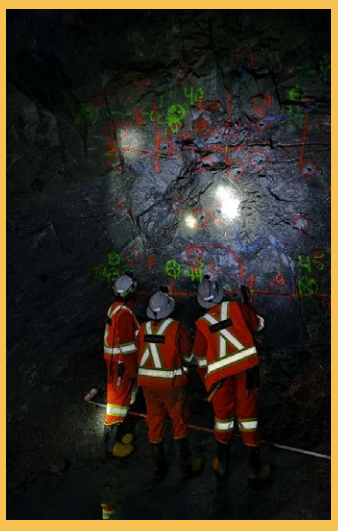
PN3.1 (1 of 2) Environmental Impact Assessment - Volume 1

OSISKO MINING

WINDFALL MINING PROJECT



ENVIRONMENTAL IMPACT ASSESSMENT

Volume 1

MARCH 2023
201-11330-19

wsp

WINDFALL MINING PROJECT

ENVIRONMENTAL IMPACT ASSESSMENT

OSISKO MINING INC.

PROJECT NO.: 201-11330-19
DATE: MARCH 2023

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(The French version of this report constitutes the official version. In case of conflict of interpretation between the English and French versions, the French version prevails.)

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CONCORDANCE TABLES

The following table shows the concordance between the information contained in this Environmental Impact Assessment (EIA) for the Windfall Gold Mining Project and the requirements set out in the *Directive pour le projet le minier Lac Windfall par Minière Osisko Inc* issued by the Ministère de l'Environnement, de la Lutte contre les changements climatiques, de la Faune et des Parcs (MELCCFP)
(ref: 3214-14-059; July 2017 and revised in January 2022 (MELCC, 2022)).

Table of concordance between the elements of the MELCCFP directive and the EIA

MELCCFP Directive Section (MELCC, 2022)		Corresponding Chapter or Section in the EIA
1. CONTEXT	Dans cette section de l'étude d'impact, le promoteur doit exposer les éléments à l'origine de son projet. Elle comprend une courte présentation du promoteur, le contexte d'insertion et la justification du projet.	**Chapter 1:** Section 1.1 Section 1.3 Section 1.4
1.1 Presentation of the promoter	L'étude d'impact devra présenter le promoteur du projet et, s'il y a lieu, ses consultants en spécifiant leurs coordonnées. Cette présentation inclura des renseignements généraux sur ses antécédents en relation avec le projet envisagé, et, le cas échéant, les grands principes de ses politiques en matière d'environnement et de développement durable. L'étude devra identifier la structure administrative de l'entreprise qui permet d'offrir les garanties financières requises lorsque des mesures de restauration environnementale ou de même nature devront être prises.	**Chapter 1** Section 1.1 Section 1.2
1.2 Insertion context	Le promoteur présentera un historique du projet en faisant un rappel des principales étapes qui ont conduit à la définition du projet proposé et devra traiter à ce sujet des différentes phases d'exploration qui y sont liées. Il devra présenter les structures physiques qui sont déjà en place et détailler tous les enjeux environnementaux ou sociaux rencontrés lors des travaux d'exploration. Ensuite, le promoteur identifiera le contexte général d'insertion du projet, les buts visés, les composantes connexes, le calendrier de réalisation et le coût du projet. Il doit préciser si des agrandissements ou des projets subséquents sont prévus, même de façon préliminaire. Il doit aussi préciser si la résiliation d'ententes prises avec des tiers pourrait remettre en question la réalisation ou la santé financière du projet. Finalement, le promoteur doit discuter des événements qui pourraient provoquer un ralentissement ou un arrêt temporaire des opérations, ou encore l'abandon du projet.	**Chapter 1** Section 1.1 Section 1.3 Section 1.4 **Chapter 3** Section 3.8 Section 3.9 **Chapter 4** Section 4.3 Section 4.8 **Chapter 14 - Assessment of the consideration of issues**
1.3 Justification	L'exposé de la raison d'être du projet doit permettre de comprendre les avantages de réaliser le projet dans le contexte actuel ou futur. Le promoteur doit détailler les principales opportunités et contraintes économiques, sociales et environnementales du milieu à l'implantation du projet. Il doit notamment décrire la situation actuelle dans le secteur d'activité et expliquer les besoins motivant le projet. Le cas échéant, cet exposé doit faire état des résultats des consultations publiques effectuées par le promoteur qui pourraient justifier la raison d'être du projet.	**Chapter 1** Section 1.4 **Chapter 4** Section 4.3

MELCCFP Directive Section (MELCC, 2022)		Corresponding Chapter or Section in the EIA
1.4 Acts, regulations, agreements and policies	Le cadre légal d'insertion du projet devra être décrit. Le promoteur devra énumérer les conventions, lois, règlements, politiques et directives applicables à son projet et devra, dans les sections appropriées de son étude d'impact, y faire référence et décrire comment il prévoit s'y conformer. Le promoteur doit indiquer comment son projet rejoint les objectifs et principes des ententes en vigueur sur le territoire Eeyou Istchee Baie-James, la Politique minière de la Nation Crie, ainsi que les orientations de la Stratégie minérale du Québec. Le promoteur doit également démontrer tout au long de son étude d'impact que le projet a été élaboré dans l'esprit du Chapter 22 de la CBJNQ. Le promoteur et leur consultant(s) doivent s'assurer d'une participation importante des Cris dans le cadre du développement et de l'exploitation de son projet. Finalement, le promoteur doit exposer comment son projet prend en considération les orientations relatives au Plan Nord.	**Chapter 1** Section 1.5 Section 1.6 Section 1.7 **Chapters 4, 6, 7, 8, 13**
2. SELECTION OF LOCATION AND TECHNOLOGY ALTERNATIVES		**Chapter 2 - Location and Technology Alternatives**
2.1 Location and alignment alternatives	Le promoteur décrira les différents emplacements considérés pour les infrastructures nécessaires à l'exploitation de la mine, notamment les haldes, les aires d'entreposage, les bassins, l'effluent, etc. (Il est à noter qu'il est toujours préférable de n'avoir qu'un seul effluent final.) Des analyses de variantes détaillées seront également présentées pour la localisation de l'usine, la localisation des parcs à résidus, le mode de gestion des résidus et le transport du minerai et du doré. Dans son analyse des variantes pour la localisation de l'usine, le promoteur devra tenir compte de la proximité d'une sous-station électrique et de la proximité du bassin de travailleurs, mais également de l'ensemble des autres facteurs tels que ses émissions de GES et de la qualité des sites pouvant accueillir le parc à résidu. Il devra de plus évaluer la possibilité d'utiliser une usine existante ou de la localiser à Waswanipi. Les descriptions présentées dans le cadre des analyses de variantes doivent être suffisamment détaillées pour permettre de comparer les différents emplacements envisagés et d'évaluer leurs avantages respectifs, tant sur les plans biophysique, social que technique et économique. Le promoteur devra prendre en compte les impacts cumulatifs et le potentiel des variantes à s'adapter aux changements climatiques dans son analyse des variantes. La présentation de la démarche analytique du promoteur devra être accompagnée d'un dossier photographique. Dans tous les cas, le promoteur devra faire la démonstration de son souci de réduction de son empreinte sur le milieu. De plus, puisque des équipements sont déjà présents sur le site, le promoteur indiquera ceux qu'il entend réutiliser. Le promoteur présentera par la suite le raisonnement et les critères pour arriver aux choix des emplacements retenus, en indiquant précisément comment les critères ont été considérés. Le promoteur présentera les renseignements géographiques pertinents pour permettre de bien localiser les éléments du projet, ainsi que les variantes et les infrastructures temporaires le cas échéant, notamment en précisant les noms des plans d'eau et leur position géographique.	**Chapter 2** Section 2.1 Section 2.2 **Chapter 3**

MELCCFP Directive Section (MELCC, 2022)		Corresponding Chapter or Section in the EIA
2.2 Technology alternatives	Le promoteur présentera succinctement les avantages et les inconvénients des principales technologies envisagées notamment pour l'extraction et le traitement du minerai (si requis) et pour la protection de l'environnement et il comparera ses choix technologiques avec ceux retenus ailleurs au Canada ou à l'étranger. Le promoteur indiquera comment la minéralogie du gisement influence le choix des technologies. Il présentera, par la suite, la ou les technologie(s) privilégiée(s) et les critères justifiant ce choix, sur les plans technique, économique, social et environnemental. Lors de son choix, il considérera également les objectifs de rejets liquides, les normes d'émissions à l'atmosphère, l'émission de GES et les règles de gestion des matières résiduelles afin d'assurer la protection des milieux aquatique, terrestre et atmosphérique. En ce qui concerne l'approvisionnement énergétique et les technologies utilisées au site minier, le promoteur présentera les technologies privilégiées en exposant le raisonnement et les critères techniques, économiques, environnementaux et sociaux justifiant ces choix. La méthode utilisée pour la sélection des technologies devra être clairement expliquée et comprendre les éléments suivants: — l'efficacité des technologies par rapport aux technologies les plus récentes pour le secteur d'activité; — la capacité de satisfaire la demande (objectifs, besoins, occasions d'affaires); — la disponibilité et la faisabilité sur le plan technique; — la réalisation à des coûts qui ne compromettent pas la rentabilité économique du projet; — le potentiel évolutif de la technologie (capacité technique et économique de mise à niveau ou d'amélioration); — un rapport de quantification des émissions de GES annuelles attribuables aux variantes d'approvisionnement énergétique et aux variantes technologiques; — la capacité de réduire les émissions de GES, dès l'entrée en exploitation ou au gré de l'évolution des technologies; — la capacité de limiter l'ampleur des impacts négatifs sur les milieux biophysique et humain en plus de maximiser les retombées positives.	**Chapter 2** Section 2.2 Section 2.3 **GHG Sectorial Report (Appendix 6-2)**
3. PROJECT DESCRIPTION	Dans cette section, le promoteur doit présenter l'ensemble des composantes du projet retenu. Il est à noter qu'à ce stade du projet, la localisation de l'usine de traitement du minerai devrait être déterminée. L'ensemble des infrastructures incluant l'approvisionnement énergétique et les infrastructures de transport devront être décrites. Le promoteur devra faire état des ententes déjà établies pour l'utilisation de certains services (transport, entreposage de matériel, entretien, traitement du minerai, etc.), le cas échéant.	**Chapter 3 - Project Description**

MELCCFP Directive Section (MELCC, 2022)		Corresponding Chapter or Section in the EIA
3.1 Description of the deposit and facilities	Le promoteur présentera, de façon synthétique et cartographique, quand les informations s'y prêtent, les renseignements suivants : — la localisation, la tenure des terres et les titres, dont les baux miniers, des portions de territoire devant servir à l'implantation des infrastructures nécessaires à l'exploitation minière et la présentation, si possible, d'une photographie aérienne récente du secteur (les coordonnées géographiques doivent être données en degré décimal); — la description sommaire (géologique et structurale) du gisement et des lithologies desquels seront extraits le minerai et les stériles en décrivant leurs caractéristiques minéralogiques et les associations métalliques retrouvées tout en démontrant la représentativité de l'échantillonnage effectuée notamment en termes de potentiel de génération acide ou de lixiviation. Il est important de traiter de façon approfondie les caractéristiques des stériles et des résidus miniers, notamment pour déterminer si ces résidus sont à risques élevés au sens de la Directive 019 sur l'industrie minière; — les plans et profils du gisement, en situant ces profils par rapport aux plans d'eau jouxtant le projet; — les dimensions et la localisation de toutes les infrastructures projetées; — le ou les types de métaux exploités; — La durée des différentes phases d'exploitation du gisement, leur superficie et leur emplacement; — les points de transfert et lieux d'entreposage du minerai, des stériles, du doré, des résidus de traitement et des différents matériaux et produits à l'intérieur du site minier et à l'usine (si requis); — le mode et le lieu d'acheminement du produit fini; — les garages, ateliers d'usinage et d'entretien des équipements et entrepôts des matières dangereuses (réactifs, hydrocarbures, explosifs, etc.); — les installations d'approvisionnement en eau; — l'emplacement des unités de traitement des eaux résiduaires si requis (eaux de mine, eaux du procédé de traitement, eaux sanitaires); — l'emplacement des bancs d'emprunt requis et l'estimation de leur superficie; — la façon dont le projet est conçu pour faire face aux changements climatiques et son potentiel d'adaptation; — la façon dont les consultations avec le maître de trappe ont été prises en compte dans la conception du projet et localisation des infrastructures. Le promoteur décrira les activités et travaux préparatoires requis à l'implantation des installations qu'il s'agisse, entre autres, de déboisement (en précisant les superficies et les caractéristiques des peuplements forestiers déboisés), de dynamitage, de détournement de cours d'eau, de dénoyage et de rejet d'eau, de terrassement, de remblayage, de déplacement ou de démantèlement de bâtiments. Il indiquera les lieux, les limites approximatives, les volumes approximatifs de même que les modes de collecte, de transport et d'élimination des matériaux déplacés. Il fournira la description de la nature, des volumes approximatifs, du mode et du lieu d'entreposage du sol végétal et du mort-terrain.	**Chapter 1** **Chapter 3** Section 3.1 Section 3.2 Section 3.3 Section 3.4 Section 3.5 Section 3.7 Section 3.8 Section 3.9 Section 3.10 **Chapter 4** Section 4.5 Chapter 6 Section 6.4 **Chapter 9** Section 9.1 Section 9.2 Section 9.3 Section 9.4 **Geochemistry Sectorial Report (Appendix 3-1)**

MELCCFP Directive Section (MELCC, 2022)		Corresponding Chapter or Section in the EIA
3.2 Extraction	Dans le cas spécifique de l'extraction, le promoteur décrira la ou les technologie(s) utilisée(s) et indiquera le taux moyen et maximal d'extraction en tonnes/jour. Il décrira notamment, en précisant les travaux requis : – les rampes d'accès, puits, fosses et autres excavations (ouvertures de surface, etc.) et leur localisation en plan et en coupe; – les aménagements de digues si requis; – les équipements et le procédé d'extraction; – l'utilisation d'explosifs et, le cas échéant, les informations relatives à leur entreposage et fabrication; – les lieux d'entreposage du minerai; – une estimation des quantités et du débit des eaux de mine générées et les composantes du système de maintien à sec de la mine, le cas échéant.	**Chapter 3** Section 3.2 Section 3.3 Section 3.4 Section 3.5
3.3 Ore Processing	Le promoteur devra clarifier la localisation de son usine de traitement du minerai ainsi que les taux moyen et maximal de traitement. Dans le cas où l'usine de traitement est située au site de la mine, le promoteur devra obligatoirement inclure les informations suivantes sur la technologie retenue dans son étude d'impact : – la liste et la composition des produits requis et le tableau de leur consommation annuelle; – la description des différentes étapes du procédé de traitement (points d'entrée et de sortie, recirculation, points d'ajout des produits et leur représentation sur un schéma); – les quantités et caractéristiques physiques et chimiques détaillées des rejets liquides, solides et gazeux des activités et la localisation de leurs points de rejet, le bruit et les autres sources de nuisance, ainsi que les équipements et installations qui y sont associés (captage, épuration, traitement, dispersion, diffusion, élimination, contrôle, réception, entreposage, manipulation, etc.) Si l'usine est localisée à proximité de Lebel-sur-Quévillon, dans un souci de transparence et de participation publique, il est fortement recommandé au promoteur de tout de même inclure les informations relatives au traitement du minerai et à la gestion des résidus miniers dans son étude d'impact.	**Chapter 2** Section 2.1 **Chapter 3** Section 3.3 Section 3.6 Section 3.7 **Air Dispersion Sectorial Report (Appendix 6-1)** **Noise and Vibration Sectorial Report (Appendix 6-3)** **GHG Sectorial Report (Appendix 6-2)** **Chapter 6** Section 6.2, 6.3 et 6.4

MELCCFP Directive Section (MELCC, 2022)		Corresponding Chapter or Section in the EIA
3.4 Tailings and waste rock management	Une fois que le ou les emplacement(s) pour les aires d'accumulation des stériles et des résidus de traitement du minerai auront été identifiés, des études plus détaillées doivent être élaborées et doivent comprendre : – une cartographie détaillée du terrain décrivant la topographie et localisant les affleurements rocheux, les dépôts de sable, gravier, silt et argile, les cours d'eau et les plans d'eau, le ou les bassin(s) de drainage, les milieux humides et la végétation; – le résultat des investigations géotechniques et hydrogéologiques permettant d'établir l'épaisseur et les propriétés du sol à l'emplacement des aires d'accumulation (conductivité hydraulique, densité et résistance au cisaillement, etc.); – le mode de gestion des aires d'accumulation des résidus; – la composition physique et chimique des résidus miniers; – les critères de conception des infrastructures de retenue des aires d'accumulation des résidus, si requis : analyse de la stabilité des digues, des conditions de fondation, contrôle de la percolation et imperméabilité; – la possibilité et les modalités du retour des résidus sous terre dans les chantiers exploités ou lors de la fermeture et/ou dans les micro-fosses. En ce qui concerne les stériles, le promoteur s'appliquera particulièrement à documenter ce qui suit : – les quantités totales de stériles à éliminer (ordre de grandeur en milliers de m^3); – les durées d'entreposage minimales et maximales des stériles; – la description minéralogique des différents types de stériles et la détermination de tous les éléments majeurs et en trace à partir d'échantillons représentatifs; la détermination du potentiel de génération d'acide et de la lixiviabilité de certains métaux pour chacune des lithologies dont sont issus les stériles à partir d'échantillons représentatifs; – l'évaluation de la superficie des haldes requises et la présentation des conditions hydrogéologiques et de drainage et la description détaillée des modalités de gestion et de contrôle plus particulièrement dans le cas de stériles générateurs d'acide ou lixiviables; – le mode de déposition; – le cas échéant, les modalités d'utilisation des stériles comme matériau de remblai. Dans le cas des résidus de traitement, le promoteur fournira les renseignements suivants : – la quantité approximative de résidus devant être générés; – leur composition chimique et physique; – la détermination du potentiel de génération d'acide ou de lixiviation possible de certains métaux à partir d'échantillons représentatifs; – le détail de la conception des infrastructures de retenue, si requis : stabilité, imperméabilité et hauteur maximale des digues, la capacité d'emmagasinement, le mode de gestion (par cellule ou conventionnel) et le schéma de remplissage; – la proximité de l'usine de traitement et l'accessibilité au pourtour de l'aire d'accumulation.	**Chapter 3** Section 3.4 Section 3.1 Section 3.3 Section 3.8 **Geochemistry Sectorial Report (Appendix 3-1)** **Chapter 6** Section 6.5 Section 6.7 Section 6.9 Section 6.10 Annexe 6-8

MELCCFP Directive Section (MELCC, 2022)		Corresponding Chapter or Section in the EIA
3.5 Water management	Dans un contexte de développement durable, la réduction de l'utilisation de l'eau fraîche et la protection et la conservation des eaux souterraines sont privilégiées. Dans cette section, le promoteur devra démontrer qu'il a favorisé la recirculation des eaux en ayant comme objectif un rejet minimal dans l'environnement. Il devra également décrire les mesures qui seront prises pour protéger les eaux propres entrant sur le site d'un contact avec des secteurs contaminés de l'exploitation minière.	**Chapter 3** Section 3.5
3.5.1 Water balance	Le promoteur présentera un bilan complet de l'utilisation de l'eau pour les besoins des opérations minières et des services sur l'ensemble du site minier. Ce bilan devra être établi et détaillé sur une année complète pour prendre en compte les variations saisonnières. De façon plus précise, le promoteur fournira les renseignements suivants : — les sources d'approvisionnement en eau en précisant les volumes requis et la description des travaux dans le cas où un endiguement de cours d'eau s'avère nécessaire; — les besoins en eau pour les usages domestiques; — la description du circuit et des débits des eaux requises pour les opérations d'extraction et de traitement du minerai (si requis) en décrivant les circuits de recirculation et en présentant le tableau de la consommation journalière et annuelle des eaux reliées à ces activités et leur usage; — les eaux de ruissellement et les eaux de mine qui pourraient être pompées devront être incluses dans le système de gestion de l'eau du site minier; — les travaux d'abaissement de la nappe phréatique au pourtour de la fosse, si requis; — les dimensions et la localisation des fossés de drainage et de dérivation (le cas échéant).	**Chapter 3** Section 3.5.1
3.6 Treatment and disposal of contaminated water		**Chapter 3** Section 3.5
3.6.1 Water treatment plant	Le promoteur présentera les caractéristiques physico-chimiques des eaux usées industrielles à être traitées incluant les eaux de mine et une description détaillée des techniques utilisées pour leur traitement comprenant notamment : — les points d'entrée et de sortie des eaux; — la liste et la fiche technique des produits chimiques utilisés dans leur traitement, leurs points d'addition et les quantités utilisées; — l'efficacité anticipée en termes de pourcentage de réduction des contaminants ou de niveau de toxicité du traitement; — les volumes approximatifs et le mode de gestion des boues et des sous-produits résultant du traitement.	**Chapter 3** Section 3.5.3

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3.6.2 Mine effluent(s)	Le promoteur décrira : — les volumes et les débits moyens quotidiens prévus du ou des effluents; — la description des modalités de déversement (conduites, canalisations, pompage, diffuseur); — la localisation du ou des points de déversement et le tracé menant vers le milieu récepteur (le promoteur devra s'efforcer de n'avoir qu'un seul effluent final); — l'aménagement du milieu récepteur au point de déversement de l'effluent final (enrochement, endiguement, etc.); — les caractéristiques attendues de l'effluent en insistant sur sa qualité, sa concentration et le pH. Les informations devront être reportées sur un plan à une échelle appropriée. Le promoteur s'assurera également qu'un calcul des objectifs environnementaux de rejet (OER) est effectué. Il est à noter que le niveau et l'efficacité des systèmes d'épuration seront établis en fonction des exigences des lois et des règlements en vigueur et complétés en fonction des caractéristiques spécifiques du milieu récepteur (OER). La gestion de ces systèmes devra viser la réduction à la source, rechercher l'atteinte du rejet minimal et comprendre un programme d'amélioration continue.	**Chapter 3** Section 3.5.4
3.7 Residual materials management	Le promoteur décrira les déchets produits dans le cadre de toutes les phases du projet (nature, volumes produits, etc.) et la façon dont ils seront gérés. Il est à noter que le projet devra être conçu selon les principes de conservation des ressources en appliquant l'approche des « 3RV » (réduction à la source, réemploi, recyclage et valorisation). De plus, des initiatives comme le compostage devront être considérées. Cette section devra inclure : — les types et les volumes de matières résiduelles produits; — les modes et lieux d'élimination des déchets, la localisation et les conditions des sites existants ou futurs permettant leur gestion en indiquant à ce propos les volumes anticipés, la durée prévue du site proposé et les aménagements qu'on y prévoit; — les dispositions favorisant le système de recyclage des déchets et de réduction à la source; — dans le cas de l'utilisation d'un système d'incinération, on justifiera le choix des équipements et on indiquera les programmes de suivi où les équipements de contrôle qui y seront installés.	**Chapter 3** Section 3.6
3.8 Greenhouse Gases	Tant sur le plan de la réduction des émissions de GES que sur celui de l'adaptation aux changements climatiques, le promoteur devra prendre en compte les changements climatiques dès l'élaboration de son projet et lors de la réalisation de l'étude d'impact. À cet effet, le promoteur est invité à consulter le document : Les changements climatiques et l'évaluation environnementale : Guide à l'intention de l'initiateur de projet (MELCC, 2021). L'analyse des solutions de rechange, des différentes variantes de réalisation et des impacts du projet devra donc être effectuée en considérant le contexte des changements climatiques.	**Chapter 2** Section 2.2 Section 2.3 **Chapter 3** Section 3.7 **GHG Sectorial Report (Appendix 6-2)**

MELCCFP Directive Section (MELCC, 2022)		Corresponding Chapter or Section in the EIA
	Le promoteur devra produire un rapport d'identification et de quantification détaillé des émissions de GES annuelles attribuables à toutes les sources d'émissions du projet et aux différentes phases du projet. Le promoteur est invité à consulter Guide de quantification des émissions de gaz à effet de serre (MELCC, 2019 qui détaille les méthodologies de calcul à utiliser pour les différents types de sources, de puits ou de réservoirs de GES. Le promoteur doit également évaluer les effets possibles des changements climatiques sur son projet et sur le milieu d'implantation de ce dernier, notamment s'ils sont susceptibles de modifier la nature et l'importance des impacts du projet sur l'environnement, la sécurité des personnes ou la stabilité et la pérennité des infrastructures.	**Chapter 6** Section 6.3 **Chapter 9** Section 9.1 Section 9.2 Section 9.3 Section 9.4
3.9 Related developments and Projects		**Chapter 3** Section 3.8
3.9.1 Site Access	Le promoteur discutera des accès routiers dans la zone du projet et précisera l'utilisation qu'il compte en faire. Il devra décrire tous les activités ou travaux nécessaires pour la mise à niveau de la route forestière qu'il compte utiliser et des autres chemins, incluant les chemins temporaires. Il devra préciser si la construction d'un accès sera nécessaire afin de relier le site minier au chemin forestier existant. Le cas échéant, il décrira la longueur du chemin, la nature des travaux. Les descriptions présentées devront inclure, sans s'y limiter, l'installation d'ouvrages de traversées de cours d'eau, les travaux ou activités prévus sous la ligne naturelle des hautes eaux. Finalement, le promoteur précisera si, et dans quelle mesure, il sera responsable de l'entretien des chemins qu'il va utiliser. De façon plus ciblée, afin de permettre une description adéquate et pertinente des effets du projet sur l'habitat du poisson, le promoteur devra localiser et décrire les interventions envisagées en rives et dans les cours d'eau, permanents et intermittents, la dimension des ouvrages (permanents et temporaires), les matériaux nécessaires, etc. Ces interventions peuvent être, sans s'y limiter, le remblai en rive, la réfection et la construction de ponceau ou de pont.	**Chapter 3** Section 3.8.1 Section 3.9 **Chapter 7** Section 7.2
3.9.2 Accommodation Facilities	Le promoteur devra identifier ce que comprend ce volet de son projet, et ce, aux étapes de construction, d'exploitation et de fermeture. Le promoteur précisera la localisation exacte de ces installations, leur capacité d'accueil, leur durée et leurs périodes d'utilisation. Il devra indiquer ce qui a déjà été mis en place à la phase exploration et privilégiera, dans la mesure du possible, la réutilisation de sites existants. Il devra indiquer ce qui adviendra de ces installations à la fermeture du site. Pour les composantes de ces installations d'hébergement, le promoteur fournira une description des travaux requis et des précisions sur : — les installations de traitement et d'approvisionnement en eau potable; — le mode de gestion des eaux usées domestiques et les zones de rejet en précisant, s'il y a lieu, les taux de dilution après traitement;	**Chapter 3** Section 3.5.5 Section 3.5.6 Section 3.8.2 Section 3.8.3 Section 3.8.8 Section 3.12

MELCCFP Directive Section (MELCC, 2022)		Corresponding Chapter or Section in the EIA
	– le mode de gestion des boues septiques provenant des systèmes de traitement des eaux usées; – le mode d'approvisionnement énergétique régulier et d'urgence ou intérimaire; – la gestion de toute autre infrastructure nécessaire au fonctionnement d'un campement si requis et pouvant avoir un impact sur l'environnement.	
3.9.3 Storage site for fuel or hazardous materials	Le promoteur indiquera la localisation et la nature des ouvrages, équipements et installations pour l'entreposage et le confinement des produits chimiques, les hydrocarbures et les explosifs et le mode de récupération ou d'élimination de certains produits, équipements ou matériaux pouvant constituer un risque pour l'environnement. Il précisera les quantités et les concentrations des produits qui y transiteront et leur mode d'entreposage ainsi que la capacité d'entreposage des réservoirs utilisés. Le promoteur démontrera que ceux-ci respectent la législation et la réglementation en vigueur et indiquera les mesures préventives et d'urgence élaborées.	**Chapter 3** Section 3.3.2 Section 3.5.3 Section 3.8.4 Section 3.8.5 **Chapter 12** Section 12.5 Section 12.8
3.9.4 Borrow pits	Dans cette section, le promoteur devra définir précisément ce qu'il entend faire relativement à l'exploitation des bancs d'emprunt requis par le projet, et ce, tant pour les différentes étapes de la construction et de l'exploitation minière elle-même que pour les accès routiers ou pour tout autre aspect du projet Il devra localiser et cartographier l'ensemble des exploitations existantes et prévues pour les besoins du projet en précisant leur proximité par rapport à l'emplacement des routes, des cours d'eau et des aires protégées projetées de façon à tenir compte de la réglementation et des particularités et des possibilités du milieu. Il évaluera les superficies et les volumes requis et, au besoin, il présentera les rapports de sondage décrivant la stratigraphie et fournira les courbes granulométriques. Le promoteur indiquera comment s'est faite l'optimisation de l'évaluation des matériaux d'emprunt requis. Finalement, un aperçu des mesures de réaménagement et de désaffectation de ces sites devra également être fourni.	**Chapter 3** Section 3.4 Section 3.8.6
3.9.5 Transport of Ore and other goods	Le promoteur devra définir comment et vers quel(s) endroit(s) il entend procéder au transport du minerai. Les infrastructures routières qui seront empruntées devront être décrites. Il devra également préciser les volumes transportés, le type et le nombre de camions utilisés et de déplacements (allers-retours quotidiens et hebdomadaires), et les activités de transbordement prévues, si requises, et ce, tant pour le transport du minerai que pour le transport des marchandises et matériaux destinés à l'opération du site minier et le transport des employés. Par ailleurs, le promoteur devra mentionner où se fera le traitement du minerai et si cet endroit se trouve sur le territoire d'application de la CBJNQ ou en dehors de celui-ci. Dans le cas où l'utilisation et/ou la construction d'aménagements ou d'infrastructures seraient requises dans les limites du territoire conventionné, il devra les décrire et en évaluer les impacts.	**Chapter 3** Section 3.3 Section 3.8.1 Section 3.8.7 **Chapter 5** Annexe 5-2 **Chapter 8**

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	De façon plus ciblée, il devra décrire les effets de toutes les activités de transport du projet sur le milieu humain et l'utilisation du territoire et devra indiquer les éléments et les zones sensibles reliées au transport et au transbordement du minerai (poussières, bruit, sécurité, etc.). Le promoteur devra également présenter les mesures spécifiques qui seront mises en place durant les périodes culturellement importantes pour les Cries (ex. chasse à l'oie et à l'orignal) afin de limiter ou de réduire les effets du transport. Le promoteur devra également décrire les mesures qui seront mises en place afin d'assurer la sécurité de tous les usagers sur les routes et à proximité de celles-ci. Il devra préciser les limites de vitesse des véhicules, particulièrement à proximité des campements cris.	Section 8.4 Section 8.5 Section 8.6 Section 8.7
3.10 Employment and training	Le promoteur devra rendre disponible la politique corporative sur la formation au travail et l'embauche des Autochtones et sur leur intégration dans le bassin de main-d'œuvre. Il traitera notamment des mesures (transport, information, horaires de travail, fréquence, etc.) possibles pour favoriser l'accès des travailleurs du territoire aux opportunités d'emplois et d'affaires créés par le projet et la rétention de ces travailleurs, ainsi que les stratégies prévues pour favoriser l'embauche des femmes. Il devra tenir compte d'expériences analogues dont celles reliées aux projets récents réalisés sur le territoire. Il devra également présenter les cibles d'embauche régionale, particulièrement pour les Autochtones, dans un contexte de collaboration entre les communautés concernées et le gouvernement de la Nation crie. Finalement, le promoteur devra indiquer s'il est prévu de mettre en place des mesures pour prévenir le harcèlement.	**Chapter 1** Section 1.2 **Chapter 3** Section 3.11 **Chapter 4** Section 4.7 **Chapter 8** Section 8.4
4. DESCRIPTION OF THE ENVIRONMENT	Dans cette section, en prenant en compte le savoir traditionnel et les valeurs culturelles des communautés locales, le promoteur décrira le contexte environnemental, culturel et socioéconomique dans lequel s'inscrit le développement minier de cette région et de ce secteur. Il délimitera sa zone d'étude afin d'y décrire les composantes des milieux biophysique et humain pertinentes au projet.	**Chapter 5: Impact identification and assessment methodology** **Chapter 6: Current conditions and project impacts on the physical environment** **Chapter 7: Current conditions and project impacts on the biological environment** **Chapter 8: Current conditions and project impacts on the social environment**

MELCCFP Directive Section (MELCC, 2022)		Corresponding Chapter or Section in the EIA
4.1 Study area Boundaries	Le promoteur doit circonscrire une zone d'étude dont l'étendue devra pouvoir englober l'ensemble des activités projetées (incluant les activités connexes) et leurs effets directs et indirects sur les milieux biophysique et humain. Le promoteur devra justifier les limites de cette aire d'étude et son étendue. La limite de l'aire d'étude peut être adaptée en fonction des impacts étudiés, qu'ils soient d'ordre biophysique ou social.	**Chapter 5** Section 5.1
4.2 Description of relevant components	Le promoteur devra décrire l'état de l'environnement tel qu'il se présente dans la zone d'étude avant la réalisation du projet. Il doit décrire de la façon la plus factuelle possible les composantes des milieux biophysique et humain susceptibles d'être touchées par la réalisation du projet. Si les données disponibles chez les organismes gouvernementaux, municipaux, autochtones ou autres sont insuffisantes ou ne sont plus représentatives, le promoteur complétera la description du milieu par des inventaires. Le promoteur doit indiquer la provenance de toutes les données ayant servi à la description du milieu ainsi que les fins pour lesquelles elles sont utilisées. De plus, il doit commenter la qualité et la fiabilité des données disponibles. Pour de nombreuses composantes du milieu, les organismes gouvernementaux ont développé des guides ou des documents de références afin d'aider les promoteurs et leurs consultants dans la collecte et la présentation de l'information. Nous encourageons le promoteur à consulter préalablement ces documents pour s'assurer de fournir l'information de base.	**Chapter 5** Section 5.2 Section 5.3.2 **Chapters 6, 7, 8**
4.2.1 Biophysical environment	Le promoteur décrira, pour la zone d'étude, les composantes du milieu biophysique à l'aide de cartes précises où les infrastructures existantes et proposées seront indiquées. Lorsque cela s'y prête, les informations seront cartographiées et des photographies seront fournies pour l'aire d'étude. Les composantes biophysiques incluent notamment : – la géologie et la topographie générale; – les bassins versants; – les cours d'eau et les plans d'eau susceptibles d'être affectés par le projet ainsi que leurs caractéristiques physiques (bathymétrie, substrat, largeur, profondeur, obstacles au libre passage du poisson et niveaux d'eau), leur qualité physico-chimique, leur régime hydrique (débit, vitesse de courant, etc.), leurs usages notamment en aval des points de rejet et les caractéristiques des sédiments (matière organique, granulométrie et teneur en métaux) du ou des cours d'eau récepteurs; – les rives, les zones inondables et les milieux humides (incluant une cartographie détaillée par type de milieux humides ainsi que les superficies affectées); – les caractéristiques hydrogéologiques pertinentes associées au projet; – le contexte climatique : valeurs de température annuelle, périodes de gel, hauteur des précipitations moyennes et maximales, estimation de l'évaporation annuelle (mm), carte des vents dominants et conditions particulières observées; – la façon dont les changements climatiques affectent la région; – les stocks de carbones des écosystèmes tourbeux et forestiers;	**Chapter 6** Section 6.1 Section 6.3 Section 6.5 Section 6.6 Section 6.7 Section 6.8 Section 6.9 Section 6.10 **Sectorial reports: hydrology, surface water and sediment, natural groundwater background, natural soil background, hydrogeology, air quality, GHG and noise and vibration**

MELCCFP Directive Section (MELCC, 2022)		Corresponding Chapter or Section in the EIA
	– le couvert végétal, incluant la végétation aquatique et riveraine, en indiquant la présence de peuplements fragiles ou exceptionnels dans la zone d'étude, ainsi que les peuplements forestiers et leurs caractéristiques (type, âge, superficie); – les espèces fauniques (mammifères, oiseaux, reptiles, amphibiens) et leurs habitats; les espèces d'intérêt pour les communautés autochtones et non-autochtones; les espèces de poissons présentes ainsi que l'emplacement et les superficies des habitats, potentiels ou confirmés, pour la reproduction, l'alevinage, la croissance, l'alimentation, la migration et la survie hivernale; – les espèces rares, menacées ou vulnérables selon le statut de protection accordé à ces espèces par les gouvernements, ou susceptible d'être ainsi désigné, en décrivant les espèces fauniques et floristiques (terrestres ou aquatiques) et les habitats de ces espèces; – la situation des espèces exotiques envahissantes dans la zone d'étude. Le promoteur est invité à consulter la section 2.3.2 de la Directive pour la réalisation d'une étude d'impact et la section 2.3.2 de l'annexe Autres renseignements requis pour un projet minier afin de compléter les composantes requises pour la description du milieu et les méthodologies recommandées.	**Sectorial reports on vegetation, avian fauna, fur-bearing animals, small fauna and micromammals, herpetofauna, ichthyofauna and benthos, chiropterans and large fauna** **Chapter 7** Section 7.1 Section 7.2 Section 7.3 Section 7.4 Section 7.5 Section 7.6 Section 7.7 **Chapter 9** Section 9.1
4.2.2 Archaeological and cultural potential	Le potentiel archéologique et culturel du secteur, principalement aux sites retenus pour les composantes du projet, sera décrit en identifiant les sites archéologiques connus, les zones à potentiel archéologique et les autres éléments d'intérêt patrimonial protégés ou non. Le promoteur présentera quelle approche sera mise de l'avant pour recueillir et rassembler le savoir traditionnel.	**Chapter 8** Section 8.8 **Sectorial Report on Archaeological Potential**
4.2.3 Social environment	Le promoteur devra élaborer sur le milieu social touché par le projet en expliquant les limites inhérentes aux données qu'il possède et qu'il aura recueillies. La description du milieu social devra permettre une évaluation globale des transformations probables des modes de vie des diverses communautés affectées par le projet. Il présentera notamment : – les profils socio-économiques des populations concernées et de la région (caractéristiques démographiques, mode de vie, etc.); – l'économie locale et régionale et les perspectives de développement (taux d'activité et de chômage, les sources de revenus, les salaires, les principaux secteurs d'activité, la formation, etc.);	**Chapter 1** Section 1.2 **Chapter 3** Section 3.10 Section 3.11 **Chapter 4** Section 4.1

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	— le bassin de main-d'œuvre et d'entreprises qualifiées pour occuper des postes ou remplir des contrats en rapport avec les activités minières prévues et celles liées à la construction du projet; — les préoccupations, opinions et réactions des communautés locales et plus particulièrement des collectivités directement concernées en incluant une présentation des consultations effectuées par le promoteur et les principaux éléments de son plan d'information, de consultation et de participation publique; — la limite des terres de catégories I, II et III; — l'utilisation actuelle et prévue du territoire notamment pour les points suivants : — les sources d'alimentation en eau; — les zones de pêche et de chasse, incluant les espèces visées et leur importance; — les zones de cueillette de petits fruits ou de plantes médicinales; — les cours d'eau navigables de même que ceux présentant un potentiel pour la navigation; — les voies de déplacement traditionnelles et leurs périodes d'utilisation; — les campements cris ou autres; — les aires protégées, les projets d'aires protégées inscrits au registre du MDDELCC et les territoires d'importance pour la conservation (identifiés par la direction des aires protégées du MDDELCC); — les routes et autres infrastructures de transport; — les pourvoiries et autres activités récréatives, touristiques, baux de villégiature, etc.; — la localisation et la description des divers bâtiments et infrastructures (habitation, services, lignes de transport, etc.) situés à proximité; — les sites et secteurs ayant une valeur particulière pour la population autochtone. Une attention particulière sera accordée à l'occupation du territoire par les Cris, plus particulièrement de la communauté de Waswanipi, en tenant compte de l'identification des territoires de chasse et des voies de déplacement traditionnelles (terrestres ou navigables). Les périodes d'utilisation du territoire par les familles et l'impact qu'aura le projet sur l'accès et l'occupation des territoires de chasse, de pêche, de piégeage et de cueillette devront être détaillés. Puisque les communautés algonquines Anishinabeg du Lac-Simon et atikamekw d'Obedjiwan ont également été identifiées par le promoteur comme ayant un intérêt dans le projet, il devrait aussi décrire l'occupation de l'aire d'étude par ces deux communautés. Le promoteur devra rendre disponibles la politique corporative sur la formation au travail, l'embauche et l'intégration d'autochtones dans le bassin de main-d'œuvre. Il devra tenir compte d'expériences analogues. Il devra également présenter les cibles d'embauche pour les communautés autochtones.	Section 4.2 Section 4.4 Section 4.5 Section 4.6 Section 4.9 **Chapter 8** Section 8.1 Section 8.2 Section 8.3 Section 8.4 Section 8.5 Section 8.6 Section 8.7 Section 8.9 **Economic Benefits Sectorial Report**

