Kodal Minerals Plc

Kodal Project

Exploration report- 2016

Executive Summary

Kodal Phosphate AS ("Kodal Phosphate" or "the Company"), a wholly owned subsidiary of Kodal Minerals Plc ("Kodal Minerals"), hold three extraction and held seven exploration permits at the Kodal Project site. At the End of 2015 six of these exploration permits are being relinquished, one will be maintained. The three extraction permits will all be maintained.

Exploration work at the site has been completed and consisted of geological mapping, sampling, ground-based geophysics, re-evaluation of existing geophysical information and trialling of portable drilling equipment on the project.

The outcome of this work has been that the known extent of the main ore body has been extended in the north-west of the deposit. In addition to this, two new separate mineralised bodies have been identified within 1km of the main deposit, one to the north and the other to the south. Of these the body to the south is the more significant and is situated within the exploration permit Kodal 6. For this reason, the permit Kodal 6 is being maintained. In addition to these moderate discoveries, large areas of ground have been preliminarily sterilised to allow for the development of planning activities related to the Kodal mine proposal.

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Introduction

Kodal Minerals through its wholly owned subsidiary Kodal Phosphate AS, hold extraction and exploration permits at the Kodal Project in Vestfold, Norway. The following document details exploration activity conducted by Kodal Minerals to date on the project.

This report is submitted to cover the requirements of relinquishing the exploration permits Kodal 1-5 and Kodal 7.

The report also details the progress to date on exploration permit 0099-1/2014, “Kodal 6” which has been maintained.

This report does not include information relating to the progress of plans and engineering works for the Kodal Mining project and planning process.

Location

The Kodal Project is situated in the Vestfold region of Norway, 85km south west of Oslo, approximately 20km north of the town of Larvik and covers area in both the Larvik and Andebu municipalities. The project sits approximately equidistant between the towns of Kodal and Kvelde.

Kodal Minerals are aware that there may be a change to the administrative boundaries in the region of the permits at the end of 2016 which may affect the distribution of the permits between municipalities.

Figure 1: Plan detailing the location of the Kodal Project

Permits

In 2013, Kodal Phosphate AS was granted extraction permits at the Kodal Project site, near Kodal in Vestfold. During the course of 2013 the geology project area was remapped by Kodal Minerals and subsequently in 2014, seven additional exploration licences were applied for and granted.

Kodal Minerals held 7 exploration permits at the property along with 3 extraction permits, the details of the exploration permits are covered in Table 1. Figure 2 shows a plan of the exploration permits on the project, including exploration permits surrendered and maintained, the plan also details the extraction permits held by the company.

Kodal Minerals maintains its extraction permits along with one exploration permit, 'Kodal 6' but after concluding the work program of 2014 and 2015 relinquishes the exploration permits 'Kodal 1-5' and 'Kodal 7'.

Table 1: Details of Exploration Permits held at the Kodal Project by Kodal Minerals

Type	Name	Number	Point	E	N	Commune	Region	Area		Status	Maintenance due	Expires
Exploration	Kodal 1	0091-1/2014	A	557425	6569000	Andebu	Vestfold	5752500	m²	Expired end 2016	N/A	N/A
			B	559375	6569000							
			C	559375	6566050							
			D	557425	6566050							
Exploration	Kodal 2	0092-1/2014	A	559375	6569000	Andebu	Vestfold	1512500	m²	Expired end 2016	N/A	N/A
			B	559925	6569000							
			C	559925	6566250							
			D	559375	6566250							
Exploration	Kodal 3	0096-1/2014	A	559925	6569000	Andebu	Vestfold	6500000	m²	Expired end 2016	N/A	N/A
			B	562425	6569000							
			C	562425	6566400							
			D	559925	6566400							
Exploration	Kodal 4	0097-1/2014	A	560475	6566400	Larvik	Vestfold	1511250	m²	Expired end 2016	N/A	N/A
			B	562425	6566400							
			C	562425	6565625							
			D	560475	6565625							
Exploration	Kodal 5	0098-1/2014	A	557425	6566050	Larvik	Vestfold	2500000	m²	Expired end 2016	N/A	N/A
			B	558675	6566050							
			C	558675	6564050							
			D	557425	6564050							
Exploration	Kodal 6	0099-1/2014	A	558675	6565350	Andebu	Vestfold	1625000	m²	**Valid**	Dec-16	2021
			B	559925	6565350							
			C	559925	6564050							
			D	558675	6564050							
Exploration	Kodal 7	0100-1/2014	A	559925	6565625	Andebu	Vestfold	393750	m²	Expired end 2016	N/A	N/A
			B	562425	6565625							
			C	562425	6564050							
			D	559925	6564050							

