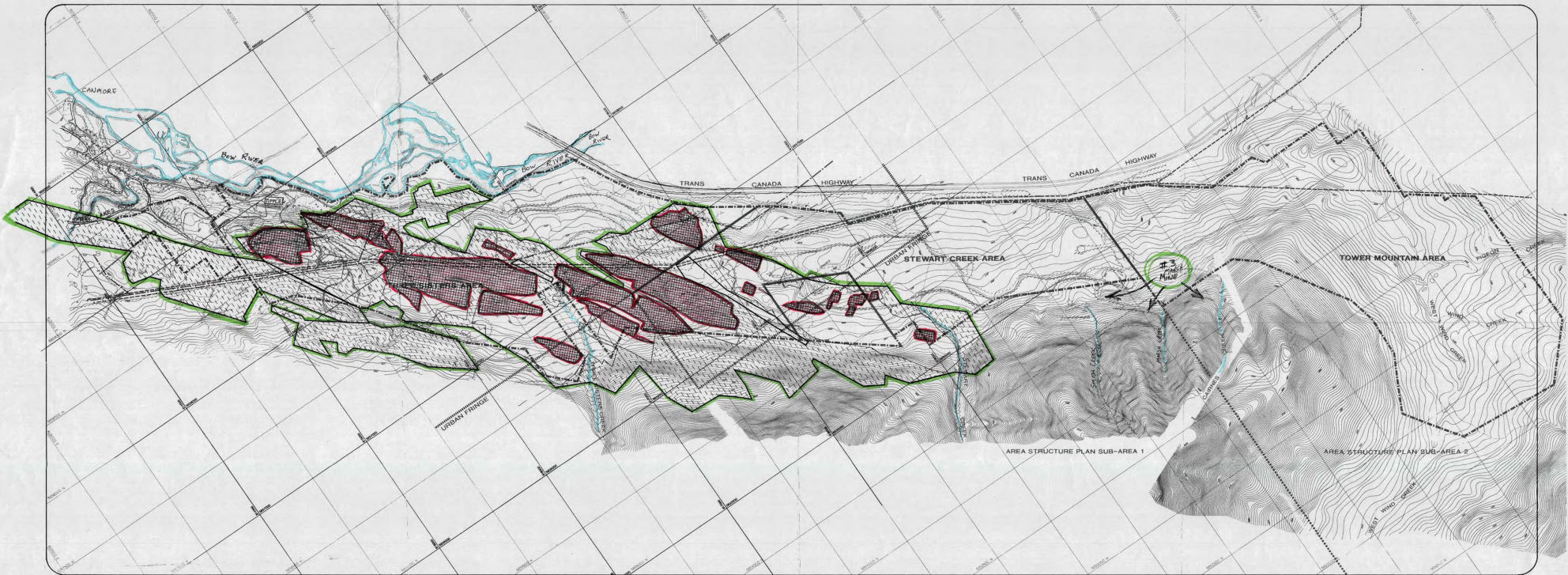


MAP "A"



RISK AREAS FOR DEVELOPMENT DUE TO UNDERMINING CONSTRAINTS THREE SISTERS RESORTS




Three Sisters Golf Resorts Inc. - #1003

Exhibit No. 146

NRCB File 0099

NRCB INTERVIEWER R. HAMMILA

LEGEND:

-  **NON DEVELOPMENT**
-  **RESTRICTED DEVELOPMENT - EXTRACTION**
-  **RESTRICTED DEVELOPMENT - DRIVEAGES**

NO. 3 MINE (MARSH MINE - PROSPECT)

DESCRIBED BY DERRICK STEELE
AS ONE OF THE GASSEY MINES (METHANE)
IN NORTH AMERICA

D. Steele, Dames & Moore
CONSULTANTS
(GEOLOGICAL ADVISOR TO TEAM OF CHAMBERS)
RE: GEOLOGICAL RESEARCH ASSOCIATED WITH PEOP COAL MINING

MAY 1990

uma

SCALE:
0 100 200 300 700m

FIG. 6

interview with Chamber Group in Calgary, Alberta

TO: The Mayor and Town Council of Canmore
RE: Three Sister's Resorts Proposed Development

The following is said without prejudice and based on facts as I know them.

My name is Raymond Haimlla, I was born in Canmore. My grandfather started work in the No. 1 Mine in 1907. My father began work in the No. 2 Mine in 1926 and I started work in the Wilson Seam Mine in 1963. I also worked in the Grande Cache Mine in 1969. I was an Intervenor at the NRCB Hearings. It was recommended in the NRCB Decision Report, that because of my expertise, I should serve on Canmore's first Undermining Review Committee. This committee was to formulate a set of guidelines for development and/or non-development over areas of past mining activity. These guidelines would be based on peer reviewed science specific to the geotechnical hazards associated with the past mining of coal seams in the Canmore area and site specific to Three Sister's Resorts Development.

While working on the guidelines, a unanimous decision was made by the Committee and was site specific. Only a golf course was considered to be viable (with a caveat). That decision by the Undermining Committee was based on the following geotechnical hazards and the UWM constraint Map A associated with this specific area:

- (1) Hazards specific to the Type of coal mined in Canmore
.....Canmore coal is classified as Friable coal and has a Factor of Safety (FOS) that is often less than 1. A Factor of Safety has to be 1.5 for long term stability and anything less than FOS 1.5 should not be built upon. (risk of harm / civil liability)
- (2) Hazards specific to Dipping and/or steep Canmore coal seams
...Vertical / steeply dipping seams / Trough subsidence and Pit subsidence
.....Pit subsidence is sudden, often no warning and occurs over centuries and is the result of migrating cavities / voids caving to the ground surface
...Trough / down warping subsidence also occurs over centuries.
- (3) Hazards specific to multiple coal seams (more complicated re: coal is friable)
- (4) Hazards specific to recurring abandoned mine flooding
....eroding of coal pillars by the movement of water / caving debris more easily moves down slope and can be very significant with the annual spring flooding.
...contaminated mine water
- (5) Hazards specific to unmarked mines and prospects in proposed development
....Grainger Collieries/ Wheatley Mine (no maps available)
- (6) Methane, Radon gas, Coal seam fires
- (7) Liability

I see nothing in the Three Sisters 2021 Area Structure Plan that would change the original decision of the Undermining Review Committee and UWM's constraint Map A; there is to be No Development except for the golf course in this area with the caveat - no building over high constraint areas. (see UWM Map A)

**TO: The Mayor and Town Council of Canmore
RE: Three Sister's Resorts Proposed Development**

Included with this written submission are the following:

...a page reprinted from the Golder Report specific to the Factor of Safety of the friable coal mined in Canmore with added comments / re: civil liability.

...several illustrations: Trough Subsidence; Pit Subsidence and Void Migration and a map of the area of void migration/collapse under Spray Lakes Road.

...Map A - risk areas due for development due to undermining constraints submitted to the Town of Canmore on behalf of Three Sisters Resorts by UMA's geotechnical experts. (areas of NO Development highlighted)

...Map B - a diagrammatic and structural contour map of the underground haulage system associated with the mining of coal in the Canmore area to give Council an idea of the extent of the underground workings. It extends from No. 1 Mine on Canmore Creek in the west to the Marsh Mine/No. 3 Mine in the Smith Creek area in the east. I have highlighted the location of Vertical Section A.

...Map C - is Vertical Section A; shows complexity of Carey and seams 1; 2; 3; 4. Its location is just west of where Three Sisters Parkway collapsed and just east of Spray Lakes Road where migrating Voids are to be mitigated/filled with concrete in 2021. The voids are the result of mining Seams 1; 2; 3 and 4 over 100 yrs ago.

...Map D - is a 1935 Department of Mines map of the Canmore Area (map 322A) shows location of coal seam outcrops and sub-crops and location of vertical cross sections

...Map E - is the 1935 Department of Mines Sections Supplementing Map 322A shows cross sections of multiple seams underlying this specific Canmore Area. Shows location of vertical workings of coal seams including Carey, Stewart, etc

