The Ti-pa-haa-kaa-ning (TPK) gold grain glacial dispersal apron, northwestern Ontario, Canada

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Superior Diamonds Inc. initiated an overburden sampling program in 2005 within the Stull-Wunnummin mining district of northwestern Ontario. The purpose of this initial sampling program was to assess the diamond potential for the area through recovering kimberlite indicator minerals (KIMs) from 10 kg (average) till samples. Although KIMs were recovered, of particular interest was the number of gold grains recovered from esker samples in what is now the southern-most part of the Ti-pa-haa-kaa-ning (TPK) gold property.

In 2007, Superior Diamonds was re-named Northern Superior Resources (NSR) and the company's focus shifted to gold exploration, specifically in the Stull-Wunnummin area. Subsequent exploration programs finally defined a large gold grain-in-till apron, the source of gold grains dispersed from splays off the main regional Stull-Wunnummin Fault. The system measures at least 24 km long though the length of glacial dispersal of gold grains from source is not fully understood, as the apron extends off the TPK property. At the head of the apron, gold grains are primarily pristine (≥70%), and as many as 1250 grains have been recovered from individual 10 kg (average) till samples. In addition to gold grains, the apron also includes mineralized boulders. This apron is one of the largest in North America, surpassed only by the gold grain-in-till apron associated with the Meliadine gold deposit, Nunavut, Canada (2.6 million ounces, proven and/or probable.

In 2011–2012, exploration programs completed by NSR to the west and north of the TPK apron defined a second gold grain-in-till dispersal train. As this train is at least 3 km wide, it is referred to as a corridor and was named after a local lake, the Keely Lake gold grain-in-till dispersal corridor. Associated gold grains were sourced from within the corridor and from a newly discovered greenstone belt at the head of the corridor. Mineralized boulders recovered from within the corridor indicate that the greenstone belt also has copper and silver potential.

The TPK property is located approximately 470 km northeast of Thunder Bay, Ontario, and 190 km northeast of Pickle Lake (Fig. 1). The size of this property has evolved since 2005, now stretching almost 30 km east to west and 20 km north to south. This contiguous claim block consists of 190 mining claims comprising 2506 units or 42,719 hectares (Fig. 2). The property now encompasses at least two regional mineral-bearing systems. The property is 100% owned and operated by Northern Superior Resources Inc. and is operated with the cooperation of the local First Nation, Neskantaga, under an "Early Economic Exploration Agreement".

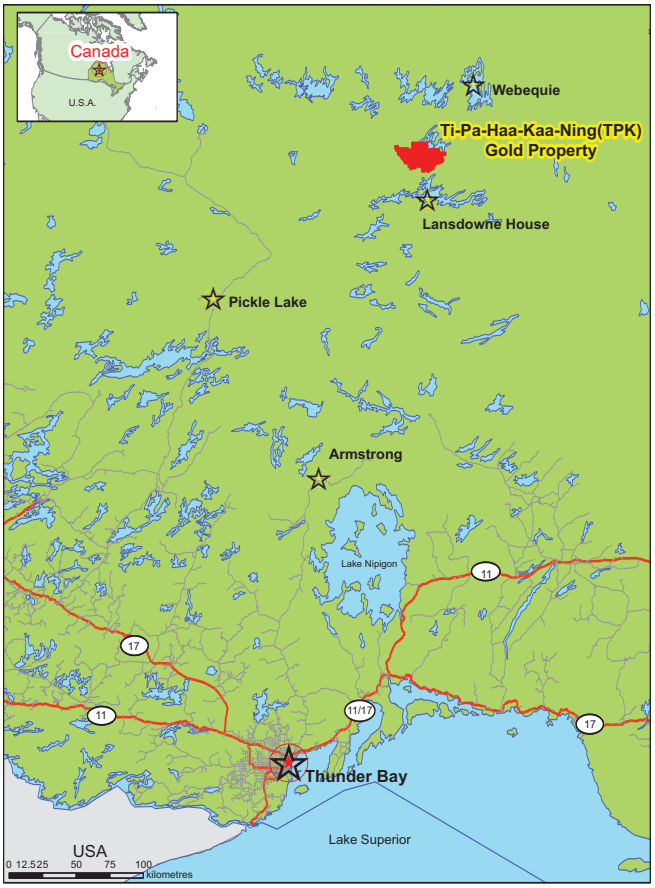

Fig. 1. Property location map.

PHYSIOGRAPHY

Topography is primarily controlled by the presence and distribution of glacial sediments, covering over 95% of the TPK property. The landscape is relatively low and flat, generally varying only 20 m over broad areas with occasional isolated ridges. The limited variation in relief results in poor drainage producing numerous swamps and lakes and few well developed rivers and streams. Northeast-oriented drumlins control the shape of lakes and the direction of drainage in the eastern part of the property (Parsons 2013).

BEDROCK GEOLOGY

The TPK property is associated with the Sachigo Superterrane, subdivided into the North Caribou Terrane consisting from south to north of the Uchi, North Caribou, Island Lake, and Oxford-Stull domains (Percival *et al.* 2006; Stott 2007) (Fig. 3). The Northern Superior Superterrane bounds the Sachigo Superterrane to the north, and both superterranes are continuous to the east under the Paleozoic cover of the James Bay Lowland.

