Geological and geomorphological report from "Io" placer gold property, located at Excelsior Creek, map 115J15.

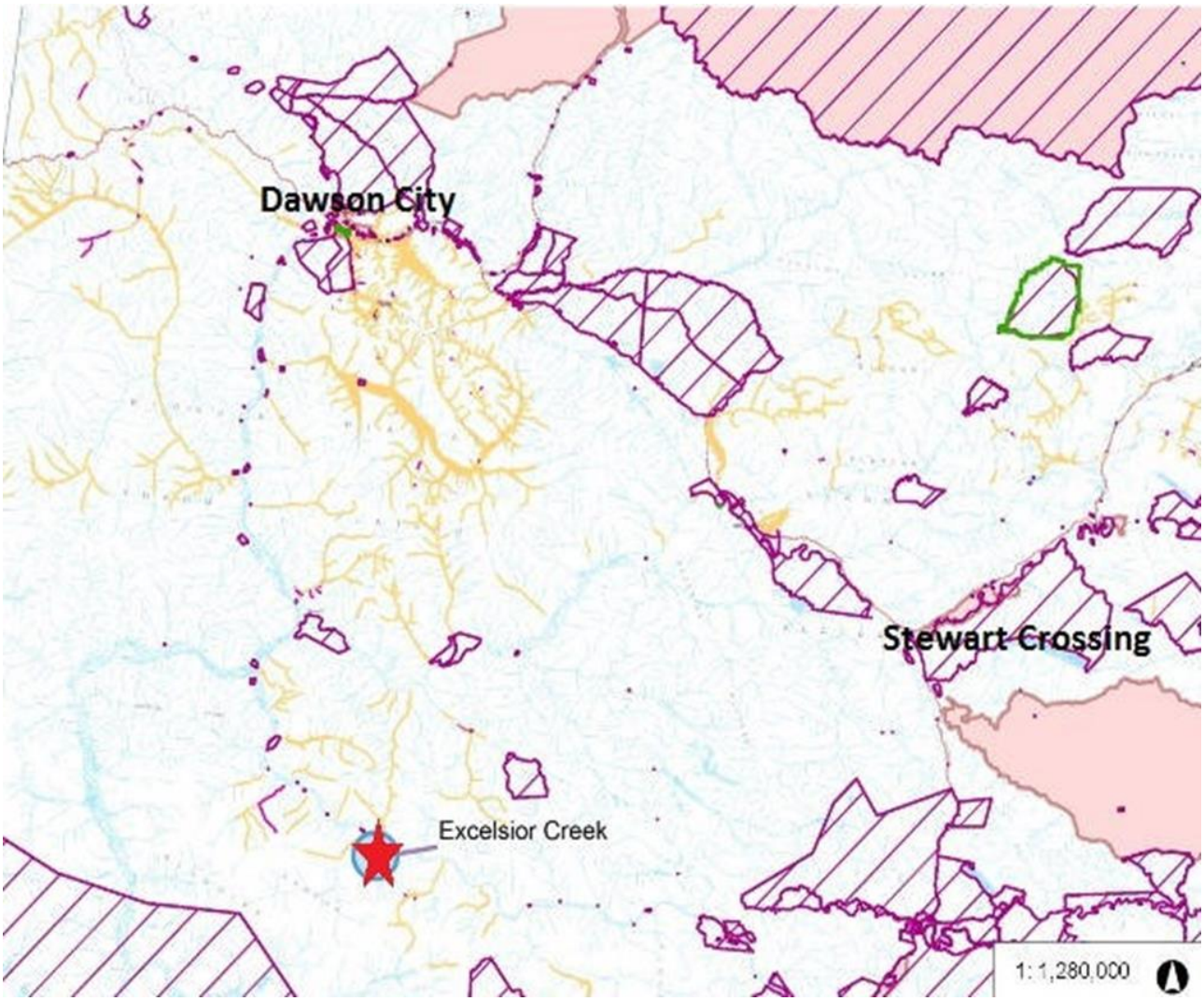
by Sandro Frizzi, geologist and prospector, 2019.