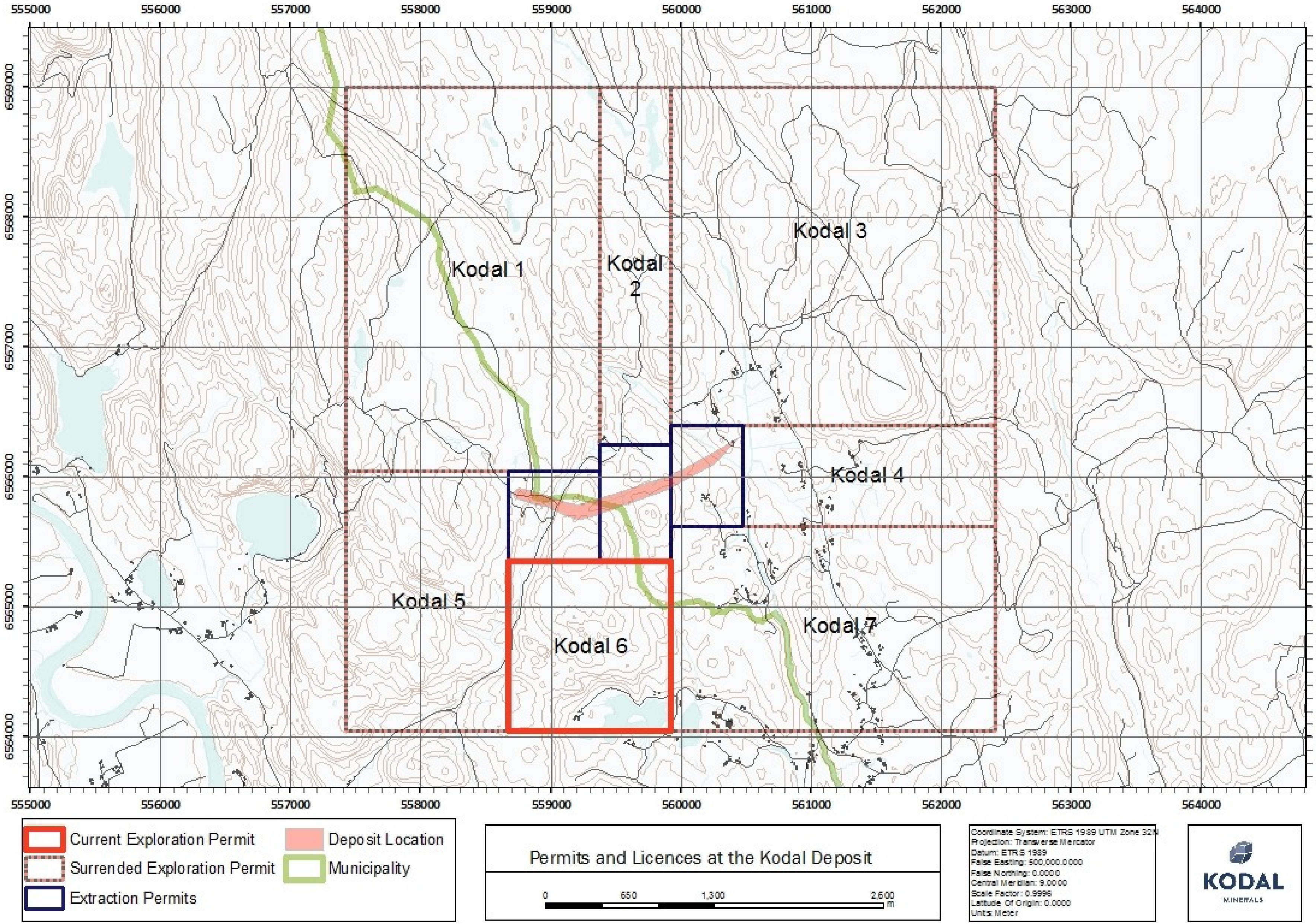

Figure 2: Permits at the Kodal Deposit

Work Conducted

The following details work conducted by Kodal Minerals 2013- 2015 and their findings, some of this work has been in conjunction with developing the knowledge base for the mine planning process the company is engaged with.

Geological Mapping

Previous mapping had been conducted in the area by Lindberg and Bergstol. The mapping conducted by the Company found no inaccuracies but a better understanding of hydrothermal processes has affected the interpretation of geometry of the mapped outcrop and inference between outcrops. Recent mapping has also identified and extended the existence of a zone of significant potassic alteration around the deposit. This is seen to be focussed on the main ore zone and gradationally decrease with increasing distance from the deposit.

Geological mapping of the project site occurred in 2013 and 2014. The terrain is rough and undulating with frequent rocky exposures, a number of large cliffs cut through the areas and the vegetation is predominantly dense evergreen forest with infrequent farming activity in flatter areas where outcrop is seldom encountered. Mapping took place initially over the deposit area and subsequently over the area covering the seven exploration licences. This was done on foot with initial geological reconnaissance identifying the style, nature and classification of geology and mineralisation that would be used subsequently.

Mapping was conducted using the rock classification suggested by the NGU (*Gjelle, S & Sigmond, E. 1995)* where possible, deviations to this have been made in order to differentiate between similar rock types that would have otherwise been classified together.

In the field, geologists would walk between outcrops, identify the extent of the outcrop being delineated and mark onto prepared topographical base maps. Outcrop geology was then marked using the predefined terms and notes and field observations made into notebooks. Structural data was also collected and marked directly onto basemaps where pertinent or recorded with field observations.

Geological Classifications

Monzonite – termed 'larvikite' in the literature. Dark grey/blue. 80% euhedral feldspar phenocrysts (likely K-feldspar, with a perthite component due to lustre), and 20% blebby granular pyroxene as an interstitial phase. Minor quartz and magnetite. Coarse grained; feldspars 3 - 10 mm, pyroxene blebs up to 5 mm. Typically massive and homogenous.

Syenite – termed 'nordmarkite' in the literature. Orange/pink. 97% euhedral feldspar phenocrysts (likely K-feldspar) and 3% euhdral pyroxene. Extremely limited and localised magnetite, no quartz. Very coarse grained/megacrystic; feldspars 10 - 30 mm, pyroxene 5 – 10 mm.typically massive and homogneous.

Main Oxide Ore – Fine grained black mineralised typically granular mass which distally grades into variable amounts of felsic cumulate material (from 0 – 90%); for this, see *Transitional Cumulate*. The ore is magnetic, containing a field-indeterminable quantity of magnetite, ilmenite, titanomagnetite, pyroxene, and potentially amphibole and biotite. Apatite not observed due to fine grained mafic nature. Locally, granular accretions occur to define larger blebs.

Transitional Ore– Amorphous feldspathic phase with variable quantities of interstitial ore material. Felsic components are typically 5 – 15 mm, unorientated crystalisation and do not appear to define a fabric. Generally pink in colour due to hydrothermal alteration of feldspars, believed to be potassic alteration with sericite and chlorite. Occasionally rock will appear altered without minerlisation but in no circumstances was transition material observed without alteration.

Rhomb Porphyry – sheet like intrusions around the deposit with a broadly syenitic composition and a distinctly leucratic nature and rhomb phenocrystic texture

Latite – Fine grained with mozonitic composition, lava and ash flows, sit discordantly above mozonite intrusive units. Generally lacking in texture occasionally displaying a pink hue. ~5mm euhedral phenocrysts of feldspar can be seen at a number of locations, these seldom exceed 10% of the rock mass.

Micro Diorite – fine to aphanitic seen cut, dioritic composition, occasionally with epidote. Monzonite and mineralisation but not Syenite.

Findings

The geological mapping exercise has identified two new areas of mineralisation in the vicinity of the project, both are relatively small. One to the south of the main mineralisation and one to the north, these are labelled in Figure 4. In addition to these small new discoveries, detailed mapping of the western end of the deposit has revealed further mineralisation. Mapping of a significant alteration zone, combined with textures observed during the mapping has also strongly influenced Kodal Minerals' thoughts on the origin of the mineralisation at the project.