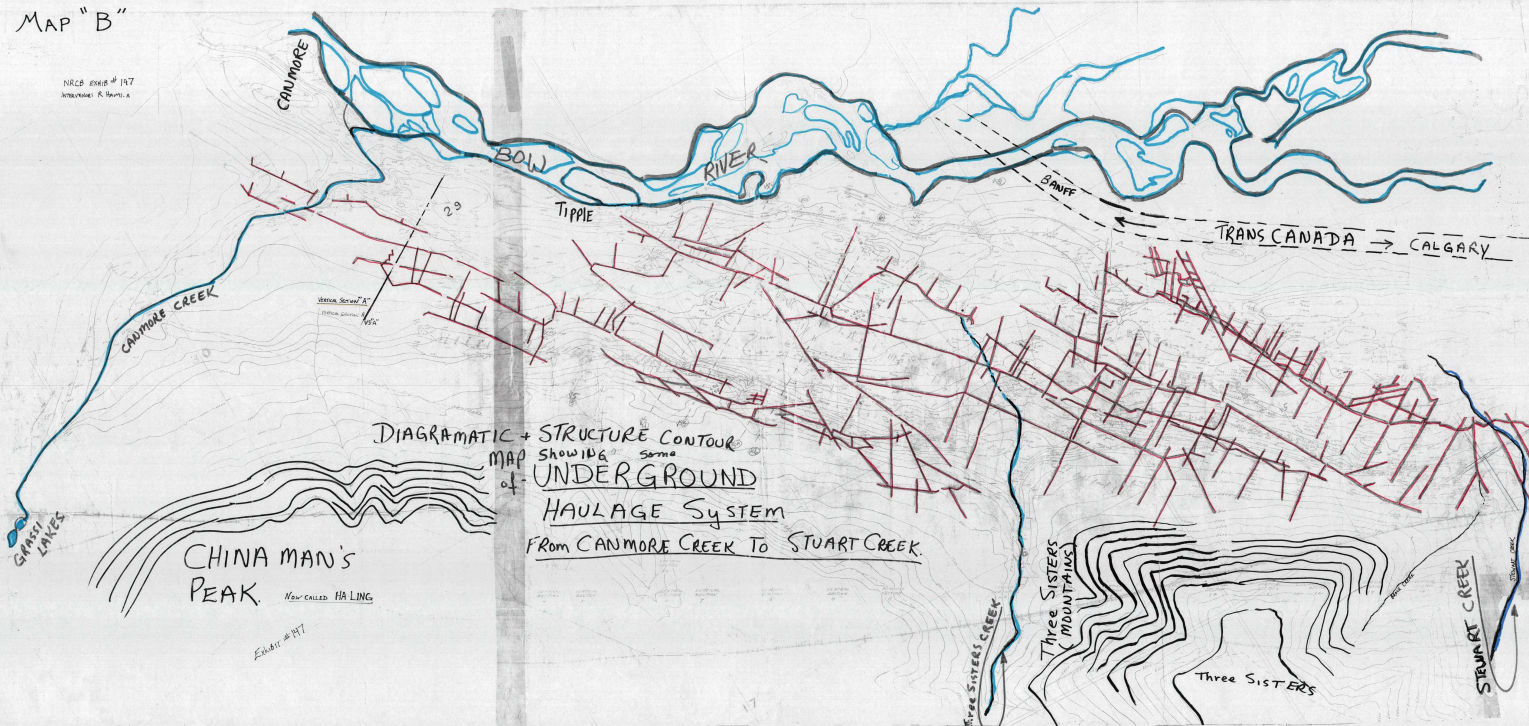
...Map F - is a plan view of the Stewart Seam from the No. 2 Mine Canmore. This map shows the "room and pillar" mining of the Stewart Seam. The cross-hatching over the pillars identifies where the pillars were mined. The area "vertical gangway" shows location of vertical portion of the Stewart Seam.

The purpose of these maps is to show to the Town of Canmore's Mayor and Councillors how extensive the undermining is. I suggest laying out all of these maps on the floor and walk around them...the reason being that most people cannot visualize the extent and complexity of the undermining in this area from reading an Area Mining Impact Overview Report with limitations and/ or caveats.

I strongly suggest the Mayor and Councillors read Appendix "D" of ASP Mining Impact Overview Report. The last 3 pages are limitations (17) to this geotechnical report. Appears consultant is unwilling to accept liability for reports limitations.

MAP "B"

NRCC 8584 of 1977
INTRODUCTION: R. HARRIS, A.



DIAGRAMATIC + STRUCTURE CONTOUR MAP of UNDERGROUND HAULAGE SYSTEM FROM CANMORE CREEK TO STUART CREEK.

CHINA MAN'S PEAK
Now called HAILING



Stuart Creek Area
Approximate Location of the Mountain (to be done)
Plan View of Under-structure Haulage System

Map "B" modified by R. HARRIS (1977)
to include information of the 1977
under-structure haulage system

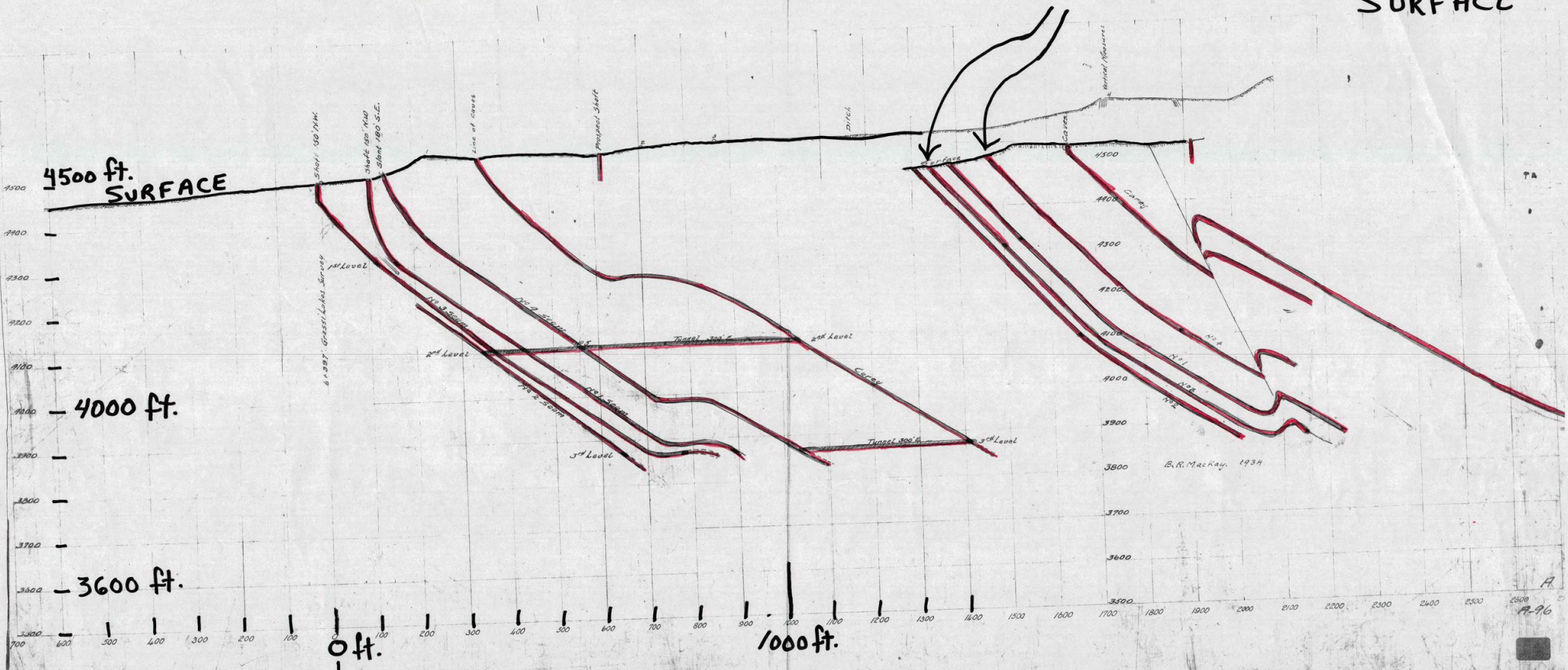
Introduction: R. HARRIS, A.

MAP "C"

5 STEEP SEAMS / VERTICAL MEASURES

SHOWS SEAMS MINED
TO 10 feet to 15 feet
BELOW
SURFACE

VERTICAL SECTION A



SEAMS: No. 1, No. 2, No. 3, No. 4, and CAREY
connected by 3 levels of TUNNELS
S. HAMILA WORKED WITH MACKAY CUTTING & SURVEY LINES (1933-34)
(GRASSI LAKES SURVEY)

Three Sisters Golf Resorts Inc. - #9103
Exhibit No. 41
NRCB File copy

MAP D

3 GENERATIONS
of Haimila's WORKS
IN CANMORE MINES
1907 To 1976
Sole was in England
From 1952 to 1976
Running 1947-70

Canada
Department of Mines
BUREAU OF ECONOMIC GEOLOGY
GEOLOGICAL SURVEY
Issued 1935

LEGEND

- CENOZOIC**
- MODERN**
RECENT AND PLEISTOCENE
10 Recent alluvium and glacial deposits
- CRETACEOUS**
LOWER CRETACEOUS
8 BLAIRMORE FORMATION: sandstone, shaly sandstone, quartzitic sandstone, conglomerate
- MESOZOIC**
- 7 JURASSIC
7 FERNIE FORMATION: shale with thin limestone beds, shale and shaly sandstone with calcareous beds, phosphatic
- 6 TRIASSIC
6 SPRAY RIVER FORMATION: quartzitic sandstone and shale, arenaceous limestone and dolomite
- CARBONIFEROUS**
- PENNSYLVANIAN
5 ROCKY MOUNTAIN FORMATION: arenaceous dolomite, quartzite with beds of arenaceous limestone and beds of chert and phosphatic quartzite
- 4 MISSISSIPPIAN AND PENNSYLVANIAN
4 RUNDLE FORMATION: limestone
- 3 MISSISSIPPIAN
3 BANFF FORMATION: shale, limestone or glauconitic limestone (does not outcrop on map area)
- PALEOZOIC**
- 2 DEVONIAN
2 MIVVENHANA FORMATION
- 1 DEVONIAN (?)
1 GHOST RIVER FORMATION: arenaceous limestone, quartzite, dolomite

Symbols

- Geological boundary (defined approximately, assumed)
- Bedding (horizontal, vertical, inclined, overturned)
- Anticline axis
- Synclinal axis
- Fault (defined approximately, assumed)
- Coal seam (defined approximately, assumed)
- Coal company section line
- Coal prospect
- Mine shaft
- Mine dump
- Cherty hole
- Shale hole
- Shaft

Geology by B. R. Mealy, 1934.

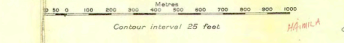
SECTIONS

See Publication No. 2384. Sections supplementing Map 322 A. Cross-sections from (North to South) Alberta. Lines of Sections (A-B, C-D, E-F, G-H, I-J) are shown extending across map area.