INTRODUCTION:

Since 2014 our group (Yukon Exploration Green Gold Inc.) is prospecting along the Excelsior Creek, a left limit tributary of the Yukon River.
In 2016 we conducted a first geophysical survey along the lower section of the creek with the use of a ground penetrating radar which revealed a relatively shallow bedrock (4.5-5 meter of depth) and favourable condition to conduct a test-pit campaign.
In 2017 we managed to walk a 15 tons excavator along the lower part of the creek, and to sluice the alluvial gravel right at its contact with bedrock. From two of the five tested pits we recovered noticeable quantities of coarse placer gold (around 1 gram per 0.5 square meter), that result encouraged us to keep going with our research.
Unfortunately at that time the many limitations of Class 1 Permit didn't allowed us to walk our excavator toward the upper part of the property where the best gold-deposition was expected (fording and building trails are forbidden without a Class 4 Permit).
In 2018 we conducted a second geophysical campaign on the upper section of the property, three miles up from the mouth, with the use of two different models of ground penetrating radars.
By the end of that summer we converted the lease into 33 claims.
During the winter between 2018-19 we applied for full Water Licence and Class 4 Land Use Permit and few days ago, the 15th of August 2019, we received all the permits necessary to start mining.
This summer we prospected the upper part of the creek and we performed a drone-survey campaign along the entire property. Our work is described in this report: a **geomorphological investigation aimed to locate the most favourable areas to be targeted for a gold placer deposits,** when a preliminary mining operation will take place in 2020.

LOCATION OF 'IO PROPERTY'.

Our 33 'Io' claims have been staked along three miles of the lower section of Excelsior Creek, a left tributary of the Yukon River located 134km south of Dawson City (on a straight line) and 123 km west of Pelly Crossing. This creek is currently not accessible by roads or trails and the only way to reach it is by boat: 185 km upstream the Yukon River from Dawson City, or 152 km downstream from Pelly Crossing (52 km down the Pelly River until the junction with the Yukon River, then 100 more kilometers downstream!). A barge is available for transportation of heavy equipment.
At this time the area is still extremely remote, however, a new road from Dawson City to Coffee Creek (which lies 5km downstream from Excelsior) has already been planned and approved by the Yukon government, on request of Gold Corp.



Location of Excelsior Creek

THE IMPORTANCE OF A GEOMORPHOLGICAL ANALYSIS IN PLACER MINING EXPLORATION:

The word 'placer' (Spanish etymology) in mining refers to "minerals which have been liberated (eroded) from their primary deposits (host rocks) and gathered along hillsides and valley bottoms, thanks to the action of gravity, solifluction (frost and taw) and meteoric events".
The Klondike is a vast mineralized region which hosts a great extension of scattered lode (primary) gold deposits, for the most part of very low-grade and of intrusive/structural genesis.
The work of millions of years of natural erosion contributed to separate those scattered gold particles from their host-rocks. Then gravity and meteoric events mobilize that 'free-gold' downhill, where its run ended in morphological depressions (geotraps) mostly located along those valley-bottoms carved by the many watercourses which are typical of this part of the world.
This incessant natural process create concentrated pockets of gold which are targeted by placer miners.
In order to locate the most promising section of a floodplain, where the precious metal could be collected, an efficient exploration campaign should be mostly focused on: 1) the localization of those primary deposits which have been at least partially eroded (in order for the gold particles to be liberated), 2) the identification of all the geotraps scattered along the targeted floodplain.
While step number one requires a great complex of geological information, with the involvement of mineralogists, geochemical analysis and structural investigations, the second investigation needs nothing but a close observation of those morphological features (rock-barriers, natural depressions, faults, contacts, waterfalls, valleys bottlenecks, river bands, etc.) which are contributing to trap the gold particles during their transportation.
For a successful search of placer deposits, a meticulous geomorphological investigations is fundamental: a single placer gold deposit could possibly have several different sources (feeders) connected with as many different geological environments, but its deposition and concentration will follow one only physical low: gravity.

USING A DRONE SURVEY TO LOCATE POTENTIAL PLACER MINING AREAS.

As mentioned in the introduction, at 'Io Property' since the beginning of our exploration we conducted three separate field-campaigns: a) a preliminary prospecting (2014-15) aimed to collect evidences of eventual favourable conditions for the gold to be deposited b) a geophysical survey (2016-2018), to determine the bedrocks depth under the alluvial coverage, c) a dig and testing campaign (2017), performed by using an excavator and a small plant to wash the gravel.
The combination of these different exploration techniques led us to discover a considerable deposition of placer gold, with the consequent decision to keep investing in further exploration.
This summer of 2019 has been dedicated to analyze the morphology of the three miles of floodplain, in order to select areas with the right features for potential targets.
In August we surveyed the entire 'Io Property' with a drone **DJI Mavic 2 Zoom** flying at 150-200 meters of elevation above the ground and equipped with an Hasselblad camera with 24-48mm optical zoom lens for a high-resolution capacity.
The drone has an official Canadian registration.