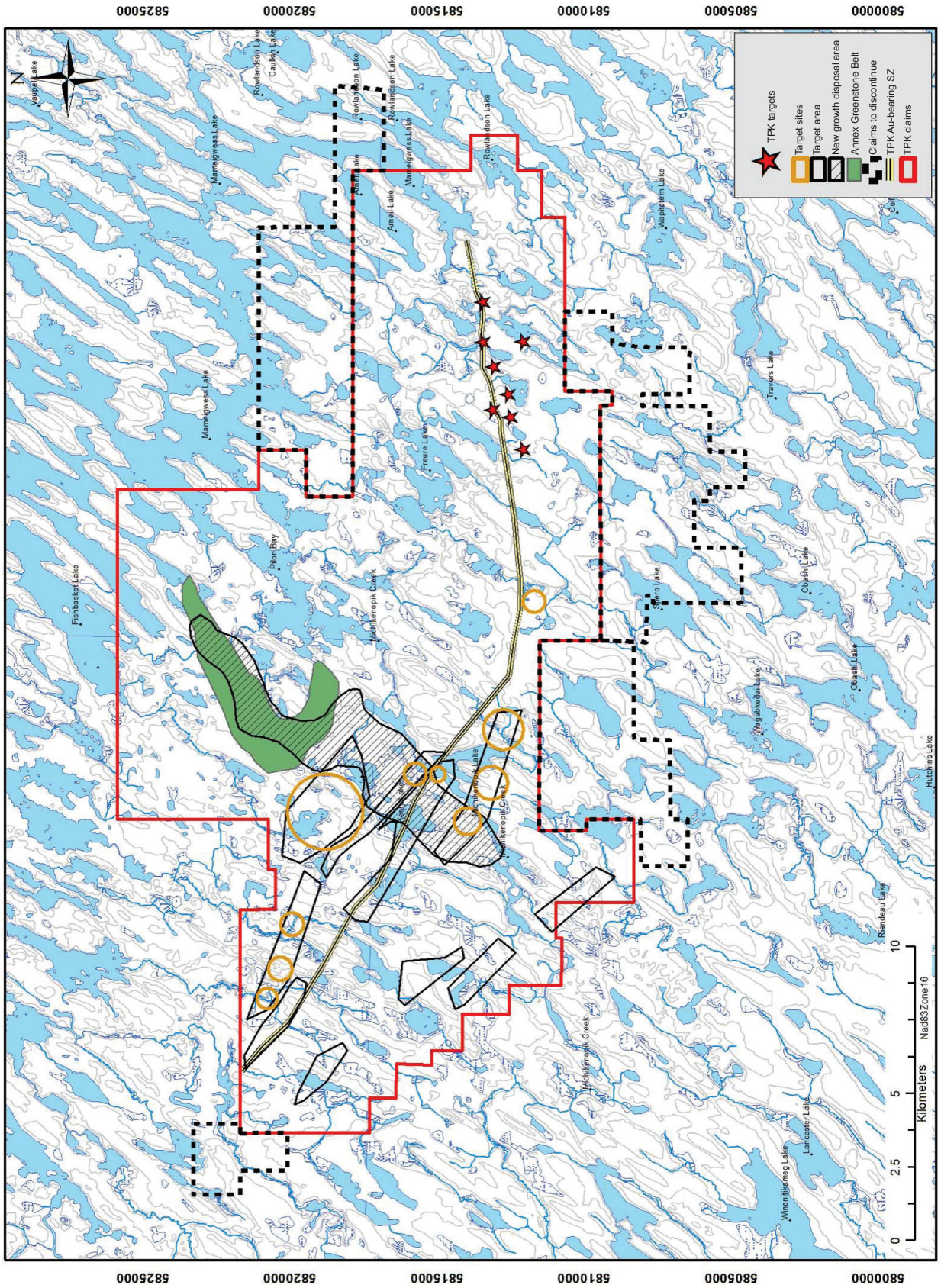

Fig 2. Ti-pa-haa-kaa-ning gold property, northwestern Ontario, Canada.