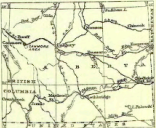


MAP 322 A
(PUBLICATION No. 2382)
NORTH PORTION
CANMORE AREA
(WEST OF FIFTH MERIDIAN)
ALBERTA

Scale: 8200 or 1 inch to 800 Feet



- Legend**
- Road and buildings
 - Road not well travelled
 - Trail
 - Railway
 - Bridge culvert
 - Power transmission line
 - Power line (insulated)
 - Telephone line
 - Church
 - Shed
 - Road office
 - Section road alignment
 - Bench mark
 - Section corner post
 - Intermittent stream
 - Spring
 - Sand bar; gravel wash
 - Flume and pipe line
 - Ditch
 - Marsh
 - Contour
 - Depression contour
 - Height in feet above sea level



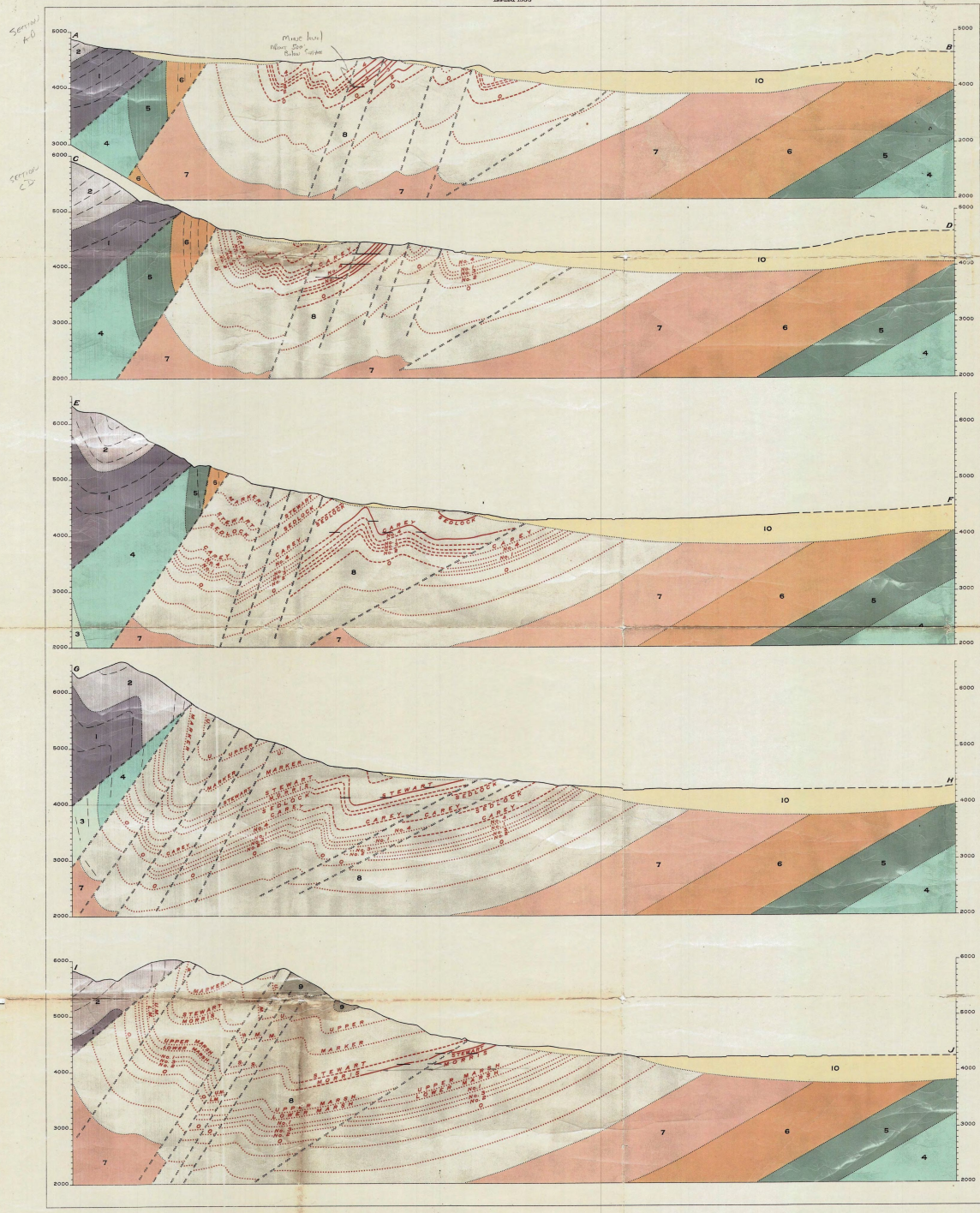
Approximate magnetic declination, 24° East.

Solo Haimila

MAP E

Sub Hamica

Canada
 Department of Mines
 Hon. W. A. Gordon, Minister, Charles Cansell, Deputy Minister
 BUREAU OF ECONOMIC GEOLOGY
 GEOLOGICAL SURVEY
 Issued 1935



LEGEND

CENOZOIC

MODERN
 10 RECENT AND PLEISTOCENE
 Recent alluvium and glacial deposits

CRETACEOUS
 9 LOWER CRETACEOUS
 BLAINHORE FORMATION: sandstone, shaly sandstone, quartzite sandstone, conglomerate
 8 KOOTENAY FORMATION: sandstone, shaly sandstone, carbonaceous shale, coal

MESOZOIC

JURASSIC
 7 FERNIE FORMATION: shale with thin limestone beds, shale and shaly sandstone with calcareous earth, phosphate

TRIASSIC
 6 SPRAY RIVER FORMATION: quartzite, sandstone and shale, arenaceous limestone and dolomite

CARBONIFEROUS

PENNSYLVANIAN
 5 ROCKY MOUNTAIN FORMATION: arenaceous dolomite, quartzite with beds of arenaceous limestone and beds of chert, and phlogopite quartzite
 4 MISSISSIPPIAN AND PENNSYLVANIAN
 RUNDLE FORMATION: limestone

PALEOZOIC

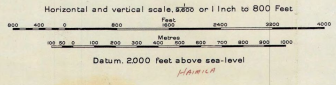
DEVONIAN
 3 BANFF FORMATION: shale, limestone, argillaceous limestone (does not outcrop on map area)
 2 MINNEWANKA FORMATION: limestone, dolomite
 1 DEVONIAN (?)
 GHOST RIVER FORMATION: arenaceous limestone, quartzite, dolomite

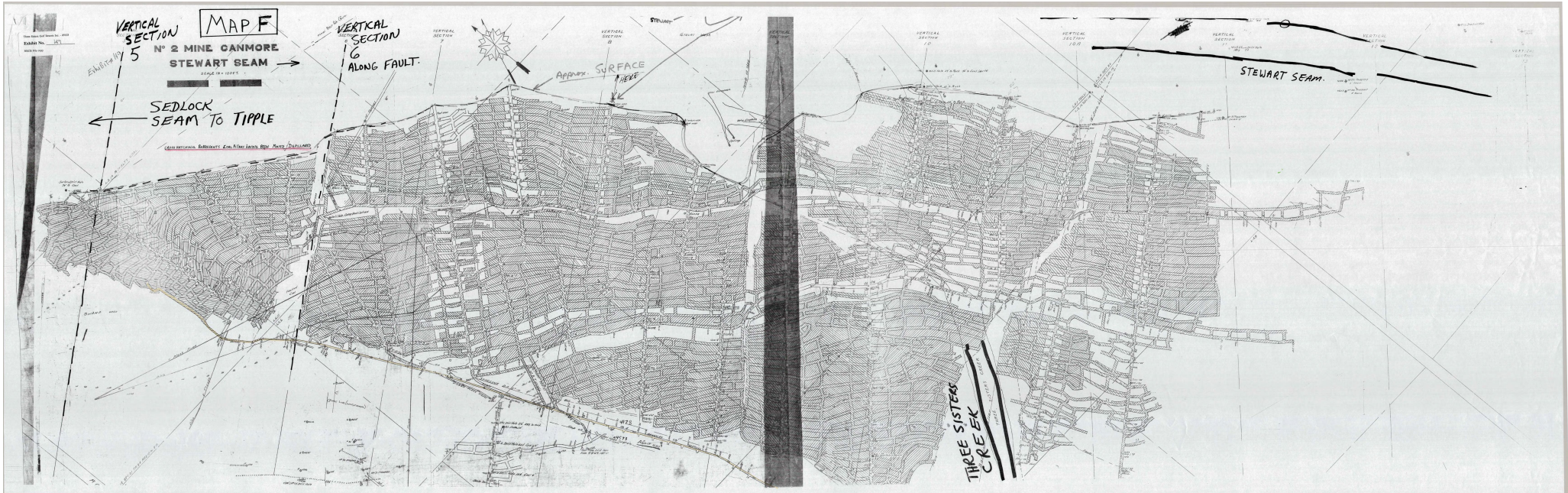
Symbols

Geological boundary (approximate, assumed) ————
 Fault (approximate, assumed) - - - - -
 Coal seam (defined, approximate, assumed) ————
 Mine level ————

Geology by B. P. McKay, 1934

PUBLICATION No. 2384
SECTIONS SUPPLEMENTING MAP 322A, CANMORE AREA (NORTH PORTION), ALBERTA





TO: The Mayor and Town Council of Canmore
RE: Three Sister's Resorts Proposed Development

It is because of these 3 pages of listed limitations to Three Sisters Resort's ASP Mining Impact Overview Report / geotechnical report that I bring up the subject of liabilities.

In 2004 the Supreme Court of Canada's ruling that their interpretation of "bad faith" include not just malice or intent but the lesser standard of gross negligence. This sends a message that all regulators, law societies and professional bodies across Canada cannot shelter under a claim of good faith when their conduct amounts to gross carelessness; civil liability would apply. (Globe and Mail, Aug. 2004)

Decision makers should always use peer reviewed science and sound scientific information - not assumptions - when making technical judgements. This is the Precautionary Approach and has been referred to in Supreme Court decisions. This is especially important when making technical judgements on the subsidence dangers associated with underlying coal seam workings. Three Sisters Resorts 2 year liability insurance period is insufficient when one takes into account that peer reviewed science says Ground Stability Distortions on post-mining terranes may be observed for decades, even centuries after decommissioning a mine. Often referred to as Anthropogenic Transformations of Grounds and includes: induced seismicity, subsidence troughs, sinkholes from collapsing voids, dumping of rock masses,, and waste or flooding of abandoned underground mines.