In addition to the mineralisation, one of the other interesting findings was in the vicinity of the eastern end of the deposit to the immediate north, a slightly later Monzonite intrusion was observed hosted entirely within the Monzonite found throughout the project area. A reduction in grain size along with a foliated contact zone was noted, the influence of this intrusion on mineralisation in the area is presently unknown.

Southern Mineralisation

The southern mineralisation seen in Figure 6 was found during the source of field mapping, only minimal outcrop is to be found in a topographical low. The area is clearly in in an area affected by moderately significant faulting running NW-SW, sub parallel with the western end of the Main ore zone mineralisation. Main oxide ore has been found and very small amounts of transition zone material. Minimal potassic type alteration was observed, suggesting that this body of mineralisation is likely insignificant in size in the near surface domain, however a hydrothermal formation model could permit a scenario where the majority of mineralisation was at depth. The only way to test the economic viability of this target is drilling 25-100m below surface. The area is also noted for being considerably intruded by late porphyritic latite and latite dykes.

XRF analysis was conducted by the company's staff used on outcrop grab samples, the sample was crushed and the results from four tests throughout the samples were taken, the results along with a mean and results from the JORC statement are detailed in Table 2. The results clearly show that the mineralisation is very similar to that of the Kodal Main ore zone.

Table 2: XRF results from the Kodal South Mineralisation, including mean and Kodal Main ore zone JORC reported resource grade

	Kodal South					Kodal JORC Resource
Test	1	2	3	4	MEAN	
P (%)	3.1	2.1	2.6	2.4	**2.5**	
P2O5 (%) Equivalent	7.0	4.9	6.0	5.5	**5.8**	4.77
Fe (%)	12.3	12.8	17.8	14.3	**14.3**	21.5
Ti (%)	1.5	1.4	1.7	0.9	**1.4**	
Ca (%)	7.4	3.6	5.0	3.5	**4.9**	
K (%)	1.1	1.8	1.5	0.1	**1.1**	
Al (%)	3.3	4.6	3.4	4.5	**3.9**	
Si (%)	16.4	19.9	13.4	9.3	**14.8**	

Northern Mineralisation

The northern mineralisation is limited to a small outcrop immediately on the side of the road around 1km to the north of the main ore zone mineralisation. The surface expression is approximately 2x10 m and is composed of transition ore material. Very moderate amounts of potassic alteration have been observed within cm of the small mineralised blebs at the location. Again the location sit on top of what appears to be a moderate scale faulted feature running NW-SE combined with latite intrusive sills. The very limited size of the outcrop along with relatively low grade does not give cause for further exploration at this time at this location. An XRF analysis was conducted using grab samples from this location also, results are detailed in Table 3.

Both of these mineralisation findings are noted to be around 1km from the main deposit to the north and south respectively. They also occupy distinct topographical features related to a degree a faulting and latite intrusion. Two theories have evolved, the first that these could be the extremities of bifurications that connect at depth or a sources from the same mineralisation that feeds the Kodal main ore zone. Another suggestion, certainly applicable to the northern mineralisation, is that this is remobilisation of mineralised material possibly caused directly by post mineralisation latite dyking. These dykes are seen to cut the whole area, which has recrystalised in areas which could be interpreted as being low pressure zones in existing faulted features.

Table 3: XRF results from the Kodal North Mineralisation, including mean and Kodal Main ore zone JORC reported resource grade

	Kodal North					Kodal JORC Resource
Test	1	2	3	4	MEAN	
P (%)	1.6	0.5	1.4	1.2	**1.2**	
P2O5 (%) Equivalent	3.7	1.1	3.2	2.7	**2.7**	4.77
Fe (%)	8.7	6.1	5.8	5.9	**6.6**	21.5
Ti (%)	1.4	0.4	0.8	1.1	**0.9**	
Ca (%)	4.3	1.7	3.8	3.4	**3.3**	
K (%)	1.6	2.2	1.1	1.5	**1.6**	
Al (%)	3.4	3.7	3.2	6.0	**4.1**	
Si (%)	12.9	17.9	14.4	24.2	**17.4**	

Western Mineralisation

Figure 7 shows a plan of the detail geology at the extreme west of the deposit including the area to the immediate north of the main deposit, this is known as the western mineralisation. This zone appears to represent a bifurcation of the main ore zone, not perfectly represented in surface outcrop. While clearly part of the main ore zone and formed during the same geological event the presence of this extended zone is considered positive by the company, permitting the possibility of other bifurications of the main ore zone at depth. The grades noted using XRF analysis detailed in Table 4 show exceptionally good phosphate results in this vicinity.

Table 4: XRF results from the Kodal Western Mineralisation, including mean and Kodal Main ore zone JORC reported resource grade

	Kodal Cabin					Kodal Main JORC Resource
Test	1	2	3	4	MEAN	
P (%)	1.3	5.9	7.9	1.9	**4.3**	
P2O5 (%) Equivalent	3.0	13.5	18.1	4.4	**9.7**	4.77
Fe (%)	9.7	15.4	34.1	7.3	**16.6**	21.5
Ti (%)	0.8	2.9	4.7	1.3	**2.4**	
Ca (%)	6.3	10.2	10.4	6.4	**8.3**	
K (%)	0.4	0.7	0.7	0.7	**0.6**	
Al (%)	7.7	3.3	4.0	6.5	**5.4**	
Si (%)	9.4	16.3	9.1	25.9	**15.2**	

