NI 43-101 Technical Report

Preliminary Economic Assessment of the Wood Mountain Project, Saskatchewan

Whitemud Resources Inc.

SLR Project No.: 233.65141.0001

Effective Date:

August 21, 2024

Signature Date:

August 23, 2024

As amended and restated on September 27, 2024

Prepared by:

SLR Consulting (Canada) Ltd.

Qualified Persons:
Ian Weir, P.Eng.
Lance Engelbrecht, P.Eng.
Derek Riehm, P.Eng., M.A.Sc.
Reno Pressacco, P.Geo., M.Sc.(A).

Making Sustainability Happen

NI 43-101 Technical Report for the Preliminary Economic Assessment of the Wood Mountain Project, Saskatchewan

SLR Project No.: 233.65141.0001

Prepared by

SLR Consulting (Canada) Ltd.

55 University Ave., Suite 501

Toronto, ON M5J 2H7

for

Whitemud Resources Inc.

6713 Fairmount Drive SE

Calgary, AB

T2H 0X6

Effective Date - August 21, 2024

Signature Date August 23, 2024, as amended and restated on September 27, 2024

Prepared by:
Ian Weir, P.Eng.
Lance Engelbrecht, P.Eng.
Derek Riehm, P.Eng., M.A.Sc.
Reno Pressacco, P.Geo., M.Sc.(A)., FGC

Peer Reviewed by:
Luke Evans, M.Sc., P.Eng.
Jason Cox, P.Eng.

Approved by:

Project Manager
Ian Weir, P.Eng.

Project Director
Jason Cox, P.Eng.

Table of Contents

Tables

Figures

1.0 Summary

1.1 Executive Summary

SLR Consulting (Canada) Ltd. (SLR) was retained by Whitemud Resources Inc. (Whitemud) to prepare an independent Technical Report on the Preliminary Economic Assessment (PEA) for the Wood Mountain Project (the Project), located near Assiniboia, southern Saskatchewan, Canada. The purpose of this Technical Report is to disclose the results of updated Mineral Resource estimates, along with updated life of mine (LOM) plans and financial models in support of a contemplated restart of the Project. This Technical Report conforms to National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101). SLR visited the property on May 9, 2024.

This report has been amended to provide details of the Qualified Person (QP)'s data verification work, meet NI 43-101 compliance requirements in Section 3 (Reliance on Other Experts), Section 6 (History), and Section 29 (Certificate of Qualified Person).

The Project is located approximately 225 kilometres (km) southwest of Regina, Saskatchewan and 55 km north of the U.S. border at Opheim, Montana.

Whitemud owns several properties in southern Saskatchewan that host a significant kaolin deposit. The deposit has been known for some time, with the Saskatchewan government carrying out evaluations as early as the 1940s. Since that time a number of corporate interests have worked on the deposit with the objective of developing an economically viable mining and processing operation. Whitemud acquired the property in 2002.

A 2006 Technical Report, produced by Scott Wilson Roscoe Postle Associates Inc. (Scott Wilson RPA), a predecessor of Roscoe Postle Associates Inc. (RPA), which is now part of SLR, disclosed the results of a prefeasibility study. Whitemud built the process plant and operated the Wood Mountain Project intermittently from 2008 to 2012. Processing throughput issues and economic challenges resulted in the operation being put on care and maintenance.

Whitemud has been working on a restart plan for the Project, including plant modifications and marketing assessments.

1.1.1 Conclusions

1.1.1.1 Main Conclusions

- Whitemud holds valid environmental authorizations that apply to mine restart.
- Mining is planned to re-commence in 2025. Prior to that, stockpiled material left over from previous operations will be used to feed the processing plant
- Modifications to address the processing plant's inefficiencies that were partly responsible for the shutdown of operations in 2012 began in December 2023 and are scheduled to be completed in H2 of 2024.
- The actual metakaolin yield for the project will be determined once the commercial plant has been commissioned and has achieved stable, consistent operation. The uncertainty concerning yield is a key risk for the project's economic viability.
- The North American market for metakaolin has been forecast to grow from 134,960 t in 2024 to 148,776 t in 2029. At a forecast production rate increasing to 63,000 tpa in 2027, Whitemud's metakaolin would make up a significant proportion of the forecast market for

SCMs based on current, known uses. Additional marketing information provided suggests that there may be significant opportunity to grow the market for metakaolin as an SCM, and this will be necessary to reach the cash flow projections in the PEA.

- For cash flow modelling, revenue has been estimated using a base metakaolin sales price of C$250/t (the actual price of recent sales of Whitemud metakaolin remaining from 2012 operations) with a gradual increase to C$300/t by 2029.
- The Project's after-tax NPV at a 10% discount rate is C$12.0 million.
- The Project's after-tax IRR is 22%.

1.1.1.2 Geology and Mineral Resources

- Kaolinized sediments contained within the Whitemud formation have been outlined by 225 drill holes completed by both Whitemud and previous owners over an area measuring approximately 11.5 km in an east-west direction and 9.0 km in a north-south direction.
- Considering the strata bound nature of this type of mineral deposit, a simple geological model was created for the Whitemud formation using surfaces representing the top and bottom of the KSG formation to code the block model.
- Mining activities were carried out in 2008, however, no detailed information is available describing the volume that was excavated. SLR prepared an estimated perimeter boundary line representing the approximate crest of the mined out area. An allowance was coded into the block model to reflect the approximate location of the mined out area.
- An in-situ bulk specific gravity of 2.01 tonnes per cubic metre (t/m^3) for both overburden and kaolinized material has been assumed based on a 15% moisture content.
- Two block models were constructed to model the Mineral Resources present in the Gollier Creek area. The first block model, initially constructed in 2006, and updated in 2024, covers the Mineral Resources present in the West Pit, North Pit, and East Pit deposits. A second overlapping block model was created to cover the Mineral Resources present in the West Extension of West Pit, Elm Spring, and East Pit Bridge deposits.
- The Mineral Resources are outlined over an area measuring approximately 5.1 km in an east-west direction and 4.9 km in a north-south direction. The Mineral Resources are contained within seven areas located in the Gollier Creek area. They are classified into either the Measured, Indicated, or Inferred Mineral Resource categories on the basis of the drill hole spacing. Mineral Resources are reported within manually created open pit outlines for all remaining material outlined by drill hole data present beyond an approximation of a 50 metre (m) stand off buffer distance from the crest of Gollier Creek.
- Mineral Resource grades represent the weight fraction of all material contained within the -44 micrometre (µm) size fraction, which includes a mixture of kaolin and quartz. Preliminary studies indicate that kaolinite accounts for approximately 20% to as high as 60% of the mineral mass, with a typical average of approximately 40%. Past mining and processing activities have shown that a final product can be produced and sold from this material.
- Measured Mineral Resources comprise approximately 19.5 million tonnes (Mt) at an average grade of 39.8% -44 µm and Indicated Mineral Resources comprise

approximately 53.8 Mt at an average grade of 41.4% -44 µm, for a Measured and Indicated total of approximately 73.3 Mt at an average grade of 41.0% -44 µm. Inferred Mineral Resources are estimated to total approximately 58.6 Mt at an average grade of 43.6 % -44 µm.

1.1.1.3 Mining and Mineral Reserves

- Mineral Inventory was reported by resource classification. Measured and Indicated Resource classifications were considered as Mineral Inventory and included within the LOM schedule. Mine designs were carried out in the West Pit to provide sufficient feed for approximately 30 years. The Mineral Inventory reported for the LOM plan is 8.4 Mt at 42.9% passing -44 µm kaolin.
- The Project has ample Mineral Resources to support a long-life operation of more than 100 years at proposed production rates.
- An overall slope angle of 45 degrees (1:1) was assumed in the design the ultimate pits as there is no geotechnical information available.
- Mining will be carried out by contractors with a small fleet of 40 t trucks and typical mining excavators.
- There are currently no Mineral Reserves for the Project. Additional operational information is required to confirm the expected product yields and overall economic viability of the Project. It is expected that Whitemud will complete the plant updates in 2024 after which this information will be available in order to determine the economic viability and declare Mineral Reserves.

1.1.1.4 Mineral Processing

- Several test work programs were conducted in 2006 and 2007 prior to design and construction of the processing facility. The programs were designed to evaluate different process options and provide base data for engineering design. Test material was obtained from kaolin stockpiles at the Gollier Creek deposit that were excavated by Ekaton Resources Ltd. (Ekaton) in 1987.
- After completion of construction, the processing plant operated intermittently from 2008 to 2010, and again in 2012 for approximately three months after which the facility was closed. The economics of the operation were challenging due to inefficiencies in the processing plant. The most significant issues were a large recirculating load of metakaolin from the rotary calciner returning to the dryer that severely restricted the feed rate of new feed to the dryer, and low yield caused by low dry kaolin capture at the discharge end of the dryer.
- Modifications to address the facility’s bottlenecks, primarily intended to eliminate the recirculating load from the calciner to the dryer as well as to improve dry kaolin capture from the rotary dryer, began in December 2023. The rotary calciner and cooler will be replaced with a flash calciner, baghouse, and ancillary equipment, and modifications have been made to the discharge end of the rotary dryer.
- Flash calcining pilot test work completed in 2023 showed that metakaolin could be produced successfully by flash calcining and provided information to complete the design of the commercial flash calciner.

- Test runs of the rotary dryer in 2023 indicated that modifications to the discharge end of the rotary dryer resulted in improved kaolin capture. Successful tests resulted in kaolin capture through the dryer ranging from 17.4% to 19.9%. Further improvement by optimizing the discharge configuration of the dryer may be required to maximize kaolin capture.
- Installation of a bag house to capture all of the metakaolin from the flash calciner will eliminate the circulating load from the calciner to the rotary dryer that occurred during the 2008 to 2012 operations and will significantly improve the plant's throughput capability.
- The actual metakaolin yield for the project will be determined once the commercial plant has been commissioned and has achieved stable, consistent operation with the new flash calciner, bag house, and bulk cooler. The uncertainty concerning yield is a key risk for the project's economic viability. Whitemud has estimated that metakaolin yield during the intermittent operations from 2008 to 2012 reached approximately 9% per tonne of feed material processed, and while the original design mass balance contemplated a yield of up to approximately 20%, the capability of the processing plant to achieve yields approaching 20% has yet to be proven.
- Similarly, the actual processing rate that the operation will be able to achieve with the modified plant can only be demonstrated after the completion of commissioning and ramp-up of the plant to consistent production levels. While the design processing capacity of the plant is shown in the design criteria as 110 tonnes per hour (tph) of feed material, the throughput is currently limited to approximately 55 tph by the natural gas supply, which would need to be upgraded before the full capacity of the plant can be proven. The economic analysis presented in this report is based on a throughput of 55 tph.

1.1.1.5 Infrastructure

- The project is in a semi-arid region where water conservation is critical. Whitemud plans to minimize water consumption and impacts on surface and groundwater. The plant's dry process requires minimal water, with local groundwater supply expected to meet plant requirements. Fresh water will be diverted around surface facilities, with runoff stored in an existing pond for fire protection and remaining water will be diverted to a temporary storage pond. The existing mined out quarry also serves as additional water storage capacity.
- Three-phase electrical power at 25 kilovolts (kV) for a 2,000 kilovolt-amperes (kVA) demand is available from SaskPower. Whitemud installed electronic soft start controls or variable speed drives for large motors (>100 horsepower (hp)). SaskPower has the capacity to upgrade electrical services for future expansions.
- Energy for drying and calcining is provided by natural gas, which replaced the previous use of coal as the plant's energy source during the 2024 upgrades. Natural gas service at the site is currently sufficient for approximately 50% of the plant's design capacity and the supply pipeline would need to be upgraded for higher production rates.
- Metakaolin product will be shipped by truck to Western Canadian and Northern U.S. customers. A combination of truck and rail will be used for other North American markets.

1.1.1.6 Environment

- Whitemud submitted a Project Proposal to the Saskatchewan Ministry of Environment and Resources, and this was approved in 2006. Whitemud completed baseline surveys in support of the Project proposal as well as additional studies related to sensitive plant and animal species, surface drainage, heritage resources, decommissioning and reclamation plans, and quarry impacts on groundwater. No surveys have been conducted for the expanded footprint areas and this has not been requested by regulators to SLR's knowledge.
- Whitemud holds valid environmental authorizations that apply to mine restart. In addition, Whitemud will need to submit a mine plan to the Saskatchewan Ministry of Energy and Resources prior to restart. Dewatering authorizations will be applied for prior to any dewatering activities. Whitemud conducts environmental monitoring on a regular basis and submits annual reports to the Ministry of Environment and Resources.
- The 2006 Project Proposal identified several significant negative environmental impacts and mitigations measures. It would be beneficial for Whitemud to compile an environmental and social management plan which includes these mitigation measures and any requirements of Project approvals and authorizations.
- Whitemud has not engaged with local communities or stakeholders and has indicated that the Project has not been required to do so.
- The Decommissioning and Reclamation Plan (dated 2007) is due for update and resubmission prior to February 16, 2026.

1.1.1.7 Marketing

- Metakaolin is used in several applications. The primary application for Whitemud's metakaolin will be as a supplementary cementitious material (SCM) in concrete (e.g. ready mix, precast concrete, and shotcrete).
- The size of the metakaolin market is driven in part by increasing demand for high performance concrete and construction industry growth, while being limited by the availability of SCM additives and substitutes such as fly ash, silica fume, and GGBFS. Fly ash is the most widely used SCM in concrete and is sourced from coal-fired power plants where it is captured from the flue gases that result from the combustion of coal. Silica fume is produced during the carbo-thermic reduction of quartz in the production of silicon metal, and GGBFS is a major discard material produced during the production of iron for steelmaking.
- The production of fly ash is decreasing as the number of coal-fired power plants has been declining due to various factors such as aging coal-fired units, environmental regulations, and competition from natural gas, solar, and wind power plants. Therefore, the sustainable development of the concrete industry will provide opportunities for the growth of the metakaolin market.
- An additional driver for the metakaolin market is the requirement to lower carbon dioxide emissions in the cement industry. By replacing part of the cement in concrete mixtures with metakaolin, the amount of carbon dioxide-intensive cement can be reduced.
- Forecast growth of the North American market for metakaolin has been based on current, known uses. While Whitemud's metakaolin would make up a significant

proportion of the forecast market for SCMs, additional considerations suggest that there may be significant opportunity to grow the market for metakaolin as an SCM.

1.1.1.8 Capital and Operating Costs

- The capital cost for the modifications to the plant were budgeted at C$7 million, however, it is estimated that the final cost will amount to approximately C$7.5 million to C$7.6 million. The cash flow model uses a capital cost of C$7.6 million.
- The overall operating cost for the Project is estimated to be C$2.8 million in 2024 and C$11.7 million at full production in 2027.
- For 2024, mine operating costs include stockpile rehandling and sand haulage to the mine. Starting in 2025, stockpile rehandling has been removed and mining and reclamation costs were added. The operating cost for mining is estimated to be C$0.4 million in 2024 (stockpile rehandling) and an average of approximately C$5.0 million at full production in 2027. Mining is assumed to be carried out by a contract miner.
- The operating cost for processing is estimated to be C$1.6 million in 2024 and C$5.5 million at full production in 2027.
- The general and administrative costs are estimated to be $838,000 in 2024 and C$1,179,000 at full production in 2027 through the LOM.

1.1.2 Recommendations

1.1.2.1 Geology and Mineral Resources

1. Review location and elevation of drill holes relative to LIDAR topographic surface.
2. Carry out a detailed survey pick up of the mined out volume of the open pit when conditions permit.

1.1.2.2 Mining and Mineral Reserves

1. Mineral Reserves could not be stated due to a lack of clarity in process recovery factors. Once the process recovery factors are understood, an estimation of Mineral Reserves should be carried out. A detailed mine plan should be carried out as part of any future Mineral Reserve estimations.
2. Further analysis should be done on a mining cut-off grade to optimize plant feed and product tonnes production.
3. A dewatering plan will be necessary to follow the LOM plan to ensure that mined out areas remain dry. Excess water in operating areas will pose serious challenges to carrying out an efficient mining operation.
4. An owner-operated mining scenario should be investigated in order to reduce mine operating costs.
5. Maintain accurate records of tonnage and grades in the stockpile area. The current stockpile should be surveyed and assayed to determine tonnes and grade.

1.1.2.3 Mineral Processing

1. Initiate and maintain accurate production logs containing sufficient detail to allow for auditable assessment of throughput, metakaolin yield, plant utilization, and operating costs. Logging of the data should be initiated during commissioning and continue through the ramp-up phase and regular production. The data should include daily crusher feed grade and tonnage, and hourly production data such as dryer feed rate and metakaolin produced, metakaolin product analysis, and downtime recording and analysis. The data should include daily and monthly summaries.

1.1.2.4 Infrastructure

1. Upgrade the telecommunications to allow for better cellular service and high-speed internet.

1.1.2.5 Environment

1. Consult with qualified subject matter experts to determine the need for additional baseline surveys and additional water monitoring points for expanded footprint areas to determine if additional mitigation is required.
2. The QP understands that Whitemud will maintain buffer zones to minimize impacts on Northern leopard frogs agreed upon with the Ministry of Environment and Resources, and as per current Project authorization conditions. Whitemud should identify these areas using surveys in order to have a digital record of the buffer zone.
3. Conduct an environmental and social risk assessment to consider restart activities and the expanded footprint. This could be done in-house, and subject matter experts could be consulted if deemed necessary. This is aimed at ensuring the operation is managed responsibly and any new risks and impacts can be mitigated.
4. Compile an environmental and social management plan which includes all the mitigation measures from the Project proposal as well as conditions related to Project approvals and authorisations. This will allow the mine to track compliance with these requirements.
5. The Project proposal identified measures to enhance positive socio-economic impacts which included consultation with communities and with the municipalities and Province of Saskatchewan. Consider implementing consultation activities to comply with the mitigation measure.
6. Obtain approval of the mine plan prior to restart and ensure all environmental approvals and permits remain valid for all planned activities and infrastructure, including any temporary approvals that may be needed for dewatering and potential discharge of excess water to the environment.
7. Update the Decommissioning and Closure Plan and the financial provision as required.

1.1.3 Risks

- Processing throughput and yield in the historical operation were uneconomically low. Significant improvement in both throughput and yield are necessary to make the operation economically viable. While modifications have been made to the processing plant to address the identified causes of low throughput and yield, the real effect of these modifications must still be proven.

- Insufficient dewatering poses a risk to mine operations. The mined out pit from 2012 is currently flooded and it is not clear whether the source of water is from the ground or from precipitation. Further hydrological assessments should be undertaken to better understand the hydrology in the area.
- The leopard frog habitat and breeding areas are not currently well understood. Further studies should be undertaken in order to understand which areas will require standoffs for mining.
- Whitemud's current permit P024-020 states: *An operations setback restriction from Gollier Creek and associated wetlands are required between April 1st to October 31st.* The QP understands that the current activity is limited to 50 m from these areas. A full survey identifying these limits is required in order to accurately estimate the offsets from these areas as these could impact the current Mineral Resource estimate as well as any future Mineral Reserves estimates.
- Whitemud's metakaolin production will make up a significant proportion of the forecast North American market size by 2027 based on current and known uses, and there is a risk that the market will not be able to absorb Whitemud's production if sufficient effort is not made to grow the market. The following mitigatory information should be considered:
    - Pricing of metakaolin from Georgia has historically been more than double or triple the price of commonly used SCMs such as fly ash, limiting the use of metakaolin as an SCM. Therefore, it is typically being used in specialty applications only, which greatly limits consumption. Whitemud's metakaolin pricing is closer to that of fly ash, which will provide opportunities for increased demand.
    - The cost of fly ash has risen from US$100/t to more than US$200/t in the past 10 years due to lack of supply and reprocessing costs, as suppliers are now mining fly ash, and grinding and drying it to make their products. This has resulted in more demand for alternative SCMs like metakaolin that haven't been accounted for in marketing forecasts.
    - The cost of cement has increased to the point where the use of metakaolin is more cost effective then cement. At 10% replacement of cement in concrete, with equivalent or better performance than unmodified concrete, metakaolin becomes viable to use in all concrete.
    - Global pressure for more environmentally friendly cements should encourage the use of lower-green-house-gas-intensive SCMs such as Whitemud's metakaolin.
    - Whitemud is actively developing other applications for its metakaolin. If successful, these may result in significant increases in demand for metakaolin concrete or concrete-equivalents.
- The economic analysis contained in this Technical Report is preliminary in nature. There is currently limited test work available to determine reliable product yield estimates and therefore there is no certainty that economic forecasts on which this PEA is based will be realized.

1.2 Technical Summary

1.2.1 Property Description and Location

The Project is located in southern Saskatchewan, approximately 33 km southwest of Assiniboia and approximately nine kilometres east of the Town of Wood Mountain, in the Rural Municipality of Old Post. The processing plant is located at a latitude of approximately 49.38º N and longitude of approximately 106.26º W (UTM coordinates of 4085,34 m E 5,470,452 m N in Zone 13U, NAD83).

1.2.2 Land Tenure

Kaolinized resources are held under 21 quarry leases for kaolin, clay, and granular silica totalling 4,395.29 hectares (ha) (10,861 acres) in two land packages. In addition, Whitemud is in the process of applying for additional lease permits consisting of 18 pending lease applications comprising two quarry leases totalling 517.00 ha (1,280 acres) and 14 rights-of-way permits totalling 63.94 ha (158 acres). The 21 existing quarry leases are currently in good standing to the indicated renewal dates.

1.2.3 History

Previous owners of title to the quarry rights include Ekaton (1984 to 1989), Kaolin Industries Limited (Kaolin Industries, 1992 to 1994), and Minfocus International Inc. (Minfocus, 1998 to 1999). Whitemud held the quarry rights from 2002 to 2008. Whitemud relinquished the quarry rights to a majority of the area from 2008 to 2020 and began to re-acquire the quarry rights beginning in 2020.

Work completed by Ekaton included diamond drilling programs, collection of a bulk sample for metallurgical testing, and preparation of Mineral Resource estimates.

Work completed by Kaolin Industries included excavation of additional bulk sample material and additional testing to produce paper grade kaolin.

Work completed by Minfocus included completion of an auger drilling program and additional metallurgical test work to investigate the feasibility of the paper grade kaolin product.

Work completed by Whitemud included carrying out additional diamond drilling programs, metallurgical testing, construction of a processing plant to produce a metakaolin product, and contract mining.

1.2.4 Geology and Mineralization

The main area of interest for Whitemud is the extensive deposits of kaolinized sediments that have been outlined by outcrop mapping and drilling in the Wood Mountain area. The kaolinized sediments are mainly comprised of the Whitemud Formation but include upper portions of the Upper Eastend Formation.

The Gollier Creek kaolinized sediment deposit is classified as a sedimentary deposit consisting of altered and unaltered feldspars and pseudomorphs within a silica sand matrix.

1.2.5 Mineral Resources

Mineral Resources are estimated from a database containing 225 drill holes completed by both Whitemud as well as previous owners of the property.

Mineral Resource grades represent the weight fraction of all material contained within the -44 µm size fraction, which includes a mixture of kaolin and quartz. Past mining and processing activities have shown that a final product can be produced and sold from this material.

Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Definition Standards for Mineral Resources and Mineral Reserves (CIM (2014) definitions) were used for Mineral Resource classification.

The Mineral Resources are contained within seven areas located in the Gollier Creek area. They are classified into either the Measured, Indicated, or Inferred Mineral Resource categories on the basis of the drill hole spacing. Mineral Resources are reported within manually created open pit outlines for all remaining material outlined by drill hole data present beyond an approximation of a 50 m stand off buffer distance from the crest of Gollier Creek. An allowance has been applied to the Mineral Resource block model to account for excavated material. The estimated Mineral Resources are presented in Table 1-1.

Table 1-1 Summary of Mineral Resources as at August 16, 2024

Category	Tonnage (000 t)	Grade (% -44 µm)
Measured	19,500	39.8
Indicated	53,800	41.5
Total Measured and Indicated	**73,300**	**41.0**
Inferred	58,600	43.6

Notes:
1. CIM (2014) definitions were followed for Mineral Resources.
2. Mineral Resources are estimated based on wt% -44 µm fraction in the KSG formation.
3. Mineral Resources are estimated using a long-term price of C$209 per tonne metakaolin, and a US$/C$ exchange rate of 1.3.
4. Bulk density is 2.01 t/m^3.
5. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
6. Numbers may not add due to rounding.

1.2.6 Mining Method

The Project involves an initial production rate of 16,000 tpa of product. The initial plant production is scheduled to commence in late 2024 and will ramp up to 60,000 tpa of metakaolin by 2027. There are currently approximately 50,000 t of kaolin in a stockpile located adjacent to the plant (as estimated by Whitemud staff based on aerial surveys dating from 2020). This stockpile will provide sufficient feed for a few months as the process plant begins to ramp up at the end of 2024. Mining of new material is expected to commence in 2025.

The quarrying operations will take place in West Pit adjacent to the processing plant. The quarry has been developed as a conventional open pit mine using excavators and off-highway 40 t haul trucks. Mine operations will initially be operated by a contractor with the potential to converting to owner operated in the future. The kaolin will be transported to the processing plant, where it will undergo crushing, screening, drying, separation from silica, and ultimately calcined to produce metakaolin.

Quartz sand recovered from the drying and separation processes will be returned to the pit as tailings and compacted before regrading with overburden. A small amount of sand is expected to be sold in local markets although we have not accounted for this in the economic model. Site rehabilitation is anticipated to proceed concurrently with the quarrying operations to ensure the efficient operation of both activities.

1.2.7 Mineral Processing

The Project's metakaolin facility was designed to produce metakaolin by a process of drying, size and density classification to reject silica, and calcining to convert kaolin to metakaolin.

The processing plant operated intermittently from 2008 to 2010, and again in 2012 for approximately three months. The operation was economically challenged partly due to inefficiencies in the processing plant stemming from design deficiencies. The most significant issues were a large recirculating load of metakaolin from the rotary calciner returning to the dryer that severely restricted the feed rate of new feed to the dryer, and loss of kaolin and metakaolin to the silica sand reject stream.

Whitemud plans to restart mining and processing operations, and in December 2023 modifications to address bottlenecks began, primarily intended to eliminate the recirculating load from the calciner to the dryer and reduce kaolin losses. The rotary calciner and cooler will be replaced with a flash calciner, baghouse, and ancillary equipment. The facility is expected to be recommissioned in H2 of 2024.

The processing facility consists of a crushing circuit, rotary dryer, kaolin sizing and classification, flash calciner, a bulk cooler, metakaolin dust collector, and a metakaolin storage facility.

1.2.8 Project Infrastructure

Site infrastructure is limited. Local roads have been upgraded to accommodate the anticipated truck traffic. The current electrical power system is sufficient for site requirements, however, may require upgrading for potential future expansions. The natural gas supply line that currently services the site is sufficient to allow for processing up to approximately 55 tph of run of mine (ROM) and will require upgrading to allow the processing plant to achieve higher production rates. A transload facility for loading rail cars was constructed at Scout Lake and is owned by Whitemud. There is no current potable water supply at the site and a well supplies water for truck washing and domestic requirements. Telecommunications service in the area is limited and upgrades in cellular service and high-speed internet access have been made with the addition of satellite services.

1.2.9 Market Studies

Whitemud engaged Maia Research in 2024 to conduct a market study to assess the marketability of Whitemud's metakaolin.

Metakaolin, also known as calcined kaolin or dehydroxylated aluminum silicate, is a highly reactive pozzolanic material that is commonly used as a supplementary cementitious material (SCM) in the production of high strength and durable concrete (57% of the north American market in 2023 and the target market for Whitemud's metakaolin), in soil-cement stabilization to improve the engineering properties of soils, as well as in other applications including hempcrete and geopolymers. Additionally, metakaolin can be divided into types based on size range, with Whitemud's metakaolin in the 2 µm to 10 µm size range, which made up 52% of the North American market in 2023 with a value of US$30.48 million. The largest market for metakaolin in

North America is the United States, which accounted for 87% of the metakaolin consumed in 2023.

The size of the metakaolin market is driven in part by increasing demand for high performance concrete and construction industry growth, while being limited by the availability of other SCMs such as fly ash, silica fume, and ground granulated blast furnace slag (GGBFS). Fly ash is the most widely used SCM in concrete and is sourced from coal-fired power plants. The production of fly ash is decreasing; in recent years, the number of coal-fired power plants has been declining due to various factors such as aging coal-fired units, environmental regulations, and competition from natural gas, solar, and wind power plants. An additional driver for the metakaolin market is the requirement to lower carbon dioxide emissions in the cement industry. By replacing part of the cement with metakaolin in concrete mixtures, the amount of carbon dioxide-intensive cement can be reduced.

Maia forecast sales volumes and prices for metakaolin in the United States and Canada from 2024 to 2029 with sales volumes increasing from 134,960 t in 2024 to 148,776 t in 2029, and prices ranging from C$569/t to C$582/t for specialty use applications in the concrete industry.

The location of existing kaolin mines (mainly in Georgia, USA), cost of product, and delivery to Canada and the northern United States limits the use of metakaolin from mines in Georgia due to higher delivered costs. Whitemud's proximity to these markets is expected to enable it to provide a lower delivered cost than can be achieved by existing kaolin mines.

Whitemud does not have sales contracts in place, however, it has been successful in selling metakaolin that remained in storage from the previous operations that ended in 2012. From 2019 to 2022, Whitemud sold the majority of the remaining volume of metakaolin totalling approximately 2,700 t at an average price of C$250/t, excluding freight (with freight being at the customers' cost).

Whitemud's metakaolin pricing has been set up to allow the product to be widely used beyond specialty applications such as ready mix, precast, and shotcrete. Whitemud's metakaolin pricing also makes it feasible for use in new, evolving concrete technologies that perform as well as or better than conventional concretes. Demand for lower greenhouse gas intensive concrete will also benefit the demand for the use of metakaolin. Whitemud's metakaolin sales will be subject to market acceptance and proof of consistent supply. At a production rate of 63,000 t expected to be achieved by 2027, Whitemud's metakaolin would represent a significant proportion of the market as forecast based on the current uses.

1.2.10 Environmental, Permitting and Social Considerations

Whitemud submitted a Project Proposal for phase I of the Gollier Creek Project to the Saskatchewan Ministry of Environment and Resources and this was approved in 2006. Whitemud completed baseline surveys in support of the Project proposal as well as additional studies related to sensitive plant and animal species, surface drainage, heritage resources, decommissioning and reclamation plans, and quarry impacts on groundwater.

The 2006 Project Proposal identified several significant negative environmental impacts and mitigations measures. Whitemud does not have a documented environmental and social management plan, however, it has a Water Monitoring Plan, Environmental Protection Plan under Industrial Source (air quality) chapter of the Saskatchewan Environmental Code, and a Decommissioning and Reclamation Plan.

The Project area includes sensitive wildlife habitat (native grassland and riparian/wetland areas). Sensitive species were identified within the Gollier Creek valley and neighbouring coulees. The impact of the Project on vegetation and wildlife was specifically discussed with Saskatchewan Ministry of Environment and guidance was received on appropriate mitigation measures for several species. These mitigation measures were incorporated into quarrying and reclamation plans for the Project.

Whitemud conducts annual surface water monitoring and submits an annual Environmental Report to the Ministry of Environment and Resources.

Whitemud holds environmental authorizations which the QP understands remain valid and apply to mine restart. Whitemud confirmed that no amendments are needed to these authorizations, nor are any other authorizations or permits needed to restart mining, however, a mine plan must be submitted to the Saskatchewan Ministry of Energy and Resources prior to restart. In addition, dewatering authorizations will be applied for prior to any dewatering activities.

Whitemud has not engaged with local communities or stakeholders and have indicated that it has not been required to do so.

The Decommissioning and Reclamation Plan (dated 2007) is due for update and resubmission prior to February 16, 2026.

1.2.11 Capital and Operating Cost Estimates

The capital cost for the modifications to the plant are estimated at C$7.6 million, with additional development costs prior to 2021 of C$1 million. The cash flow model uses a figure of C$8.6 million for total project and development costs. No allowance has been made for expansion capital, and the cash flow model is based on a maximum processing rate of 55 tph.

Operating costs have been estimated based on seasonal operation, with mining and processing occurring from March to December each year. Staff, operators, and maintenance personnel have been budgeted for on a full time (year-round) basis with maintenance activities taking place during the winter. Employment costs are based on actual costs per the existing operation.

Mining is assumed to be carried out by a contract miner. For the PEA, the mining costs are based on quotes for hourly machine usage rates from a local contractor and estimated utilizations required to move planned volumes of material. In 2024, there is sufficient material in the stockpile (approximately 50,000 t) to meet the processing needs. Rehandling will involve a dozer, excavator, and a haul truck to move stockpiled material to the crusher feed bin, as well as to haul sand back to the mine. The cost has been estimated using hourly rates for each machine.

Stripping and mining will commence in 2025, and costs are based on the use of an excavator, front-end loader, two bulldozers, a grader, and five haul trucks (40 t capacity). Sand removal back to the mine will require a haul truck, however, productivity for sand removal may be improved by having the kaolin haulage and sand removal shared by the mining haul trucks.

Reclamation of mined out areas is included as a capital cost in the annual costs in the cash flow model from 2025.

Processing costs were developed by Whitemud based on current and forecast labour rates for personnel currently employed at the Project and those expected to be employed as the Project ramps up production, current electricity and natural gas prices and forecast usage and consumption, forecast maintenance materials based on historical requirements and current costs, and forecast mobile equipment needs and usage. Processing costs average C$18.65/t processed over the LOM.

General and administrative (G&A) costs were estimated by Whitemud based on current and future forecast costs and average C$4.14/t processed over the LOM.

1.3 Economic Analysis

The economic analysis presented in this Technical Report contains forward-looking information regarding Mineral Resource estimates, commodity prices, exchange rates, proposed production plans, projected mining and metallurgical recoveries, costs, and Project schedule aspects.

This Technical Report is considered by SLR to meet the requirements of a Preliminary Economic Assessment as defined in Canadian NI 43-101 regulations. The economic analysis contained in this Technical Report is preliminary in nature. There is currently limited test work available to determine reliable product yield estimates and therefore there is no certainty that economic forecasts on which this Preliminary Economic Assessment is based will be realized.

The economic analysis of the Project was carried out using a discounted cash flow approach on a pre-tax and after-tax basis, based on a sales price for metakaolin of C$250/t in 2024, gradually increasing to C$300/t in 2029 and cost estimates prepared in Canadian currency.

An exchange rate of 0.74 United States dollars (USD) per 1.00 Canadian dollar (CAD) was assumed to convert CAD market price projections and particular components of the cost estimates into CAD.

The QP notes that all costs presented in this report for the first quarter 2024 are expressed in CAD. Year 1 of Commercial Production started January 1, 2024.

The internal rate of return (IRR) on total investment that is presented in the economic analysis was calculated assuming 100% equity financing.

The net present value (NPV) was calculated from the cash flow generated by the Project, based on a discount rate of 10%.

An after-tax sensitivity analysis has been performed to assess the impact of variations in the Project's economic assumptions, i.e., exchange rate, metakaolin sales price, head grade, process yield, and operating costs.

1.3.1 Economic Criteria

1.3.1.1 Physicals

- Project Life:
  - 30 years of commercial production
  - One year of stockpile processing and 29 years of open pit mining
- Open pit mining operations
  - LOM Total Mined: 29.409 Mt
  - LOM Total Plant Feed Produced: 8.40 Mt
  - Strip Ratio: 2.5 (waste:plant feed)
  - Peak Mining Rate (all materials): 1.5 million tonnes per annum (Mtpa)
- Processing
  - Annual Processing Rate: 300 thousand tonnes per year (ktpa)

- LOM Total Plant Feed: 8.45 Mt at 43% of -44 µm
- LOM Contained Kaolin: 3.63 Mt
- LOM Average metakaolin yield: 19.7%
- LOM metakaolin produced: 1.664 Mt

1.3.1.2 Revenue

- For this economic analysis, revenue is estimated based on a base metakaolin sales price of C$250/t with a gradual increase to C$300/t by 2029
- LOM net revenue totals $494 million.
- 5% Royalty of net profit paid to the Government of Saskatchewan after recovery of 150% of capital cost (allowable capital is estimated by Whitemud to be C$8.6 million).

1.3.1.3 Capital Costs

- Total project capital costs: $8.6 million.

1.3.1.4 Sustaining Capital, Reclamation and Closure

Table 1-2: Sustaining, Reclamation, and Closure Capital Cost Estimate Summary

Area	Cost (C$M)
Reclamation	14.4
Salvage	(1.5)
Closure	2.0
Total Sustaining, Reclamation, and Closure Capital	**14.9**

1.3.1.5 Operating Costs

Table 1-3: Total Operating Costs over Life of Project

Cost Area	Total (C$M)	Unit Cost (C$/t of processed feed)	Percent of total
Open Pit Mining	142.9	16.91	42.6
Processing	157.6	18.65	47.0
General & Administrative	35.0	4.14	10.4
Total	**335.5**	**39.70**	**100.0**

1.3.1.6 Taxation

- Income tax is payable to the Federal Government of Canada, pursuant to the *Income Tax Act (*Canada). The applicable Federal income tax rate is 15% of taxable income.

- Income tax is payable to the Province of Saskatchewan at a tax rate of 12% of taxable income.
- LOM total taxes paid is approximately $24.97 million.
- Whitemud has accrued tax credits that have not been applied to this cash flow.

1.3.1.7 Exclusions

The economic analysis does not consider the following components:

- Escalation or inflation over the LOM.
- Financing costs.
- Corporate overhead costs.
- An after-tax cash flow summary is presented in Table 1-4. All costs are presented in Q3 2024 C$ thousands.

1.3.2 Cash Flow Analysis

The Project's cash flow results have been determined using the discounted cash flow method by considering annual processed tonnages, head grades of plant feed material, metakaolin yield, metakaolin sales price, operating costs, capital expenditures, and royalties.

The discount rate used in this Technical Report is 10%.

1.3.2.1 Results

- The Project's after-tax NPV at a 10% discount rate is C$10.0 million.
- The Project's after-tax IRR is 20%.
- The LOM average cash cost of metakaolin production is $201.60/t, derived from mining, processing, on-site G&A, royalties, and other owner's costs.

Table 1-4: Cash Flow Summary

Summary Cash Flow	Units	Total LOM
Production		
LOM	years	30
Material Moved	**'000 tonnes**	**29,409**
Process Plant Feed	**'000 tonnes**	**8,451**
-44 µm grade	%	42.9
Metakaolin Production	**'000 tonnes**	**1,664**
Yield	%/t processed	19.7
Metakaolin Price		
LOM weighted average	C$/t	297
Cash Flow		
Gross Revenue	C$ '000	494,012
Royalties	C$ '000	(6,246)
Operating Costs		
Mining Costs	C$ '000	(142,937)
Processing Costs	C$ '000	(157,625)
G&A	C$ '000	(34,965)
Operating Cash Flow	C$ '000	158,485
Capital Costs		
Capital Costs	C$ '000	(8,600)
Reclamation & Closure	C$ '000	(14,853)
Depreciation	C$ '000	(7,000)
Pre-Tax Net Cash Flow	**C$ '000**	**86,695**
Taxes - Income Tax	C$ '000	(24,974)
Taxes - Property, Carbon	C$ '000	(42,091)
After-Tax Cashflow	**C$ '000**	**61,721**
Project Economics		
After-Tax IRR	**%**	**20**
After-Tax NPV at 10%	**C$ '000**	**19,984**

1.3.2.2 Sensitivity Analysis

Project risks can be identified in both economic and non-economic terms. Key economic risks were examined by running cash flow sensitivities on the following variables and examining the impact on the Project's after-tax NPV and IRR:

- LOM Metakaolin yield
- LOM Metakaolin sales price
- LOM Capital cost
- LOM Operating cost

The results of the sensitivity analysis are summarized in Table 1-5.

Table 1-5: After-tax NPV and IRR Sensitivity Results

	Metakaolin Yield (% of feed tonnage)	**After-tax NPV at 10% (C$ thousand)**	**IRR (%)**
0.80	15.8%	($8,705)	N/A
0.90	17.7%	$896	11%
1.00	19.7%	$9,984	20%
1.03	20.2%	$12,273	22%
1.05	20.7%	$14,384	24%
	Metakaolin Price	**After-tax NPV at 10%**	**IRR**
	(C$/tonne)	**(C$ thousand)**	**(%)**
0.80	$237	($8,705)	N/A
0.90	$267	$896	N/A
1.00	$297	$9,984	-3%
1.10	$327	$18,653	9%
1.20	$356	$27,772	16%
	LOM Capital Cost	**After-tax NPV at 10%**	**IRR**
	(C$ thousand)	**(C$ thousand)**	**(%)**
0.85	$19,935	$11,449	23%
0.93	$21,694	$10,716	21%
1.00	$23,453	$9,984	20%
1.18	$27,558	$8,275	18%
1.35	$31,662	$6,677	16%
	LOM Operating Cost	**After-tax NPV at 10%**	**IRR**
	(C$ thousand)	**(C$ thousand)**	**(%)**
0.85	$285,198	$19,185	29%
0.93	$310,363	$14,359	24%
1.00	$335,527	$9,984	20%
1.18	$394,244	($1,343)	8%
1.35	$452,962	($13,569)	N/A

2.0 Introduction

SLR Consulting (Canada) Ltd. (SLR) was retained by Whitemud Resources Inc. (Whitemud) to prepare an independent Technical Report on the Preliminary Economic Assessment (PEA) for the Wood Mountain Project (the Project), located near Assiniboia, southern Saskatchewan, Canada. The purpose of this Technical Report is to disclose the results of updated Mineral Resource estimates, along with updated life of mine (LOM) plans and financial models in support of a contemplated restart of the Project. This Technical Report conforms to NI 43-101 Standards of Disclosure for Mineral Projects.

The Project is located approximately 225 km southwest of Regina, Saskatchewan and 55 km north of the U.S. border at Opheim, Montana.

Whitemud is a publicly listed Canadian company based in Calgary, Alberta, that has been established to manufacture and supply metakaolin to the North American Portland cement, ready-mix concrete, and oilwell cementing markets. The company's shares are listed on the TSX Venture exchange under the trading symbol WMK.

Metakaolin is a high performance supplementary cementitious material (SCM) used as a performance enhancing additive to Portland cement and concrete. Metakaolin is highly pozzolanic and its addition to cement and concrete can offer significant technical and cost advantages. Technical studies of the performance of metakaolin in various cement, concrete mix, and oilwell cementing designs indicate the product can provide improvements comparable to alternative SCMs such as silica fume and fly ash. Previous attempts to develop the kaolinized sediment resources contained in the Whitemud Formation were focused on the potential production of kaolin for use in paper coating and filler applications. These attempts were unsuccessful.

Whitemud constructed and operated an open pit mine and a processing facility to produce metakaolin. The plant was in commercial operation intermittently from 2008 to 2012, after which the operation was placed on a care and maintenance. Whitemud is proposing to restart the processing plant for the production of metakaolin and began processing plant modifications designed to address previous inefficiencies in December 2023.

This Technical Report is considered by SLR to meet the requirements of a Preliminary Economic Assessment as defined in Canadian NI 43-101 regulations. The economic analysis contained in this Technical Report is preliminary in nature. There is currently limited test work available to determine reliable product yield estimates and therefore there is no certainty that economic forecasts on which this Preliminary Economic Assessment is based will be realized.

2.1 Sources of Information

A site visit to the Wood Mountain Project was carried out by Ian Weir, P.Eng., Lance Engelbrecht, P.Eng., and Reno Pressacco, M.Sc.(A)., P.Geo., FGC on May 9, 2024. Scott Wilson Roscoe Postle Associates Inc. (Scott Wilson RPA), a predecessor of Rosco Postle Associates Inc. (RPA), which is now part of SLR, had previously visited the project on November 25 to November 26, 2005; August 8, 2006; and December 17, 2007.

During the 2024 site visit, the SLR qualified persons (QPs) visited the kaolin stockpile area, processing plant, and final product storage areas. A visit was also made to the existing open pit mine (now flooded) as well as the open cut excavated by Ekaton Resources Ltd. (Ekaton), a prior owner of the Project area.

Discussions were held with the following personnel:

- Andrew Dickson, B.A.Sc. MBA, Contract Consultant, Whitemud Resources Inc
- Curtis Karst, A.Sc.T., Technical Director, Whitemud Resources Inc.

A summary of the QP responsibilities is presented in Table 2-1.

Table 2-1: List of Qualified Persons and Responsibilities

QP, Designation, Title	Section Responsibility
Ian Weir, P.Eng., Principal Mining Engineer	Overall preparation of the report, and specifically 4.4, 12.2, 15, 16, 21.2.1, and 22
Lance Engelbrecht, P.Eng., Principal Metallurgist	2, 3, 12.3, 13, 17, 18, 19, 21.1, 21.2.2, 21.2.3, 21.2.4, 23, and 24
Derek Riehm, P.Eng., M.A.Sc., Principal Consultant, Environmental & Social Assessment	12.4, 20
Reno Pressacco, P.Geo., Associate Principal Geologist	4.1, 4.2, 4.3, 5 to 11, 12.1, and 14
All QPs	Related disclosure in 1, 25, 26, and 27

The documentation reviewed, and other sources of information, are listed at the end of this Technical Report in Section 27 References.

2.2 List of Abbreviations

Units of measurement used in this Technical Report conform to the metric system. All currency in this Technical Report is Canadian dollars (C$) unless otherwise noted.

μ	micron
μg	microgram
a	annum
A	ampere
bbl	barrels
Btu	British thermal units
°C	degree Celsius
C$	Canadian dollars
cal	calorie
cfm	cubic feet per minute
cm	centimetre
cm^2	square centimetre
d	day
dia	diameter
dmt	dry metric tonne
dwt	dead-weight ton
°F	degree Fahrenheit
ft	foot
ft^2	square foot
ft^3	cubic foot
ft/s	foot per second
g	gram
G	giga (billion)
Gal	Imperial gallon
g/L	gram per litre
Gpm	Imperial gallons per minute
g/t	gram per tonne
gr/ft^3	grain per cubic foot
gr/m^3	grain per cubic metre
ha	hectare
hp	horsepower
hr	hour
Hz	hertz
in.	inch
in^2	square inch
J	joule
k	kilo (thousand)
kcal	kilocalorie
kg	kilogram
km	kilometre
km^2	square kilometre
km/h	kilometre per hour
kPa	kilopascal
kVA	kilovolt-amperes
kW	kilowatt
kWh	kilowatt-hour
L	litre
lb	pound
L/s	litres per second
m	metre
M	mega (million); molar
m^2	square metre
m^3	cubic metre
MASL	metres above sea level
m^3/h	cubic metres per hour
mi	mile
min	minute
μm	micrometre
mm	millimetre
mph	miles per hour
MVA	megavolt-amperes
MW	megawatt
MWh	megawatt-hour
oz	Troy ounce (31.1035g)
oz/st, opt	ounce per short ton
ppb	part per billion
ppm	part per million
psia	pound per square inch absolute
psig	pound per square inch gauge
RL	relative elevation
s	second
st	short ton
stpa	short ton per year
stpd	short ton per day
t	metric tonne
tpa	metric tonne per year
tpd	metric tonne per day
US$	United States dollar
USg	United States gallon
USgpm	US gallon per minute
V	volt
W	watt
wmt	wet metric tonne
wt%	weight percent
yd^3	cubic yard
yr	year

3.0 Reliance on Other Experts

This Technical Report has been prepared by SLR for Whitemud. The information, conclusions, opinions, and estimates contained herein are based on:

- Information available to SLR at the time of preparation of this Technical Report.
- Assumptions, conditions, and qualifications as set forth in this Technical Report.