More than 300 photos were collected by the drone, to be later stitched together thanks to the help of two different software: **Dronedeploy**, to generate flight plans, convert and download data, and calculate 3D models, and **Meshlab**, which allow to view and to control the 3D mesh.
Civil engineer Joerg Lotz was the officially-certified drone-operator who conducted the survey in the field.
Then, geologist Sandro Frizzi prospected the area to double-check geology and structures.

The pre-flight planning (creation of the grid within the drone will operate), the conversion and the downloading of the collected data, together with the calculation of the 3D models and all their final verifications and corrections, was done by "LOTZ AG Ingenieure" from Waechtersbach (Germany), a civil engineering enterprise specialized in 3D planning, land-mapping, road-planning and watercourse restoration.

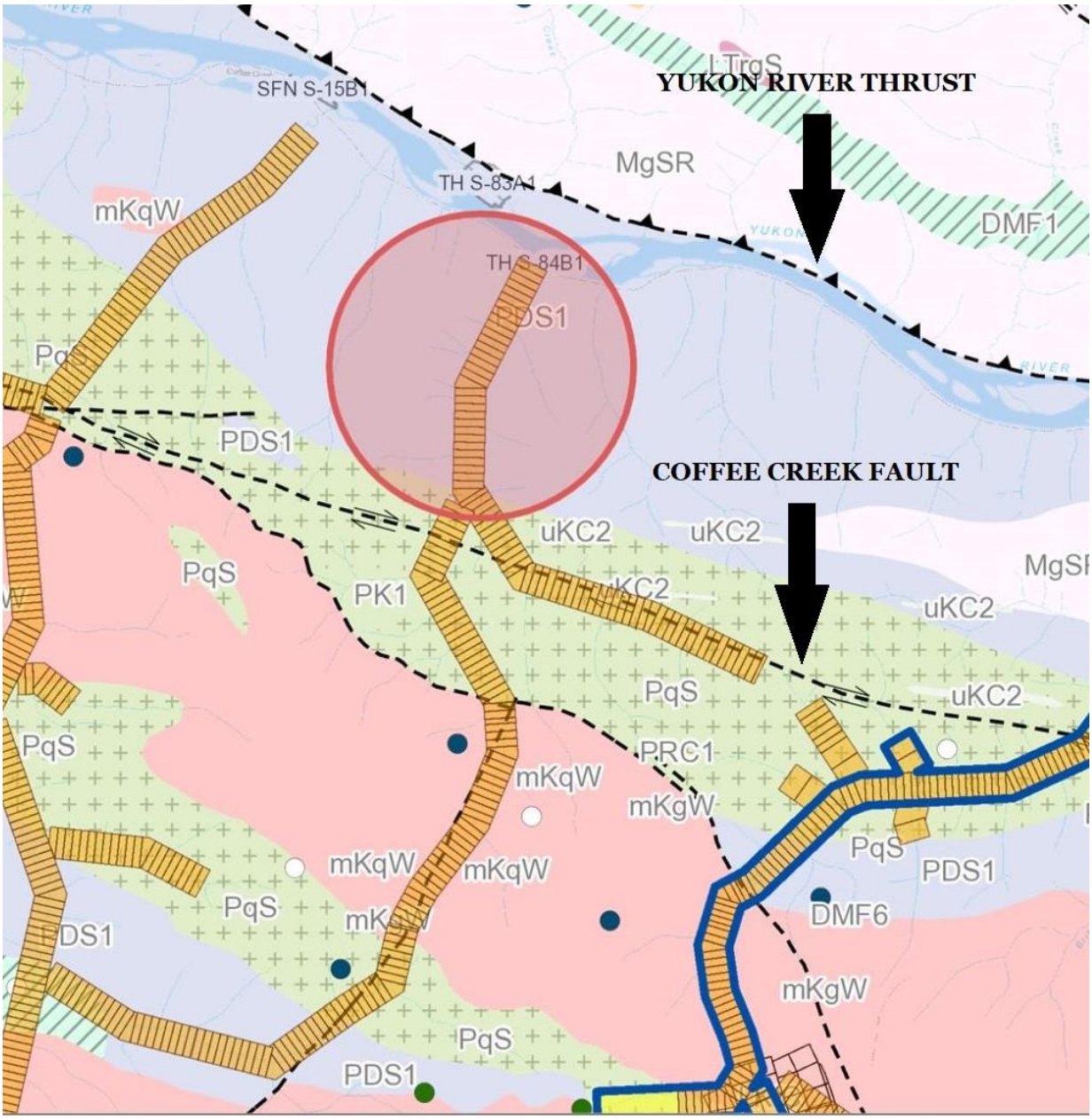
Engineer Joerg Lotz is preparing the drone for survey