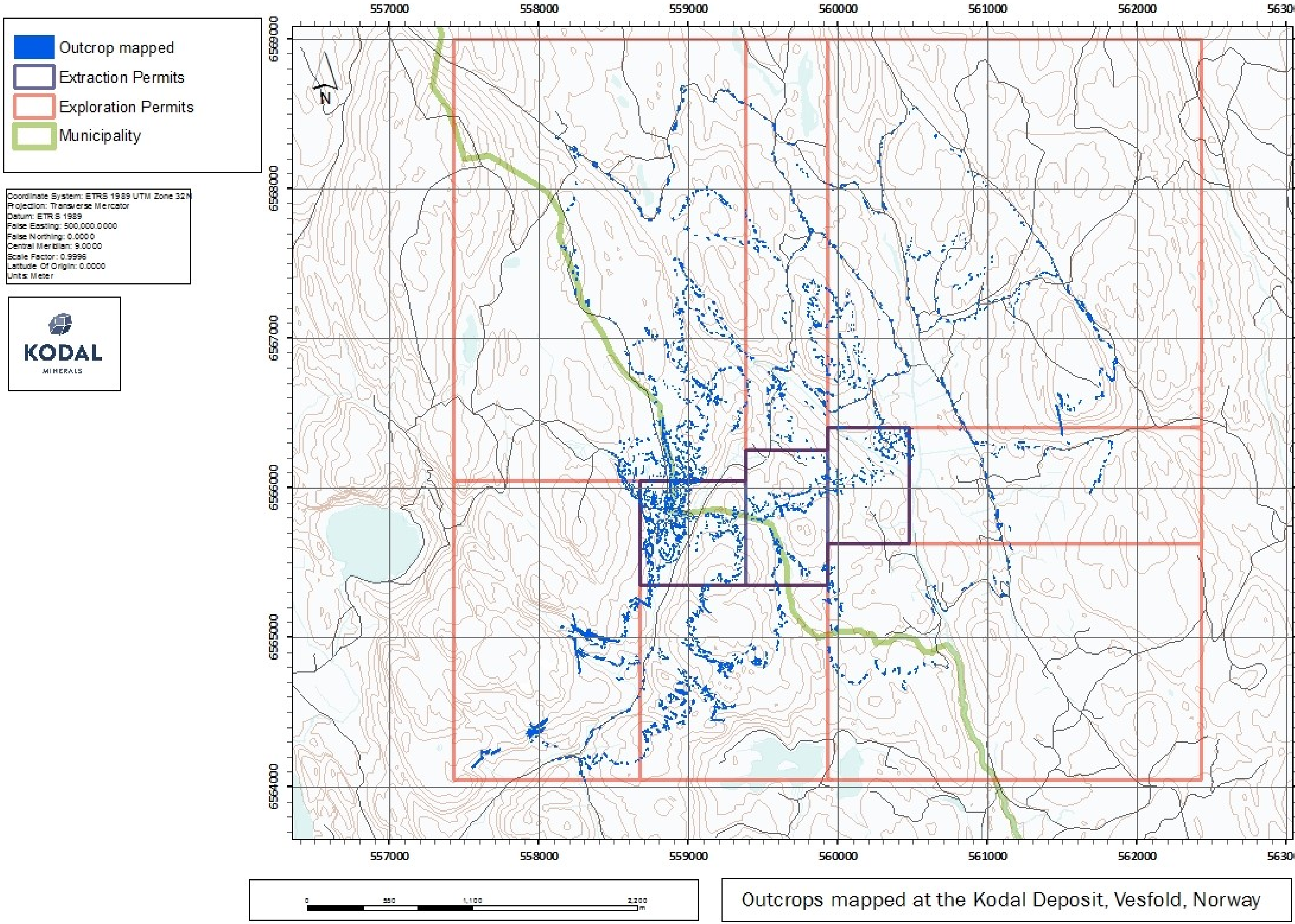

Figure 3: Plan of the Kodal deposits area showing outcrops mapped 1:30,000

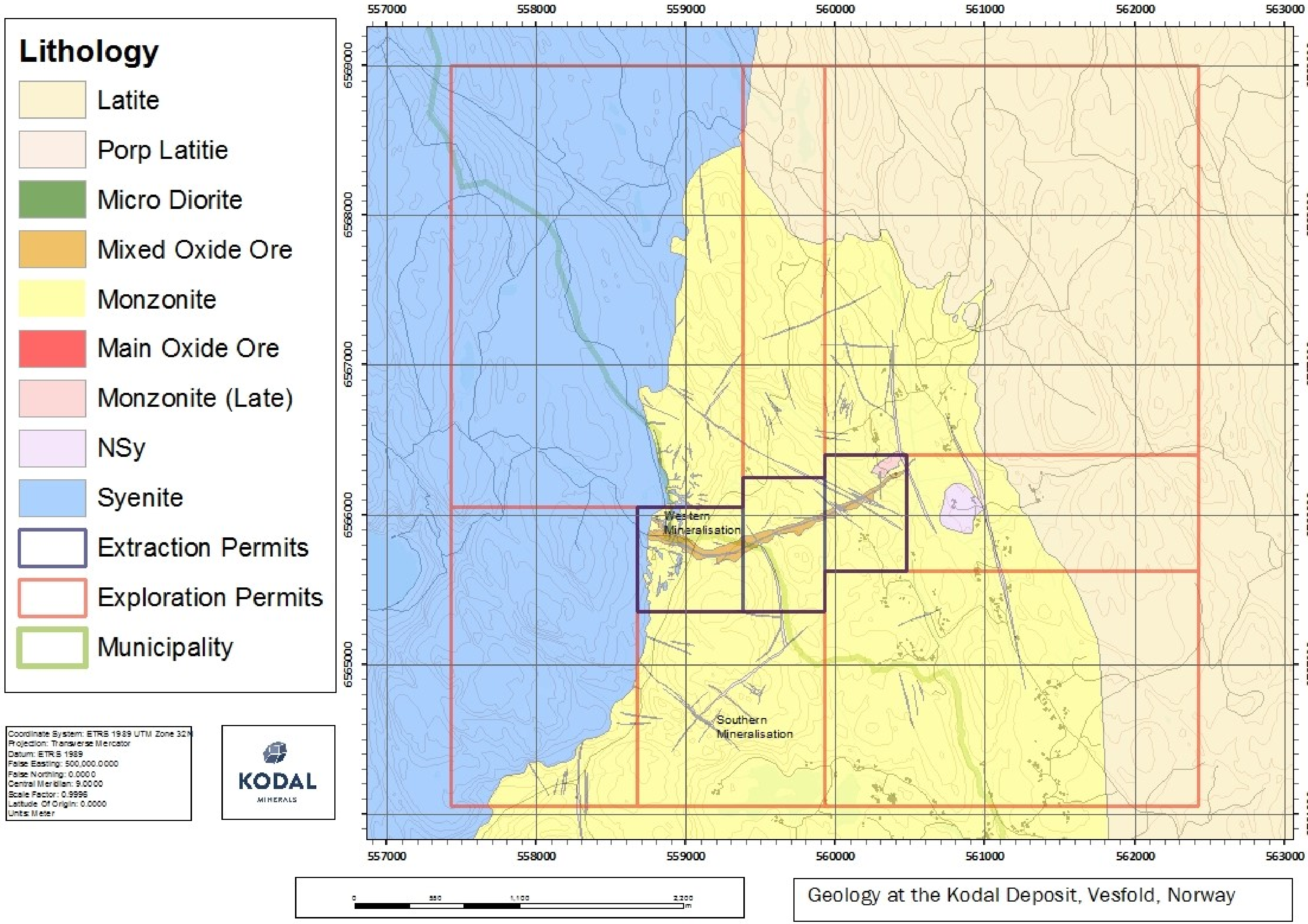