For the purpose of this Technical Report, SLR has relied on ownership information provided by Whitemud. The information is summarized quarry lease information under Quarry Lease Holdings as registered by the Provincial Government of Saskatchewan. SLR has not researched property title or mineral rights for the Wood Mountain Project other than reviewing the ownership and status information provided in the Quarry Disposition Searchbook maintained by the Government of Saskatchewan (2024).

The QP has relied on Whitemud (Whitemud, 2024c) for guidance on applicable taxes, royalties, and other government levies or interests, applicable to revenue or income from the Wood Mountain Project. The QP has also relied on third party expertise for pricing and marketing assumptions. This is relied upon in Sections 19 and 22, respectively, and the Summary of this Technical Report.

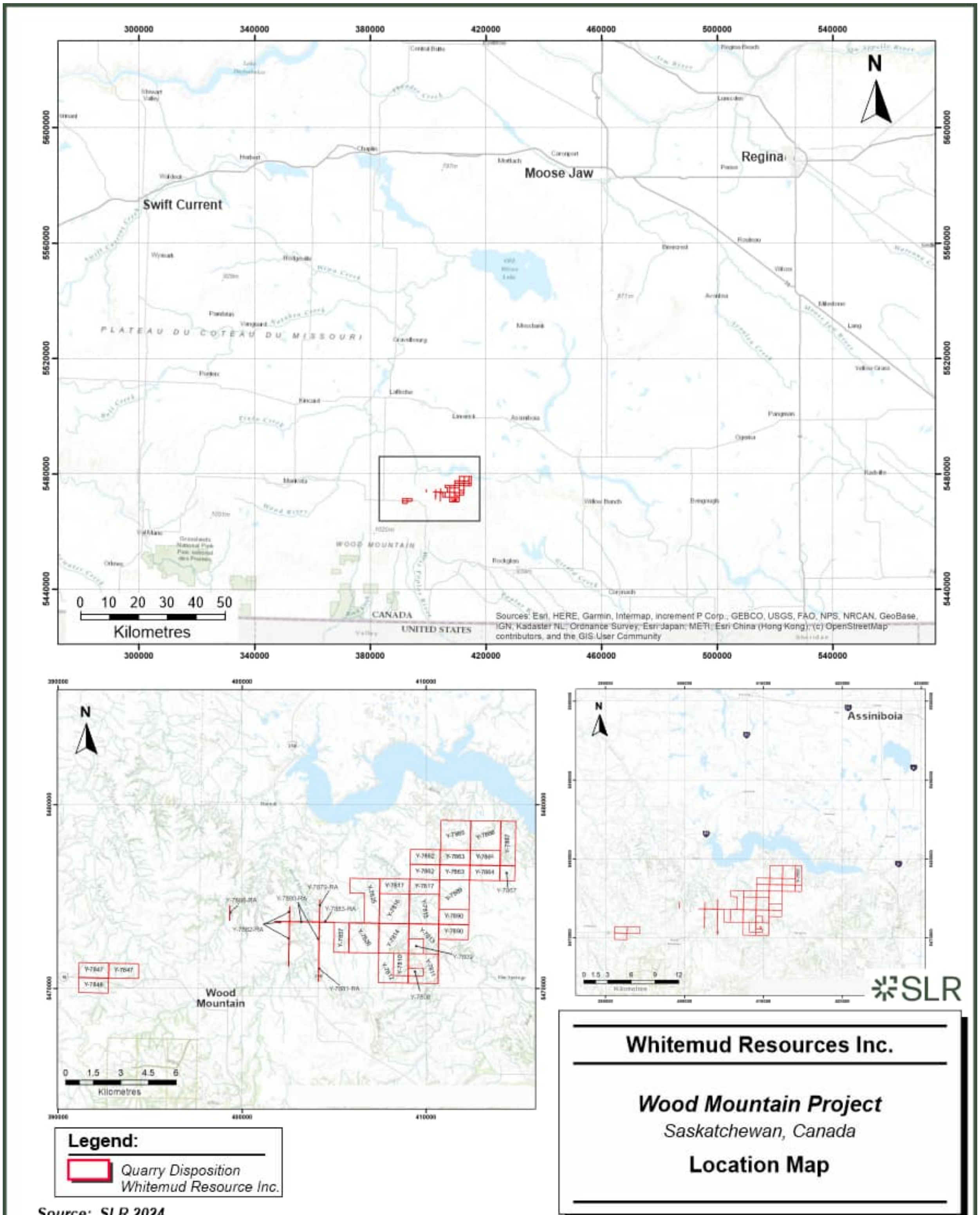
4.0 Property Description and Location

The following is excerpted and slightly modified from Scott Wilson RPA (2008a).

4.1 Location

The Project is located in southern Saskatchewan, approximately 33 km southwest of Assiniboia and approximately nine kilometres east of the Town of Wood Mountain (Figure 4-1), in the Rural Municipality of Old Post. The processing plant is located at a latitude of approximately 49.38º N and longitude of approximately 106.26º W (UTM coordinates of 408,534 m E 5,470,452 m N in Zone 13U, NAD83).

Figure 4-1: Location Map



Source: SLR 2024.

4.2 Land Tenure

Kaolinized resources are held under 21 quarry leases for kaolin, clay, and granular silica totalling 4,395.29 ha (10,861 acres) in two land packages. In addition, Whitemud is in the process of applying for additional lease permits consisting of 18 pending lease applications comprising two quarry leases totalling 517.00 ha (1,280 acres) and 14 rights-of-way permits totalling 63.94 ha (158 acres) as detailed in Table 4-1 and illustrated in Figure 4-2. The 21 existing quarry leases are currently in good standing to the indicated renewal dates.

The primary focus of the present work is W½ Sec. 17-5-2 W3M and SE ¼ Sec. 18-5-2 W3M (West Pit area). These areas are the sites of the first phase of the open pit mine operation and the processing plant. The property has not been subject to a legal survey, however, all land parcels held by Whitemud are referenced to the Saskatchewan township and range fabric which has been set out by legal survey. Whitemud is in the process of securing mineral leases for the 14 road allowances and two quarry leases detailed in Table 4-1.

The quarry rights which include the right to mine clay, kaolin, and silica sand are held under *Saskatchewan Quarry Regulations, 1957*. The term of quarry leases is not more than 21 years, however, leases are typically granted in five year terms, with five year renewals upon application being secure, provided that all reporting and rental payments have been received on a timely basis.

No surface rights are granted with the mineral rights under the *Saskatchewan Quarry Regulations, 1957*, however, the registered owner of the minerals may not be unreasonably denied access by the owner of the surface rights. The *Saskatchewan Quarry Regulations, 1957* contain provisions for an arbitration process to settle disputes between the mineral owner and the surface owner. Whitemud owns the surface outright at the SE quarter of 17, SW quarter 17, and the SE and SW quarter of 18, T5, R2, W3M (Figure 4-3). This includes the initial opening and first several years of mining of the Gollier Creek (currently referred to as the Wood Mountain Project) West Pit. Whitemud has an option to purchase essentially all the land required for mining of the West Pit. The surface landowners from whom Whitemud acquired the surface rights have been granted a right to repurchase the land after it has been mined and reclaimed for one dollar.

There are no specific work obligation requirements for leases under the *Saskatchewan Quarry Regulations, 1957*, beyond reporting production, if any, paying royalties if there is production and paying annual rentals of $2 per acre. Quarry prospecting permits require a deposit of $500 which is returned upon submission of satisfactory exploration work.

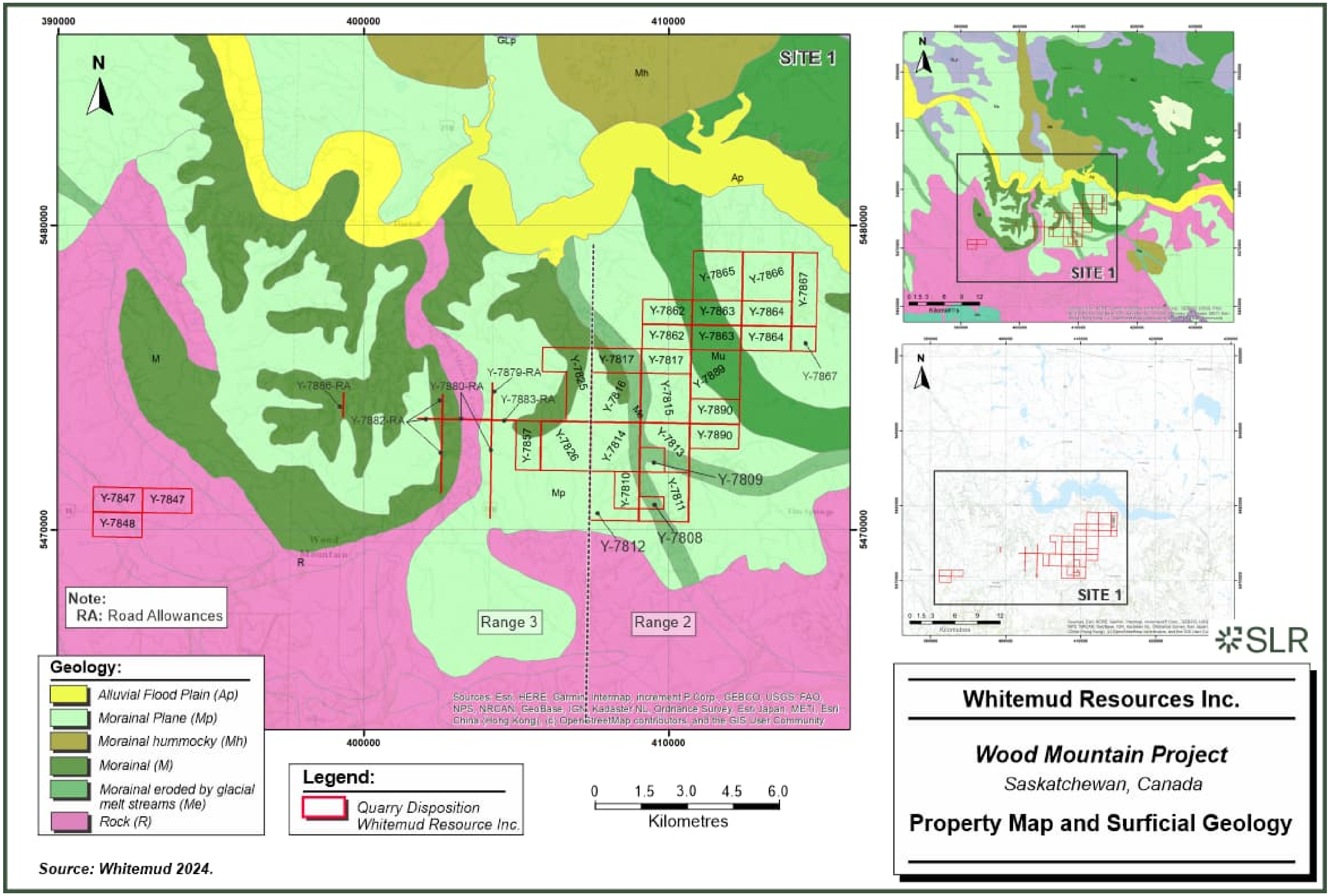
Maintenance of quarry leases requires rental payments and submission of production reports quarterly, and payment of royalty payments if applicable.

Table 4-1: Quarry Lease Holdings

DISPOSITION ID	EFFECTIVE DATE	RENEWAL DATE	MATERIAL	ACRES
Y-7808-R2	April 5, 2020	April 5, 2025	KAOLIN, GRANULAR SILICA	80
Y-7809-R2	April 5, 2020	April 5, 2025	KAOLIN, GRANULAR SILICA	160
Y-7810-R2	April 5, 2020	April 5, 2025	KAOLIN, GRANULAR SILICA	240
Y-7811-R2	April 28, 2020	April 28, 2025	KAOLIN, CLAY, GRANULAR SILICA	546
Y-7812-R2	April 28, 2020	April 28, 2025	KAOLIN, CLAY, GRANULAR SILICA	400
Y-7813-R2	April 28, 2020	April 28, 2025	KAOLIN, CLAY, GRANULAR SILICA	480
Y-7814-R2	April 28, 2020	April 28, 2025	KAOLIN, CLAY, GRANULAR SILICA	640
Y-7815-R2	April 28, 2020	April 28, 2025	KAOLIN, CLAY, GRANULAR SILICA	636
Y-7816-R2	April 28, 2020	April 28, 2025	KAOLIN, CLAY, GRANULAR SILICA	640
Y-7817-R2	April 28, 2020	April 28, 2025	KAOLIN, CLAY, GRANULAR SILICA	640
Y-7825-R2	April 28, 2020	April 28, 2025	KAOLIN, CLAY, GRANULAR SILICA	640
Y-7826-R2	April 28, 2020	April 28, 2025	KAOLIN, CLAY, GRANULAR SILICA	640
Y-7847-R2	July 28, 2021	July 28, 2026	KAOLIN, CLAY	640
Y-7848-R2	July 28, 2021	July 28, 2026	KAOLIN, CLAY	320
Y-7857-1	February 5, 2022	February 5, 2027	CLAY, KAOLIN, GRANULAR SILICA	319
Y-7862-1	February 5, 2022	February 5, 2027	CLAY, KAOLIN, GRANULAR SILICA	640
Y-7863-1	February 5, 2022	February 5, 2027	CLAY, KAOLIN, GRANULAR SILICA	640
Y-7864-1	February 5, 2022	February 5, 2027	CLAY, KAOLIN, GRANULAR SILICA	640
Y-7865-1	February 5, 2022	February 5, 2027	CLAY, KAOLIN, GRANULAR SILICA	640
Y-7866-1	February 5, 2022	February 5, 2027	CLAY, KAOLIN, GRANULAR SILICA	640
Y-7867-1	February 5, 2022	February 5, 2027	CLAY, KAOLIN, GRANULAR SILICA	640
			Sub-total	**10,861**
Pending Lease Applications				
Y-7889-1	December 17, 2022		CLAY, KAOLIN, GRANULAR SILICA	640
Y-7890-1	December 17, 2022		CLAY, KAOLIN, GRANULAR SILICA	640
			Sub-total	**1,280**
Pending Road Allowance Leases				
Y-7873-RA-1	December 14, 2022		CLAY, KAOLIN, GRANULAR SILICA	8
Y-7874-RA-1	December 14, 2022		CLAY, KAOLIN, GRANULAR SILICA	16
Y-7875-RA-1	December 14, 2022		CLAY, KAOLIN, GRANULAR SILICA	16
Y-7876-RA-1	December 14, 2022		CLAY, KAOLIN, GRANULAR SILICA	8
Y-7877-RA-1	December 14, 2022		CLAY, KAOLIN, GRANULAR SILICA	8

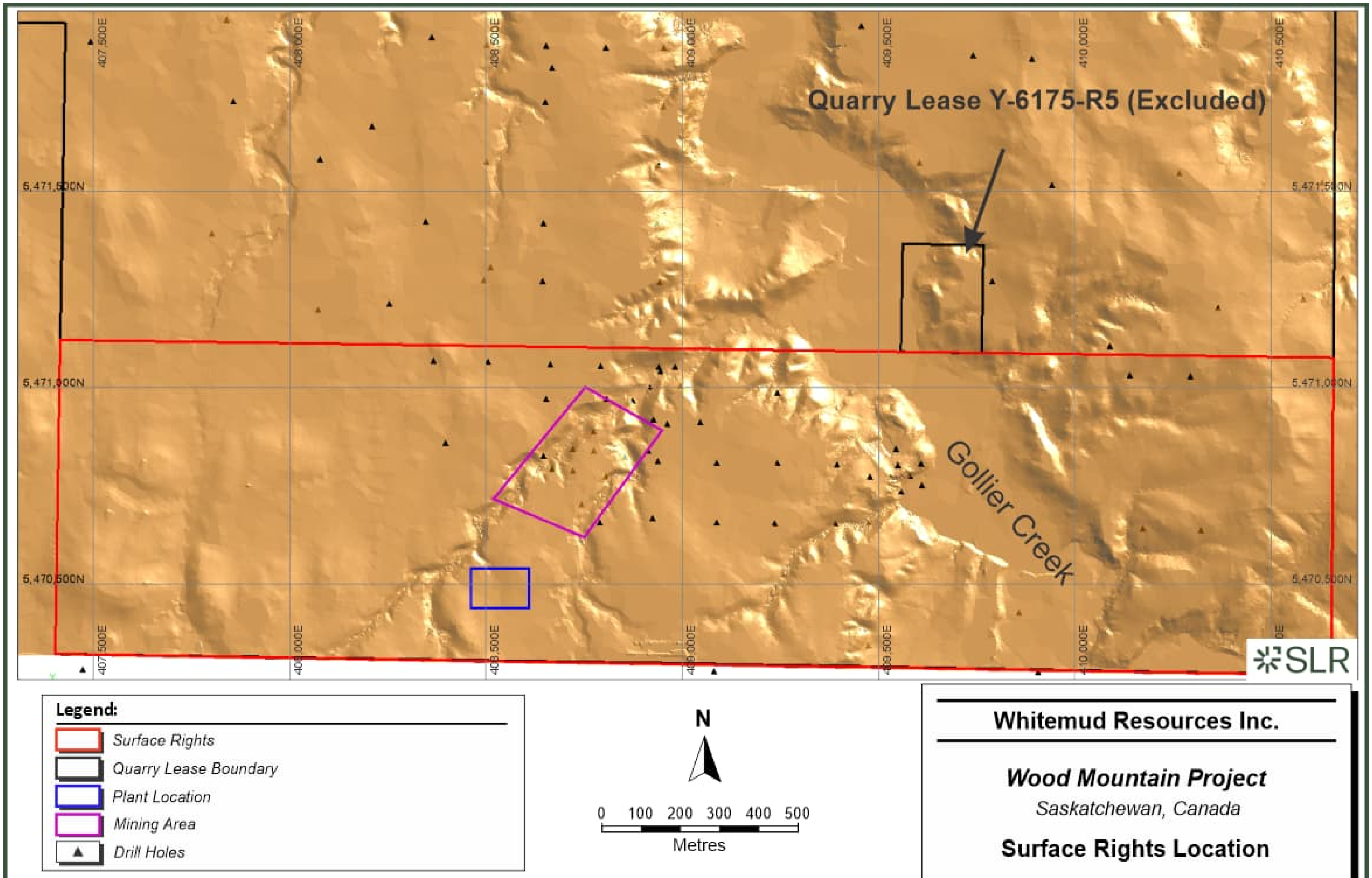
DISPOSITION ID	EFFECTIVE DATE	RENEWAL DATE	MATERIAL	ACRES
Y-7878-RA-1	December 14, 2022		CLAY, KAOLIN, GRANULAR SILICA	8
Y-7879-RA-1	December 14, 2022		CLAY, KAOLIN, GRANULAR SILICA	6
Y-7880-RA-1	December 14, 2022		CLAY, KAOLIN, GRANULAR SILICA	16
Y-7881-RA-1	December 14, 2022		CLAY, KAOLIN, GRANULAR SILICA	8
Y-7882-RA-1	December 14, 2022		CLAY, KAOLIN, GRANULAR SILICA	20
Y-7883-RA-1	December 14, 2022		CLAY, KAOLIN, GRANULAR SILICA	4
Y-7884-RA-1	December 14, 2022		CLAY, KAOLIN, GRANULAR SILICA	12
Y-7885-RA-1	December 14, 2022		CLAY, KAOLIN, GRANULAR SILICA	16
Y-7886-RA-1	December 14, 2022		CLAY, KAOLIN, GRANULAR SILICA	4
Y-7887-RA-1	December 14, 2022		CLAY, KAOLIN, GRANULAR SILICA	2
Y-7888-RA-1	December 14, 2022		CLAY, KAOLIN, GRANULAR SILICA	6
			Sub-total	**158**

Figure 4-2: Property Map and Surficial Geology



Source: Whitemud 2024.

Figure 4-3: Surface Rights Location



Source: Whitemud 2024.

4.3 Encumbrances

There are no encumbrances attached to the leases, nor have there been any environmental liabilities identified with any of Whitemud's holdings.

4.4 Royalties

The royalty is 5% of net profit after capital recovery. Capital recovery is considered to have occurred once the royalty payer has recovered 150% of its initial costs of exploration and development. Pre-production expenses eligible for inclusion in the capital recovery bank include exploration expenditures in the 10 year period prior to commercial production and expenditures on the design, development, and construction of the production unit. Whitemud has estimated the approximate capital recovery to be $12.9 million (project cost of $7.0 million plus development costs since 2021 of $1.6 million * 150%).

The QP is not aware of any environmental liabilities on the property. Whitemud Resources Inc.has all required permits to conduct the proposed work on the property, although it is noted that dewatering authorizations will need to be applied for prior to any dewatering activities. The QP is not aware of any other significant factors and risks that may affect access, title, or the right or ability to perform the proposed work program on the property.

5.0 Accessibility, Climate, Local Resources, Infrastructure and Physiography

The following is excerpted from Scott Wilson RPA (2008a):

5.1 Accessibility

Access to the property is provided by a series of provincial highways and secondary municipal and rural roads. Primary access is via Highway 2 south from Assiniboia approximately 25 km (15 miles), then west on the Pickthall Grid Rd. approximately 13.3 km (eight miles), south on the Popescul Grid Rd. approximately 6.7 km (four miles), and west for 6.7 km (four miles) on a farm access road. Access is also possible from Limerick and Wood Mountain via Highway 358 and the farm access road, or from Highway 2 via Super Grid No. 705. The farm road running east from the plant site to Scout Lake has been upgraded by the rural municipality to handle heavy truck traffic. This road joins Highway 2 at Scout Lake and is the principal truck haul route for movement of product from the plant to the transload station at Scout Lake.

5.2 Climate

The Project is located in the semi-arid prairie region of south central Saskatchewan. It is on the north flank of the Wood Mountain upland, which places it at a slightly higher elevation than the surrounding prairie. Assiniboia, approximately 35 km to the northeast of the Project site and at an elevation of 723 MASL, is the closest long term weather station. Climatic conditions at the site can be expected to be similar to those at Assiniboia.

Average temperatures at Assiniboia range from -12.6°C in January to 18.6°C in July. The lowest recorded temperature was -43.9°C on January 11, 1916, and the highest was 42.8°C on July 7, 1937.

Average annual precipitation is 396 mm, with 26% occurring as snow and 74% occurring as rain. The four month period from May to August accounts for 57% of annual precipitation.

5.3 Local Resources

The surrounding area is agricultural, with grain crops and ranching as the principal activities. The nearest communities of Wood Mountain, Scout Lake, and Flintoft, are quite small and have limited facilities. Assiniboia, population 2,700, is the closest significant community and contains a range of commercial and institutional services such as farm equipment sales and repair, banks, schools, restaurants, and hardware stores.

5.4 Infrastructure

Aside from the regional road network, CP Rail maintains a rail siding at Assiniboia for loading grain. Fife Lake Railway operates a short line from Assiniboia to Coronach, which passes through the village of Scout Lake, approximately 19 km east of the Project site. Whitemud owns a loadout facility and a rail siding at Scout Lake for transloading of Whitemud's products for rail shipping, if required. Telecommunications is via land line. Cellular telephone coverage in the area is weak, although plans are in place to upgrade service coverage. Water supply is via wells.

A water supply well supplies non-potable water to the Wood Mountain plant site. Electricity supply is provided to the plant site by SaskPower, and a natural gas line provides the gas supply. Whitemud has excavated kaolin from an open pit mine (partially flooded at the time of the QP's 2024 site visit) and is in the process of modifying the existing processing plant (Figure 5-1).

5.5 Physiography

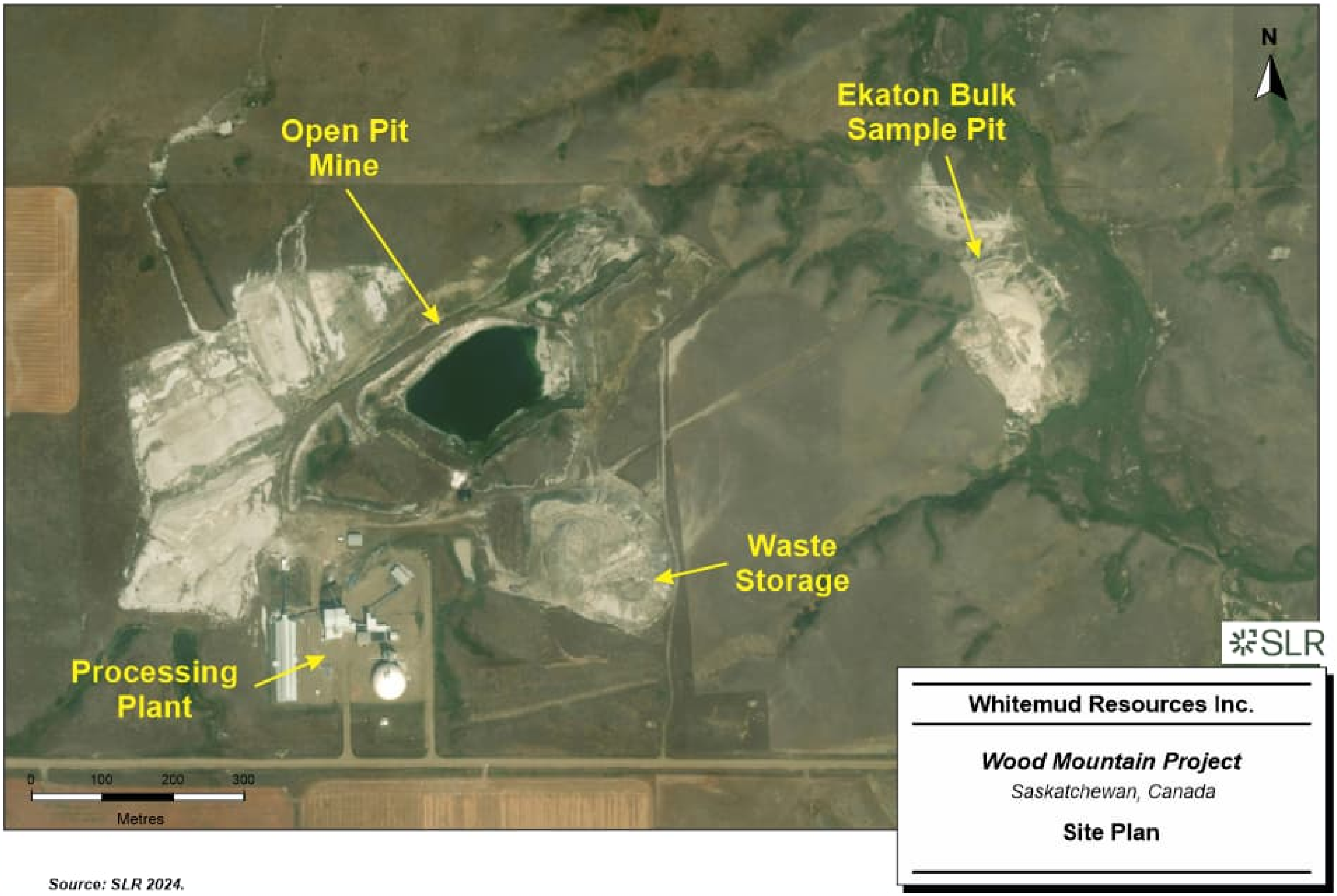
The Project area is characterized as prairie plateau incised by deep arroyos and creek valleys with a generally northward orientation (Figure 5-2). The surface elevation of the plateau ranges from approximately 800 MASL to approximately 830 MASL. Outcrop exposure of the Whitemud Formation on the flanks of the creek valleys is generally excellent. Glacial cover is generally thin (rarely >3 m) and highly irregular. Glacial cover decreases toward the southeast of the Project area. Most of the preglacial cover consists of partly consolidated sands, silts, and clays of the Ravenscrag Formation.

The Project site lies within the Old Wives Lake Basin. Gollier Creek is the main drainage system in the primary Project area, with Wood Mountain Creek acting as a second major drainage area in the western part of the Project property. Gollier Creek originates above elevation 975 MASL on the Wood Mountain upland approximately 10 km southwest of the proposed Project location and discharges into Twelve Mile Lake at an elevation of approximately 755 MASL approximately 10 km north of the proposed Project site. Twelve Mile Lake drains into Lynthorpe Creek and then successively to the Wood River, Thomson Lake, and eventually into Old Wives Lake, a closed basin with no outlet.

Both the Gollier Creek and Wood Mountain Creek drainages are wide, flat valleys lying approximately 25 m below the surface of the plateau. The Gollier Creek drainage basin is reported to be approximately 83 km^2 (Clifton, 2006). Creek flow is sufficient for livestock watering and domestic uses, however, it is not sufficient for large water demands. The major runoff period is February to April, with occasional summer storm runoff. Water flows are negligible after August. The median annual runoff is eight millimetres (Clifton, 2006).

Sand units in the Ravenscrag Formation, the Whitemud Formation, and the underlying Eastend Formation have sufficient hydraulic conductivity and porosity to be low to moderate yielding sources of groundwater supply for domestic uses. There is a general northeasterly groundwater gradient toward the Gollier Creek valley. Exploratory bore holes within the proposed mine area indicate the water table lies approximately 20 m to 25 m below the surface elevation. Whitemud completed a water supply well, screened across the Ravenscrag and Whitemud formations, at the plant site. A 24 hr pump test indicated that sustained yields of 10 Gpm from this well should be achievable. The nearest domestic water wells are located approximately 1.5 km from the proposed mine site.

Figure 5-1: Site Plan



Source: SLR 2024.

Figure 5-2: Panoramic View of the Project Site

SLR

Whitemud Resources Inc.

Wood Mountain Project
Saskatchewan, Canada

Panoramic View of the Project Site

Source: Photo by SLR 2024.

6.0 History

The following is excerpted and slightly modified from Scott Wilson RPA (2008a):

The Whitemud Formation occurs over an extensive area in southern Saskatchewan and southeastern Alberta. In southeastern Alberta, outcrops of the formation are visible along the north and south slopes of the Cypress Hills, on Eagle Butte and along both sides of the Medicine Lodge Coulee. Further west, it outcrops in the Red Deer River Valley, at Kneehill Creek, and Threehills Creek, and just north of the Bow River Valley. Outcrops are also found at a location in Oldman River Valley. In Saskatchewan, the Whitemud Formation occurs in two main outcrop areas. One is in the vicinity of Eastend (near the Frenchman River), and the other is in the vicinity of Wood Mountain. In between, over a distance of 150 km, the formation is absent.

The Formation was named *Whitemud* by N.B. Davis of the Mines Branch, Dominion Bureau of Mines, in 1918. The name derives from the characteristic white appearance of the outcrops which are visible high upon the sides of river valleys and are excellent stratigraphic markers (Figure 6-1).

Figure 6-1: Whitemud Formation Outcrop at Gollier Creek Site

Source: Scott Wilson RPA.

Note: Lignite band near top of outcrop. Whitemud Formation begins immediately below.

Historically, material from the Whitemud Formation was used as whitewash and as clay for local ceramic ware manufacturing. Formal geological exploration and beneficiation studies of the potential of the kaolin resources in the Whitemud Formation started after World War II. The focus of work since the late 1940s up to the recent activity by Whitemud has been on development of the kaolin for paper applications.

Between 1948 and 1954, the Saskatchewan Department of Mineral Resources conducted a program for drilling for industrial mineral resources. Several areas of kaolinized sand and clay were identified and recorded. A pilot plant test was done by the Saskatchewan Department of Mineral Resources in 1954 on samples collected in the areas identified by the 1948 to 1954 program. The test work determined that considerable beneficiation of the kaolin would be required before it could be used in paper coating or filler applications (Master 1985).

In 1960, the Eastend outcrops of the Whitemud Formation were examined by L.S. Beck (unpublished report) specifically to determine their economic potential. "Huge reserves of kaolin clays and kaolin sands" were reported by Beck (Master 1985).

In 1965, a Ph.D. thesis by S.H. Whitaker examined the geology of the Eastend and Wood Mountain areas, including the Whitemud Formation. Maps #5 and #22 of the Saskatchewan Research Council summarize this work (Master, 1985). This work was followed up in 1976 by test work by Steetley Research on the brightness of kaolinized sands of the Wood Mountain area. The work indicated that oxidation and reduction bleaching could improve the brightness of the kaolin, but insufficiently to render the kaolin suitable for filler grade applications."

6.1 Prior Ownership

A summary of the prior ownership of the property is provided in Table 6-1.

Table 6-1: Summary of Prior Ownership

Year	Owner	Summary of Activities
1984 to 1989	Ekaton Resources Ltd.	Acquisition of prospecting rights, surface geological mapping and sampling, completion of split-spoon drill holes, metallurgical test work programs.
1992 to 1994	Kaolin Industries Limited	Metallurgical test work.
1998 to 1999	Minfocus International Inc.	Completion of auger drilling, mineralogical characterization.
2002 to 2008	Whitemud Resources Inc.	Metallurgical test work, construction and operation of processing plant, and open pit mining.
2008 to 2020	Whitemud Resources Inc.	Dormant.
2020 to 2024	Whitemud Resources Inc.	Refurbishment and design enhancements to the processing plant.

6.2 Exploration and Development History

6.2.1 Ekaton Resources Ltd.

Ekaton was of the belief that new beneficiation techniques and changing industry specifications for kaolin use in paper could result in a potentially viable business based on exploitation of the kaolinized sands of the Whitemud Formation.

In 1984 and 1985, Ekaton conducted surface mapping and sampling, and completed 113 drill holes covering an area of 41,172 ha (101,696 acres) in the Eastend and Wood Mountain regions. Holes were generally drilled at section corners on a one mile grid using a combination of compactrosonic (CRS) rotary (mainly through overburden) and split tube core drilling (primarily in kaolinized sediments). The holes were approximately 30 m (100 ft) deep for a total of 1,870.5 m (6,157 ft) rotary and 905.9 m (2,982 ft) core drilling. This work identified the area with the best potential as being in the Wood Mountain region.

Ekaton prepared a preliminary resource estimate based on the results of the 1985 drilling and mapping program. This historical estimate assumed an average thickness of kaolinized sediments of 6.1 m, an in-situ bulk density of 1.75, and continuity between drill holes and outcrops. Areas less than 4.6 m in thickness were excluded from the estimate. In developing the historical resource estimate, Master (1987) reported that “insufficient outcrop and drill samples have been tested for kaolin content; …, grade boundaries have not been located and the whole deposit has been treated as having a single grade”.

In 1987, Ekaton made another estimate of the resources in the Wood Mountain deposits based on visual categorization of the kaolinized sediments as either “good” or “medium” grade.

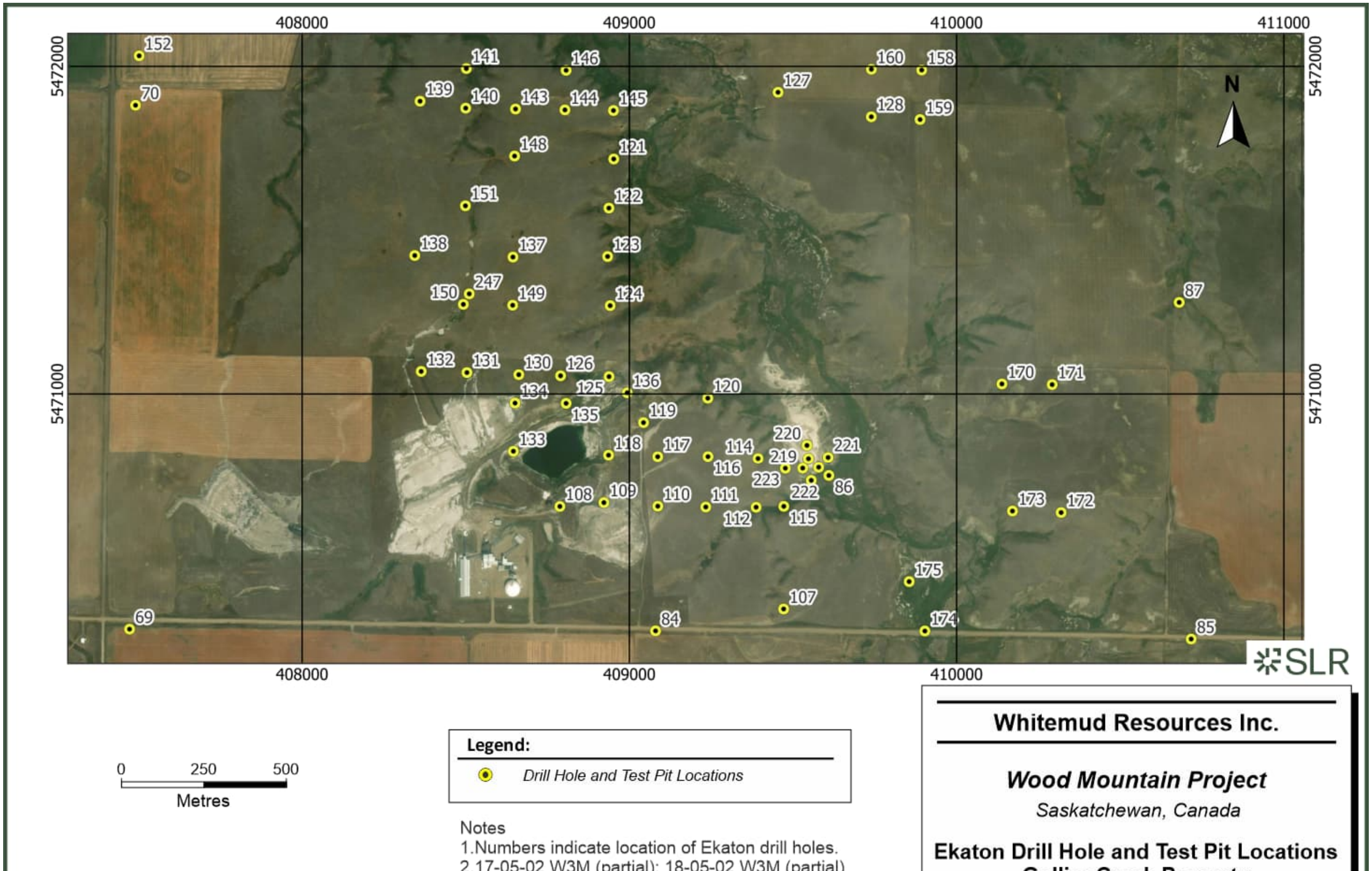
All resource estimates referred to in this section are historical in nature and should not be relied upon. A qualified person has not completed sufficient work to classify the historical estimate as a current Mineral Resource or Mineral Reserve and Whitemud is not treating the historical estimates as current Mineral Resources or Mineral Reserves.

Also in 1984, Ekaton took a 680 kg (1,500 lb) bulk sample of material from the Project 12 area for beneficiation test work at the Saskatchewan Research Council in Saskatoon. This work was designed to evaluate different separation methods to remove the kaolin from the sand. Products from this work were sent to the Colorado School of Mines Research Institute, Miles Industrial Minerals Research, and Eriez Magnetics for further work on magnetic separation and bleaching of the kaolin to improve brightness and remove grit.

A scoping study for the production of filler and coating grades of kaolin was completed by GPW & Associates for Ekaton in February 1986. By the end of 1986, Ekaton had spent $1.619 million on the Project. Ekaton was sufficiently encouraged by the drill results and test work to undertake a second phase of work beginning in 1987. This work, which was conducted in joint venture with Esso Resources Canada Inc., included another drilling program, isopach mapping, further beneficiation studies, including the construction of a pilot plant near Regina, and preliminary resource estimates and preparation of a prefeasibility study.

A total of 118 holes totalling 3,310.5 m (10, 897 ft) were drilled in 1987, using a combination of CSR and core drilling. These holes were generally drilled on a 1,000 m x 1,000 m or tighter grid, especially in the vicinity of Gollier Creek (Figure 6-2). Core was only recovered from the kaolinized intersections and represented approximately 65% of total drilling. A very large bulk sample, several thousand tonnes, was collected from a test pit at Gollier Creek (Figure 6-3). This material provided the basis for an extensive program of test work to develop a beneficiation process for recovery of high brightness filler and coating grade kaolin. A further drill program of 13 drill holes was completed in August 1988. By mid-1988, Ekaton had spent an additional $2.116 million on exploration and process development work. Ekaton continued process development and material characterization studies through 1989, however, by the end of 1989, had exhausted its funds and the company was liquidated, with purchased land and equipment being sold.

Figure 6-2: Ekaton Drill Hole and Test Pit Locations, Gollier Creek Property



Source: SLR 2024.

Figure 6-3: Gollier Creek Test Pit Excavated by Ekaton

Source: Scott Wilson RPA.

6.2.2 Kaolin Industries Limited

Kaolin Industries Limited (KIL) acquired the former Ekaton pilot plant equipment in the early 1990s and began a new research program to produce paper grade kaolin. The company extracted a new bulk sample of material from the Ekaton pit at Gollier Creek. The work, which was conducted in 1992 and 1993 and summarized in a 1994 report, reportedly resulted in a process to produce paper coating grade kaolin with reasonable brightness (86° - 87° GE). KIL exhausted its funds in 1994 and the plant and equipment were sold off.

6.2.3 Minfocus International Inc.

Minfocus International Inc. (Minfocus) revisited the potential for the Gollier Creek kaolin deposits in 1998 and 1999. In 1998, Minfocus obtained a Quarrying Permit covering 696.36 ha (1,720 acres) in the Gollier Creek area covering all or portions of Sections 17, 18, 19, and 20, Township 5, Range 2 W3M. Auger holes to five metres depth were drilled and samples of core from the Ekaton drill program obtained. Mineralogical work on the core samples was undertaken by Dr. Haydn Murray of the University of Indiana to characterize the material in terms of kaolin content, particle size distribution, and other parameters. This work concluded that the kaolin could not be economically beneficiated to yield a marketable kaolin product for paper applications. Based on this result, Minfocus relinquished its permits in 1999.

6.2.4 Whitemud Resources Inc.

In 2003, Whitemud was formed to examine the potential of the Gollier Creek – Wood Mountain kaolin deposits for the production of metakaolin. Whitemud obtained permits to the prime kaolinized areas identified by Ekaton, as well as the historical database of drill logs, assays, and test work, and began its own program of work to define the resource potential of the deposits and design and develop a suitable process for manufacturing metakaolin from the kaolin. The focus of the activity by Whitemud was on the resources contained within the Gollier Creek lease block. As part of its work, in 2006 and 2007 Whitemud completed a total of 93 drill holes totalling approximately 2,832 m in length."

6.3 Past Production

Only limited production of metakaolin has been achieved from the property. Mining was carried out on a contract basis in 2008 (Figure 6-4). Few details are available regarding the mining operations.

Figure 6-4: View of the Mining Operations, May 31, 2008

Source: Whitemud

7.0 Geological Setting and Mineralization

The following excerpt is slightly modified from Scott Wilson RPA (2008a):

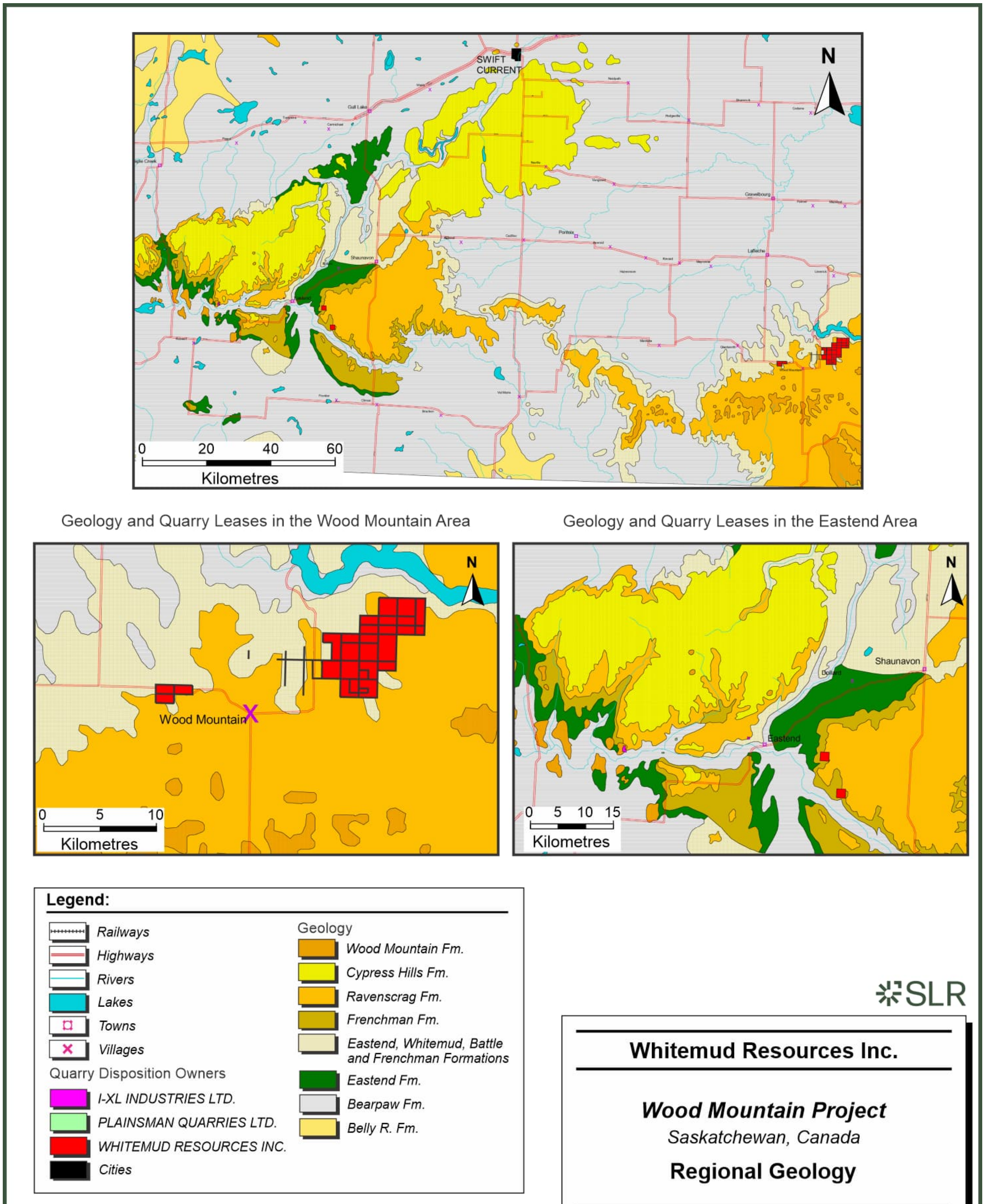
> The subject properties are located to the north of the Wood Mountain Upland, which forms the divide between the Old Wives Lake drainage basin to the north and the Missouri River drainage basin to the south. To the south, topographic relief gradually becomes more rugged into the Wood Mountain Upland. Major step-sided valleys, 15 m to 90 m deep and up to five kilometres wide, occur in the area (Master 1987). Twelve Mile Lake occupies one such valley. It is a meltwater channel formed towards the close of the last glaciation (Master 1987). Gollier Creek and Wood Mountain Creek drain into Twelve Mile Lake. Most bedrock exposures in Whitemud's lease block occurs along these steep-sided channels.
>
> Glacial drift cover is thin or absent. The western half of the Project area is covered by hummocky moraines composed mainly of sand with minor amounts of till. The eastern half of the area is bedrock upland with a thin veneer of glacial drift consisting of relatively flat areas separated by deep, steep-sided drainage channels (Master 1987)." The distribution of surficial materials in the project area is presented in Figure 4-2.