GEOLOGY AT EXCELSIOR CREEK.

Our creek lies on the left limit of the Yukon River, right in between of two important goldfields: Coffee Creek (5 kilometers downstream from Excelsior), which became extremely popular in 2006-07 after an important primary gold-deposition was discovered by prospector Shawn Ryan on its surroundings, and Canadian Creek (12 kilometers upstream), an historical placer mine which already produced thousands of ounces of raw gold.
Thanks to the Coffee Creek discovery, several of the major North American hard-rock gold companies (White Gold, Kaminak, Gold Corp, Newmont) invested huge amount of finances and human resources into one of the most exhaustive geological exploration conducted in the Yukon on our days. A great research which minutely covered each corner of this huge area.
Several geologists and university researchers from different countries collaborated to analyze the Coffee Creek gold depositional model: a deep explanation of all the mechanism of this particular type of mineralization which will help to comprehend the metallogeny and the orogenic gold mineralization in the Dawson Range and northern Cordillera, as well globally.
Thanks to this colossal research we now know in details what are the events which controlled the gold mineralization around the Coffee Creek area, where Excelsior Creek is also located.

According to the Coffee Creek researchers, the presence of gold in this region is the product of a structurally controlled mineralization due to a sequence of different episodes started during the Permian, with the origin of the Coffee Creek Fault, which is related to the Big Creek Fault active toward southeast. Here the thrusting was followed by a Mid-Cretaceous transition to dextral-strike movements and ended with few later episodes of reactivations occurred during the Tertiary (*M.G.Sanchez*).
Later on this fractured system was occasionally intruded by post-metamorphic dikes.
The subsequent mineralization comprises auriferous sulphides associated with an alteration assemblage of quartz-muscovite-illite-kaolinite-carbonate, which sulphidize host rock muscovite and biotite.
This mineralization seems to be happened around 97 Ma ago (*Craig J.R. Hart, Murray M. Allan, Lee A., James K. Mortensen*).

Geologically our Excelsior Creek is located in the Yukon Tanana Terrane, an accreted pericratonic sequence that covers a large part of the northern Cordillera from northern British Columbia to east-central Alaska (*M. Colpron*). The YTT consists of Paleozoic schist and gneiss that were deformed and metamorphosed in the late Paleozioc, and intruded by several suites of Mesozoic intrusions, from Jurassic to Eocene (*J. Mortensen, M. Colpron*).
The geology of the surroundings of Excelsior Creek and Coffee Creek is well visible on Yukon government map (115J15) published in the following page.



'Io' Property is in the red circle (MAP 115J15)

Legend:

- PDS1= Ediacaran-Devonian (635-375Ma).
  Metamorphic (quartzite, psammite, schist)

- PqS= Permian (264-252Ma).
  Metamorphic (K-feldspar augen granite, metporphyry)

- uKC2= Cretaceous (73-68Ma).
  Volcanic (andesite, dacite)

- mKqW= Cretaceous (105-90Ma).

  Plutonic (quartz monzonite, granite)

Here below there are some pictures of some representative rocks commonly found along the floodplain of Excelsior Creek:

Augen orthogneiss

Greenstone with felsic-intusion

Andesite (porphyritic)

Poorly foliated amphibol/mica-schist

GEOMORPHOLOGICAL ANALISIS OF THE LOWER SECTION (3 MILES) OF EXCELSIOR CREEK.