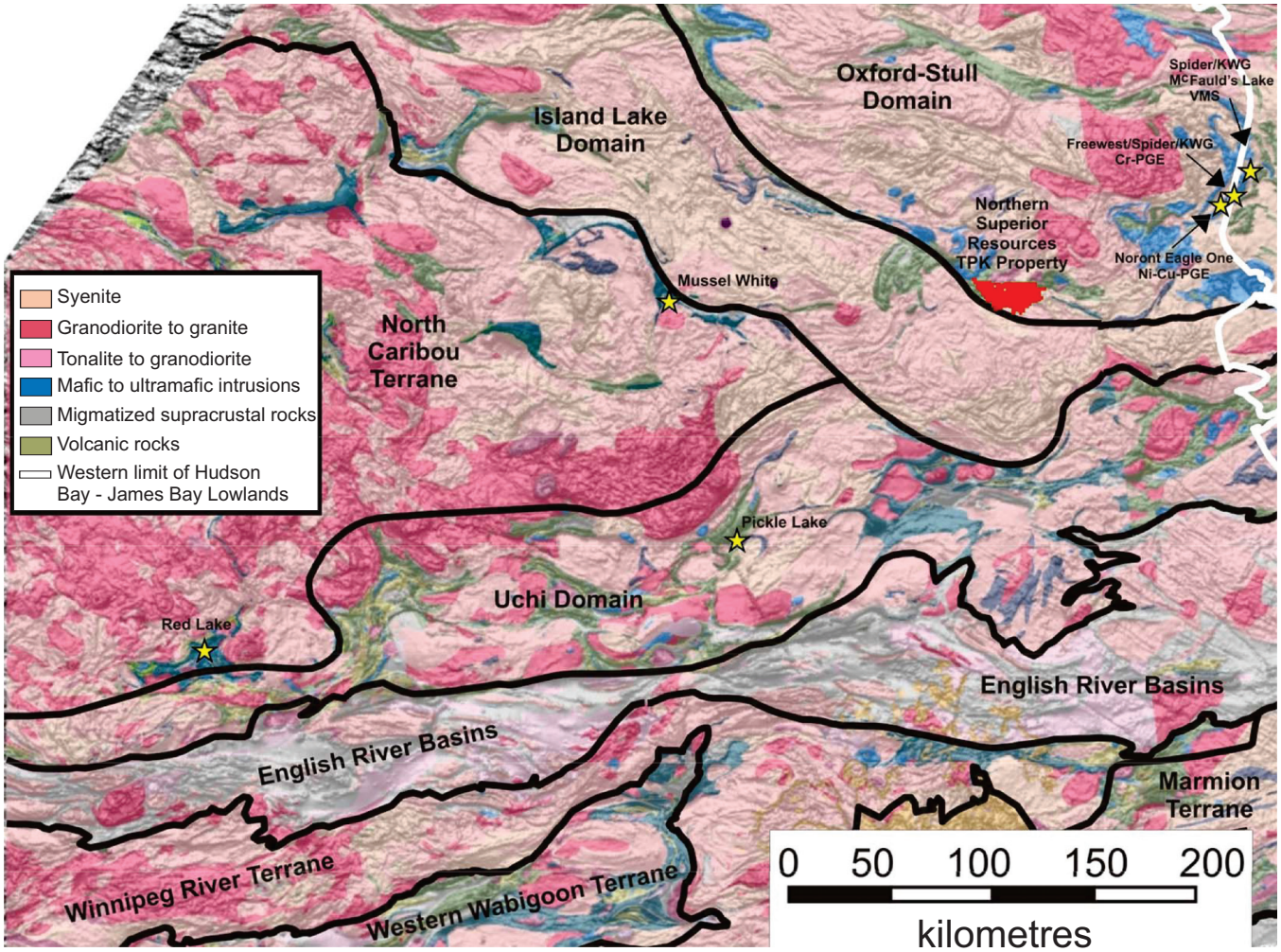

Fig. 3. Regional geology of the eastern portion the Oxford-Stull Domain (Stott 2007).

The understanding of the local bedrock geology was primarily derived from regional compilations or reconnaissance-scale mapping (Bostock 1962; Prest 1963; Thurston & Carter 1970a,b; Mason & White 1995; Bradford 2001; Kaip and Childe 2002; Osmani & Samson 2002). The Bartman Lake greenstone belt is a generally northwest-trending supracrustal sequence that extends for approximately 75 km from the interpreted southeast limit near Barnhart Lake in the southeast to the Fishbasket intrusion to the northeast (Fig. 4). The eastern half of the belt is composed of metavolcanic rocks intruded by mafic to ultramafic units, and the western half consists of metavolcanic rocks and clastic metasedimentary rocks bounded by a mafic to ultramafic unit to the northwest. A northeast-trending arm of the belt composed of metavolcanic rocks is interpreted to extend for about 20 km along the northwest side of Fishbasket Lake. The belt measures up to 10 km in width, but is highly attenuated in the area west of Rowlandson Lake between a massive granitoid to the north and felsic gneisses to the south. Splays from the main trace of the Stull-Wunnummin fault trend to the southeast to east and are interpreted to form a 2–5 km wide duplex fault zone with apparent dextral displacement.

In 2010 and 2011, Overburden Drilling Management Limited (ODM) was contracted to complete two phases of reverse circulation drilling and a boulder prospecting program. The program was focussed on the head of the gold grain-in-till dispersal apron in the eastern part of the TPK property. As part of this program, bedrock chips from the 192 reverse circulation holes were collected and analyzed. The observations made by ODM (Averill 2010; Averill *et al.* 2011)(Fig. 5) from these bedrock chips and mineralized boulders recovered from the boulder prospecting program, greatly enhanced the understanding of the bedrock geology and the relationship(s) between stratigraphy, plutonism, metamorphism, shear deformation, and gold mineralization for that area of the property. Key observations include (a) the Stull-Wunnummin fault follows the southern edge of the greenstone belt and is hosted by granodiorite of the Spero Lake Batholith; (b) west-northwest trending splay faults were identified in quartz monzonite of the 15 km long Freure Lake Batholith north of the belt and especially in leucogranite of the high-level Contact Stock between this synvolcanic batholith and the greenstones; (c) these splay faults are characterized by planar to anastomosing shear deformation and are locally mineralized with pyrite, arsenopyrite, and gold; and (d) the development of these splay faults appear to have been induced by deflection of the Stull-Wunnummin fault around the buttress formed by the lenticular Freure Lake Batholith. Averill *et al.* (2011) note that this metallogenic model is analogous to that of the Malartic- Val d'Or gold district in Québec.