7.1 Regional Geology

The following excerpt is slightly modified from Scott Wilson RPA (2008a):

> The Whitemud quarry leases are located along the main contact between Tertiary and Upper Cretaceous rocks (Figure 7-1). Upper Cretaceous rocks represent most of the bedrock exposures west of the contact, while the area to the east of the contact is underlain mainly by Tertiary rocks, although large inliers of Upper Cretaceous rocks are located along Lake of the Rivers, Willow Bunch Lake, and Big Muddy Lake valley. Strata generally dip eastward toward the centre of the Williston Basin, but local folds cause deviations from the regional trend.
>
> The Whitemud leases are located a considerable distance south of known salt deposits of the Middle Devonian Prairie Evaporite. Some salt-free areas were, geologically, underlain by the Prairie Evaporite, and salt was removed by sub-surface solution. Some portions of the salt may have been removed later in the Tertiary Period, following deposition of the Ravenscrag Formation. In addition to the better known, large collapse structures in the area, such as Hummingbird, evidence from Ekaton's 1985 drilling program suggests that localized features near Wood Mountain may also be due to post-Whitemud (possibly post-Ravenscrag) salt removal and collapse.

Figure 7-1: Regional Geology



Source: Whitemud 2006.

7.1.1 Structure

The drilling information collected by Ekaton in the mid to late 1980s indicates that the regional dip of the kaolinized sediments is generally eastward. The kaolinized sediments appear to be folded into four ridges, viz. Project 12 Ridge, Waverly Ridge, Wood Mountain Ridge, and Gollier Ridge. All of these ridges, except Gollier Ridge, trend east-northeast (Master 1987).

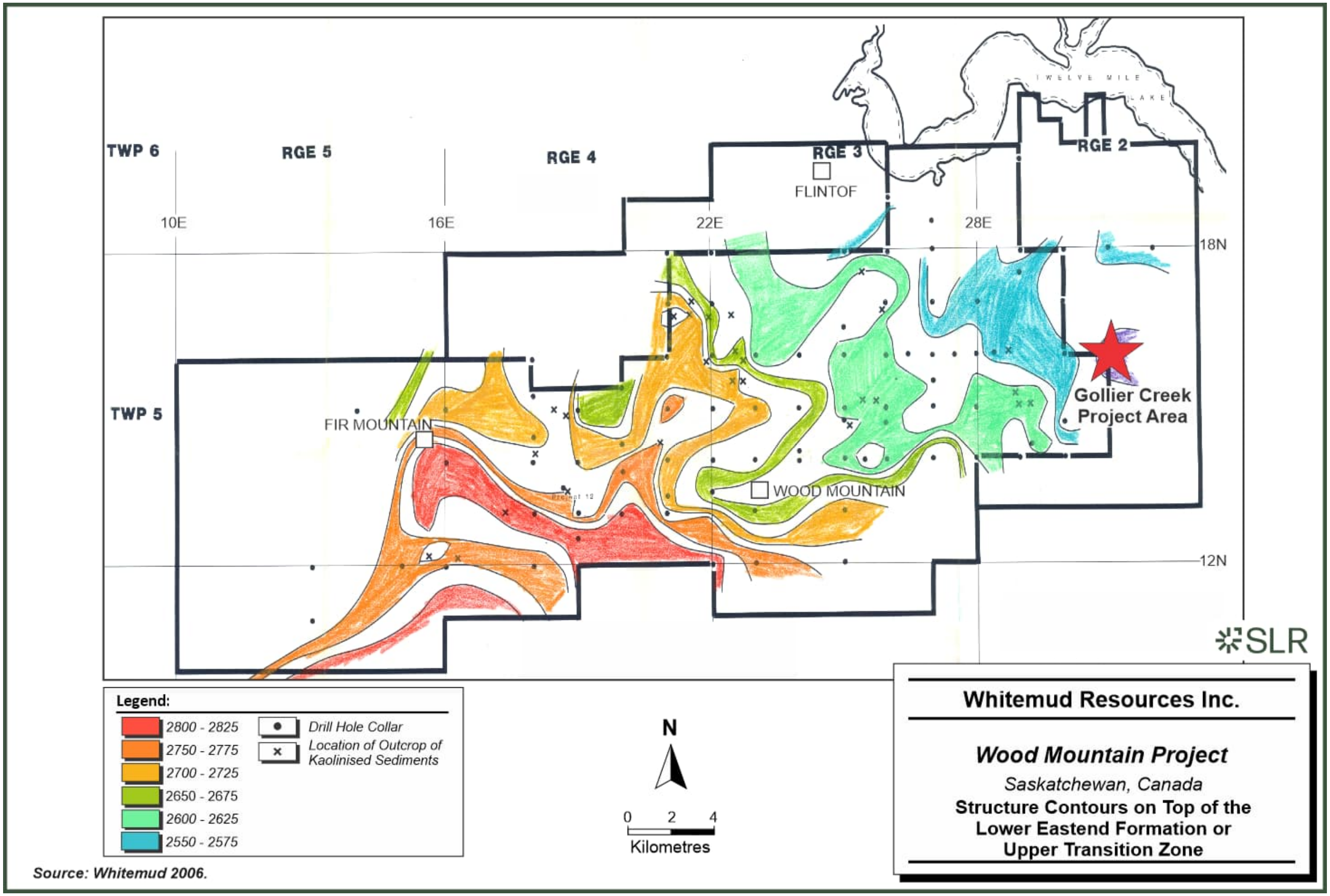
The crests of the Project 12, Waverly and Wood Mountain ridges lie between the limits of the kaolinized sediments, indicating these crests were eroded off in post-Whitemud, pre-Ravenscrag time. Structure-contour mapping of the top of the Lower Eastend Formation or Upper Transition Zone (Figure 7-2) shows structural highs that coincide fairly closely with the projected ridge crests on top of the kaolinized sediments (Figure 7-3). Crests of the Waverly Ridge and Wood Mountain Ridge directly overlie a prominent structural high with a similar coincidence under the Project 12 Ridge. The relationship of the Gollier Ridge to the structure underneath appears to be similar (Master 1987).

The base of the Tertiary-aged Ravenscrag Formation shows a generally northeasterly dip and some degree of structural continuity with the top of the Whitemud Formation kaolinized sediments.

Mapping of the Tertiary-Upper Cretaceous structure provides additional information on the development of the Whitemud Formation. Assuming the zone between the Ravenscrag and Whitemud or Lower Eastend Formation is the Frenchman Formation, the kaolinized sediments appear to be of fairly uniform thickness wherever they are encountered and may at one time have been fairly continuous. A later major deformation, probably occurring before the Tertiary Period, created several ridges in the Upper Cretaceous formations. The Whitemud sediments at the crests of the ridges were stripped off prior to deposition of the Ravenscrag formation. Thus, the existing deposits of the Whitemud and Upper Eastend kaolinized sediments are remnants, preserved on the flanks of these ridges. Isopach maps of the kaolinized sediments indicate they are thinner towards the projected crests of the ridges, a result of differential erosion between the crests and the more protected flanks of the ridges (Master 1987).

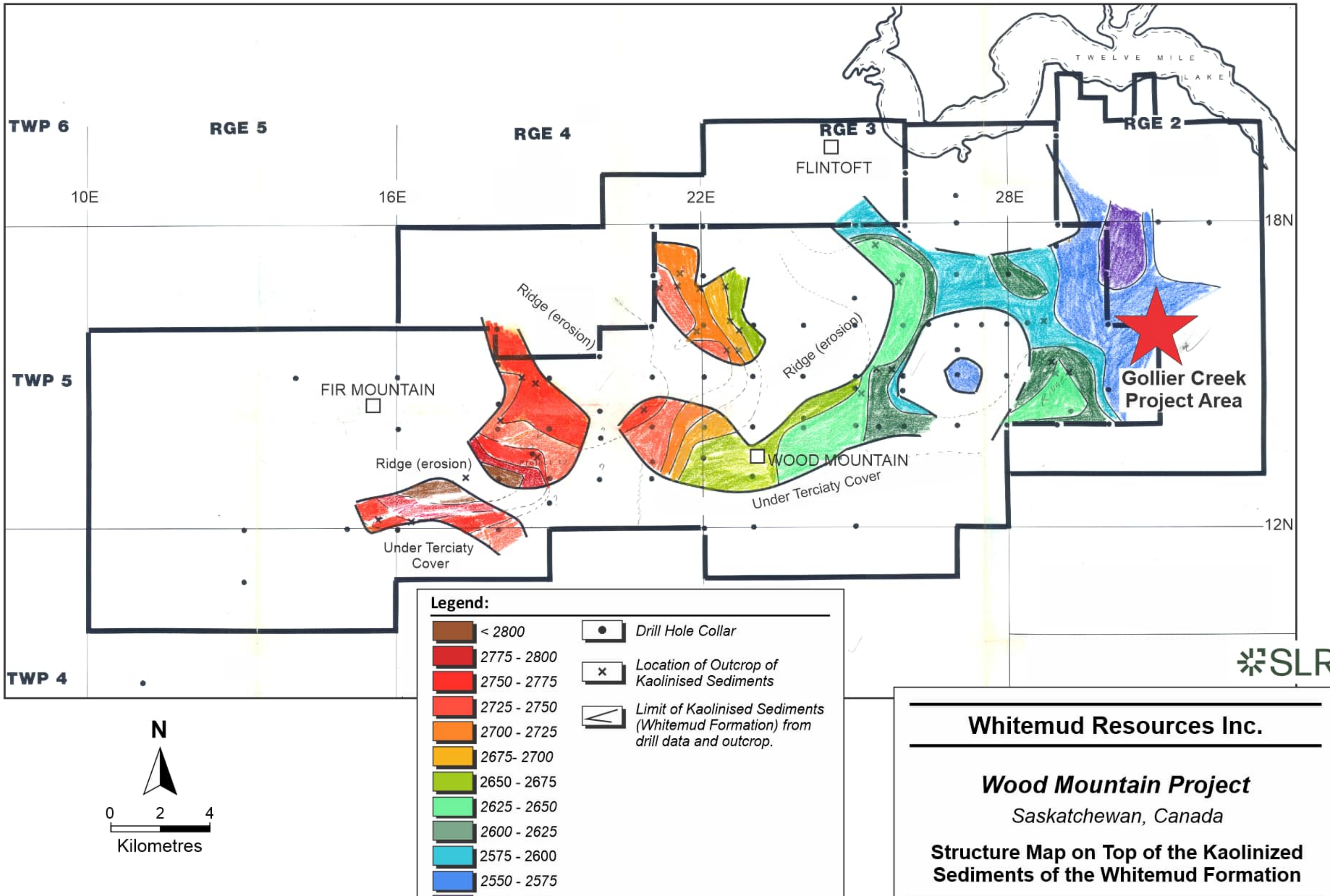
It is not known if the Tertiary-aged Ravenscrag sediments were also involved in this deformation and erosion process, primarily because consistent data about the structure of the Ravenscrag Formation was not recorded during the Ekaton drilling programs of the mid to late 1980s. The Frenchman Formation appears to wedge out eastwards on the original Ekaton permits, and the Ravenscrag directly overlies the Whitemud and Lower Eastend Formations in the south and east (Master 1987).

Figure 7-2: Structure Contours on Top of the Lower Eastend Formation or Upper Transition Zone



Source: Whitemud 2006.

Figure 7-3: Structure Map on Top of the Kaolinized Sediments of the Whitemud Formation



Source: Whitemud 2006.

7.2 Local Geology

7.2.1 General

The main area of interest for Whitemud is the extensive deposits of kaolinized sediments that have been outlined by outcrop mapping and drilling in the Wood Mountain area. The kaolinized sediments are mainly comprised of the Whitemud Formation and partly of the Upper Eastend Formation, both located high in the Upper Cretaceous Series (Table 7-1).

Table 7-1: Cretaceous-Pleistocene Stratigraphy in Southwestern Saskatchewan

System	System	Formation
Quaternary	Pleistocene	Glacial Drift
Tertiary	Pliocene	
	Miocene	Wood Mountain
	Oligocene	Cypress Hill
	Eocene	Swift Current
	Paleocene	Ravenscrag
Cretaceous	Upper Cretaceous	Frenchman
		Battle
		Whitemud
		Eastend
		Bearpaw
		Belly River
		Upper Colorado
		First White Speckled Shale
		Second White Speckled Shale
		Lower Colorado
		Shale
		Fish Scale Zone
		Shale
	Lower Cretaceous	Viking
		Blairmore

The sediments of the Whitemud and Eastend formations are similar in mineralogy and chemistry but differ in the degree of kaolinization. Feldspars (including altered pseudomorphs) are recognizable in both the kaolinized and the relatively unkaolinized sediments of the Whitemud and Eastend Formations, and feldspar pseudomorphs are abundant in even the most kaolinized sediments. The sediments of the Whitemud and Eastend Formations are possibly derived from the same source material, and most of the kaolinization may have occurred in-situ following deposition. The amount and nature of feldspar alteration was a function of the environment of deposition and/or post-depositional, in-situ alteration, both of which were variable over short lateral distances and short time spans.

Local structures within the Whitemud and Eastend formations, as interpreted from the 1985 Ekaton data, may be related to subsidence of the sediments following the solution of the underlying Devonian Prairie Evaporite. At and adjacent to the crests of some structural highs, the Whitemud Formation was eroded off. A few of the features may be related to Tertiary collapse structures described by Whitaker (1965), however, evidence suggests that most of the structural highs were eroded prior to the deposition of the Tertiary-aged Ravenscrag Formation.

7.2.2 Stratigraphy and Lithology

Table 7-2 is a compilation of previously published sections and the results of Ekaton's 1985 drilling program as reported by Master (1987).

Table 7-2: Stratigraphy and Lithology of Part of the Upper Cretaceous-Tertiary Sequence in Wood Mountain Region

System	Formation	Lithology
Tertiary	Ravenscrag Formation	Green-grey, buff feldspathic sandstone, clayey sands, silts and coal seams
Upper Cretaceous	Frenchman Formation (?)	Grey-green, purple bentonite clays, carbon and/or grey-green, yellow sand or sandstone-carbon
		Purple or dark grey ball clay, some sand and silt
	Whitemud Formation - Kaolinized	White to partly yellow, consolidated clayey fine sand to clay (fireclay)
		White to grey, consolidated sandy clay
		Band of iron nodules
		White, grey-green clayey sand and sandstone
	Upper - partly kaolinized	Grey to white clayey sand and sandstone, silt-carbon
	Eastend Formation	Clay in matrix yellow-orange
	Lower	Uniform, unconsolidated, fine green-grey sand
	Upper Transition Zone	Grey to greenish grey, partly consolidated, fine-to-medium sand or interbedded silt with clay
	Lower Transition Zone	Consolidated interbedded grey clays and yellow to grey-white sandstone or grey to apple-green bentonitic clays – variable silt and fine sand
	Bearpaw Formation	Grey, partly bentonitic shales

Fine to medium sands, silts and clays show cyclic repetition in the Upper Cretaceous and Tertiary strata. The Whitemud Formation, composed of white kaolinized sediments, is the only distinct marker horizon. Some of the colour differences, which cut across formational boundaries, are likely a result of post-depositional processes. In the absence of the white kaolinized marker beds, formation identification from lithology is difficult. For example, the Ravenscrag and Frenchman Formations are almost indistinguishable from the Eastend Formation in drill holes unless the white kaolinized sediments of the Whitemud are present.

The Ravenscrag Formation is characterized by distinct beds of lignite. Whitaker (1965) reports that a greenish-grey clay or silt band below the lowermost lignite seam forms a distinct lithological marker for the contact between the Ravenscrag and the underlying Whitemud Formation. Other green sediments, however, lie within the Ravenscrag and Frenchman Formations, and the marker horizon of Whitaker is usable only in conjunction with geophysical logs. In the absence of geophysical logs, the base of the Ravenscrag Formation is considered to be the bottom of the lowest distinct lignite seam (Figure 7-4).

Figure 7-4: View of the Outcrop at Gollier Creek Showing the Ravenscrag/Whitemud Contact (contact is at the lignite seam)

Source: Scott Wilson RPA 2006.

Older records report that the kaolinized sediments of the Whitemud Formation are overlain by a layer of ball clay, a relationship recognizable in some outcrops and in drill core. During drilling, however, the ball clay is difficult to distinguish visually from the plastic bentonitic clays of the overlying Frenchman and Ravenscrag formations. Examination of several outcrops indicates that a distinct unconformity exists on top of the kaolinized sediments so that in places the kaolinized sediments are overlain by the Frenchman, while in others they are directly overlain by the Ravenscrag, and in spots by the gravels of the Wood Mountain Formation. In many places the ball clay is absent and kaolinized sediments are overlain directly by the Frenchman, Ravenscrag or Wood Mountain formations. The upper contact of the Whitemud is generally marked by a downward colour change to white or greyish white. The lithology above the contact is variable, and in the absence of the kaolinized sediments, difficulty exists in determining if the drill intersections represent the section above or below the Whitemud Formation.

The Whitemud sediments vary laterally and vertically over several metres between the following lithologies:

- Kaolinized feldspathic sands and sandstone
- Clayey (kaolinitic) sand and sandstone
- Consolidated sandy clay (kaolin)
- Consolidated clayey (kaolinitic) fine sand and fireclay

The sediments range in colour from white to yellow to grey and greyish-green with gradations between. The dark minerals, identifiable in a hand lens, consist mainly of chert, and some carbon grains (lignite/coal?) are also generally present. The dark chert and carbon give some of the rocks a salt and pepper appearance. The grain size ranges from medium sand to fine sand, silt, and clay. Variations in grain size and colour are easily observed in outcrop. Using a hand lens, kaolin infillings are distinguishable and distinct lath-shaped clay pseudomorphs after feldspar are recognizable.

The lower contact of the Whitemud Formation with the Eastend Formation is described in the literature as gradational. The contact is generally easy to recognize by colour. It is commonly gradational over 1.5 m to 3.0 m through either grey to yellow feldspathic sandstone, or grey to white clayey sand, siltstone, or sandstone. This gradational zone has been termed the Upper Eastend Formation.

The lower contact between the kaolinized sediments (including the partly kaolinized Upper Eastend) and the underlying rocks is marked by a distinct downward colour change to apple green or apple green-grey. The sediments below the kaolinized material are unconsolidated uniform fine sand, partly consolidated fine to medium sand, or interbedded with clay. The uniform fine sand is designated as the Lower Eastend Formation and the remaining sediments are part of the Upper Transition Zone.

There are two transition zones that separate the Eastend Formation from the underlying Bearpaw Formation: The Upper Transition Zone is coarser grained and, according to Whitaker (1965), should be placed in the Eastend Formation, whereas the Lower Transition Zone should be considered part of the Bearpaw Formation.

The Lower Transition Zone was rarely intersected in the Ekaton drill program, as the apple-green colour of the Lower Eastend and Upper Transition Zone provided clear indication that the drill was below the potential zone for kaolinized sediments. The bentonitic clays are recognizable from their green colour and vitreous luster on freshly cut surfaces.

7.3 Mineralization

Mineralogical analysis of the Whitemud Formation sediments was conducted by Miles Industrial Minerals Research on behalf of Ekaton in 1985. Random core samples from the 1984 drill program representing material from the Whitemud Formation, Upper Eastend, Lower Eastend-Upper Transition, and Lower Transition zones were selected. Mineral species were identified in thin section by optical methods. The results of this work are summarized as follows:

- Quartz and feldspar are the dominant minerals, with clay fill representing between 10% and 75% on a volume basis (typically 10% to 20% clay fill).
- Clay sediments of low birefringence appear to be deposited between the grains of quartz and feldspar (grains generally touch each other) and do not appear to be altered in-situ.
- Quartz and feldspar grains have angular edges, suggesting that they have been transported relatively short distances. The muscovite, quartz, and feldspar distribution is generally uniform, with larger quartz grains associated with larger muscovite and feldspar grains.
- The altered feldspar content of the kaolinized sediment is similar to that of the partly kaolinized and unkaolinized material.
- The volume percentages of quartz and clay-fill minerals in the sediments of the Whitemud and the underlying Eastend/Transition sediments show that feldspar, quartz, and clay-fill contents are generally similar, suggesting a common source area for the sediments.

Additional mineralogical work by Ekaton identified illite and traces of smectite as accessory clay minerals within the clay fill.

Mineralogical work in 1999 by Minfocus, using samples of core from the Ekaton drill program of the mid-1980s, manual auger samples collected by Minfocus, and channel samples from outcrop at the Gollier Creek pit, focused on characterization of the mineral species and evaluation of mineralogical differences by particle size. Drill core samples were collected from drill core from holes in the Gollier Creek area, primarily holes located near the Ekaton test pit.

X-ray diffraction studies of the -325 mesh (-44 µ) size fraction showed that the samples were composed principally of quartz and kaolinite, with minor amounts of illite, muscovite mica, sericite, amphibole, orthoclase feldspars, and oligoclase feldspars. The -325 mesh fraction represented 33.7% to 52.2% by weight of the samples, with drill core samples typically being in the mid 30% range. Quartz was primarily contained in the +325 mesh fraction, however, fine quartz was also found in the finer fractions at levels ranging from a low of 1.81% for a <2 µ sample to a high of 15.89% for a <10 µ sample."

8.0 Deposit Types

The following excerpt is slightly modified from Scott Wilson RPA (2008a):

> The Gollier Creek kaolinized sediment deposit is classified as a sedimentary deposit consisting of altered and unaltered feldspars and pseudomorphs within a silica sand matrix. Based on the results of the Ekaton work (Master 1987) and the characterization work conducted by Minfocus and Whitemud, the genesis of the kaolin is proposed as follows:
>
> - It is most probable that the non-marine sediments of the Whitemud and Upper Eastend formations were derived from the same source material. Byers (1969) has suggested Montana, while McLaren (Fraser et al. 1935) suggests the Purcell and Selkirk Mountains.
> - The strong lithological and mineralogical similarities between the kaolinized sediments and the partly kaolinized and poorly kaolinized sediments of the Eastend are evidence that all the sediments are derived from the same source area.
> - Drill core and outcrop samples from the Ekaton 1985 drilling suggest the kaolinized sediments of the Whitemud, the partly kaolinized sediments of the Upper Eastend, and the unkaolinized sediments of the Lower Eastend/Upper Transition are mineralogically similar. The degree of feldspar alteration appears to be similar, however, the alteration products are different.
> - The presence of angular quartz grains in all the formations suggests relatively short distance of transport from indeterminate source areas. Sorting with respect to grain size and chert content appears to have occurred. Some reworking and redistribution of the Whitemud sediments over short distances may have taken place. Ball clays present in the Whitemud sediments probably represent reworked material derived from the underlying kaolinized sediments.
> - In-situ alteration (kaolinization) of the Whitemud sediments due to fluctuations of water table and climate is likely to have occurred as unaltered feldspar represents less than 5% of the rock, however, the abundance of feldspar pseudomorphs (particularly in kaolinized material) suggests that the total feldspar content of the original sandstone was between 30% and 40%.
> - The significant amount of feldspar, ranging from clay and sericite pseudomorphs after feldspar to unaltered grains, suggests that the kaolin in the sediments was derived from the weathering of the feldspars at the site of deposition. If kaolinization took place in the source area, less kaolin would be present in the form of lath-shaped feldspar pseudomorphs.

9.0 Exploration

9.1 Ekaton

The following excerpt is slightly modified from Scott Wilson RPA (2008a):

> Ekaton conducted an extensive exploration program across all of the Whitemud lease areas in the 1980s. This program included surface sampling and mapping, drilling, and core sampling. Drill core from the Ekaton drill program is stored at the core library at the Saskatchewan Industry and Resources Subsurface Geological Laboratory, in Regina, Saskatchewan. Drill logs, assay data sheets and other geological information from the Ekaton exploration program was obtained by Whitemud from Saskatchewan Industry and Resources mineral assessment files and from former Ekaton employees, especially Pilsum Master, P. Geo., formerly exploration manager for Ekaton. Review of the data indicates the Ekaton work was done to a high standard.
>
> The drill core library in Regina maintains core for Ekaton holes 103 through 252. Drill logs are available for all holes, with assay data (chemical analysis, mineralogical analysis, particle size analysis, in part or in combination, being available for a large number of holes). Ekaton holes 104 through 252 were relogged by Whitemud (Chris Curry, P. Geo.), while the drill logs for Ekaton holes 1 through 99 were examined and reinterpreted to conform to the stratigraphic relationships established for the relogged core.
>
> As part of its site visit activities in 2006, Scott Wilson RPA examined the available core, reviewed the revised logs, and took selected samples of core for analysis as part of its due diligence (Figure 9-1).
>
> The available drill core includes all of the property areas of primary interest, with a focus on the Gollier Creek area as well as the Wood Mountain and Project 12 deposits. In the opinion of Scott Wilson RPA, the available core and related analytical data can be used for the preparation of Mineral Resource estimates, and additional drilling is not required to confirm historical data with respect to stratigraphic relationships and interpretation of the thickness of the kaolinized sediments of the Whitemud Formation and the associated overburden.

Figure 9-1: Drill Core Sampling. Drill Hole WM87-132 at 61 ft)

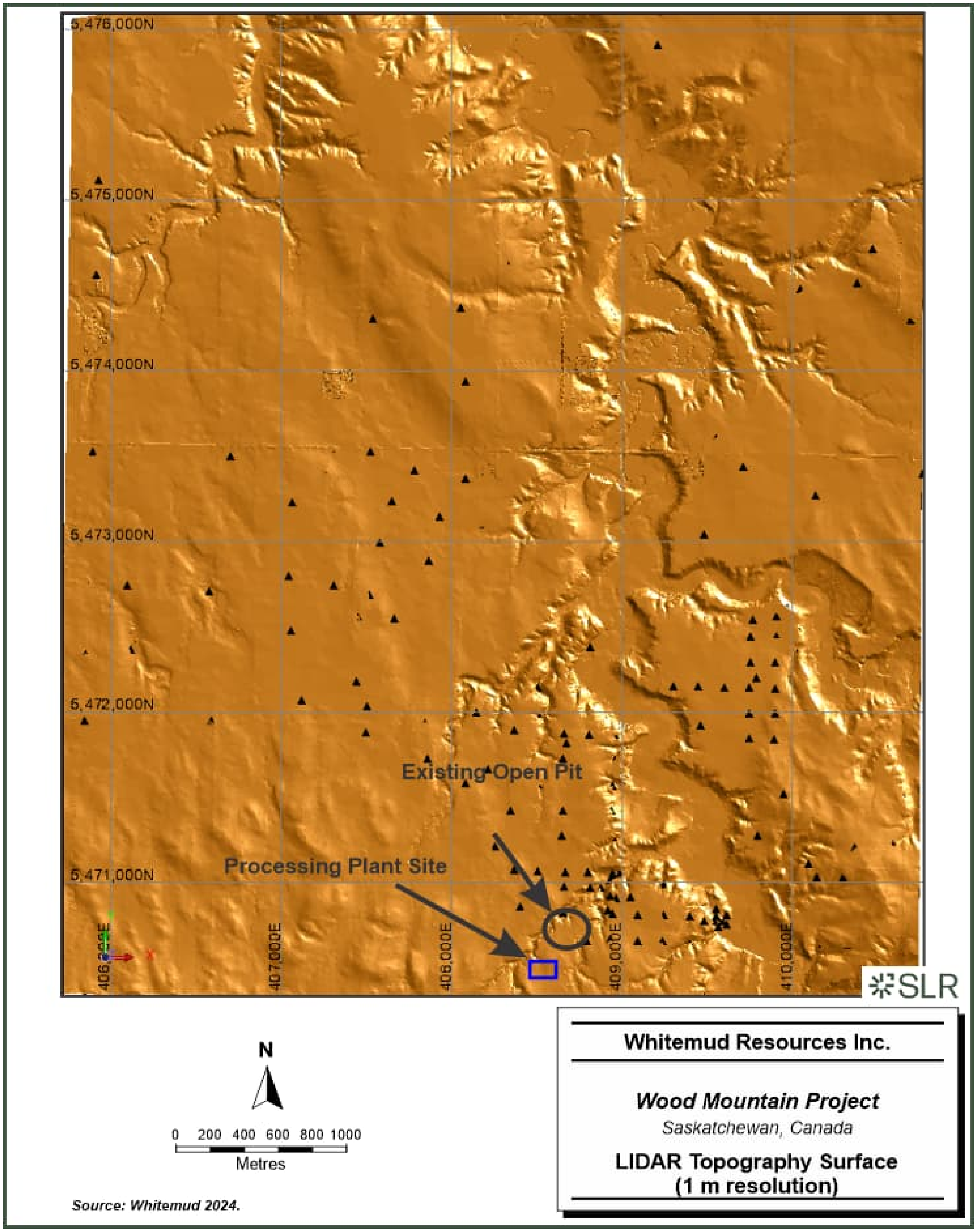
Source: Scott Wilson RPA 2008a.

9.2 Whitemud Resources

The following excerpt is slightly modified from Scott Wilson RPA (2008a):

> Whitemud has conducted additional in-fill drilling and particle size analysis of drill core for the Gollier Creek deposits. Additional in-fill drilling, combined with particle size analysis of drill core samples, was also conducted to extend and upgrade the categorization of resource estimates across most of the remaining Whitemud property holdings at the time. Many of these quarry lease claims not part of the Gollier Creek area have since been allowed to lapse.
>
> Whitemud utilized the existing stockpiles of kaolinized sediments at Gollier Creek in its metallurgical test work programs carried out in 2003 to 2008. These stockpiles, representing several thousand tonnes of kaolinized material, have been exposed to the weather since 1987. Inspection of the stockpiles by Scott Wilson RPA and comparison with outcrop exposures indicates some kaolin may have been washed from the surface of the pile, but that the interior material should be representative of the material originally removed from the test pit. Samples of this material have been analyzed by X-ray diffraction (XRD) for mineralogical characterization, by X-ray fluorescence (XRF) for chemical composition, and by Sedigraph for particle size distribution, at the University of Indiana, in Bloomington, Indiana, United States, by Dr. Haydn Murray."
>
> Whitemud completed a Laser Interferometer Distance And Ranging (LIDAR) topographic survey of its quarry leases in 2006, with a focus on the leases in the Gollier Creek area. This survey provides topographic information to approximately ±0.1 m elevation accuracy. The results of this survey have been used in development of the 2006 drilling program, and to assist in resource estimation and mine planning (Figure 9-2).

Figure 9-2: LIDAR Topography Surface (1 m resolution)



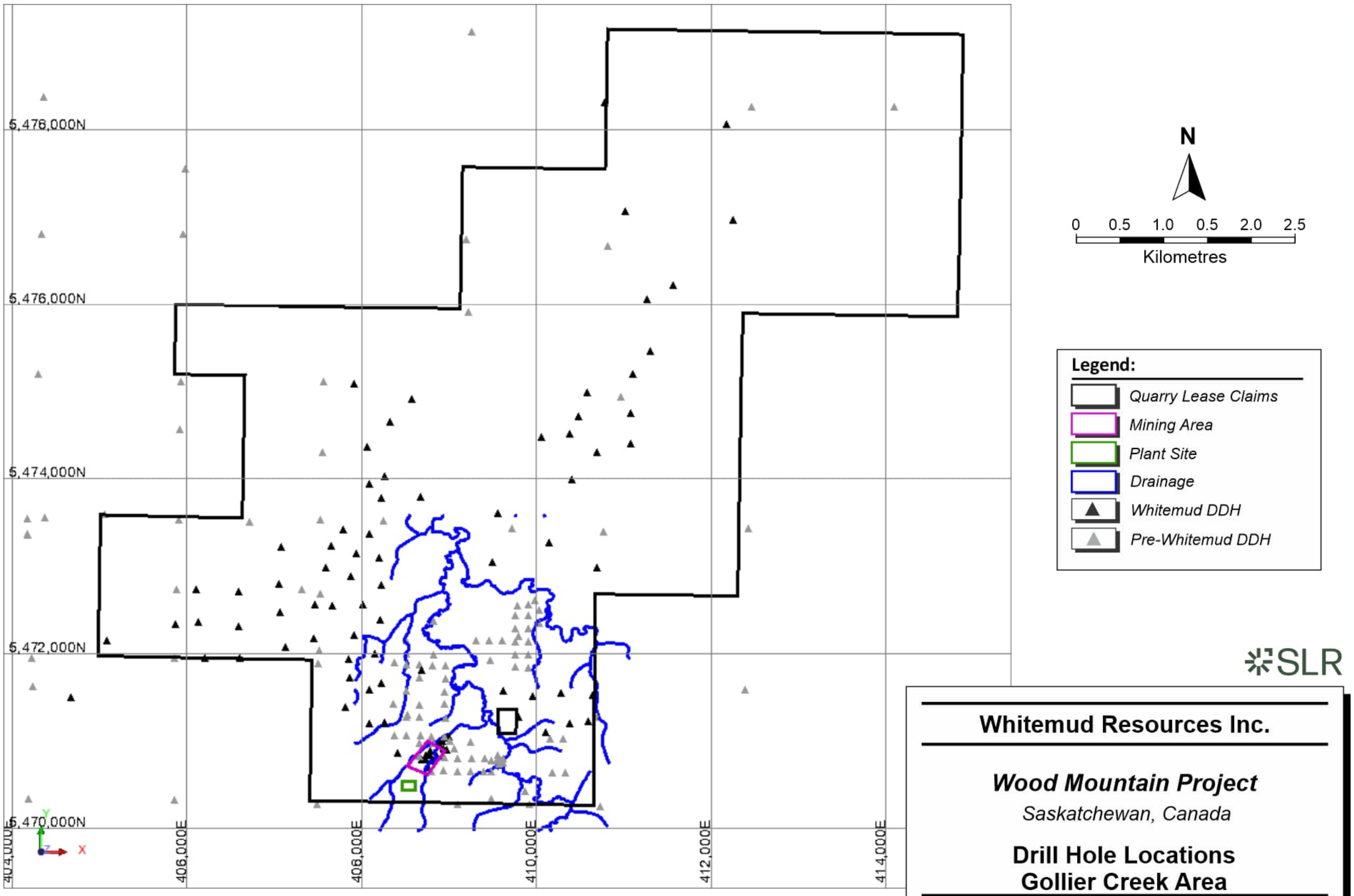
Source: Whitemud 2024.

10.0 Drilling

10.1 Introduction

Whitemud carried out in-fill drilling programs in 2006 and 2007. The 2006 drill program completed by Whitemud was designed to fill in gaps between some of the Ekaton holes in the Gollier Creek area and to extend the potential limits for Mineral Resource estimation purposes. The 2007 drilling program continued to provide further in-fill drilling information in support of the Mineral Resource estimates. A summary of the drilling completed in the Gollier Creek area by both Whitemud and prior owners is presented in Figure 10-1.

Figure 10-1: Drill Hole Locations, Gollier Creek Area



Source: SLR 2024.

10.2 2006 Drilling Program

The program was designed after Scott Wilson RPA had completed its initial data review and resource estimations. Drill hole spacing was 400 m or less from adjacent holes. This distance was determined from semi-variogram analysis of the Ekaton drill data. Holes were drilled to the west and north of the Ekaton holes on the west side of Gollier Creek and between areas of Ekaton holes on the east side of Gollier Creek.

The drill program consisted of 30 planned holes, of which 25 were completed. The drill hole locations were determined using a handheld Global Positioning System unit. Holes were labelled either Axx or Bxx, with A indicating priority holes. Drilling was conducted using a rotary drill with a hollow stem core barrel. Core recovery was initiated once the drill cuttings return indicated the bit had entered sand. Core was recovered in three metre intervals. After removal of surface drilling mud, the core was logged and sampled. Figure 10-2 to Figure 10-5 inclusive, illustrate the 2006 drill program. Resistivity logs for each hole were also completed. The resistivity logs generally indicated sharp distinctions between the clay and kaolinized sediment layers and provided good correlation with the drill logs. A summary of the drill hole results is provided in Table 10-1. Considering that the drill holes are drilled to intersect the target lithologies at very high angles, the true widths of the intervals are expected to be greater than 95% of the core lengths.

Figure 10-2: View of the Drill Rig for the 2006 Drilling Program

Source: Whitemud.

Figure 10-3: View of the Drill Core Produced During the 2006 Drilling Program

Source: Whitemud.

Figure 10-4: View of the Sampled Drill Core

Source: Whitemud.

Figure 10-5: Example of the Contact Between the Whitemud and Eastend Formations

Source: Whitemud.

Table 10-1: Summary of 2006 Drilling Program

Hole No.	UTM Location		Collar Elev. (m)	Depth (ft)	Top of K_{sd} (ft)	Bottom of K_{sd} (ft)	Remarks
	Easting	Northing					
A01	408206	5472788	798	54	13	34	
A02	408197	5472383	807	58	17	34.5	
A03	408208	5471665	811	110.5	76.2	97.5	
A04	408960	5470907	818	119	62	104	
A05	408668	5471815	804	128	98	112	
A06	408252	5471213	811	72	32	55	Poor core recovery. Contacts estimated from resistivity log.
A08	408396	5470860	821				Hole not drilled
A09	408136	5471996	804	72	31	53	
A10	408077	5471582	817	112	56	94.9	
A11	408071	5471198	822	118	75.2	115.2	
B01	407998	5472562	802	48	13	31.8	Cored from 18 to eoh. Good recovery in K_{sd}
B02	409602	5471573	814	69	17	54.5	

Hole No.	UTM Location		Collar Elev. (m)	Depth (ft)	Top of K_{sd} (ft)	Bottom of K_{sd} (ft)	Remarks
	Easting	Northing					
B03	407905	5472215	811	70	26	48.5	
B04	407838	5471937	819	113	74.5	107.7	
B05							Not drilled. Redundant after moving neighbouring holes
B06	407657	5472545	808	70	20	48	Lost core 20 - 40
B10	407855	5471729	812	108	72.7	97.7	
B11	407800	5471392	818	124	81	112.5	
B20	408184	5473100	795	54	14	32	
B21	408079	5473366	793	40	18	28	
B22	407776	5473415	798	100	11	22	Rotary test hole – not cored
B23	407925	5473147	798	54	10	34.5	
B24	407863	5472886	805	41	17	31	
B25	407843	5473237	801	60	Nil	nil	
B26	407579	5472989	803	120	18?	22?	Inferred from cutting. No Whitemud recovered in core.
B30	409788	5471271	812	80	16.5	54	100% recovery below 20 ft
Note: K_{sd} = kaolinized sediments							

10.3 2007 Drilling Program

The 2007 drill program totalled 68 holes for 2,218.6 m (7,278 ft). The results of the drill holes utilized in updating the Mineral Resource estimate in 2007 in the Gollier Creek area are detailed in Table 10-2. The drill hole locations and the Mineral Resource areas are shown in Figure 10-6. A typical cross section is presented in Figure 10-7. Considering that the drill holes are drilled to intersect the target lithologies at very high angles, the true widths of the intervals are expected to be greater than 95% of the core lengths.

Table 10-2: Summary of 2007 Drilling Program

Resource Area	Location Name	Hole Coordinates		Collar Elev (m)	Hole Location - Geographic					TD (ft)	Top Ksd (ft)	Bottom Ksd (ft)	Thickness Ksd (ft)
		N83UTME	N83UTMN		1/4 Sec	Section	Twp	Rng	Mer				
E Pit Bridge	WRI2007-B07	409940	5471515	822	NE	17	5	2	3	135	71	109	38
	WRI2007-B08	410628	5471523	819	NE	17	5	2	3	160	55	78	23
	WRI2007-B09	410580	5471225	817	NE	17	5	2	3	180	84.5	110.5	26
	WRI2007-B10	410362	5471204	830	NE	17	5	2	3	220	116	140	24
	WRI2007-B11	410088	5471106	829	NE	17	5	2	3	160	60	102	42
	WRI2007-A10	410264	5471547	824	NE	17	5	2	3	130	88	110	22
Elm Springs Deposit	WRI2007-B30	411064	5474399	811	NW	28	5	2	3	120	45	58	13
	WRI2007-B38	411064	5474750	802	NW	28	5	2	3	67	35	59	24
	WRI2007-B31	410373	5474515	801	NE	29	5	2	3	62	14	53	39
	WRI2007-B34	410573	5474992	794	NE	29	5	2	3	52	15	48	33
	WRI2007-B36	410039	5474477	793	NE	29	5	2	3	100	0	0	0
	WRI2007-B37	410463	5474716	805	NE	29	5	2	3	72	14	51.7	37.7
	WRI2007-A15	410685	5474301	803	SE	29	5	2	3	99	10.5	62	51.5
	WRI2007-B33	410389	5473990	792	SE	29	5	2	3	100	17	38.3	21.3
	WRI2007-B21	411287	5475460	814.5	SW	33	5	2	3	159	125.3	137	11.7
	WRI2007-B22	411091	5475203	797	SW	33	5	2	3	160	52	62	10
N Extension W Pit	WRI2007-A08	408566	5474913	783	NE	30	5	2	3	52	0	0	0
	WRI2007-B04	408314	5474649	796	NE	30	5	2	3	74	13	41	28
	WRI2007-A07	407900	5475093	799	NW	30	5	2	3	100	12	61	49
	WRI2007-B03	408049	5474370	803	NW	30	5	2	3	70	26	61	35
	WRI2007-B05	408660	5473796	809	SE	30	5	2	3	89	13	44.4	31.4

Resource Area	Location Name	Hole Coordinates		Collar Elev (m)	Hole Location - Geographic					TD (ft)	Top Ksd (ft)	Bottom Ksd (ft)	Thickness Ksd (ft)
		N83UTME	N83UTMN		1/4 Sec	Section	Twp	Rng	Mer				
	WRI2007-A06	408245	5474032	803	SW	30	5	2	3	68	15	56	41
	WRI2007-B01	408214	5473783	799	SW	30	5	2	3	70	22	51	29
	WRI2007-B02	408076	5473938	803	SW	30	5	2	3	66	15	47	32
Readlyn	WRI2007-RD03	446146	5492303	739	NW	21	7	28	2	200	84.7	107.8	23.1
	WRI2007-RD04	445399	5492302	720	NW	21	7	28	2	120	0	0	0
	WRI2007-RD02	447053	5493882	712	NW	27	7	28	2	180	54	73.5	19.5
	WRI2007-RD05	447050	5493505	720.3	NW	27	7	28	2	107.5	64.5	96	31.5
	WRI2007-RD01	447041	5493103	726	SW	27	7	28	2	190	105	155	50
W Extension W Pit	WRI2007-A01	407446	5472562	815	SW	19	5	2	3	37	14	?	na
	WRI2007-B28	407436	5472178	820	SW	19	5	2	3	160	62	110	48
	WRI2007-A21	405069	5472146	800	SE	23	5	3	3	120	32	43.5	11.5
	WRI2007-A14	407041	5472798	814	NE	24	5	3	3	87	43	62	19
	WRI2007-A02	407060	5473226	815	NE	24	5	3	3	120	9	50.5	41.5
	WRI2007-B27	407051	5472474	824	SE	24	5	3	3	160	71	85	14
	WRI2007-B29	407114	5472068	822	SE	24	5	3	3	180	0	0	0
	WRI2007-A03	405852	5472337	812	SW	24	5	3	3	120	47.2	78	30.8
	WRI2007-A04	406574	5472707	812	SW	24	5	3	3	62	32	52	20
	WRI2007-B23	406574	5472306	813	SW	24	5	3	3	131	74	121	47
	WRI2007-B24	406591	5471951	828	SW	24	5	3	3	200	93	132	39
	WRI2007-B25	406191	5471951	814.2	SW	24	5	3	3	122	75	101.5	26.5
	WRI2007 B26	406115	5472366	815	SW	24	5	3	3	72	42	62	20
	WRI2007-B35	406091	5472738	804	SW	24	5	3	3	42	21	31	10

Resource Area	Location Name	Hole Coordinates		Collar Elev (m)	Hole Location - Geographic					TD (ft)	Top Ksd (ft)	Bottom Ksd (ft)	Thickness Ksd (ft)
		N83UTME	N83UTMN		1/4 Sec	Section	Twp	Rng	Mer				
West Pit Active Blocks	GCM-01-A01	408773.33	5470888.3	806.1	SE	18	5	2	3	62	21	50.5	29.5
	GCM-01-A02	408773.05	5470839.3	810.7	SE	18	5	2	3	81	42	70	28
	GCM-01-A03	408719.44	5470787.8	811.3	SE	18	5	2	3	81.5	43.6	69	25.4
	GCM-01-A04	408720.01	5470843.8	807.8	SE	18	5	2	3	62	23	33	10
	GCM-01-A05	408667.01	5470793.9	810.9	SE	18	5	2	3	73	28.5	55	26.5
	GCM-02-A01	408912.3	5470838.9	816.0	SE	18	5	2	3	100	52.8	75	22.2
	GCM-02-A02	408925.5	5470918.4	815.9	SE	18	5	2	3	113	68	98	30
	GCM02-B02	408942	5471041	798	SE	18	5	2	3	50.5	14	44	30
	GCM02-B03	408916	5471001	805	SE	18	5	2	3	60.5	22	50.5	28.5
	GCM02-B04	408871	5470966	804	SE	18	5	2	3	70.5	26.6	65	38.4
	GCM03-A01	408852	5470823	806	SE	18	5	2	3	80	28.5	70	41.5
	GCM03-A02	408804	5470773	807	SE	18	5	2	3	80	40	70.5	30.5
	GCM03-A03	408742	5470703	811	SE	18	5	2	3	89.5	40.5	77	36.5
	GCM02-B01	408980	5471053	793	SE	18	5	2	3	32	9	23	14
Other Exploratory Holes	WRI2007-A18	412159	5478070	803	NE	4	6	2	3	70	18.5	42	23.5
	WRI2007-A19	412237	5476966	791	SE	4	6	2	3	140	0	0	0
	WRI2007-A17	410998	5477063	806	SW	4	6	2	3	100	0	0	0
	WRI2007-A16	410765	5478313	825	NE	5	6	2	3	160	80.5	101	20.5
	WRI2007-A22b	404661	5471506	812	NW	14	5	3	3	100	30	49.5	19.5
	WRI2007-A13	410127	5473273	793	NE	20	5	2	3	52	0	0	0
	WRI2007-B06	410678	5472978	806	NE	20	5	2	3	105	45.5	66.5	21
	WRI2007-A12	409478	5473042	798	NW	20	5	2	3	100	0	0	0

