

# Three Sisters Mountain Village Development – Transformation of Old Coal Mine Properties into Modern Day Use

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The Three Sisters Mountain Village Development site is located in the northern region of the northwest trending Cascade Coal Basin of Alberta on the eastern edge of Canmore, Alberta. Coal mines opened up in 1887 in support of the Trans Continental Railway. Since that time, 17 different coal operations have existed, the last having ceased operation in 1979.

The Three Sisters Mountain Village Development Corp. is in the process of developing these old coal mine properties into very viable real estate holdings

Standard mining operations were done in a room and pillar fashion. Underground drifts rise and fall with the Coal seams and at times daylight to surface. Due to this methodology and the close proximity to surface, there has developed a history of ground subsidence in the area.

In order to develop the properties for use these existing as well as potential subsidence issues need to be identified, and rectified.

The two types of subsidence in the area are, 1) Panel Subsidence issues; and 2) Pot Hole Subsidence issues

Panel Subsidence.....is where large areas of ground cave in due to the fact that the crown pillar overlaying the mining operations has become weak from weathering or loads and falls in on the workings resulting in a large depression of surface area.

Pot Hole Subsidence.....is usually of a smaller ground surface area than a panel type, but can be open to depth. It is caused by weathering and loads on a weak crown pillar over the workings. It results from the pillar caving in to the workings, but the volume of pillar is not sufficient to fill the void, thus leaving an open hole to surface

Three Sisters Mountain Village Development received permission to develop an 800 Ha site in the area encompassing the old mine sites. They plan to build a housing community of 10,000 people. The development includes wildlife corridors, golf courses, wellness centre, school, and commercial properties.

Key factors to development were; 1) recognizing that due to the existing and potential issues of subsidence, there existed hazards to public; 2) Government Regulations allowing proven mitigation practices; and 3) With the moratorium on development within

Banff National Park, and the development being only 20km from Banff, it's location is a prime driver. .

Alberta Provincial Regulation (114 / 97) requires a developer to have the situation studied by an undermining engineer, who prepares a report and recommendations. When these recommendations are carried out, the engineer certifies the results, which in turn are certified by an independent expert.

Golder Associates Ltd. was commissioned by Three Sisters to study the site and make recommendations. Knowing that concrete fill is not either economical or practical, and in order to provide both an economical solution for its client ,as well as technology that would meet the backfill specifications as required, Golder Associates Ltd. introduced Golder Paste Technology to the site

The practicality of Paste was that it was able to provide the volumes and strength of back fill required, and still flow to fill the voids. It also is a lot more economical then concrete and can be produced by using the clients own waste materials.

Once the voids were filled to specifications, Golder was able to provide the engineering support required by 3 Sisters to qualify under the Alberta regulations for development of the properties To date more then 24,000m<sup>3</sup> of paste has been injected into existing voids

### ***What is Paste?***

***“Paste is a designed mixture of solids and water, that produces a measurable slump (ASTM), and usually requires a positive displacement pump to move it through a pipeline, consistently demonstrating its ability to have minimal segregation and minimal water bleed at any stage of transport or placement”***

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