The aerial images taken by the drone from a variable elevation of 150-200 meters above the surface are extremely clear and produced an extremely detailed bird's eye view of the floodplain of Excelsior Creek, starting from its mouth and going three mile upstream.
For practical reasons we decided to produce three separate maps, each one covering a mile of section: 'Lower', 'Middle' and 'Upper'.
We also included a "Chart of Elevations" with different colours for different altitudes.
A digital 3D model has also been created by Lotz AG Ingenieure, with the possibility to observe the valley from different angles.
The three aerial views and the Map of Elevations have been printed on paper and attached to this report, together with an USB key which contains the digital version of the maps together with a link to access at the 3D models elaborated by our team.

Excelsior Creek is an 11km long watercourse with three main left limit tributaries on its upper section and a bunch of much smaller ones flowing on both limits in its lower part.
The major of these tributaries measures 6km of length and flows into the main valley on claim Io32.
A close observation of the aerial pictures produced by our drone reveals that Excelsior is a kind of 'mature' creek and its course shows a low gradient (1.4-2%) which induces the slow water-flow to a constant meandering across a fairly wide valley (up to 140-160 meters at its maximum extension).
The creek is twisting among older benches which are elevated only few meters above the modern floodplain.
Those upper benches are more or less coeval and are covered by moss and short black spruces, to confirm the presence of mostly frozen ground. The bedrock here is mostly shallow: from 2 meters close to the valley sides to 4-4.5 meters toward its centerline.
The modern floodplain lies 2-6 meters below this older benches and within its young meanders the banks are vegetated by tall white and black spruces, together with willows, aspens and birches, to witness the absence of permafrost.
The internal curves of these meanders are also hosting thick gravel-bars mostly made of well-rounded cobbles which are well representing the variety of local rocks forming the surrounding bedrock geology. This coarse/rounded gravel shows the highly energetic transportation which occurs during the seasonal snow-melt.

Thanks to the aerial pictures produced by our drone, we were able to individuate and to mark (with letters on the attached maps) several floodplain-sections which could have good potential for gold depositions. These areas should be targeted by the miners.

Here below there are the descriptions of each one of these areas of interest, starting from the mouth of the creek to the end of the 'Io' claims (Io33), three miles upstream:

A) The mouth of Excelsior Creek is a kind of small estuary which has been multiple times invaded for the first 500 meters by the Yukon River during its phases of high water-level (inter- and post-glacial phases).
   In 2017 we dug 4 pits to bedrock along this area (1-2-3-4 on the map) and which exposed repeated sequences of cobbles, gravel and sand, mixed with ultrafine and extremely flattened

gold typical of the Yukon River sand-bars. The limit of the river depositional-influence is visible at pit 4, where just few small lenses of silt belonging to the Yukon River are intercalated with coarse gravel transported by Excelsior Creek. This area should be avoided by the miners.

B) Right limit bench with remains of an ancient dead meander where pit 5 has been excavated in 2017. This bench lies a couple of meters above the actual creek and during our testing revealed 4 meters of bedrock depth. The mattress of loose material is composed by well-rounded cobbles, pebbles and gravel mixed with huge slabs of angular quartzite slide-down from the close hillside. This material is are extremely hard to dig when the ground is frozen. From a small portion of exposed bedrock we managed to recover with a big effort (our excavator was a small 14 tons Komatsu) a considerable quantity of coarse gold!

C-D-E) Left limit extension of upper benches. Those are deeply frozen and consequently poorly vegetated. The creek is meandering in the opposite half side of the valley on a thawed floodplain vegetated with tall trees indicates. **This area could be considered a potential target.**

F-G) Right (F) and left (G) limit benches located where the valley is slightly bending toward east. The creek is crossing the valley and is separating these two frozen benches. Right upstream from bench G the valley is narrowing.

H) Bottleneck in the valley due to sliding material (soliflux) coming from the right hillside. The creek is flowing along the left limit and is moderately digging (canyoning) in the bedrock.

I-J) Two extended right limit benches upstream from the valley bottleneck. According with the lack of trees those seems to be quite frozen and possibly covered by a layer of talus coming down from the right hillside. The creek runs on the left side, along a cliff made by quartzite. **This area seems to have the right conditions for a good gold deposition**.

K) The creek is here running in the middle of the valley and the floodplain, according with the presence of tall white spruces, seems to be thawed. During our field-exploration we found evidences of old-timer activities (shafts, cut trees, old posts, remains of shelters).