Resource Area	Location Name	Hole Coordinates		Collar Elev (m)	Hole Location - Geographic					TD (ft)	Top Ksd (ft)	Bottom Ksd (ft)	Thickness Ksd (ft)
		N83UTME	N83UTMN		1/4 Sec	Section	Twp	Rng	Mer				
	WRI2007-A11	409547	5473606	783	SW	29	5	2	3	60	0	0	0
	WRI2007-A20	411257	5476059	818	NW	33	5	2	3	200	120	160	40
	WRI2007-B20	411548	5476217	806	NW	33	5	2	3	180	94.8	110	15.2

Note: K_{sd} = kaolinized sediments

Figure 10-6: Drill Hole Locations and Mineral Resource Areas

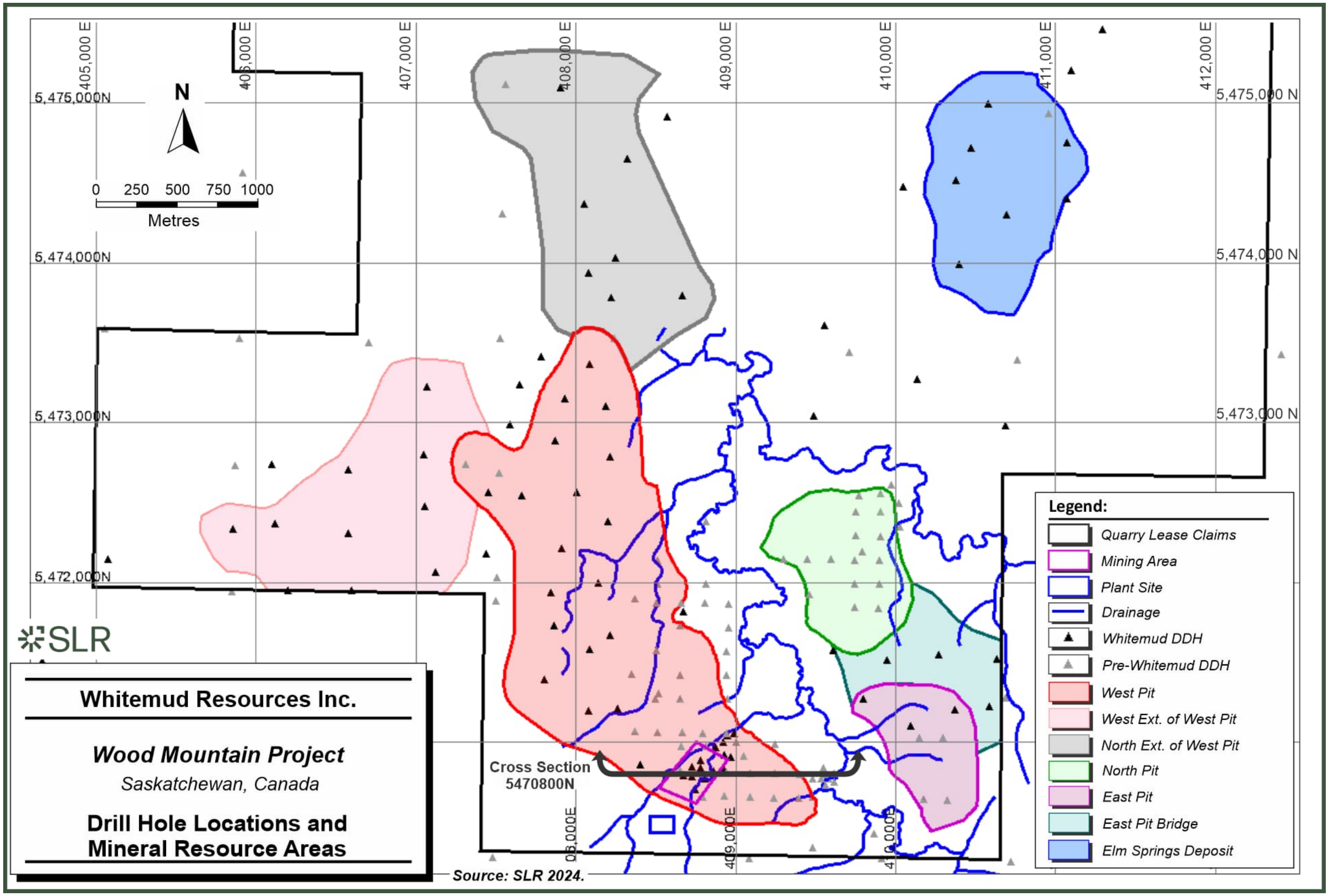
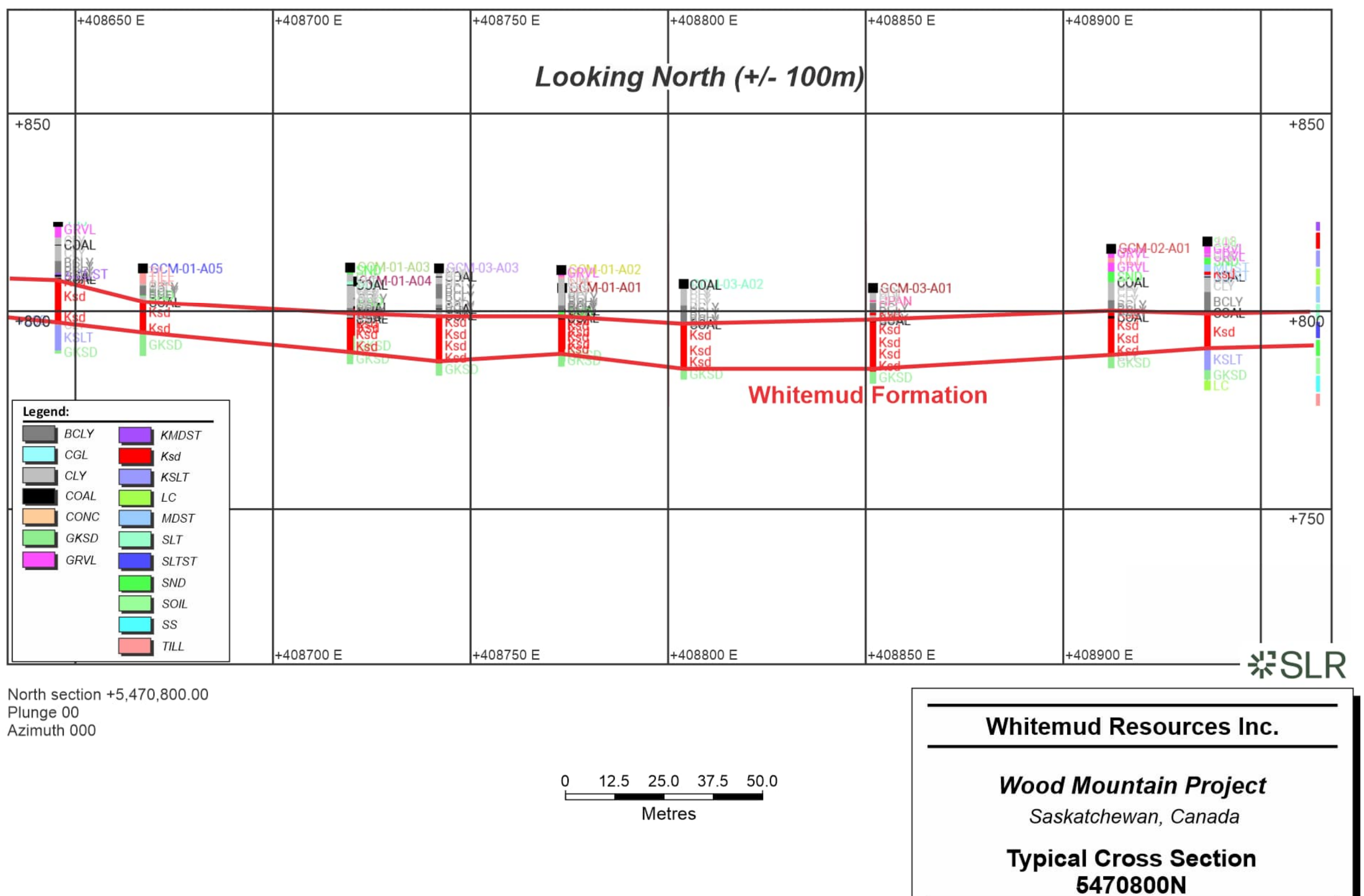


Figure 10-7: Typical Cross Section 5470800N



Source: SLR 2024.

11.0 Sample Preparation, Analyses, and Security

The following is excerpted and slightly modified from Scott Wilson RPA (2008a):

Whitemud is proposing to restart production of metakaolin by calcination of kaolinized material. In the process, raw kaolinized sediments are mined, crushed and passed through a rotary dryer to reduce the moisture content to less than 1%. At this point, the cementing action of the moist kaolin particles becomes negligible and the kaolin particles, together with any other fine clay, feldspar and quartz particles, are separated from the coarser particles. Test work by Whitemud indicates that the initial feed material to the dryer should be less than 0.25 in. (approximately 3 1/2 mesh, or 5.6 mm).

Prior particle size analysis work by Ekaton had defined 325 mesh (44 µ) as an initial separation point for beneficiation of kaolin. Work by Ekaton had also defined the -10 µ size fraction as representing the true kaolin fraction in the kaolinized sediments. The available Ekaton data provided an initial data base for samples that had been subject to particle size analysis. Samples for analysis were taken by Ekaton at 0.61 m (two foot) intervals from drill core. The weight fractions for the -325 mesh and -10 µ size fractions were determined using sieve analysis. These data were used by Scott Wilson RPA to develop an initial semi-variogram of the particle size distribution of the kaolinized sediments in the Gollier Creek deposit area.

Scott Wilson RPA determined that the available Ekaton data were insufficient to develop reliable estimates of the particle size distribution of the kaolinized sediments throughout the Gollier Creek deposit. Accordingly, Whitemud obtained samples from drill core from holes specified by Scott Wilson RPA. Samples were collected from split drill core at 1.22 m (four foot intervals within the identified Whitemud Formation. In total, 235 samples were taken. Wet sieve analyses to determine the wt% -44 µ (-325 mesh) fraction were conducted. In addition, Coulter Count analysis of the volume % of each size fraction was conducted for 11 samples.

A similar procedure was followed for sampling of the drill core obtained during the 2006 and 2007 drill programs. Drill core was cleaned of drill mud and samples obtained by slicing the surface of the drill core along four foot intervals. In some cases, it was not possible to obtain four foot intervals and shorter sample lengths were used. Particle size analysis using the wet sieve method to determine the wt% -44 µ fraction was conducted. Coulter count analysis of the volume % of each size fraction was also conducted for selected samples.

Sampling of Ekaton drill core material for determination of bulk density was undertaken by Whitemud. Whitemud took 22 samples of drill core and one chip sample from outcrop from the Gollier Creek area. Samples were selected to be representative of various depths within the kaolinized sediments of the Whitemud Formation. Table 11-1 details the results of the bulk density tests.

Table 11-1: Dry Bulk Density Test Results

Sample Identification	Interval	Moisture Content (%)	Bulk Density (kg/m^3)	
			Wet	Dry
WM 87-115	120’ – 123’	1.6	1794	1765
WM87-115	112’ – 115’	1.1	1795	1776
WM87-126	101’ – 104’	2.2	1726	1690
WM87-130	71’ – 74’	1.4	1779	1755
WM87-130	85’ – 88’	2.0	1772	1738
WM87-133	74’ – 77’	2.0	1843	1808
WM87-140	75’ – 78’	1.3	1781	1757
WM87-140	98’ – 101’	2.3	1759	1719
WM87-141	57’ – 60’	1.0	1787	1769
WM87-141	79’ – 87’	1.7	1801	1770
WM87-145	73’ – 76’	2.9	1832	1780
WM87-145	83’ – 86’	2.5	1779	1735
WM87-162	35’ – 38’	1.7	1779	1750
WM87-162	47’ – 50’	1.8	1737	1706
WM87-167	37’ – 40’	1.4	1758	1735
WM87-174	63’ – 66’	2.1	1832	1794
WM87-174	71’ – 74’	1.8	1767	1736
WM87-155	12’ – 15’	0.7	1718	1706
WM87-127	52’ – 55’	0.4	1811	1803
WM87-155	24’ – 27’	1.1	1773	1753
WM87-127	64’ – 67’	0.5	1770	1762
WM87-127	68’ – 71’	1.0	1826	1809
Outcrop		0.5	1775	1767

These data are in accord with specific gravity tests conducted by Hardy Associates of Calgary in 1985 for Ekaton. These tests determined a dry bulk specific gravity of 1.75 g/cm^3 based on analysis of 13 widely separated samples.

The moisture content of the drill core from the 2006 drill program was also determined. Results of the analysis indicated a moisture content ranging from approximately 10% to in excess of 20%, with an average of approximately 15%. These data are in general agreement with moisture measurements of auger drill cuttings obtained from two test bore wells drilled in 2005 for piezometer installation. Based on these results, an in-situ moisture content of 15%, yielding a wet bulk specific gravity of 2.01 g/cm^3, has been used for resource estimation purposes.

Samples of Ekaton drill core for particle size analysis were collected by Chris Curry, P. Geo., Whitemud. Samples were taken over four foot intervals of drill core within the identified Whitemud Formation for each hole of interest. Scott Wilson RPA identified the holes from which samples were obtained but did not attend the actual sampling process. Samples were tagged and bagged, with duplicate sample tags left in the drill core boxes.

Samples of drill core from the 2006 drill program were collected by Lynn Kelley, P. Geo., Manager, Geology and Exploration, for Whitemud. Samples were collected at four foot intervals or as available. Samples were obtained by cleaning drill core of drilling mud and then slicing off a section several millimetres thick along the sample length using a putty knife. Samples were placed in plastic bags and labelled with the hole number and interval. Drill core was stored in waxed cardboard core boxes as illustrated in Figure 10-4. Scott Wilson RPA observed the drilling and sampling process and is of the opinion that the sampling procedures employed are acceptable.

All drill core samples were shipped to Core Laboratories Canada Ltd. (Core Laboratories) in Calgary, Alberta, for analysis. Core Laboratories is a Canadian Standards Association (CSA) certified testing laboratory. The analytical procedure followed for the sieve analysis was:

- Weigh initial sample and jaw crush.
- Riffle split representative sample.
- Weigh out approximately 75 g sample, place in beaker with methanol, and cover with 2.5% solution of sodium hexametaphosphate.
- Disaggregate sample using ultrasonic breaker.
- Wet sieve on 8 inch (20.32 cm) dia. 325 mesh brass sieve.
- Dry and weigh the +325 mesh fraction.
- Calculate wt% fractions for +325 mesh and -325 mesh fractions.

Samples for determination of bulk specific gravity were tested in accordance with Saskatchewan Highways and Transportation Standard STP 205-9, which references ASTM Standard D 4531.The analytical work was conducted by AMEC Earth and Environmental Ltd., in Calgary, Alberta (AMEC). AMEC is a certified concrete testing laboratory with experience in conducting the required test work.

Drill core samples from the 2007 drill program were handled in a similar manner as detailed above for the 2006 drill samples. Samples were analyzed at SGS Lakefield Research Limited, Lakefield, Ontario (SGS Lakefield), for particle size, chemistry and mineralogy.

12.0 Data Verification

12.1 Data Verification for the Mineral Resource Estimate

Data verification activities carried out in 2024 by the QP included visual inspection of the presence of the kaolinized sediments in the walls of the previously excavated open pit, completion of a detailed review of the processing plant, inspection of samples of the final saleable product, and discussion with Whitemud representatives regarding product specifications and market requirements. The QP also reviewed the data verification activities and results carried out by Scott Wilson RPA. In the QP's opinion, the data verification activities carried out by Scott Wilson RPA were appropriate for this commodity.

A summary of the data verification activities carried out by Scott Wilson RPA (2008a) as follows:

> The author examined available Ekaton drill core and compared the core to the original Ekaton drill log descriptions. Available assay data respecting chemical, mineralogical, and particle size information assay data have been reviewed and compared to the current results, where possible. Scott Wilson RPA is satisfied that the sampling methods and analytical techniques used by Ekaton and Whitemud are appropriate, and that the mineralogical information, particle size, and bulk specific gravity data developed by Ekaton and Whitemud are reliable.
>
> As part of the due diligence for its report, Scott Wilson RPA collected samples for mineralogical analysis from drill core from the Gollier Creek deposit and from the Project 12 area. Individual and composite samples were characterized by SGS Lakefield laboratories for particle size distribution using Malvern Mastersizer, while composite samples were characterized for mineralogy using XRD and Qemscan particle analysis. The list of samples and composites are detailed in Table 12-1, with the results of the analyses detailed in Table 12-2 and Table 12-3.
>
> Scott Wilson RPA has reviewed the analytical results and assay certificates for the 2007 drill program and is satisfied that the analytical data are correct, complete, and reliable. The analytical results for the 2007 drill program are consistent with prior laboratory results for the 2006 drill program and Scott Wilson RPA's due diligence of the 2006 drilling and sampling program and prior work.

Table 12-1: Scott Wilson RPA Data Validation Sample List

Sample No.	Hole No.	Intersection (ft. from collar)	Composite	Area
71051	148	110.5	1	Gollier Creek
71054	132	42		Gollier Creek
71058	132	61		Gollier Creek
71057	121	119		Gollier Creek
71059	147	25		Gollier Creek
71053	117	55	2	Gollier Creek
71060	113	21 – 22		Gollier Creek
71061	113	44.5		Gollier Creek

Sample No.	Hole No.	Intersection (ft. from collar)	Composite	Area
71071	219	26 – 31		Gollier Creek
71072	219	56 – 58		Gollier Creek
71079	221	17 – 19		Gollier Creek
71080	221	48 – 51.5		Gollier Creek
71055	159	78.5	3	Gollier Creek
71056	159	99.3		Gollier Creek
71065	128	58.5		Gollier Creek
71066	128	85.5		Gollier Creek
71067	162	33 – 34		Gollier Creek
71073	167	35		Gollier Creek
71068	201	13 – 15	4	Project 12
71078	184	29 – 31		Project 12
71081	214	76 – 78		Project 12

Table 12-2: Summary of Qualitative X-Ray Diffraction Results – Composite Samples

Sample	Crystalline Mineral Assemblage (relative proportions based on peak height)			
	Major	Moderate	Minor	Trace
Comp 1	kaolinite	quartz,	potassium-feldspar	*chlorite, *amphibole,
		mica		*plagioclase-feldspar
Comp 2	kaolinite	quartz,	potassium-feldspar	*chlorite,
		mica		*plagioclase-feldspar
Comp 3	kaolinite	quartz,	potassium-feldspar	*chlorite, *amphibole,
		mica		*plagioclase-feldspar
Comp 4	kaolinite	quartz	plagioclase-feldspar,	*chlorite,
			potassium-feldspar,	*montmorillonite
			aluminite, mica	
*Tentative identification due to low concentrations, diffraction line overlap or poor crystallinity				

Table 12-3: QEMSCAN Particle Analysis of Composite Samples

Sample	Name	Comp 1	Comp 2	Comp 3	Comp 4
Mineral Mass (%)	Kaolinite	21.2	29.3	38.4	46.4
	Quartz	25.2	20.7	10.8	4.4
	Plagioclase	15.4	15.4	12.9	15.7
	K-Feldspar	10.8	7.8	8.3	11.6
	Sericite/Muscovite	20.7	20.1	23.0	11.7
	Chlorite	1.4	0.5	3.0	3.1
	Oxides	4.0	4.9	2.5	4.1
	Amphibole	0.6	0.9	1.0	2.2
	Other	0.6	0.3	0.2	0.4
	Total	**100.0**	**100.0**	**100.0**	**99.8**
Particle Size		19	23	25	36
Grain Size (μm)	Kaolinite	12	14	17	21
	Quartz	17	18	15	15
	Plagioclase	7	7	7	9
	K-Feldspar	12	11	10	10
	Sericite/Muscovite	9	9	8	6
	Chlorite	10	9	6	8
	Oxides	14	15	12	13
	Amphibole	7	10	8	8
	Other	16	12	9	16

The data detailed in Table 12-2 and Table 12-3 are consistent with the mineralogical and particle size analysis data obtained by Ekaton and Whitemud for the kaolinized sediments within the Gollier Creek property.

12.2 Data Verification for Mining, Economics

The QP oversaw the SLR personnel that carried out mine design, scheduling, mine cost estimation, and financial modeling, reviewing the work as it was completed. The QP observed the geotechnical and site water conditions of the existing pit.

12.3 Data Verification for Metallurgy, and Capital and Operating Costs

The QP examined the plans for plant modifications that are currently being executed by Whitemud. Production records from past operations were reviewed alongside underlying test work. The QP reviewed cost estimates for capital and operating costs.

12.4 Data Verification for Environment

The QP reviewed permitting and support documents related to past operations.

13.0 Mineral Processing and Metallurgical Testing

Metakaolin is a SCM used as an additive for Portland cement. Metakaolin is a highly reactive pozzolanic material and both competes with and complements other SCMs such as silica fume, fly ash, and ground granulated blast furnace slag (GGBFS).

Metakaolin is produced by the controlled calcination of kaolin at moderately high temperatures (600ºC to 800ºC). The calcination process breaks down the crystal structure of the kaolin, producing a transition phase material consisting of silica and amorphous alumina in reactive form with a very high surface area per unit mass. The optimum calcination temperature for production of metakaolin is a function of the purity of the originating kaolin material and the degree of crystallinity of the kaolin. Calcination at too high of a temperature causes recrystallization of the kaolin into quartz and mullite, which are inert in cement mixes. Calcination at too low of a temperature will fail to break down the kaolin crystal. For these reasons, processing parameters for metakaolin are specific to the base material used and test work is required to establish the correct operating conditions to produce highly reactive metakaolin product (Scott Wilson RPA 2008a).

At the Project, mined material is transported to a crushing plant where raw ore is crushed to 90% passing 6.3 mm. This material is transferred to a rotary dryer where it is dried to less than 0.5% moisture. As drying proceeds, the kaolin is liberated from the coarse sand fraction. Fine material is passed through a hot air cyclone and baghouse to separate the kaolin into a coarse and fine fraction. Fine silica is removed from the coarse kaolin in the cyclone, while fine kaolin is captured in the baghouse. Kaolin is recovered from the cyclone and baghouse and fed to a calciner, where chemically bound water is removed, and the kaolin is converted to metakaolin. The metakaolin is cooled and transferred to silos for shipment.

During historical operations, the processing plant operated intermittently from 2008 to 2010, and again in 2012 for approximately three months. The economics of the operation were challenging due to inefficiencies in the processing plant. The most significant issues were a large recirculating load of metakaolin from the rotary calciner returning to the dryer that severely restricted the feed rate of new feed to the dryer, and low yield caused by low dry kaolin capture at the discharge end of the dryer. Modifications to address the facility’s bottlenecks, primarily intended to eliminate the recirculating load from the calciner to the dryer and improve dry kaolin capture, began in December 2023. The rotary calciner and cooler will be replaced with a flash calciner, baghouse, and ancillary equipment, and modifications have been made to the discharge end of the rotary dryer. The facility is expected to be recommissioned in Q2 of 2024.

13.1 2006 and 2007 Test Work

Information in this section is summarized from Scott Wilson RPA (2008a).

In 2006 and 2007, Whitemud conducted several test programs prior to design and construction of the processing facility to evaluate different process options and provide base data for engineering design. Test material was obtained from kaolin stockpiles at the Gollier Creek deposit. These stockpiles represent material excavated by Ekaton in 1987.

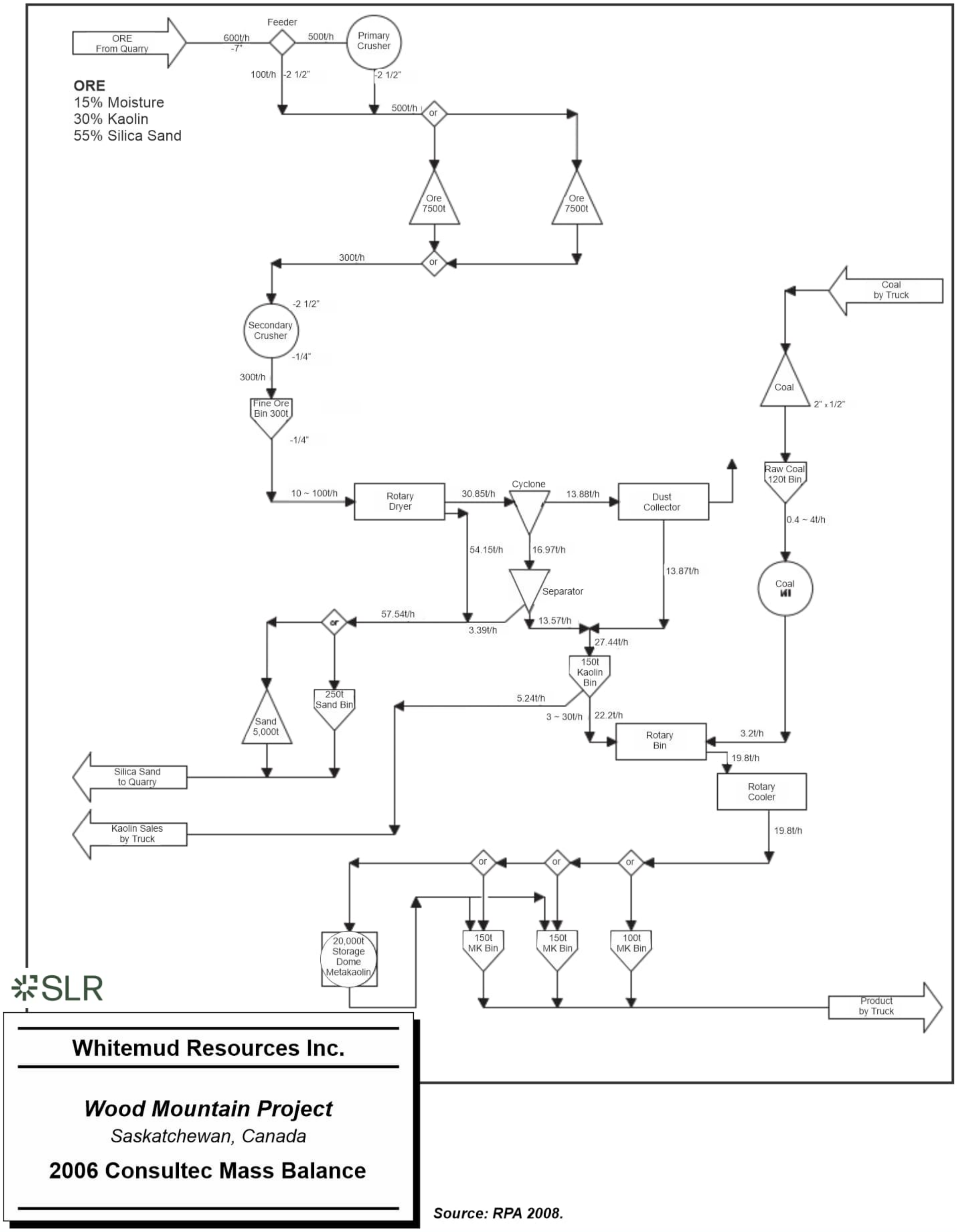
Process test work was conducted to determine the relationship of crushed ore size to a drying and initial kaolin-sand separation efficiency, calcination behaviour and associated mass and heat transfer relationships, as well as the impact of coal type on burner efficiency and flame stability. Work on the relationship between crushed ore size and dryer parameters was conducted at Hosakawa America and Alstom Power, while calcination tests were conducted at Alstom Power and FFE Minerals. Pilot plant test work resulted in product recoveries somewhat below the recoveries anticipated in the commercial plant. This was considered not unusual for industrial minerals process development work due to the inherent difficulties in operating small scale dry process plants. Table 13-1 highlights results from the pilot plant tests.

Table 13-1: Pilot Plant Test Results

Parameter	Units	Results
Kaolin Recoveries Pilot Plant	%	89
Metakaolin Recovery Pilot Plant	%	79.4

The results of the pilot plant test work were used by Whitemud, Hatch Energy, and Consultec Ltd. (Consultec) for specification and engineering of the process plant. Recoveries for the commercial plant were projected from the pilot plant results and these recoveries (91.5% for kaolin and 89.2% for metakaolin) were used to calculate a mass balance for process design, which was used in equipment sizing for the production plant. Figure 13-1 details the projected mass balance assuming a feed material containing 30% kaolin by weight on a dry basis. The mass balance included a metakaolin yield of 19.8% per tonne of feed processed.

Figure 13-1: 2006 Consultec Mass Balance



Source: RPA 2008.

13.1.1 Pilot Plant Product Testing

Performance testing of the final metakaolin product from the pilot tests for use in concrete was conducted by AMEC Earth and Environmental, Hamilton, Ontario, CTL Technologies Inc. (CTL), Chicago, United States, and several cement companies. AMEC and CTL were accredited concrete materials testing laboratories. Test work was conducted to determine compliance of Whitemud's metakaolin product with CSA Standard A 3001-03 Cementitious Materials for Use in Concrete, Appendix D, Guide for the Evaluation of Alternative Supplementary Cementing Materials (SCMs) for Use in Concrete, and ASTM Standard C618. The tests are summarized in Table 13-2.

Table 13-2: Performance Testing of Metakaolin Product for Concrete Applications

Analysis	Standard
Chemical Analysis	
Loss of Ignition, major oxides	ASTM C114
Available Alkali	ASTM C311
Mineralogical Compositions by X-Ray Diffraction	
Physical Analysis	
Fineness Retained on 45 µm (Blaine Fineness)	ASTM C204
Particle Size Analysis by Horiba Capa-700 particle analyser Density	ASTM C188
Fineness (% retained on 45 µm sieve)	ASTM C430
Increased in drying shrinkage of mortar bar	ASTM C157
Soundness	ASTM C151
Air entrainment of mortar	ASTM C311
Strength activity index	ASTM C109
Water requirement	ASTM C109
Effectiveness of mineral admixtures to control Alkali Silica Reaction (ASR)	ASTM C441
Effectiveness of mineral admixtures to sulphate Reaction	ASTM C1012

Two samples of metakaolin (WMC and WM1) produced on two separate pilot runs by Whitemud were tested. Both samples were produced from Gollier Creek kaolin. The results of the test work are summarized in Table 13-3 and Table 13-4.

Table 13-3: Chemical Analysis Comparison

Element Oxide (%)	WMC	WM1
SiO_2	62.1	60.5
Al_2O_3	31.9	33.0
Fe_2O_3	1.35	1.40
MgO	0.45	0.42
CaO	0.38	0.16
Na_2O	0.13	0.11

Element Oxide (%)	WMC	WM1
K_2O	1.31	1.35
P_2O_5	0.04	0.03
MnO	0.01	0.01
Cr_2O_3	0.02	0.02
V_2O_5	0.03	0.03
C	0.05	0.02
Total Alkali	0.99	1.00
LOI	0.86	0.86

XRD patterns showed no discernable differences in the mineralogical composition of the two materials.

Table 13-4: Physical Property Test Summary

Test	Test Method	Test Results	Specification Requirements
Density	ASTM C188	WMC: 2510 kg/m3 WM1: 2630 kg/m3	N/A
Fineness	ASTM C204	WMC: 1101 m2/kg WM1: 1164 m2/kg	Consistent with water demand and particle size data
Fineness	ASTM C430	WMC: <1% WM1: <1%	CSA A3001-03: max. 34% ASTM C618: max. 34%
Particle Size Analysis	Horiba Capa-700	WMC: 2.03 µ median WM1: 2.09 µ median	N/A
Increase in drying shrinkage of mortar bars	ASTM C157	WM1: 0.0643 at 28 days	ASTM C618: 0.03% of control at 64 weeks
Soundness	ASTM C151	WM1: 0.02% expansion (20% mix)	CSA A3001-03: 0.8% max for Type N material ASTM C618: 0.8% max for Type N material
Air entrainment of mortar	ASTM C311	WM1: 17%	18% air entrainment at minimal addition of air entraining agent (AEA)
Strength activity index	ASTM C311	WMC: 41.8 MPa @ 28 days WM1: 50.6 MPa @ 28 days	CSA A3001-03: min. 75% of control for Type N material ASTM C618: min. 75% of control for Type N material
Water Requirement	ASTM C109	WMC: 107% WM1: 109%	ASTM C618: max. 115% for Type N material

Test	Test Method	Test Results	Specification Requirements
Effectiveness of mineral admixtures to control Alkali Silica Reactions (ASR)	ASTM C441	WM1: 99% based on 20% metakaolin in mix	ASTM C618: max. 100% of control for Type N material
Effectiveness of mineral admixtures to control sulphate reactions	ASTM C1012	WM1: 0.0237% @ 4 months	Max. 0.1% @ 6 months for Type N material

Tests of the performance of Whitemud's metakaolin product in concrete mixes were conducted by AMEC Earth and Environmental, EBA Engineering, and CANMET Materials Technology Laboratory. Test work concentrated on the performance of metakaolin in selected binary, ternary, and quaternary concrete mix designs to determine the optimum level of metakaolin addition in terms of property improvement and overall cost reduction.

Key test results are shown in Table 13-5, Table 13-6, and Table 13-7.

Table 13-5: Whitemud Metakaolin vs. Silica Fume

Mix No	Cement (kg)	Fly Ash (kg)	Silica Fume (kg)	Metakaolin (kg)	Slump (mm)	Conc. Temp (ºC)	3 Day (MPa) Conc. Temp (ºC)	7 Day (MPa)	28 Day (MPa)	56 Day (MPa)	91 Day (MPa)	Initial Set (Hrs)	Final Set (Hrs)
2	204	60	0	36	80	17	15.9	30.2	40.8	45.3	48.3	6.0	7.9
10	204	60	36	0	80	17	16.5	25.3	41.3	45.0	45.3	6.6	9.0
11	221	60	0	19	70	17	18.4	28.0	39.6	41.7	46.7	5.9	7.9
12	221	60	19	0	80	17	20.3	29.4	47.1	49.4	52.7	6.4	7.8

Table 13-6: Whitemud Metakaolin vs Fly Ash

	Mix Design				Test Results						
Mix No	Cement (kg)	Fly Ash (kg)	Metakaolin (kg)	Total Cementitious (kg)	Slump (mm)	Conc. Temp (ºC)	3 Day (MPa)	7 Day (MPa)	28 Day (MPa)	Initial Set (Hrs)	Final Set (Hrs)
18	240	60		300	80	21.6	21.8	28.2	37.3	6.7	8.4
19	197	58	35	290	80	20.6	17.4	28.1	38.4	5.8	7.9
20	190	56	34	280	70	20.6	15.8	27.8	36.9	6.3	8.2
21	184	54	32	270	80	20.6	13.8	24.4	32.7	6.8	8.6
Mix No	Cement (kg)	Fly Ash (kg)	Metakaolin (kg)	Total Cementitious (kg)	Slump (mm)	Conc. Temp. (ºC)	3 Day (MPa)	7 Day (MPa)	14 Day (MPa)	28 Day (MPa)	
Control	240	60		300	80	21	19.6	25.8	31.3	39.0	
Mix A[1]	204	60	36	300	80	21	18.2	32.5	40.6	43.3	
Mix B[1]	204	60	36	300	80	21	16.4	28.8	36.4	39.7	
Note: [1] Water reducer added at 280 mL/100 kg cementitious.											

Table 13-7: Whitemud Metakaolin Evaluation – Comparison in HPC Bridge Deck Mix vs Silica Fume

Mix No	Mix Design				Test Results									
	Cement (kg)	Fly Ash (kg)	Silica Fume (kg)	Metakaolin (kg)	Slump (mm)	Air (%)	Conc. Temp (ºC)	3 Day (MPa)	7 Day (MPa)	28 Day (MPa)	56 Day (MPa)	91 Day (MPa)	Avg. Coulomb Rating
13	400	40	40	0	170	5.6	17	30.7	37.9	49.7	52.7	52.2	442
14	400	40	0	40	180	5.4	18	30.7	41.2	49.2	50	53	981

Whitemud engaged CTL Group (CTL), a consulting firm specializing in cement and concrete materials and technology, to conduct tests of Whitemud's metakaolin product. CTL conducted the tests identified in Table 13-8.

Table 13-8: Tests Conducted by CTL Group

Test Description	Standards
Chemical Analysis by XRF	
Particle Size Distribution (PSD)	
Laboratory Concentrate Testing	
Fresh Properties:	
Slump	ASTM C143
Air Content	ASTM C231
Temperature	ASTM C1017
Density	ASTM C138
Setting Time	ASTM C403
Hardened Properties:	
Compressive strength Rapid chloride permeability	ASTM C39 ASTM C1202

CTL found that Whitemud's metakaolin product had a slightly higher silica content than commercially available materials, however, that this did not have a significant impact on the performance of the material. When tested, Whitemud's metakaolin product met the compressive strength activity requirement of ASTM C618. When evaluated against a competing product, PowerPozz, the Whitemud metakaolin had a similar water demand and 28-day strength index values. Seven-day strength activity for the Whitemud material was approximately 7% lower, while at 28 days the strength activity indices of both metakaolin samples were on a similar order of magnitude. Overall, CTL concluded that Whitemud's metakaolin product would be performance-competitive against existing metakaolin products.

The following conclusions were drawn from the test work conducted on Whitemud's metakaolin product:

- Metakaolin performs equivalently to silica fume in a ternary mix with fly ash and cement in terms of slump, concrete temperature, initial set time and final set time. Compressive strength at 3, 7, 28, 56, and 91 days is comparable for equivalent additions of silica fume or metakaolin. At equivalent addition rates, water demand is reduced with the use of metakaolin versus silica fume.

- In a high-performance concrete (HPC) bridge deck mix design using fly ash and silica fume, metakaolin provided equivalent compressive strength and water demand. At an 8% addition rate, chloride ion permeability was higher for metakaolin than for silica fume, however, still well within the limits for low permeability concrete.
- Metakaolin addition can reduce the total cementitious requirement by up to 20% with equivalent 28-day compressive strength and set times.
- Metakaolin can significantly reduce expansion due to adverse alkali-silica reactions.
- Whitemud's metakaolin is performance-competitive versus commercially available product.

13.2 2021-2022 Test Work

Test work was conducted at the Gollier Creek Project facilities in late 2021 and early 2022. Objectives of the test work were to:

- evaluate the operation of the existing dryer to determine baseline yields,
- evaluate the potential to increase kaolin yields by improving the capture of larger fractions of the particles present in the dryer,
- determine the effectiveness of products produced from a product made from the kaolin produced at higher yields.

Between December 1 and December 7, 2021, a program to evaluate kaolin recovery from the existing plant was conducted.

The first phase of testing represented an evaluation of expected results from the baseline configuration of the facility. The dryer was operated under conditions that reflected the maximum throughput possible with the gas supply. Ore feed rates of between 55 tonnes per hour (tph) and 75 tph were tested, with dryer air exit temperatures of between 95°C and 105°C. The rotation speed of the dryer was adjusted during the testing to determine the effect of the dryer speed on kaolin yields.

Baseline kaolin yields from the system were observed to range from as low as 6% to approximately 10% of the ore fed to the system depending on the operating conditions in the dryer.

Following the baseline test, additional test runs were undertaken to redirect coarse material that had been rejected by the dryer during the baseline test through the kaolin separation system. This was achieved by capturing this material in a pneumatic transport trailer and conveying it into the inlet of the kaolin separation system. Recycling the rejected material resulted in observed yields of kaolin from the ore stream exceeding 20%.

The kaolin recovered from the baseline testing and the kaolin recovered during the recycle test were blended to reflect their overall proportions of the total yield and were subsequently calcined in a laboratory furnace at 650°C and tested to determine product performance per ASTM C109. In-house results from testing, summarized in Table 13-9, indicated that the strength activity and water demand of the blended metakaolin were consistent with the performance of metakaolin sold by Whitemud that was manufactured from previous production runs in 2012.

Table 13-9: Summary of Comparative Results for Metakaolin in Cement Mixtures

Description	Water demand of mortar mix vs. GU-10 control	7 Day Strength Activity Index	28 Day Strength Activity Index
Control 1 (mortar mix GU-10 cement only)	100%	100%	100%
Control 2 (90% GU-10 cement and 10% production metakaolin from 2012 to 2022 inventory)	103.8%	110%	109%
Results of testing with blended samples from test run (90% GU-10 cement and 10% metakaolin produced from blended test run samples)	Average 104.6% Range 103.1 to 109.4%	Average 109% Range 101.5% to 119.6%	Average 109.2% Range 103.2% to 113.3%

The conclusions from the test program were:

- Kaolin yields from the process can be improved using the existing air separation system provided that material that was rejected in the dryer could be redirected from the waste stream into the air separation system.
- The performance of metakaolin made during the trial from higher yield kaolin provided similar results to previous production runs which were made from lower yielding products.

13.3 2023 Test Work

Test work was conducted at the Wood Mountain facilities in 2023 to achieve yield and operability improvements.

13.3.1 Dryer Improvements

The first initiative consisted of design, installation, and testing of modifications to the existing dryer to improve capture of coarse particles that had been found to be carrying kaolin, however, had previously been rejected by the system with the sand fraction.

In January 2023, the exit breech of the dryer was modified to install an internal chimney to create a high velocity air stream at the point where coarse particles had previously spilled from the dryer and entered the reject stream. The modification was designed to create gas velocities that would suspend and carry particles larger than 150 µm up and into the air separation system.

To test this modification the primary crusher, feed conveyors, rotary dryer, and kaolin separation system were recommissioned. Stockpiled material from the mine left over from 2012 operations was processed from outdoor storage areas and used to feed the plant.

Between March 31 and April 6, 2023, several test runs were conducted to test the performance of the modified system. The test runs consisted of a warm-up cycle to bring the drying system within the normal operating ranges for the production process. Once the system was operating within specification, the ore feed rate was stabilized and measured by a gravimetric feeder, and the kaolin produced was captured in a pneumatic trailer and subsequently measured on a certified scale.

Six trial runs were conducted over this period. Of the six trial runs, three were found to be valid runs, with three of the tests suffering from equipment malfunctions that resulted in reduced yield. The equipment malfunctions were thought to have resulted from the long idle period that the facility had experienced prior to the test. Table 13-10 summarizes the test results.

Table 13-10: Dryer Improvement Test Results

Date	Test Duration (hours)	Total Ore Fed (tonnes)	Average Ore Feed Rate (t/hr)	Kaolin Produced (tonnes)	Kaolin Yield (%)	Notes
31/03/23	2.5	92	36.8	17.4	18.9	
02/04/23	2	120	60	13.8	11.5	1
03/04/23	3	140	46.7	27.8	19.9	
04/04/23	2.5	131.25	52.5	17.2	13.1	2
05/04/23	2.33	124	53.1	20.8	16.8	3
06/04/23	3	169	56.3	29.4	17.4	

Notes:

1. Multiple trips and faults of the dryer and air separator system were experienced during this run, resulting in product loss. Results from this test are not representative of expected operating conditions.
2. Upon completion of this test, a faulty airlock was discovered which resulted in significant portions of the kaolin stream being diverted to the waste stream. Results from this test are not representative of the expected operating conditions.
3. Test suspended as a result of ore silo running empty prematurely. The yield was reduced in this run due to the reduction in feed rate during the last twenty minutes of the test.

Results from the test runs on March 31, April 3, and April 6, 2023 have been condensed in Table 13-11 to provide an average result for the test runs considered to be representative of possible plant performance.

Table 13-11: Average Valid Dryer Test Runs

Total Duration (hours)	Total Feed (tonnes)	Average Feed Rate (t/hr)	Kaolin Produced (tonnes)	Kaolin Yield (%)
8.5	401	47.2	74.6	18.6

Results from the modified process indicate that kaolin capture was significantly improved versus the baseline prior to the modifications.

Kaolin from the various tests was examined and thermally processed to transform it into metakaolin to determine the physical, chemical, and performance characteristics.

Key attributes of the product include particle size, alumina and silica content, and effectiveness as an SCM using standardized industry tests.

13.3.2 Particle Size

The particle size distribution of metakaolin samples prepared from the March 31, 2023 test run was compared to previous production in Table 13-12.

Table 13-12: Particle Size Distribution of Metakaolin Samples

Sample Identifier	D10 (µm)	D50 (µm)	D90 (µm)
Production Sample (Dec 12, 2022 shipment)	0.42	6.52	27.67
Calcined sample from March 31 test run prepared at 640°C	0.42	7.86	23.94
Uncalcined sample from April 6 test run	0.21	3.58	26.04

13.3.3 X-ray Fluorescence Results

Results from the chemical and physical testing indicated that the materials produced during the trial run as seen in Table 13-13 were consistent with the production metakaolin sold by Whitemud between 2012-2022.

Table 13-13: X-ray Fluorescence Test Results

Sample Identifier	Normalized Al_20_3 Content (wt%)	Normalized SiO_2 Content (wt%)
Production Sample (Dec 12, 2022 shipment)	27.61	64.37
Composite sample of test material from April 6 run, calcined at 720°C	27.87	65.25
Note: Testing conducted by XRF Solutions, Calgary, AB		

13.3.4 Flash Calciner Prototype

Previous production at Gollier Creek utilized a rotary kiln to effect the physical transformation from kaolin to metakaolin. The process involved adding kaolin to a kiln with a residence time of approximately 30 minutes. As the kaolin traversed the length of the kiln, the temperature of the kaolin increased to between 650°C to 700°C. When operating properly, this process is effective and produces metakaolin with consistent product quality. In practice, the kiln at Gollier Creek presented a number of barriers to the effective production of metakaolin including numerous failures of the refractory lining, lengthy startup times to bring the kiln from ambient conditions to operating temperature at the beginning of a production, poor responsiveness following process challenges such as an electrical disruption or trip or failure of any upstream or downstream components in the system.

To address these shortcomings, Whitemud considered replacing the rotary kiln with a flash calcining process. Instead of the lengthy residence time present in a rotary kiln, kaolin would be thermally processed inside a flash calciner in less than one second.

A small prototype flash calciner (inner diameter 125 mm, overall length 2,500 mm) was constructed and tested by Whitemud during the summer of 2023. Kaolin generated during the April 6 dryer test program was used as feed material for the flash calcining. Pilot testing for flash calcining was conducted in 2023 at the Project facility. The flash calciner processed kaolin at a rate of approximately 80 kg/hr and achieved an exit temperature of between 650°C to 750°C.

Residence time in the flash calciner was estimated at less than 250 milliseconds. The residence time in the flash calciner was lower that the ideal residence time, however, space constraints within the existing plant prevented a larger unit from being practical.

Thermogravimetric analysis of the resulting product was performed. The residual loss in weight indicated that the dehydroxylation process in the prototype flash calciner achieved approximately 80% to 85% of the conversion that would be expected in a longer conversion process such as a rotary kiln or laboratory muffle furnace. Results of this testing indicated that a longer residence time would likely increase the kaolin conversion rate at the desired exit temperature.

Samples of the metakaolin product from the prototype calciner were also subsequently exposed to a longer duration thermal conversion process to determine if uneven heating resulted in irreversible transformations that would negatively affect product quality.

13.3.5 Strength Activity Testing

Materials produced from the prototype flash calciner test run, as well as a sample that received additional thermal processing in a laboratory furnace were used to compare strength activity of mortar mixes using 10% and 20% replacement of Portland cement with metakaolin against control samples using ASTM-C109. This work was carried out in Whitemud's laboratory facilities on site. A summary of the test results is included Table 13-14.