Figure 4: Kodal deposits area showing interpreted geology 1:30,000

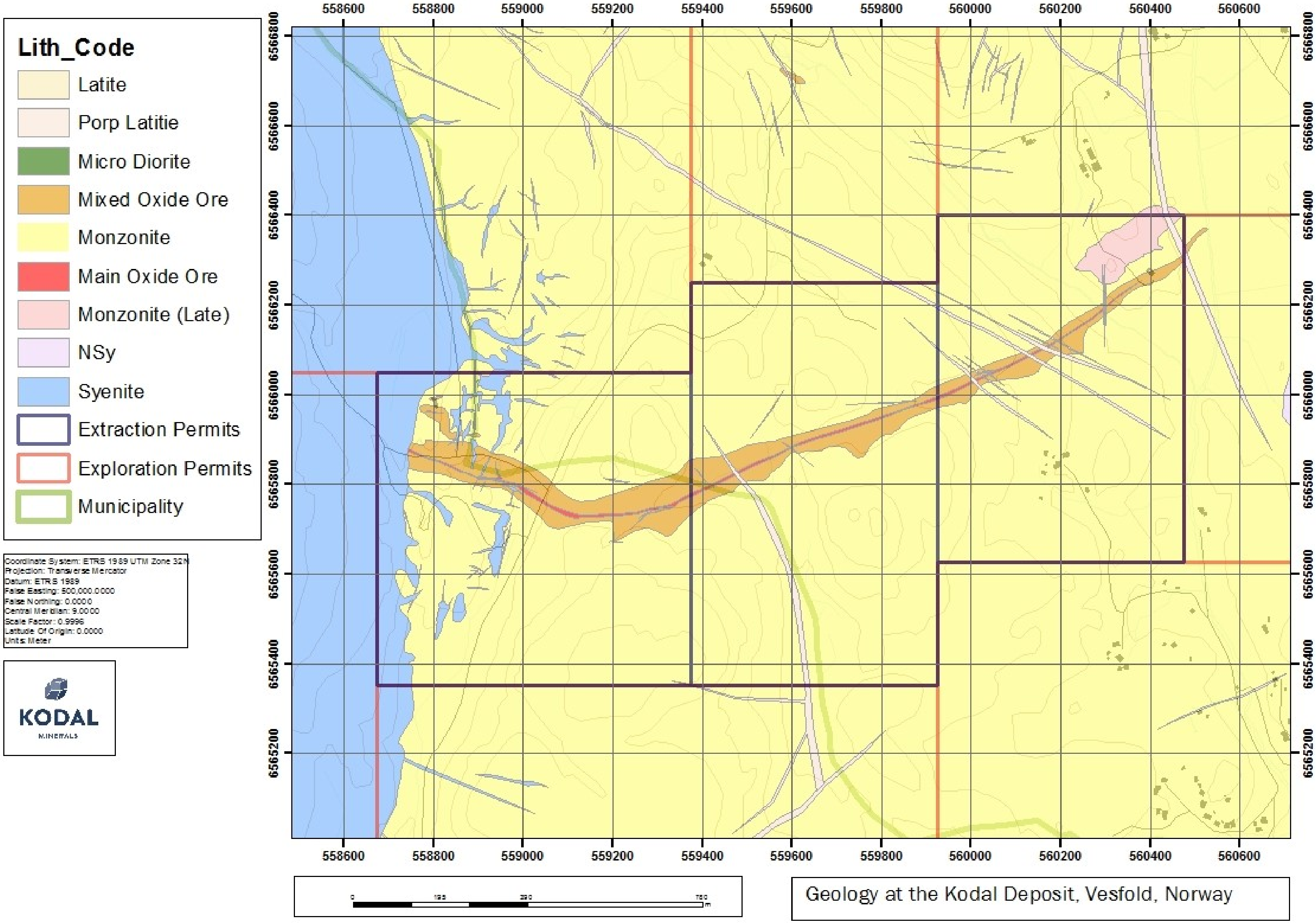

Figure 5: Plan of the Kodal deposits area detailing the Main ore zone interpreted geology 1:10,000