I see nowhere in the 2020 undermining guidelines where the Alberta Government and/or Three Sisters Resorts accepts responsibility for negligence and/or carelessness and/or civil liability should a risk of harm materialize because of the listed limitations as set out under Appendix "D" of Three Sister's ASP Mining Impact Overview Report. Case in point ...if an authority such as the Town of Canmore's Mayor and Councillors ignore expert technical advice (Undermining Review Committee and UWM Risk Constraint Mapping) concerning a risk of harm and that risk of harm materializes ...the individuals involved in the decision making may be subject to civil liabilities because of possible negligence.

I am referring to Three Sisters Resorts' proposal to develop a golf course (1990's) in the area that is the subject of their 2021 ASP. Almost three decades ago the Undermining Review Committee had a meeting specific to developing this area as a golf course. It had already been agreed that the only development that could occur on this site was a golf course. (a high risk area due to to past coal mining activities see Map A). Present at the meeting were: Bill Baxter (coal geologist); Derek Steele of Dames and Moore (geotechnical advisor to the Town of Canmore); Henderson (Engineer representing Alberta Gov't); John Kende (Town Councillor with an expertise in mapping); Gerry Stephenson (Engineer representing Three Sisters Resorts) and Raymond Haimila (Canmore resident).

**TO: The Mayor and Town Council of Canmore
RE: Three Sister's Resorts Proposed Development**

This Committee was to review the undermining risk constraint Map A (specific to the proposed location of a number of golf club houses) and do a site visit.

Derek Steele was looking at constraint Map A when TSR consultant Gerry Stephenson suggested we head to the site of the proposed golf course. Derek Steele proceeded to tell Gerry that we would not be visiting the site because there were areas on site too dangerous to walk on and should not be included as part of the golf course. He also said that some of the sites picked by TSR for club houses would have to be moved because of the hazards and subsidence dangers associated with the underlying vertical coal seam workings and pointed to the Non Development Risk Areas highlighted on UWM constraint map submitted by TSR to the Town of Canmore. (see Map A)

The Undermining Review Committee had another purpose set out by the NRCB; ...to develop a set of undermining guidelines to aid the Town of Canmore and any developer and/or consultants in their decision as to the safe development of any lands overlying the undermined lands due to the geotechnical hazards associated with past coal extraction and included a Certificate of Compliance. The Certificate meant that the developer/consultant followed said guidelines to arrive at a decision and is only an opinion to proceed. It does not state that the development is safe. That was a decision to be made by the Town Of Canmore.

For example, the Certificate of Compliance included in TSR report does not make any reference to the consultants three pages of 17 limitations that appears at the end of their technical report. The Consultants appear not willing to accept responsibility for the possibility that there may arise a risk of harm that was not included in TSR report. The Certificate of Compliance makes no mention that there were no durability tests of coal from borehole cores included in the TSR Report as required the 2020 Guidelines to determine Factor of Safety of Coal.

Factor of Safety as it Relates to Hazards associated with Canmore's Friable Coal

Friable Coal vs Blocky Coal....Coal mined in Canmore is classified as friable coal. Friable coal is highly fractured and slickensides and has a lower uniaxial compressive strength than blocky coal. The compressive strength is used to determine the Factor of Safety (pillar strength). Hoek and Brown (1980) consider a factor of safety of 1.5 is appropriate for long term stability. Tests on Canmore coal showed a maximum FOS of 1.67 and a minimum FOS of 0.86. A FOS of 0.86 is not a high enough factor of safety for long term stability. Mark and Barton (1996) suggest in-situe mass strength of coal should only be derived by reducing the measured laboratory values using the Holland and Gaddy (1957) formula for when the coal is "blocky". For "Friable" coals, the size effects are much less pronounced or even nonexistent. (reprinted from Golder Associates Report.)

TO: The Mayor and Town Council of Canmore
RE: Three Sister's Resorts Proposed Development

This peer reviewed science is stating that the formulas designed specifically for determining the mass strength of BLOCKY coal should never be used to determine the strength / size effect of FRIABLE coal. These formulas (empirical or otherwise) should not be used to determine the risk factor associated with the highly sheared friable coal (mined or un-mined) found in the Canmore area.

Page 15 of the 2020 Guidelines to Evaluate the Proposed Development over Designated Undermined Lands in Canmore, states "durability tests should be carried out on seam floor coresand if possible at least one core should be obtained from each mined coal seam (to determine the uniaxial compressive strength of uncrushed coal pillars) Of the historical 400 bore holes drilled, there appears to be no uniaxial compressive strength test results of cores from coal seams as required by 2020 Guidelines.

In determining risk assessment and TSR is unable do plate tests and/or cannot retrieve bore hole core from coal seams to do the required uniaxial compressive tests; then Three Sisters Resorts must use the minimum factor of safety (FOS) that was determined from actual testing of Canmore's friable coal. That FOS is 0.86. To assume a higher FOS without doing uniaxial compressive testing of a coal seam / pillar is not scientific and would result in negligence and civil liability. *To assume a higher FOS without doing a uniaxial compressive test is a design which creates a foreseeable risk of harm and would be viewed as misfeasance should that risk of harm materialize.*

Subsidence Hazards specific to dipping and/or steep seams and multiple seams

Pit subsidence and trough subsidence will and does occur over time, from decades to centuries. Migrating voids take time to reach the surface. Case in point is the Spray Lakes Road where it crosses mined coal seams associated with the No. 1 Mine. (seam No. 's 1; 2; 3 ;4) This area was mined over 100yrs ago and it is only now that the migrating voids associated with past mining activities are approaching the surface. This area of highway is now undergoing remedial work. These voids will be filled with concrete before the end of the year (2021). Multiple seams only complicate remedial actions as they can increase the size of the migrating voids. (see Map C; Vertical Section A; and pit and sag subsidence illustrations).

Grouting / plastering is not appropriate for long term stability of voids overlying the areas of past mining of medium, steep and multiple coal seams where coal is defined as friable, highly sheared; unless all of the underlying voids are mitigated and filled with grout / concrete. This would require large diameter bore hole casing, etc.; for the placement of the grout / concrete. Monitoring of voids by video is NOT mitigating and will not stop future subsidence from occurring.

TO: The Mayor and Town Council of Canmore
RE: Three Sister's Resorts Proposed Development

Sinkholes may occur as a result of an underground void collapsing. It can happen suddenly even after many years of quasi stable conditions. Typical for the process of sinkhole generation is that there are NO warning symptoms before their occurrence - the creation of sinkholes is sudden and fast, and their dimensions are large in relation to typical buildings. Sinkholes affect surface structure heavily, but in a small areal range. (Strozik G.; 2015)

Case in point; in the 1950's my father was asked to investigate the continual yelping of a coyote in an area associated with the No. 1 Mine. The coyote had triggered a pit subsidence and had fallen some 30 ft into an old mine working. My dad shot the coyote. It took the Canmore Mines three weeks to fill the hole. The coyote weighed maybe 40 lbs. A comparable weight to that of a young child.

Another case in point; Mr. Chuck Whelan drove trucks for the Canmore Mines. He was driving from the Tipple to the No. 5 Mine to pick up a load of coal. On the side of the road he observed a large tree shaking vigorously. He proceeded to the No. 5 Mine to load up with mined coal. Upon returning he was shocked to see that an area of highway (30 ft in diameter) had disappeared. This was located in the area of the proposed golf course development and occurred in the 1960's.

Hazards associated with recurring flooding of abandoned mines.

Another subsidence-related issue from the flooding of decommissioned mines, which is a relatively new phenomena being observed in the Upper Silesia Coal Basin, Poland...the ground deformations resulting from lifting processes caused by increased water pressure on the roof systems in the underground workings. This means that design mitigation should take into account and be prepared for inverted stress-strain relation. (Strozik G.; 2015)

Case in point, the collapse of the Three Sisters Parkway. This shaft was mitigated with rock and boulders, a geotechnical mesh as well as both reinforced and non reinforced concrete cap. This was followed with gravel and pavement. I was with the Mayor of Canmore, Glen Craig and Gerry Stevenson (mine engineer) and asked Gerry how could it collapse ? Gerry said it didn't; he said the concrete plug was lifted by water pressure first and then it collapsed. Gerry said the water main break could not explain the amount of water pressure need to lift the plug. This suggests to me that the lifting process caused by recurring flooding in the Upper Silesia Coal Basin may have occurred in the abandoned Canmore Coal mines in this area and should be investigated.

**TO: The Mayor and Town Council of Canmore
RE: Three Sister's Resorts Proposed Development**

Hazards specific to Unmarked Mines and prospects

I know of two family owned mines that operated in the Canmore Mines area. One was the Grainger Collieries and the other was owned by the Wheatley family formerly of Banff. I do not know of their exact location. There were also a fair number of coal prospects throughout the Canmore Mine Properties. Examples of these prospects are identified on the Department Of Mines 1935 maps and can be seen on the Joe; Dirty; Upper Marsh and Lower Marsh coal seams located in the Smith Creek area. A coal prospect could be several hundred feet in length, an early method of tunnelling used to investigate a coal seam for future mining.

Coal Seam Fires, Methane Gas and Radon Gas

Coal seam fires are self explanatory; extremely dangerous, produces noxious gases, sometimes spontaneous and almost impossible to extinguish.