Table 13-14: ASTM C-109 Strength Activity and Water Demand Test Results

Mix Description	7 Day Strength Activity (%)	28 Day Strength Activity (%)	Water Demand versus Control (%)
Control (100% Portland cement)	100	100	100
Control 2 (90% Portland cement, 10% production Whitemud metakaolin from 2012-2022 inventory)	111.9	106.5	101.6
10% Metakaolin replacement, 90% Portland cement prepared from composite April 6 sample, flash calcined in prototype with 735°C calciner exit temperature	98.7	95.1	100
20% Metakaolin replacement, 80% Portland cement prepared from composite April 6 sample, flash calcined in prototype with 735°C calciner exit temperature	108.0	106.5	102.0
10% Metakaolin replacement, 90% GU-10 prepared from flash calciner products, subsequently calcined at 735°C for 30 minutes in laboratory furnace	112.1	111.8	102.8

Strength activity and water demand results generated during this testing indicate that the materials produced by the prototype flash calciner exceed the key performance requirements for Type N natural pozzolans as defined in ASTM C-618 (Table 13-15).

Table 13-15: Comparison of Performance of Flash Calcined Metakaolin vs ASTM C-618 Strength Activity and Water Demand Requirements

Metric	ASTM Standard Requirement	Prototype Flash Calciner Product at 20% Portland cement replacement
Combined $SiO_2 + Al_2O_3 + Fe_2O_3$ (min%)	>70.0%	>90%
Loss on ignition (max %)	<10%	1.4%
7 day Strength Activity Index	>75%	108%
28 day Strength Activity Index	>75%	106.5%
Water demand, max, percent of control	<115%	102.0%

13.3.6 Summary

- Modifications to the dryer resulted in increased kaolin yields, and subsequent chemical, physical, and performance tests indicated that the kaolin produced from the modified dryer process resulted in a metakaolin suitable for use as an effective SCM.
- The 2023 pilot test work showed that metakaolin could be produced successfully by flash calcining and provided information to complete the design of the commercial flash calciner.
- Modifications to the discharge end of the rotary dryer improved kaolin capture and will increase the yield of metakaolin.
- Installation of a bag house to capture all of the metakaolin from the flash calciner will eliminate the circulating load from the calciner to the rotary dryer that occurred during the 2008 to 2012 operations and will significantly improve the plant's throughput capability.
- The actual metakaolin yield for the project will be determined once the commercial plant has been commissioned and has achieved stable, consistent operation with the new flash calciner, bag house, and bulk cooler. The uncertainty concerning yield is a key risk for the project economic viability. Whitemud has estimated that metakaolin yield during the intermittent operations from 2008 to 2012 reached approximately 9% per tonne of feed material processed, and while the original design mass balance contemplated a yield of up to approximately 20%, the capability of the processing plant to achieve yields approaching 20% has yet to be proven.
- Similarly, the actual processing rate that the operation will be able to achieve with the modified plant can only be demonstrated after the successful commissioning and ramp up of the plant.

14.0 Mineral Resource Estimates

14.1 Summary

Mineral Resources are estimated from a database containing 225 drill holes completed by both Whitemud as well as previous owners of the property.

Mineral Resource grades represent the weight fraction of all material contained within the -44 µm size fraction, which includes a mixture of kaolin and quartz. Past mining and processing activities have shown that a final product can be produced and sold from this material.

Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Definition Standards for Mineral Resources and Mineral Reserves (CIM (2014) definitions) were used for Mineral Resource classification.

The Mineral Resources are contained within seven areas located in the Gollier Creek area. They are classified into either the Measured, Indicated, or Inferred Mineral Resource categories on the basis of the drill hole spacing. Mineral Resources are reported within manually created open pit outlines for all remaining material outlined by drill hole data present beyond an approximation of a 50 m stand off buffer distance from the crest of Gollier Creek. An allowance has been applied to the Mineral Resource block model to account for excavated material. The estimated Mineral Resources are presented in Table 14-1.

Table 14-1: Summary of Mineral Resources as at August 16, 2024

Category	Tonnage (000 t)	Grade (% -44 µm)
West Pit (Block Model: whitemud06_rev2024)		
Measured	13,000	40.3
Indicated	39,200	41.6
Total Measured and Indicated	**52,200**	**41.3**
Inferred	0	0
North Pit (Block Model: whitemud06_rev2024)		
Measured	6,500	38.7
Indicated	6,500	38.9
Total Measured and Indicated	**13,000**	**38.8**
Inferred	0	0
East Pit (Block Model: whitemud06_rev2024)		
Measured	0	0
Indicated	8,000	43.2
Total Measured and Indicated	**8,000**	**43.2**
Inferred	0	0
Elm Springs Deposit (Block Model: check08)		

Category	Tonnage (000 t)	Grade (% -44 µm)
Measured	0	0
Indicated	0	0
Total Measured and Indicated	**0**	**0**
Inferred	24,700	43.3
West Extension, West Pit (Block Model: check08)		
Measured	0	0
Indicated	0	0
Total Measured and Indicated	**0**	**0**
Inferred	26,200	45.0
East Pit Bridge (Block Model: check08)		
Measured	0	0
Indicated	0	0
Total Measured and Indicated	**0**	**0**
Inferred	7,700	40.4
Total, All Deposits		
Measured	19,500	39.8
Indicated	53,800	41.5
Total Measured and Indicated	**73,300**	**41.0**
Inferred	58,600	43.6

Notes:

1. CIM (2014) definitions were followed for Mineral Resources.
2. Mineral Resources are estimated based on wt% -44 µ fraction in the KSG formation.
3. Mineral Resources are estimated using a long-term price of C$209 per tonne metakaolin, and a US$/C$ exchange rate of 1.3.
4. Bulk density is 2.01 t/m^3.
5. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
6. Numbers may not add due to rounding.

The QP is not aware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the Mineral Resource estimate.

14.2 Resource Database

Kaolinized sediments contained within the Whitemud formation have been outlined by 225 drill holes completed by both Whitemud as well as previous owners over an area measuring approximately 11.5 km in an east-west direction and 9.0 km in a north-south direction. The drill hole database includes drill holes that are located beyond the current boundary of the quarry lease permits. Of the total drill holes in the database, 188 are contained within the current boundary of the quarry lease permits. The drill hole data for both historical drill holes as well as drill holes completed by Whitemud was provided to SLR by Whitemud in a series of spreadsheets.

SLR proceeded to compile this information into a coherent database format suitable for use in the preparation of a computer-assisted Mineral Resource estimate (MRE). The Gemcom GEMS software program was used to prepare the MREs for the Gollier Creek area.

A summary of the drilling information is presented in Table 14-2. The locations of the entire drill hole data set relative to the current quarry lease boundary was provided in Figure 10-1. The location of the drill holes in relation to the Mineral Resource areas was presented in Figure 10-6. All drill hole locations are recorded using Universal Transverse Mercator coordinate system for Zone 13U, NAD83 datum.

Table 14-2: Description of the Whitemud Gollier Creek Database as of July 26, 2024.

Table Name	Data Type	# of Records
Collar	Point	225
Survey	Point	355
Assay	Interval	981
Lithology	Interval	2,239

Additional tables were created by SLR during the Mineral Resource estimation workflow as necessary to capture and record additional information such as composite intervals, formation flags, etc.

14.3 Topography and Excavation Models

A summary of the method used to capture the topographic information was presented in Section 9.2 and an image of the resulting topographic surface was presented in Figure 9-2.

Detailed topographic information describing the extent of the mining activities was not available for the preparation of the updated MRE. Due to the flooded condition of the open pit, no retroactive survey activities were possible to accurately measure the volume and extent of the mined out areas (Figure 14-1).

In order to provide a reasonable description of the mined out material, SLR prepared an estimated perimeter boundary line representing the approximate crest of the mined out area. The estimated mined out area was coded into the block model using this approximate perimeter outline. It is important to note that this estimated perimeter does not represent the detailed surveyed outline of the mined out area. Rather, this estimated perimeter is an allowance only so as to reflect the mining activity completed to-date.

The QP recommends that a detailed survey pick up be carried out of the mined out volume of the open pit when conditions permit.

Figure 14-1: View of the Flooded Open Pit Mine as of May 9, 2024 (looking northeast)

Source: SLR 2024.

14.4 Geological Interpretation

Considering the strata bound nature of this type of mineral deposit, a simple geological model was created for the Whitemud formation using surfaces representing the top and bottom of the KSG formation to code the block model. Overlying and underlying waste materials were also coded into the block model using these surfaces. Only those portions of each area within a 200 m radius of an adjacent drill hole were included as part of the geological models. A typical cross section was provided in Figure 10-7. Additional information relating to the preparation of the geological models was presented in Scott Wilson RPA (2006a and 2008a).

14.5 Treatment of High Grade Assays

No capping values or restricted search criteria have been applied to any of the weight percent measurements contained within the assay table for samples contained within the Whitemud Formation.

14.6 Bulk Density

An in-situ bulk specific gravity of 2.01 t/m^3 for both overburden and kaolinized material has been assumed based on a 15% moisture content (Scott Wilson RPA, 2006a).

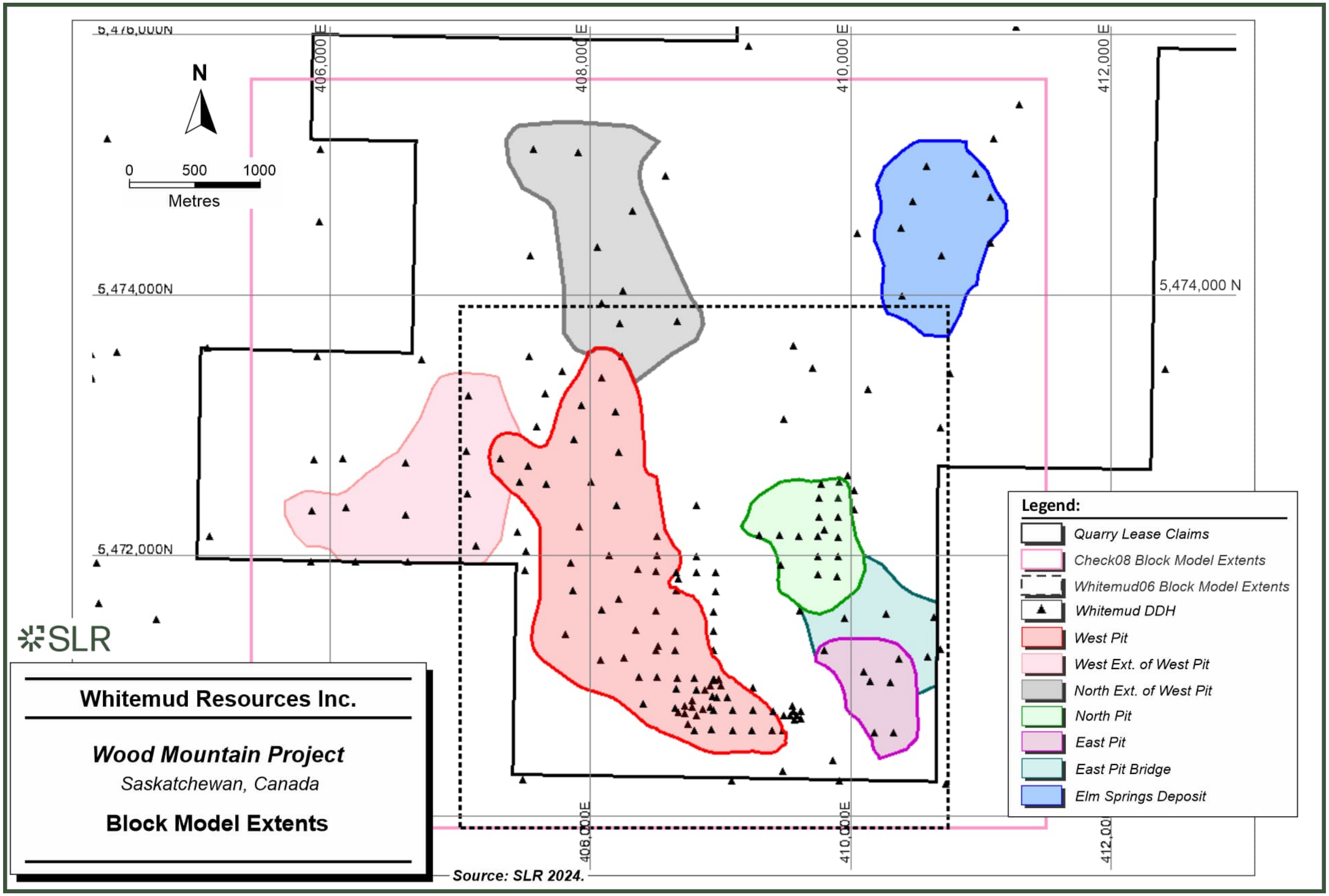
14.7 Compositing

All samples contained within the geological model of the Whitemud Formation were composited into 2.5 m lengths using the composting function contained within the Gemcom GEMS software package. For those samples whose lengths were less than the set composite lengths, the residual samples were retained.

14.8 Block Model Construction

Two block models were constructed to model the Mineral Resources present in the Gollier Creek area. The first block model, initially constructed in 2006and updated in 2024, was utilized to cover the Mineral Resources present in the West Pit, North Pit, and East Pit deposits (filename: whitemud06_rev2024). As a result of the drilling program completed in 2007, a second block model was constructed in 2008 with larger extents to cover the Mineral Resources present in the West Extension of West Pit, Elm Spring, and East Pit Bridge deposits (filename: check08). Figure 14-2 shows the extent of the two block models and the details of the block model construction is provided in Table 14-3 and Table 14-4. Both block models are partial percentage models constructed using upright, non-rotated, whole block models with block sizes of 25 m x 25 m x 2.5 m.

Figure 14-2: Block Model Extents



Source: SLR 2024.

Table 14-3: Summary of Block Model Extents

Type	Y (Northing)	X (Easting)	Z (Elevation)
Block Model: whitemud06_rev2024			
Minimum Coordinates	5,469,912.5	407,000	740
Maximum Coordinates	5,473,912.5	410,750	830
Block Size	25	25	25
Rotation	0	0	0
Block Model: Check08			
Minimum Coordinates	5,469,912.5	405,400	740
Maximum Coordinates	5,475,662.5	411,500	830
Block Size	25	25	25
Rotation	0	0	0

Table 14-4: List of Block Model Attributes

Attribute Name	Type	Decimals	Background	Description
Block Model: whitemud06_rev2024				
Class	Integer	- -	0	1=measured, 2=indicated, 3=inferred
Cut_60_325	Real	2	0	
Density	Real	2	0	
Economic	Real	1	0	
Mined_out_july2024	Integer	- -	0	0=remaining, 1=mined
Nn_200	Real	1	0	
Nn_600	Real	1	0	
Percent	Real	1	0	0 to 100
Rock Type	Integer	- -	0	
Uncut_325	Real	1	0	
Block Model: Check08				
Density	Real	2	0	
Economic	Real	2	0	
Pct_44_micron	Real	2	0	
Percent	Real	2	0	
Rock_type	Real	2	0	

14.9 Classification

The Mineral Resources were classified into either the Measured, Indicated, or Inferred categories on the basis of the drill hole densities. Those areas where the drill holes were completed at spacings of approximately 100 m were assigned to the Measured Mineral Resource category. Those areas where the drill holes were completed at spacings of approximately 200 m were assigned to the Indicated Mineral Resource category. All blocks in the remaining Mineral Resources were assigned to the Inferred Mineral Resource category.

14.10 Mineral Resource Reporting

The Mineral Resources in Table 14-5 are reported using manually designed pit shells as constraining volumes. Mineral Resource grades represent the weight fraction of all material contained within the -44 µm size fraction, which includes a mixture of kaolin and quartz. Past mining and processing activities have shown that a final product can be produced and sold from this material.

Table 14-5: Mineral Resources as at August 16, 2024

Category	Tonnage (000 t)	Grade (% -44 µm)
West Pit (Block Model: whitemud06_rev2024)		
Measured	13,000	40.3
Indicated	39,200	41.6
Total Measured and Indicated	**52,200**	**41.3**
Inferred	0	0
North Pit (Block Model: whitemud06_rev2024)		
Measured	6,500	38.7
Indicated	6,500	38.9
Total Measured and Indicated	**13,000**	**38.8**
Inferred	0	0
East Pit (Block Model: whitemud06_rev2024)		
Measured	0	0
Indicated	8,000	43.2
Total Measured and Indicated	**8,000**	**43.2**
Inferred	0	0
Elm Springs Deposit (Block Model: check08)		
Measured	0	0
Indicated	0	0
Total Measured and Indicated	**0**	**0**
Inferred	24,700	43.3
West Extension, West Pit (Block Model: check08)		

Category	Tonnage (000 t)	Grade (% -44 µm)
Measured	0	0
Indicated	0	0
Total Measured and Indicated	**0**	**0**
Inferred	26,200	45.0
East Pit Bridge (Block Model: check08)		
Measured	0	0
Indicated	0	0
Total Measured and Indicated	**0**	**0**
Inferred	7,700	40.4
Total, All Deposits		
Measured	19,500	39.8
Indicated	53,800	41.5
Total Measured and Indicated	**73,300**	**41.0**
Inferred	58,600	43.6

Notes:

1. CIM (2014) definitions were followed for Mineral Resources.
2. Mineral Resources are estimated based on wt% -44 µ fraction in the KSG formation.
3. Mineral Resources are estimated using a long-term price of C$ 209 per tonne metakaolin, and a US$/C$ exchange rate of 1.3.
4. Bulk density is 2.01 t/m^3.
5. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
6. Numbers may not add due to rounding.

The QP is not aware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the Mineral Resource estimate.

15.0 Mineral Reserve Estimates

There are currently no Mineral Reserves on the Property. Additional operational information is required to confirm the expected product yields and overall economic viability of the Project. It is expected that Whitemud will complete the plant updates in 2024 after which this information will be available in order to determine the economic viability and declare Mineral Reserves in an updated Technical Report.

16.0 Mining Methods

16.1 Geotechnical Studies

The QP is unaware of any geotechnical studies carried out on the property. Previous mining in the areas adjacent to the plant which took place during the 2008 to 2012 period has shown that pit walls have held up well without any notable failures. This is likely largely due to the relatively shallow nature of the pit. The QP recommends that some form of geotechnical analysis be undertaken on the pit wall areas shown in this report to avoid any potential wall failures.

16.2 Mine Design

The mine design for the open pit incorporates a 45 degree (1:1) overall slope angle. Strip phasing within the ultimate pit incorporates a 26.5 degree (1:2) overall slope angle (Figure 16-1). Overall slope angles accommodate brittle, sedimentary material but requires further analysis to confirm the safety factor of this design basis.

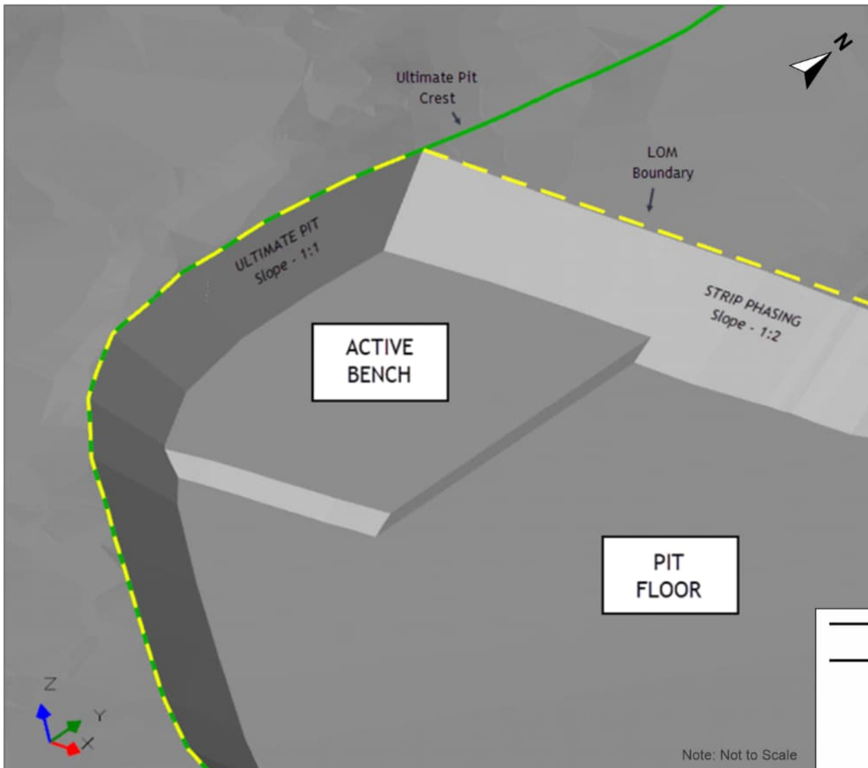
We have assumed temporary haulage roads of approximately 10 m wide to accommodate 40 t trucks at a grade of 10%.

The Mineral Resources are comprised of three areas – West Pit, East Pit, and North Pit as shown in Figure 16-2. SLR has carried out a basic mine design on the West Pit which will provide approximately 30 years of mine production. The Project has ample Mineral Resources to support a long-life operation of well over 100 years at current production rates.

The QP recommends that a more detailed mine plan be carried out in order to optimize the mining sequence to access higher quality kaolin at reduced stripping ratios.

Currently overburden is being stored to the east of the plant. As part of an updated detailed mine design, optimized overburden storage locations will need to be identified. As mining progresses, overburden can be placed back in the mined out pits as part of the reclamation process.

Figure 16-1: Mine Design Details



Whitemud Resources Inc.

Wood Mountain Project
Saskatchewan, Canada
Mine Design Details

Source: Whitemud 2024.

16.3 Mining Method

Whitemud's Gollier Creek Project involves an initial production rate of 16,000 tonnes per annum (tpa) of product. The initial plant production is scheduled to commence in late 2024 and will ramp up to 60,000 tpa of metakaolin by 2027. There are currently approximately 50,000 tonnes of kaolin in a stockpile located adjacent to the plant (as estimated by Whitemud staff based on aerial surveys taken in 2020). This stockpile will provide sufficient feed for a few months as the process plant begins to ramp up at the end of 2024. Mining of new material is expected to commence in 2025.

The quarrying operations will take place in West Pit adjacent to the processing plant. The quarry has been developed as a conventional open pit mine using excavators and off-highway 40 t haul trucks. Mine operations will initially be operated by a contractor with the potential to converting to owner operated in the future. The kaolin will be transported to the processing plant, where it will undergo crushing, screening, drying, separation from silica, and ultimately calcined to produce metakaolin.

Quartz sand recovered from the drying and separation processes will be returned to the pit as tailings and compacted before regrading with overburden. A small amount of sand is expected to be sold in local markets although we have not accounted for this in the economic model. Site rehabilitation is anticipated to proceed concurrently with the quarrying operations to ensure the efficient operation of both activities.

Whitemud has obtained environmental approval for the proposed mine and Phase I process plant.

The process after the initial box cut will be repetitive and can be summarized as follows:

- Topsoil will be removed and stockpiled separately or spread directly on backfilled areas that are ready for final stages of reclamation.
- Overburden will be stripped from the kaolin and spread on top of the sand as a first stage of reclamation.
- The kaolin will be quarried and transported to the processing plant.
- The barren pit will be dewatered to accept the bottom lift of sand with filling continuing to the design elevation.
- Overburden will be spread to cap the sand and it will be contoured, scarified, and prepared to accept topsoil.
- Once the final topsoil lift is in place, the area will be cultivated, fertilized and seeded with an appropriate seed mixture to provide a sustainable vegetative cover suitable for the environment. The experience of other regional open pit operators, such as SaskPower and Prairie Coal, will be closely reviewed and their best practices adopted.
- The reclaimed areas will be irrigated with available water.

It is expected that the sand would be covered with >5 m of overburden followed by approximately 100 mm of topsoil. Given the loss of the kaolin fraction and the volume change that results from handling, the final ground line will not replicate the pre-quarrying topography. The reclaimed landscape will be contoured to a knoll and swale topography wherein small basins with shallow ponding areas are created. Experience has shown that this landform creates a variety of micro-environments and returns to productive agricultural use relatively quickly.

16.4 Life of Mine Plan

The kaolin is found in layers of earth that include soil, occasional gravel beds, thin coal seams, and ball clay. To start quarrying, kaolin will be uncovered by removing the layers of earth above the kaolin seam using conventional earthmoving equipment. Quarry development will be carried out in a planned manner to support long-term production of the kaolin and progressive reclamation of mined out and backfilled areas.

Quarrying will begin in the southern area of the West Pit and continue in a northern direction to optimize resource recovery in the Gollier Creek lease area. The initial mining during 2008 to 2012 took place in the southern end of the West Pit. The quarry has since partially filled with water and during the site visit, we observed the habitation of leopard frogs adjacent to the quarry. Based on the location of the leopard frogs, along with generally higher strip ratios in the south end of the West Pit, we have planned mining operations to recommence slightly to the north of the existing quarry at a distance of approximately 500 m from the leopard frog habitat in accordance with Whitemud's current permit (P024-020) as shown in Figure 16-4.

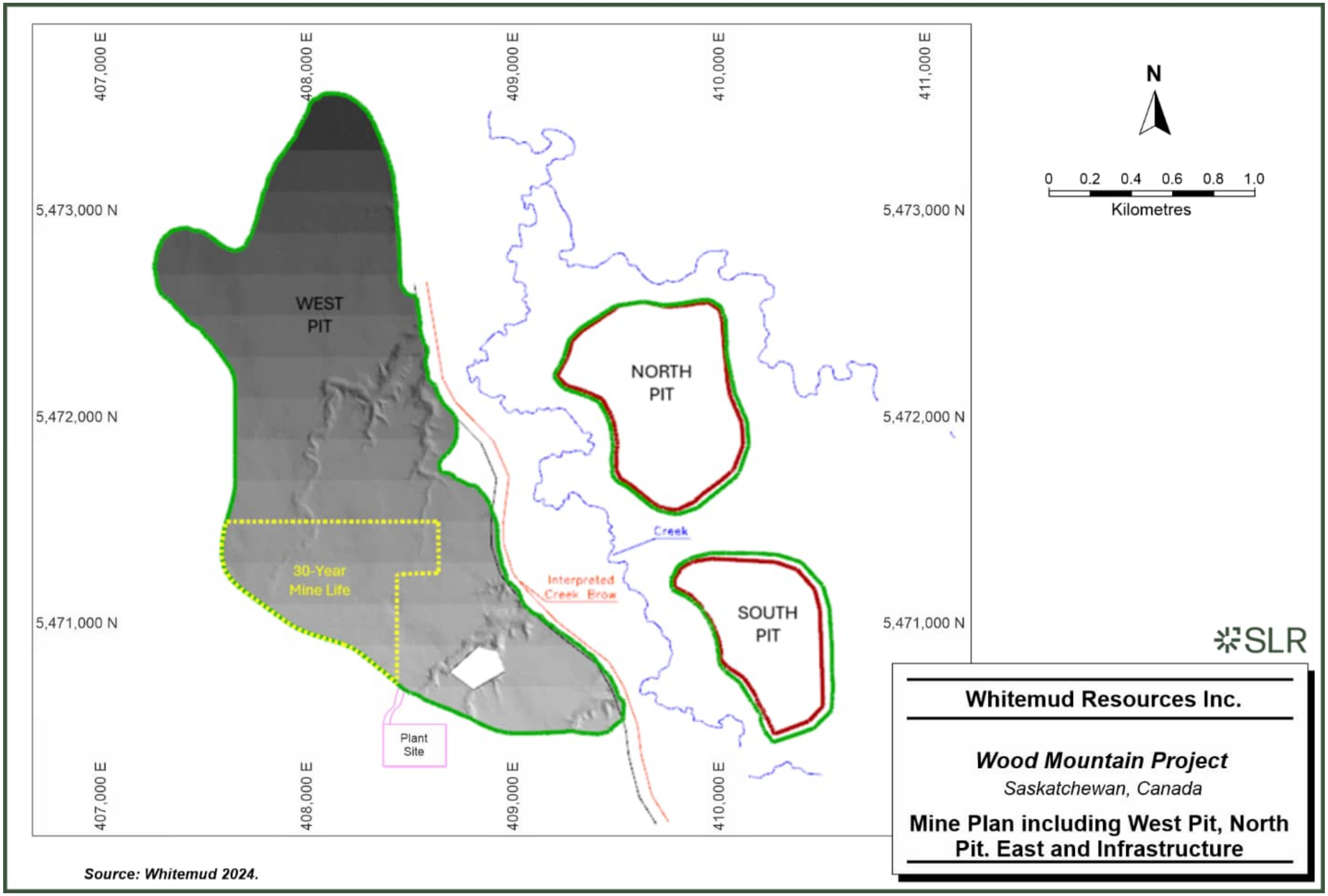
The mine plan cut layout is shown in Figure 16-2, while Figure 16-3 illustrates the general progression of the mine by sequencing cuts south to north. Each cut is highlighted using a grey gradient. All cuts for the West Pit illustrate the potential of the Project to extend the LOM to well beyond 100 years.

The configuration of the quarry is determined by the geology of the deposit and material handling logistics. Economic considerations mainly govern the methods of quarrying and quarry development. The quarry will operate as an open pit with earth materials excavated and transported using conventional earthmoving equipment. The quarry operations will include the following elements:

- At full Phase 1 capacity, the quarry must provide approximately 300,000 tonnes of mineralization to the processing plant annually, or about 822 tonnes per day (tpd). Following processing, approximately 195,000 tonnes of sand rejects must be returned to the quarry. These volumes would need to double if Whitemud expands it's processing capacity. Stripping, quarrying, tailings disposal, and reclamation operations in the quarry will be continuous through the LOM.
- Quarrying will be done in long strips, generally in three benches, depending on the thickness of the kaolin bed. Ore preparation will occur near the plant, and a 150,000 tonne to 200,000 tonne kaolin stockpile will be maintained at the plant to ensure feed during times where no mining is taking place.
- The quarry will be worked in a series of roughly parallel cuts to create an "open pit," similar to the methods used in the strip-mining operations in the southern Saskatchewan coalfields, but on a smaller scale. The initial strip will be opened by a "box cut" where the topsoil and overburden are stockpiled outside the pit to facilitate mining of the kaolin in the "box cut." This overburden stockpile will not be immediately reclaimed since it will not be replaced into the quarry. The initial plan is to place the overburden stockpiles to the west of the plant yard to act as a wind barrier for the plant.
- Subsequent cuts, or "turnover cuts," will be initiated by stripping and stockpiling topsoil and overburden. These materials will be transported across the pit and used to cover the sand tailings and reclaim the "quarried-out" portion of the pit. In this way, a continuous operation of stripping, excavation of kaolin, deposition and cover of sand tailings, and reclamation of the pit will be sustained on a long-term basis.
- The final "turnover cut" in any quarrying block will not be backfilled but will remain as a depression or trench that becomes a ponding area for runoff and seepage.
- The rate of land disturbance will be determined by plant production and kaolin characteristics. The estimated annual rate of land disturbance and reclamation will range between about 1.1 hectare and 2.5 hectares (approximately 2.7 acres to 6.2 acres).
- The dry fine sand tailings will be vulnerable to wind erosion. To mitigate this, active tailings disposal will be limited to as small an area as practical, and the sand will be covered with overburden as quickly as possible to stabilize the surface.

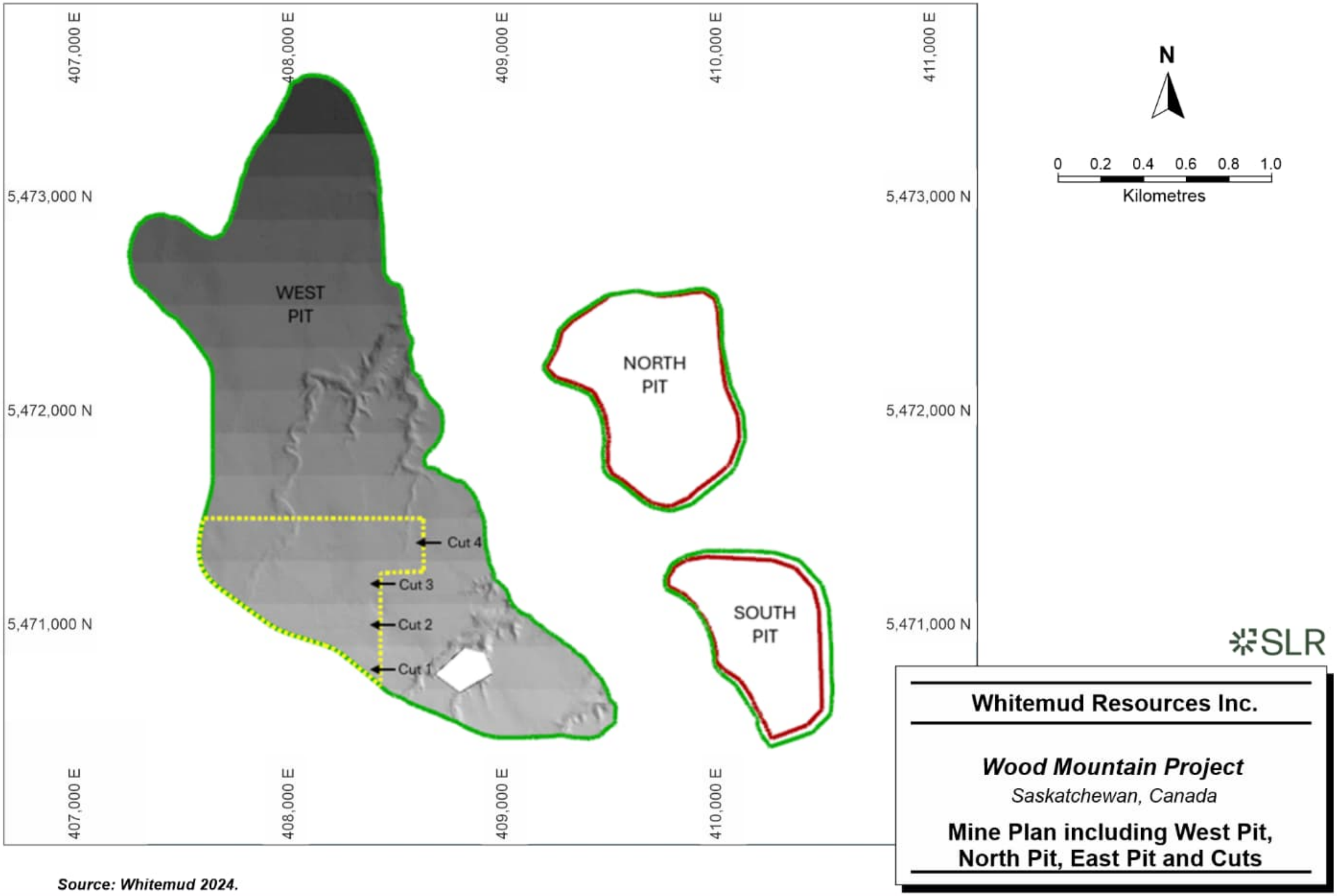
Period plots of the 30-year schedule is shared below from Figure 16-5 to Figure 16-11 . The LOM schedule is graphically represented in Figure 16-12. The uniform cut sequence shows a required ramp up in production rates from 0.86 Mt in year 1 to 1.34 Mt in year 5. The box cut shown in the period plots, representing a depleted zone, highlights a higher grading area of the deposit.

Figure 16-2: Mine Plan including West Pit, North Pit. East and Infrastructure



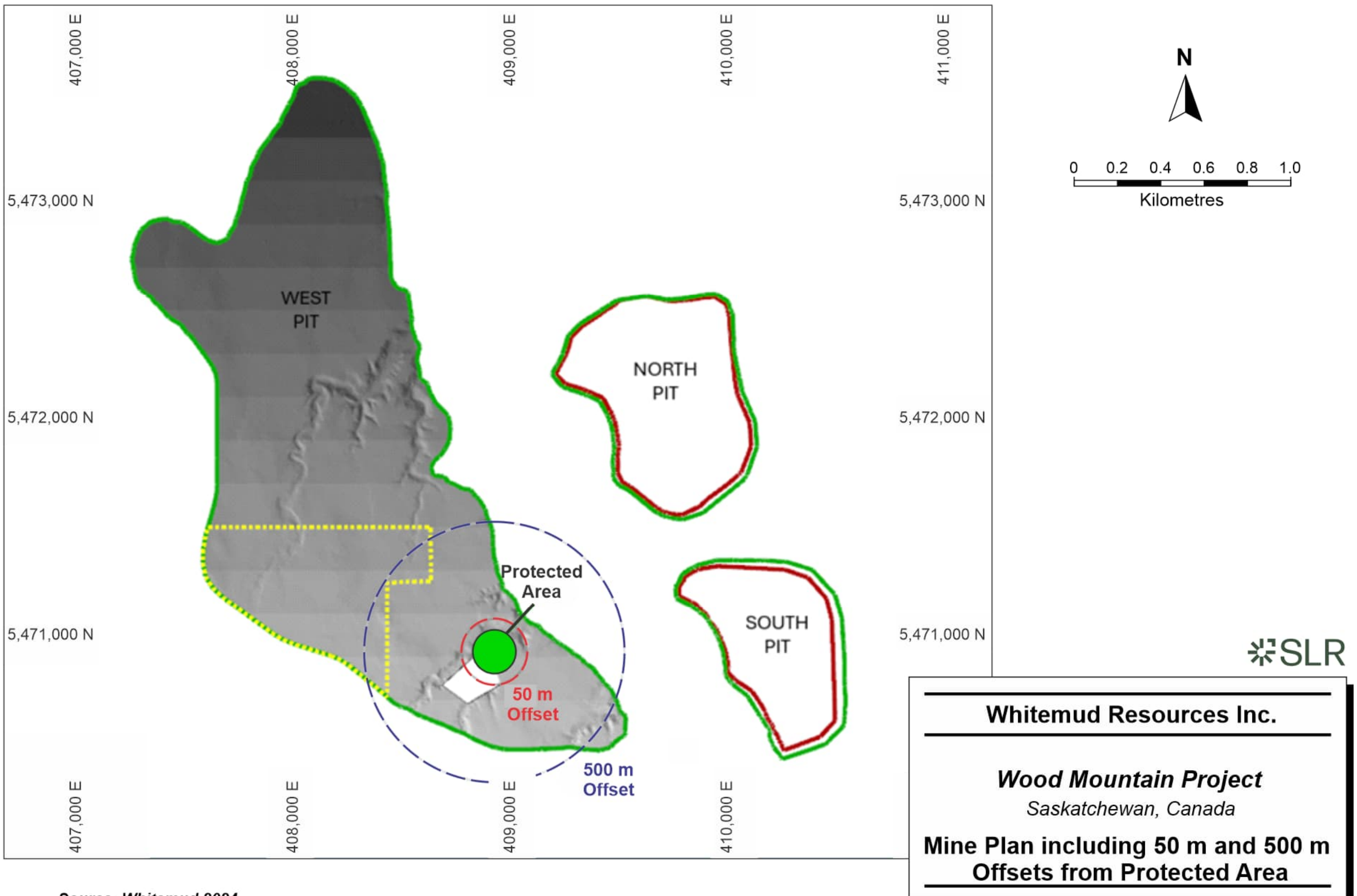
Source: Whitemud 2024.

Figure 16-3: Mine Plan including West Pit, North Pit, East Pit and Cuts



Source: Whitemud 2024.

Figure 16-4: Mine Plan including 50 m and 500 m Offsets from Protected Area



Source: Whitemud 2024.