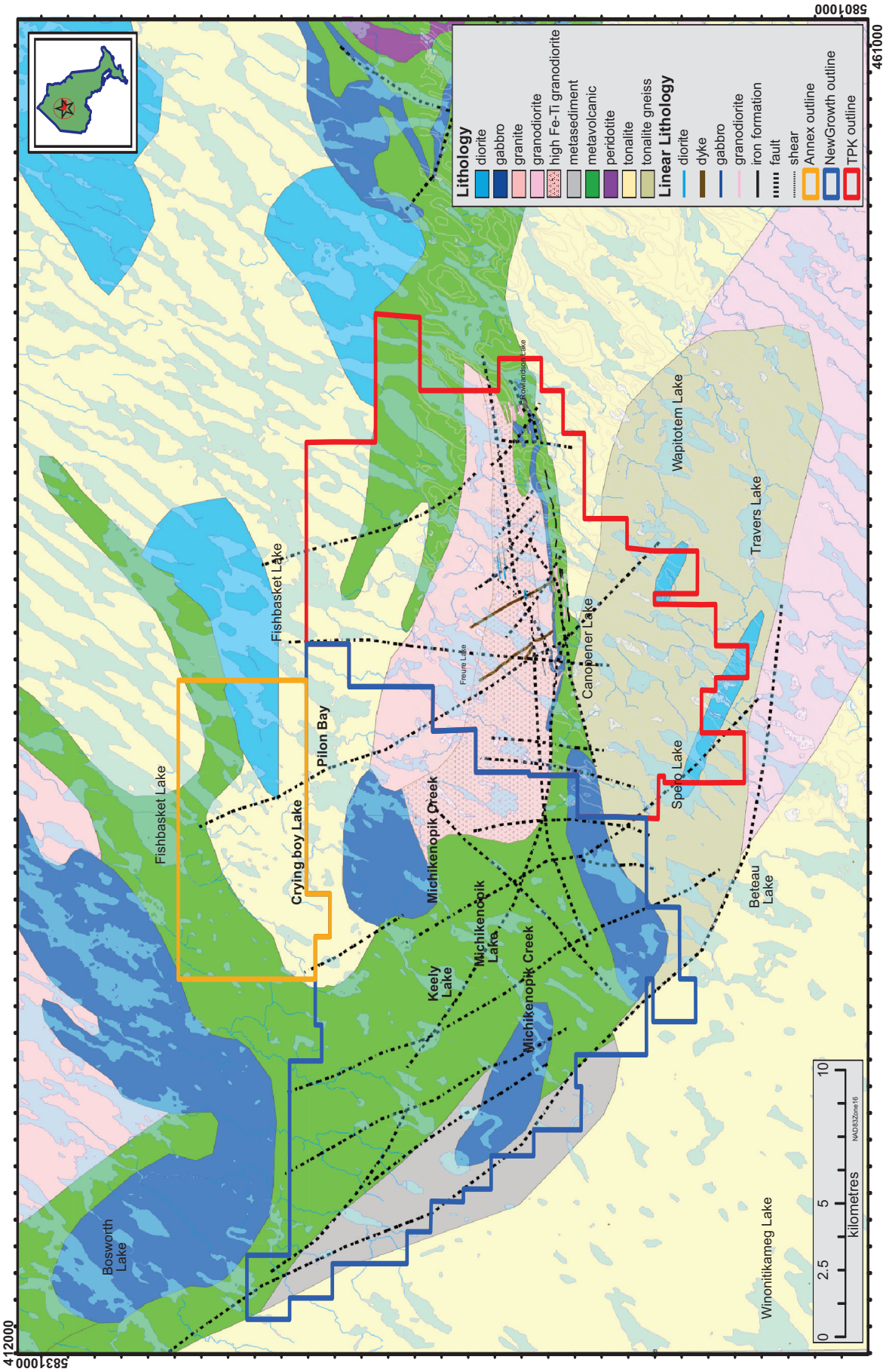

Fig 4. Property-scale geology map (Hart & Boucher 2010).