Methane was associated with all of the Canmore coal seams but especially so in the Smith Creek area. The Marsh Mine / No. 3 Mine is located in the Smith Creek; Marsh Creek and Cairns Creek drainages. Derek Steele of Dames and Moore said the No. 3 mine was known as one of the gassiest mines (methane) in North America. The Grainger; Upper Marsh, Lower Marsh; Dirty and Joe are some of the named coal seams in this area. The coal seams in this area, whether mined or un-mined, should be investigated for methane. Case in point; Bill Baxter (coal geologist and member of the Canmore Undermining Group) and myself were in Wind Valley and noticed a lot of bubbles forming in a large mud puddle in the middle of the road. Bill took a lit match and lowered to the bursting bubbles; the flame increased in length from 1" to 3". We mentioned this occurrence to Bob Bushalak (Canmore Mines fire boss) and this brings me to my second case in point. Bob said he still had his fire boss's methane detector and suggested we check the bubbles in Quarry Lake. We had to wait until the lake was freezing. This left small areas of no ice where the bubbles came to the surface. We walked over the ice until we needed 2X6 boards to hold our weight over the bubbling water. We placed an inverted plastic garbage container over said hole for about 30min. and then stuck the methane detector into the inverted container. It read 8% methane, which is a dangerous level. I am told there are bubbles in the 2 ponds on the TSR site. They should be checked for methane seepage. High levels of Radon gas have also been detected in the Canmore area and should also be checked for.

The mined and unmined coal seams in the Smith Creek (see Map B for location) area should be monitored for methane / radon gases. Methane could be a problem for any development over any coal seam, even if it is unmined. *These coal seams should also be cored and tested for uniaxial compressive strength (FOS) if they are to be developed over because of the undermining hazards associated with highly sheared friable coal and past mining activity / prospects.*

TO: The Mayor and Town Council of Canmore
RE: Three Sister's Resorts Proposed Development

Conclusion and Recommendation

"There is however, nothing in the Guidelines to prevent the Town of Canmore from following prescriptive advice of the nature provided by Dames and Moore where site conditions indicate it is appropriate to do so.

Alberta Environmental Protection does not accept liability for development decisions made by the Town. Department staff assisted in the preparation of the Guidelines to provide the Town with a framework for evaluating potential hazards to development and risk to public safety. In assessing development proposals, the Town will need to satisfy itself that the evaluation is sufficient for an informed decision." Sincerely, Peter Melnychuk, Deputy Minister; cc: Hon. Brian Evans

...page 2 of a letter sent to R. Haimila by Alberta Environmental Protection and submitted to the Town of Canmore - written submission 2005; re: liability.

THE GUIDELINES ARE TO PROVIDE THE TOWN WITH A FRAMEWORK FOR EVALUATING POTENTIAL HAZARDS TO DEVELOPMENT AND RISK TO PUBLIC SAFETY.

Derek Steele and the Undermining Review Committee decided that because of the risk to public safety the only viable development on this specific site was a golf course with the caveat that areas designated Non Development would remain areas of Non Development. This decision was based on an in depth study by the Committee of the geotechnical hazards associated with past mining activity of the underlying mined and un-mined coal seams. (1990's)

This decision was also based on the included Map A; Risk Areas for Development Due to Undermining Constraints on which areas of Non Development were highlighted. Map A was the result of the analyzing of the geotechnical hazards associated with past mining activity by UWM geotechnical experts and submitted to the Town of Canmore on behalf of Three Sisters Resorts. (1990's)

...The preceding seven pages, the included illustrations that follow and the included Maps highlight the risk to public safety from geotechnical hazards associated with past mining of the underlying Canmore Mines coal workings. If the Town of Canmore ignores the aforementioned decisions in favour of Three Sisters Resorts ASP / Mining Impact Overview Report and allows for the development to proceed and a risk of harm materializes; the Town of Canmore, the Mayor and the Councillors decision may be deemed gross carelessness and Civil Liability would apply.

If the Town of Canmore does not have a geotechnical adviser I recommend one the caliber of Derek Steele be hired to advise the Town. This decision is critical.

Thank you for your time


Raymond Haimila, Canmore Resident

bcc

FLOODING ACCELERATES THE MOVEMENT OF DEBRIS FROM CAVING DOWNSLOPE

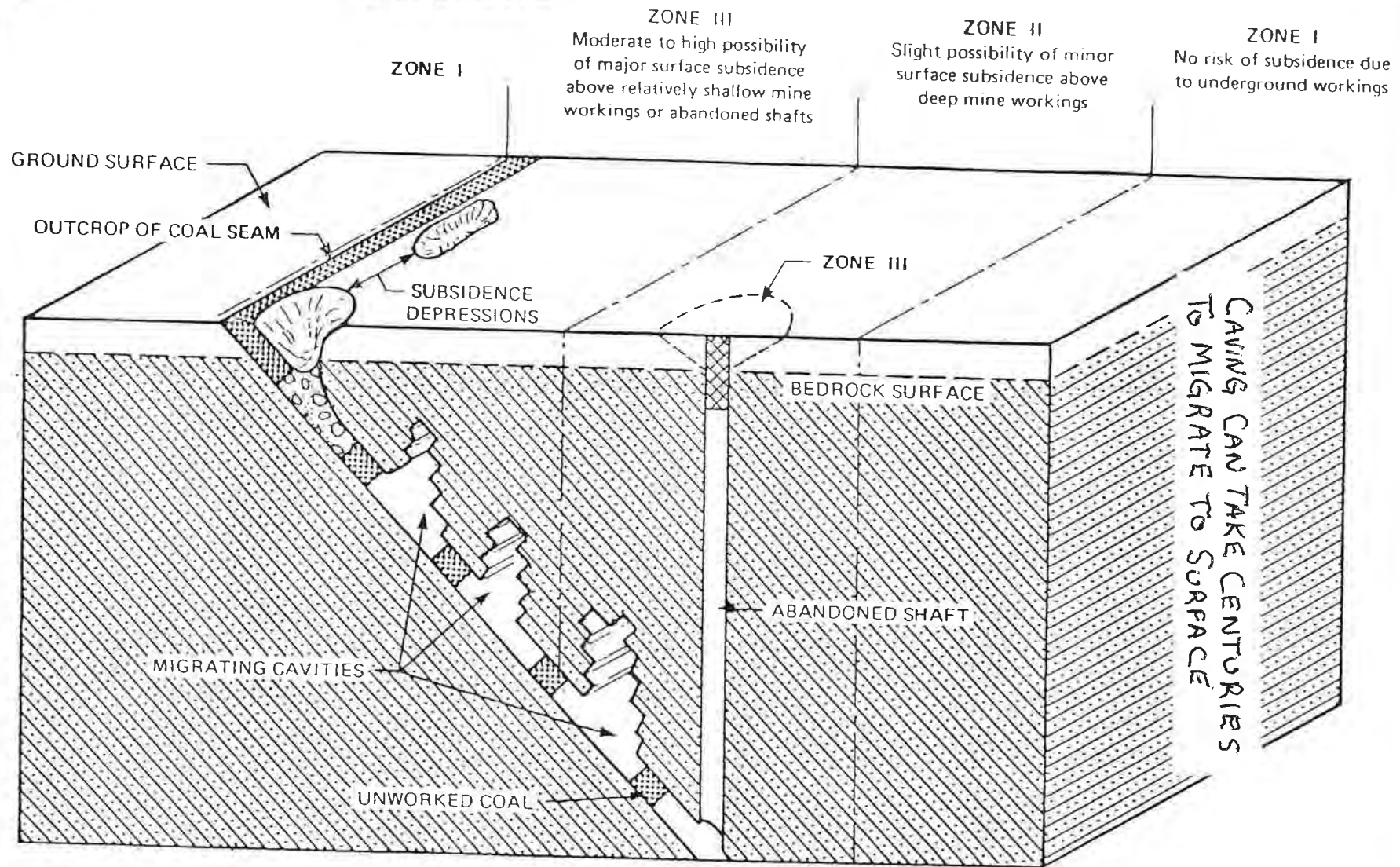


FIGURE 8 SCHEMATIC DIAGRAM SHOWING A PROBABLE RELATIONSHIP BETWEEN WORKINGS ON A DIPPING COAL SEAM AND ASSOCIATED SUBSIDENCE RISK ZONES