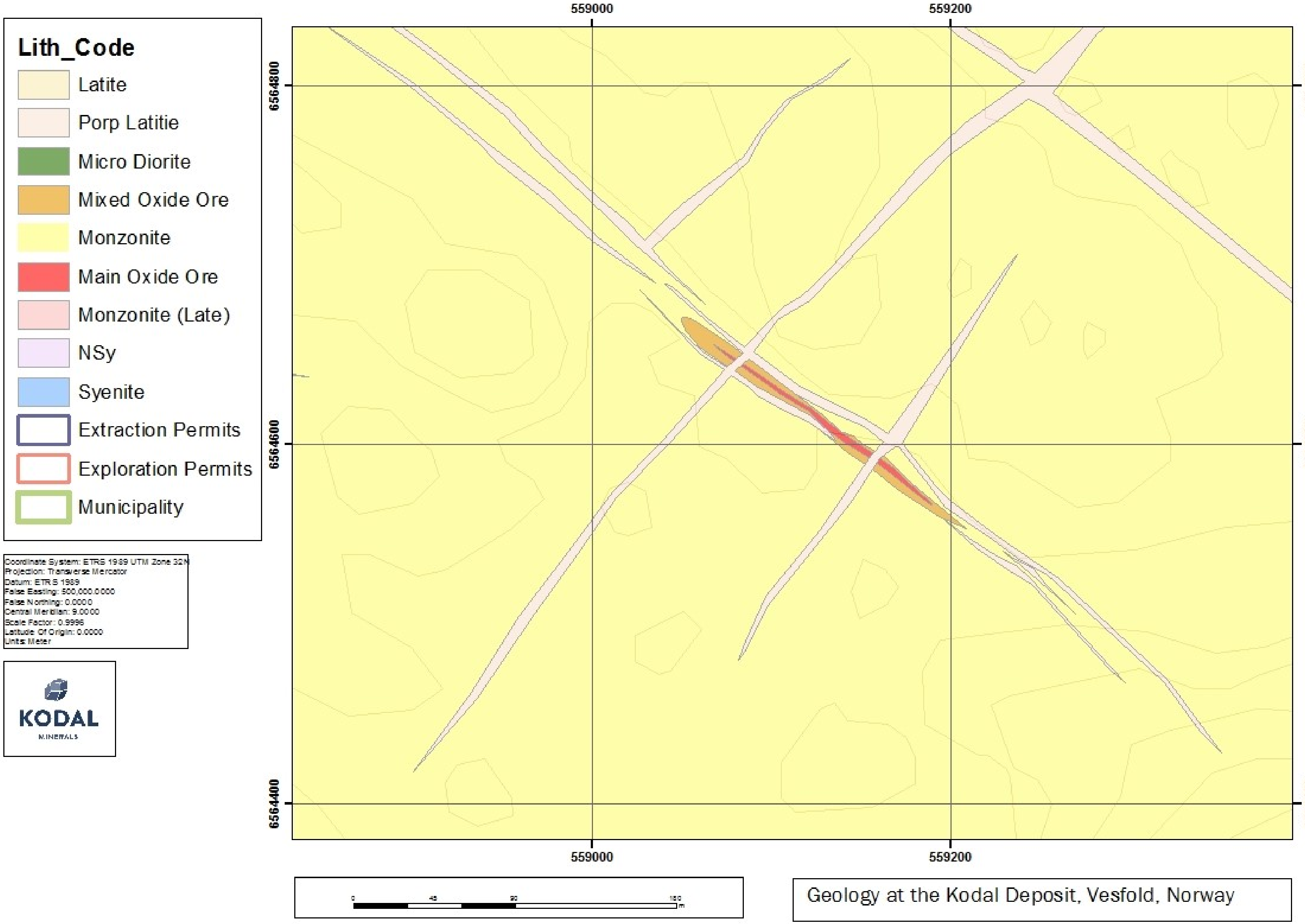

Figure 6: Plan of the Kodal deposits area detailing the Southern Mineralised zone interpreted geology 1:5,000

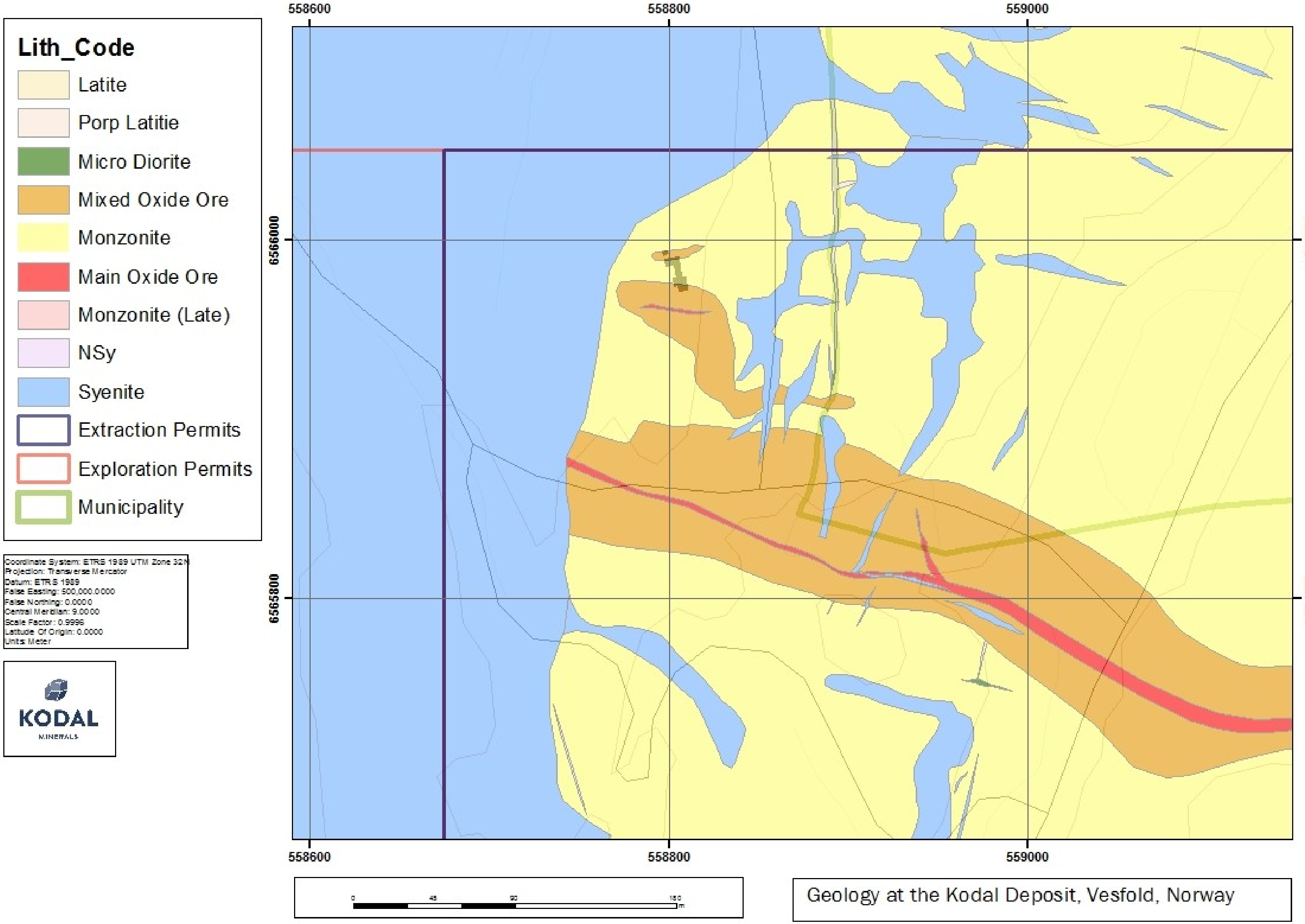

Figure 7: Plan of the Kodal deposits area detailing the Western end of the Main ore zone interpreted geology 1:5,000

Microscopy

Two suits of samples have been taken by the Company during the period and two reports are appended to this report detailing the findings.