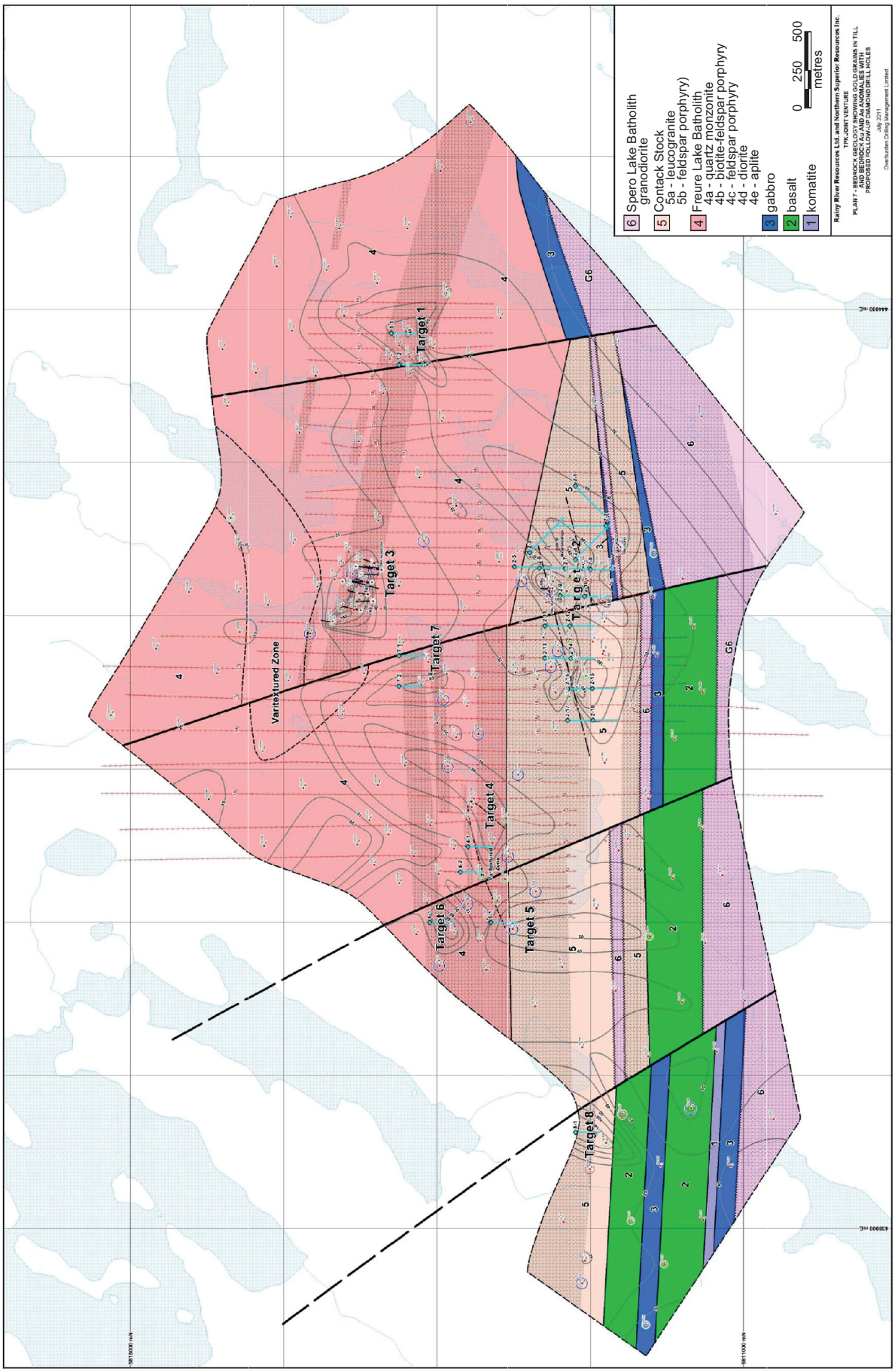

Fig. 5. Bedrock geology from reverse circulation (RC) bedrock chips (Averill *et al.* 2011). The "Targets" refer to areas where gold grains are concentrated in till samples recovered from the RC program and represent excellent core drill targets.

OVERBURDEN GEOLOGY

Northern Ontario was likely covered with ice from the inception of the Wisconsinan approximately 115,000 years BP. The advance of glacial ice over the TPK property during this time was primarily southwest from an ice mass centred over Labrador, northeastern Canada. This flow is responsible for depositing much of the subglacial tills and moulding bedrock in north-central Ontario, and often representing a thin cover (usually <1 m) over bedrock. During the Late Wisconsinan, the ice margin began retreating towards the Hudson Bay Lowland with the direction of retreat recorded by the distribution and orientation of recessional moraine and glaciofluvial deposits. The recessional moraines are commonly composed of flow tills, coarse-grained glaciofluvial materials, and ice-contact stratified drift. Glaciofluvial deposits commonly consist of coarse-grained sand and gravel (Morris 2003).

Locally, five primary glacial deposit types were identified following the classification of Dreimanis (1989) and Dreimanis and Schluchter (1985). These include (a) thick, subglacial till blankets; (b) thin till veneers; (c) ice-contact stratified drift; (d) glaciofluvial sand and gravels; and (e) glaciolacustrine materials (Parsons 2008). From the reverse circulation drilling, it was observed that overburden thickness in the eastern part of the property varies between 3 and 10 m north of the greenstone belt, but south of this belt, till thickness locally exceeds 30 m. Through the central part of the property, a northeast-southwest belt of ice-contact stratified material exists, which is assumed to be thick due to a notable increase in elevation through this area. Overburden thickness in the western part of the property is assumed to be similar to that in the east.

THE TPK GOLD GRAIN-IN-TILL DISPERSAL APRON

The TPK gold grain-in-till dispersal apron is one of the largest, gold grain-in-till dispersal aprons in North America (Fig. 6). Gold grains associated with this apron are thought to have been dispersed from a series of gold-bearing shear zone(s) (see "Bedrock Geology" section above). These shear zones have a potential fertile strike length of 24 km. The extension of the gold-bearing shear-zones west from the eastern part of the property is defined by airborne geophysics, prospecting, and the distribution and concentration of anomalous arsenic geochemical values and gold grains recovered from surficial tills. The only "break" in the apron is due to a thick layer of ice-contact stratified drift (see "Overburden Geology" section above), presumably masking the underlying gold grain-bearing tills. The shear zone, however, can be easily traced along strike through this area as interpreted from high-resolution airborne geophysics.