RISK ASSESSMENT COMPLICATED BECAUSE CANMORE COAL IS FRIABLE COAL

SAG OR DOWN WARPING IS MORE COMPLICATED OVER UNDERMINING OF MULTIPLE DIPPING SEAMS WHEN COAL IS CLASSIFIED AS FRIABLE

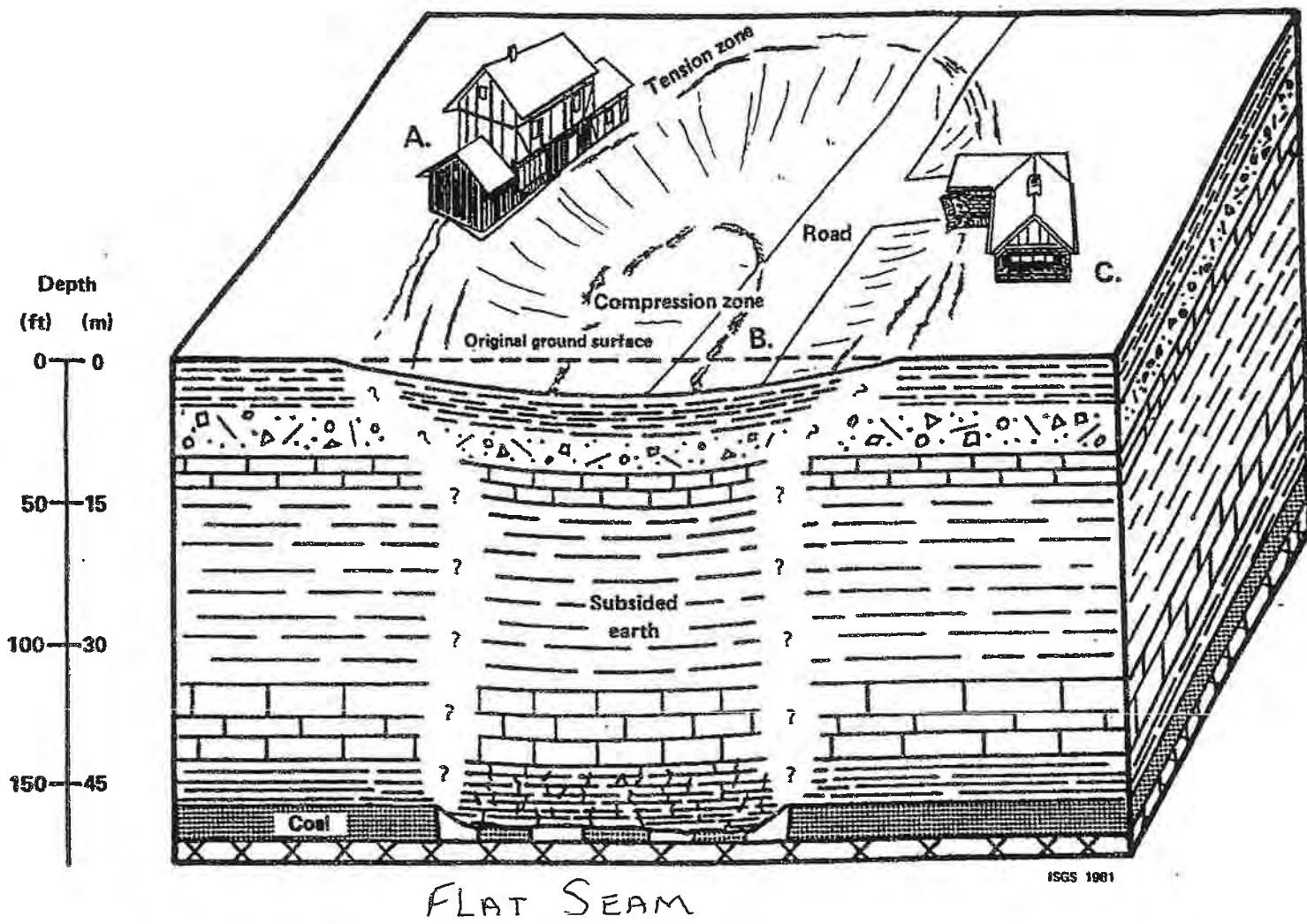


Figure 10. Block diagram of a typical sag subsidence event:

- A. Wooden frame house in tension zone. Foundation has pulled apart and dropped away from the superstructure in one corner.
- B. Road in compression zone. Asphalt has buckled.
- C. Brick house in tension zone. Walls, ceilings, and floors have cracked.

RISK ASSESSMENT OF CANMORE COAL (FRIABLE) SEAMS (DIPPING/VERTICAL) IS COMPLICATED (MANY VARIABLES TO BE CALCULATED)

SAG HAS YET TO OCCUR IN AREAS WHERE CAVING IS NOT YET ACTIVE. BUT IS DAMAGING TO OVERLYING DEVELOPMENT/UTILITIES WHEN IT DOES OCCUR.

MINE SUBSIDENCE IN ILLINOIS: FACTS FOR THE HOMEOWNER

PIT SUBSIDENCE IS VERY COMPLICATED IN CARMORE
MULTIPLE SEAMS / DIPPING SEAMS / FRIABLE COAL

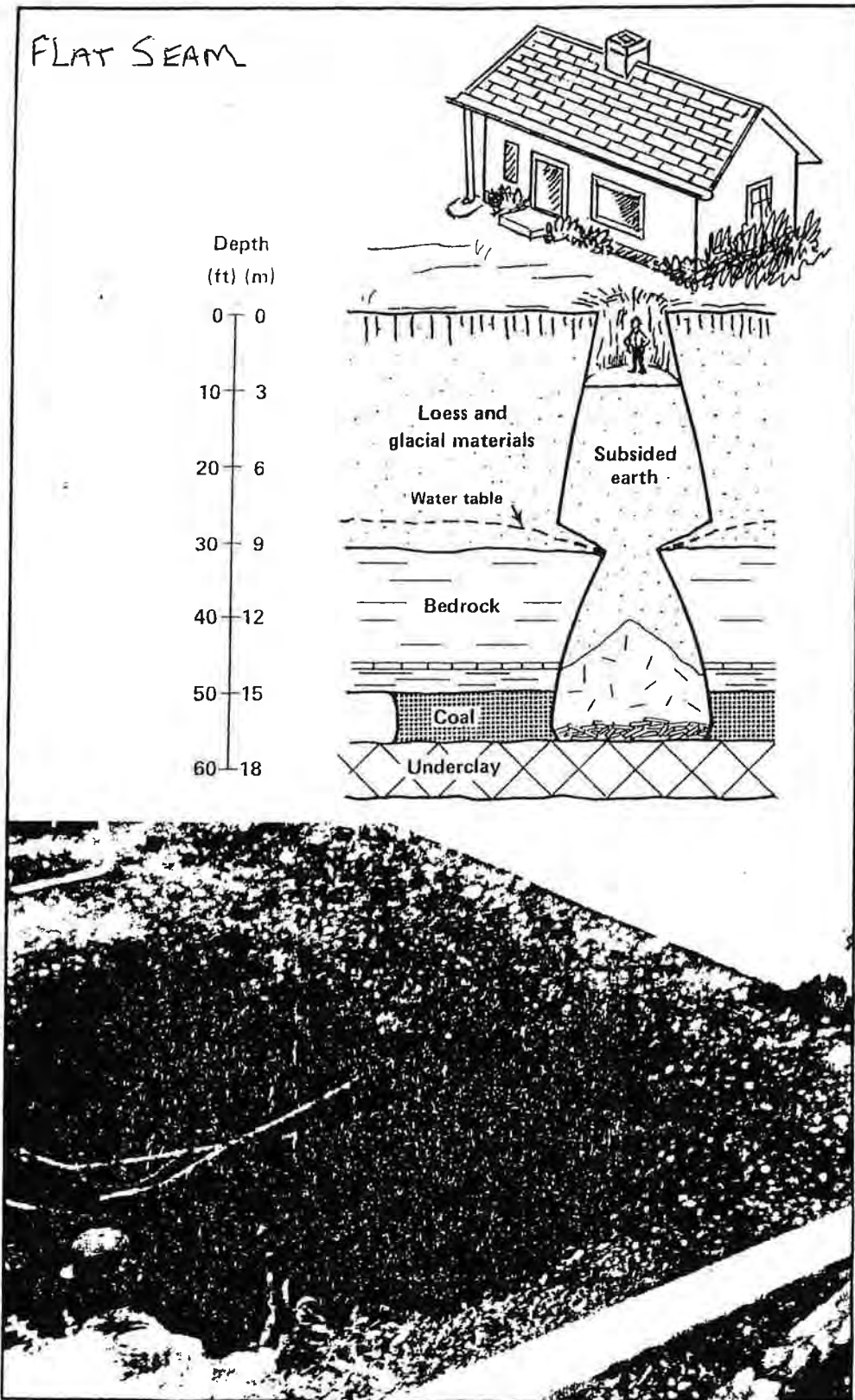
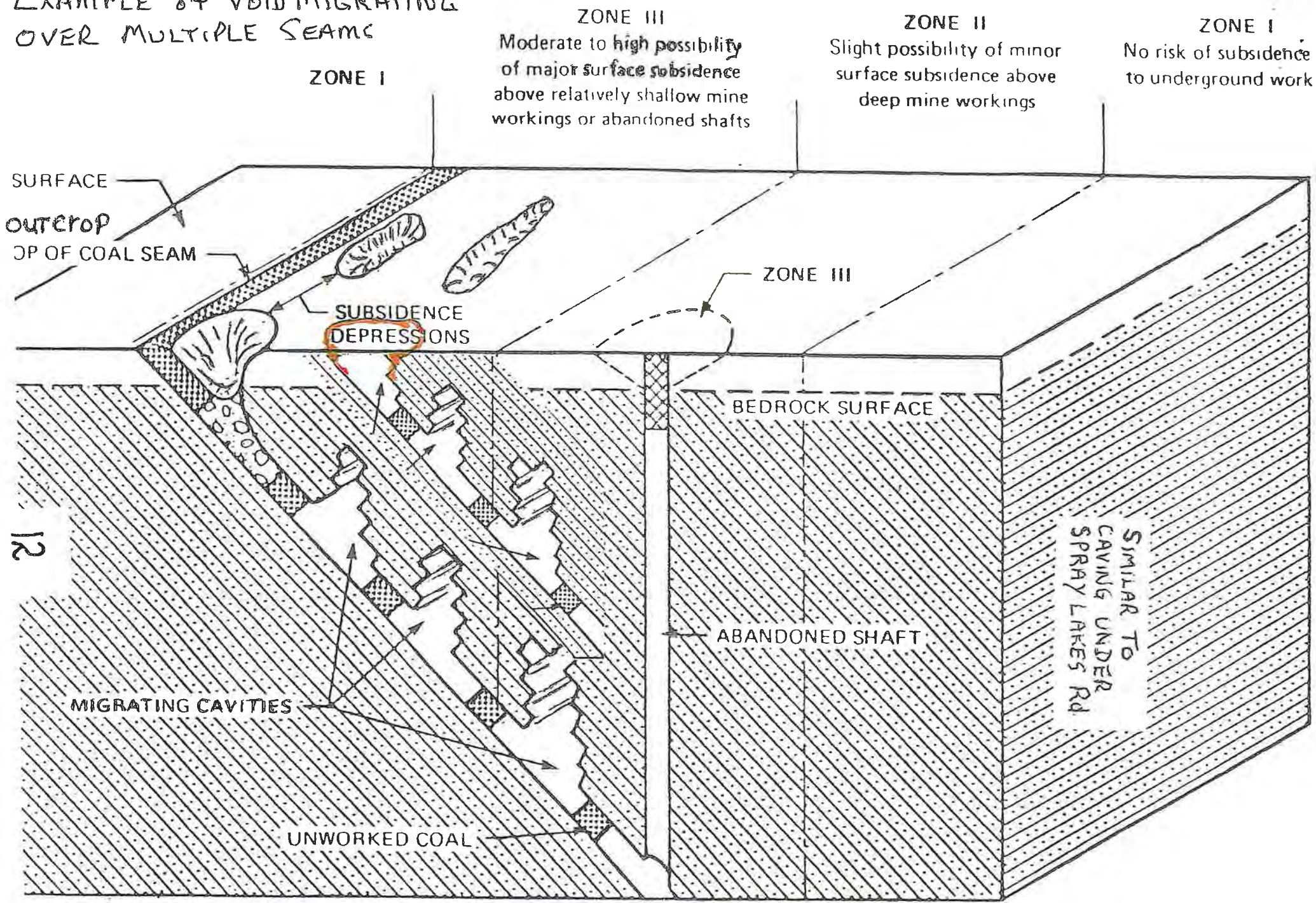


Figure 8. Cross section and photograph of a typical pit subsidence event (after Wildanger et al., 1980).

