Engineering
UPDATE©
MEA MARINO ENGINEERING ASSOCIATES, INC. • Issue 54

HANDLING POTENTIAL MINE SUBSIDENCE AT A PROJECT SITE

When confronted with a project site which may be undermined, there are many questions that may need to be answered by the risk decision maker. For example:

Is my site actually undermined?

Will my site be affected?

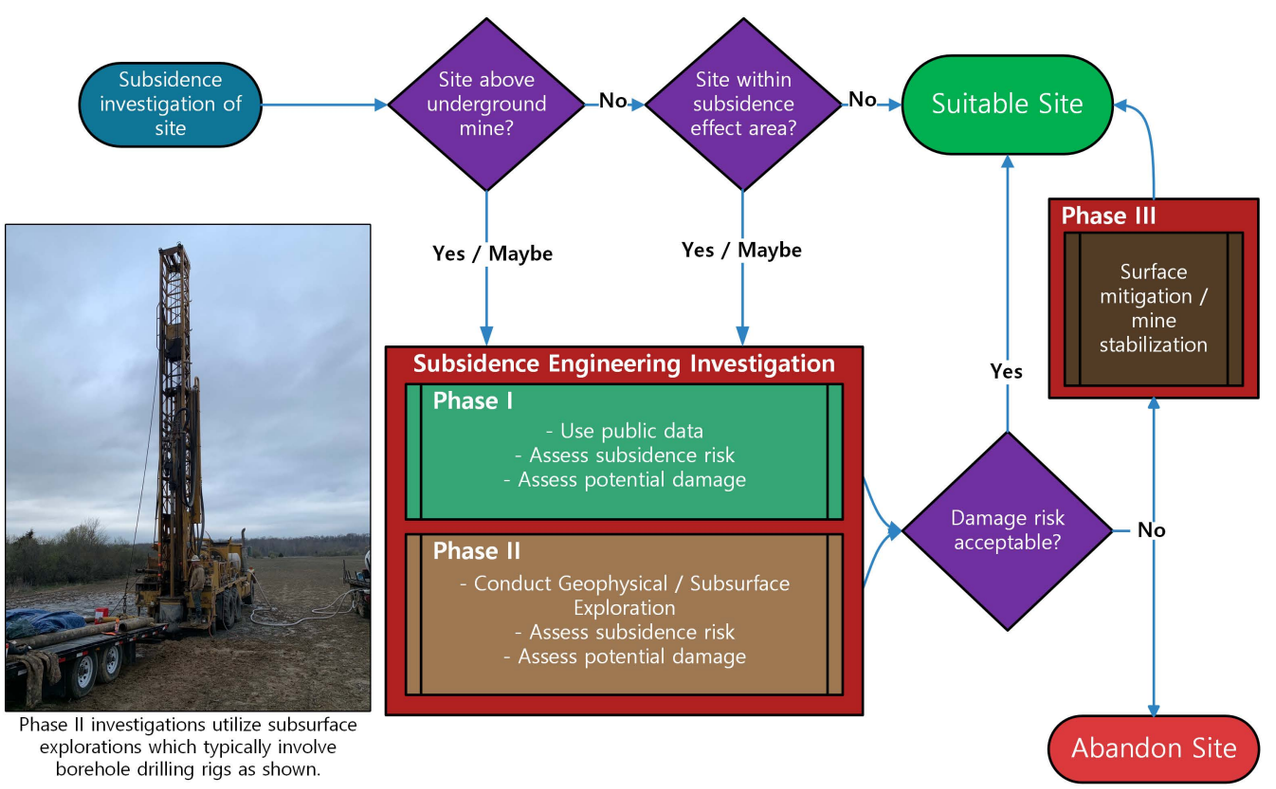
What if the site is not undermined but is close to an underground mine?

If my site is undermined, what is the risk of mine subsidence?

How much damage can I expect if mine subsidence were to occur in the future?

If I wanted to mitigate the site against subsidence what are my options?

Of all the mitigation options available which makes the most sense for my site?



Phase II investigations utilize subsurface explorations which typically involve borehole drilling rigs as shown.

FIGURE 1 MINE SUBSIDENCE DECISION TREE DIAGRAM©

The decision tree that the project director will typically follow when confronted with potential mine subsidence issues is summarized in Figure 1. The first step in this mine subsidence investigation is whether or not there is (or has planned to be) any underground mining present which can impact the site. The question may be easily resolved from existing mine records and mine depth

but in areas where records are scarce or incomplete or of low quality the subsurface mining conditions in the project site vicinity can be investigated. Probably the most effective method of assessing the presence of mine voids, or limits of coal mining in the vicinity of the site, is the use of the cross-hole radar technique (see Update 5). Where potential subsidence effects are confirmed due to known underground mining in the area, or where a mining impact may be possible, a subsidence engineering investigation can be undertaken which may be coincidentally done with the mine verification exploration.

Where it is confirmed that underground mining has the potential to impact important infrastructure, mine stability analyses are then performed to assess how sturdy the mine workings will be over the considered life span of the project. This is a very important determination to get correct as the outcome of this analysis will determine if there is anywhere from a negligible up to a very high risk of surface subsidence from mine collapse (See Updated 14).

With the risk of subsidence properly assessed, the mine subsidence engineering investigation should then further assess the nature, extent, and magnitude of the surface subsidence, as this is a vitally important step in predicting the potential damage to the structure. This is best presented in the form of the spectrum of the damage potentialities (see Update 40). The damage assessment is most important to the risk decision maker as it typically determines the direction the project will take. In other words, using this data by the project decision maker determines whether or not the project should continue with or without risk mitigation, or should be abandoned. Where the risk is not acceptable, the project will proceed only when the necessary subsidence mitigation measures at the site are considered viable. Subsidence mitigation measures can be taken on the surface and/or in the subjacent mine workings to lower risk to an acceptable threshold. The cost to employ risk mitigation measures, especially mine stabilization measures, can be significant (See Update 24). Therefore, the importance of high quality mine subsidence risk evaluation cannot be over emphasized.

Other MEA Publications that may be of Interest:

Engineering Update #14: Establishing Mine Subsidence Risk

Engineering Update #24: Anatomy of Mine Grouting Voids

Engineering Update #40: The Importance of Estimating Damage Potential

ABOUT MEA: Marino Engineering Associates, Inc. focuses on engineering research, practice and expert evaluations and is licensed in 28 states in the U.S. Our projects primarily have an emphasis on Geotechnical Engineering, however, we also have significant experience in projects involving transportation, subsidence engineering, laboratory testing, training, and geophysical exploration. Gennaro G. Marino, Ph.D., P.E., D.GE is president and founder of Marino Engineering Associates, Inc., and has been a licensed professional engineer since 1984. To obtain additional information on MEA, one can also visit our website at www.meacorporation.com.

FOR MORE INFORMATION: There is a significant amount of additional information that is available on the above subject. For more information, please contact MEA at the address listed below.

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