Similar gold grain anomalies in other gold districts have consistently proven to represent an amalgamated response from a cluster of gold zones, indicating a large gold system or district rather than a single gold zone (Northern Superior Resources Inc., Rainy River Resources Ltd., press release, June 24, 2010). Examples of similar gold grain-in-till aprons include the Meladine (development stage) and Meadowbank (new mining operation) gold deposits in Nunavut, the Casa Berardi (mining operation) gold deposit in Québec, and the Rainy River (in development) gold deposit in Ontario.

Gold-bearing boulders (assaying up to 92 g/t gold) and mineralized boulder trains (Fig. 7) were discovered and defined within the eastern part of the gold grain-in-till dispersal apron (Averill *et al.* 2011).

The two phases of reverse circulation (RC) drilling defined eight core drill targets (Averill *et al.* 2011)(Fig. 5), from the distribution and concentration of gold grains within the lowermost basal till. Of the eight targets defined thus far, target two has generated the most interest. This target covers a broad area, defined by strong gold-in-till anomalies from RC drilling, a significant concentration of gold-bearing boulders, and several Induced Polarization (IP)/Resistivity geophysical anomalies. From target two, a strong gold grain-in-till dispersion train of at least 3 kms extends southwest down-ice of the target. The anomaly is also associated with anomalous concentrations of arsenic and zinc, and overlies a broad, shear-fractured leucogranite of the "contact stock". The leucogranite contains both spessartine garnet and fluorite alteration, important minerals commonly associated with gold mineralization in these environments. This target remains untested.

Core drilling completed so far has been focused on two of the lower priority targets (one and three) and an extension of the shear zone west of target two. It is very important to note that the two higher priority targets (two and four) have yet to be drilled. Nonetheless, several excellent intersections have been reported, including 28.75 g/t gold over 13.45 m (TPK-10-004) from target three.

KEELY LAKE GOLD GRAIN-IN-TILL DISPERSAL CORRIDOR

In the summer of 2011, Northern Superior completed a first-phase prospecting and overburden sampling program over the western part of the TPK property. Although the purpose of this program was to define the extension of the gold-bearing shear zone(s) west from the eastern side of the TPK property (and the program was successful in doing this), it soon became obvious that a strong gold grain-in-till dispersal corridor (named Keely Lake, up to 3.5 km width) existed north of the shear zone with a source for the associated gold grains to the northeast (Fig. 8). Prospecting also lead to the discovery of a large boulder that assayed 12.60 g/t gold, 111 g/t silver, and 4.05% copper (Northern Superior Resources press releases, September 14, October 25, December 6, 2011).

In the fall of 2011 a second overburden sampling and prospecting program was initiated to build on the discoveries made from the previous year. The head of the Keely Lake gold grain-in-till was defined north of the TPK property boundary, so additional staking was completed to capture the source of the gold grains. A second source of gold grains was identified within the dispersal corridor itself. From the prospecting program, 100 mineralized boulders (sampling terminated due to heavy snow fall) were recovered, 83 of which contained anomalous gold, silver, and copper values, one of which contained coarse visible gold (727 g/t gold).

Following this second phase of exploration on the western half of the property, a core drilling program consisting of 7 holes (2,241 m) was completed in the second quarter of 2012 (Northern Superior Resources press release, June 26, 2012). Highlights from this core drill program include an intersection of 4.62 g/t gold over 5.5 m.

