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Mitigation of hydraulic risk induced by construction of a railway line: the case of Roccella river.

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In in this study, it is intended to investigate flooding problem of an urbanized area in Sicily and possible measurements to be adopted at a railway crossing Roccella river by adopting a coupled 1D-2D model.
Before its mouth into Tirreno Sea, Roccella river experiences main and secondary road crossings as well as railway crossings.
Speeding up of railway line VI02 and improvement of its reliability standards involve the re-arrangement of the area involved in the project intervention, consisting of demolition of the old single-track railway bridge, construction of a new double-track railway bridge (VI02) with intrados elevation of 11.02 m, arrangement of the current road system, downstream of the railway, by demolishing the existing bridge and subsequent construction of a new bridge (NV14) with an intrados of 10.27 m.
The present study aimed at identifying measurements that allow hydraulic risk for the area to remain unchanged after new developments realization and changes to facilities.
These solutions consist of river bed adaptation and bottom regularization as well as introduction of flood walls. Effectiveness of these measurements was demonstrated through a flood modeling study conducted in proximity of the railway crossing for both existing and future configuration.
The complete procedure followed to carry out the flooding study included data surveys, cartographic data retrieval and interpretation, definition of basin geomorphological characteristics and watershed delineation, collection and processing of recorded rainfall data and IDF curve definition, peak discharges and routing flow hydrographs estimation and results validation, flood model settling and flood simulations for present and post operam conditions, identification and localization of areas in which hydraulic risk occurs and definition of mitigation measurements at highlighted critical areas.
By analyzing and comparing simulation results obtained for future solution with respect to the actual ones, it is demonstrated that no modifications are needed at actual regulatory floodplains due to the new development and changes to facilities.
Furthermore, it is demonstrated that for all considered rainfall frequencies no adverse impact occur on structures and no erosion will take place in the channel at future conditions.

References

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