Figure 16-5: Period Plot: Year 0

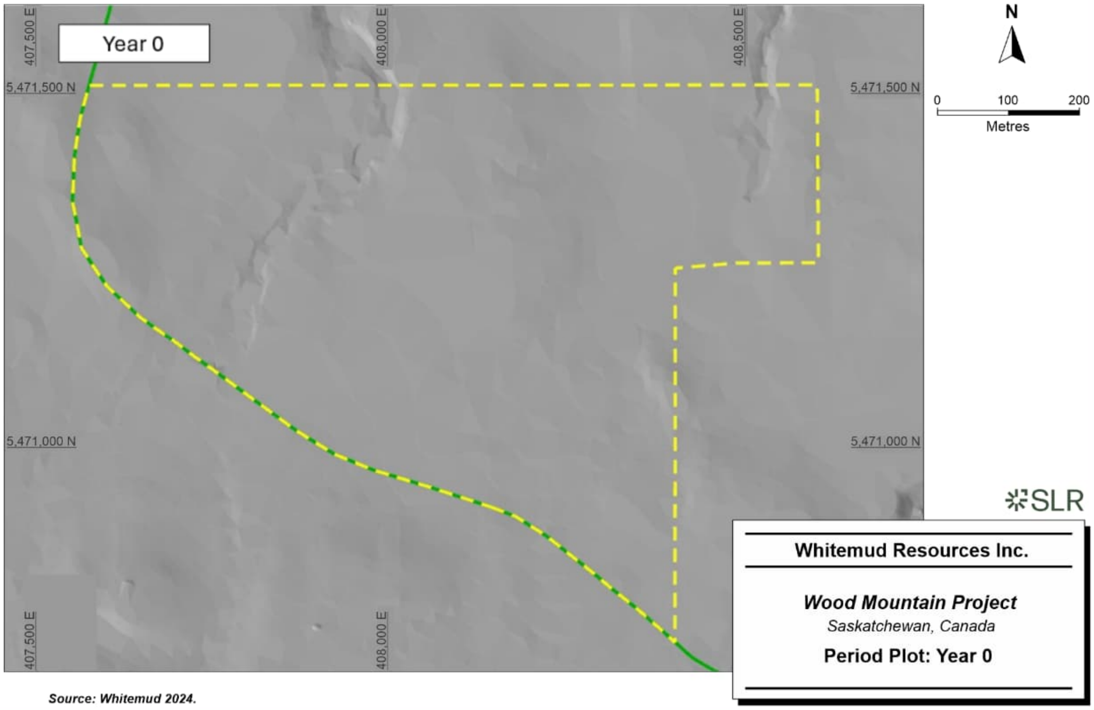


Figure 16-6: Period Plot: Year 0 – 5

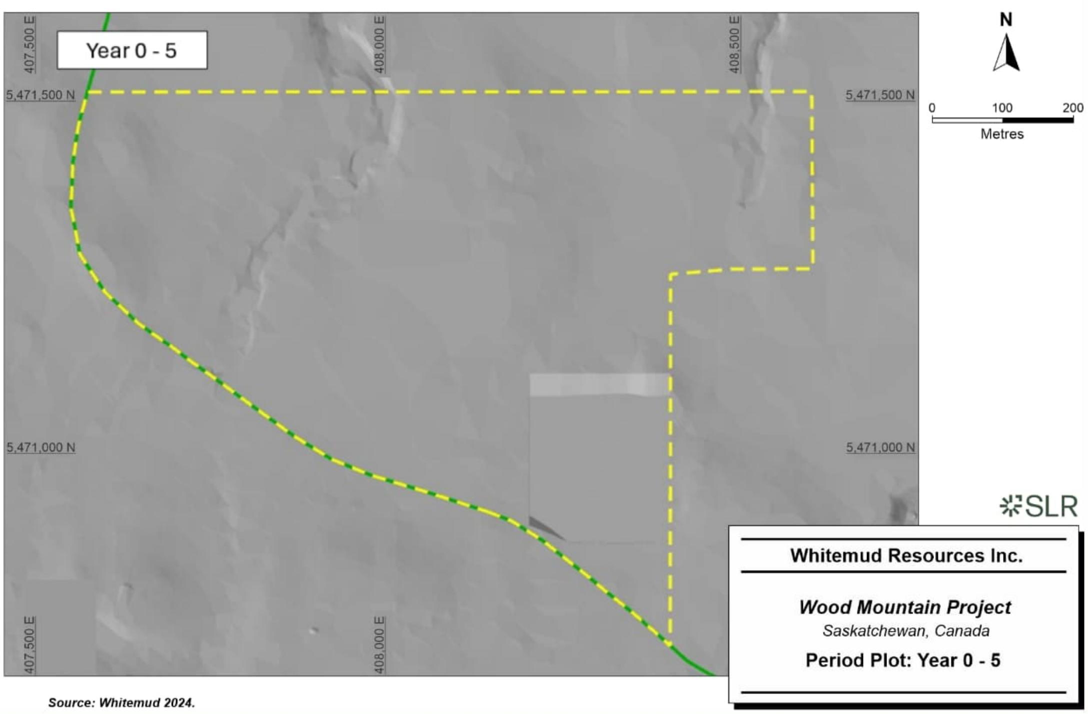


Figure 16-7: Period Plot: Year 5 – 10

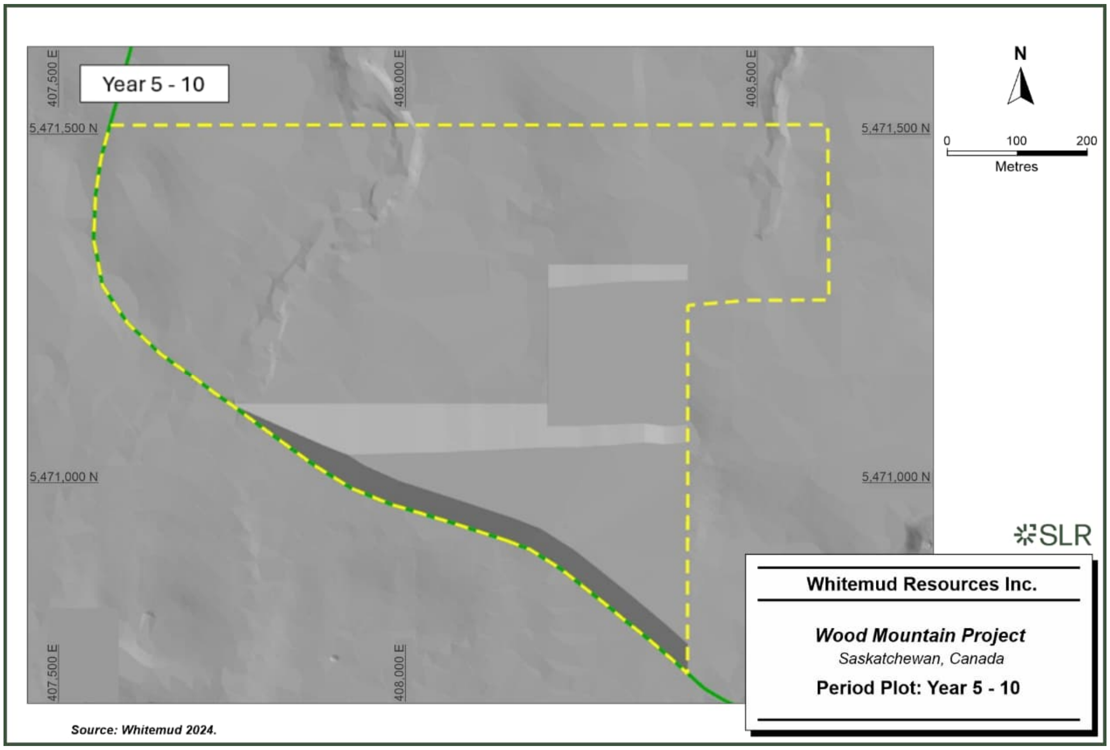


Figure 16-8: Period Plot: Year 10 – 15

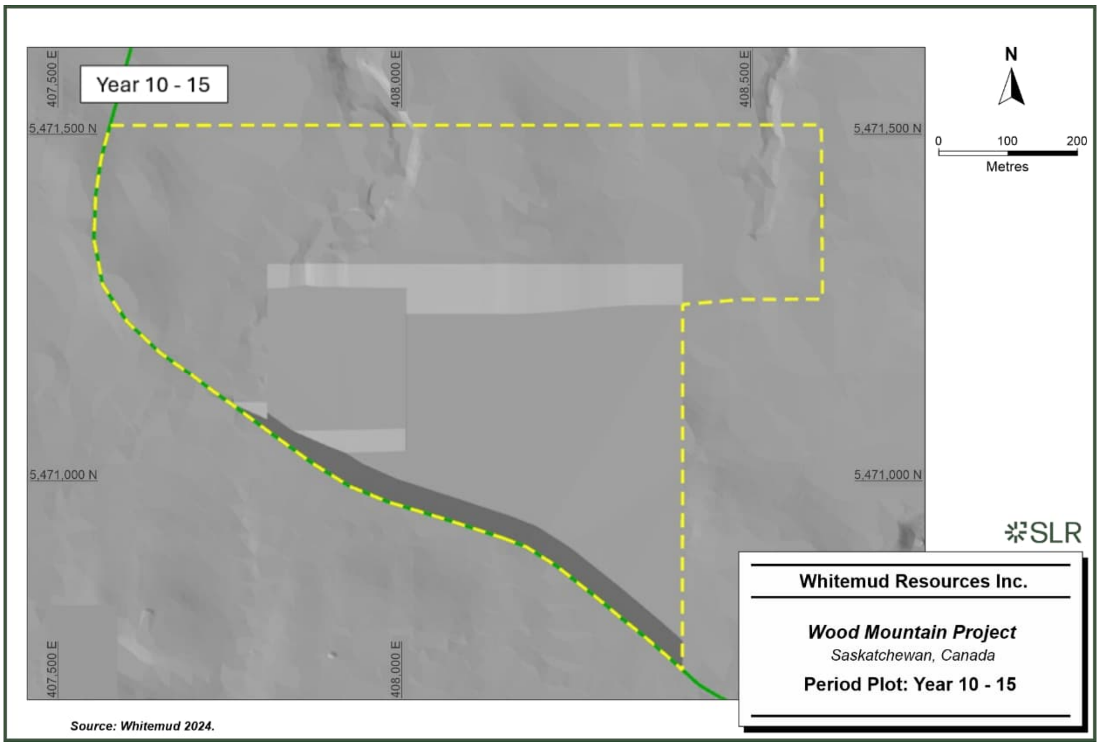


Figure 16-9: Period Plot: Year 15 – 20

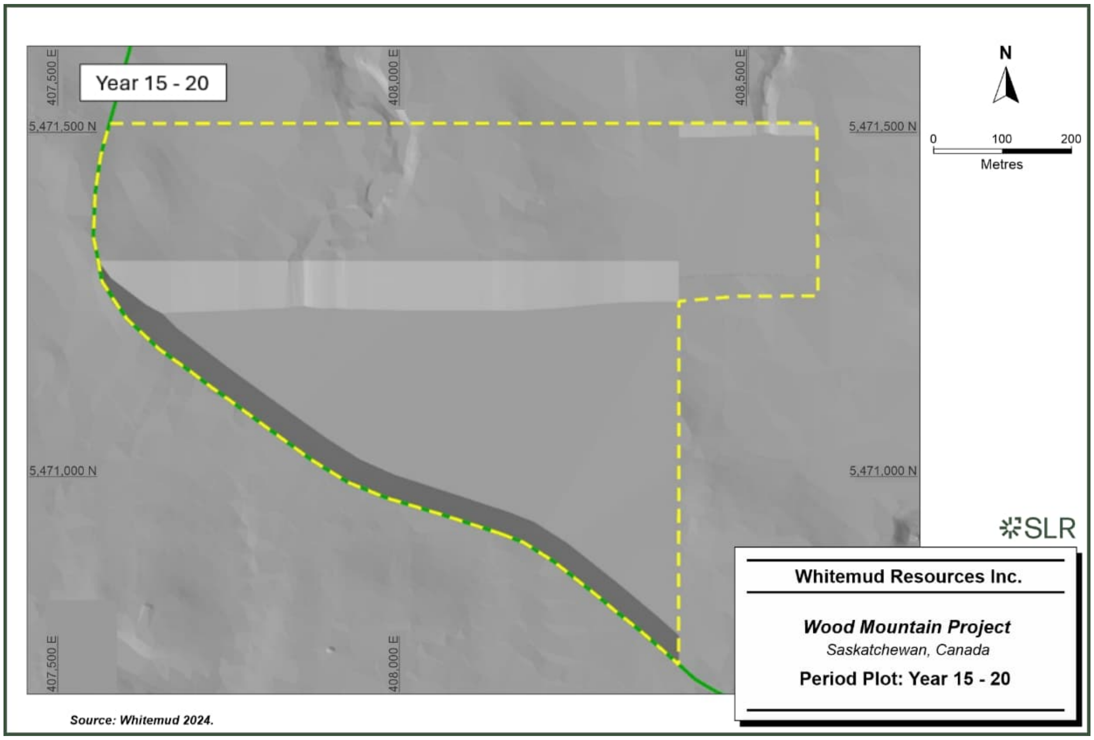


Figure 16-10: Period Plot: Year 20 - 25

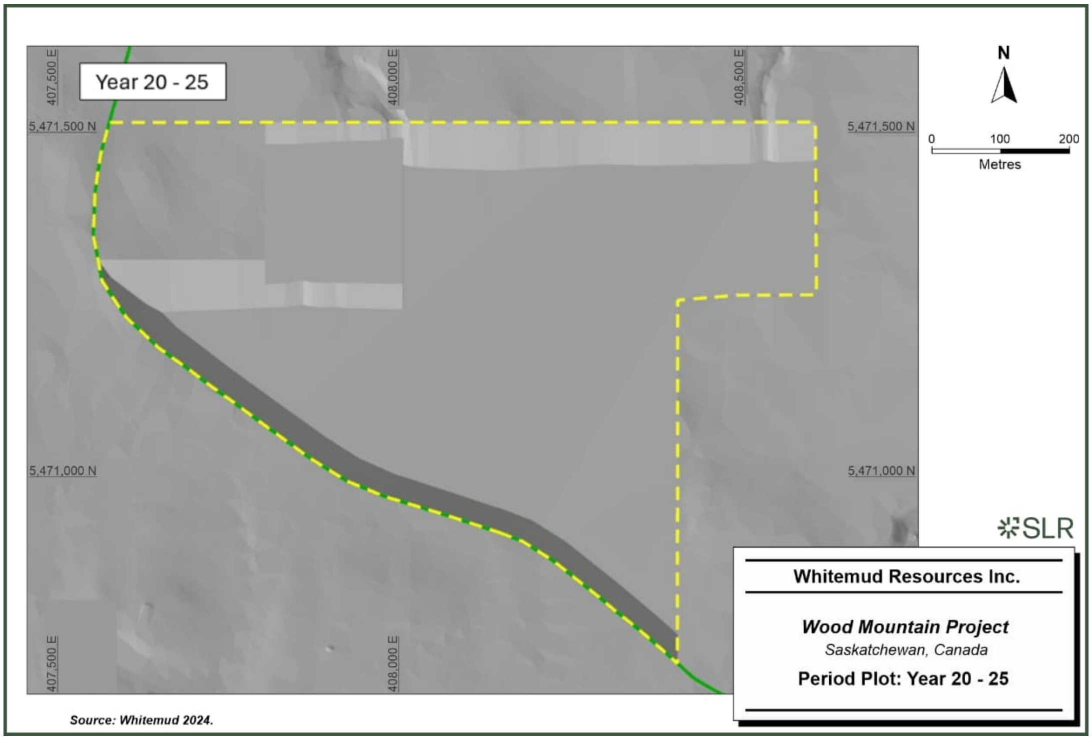


Figure 16-11: Period Plot: Year 25 - 30

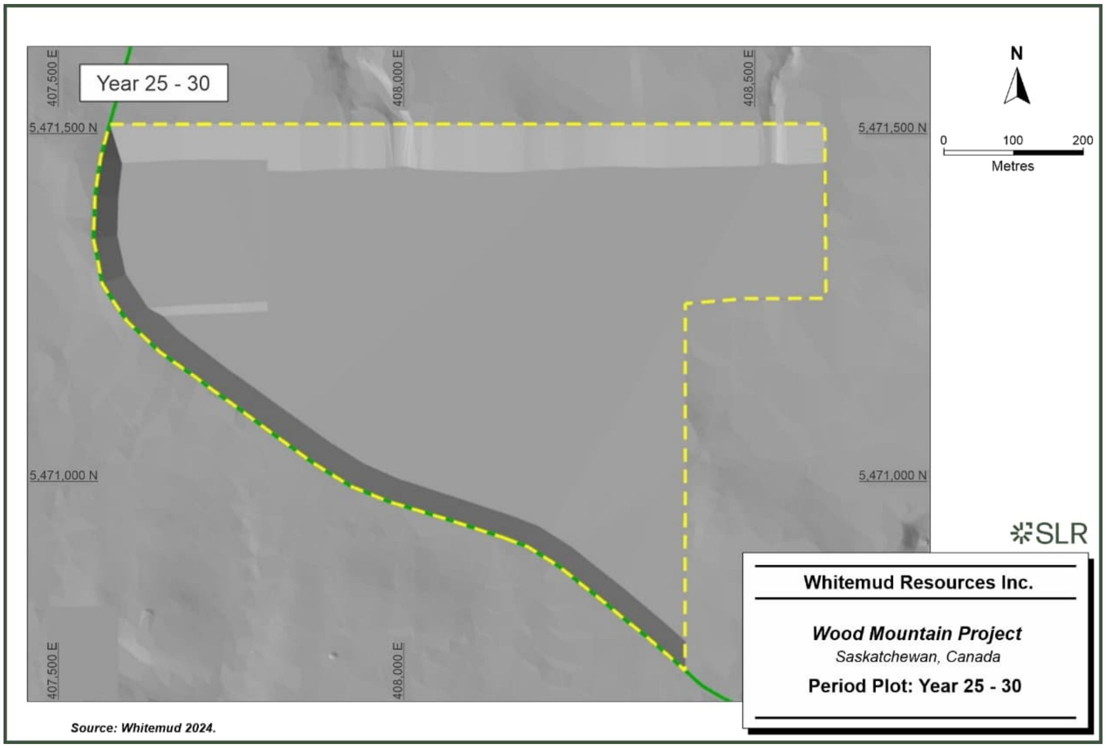
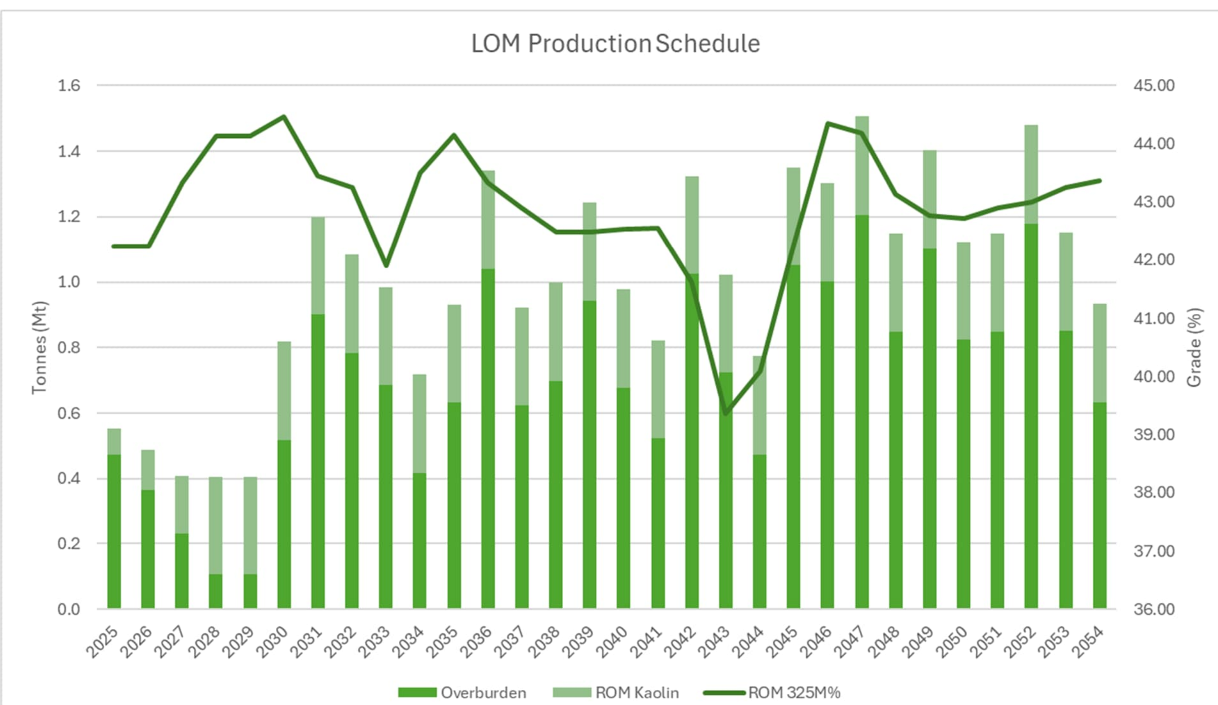


Figure 16-12: LOM Production Schedule



Stripping and quarrying operations will be carried out under contract. The current mine plan provides for overburden removal, quarrying, and rehabilitation to occur on a 5-day-a-week, 2-shift-per-day basis. Sand rejects will be placed in the pit by both the overburden contractor and Whitemud staff operating one of the haul trucks during the night shift.

16.5 Mine Infrastructure

A dewatering system will need to be introduced to prepare the West Pit for operations. The previously mined out pit adjacent to the plant can be used to store excess water. It will be important to maintain a mining face as excess water can cause very muddy working conditions due to the wet clay.

Very minimal mining infrastructure will be required due to the small fleet size. The existing administration buildings will provide sufficient space for to support the mining operation.

For further information on infrastructure, see Section 18.0.

16.6 Mine Equipment

The primary and secondary operational equipment for the West Pit is summarized in Table 16-1.

Table 16-1: Mine Equipment

Description	Specification	Quantity (Units)
Excavator	Hitachi EX 1200	1
Front-End Loader	Cat 988	1
Haul Truck	Cat 770	5
Dozer	Cat D5	2
Grader	Cat 14H	1

The mine will be operating two shifts per day, five days per week, for a total of 3,120 operating hours per year. After accounting for availability and utilization, the effective hours of operation per year will be 2,387. Further details can be reviewed in Table 16-2.

Table 16-2: Mine Operating Hours

Item	Shifts (Daily)	Hours (Daily)	Operating Days (Weekly)	Availability (%)	Utilization (%)	Effective Hours (Yearly)
Excavator	2	12	5	85%	90%	2,387
Front-End Loader	2	12	5	85%	90%	2,387
Haul Truck	2	12	5	85%	90%	2,387
Dozer	2	12	5	85%	90%	2,387
Grader	2	12	5	85%	90%	2,387

16.7 Mine Personnel

Mining will be carried out by a mining contractor that will be overseen by the Whitemud General Manager. No additional mine personnel will be required.

17.0 Recovery Methods

Whitemud's Gollier Creek metakaolin facility was designed to produce metakaolin by a process of drying, size and density classification to reject silica, and calcining to convert kaolin to metakaolin. The processing plant operated intermittently from 2008 to 2010, and again in 2012 for approximately three months. The operation was challenged by its economics partly resulting from inefficiencies in the processing plant. The most significant issue was a large recirculating load of metakaolin from the rotary calciner returning to the dryer that severely restricted the feed rate of new feed to the dryer.

Modifications to address the facility's bottlenecks, primarily intended to eliminate the recirculating load from the calciner to the dryer and improve dry kaolin capture from the rotary dryer, began in December 2023. The QP understands that the rotary calciner and cooler are to be replaced with a flash calciner, baghouse, and ancillary equipment, and the discharge end of the rotary dryer has been modified. The facility is expected to be recommissioned in H2 of 2024.

17.1 Process Description

17.1.1 2008 to 2012

A block flow diagram for the original process is provided in Figure 17-1. Figure 17-2 provides a plan view of the plant layout.

The feed ore was transported to the plant site and stockpiled ready to be fed to the processing plant. The run of mine (ROM) was reclaimed from the stockpile by front end loader (FEL) and delivered to the feed bin, which discharged to an apron feeder feeding the primary crusher, a double roll mineral sizer. The ore was reduced to a nominal size of minus 64 mm prior to transfer by conveyor to the raw ore storage shed. A tripper conveyor allowed the raw ore to be stored in the shed in two 7,500 t longitudinal stockpiles. One stockpile received ore from the crusher while the other stockpile was being reclaimed by FEL to feed the plant.

Raw ore was reclaimed from the stockpile and fed by conveyor to the fine ore storage bin that fed the dryer. Dust collection was provided at all transfer points to control dust emissions. Self-cleaning magnets were used to capture any tramp iron prior to transfer of ore to the fine ore bin.

Ore was fed at a controlled rate from the fine ore bin into the rotary dryer. The dryer operated in co-current mode with hot gases from the rotary calcining kiln and rotary cooler, and a coal-fired hot gas generator. Supplementary heat for the dryer operation was provided by a hot gas generator equipped with a natural gas burner.

The dryer was designed to reduce the moisture content of the ore to 0.5% and to liberate silica sand from the kaolin. The light kaolin particles and fine silica sand were swept from the dryer by the dryer exhaust gases pulled by an induced draft fan (the main process fan). The coarse silica sand continued through the dryer and cooler and was transferred by screw conveyor and bucket elevator to a hot sand bin where it was stored prior to disposal in the quarry by the quarry trucks.

The dryer exhaust gases containing the kaolin and fine silica were drawn through a cyclone and bag filter by the main process fan to capture the kaolin and silica before being released to the atmosphere. The coarse kaolin fraction and fine silica sand separated by the cyclone were fed to a mechanical classifier for the separation of the fine silica sand from the kaolin. Fine silica sand removed from the separator was transferred to the hot sand bin. Fine kaolin was recovered in the bag house. Kaolin collected in the baghouse and the separator dust collector were conveyed to the dry kaolin bin.

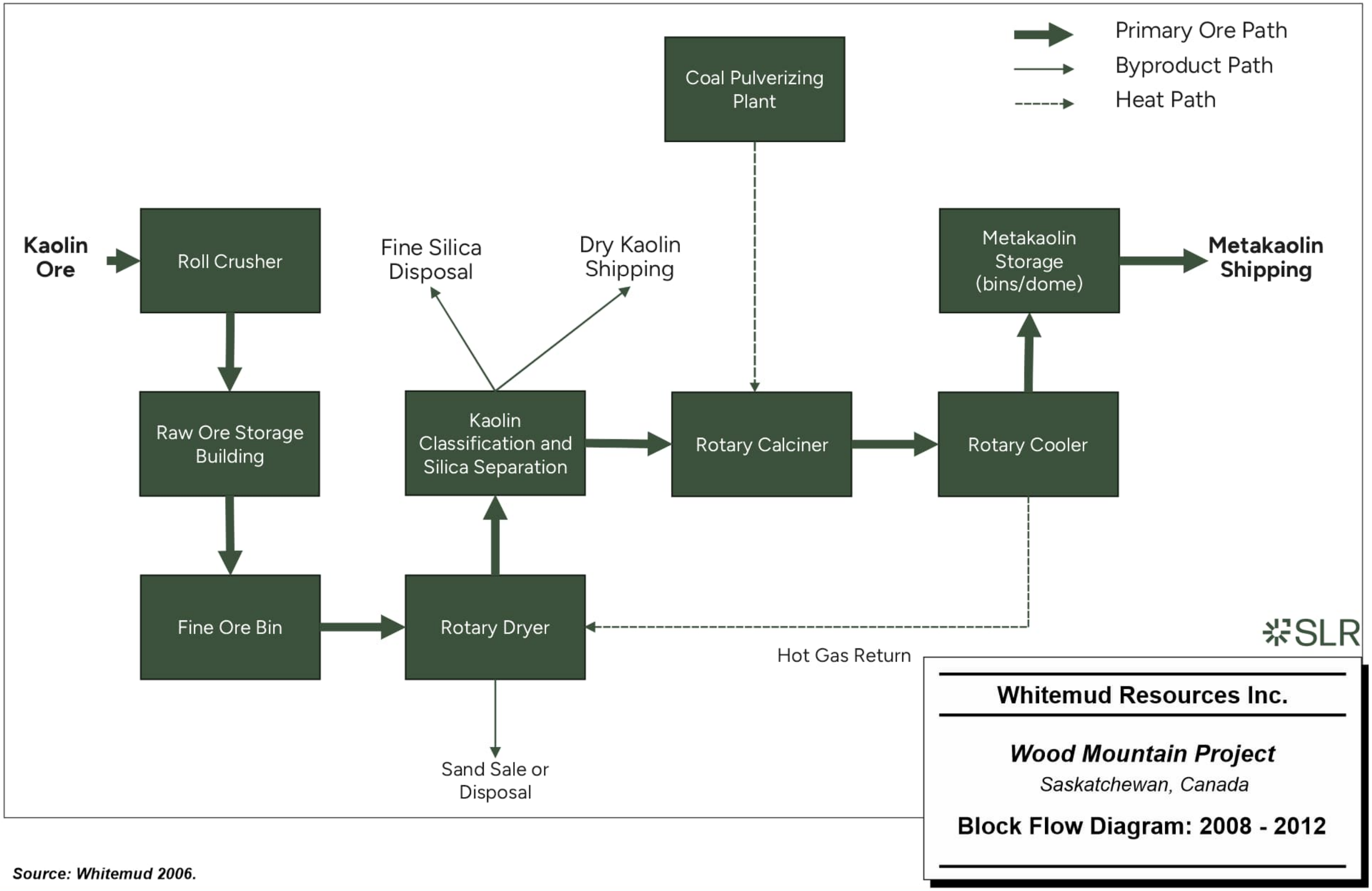
Dry kaolin was recovered from the dry kaolin bin and could either be shipped to market or transferred to the rotary kiln for calcining. The rotary kiln was coal-fired and was designed to calcine the kaolin. Hot, calcined kaolin (metakaolin) was discharged from the rotary kiln into the rotary cooler. Cooling air was drawn through the cooler by the dryer vent fan countercurrent to the product direction of flow.

Cooled metakaolin was discharged from the cooler and transferred pneumatically via pipeline to storage bins and a 20,000 t storage dome. The product was recovered from the storage dome using a fluidized floor system for transport to the loadout stations from where it was loaded into trucks either for direct shipment to customers or transport to a rail transfer station at Scout Lake. Rail cars were loaded at the Scout Lake terminal for rail shipment.

All product transport requirements were provided by contract services.

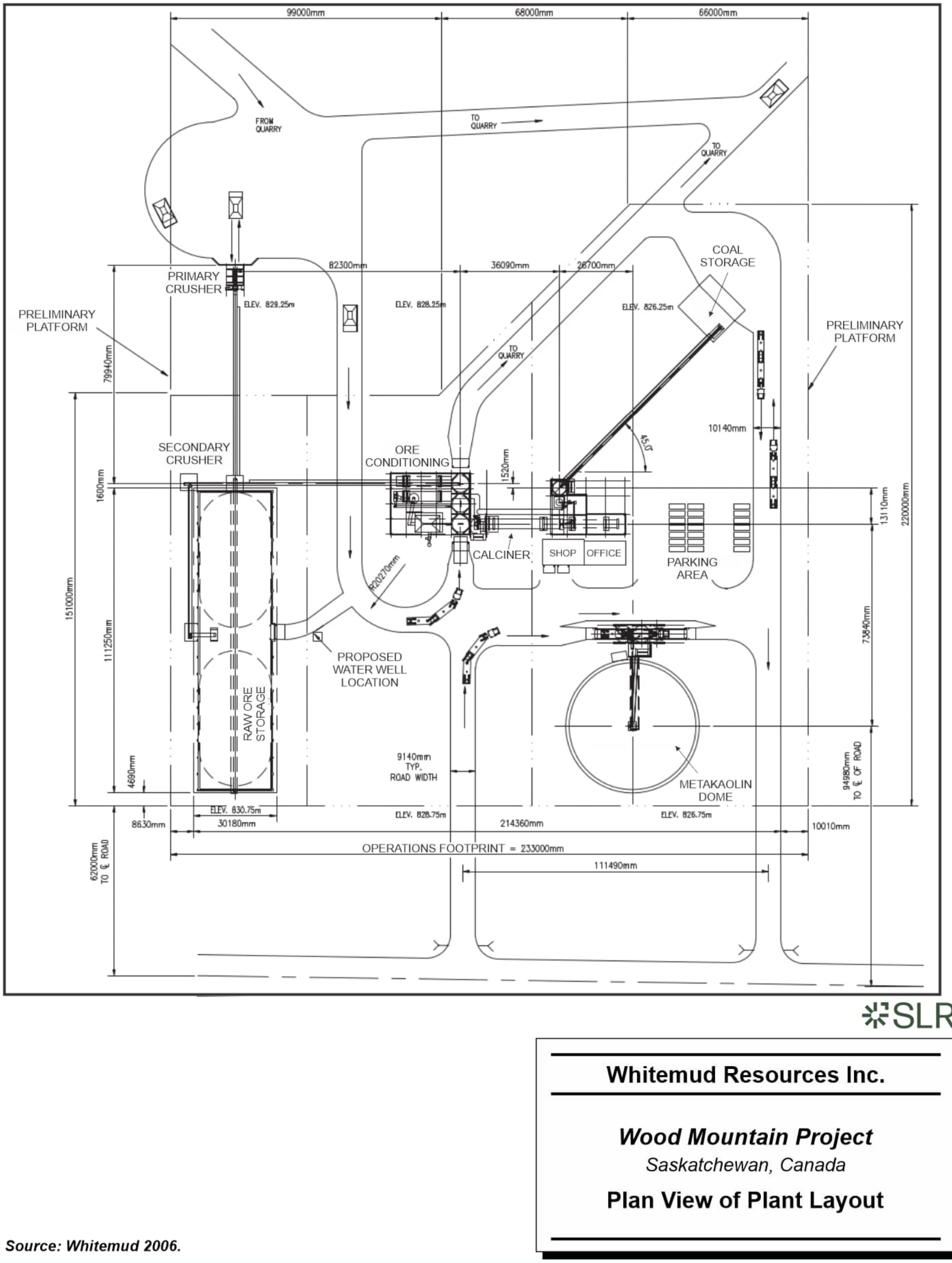
The primary fuel source for the plant was lignite coal. Coal was trucked to the plant and stored in a covered storage area. The raw coal was recovered by FEL and transferred by belt conveyor to the raw coal bin. Raw coal from the coal bin was fed to a Raymond coal mill where it was pulverized for use in the coal-fired hot gas generator that provided the hot gas for the calciner. Hot gases for the drying and transport of the coal were recovered from the rotary cooler discharge hood and were tempered with recycled gases. Pulverized coal was transported to the calcining kiln burner by the main process induced draft fan after being densified in a cyclone. A separate fan provided primary combustion air for the coal burner.

Figure 17-1: Block Flow Diagram: 2008-2012



Source: Whitemud 2006.

Figure 17-2: Plan View of Plant Layout



Source: Whitemud 2006.

17.1.2 2024 Plant Modifications

In Q1 of 2024, a Design Basis Memorandum for Gollier Creek was produced by Fortress Engineering LTD (Fortress) out of Calgary, Alberta. The memorandum highlighted the inefficiencies in the original design that led to the Gollier Creek facility's poor economics. Specifically, Fortress identified the creation of a large circulating load of metakaolin from the rotary calciner and cooler back to the rotary dryer resulting from the high gas velocities in this equipment and the lack of a gas-solid separation system. This circulating load decreased the new feed capacity of the dryer (and therefore the overall process) by more than 50%. Exacerbating the capacity issue, gas velocities at the discharge end of the dryer were insufficient to capture much of the dry kaolin, which instead would discharge with the sand and be directed to the hot sand bin and subsequently returned to the pit. The yield of metakaolin per tonne of plant feed achieved during the 2008 to 2012 intermittent operations was approximately 9%. An additional concern identified was the unfavorable carbon footprint of the process due to the use of pulverized coal as a heat source in the calciner.

An updated design, presented in Figure 17-3, replaces the rotary calciner, cooler, and coal pulverizing plant with a flash calciner that will be heated by the existing 60 GJ rotary dryer burner using natural gas, and dust collector (bag house). The updated design parameters are presented in Table 17-1. The kaolin will be heated to its dehydroxylate (calcining) temperature of 800ºC as it passes through the flash calciner. The hot gas stream carrying the metakaolin will be mixed with quench air and cooled to less than 250ºC before entering the dust collector. The dust collector will capture the particulate, eliminating any circulating load of metakaolin to the rotary dryer. The hot gas stream carrying the metakaolin will be mixed with quench air before entering the dust collector and cooled to lower than 250ºC. Metakaolin captured in the dust collector will be transferred pneumatically to a glycol-cooled bulk cooler where the temperature will be further reduced to 80ºC. The cooled metakaolin will pass through a sizer before being transferred by pneumatic conveyors to the metakaolin product storage dome and loadout silos.

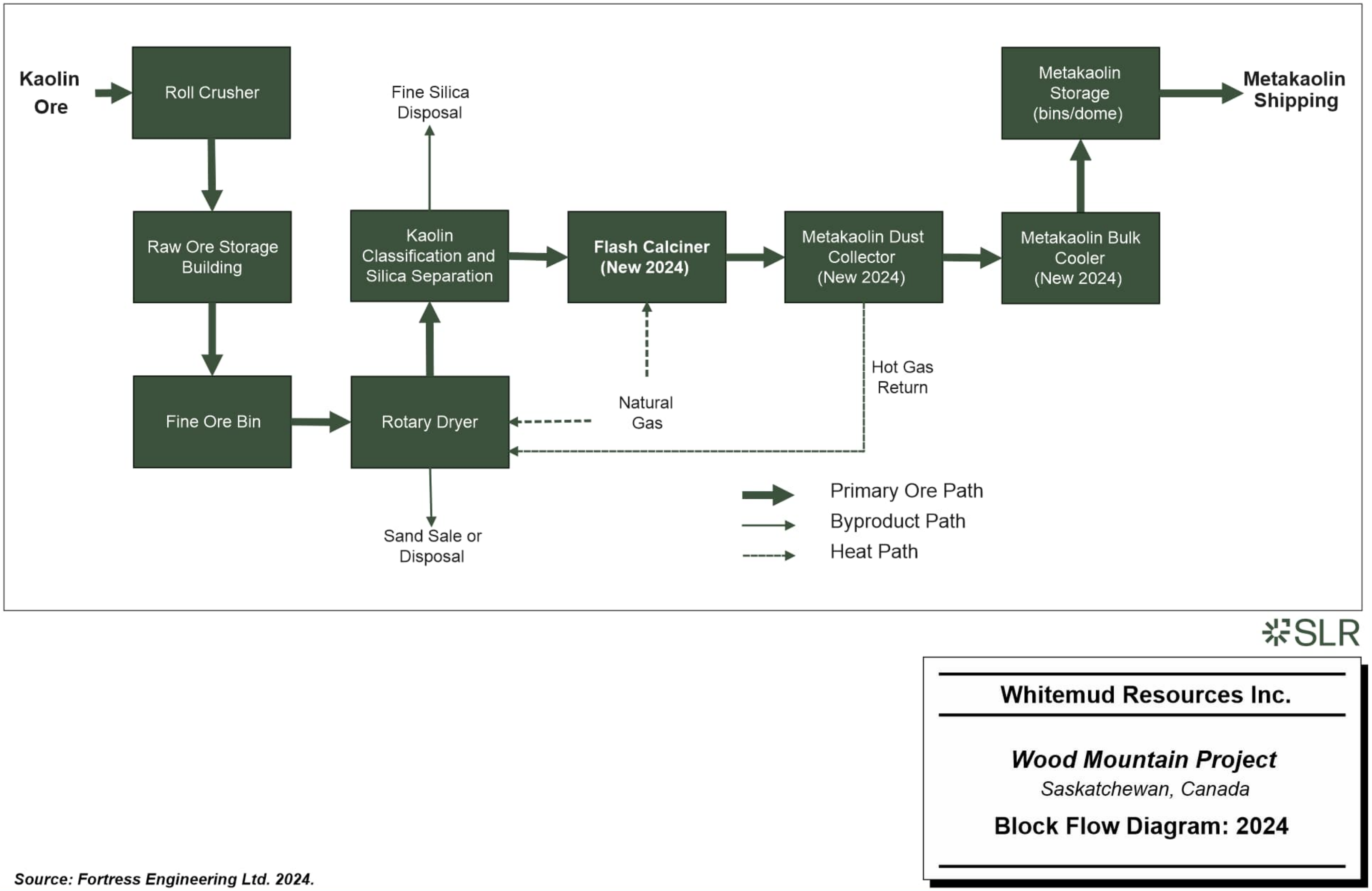
The particulate-free gas discharged from the dust collector will pass upstream to the rotary dryer, providing most of the heat for the rotary dryer. Supplementary heat for the rotary dryer will be provided by a 17 GJ natural gas trim burner to increase the air temperature entering the rotary dryer to 315ºC.

The gas discharge of the dryer was modified after test runs of the dryer in 2022 to increase the velocity of the gas at the discharge of the dryer to maximize capture of kaolin for calcining.

The rotary calciner, cooler, and coal pulverizing plant will become redundant.

Previous operating experience showed that ROM material fed to the plant must contain less than 8% moisture to minimize material handling difficulties. Spreading the ore outdoors for a day was found to be effective in reducing the moisture content through evaporation to acceptable levels for feeding to the plant. This method will be used during future operations for all ore to be processed.

Figure 17-3: Block Flow Diagram: 2024



Source: Fortress Engineering Ltd. 2024.

Table 17-1: Gollier Creek Key Process Design Criteria

Design Criteria	Units	
Plant operating time	days/annum	183
	days/week	7
Utilization	%	83
Operating hours	hr/day	24
Plant feed rate	tph	55
Metakaolin production rate	tph	10.5
Temperature of rotary dyer inlet gas	ºC	315
Temperature in flash calciner inlet gas	ºC	1,650
Temperature in calciner dust collector (calciner exhaust gas)	ºC	250
Temperature at bulk cooler discharge (metakaolin)	ºC	80

17.2 Modified Plant Equipment Characteristics

The proposed process changes will require some additional equipment to be sourced by Whitemud, and for certain existing equipment to be repurposed.

- Flash Calciner – Refractory-lined duct that will be heated using an existing 60 GJ/hr burner converted to use natural gas as the fuel.
- Dryer Trim Burner – Refractory-lined duct used to bring recirculating air from the calciner dust collector back up to 315ºC as it enters the dryer. A 17 GJ/hr natural gas-fired duct burner has been specified.
- Dust Collector – Consisting of 732 five-inch diameter filter bags, which will prevent a circulating load of metakaolin to the dryer. The unit has been sourced by Whitemud and will be installed together with ancillary instrumentation.
- Air Locks and Pneumatic Conveyor System – The conveyor system downstream of the dust collector will be upgraded with new air locks and pneumatic conveying pipeline.
- Metakaolin Bulk Cooler – Metakaolin will enter through the top of the cooler and pass over glycol-filled cooler plates that will be used to decrease the metakaolin temperature from approximately 250ºC to 80ºC. The cooled metakaolin will exit the bulk cooler with the assistance of instrument air-filled fluidization pads and be transported pneumatically to the storage silos and storage dome. The cooler has been designed, sized, and constructed onsite by Whitemud and Fortress.
- Metakaolin Sizer and Metakaolin Pump – A repurposed sizer (ensuring that metakaolin particle sizes are smaller than 45 µm) and pneumatic conveyance system will be located downstream from the bulk cooler.
- Interconnecting Ductwork and Conveyance Devices – Whitemud will provide the required duct sizing information to Fortress so that the pressure drop calculations between the existing and new air and fuel gas piping can be completed. Whitemud plans to reuse as much of the existing ducting as possible, however, it is expected that

additional ducting will be required. Rotary air locks will replace slide gate valves at kaolin and metakaolin transfer points to ensure positive seals and minimize leaks.

17.3 Utility Requirements

The following utilities will be required for the proposed process changes.

- Glycol Cooling, Pumping, and Piping – A glycol cooling loop and support equipment will be used in the metakaolin bulk cooler. Once the glycol leaves the cooler it will be used to preheat the combustion air for the flash calciner burner and dryer burner.
- Air – Air and combustion gases will be used to move the material through the flash calciner and dust collector. Combustion air will be needed for the new burners and pneumatic conveyance system feeding the new flash calciner, at the discharge of the dust collector, and at the metakaolin pneumatic system that will move the material to the storage facilities.
- Instrument Air – Instrument air will be required at the dryer dust collector, the bulk cooler, the dust collector, and for the glycol temperature control valves. Whitemud is planning to replace the existing instrument air compressor to meet the instrument air demands of the plant.
- Natural Gas – Natural gas will be used for the burners at the flash calciner and for the dryer trim burner. Natural gas will be supplied by Sask Energy through an existing two-inch supply pipeline
- Electricity – Electricity will be provided by SaskPower from the regional grid. The site is fed by a 25 kV transmission line and transformer with a capacity of 2 MW. The connected load of the site is 1.7 MW
- Water – The process is a dry process and does not use water.
- Consumables - Key consumables for the processing plant will include crusher wear parts, conveyor belting and idlers, and filter bags.

17.4 Operating Plan

The mine and process will operate for six months of the year (July to December) since winter operation is challenging, initially only every second week, i.e. one week operating, one week off. It is anticipated that up to approximately 20,000 tpa of metakaolin can be produced in this scenario at a product yield of approximately 19% per tonne of ore processed. This will allow for gradual market penetration as potential customers become familiar with the product.

Previous operating experience showed that ROM fed to the plant should contain less than 8% moisture to minimize material handling difficulties, and preferably greater than 6% moisture to minimize dust generation during handling. Spreading the material outdoors for a day before introducing it into the process was found to be effective in reducing the moisture content through evaporation to acceptable levels for feeding to the plant. When necessary, this method may be used during future operations to ensure sufficiently low levels of moisture in the plant feed.

17.5 Quality Control and Quality Assurance

The following quality parameters are measured for process control, quality control, and quality assurance purposes.

- Chemical oxides are measured using a PANalytical Epsilon1 X-Ray Spectrometer. Key chemical parameters analyzed are Al_2O_3, SiO_2, SO_3, K_2O and Na_2O. Al_2O_3 is a proxy for the kaolin or metakaolin content in the product.
- Fineness and particle size distribution is measured using a Malvern Mastersizer 3000 Laser Diffraction instrument. The median particle size, D50 the 10th percentile, D10 and the 90th percentile particle size, D90, and the calculated surface area m^2/kg are used for process and quality control purposes. Product acceptance criteria also include the percent less than 20 µm.
- Thermal properties are measured using a Mettler-Toledo TGA/DSC 3+ STARe instrument with Thermo Gravimetric Analysis (TGA) and Differential Scanning Calorimetry (DSC) capabilities. The weight loss or loss on ignition (LOI) and the endothermic thermal peaks associated with dehydroxylation together with exothermic phase changes at higher temperatures are used to assess the degree of dehydroxylation for process control. A Mettler-Toledo TGA 2 STARe instrument with TGA capability is used to measure LOI for day-to-day process and quality control.
- The physical and chemical properties in addition to the above that are required by the CSA, ASTM, or AASHTO standards are also measured. The testing follows the requirements of CSA A 3004, ASTM C 311, or any specific additional requirements established by customers or other specifications.

Critical processes will be monitored using statistical process control (SPC) charts that have been designed to provide an indication of when process adjustments are necessary. The target values for all process indicators are defined in the Production Operating Instructions or plant Internal Quality Objectives.

18.0 Project Infrastructure

Site infrastructure is limited. Local roads have been upgraded to accommodate the anticipated truck traffic. The current electrical power system is sufficient for site requirements, however, may require upgrading for potential future expansions. The natural gas supply line that currently services the site is sufficient for processing up to 55 tph of ROM and will require upgrading to allow the processing plant to achieve the design capacity of 110 tph. A transload facility for loading rail cars was constructed at Scout Lake and is owned by Whitemud. There is no current potable water supply at the site and a well supplies water for domestic requirements. Telecommunications service in the area is limited and upgrades in cellular service and high-speed internet access have been made with the addition of satellite services. Key aspects of infrastructure are detailed below.

18.1 Water

The Project lies in a semi-arid region of the province where water conservation and management are paramount for social and economic reasons. Whitemud recognizes that water scarcity is prevalent in the region and is planning the Project to conserve water by minimizing consumption and minimizing impacts on both surface water and groundwater resources.

To the extent possible, fresh water will be diverted around the surface facilities to avoid having excess surface water in the quarry or in the vicinity of the kaolin processing plant. An existing storage pond will store water for fire protection and, wherever possible, water runoff will be diverted into that pond to maintain it at an adequate level. All remaining surface water will be diverted to a small temporary storage pond.

Since the process is a dry process, no water will be consumed in the plant. A small amount will be required for wash down and vehicle maintenance, and domestic uses. This is supplied from a well on site.

18.2 Electrical Power

Three phase electrical power at 25 kV suitable for 2,000 KVA demand is available from SaskPower at the site. SaskPower extended a transmission line to the plant location and supplied a transformer at no cost to Whitemud. Whitemud installed electronic soft start controls or variable speed drives for all large motors (greater than 100 hp) to ensure sufficient starting current is available.

The QP understands that SaskPower has indicated that it would be willing to upgrade the electrical service to meet the power requirements of potential later expansions.

18.3 Natural Gas Line

Natural gas service is available at the site and the capacity is sufficient to meet approximately 50% of the design throughput of the plant. plant. A larger diameter 80 psi line from the nearest compressor station at Glenworth, approximately 30 km west of the plant, would allow the Project to meet future expansion needs.

18.4 Road and Rail Transportation

Kaolin and metakaolin products will be shipped by truck to western Canadian and northern U.S. customers where economical to do so. For shipments to British Columbia, eastern Canada, and the remainder of the United States, pneumatic trucks will be loaded at the plant, and transloaded into pneumatic hopper-bottom rail cars at the transload facility at Scout Lake owned by Whitemud.

There are two options for road-haul routes (Figure 18-8):

1 From the Whitemud plant site, trucks would travel 19 km east on farm grid and concession roads to Scout Lake. At Scout Lake, trucks would be transloaded to rail cars, or continue north on Highway 2 to Assiniboia. This road has been upgraded to handle heavy truck traffic and is the main access road from the plant to the transload facility at Scout Lake.

2 A possible second route would take trucks west from the Whitemud plant site for 4.5 km on the farm grid, 1 km south on Highway No. 358, then 29 km south and east on Super Grid No. 705 to Highway 2. This route would then require traveling 33 km north on Highway No. 2 to Assiniboia.

18.5 Ancillary Facilities

No temporary or permanent camp is required since all labour will be drawn from the surrounding communities.

Other facilities on site include a small office block with kitchen and washrooms, a laboratory building, a maintenance shop, and storage for spares and supplies.

Petroleum products will be stored and handled in accordance with applicable provincial regulations. Gasoline and diesel fuel will be stored in double wall Enviro-Tanks with leak detection, while lubricants will be stored in secure buildings. Equipment and supplies for immediate cleanup of spills will be maintained on site and personnel will be trained in their use.

Domestic sewage will be treated in a septic tank with a tile field and a pump-out system that will enable wastewater reuse.

Domestic solid waste will be disposed of at the Assiniboia regional landfill, which is appropriately licensed to accept such waste. Industrial waste such as oil, antifreeze, and filters will be disposed of through a licensed waste recycler.

Whitemud intends to rely on the SaskTel network for all telecommunication services, on the understanding that adequate service can be provided.

18.6 Process Rejects

The process produces a dry high purity, fine silica sand (40 to 200 mesh) with approximately 0.5% moisture by weight. The material is cohesionless and will also be highly erodible by water and wind. It will not contain nutrients and will have been sterilized during the separation process; the sand would require substantial enhancement with moisture, nutrients, bacteria, and stabilizing cover to support plant growth. The sand is almost pure silica and will be essentially inert. It contains no adsorbed or bonded constituents that pose an environmental concern.

The sand coming out of the dryer and the air classifier will be conveyed to a 300 t sand silo. During quarrying operation, as dump trucks bring kaolin to the plant feed stockpile, they will make return trips carrying sand back to dump in the reclaim pit.

The size of the reclaim pit will be kept to the minimum dimensions practicable for the operation. The objective will be to work in small panels that can be filled in a short time and stabilized with overburden to prevent wind erosion. Experience at other locations in Saskatchewan has shown that soil drifting can be controlled by using this approach and by incorporating progressive reclamation into operating plans.

Rejects stability is a critical pit design and management issue. Physical stability refers to susceptibility to physical dislocation by erosion, frost action, or mass wasting such as instability caused by land sliding. The rejects must be covered as soon as possible upon placement to prevent damage to adjacent land from windblown sand. The materials are suitable as fill material and must be stabilized with clay cover to prevent erosion.

Two main concerns pertain to the stability of the rejects and overburden (collectively called the *spoil pile*) that is stored in the worked-out pit; stability of the spoil slopes and overall stability with respect to shear strength of the foundation. The sand is a strong material, however, the spoil pile slopes will only stand at the angle of repose of the sand, estimated to be 32°. If the slope is steeper than the angle of repose, the sand may erode into the pit. The angle of repose is expected to be the controlling angle for sand and spoil placement. By contrast, it is expected that the undisturbed clay of the pit walls will stand at slopes near 45° for a sufficient time to allow the kaolin to be excavated.

Overall stability of the spoil will be enhanced if it is placed in a fully dewatered pit. To maintain spoil stability, water must be pumped from the pit prior to placing the bottom lift of sand.

In summary, physical stability of the sand and spoil will be maintained by:

- Transporting the sand in a fashion that minimizes dusting.
- Operating the rejects area in small cells, covering each cell as quickly as possible after placing the sand and progressively reclaiming the sand areas as quarrying proceeds.
- Ensuring the pit is dewatered prior to placing the bottom lift of sand.

19.0 Market Studies and Contracts

Whitemud engaged Maia Research to conduct a market study (Maia 2024) to assess the marketability of metakaolin. The information in this section is extracted from the Maia report and values are reported in US$ and short tons (st) except where otherwise noted.

Metakaolin, also known as calcined kaolin or dehydroxylated aluminum silicate, is a highly reactive pozzolanic material that is commonly used in the production of high strength and durable concrete. Additionally, metakaolin can be used to fill the micropores and voids in concrete, which reduces the permeability and moisture migration of concrete, thereby improving the durability and service life of concrete. Metakaolin can also be used in combination with other cementitious materials such as different types of cement, fly ash, etc. to form composite cementitious materials. Through reasonable proportioning and mixing, the advantages of metakaolin can be further exerted to improve the overall performance of concrete.