GOING FORWARD

The opportunity for significant mineral discoveries on the

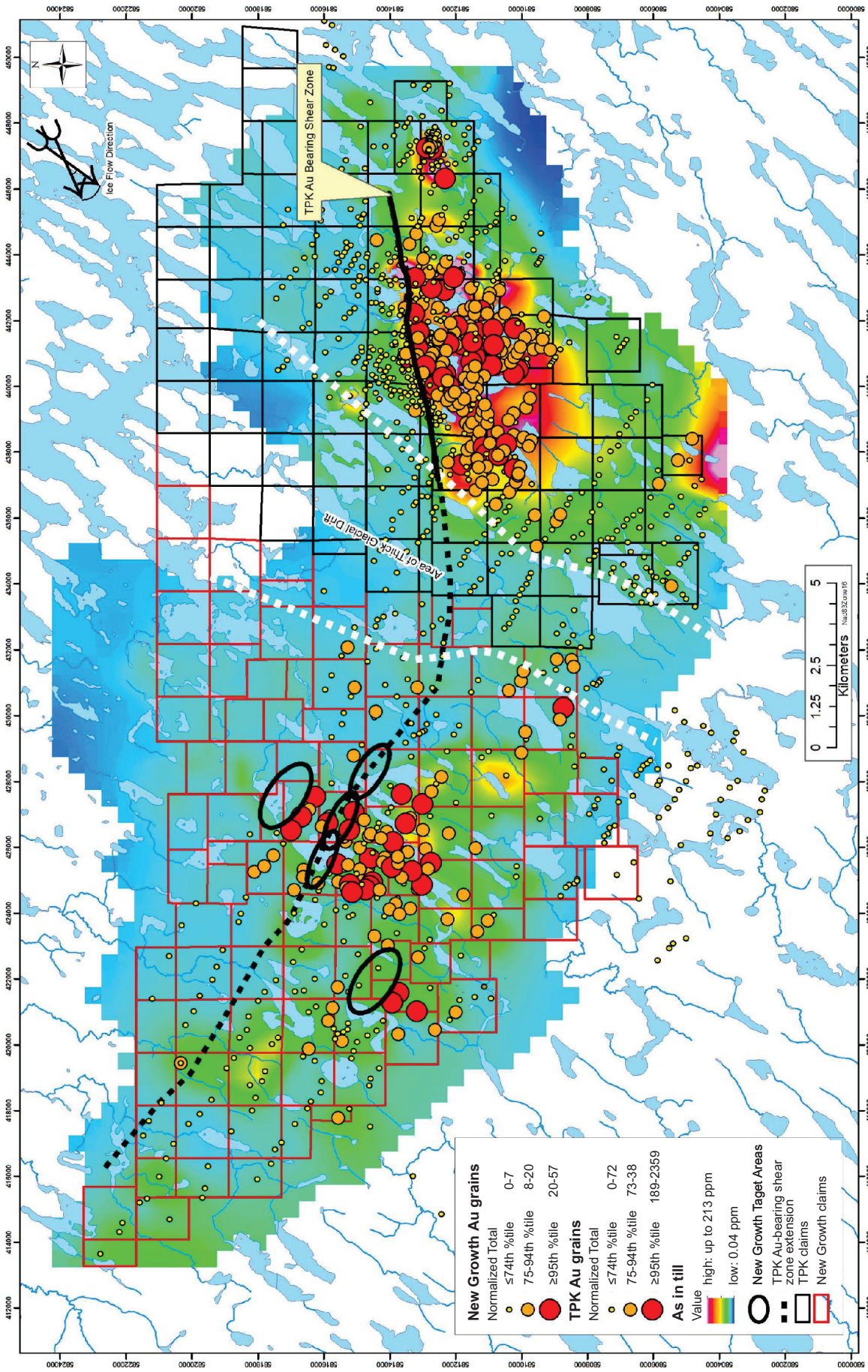

Fig. 6. The TPK gold grain-in-till dispersal apron. The location (solid line) and proposed location (dashed line) of the 24 km long gold-bearing shear zone(s) is also illustrated. Property outline is pre-2013

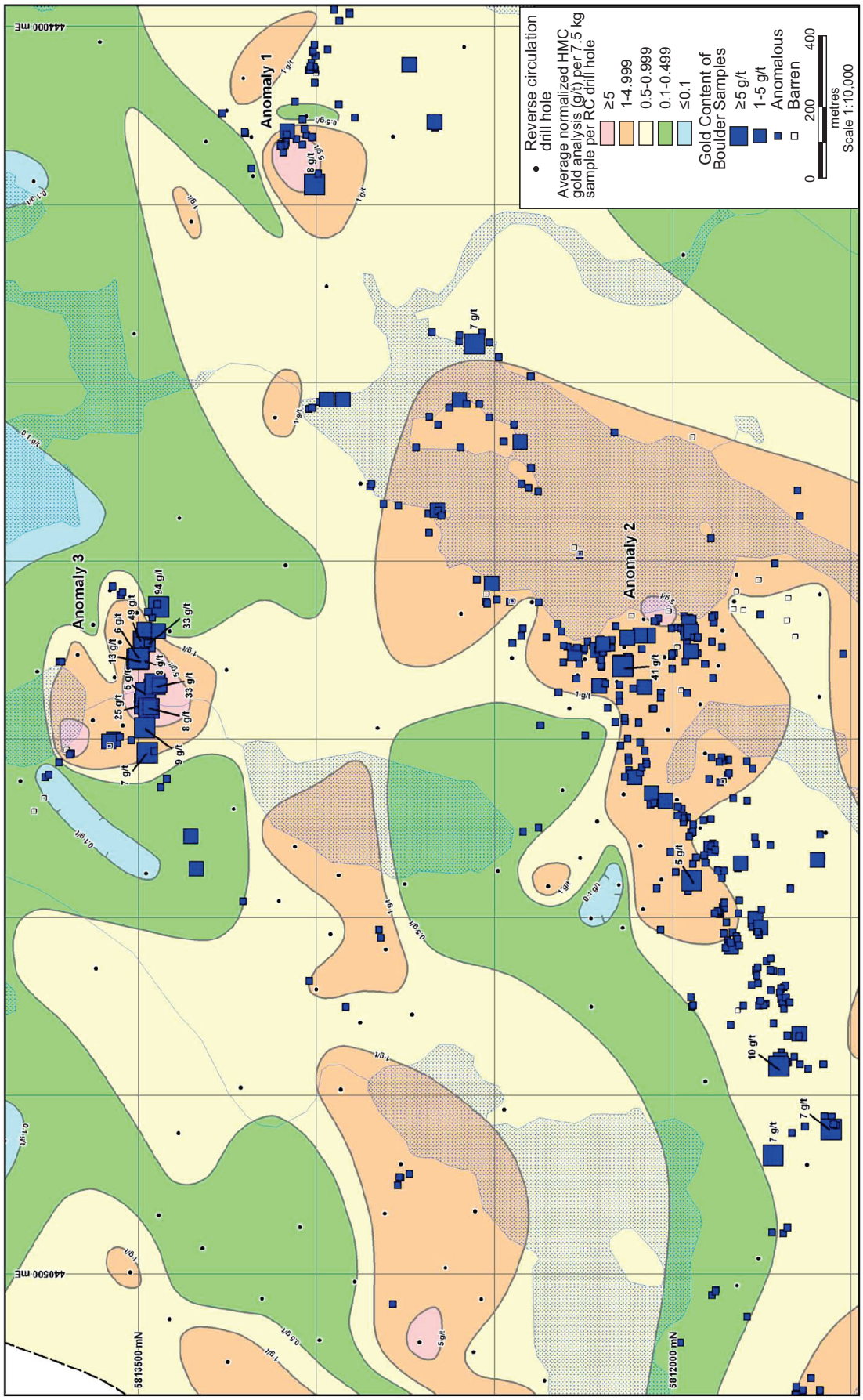

Fig. 7. Distribution of mineralized boulders and boulder dispersal train (Averill *et al.* 2011).