MELCCFP Directive Section (MELCC, 2022)		Corresponding Chapter or Section in the EIA
5. ANALYSIS OF PROJECT IMPACTS	L'analyse portera sur les impacts à court, à moyen et à longs terme de manière à couvrir les périodes de préparation, de construction, d'installation des infrastructures, d'exploitation du gisement et de la route, de la fermeture de la mine et de la restauration du site. L'identification des répercussions devrait se faire en concordance avec la section « Description du milieu ». En prédisant et en évaluant les conséquences du projet, le promoteur doit indiquer les détails importants et énoncer clairement quels éléments et quelles fonctions du milieu peuvent être affectés, à quel endroit, dans quelle mesure, durant combien de temps et avec quel effet global. Il présentera les méthodes utilisées ainsi que leurs limites et les biais possibles. Le promoteur doit faire une évaluation détaillée des impacts positifs et négatifs anticipés et décrire, le cas échéant, les mesures qu'il entend prendre pour minimiser les impacts négatifs et optimiser les impacts positifs. Le promoteur indiquera le degré de validité et de précision de ses prévisions. Il doit porter une attention particulière au choix et à la portée des mesures d'atténuation ainsi que dans la détermination des composantes du milieu devant faire l'objet d'un programme de suivi environnemental et social. L'évaluation du projet devra tenir compte des ressources renouvelables qui pourraient être touchées de façon importante. Il convient donc que l'ensemble de la démarche d'analyse des impacts soit élaborée et conduite en prenant en compte la capacité de support du milieu qui permettra d'assurer la pérennité des espèces floristiques et fauniques. Par ailleurs, le promoteur identifiera les changements de l'environnement pouvant entraîner des effets sur le projet et documentera ces effets et les risques qu'ils entraînent. En fonction des ressources du milieu, de l'occupation du territoire, de son utilisation, de la vocation des sites et de la capacité de support des différents milieux, le promoteur doit évaluer les pertes environnementales et les modifications des conditions naturelles d'équilibre. Il doit mettre de l'avant, au niveau de la protection des habitats sensibles, le principe « éviter et minimiser », et ce, tout particulièrement pour le milieu aquatique, les zones inondables et les milieux humides. De plus, il doit déterminer les seuils d'irréversibilité pour tout impact. Le promoteur accordera une attention particulière aux impacts qu'aura son projet sur l'utilisation actuelle et future du territoire. Le promoteur devra définir les enjeux principaux de son projet, en s'inspirant de son expérience passée et notamment à partir des consultations qu'il fera auprès des populations touchées. Dans ce processus d'analyse, il portera une attention particulière aux valeurs véhiculées lors des consultations et au savoir traditionnel. L'accent devra être mis sur ces enjeux et devra se refléter sur les mesures d'atténuation ou de compensation et influencera le programme de suivi, en particulier si des incertitudes demeurent sur ces enjeux.	**Chapter 4** Section 4.8 Section 4.9 **Chapter 5: Impact identification and assessment methodology** Appendix 5-1 Appendix 5-2 **Chapter 10: Review of impacts** Section 10 **Chapter 11: Cumulative Impacts Assessment** **Chapter 14: Assessment of the consideration of issues**

MELCCFP Directive Section (MELCC, 2022)		Corresponding Chapter or Section in the EIA
5.1 Impact identification and assessment	Le promoteur devra présenter les principaux impacts observés sur l'environnement et le milieu social dus aux mines d'or. Une présentation des différents cas de mines d'or au Canada ou ailleurs dans le monde permettra d'avoir un portrait des impacts et des mesures d'atténuation documentés pour des exploitations déjà en activité. L'étude décrira la méthode retenue pour l'évaluation des impacts. La méthode et les techniques utilisées doivent être objectives, concrètes, reproductibles et compréhensibles de tous. Le lecteur doit pouvoir suivre facilement le raisonnement du promoteur pour déterminer et évaluer les impacts. – L'évaluation des impacts sur le milieu biophysique portera, entre autres, sur :la qualité, incluant la température, ainsi que les variations de débit et de niveau du ou des cours d'eau récepteurs, du ou des effluent(s) et le maintien à court et à long terme des habitats et des usages; – le maintien des habitats et des populations de poissons présents reliés à la toxicité possible des effluents miniers, à la gestion des eaux de surface et à la présence d'obstacles à la libre circulation (ponceaux, pont, etc.); – les risques d'accumulation des métaux dans la chair des poissons; – les conséquences de la perte ou de la modification de cours d'eau et de plans d'eau en phase de construction et d'exploitation (détournement, assèchement, baisse de l'alimentation en eau de surface); – les effets de l'abaissement de la nappe phréatique sur le réseau hydrographique et les milieux humides avoisinants et l'habitat du poisson; – la survie et les déplacements de la faune terrestre, aquatique et avienne ainsi que la destruction ou la modification de leurs habitats ou la destruction et la modification possible d'habitats pour les autres espèces à statut précaire; – les effets sur les espèces floristiques, en particulier sur celles ayant un statut précaire ou d'intérêt spécial pour les communautés locales; – une analyse des répercussions du rejet des eaux de mine sur les milieux terrestres et aquatiques, et ce, tant durant les périodes de construction que d'exploitation; – les répercussions sur le milieu aquatique ou terrestre liées à l'usage des fondants et d'abrasifs sur les chemins et sur les ponts ou à un déversement accidentel d'un produit pétrolier ou de tout autre produit chimique utilisé; – le drainage, l'érosion par ruissellement ou par le vent; – les répercussions sur les ressources fauniques tant en termes de dynamique de population, de comportement et le cas échéant de toxicité sur celle-ci ou sur celle induite à partir de la contamination du milieu; – les effets sur les milieux visuels par l'intrusion de nouveaux éléments dans le champ visuel et le changement de la qualité esthétique du paysage; – l'émission de GES; – la perturbation des stocks de carbone, particulièrement des écosystèmes tourbeux importants;	**Chapter 4** Section 4.1 Section 4.7 **Chapter 5** Section 5.1 Section 5.2 Section 5.3 Section 5.4 Section 5.5 **Chapter 6** Section 6.2 Section 6.3 Section 6.5 Section 6.6 Section 6.7 Section 6.8 Section 6.9 Section 6.10 **Chapter 7** Section 7.1 Section 7.2 Section 7.3 Section 7.4 Section 7.5 Section 7.6 Section 7.7 **Chapter 8** Section 8.1 Section 8.2

MELCCFP Directive Section (MELCC, 2022)		Corresponding Chapter or Section in the EIA
	— les répercussions sur l'accès, l'utilisation et l'occupation des territoires de chasse, de pêche, de piégeage et de cueillette; — la pollution de l'air, en ciblant les problématiques ayant un impact significatif sur le milieu et ses utilisateurs et la dispersion atmosphérique des contaminants à l'aide d'une modélisation. Pour évaluer les concentrations de contaminants trouvées sur l'ensemble du territoire potentiellement touché par les émissions atmosphériques, le promoteur effectuera une modélisation de la dispersion atmosphérique des contaminants potentiellement émis par le projet, conformément au Règlement sur l'assainissement de l'atmosphère et aux documents suivants : — Guide de la modélisation de la dispersion atmosphérique — Guide d'instructions – Préparation et réalisation d'une modélisation de la dispersion des émissions atmosphériques – Projets miniers; — Devis de modélisation de la dispersion atmosphérique. Le promoteur devra fournir un rapport complet présentant de façon détaillée la méthodologie employée pour réaliser la modélisation ainsi que les résultats sous forme de tableaux et de cartes, à une échelle appropriée, indiquant les courbes d'isoconcentration. Le promoteur devra également comparer les résultats de l'étude aux critères de qualité de l'air ambiant. À noter que les mesures d'atténuation envisagées par le promoteur doivent faire partie intégrante des scénarios de modélisation et que leur efficacité doit être évaluée par modélisation de la dispersion atmosphérique. En ce qui concerne le milieu social, le promoteur devra considérer tous les impacts sociaux négatifs et positifs du projet pour en faire ressortir les enjeux. Il s'agira d'évaluer globalement les transformations probables des modes de vie des diverses communautés habitant ou utilisant le territoire visé par le projet et leur capacité à gérer des changements découlant du projet. Le promoteur devra, à ce sujet et dans la mesure du possible, référer à d'autres projets analogues sur le territoire nord québécois et à l'expérience qu'il a acquise à la phase exploration de ce projet. Le promoteur abordera notamment les impacts liés à : — l'utilisation par le promoteur des accès routiers, le maintien des usages d'utilisation par les communautés locales, de même que les conflits possibles entre les usagers pour le partage du territoire et des installations existantes; — les conflits possibles pour la compétitivité des emplois; — la sécurité des utilisateurs du territoire; — les possibilités de formation, d'embauche ou d'obtention de contrats pour des individus ou des entreprises cries; — un déversement accidentel de produit pétrolier ou de tout autre produit chimique sur le milieu; — les risques de nuisance (bruit, poussières) et leurs effets sur les utilisateurs du territoire à proximité; — les modifications ou les adaptations que les maîtres de trappe devront apporter à l'exploitation du ou des lots de piégeage affectés par le projet;	Section 8.3 Section 8.4 Section 8.5 Section 8.6 Section 8.7 Section 8.8 Section 8.9 **Chapter 9** **Chapter 12** Section 12.5 **Air Dispersion Sectorial Report (Appendix 6-1)** **Chapter 14: Assessment of the consideration of issues**

MELCCFP Directive Section (MELCC, 2022)		Corresponding Chapter or Section in the EIA
	– l'utilisation des ressources fauniques par les chasseurs et pêcheurs sportifs en regard des modifications de l'accessibilité; – les impacts d'un tel projet d'une durée limitée qui, à la fin de l'exploitation, entraînera des changements du tissu social; – l'aspect visuel après la réalisation des travaux; – les impacts et retombées économiques prévues à court et à long terme pour les entreprises locales (la nature et le nombre d'emplois temporaires et permanents créés par le projet pour les autochtones et ceux provenant de l'extérieur de la région ou les emplois perdus le cas échéant) incluant les perspectives de développement dans les secteurs connexes pour les communautés locales ou régionales ainsi que les impacts potentiels sur des perspectives de développement qui seraient négativement affectées par le projet (par exemple, potentiel récréotouristique); – l'entente sur les répercussions et les avantages, s'il y a lieu; – les impacts sur la vie familiale des travailleurs; – la modification des habitudes de vie dues aux craintes d'une contamination possible du milieu dans le cadre de l'exploitation du projet; – la compétition possible pour certains services (santé, communication, approvisionnement, etc.) offerts en région; – le phénomène des cycles d'expansion et de ralentissement (boom and bust economy) en expliquant la portée de ce phénomène et des changements qu'il est susceptible de représenter pour la région; – les impacts sur la santé des usagers du territoire.	
5.2 Cumulative impacts assessment	Les effets cumulatifs sont définis en termes généraux comme des changements subis par l'environnement en raison d'une action combinée avec d'autres actions passées, présentes et futures. Le promoteur devra évaluer les impacts cumulatifs relatifs aux enjeux principaux de son projet. Il présentera une justification concernant la délimitation géographique de l'étude des impacts cumulatifs. Il proposera et justifiera le choix des projets et activités retenus pour l'analyse des impacts cumulatifs, qui devront comprendre les activités ou projets passés, en cours et futurs (dont la probabilité de réalisation est grande). Les méthodes utilisées pour prédire les impacts cumulatifs devront être clairement décrites afin de mieux comprendre la façon dont l'analyse a été réalisée et la logique des conclusions présentées. L'évaluation des impacts environnementaux cumulatifs devra notamment : – établir un niveau de référence; – prendre en compte les actions et effets en combinaison avec d'autres actions passées présentes et futures; – prendre en compte les perturbations naturelles; – prendre en compte les autres utilisations des terres; – établir des tendances ou des changements dans l'état des composantes étudiés dans le temps.	**Chapter 5** Section 5.5 Annexe 5-1 **Chapter 11** Section 11.1 Section 11.2

MELCCFP Directive Section (MELCC, 2022)		Corresponding Chapter or Section in the EIA
6. MITIGATION MEASURES, RESIDUAL IMPACTS AND COMPENSATION MEASURES		**Chapter 5** Annexe 5-2 **Chapters 6 à 8**
6.1 Impact Mitigation	L'atténuation des impacts vise la meilleure intégration possible du projet aux milieux biophysique et humain. Le promoteur décrira les mesures qu'il mettra en vigueur pour accentuer au maximum les effets favorables sur l'environnement et le milieu social ainsi que les mesures correctrices qu'il compte mettre de l'avant afin de réduire les impacts négatifs du projet. Le promoteur devra privilégier les mesures permettant d'éviter les impacts négatifs, puis celles visant à réduire l'importance des impacts et, pour les impacts résiduels qu'il n'aura pas pu atténuer, proposer des mesures de compensation ou de restauration. Il est à noter que le respect des lois et des règlements, de même que les moyens pris pour les respecter ne peuvent être considérés comme des mesures d'atténuation. Une attention particulière devra être accordée à l'insertion des mesures suivantes : – clauses spécifiques de protection de l'environnement dans les différents contrats octroyés; – choix des périodes de travaux lors de la construction des infrastructures; – méthodes proposées pour la construction d'infrastructures près des plans d'eau et des zones humides; – précautions prises pour limiter l'introduction et la propagation d'espèces exotiques envahissantes; – protection des milieux humides en évitant si possible de les affecter, en minimisant le plus possible les impacts sur ces milieux, ou en compensant les impacts inévitables; – modes de restauration de certains tronçons de route existants ou de traversées des cours d'eau sujets à problèmes; – modes de restauration possibles des fosses après leur exploitation; – protection des milieux aquatiques et de l'habitat du poisson afin d'éviter ou de réduire la détérioration, la destruction ou la perturbation de celui-ci; – normes de restauration et réhabilitation des bancs d'emprunt et, le cas échéant, des portions de routes désaffectées et des sites perturbés; – modalités de démantèlement des infrastructures d'hébergement; – information pour le personnel de chantier aux droits et coutumes de pêche et de chasse en territoire conventionné; – dans le contexte du régime faunique prévu au Chapter 24 de la CBJNQ, mise en place de mesures particulières à l'égard des travailleurs concernant la chasse et la pêche sportives; – protection de la saison de nidification des oiseaux migrateurs; – protection des espèces à statut précaire au sens des législations provinciales et fédérales ou de toute espèce d'intérêt pour les communautés;	**Chapter 5** Annexe 5-2 **Chapter 3** Section 3.12 **Chapter 6** Sections 6.2 à 6.10 **Chapter 7** Sections 7.1 à 7.7 **Chapter 8** Sections 8.1 à 8.9 **Chapter 13** Section 13.2 **Windfall Mine Site Rehabilitation Plan**

MELCCFP Directive Section (MELCC, 2022)		Corresponding Chapter or Section in the EIA
	– protection des sites archéologiques et sites d'intérêts culturels; – participation de la main-d'œuvre autochtone dans la force ouvrière ou comme contractants lors de la construction du projet et de son exploitation; – programmes pour venir en support aux travailleurs et à leur famille (par ex. pour faciliter les moyens de communication et la cohabitation des travailleurs allochtones et autochtones); – partage de l'information aux personnes intéressées (communautés touchées, familles directement affectées par le projet, conseils de bandes et le Gouvernement de la Nation Crie); – programme d'intégration culturelle destiné aux allochtones et aux autochtones. En ce qui a trait aux mesures d'atténuation relatives à l'exploitation minière elle-même, le promoteur départagera les mesures prises en cours d'exploitation et celles applicables lors de la désaffectation de la mine. En particulier, le plan décrira : – le programme de restauration progressive pendant l'exploitation, le programme de confinement et de contrôle lors d'une fermeture temporaire et une copie du plan de restauration et de réaménagement tel que déposé au MERN et prévu à la Loi sur les mines (Chapter M-13.1); – les caractéristiques du comité de suivi prévu à la Loi sur les mines, en version préliminaire. À cet effet, l'initiateur est invité à consulter le Guide des bonnes pratiques sur les comités de suivi et obligations légales des promoteurs pour des projets miniers et d'hydrocarbures – les modalités de réaménagement des aires d'accumulation et leur stabilisation afin de lutter contre l'érosion éolienne ou par ruissellement; – les possibilités d'utilisation du mort-terrain dans la restauration de sites désaffectés; – la prise en compte de la composante « paysage »; – la récupération de certains équipements et aménagements.	
6.2 Residual impacts and compensation measures	Finalement, le promoteur indiquera la nature et l'envergure des impacts résiduels susceptibles de demeurer après l'application des mesures d'atténuation. Des propositions d'aménagements, des engagements et des mesures compensatoires pour suppléer à la perte d'habitats devront être fournis. On traitera des mesures de compensation pour des modifications ou des pertes liées à la pratique des activités traditionnelles. On devra également faire part de toutes garanties financières ou autres de nature environnementale pouvant être utilisées au cours des phases de construction, exploitation et désaffectation du projet. La restauration d'anciens sites miniers abandonnés, les possibilités de réutilisation des équipements ou des installations temporaires à des fins publiques ou communautaires devraient être considérées comme mesures compensatoires, tout comme la mise en réserve pour utilisation future de certains résidus de construction tels que les matériaux de déblais ou tout autre résidu. Plus particulièrement, en ce qui concerne le programme de restauration, le promoteur devra s'attarder sur les possibilités existantes en tenant compte, entre autres, des exigences de la Loi sur les mines.	**Chapter 6** Sections 6.2 à 6.10 **Chapter 7** Sections 7.1 à 7.7 **Chapter 8** Sections 8.1 à 8.9 **Chapter 10**

MELCCFP Directive Section (MELCC, 2022)		Corresponding Chapter or Section in the EIA
		Chapter 11 Section 11.2 **Chapter 13** Section 13.3
7. Accident risk management	Certains projets miniers peuvent être à l'origine d'accidents dont les conséquences pourraient dépasser les frontières du projet. L'étude d'impact du projet nécessitera donc une analyse des risques d'accident technologiques majeurs. Dans tous les cas, l'étude décriera les mesures de sécurité et présentera des plans préliminaires des mesures d'urgence pour les phases de construction et d'exploitation. Les accidents ou dommages aux infrastructures minières et aux autres composantes du projet et à son opération causée par des catastrophes naturelles ou des événements météorologiques extrêmes, tels les blizzards, devront être évalués. Cette évaluation tiendra aussi compte des changements climatiques. Le promoteur devra expliquer comment l'éloignement du site minier oriente la conception des mesures d'urgence.	**Chapter 12** Section 12.1 Section 12.3 **Chapter 9** Section 9.1 Section 9.2 Section 9.3 Section 9.4
7.1 Potentiel accident risks	L'analyse des risques d'accident technologiques majeurs repose sur l'identification des dangers (dangerosité des produits, défaillances des systèmes, sources de bris, etc.) à partir desquels des scénarios d'accidents sont établis. Un bilan des accidents passés (depuis environ cinq ans) pour des projets similaires, ou à défaut, dans des exploitations utilisant des procédés similaires, fournit des renseignements supplémentaires pour l'établissement de ces scénarios. Toutes les activités reliées au projet (manutention, exploitation, transport, etc.) devront être considérées. Une attention devra être portée à tout événement (déversement par exemple) susceptible de porter atteinte à la qualité du milieu, à son utilisation et à ses utilisateurs.	**Chapter 12** Section 12.3 Section 12.4 Section 12.5 Section 12.6
7.2 Security measures	L'étude d'impact décriera les mesures de sécurité prévues pour les lieux d'exploitation, en incluant les installations connexes localisées à l'extérieur de l'emplacement principal. Entre autres, elle décriera les éléments suivants : — les limitations d'accès aux emplacements (balisage du terrain); — les mesures de sécurité prévue pour le transport; — les installations de sécurité et mesures de prévention (systèmes de surveillance, d'arrêt d'urgence, de lutte contre les incendies, cheminées de ventilation et de sécurité, extincteurs automatiques, présence de groupes électrogènes d'urgence, détecteurs de fuite, alarmes de haut niveau, bassin de rétention, distances de sécurité, etc.); — les moyens d'entreposage de produits en fonction de leur dangerosité.	**Chapter 12** Section 12.3 Section 12.5 Section 12.7

MELCCFP Directive Section (MELCC, 2022)		Corresponding Chapter or Section in the EIA
7.3 Preliminary emergency response plan	L'étude présentera un plan préliminaire des mesures d'urgence prévues afin de réagir adéquatement en cas d'accident, autant pour la période de construction que pour la période d'exploitation. Ce plan exposera les principales actions envisagées pour faire face aux situations d'incident ou d'accident, de même que les mécanismes de transmission de l'alerte. Il décriera le lien avec les autorités municipales ou les Conseils de bande concernés et, le cas échéant, leur articulation avec leur plan des mesures d'urgence. Le promoteur est invité à consulter les différentes publications sur la préparation des plans de mesures d'urgence, dont celles de l'Association canadienne de normalisation et de la Commission des normes, de l'équité, de la santé et de la sécurité au travail. Un plan final de mesures d'urgence comprenant des scénarios pour chaque type d'accident majeur envisagé devra être complété par le promoteur avant le début de l'exploitation de son projet. Des détails devront être fournis pour l'évacuation dans les cas d'incident comportant un nombre massif de victimes et si une coordination avec le Conseil cri de la santé et des services sociaux de la Baie James (CCSSSBJ) ou avec le CRSSS de la Baie-James est nécessaire. Compte tenu de l'éloignement du site minier, le promoteur devra appliquer les premières mesures d'urgence en cas d'accident technologique, de déversement, etc. Il fournira notamment les renseignements sur sa capacité d'intervention.	**Chapter 12** Section 12.8 Appendix12-1
8. MONITORING AND FOLLOW-UP PROGRAM	Les sections suivantes visent à établir les modalités de conception et de réalisation des programmes de surveillance et de suivi reliés au projet. Les programmes devront être conçus avec suffisamment de souplesse pour pouvoir être modifiés en fonction de nouveaux renseignements et d'événements imprévus.	**Chapter 13**

MELCCFP Directive Section (MELCC, 2022)		Corresponding Chapter or Section in the EIA
8.1 Monitoring program	La surveillance environnementale sera réalisée par le promoteur et elle aura pour but de s'assurer de la mise en œuvre : — des exigences relatives aux lois et règlements pertinents; — des mesures proposées dans l'étude d'impact, incluant les mesures d'atténuation ou de compensation; — des engagements du promoteur prévus aux autorisations ministérielles; — des conditions fixées dans le certificat d'autorisation. La surveillance environnementale concernera aussi bien la phase de construction que les phases d'exploitation, de fermeture ou de démantèlement du projet. Le promoteur devra proposer dans l'étude d'impact un programme préliminaire de surveillance environnementale. Ce programme préliminaire sera bonifié lorsque tous les éléments du projet seront mieux définis. Il sera complété, le cas échéant, à la suite de l'autorisation du projet. Ce programme décriera les moyens et les mécanismes mis en place pour s'assurer du respect des exigences légales et environnementales. Il permettra de vérifier le bon fonctionnement des travaux, des équipements et des installations et de surveiller toute perturbation de l'environnement causée par la réalisation, l'exploitation, la fermeture ou le démantèlement du projet. Le programme de surveillance pourra permettre, si nécessaire, de réorienter les travaux et éventuellement d'améliorer le déroulement de la construction et de la mise en place des différents éléments du projet. Le programme de surveillance environnementale devra notamment comprendre : — la liste des éléments nécessitant une surveillance environnementale; — l'ensemble des mesures et des moyens envisagés pour protéger l'environnement; — les caractéristiques du programme de surveillance (pour chacun des milieux : eau de surface, atmosphérique, utilisation du sol, etc.), lorsque celles-ci sont prévisibles (exemples : localisation des interventions, protocoles prévus, liste des paramètres mesurés, méthodes d'analyse utilisées, échéancier de réalisation, ressources humaines et financières affectées au programme); — un mécanisme d'intervention en cas de non-respect des exigences légales et environnementales ou des engagements du promoteur; — les engagements du promoteur quant au dépôt des rapports de surveillance (nombre, fréquence et contenu); — les engagements du promoteur quant à la diffusion des résultats de la surveillance environnementale à la population concernée.	**Chapter 13** Section 13.1 Section 13.2 Section 13.3

MELCCFP Directive Section (MELCC, 2022)		Corresponding Chapter or Section in the EIA
8.2 Environmental and social follow-up program	Le suivi environnemental sera effectué par le promoteur et il aura pour but de vérifier, par l'expérience sur le terrain, la justesse de l'évaluation de certains impacts et l'efficacité de certaines mesures d'atténuation ou de compensation prévues à l'étude d'impact et pour lesquelles subsiste une incertitude. Le promoteur devra proposer dans l'étude d'impact un programme préliminaire de suivi environnemental et social. Ce programme préliminaire pourra être complété à la suite de l'autorisation du projet. Ce programme devra notamment comprendre les éléments suivants : — une liste des éléments nécessitant un suivi environnemental; — les objectifs et les composantes visés par le programme de suivi (exemples : valider l'évaluation des impacts, apprécier l'efficacité des mesures d'atténuation pour les composantes eau, air, sol, etc.); — le nombre d'études de suivi prévues ainsi que leurs caractéristiques principales (liste des paramètres à mesurer, durée, échéancier de réalisation projeté, etc.); — les modalités concernant la production des rapports de suivi (nombre, fréquence et format); — le mécanisme d'intervention mis en œuvre en cas d'observation de dégradation imprévue de l'environnement.	**Chapter 13** Section 13.1 Section 13.2 Section 13.3

GLOSSARY

Acid-generating potential	The acid-generating potential associated with the oxidation of tailings.
Anthropogenic	Refers to phenomena that essentially result from man's direct or indirect intervention.
Aquifer	A geological stratum or formation that is sufficiently porous and permeable to stock a significant quantity of water while being sufficiently permeable to allow water to flow freely through it.
Background concentration	The concentration of a chemical substance that corresponds to said substance's ambient presence.
Carbon oxide equivalent (CO_2 eq.)	A unit used to compare the radiative forcing of a GHG to carbon dioxide.
Criteria	Concentrations of a contaminant that, if they are exceeded, risk causing a complete or partial loss of the use for which they were established.
Deposit	A series of mineral layers in the ground. A mineralized zone that is large enough to justify its commercial development.
Dewatering	The action of evacuating infiltration water from a mine.
Effluent Discharge Objectives	The maximum concentrations and loads of different contaminants that may be released into a receiving environment while ensuring the maintenance or retrieval of their uses.
Expected detection limit	The detection limit associated with the analytical method of a given parameter specified in the list of analytical methods published by the Centre d'analyse environnementale du Québec of the MELCCFP.
Extraction	The action of removing mineral material from excavation - open pit or underground.
Filter press	An intermittently operating filter consisting of a series of flat vertical filtering surfaces into which the pulp to be filtered is injected under pressure. The pulp is released by separating the filter plates.
Final effluent	Mine wastewater that is no longer treated before being released at the discharge point into the receiving environment or a sewer system.
Flood period	A significant increase in the water flow (and consequently the level) of a watercourse, a lake or a reservoir, most often attributable to precipitations or melting snow.
Freeboard	The vertical distance separating the embankment crest and the maximum water level in the tailings area.
Geochemistry	The study of the chemical behaviour of the elements, in particular in rocks (magmatic, metamorphic and sedimentary) as well as in water (coastal and marine) and the atmosphere.
Glaciofluvial deposits	Continental sediments originating from matter ripped off by a glacier and carried by a watercourse.
Global warming potential	A factor that describes the impact of the radiative forcing of one unit of a given greenhouse gas compared to one equivalent unit of carbon dioxide for a defined period.
Greenhouse gas	Gaseous component in the atmosphere, both natural and artificial, that absorbs and re-radiates the infrared radiation of a specific wavelength emitted by the surface of the Earth, the atmosphere and the clouds.

Hazardous material	A material which, by reason of its properties, is a hazard to health or to the environment and which is explosive, gaseous, flammable, poisonous, radioactive, corrosive, oxidizing or leachable or is designated as a hazardous material, and any object classed by regulation as a hazardous material by virtue of the *Environment Quality Act.*
High water	Elevation of the water level following abundant rainfalls or melting snow or ice.
High-water mark	This line is located at the natural high-water mark, i.e., where the predominance of aquatic plants passes to a predominance of terrestrial plants or, if there are no aquatic plants, where the terrestrial plants stop towards the body of water. This mark delineates the shorelines and shores of lakes and watercourses.
Hydraulic conductivity	A property of geological materials that characterizes the ease with which they allow the movement of water.
Hydrogeological conditions	A set of elements and characteristics that define the hydrology (groundwater science) and geology of a sector. It includes, among other things, the hydrostratigraphic units, granulometry and hydraulic properties of geological materials as well as groundwater levels and characteristics.
In situ	Latin expression that means on site.
Land use	The traditional and contemporary use of resources and the full occupation of the traditional territory.
Leaching tests	These tests make it possible to establish the risks associated with the potential leaching of toxic substances into the groundwater table.
Lixiviation	A technique consisting of using a solvent, namely water flowing in the soil or a substrate containing toxic products, to extract soluble products.
Low water level	The lowest recorded level of a watercourse or any other body of water.
Low-water period	The period of the year during which the flow of a watercourse reaches its lowest level (minimum flow).
Maternity	A fauna breeding site.
Mine water	Water, not including domestic wastewater, that is pumped from a mine excavation to keep it dry during exploration and development operations.
Mining lease	A mineral title that confers on its holder, on a given public territory, the exclusive right to mine mineral substances, except for those found on the surface. Since 1966, mining leases have replaced mining claims for new applications to operate.
Mitigation measure	A measure designed to reduce or eliminate the adverse effects of a project.
Modelling	The design of a model, i.e., a diagram representing a defined system, chosen following its intended use, followed by the development of a simulator (or an analogue, digital or other simulation model) of the system.
Observation well	A well used to observe, on an episodic or regular basis, a characteristic of the groundwater that may vary: level, chemical quality, temperature, etc. More specifically, a well used to measure the hydraulic load of a water table, in general near its surface, by surveying the depth of the table, and to observe its natural or influenced variations, through periodic measurements (less rigorously than when using a piezometer).
Organic matter	A substance of biological origin that results from the decomposition of plant debris, dejections and animal carcasses.
Outflow	A watercourse that releases the water of a lake or pond.
Overburden	The unconsolidated natural layer of sediments that must be penetrated to reach the economic material, i.e., soil that does not contain any material of value to mining companies.

Pond	A wetland with a water level of less than 2 m during the low-water season. It is characterized by the presence of floating or submerged aquatic vegetation as well as emergent vegetation covering at least 25% of the environment's surface area. Temporary ponds, often called vernal or forest pools, are shallow (< 1 m), isolated and usually fed in water by precipitations, melting or the water table. Ponds retain stagnant water in the spring for a period of approximately two months and then dry out during the summer. Given they are not inhabited by fish, they tend to favour species that are adapted to the recurrent flooddrought cycles such as salamanders and certain frog species.
Post-rehabilitation	The period that follows the end of the rehabilitation work planned to return the receiving environment to a satisfactory state for its protection.
Receiving environment	The environment in which the project unfolds and that is likely to be affected by the completion of the project.
Recirculation	Action by which mine wastewater is retrieved to be reused in equipment and processes.
Reference state	The characteristics of an environmental component as they were before the project.
Shoreline	The part of a lake or watercourse that extends from the high-water line to the centre of the body of water.
Special status species	Special status species are plant and animal species at risk according to the MELCCFP, i.e., those that are designated as threatened or vulnerable Québec by virtue of the *Act respecting threatened or vulnerable species* and those that are likely to be designated as such as well as plant and animal species that are at risk in Canada by virtue of the *Species at Risk Act*.
Stockpile	Land where mineral substances, topsoil, concentrates or mine tailings are accumulated.
Surface mineral substances	Peat; sand including silica sand; gravel; limestone; calcite; dolomite; common clay and argillaceous rocks used in the manufacture of clay products; all types of rocks used as dimension stone, crushed stone, silica or mineral in the making of cement; and every mineral substance that is found in its natural state as a loose deposit, except the tilth, as well as inert mine tailings, where such substances and tailings are used for construction purposes, for the manufacture of construction materials, or for the improvement of soils *(chapter I-1, Mining Act).*
Surface or superficial deposits	Unconsolidated sediments (clay, sand, gravel, stones, etc.) of various origins, natures, morphologies and thicknesses that rest on the surface of the bedrock.
Tailings	Solid or liquid substances, with the exception of the final effluent, resulting from the extraction, preparation, enrichment and separation of an economic material, including the sludge and dust resulting from the treatment or purification of mine wastewater or air emissions. Are considered as tailings the slag and sludge, including sewage sludge, released during the treatment by pyrometallurgy, hydrometallurgy or electroextraction. Are also considered as tailings the substances released during the extraction of a marketable substance from tailings and that correspond to those already defined in the first two paragraphs. Are excluded the tailings resulting from the working of a pit within the meaning of the *Regulation respecting pits and quarries* (R.Q., c.Q-2, r.2).
Tallyman	A trapper in charge of supervising other trappers and whose primary responsibility is managing animal populations within the limits of the land for which he is responsible.
Topsoil	Surface soil that is composed of a mix of organic matter as well as sand, silt and clay or a combination thereof and that is conducive to vegetation growth.
Traditional practices (traditional activities)	All of the traditional hunting, fishing, gathering and general activities as well as land and resource use activities for livelihood, ritual and social purposes.

Tributary	A watercourse that flows into a larger watercourse or into a lake (affluent).
Unconsolidated deposits	Unconsolidated matter that covers a deposit or the bedrock.
Waste rock	Rocks that do not contain enough minerals to make them economically viable.
Water table	The underground water table that feeds catchment works. The water table is the first table of groundwater under the soil surface.
Watercourse	Any water mass that flows into a bed at a regular or intermittent rate, including those created or modified by human intervention as well as the St. Lawrence River and the Gulf of St. Lawrence and all seas surrounding Québec.
Watershed	A watershed is a territory, bounded by drainage divides, over which water flows to a single point called an outflow.