L) Confluence of Excelsior Creek with its major tributary. The floodplain is flat and extended. The remains of an old shaft are well visible on the right side of the creek. **This area will be our main target for the preliminary mining (bulk-sampling) campaign planned for 2020.**

M) This is the major tributary of Excelsior: a creek long 6 kilometers which is cutting through all the geological formations indicated as host-rocks for the gold mineralization if the area by the researchers of the Coffee Creek hard-rock mining exploration (see the chapter dedicated to the geology of this area). **This tributary has the potential to be the major gold feeder of Excelsior Creek**: we will sample it during the next summer.

N) After the last Io claim (Io33), on the upper end of our property, Excelsior Creek bend toward east and runs for 6 kilometers to its headwater, which springs from the west side of the

watershed divide with Canadian Creek. In 2020 together with the mouth of its tributary (M) we will separately test this upper part of Excelsior, to understand where the majority that placer gold is coming from.

CONCLUSIONS.

After the encouraging placer gold discoveries achieved during five years of exploration campaigns performed by our company (Yukon Exploration Green Gold Inc.) on the lower three miles of Excelsior Creek, a left tributary of the Yukon River which runs through one of the most important gold district of the Klondike, we are now planning a preliminary mining attempt for the summer of 2020.
The main problem of starting a mine on virgin land is to locate the most promising section of floodplain to target at first. For this reason during this summer of 2019 we decided to employ a drone to closely photograph the stretch of valley where our claims are located: this survey will help the geologist to spot all those favourable morphological features essential for a good placer gold deposition (geotraps).
This drone survey has been conducted by a certified operator, civil engineer Joerg Lotz, and has been preceded by a geological field survey conducted by geologist Sandro Frizzi with the help of Matthias Brunmayr.
The 300+ high-definition pictures taken by the drone have been processed by LOTZ AG Ingenieure studio of Waechtersbach (Germany), to create three bird's eye maps: one for each mile of our Io Property. A 3D model has also been produced for a different-angle-vision of the local geomorphology, together with a Chart of Elevation.
The maps and the 3D model have been analyzed by geologist Sandro Frizzi, in order to localize and circumscribe areas with good potential for placer gold deposition where to start our first mining attempt planned for summer of 2020.
After a close examination of these maps Sandro chose the area labeled with letter **L** on the aerial-view map attached to this report.

Sandro Frizzi, geologist and prospector for
Yukon Exploration Green Gold Inc.
p.o.box 1178, Dawson City, Yukon Y0B 1G0
yukonexploration.ca
1 (604) 500-4109
yukonexploration@hotmail.com

PROFESSIONAL QUALIFICATION OF SANDRO FRIZZI.

Sandro Frizzi is an Italian citizen and permanent resident of Canada since 2009.
Born in Italy the 28th of August 1961, he works and lives in Dawson City since 2011 (1342, 4th Ave.).
In 1993 Sandro obtained the University degree in Geological Sciences at University of Bologna, with specialization in hydrogeology, aquifers and alluvial deposits.
As geologist he worked as a consultant for different companies in Italy (1993-2004), in Canada (1997-2019), in Bolivia-Argentina (2009), and in Mexico (2010-11).
Since 2005 Sandro is operating in the Yukon as field-geologist, in hard-rock exploration (2005-2009) and successively self-employed in the placer mining industry (2009-today).
Since 2013 is co-founder and director of Yukon Exploration Green Gold Inc., a placer exploration and mining enterprise.
His company today is holding several fully licensed properties, some of those already in active gold production (Big Creek, California Creek, Bruin Creek and 12 Mile Creek).
In 2018 he created Gold Pan Corp, a small placer exploration company specialized in low-impact technologies.
Since 2009 Sandro dedicated part of his time to test and to promote non-invasive and eco-friendly exploration techniques (ground penetrating radars, magnetometers, gravimeters, drones etc.).
In 2013-14-15 he conducted a successful exploration along the floodplain of Big Creek (Map 115P15) by using for the the first time a ground penetrating radar of Bulgarian fabrication. That experiment revealed the efficiency of the GPR in the determination of bedrock's profile and led to the discovery of an important gold-bearing/hidden bench.
After this positive result, during the winter of 2016-17, Sandro travelled to Plovdiv (Bulgaria) to work together with electronic engineer Anton Doychev to customize two GPRs: Oerad Scudo 500 and Dipole 300, especially calibrated for the placer exploration.