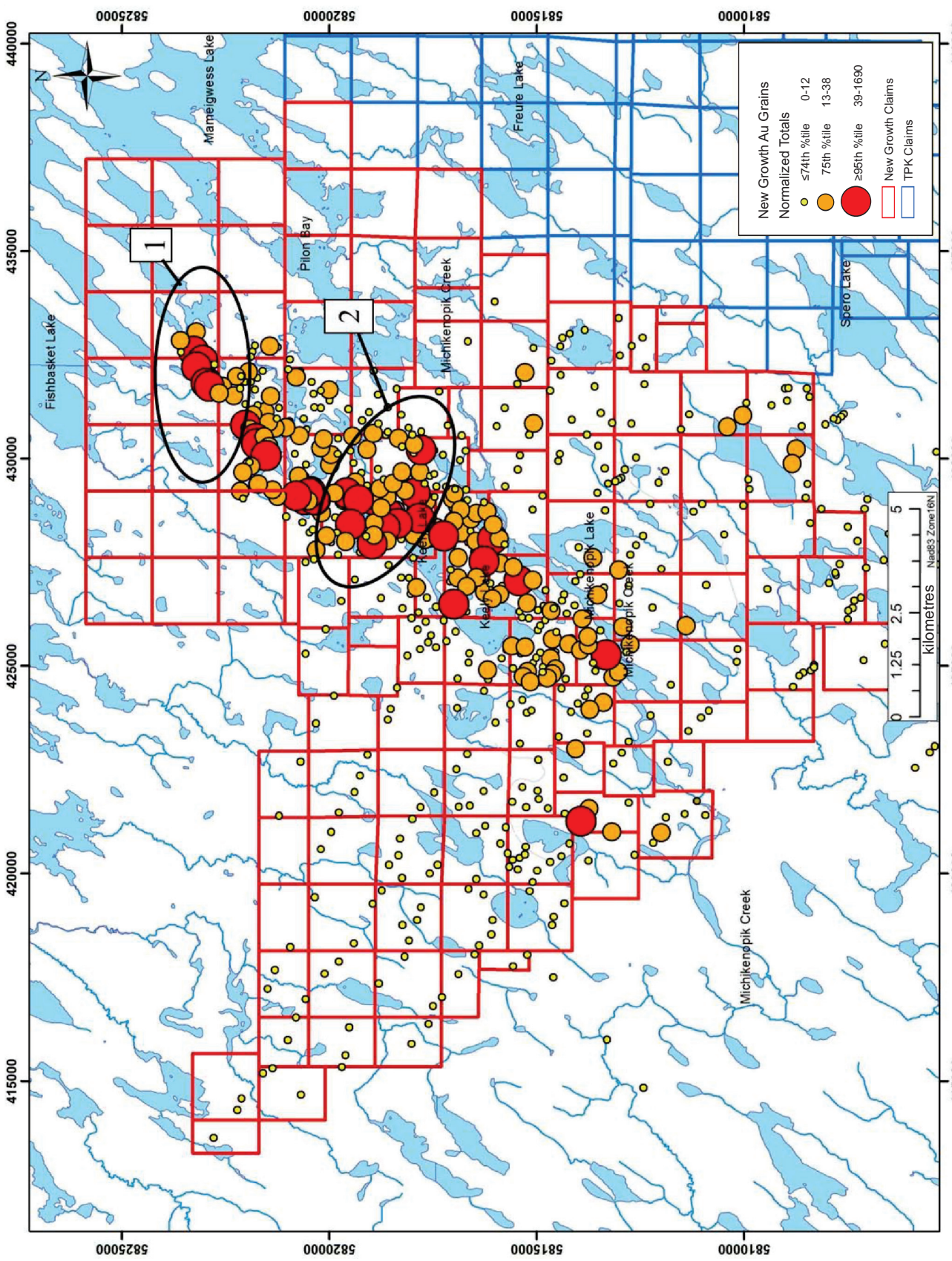

Fig. 8. Keely Lake dispersal corridor. Gold grain source at the head of the corridor (1) and within the corridor (2). See Figure 2 (dashed line) for the projected location of the gold-bearing shear zone.

TPK property is both unique and exceptional. Much of the "heavy-lifting" on this property has already been done with many untested, drill-ready targets defined. Infrastructure and access have been greatly improved with the addition of a year-round camp and access trails extending across the eastern part of the property from the camp. Relations with the local First Nation are excellent, with an extension of an Early Economic Benefits Agreement recently (July 2013) signed. The property is 100% Northern Superior Resources Inc. owned, is large, and captures two important mineral systems. Northern Superior Resources is currently looking for an option partner to participate and finance the next phase of exploration on the property.

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