ABBREVIATIONS/ACRONYMS

ABA	Acid-base accounting
ACS	Attestation of College Studies
AEGL	Acute Exposure Guideline Levels
AIS	Air Insulated Switchgear
AMD	Acid mine drainage
ANFO	Ammonium nitrate–fuel oil
ANRQC	Agreement Concerning a New Relationship Between the Gouvernement du Québec and the Crees of Québec
AP	Acidification potential
ARBJ	Administration régionale Baie-James
ASD	Apatisiiwin Skills Development
ATV	All Terrain Vehicule
BARPI	Bureau d'analyse des risques et pollutions industriels
BBS	Breeding Bird Survey
BCR	Bird Conservation Regions
BEX	Exclusive leases for the mining of surface mineral substances
BOD	Biochemical Oxygen Demand
BP	Before Present
CAPEX	Capital expenditure
CAR	Clean Air Regulation
CBHSSJB	Cree Board of Health and Social Services of James Bay
CDEC	Corporation de développement économique de Chapais
CDPNQ	Centre de Données sur le Patrimoine Naturel du Québec
CEAA	Canadian Environmental Assessment Agency
CEC	Commission for Environmental Coorporation
CEO	Chief executive officer
CERQ	Cadre écologique de référence du Québec
CESCC	Canadian Endangered Species Conservation Council
CFDC	Community Futures Development Corporation
CFM	Cubic feet per minute

CFNW	Cree First Nation of Waswanipi
CFPBJ	Centre de formation professionnelle de la Baie-James
CFU	Colony-forming unit
CHESB	Cree Hunters Economic Security Board
CIL	Cyanidation using the carbon-in-leach method
CIM	Canadian Institute of mining, metallurgy and petroleum
CIP	Carbon-in-pulp adsorption circuit
CLSC	Local Community Service Centre
CMC	Community Miyupimaatissiun Centre
CMHC	Canada Mortgage and Housing Corporation
CN	Canadian National
CNESST	Commission des normes, de l'équité, de la santé et de la sécurité du travail
CNG	Cree Nation Government
CNMP	Cree Nation Mining Policy
CNRC	Canadian National Railway Company
COD	Chemical Oxygen Demand
COFEX	Federal Review Panel South
COMEV	Environmental and Social Impact Evaluating Committee
COMEX	Environmental and Social Impact Review Committee
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CPC[O]	Contamination prevention criterion, water and aquatic organisms
CPEQ	Quebec Business Council on the Environment
CPHR	Cutting to protect the high regeneration
CQFB	Cree-Québec Forestry Board
CRA	Cree Regional Authority
CRAIM	Conseil pour la réduction des accidents industriels majeurs
CRRNTBJ	Commission régionale sur les ressources naturelles et le territoire de la Baie-James
CRSSSBJ	Centre régional de santé et de services sociaux de la Baie-James
CSB	Cree School Board
CSBJ	Commission scolaire de la Baie-James
CSMO	Sectoral manpower committees
CSSBJ	Centre de services scolaire de la Baie-James
CTA	Cree Trappers' Association

CTEU-9	Water leaching test method (Equilibrium extraction) by Environment Canada
CTS	Cap and Trade System
CVAA	Aquatic life protection, acute effect
CVAC	Aquatic life protection, chronic effect
CWHC	Canadian Wildlife Health Cooperative
CWICI	Canada Warbler International Conservation Initiative
CWS	Canadian Wildlife Service
D019	Directive 019
DAF	Dissolved air flotation
DFO	Fisheries and Oceans Canada
DIPPR	Design Institute for Physical Property
DVS	Diploma of Vocational Studies
EC	Environment Canada
ECCC	Environment and Climate Change Canada
EDO	Environmental discharge objectives
EEM	Environmental Effects Monitoring
EER	Environmental Emergency Regulations
EFE	Exceptional forest ecosystems (Écosystème forestiers exceptionnels)
EIA	Environmental Impact Assessment
EIJB	Eeyou Istchee James Bay
EIJBRG	Eeyou Istchee James Bay Regional Government
EMS	Environmental Monitoring System
EMVS	Threatened or vulnerable species or species likely to be so designated
EPA	Environmental protection agency
EPT	Ephemeroptera - Plecoptera - Trichoptera
EQA	Environment Quality Act
ERCSQ	Équipe de rétablissement des chauves-souris du Québec
EROP	Équipe de rétablissement des oiseaux de proie du Québec
ERP	Emergency response plan
ES	Endangered species
ESG	Environmental, social and governance
FED	Frequent effect concentration
FIFO	Fly-in, fly-out

FMU	Furbearer Management Unit
FQCK	Fédération québécoise du canot et du kayak
FRAC	Fonds Restor-Action Cri
FRR	Fonds régions et ruralité
FTE	Full-time equivalent
GA	Timber supply guarantees
GBIF	Global biodiversity information facility
GCC	Grand Council of the Crees
GDP	Gross domestic product
GHG	Greenhouse gas
GHGRP	Greenhouse Gas Emissions Reporting Program
GPS	Global Positioning System
GRTATU	Groupe de Ressources Techniques de l'Abitibi Témiscamingue Ungava
GUSPM	US Gallon per minute
ha	Hectare
HA	Highly annoyed
HDPE	High density polyethylene
HP	Horsepower unit
HQ	Hydro-Québec
HSF	Health Services Fund
HSSA	Health and social services agencies
IAA	Impact Assessment Act
IAAC	Impact Assessment Agency of Canada
IAS	Invasive alien species
IBA	Impact and Benefit Agreement
IBC	Intermediate Bulk Containers
ILR	Intensive leaching reactor
INSPQ	Institut national de santé publique du Québec
IOC	Integrated operations centre
IP	Indicated pair
IPA	Indice ponctuel d'abondance
IROC	Integrated Remote Operations Center
ISP	Income Security Program for Cree Hunters and Trappers

ISQ	Institut de la statistique du Québec
JBNQA	James Bay and Northern Quebec Agreement
KEQC	Kativik Environmental Quality Commission
Km	Kilometre
KM	Semi-parametric method Kaplan-Meier
kV	Kilovolt
LDTV	Likely to be designated threatened or vulnerable
LED	Light emitting diode
LEET	Lieu d'enfouissement en tranchées
LEMVQ	List of Threatened or Vulnerable Species in Quebec
LFL	Lower flammability limit
LLDPE	Linear low-density polyethylene
LNG	Liquefied natural gas
LSA	Local study area
MA	Ministerial authorization
MAC	Mining Association of Canada's
MAH	Monocyclic aromatic hydrocarbons
MBBR	Moving bed biofilm reactor
MBJ	Municipalité de la Baie-James
MCC	Ministère de la Culture et des Communications
MDDEFP	Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs
MDDELCC	Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques
MDDEP	Ministère du Développement durable, de l'Environnement et des Parcs
MDMER	Metal and Diamond Mining Effluent Regulations
MEES	Ministère de l'Éducation et de l'Enseignement supérieur
MELCC	Ministère de l'Environnement et de la Lutte contre les changements climatiques
MELCCFP	Ministère de l'Environnement, de la Lutte contre les changements climatiques, de la Faune et des Parcs
MERN	Ministère de l'Énergie et des Ressources naturelles
MERS	Mining Effluent Reporting System
MFFP	Ministère des Forêts, de la Faune et des Parcs
MIBC	Methyl isobutyl ketone

MRCVO	Municipalité régionale de comté de La Vallée-de-l'Or
MRE	Mineral resource estimates
MRNF	Ministère des Ressources naturelles et des Forêts
MSDC	Multi-Service Day Center
MSDS	Material Safety Data Sheet
MSP	Minister of Public Security
MSSS	Ministère de la Santé et des Services sociaux
Mt	Megaton tons
MTESS	Ministère du Travail, de l'Emploi et de la Solidarité sociale
MTMDET	Ministère des transport, Mobilité durable et électrification des Transports du Québec
MTQ	Ministère des Transports du Québec
MW	Megawatt
NABCI	North American Bird Conservation Initiative
NAG	Potentially not acid generating
NAP	Northern Action Plan
NAPS	National Air Pollution Surveillance
NBL	Natural background level
NEQ	Quebec Enterprise Number
NFC	National Fire Code of Canada
NFPA	National Fire Protection Association
NHCA	Natural Heritage Conservation Act
NIOSH	National Institute for Occupational Safety and Health
NP	Acid neutralization potential
NPO	Non-profit organization
NPRI	National Pollutant Release Inventory
NPV	Net Present Value
NRCan	Natural Resources Canada
NSR	Net smelting return
NSS	Not self-sustainable
NTS	National Topographic System
NTU	Nephelometric Turbidity unit
NVZ	Northern Volcanic Zone
OEC	Occasional effect concentration

OECD	Organization for Economic Cooperation and Development
OGQ	Ordre des Géologues du Québec
OHSMS	Occupational Health and Safety Management System
OIQ	Ordre des ingénieurs du Québec
ONEMA	Office national de l'eau et des milieux aquatiques
OPEX	Operation expenditure
OSK	Osisko
PAFI	Plan d'aménagement forestier intégré
PAFIO	Plan d'aménagement forestier intégré opérationnel
PAFIT	Plan d'aménagement forestier intégré tactique
PAG	Potentially acid generating
PAH	Polycyclic aromatic hydrocarbons
PATP	Public land use plans
PCB	Polychlorobiphenyls
PEA	Preliminary economic assessment
PEC	Probable effect concentration
PHAST	Process Hazard Analysis Software Tool
PMF	Probable maximum flood
PPV	Peak particle velocity (PPV, measured in mm/s)
PRAU	Permis de récolte de bois aux fins d'approvisionnement des usines de transformation du bois
PRDTP	Plan régional de développement du territoire public
QBBA	Quebec Bird Breeding Atlas
QFP	Quartz-feldspar porphyry
QMA	Quebec Mining Association
RADF	Regulation respecting the sustainable development of forests in the domain of the State
RBQ	Régie du bâtiment du Québec
RCM	Regional county municipality
RCS	Regulation respecting sand pits and quarries
RDL	Reported detection limits
RDOCECA	Regulation respecting the mandatory reporting of certain emissions of contaminants into the atmosphere
REC	Rare effect concentration

REFMVH	Regulation respecting threatened or vulnerable wildlife species and their habitats
RES	Criteria for resurgences in surface water
RESC	Regulation respecting the burial of contaminated soils
RHM	Residual hazardous materials
RLRQ	Act respecting the compilation of Quebec Laws and Regulations
RM	Residual materials
RMD	Regulation respecting hazardous materials
ROS	Non-parametric method « Regression on order statistics »
RQDW	Regulation respecting the quality of drinking water
RRSEI (ou RSEI)	Regulation respecting the regulatory scheme applying to activities on the basis of their environmental impact
RSA	Regional study area
RSST	Regulation respecting occupational health and safety
SABC	Secondary ball mill in closed circuit with a cyclone cluster (ball mill and pebble crusher)
SADF	Sustainable Forest Management Strategy (Stratégie d'aménagement durable des forêts)
SAG	Semi-autogenous grinding
SAGR	Submerged attached growth reacto
SARA	Species at Risk Act
SDBJ	Société de développement de la Baie-James
SFA	Service de la faune aquatique
SFDA	Sustainable Forest Development Act
SHNVSL	Société d'histoire naturelle de la Vallée du Saint-Laurent
SIGÉOM	Système d'information géominière du Québec
SOPFEU	Société de protection des forêts contre le feu
SPLP	Test method for leaching in the presence of acid rain
SRVTC	Sabtuan Regional Vocational Training Centre
TAC	Transportation association of Canada
TCLP	Leaching test method for assessing the mobility of inorganic species
TDG	Transportation of dangerous goods
TEC	Threshold effect concentration
TIR	Regional interdepartmental round table
TLGIRT	Table locale de gestion intégrée des ressources et du territoire
TPD	Tons per day

TSM	Towards Sustainable Mining
TSP	Total suspended particulates
TSS	Total suspended solids
TSX	Toronto Stock Exchange
UFL	Upper flammability limit
UGAF	Fur-bearing animal management units
URSTM	Unité de recherche et de service en technologie minérale
USG	US gallons (unit of measure)
UV	Ultraviolet radiation
VOC	Volatile organic compounds
VOC	Volatile organic compound
WHMIS	Workplace Hazardous Materials Information System (SIMDUT)
WHO	World Health Organization
WNS	White-nose syndrome
WSI	Weh-Sees Indohoum
WTP	Water treatment plant
ZEC	Zone d'exploitation contrôlée

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Note to the reader: Appendices are provided in French only, except for 4-1, 5-1 and 5-2 (translation of the French version) and 11-1 (bilingual).

APPENDICES

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1 CONTEXT

1.1 PROJECT PROPONENT AND CONSULTANT

As a mining exploration and development company focused on precious metal resource properties in Canada, Osisko Mining Inc. (Osisko) proposes to develop a mining complex, including an underground mine, for the extraction and on-site processing of gold.

Osisko is a Canadian corporation listed on the Toronto Stock Exchange (TSX:OSK), incorporated in 2010 under the Ontario Business Corporations Act (R.S.O. c. B.16). The corporation's head office is located in Toronto. Osisko also has an office in Montréal, in Lebel-sur-Quévillon, and at the Windfall site.

Osisko is primarily focused on the acquisition, exploration, and development of precious mineral deposits in Canada. The acquisition, exploration, and development of precious mineral deposits involve a high degree of risk. Osisko's projects are at the exploration stage and are subject to risks and challenges similar to those of companies at a comparable stage. These risks include the challenges of raising adequate capital, those of exploration, and the inherent operational risks of the mining industry. These risks also include challenges related to future profitable production or Osisko's ability to profitably divest its interest, as well as the volatility of the global economy and commodity prices, all of which are uncertain. Despite these risks, the financial stability of the company is solid. Current operations at the Windfall site have required financial guarantees that have always been provided to the authorities in a timely manner.

The Windfall gold project is 100% owned by Osisko and is not affected by any prior agreements with third parties.

The project is subject to the provincial environmental impact assessment and review procedure under section 153 of Chapter II of the Environment Quality Act (EQA; R.S.Q., c. Q 2), which documents the provisions applicable to the James Bay and Northern Quebec region in connection with the James Bay and Northern Quebec Agreement. The project is not subject to a federal environmental assessment under the Impact Assessment Act (S.C., 2019, c. 28, s. 1) pursuant to the Physical Activities Regulations (s. 18, para. c), as the planned nominal extraction of this new gold mine is 3,400 tonnes of ore per day (t/day or tpd) and the processing plant capacity is also 3,400 t/day nominal, or less than 5,000 t/day of ore.

A Directive has been issued by the Ministère de l'Environnement, de la Lutte contre les changements climatiques, de la Faune et des Parcs (MELCCFP)[1] for the project [ref: 3214-14-059; July 2017; revised January 2022 (MELCC, 2022)].

Table 1-1 shows the proponent's contact information.

1 Formerly the Ministère de l'Environnement du Québec (MENV), the Ministère du Développement durable, de l'Environnement et des Parcs (MDDEP), the Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques (MDDELCC), and the Ministère de l'Environnement et de la Lutte contre les changements climatiques (MELCC). The acronym MELCCFP will be used to refer to this department throughout the report, regardless of when the documents are published.

Table 1-1 Proponent name and contact information

Name of the proponent	Osisko Mining Inc.
Civic address	1100 Des Canadiens-de-Montréal Avenue, suite 300 Montréal, Qc, H3B 2S2
Person in charge of the project	Andréanne Boisvert, Geographer, M. A. Vice President Environment ad Community Relations aboisvert@osiskomining.com.
Resource person	Vanessa Millette, geographer, M.Sc. Env. Environment Director vmillette@osiskomining.com
Phone	438-870-6237
Fax	416-363-7579
Website	www.osiskomining.com
Quebec Enterprise Number (NEQ) from the Registraire des entreprises du Québec	1172033616

The mandate to conduct the environmental impact assessment was given to WSP Canada Inc. (WSP), whose information is presented in Table 1-2.

Table 1-2 Consultant name and contact information

Name	WSP Canada Inc.
Street address	1135 Lebourgneuf Blvd. Québec QC H3H 1P9
Project manager	Marie-Hélène Brisson, Biologist Project Director marie-helene.brisson@wsp.com
Phone	581-814-5976
Fax	418-624-1857
Website	www.wsp.com
Quebec Enterprise Number (NEQ) from the Registraire des entreprises du Québec	1148357057

The other consulting firms supporting WSP in its mandate are:

- BBA Inc.: Infrastructure for the ore processing plant.
- Entech Mining Ltd.: Mining plan.
- GCM Consultants Inc.: Mine water treatment plant.
- Arkéos: Archaeological potential study.

1.2 OSISKO'S ENVIRONMENTAL AND SUSTAINABLE DEVELOPMENT POLICIES, CORPORATE PROCEDURES, AND AGREEMENTS

Osisko's vision is to be "a sustainable company and an industry leader that is valued by its stakeholders." Respect, diversity, integrity, passion, and efficiency are among the company's fundamental values (Osisko, 2022).

To achieve this vision, Osisko has formulated a Corporate Responsibility Strategy aimed at minimizing environmental impacts and creating sustainable value for all its stakeholders, including host communities. This commitment materializes on a daily basis through the integration of social, environmental, and economic aspects into the company's decision-making processes, as well as through the resulting actions. Osisko also reports on its sustainability performance through its annual sustainable development report. Its sustainable development reports and most of its corporate policies and procedures are available on its website (https://www.osiskomining.com/data-center/).

In 2022, Osisko received an "AA" rating following an evaluation by *MSCI ESG Ratings*. This assessment measures corporate resilience and financial risk management with respect to environmental, social, and governance (ESG) criteria. Companies are rated on a scale of "CCC" to "AAA," where "AAA" represents industry leaders (MSCI, 2022). Osisko's result reflects the company's strong performance and its efforts to become a leader in this field.

As a result of the protocols, standards, and policies put in place by the proponent, no environmental non-compliance has been reported at the Windfall project effluent between 2019 and 2022. The company also has a composter on site, which reduces the volume of waste to be transported. A total of 42,300 kg of household waste and cardboard was composted in 2021 (Osisko, 2022).

Diversity, equality, and inclusion also guide the proponent's recruitment and hiring process. In 2021, 30% of Osisko's employees were women and 50% of the senior management team were women or queer. In the same year, 22% of Windfall project employees were members of First Nations (Osisko, 2022).

Osisko also seeks to generate value in the communities where it operates by encouraging local hiring, purchasing, and investment. For example, available jobs are posted in the Cree communities of Eeyou Istchee and Cree people with equal qualifications from these communities are given priority for hiring (primarily from the community of Waswanipi). Of Osisko's 175 employees in Canada in 2021, 13% were from the Cree communities of Eeyou Istchee, 5% from the non-First Nations communities of Nord-du-Québec, and 33% from Abitibi-Témiscamingue. As for purchases, 74% were made in Quebec and Ontario, including $85 million in purchases and contracts with First Nations companies or joint ventures (Osisko, 2022).

Osisko has also recently undertaken two workforce training initiatives, the first through a partnership with the Comité sectoriel de main-d'oeuvre de l'industrie des mines [Sectoral workforce committee for the mining industry] and the Cree community of Waswanipi. The first training initiative on mining basics is an employment preparation program for the Cree. The objective is to teach the job skills required to obtain a job in the mining sector. The second initiative is with the Centre de formation professionnelle de la Baie-James to support students pursuing a Diploma of Vocational Studies (DVS) in ore processing in Chibougamau through on-site training. The students come to do their field training directly at the Windfall site. These programs are offered on an ongoing basis and additional cohorts are planned.

Osisko's commitment to sustainable development is reflected in its environmental and social policies as well as in the existing agreements it has with its host communities. A brief overview of this commitment is presented by theme in this section.

1.2.1 ENVIRONMENTAL POLICY

Through its Environmental Policy, Osisko aims to promote a culture of environmental protection and sound management. To achieve this, the proponent is committed to rigorously complying with applicable laws and regulations; considering and preventing the potential impacts of its activities on the natural, human, and social environments; developing emergency action plans to mitigate the negative effects of unforeseen events; using proven technologies and the most effective techniques to mitigate environmental risks; providing training to employees to raise their awareness of environmental protection; minimizing its consumption of natural resources and its environmental footprint; rehabilitating mining exploration sites; and, consulting with its stakeholders. Osisko also relies on the collaboration of all its managers, employees, subcontractors, and suppliers to create and maintain this culture of sound environmental management.

1.2.2 RESPONSIBLE PROCUREMENT POLICY

One of the objectives of Osisko's Responsible Procurement Policy is to provide "mutually beneficial business opportunities" to local stakeholders. Osisko is committed to promoting local purchases and suppliers, as well as encouraging the development of local businesses, particularly those owned by First Nations and women. Furthermore, the proponent emphasizes the importance of respecting human rights and aims to reduce the impact on the environment by integrating environmental performance concepts throughout its procurement process.

1.2.3 COMMUNITY RELATIONS POLICY

Osisko has adopted its Community Relations Policy, which promotes an ongoing dialogue with host communities and is implemented at early project stages to understand concerns and work together to implement appropriate solutions. This policy also emphasizes the importance of considering the potential impacts of the company's activities on the natural, human, and social environments and to adopt preventive measures accordingly. As with its Responsible Procurement Policy, Osisko is committed to contributing to the socioeconomic development of local communities by creating jobs and investing in sustainable projects.

1.2.4 POLICY ON THE DIVERSITY OF THE BOARD OF DIRECTORS AND EXECUTIVES

To ensure that a range of perspectives, experiences, and expertise are included in its management and decision-making, Osisko has a Policy on the Diversity of the Board of Directors and Executives. The company is committed to promoting diversity on its Board of Directors and of its executives with respect to gender, ethnicity, age, race, religion, disability, cultural and socioeconomic background, geographic location, and sexual orientation. Specifically, this policy states that Osisko's goal is to have 40% of its Board of Directors be women or persons of another gender.

1.2.5 HUMAN RESOURCES POLICY

Osisko's Human Resources Policy aims to promote a respectful, diverse, and inclusive work environment. Several measures are put forward to promote a healthy work environment, including training for talent development and mechanisms to address employee concerns, while ensuring compliance with laws, regulations, and human rights.

1.2.6 POLICY ON HARASSMENT IN THE WORKPLACE

Osisko has adopted its Policy on Harassment in the Workplace, which commits the company to maintaining a respectful work environment where harassment is prohibited. According to the Policy:

> "*Workplace harassment occurs when a person engages in a course of vexatious comment or conduct against a worker in a workplace which is known, or ought reasonably to be known, to be unwelcome.*"

This definition of harassment is consistent with the laws and regulations in force in Quebec. The Policy also encourages the reporting of incidents of harassment in the workplace and defines the process for handling reports. As part of this process, it is stated that Osisko's management will investigate all reports and that corrective measures will be put in place if necessary.

1.2.7 HEALTH AND SAFETY POLICY

Osisko's Health and Safety Policy is based on five core values: respect, passion, diversity, integrity, and efficiency, for its workers, partners, and the general public. To this end, in addition to complying strictly with the laws and regulations of the jurisdictions in which it operates, Osisko is committed to:

- Develop emergency action plans to mitigate the negative effects of unforeseen events.
- Design and use its facilities with approved technologies and the most efficient techniques to minimize risks to the environment and to the health and safety of people, while keeping in mind the concerns of host communities.
- Provide employees with a continuing training program to improve their health and safety skills and knowledge.

- Continuously develop prevention activities that meet industry standards and are tailored to the needs and uniqueness of our workplaces.
- Aim for continuous improvement by implementing its Occupational Health and Safety Management System (OHSMS), annually reviewing its commitments and objectives, collecting and analyzing statistics, conducting audits, and developing plans and targets to improve performance.
- Ensure that the necessary resources—human, material, and financial—are available to promote, plan, and implement this policy.

1.2.8 PROFESSIONAL DEVELOPMENT POLICY

Osisko's Professional Development Policy aims to ensure fair and equitable treatment of all its employees. One of its objectives is to promote the development of employee skills and qualifications, to facilitate the integration of the next generation of employees, and to ensure a qualified succession for management positions. To achieve this, it has established a framework and procedure for responding to requests for professional development activities from all employees. The skills development activities supported must be related to the position held by the employee making the request or must meet the needs of the company.

1.2.9 FOREST ROAD ACCESS PROCEDURE

To ensure the safety of users of the access roads to the Windfall project site, Osisko has developed its Forest Road Access Procedure. According to this procedure, users going to the Windfall site must use the designated access roads from Lebel-sur-Quévillon, Roads 1050 (R1000), 0853 (R5000), and 1053 (R6000), and have in their possession an FM radio. They must also call in by FM radio or telephone before departing, and then by FM radio every 5 km until they arrive at the Windfall site gatehouse. The procedure also defines departure and arrival times that must be respected, between 6 a.m. and 6 p.m. Exceptional circumstances may cause departures outside of these periods, in which case prior authorization must be obtained from the industrial safety department. Lastly, it is specified that Osisko's workers and subcontractors must use the means of transportation provided by the employer since no worker or subcontractor can take their personal vehicle to the site.

1.2.10 ADVANCED EXPLORATION AGREEMENT WITH THE CREE COMMUNITY OF WASWANIPI

Before Osisko acquired the project, several information meetings were held between Eagle Hill and Waswanipi representatives. These meetings led to the signing in 2012 of an Advanced Exploration Agreement with the Cree First Nation of Waswanipi, the Grand Council of the Crees, and the Cree Regional Authority. Osisko continues to honour the terms of the Exploration Agreement. This agreement is aimed at promoting the employment and training of Cree workers and providing business opportunities for Cree businesses, particularly in the areas of road maintenance and food services. Joint strategies were developed to ensure transparency and collaboration, such as public presentations, meetings, an environmental monitoring committee, involvement of community members in field inventories, and site visits. Osisko also employs a Cree liaison officer based in the Waswanipi community who facilitates recruitment activities, consultation, and the organization of information and cultural events.

1.2.11 COLLABORATION AGREEMENT WITH LEBEL-SUR-QUÉVILLON

A collaboration agreement was signed between Osisko and the town of Lebel-sur-Quévillon in 2017. The main objectives of this collaborative process are to ensure transparency and effective communication with the town, to promote social acceptability, and to maximize the socioeconomic benefits of the project for Lebel-sur-Quévillon, all in a spirit of partnership. The implementation of this agreement and the exchange of information are carried out through regular meetings of the collaboration committee, which includes city representatives, the James Bay Regional Government, and Osisko.

1.3 INTEGRATION CONTEXT

1.3.1 PROJECT LOCATION

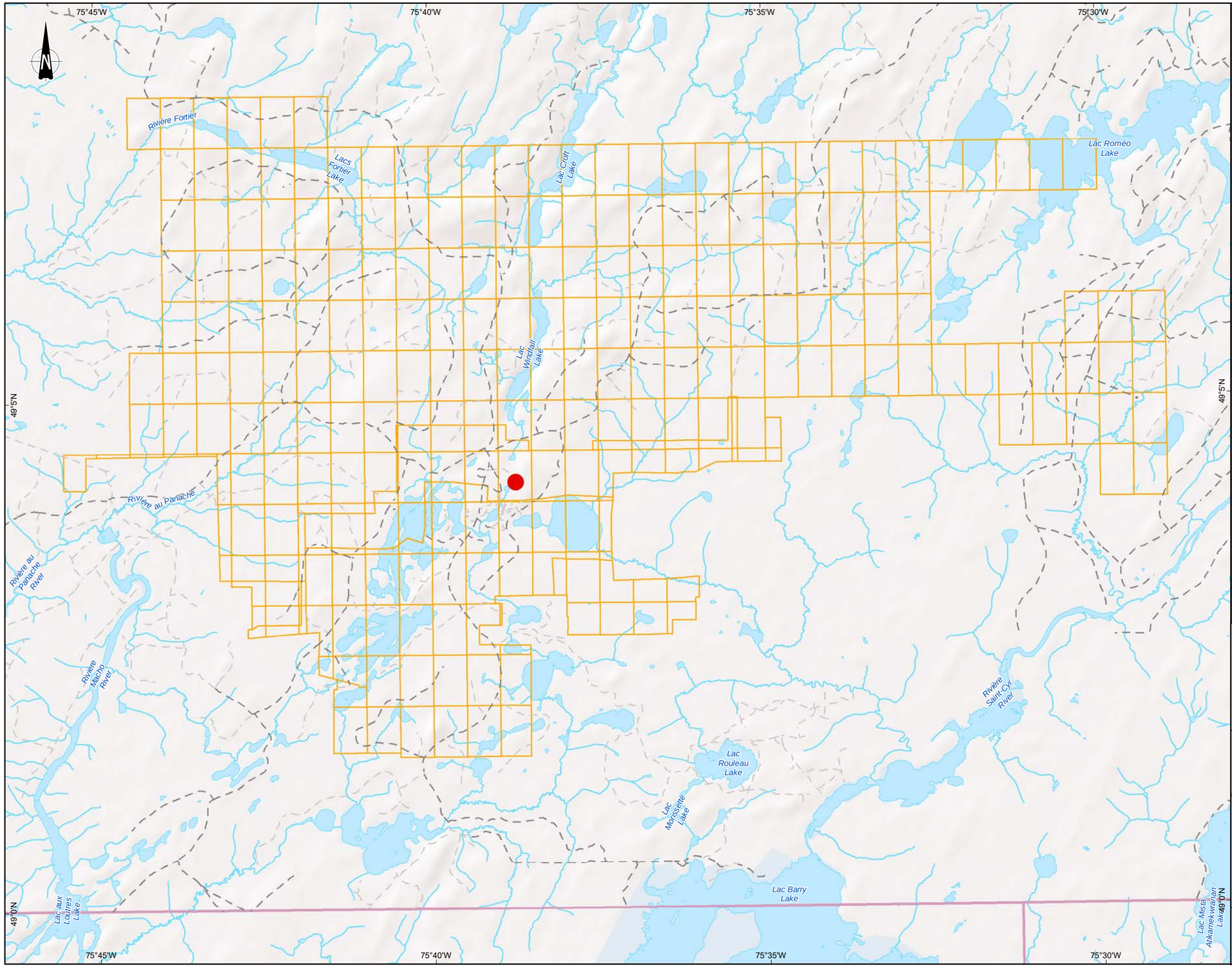
The Windfall project is located north of the 49th parallel in the Nord-du-Québec administrative region, on Category III lands in the Eeyou Istchee James Bay Territory. The mine site is located approximately 270 km by road from the town of Val-d'Or and 115 km east of the town of Lebel-sur-Quévillon (Map 1-1), an area known for its gold, copper, and zinc deposits. The Windfall property consists of 286 contiguous mining claims covering an area of 12,400 ha (Map 1-1).

The mine site is located 100% on Crown land and no federal land is located in the local study areas of the Project. It is accessible by forest roads (Road R1050 [R1000] to kilometre 12, Road R0853 [R5000] to kilometre 66, then Road R1053 [R6000] to kilometre 112 - Windfall). It is also possible to get to the site from Chapais using the forest roads (151 km).

The geographic coordinates at the centre of the mine site are shown below.

— Latitude: 49.069873 North

— Longitude: -75.645724 West



Limite administrative / *Administrative boundary*

Hydrographie / *Hydrography*

Cours d'eau / *Watercourse*

Plan d'eau / *Waterbody*

Routes / *roads*

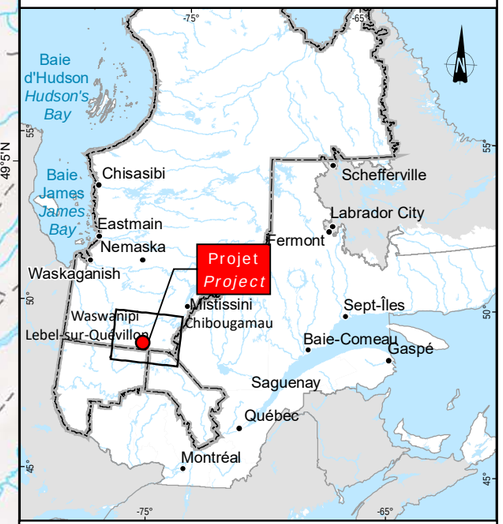
Chemin forestier / *Forestry road*

Chemin d'hiver / *Winter road*

Projet / *Project*

Localisation du projet minier Windfall / *Windfall mining project location*

Titre minier de la propriété Windfall appartenant à Minière Osisko Inc. / *Windfall property mining claims owned by Osisko Mining Inc.*



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Projet minier Windfall - Étude d'impact sur l'environnementl /
Windfall Mining Project - Environmental Impact Assessment

Site minier Windfall, Eeyou Istchee Baie-James (Québec) /
Windfall Mining Site, Eeyou Istchee Baie-James (Quebec)

Carte 1-1 / *Map 1-1*
Localisation du projet minier Windfall /
Windfall Mining Project Location

Sources / Sources:
CanVec+, 1/50 000, RN Can, 2014
SDA, 1/20 000, MERN Québec, 2020
BDTA, 1/250 000, MRN Québec, 2002
BDGA, 1/5 000 000, MRN Québec, 2012
GESTIM, MRN Québec, 2022

0 0,7 1,4 Km

MTM, Fuseau 9 / *Zone 9*, NAD83

2023-02-24

Préparée par / Preparation : M.-H. Brisson
Dessinée par / Drawing : C. Thériault
Vérifiée par / Verification : M.-H. Brisson
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wsp

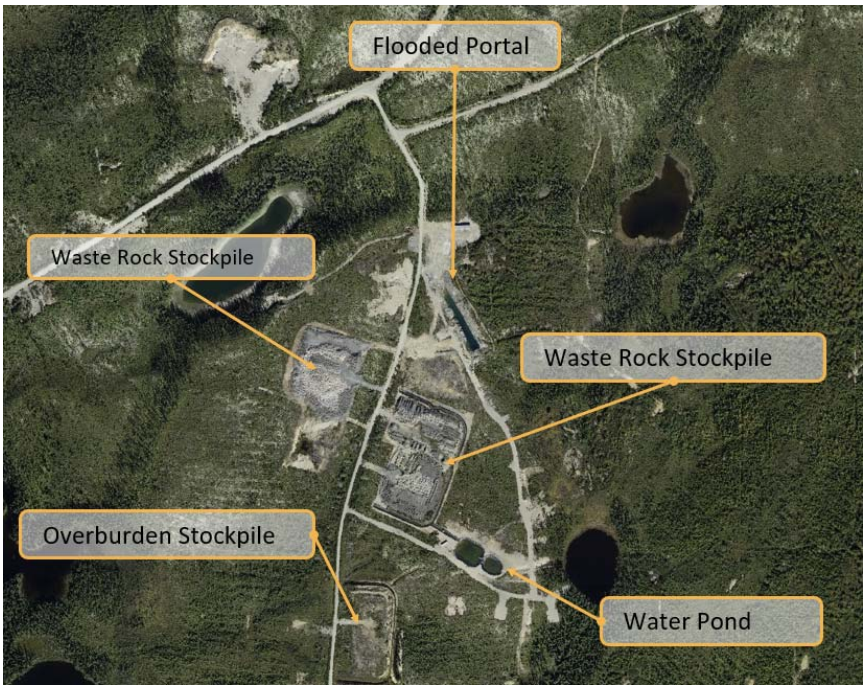
1.3.2 HISTORY OF MINING ACTIVITIES

Mining exploration activities have taken place on the Windfall property since 1975. Gold mineralization in this area was discovered in 1994 by Murgor Resources, specifically in Barry Township, located approximately 10 km southeast of the Windfall property.

In 1996, the Alto fault was discovered on the Windfall mine property by Alto Minerals Inc. and Noront Resources Ltd. during an extensive mapping and trenching campaign. Exploration has been ongoing since then by Inmet Mining Corporation and Fury Explorations Ltd.

In early 2007, a collaboration agreement was signed between Noront Resources Ltd. (formerly the holder of the claims) and Murgor Resources Inc. for the construction of the exploration ramp to extract a bulk sample. At the portal site, logging for drilling was done and rock was cleared in a few locations. In 2008, Noront excavated a ramp to extract a bulk sample. This ramp was flooded and plugged with a rock pile afterwards. Some vestiges of the bulk sampling (extraction) that occurred in 2008 (waste rock pile and ore) can still be seen on the site (Figure 1-1).
In 2009, Noront was acquired by Eagle Hill.

Figure 1-1 Aerial photograph of the Windfall site after Noront's initial operations



A total of three mineral resource estimates have been published by Eagle Hill (2011, 2012, and 2014). In November 2014, the latest update to the project's mineral resource estimate by SRK (Canada) led Eagle Hill, in April 2015, to release the results of an independent preliminary economic assessment (PEA) of this gold project. This assessment envisaged an underground mine project with a production rate of 1,200 t/d over the estimated 7.6-year mine life, for a total production of 3.3 Mt of ore.

BULK SAMPLES

It was not until August 2015 that Osisko, then Oban Mining Corporation (Oban), acquired Eagle Hill and began drilling at the Windfall mine site. In 2016, drilling led to the discovery of a zone that was named Lynx and that would later become the cornerstone of the mineral resource estimate. This discovery underscored the need for further development work underground. To restart its activities, the ramp had to be dewatered.

Therefore, in 2017, Osisko initiated the steps to continue the bulk sampling work started by Noront. Collection of a bulk sample of 5,567 tonnes of mineralized material in Zone 27 was completed in the fall of 2018. The first part of the sample was transported between October 31 and December 5, 2018, and then processed between December 3, 2018, and March 8, 2019. The second part of the sample was transported from January 29 to March 13, 2019, and processed between May 12 and 16, 2019. Processing of the mineralized material was done at Northern Sun Mining's Redstone mill located in South Porcupine, Ontario. Results from the first bulk sample released on June 11, 2019, returned an average grade of 8.53 g/t Au (1,508 oz Au), which is a 126% positive reconciliation to the predicted average grade. The surface infrastructure for this period is shown in Figure 1-2.

At the end of 2017, Osisko was interested in continuing exploration by advancing the exploration ramp toward the Lynx and Underdog zones to take a second 5,000-tonne bulk sample from each zone. As mentioned above, the Lynx zone had just been discovered and had great potential. Upon obtaining authorization, the collection of a bulk sample of 5,716 tonnes of mineralized material from the Lynx zone was completed in September 2019. Transportation of the sample was completed on October 31, 2019, and processing of the mineralized material was completed from November 14 to 23, 2019, again at the Redstone Mill. The second bulk sample returned a reconciled processed grade of 17.8 g/t Au from the extracted tonnes (3,271 oz Au). The average grade of 17.8 g/t Au represents a positive reconciliation of 189% to the predicted average grade of 9.40 g/t Au.

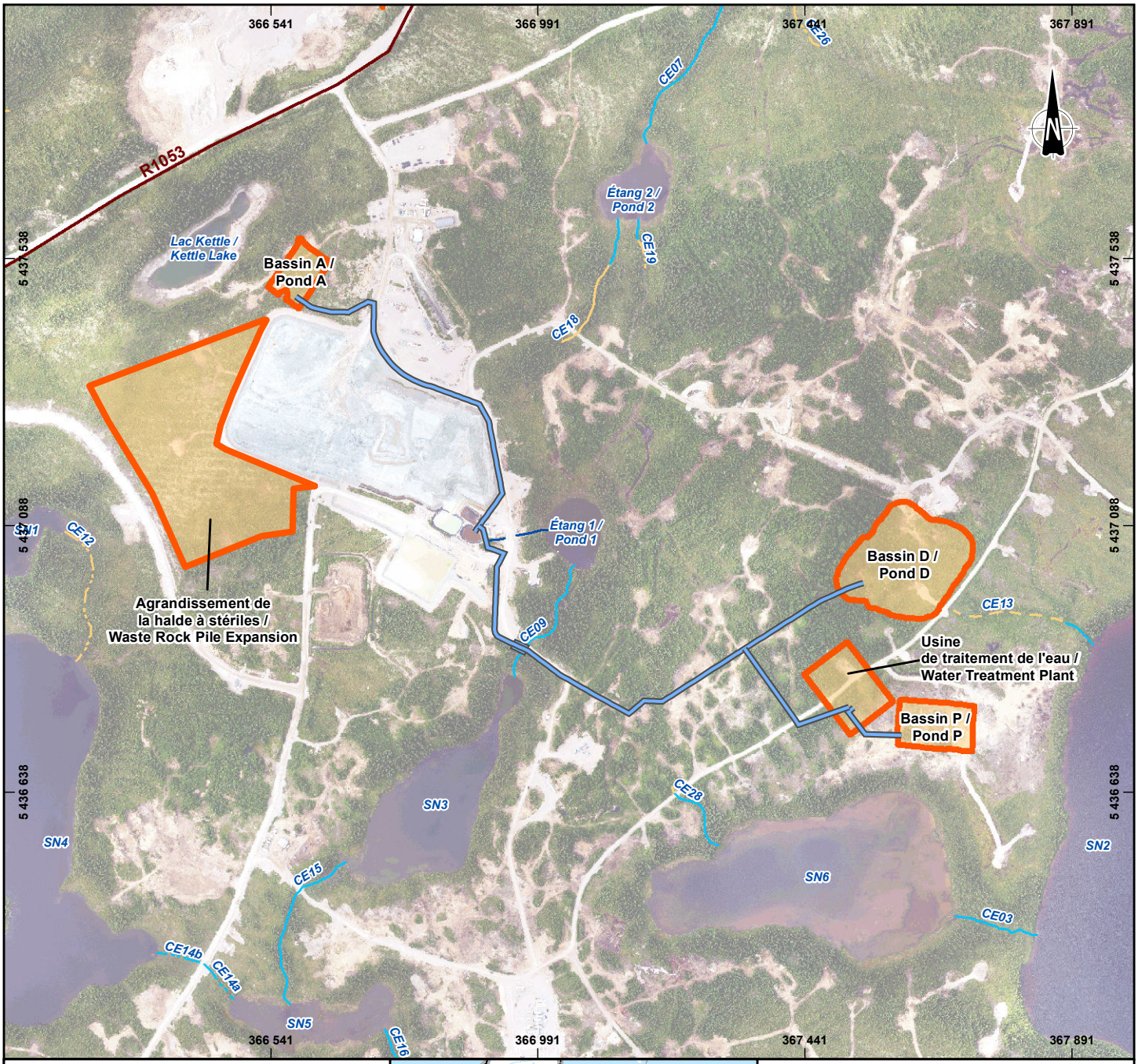
Figure 1-2 Aerial photograph of the Windfall site after the first bulk sampling activities

Following the completion of the surface drilling program conducted in 2018–2019 and the discovery of the Triple Lynx zone, Osisko requested in November 2019 to postpone the collection of the sample from the Underdog zone to collect a 5,000-tonne sample from the upper portion of Triple Lynx instead. Osisko then submitted amendment applications and obtained its authorizations. The sample was transported during the summer of 2022 and the mineralized material was processed at the Redstone Mill in September 2022. Results from the third bulk sample obtained in October 2022 from the Triple Lynx zone yielded an average grade of 65.5 g/t Au from the processing of 4,809 tonnes mined. The reconciliation of this third sample, relative to the average grade of the resource estimate, was calculated at 169% (anticipated: 6,009 oz Au, 38.9 g/t Au; actual: 65.5 g/t Au, 10,135 oz Au).

From 2020 onwards, exploration efforts were focused on Lynx and work in the Underdog zone was no longer a priority. In November, Osisko planned a series of work programs in the Lynx zone and to a lesser extent in the Main zone (Caribou/27). The new characterization work performed included a test pit (without processing) in the Lynx zone and mineralized drifts and cross-cuts in the Lynx zone and in Zone 27. Figure 1-3 shows the site layout during this period.

Figure 1-3 Drone image of the Windfall site after the second bulk sampling activities

In the summer of 2021, Osisko applied for new permits to conduct a fourth bulk sampling in the Lynx 4 and Caribou zones. These were obtained in December 2022 and surface infrastructure development will begin in 2023 (Figure 1-4). Ramp excavation activities are ongoing.