Geophysics

During 2014, the Company undertook a trial of ground based geophysics on the site, the aim of this was to test the suitability of these methods for identifying and defining mineralisation in the area of the Kodal Project.

A twin magnetic field receiver and recorder was used over a series of pre-planned lines over the Kodal Main ore zone. This measures the instantaneous magnetic field at points every 5 seconds which equates to 1-2m. The use of two receivers allows for two recordings at differing but fixed heights to be taken, in effect the difference between these two readings over a short distance permits the recording of the change in field and therefore the gradient of the magnetic field in a vertical vector at that location. This magnetic method was trailed after consultation with several geophysicists as a potentially very effective, relatively low cost method. The high iron content of the mineralisation, especially when considered compared to the surrounding geology should give a high contract magnetic signature.

Lines that were walked are marked in Figure 8 in red, with the main ore zone and the approximate location of the southern mineralisation shown as a trace in brown. Under a full survey, clear lines would be made across the terrain in order to walk in perfectly straight lines, this aids in processing the data and can give better defined results.

Results from the passes over the Kodal deposit provided an extremely positive signature with a centre of the response observed as being a short distance ~100m to the south of the outcrop, Figure 9. Drilling has proven the deposit to dip at 75-80° to the south, the effect of this dip being the most likely reason for the offset. The length of the lines across the deposit was 450m. During the post processing of the data, this was observed to be too great to interpolate between the two lines although this was unsurprising.

The trial lines over the southern mineralisation were spaced much closer together, around 150m centre to centre. The lines crossed a strong topographical feature to the north of the mineralisation, a steep rock face which made walking lines difficult. The results from these lines did show a positive magnetic signature across the three lines to the north of the mineralisation in the vicinity of the outcrop although not as clear as from the main ore zone. While this is very positive, the extent of this mineralisation at surface is likely to be 300-400m. Concerns have been raised about errors introduced by the strong topographic changes in the area and the effects of these need to be examined in further detail. The utilisation of longer lines may help control or at least help quantify this effect.

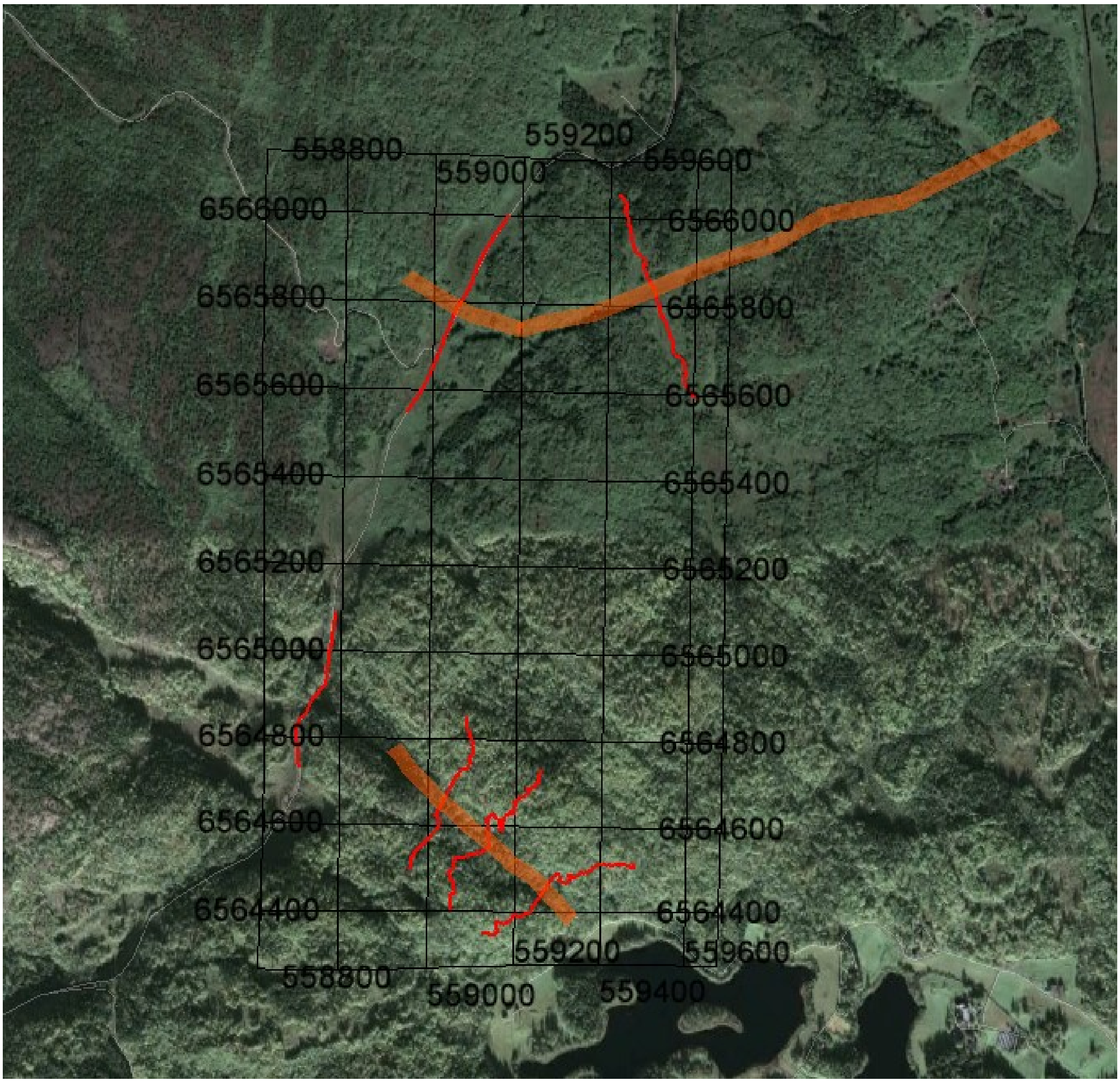

Figure 8: Plan detailing location of main and Southern mineralisation at the Kodal project in brown with walked lines in red