EXAMPLE OF VOID MIGRATING OVER MULTIPLE SEAMS







ZONE III
Moderate to high possibility of major surface subsidence above relatively shallow mine workings or abandoned shafts

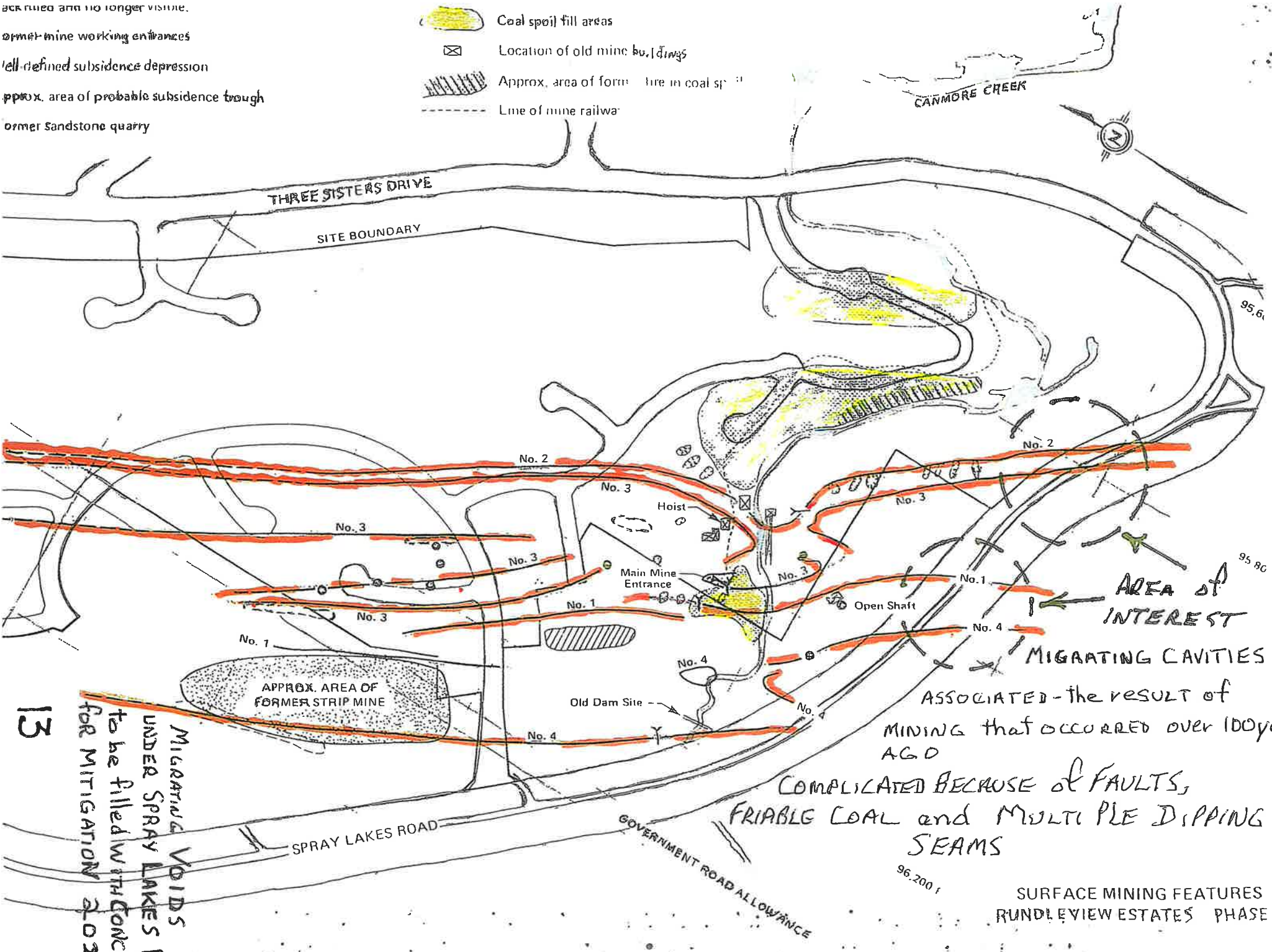
ZONE II
Slight possibility of minor surface subsidence above deep mine workings

ZONE I
No risk of subsidence to underground work

TYPICAL OF VOID MIGRATION OVERLYING MINED COAL SEAMS / DIPPING AND CREATES A RISK OF HARM TO ANY SURFACE DEVELOPMENT.

back filled and no longer visible.
 former mine working entrances
 well defined subsidence depression
 approx. area of probable subsidence trough
 former sandstone quarry

-  Coal spoil fill areas
-  Location of old mine buildings
-  Approx. area of former fire in coal spoil
-  Line of mine railway



AREA OF INTEREST
 MIGRATING CAVITIES
 ASSOCIATED - the result of MINING that OCCURRED over 100yrs AGO

COMPLICATED BECAUSE OF FAULTS,
 FRIABLE COAL and MULTIPLE DIPPING SEAMS

SURFACE MINING FEATURES
 RUNDLEVIEW ESTATES PHASE

13
 MIGRATING VOIDS
 UNDER SPRAY LAKES Rd.
 to be filled with CONCRETE
 for MITIGATION 2021

The Task Force was concerned that prescriptive statements of the type contained on page 23 of the Dames and Moore report would unnecessarily limit development in areas where coal related constraints are minor or effective remediation is easily achieved. For example, if coal seam outcrops or subcrops are very thin, contain low quality coal, do not produce significant quantities of methane gas, are isolated, or are otherwise shown to present no hazards to development, then there may be no reason to prevent construction on the site. Similarly, if an effective, economical, engineered solution is available, some types of construction may be acceptable.

The staged approach presented in the guidelines requires that site-specific determination of hazards be addressed through specific recommendations on mitigation for individual developments. The process is meant to assist the Town of Canmore in meeting its responsibilities when considering the wide variety of site conditions, development types and mitigation treatments associated with coal deposits. There is however, nothing in the Guidelines to prevent the Town from following prescriptive advice of the nature provided by Dames and Moore where site conditions indicate it is appropriate to do so.

*
IMP

Alberta Environmental Protection does not accept liability for development decisions made by the Town. Department staff assisted in the preparation of the Guidelines to provide the Town with a framework for evaluating potential hazards to development and risks to public safety. In assessing development proposals, the Town will need to satisfy itself that the evaluation is sufficient for an informed decision.

Thank you again for the interest you have shown in this matter.

Sincerely,


Peter G. Melnychuk
Deputy Minister

cc: Honourable Brian Evans

from letter sent to R. HAIMILA by ALBERTA ENVIRONMENT
PROTECTION AND SUBMITTED TO TOWN OF CANMORE 2005 RE: LIABILITY

REPRINTED FROM GOLDER REPORT

Using an average in-situ pillar strength for the coal of 5 MPa, which is towards the lower bound of the tests measured in the Riverside Mine, the factor of safety of the workings can be calculated by comparing the calculated in-situ stress with the pillar strength as follows:

$$FOS = \text{Average Pillar Strength} / \text{Average Stress}$$

Average pillar stress ranges between 3.0 to 5.8 MPa for the recorded pillars adjacent to Lot 45 to 59MR.
Hence:

cannot use math formula

Maximum FOS = $5/3.0$
= 1.67
Minimum FOS = $5/5.8$
= 0.86



COMPRESSION / DURABILITY TESTS REQUIRED ON CANMORE COAL SEAMS (2020 GUIDELINES) to determine the FACTOR OF SAFETY (FOS)

A FACTOR OF SAFETY of 1.5 is APPROPRIATE for LONG TERM STABILITY. ANY FOS below 1.5 is NOT CONSIDERED SAFE TO BUILD ON.

HISTORICAL BOREHOLES NUMBERED 400 BUT NO DURABILITY TEST RESULTS (FOS) APPEARED IN TSR REPORT.

DEREK STEELE OF DAMES + MOORE CONSULTANT TO TOWN OF CANMORE STRESSED

THE USE OF MINIMUM FOS FOR PUBLIC SAFETY IF NO DURABILITY / STRESS TESTS DONE ON UNDERLYING COAL SEAMS.

TEST ON CANMORE COAL HAVE A MINIMUM FACTOR OF SAFETY 0.86 AN FOS OF 0.86 IS NOT APPROPRIATE TO BUILD ON.

Hoek and Brown (1980) consider that a factor of safety of 1.5 is appropriate for long-term stability. The range of factors of safety calculated above is considered to be reasonable. However, extensive investigative drilling in the development areas beneath and adjacent to Lots 45 to 59MR shows no indications of collapse or closure of the mine or in-situ pillars. This would indicate that the factors of safety are significantly greater than 1.0. In addition, the stress analysis approach does not take account of the pillar width to height ratio effects on the appropriate coal compressive strength. This effect is pronounced when the width to height ratio exceeds 4, as discussed in the following section.

GOLDER DOES NOT TAKE INTO ACCOUNT THAT IT CAN TAKE CENTURIES FOR COLLAPSING TO OCCUR. THIS IS THE REASON FOR DURABILITY TESTS ON UNDERLYING COAL SEAMS.