Infrastructure / *Infrastructure*

Route forestière secondaire / *Secondary Forest Road*

Conduite existante / *Existing conduct*

Hydrographie / *Hydrography*

Cours d'eau permanent / *Permanent watercourse*

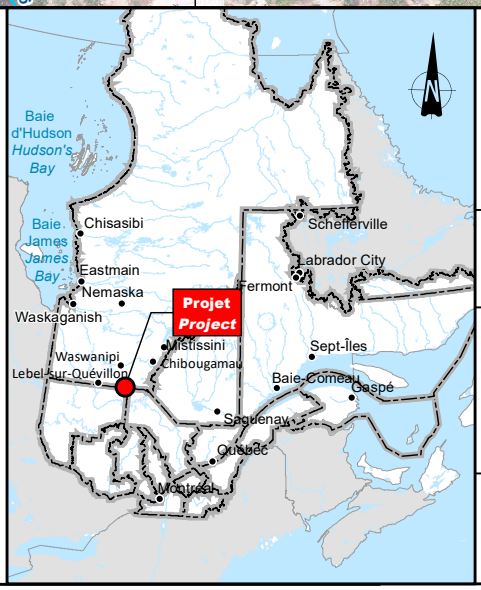
Cours d'eau permanent partiellement souterrain / *Partially undeground permanent watercourse*

Cours d'eau intermittent / *Intermittent watercourse*

Cours d'eau intermittent partiellement souterrain / *Partially undeground intermittent watercourse*

Cours d'eau souterrain / *Underground watercourse*

Canal / *Canal*



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Projet minier Windfall - Étude d'impact sur l'environnement /
Windfall Mining Project - Environmental Impact Assessment

Site minier Windfall, Eeyou Istchee Baie-James (Québec) /
Windfall Mining Site, Eeyou Istchee Baie-James (Quebec)

Carte 1-2 / *Map 1-2*
Plan des aménagements prévus en 2023 /
Plan of Infrastructures Planned for 2023

Sources :
BDGA, 1/5 000 000, MRNF Québec, 2010
SDA, 1/20 000, MERN Québec, 2019-01
Orthophoto, résolution 80 cm, Osisko Mining inc., 2020-07

0 75 150 m

MTM, fuseau 9 / Zone 9, NAD83

06/03/2023

Préparée par / Preparation : M.-H. Brisson
Dessinée par / Drawing : C. Villeneuve
Vérifiée par / Verification : M.-H. Brisson
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wsp

La précision des limites et les mesures montrées sur ce document ne doivent pas servir à des fins d'ingénierie ou de délimitation foncière. Aucune analyse foncière n'a été effectuée par un arpenteur-géomètre. / Boundaries and measurements shown on this document must not be used for engineering or land survey delineation. A land register analysis conducted by a land surveyor was not undertaken.

PUBLISHED STUDIES

Over the years, Osisko has published several technical studies on the Windfall project. In July 2018, Osisko completed the initial PEA that included the Windfall and Osborne-Bell deposits (BBA Inc. et al., 2018). This document presented ore processing methods and metallurgical test results. It also included a consideration of possible surface infrastructure. This study was based on the findings of previously produced mineral resource estimates (MREs) for the two deposits (InnovExplo, 2018). In April 2021, a new PEA was completed for the project (BBA Inc. et al., 2021). It was based on the MRE of February 17, 2021, and the project was focused on the Windfall mine site.

The latest MRE, released on August 30, 2022, reported 4.1 million ounces of measured and indicated resources at an average grade of 11.4 g/t Au and 3.3 million ounces of inferred resources at an average grade of 8.4 g/t Au (Osisko, 2022). The activities carried out between 2015 and 2022, representing more than 1,800,000 metres of drilling, made it possible to finalize this MRE. Drilling has led to the discovery of several significant mineralized zones, including Lynx, Triple Lynx, and Lynx 4. These three zones currently account for 65% of the total ounces contained in the most recent MRE of the Windfall deposit. During 2022, Osisko drilled for a total of 116,000 m, including almost 87,000 m underground to convert inferred resources to indicated and measured resources.

The Windfall feasibility study was published on January 10, 2023 (effective date: November 25, 2022) (BBA Inc. et al., 2023). It is based on the findings of the August 2022 MRE. This document includes all the technical references that led to the preparation of the technical descriptions presented in this study. All deliverables produced by Osisko were compliant with NI 43-101 standards.

SURFACE INFRASTRUCTURE

To support the exploration work and bulk sampling, Osisko had to build infrastructure. The site is divided into two areas, the camp and the portal. The camp can accommodate up to 300 people. There are administrative buildings in addition to housing. Tasks such as analysis, data processing, preparation, and storage of drill cores are also carried out in this area. To allow these activities to be carried out, support infrastructure, such as warehouses, containers for sorting and managing residual materials, drinking water, and domestic treatment systems are also located in this area. Figure 1-4 shows the exploration camp site.

Figure 1-4 Drone image of the exploration camp area, 2021

The infrastructure associated with the portal area was described earlier. A photograph of the Main portal entrance is shown in Figure 1-5. Thus, since 2017, Osisko has been continuing the underground development work. The exploration ramp that allowed the extraction of the first three bulk samples reached a depth of 635 m in 2022, which represents a total of 12,800 m of development.

Figure 1-5 Photograph of the entrance to the Main portal

1.4 PROJECT RATIONALE

1.4.1 POTENTIAL OF THE WINDFALL DEPOSIT

The resource potential known to date for the Windfall project deposit makes it a most promising site. The November 2022 feasibility study reported average annual production of 294,234 oz Au at an average mill feed grade of 8.1 g/t gold. Total production is estimated at 2,942,339 oz Au. The anticipated feed grade of 8.1 g/t Au makes the Windfall project one of the top 10 high-grade gold deposits in the world. Furthermore, the size of the deposit makes it among the largest gold discoveries in Quebec's history (Mercier-Langevin et al., 2020; S&P Global, 2021).

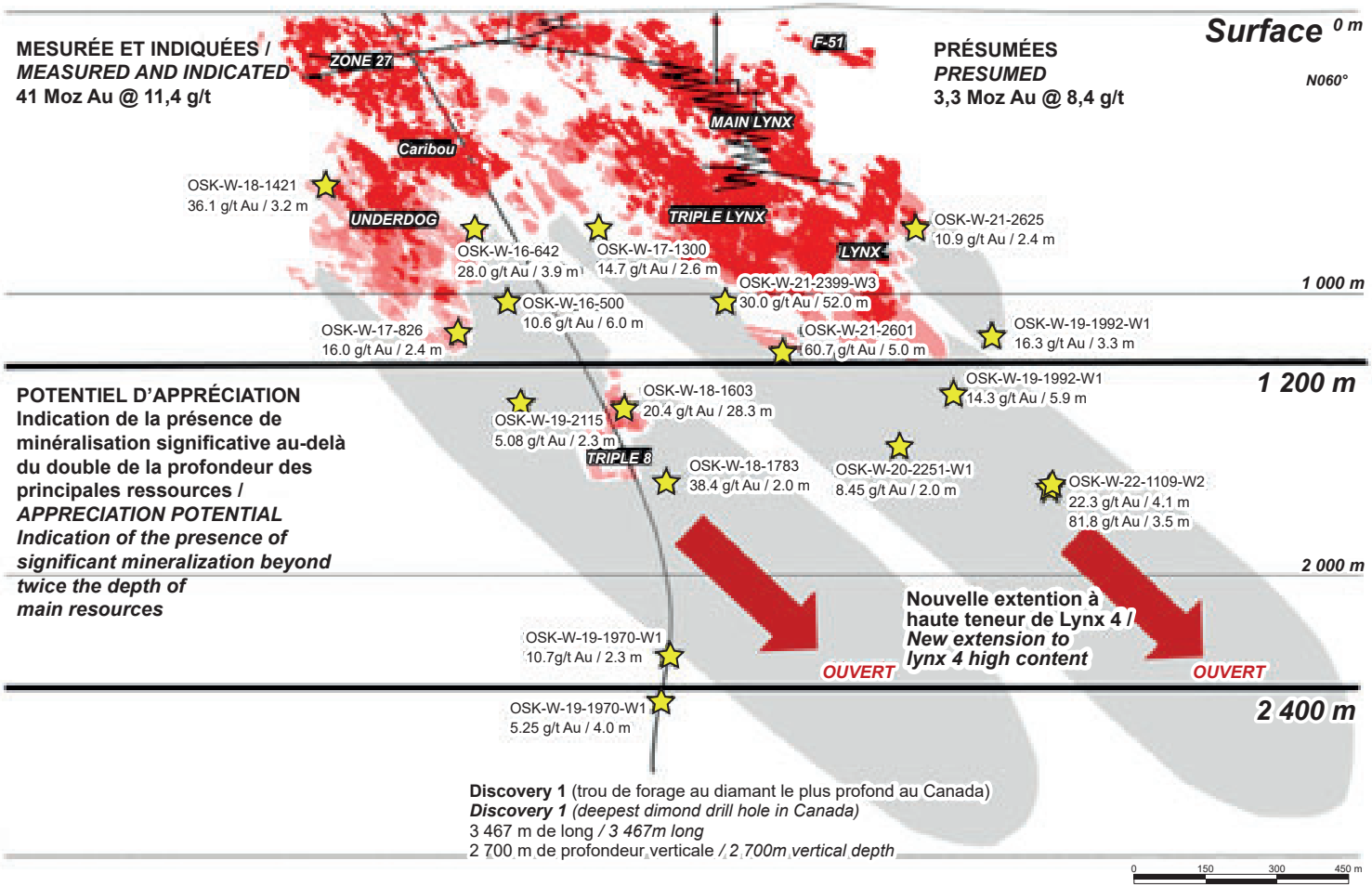
Industry standards specify that feasibility studies can only include measured and indicated resources, which is 4.1 M oz Au for the Windfall site. The 10-year production life determined in the feasibility study does not include the inferred resource of 3.3 M oz Au. Figure 1-6 shows the location of the resources known to date at the Windfall site. Although all of the known resources in the MRE are located in the first 1,200 m, deep drilling results have shown that the deposit is still open down plunge. Therefore, it will be possible to confirm the site's potential depending on the drilling that will be done later on.

Based on the information presented above, fluctuations in the price of gold or the ups and downs of the markets should not influence the suitability of developing the Windfall site. The overall size of the deposit, its high grade, and the potential for future development suggest that it will remain relevant to proceed with project development.

1.4.2 ECONOMIC IMPACTS

The mining industry is an important economic player for Quebec. In terms of employment, it is estimated that this sector of economic activity generates approximately 19,000 direct jobs and results in economic spinoffs to over 5,000 suppliers of goods and services province-wide (MERN, 2022). In its 2020 update of the economic impact of the mining industry in Quebec, the Quebec Mining Association (QMA) estimated that the revenues of Quebec mining companies totalled $12.5 billion including investments (Eco Tec Consultants, 2022). The mining industry generates an estimated 65,284 person-years of employment, the vast majority of which is in Quebec (73%). It is estimated that it generates a GDP of $10.5 billion in Quebec. More specifically in Nord-du-Québec, the $1.1 billion GDP generated by the mining industry corresponds to 20.6% of the region's total GDP. That represents 1,645 person-years of employment in the mining industry in Nord-du-Québec in 2020. In terms of tax and quasi-tax revenues, mining companies have contributed $1.8 billion to the Government of Quebec and $620 million to the Government of Canada through taxes, mining duties, and quasi-taxes in 2020 alone.

The Windfall project is in line with the political will to responsibly develop Quebec's mineral resources, increase employment, and ensure Quebec's prosperity. In addition to maximizing economic benefits in local (Cree/Jamesian) and regional communities, the project will generally improve living conditions for the people of the region. And besides contributing to the development of northern Quebec and beyond, the Windfall project will generate significant economic benefits throughout the province.



Estimation des ressources minérales /
Mineral Ressources Estimation
Date d'effet au 7 juin 2022 / *Effective on June 7th 2022*
Teneur de coupure : *3,5 g/t Au / Cut-off grade : 3,5 g/t Au*

- Mesurée + indiquées / *Measured and indicated*
- Présumée / *Presumed*
- Intersection significative avec potentiel ouvert (publié antérieurement et diponible sous le profil d'émmetteur SEDAR) / *Significant intersection with open potential (previously published and available under the SEDAR issuer profile)*
- Potentiel / *Potential*
- Rampe actuelle / *Actual ramp*

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Figure 1-6 **ERM et potentiel de développement du projet minier Windfall**
MRE and Development Potential of Windfall Mining Project (réf. Document interne Osisko)

Aviseo Conseil (2023) conducted an economic impact analysis of the Windfall project, the summary document including the methodology and details of certain information can be found in Appendix 1-1. The following paragraphs are taken from this study. Capital expenditures for the construction phase, operation and closure of the Windfall mine site are estimated at $3,594 million. These expenditures fall into three broad categories, including construction phase expenditures estimated at $789 million, sustaining capital expenditures estimated at $588 million, and mine site restoration and closure expenditures estimated at $83 million. In addition to capital expenditures, the operation of the Windfall mine will require expenses of $2,134 million.

Windfall's capital expenditures will generate $65.3 million in tax revenues for the Government of Quebec and $42.6 million for the Government of Canada. The Windfall project capital expenditures are expected to generate $579.3 million in GDP over the period. 51% of the added value is expected to be generated during the construction phase (2024-2025). The Abitibi-Témiscamingue and Nord-du-Québec regions will be the main beneficiaries of the investment activities, as it is estimated that 53% of the added value will be generated in these regions, or $305.7 million.

The capital expenditures will support a total of 5,223 full-time equivalent (FTE) jobs throughout Quebec, including 2,800 in the Abitibi-Témiscamingue and Nord-du-Québec regions. These two regions will host 54% of total jobs. In addition, 682 of the 2,800 jobs will be in the Nord-du-Québec region.

Between 2025 and 2035, the operation of the mine will contribute a total amount of $1,783 million to Quebec's GDP. Of this amount, $1,155 million will be directly generated in the Abitibi-Témiscamingue and Nord-du-Québec regions, representing 65% of the value creation. In addition, between 2025 and 2035, operating expenses will generate $711.5 million in tax benefits for the Government of Quebec. Of this amount, direct tax revenues will represent $633.6 million, of which mining taxes will be the main component (55%) and corporate income taxes (27%) the second. On an annual average, a total of 1,017 direct and indirect jobs will be supported during the operation of the mine. Of this number, 475 jobs will be directly supported by Osisko and indirect jobs will account for an average of 542 FTE jobs per year. The Abitibi-Témiscamingue and Nord-du-Québec regions will be able to count on an average of 635 jobs per year.

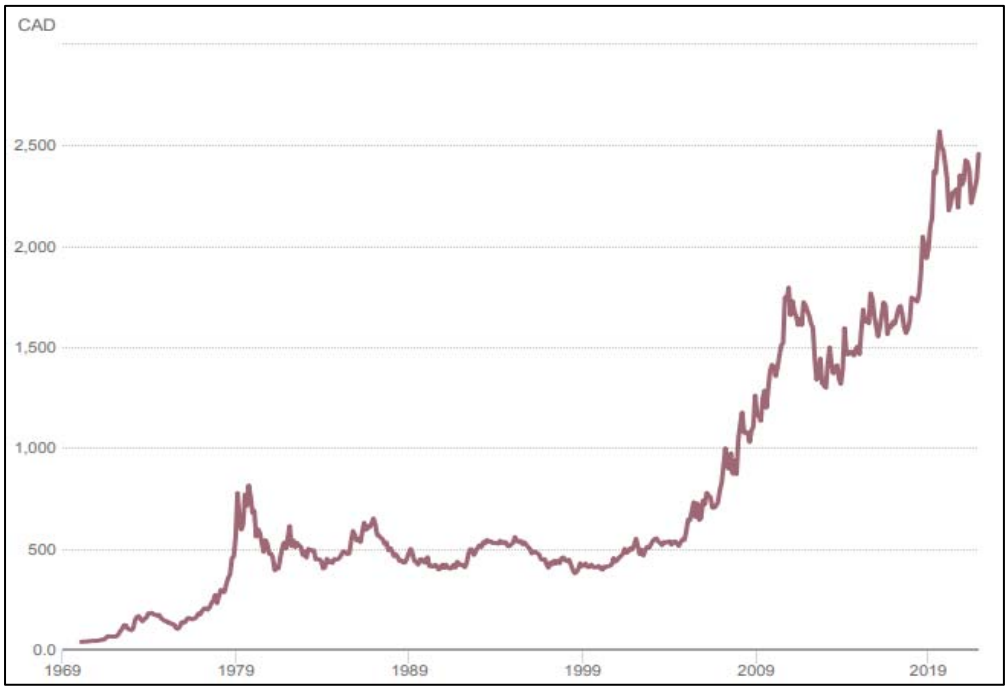
1.4.3 GOLD MARKET

According to the World Gold Council (2022a), annual demand for gold averaged 4,314 tonnes for the period 2012-2021. This demand breaks down as follows: 51% for jewelry, 26% for gold bullion and coins, 12% for central bank storage, 8% for technology needs, and 3% for other financial products. Of the average 2012–2021 supply, 74% of the gold used annually came from mining, while 26% came from recycled sources. Gold jewelry accounts for the largest share of annual gold demand. The proportion of gold used for jewelry has declined in recent decades, but it still accounts for about half of total gold demand. Gold also plays an important role in the reserves of the world’s central banks, as they are major holders of gold. The financial crisis of 2008 led national central banks to change their behaviour with respect to gold. Central banks in emerging markets increased their official purchases of gold, while European and American banks stopped selling gold (MINING.COM, 2023). These acquisitions ensure the stability of the financial markets, which is essential for the health of the global economy. Furthermore, following 13 consecutive years of growth, 2022 was the year in which demand for central bank gold was the highest since 1950. This is one of the reasons why the sector is now a major source of annual gold demand.

Gold is also used as an industrial metal in a wide range of applications, but the demand is primarily for the electronics sector, which accounts for about 80% of gold used in industrial applications. Gold is ubiquitous in most consumer electronics applications and also in automobiles, where its combination of chemical and physical properties make it irreplaceable. The trend toward electrification also supports the demand for gold, with most types of semiconductor chips using it either as a coating or as thin bonding wires. While electronics is by far the largest source of demand for its industrial use, gold is also found in a multitude of other applications.

The gold market has seen many fluctuations, but the price of gold has generally followed a growth curve. Figure 1-7 shows the changing price of gold from 1970 to the present.

Figure 1-7 Historical gold value from 1970 to present



Source: World Gold Council (2022b).

1.5 ALIGNMENT WITH AGREEMENTS AND POLICIES

SECTION 22 OF THE JAMES BAY AND NORTHERN QUEBEC AGREEMENT (JBNQA)

The James Bay and Northern Quebec Agreement (JBNQA) is an agreement signed in 1975 by the Grand Council of the Crees of Quebec, the Northern Quebec Inuit Association, the Government of Quebec, the Government of Canada, Hydro-Québec, and the James Bay Energy Corporation. Section 22 of this agreement, which applies to the Eeyou Istchee James Bay Territory south of the 55th parallel, establishes an environmental and social protection regime. It is aimed at reducing the impact of development on the territory and protects Cree hunting, fishing, and trapping rights. Among the measures introduced by the JBNQA are the division of lands into Categories I, II, and III; a hunting, fishing, and trapping regime; two separate environmental protection regimes (Cree and Inuit); a regime for the control and operation of outfitters; wildlife protection measures; measures to support traditional activities; and, economic and social development measures.

Table 1-3 shows the correlation between key subsections of Section 22 of the JBNQA and the information presented in the Windfall Project EIA.

Table 1-3 Correlation between Section 22 of the JBNQA and the EIA

Subsections of Section 22 of the JBNQA	Corresponding chapter or section in the EIA
22.2 GENERAL PROVISIONS	
22.2.2 a) To minimize the negative impact of development on the First Nations people and wildlife resources of the Territory.	Chapter 6 - Physical Environment Chapter 7 - Biological Environment Chapter 8 - Social Environment – Current conditions – Likely environmental impacts – Impact mitigation measure – Significance of residual impacts Chapter 11 - Cumulative Impact Assessment – Cumulative impacts in the study area Chapter 13 – Environmental Programs – Proposed monitoring and follow-up program
22.2.2 c) A special status and involvement for the Cree people over and above that provided for in procedures involving the general public through consultation or representative mechanisms.	Chapter 4 - Community Relations – Consultation process – List of meetings with stakeholders – Concerns and expectations of First Nations communities
22.2.2 d) The protection of the rights and guarantees of the Cree people established by and in accordance with Section 24: – Hunting, fishing, and trapping – Maintaining traditional First Nations activities	Section 8.2 - First Nations interests and treaty lands Section 8.6 - Traditional use of the land by First Nations – Current conditions – Likely environmental impacts – Impact mitigation measure – Significance of residual impacts
22.2.2 e) The protection of the Cree people, their economies, and the wildlife resources upon which they depend:	Chapter 7 - Biological Environment Chapter 8 - Social Environment – Current conditions – Likely environmental impacts – Impact mitigation measure – Significance of residual impacts

Subsections of Section 22 of the JBNQA	Corresponding chapter or section in the EIA
22.2.4 a) The protection of the hunting, fishing, and trapping rights of First Nations people in the Territory.	Chapter 7 - Biological Environment Chapter 8 - Social Environment — Current conditions — Likely environmental impacts — Impact mitigation measure — Significance of residual impacts
22.2.4 c) The protection of First Nations people, societies, communities, and economies with respect to developmental activity affecting the Territory.	
22.2.4 d) The protection of wildlife resources, physical and biotic environment, and ecological systems in the Territory with respect to developmental activity affecting the Territory.	Chapter 6 - Physical Environment Chapter 7 - Biological Environment
22.5 REQUIREMENT FOR IMPACT ASSESSMENT AND REVIEW	
22.5.11 a-i) Purpose of the project.	Chapter 1 - Context
22.5.11 a-ii) The nature and extent of the proposed development.	Chapter 1 - Context Chapter 3 - Project Description
22.5.11 a-iii) Intention to study alternative sites for development where appropriate.	Chapter 2 - Location and Technology Alternatives
22.5.11 a- iv) If applicable, the reasons why no site alternatives are possible.	Chapter 2 - Location and Technology Alternatives
22.7 FINAL PROVISIONS	
22.7.1 The proponent shall, before proceeding with the work, obtain where applicable, the necessary authorization or permits from the responsible government departments and services.	Section 1.6 - Regulatory context

THE CREE NATION MINING POLICY

The Cree Nation Mining Policy (CNMP) establishes the guidelines for the development of natural resources, mainly mining activities, on the Eeyou Istchee territory. It aims to ensure Cree participation in the various stages of mining projects. The CNMP values the integration of sustainable development, as well as the respect of Cree rights and way of life.

Following the acquisition of the Windfall project in 2015, Osisko implemented an information and consultation process with the Cree communities, particularly with the Cree First Nation of Waswanipi (CFNW). The main objective of this approach was to consider traditional interests, concerns, and knowledge throughout the development of the project.

Table 1-4 shows the alignment between the major pillars of the CNMP and various aspects addressed in the Windfall Project EIA.

Table 1-4 Correlation between the Cree Nation Mining Policy and the EIA

Sections of the CNMP	Corresponding chapter or section in the EIA
PILLAR 1 – PROMOTION AND SUPPORT OF MINING ACTIVITIES	
Cree Contribution	
Incorporation of Cree guidance based on their traditional, technical, and scientific expertise on land and mineral resources.	Chapter 4 - Community Relations – Consultation process – List of meetings with stakeholders – Concerns and expectations of First Nations communities
Consideration of the interests of all Cree people and their institutions.	
PILLAR 2 – MINING AND SUSTAINABLE PRACTICES	
Sustainable Development Policy	
Conservation of biological diversity, soils, water and watercourses, flora, fauna, scenic diversity, and recreational values.	Chapter 6 - Physical Environment Chapter 7 - Biological Environment Chapter 8 - Social Environment
Restoration of damaged ecosystems.	Chapter 3 - Project Description – Restoration plan Chapter 7 - Biological Environment – Impacts and mitigation measures during the closure phase
PILLAR 3 – TRANSPARENCY AND COLLABORATION	
Transparency	
Establishing direct and close relationships with Cree communities and other entities.	Chapter 4 - Community Relations – Consultation process – List of meetings with stakeholders – Concerns and expectations of First Nations communities
Collaboration	
Involvement of the Cree in the project to ensure that their rights, interests, and benefits are well protected and enhanced.	Chapter 4 - Community Relations – Consultation process – List of meetings with stakeholders – Concerns and expectations of First Nations communities
Support for the Mining Community	
Work with affected communities and local Cree families, including Cree tallymen and contractors.	Chapter 4 - Community Relations – Consultation process – List of meetings with stakeholders – Concerns and expectations of First Nations communities

EXISTING AGREEMENTS IN THE EEYOU ISTCHEE JAMES BAY TERRITORY

On July 24, 2012, the Cree of Eeyou Istchee and the Government of Quebec signed the Agreement on Governance in the Eeyou Istchee James Bay Territory (Governance Agreement). This Governance Agreement grants the Cree expanded jurisdiction over the management of natural resources and lands in the Eeyou Istchee James Bay Territory. On Category III lands, municipal land management is done in collaboration with the Jamesians. The purpose of the Governance Agreement is to pursue the development of the territory, to integrate a governance model based on sustainable development, and to take into account the traditional way of life.

The Windfall project is part of the Governance Agreement's vision of "continuing the development of Northern Quebec." It was developed by considering the three pillars of sustainable development: environmental, social, and economic. Various project alternatives were considered in light of the environmental impacts (Chapter 2). The anticipated impacts on the physical, biological, and social environments have been assessed and mitigation measures are proposed to minimize the impacts (Chapters 6, 7, and 8). The project will also generate economic benefits for the region, in addition to creating more than 1,100 jobs during construction and more than 670 jobs during the operation phase. Finally, through consultations with the tallymen and the Cree First Nation of Waswanipi (CFNW), Osisko has taken into account the concerns of the Cree population, particularly with regard to their traditional way of life (Chapter 4).

STRATEGIC VISION OF MINING DEVELOPMENT IN QUEBEC

Quebec's Mineral Strategy, developed in 2009, established broad directions for the development of the mining sector in the province (MRNF, 2009). The three main guidelines of this strategy were to:

- create wealth and prepare the future of the mineral sector;
- ensure environmentally friendly mineral development; and,
- promote mineral development that is community-based and integrated with the environment.

In 2016, the Ministère de l'Énergie et des Ressources naturelles (MERN) published a new version of this strategy entitled "Strategic Vision of Mining Development in Quebec." This Strategic Vision contains three similar guidelines that focus on advancing existing mining industries and developing new ones, preventing and mitigating environmental impacts, and promoting transparency and citizen participation.

Among other things, this Strategic Vision addresses workforce training, community involvement, environmental protection, and harmonization with other types of activities.

The Windfall project fits well with several of the key guidelines of the Strategic Vision. For one thing, it contributes to the development of current mining sectors. Gold mining is the most important mining sector in Quebec with seven gold mines out of a total of 20 active mines in 2022. The Windfall project is one of 16 gold mining projects under development in the province, out of a total of 35 mining projects (MERN, 2022).

Table 1-5 shows the correlation between the guidelines of the Strategic Vision of Mining Development in Quebec and the implementation of the Windfall project and the EIA.

Table 1-5 Correlation between the Strategic Vision of Mining Development in Quebec and the Windfall Project and the EIA

Sections of the Strategic Vision	Corresponding chapter or section in the EIA
GUIDELINE 2 – PREVENT AND MITIGATE ENVIRONMENTAL IMPACTS	
Support energy efficiency	– Choice of building materials made with the objective of maximizing the energy efficiency of buildings and minimizing heat or energy losses that can involve significant costs – Heat capture projects assessed at the Main portal (compressor heat capture and underground recirculation)
Adopt clean technologies	Chapter 3 - Project Description Section 2.2 - Ore transportation – Underground mobile electrical equipment Section 3.3 - Energy supply sources – Power transmission line project (69 kV) to supply the site, under development by Miyuukaa Corp.
GUIDELINE 3 - PROMOTE TRANSPARENCY AND CITIZEN PARTICIPATION	
Promote the harmonious coexistence of mining activities with other land uses	Chapter 4 - Community Relations – Consultation process – List of meetings with stakeholders – Concerns and expectations of First Nations communities and James Bay municipalities Chapter 8 - Social Environment – Current conditions – Anticipated impacts – Mitigation measures – Significance of residual impacts
Consider social acceptability factors in project analysis	Chapter 4 - Community Relations – Consultation process – List of meetings with stakeholders – Concerns and expectations of First Nations communities and James Bay municipalities – Concerns and expectations of First Nations communities Chapter 8 - Social Environment – Current conditions – Anticipated impacts – Mitigation measures – Significance of residual impacts
Encourage the hiring of local and First Nations workers	Section 1.2.3 - Community Relations Policy – Promote local job creation Section 3.11 - Employment and training – Hiring policy favouring the hiring of women, local candidates, and First Nations people – Creation of over 1,100 jobs (direct and indirect) during the construction phase and approximately 670 jobs during the production phase
Improve access to mining training in mining regions	Section 3.11 - Employment and training – Partnership with training institutes for the development of training specific to the mining sector and adapted to the regional context
Implement measures to promote transparency	Section 1.2 - Osisko's Environmental and Sustainable Development Policies and Procedures – Accountability for Osisko's annual performance in its sustainability report

NORTHERN ACTION PLAN (PLAN NORD)

The first version of the Plan Nord [Northern Action Plan] was unveiled by the Quebec government in 2011. The primary focus of the Plan Nord was the development and enhancement of resources in the north of the province. The second version of this action plan, entitled "Plan Nord toward 2035, the 2015-2020 Action Plan," was published in 2015. The three key policy directions of this action plan were to:

- develop the diversified economic potential of northern Quebec in a responsible way and for the benefit of the population living there and Quebec as a whole;
- support the development of all communities in the area covered by the Plan Nord, by helping them realize their full potential and enhancing their living conditions; and,
- protect the environment and preserve the distinctive biodiversity of northern Quebec by ensuring that mechanisms are put in place to dedicate 50% of the area covered by the Plan Nord, by 2035, to non-industrial purposes, protection of the environment, and the safeguarding of biodiversity (Secrétariat du Plan Nord, 2015).

In 2020, the Société du Plan Nord developed "The 2020-2023 Northern Action Plan" which is in line with the Plan Nord's 2035 horizon and its long-term objectives. Four main orientations were adopted:

- Optimized access to the northern territory;
- A robust, diversified economic fabric;
- An attractive, dynamic living environment; and,
- A northern environment to be preserved (Société du Plan Nord, 2020).

The Windfall project fits well into the economic recovery context of this action plan, which is focused on responsible community and natural resource development in the North. Table 1-6 presents the various aspects of the Windfall Project EIA that are consistent with the orientations of the Plan d'action nordique 2020-2023.

Table 1-6 Correlation between the 2020-2023 Northern Action Plan and the EIA

Sections of the Northern Action Plan	Corresponding chapter or section in the EIA
ORIENTATION 2: A ROBUST, DIVERSIFIED ECONOMIC FABRIC	
2.2 Increase the social responsibility of companies on the territory	Section 1.2 - Osisko's Environmental, Responsible Procurement, and Sustainable Development Policies and Procedures Chapter 4 – Community Relations — Consultation process — A series of meetings with stakeholders (including meetings/consultation activities with 22 Quebec companies in September 2022 and networking day organized by the Société du Plan Nord in November 2022) — Concerns and expectations of First Nations communities and James Bay municipalities Chapter 6 - Physical Environment Chapter 7 - Biological Environment Chapter 8 - Social Environment — Current conditions — Anticipated impacts — Mitigation measures — Significance of residual impacts Chapter 13 - Environmental Programs
2.3 Linking training and education to northern realities	Section 3.11 - Employment and training — Partnership with training institutes for the development of training specific to the mining sector and adapted to the regional context
2.3.1.2 Matching workforce training with the needs of major projects on the territory	

SUSTAINABLE DEVELOPMENT GOALS

The concept of sustainable development was articulated in 1987 in the Report of the World Commission on Environment and Development: Our Common Future (the Brundtland Report).

According to the MELCCFP directive (2017; revised 2022):

> *"Sustainable development aims to meet the needs of the present without compromising the ability of future generations to meet their own needs."*

The three objectives of sustainable development are to:

— Maintain environmental integrity

— Ensure social equity

— Aim for economic efficiency

According to the directive, a project designed with such a perspective must aim to integrate and balance these three objectives in the planning and decision-making process and include citizen participation. The project, as well as its alternatives, must take into account the relationships and interactions between the different components of the ecosystems and the satisfaction of the needs of the people, without affecting those of future generations.

The directive also requires that the project proponent be aware of the 16 principles of the Sustainable Development Act (R.S.Q., c. D-8.1.1) and that it demonstrate how it applies these principles in its activities and in the development of the project. The principles are: health and quality of life, social equity and solidarity, environmental protection, economic efficiency, participation and commitment, access to knowledge, subsidiarity, partnership and inter-governmental partnership and cooperation, prevention, precaution, protection of cultural heritage, biodiversity preservation, respect for ecosystem support capacity, responsible production and consumption, polluter pays, and internalization of costs. Although the Act was developed for Quebec government departments, many of the principles set out will be applicable to Osisko's operations.

The impact assessment of a project must be carried out with the participation of citizens in the planning and decision-making process. The project must be based on a rational and integrated planning approach that takes into account the links between project components and implementation choices. For the impact assessment to be an effective tool in support of sustainable development, it must integrate the social, environmental, and economic dimensions in a way that meets the needs of the local population (in the vicinity of the work) and those who will be served by the project.

As mentioned in section 1.2, through its policies, Osisko strives to apply its five core values of respect, passion, diversity, integrity, and efficiency, as well as sustainable development. With its Environmental Policy (section 1.2.1), the Windfall project is guided to respect values, but also to take into account the three objectives of sustainable development. Table 1-7 shows how Osisko takes the principles into account through its actions, commitments, and the way it has adapted its project.

It is important to mention that, from the very beginning of the project, Osisko issued requirements to employees, consultants, and partners to ensure that decisions taken would take into account the three objectives of sustainable development. The numerous team meetings (with or without consultants) and discussions made it possible to validate technical information, but also to see how Osisko could improve its practices. Among the objectives of these meetings was to evaluate how to adopt sustainable practices, to reduce the impact on the three spheres of sustainable development, and to consider the "post-project" effects. The project team has worked to develop a viable project that respects Osisko's core values and sustainable development objectives. The various meetings with the communities have also allowed Osisko to obtain points of view, suggestions, and comments that have led to a review of certain elements to further improve the project. The information arising from these discussions was always reported to the engineering team and other members working on the project.

Table 1-7 Sustainable development principles integrated into the project

Principles of sustainable development	Examples of implementation in the Windfall project
1. HEALTH AND QUALITY OF LIFE	– Osisko's commitment to creating and maintaining a safe and healthy work environment. – Existing policies to meet these health and quality of life commitments. – System in place to report incidents and implement corrective actions or follow-ups to improve practices. – Nursing services are available on site; employees are offered prevention and follow-up care to better guide them in matters of health and quality of life. – Human resources team members on site at the camp. – Choice of certain project-related features and equipment that will improve the quality of life of employees (e.g.: northern corridor, use of certain electrical equipment, etc.).
2. SOCIAL EQUITY AND SOLIDARITY	– Osisko's commitment to creating and maintaining a fair and ethical workplace in its existing policies. – Osisko's efforts to ensure social solidarity and maintain cohesion through activities, dialogue, and training.
3. ENVIRONMENTAL PROTECTION	– Environment Team on site at Windfall to ensure the respect of environmental protection, sensitize workers on site, follow up on regular activities, keep governmental authorities informed, introduce improvement or correction measures, etc. – Existing Environmental Policy known to all employees. – Commitment by Osisko's management to prioritize environmental protection at the strategic and operational levels. – Several concrete improvements made at the Windfall site in terms of environmental protection, which are continuing with the Windfall project. – Participation in the Quebec Mining Association (QMA) and the Conseil Patronal de l'Environnement du Québec (CPEQ), which allows Osisko to be on the lookout for new environmental requirements and new ways of doing things, and to obtain the necessary training to improve the knowledge base of its team. – Raising awareness and sharing information on environmental protection (reminder of the importance of environmental protection, awareness of various topics and requirements, procedure to follow in the event of accidental spills, etc.) when welcoming new employees to camp.
4. ECONOMIC EFFICIENCY	– Contribution to economic prosperity already underway in the exploration phase and with the Windfall project, which will be even more significant and favourable to the host community, in the Eeyou Istchee James Bay Territory, and in Quebec (section 1.4).
5. PARTICIPATION AND COMMITMENT	– Osisko's commitment to communicate all information about its project to the host communities and to gather comments, concerns, or suggestions. – Existing Community Relations Policy. – Numerous meetings held with various stakeholders. Information provided to employees from various regions on the progress of the project. – Osisko's willingness to sign agreements with First Nations and non-First Nations stakeholders.
6. ACCESS TO KNOWLEDGE	– Involvement of Cree community members in inventories to obtain opinions on land use (fishing, hunting, gathering, or other activities) and on the wildlife species found in the study area (information collected and discussed in Chapters 4 and 8). – Regular meetings organized with the environmental committee, as well as information sessions and consultations with other stakeholders to gather information on traditional knowledge. – Osisko's implementation of two workforce training initiatives through a partnership with the Comité sectoriel de main-d'oeuvre de industrie des mines [Sectoral workforce committee for the mining industry] and the Cree community of Waswanipi. Goal of developing the job skills required to obtain employment in the mining sector (Section 1.2).
7. SUBSIDIARITY	– Principle not applicable to the Windfall project.

Principles of sustainable development	Examples of implementation in the Windfall project
8. Inter-governmental partnership and cooperation	– Integration of the Windfall project in the economic recovery context of the Northern Action Plan (Plan Nord), which is focused on responsible community and natural resource development in the North (section 1.5). – Collaboration with the regional interdepartmental round table (TIR), which includes several departments, to support the Windfall project in its requests for authorizations, once the decree is obtained. Several meetings have already been held with the TIR to keep them informed on the project's progress and to obtain recommendations or suggestions regarding its planning and permit applications.
9. Prevention	– Presence of a health and safety team and an environment team that works on prevention with employees on a daily basis. – Procedures in place and accessible to all employees to respond quickly to incidents. All incidents reported through an incident management tool and when required (based on severity, type of risk, etc.), rapid implementation of corrective actions by the team. – Before the start of the work shift, risk identification by employees according to their respective tasks, and distribution of guidelines and warnings to the teams during the day's start-up meeting to ensure that they are alert to certain situations that could arise, if necessary. – Emergency response plan available on site and accessible to employees. – Spill and first aid kits available at all times (trucks, work area, etc.). – As part of the development of the Windfall project, special attention was paid to the layout of certain equipment, work areas, and the order and location of certain facilities to ensure rapid response in the event of any risk.
10. Precaution	– Information applicable to Principle no. 9 – Prevention, is also applicable to the Precaution principle.
11. Protection of cultural heritage	– Objective to integrate a cultural centre into the project's facilities to promote the maintenance and sharing of Cree First Nation traditions and knowledge, particularly for those who work at the camp. This space will allow them to gather to carry out various activities (wood carving, handicrafts of all kinds), discuss and share ideas, cook, etc. – Efforts made by Osisko in planning its mining facilities to keep them in a concentrated area so as to limit encroachment on the tallyman's territory and to respect, as much as possible, the sites, landscapes, and locations that are sensitive to the tallyman, as well as to other users. – Osisko's commitment to ongoing and respectful dialogue with host communities through documenting and sharing information, understanding, and working collaboratively to address concerns, including cultural aspects, etc. – Archaeological excavations carried out around the camp area on sites of medium potential identified by a specialized archaeological consultant. Cree participation in field excavations. – Inclusion of traditional knowledge in the EIA through interviews with the users of the territory and the participation of many members of the Waswanipi community during the project's field inventories.
12. Biodiversity preservation	– Osisko's commitment to respect the requirements to protect biodiversity by establishing work programs that will consider sensitive periods during the construction, operation, and closure phases. – Decisions made during project design to limit the impact of development on the environment. – At all times, discussion with the Environment Team when planning activities at the site to ensure environmental protection and to identify issues that may arise, thereby anticipating and adjusting the required activities in an environmentally friendly manner. – Commitment by Osisko to provide for a biodiversity program, propose a research project on a valued species, and improve knowledge to find ways to enhance biodiversity.