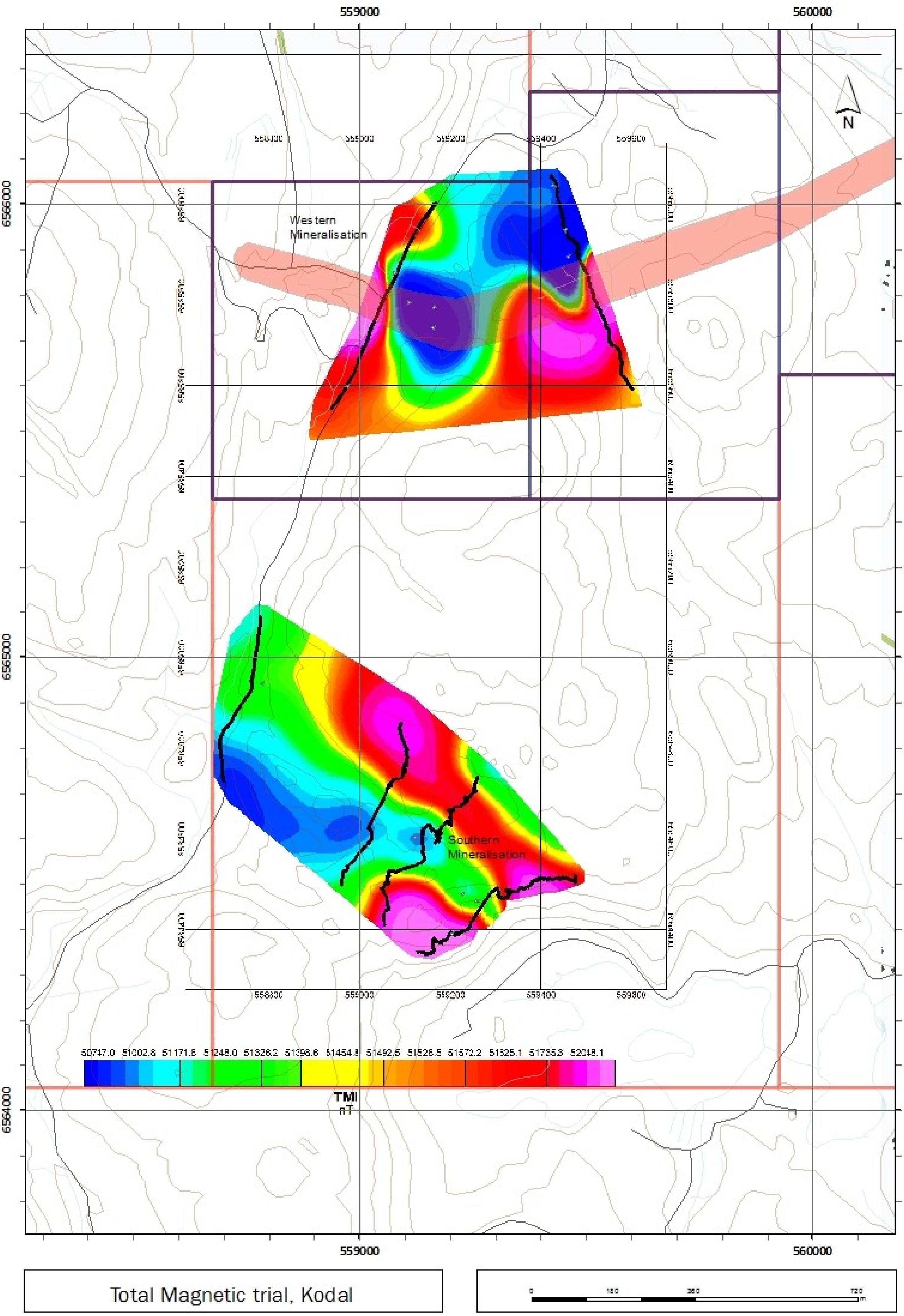

Figure 9: Plan detailing location of Main and Southern mineralisation at the Kodal project in brown with overlain processed results of magnetic survey

Drilling

Given the rugged terrain Kodal Minerals experimented a backpack drill rig at the southern mineralised site in 2014. It was hoped to drill a pattern of low impact hole to quantify the extent of the mineralisation before incurring the cost and environmental impact of creating road access to the site and conducting standard test drilling. A small petrol drill was loaned by the NGU. Unfortunately the rock encountered was too hard for the forces generated by the machine and operator which were not sufficient achieve penetration. Thanks to the NGU and in particular to Leif Furuhaug for the loan of the drill rig.

Conclusion

Situated within the lower part of the Permian Oslo rift in the Vestfold Graben. The Deposit is part of the Larvikite- Ladalite complex of Syenites and Monzonites of late Variscan age. The deposit is found at the basal contact of the younger of two Larvikite intrusions. The deposit has previously been interpreted as being a cumulate deposit with a number of lenses defined by modal layering of heavy minerals contributing to the main zone which is around 20 m thick, and extends along the strike of the deposit although it thins on at the eastern end. Above and below the main ore layer is a transition zone of small and irregular shaped lenses of ore material hosted within the layered Monzonite. The host rock for this transition zone is observed to be hydrothermally altered.

The deposit strikes E-W for approximately 1900m, dipping 80° to the south, concordant with internal layering of the larvikites. To the East the deposit terminates with a series of en-echelon lenses decreasing in size until extinction interpreted as the limit of mineral formation. At the western end the deposit is truncated by a slightly younger nordmarkite / syenite intrusion. A number of syenite dykes can be found in the vicinity of the deposit and at times crosscutting the mineralisation, these are generally more frequent and pervasive in west but are found across the entirety of the deposit. Mineralisation is up to 60m thick including the transition zones and drilling has proven the tenure of mineralisation to a depth of 300 m. One geophysical interpretation suggests that a much deeper mineralised tenure may be present and there is currently no evidence to suggest either truncation or degradation of mineralisation at depth. The deposit is very tabular and grades have low variability.

Total magnetic signatures can also be used to effectively assess the location of mineralisation at the project. This method can be used in the future to help sterilise ground as and when required.

The findings at the Kodal project have revealed further mineralised locations proximal to the Kodal deposit, this a positive finding for the future of the project but has no significant influence on the immediate work of the company. The other significant finding is that the mineralisation was likely formed during a hydrothermal process associated with the significant volcanism that defines the Oslo Permian rift region. These confirm that the project may have significant tenure at depth.

Further Work

No further exploration work is anticipated on the areas which have been relinquished. There may be a requirement for some drilling on these areas for geotechnical or hydrology studies prior to mining.

The Main ore zone will require significant additional definition drilling prior to mining and this should include a number of deep holes. The mineralised zone to the south should be drill tested.

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