19.1 Markets

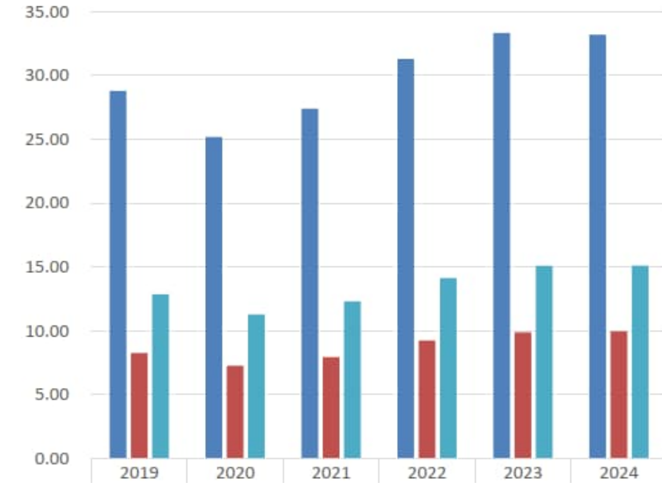
19.1.1 Market Size

Metakaolin is used in several applications(Table 19-1), and the value and relative size of each market segment in North America by application is presented in Figure 19-1 and Figure 19-2, respectively.

Table 19-1: Key Metakaolin Applications

Application	Description
Supplementary Cementitious Material (SCM)	Metakaolin can be used as an SCM in concrete (ready mix, precast, shotcrete, etc.) and down hole well-cementing applications.
Soil-cement Stabilization	Metakaolin can be used to improve the engineering properties of soils, such as reducing swelling and increasing soil stability.
Other	Metakaolin can also be used in other fields such as hempcrete, geopolymers, etc.
Source: Maia 2024	

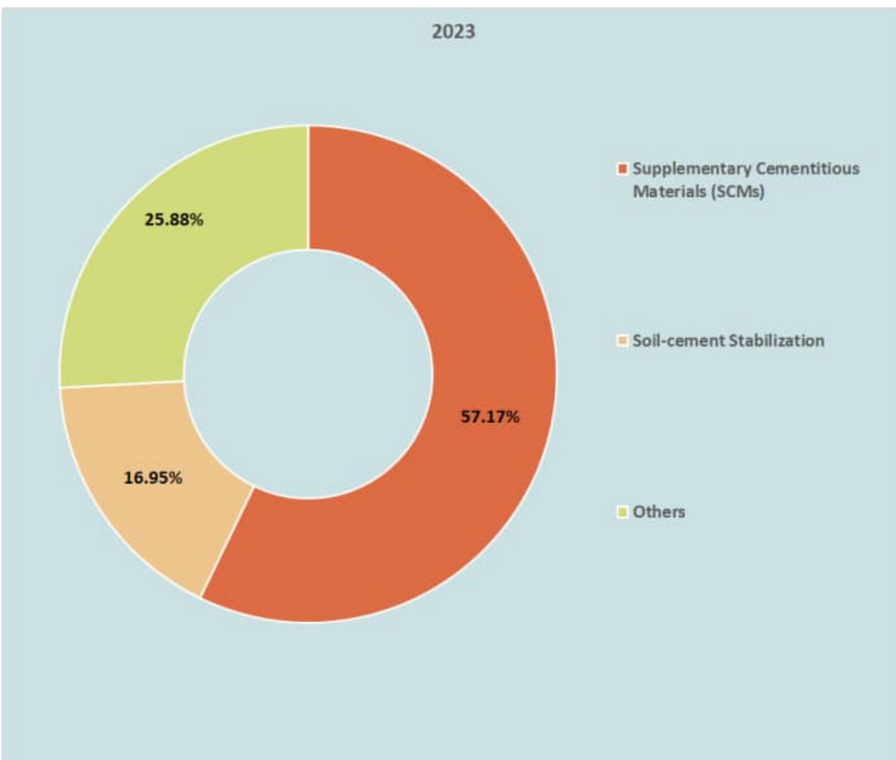
Figure 19-1: North American Metakaolin Market Value by Segment (US$M)



	2019	2020	2021	2022	2023	2024
Supplementary Cementitious Materials (SCMs)	28.79	25.19	27.41	31.30	33.33	33.21
Soil-cement Stabilization	8.26	7.27	7.94	9.24	9.88	9.95
Others	12.86	11.28	12.31	14.14	15.09	15.10

Source: Maia 2024

Figure 19-2: North American Metakaolin Market by Segment



Source: Maia 2024

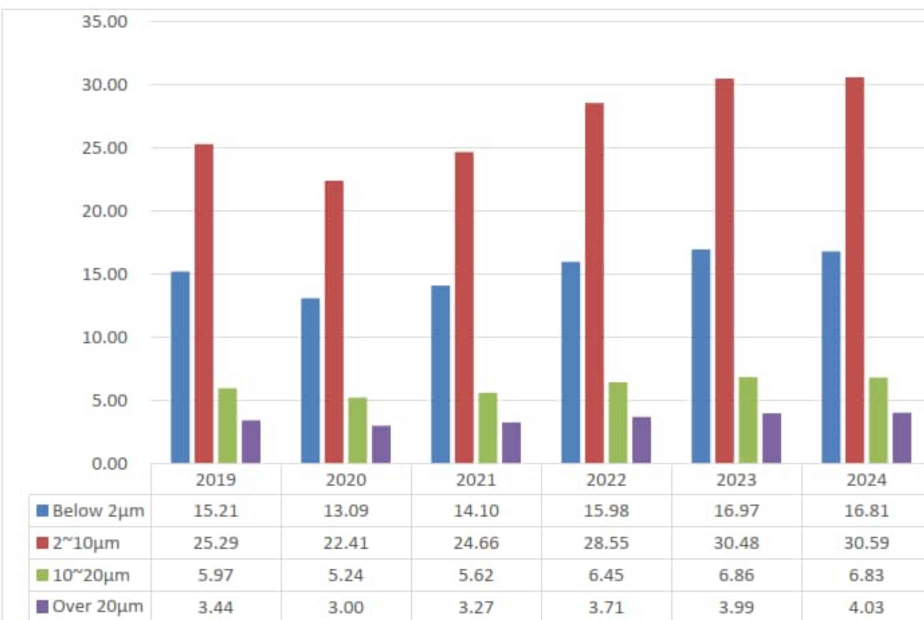
Metakaolin can be divided into types based on size (Table 19-2). Whitemud produces metakaolin in the 2 µm to 10 µm size range.

Table 19-2: Metakaolin Types by Size

Type
Below 2 µm
2 µm to 10 µm
10 µm to 20 µm
Over 20 µm
Source: Maia 2024

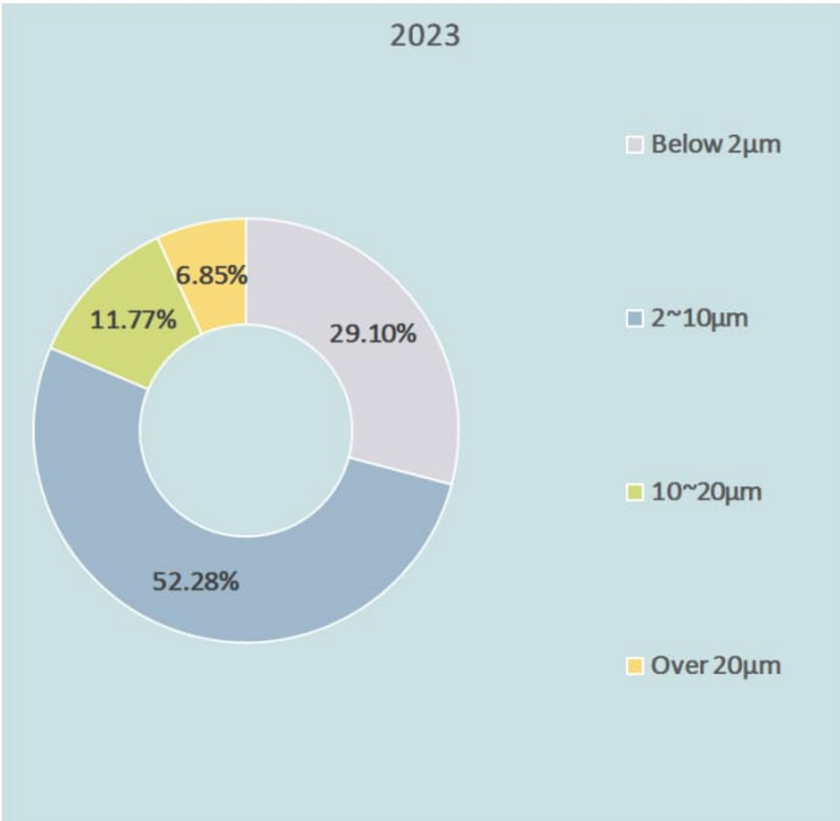
The value and relative size of the market for each type in North America since 2019 is presented in Figure 19-3 and Figure 19-4, respectively.

Figure 19-3: North American Metakaolin Market Value by Type (US$M)



Source: Maia 2024

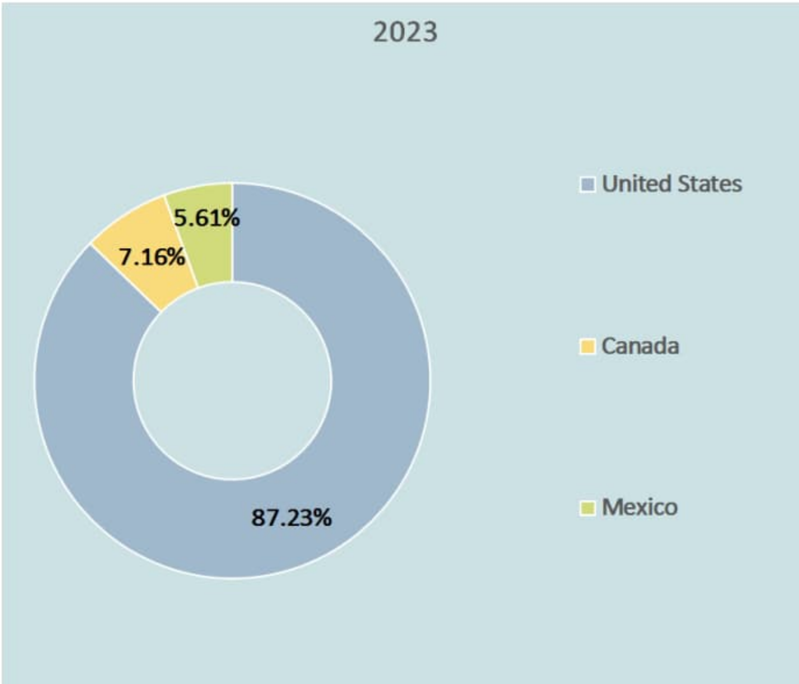
Figure 19-4: North American Metakaolin Market by Type



Source: Maia 2024

The largest market for metakaolin in North America is the United States, which accounted for 87% of the metakaolin consumed in 2023, as shown in Figure 19-5.

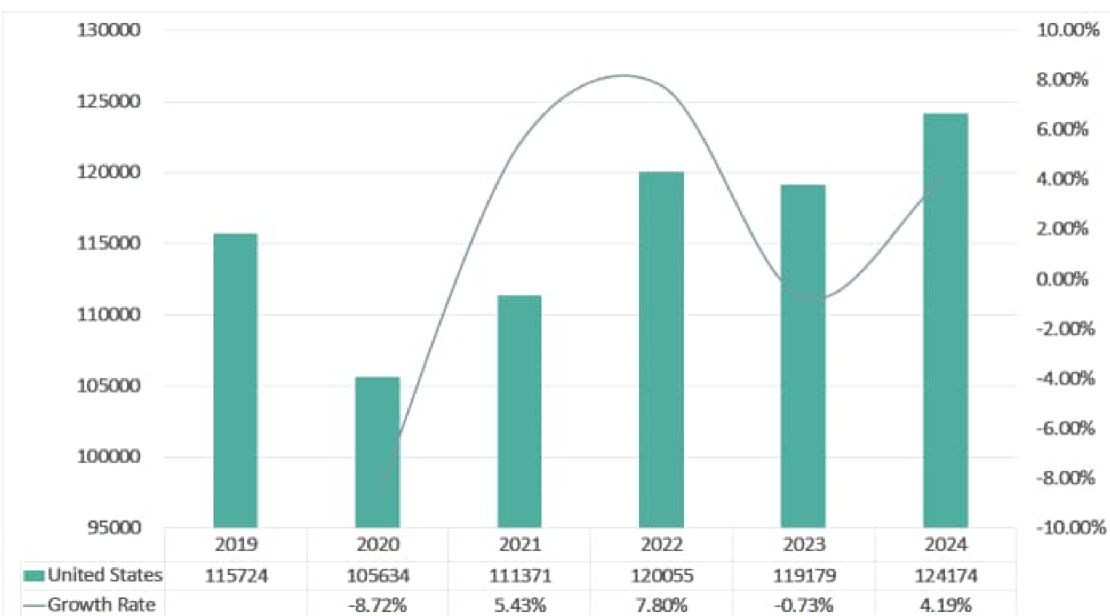
Figure 19-5: North American Metakaolin Market Share by Country



Source: Maia 2024

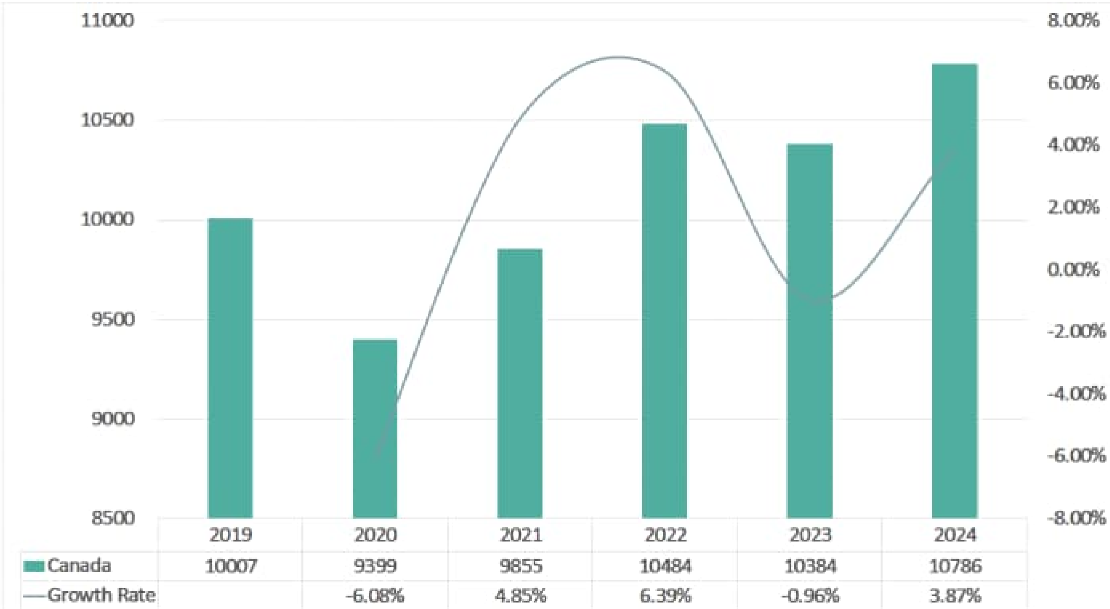
The annual sales volume and growth rate of the market in the United States since 2019 are presented in Figure 19-6. Similarly, the annual sales volume and growth rate of the market in Canada are presented in Figure 19-7.

Figure 19-6: United States Sales Volumes (st) and Growth Rate (%) for Metakaolin



Source: Maia 2024

Figure 19-7: Canada Sales Volumes (st) and Growth Rate (%) for Metakaolin



Source: Maia 2024

19.1.2 Market Drivers and Limitations

The size of the metakaolin market is driven in part by increasing demand for high performance concrete and construction industry growth, while being limited by the availability of SCM additives and substitutes such as fly ash, silica fume, and GGBFS. Fly ash is the most widely used SCM in concrete and is sourced from coal-fired power plants where it is captured from the flue gases that result from the combustion of coal. Silica fume is produced during the carbo-thermic reduction of quartz in the production of silicon metal, and GGBFS is a major discard material produced during the production of iron for steelmaking.

The production of fly ash is decreasing; in recent years, the number of coal-fired power plants has been declining due to various factors such as aging coal-fired units, environmental regulations, and competition from natural gas, solar, and wind power plants. According to the U.S. Energy Information Administration (EIA)'s Annual Energy Outlook 2023 (AEO2023), the U.S. coal-fired power generation capacity will decrease to less than half of the 2022 level by 2050. Therefore, the sustainable development of the concrete industry will provide opportunities for the growth of the metakaolin market.

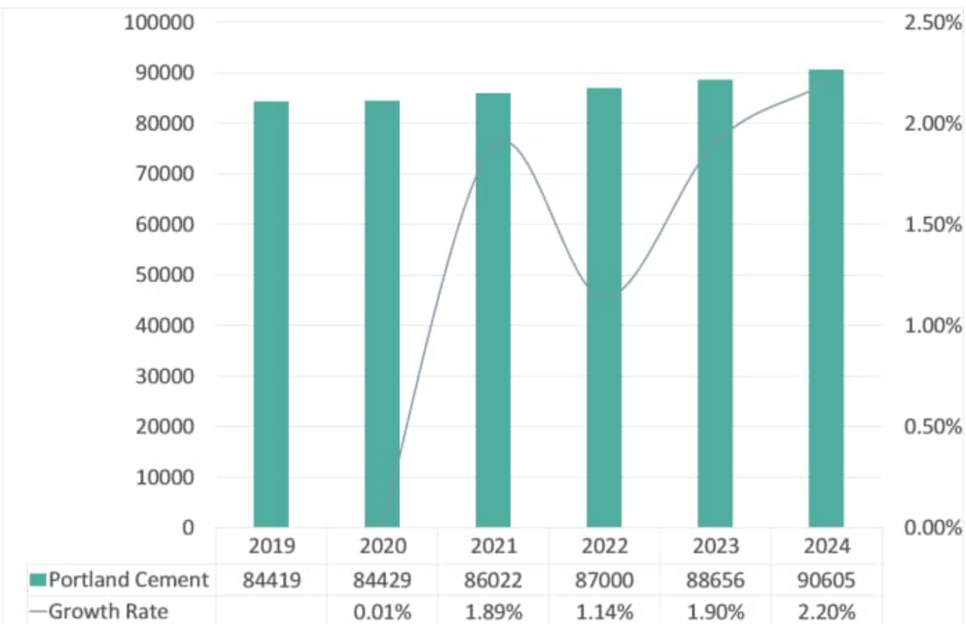
An additional driver for the metakaolin market is the requirement to lower carbon dioxide emissions in the cement industry. The cement industry is the source of approximately 8% of global carbon dioxide emissions, and, according to the Paris Climate Agreement of 2016, the industry is required to reduce its emissions by 16% by 2030 and 100% by 2050. By replacing part of the cement with metakaolin in concrete mixtures, the amount of carbon dioxide-intensive cement can be reduced. For every short ton of cement replaced, it is equivalent to decreasing carbon dioxide emission by approximately 0.8 st to 0.9 st.

The United States has abundant kaolin resources, which are mainly distributed in an 800 km long, high quality kaolin belt in Georgia, which is also the main kaolin production area in the United States. The development of these kaolin resources has provided a foundation for the development of North American metakaolin.

The U.S. construction industry includes residential construction, commercial construction, public construction, and other aspects of construction. For the residential market, according to the National Association of Home Builders (NAHB), the construction of single family homes in the United States will increase by 4.7% in 2024 to an average of 988,000 units per year, and will increase by an additional 4.2% to 1.03 million units by 2025. In addition, under the influence of the *Infrastructure Investment and Jobs Act* (IIJA), the *Inflation Reduction Act* (IRA) and the *Creating Beneficial Semiconductor Production Incentives Act* (CHIPS), more funds are expected to flow into the non-residential construction sector. For example, the non-residential segment is likely to continue to grow steadily as federal funding flows into chip manufacturing plants, biotech facilities, electric vehicle battery factories, and other clean energy projects. The growing construction industry will benefit the metakaolin industry by increasing the demand for concrete and SCMs. In addition, the sustainable development trend in the concrete and construction industries will further promote the development of the metakaolin industry.

Sales volumes and growth rate of Portland cement in the United States since 2019 are presented in Figure 19-8.

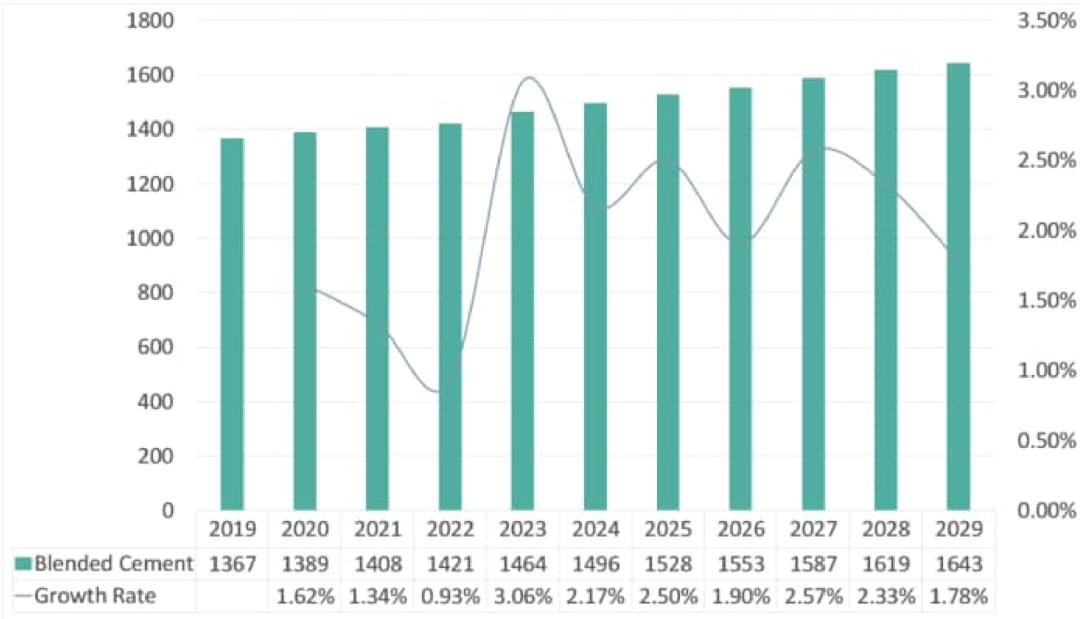
Figure 19-8: Sales Volumes of Portland Cement (kt) and Growth Rate (%) in the United States



Source: Maia 2024

The historical and forecast blended cement consumption and growth rate in Canada are presented in Figure 19-9.

Figure 19-9: Historical and Forecast Blended Cement Consumption (kt) and Growth Rate (%) in Canada



Source: Maia 2024

19.2 Price Forecasts

The price of metakaolin in the North American market since 2019 is presented by type in Figure 19-10 and sales volumes by region since 2019 are summarized in Table 19-3.

Figure 19-10: Historical Metakaolin Price (US$/t) in North America

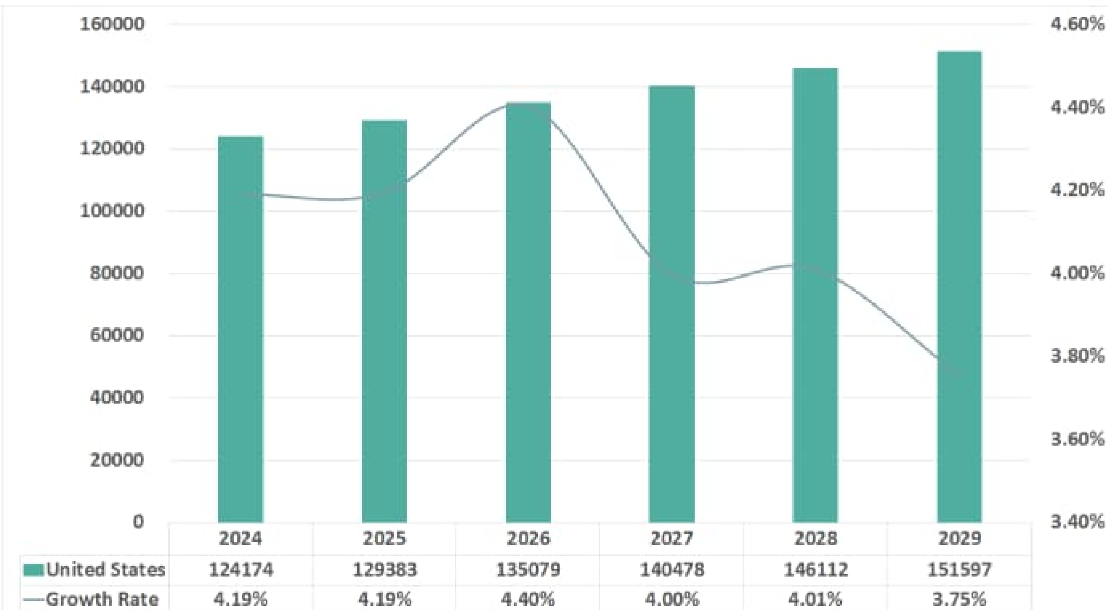
Source: Maia 2024

Table 19-3: Historical Metakaolin Sales Quantities by Region

Region	2019 st	2020 st	2021 st	2022 st	2023 st	2024 st
United States	115,724	105,634	111,371	120,055	119,179	124,174
Canada	10,007	9,399	9,855	10,484	10,384	10,786
Mexico	7,331	6,745	7,121	7,729	7,643	7,928
Total	**133,063**	**121,778**	**128,347**	**138,268**	**137,207**	**142,887**
Source: Maia 2024						

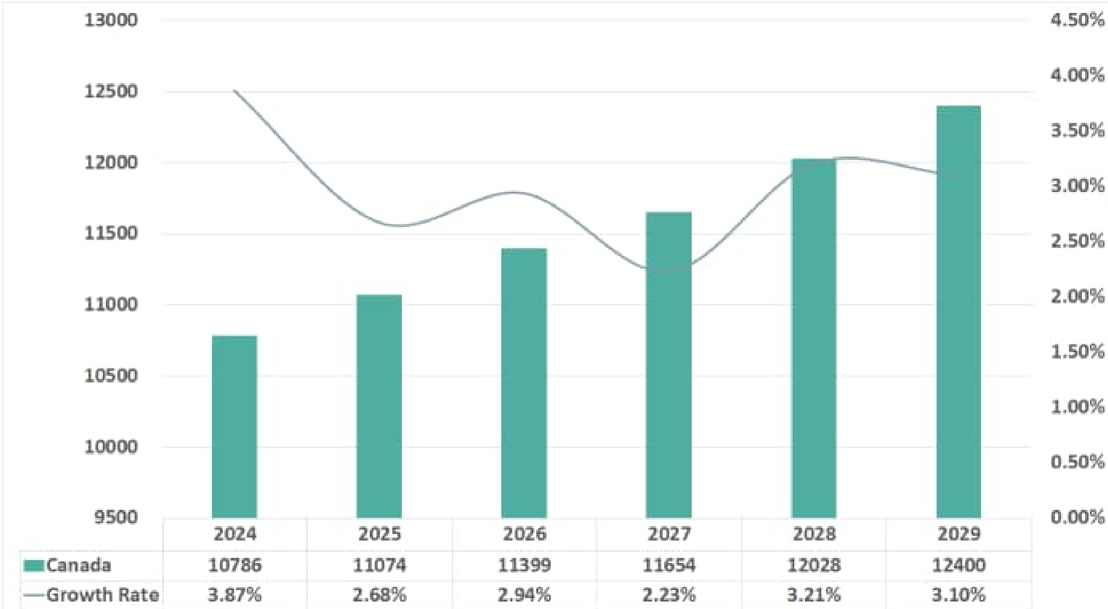
Forecast sales volumes and growth rates to 2029 are presented in Figure 19-11 for the United States and in Figure 19-12 for Canada.

Figure 19-11: Forecast Metakaolin Sales Volumes and Growth Rates for the United States



Source: Maia 2024

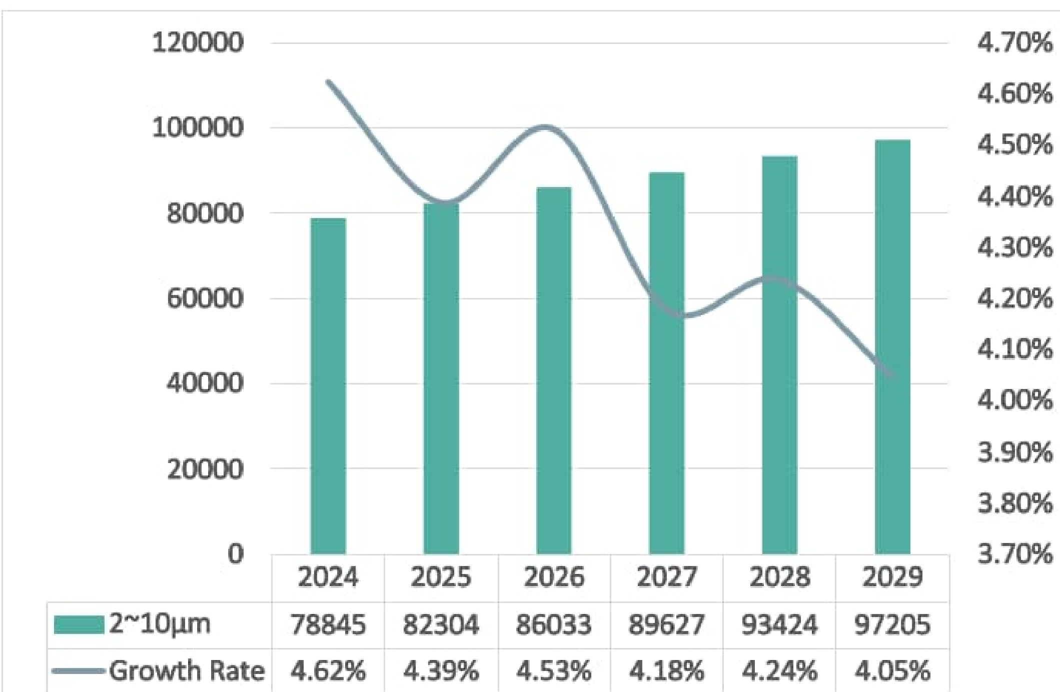
Figure 19-12: Forecast Metakaolin Sales Volumes and Growth Rates for Canada



Source: Maia 2024

Maia's forecast for metakaolin market volume for 2 µm to 10 µm material is shown in Figure 19-13. For this market (into which Whitemud will sell its metakaolin), Maia forecasts an increase from 78,845 st in 2024 to 97,205 st in 2029 (71,527 t to 88,183 t).

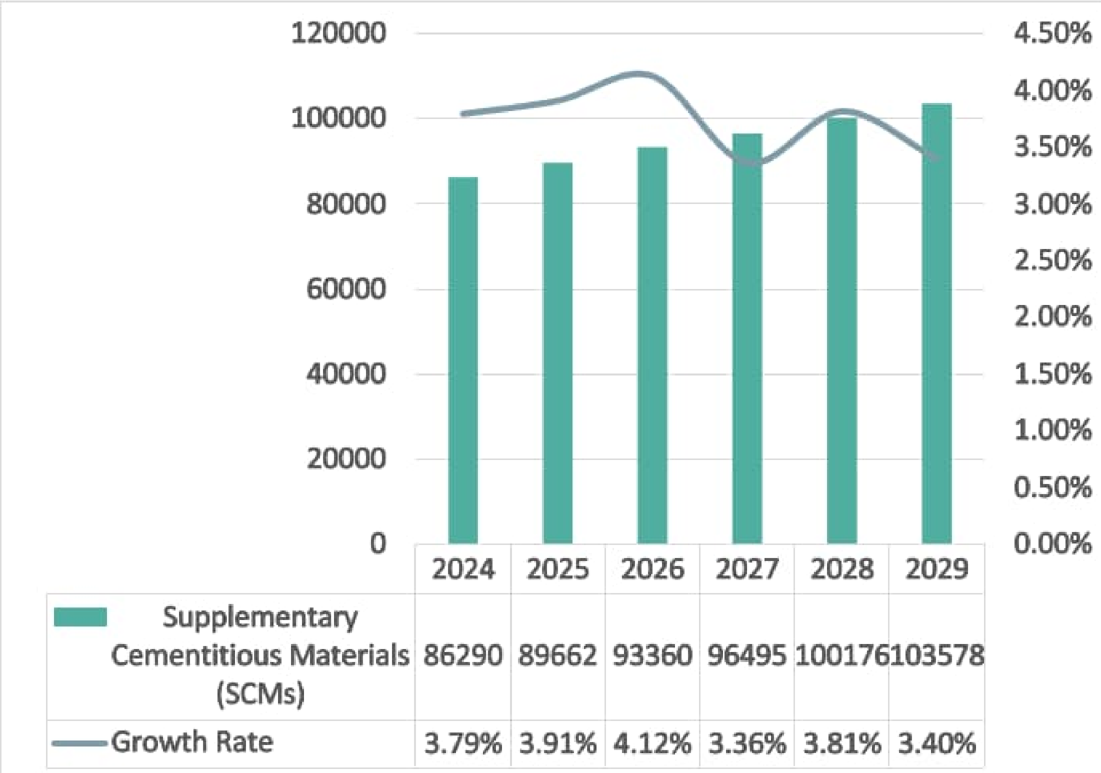
Figure 19-13: Forecast North American Metakaolin Market and Growth Rate (2 µm to 10 µm)



Source: Maia 2024

Forecast sales volumes and growth rates for SCMs to 2029 are presented in for the North American market in Figure 19-14.

Figure 19-14: Forecast North American Market Volume and Growth Rate for SCMs



Source: Maia 2024

Forecast prices for the North American market segments (uses) of kaolin have been calculated from Maia's forecast of the market value by segment and volume and are presented in Table 19-4, and converted to Canadian dollars (C$) per metric tonne (t) using an exchange rate of CAD1.35/USD.

Table 19-4: Forecast Kaolin (Delivered) Price by Application

Type	2024 (C$/t)	2025 (C$/t)	2026 (C$/t)	2027 (C$/t)	2028 (C$/t)	2029 (C$/t)
CSM	573	582	579	575	569	578
Soil-cement stabilization	634	644	641	637	631	641
Others	676	687	684	679	673	683

The location of existing kaolin mines, cost of product, and delivery to Canada and the northern United States limits the use of metakaolin from mines in Georgia due to higher delivered costs. Whitemud's proximity to these markets is expected to enable it to provide a lower delivered cost than can be achieved by existing kaolin mines.

19.3 Contracts

Whitemud does not have sales contracts in place, however, it has been successful in selling metakaolin that remained in storage from the previous operations that ended in 2012. From 2019 to 2022, Whitemud sold the majority of the remaining volume of metakaolin totalling approximately 2,700 t at an average price of C$250/t, excluding freight (with freight being at the customers' cost). This material was sold to customers in southern Saskatchewan and Alberta, the likely market for initial future production. Many of Whitemud's existing clients and potential new clients are awaiting plant restart and confirmation of quality and reliability of supply to continue purchasing and increase demand.

19.3.1 Whitemud Pricing Strategy

Pricing of metakaolin from Georgia has historically been more than double or triple the price of commonly used SCMs such as fly ash, limiting the use of metakaolin as an SCM. Whitemud's metakaolin pricing is closer to that of fly ash, which will provide opportunities for increased demand.

Whitemud's metakaolin pricing has been set up to allow the product to be widely used beyond specialty applications such as ready mix, precast, and shotcrete. Whitemud's metakaolin pricing also makes it feasible for use in new, evolving concrete technologies that perform as well as or better than conventional concretes. Whitemud is actively developing other applications for its metakaolin. If successful, these may result in significant increases in demand for metakaolin concrete or concrete-equivalents. Additionally, demand for lower-greenhouse-gas-intensive concrete will also benefit the demand for the use of metakaolin. Whitemud's metakaolin sales will be subject to market acceptance and proof of consistent supply. At a production rate of 63,000 t expected to be achieved by 2027, Whitemud's metakaolin would represent a significant proportion of the market as forecast based on the current uses, and this will be necessary to reach the cash flow projections in the PEA.

Freight costs result in approximate delivered prices (depending on distance from the Gollier Creek facility to the customers' facilities) for bulk shipments transported by road (maximum 42 t) as summarized in Table 19-5. Rail transport of bulk shipments via Whitemud's transload facility at Scout Lake offers the opportunity to reduce freight costs and thus the potential to supply customers beyond the neighbouring provinces and in the northern United States.

Table 19-5: Estimated Trucked Delivered Prices to Canadian and Northern U.S. Customers

Destination	Delivered Price (C$/t)
Saskatchewan	280 to 380
Alberta	310 to 480
Manitoba	300 to 400
British Columbia	380 to 550
Ontario	550 to 600
Northern United States	280 to 480

Source: Whitemud 2024
Note: Ranges provided are dependent on distance to the customer

Whitemud estimates that the realizable price for its product will be approximately C$250/t initially, with the possibility for price increases as the product gains market share and greater acceptance. A sale price of C$300/t has been used in cash flow modelling.

20.0 Environmental Studies, Permitting, and Social or Community Impact

This section draws upon content in the 2008 NI 43-101 Technical Report (Scott Wilson RPA 2008a and 2008b), as relevant, with updated information provided where available.

20.1 Environmental Studies and Baseline Setting

Whitemud submitted a Project Proposal for phase I of the Gollier Creek Project in 2006 that included some environmental baseline surveys. Subsequently, studies related to endangered plant and animal species, surface drainage, heritage resources, decommissioning and reclamation plans, and quarry impacts on groundwater were conducted to clarify specific issues. Key baseline information is provided below (Clifton 2006, as cited in Scott Wilson RPA 2008; and Clifton 2007):

20.1.1 Surface water

As outlined in Section 5.0 of this report, Gollier Creek is the main drainage system in the Project area, and Wood Mountain Creek is a second major drainage area in the western part of the Project property. Gollier Creek discharges into Twelve Mile Lake approximately 10 km north of the Project area. Twelve Mile Lake drains into Lynthorpe Creek and then into the Wood River, Thomson Lake, and eventually into Old Wives Lake, a closed basin.

Creek flow is sufficient for livestock watering and domestic uses; however, it is not sufficient for large water demands. The major runoff period is February to April, with occasional summer storm runoff. Water flows are negligible after August.

Whitemud conducts surface water sampling once in June or July at four sampling points, namely Plant Runoff, East Quarry, Fire Reservoir, and Gollier Creek. According to the Water Sampling and Monitoring Plan (Whitemud 2024b), annual environmental reports must be submitted to the regulator in March every year. SLR was provided with the annual reports from 2012 to 2023. The 2024 Annual Environmental Report noted that total dissolved solids (TDS) exceeded the water quality guideline for the East Quarry sample, and TDS, aluminum, iron, manganese, and uranium exceeded the guidelines in the Plant Runoff sample. The report notes that the Plant Runoff dam was almost dry. The guideline was also exceeded for TDS in Gollier Creek, and this was noted to be consistent with previous years, possibly due to low flow (Whitemud, 2023).

The QP recommends consulting a qualified water quality specialist to determine the need for additional monitoring points.

20.1.2 Groundwater

As outlined in Section 5.0 of this report, there is a general northeasterly groundwater gradient toward the Gollier Creek valley, and the water table lies approximately 20 m to 25 m below the surface elevation. Whitemud has a water supply well, screened across the Ravenscrag and Whitemud formations, at the plant site. The nearest domestic water wells are located approximately 1.5 km from the Project area.

Whitemud will initiate bi-annual (spring and fall) groundwater sampling in 2024 at 12 monitoring wells. Additionally, Whitemud has piezometers installed to monitor water levels quarterly. Annual environmental reports are submitted to the regulator in March every year.

20.1.3 Fauna and Flora

The Project lies within the Wood Mountain Plateau Landscape area in the mixed Grassland Ecoregion of the Prairies Ecozone. Vegetation in the Project area primarily consists of rangeland and cropland. Native mixed grass prairie occurs in association with Tertiary quartzites and gravels of the plateaus and gullied lands. Riparian or wetland or marsh areas account for approximately 190 ha of the 1,057 ha surveyed. Clifton (2006) identified six vascular plants in the study area ranked as S3 (rare-uncommon) and one as S2 (rare) as listed in the Saskatchewan Conservation Data Centre database. None of the identified plants were ranked as rare by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

The Project area includes sensitive wildlife habitat (native grassland and riparian/wetland areas). Several rare animal and bird species could potentially occur within the Project area, although only three species were identified: northern leopard frog, prairie falcon, and golden eagle. Of these rare species, only the northern leopard frog was noted as a resident. No nest sites for the prairie falcon or golden eagle were noted. Northern leopard frogs were abundant along Gollier Creek, with both adults and froglets observed throughout the area.

The 2008 NI 43-101 (Scott Wilson RPA 2008) notes that Saskatchewan activity restrictions recommended a setback of 500 m from ponds used by leopard frogs for breeding, living or hibernating when conducting high impact activities such as mining and quarrying. However, special mitigative measures were proposed by WRI and accepted by Saskatchewan Environment. These measures permit the mine to operate within 50 m of the edge of the Gollier Creek valley. The QP understands this buffer zone will be maintained upon mining restart.

The QP recommends consulting a qualified ecologist to determine the need for additional baseline surveys in the expanded footprint areas to check for the presence of northern leopard frogs or other species that may require protection or mitigation measures.

20.1.4 Heritage Resources

Paleontological finds are known to occur in the Rock Creek badlands to the south of the Project site. Specimens of petrified wood have been found on the Project site; however, the site is not considered highly fossiliferous.

Archaeological sites of interest were identified in the surrounding area, but none in the immediate vicinity of the plant site or within the five-year mining area. Additional surveys completed as part of the environmental assessment process identified three sites beyond the five-year mine area. These sites were noted to be assessed as part of the mine progression plan.

The QP recommends consulting a qualified heritage consultant to determine the need for additional baseline surveys in the expanded footprint areas to check for potential heritage resources.

20.2 Environmental Issues

The Project proposal identified several significant negative impacts and mitigation measures (Table 20-1.)

Table 20-1: Significant Negative Environmental Impacts and Mitigation

	Significant Impact	Mitigation
Groundwater	Mine seepage	Modelling and monitoring in advance of quarrying. Ongoing public consultation.
	Water table lowering	As above and well replacement if required.
Aquatic environment	Dust	Ongoing monitoring and dust abatement program.
Terrestrial environment	Disturbance of native grassland	Detailed mapping prior to disturbance. Relocation as needed and reclamation to restore native species.
	Introduction of non-native species	Best practices for reclamation.
	Disturbance of cultivated land	Best practices for reclamation to return land to agricultural production.
	Disturbance of rare plants	Relocation and reclamation as required.
Wildlife	Disturbance of sensitive wildlife habitat; disturbance of native animals	Detailed studies currently underway. Adjust operations to minimize disturbance. Reclaim to restore habitat at earliest possible date.
Air quality	Dust and particulates	Best abatement practices in quarry and plant.
	CO_2 and greenhouse gases (GHG)	Significant GHG reduction for equivalent cement production.
Land use	Modification of topography of quarried land	None planned beyond routine reclamation.
	Disturbance of cultivated land	Minimize active quarry footprint. Reclaim to support agricultural use as soon as practicable after quarrying.
Source: Clifton 2006 as cited in Scott Wilson RPA 2008		

Disturbance of northern leopard frog habitat was not deemed to be a significant impact, however, the purpose of the mitigation measure identified was to avoid critical habitat and provide ongoing monitoring. The QP is not aware of any monitoring aimed at the frog habitat.

According to the Decommissioning and Closure Plan (Clifton 2007), most of the sensitive species were identified within the Gollier Creek valley and neighbouring coulees. Quarrying will affect several coulees, however, with the implementation of guidelines that minimize disturbance of the valley and the reclaim the coulees, potential impact is considered to be minimal. The report further states that the impact of the project on vegetation and wildlife was specifically discussed with Saskatchewan Ministry of Environment and guidance was received on appropriate mitigation measures for several species. These mitigation measures were to be incorporated into quarrying and reclamation plans for the Project. The QP understands that this includes measures to protect the northern leopard frog.

The following positive impacts were identified (Clifton 2006 as cited in Scott Wilson RPA 2008):

- Creation of local ponds on upland
- Reduction in net CO_2 and greenhouse gases (GHG) generated from cement production
- Provision of employment in community
- Support of local and regional businesses and institutions
- Improvements to transportation infrastructure

A new environmental assessment has not been required for the mine restart, however, the QP recommends that an environmental and social risk assessment be conducted considering restart activities and the expanded footprint.

Whitemud has an approved Environmental Protection Plan under Industrial Source (air quality) chapter of the Saskatchewan Environmental Code (dated 2021) that includes dispersion modelling to determine the need for ambient monitoring, reporting, routine inspection and maintenance, and emergency and contingency planning. The QP is aware of a Contingency Plan that has been updated periodically, as stated in the annual environmental reports. Whitemud has not been required to report under the National Pollution Release Inventory to date. The 2023 Annual Environment Report indicates that dispersion modelling was conducted as per the Environmental Protection Plan and deemed satisfactory on June 21, 2022, therefore no ambient monitoring is planned.

Whitemud submits annual environmental reports to the Saskatchewan Ministry of Energy and Resources. The reports from 2012 to 2023 indicate that weekly environmental checks were performed throughout each year and there were no spills or issues reported. In addition, these reports indicate that the monitoring systems were efficient and adequate for the site activities (Whitemud 2012-2023).

The Ministry of Environment inspected the site in July 2018 and the mine subsequently implemented the requested actions. These requests were limited to emptying a used oil tote and moving gas cylinders to cages (Whitemud, 2018).

20.3 Project Permitting

Whitemud submitted a Project Proposal for phase I of the Gollier Creek Project in 2006 (Clifton 2006) that was approved by the Environmental Assessment Branch of Saskatchewan Environment under the Saskatchewan *Environmental Assessment Act* and the Canada-Saskatchewan Agreement on Assessment Cooperation. Phase I included the construction of a mine and processing plant. Amendments to the Assessment Approval were noted to be required when the Project proceeds to Phase II and eventually to its maximum projected capacity of 700,000 tpa metakaolin. The QP understands that the processing plant has a capacity of 60,000 tpa, and there are no current plans to increase capacity.

Whitemud holds the following authorizations that the QP understands are valid and apply to mine restart:

- The Gollier Creek Plant Industrial Source Air Quality Environmental Protection Plan was fully accepted by the Saskatchewan Ministry of the Environment on June 21, 2022 (Acceptance of Notification # 10053673).

- Fire Prevention and Emergency Response Plan was approved by the Saskatchewan Ministry of the Environment on November 22, 2023.
- Approval to Operate Pollutant Control Facilities (Approval No. PO24-020) was received on June 13, 2024, and is valid until March 31, 2029.
- Decommissioning and Reclamation Plan was submitted on March 15, 2023 under submission 10059060. The plan was reviewed and commented on by the Ministry of the Environment. The Decommissioning and Reclamation Plan and review of financial assurance are due for resubmission prior to February 16, 2026.
- Updated financial assurance to cover Decommissioning and Reclamation costs was provided to the Province of Saskatchewan on February 16, 2021. Whitemud has confirmed that the financial assurance need only be updated in 2026 when the Decommissioning and Reclamation Plan is updated.