Principles of sustainable development	Examples of implementation in the Windfall project
13. RESPECT FOR ECOSYSTEM SUPPORT CAPACITY	– Information applicable to Principle no. 12 – Biodiversity preservation, is also applicable to the principle of Respect for ecosystem support capacity. – Inventories carried out as part of the impact assessment provided a good understanding of the receiving environment, the dynamics of ecosystems, and the link between the project and its environment, the receiving environment. As part of the impact analysis, support capacity will be discussed in Chapter 6 and if necessary, mitigation measures will be implemented to limit the impact on the receiving environment.
14. RESPONSIBLE PRODUCTION AND CONSUMPTION	– Osisko's commitment to corporate responsibility in improving consumption management and making sound choices regarding the purchase of goods. – Osisko's objective to avoid waste and optimize the use of its resources. The recycling, recovery, and composting systems of residual materials allow Osisko to have a clear picture of its consumption and production. Optimization is encouraged at Osisko.
15. POLLUTER PAYS	– Information applicable to Principle no. 14 – Responsible production and consumption, is also applicable to the Polluter pays principle. – Through its exploration activities and as part of future operations, Osisko's has an obligation to pay royalties and post financial guarantees, particularly for the mine site restoration plan, etc. Osisko is mindful of its operations, and is willing to assume its share of costs and adopt best practices in environmental prevention and mitigation.
16. INTERNALIZATION OF COSTS	– Commitment by Osisko to revegetate the site progressively as the work areas are no longer required. – Guaranteed amount for site restoration following the end of operations.

1.6 REGULATORY CONTEXT

The Windfall project is located on the James Bay Territory, which is covered by the James Bay and Northern Quebec Agreement (JBNQA) and is therefore subject to a specific authorization process under the JBNQA. In addition, the Project will require provincial, federal, and regional approvals under applicable laws and regulations. The following sections provide an overview of the environmental legislation relevant to the Project.

1.6.1 QUEBEC

ENVIRONMENT QUALITY ACT (R.S.Q. C Q-2)

Section IV.1 of the Environment Quality Act (EQA) requires any person or group to follow the environmental impact assessment and review procedure and to obtain a certificate of authorization from the government before undertaking a project covered by the Regulation respecting the environmental and social impact assessment and review procedure applicable to the territory of James Bay and Northern Quebec (Q-2, r. 25).

The environmental and social protection regime applicable in the James Bay region is established under Chapter XXII of the JBNQA and is governed by sections 148 to 167 of the EQA.

This regime provides for: “An environmental and social impact assessment and review procedure established to minimize the environmental and social impact of development when negative on the First Nations population and wildlife resources of the Territory” (par. 22.2.2 b). Any mining project, including the expansion, transformation, or modification of an existing mining operation, is subject to the environmental and social impact assessment and review procedure. Therefore, the Project is subject to this procedure.

The environmental and social assessment of projects under Quebec jurisdiction is the responsibility of the Environmental and Social Impact Evaluating Committee (COMEV) and the Environmental and Social Impact Review Committee (COMEX). COMEV first considers the scope and obligation of a project’s impact assessment. COMEX then takes over upon receipt of the impact assessment until the end of the process, including changes to the project authorized during construction or operation and follow-up reports produced by the initiators.

Following the issuance of the certificate of authorization for the construction and operation of the underground gold mine, ministerial authorizations (MA) will also be required prior to the construction of the planned infrastructure, in accordance with section 22 of the EQA.

DIRECTIVE 019 PERTAINING TO THE MINING INDUSTRY (MARCH 2012 EDITION)

Directive 019 (D019) is the analytical framework used by the MELCCFP when receiving applications for ministerial authorizations of mining projects. It presents the environmental guidelines and basic requirements for the different types of mining activities so that environmental deterioration can be prevented. It also provided Osisko with the information required to prepare the impact assessment. D019 is therefore a guideline that specifies MELCCFP’s expectations regarding main mining activities.

INSTRUCTION NOTE 98-01 [PROCESSING NOISE COMPLAINTS AND REQUIREMENTS FOR NOISE GENERATING COMPANIES]

The MELCCFP’s Instruction Note 98-01 is an administrative tool that defines the requirements for managing noise levels for businesses. In particular, it issues guidelines on noise assessment methods and on noise limits to be respected.

MINING ACT (R.S.Q., C. M-13.1)

Quebec’s Mining Act, as well as its Regulation respecting mineral substances other than petroleum, natural gas and brine (CQLR, C. M-13.1, r. 2), determines how mines are to be developed, operated, and closed. It defines the conditions for obtaining a mining lease issued by the Ministère des Ressources naturelles et des Forêts (MRNF)[2], which is required for the operation of a mine. This lease has an initial term of 20 years and is renewable up to three times for periods of 10 years. To obtain a mining lease, companies must develop a site restoration plan to be submitted to the MRNF for approval. This plan will then have to be reviewed every five years, or when there are changes in the mining activities that justify the amendment. In the two years following the approval of the site restoration plan, a financial guarantee covering all anticipated costs must be paid to the MRNF.

2 Formerly the Ministère de l’Énergie et des Ressources naturelles (MERN) and the Ministère des Forêts, de la Faune et des Parcs (MFFP). The acronym MRNF will be used to refer to this department throughout the report, regardless of when the documents are published.

The Mining Act also provides a framework for the granting of exclusive leases for the mining of surface mineral substances (BEX), which may be issued for the extraction of sand, gravel, or other surface mineral substances (peat, stone, etc.) for the operation of quarries and sandpits, as well as for the granting of mining claims for mineral exploration.

ACT RESPECTING OCCUPATIONAL HEALTH AND SAFETY (R.S.Q., C. S-2.1)

The main health and safety legislation in Quebec is the Act respecting occupational health and safety, with which the Project must comply. Several regulations, such as the Regulation respecting occupational health and safety in mines (R.R.Q, c. S-2.1, r. 14) and the Regulation respecting occupational health and safety (R.R.Q., c. S-2.1, r. 13), also apply.

OTHER APPLICABLE REGULATIONS

In addition, the following regulations will apply:

- Sustainable Forest Development Act (CQLR, c. A-18.1):
  - Regulation respecting the sustainable development of forests in the domain of the State (CQLR, c. A-18.1, r. 0.01);
- Act respecting the lands in the domain of the State (CQLR, c. T-8.1);
- Watercourses Act (CQLR, c. R-13):
  - Regulation respecting the water property in the domain of the State (CQLR, c. R-13, r. 1);
- Dam Safety Act (CQLR, c. S-3.1.01):
  - Dam Safety Regulation (CQLR, c. S-3.1.01, r. 1);
- Act respecting threatened or vulnerable species (CQLR. c. E-12.01):
  - Regulation respecting threatened or vulnerable wildlife species and their habitats (CQLR, c. E-12.01, r. 2);
  - Regulation respecting threatened or vulnerable plant species and their habitats (CQLR, c. E-12.01, r. 3);
- Act respecting the conservation and development of wildlife (CQLR, c. C-61.1):
  - Regulation respecting wildlife habitats (CQLR, c. C-61.1, r. 18);
- An Act respecting the conservation of wetlands and bodies of water (Bill 132) (CQLR, c. 14);
- Cultural Heritage Act (CQLR, c. P-9.002);
- Building Act (CQLR, c. B-1.1):
  - Construction Code (CQLR, c. B-1.1, r. 2);
  - Safety Code (CQLR, c. B-1.1, r. 3);
- Act respecting explosives (CQLR, c. E-22):
  - Regulation under the Act respecting explosives (CQLR, c. E-22. r. 1);
- Highway Safety Code (CQLR, c. C-24.2):
  - Transportation of Dangerous Substances Regulation (CQLR, c. C-24.2, r. 43);

- Regulations under the Environment Quality Act:
  - Regulation respecting activities in wetlands, bodies of water and sensitive areas (CQLR, c. Q-2, r. 0.1);
  - Clean Air Regulation (CQLR, c. Q-2, r. 4.1);
  - Regulation respecting pits and quarries (CQLR, c. Q-2, r. 7.1);
  - Regulation respecting compensation for adverse effects on wetlands and bodies of water (CQLR, Q-2, r. 9.1);
  - Regulation respecting biomedical waste (CQLR, c. Q-2, r. 12);
  - Regulation respecting the declaration of water withdrawals (CQLR, c. Q-2, r. 14);
  - Regulation respecting mandatory reporting of certain emissions of contaminants into the atmosphere (CQLR, Q-2, r. 15);
  - Regulation respecting the regulatory scheme applying to activities on the basis of their environmental impact (CQLR, Q-2, r. 17.1);
  - Regulation respecting the burial of contaminated soil (CQLR, Q-2, r. 18);
  - Regulation respecting the landfilling and incineration of residual materials (CQLR, Q-2, r. 19);
  - Regulation respecting waste water disposal systems for isolated dwellings (CQLR, Q-2, r. 22);
  - Regulation respecting the operation of industrial establishments (CQLR, Q-2, r. 26.1);
  - Snow, road salt and abrasives management Regulation (CQLR, Q-2, r. 28.2);
  - Regulation respecting halocarbons (CQLR, Q-2, r. 29);
  - Regulation respecting hazardous materials (CQLR, Q-2, r. 32);
  - Water Withdrawal and Protection Regulation (CQLR, Q-2, r. 35.2);
  - Land Protection and Rehabilitation Regulation (CQLR, Q-2, r. 37);
  - Regulation respecting the quality of the atmosphere (CQLR, Q-2, r. 38);
  - Regulation respecting the quality of drinking water (CQLR, Q-2, r. 40);
  - Regulation respecting the charges payable for the use of water (CQLR, Q-2, r. 42.1);
  - Regulation respecting the traceability of excavated contaminated soil (CQLR, Q-2, r. 47.01);
- Lignes directrices relatives à la valorisation des résidus miniers [Tailings reclamation guidelines] (2015);
- Guide de préparation du plan de réaménagement et de restauration des sites miniers au Québec (2022); [Guidelines for preparing mine closure plans in Québec (2017)];
- Guide d'intervention – Protection des sols et réhabilitation des terrains contaminés [Intervention guide – Soil protection and rehabilitation of contaminated sites] (2021);
- Guide de caractérisation des résidus miniers et du minerai [Tailings and ore characterization guide] (2020).

PROCEDURE

It has been determined that the Windfall deposit is located in the territory governed by the JBNQA. The proponent is therefore obliged to follow the environmental impact assessment and review procedure in accordance with the Regulation respecting the environmental and social impact assessment and review procedure applicable to the territory of James Bay and Northern Québec (Q-2, r. 25) since the list of projects subject to the JBNQA includes all types of mining projects.

The Quebec environmental assessment procedure that applies to the project is a five-step process, some of which has already been completed, namely:

1 Project initiator's statement.

- Notice of intent including preliminary project information submitted on May 24, 2017.

2 Evaluation

- In the event that a project is subject to a directive, COMEV (for projects located south of the 55th parallel), or KEQC, the Kativik Environmental Quality Commission (for projects located north of the 55th parallel) issues a recommendation for a directive specifying the scope of the impact assessment to be carried out by the project initiator. This directive shall be submitted to the Administrator[3] who shall forward it to the initiator, with or without modifications.
- Directive for the Windfall mine project by Osisko Mining Inc. (file 3214-14-059), received in July 2017 and revised in January 2022.

3 Preparation of the impact assessment by the project initiator.

4 Review

- Submission of the impact assessment to the Administrator, who then forwards it either to COMEX in the case of a project located south of the 55th parallel, or to KEQC in the case of a project located north of the 55th parallel.
- First Nations governments and the public have the opportunity to make representations to the committee (COMEX or KEQC, as the case may be), which may also hold public hearings or any other form of consultation.

5 Decision

- After considering the COMEX recommendation or the KEQC decision, the Administrator decides whether or not to authorize the project. If the Administrator cannot accept the COMEX recommendation or the KEQC decision, he/she shall consult with KEQC before making a final decision and informing the project initiator. The final decision is also forwarded to the relevant First Nations administrations. In addition, sectoral authorizations (e.g., for quarries and sand pits, water and sewer networks, campsites, etc.) must be issued under the various provisions of Chapter I of the EQA.
- The EQA provides for different timeframes, ranging from 30 to 90 days, for each step of the process. However, the duration of these steps may be extended, if necessary, by the Administrator.

1.6.2 CANADA

The Impact Assessment Act (IAA) (S.C., 2019, c. 28, s. 1) and its regulations provide the legislative basis for federal environmental assessment practice in most parts of Canada.

3 The Administrator, designated by the Government of Quebec, is a Deputy Minister of the MELCCFP and is responsible for deciding whether or not to authorize a project.

The IAA (2019) applies to projects designated by the Physical Activities Regulations. A project may also be designated by the Minister of the Environment if he or she believes that the implementation of the project may cause adverse environmental effects or that public concern about those effects warrants designation.

The project is not subject to a federal environmental assessment under the IAA (S.C., 2019, c. 28, s. 1) pursuant to the Physical Activities Regulations (s. 18, para. c), as the anticipated production from this new gold mine is less than 5,000 tonnes per day (t/day). It should be noted that the project was subject to the Canadian Environmental Assessment Act (2012) when it was originally submitted in 2017. Following the reform of this law, which was replaced by the IAA in 2019, Osisko received a letter from the Impact Assessment Agency of Canada (IAAC) confirming the closure of the federal environmental assessment procedure for the Windfall project.

A Fisheries Act authorization will be required from Fisheries and Oceans Canada (DFO) for the indirect effects of the project on fish habitat.

Also, the Canadian Navigable Waters Act will apply as navigable water bodies within the meaning of the Act will be indirectly affected by the construction of the mining infrastructure.

Finally, various laws and regulations may need to be applied to the project, including:

- Canadian Environmental Protection Act (S.C. 1999, c. 33):
  - Environmental Emergency Regulations (SOR/2019-51);
  - PCB Regulations (SOR/2008-273);
  - Federal Halocarbon Regulations (SOR/2022-110);
- Species at Risk Act (S.C. 2002, c. 29);
- Canada Wildlife Act (R.S.C. 1985, c. W-9);
- Explosives Act (R.S.C., c. E-17);
- Hazardous Products Act (R.S.C. 1985, c. H-3);
- Transportation of Dangerous Goods Act, 1992 (S.C. 1992, c. 34):
  - Transportation of Dangerous Goods Regulations (SOR/2001-286);
- Nuclear Safety and Control Act (S.C. 1997, c. 9):
  - General Nuclear Safety and Control Regulations (SOR/2000-202);
  - Nuclear Substances and Radiation Devices Regulations (SOR/2000-207);
- Metal Mining and Diamond Mining Effluent Regulations (SOR/2002-222);
- Migratory Birds Regulations (SOR/2022-105).

1.6.3 JAMES BAY AND NORTHERN QUEBEC AGREEMENT

The JBNQA was signed on November 11, 1975, between the governments of Canada and Quebec, the Grand Council of the Crees, and the Northern Quebec Inuit Association. The JBNQA divides the territory at the 55th parallel into two zones: James Bay and Nunavik. Depending on the location of the Project, the provisions associated with the James Bay Territory must be applied. Section 22 of the JBNQA defines the regime for the protection of the environment and the social environment of the Cree people, their companies and communities, and their economy in relation to development activities affecting the territory. The MELCCFP Directive (2017, revised 2022) also lists projects subject to the environmental assessment process.

The territorial regime introduced by the JBNQA is a determining element for the use of the territory. It provides for the division of the territory into Category I, II, and III lands. Table 2-1 shows the specific rights of each land category.

Table 1-8 Specific rights according to land category

CATEGORY	SPECIFIC RIGHTS
Category I lands	For Cree use only. These lands can be used for residential, community, commercial, industrial, or other purposes. In addition, the Cree have exclusive hunting, fishing, and trapping rights.
Category II lands	Contiguous to Category I lands. They are part of the Quebec public domain. These are lands where the Cree have exclusive hunting, fishing, and trapping rights.
Category III lands	Consists of all lands in the territory covered by the Agreement that are not included in Category I and II lands. On these lands, the Cree have the exclusive right to trap fur-bearing animals. In addition, certain wildlife species are reserved for their hunting and fishing activities. On these lands, hunting and fishing are permitted for both First Nations and non-First Nations people who may, subject to the principle of conservation, pursue their traditional activities throughout the year. On Category III lands, the mineral rights belong to the provincial government. **The Project is located north of the 49th parallel in the Nord-du-Québec administrative region, on Category III lands in the Eeyou Istchee James Bay Territory.**

Section 22 of the JBNQA also defines the process for obtaining permits with the help of three committees, which are either evaluation or review committees.

- COMEV is a tripartite Quebec-Canada-Cree organization (composed of representatives of the Cree Nation and federal and provincial authorities) responsible for reviewing the project notice and preparing guidelines in consultation with the community for projects located south of the 55th parallel (sections 148 to 150 and 153 to 159 of the EQA and section 22.5 of the JBNQA).
- COMEX is a bipartite Quebec-Cree organization (made up of Cree and provincial government representatives) responsible for reviewing the EIA of projects located south of the 55th parallel and for recommending whether or not authorization should be granted (sections 151, 152, and 160 to 167 of the EQA and section 22.6 of the JBNQA).
- A similar review committee, the Canada-Cree federal Review Panel (COFEX-South) (composed of Cree and federal government representatives) is responsible for reviewing projects south of the 55th parallel. This committee sits exclusively in cases where a federal authority has jurisdiction. Paragraph 22.6.7 of Section 22 notes that the signatory parties to the JBNQA may merge the two review panels.

The requirements regarding the preliminary information and the content of the impact assessment are found in the Regulation respecting the environmental and social impact assessment and review procedure applicable to the territory of James Bay and Northern Québec (Q-2, r. 25).

Before undertaking its mining operations, the Project must first obtain an authorization under section 153 of the EQA.

The Eeyou Istchee James Bay Regional Government (EIJBRG) is also involved in the authorization process. Once the ministerial authorization has been obtained, additional applications for authorization will be filed mainly under the James Bay Region Development Act (chapter D-8.0.1).

Under this Act, a business corporation has been incorporated under the name Société de développement de la Baie-James (SDBJ). The SDBJ has the rights and privileges of an agent of the state. Its mission is to promote, from a sustainable development perspective, the economic development, improvement, and exploitation of the territory's natural resources, other than the hydroelectric resources under Hydro-Québec's mandate. In particular, it may initiate, support, and participate in carrying out projects with these objectives. Its mission is also to develop the territory under municipal jurisdiction in matters of development and urban planning.

1.6.4 BY-LAWS OF THE EEYOU ISTCHEE JAMES BAY TERRITORY

The Project must also comply with the regulations applicable in the James Bay region, particularly the Act respecting land use planning and development (chapter A-19.1). The Eeyou Istchee James Bay Territory also has specific regulations applicable to the project, particularly with respect to zoning and nuisances:

— Zoning By-law (No. 213);

— Nuisance By-law (No. 149);

— By-law relating to peace and order in public and private places (No. 148).

Osisko will file applications for authorizations and permits for the construction and operation of the project with the Eeyou Istchee James Bay Regional Government, including applications for certificates of compliance and regional regulatory approvals.

1.7 AUTHORIZATIONS RECEIVED IN THE EXPLORATION PHASE

Bulk sampling of the Windfall site was initiated in 2008 by Noront following the issuance of the first permit in 2007. Noront's operations were taken over by Osisko in 2015. Sampling of the site has continued since then. This is subject to five (5) authorizations and amendments of authorizations that allow the sampling of mineralized material. The authorizations obtained are as follows:

— Authorization 7610-10-01-70090-20 200178172 issued on September 18, 2007, for the sampling of 45,000 Mt of the Caribou zone and Zone 27 lenses transferred to Osisko Mining on March 17, 2017.

— Authorization 7610-10-01-70090-27 4017226560 issued on August 6, 2018, for the sampling of 5,000 Mt of Lynx and Underdog zone lenses.

- Amendment to Authorization 7610-10-01-70090-27 401926106 issued June 8, 2020, for the addition of sampling of 5,000 Mt of the upper portion of the Triple Lynx lens (replacing Underdog).
- Amendment to Authorization 7610-10-01-70090-27 401985463 issued January 14, 2021, for the sampling of 30,579 Mt of the Lynx, Triple Lynx, and Main (Zone 27) lenses.
- Amendment to Authorization 7610-10-01-70090-27-402199594 issued on December 28, 2022, for:
  - additional bulk sampling of 13,368 Mt in the Caribou, Triple Lynx, and Lynx 4 zones;
  - a 72,047 m^2 expansion of the waste rock pile and an adjacent basin (basin A);
  - the installation of an industrial wastewater treatment unit for the destruction of ammonia nitrogen, as well as two adjacent basins (basins D and P);
  - the addition of a crushing and screening process on the waste rock pile; and,
  - clearing, excavation, backfilling, and installation of two HDPE pipes in an open bog wetland.

2 LOCATION AND TECHNOLOGY ALTERNATIVES

Identifying and analyzing project alternatives is part of the environmental assessment process, which must highlight the objectives and criteria for selecting the proponent's preferred alternative.

The following sections contain, for each of the project's major components, a description of the infrastructure location and technology alternatives considered, the comparative analysis, and finally the chosen alternative. When relevant, the cumulative impacts considered in the choice of alternative are addressed.

2.1 LOCATION OF MAIN INFRASTRUCTURE

Early in the project design, it was decided that existing exploration infrastructure would be reused whenever possible. In this chapter, as well as in Chapter 3 – Description of the Project, the elements that will be reused, relocated, or retained are presented where relevant.

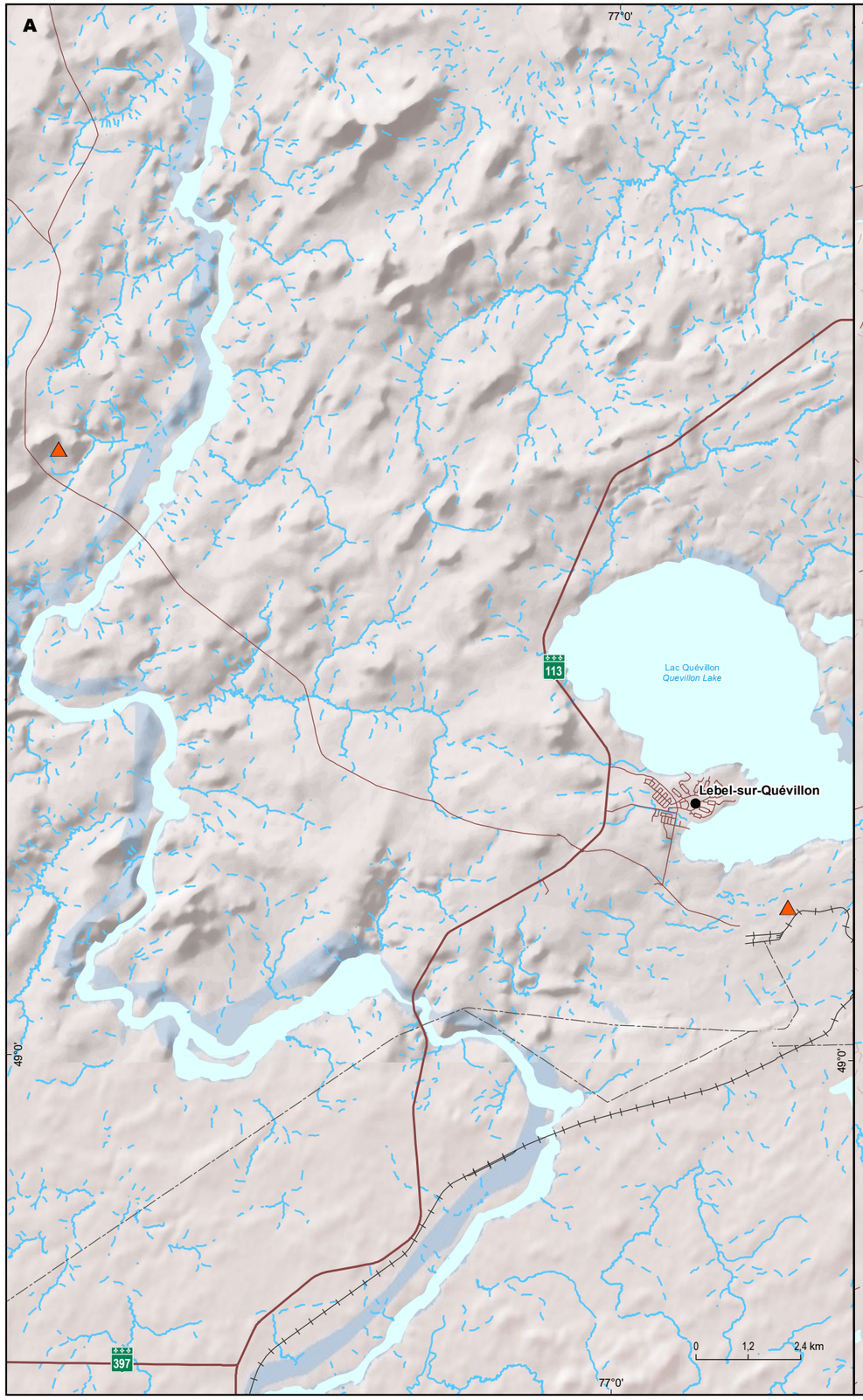
For example, the existing waste rock stockpile will continue to be used during mining operations, and simply expanded and upgraded over the life of the mine. It was more efficient to concentrate waste rock transfer in one location and to limit the footprint. The addition of an upper level, while meeting stability criteria and minimizing the visibility of the structure, was a clear advantage to the project.

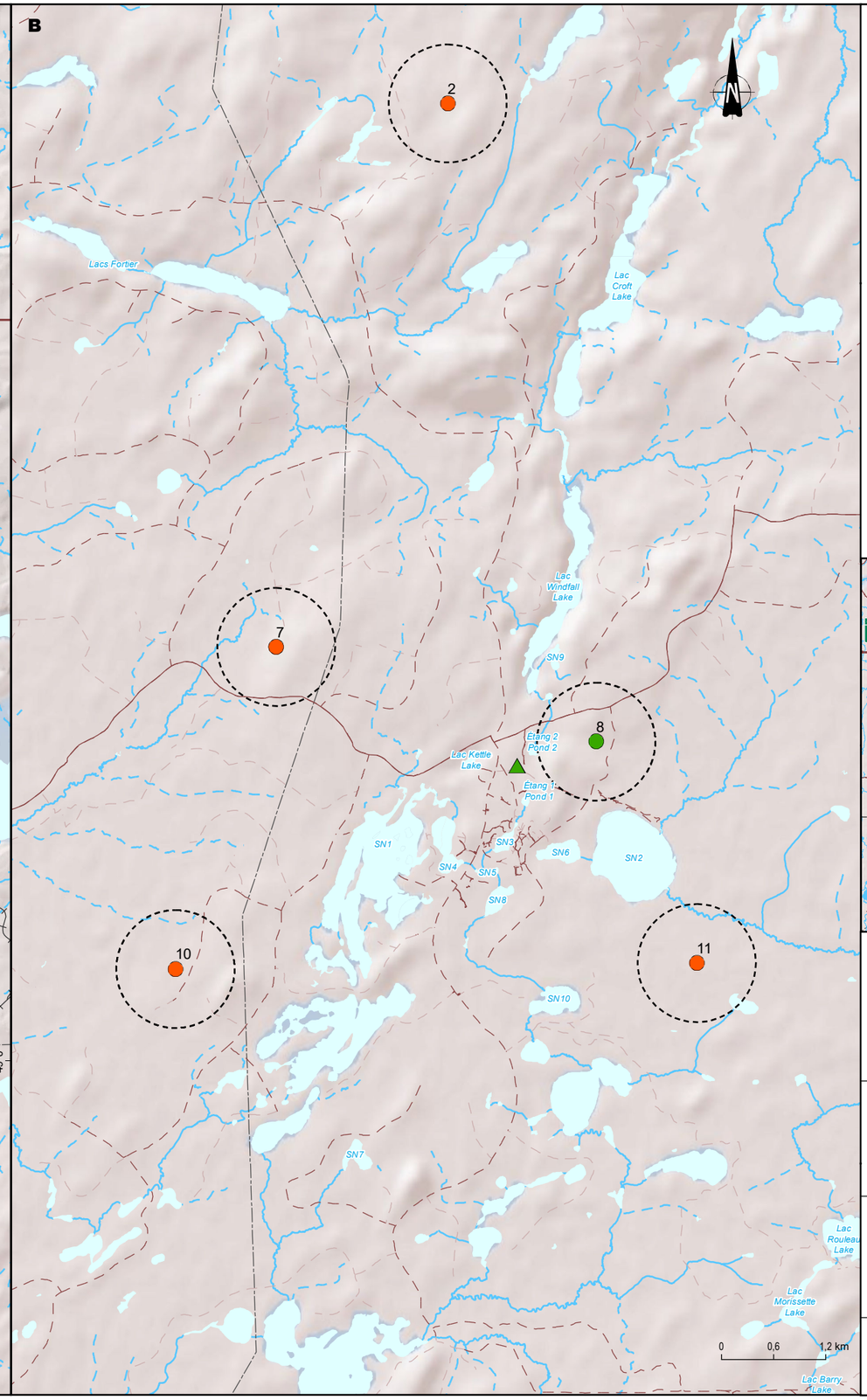
2.1.1 PROCESS PLANT

In 2017, Osisko was considering two options for the location of the process plant, either on the Windfall site itself or near the municipality of Lebel-sur-Quévillon (Osisko Mining Inc., 2017). It looked at two different sites in Lebel-sur-Quévillon (Map 2-1). The proximity of an electrical substation meant that there would be no need for generators or a power line that would have been more than 80 km long.

It should be mentioned that the option of locating the plant in Waswanipi was excluded at the pre-selection stage. The Cree First Nation of Waswanipi (CFNW) sent a letter to the CEAA and MDDELCC on December 5, 2017, stating that the Waswanipi Crees did not want this alternative to be considered.

The company did consider the option of acquiring and converting plants (namely those at the Langlois and Bachelor sites). However, they did not meet the specific requirements for processing the Windfall ore. In particular, they lacked the necessary grinding power (see section 2.3.1) and the tailings storage facility was managed with material that is considered to have the potential to generate acid. Furthermore, both of these plants would have required Windfall ore to be carried from the site on existing roads. This would have meant that 75- to 90-ton trucks would be making 21–26 trips per day, 365 days a year unless the road was closed. This would have generated a significant amount of GHGs from the use of diesel fuel in the trucks and would have had additional impacts on land use in an area where Osisko is not currently operating. Transporting the ore over longer distances would also have generated more dust and air contaminants. Finally, the Langlois plant option would have required transporting the concentrate to another plant or refinery to further concentrate the gold in the product.





- Municipalité / *Municipality*

Hydrographie / *Hydrography*

- Cours d'eau permanent / *Permanent watercourse*
- Cours d'eau intermittent / *Intermittent watercourse*
- Plan d'eau / *Waterbody*

Infrastructures / *Infrastructures*

- Route nationale / *National road*
- Route secondaire / *Secondary road*
- Chemin forestier / *Forestry road*
- Chemin d'hiver / *Winter road*
- Chemin de fer / *Railroad*
- Ligne de transport d'énergie électrique / *Electric power transmission line*

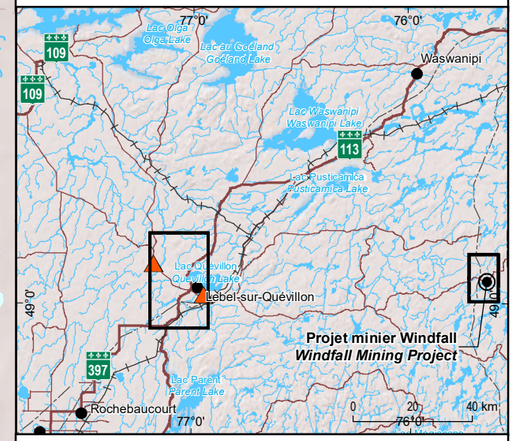
Variante d'emplacement des infrastructures / *Alternatives for Infrastructure Locations*

Usine de traitement de minerai / *Ore processing plant*

- Variante rejetée / *Rejected alternative*
- Variante retenue / *Chosen alternative*

Parc à résidus / *Tailing Storage Facility*

- Variante rejetée / *Rejected alternative*
- Variante retenue / *Chosen alternative*
- Aire approximative de l'infrastructure étudiée / *Approximate area of the studied infrastructure*



OSISKO
MINIÈRE OSISKO

Projet minier Windfall - Étude d'impact sur l'environnement / *Windfall Mining Project - Environmental Impact Assessment*

Site minier Windfall, Eeyou Istchee Baie-James (Québec) / *Windfall Mining Site, Eeyou Istchee Baie-James (Quebec)*

Carte 2-1 / *Map 2-1*
Variantes d'emplacement de l'usine de traitement de minerai et du parc à résidus / *Alternatives for the Ore Processing Plant and the Tailings Storage Facility*

Sources :
CanVec+, 1/50 000, RNCan, 2014
MERN, AQréseau+, réseau routier, 2020
GRHQ, Hydrologie, 2022

MTM, Fuseau 9 / *Zone 9*, NAD83

2023-03-02

Préparée par / Preparation : M.-H. Brisson
Dessinée par / Drawing : B. Lauzière
Vérifiée par / Verification : M.-H. Brisson
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wsp

As for the option near Lebel-sur-Quévillon, it would also have required the ore (approximately 1,800 TPD) to be hauled on existing logging roads in the same way as for the plants considered near the site, but over an even greater distance. This would also have generated a significant amount of GHGs through the use of diesel fuel for trucks. However, it must be said that one of the notable advantages of locating the process plant near Lebel-sur-Quévillon would have been the proximity of the labour pool. Transportation can also be a vulnerability during extreme weather events and thus be impacted by possible climate change.

The potential presence of these mining trucks on forest roads raised concerns by both First Nations and non-First Nations land users. In 2018, a series of interviews were held with the CFNW tallymen and the leaseholders located within 5 km of either side of R1050 (R1000), R0853 (R5000), and R1053 (R6000). These interviews found that the forest roads are used to access camps and for various activities, including hunting, gathering, fishing, and trapping. The main concerns expressed by First Nations and non-First Nations users were the following:

— Safety of road users, risk of accidents and damage to vehicles, loss of visibility due to dust;
— Disturbances from noise, dust, and vibrations;
— Impacts of the dust raised by the trucks and generated by the ore on plants, wildlife, water, and human health;
— Impacts of noise and vibration on wildlife, particularly on animal movement;
— Risk of collisions with wildlife;
— Risk of spills and their impact on the environment, particularly on water.

The preliminary economic assessment (PEA) (BBA Inc. et al., 2018) covered the Windfall and Osborne-Bell deposits. This study provided a base case assessment for developing the Windfall (2,600 TPD) and Osborne-Bell (600 TPD) deposits as underground mines with a 3,200 TPD central process plant just outside the town of Lebel-sur-Quévillon. This 44% increase in daily production would have resulted in even more trucks on the logging roads. The Windfall and Osborne-Bell mines would have been located approximately 115 km and 23 km, respectively, from the proposed process plant.

In 2021, Osisko delivered an updated preliminary economic assessment (BBA Inc. et al., 2021a). This PEA was based on the 2021 mineral resource estimate, which provided a base case assessment for developing the Windfall deposit as an underground mine with a 3,100 TPD plant on the Windfall site. This was significantly more economically advantageous, and the construction costs included financial provision for the construction of a power line.

From 2018 to 2021, Osisko continued its efforts to estimate the mineral resources of the Windfall deposit. Exploration successes have updated the geological interpretation of the Windfall deposit, leading to a much larger (and still growing) deposit footprint compared to the previously defined mineralized area. Several significant new mineralized zones were also discovered, and the main mineralization corridors were extended. The larger size of the Windfall deposit allows it to support a plant at the site, justifies the construction of a power line, and eliminates the need to haul ore on logging roads. As such, no additional geotechnical investigations have been conducted on the properties outside the Windfall site, where the plant will be located. Centralizing infrastructure at a single site also minimizes the nuisances associated with transportation and thus reduces the impact assessment on land users' quality of life.

The January 2023 feasibility study (BBA Inc. et al., 2023) concurs and provides a base case assessment for developing the Windfall deposit as an underground mine with a process plant (3,400 TPD) on the site.

2.1.2 TAILINGS STORAGE FACILITY

The site currently has a small waste rock stockpile to accommodate the tailings generated during the creation of the exploration ramp and access points for bulk sampling. As the project develops, a new waste rock stockpile and tailings storage facility will become necessary.

Golder Associates Ltd. (now WSP) assessed the location alternatives for the tailings storage facility of the Windfall project in April 2022, in accordance with the *Guidelines for the assessment of alternatives for mine waste disposal* (Environment Canada, 2016), to identify the most appropriate environmental, technical, economic, and socio-economic choice. The report was prepared with the data from the April 2021 PEA.

METHODOLOGY

The methodology recommended by the *Guidelines for the assessment of alternatives for mine waste disposal* (Environment Canada, 2016) includes the following six steps:

- Step 1: Identify candidate alternatives.
- Step 2: Perform a pre-screening assessment.
- Step 3: Characterize alternatives.
- Step 4: Create a multiple accounts ledger.
- Step 5: Employ a value-based decision process.
- Step 6: Perform a sensitivity analysis.

In the current study, only the alternatives selected for evaluation (i.e., those that met the baseline and site pre-screening criteria) will be described. All steps in the evaluation process are detailed in Golder report (2022). The pre-screening criteria used were the following:

- Encroachment into fish habitats
- Presence of a drinking water source
- Presence of proposed or existing protected areas
- Known presence of archaeological sites
- Right-of-way for existing or proposed power line infrastructure
- Use of the land for traditional Cree activities

Geological potential was not used as a pre-screening criterion, but the lack of potential was confirmed by "condemnation" drilling at the selected site (Appendix 3-1). In order to proceed with pre-screening, meetings were held with land users to identify the zones that were incompatible with mining activity on their traplines. If an alternative may have encroached on a valued or used area, it was eliminated to minimize the impact on habitats and land use as much as possible.

Table 2-1 summarizes the sites that meet the pre-screening criteria and Table 2-2 summarizes the technical characteristics of the selected alternatives. Map 4-2 shows the alternate locations for the tailings storage facility. It should be noted that for the alternatives assessment, two storage technologies were considered for each of the potential sites. The letters to the right of the site number indicate these technologies: "F" stands for "filtered tailings," while "T/P" stands for "thickened paste." These technologies are discussed further in section 2.2.2.

Table 2-1 Summary of sites meeting the pre-screening criteria

Proposed site	Distance from the process plant	Topography and vegetation	Presence of wetlands or waterbodies
2	7.7 km (N)	Uneven, dense forest	Yes, wetland
7	3.1 km (NW)	Flat, dense forest	Yes, wetland and watercourse
8	950 m (NE)	Uneven, disturbed vegetation	Yes, wetland
10	4.6 km (SW)	Flat, disturbed vegetation	Yes, wetland and watercourse
11	3.1 km (SE)	Flat, cleared	Yes, wetland

In all cases, factors associated with climate change were incorporated into the design criteria for the projected footprint of the alternatives. The geographic alternatives of thickened paste technology were therefore disadvantaged. Additionally, pre-screening revealed that the footprint of Alternative 7T/P overlapped several watercourses. It was therefore removed from the list.