Golder Associates

FAILURE TO TEST AND RISK OF HARM MATERIALIZES WOULD RESULT IN CIVIL LIABILITY (NEGLIGENCE)

Recent research published by Mark and Barton (1996) suggests that the 'in-situ', mass strength of coal should only be derived by reducing the measured laboratory values using the Holland and Gaddy (1957) formula when the coal is 'blocky'. For friable coals, the size effect is much less pronounced or even non-existent. The highly sheared coal found in the Canmore area can be considered as friable, with very closely spaced fractures and slickensides.

MINIMUM FACTOR OF SAFETY CANMORE COAL 0.86 FROM GOLDER REPORT

15

**TO: The Mayor and Town Council of Canmore
RE: Three Sister's Resorts Proposed Development**

A REQUIREMENT

The Town of Canmore should require that the proponent, Three Sisters Resorts, post a \$5 million Surety Bond; to be used by the Town of Canmore should a risk of harm materialize. The Term should be 5 years and be renewable. The reasons for a Surety Bond are twofold:

(1) The time limitation of two years on the liability insurance required by Three Sisters Resorts (2020 Guidelines) is hardly sufficient when geotechnical hazards can occur over a period of centuries. Even a Home Warranty is 5 years.

(2) The three pages of limitations (liability) as set out in Appendix D of the ASP Mining Impact Overview Report, limits the consultants liabilities should a risk of harm materialize. (see pages 17, 18 & 19 of this submission)

Just the fact that Pit / Sinkhole subsidence generation .. *is that there are No warning symptoms before their occurrence...the creation of sinkholes is sudden and fast...(Strozik G. 2015)* should convince the Town Of Canmore to require Three Sisters Resorts to post a Surety Bond now. This type of subsidence is a risk to public safety now and should not be dependent on the Town of Canmore's decision to allow development or not to allow development.

The Town of Canmore's legal advisors would draft the terms re: Surety Bond.

Limitations

1. The work performed in the preparation of this report and the conclusions presented herein are subject to the following:
 - a) The contract between Wood and the Client, including any subsequent written amendment or Change Order duly signed by the parties (hereinafter together referred as the "Contract");
 - b) Any and all time, access and/or site disturbance, risk management preferences, constraints or restrictions as described in the contract, in this report, or in any subsequent communication sent by Wood to the Client in connection to the Contract, and
 - c) The limitations stated herein.
2. **Standard of care:** Wood has prepared this report in a manner consistent with the level of skill and care ordinarily exercised by reputable members of Wood's profession, practicing in the same or similar locality at the time of performance, and subject to the time limits and physical constraints applicable to the scope of work, and terms and conditions for this assignment. No other warranty, guarantee, or representation, expressed or implied, is made or intended in this report, or in any other communication (oral or written) related to this project. The same are specifically disclaimed, including the implied warranties of merchantability and fitness for a particular purpose.
3. **Limited locations:** The information contained in this report is restricted to the site and structures evaluated by Wood and to the topics specifically discussed in it, and is not applicable to any other aspects, areas or locations.
4. **Information utilized:** The information, conclusions and estimates contained in this report are based exclusively on: i) information available at the time of preparation, ii) the accuracy and completeness of data supplied by the Client or by third parties as instructed by the Client, and iii) the assumptions, conditions and qualifications/limitations set forth in this report.
5. **Accuracy of information:** No attempt has been made to verify the accuracy of any information provided by the Client or third parties, except as specifically stated in this report (hereinafter "Supplied Data"). Wood cannot be held responsible for any loss or damage, of either contractual or extra-contractual nature, resulting from conclusions that are based upon reliance on the Supplied Data.
6. **Report interpretation:** This report must be read and interpreted in its entirety, as some sections could be inaccurately interpreted when taken individually or out-of-context. The contents of this report are based upon the conditions known and information provided as of the date of preparation. The text of the final version of this report supersedes any other previous versions produced by Wood.
7. **No legal representations:** Wood makes no representations whatsoever concerning the legal significance of its findings, or as to other legal matters touched on in this report, including but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and change. Such interpretations and regulatory changes should be reviewed with legal counsel.
8. **Decrease in property value:** Wood shall not be responsible for any decrease, real or perceived, of the property or site's value or failure to complete a transaction, as a consequence of the information contained in this report.
9. **No third-party reliance:** This report is for the sole use of the party to whom it is addressed unless expressly stated otherwise in the report or Contract. Any use or reproduction which any third party makes of the report, in whole or in part, or any reliance thereon or decisions made based on any information or conclusions in the report is the sole responsibility of such third party. Wood does not represent or warrant the accuracy, completeness, merchantability, fitness for purpose or usefulness of this document, or any information contained in this document, for use or consideration by any third party. Wood accepts no responsibility whatsoever for damages or loss of any nature or kind suffered by any such third party as a

result of actions taken or not taken or decisions made in reliance on this report or anything set out therein, including without limitation, any indirect, special, incidental, punitive or consequential loss, liability or damage of any kind.

10. **Assumptions:** Where design recommendations are given in this report, they apply only if the project contemplated by the Client is constructed substantially in accordance with the details stated in this report. It is the sole responsibility of the Client to provide to Wood changes made in the project, including but not limited to, details in the design, conditions, engineering or construction that could in any manner whatsoever impact the validity of the recommendations made in the report. Wood shall be entitled to additional compensation from Client to review and assess the effect of such changes to the project.
11. **Time dependence:** If the project contemplated by the Client is not undertaken within a period of 18 months following the submission of this report, or within the time frame understood by Wood to be contemplated by the Client at the commencement of Wood's assignment, and/or, if any changes are made, for example to the elevation, design or nature of any development on the site, its size and configuration, the location of any development on the site and its orientation, the use of the site, performance criteria and the location of any physical infrastructure, the conclusions and recommendations presented herein should not be considered valid unless the impact of the said changes is evaluated by Wood, and the conclusions of the report are amended or are validated in writing accordingly.

Advancements in the practice of geotechnical engineering, engineering geology and hydrogeology and changes in applicable regulations, standards, codes or criteria could impact the contents of the report, in which case, a supplementary report may be required. The requirements for such a review remain the sole responsibility of the Client or their agents.

Wood will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report.

12. **Limitations of visual inspections:** Where conclusions and recommendations are given based on a visual inspection conducted by Wood, they relate only to the natural or man-made structures, slopes, etc. inspected at the time the site visit was performed. These conclusions cannot and are not extended to include those portions of the site or structures, which were not reasonably available, in Wood's opinion, for direct observation.
13. **Limitations of site investigations:** Site exploration identifies specific subsurface conditions only at those points from which samples have been taken and only at the time of the site investigation. Site investigation programs are a professional estimate of the scope of investigation required to provide a general profile of subsurface conditions.

The data derived from the site investigation program and subsequent laboratory testing are interpreted by trained personnel and extrapolated across the site to form an inferred geological representation and an engineering opinion is rendered about overall subsurface conditions and their likely behaviour with regard to the proposed development. Despite this investigation, conditions between and beyond the borehole/test hole locations may differ from those encountered at the borehole/test hole locations and the actual conditions at the site might differ from those inferred to exist, since no subsurface exploration program, no matter how comprehensive, can reveal all subsurface details and anomalies.

Final sub-surface/bore/profile logs are developed by geotechnical engineers based upon their interpretation of field logs and laboratory evaluation of field samples. Customarily, only the final bore/profile logs are included in geotechnical engineering reports.

Bedrock, soil properties and groundwater conditions can be significantly altered by environmental remediation and/or construction activities such as the use of heavy equipment or machinery, excavation, blasting, pile-driving or draining or other activities conducted either directly on site or on adjacent terrain. These properties can also be indirectly affected by exposure to unfavorable natural events or weather conditions, including freezing, drought, precipitation and snowmelt.

Interpretations and recommendations presented herein may not be valid if an adequate level of review or inspection by Wood is not provided during construction.

14. **Factors that may affect construction methods, costs and scheduling:** The performance of rock and soil materials during construction is greatly influenced by the means and methods of construction. Where comments are made relating to possible methods of construction, construction costs, construction techniques, sequencing, equipment or scheduling, they are intended only for the guidance of the project design professionals, and those responsible for construction monitoring. The number of test holes may not be sufficient to determine the local underground conditions between test locations that may affect construction costs, construction techniques, sequencing, equipment scheduling, operational planning etc.

Any contractors bidding on or undertaking the works should draw their own conclusions as to how the subsurface and groundwater conditions may affect their work, based on their own investigations and interpretations of the factual soil data, groundwater observations and other factual information

15. **Groundwater and Dewatering:** Wood will accept no responsibility for the effects of drainage and/or dewatering measures if Wood has not been specifically consulted and involved in the design and monitoring of the drainage and/or dewatering system.
16. **Environmental and Hazardous Materials Aspects:** Unless otherwise stated, the information contained in this report in no way reflects on the environmental aspects of this project, since this aspect is beyond the Scope of Work and the Contract. Unless expressly included in the Scope of Work, this report specifically excludes the identification or interpretation of environmental conditions such as contamination, hazardous materials, wildlife conditions, rare plants or archeology conditions that may affect use or design at the site. This report specifically excludes the investigation, detection, prevention or assessment of conditions that can contribute to moisture, mold or other microbial contaminant growth and/or other moisture related deterioration, such as corrosion, decay, rot in buildings or their surroundings. Any statements in this report or on the boring logs regarding odours, colours, and unusual or suspicious items or conditions are strictly for informational purposes
17. **Sample Disposal:** Wood will dispose of all uncontaminated soil and rock samples after 60 days following the release of the final geotechnical report. Should the Client request that the samples be retained for a longer time, the Client will be billed for such storage at an agreed upon rate. Contaminated samples of soil, rock or groundwater are the property of the Client, and the Client will be responsible for the proper disposal of these samples unless previously arranged for with Wood or a third party