Whitemud confirmed that no amendments are needed to these authorizations, nor are any other authorizations or permits needed to restart mining, however a mine plan must be submitted to the Saskatchewan Ministry of Energy and Resources prior to restart. The QP understands that Whitemud obtains temporary permits as needed for dewatering and any discharges to the environment. These permits will be required prior to mining restart in the flooded pit or when any dewatering activities are planned.

20.4 Water and Waste Management

As described in Section 18.0 of this report, fresh water will be diverted around the Project infrastructure and flow into Gollier Creek. Water management includes (Clifton 2007):

- Plant runoff is contained in a control pond located on the east side of the plant site, where it will settle and be stored. If necessary to maintain active storage volumes, excess water will be pumped to the environment through the diversion channel located south of the pond, however, no routine discharge is planned. Runoff from extreme events will spill into the quarry.
- Water from local runoff and from groundwater seepage enters the quarry. This water is stored in the Quarry Water Management Pond and is either used for dust control or is discharged to the environment via pump. There is no gravity drainage from this facility.
- Local areas outside the quarry watershed have silt curtains that are inspected on a weekly basis during non-winter months to ensure they are intact and remain effective.
- Grey water and sewerage are routed to a septic tank system equipped with an effluent pump-out. The effluent will be trucked to licensed wastewater treatment facilities.

Tailings material is a fine silica sand and contains no adsorbed or bonded constituents that pose an environmental concern (Scott Wilson RPA 2008).

General waste is taken to the Town of Assiniboia landfill.

In addition, process rejects will be placed in the mined out pit, as per Sections 18.6 and 18.7. To maintain stability, water must be removed from the pit prior to placing the bottom lift of sand and spoil. The QP understands that Whitemud obtains dewatering approvals as needed and these are usually temporary approvals.

20.5 Social or Community Requirements

As outlined in Section 5.0, land use surrounding the Project area is agricultural, with mainly grain crops and ranching. The nearest communities are small and lie more than seven kilometres away from the Project area and include Wood Mountain, Scout Lake, and Flintoft. Assiniboia is approximately 25 km from the Project area, with a population of 2,700.

The Project proposal identified significant positive socio-economic impacts on the labour market, local and regional institutions and businesses, and transportation infrastructure. Measures to enhance these positive impacts were noted as on-going consultation with communities and with the municipalities, and Province of Saskatchewan (Clifton 2006 as cited in Scott Wilson RPA 2008). No negative socio-economic impacts were identified.

The QP is not aware of any engagement that Whitemud may have carried out with local communities or stakeholders; Whitemud has indicated that the mine has not been required to do so. The Whitemud annual environmental reports note that no public complaints were received from 2012 to 2023 (Whitemud 2012-2023).

20.6 Mine Closure Requirements

As mentioned in Section 20.3, the mine has an approved Decommissioning and Reclamation Plan (dated 2007) and submitted updated financial assurance to the Province of Saskatchewan in 2021. The Decommissioning and Reclamation Plan and review of financial assurance are due for resubmission prior to February 16, 2026. This plan is conceptual as of the effective date of this Technical Report.

The plan aims to design for decommissioning and incorporate progressive reclamation to return the quarry and plant site to productive cultivated or pastureland, and to eliminate all unacceptable hazards to ensure public safety.

Conceptual decommissioning planning includes (Clifton 2007):

- The quarry will be progressively reclaimed during operations (described in Section 16.0). At closure the highwall slopes will be flattened to a stable angle, covered with topsoil, and seeded. The final turnover cut will remain as a permanent pond, suitable as habitat or for livestock watering. Surface drainage will be routed to the permanent watercourses.
- Other surface infrastructure and equipment such as the processing plant will be removed from site. Building foundations below the ground surface may remain in-situ, however, they will be covered with sufficient growth material to permit the re-establishment of vegetation.
- Vegetative cover, consistent with pre-quarrying land use and vegetation, will be restored to all areas affected by quarrying operations.
- Demolished buildings and other related material will be removed from the site. All pipelines, pumps, and electric gear will be removed for salvage or will be disposed of in the quarry workings.

- All hazardous materials, including fuel, fuel tanks, lubricants, and other petroleum products will be removed from the site and properly disposed of prior to decommissioning the site.
- The land will be returned to private ownership upon acceptance of the decommissioned land by the regulatory agencies. It is anticipated that this process would be initiated on a progressive basis, with land turned back to private ownership as quarrying and reclamation are completed.

21.0 Capital and Operating Costs

21.1 Capital Costs

The capital cost for the modifications to the plant were budgeted at $7 million, with additional development costs since 2021 of $1.6 million. The cash flow model uses a figure of $8.6 million for total project and development costs.

21.2 Operating Costs

Operating costs have been estimated based on seasonal operation, with mining and processing occurring from March to December each year. Staff, operators, and maintenance personnel have been budgeted for on a full time (year-round) basis with maintenance activities taking place during the winter. Employment costs are based on actual costs per the existing operation.

21.2.1 Mining Costs

Mining is assumed to be carried out by a contract miner. For the PEA, the mining costs are based on quotes for hourly machine usage rates from a local contractor and estimated utilizations required to move planned volumes of material. In 2024, there is sufficient material in the stockpile (approximately 50,000 t) to meet the processing needs. Rehandling will involve a dozer, excavator, and a haul truck to move stockpiled material to the crusher feed bin, as well as to haul sand back to the mine. The cost has been estimated using hourly rates for each machine.

Stripping and mining will commence in 2025, and costs are based on the use of an excavator, front-end loader, two bulldozers, a grader, and five haul trucks (40 t capacity). Sand removal back to the mine will require a haul truck, however, productivity for sand removal may be improved by having the kaolin haulage and sand removal shared by the mining haul trucks.

Reclamation of mined out areas is included as a capital cost in the annual costs in the cash flow model from 2025.

A summary of the annual mining costs is presented in Table 21-1.

Table 21-1: Summary of Annual Mining Costs

	2024 ($000)	2025 ($000)	2026 ($000)	2027 to LOM ($/a 000)
Stockpile Rehandle	320			
Mining		3,730	3,342	4,092
Sand Haulage to Mine	240	360	504	864
Total	**560**	**4,090**	**3,846**	**4,956**

21.2.2 Processing Costs

Processing costs were developed by Whitemud based on current and forecast labour rates for personnel currently employed at the Project and those expected to be employed as the Project ramps up production, current electricity and natural gas prices and forecast usage and consumption, forecast maintenance materials based on historical requirements and current costs, and forecast mobile equipment needs and usage. A summary of the annual processing costs is presented in Table 21-2.

Table 21-2: Summary of Annual Processing Costs

	2024 ($000)	2025 ($000)	2026 ($000)	2027 to LOM ($/a 000)
Labour and Supervision	413	708	935	1,176
Maintenance Materials	230	342	467	733
Mobile Equipment	73	108	112	115
Consumables	635	1,039	1,548	2,655
Electricity	295	492	604	864
Total	**1,646**	**2,689**	**3,667**	**5,542**
Note: Numbers may not add due to rounding				

21.2.2.1 Labour

Operations for 2024 and 2025 are based on two shifts working seven days on and seven days off; the process plant would be shut down every second week. In 2026, an additional shift may be added to allow for increased processing time. From 2027 onwards, processing will be continuous during the operating season and will involve four shifts. Each shift will include one supervisor and one operator, with maintenance personnel working Monday to Friday on day shift only and breakdowns handled on a call-out basis (where the supervisor and operator are not able to conduct repairs themselves).

Maintenance personnel will include a maintenance manager, two mechanics, and one electrician.

21.2.2.2 Maintenance Materials

Maintenance costs (replacement parts) have been estimated based on quantities of maintenance materials required during the 2012 operations with costs adjusted for inflation. The rotary calciner and cooler have been removed from the flowsheet and replaced by estimated costs for the flash calciner maintenance.

21.2.2.3 Mobile Equipment

Mobile equipment required includes a skid steer, front end loader, telehandler, and two light trucks, and costs for these are conceptual.

21.2.2.4 Consumables

Consumables will include diesel (for plant mobile equipment), gasoline (for light trucks), and natural gas (for the calciner burner, drying kiln trim burner, and heating for the administration and laboratory buildings totalling 30 GJ/h, limited by supply pressure), as well as oils and lubricants. The use of natural gas incurs a carbon tax, which has been included in the cost for the gas supply.

No chemicals are used in the process and there are no additional reagent costs.

21.2.2.5 Electricity

The process plant will draw approximately one megawatt on average while running. Electricity consumption when the plant is not running will be approximately 30 kW to 40kW.

Electricity is supplied from the local grid by SaskPower and is largely generated by coal-fired power stations. Therefore, electricity consumption also incurs a carbon tax, which has been included in the electricity cost build-up.

21.2.3 General and Administrative Costs

General and administrative costs (G&A) include:

- Site management (site manager, maintenance manager, and technical support staff)
- Insurance
- Property taxes
- Mineral leases
- Communications (phone, internet)
- Accounting services
- Information technology services and equipment
- Janitorial services (contracted).

A summary of annual G&A costs is presented in Table 21-3.

Table 21-3: Summary of Annual G&A Costs

	2024 ($000)	2025 ($000)	2026 ($000)	2027 to LOM ($/a 000)
Total	**838**	**1,129**	**1,154**	**1,179**

21.2.4 Royalties

Royalties (payable to the Province) have been included at 5% of net cash flow after capital recovery. Capital recovery is considered to have occurred once the royalty payer has recovered 150% of its initial costs of exploration and development. Pre-production expenses eligible for inclusion in the capital recovery bank include exploration expenditures in the 10 year period prior to commercial production and expenditures on the design, development, and construction of the production unit. Whitemud has estimated the approximate capital recovery to be $12.9 million (project cost of $7.6 million plus development costs since 2021 of $1 million * 150%).

22.0 Economic Analysis

The economic analysis presented in this Technical Report contains forward-looking information regarding Mineral Resource estimates, commodity prices, exchange rates, proposed production plans, projected mining and metallurgical recoveries, costs, and Project schedule aspects.

This Technical Report is considered by the QP to meet the requirements of a Preliminary Economic Assessment as defined in Canadian NI 43-101 regulations. The economic analysis contained in this Technical Report is preliminary in nature. There is currently limited test work available to determine reliable product yield estimates and therefore there is no certainty that economic forecasts on which this Preliminary Economic Assessment is based will be realized.

The economic analysis of the Project was carried out using a discounted cash flow approach on a pre-tax and after-tax basis, based on a sales price for metakaolin of C$250/t in 2024, gradually increasing to C$300/t in 2029 and cost estimates prepared in Canadian currency.

An exchange rate of 0.74 United States dollars (USD) per 1.00 Canadian dollar (CAD) was assumed to convert CAD market price projections and particular components of the cost estimates into CAD.

The QP notes that all costs presented in this report for the first quarter 2024 are expressed in CAD. Year 1 of Commercial Production started January 1, 2024.

The internal rate of return (IRR) on total investment that is presented in the economic analysis was calculated assuming 100% equity financing.

The net present value (NPV) was calculated from the cash flow generated by the Project, based on a discount rate of 10%.

An after-tax sensitivity analysis has been performed to assess the impact of variations in the Project's economic assumptions, i.e., exchange rate, metakaolin sales price, head grade, process yield, and operating costs.

22.1 Economic Criteria

22.1.1 Physicals

- Project Life:
  - 30 years of commercial production
  - One year of stockpile processing and 29 years of open pit mining
- Open pit mining operations
  - LOM Total Mined: 29.409 Mt
  - LOM Total Plant Feed Produced: 8.40 Mt
  - Strip Ratio: 2.5 (waste:plant feed)
  - Peak Mining Rate (all materials): 1.5 million tonnes per annum (Mtpa)
- Processing
  - Annual Processing Rate: 300 thousand tonnes per year (ktpa)
  - LOM Total Plant Feed: 8.45 Mt at 43% of -44 µm

- LOM Contained Kaolin: 3.63 Mt
- LOM Average metakaolin yield: 19.7%
- LOM metakaolin produced: 1.664 Mt

22.1.2 Revenue

- For this economic analysis, revenue is estimated based on a base metakaolin sales price of C$250/t with a gradual increase to C$300/t by 2029
- LOM net revenue totals $494 million.
- 5% Royalty of net profit paid to the Government of Saskatchewan after recovery of 150% of capital cost (allowable capital is estimated by Whitemud to be C$8.6 million).

22.1.3 Capital Costs

- Total project capital costs: $8.6 million.

22.1.4 Sustaining Capital, Reclamation and Closure

Table 22-1: Sustaining, Reclamation, and Closure Capital Cost Estimate Summary

Area	Cost (C$M)
Reclamation	14.4
Salvage	(1.5)
Closure	2.0
Total Sustaining, Reclamation, and Closure Capital	**14.9**

22.1.5 Operating Costs

Table 22-2: Total Operating Costs over Life of Project

Cost Area	Total (C$M)	Unit Cost (C$/t of processed feed)	Percent of total
Open Pit Mining	142.9	16.91	42.6
Processing	157.6	18.65	47.0
General & Administrative	35.0	4.14	10.4
Total	**335.5**	**39.70**	**100.0**

22.1.6 Taxation

- Income tax is payable to the Federal Government of Canada, pursuant to the *Income Tax Act (*Canada). The applicable Federal income tax rate is 15% of taxable income.

- Income tax is payable to the Province of Saskatchewan at a tax rate of 12% of taxable income.
- LOM total taxes paid is approximately $24.97 million.
- Whitemud has accrued tax credits that have not been applied to this cash flow.

22.1.7 Exclusions

The economic analysis does not consider the following components:

- Escalation or inflation over the LOM.
- Financing costs.
- Corporate overhead costs.
- An after-tax cash flow summary is presented in Table 22-3. All costs are presented in Q3 2024 C$ thousands.

22.2 Cash Flow Analysis

The Project's cash flow results have been determined using the discounted cash flow method by considering annual processed tonnages, head grades of plant feed material, metakaolin yield, metakaolin sales price, operating costs, capital expenditures, and royalties.

The discount rate used in this Technical Report is 10%.

22.2.1 Results

- The Project's after-tax NPV at a 10% discount rate is C$10.0 million.
- The Project's after-tax IRR is 20%.
- The LOM average cash cost of metakaolin production is $201.60/t, derived from mining, processing, on-site G&A, royalties, and other owner's costs.

Table 22-3: Cash Flow Summary

Summary Cash Flow	Units	Total LOM
Production		
LOM	years	30
Material Moved	**‘000 tonnes**	**29,409**
Process Plant Feed	**‘000 tonnes**	**8,451**
-44 µm grade	%	42.9
Metakaolin Production	**‘000 tonnes**	**1,664**
Yield	%/t processed	19.7
Metakaolin Price		
LOM weighted average	C$/t	297
Cash Flow		
Gross Revenue	C$ '000	494,012
Royalties	C$ '000	(6,246)
Operating Costs		
Mining Costs	C$ '000	(142,937)
Processing Costs	C$ '000	(157,625)
G&A	C$ '000	(34,965)
Operating Cash Flow	C$ '000	158,485
Capital Costs		
Capital Costs	C$ '000	(8,600)
Reclamation & Closure	C$ '000	(14,853)
Depreciation	C$ '000	(7,000)
Pre-Tax Net Cash Flow	**C$ '000**	**86,695**
Taxes - Income Tax	C$ '000	(24,974)
Taxes - Property, Carbon	C$ '000	(42,091)
After-Tax Cashflow	**C$ '000**	**61,721**
Project Economics		
After-Tax IRR	**%**	**20**
After-Tax NPV at 10%	**C$ '000**	**19,984**

22.2.2 Sensitivity Analysis

Project risks can be identified in both economic and non-economic terms. Key economic risks were examined by running cash flow sensitivities on the following variables and examining the impact on the Project’s after-tax NPV and IRR:

- LOM Metakaolin yield
- LOM Metakaolin sales price
- LOM Capital cost
- LOM Operating cost

The results of the sensitivity analysis are summarized in Table 22-4.

Table 22-4: After-tax NPV and IRR Sensitivity Results

	Metakaolin Yield (% of feed tonnage)	**After-tax NPV at 10% (C$ thousand)**	**IRR (%)**
0.80	15.8%	($8,705)	N/A
0.90	17.7%	$896	11%
1.00	19.7%	$9,984	20%
1.03	20.2%	$12,273	22%
1.05	20.7%	$14,384	24%
	Metakaolin Price	**After-tax NPV at 10%**	**IRR**
	(C$/tonne)	**(C$ thousand)**	**(%)**
0.80	$237	($8,705)	N/A
0.90	$267	$896	N/A
1.00	$297	$9,984	-3%
1.10	$327	$18,653	9%
1.20	$356	$27,772	16%
	LOM Capital Cost	**After-tax NPV at 10%**	**IRR**
	(C$ thousand)	**(C$ thousand)**	**(%)**
0.85	$19,935	$11,449	23%
0.93	$21,694	$10,716	21%
1.00	$23,453	$9,984	20%
1.18	$27,558	$8,275	18%
1.35	$31,662	$6,677	16%
	LOM Operating Cost	**After-tax NPV at 10%**	**IRR**
	(C$ thousand)	**(C$ thousand)**	**(%)**
0.85	$285,198	$19,185	29%
0.93	$310,363	$14,359	24%
1.00	$335,527	$9,984	20%
1.18	$394,244	($1,343)	8%
1.35	$452,962	($13,569)	N/A

23.0 Adjacent Properties

There are no adjacent properties to report in this section.

24.0 Other Relevant Data and Information

No additional information or explanation is necessary to make this Technical Report understandable and not misleading.

25.0 Interpretation and Conclusions

25.1 Main Conclusions

- Whitemud holds valid environmental authorizations that apply to mine restart.
- Mining is planned to re-commence in 2025. Prior to that, stockpiled material left over from previous operations will be used to feed the processing plant
- Modifications to address the processing plant's inefficiencies that were partly responsible for the shutdown of operations in 2012 began in December 2023 and are scheduled to be completed in H2 of 2024.
- The actual metakaolin yield for the project will be determined once the commercial plant has been commissioned and has achieved stable, consistent operation. The uncertainty concerning yield is a key risk for the project's economic viability.
- The North American market for metakaolin has been forecast to grow from 134,960 t in 2024 to 148,776 t in 2029. At a forecast production rate increasing to 63,000 tpa in 2027, Whitemud's metakaolin would make up a significant proportion of the forecast market for SCMs based on current, known uses. Additional marketing information provided suggests that there may be significant opportunity to grow the market for metakaolin as an SCM, and this will be necessary to reach the cash flow projections in the PEA.
- For cash flow modelling, revenue has been estimated using a base metakaolin sales price of C$250/t (the actual price of recent sales of Whitemud metakaolin remaining from 2012 operations) with a gradual increase to C$300/t by 2029.
- The Project's after-tax NPV at a 10% discount rate is C$12.0 million.
- The Project's after-tax IRR is 22%.

25.2 Geology and Mineral Resources

- Kaolinized sediments contained within the Whitemud formation have been outlined by 225 drill holes completed by both Whitemud and previous owners over an area measuring approximately 11.5 km in an east-west direction and 9.0 km in a north-south direction.
- Considering the strata bound nature of this type of mineral deposit, a simple geological model was created for the Whitemud formation using surfaces representing the top and bottom of the KSG formation to code the block model.
- Mining activities were carried out in 2008, however, no detailed information is available describing the volume that was excavated. SLR prepared an estimated perimeter boundary line representing the approximate crest of the mined out area. An allowance was coded into the block model to reflect the approximate location of the mined out area.
- An in-situ bulk specific gravity of 2.01 tonnes per cubic metre (t/m^3) for both overburden and kaolinized material has been assumed based on a 15% moisture content.
- Two block models were constructed to model the Mineral Resources present in the Gollier Creek area. The first block model, initially constructed in 2006, and updated in 2024, covers the Mineral Resources present in the West Pit, North Pit, and East Pit deposits. A second overlapping block model was created to cover the Mineral

Resources present in the West Extension of West Pit, Elm Spring, and East Pit Bridge deposits.

- The Mineral Resources are outlined over an area measuring approximately 5.1 km in an east-west direction and 4.9 km in a north-south direction. The Mineral Resources are contained within seven areas located in the Gollier Creek area. They are classified into either the Measured, Indicated, or Inferred Mineral Resource categories on the basis of the drill hole spacing. Mineral Resources are reported within manually created open pit outlines for all remaining material outlined by drill hole data present beyond an approximation of a 50 metre (m) stand off buffer distance from the crest of Gollier Creek.
- Mineral Resource grades represent the weight fraction of all material contained within the -44 micrometre (µm) size fraction, which includes a mixture of kaolin and quartz. Preliminary studies indicate that kaolinite accounts for approximately 20% to as high as 60% of the mineral mass, with a typical average of approximately 40%. Past mining and processing activities have shown that a final product can be produced and sold from this material.
- Measured Mineral Resources comprise approximately 19.5 million tonnes (Mt) at an average grade of 39.8% -44 µm and Indicated Mineral Resources comprise approximately 53.8 Mt at an average grade of 41.4% -44 µm, for a Measured and Indicated total of approximately 73.3 Mt at an average grade of 41.0% -44 µm. Inferred Mineral Resources are estimated to total approximately 58.6 Mt at an average grade of 43.6 % -44 µm.

25.3 Mining and Mineral Reserves

- Mineral Inventory was reported by resource classification. Measured and Indicated Resource classifications were considered as Mineral Inventory and included within the LOM schedule. Mine designs were carried out in the West Pit to provide sufficient feed for approximately 30 years. The Mineral Inventory reported for the LOM plan is 8.4 Mt at 42.9% passing -44 µm kaolin.
- The Project has ample Mineral Resources to support a long-life operation of more than 100 years at proposed production rates.
- An overall slope angle of 45 degrees (1:1) was assumed in the design the ultimate pits as there is no geotechnical information available.
- Mining will be carried out by contractors with a small fleet of 40 t trucks and typical mining excavators.
- There are currently no Mineral Reserves for the Project. Additional operational information is required to confirm the expected product yields and overall economic viability of the Project. It is expected that Whitemud will complete the plant updates in 2024 after which this information will be available in order to determine the economic viability and declare Mineral Reserves.

25.4 Mineral Processing

- Several test work programs were conducted in 2006 and 2007 prior to design and construction of the processing facility. The programs were designed to evaluate different process options and provide base data for engineering design. Test material was obtained from kaolin stockpiles at the Gollier Creek deposit that were excavated by Ekaton Resources Ltd. (Ekaton) in 1987.

- After completion of construction, the processing plant operated intermittently from 2008 to 2010, and again in 2012 for approximately three months after which the facility was closed. The economics of the operation were challenging due to inefficiencies in the processing plant. The most significant issues were a large recirculating load of metakaolin from the rotary calciner returning to the dryer that severely restricted the feed rate of new feed to the dryer, and low yield caused by low dry kaolin capture at the discharge end of the dryer.
- Modifications to address the facility’s bottlenecks, primarily intended to eliminate the recirculating load from the calciner to the dryer as well as to improve dry kaolin capture from the rotary dryer, began in December 2023. The rotary calciner and cooler will be replaced with a flash calciner, baghouse, and ancillary equipment, and modifications have been made to the discharge end of the rotary dryer.
- Flash calcining pilot test work completed in 2023 showed that metakaolin could be produced successfully by flash calcining and provided information to complete the design of the commercial flash calciner.
- Test runs of the rotary dryer in 2023 indicated that modifications to the discharge end of the rotary dryer resulted in improved kaolin capture. Successful tests resulted in kaolin capture through the dryer ranging from 17.4% to 19.9%. Further improvement by optimizing the discharge configuration of the dryer may be required to maximize kaolin capture.
- Installation of a bag house to capture all of the metakaolin from the flash calciner will eliminate the circulating load from the calciner to the rotary dryer that occurred during the 2008 to 2012 operations and will significantly improve the plant’s throughput capability.
- The actual metakaolin yield for the project will be determined once the commercial plant has been commissioned and has achieved stable, consistent operation with the new flash calciner, bag house, and bulk cooler. The uncertainty concerning yield is a key risk for the project’s economic viability. Whitemud has estimated that metakaolin yield during the intermittent operations from 2008 to 2012 reached approximately 9% per tonne of feed material processed, and while the original design mass balance contemplated a yield of up to approximately 20%, the capability of the processing plant to achieve yields approaching 20% has yet to be proven.
- Similarly, the actual processing rate that the operation will be able to achieve with the modified plant can only be demonstrated after the completion of commissioning and ramp-up of the plant to consistent production levels. While the design processing capacity of the plant is shown in the design criteria as 110 tonnes per hour (tph) of feed material, the throughput is currently limited to approximately 55 tph by the natural gas supply, which would need to be upgraded before the full capacity of the plant can be proven. The economic analysis presented in this report is based on a throughput of 55 tph.

25.5 Infrastructure

- The project is in a semi-arid region where water conservation is critical. Whitemud plans to minimize water consumption and impacts on surface and groundwater. The plant’s dry process requires minimal water, with local groundwater supply expected to meet plant requirements. Fresh water will be diverted around surface facilities, with runoff stored in an existing pond for fire protection and remaining water will be diverted to a temporary storage pond. The existing mined out quarry also serves as additional water storage capacity.

- Three-phase electrical power at 25 kilovolts (kV) for a 2,000 kilovolt-amperes (kVA) demand is available from SaskPower. Whitemud installed electronic soft start controls or variable speed drives for large motors (>100 horsepower (hp)). SaskPower has the capacity to upgrade electrical services for future expansions.
- Energy for drying and calcining is provided by natural gas, which replaced the previous use of coal as the plant's energy source during the 2024 upgrades. Natural gas service at the site is currently sufficient for approximately 50% of the plant's design capacity and the supply pipeline would need to be upgraded for higher production rates.
- Metakaolin product will be shipped by truck to Western Canadian and Northern U.S. customers. A combination of truck and rail will be used for other North American markets.

25.6 Environment

- Whitemud submitted a Project Proposal to the Saskatchewan Ministry of Environment and Resources, and this was approved in 2006. Whitemud completed baseline surveys in support of the Project proposal as well as additional studies related to sensitive plant and animal species, surface drainage, heritage resources, decommissioning and reclamation plans, and quarry impacts on groundwater. No surveys have been conducted for the expanded footprint areas and this has not been requested by regulators to the QP's knowledge.
- Whitemud holds valid environmental authorizations that apply to mine restart. In addition, Whitemud will need to submit a mine plan to the Saskatchewan Ministry of Energy and Resources prior to restart. Dewatering authorizations will be applied for prior to any dewatering activities. Whitemud conducts environmental monitoring on a regular basis and submits annual reports to the Ministry of Environment and Resources.
- The 2006 Project Proposal identified several significant negative environmental impacts and mitigations measures. It would be beneficial for Whitemud to compile an environmental and social management plan which includes these mitigation measures and any requirements of Project approvals and authorizations.
- Whitemud has not engaged with local communities or stakeholders and has indicated that the Project has not been required to do so.
- The Decommissioning and Reclamation Plan (dated 2007) is due for update and resubmission prior to February 16, 2026.

25.7 Marketing

- Metakaolin is used in several applications. The primary application for Whitemud's metakaolin will be as a supplementary cementitious material (SCM) in concrete (e.g. ready mix, precast concrete, and shotcrete).

- The size of the metakaolin market is driven in part by increasing demand for high performance concrete and construction industry growth, while being limited by the availability of SCM additives and substitutes such as fly ash, silica fume, and GGBFS. Fly ash is the most widely used SCM in concrete and is sourced from coal-fired power plants where it is captured from the flue gases that result from the combustion of coal. Silica fume is produced during the carbo-thermic reduction of quartz in the production of silicon metal, and GGBFS is a major discard material produced during the production of iron for steelmaking.
- The production of fly ash is decreasing as the number of coal-fired power plants has been declining due to various factors such as aging coal-fired units, environmental regulations, and competition from natural gas, solar, and wind power plants. Therefore, the sustainable development of the concrete industry will provide opportunities for the growth of the metakaolin market.
- An additional driver for the metakaolin market is the requirement to lower carbon dioxide emissions in the cement industry. By replacing part of the cement in concrete mixtures with metakaolin, the amount of carbon dioxide-intensive cement can be reduced.
- Forecast growth of the North American market for metakaolin has been based on current, known uses. While Whitemud's metakaolin would make up a significant proportion of the forecast market for SCMs, additional considerations suggest that there may be significant opportunity to grow the market for metakaolin as an SCM.

25.8 Capital and Operating Costs

- The capital cost for the modifications to the plant were budgeted at C$7 million, however, it is estimated that the final cost will amount to approximately C$7.5 million to C$7.6 million. The cash flow model uses a capital cost of C$7.6 million.
- The overall operating cost for the Project is estimated to be C$2.8 million in 2024 and C$11.7 million at full production in 2027.
- For 2024, mine operating costs include stockpile rehandling and sand haulage to the mine. Starting in 2025, stockpile rehandling has been removed and mining and reclamation costs were added. The operating cost for mining is estimated to be C$0.4 million in 2024 (stockpile rehandling) and an average of approximately C$5.0 million at full production in 2027. Mining is assumed to be carried out by a contract miner.
- The operating cost for processing is estimated to be C$1.6 million in 2024 and C$5.5 million at full production in 2027.
- The general and administrative costs are estimated to be $838,000 in 2024 and C$1,179,000 at full production in 2027 through the LOM.

25.9 Risks

- Processing throughput and yield in the historical operation were uneconomically low. Significant improvement in both throughput and yield are necessary to make the operation economically viable. While modifications have been made to the processing plant to address the identified causes of low throughput and yield, the real effect of these modifications must still be proven.

- Insufficient dewatering poses a risk to mine operations. The mined out pit from 2012 is currently flooded and it is not clear whether the source of water is from the ground or from precipitation. Further hydrological assessments should be undertaken to better understand the hydrology in the area.
- The leopard frog habitat and breeding areas are not currently well understood. Further studies should be undertaken in order to understand which areas will require standoffs for mining.
- Whitemud's current permit P024-020 states: *An operations setback restriction from Gollier Creek and associated wetlands are required between April 1st to October 31st.* The QP understands that the current activity is limited to 50 m from these areas. A full survey identifying these limits is required in order to accurately estimate the offsets from these areas as these could impact the current Mineral Resource estimate as well as any future Mineral Reserves estimates.
- Whitemud's metakaolin production will make up a significant proportion of the forecast North American market size by 2027 based on current and known uses, and there is a risk that the market will not be able to absorb Whitemud's production if sufficient effort is not made to grow the market. The following mitigatory information should be considered:
  - Pricing of metakaolin from Georgia has historically been more than double or triple the price of commonly used SCMs such as fly ash, limiting the use of metakaolin as an SCM. Therefore, it is typically being used in specialty applications only, which greatly limits consumption. Whitemud's metakaolin pricing is closer to that of fly ash, which will provide opportunities for increased demand.
  - The cost of fly ash has risen from US$100/t to more than US$200/t in the past 10 years due to lack of supply and reprocessing costs, as suppliers are now mining fly ash, and grinding and drying it to make their products. This has resulted in more demand for alternative SCMs like metakaolin that haven't been accounted for in marketing forecasts.
  - The cost of cement has increased to the point where the use of metakaolin is more cost effective then cement. At 10% replacement of cement in concrete, with equivalent or better performance than unmodified concrete, metakaolin becomes viable to use in all concrete.
  - Global pressure for more environmentally friendly cements should encourage the use of lower-green-house-gas-intensive SCMs such as Whitemud's metakaolin.
  - Whitemud is actively developing other applications for its metakaolin. If successful, these may result in significant increases in demand for metakaolin concrete or concrete-equivalents.
- The economic analysis contained in this Technical Report is preliminary in nature. There is currently limited test work available to determine reliable product yield estimates and therefore there is no certainty that economic forecasts on which this PEA is based will be realized.

26.0 Recommendations

26.1 Geology and Mineral Resources

1 Review location and elevation of drill holes relative to LIDAR topographic surface.

2 Carry out a detailed survey pick up of the mined out volume of the open pit when conditions permit.

26.2 Mining and Mineral Reserves

1 Mineral Reserves could not be stated due to a lack of clarity in process recovery factors. Once the process recovery factors are understood, an estimation of Mineral Reserves should be carried out. A detailed mine plan should be carried out as part of any future Mineral Reserve estimations.

2 Further analysis should be done on a mining cut-off grade to optimize plant feed and product tonnes production.

3 A dewatering plan will be necessary to follow the LOM plan to ensure that mined out areas remain dry. Excess water in operating areas will pose serious challenges to carrying out an efficient mining operation.

4 An owner-operated mining scenario should be investigated in order to reduce mine operating costs.

5 Maintain accurate records of tonnage and grades in the stockpile area. The current stockpile should be surveyed and assayed to determine tonnes and grade.

26.3 Mineral Processing

1 Initiate and maintain accurate production logs containing sufficient detail to allow for auditable assessment of throughput, metakaolin yield, plant utilization, and operating costs. Logging of the data should be initiated during commissioning and continue through the ramp-up phase and regular production. The data should include daily crusher feed grade and tonnage, and hourly production data such as dryer feed rate and metakaolin produced, metakaolin product analysis, and downtime recording and analysis. The data should include daily and monthly summaries.

26.4 Infrastructure

1 Upgrade the telecommunications to allow for better cellular service and high-speed internet.

26.5 Environment

1 Consult with qualified subject matter experts to determine the need for additional baseline surveys and additional water monitoring points for expanded footprint areas to determine if additional mitigation is required.

2 The QP understands that Whitemud will maintain buffer zones to minimize impacts on Northern leopard frogs agreed upon with the Ministry of Environment and Resources, and as per current Project authorization conditions. Whitemud should identify these areas using surveys in order to have a digital record of the buffer zone.

3 Conduct an environmental and social risk assessment to consider restart activities and the expanded footprint. This could be done in-house, and subject matter experts could be consulted if deemed necessary. This is aimed at ensuring the operation is managed responsibly and any new risks and impacts can be mitigated.

4 Compile an environmental and social management plan which includes all the mitigation measures from the Project proposal as well as conditions related to Project approvals and authorisations. This will allow the mine to track compliance with these requirements.

5 The Project proposal identified measures to enhance positive socio-economic impacts which included consultation with communities and with the municipalities and Province of Saskatchewan. Consider implementing consultation activities to comply with the mitigation measure.

6 Obtain approval of the mine plan prior to restart and ensure all environmental approvals and permits remain valid for all planned activities and infrastructure, including any temporary approvals that may be needed for dewatering and potential discharge of excess water to the environment.

7 Update the Decommissioning and Closure Plan and the financial provision as required.

27.0 References

Byers, P.N. 1969. Mineralogy and the Origin of the Upper Eastend and Whitemud Formations of South-central and Southwestern Saskatchewan and Southeastern Alberta; Canadian Journal of earth Sciences, Vol. 6, pp. 317-334.

Canadian Institute of Mining, Metallurgy and Petroleum (CIM). 2014. CIM Definition Standards for Mineral Resources and Mineral Reserves, adopted by the CIM Council on May 10, 2014.

Clifton Associates Ltd. 2007. Reclamation and Decommissioning Plan - Old Post Kaolin Project Wood Mountain, Saskatchewan. Whitemud Resources Inc. File R3762 .7 15 March 2007

Clifton Associates Ltd. 2006. Project Proposal, Old Post Quarry & Processing Plant Near Wood Mountain, SK; File R3762, 19 April 2006; prepared for Whitemud Resources Inc.

Fraser, F.J., McLearn, F.H., Russell, L.S., Warren, P.S. and Wickenden, R.T.D. 1935. Geology of Southern Saskatchewan; Canada department of Mines, Geological Survey Memoir 176, 176 p., map 276A and sections.

Government of Saskatchewan, 2024. Quarry Disposition Searchbook. Website visited on April 26, 2024 at Quarry%2BSearchbook_20240401.xls (live.com)

Maia Research, 2024, North America Metakaolin Industry Market Research Report, prepared for Whitemud Resources, May 2024.

Master, P.P. 1985. Kaolinized Sediments of the Whitemud Formation at Wood Mountain, Saskatchewan. Report on work completed 1985 & 1986, Prospecting permits 1 to 9, Prospecting Permits 12 & 13; Ekatron Energy Limited, Calgary, AB.

Master, P.P. 1987, Evolution and Geology of Kaolinized Sediments, Wood Mountain Saskatchewan, in Economic Minerals of Saskatchewan, Special Publication No. 8 p. 166-181; C.F. Riley and L.W. Vigrass eds: Saskatchewan Geological Society, Regina, SK.

Scott Wilson RPA. 2006a. Technical Report on Gollier Creek Kaolin Project Wood Mountain, Saskatchewan, Volume 1. Prepared by Scott Wilson Roscoe Postle Associates Inc. Available from the SEDAR+ website at https://www.sedarplus.ca/csa-party/records/document.html?id=1152258c6e0b65aa533733a60ecbb794a8ef229226075162863650ea6f400390

Scott Wilson RPA. 2006b. Technical Report on Gollier Creek Kaolin Project Wood Mountain, Saskatchewan, Volume 2. Prepared by Scott Wilson Roscoe Postle Associates Inc. Available from the SEDAR+ website at https://www.sedarplus.ca/csa-party/records/document.html?id=1eb4ffdcb5f24559a0c842cccbb7409a5b1ff446ad1279ea0f62c261b6564403

Scott Wilson RPA. 2008a. Technical Report on Gollier Creek Kaolin Project Wood Mountain, Saskatchewan, Volume 1. Prepared by Scott Wilson Roscoe Postle Associates Inc. Available from the SEDAR+ website at https://www.sedarplus.ca/csa-party/records/document.html?id=280d7d031b1be1fe4683344cb5894bba1dbaab8650cdf00aceb7a0c8be248b95

Scott Wilson RPA. 2008b. Technical Report on Gollier Creek Kaolin Project Wood Mountain, Saskatchewan, Volume 2. Prepared by Scott Wilson Roscoe Postle Associates Inc.

Available from the SEDAR+ website at https://www.sedarplus.ca/csa-party/records/document.html?id=ed7a8a66e81620a603b834f35fdf4e2c4ea9dcff5c3df7bb47ab39b8ef9cc98d

Whitaker, S.H. 1965. Geology of the Wood Mountain area (72G), unpublished Ph.D. thesis, University of Illinois, Urbana, Ill.

Whitemud. 2024a. Environmental Benefits, ESG (whitemudresources.com). (Accessed August 2024)

Whitemud. 2024b: Water Sampling and Monitoring Plan. May 24, 2024.

Whitemud. 2012-2023: Annual Environmental Reports.

Whitemud. 2024c. Memorandum on Mining Royalties, September 24, 2024

28.0 Date and Signature Date

This report titled "NI 43-101 Technical Report for the Preliminary Economic Assessment of the Wood Mountain Project, Saskatchewan" with an effective date of August 21, 2024 was prepared and signed by the following authors:

(Signed & Sealed) ***Ian Weir***

Dated at Toronto, ON
September 27, 2024

Ian Weir, P.Eng.

(Signed & Sealed) ***Lance Engelbrecht***

Dated at Toronto, ON
September 27, 2024

Lance Engelbrecht, P.Eng.

(Signed & Sealed) ***Derek Riehm***

Dated at Toronto, ON
September 27, 2024

Derek Riehm, P.Eng., M.A.Sc.

(Signed & Sealed) ***Reno Pressacco***

Dated at Toronto, ON
September 27, 2024

Reno Pressacco, P.Geo.

29.0 Certificate of Qualified Person

29.1 Ian Weir

I, Ian Weir, P.Eng., as an author of this report entitled "NI 43-101 Technical Report on the Preliminary Economic Assessment of the Wood Mountain Project, Saskatchewan" with an effective date of August 21, 2024 prepared for Whitemud Resources Inc., do hereby certify that:

1. I am Principal Mining Engineer with SLR Consulting (Canada) Ltd, of Suite 501, 55 University Ave., Toronto, ON M5J 2H7.
2. I am a graduate of Queen's University, Kingston, Ontario, in 2004 with a Bachelor of Science (Applied) degree in Mining Engineering.
3. I am registered as a Professional Engineer in the Province of Ontario (Reg.# 100143218). I have worked as a mining engineer for a total of 15 years since my graduation. My relevant experience for the purpose of the Technical Report is:
   - Open pit operational experience including supervision of mine development at a copper mine in Chile from the pre-stripping phase to a fully operational mine.
   - Review and report as a consultant on open pit mining projects and operations in Canada and around the world for studies, audits, due diligence, and regulatory requirements.
   - Engineering study work (PEA, PFS, and FS) on many mining projects around the world, including commodities such as precious metals, base metals, bulk commodities, industrial minerals, and rare earths.
   - Project cash flow modelling and economic analysis.
4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
5. I visited the Wood Mountain Project on May 9, 2024.
6. I am responsible for overall preparation of the report, and specifically Sections 4.4, 12.2, 15, 16, 21.2.1, and 22, and related disclosure in Sections 1, 25, 26, and 27 of the Technical Report.
7. I am independent of the Issuer applying the test set out in Section 1.5 of NI 43-101.
8. I have had no prior involvement with the property that is the subject of the Technical Report.
9. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.
10. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 27th day of September, 2024

(Signed & Sealed) *Ian Weir*

Ian Weir, P.Eng.

29.2 Lance Engelbrecht

I, Lance Engelbrecht, P.Eng., as an author of this report entitled “NI 43-101 Technical Report on the Preliminary Economic Assessment of the Wood Mountain Project, Saskatchewan” with an effective date of August 21, 2024 prepared for Whitemud Resources Inc., do hereby certify that:

1. I am Technical Manager – Metallurgy and Principal Metallurgist with SLR Consulting (Canada) Ltd, of Suite 501, 55 University Ave., Toronto, ON M5J 2H7.
2. I am a graduate of the University of the Witwatersrand, Johannesburg, South Africa in 1992 with a Bachelor of Science degree in Engineering, Metallurgy and Materials (Mineral Processing Option).
3. I am registered as a Professional Engineer in the Provinces of Ontario (Reg.# 100540095) and Newfoundland and Labrador (Reg.# 10730). I have worked as a metallurgist for a total of 30 years since my graduation. My relevant experience for the purpose of the Technical Report is:
   - Review and report as a metallurgical consultant on numerous mining operations and projects for due diligence and regulatory requirements.
   - Preparation of conceptual, prefeasibility, and feasibility studies for projects around the world including for precious metals, base metals, and rare earths, as well as test work interpretation, recommendations, and supervision.
   - Management and operational experience at Canadian and international milling, smelting, and refining operations.
4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
5. I visited the Wood Mountain Project on May 9, 2024.
6. I am responsible for Sections 2, 3, 12.3, 13, 17, 18, 19, 21.1, 21.2.2, 21.2.3, 21.2.4, 23, 24 and related disclosure in Sections 1, 25, 26, and 27 of the Technical Report.
7. I am independent of the Issuer applying the test set out in Section 1.5 of NI 43-101.
8. I have had no prior involvement with the property that is the subject of the Technical Report.
9. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.
10. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the sections in the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 27th day of September, 2024

(Signed & Sealed) ***Lance Engelbrecht***

Lance Engelbrecht, P.Eng.

29.3 Derek J. Riehm

I, Derek J. Riehm, M.A.Sc., P.Eng., as an author of this report entitled “NI 43-101 Technical Report on the Preliminary Economic Assessment of the Wood Mountain Project, Saskatchewan” with an effective date of August 21, 2024 prepared for Whitemud Resources Inc., do hereby certify that:

1. I am a Principal Consultant with SLR Consulting (Canada) Ltd., of Suite 501, 55 University Ave., Toronto, ON M5J 2H7.
2. I am a graduate of Queen´s University in Kingston, Ontario in 1983 with a Bachelor of Science (Honour’s, First Class) degree in Metallurgical Engineering and of the University of British Columbia in Vancouver, British Columbia, in 1990 with a Master of Science (Applied) degree in Metals and Materials Engineering.
3. I am registered as a Professional Engineer in the Province of British Columbia (Reg.# 21391). I have worked as an engineer and mining executive for 32 years since my graduation. My relevant experience for the purposes of the Technical Report is:
    - Environmental and social impact assessments, due diligence evaluations, audits, and reviews of numerous mineral exploration and mining projects around the world including preparation of relevant sections of NI 43-101 Technical Reports.
    - A senior position with an international consulting firm.
    - Performing as an environmental and social manager and executive for several Canadian mining companies.
4. I have read the definition of “qualified person” set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a “qualified person” for the purposes of NI 43-101.
5. I did not visit the Wood Mountain Project.
6. I am responsible for Sections 20, 12.3, and related disclosure in Sections 1, 25, 26, and 27 of the Technical Report.
7. I am independent of the Issuer applying the test set out in Section 1.5 of NI 43-101.
8. I have had no prior involvement with the property that is the subject of the Technical Report.
9. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.
10. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the sections in the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 27th day of September, 2024

(Signed & Sealed) ***Derek J. Riehm***

Derek J. Riehm, M.A.Sc., P.Eng.

29.4 Reno Pressacco

I, Reno Pressacco, M.Sc.(A).,P.Geo., FGC., as an author of this report entitled “NI 43-101 Technical Report on the Preliminary Economic Assessment of the Wood Mountain Project, Saskatchewan” with an effective date of August 21, 2024 prepared for Whitemud Resources Inc., do hereby certify that:

1. I am an Associate Principal Geologist with SLR Consulting (Canada) Ltd, of Suite 501, 55 University Ave Toronto, ON M5J 2H7.
2. I am a graduate of Cambrian College of Applied Arts and Technology, Sudbury, Ontario, in 1982 with a CET Diploma in Geological Technology, Lake Superior State College, Sault Ste. Marie, Michigan, in 1984, with a B.Sc. degree in Geology and McGill University, Montreal, Québec, in 1986 with a M.Sc.(A) degree in Mineral Exploration.
3. I am registered as a Professional Geologist in the Province of Ontario (Reg. #939). I have worked as a geologist for a total of 38 years since my graduation. My relevant experience for the purpose of the Technical Report is:
   - Preparation, reviews, and reporting as a consultant for Mineral Resource estimates on numerous exploration and mining projects around the world.
   - Numerous assignments in North, Central and South America, Europe, Russia, Armenia, and China for a variety of deposit types and in a variety of geological environments; commodities including Au, Ag, Cu, Zn, Pb, Ni, Mo, U, PGM, REE, and industrial minerals.
   - Vice president positions with Canadian mining companies.
   - Senior positions with international consulting firms.
   - Performing as an exploration, development, and production stage geologist for a number of Canadian mining companies.
   - Preparation of Mineral Resource estimates for open pit and underground mines for the three prior years.
4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
5. I visited the Wood Mountain Project on May 9, 2024.
6. I am responsible for Sections 4.1, 4.2, 4.3, 5, 6, 7, 8, 9, 10, 11, 12.1, 14, and related disclosure in Sections 1, 25, 26, and 27 of the Technical Report.
7. I am independent of the Issuer applying the test set out in Section 1.5 of NI 43-101.
8. I have had no prior involvement with the property that is the subject of the Technical Report.
9. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.
10. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the sections in the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 27th day of September, 2024

(Signed & Sealed) ***Reno Pressacco***

Reno Pressacco, M.Sc.(A)., P.Geo., FGC.

Making Sustainability Happen