Table 2-2 Summary of the technical characteristics of the alternatives chosen for evaluation

Alternative	Technical description
2F	Elevation of the tailings stockpile: 428 m; Maximum stack height: 16 m; Approximate footprint: 910,000 m².
2T/P	Dam elevation: 437 m; Maximum height of the dam: 24 m; Approximate volume: 2,500,000 m³; Distance from the top of the dam to the top of the tailings: 2.7 m; Approximate footprint: 1,360,000 m².
7F	Elevation of the tailings stockpile: 413 m; Maximum stack height: 13 m; Approximate footprint: 830,000 m².
8F	Elevation of the tailings stockpile: 408 m; Maximum stack height: 12 m; Approximate footprint: 850,000 m².
8T/P	Dam elevation: 418 m; Maximum height of the dam: 21 m; Approximate volume: 2,320,000 m³; Distance from the top of the dam to the top of the tailings: 2.8 m; Approximate footprint: 910,000 m².
10F	Elevation of the tailings stockpile: 410 m; Maximum stack height: 12 m; Approximate footprint: 1,040,000 m².
10T/P	Dam elevation: 414 m; Maximum height of the dam: 16 m; Approximate volume: 1,820,000 m³; Distance from the top of the dam to the top of the tailings: 3.2 m; Approximate footprint: 1,230,000 m².
11F	Elevation of the tailings stockpile: 402 m; Maximum stack height: 7 m; Approximate footprint: 1,430,000 m².
11T/P	Dam elevation: 406.5 m; Maximum height of the dam: 11.5 m; Approximate volume: 1,750,000 m³; Distance from the top of the dam to the top of the tailings: 3.7 m; Approximate footprint: 1,450,000 m².

CHARACTERIZATION OF THE ALTERNATIVES SELECTED FOR EVALUATION

The third step in the process is the characterization of these alternatives. For each alternative, the biophysical host environment was described broadly and the social host environment was inventoried. Characterization criteria were identified to distinguish between the alternatives and establish a basis for comparison while factoring in the particularities of each site. The criteria were divided into four characterization accounts: environmental (18 criteria), socio-economic (13 criteria), technical (13 criteria), and economic (7 criteria). The characterization criteria are detailed in the Golder report (2022). In addition, field visits were made to each site to confirm feasibility. Photographs are attached as Appendix B of the Golder report (Appendix 2-1).

MULTIPLE ACCOUNTS LEDGER

The fourth step in the process is the creation of a multiple accounts ledger, which is an evaluation tool composed of sub-accounts (evaluation criteria) and indicators (measurement criteria). Multiple accounts ledgers consider the impact of each characterization criterion.

Environmental account: This account covers issues related to the physical environment (air and water quality) and biological environment (ecological functions and terrestrial and aquatic habitats). It has a total of nine sub-accounts.

Socio-economic account: This account covers issues associated with mining claims, First Nations and non-First Nations land use, nuisances, landscape, and stakeholder perception of the alternative. It has a total of five sub-accounts.

Technical account: This account is primarily used to evaluate the elements that influence water retention, tailings or waste rock storage, operation, and construction capacity. It has a total of six sub-accounts.

Economic account: This account is used to identify the lowest-cost alternative (in the short and long term) to ensure the long-term viability of the project. It has a total of five sub-accounts.

VALUE-BASED DECISION PROCESS

The pre-screened alternatives are assessed based on a weighting of the accounts and sub-accounts (evaluation criteria). This weighting, associated with the indicators (measurement criteria), is used to calculate the merit score for each indicator in an account. This, in turn, allows the value of each account to be calculated. In the initial audit, the accounts were weighted as follows:

- Environment: 6
- Socio-economic: 3
- Technical: 3
- Economic: 1.5

Table 2-3 summarizes the scores for each alternative by account type.

Table 2-3 Summary of the scores obtained for each site under each account

Account	Proposed site								
	2F	2T/P	7F	8F	8T/P	10F	10T/P	11F	11T/P
Environmental	3.63	2.91	3.78	3.81	3.31	3.26	2.54	2.36	1.76
Socio-economic	4.36	3.72	4.49	3.49	2.77	4.49	4.21	4.49	4.21
Technical	2.46	2.63	2.76	3.83	4.07	2.45	2.61	2.93	3.31
Economic	2.21	2.25	4.42	3.71	4.04	2.7	3.03	1.9	2.8
Total (with account weighting)	**3.48**	**2.95**	**3.78**	**3.79**	**3.44**	**3.4**	**3.09**	**2.91**	**2.76**

Golder (2022) provides a detailed analysis of the score assigned to each location alternative. This analysis showed that Alternative 8F would be the most advantageous tailings storage facility from an environmental and technical standpoint, while Alternative 7F would be the most advantageous from an economic and socio-economic standpoint. In the majority of cases, the sites using tailings filtration technology were found to be more advantageous than those using thickened-paste tailings technology. This analysis considers GHGs, climate change, and cumulative impacts on land use.

SENSITIVITY ANALYSIS

The sensitivity analysis is the final step in the process. It validates the robustness of the evaluation process by determining how the weighting of each account, sub-account, and indicator affects the results. Six scenarios were subjected to this sensitivity analysis.

The results showed that the alternatives 7F and 8F had the highest scores in the base scenario, as well as in all six scenarios.

Alternative 7F has the advantage of being close to an existing road, entirely within the Osisko property, and not on land with constraints indicated by the Cree community. However, it is near a watercourse and within 2 km of a status species. Additionally, it has less potential for expansion than Alternative 8F and it is farther away from the process plant.

Alternative 8F has the advantage of affecting a smaller watershed area and requiring less clearing. Its distance from the process plant and bodies of water, as well as its distance from fish habitats, is also an advantage. This alternative has existing access roads and its geotechnical conditions are favourable. However, sensitive elements are located downstream of the site and it encroaches on land that the W25B tallyman's father had been using before exploration began. The length of the ditch system for water management that would need to be created and the more complex restoration potential are further disadvantages.

Ultimately, given the positive evaluation of both sites, proximity to the process plant was the deciding factor. A site closer to the plant minimizes risks and allows for better water management on the site. Therefore, Alternative 8F was chosen as it is located 950 m from the plant site, compared to 3.1 km for Alternative 7F. This will help minimize the transportation of tailings, thereby reducing Osisko's carbon footprint. In addition, Alternative 7F would have required two water treatment units and thus two mining effluents. This would have meant that the project would have had a greater cumulative impact on hydrology, water quality, and fish habitats.

2.1.3 OTHER COLLECTION AREAS

ORE

The ore stockpile needed to be near the crusher and the surface portals to minimize transportation distances, which is beneficial in terms of GHG reduction. In addition, once the locations were planned for the mining complex infrastructure (mainly the process plant), the potential locations for the ore stockpile became limited as the process plant, conveyor, silo, and crusher must be close together and built on a solid-rock foundation. As a result, the depth and elevation of the rock became the determining factors. Geotechnical investigations confirmed the exact boundaries of the ore stockpile, and its design was optimized by limiting its footprint to a single watershed. The analysis also included technical considerations associated with water management and safety factors to account for climate change. With 66% of the mineral resource estimate coming from Lynx, the short distance from its surface ramp to the crusher (approximately 225 m as the crow flies) is evidence that the infrastructure is positioned well and follows the sequence of steps involved in mine operation. In all cases, minimizing transportation distances will shrink the carbon footprint of Osisko's operations and lower the associated transportation costs. The area was also partially impacted by exploration activities and not used by land users. It was also far enough away from the proposed camp to reduce noise from crushing that could affect workers' rest.

OVERBURDEN

The overburden stockpile is typically among the last components to be placed on a mine site, as there are generally fewer location constraints. As a result, the location is greatly influenced by the location of other infrastructure, including any changes made to the layout in the normal course of developing a project. For that reason, the overburden stockpile locations did not undergo a comparative analysis as the options were not necessarily on the table at the same time. Instead, different sites were considered one after the other.

The following criteria were used for all potential overburden stockpile sites:

- Capacity of 638,000 m³
- Proximity to the tailings storage facility (main area to be stripped)
- At least 60 m away from lakes and watercourses
- In an area already impacted by exploration activities

The considerations are summarized below, in the order the sites were considered, and the sites are marked on Map 2-2.

NORTH OPTION

The first site considered was north of the original tailings storage facility site, just below Road R1053 (R6000). The proposed footprint ran along the northern boundary of the facility, minimizing the distance for overburden transport. The site also met all other criteria. However, a change in the final position of the tailings storage facility precluded this option, as the overburden stockpile fell within its new boundary.

WEST OPTION

The second potential site was located directly west of the tailings storage facility, also minimizing transportation distance. However, biological inventories in the summer of 2022 confirmed the presence of a watercourse within the proposed footprint. As a 60 m buffer would have been needed around the watercourse, the remaining space would have been insufficient to hold all of the overburden.

SOUTH OPTION

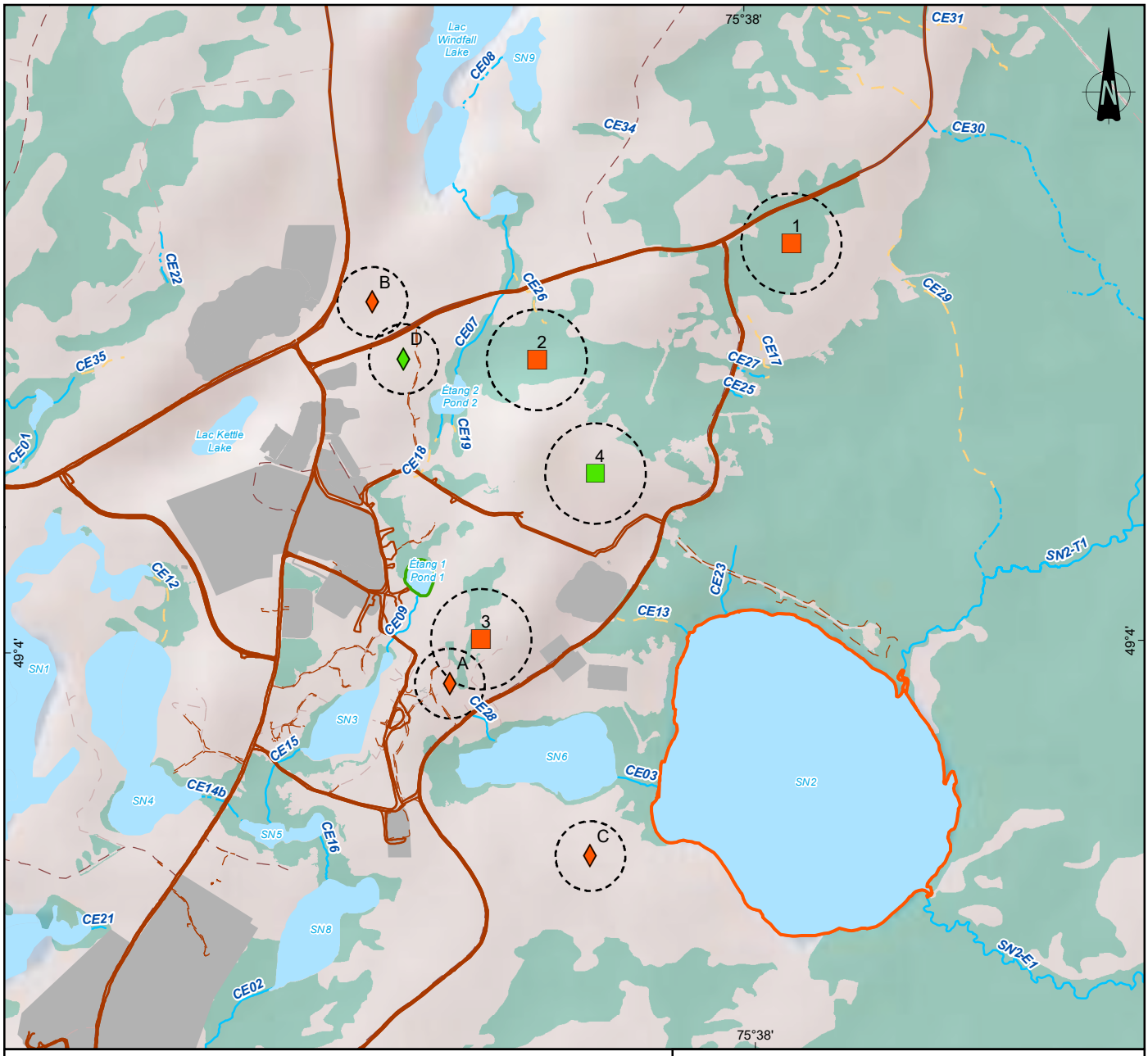
The third potential site was located south of the tailings pipe and access road, approximately 775 m southwest of the tailings storage facility. Although this site met all the criteria based on site constraints and other planned developments, it would have called for more transportation than the two previous sites. In addition, its footprint straddled two watersheds, increasing the complexity of water management. Additional infrastructure would have been required for water management, which would have created additional costs. Despite these disadvantages, this option was put forward due to the lack of a better site.

CENTRE OPTION

Ultimately, an unexpected change to the site plan created a new opportunity for the overburden stockpile. The ore stockpile, which was originally going to be located near the crusher, was moved for technical reasons (see previous section). The analysis of this location revealed that it met all of the criteria for the overburden stockpile; it was also as close to the tailings storage facility as possible given the constraints on the site. The centre option was therefore selected as the location for the overburden stockpile. This site was also partially stripped and impacted by previous exploration activities, and was not used by the tallyman or his family for traditional activities.

WASTE ROCK

From the beginning, it was considered best to continue using the existing waste rock stockpile during mining operations. It will be expanded and upgraded over the life of the mine. On a technical level, it was more efficient to concentrate waste rock transfer in one location and to limit the footprint. The addition of an upper level, while meeting stability criteria and minimizing the visibility of the structure, was a clear advantage to the project. Finally, this option was the most economically advantageous and encroached into areas that were already impacted by advanced exploration infrastructure, minimizing habitat loss.



Hydrographie / *Hydrography*

- Cours d'eau permanent / *Permanent watercourse*
- Cours d'eau intermittent / *Intermittent watercourse*
- Cours d'eau souterrain / *Underground watercourse*
- Plan d'eau / *Waterbody*

Végétation / *Vegetation*

- Milieux humide / *Wetlands*

Infrastructures / *Infrastructures*

- Route secondaire / *Secondary road*
- Chemin forestier / *Forestry road*
- Chemin d'hiver / *Winter road*

Variantes d'emplacement des infrastructures / *Alternatives for Infrastructure Locations*

Campement minier / *Mining Camp*

- Variante rejetée / *Rejected alternative*
- Variante retenue / *Chosen alternative*

Halde à mort terrain / *Overburden stockpile*

- Variante rejetée / *Rejected alternative*
- Variante retenue / *Chosen alternative*

Effluent minier / *Mining effluent*

- Variante rejetée / *Rejected alternative*
- Variante retenue / *Chosen alternative*
- Aire approximative de l'infrastructure étudiée / *Approximate area of the studied infrastructure*

OSISKO
MINIÈRE OSISKO

Projet minier Windfall - Étude d'impact sur l'environnement / *Windfall Mining Project - Environmental Impact Assessment*

Site minier Windfall, Eeyou Istchee Baie-James (Québec) / *Windfall Mining Site, Eeyou Istchee Baie-James (Quebec)*

Carte 2-2 / *Map 2-2*
Variantes d'emplacement de l'effluent minier, de la halde à mort-terrain et du campement minier / *Alternatives of Mine Effluent, Overburden Stockpile and Mining Camp Locations*

Sources :
CanVec+, 1/50 000, RNCan, 2014
MERN, AQréseau+, réseau routier, 2020
GRHQ, Hydrologie, 2022

0 200 400 m

MTM, Fuseau 9 / *Zone 9*, NAD83

2023-03-14

Préparée par / Preparation : M.-H. Brisson
Dessinée par / Drawing : C. Thériault
Vérifiée par / Verification : M.-H. Brisson
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wsp

2.1.4 WATER TREATMENT PLANT AND MINING EFFLUENT

Once a location was determined for the stockpiles, tailings storage facility, and process plant facilities, it was possible to identify a location for the water treatment plant (WTP). Since the stockpiles and tailings storage facility have the greatest ground encroachment, and consequently the largest volumes of water, it is preferable for the WTP to be located nearby. It also needs to be close to surface runoff from the areas that are the most likely to be loaded with contaminants. More specifically, the ponds need to be as close to the WTP as possible for risk management purposes. The WTP position was chosen in an earlier phase of the project, outside the scope of the current EIA. However, during the advanced exploration phase, it became necessary to move the WTP to a new location that had been authorized for the Lynx 4, Triple Lynx, and Caribou bulk sampling work. As part of the project, additional treatment trains will be added to the existing building. The treatment technology alternatives are detailed in section 2.3.3.

Since the WTP is close to Unnamed Lake 2, it was initially suggested that the mining effluent be discharged there (Map 2-2). This was the preferred option until December 2022, when it was finally decided to return the effluent to Pond 1 as is currently the case in the exploration phase. Table 2-4 presents the criteria for choosing between the effluent location options.

Several elements were taken into account. First, the Windfall site is located at the confluence and headwaters of three different watersheds, meaning that the anticipated hydrological changes from redirecting the water to another watershed were insignificant. Therefore, this factor could not be used for comparison. However, Pond 1 discharges to Unnamed Lake 5, which is 1 km downstream. At this junction, water from unnamed lakes 1 and 4 mix with water from Pond 1, which appears to give the area a greater ability to absorb extra water. In addition, Unnamed Lake 5 is already receiving discharges of mining effluent from the advanced exploration site. By keeping the effluent in the same location, activities and impacts will be limited and no new developments will be required on the shoreline or in the lake for the effluent itself. This is clearly beneficial both for the biophysical environment and the project's finances. In addition, it will reduce construction work and therefore limit GHGs. Limiting impacts to one watershed also prevents a cumulative impact on water quality in the receiving environment.

The size of Unnamed Lake 2 also makes it suitable for receiving effluent, since the flows at its outlet would be lower. The lake would have the capacity to buffer the inflow of water from the treatment plant and therefore regulate the flow. In Pond 1, erosion is possible during the times of year when discharge volumes are greater, but the effluent flow should be fairly consistent since the water will be pumped and the pumping capacity will be limited.

No fish were collected during the survey in Pond 1, though fish have been found in its outlet. The habitat quality was rated as low and marginal. Unnamed Lake 2, on the other hand, has the highest biodiversity in the study area, with seven different fish species. Of these, three species are found only in this lake. A high diversity of benthic invertebrates was also noted, and fishing efforts collected the most fish of all the lakes that were fished in the study area. In fact, land users tend to prefer fishing in this lake for that reason. Finally, during the impact study consultations, two users expressed concern that the water quality of Unnamed Lake 2 could be affected by mining effluent. Meanwhile, in the Pond 1 watershed, the closest recreational fishing area is in Unnamed Lake 10.

Given the findings from the aquatic fauna study (WSP, 2023; Appendix 7-2) and the concerns raised by the stakeholders, Osisko decided to return to discharging effluent into Pond 1.

Table 2-4 Criteria for choosing effluent discharge locations

Variable/waterbody	Unnamed Lake 2	Pond 1
Area	73.10 ha	0.82 ha
Existing mining effluent management	No, work would have been needed to bury the pipe, which would have required a capital investment and temporarily impacted aquatic wildlife during the work.	Yes, ability to reuse existing infrastructure (cost savings).
Perceived effect on the receiving environment	Headwater lake flowing into the St-Cyr River about 10 km downstream	Pond at the head of the watershed discharging into Unnamed Lake 3, then Unnamed Lake 5 one kilometre downstream; junction with outlets for unnamed lakes 1 and 4
Fish habitat	Seven species of fish, of which only three were found in this lake; Most productive habitat in the study area and highest number of catches per net-night	No fish caught during the surveys Very marginal habitat with low potential
Benthic diversity	High	Low
Watershed impacted by exploration-phase activities	Not impacted	Impacted
Traditional or recreational fishing practiced	Yes	No No fish in Pond 1, closest fishing in Unnamed Lake 10
Impact on the water regime	Low impact on changes in water levels and flows in surrounding watersheds; Possible water level decrease in Pond 1 as the underground operations will lower the water table	Low impact on changes in water levels and flows in surrounding watersheds; Potential bank erosion in Pond 1 due to increased water volumes, given its surface area
Total positives	**1/7**	**6/7**

Note: Blue cells indicate positive variables for the effluent location, while red cells indicate negative variables.

2.1.5 MINING CAMP

The existing camp, 2 km south of the main ramp, will not be used for the Windfall project as it will be needed for the ongoing exploration activities that will take place in tandem with operations.

The proposed camp complex for the project includes worker housing (capacity of 406 workers), a cafeteria and dining hall, a gym and game room, laundry facilities, an employee reception area, and a waiting room with a baggage room, first aid room, and dispatch offices. It also includes a small parking area and a bus drop-off/pick-up area for arriving and departing employees. In addition, a Cree cultural centre needs to be set up near the camp The mining camp complex will need to occupy around 4 ha.

In considering possible locations for the permanent camp, proximity was a key criterion; it needed to be close to the mine complex not only to make it easier for employees to travel to their work sites, but also to limit the need for employees to drive around the site. To reduce GHG emissions from day-to-day operations and save on vehicle acquisitions, it was decided that the site will have a limited number of vehicles and employees should be able to walk to their work sites whenever possible. In addition, one of the many internal discussions raised the point that the camp needed to remain grouped with the other facilities for several reasons: to minimize encroachment, to keep the site safe (for instance, by limiting pedestrian traffic), and to manage water efficiently and therefore limit the project's total investment costs. Consolidating infrastructure will also limit the cumulative impacts on land use by concentrating all activities closely around the portals.

Another criterion was the need to avoid wetlands and be more than 60 m from a watercourse. The camp also had to be far from any known potential archaeological area. Finally, it needed to be in a relatively calm area for the employees' sake. It could not, for example, be located near the crusher, the tailings storage facility, or the waste rock stockpile, where activities will generally be taking place 24 hours a day. Note that the options were not studied in depth, as the most suitable location became clearer and clearer as engineering progressed to the feasibility study stage. Four potential locations were available, but three of them did not meet all of the basic criteria (Map 2-2).

Table 2-5 describes the criteria for the alternate mining camp locations.

Table 2-5 Criteria for choosing mining camp locations

Criterion	Site A	Site B	Site C	Site D
Near the mining complex	No	Yes	No	Yes
Limits encroachment	Yes	Yes	No	Yes
Safe	Yes	No	No	Yes
Avoids wetlands	No	Yes	Yes	Yes
More than 60 m from a watercourse	Yes	No	Yes	Yes
Calm	No	Yes	Yes	Yes
Far from area of archaeological potential	Yes	Yes	No	Yes
Total positives ("Yes")	**4/7**	**5/7**	**3/7**	**7/7**

Note: Blue cells indicate positive variables for the effluent location, while red cells indicate negative variables.

According to this table, Site D had the highest score.

Looking at each of the options, Site A was discouraged because it encroached on a wetland, was far from the mine complex, and was less peaceful for employees due to the stockpiles. It would also have required noise screens to be installed, especially since it was located near the hauling roads.

Site B was somewhat appealing, as it was far from infrastructure. It may have been possible to change the footprint to create the 60 m buffer zone around the watercourse, but doing so would have required employees to travel much farther to their workplaces. This could have been mitigated by planning shuttles or longer pedestrian walkways, but the need to cross the existing logging road posed a safety issue for employees and road users.

Site C was the least feasible choice according to these criteria. While it was the calmest for employees, it would not have allowed the infrastructure to be consolidated. Like Site B, it would also have required employees to travel farther.

Finally, Site D meets all the criteria. This option was presented to the tallyman, who had no comments or concerns about the location as of the meeting in September 2022.

Another feature of the camp is that it has a cultural centre for the Cree community to gather. With Option D, a view can be created toward Pond 2. A view of nature like this can be soothing. The location of the cultural site was determined with the tallyman.

2.1.6 DRINKING WATER SUPPLY

As part of the project, a team of hydrogeologists conducted water research in 2021-2022 to evaluate the feasibility of using groundwater to supply the new infrastructure (WSP, 2022). Groundwater is preferred over surface water because of its quality (typically better) and stable makeup.

The water research area was identified based on constraints related mainly to the property line, accessibility from and connection to access roads, distance from planned infrastructure, and natural topography. Water demand was calculated from the average daily consumption per person for this type of context, which would be 325 L/p/d. The number of people used for planning purposes was 450, resulting in an average daily demand of 147 m^3. The daily peak was determined to be twice the demand, and the design flow rate was calculated at the daily peak: 12.2 m^3/h (54 USGPM).

Following the investigations, it was determined that Well P5, west of the future camp, is capable of supplying enough raw water of acceptable quality to meet the needs of the project (it will only need to be treated to remove iron and manganese, then disinfected). As previously mentioned, for water quality reasons and since the tests on Well P5 were successful, the option of using surface water was not evaluated.

A 72-hour pumping test was conducted on Well P5 to determine the aquifer productivity and groundwater quality. This well is screened at the base and taps an aquifer composed of granular materials at a depth of approximately 48 m.

The results showed that:

- The well is classified as Category 3 under section 51 of the WWPR.
- The aquifer formation is Class II according to the *Guide de classification des eaux souterraines du Québec* (groundwater classification guide, MDDEP, 1999).
- The well can sustain a pumping rate of 203 L/min (12.2 m^3/h or 292.5 m^3/d) over an extended period of time to cover the daily peak demand.
- The water quality meets the criteria of Schedule I of the *Regulation respecting the quality of drinking water* (RQDW).
- Iron and manganese concentrations exceed Health Canada's recommendations, as does the pH.
- The intrinsic vulnerability of the groundwater is rated "high" within the well protection zone as per section 53 of the WWPR.
- No impacts related to the operation of the new well are anticipated.
- Based on the quality of the groundwater collected during the tests, as well as the construction details of Well P5, the water drawn by the new well is not under the direct influence of surface water.

No potential sources of contamination have been identified within 200 m of Well P5. There is a gravel road and some lakes around the outskirts. The septic installations and future camp will be located more than 1 km away from Well P5, so camp activities are not expected to impact groundwater in this area. Extracting minerals always comes with the potential to affect water quality and availability in the immediate vicinity. As the mine is going to be operating underground in the bedrock and the aquifer is composed of unconsolidated deposits, mine dewatering is not expected to affect the aquifer from which Well P5 draws. Other existing and proposed mining infrastructures are located east and southeast of Well P5. The waste rock stockpile and tailings storage facility will be constructed on an impermeable membrane. Well P5 is not downstream of the tailings storage facility. The vulnerability of the aquifer and the infrastructure associated with drinking water transportation and storage is described in Chapter 9 – Climate Change Resilience.

2.2 TECHNOLOGY ALTERNATIVES

2.2.1 ORE PROCESSING

In gold mining, the processing and extraction methods depend on the mineralogy of the ore. In the veins, the sulphide content varies from 1 to 80% and is dominated by pyrite with minor concentrations (<1% total sulphide) of chalcopyrite, sphalerite, arsenopyrite, galena, pyrrhotite, tennantite, and other Bi-Te minerals, identified by petrography and microanalysis. Coarse gold was also seen. This gold mineralization shows that gravimetry, flotation, and cyanidation are all suitable recovery techniques.

Based on the tests, it was determined that gravimetry can improve the efficiency of gold recovery. Subsequently, several avenues were considered to determine the best process for treating the output from the gravimetric circuit (BBA, 2020).

1. Flotation:
   a. Regrinding of the flotation concentrate and leaching of the refractory concentrate
   b. Leaching of the flotation tailings
2. Cyanidation using the carbon-in-leach (CIL) method
3. Cyanidation using the carbon-in-pulp (CIP) method

Several process plants in Canada are currently using these very common processes in gold mining. Table 2-6 shows some examples of current operations employing similar processes.

Table 2-6 Examples of current operations using flotation and cyanidation

Process	Operation	Note
1. Flotation: a. Regrinding of the flotation concentrate and leaching of the refractory concentrate b. Leaching of the flotation tailings	LaRonde Complex (Quebec)	The plant was previously designed to mine copper and zinc, in addition to gold and silver.
	Éléonore (Quebec)	–
	Young-Davidson (Ontario)	The leachate treatment process is slightly different.
2. Cyanidation using the carbon-in-leach (CIL) method	Meliadine (Nunavut)	–
	Casa Berardi (Quebec)	–
3. Cyanidation using the carbon-in-pulp (CIP) method	Canadian Malartic (Quebec)	–
	Detour Lake (Ontario)	–
	Macassa (Ontario)	–
	Meadowbank Complex (Nunavut)	–
	Westwood (Quebec)	–
	Lamaque (Quebec)	–

Preliminary tests of direct leaching and flotation followed by leaching were evaluated in parallel to compare and determine the recovery potential. Following flotation, the concentrate was reground to 12 µm before leaching while the flotation tailings were leached directly.

Table 2-7 presents the advantages and disadvantages of the three processes (flotation followed by leaching, CIL, and CIP).

Table 2-7 Advantages and disadvantages of ore treatment processes

Process	Advantages	Disadvantages
Flotation and cyanidation	Operational flexibility to process ore with high pyrite and sulphite content	Higher capital costs
	Greater flexibility in optimization since the adsorption and leaching circuits are separate	Larger footprint
	Potential to generate separate lower- and higher-sulphur reject streams that could be stored separately	More equipment and tanks requiring more maintenance, which also decreases the availability of the system
		Higher operating costs
		Greater water use
		Requires more operators
		Requires more types of reagents than cyanidation processes alone
		Higher operating complexity, as there is more risk of error with flotation followed by leaching
Cyanidation using the carbon-in-leach (CIL) method	Lower capital costs if the tanks are not in an enclosed building	Higher capital costs if the tanks are to be in an enclosed building
	Lower operating costs	Due to the larger carbon stock, the risk of aging and fouling of the carbon surface is higher, leading to lower adsorption capacity and loss of recovery
	Smaller footprint	Greater carbon consumption
	Greater operating flexibility, especially when the ore is refractory	Larger stock of carbon and therefore gold (than CIP)
	Moderate operating complexity (lower than for CIP)	Less flexibility to optimize the circuit, since leaching and adsorption are in the same circuit
	Slightly greater operating availability than CIP	
Cyanidation using the carbon-in-pulp (CIP) method	Lower capital costs if the leaching tanks are not in an enclosed building, but the adsorption tanks are	Higher capital costs if all tanks are in an enclosed building
	Optimization is easier because leaching is separated from adsorption	Larger footprint
	Lower coal and gold stock (than CIL)	Less operational flexibility (if ore is refractory)
		Higher operating costs than CIL
		More equipment and tanks requiring more maintenance than CIL

Under some laboratory conditions, the process involving flotation gave slightly higher recoveries than the direct leaching tests. Nevertheless, it was rejected since:

— The fine regrind tests showed that 125 kWh/t was required to achieve a P_{80} of 12 µm. This power was considered too high since most of the energy would have been dissipated as heat, which would have raised the temperature of the pulp in the leaching circuit. When heat is increased in a leaching process, it leads to a decrease in dissolved oxygen, requiring more oxygen injection. It also increases chemical use. A cooling loop would have been needed to alleviate the problem.

- It is more energy-consuming because it contains more equipment in addition to the regrinding circuit. Regrinding is an energy-intensive activity, so the carbon footprint of this option was worse than for the leaching process.
- Preliminary calculations showed that the footprint of a plant with a flotation and leaching process would be significantly larger than that of a leaching (CIL or CIP) circuit alone. In addition, since the equipment will be inside the plant, more heating would be needed. A larger plant would also call for larger stormwater management infrastructure.
- It requires the addition of other chemicals (PAX collector, MIBC frother) to the flotation circuit.
- It requires greater water management. As a general rule, flotation is carried out at around 30% solids, whereas it is about 40–50% in a leaching process. As such, the process water volumes would have been higher than with cyanidation. This could have ultimately increased the volumes discharged in the effluent, even if some water had been recirculated during the process.
- The capital and operating costs would have been higher.

Cyanidation proved to have not only economic and technical advantages over flotation, but also environmental advantages as it requires less water and energy (GHG), as well as a smaller plant footprint. Flotation was therefore eliminated as an option. Next, the CIL and CIP processes underwent comparison tests to determine the best cyanidation process to use. The metallurgical results were similar. A comparative study regarding plant layout and operating efficiency ultimately led to the choice of CIP leaching for processing. This option allowed the leaching tanks to be installed outside the process plant and the CIP tanks inside, reducing capital costs and energy consumption for heating.

2.2.2 TAILINGS MANAGEMENT METHODS

The three most commonly used methods of tailings management and storage are slurry dams, thickened tailings and paste dams, and filtered tailings storage (“dry stacking”). The management methods are summarized below.

SLURRY

Tailings slurry has a low percentage of solids (calculated by dividing the mass of the solid particles by the mass of the solution), varying between 30% and 50%. The slurry is transported to the tailings storage facility through pipes and pumps and has a relatively low dry mass (solid mass ÷ total volume). This is advantageous since other options require more energy to dispose of the tailings, either by positive displacement pumps or by trucking. The tailings are stored as liquids in a pond with retaining dams, and the solids naturally settle to the bottom. However, extreme weather events are growing harder to predict with climate change, which means the volumes of water to be managed with a traditional slurry storage system are a clear disadvantage. Additionally, while the method is widely used, it offers little flexibility and requires regular water management activities. The dams are also generally higher risk; more and more mining companies are moving away from slurry because of tailings dam failures such as the one in Brumadinho, Brazil. Furthermore, these types of tailings storage facilities are generally more complex and time-consuming to close.

This option was not considered since a key design criterion for ore processing was the ability to recycle as much water as possible. Therefore, a tailings thickener was considered. This would bring the tailings to a value of 63% solids (Golder, 2022), which is already beyond the upper limit of 50% solids that slurry would have.

THICKENED TAILINGS AND PASTE

The percentage of solids (calculated by dividing the mass of the solid particles by the mass of the solution) in thickened tailings varies between 50% and 70%, while those in paste tailings vary between 70% and 80%. With this method, tailings are transported in a viscous and relatively homogeneous form to the storage facility via a system of pipes and pumps. Removing some of the water prior to storage has a number of advantages: it reduces the amount of water that needs to be transported, allows the water to be recycled directly back into the process, and reduces the footprint of the tailings storage facility by requiring less storage volume than for slurry tailings. The dam walls are also smaller. Even so, storing thickened tailings and paste occupies more area than filtered tailings. The volume of remaining water in the paste (a difference of at least 15% between the two types for the Windfall project) is part of the total volume, making the footprint proportionally larger.

FILTERED TAILINGS (DRY STACKING)

Filtered tailings typically have over 80% solids (calculated by dividing the mass of the solid particles by the mass of the solution). Filtration is carried out after an initial thickening stage, which significantly reduces the water content of the tailings. The operating costs of a filtration plant are generally higher, but the resulting tailings are easier to manage; they are usually carried on a conveyor or trucked to the tailings storage facility. Stacking can take advantage of the site's topography, reducing the facility's footprint. Water management primarily involves managing runoff, as there is no underlying or discharged water. This removes a vulnerability associated with climate change. The method also allows for progressive reclamation, which limits the potential for metal leaching and the dispersal of contaminants into the air. However, the success of this method is highly dependent on the size and geotechnical properties of the particles. These verifications were performed in a laboratory at the design stage. Details are provided in Chapter 3.

Osisko rejected slurry storage due to the greater risk of dam failure. The other two methods underwent an alternatives analysis. Their main technical characteristics are summarized in Table 2-8 and their comparative assessment is presented in Table 2-9.

Table 2-8 Technical characteristics of storage methods for filtered and thickened/paste tailings

Parameter	Filtered	Thickened/paste
Solids (%)	84	63*–72
Particle size at 80% underflow (µm)	37	
Relative density	2.8	
Deposition porosity ratio (empty volume ÷ solid volume)	0.7	1.0
Density at deposition (t/m³)	1.6	1.4
Slope of retention structure	N/A	2.5H:1V downstream
		2H:1V upstream
Dam width (m)	N/A	8
Slope of the tailings stockpile	5H:1V	N/A
Total tailings production (10-year operation)	9.6 Mt	
Estimated total volume of tailings after consolidation (million m³)	6.0	6.9

Table 2-9 Comparative analysis of the management of filtered and thickened/paste tailings

Criterion	Filtered	Thickened/paste
Economic		
CAPEX	Higher capital investment due to the filtration plant	Lower capital investment
OPEX	Higher operating costs due to the operation of the filtration plant, the need to truck the filtered tailings to the tailings storage facility, and the placement of the material	Lower costs, as the tailings are pumped away
Technical		
Dam construction	No tailings dam	Tailings dam required
Water management	Water in tailings unlikely to be extracted	Active water management causing higher leaching potential
Operational flexibility	More complex due to the trucking of the tailings and the placement of the material; Filter presses also require more maintenance	Easier because there is only pumping of the material and active management of the tailings lines
Environment		
Particle emission	More likely to emit particles due to lower water content	More stable since the paste will be wetter
Progressive restoration	Allows circulation over the entire surface and progressive restoration	More limited because the paste needs to be pressed before sectors can be closed
Vulnerability to climate change	Less vulnerable	More vulnerable, given the need for water management

Criterion	Filtered	Thickened/paste
Social		
Encroachment of infrastructure	Smaller surface area and some of the tailings can be returned underground by producing paste backfill	Larger surface area
Technological risks	Lower risk at the tailings storage facility	Higher risk at the tailings storage facility
	Higher operational risk for the filtration plant	Lower operational risk to transport the tailings to the storage facility
Labour	Requires more workers	Requires fewer workers
Total positives	**7/12**	**5/12**

Note: Blue cells indicate positive variables, while red cells indicate negative variables.

The potential to reduce the footprint, water management, and water recirculation in the process plant were also considered in the selection of the storage technology.

With this in mind, filtered tailings were ultimately chosen as the storage technology.

2.2.3 WATER TREATMENT

MINE WATER TREATMENT

Five types of mine water must be collected and treated at the Windfall site: waste rock contact water, ore contact water, underground mine water, tailings storage water, and site runoff (not in contact with any of the previous items). The potential contaminants associated with these waters are suspended solids (SS), metals, and nitrogen compounds. SS removal technologies were not presented separately since the technology choices for the other two groups influenced the selection of the SS management method.

An analysis of potential technology options for the treatment of selected metals and nitrogen compounds is presented below (GCM, 2023).

METAL TREATMENT

Two precipitation options were considered for metal treatment: hydroxide and sulphide.

Option A-1: Hydroxide precipitation

Hydroxide precipitation calls for dosing with sodium hydroxide. Metals are precipitated as hydroxides based on their precipitation pH. It should be noted that not all metals precipitate at the same pH. As such, the pH must be chosen carefully to optimize the treatment. Multiple stages, each with a different precipitation pH, may be necessary in some cases. The process is simple to operate and requires little equipment: a precipitation reactor with agitation to form the metal hydroxides, a clarifier to precipitate the metal hydroxides and separate them from the liquid, and a pH adjustment unit.

Option A-2: Sulphide precipitation

Sulphide precipitation is another option. It is more complex than hydroxide precipitation, but generally achieves lower concentrations. It is also more flexible, as multiple metals can be precipitated within the same pH range. However, this process calls for certain health and safety precautions. In addition, it calls for a unit to prepare the sodium sulphide solution, which increases the CAPEX.

TREATMENT OF NITROGEN COMPOUNDS

Three options were considered for treating nitrogen compounds at Windfall: moving bed biofilm reactors (MBBR), submerged attached growth reactors (SAGR), and zeolite adsorption combined with electro-oxidation.

Option B-1: Moving bed biofilm reactor (MBBR) with heating

An MBBR is a type of biofilm reactor. In this system, a biofilm is established on a stationary, suspended carrier (media) to oxidize organic compounds. The reactor requires aeration and agitation to maintain aerobic conditions and ensure effective treatments of compounds like ammoniacal nitrogen, cyanates, and thiocyanates. The process must run continually to maintain the active biomass and heating is often needed to maximize treatment efficiency.

Option B-2: Submerged attached growth reactor (SAGR) without heating

The SAGR is another type of biofilm reactor where the biomass remains stationary. It consists of an aerated outdoor basin where water flows through gravel, maximizing contact with the biomass. An SAGR is a passive way to efficiently treat ammoniacal nitrogen, cyanates, and thiocyanates. Unlike MBBRs, SAGRs do not typically require an SS removal unit before the water can be discharged into the environment. However, it should be noted that the rock on the Windfall site should be characterized specifically for this purpose, as certain types of rock have the potential to leach metals. In this case, the gravel needed for the SAGR would need to be sourced from off-site, which would significantly increase the capital costs of this option. It is also important to consider that this process has a very large footprint.

Option B-3: Zeolite adsorption and electro-oxidation

Zeolite adsorption combined with electro-oxidation is a complex and specific technology for treating ammoniacal nitrogen. Ammoniacal nitrogen is attached to zeolite in adsorption columns, eluted by a brine solution, and then sent to electro-oxidation cells to be degraded by an electric current. The electro-oxidation process is very energy intensive. The equipment requires regular maintenance of the many mechanical components.

The multi-criterion analysis of these options is summarized in Table 2-10.

Table 2-10 Comparative analysis of mine water treatment options

Category/Criterion	Weight	Option scoring				
		Metal treatment		Treatment of nitrogen compounds		
		Option A-1	Option A-2	Option B-1	Option B-2	Option B-3
		Hydroxide precipitation	Sulphide precipitation	MBBR (with heating)	SAGR	Zeolite + electro-oxidation
Economic	**15**	**15**	**11.25**	**10**	**6.25**	**8.75**
Low capital costs (CAPEX)	**10**	1	0.75	0.75	0.25	0.75
		Reactor with agitation, clarifier, and pH adjustment unit	Sodium sulphide preparation unit, precipitation reactor, and clarifier	Aerated reactor with heating, coagulation/ flocculation, and sludge management	Transport of gravel to site (if leachable), impermeable basin with aerator + gravel	Adsorption columns and several electro-oxidation cells
Low inspection/maintenance/ operation (OPEX) costs	**5**	1	0.75	0.5	0.75	0.25
		Reagents: NaOH and H_2SO_4	Reagents: NaOH and sulphur compounds More complex operation	Reagents: nutrients, NaOH coagulant, and flocculant Rigorous operational monitoring; high energy consumption for heating	Reagents: nutrients and NaOH Less maintenance because less mechanical equipment than MBBR	Energy-intensive process, more maintenance, more mechanical equipment than biological reactors
Technical	**40**	**31**	**36**	**29**	**28**	**29**
Robustness – resistance to variations in flow rates/loads of anticipated compounds	**10**	1	1	0.75	0.5	1
		Reagents controlled based on flow and loads	Reagents controlled based on flow and loads	Can be adjusted for higher loads by changing the water temperature	More difficult to operate in winter (no heating)	Regeneration frequency of the columns adjusted to the load
Process flexibility – compound variety	**15**	0.5	1	0.75	0.75	0.5
		May need to add several steps if the precipitation pH of the metals are different	Ability to precipitate a wider variety of metals in a smaller pH range	Allows the treatment of other compounds such as cyanates and thiocyanates	Allows the treatment of other compounds such as cyanates and thiocyanates	Specific to ammoniacal nitrogen
Ease of operation, automation and remote control, OHS	**10**	1	0.75	0.75	0.75	1
		Easy operation by pH, handling of alkaline compounds (OHS), automation possible	Danger of Na_2S dust and H_2S release, automation possible	Rigorous operational monitoring required; automation possible, but requires human intervention	Passive operation requires less human intervention, but rigorous operational monitoring	Full automation possible
Low maintenance and easy to clean	**5**	0.75	0.75	0.5	0.75	0.25
				More mechanical equipment than SAGR		Regular maintenance, lots of mechanical equipment

Category/Criterion	Weight	Option scoring				
		Metal treatment		Treatment of nitrogen compounds		
		Option A-1	Option A-2	Option B-1	Option B-2	Option B-3
		Hydroxide precipitation	Sulphide precipitation	MBBR (with heating)	SAGR	Zeolite + electro-oxidation
Environment	**45**	**29**	**36**	**38**	**36**	**28**
Small footprint	**10**	0.75	0.5	0.75	0.25	0.75
			Requires additional room for the sodium sulphide solution preparation unit	More compact than SAGR, requires building	Requires a lot of space for ponds	Footprint similar to an MBBR system
Minimizes the production of waste and the use of reagents	**10**	0.75	0.75	0.75	1	0.75
		Production of sludge containing metal hydroxides	Production of sludge containing metal sulphides	As needed: chemical for pH adjustment, nutrient addition (phosphorus), and production of biological sludge	Addition of nutrients (phosphorus), no sludge produced	Management of brine purge and zeolite when it is disposed of
Minimizes energy consumption	**5**	0.75	0.75	0.5	0.75	0.5
				Energy consumption for ventilation and heating	Energy consumption for ventilation	Energy consumption for oxidation
Effluent quality – minimizes the risk of toxicity for potentially high-risk compounds	**20**	0.5	1	1	1	0.5
			Can treat metals, more efficient than hydroxides	Can treat cyanates and thiocyanates	Can treat cyanates and thiocyanates	Does not remove compounds other than ammoniacal nitrogen
TOTAL	**100**	**75%**	**84%**	**76%**	**70%**	**65%**

Based on the results, sulphide precipitation was chosen as the metal treatment technology for this project. It is the most flexible process of the options considered, as it can be used to precipitate several metals over the same pH range and generally results in better water quality.

As for the treatment of nitrogen compounds, MBBR with heating was chosen because of its robustness and its resistance to load variations through temperature adjustment. In addition, it can be used to treat cyanates, thiocyanates, and ammoniacal nitrogen.

DRINKING WATER TREATMENT

Different drinking water supply systems were studied to identify the best solution that met the predetermined design criteria:

- Raw water quality: based on analyses of water from Well P5 conducted on April 13, 2022. These analyses show that the water contains iron and manganese;
- Compliance with the *Regulation respecting the quality of drinking water*;
- Production capacity able to meet the needs of 600 workers during the construction phase.

In the long term, the camp is intended to accommodate 406 workers. However, during construction, this number is expected to reach 600 workers over a two-year period. As leasing a drinking water production system for two years was not economically viable, the capacity of the production equipment was slightly increased to serve up to 600 workers.

An analysis of demand at the serviced buildings combined with the projected number of users resulted in a design flow of 350 m³/d. This flow was estimated based on the unit flows in the *Guide de conception des installations de production d'eau potable* (MELCC, 2017), which is the standard design reference for drinking water production in Quebec.

During pumping tests at Well P5, laboratory analyses showed that iron and manganese concentrations in the water exceeded guidelines. Table 2-11 shows the results from these analyses.

Table 2-11 Iron and manganese concentrations measured in Well P5

Parameter	Unit	Limit values (RQDW or recommendation)	Well P5 concentration
Iron	mg/L	≤0.3	1.19–1.58
Manganese	mg/L	≤0.02	0.14–0.19

Based on this information, three drinking water treatment options were investigated and are described below.

Option 1 – H_2O Innovation greensand filtration system

Greensand is a manufactured media used for the adsorption or physical filtration of iron and manganese and the catalytic oxidation of manganese. It consists of a mineral (glauconite) that is coated in a layer of manganese oxide (MnO_2) in a plant. In addition to giving the greensand its catalytic power, manganese oxide acts as a buffer, allowing the process to be stabilized during fluctuations in the concentrations of minerals or oxidants in the water. If there is an oxidant deficiency, the greensand adsorbs the un-oxidized iron and/or manganese on the surface.

The iron and manganese values recorded in Well P5 exceed the limits but remain relatively low, meaning that greensand with catalytic regeneration is sufficient. The manganese is oxidized in several steps. First, chlorine is dosed to the raw water until the residual reaches 0.5 mg/L or more in the filter effluent. The raw water, containing dissolved manganese and a certain concentration of chlorine, is then filtered through the greensand, which adsorbs the dissolved manganese. Finally, after a very short time, the manganese is oxidized by the chlorine using the catalyst MnO_2, which decreases the energy required. After a certain filtration time, or once head loss reaches a specified level, the system must be backwashed with water.

It should be noted that the chlorine residue at the outlet of the greensand filters is also necessary for the disinfection stage. Greensand systems with catalytic regeneration are simple to operate, as they only require a single chemical and injection point.

The treatment train suggested by H_2O Innovation includes the following steps:

- Injection of sodium hypochlorite for regeneration and disinfection
- Filtration through greensand filters
- Collection system for treated water
- Distribution pumps and hydropneumatic tanks

Option 2 – Puribec media filtration and softeners

Puribec's proposed process uses softeners to remove iron and manganese. This technology typically reduces water hardness by capturing ions (radium, barium, copper, calcium, zinc, iron, magnesium, potassium, and manganese) in the raw water. The resins need to be regenerated every so often in order to release the captured ions and replace them with sodium. Softeners therefore require salt for their regeneration cycles.

Water with a turbidity of more than 1 NTU[1] should not be applied directly to the resins, meaning that the raw water would need to be pre-filtered before it could be treated by the softeners. However, not all of the water needs to be softened, as maintaining a certain (low) hardness prevents the water from becoming corrosive.

The treatment train suggested by Puribec includes the following steps:

- Coarse pre-filtration (100 µm)
- Media filtration system
- Softening system
- Storage reservoir with salt regeneration system
- Chlorine injection
- Collection system for treated water
- Distribution pumps and hydropneumatic tanks

Option 3 – SUEZ Ferazur and Mangazur biological filters

Iron and manganese can also be treated using a biological process developed by SUEZ. In many cases, this process can be used to overcome problems that conventional processes cannot solve. Many naturally occurring bacteria are capable of oxidizing iron and manganese by forming a more compact and less clogging precipitate than conventional oxidation processes.

In addition, the SUEZ process can handle relatively high concentrations of iron and manganese. However, to make the most of this solution, the treatment requires greater precautions to allow the bacteria to grow properly. More specifically, the pH and dissolved oxygen need to be monitored and adjusted throughout the treatment train.

1 NTU = nephelometric turbidity unit.

The biological filter treatment train therefore calls for the following steps:

- Dissolved oxygen adjustment
- Ferazur filtration system
- pH and dissolved oxygen adjustment
- Mangazure filtration system
- Chlorine injection
- Collection system for treated water
- Distribution pumps and hydropneumatic tanks

While this technology may potentially be able to remove more iron and manganese than other technologies, the complexity of installation and operation, as well as the numerous mechanical components required in the train, give it few technical advantages over other options. The capital costs (equipment and installation labour) are also higher than for this first option, for operation and maintenance costs that are likely to be in the same order of magnitude. For these reasons, Option 3 was rejected and not evaluated further.

Therefore, only options 1 and 2 underwent a comparative analysis, as summarized in Table 2-12.

Table 2-12 Comparative analysis of drinking water supply options

Evaluation criterion		Option 1 – H_2O Innovation greensand filtration system	Option 2 – Puribec media filtration and softeners
Economic	CAPEX	The costs are similar for both technologies.	The costs are similar for both technologies.
	OPEX	The operating costs are similar for both technologies. Greensand requires a larger amount of sodium hypochlorite.	The operating costs are similar for both technologies. The water softeners require salt for regeneration.
Technical	Ease of operation	A single treatment step that allows both filtration and removal of iron and manganese.	Requires pre-filtration before softeners. The treatment train will therefore generate more wastewater: 100 µm pre-filtration washing, filter washing, softener regeneration.
	Ease of maintenance	Only one injection of chlorine for both regeneration and disinfection.	More reagents to store and manage. Salt is needed for softener regeneration and chlorine for disinfection.
	Risk level	Less equipment means less risk of breakage.	Treated water may be corrosive due to the softness of the raw water.
Environmental	Footprint	Both options are similar in that the equipment would be provided in a 40′ container.	Both options are similar in that the equipment would be provided in a 40′ container.
TOTAL		**3/3**	**0/3**

Although the capital and operating costs are similar for both technologies, greensand technology is easier to operate and produces better water. It requires less equipment, which limits the potential for breakage. As for treatment with water softeners, it requires chlorine and an extra product (salt). In addition to being one more product to manage, salt tends to raise the sodium content of the treated water. Softener systems also tend to over-soften the water, which can make it harder on the piping and plumbing systems. For these reasons, greensand was chosen as a treatment.

DOMESTIC WATER TREATMENT

The current treatment system at the exploration camp consists of three separate septic systems, two standard septic fields, and an Advanced Enviro-Septic secondary system, which are designed to treat 10 m³/d (50 people), 12.2 m³/d (61 people), and 37.8 m³/d (189 people), respectively.

To manage the domestic wastewater that will be produced by the new infrastructure, different treatment options were considered. These options needed to meet the following main design criteria:

- Sufficient processing capacity to meet the needs of the anticipated 406 workers at the site;
- Compliance with applicable regulations (*Environment Quality Act* [Q-2; EQA] and *Regulation respecting the regulatory scheme applying to activities on the basis of their environmental impact* [Q-2, r. 17.1; RRSEI]).

These criteria were then refined. First, an analysis of demand at the serviced buildings combined with the projected number of users resulted in a design flow of 117.5 m³/d. This flow was estimated based on the unit flows established in the *Guide pour l'étude des technologies conventionnelles de traitement des eaux usées d'origine domestique* (MELCCFP, 2013), which is the typical design reference for wastewater treatment in Quebec. Standard domestic wastewater loads were also used for technology evaluation.

Finally, considering that the total flow of wastewater from the site to be treated is greater than 100 m³/day, it was recognized that an infiltration system could affect underground hydraulic flow. As such, surface discharge was preferred. In this case, discharge to Pond 2, a tributary of Windfall Lake, was evaluated. To determine the required water quality of the effluent, the MELCCFP was consulted and the environmental discharge objectives (*objectifs environnementaux de rejet*, or OERs) were set in October 2022. Considering the sensitivity of the receiving environment, the chosen technology must be able to provide an effluent that meets the criteria in Table 2-13. Subsequently, it was decided to look at whether the infiltration sites could be separated geographically so the flow rate to be infiltrated at each location would be below 100 m³/day.

Table 2-13 Criteria for domestic wastewater treatment

Parameter	Criterion	Period
DBO_5	≤15 mg/L	At all times
SS	≤15 mg/L	At all times
P_{tot}	≤0.8 mg/L	At all times
Fecal coliforms	1,000 CFU/100 mL	May 1 to November 30
NH_3-NH_4	1.4 mg/L	June 1 to November 30
	3.2 mg/L	December 1 to May 31

These criteria led to the development of four domestic wastewater treatment alternatives for the permanent camp infrastructure during the operational phase.

Option 1 – H_2O Innovation SILO™ system

H_2O Innovation's SILO membrane bioreactor system includes 3 main treatment stages:

- **Fine screening**: Automated fine screens with 2 mm openings remove debris to protect the system.
- **Activated sludge**: The water first undergoes denitrification in an anoxic zone, then an aerobic membrane bioreactor retains solids for a long time to complete nitrification and produce extremely low BOD.
- **Membrane filtration**: Membrane filters with microscopic pores retain bacteria. A large membrane surface allows passive filtration without pumps and polishes the effluent. This reduces SS, including particulate phosphorus, to a minimum.

The SILO™ system is supplied pre-assembled in a "silo" (6 m tall, 3.6 m diameter), making it the most compact solution under consideration. This technology would be able to reduce the organic load and organic matter input to a concentration of less than 5 mg/L, thus limiting the impact on the receiving environment. An additional coagulant would remove phosphorus, as required for discharge to the environment.

In addition to being compact, this technology's treatment is fully contained within the bioreactor, limiting odours. This allows the system to be installed close to the future camp, limiting the investment in civil infrastructure to connect the camp to the treatment site.

Option 2 – Bionest KAMAK™ technology

For this project, Bionest submitted a proposal that included its KAMAK™ technology. Because of the flow rate to be treated, it did not consider its KODIAK™ option (a containerized system that is widely used in the mining industry, but for lower flow rates) suitable.

The Bionest KAMAK™ system is currently undergoing full-scale validation by the MELCCFP. It significantly improves the performance of conventional aerated lagoons and limits the lagoon footprint and volume of water required for treatment. In addition to reducing the organic load 2 to 3 times more effectively, this process treats nitrogen effectively by stimulating the nitrification process in the lagoons.

Using the same synthetic media as in Bionest's standalone treatment systems (AZIMUTH™ and KODIAK™), the KAMAK™ consists of biological reactors installed under prefabricated floating platforms. These platforms are installed on the surface of aerated lagoons and do not require any special operations other than those typically involved in operating a lagoon. However, the acquisition and installation costs are quite high and increase with the flow rates to be treated.

The KAMAK™ treatment train is composed of five consecutive steps, each with its own flow zone.

- Zone CL1: Decanting and accumulation of suspended solids
- Zone Rx1: First biological reactor with BIONEST® media
- Zone CL2: Clarification and accumulation area for the sludge generated in the first reactor
- Zone Rx2: Second bioreactor with BIONEST® media
- Zone CL3: Third clarification and sludge accumulation area

A phosphate removal step with coagulant injection should also be planned before zone Rx2. Furthermore, since the technology is not yet recognized for fecal coliform removal, a UV disinfection step should be included at the outlet of the lagoons.

While the KAMAK™ technology would meet effluent discharge standards, its installation requires the construction of aerated lagoons, which would entail significant costs and a sizable footprint. The lagoons would be open-air, which means they would need to be far enough away from the camp to limit risks and nuisances (particularly odours) for workers. Therefore, even though the lagoons' designs were not developed further, **this option was rejected**.

Option 3 – Ecoprocess MBBR™ technology

The Ecoprocess MBBR™ combined with the Ecoflo® coco filter – polishing unit could also be used to treat the Windfall project's domestic wastewater. This system is distributed by the company Premiertech, which has completed many similar projects in terms of flow rates and the nature of the water to be treated.

The proposed treatment train consists of the following elements:

- Septic tank with a minimum effective volume of 234 m^3;
- Flow equalization basin with a minimum effective volume of 39.2 m^3;
- Ecoprocess MBBR™ reactor with an effective volume of 29.45 m^3. This is a biological treatment system where the biofilm is attached to a synthetic carrier that is kept in motion by fluidization;
- Secondary decanter consisting of a basin equipped with three snaking baffles and a sludge removal system;
- Prefabricated pump station to the Ecoflo® biofilters with an effective volume of 9.6 m^3, with two pumps operating alternately;
- Ecoflo® coco filters (17 units);
- Pump station to the UV reactors (disinfection) with an effective volume of 7.4 m^3, with two pumps operating alternately;
- Coagulant injection system for phosphate removal (injection planned on the recirculation line AND upstream of the secondary clarifier).

While this technology's treatment performance is suitable for the anticipated effluent requirements, the complexity of installation, the numerous mechanical components required in the train, and its very large footprint give it few technical advantages over Option 1. The capital costs (equipment and installation labour) are also higher than for this first option, for operation and maintenance costs that are likely to be in the same order of magnitude. For these reasons, **Option 3 was rejected** without further assessment.

Option 4 – Enviro-Septic technology with infiltrated discharge on two separate sites

As mentioned previously, when the wastewater flow to be treated exceeds 100 m^3/day, it typically calls for surface discharge because continuous infiltration of so much water could have a significant impact on the subsurface hydraulic regime. However, this impact could be limited by directing wastewater from the new infrastructures to two separate infiltration sites. To reduce the footprint, advanced secondary treatment technology is preferred over a standard infiltration field.

With this in mind, the treatment train would consist of the following:

- Septic tank with a minimum effective volume of 177 m^3;
- Flow separator to two duplex pump stations, which direct the water to the infiltration sites;
- Two Advanced Enviro-Septic® pipe systems with 700 pipes each, for a total of 1,400 pipes. These 3.05 m long pipes, drilled and made of high-density polyethylene, are surrounded by a polypropylene fibre membrane that acts as a frame for the biomass and includes a bio-accelerator that promotes system build-up for effective contaminant removal;
- Two polishing fields underlying the Enviro-Septic® pipes with a preliminary area of approximately 885 m^2 each, assuming highly permeable soil.

An initial infiltration site was identified directly north of the new camp. Geotechnical studies have shown that this site, which is more than 300 m away from the water system, has good infiltration potential. The location of the second site is yet to be defined and therefore has several unknowns that could impact the final design and implementation costs. The chosen site should ideally be more than 300 m away from the water system to avoid the need for phosphate removal.

Although this option has not yet been thoroughly analyzed, it can be argued that its capital costs will be higher than Option 1 (membrane bioreactor). The work needed to prepare the area for on-site component installation and assembly would result in a significant labour cost as well. Extensive civil works would also be required to install the discharge line.

The infiltration option would also require a larger footprint. Furthermore, the infiltration site would need to be closed to all motor vehicle traffic, which means it would likely be dedicated entirely to that use. As such, the sites available for infiltration are mostly wooded areas that would need to be cleared, which would represent an impact on the natural environment. However, the impact on the water environment and fish habitat would be negligible compared to the surface discharge options.

Enviro-Septic® systems are easy to operate because the treatment is completely passive. There is no need to inject chemicals or oxygen. The only mechanical equipment in the system would be the pumps delivering the effluent from the septic tank to the infiltration sites. Operating costs would be related solely to septic tank emptying and pumping system operation. It should be noted that the staff at the site is actually trained to operate this type of system, as a similar treatment was installed at the existing camp in 2017 and is currently in operation.

Comparative analysis of treatment options

Table 2-14 summarizes the comparative analysis of the two domestic wastewater treatment options that are being considered for the project.

Table 2-14 Comparative analysis of domestic wastewater treatment options

Evaluation criterion		Option 1 – SILO™ (surface discharge)	Option 4 – Enviro-Septic (infiltration)
Economic	CAPEX	Cost-effective compared to Option 4: - Few civil works required to supply the train - Technology delivered pre-assembled, therefore low installation cost	- Complex and expensive installation and assembly - Infiltration sites far from the camp, therefore significant costs for the associated civil works (pumping, discharge)
	OPEX	Not assessed	Not assessed, but overall better than Option 1
Technical	Ease of operation	- Little operation to be done regularly, but overall more complex technology than Option 4 - Coagulant dosing required (chemical handling)	Passive system requiring no handling
	Ease of maintenance	Maintenance is not particularly complex. However, the equipment is more prone to breakage and clogging than Option 4	Very easy to maintain: - Periodic maintenance (emptying) of the septic tank - Annual visual inspection
	Risk level	Medium: - Chemical handling - Work at height may be necessary	Very low

Evaluation criterion		Option 1 – SILO™ (surface discharge)	Option 4 – Enviro-Septic (infiltration)
Environmental	Footprint	Very small	Large (>1400 m² for infiltration only)
	Biophysical sensitivity of the receiving environment	Potential impact on the aquatic environment and fish habitats	Clearing required for infiltration sites, so impact on land, but preferable to impact on fish habitats
Social	Sensitivity of the receiving social environment	Low impact	Low impact
TOTAL		**3/8**	**6/8**

In the end, the option of an Advanced Enviro-Septic secondary treatment with infiltration discharge was found to be the most advantageous in the long term, particularly because it is easy to operate and maintain (mostly passive) and limits the impact on the natural aquatic environment. Investigations to find a second infiltration site should therefore be continued in order to find a location that keeps the minimum required distances (notably from the water environment and the drinking water withdrawal site), has optimal permeability, and is located at an acceptable distance from the infrastructure.

2.2.4 TRANSPORTATION

ON-SITE MOBILE EQUIPMENT

A comparative study between electric and diesel equipment was conducted as part of the project feasibility study (Entech, 2022). This study evaluated the capital, operating, and consumable costs for underground mobile equipment. It took the equipment of Osisko's preferred suppliers, Epiroc and MacLean, into account. Environmental and social aspects were also considered.

Note that loaders and haulers were excluded[2] from this study for the following reasons:

- New infrastructure (large-scale charging stations) would be needed to charge or replace the batteries of loaders and haulers. Other equipment, however, could be charged using existing underground distribution panels.
- The long distance to haul materials along the ramp would require the haulers to replace their batteries every cycle, which would extend cycle times and require additional haulers (with operators) to maintain production.
- Given the multiple sub-levels and the distances to be covered, scooptrams will need to travel a lot. The available battery life would not allow them to complete a full shift without recharging, which means that more loaders would be required to do the same job.

2 As battery technology and battery life improve, the choice to use diesel engines for this equipment may be reviewed during operation.

For the economic part of the analysis, the acquisition costs of the equipment were spread over their estimated lifetimes to obtain a normalized investment cost. Operating costs were estimated based on annual equipment usage. Details of the annual costs for both types of equipment are shown in Table 2-15.

Table 2-15 Comparison of annual costs of a fleet of diesel vs. battery-powered equipment

Financial component	Annual cost	
	Diesel	Battery
CAPEX (normalized)	$6,580,000	$7,910,000
OPEX	$15,820,000	$15,400,000
Battery lease program (MacLean)	–	$2,070,000
Battery purchase (Epiroc)*	–	$530,000
Battery service (Epiroc)**	–	$1,120,000
Electricity ($0.06/kWh)	$50,000	$150,000
Diesel ($1.21/litre)	$1,300,000	–
Roadway ventilation – electricity savings	–	-$1,440,000
Roadway ventilation – propane savings	–	-$450,000
TOTAL	**$23,750,000**	**$24,170,000**

Note: If the batteries were leased instead of purchased, the total would be $24,760,000.

The analysis shows that the total costs are of the same order of magnitude for both alternatives. However, the technical, environmental, and social criteria can be used to distinguish between the alternatives, as shown in Table 2-16. In terms of GHG emissions, the anticipated reduction for heating would be about 1,100 tCO_2Eq, while for mobile equipment it would be 2,890 tCO_2Eq per year of operation.

Table 2-16 Multi-criterion comparative analysis – diesel vs. battery-powered equipment

Criterion	Value	Diesel	Battery
Total annual cost	/1	1	1
Specialized workforce	/2	2	1
Carbon footprint	/5	1	5
Impact on air quality (diesel particulate matter)	/5	1	5
Social acceptability	/3	1	3
TOTAL		**6**	**15**

Based on these results, it was decided to acquire a fleet of battery-powered vehicles from Epiroc and MacLean. In addition, to improve the transition from diesel to battery-powered equipment, battery leasing programs may be favoured over battery acquisition so that Osisko can benefit from technical support from its suppliers.

DORÉ TRANSPORT

The Directive states that the proponent should address how doré will be transported. This information will not be detailed for security reasons, but could be shared if necessary with government authorities under the regulatory provisions for trade secrets.

2.3 ENERGY SOURCES

The Windfall project is estimated to require 27.4 MW of electrical power over its planned 10-year operating period. Various power generation options were considered to meet this need, including solar, wind, hydro, diesel, and liquefied natural gas (LNG).

The energy supply alternatives were chosen by considering the technical, economic, environmental, and social advantages and disadvantages. Criteria included:

- Effectiveness of technologies
- Ability to meet demand
- Technical feasibility
- Costs
- Upgrade potential (technical and economic capacity)
- GHG emissions from energy supply and/or production
- Impacts on the biophysical and social environments

2.3.1 WIND AND SOLAR POWER

A high-level feasibility study has been completed for wind and solar power (WSP, 2018). Although it was conducted as part of the exploration project (bulk sampling over 2 years), it provides a foundation for assessing its viability.

Regarding wind power, the wind speed in the study area is considered low. There is a limit to how long the turbine would operate at full power. The total cost estimate including overhead and contingency (15%) is estimated at $9.8 million for a total capacity of 1.6 MW. The operational cost for maintenance is calculated as 10% of the initial CAPEX.

As for solar, the available sunshine at the Windfall site is within the expected range for central Quebec and Ontario. An energy yield simulation led to an estimate of 1,263 MWh/year with energy generation concentrated between March and August. The total cost estimate including overhead and contingency (15%) is estimated at $4.3 million for a total capacity of 1.0 MW. Like wind power, the operational cost for maintenance is calculated as 10% of the initial CAPEX. However, the site's energy demand is at its highest during the coldest times of the winter.

For comparison, the calculated CAPEX for diesel generators totalling 1.6 MW is $2.9M, while the OPEX is estimated at $470,000. This means that, for the same capacity, wind represents 338% of the acquisition costs and 208% of the operational costs associated with diesel power. As for solar, its CAPEX is 148% of that of generators and the OPEX is comparable, but this calculation is based on a 1.0 MW wind turbine capacity, which is 37% less installed electrical capacity than diesel.

The main advantage of solar and wind technologies is that their GHG emissions are virtually zero. However, solar and wind power still face significant challenges, including low energy efficiency and high initial capital costs. Moreover, their energy generation is variable and unpredictable due to weather conditions. Finally, adapting these systems to achieve the 27.4 MW capacity required for the development project would require a larger footprint around the mine property, whether it be to locate the turbine in an optimal wind corridor or to create the space needed to install multiple solar panels. For these reasons, wind and solar power were not included in the analysis of energy supply alternatives.

2.3.2 HYDROELECTRICITY, DIESEL, AND LIQUEFIED NATURAL GAS

Other power generation options were assessed to meet the anticipated operating requirements of the Windfall project (BBA, 2021). The study was conducted for an 18-year operating period but the values reported below have been adjusted to reflect the projected duration of the project. The main objective of this study was to identify an economically viable solution while reducing greenhouse gas emissions. The main scenarios considered in the report are: 1) a new overhead power line connected to the Hydro-Québec (HQ) Lebel substation; 2) a standalone diesel plant; and 3) a standalone liquefied natural gas (LNG) plant.

As a result of this study and following discussions with the CFNW, it was decided to plan for a new overhead line connecting to the HQ substation in Waswanipi rather than the Lebel substation. It is identified below as Scenario 1-A.

It should be noted that the OPEX costs below include GHG emission units.

Also, all scenarios involve heating the underground roadways. This is typically done with propane. However, the standalone power generation scenarios involving hydrocarbons allow enough thermal energy to be recovered from power generation to heat the underground roadways. For this reason, the OPEX costs associated with heating the underground roadways are considered for each scenario.

SCENARIO 1 – CONNECTION WITH HYDRO-QUÉBEC (LEBEL)

This scenario involved a diversion of line 1493 near the Lebel-sur-Quévillon substation and a new 120 kV power line, approximately 94 km long. It also included the construction of a substation at the mine complex to lower the voltage to 13.8 kV. The line voltage was chosen by potential partners and stakeholders in the community. A reserved capacity of 25 MW came from this facility. HQ has estimated that this scenario will take 42 months to complete, from the preliminary design to the commissioning of the line.

Since this timeline was 14 months longer than the other scenarios, the lease of a standalone diesel plant was considered for the first 14 months of the project. Table 2-17 summarizes the key elements evaluated for Scenario 1. It was also understood that the CFNW would be the project proponent; however, subsequent discussions between potential partners led to this avenue being dropped. The following section presents the scenario with the connection to the Waswanipi substation (69 kV line) instead of the Lebel substation.

Table 2-17 Summary of Scenario 1

Component	Scenario 1
CAPEX	$159.3M
Annual OPEX	$14.6M
GHG emissions (10 years)	40,000 tCO_2Eq
Construction time	42 months

SCENARIO 1-A – CONNECTION WITH HYDRO-QUÉBEC (WASWANIPI)

This scenario includes the construction of a new 69 kV power line from Waswanipi over approximately 85 km. This facility would provide 27.4 MW of capacity to the mine site. This is a separate project that would be run entirely by the Crees, with Osisko paying a fee for the use of the line.

In addition to relieving the responsibility for the initial capital costs, this scenario also has a scheduling advantage over Scenario 1. The authorization process would be simplified since the line would be subject to the northern regime only (and not both), and would not trigger the impact assessment and review procedure as the voltage would be below 75 kV. Table 2-18 summarizes the key elements evaluated for Scenario 1-A.

Table 2-18 Summary of Scenario 1-A

Component	Scenario 1-A
CAPEX	$0
Annual OPEX	$34.0M
GHG emissions (10 years)	40,000 tCO_2Eq
Construction time	12 months

SCENARIO 2 – STANDALONE DIESEL POWER PLANT

In this scenario, all electricity generation would come from a standalone power plant composed of diesel generator sets, with an installed capacity of 39.2 MW. A standard, optimized configuration of the plant was considered: five sets running to supply the demand (28 MW), one backup set, and one set in maintenance. In addition, medium-speed generator capacities known for this type of application were chosen.

A system to recover the heat released by the generators would be installed to heat the underground roadways. This represents an average annual recovery potential of 159,803,000 kW_{th} (approximately 80% of the electricity produced), which would be more than sufficient to meet the entire heating needs of the roadways, estimated at 16,779,000 kWh_{th} annually.

Table 2-19 summarizes the key elements evaluated for Scenario 2.

Table 2-19 Summary of Scenario 2

Component	Scenario 2
CAPEX	$86.2M
Annual OPEX	$73.9M
GHG emissions (10 years)	1,320,000 tCO_2Eq
Construction time	28 months

SCENARIO 3 – STANDALONE LNG PLANT

In this scenario, all electricity generation comes from a standalone power plant consisting of LNG-fuelled generators, with an installed capacity of 39.2 MW. A standard, optimized configuration of the plant was considered: five sets running to supply the demand (28 MW), one backup set, and one set in maintenance. In addition, medium-speed generator capacities known for this type of application were chosen.

As in Scenario 2, a heat recovery system would be installed, fully meeting the heating needs of the underground roadways.

Table 2-20 summarizes the key elements evaluated for Scenario 3.

Table 2-20 Summary of Scenario 3

Component	Scenario 3
CAPEX	$95.4M
Annual OPEX	$44.7M
GHG emissions (10 years)	850,000 tCO_2Eq
Construction time	28 months

2.3.3 COMPARATIVE ANALYSIS

The comparative analysis (Table 2-21) took the main critical aspects of the project into account. It covers criteria associated with the four major spheres of the project (environmental, technical, economic, and social), weighted according to the specific issues of the project.

Note that since Scenario 1-A has clear advantages over Scenario 1, only the 1-A was used as the hydroelectric alternative for the comparative analysis.

In each scenario, a value was assigned for each criterion (1 – low; 2 – medium; 3 – high).

Table 2-21 Comparative analysis of energy sources

Criterion	Weight	Scenario 1-A Waswanipi power line		Scenario 2 Diesel power plant		Scenario 3 LNG power plant	
		Value	Weighted result	Value	Weighted result	Value	Weighted result
Environment (14)							
GHG emissions	6	3	**18**	1	**6**	2	**12**
Footprint	4	1	**4**	3	**12**	3	**12**
Impact on waterbody or wetland	4	2	**8**	3	**12**	3	**12**
Technical (3)							
Constructability	2	1	**2**	3	**6**	3	**6**
Reliability	1	3	**3**	2	**2**	1	**1**
Economic (3)							
CAPEX	2	3	**6**	1	**2**	1	**2**
OPEX (NPV)	1	3	**3**	1	**1**	2	**2**
Social (9)							
Social acceptability	3	3	**9**	1	**3**	1	**3**
Nuisances (noise, air contaminants, visual impact)	3	2	**6**	1	**3**	2	**6**
Risks related to transport	3	3	**9**	1	**3**	1	**3**
TOTAL		**68**		**50**		**59**	

The results show that Scenario 1-A, the 69 kV power line from Waswanipi, is the most advantageous. It was therefore chosen for the project.

This alternative stands out in particular in terms of GHGs, which represent the highest weighted criterion due to climate change. It also received the highest overall score for the social component. The power line is an important project for the Crees, leaving a legacy in their community. Hydroelectricity is also a reliable and proven technology, being the main source of electricity in Quebec. The province therefore has significant expertise in the field. The main disadvantage of this project is its footprint.

It is also worth noting that the power line allows for fibre optics to be brought to Windfall without any additional environmental impact, as the other option would be to supply it via trenches along the road either from Lebel-sur-Quévillon or the Waswanipi substation.

3 PROJECT DESCRIPTION

SUMMARY

The Windfall project is intended to be a ramp-access underground mine, operated by conventional drifting methods of drilling, blasting, and loading and hauling ore.

The process plant at the Windfall site will have a nominal throughput capability of 3,400 tpd. The mine plan calls for approximately 12.2 Mt of ore and 8.5 Mt of waste rock to be mined over a 10-year mine life.

In addition to the mine and process plant, the planned infrastructure is as follows (Map 3-1):

1. an additional portal, the Lynx portal;
2. a tailings storage facility with a capacity of 9.0 Mt;
3. a waste rock stockpile capable of holding 9.11 Mt of waste rock;
4. an overburden stockpile measuring approximately 638,000^3;
5. a 157,750 t ore storage area;
6. water management structures (pipes, ditches, ponds. and pumps)
7. a water treatment plant with a mine effluent;
8. an underground tailings filtration and backfill plant;
9. a garage for mechanical maintenance;
10. a core shack;
11. a petroleum products storage area;
12. an underground explosives depot for each of the portals;
13. a camp for 406 employees with drinking and domestic water treatment systems;
14. a residual materials management area;
15. borrow pits;
16. a gatehouse;
17. a multi-service building where the process plant will be located. This building will house the administrative offices, worker locker room and showers, infirmary, mine rescue room, warehouse, and training rooms.

A 69 kV power line between Waswanipi and the Windfall project site will be constructed and managed by an entity independent of Osisko.

The new facilities have been grouped together to optimize the layout, thus minimizing encroachment on the natural environment, facilitating traffic between facilities, improving management of activities, and ensuring better employee safety while maintaining safe distances between facilities.

The construction phase of the project is expected to last approximately 18 months, while the operations phase of the mine will last 10 years. The closure, dismantling, and restoration phase is expected to last approximately two years. It should be noted that environmental monitoring will continue following project closure, including follow-up of final effluent water and groundwater quality. A two-year post-closure program for effluent and groundwater follow-up will be updated and implemented where necessary. This follow-up will be carried out according to the provisions mentioned in Section 2.10 of D019. Finally, a post-restoration follow-up program adapted to the sites to be restored, the restoration techniques in place, and the contaminants present will be carried out according to the provisions mentioned in Section 2.11 of D019.

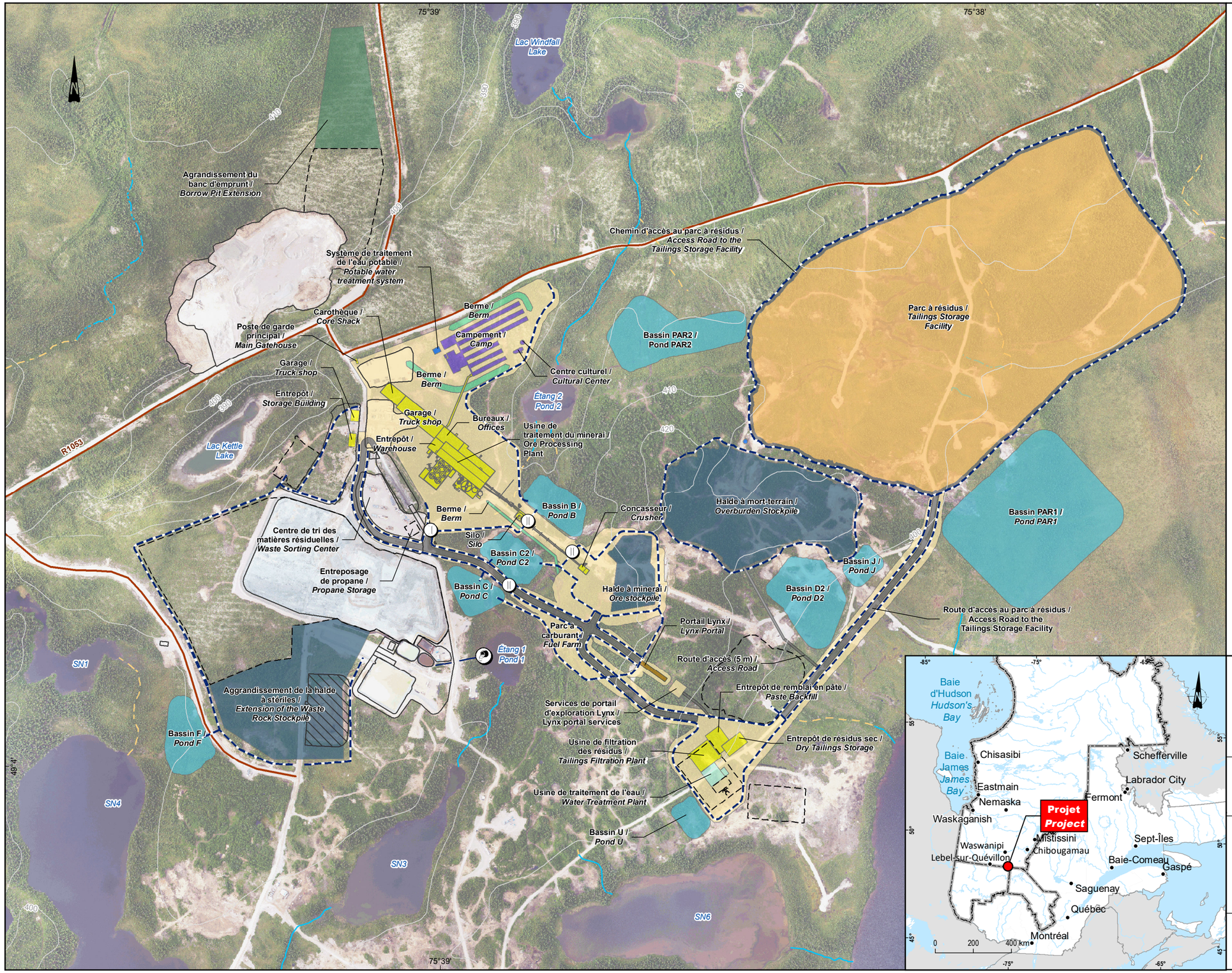
CURRENT EXPLORATION SITE

Activities at the Windfall site are considered advanced exploration since bulk sampling has been conducted since 2007. Therefore, considerable infrastructure is currently in place and some of it, as mentioned in section 1.3.2, is still being used by Osisko.

The Windfall site is currently divided into two areas: the camp and the portal (Map 3-2). The camp area, which was originally built for 40 people in 2007, has been able to accommodate 300 people since 2017. It includes rooms, a kitchen, a dining room, an infirmary, offices, as well as drinking water supply and domestic water management facilities. On the camp site, there are also core shacks, core racks, waste management facilities (including a composting unit) as well as workshops and warehouses (containers and canvas domes). There is a helicopter landing pad to the south of the existing exploration camp.

Two kilometres north of the exploration camp, the portal area, for which several ministerial authorizations have already been issued, includes the so-called Main portal, as well as a 12.8 km long ramp, with an authorization to extend it to 31.6 km. In addition to the ramp, the site contains:

- an overburden stockpile;
- a lined stockpile with water collection ditches to store ore and waste rock;
- sedimentation and polishing basins (CP, SP, polishing, A, D, and P);
- water treatment units (2) and a mine effluent;
- offices;
- sanitary facilities with showers and changing rooms;
- a garage for mechanical maintenance;
- a canvas dome warehouse and surface storage areas;
- a park for generators with electrical transmission lines;
- fuel tanks;
- two borrow pits;
- a sorting area for residual materials.



Infrastructures connexes / *Related Infrastructures*

- Chemin d'accès principal / *Main road*

Composantes du projet / *Project Components*

Infrastructure existante / *Existing Infrastructure*

- Infrastructure actuelle / *Current infrastructure*
- Autorisée pour l'échantillonnage en vrac 2023-2024 / *Autorized for bulk sampling purpose 2023-2024*
- Qui sera retirée / *To be removed*

Infrastructures projetées / *Planned Infrastructures*

- Ponceau / *Culvert*
- Effluent minier / *Mine effluent*
- Fossé / *Ditch*
- Aire d'activité / *Activity area*
- Banc d'emprunt / *Borrow pit*
- Bassin / *Pond*
- Bâtiment / *Building*
- Camp de travailleurs / *Workers camp*
- Halde / *Stockpile*
- Parc à résidus miniers / *Tailings storage facility*
- Route / *Road*
- Système de traitement de l'eau potable / *Potable drinking water treatment system*
- Souterrain / *Underground*
- Structure / *Structure*
- Usine de traitement de l'eau / *Water treatment plant*

Hypsométrie / *Hypsometry*

- Courbe de niveau (10 m) / *Contour (10 m)*

Hydrographie / *Hydrography*

- Cours d'eau permanent / *Permanent watercourse*
- Cours d'eau intermittent / *Intermittent watercourse*
- Cours d'eau souterrain / *Underground watercourse*
- Canal / *Canal*

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Projet minier Windfall - Étude d'impact sur l'environnement /
Windfall Mining Project - Environmental Impact Assessment

Site minier Windfall, Eeyou Istchee Baie-James (Québec) /
Windfall Mining Site, Eeyou Istchee Baie-James (Quebec)

Carte 3-1 / *Map 3-1*
Infrastructures projetées / *Planned Infrastructures*

Sources :
BDAT, 1/250 000, MRN Québec, 2002
BDTQ, 1/20 000, MRNF Québec, 2007
CanVec, 1/1 000 000, RNCan, 2020
CanVec Plus, 1/50 000, RNCan, 2015
SDA, 1/20 000, MERN Québec, 2020

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2023-03-20

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Dessinée par : J. Roy
Vérifiée par : M.-H. Brisson
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Infrastructures connexes / *Related Infrastructures*

- Chemin d'accès principal / *Main access*

Infrastructures actuelles / *Actual Infrastructures*

- Effluent minier / *Mine effluent*
- Ponceau / *Culvert*
- Tour de télécommunication / *Telecommunication*
- Station météorologique / *Weather station*
- Ligne électrique / *Electric line*
- Infrastructure actuelle / *Current infrastructure*
- Autorisée pour l'échantillonnage en vrac 2023-2024 / *Autorized for bulk sampling purpose 2023-2024*

Hypsométrie / *Hypsometry*

- Courbe de niveau (10 m) / *Contour (10 m)*

Hydrographie / *Hydrography*

- Sens d'écoulement / *Flow direction*
- Cours d'eau permanent / *Permanent watercourse*
- Cours d'eau intermittent / *Intermittent watercourse*
- Cours d'eau souterrain / *Underground watercourse*

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Carte 3-2 / *Map 3-2*
Infrastructures actuelles / *Current Infrastructures*

Sources :
BDAT, 1/250 000, MRN Québec, 2002
BDTQ, 1/20 000, MRNF Québec, 2007
CanVec, 1/1 000 000, RNCan, 2020
CanVec Plus, 1/50 000, RNCan, 2015
SDA, 1/20 000, MERN Québec, 2020

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For the underground mine, the drifts are heated and ventilated by ventilation stacks. There are currently five refuge stations where anyone can seek shelter in the event of a fire or other disaster. A mechanical workshop is also currently being developed underground. The Main portal will be covered in 2023 and the propane tanks required for heating will be located near the entrance.

In the project under study, the current major surface infrastructure, i.e., the portal and the waste rock stockpile, will be kept in place and reused, while other elements will be moved or dismantled; namely, the generator will be dismantled and its components reused. For areas that will no longer be required for the project, Osisko will ensure that they are restored to suit the local topography, followed by reforestation or revegetation activities.

The existing exploration camp will be used to house some of the excess personnel during the construction phase but will be used at a later date by Osisko's exploration crews who will continue to work on the other claims in the area.

3.1 DESCRIPTION OF THE DEPOSIT

The Windfall mineral exploration project, as described in the techno-economic feasibility study (BBA et al., 2023) includes the Windfall, Urban-Barry, and Urban Duke properties, which contain a total of 1,739 claims and cover a total area of 90,248 ha.

The deposit currently identified and defined as the Windfall mine project is on the Windfall property, which consists of 286 claims and covers 12,523 ha (Maps 1-1). It is 100% owned by Osisko, with claims acquired over the years from various groups. The property is located in the Nord-du-Québec region, approximately 115 km east of the municipality of Lebel-sur-Quévillon. The centre of the property is located approximately at 49.05 °N, 75.66 °W. The property is located in the Urban Township and falls within NTS map 32G04.

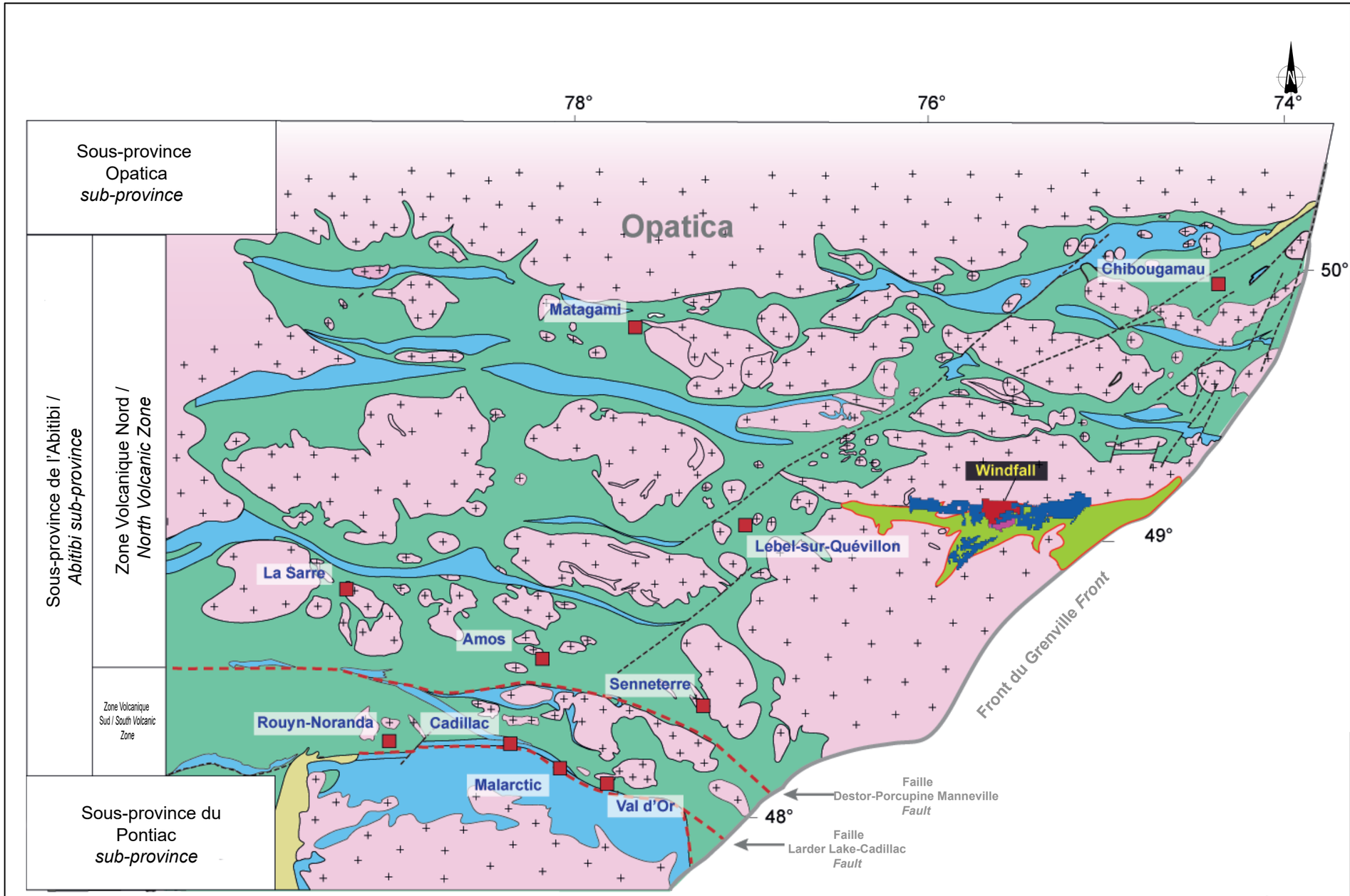
This area is subject to the JBNQA, and the sector is in Category III lands where mineral exploration and mining are permitted according to the conditions set out in the JBNQA and those of the Quebec government.

3.1.1 GEOLOGICAL CONTEXT

The Windfall property is located in the eastern portion of the Northern Volcanic Zone (NVZ) of the Abitibi Subprovince, which is part of the Archean Superior Province. The Urban-Barry volcanic belt extends east-west for 135 km and is 4 km to 20 km wide (Map 3-3). It is bounded on the north by the Father (granitoids) plutonic suite, on the east by the Proterozoic Grenville Province, on the south by the granitoid and paragneiss rocks of the Barry Complex, and on the west by the Corriveau and Souart Plutons.

The rocks of the Urban-Barry belt are generally metamorphosed to greenschist facies, although near magmatic intrusions and within corridors of intense deformation, conditions locally reached amphibolite facies. The regional metamorphic temperature-pressure gradient generally increases eastward approaching the Grenville Front (Joly, 1990).

The Urban-Barry belt contains mixed mafic to felsic volcanic rocks with lesser sedimentary deposits that are cross-cut by several east- and east-northeast-trending deformation zones.



Faille tardive / *Late Fault*

Zone de faille / *Fault Zone*

Géologie / *Geology*

Roches protérozoïques / *Proterozoic rocks*

Granitoïdes / *Granitoids*

Roches sédimentaires / *Sedimentary rocks*

Roches volcaniques / *Volcanic rocks*

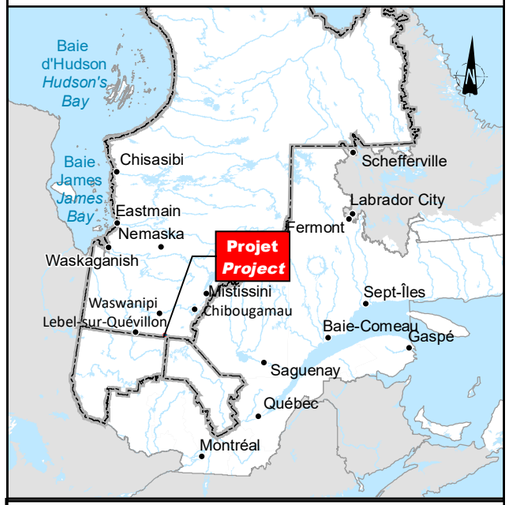
Volcaniques d'Urban-Barry / *Urban-Barry's volcanic*

Titres miniers / *Mining Titles*

Windfall / *Windfall*

Urban-Barry / *Urban-Barry*

Urban-Duke / *Urban-Duke*



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***Projet minier Windfall* - Étude d'impact sur l'environnement**
Windfall Mining Project - Environmental Impact Assessment

Site minier Windfall, Eeyou Istchee Baie-James (Québec) /
Windfall Mining Site, Eeyou Istchee Baie-James (Quebec)

Carte 3-3 / *Map 3-3*
Contexte géologique de la sous-province de l'Abitibi présentant la ceinture de roche d'Urban-Barry
Geological Context of the Abitibi Subprovince Presenting the Urban-Barry Rock Belt

Sources :
Figure modifiée de Daigneault et al. (2004)

MTM, fuseau 9, NAD83

2023-03-13

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Boundary accuracy and measurements shown on this document are not to be used for engineering or land delineation purposes. No land analysis was carried out by a land surveyor.

The Windfall property is located along the Mazères deformation zone, which is a regional east-northeast trending ductile deformation zone. It is interpreted as a second-order structure to that of the east-west trending Urban deformation zone located in the northern part of the belt.

The Urban-Barry belt is informally divided into five rock formations formed between 2791 and 2707 Ma (Rheaume and Bandyayera, 2006), including: 1) the Fecteau (2791 Ma); 2) the Lacroix (undated); 3) the Chanceux (2727 Ma); 4) the Macho (2717 Ma); and 5) the Urban (2714 to 2707 Ma). The Windfall deposit is hosted in the Macho Formation, which contains two distinct lithostratigraphic sequences: the Rouleau Member and the younger Windfall Member (2716.9 ± 2 Ma). The older Rouleau Member is comprised of: 1) calc-alkaline to transitional andesite-basalt lapilli tuffs; 2) tholeiitic basalts; and 3) mudstones. The younger Windfall Member is comprised of: 1) calc-alkaline dacite, rhyodacite, and trachyandesite; 2) tholeiitic felsic tuffs and lavas; 3) tholeiitic to transitional andesite porphyries and tuffs; and 4) minor iron formation (Bandyayera et al., 2002, Rheaume and Bandyayera, 2006).

In the Windfall deposit area, the volcanic stratigraphy trends mainly to the north and plunges moderately to the east. It consists of a bimodal sequence of texturally variable basalt, andesite, rhyolite, and minor mudstone horizons belonging to the Macho Formation. This bimodal sequence of volcanic rocks is cut by: 1) tholeiitic gabbro intrusions; and 2) a series of calc-alkaline granodiorite-quartz-feldspar porphyry dikes (hereafter called “QFP”) dikes.

The two magmatic intrusive suites were contemporary. Seven distinct QFP dikes are observed to cross-cut the volcanic strata at high angles. These dikes are divided into three main groups based on several criteria: texture, colour, size and abundance of quartz phenocrysts, orientation, and timing with respect to deformation and mineralization. From oldest to youngest, these groups are: 1) fragmental and small quartz eye QFPs; 2) large quartz eye QFPs; and 3) post-mineral hematite altered QFPs.

All dikes and volcanic rocks are affected by regional foliation. The intensity of foliation and overall deformation varies considerably within individual rock units. The most significant alteration is associated with gold mineralization.

The geology of the local study area is presented in section 6.5.

3.1.2 MINERALIZATION

Two dominant styles of gold mineralization are observed in the Windfall deposit, vein type and replacement type. Vein-type mineralization is characterized by grey to translucent quartz veins that contain pyrite and minor amounts of carbonate, tourmaline, and gold, generally visible. The veins have sharp contact margins that are straight or folded. These veins are texturally massive, vary in thickness from 0.1 m to 1 m, and are generally associated with the highest gold grades, averaging from 20 g/t to> 100 g/t. In the veins, the sulphide content varies from 1% to 80% and is dominated by pyrite with minor concentrations (<1% total sulphide) of chalcopyrite, sphalerite, arsenopyrite, galena, pyrrhotite, tennantite, and other bismuth-telluride minerals, as identified by internal petrographic and micro-analytical analyses.

Replacement-type mineralization occurs at the margins of vein-type mineralization or in high strain zones that lack the development of quartz veins. This mineralization style consists of pyrite replacement zones and stockworks associated with a strong pervasive silica-sericite alteration. The metals associated with the gangue and mineralization are similar to those in vein-type mineralization. The presence of high-grade gold intersections with spectacular visible gold is a well-documented phenomenon at the Windfall deposit.

This visible gold has been observed in both drill core and underground exposures and is hosted in the vein-type mineralization or in the zones of very intense silicification. These exposures have variable amounts of gold (i.e.>10s to 1000s g/t) commonly associated with late-stage remobilization of cloudy white quartz-carbonate veins which cross-cut the earlier vein- and replacement-type mineralization.

3.1.3 MINERALIZED ZONES

At the Windfall deposit, high-grade gold mineralization cross-cuts volcanic rocks and QFP intrusions.

Mineralization is currently known for a lateral extent of 3,000 m and a vertical extent of approximately 1,600 m. The deposit is subdivided into four main zones: the Lynx zone, the Main zone, the Underdog zone, and the Triple 8 zone (Map 3-4, Figure 3-1, Table 3-1). Current drilling is testing the extensions of several of these zones, primarily in the Lynx area. All zones generally trend east-northeast and plunge roughly 35° to 40°.

Table 3-1 Mineralized zones and sectors

Zone	Sector
Lynx	Lynx Main, Triple Lynx, Lynx SW, Lynx 4, Lynx HW
Underdog	Underdog
Main	Mallard, F-Zones, Bobcat, Caribou Extension, Zone 27, Caribou 1, Caribou 2, Windfall North
Triple 8	Triple 8

Section lines A-A’ and B-B’ on Map 3-3 show the lithologies in the mineralized zones. Figure 3-2 shows the lithologies associated with the mineralized zones as projected from these section lines.

On these cross-sections, it can be seen that the mineralized zones in the Main zone are more distant from each other than those in the Lynx zone. These structural differences will influence the mining patterns.

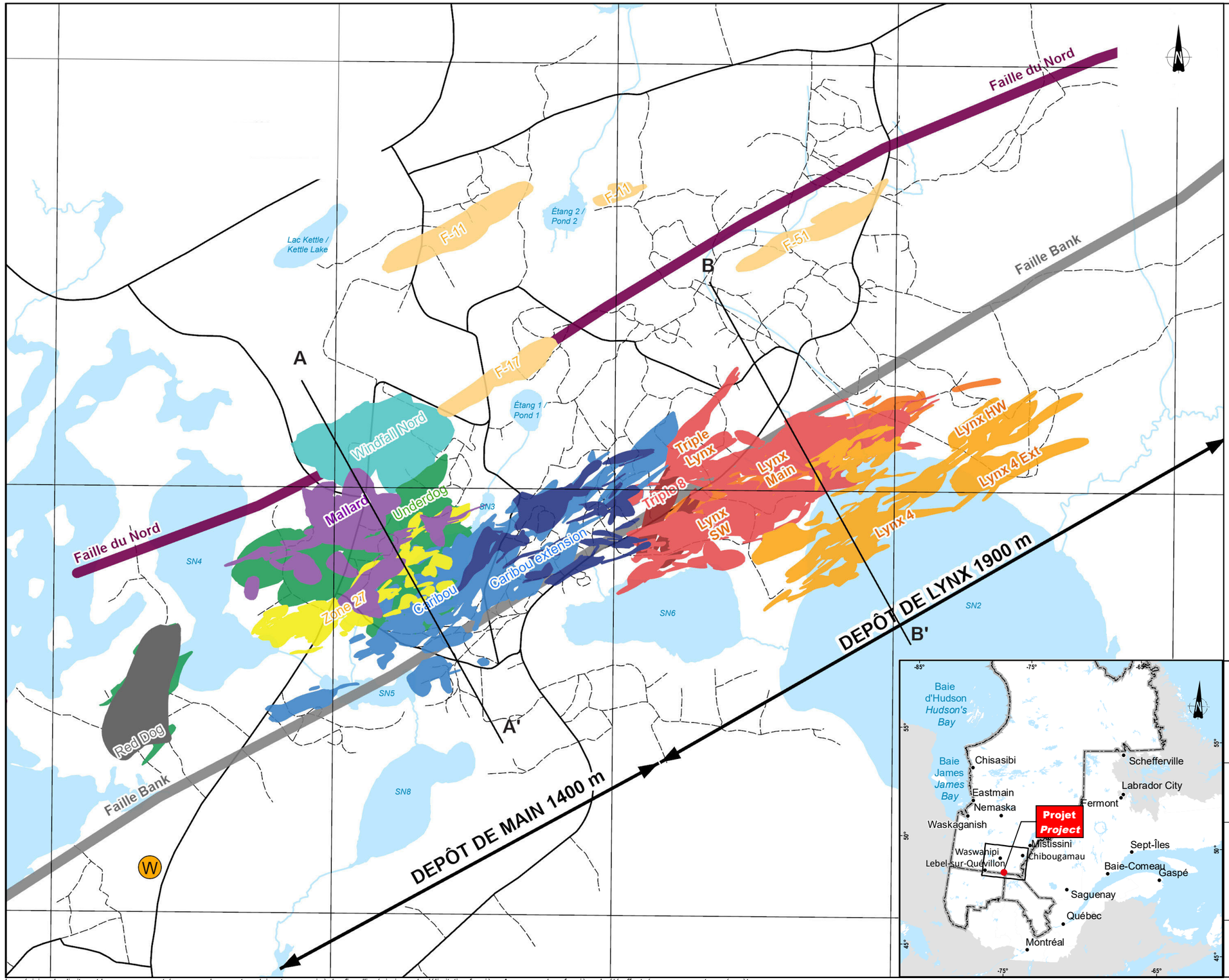
3.1.4 RESOURCES AND RESERVES

Resources and reserves were estimated in accordance with the method specified by the November 29, 2019, CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines.

Windfall resources include those in the Lynx, Underdog, Main, and Triple 8 zones. The defined resource and reserves area measures 3 km by 1.7 km by 1.2 km in depth, except for the Triple 8 zone where the depth is 1.6 km.

The drill hole database considered for the resource estimate contains 4,834 surface and underground diamond drill holes totalling 1,852,861 m of drilling, of which 4,152 drill holes (1,665,282 m) were drilled and analyzed by Osisko.

The resources have been classified as measured, indicated, and inferred. Measured and indicated resources are those that have the potential to be converted into reserves. Measured and indicated resources at Windfall are estimated at 11.061 Mt with grades of 11.4 g/t Au and 5.9 g/t Ag. Inferred resources are estimated at 12.287 Mt, grade 8.4 g/t Au and 4.8 g/t Ag, and will require further investigation and reclassification. Details of the estimated resources are presented in Table 3-2.



Zones minéralisées / *Mineralized Areas*

- Bobcat
- Caribou 1
- Caribou 2
- Caribou Ext
- FZones
- Lynx 4
- Lynx HW
- Lynx Main
- Mallard
- Triple 8
- Triple Lynx
- Underdog
- Windfall Nord
- Zone 27

Géologie / *Geology*

- Red Dog

Faille / *Fault*

- Faille Bank / *Bank Fault*
- Faille du Nord / *North Fault*

Hydrographie / *Hydrography*

- Rivières / *Rivers*
- Lacs / *Lakes*

Routes / *Roads*

- Principale / *Principal*
- Secondaire / *Secondary*
- W — Campement d'exploration / *actuel actual exploration camp*

OSISKO
MINIÈRE OSISKO

***Projet minier Windfall* - Étude d'impact sur l'environnement**
Windfall Mining Project - Environmental Impact Assessment

Site minier Windfall, Eeyou Istchee Baie-James (Québec) /
Windfall Mining Site, Eeyou Istchee Baie-James (Quebec)

Carte 3-4 / *Map 3-4*
Projection en surface des zones minéralisées du gisement Windfall / *Surface projection of the mineralized zones of the Windfall deposit*

Sources :
BDAT, 1/250 000, MRN Québec, 2002
BDTQ, 1/20 000, MRNF Québec, 2007
CanVec, 1/1 000 000, RNCan, 2020
CanVec Plus, 1/50 000, RNCan, 2015
SDA, 1/20 000, MERN Québec, 2020

0 20 40 km
MTM, fuseau 9, NAD83

2023-03-13

Préparée par : M.-H. Brisson
Dessinée par : C. Thériault
Vérifiée par : M.-H. Brisson
_201_11330_19_eiec3_4_216_ZonesMineralisees_230221.ai

wsp

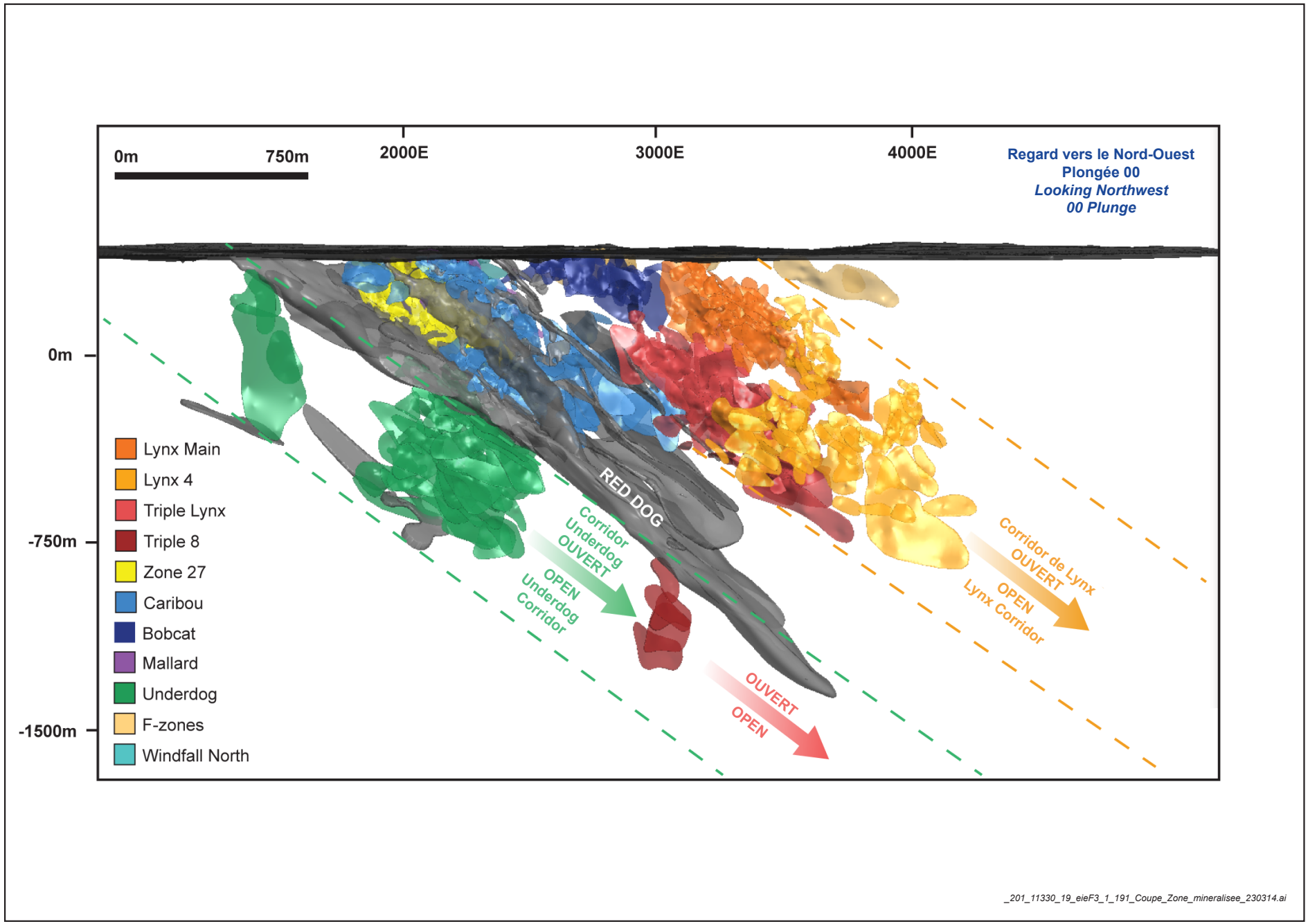


Figure 3-1 **Projection en coupe des zones minéralisées du gisement Windfall /**
Sectional Projection of the Mineralized Zones of the Windfall Deposit (réf. Document interne Osisko)

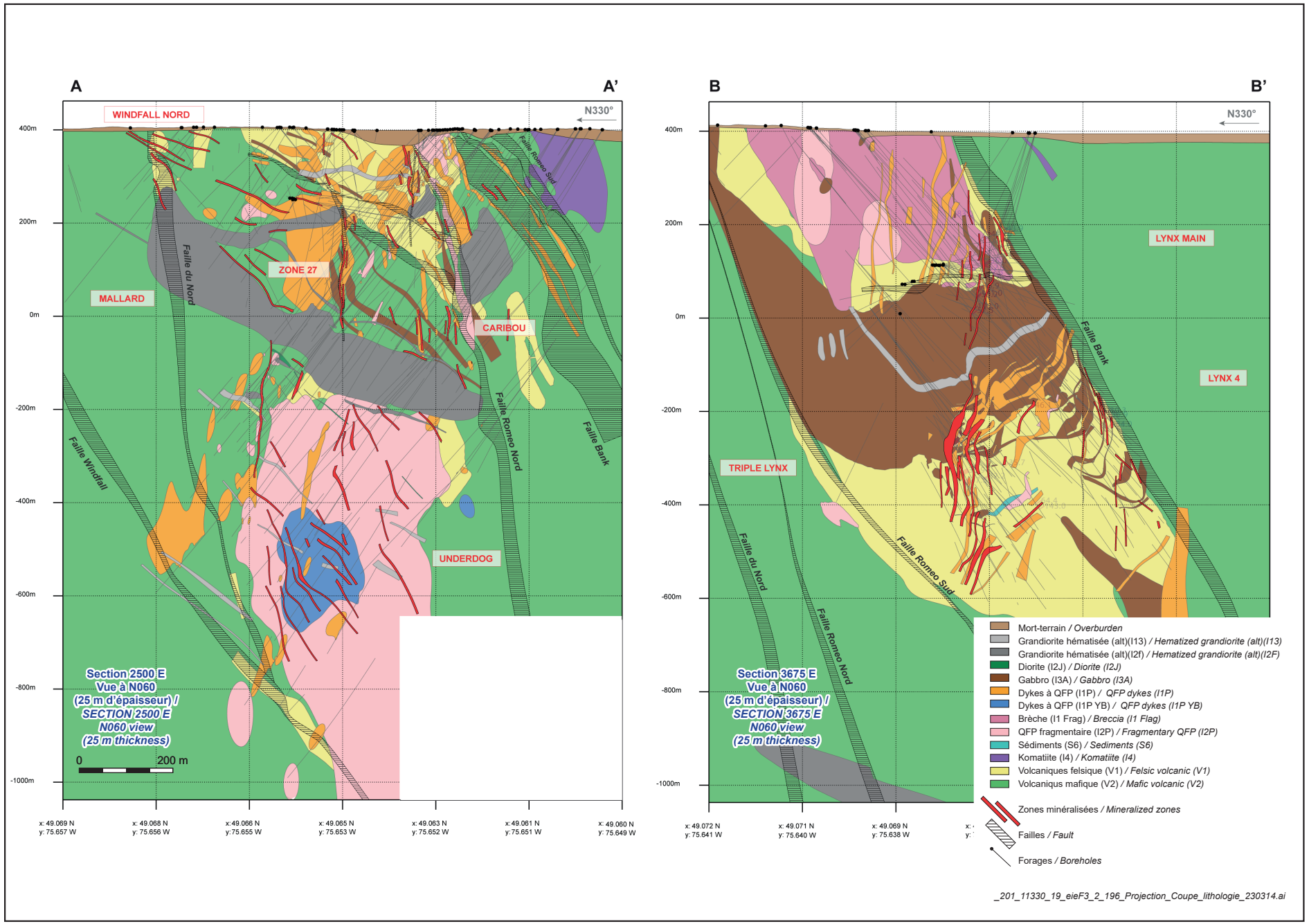


Figure 3-2 **Projections en coupe des lithologies des zones minéralisées Main (A-A') et Lynx (B-B')**
Sectional Projection of the Litologies of the Main Mineralized Zone (A-A') et Lynx (B-B') (réf. Document interne Osisko)

Table 3-2 Windfall gold deposit mineral resource estimate by zone (3.5 g/t oz Au)

Zone	Measured					Indicated					Inferred				
	Tonnes[1] (000 t)	Grade Au (g/t)	Grade Ag (g/t)	Ounces Au[1] (000 oz)	Ounces Ag[1] (000 oz)	Tonnes[1] (000 t)	Grade Au (g/t)	Grade Ag (g/t)	Ounces Au[1] (000 oz)	Ounces Ag[1] (000 oz)	Tonnes[1] (000 t)	Grade Au (g/t)	Grade Ag (g/t)	Ounces Au[1] (000 oz)	Ounces Ag[1] (000 oz)
Lynx [2]	671	11.4	7.2	247	154	6,638	13.2	6.7	2,814	1,426	4,774	10.8	6.9	1,663	1,063
Underdog	–	–	–	–	–	928	9.5	3.4	284	101	4,072	7.7	3.0	1,011	397
Main [3]	109	9.4	4.4	33	16	2,685	7.6	4.8	655	412	2,799	5.8	3.3	518	296
Triple 8	–	–	–	–	–	–	–	–	–	–	642	7.0	6.6	145	136
Total *in situ*	780	11.1	6.8	279	170	10,250	11.4	5.9	3,754	1,939	12,287	8.4	4.8	3,337	1,892
Waste rock stockpile [4]	32	16.9	4.3	17	4	–	–	–	–	–	–	–	–	–	–
Total	**811**	**11.4**	**6.7**	**297**	**174**	**10,250**	**11.4**	**5.9**	**3,754**	**1,939**	**12,287**	**8.4**	**4.8**	**3,337**	**1,892**

[1] Values are rounded to the nearest thousand, which may result in apparent discrepancies.
[2] The Lynx zone includes: Lynx Main, Lynx HW, Lynx SW, Lynx 4, and Triple Lynx.
[3] The Main zone includes: Zone 27, Caribou 1 and 2, Caribou Extension, Bobcat, Mallard, Windfall North, and F-Zones.
[4] The cut-off grade does not apply to material on the waste rock stockpile.

Notes:

1. The independent qualified person for the 2022 MRE, as defined by NI 43-101 guidelines, is Pierre-Luc Richard, P.Geo. (OGQ#1119), of PLR Resources Inc. The effective date of the estimate is June 7, 2022.
2. Windfall's mineral resource estimate is compliant with the CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines adopted on November 29, 2019.
3. These mineral resources are not mineral reserves as they have not demonstrated economic viability. The quantity and grade of reported inferred mineral resources in this news release are uncertain in nature and there has been insufficient exploration to define these resources as indicated or measured; however, it is reasonably expected that the majority of inferred mineral resources could be upgraded to indicated mineral resources with continued exploration. Resources are presented undiluted and in situ and are considered to have reasonable prospects for economic extraction. Isolated and discontinuous blocks above the stated cut-off grade are excluded from the mineral resource estimate. Must-take material, i.e., isolated blocks below cut-off grade located within a potentially mineable volume, was included in the mineral resource estimate.
4. As of June 7, 2022, the database comprises a total of 4,834 drill holes for 1,852,861 metres of drilling in the area extent of the mineral resource estimate, of which 4,152 drill holes (1,665,282 metres) were completed and assayed by Osisko. The drill hole grid spacing is approximately 12.5 metres × 12.5 metres for definition drilling, 25 metres × 25 metres for infill drilling, and larger for extension drilling.
5. All core assays reported by Osisko were obtained by analytical methods described below under "Quality Control and Reporting Protocols."
6. Geological interpretation of the deposit is based on lithologies, mineralization style, alteration, and structural features. Most mineralization envelopes are subvertical, striking NE-SW, and plunging approximately 40 degrees toward the northeast. The 3D wireframing was generated in Leapfrog Geo, a modelling software, from hand selections of mineralization intervals. The mineral resource estimate includes a total of 579 tabular, mostly subvertical domains defined by individual wireframes with a minimum true thickness of 2.0 metres.
7. Assays were composited within the mineralization domains into 2.0 metres length composites. A value of 0.00125 g/t Au and 0.0025 g/t Ag (¼ of the detection limit) was applied to unassayed core intervals.
8. High-grade composites were capped. Capping was determined in each zone from statistical studies on groups of lenses sharing similar mineralization characteristics. Capping varies from 6 g/t Au to 200 g/t Au and from 5 g/t Ag to 150 g/t Ag. A three-pass capping strategy defined by capping values decreasing as interpolation search distances increase was used during grade estimation.
9. Block models were produced using Datamine™ Studio RM Software. The models are defined by parent cell sizes of 5 metres EW, 2 metres NS, and 5 metres height, and sub-blocked to minimum sub-cell sizes of 1.25 metres EW, 0.5 metres NS, and 1.25 metres height.
10. Ordinary Kriging (OK) based interpolations were produced for gold estimations in each zone of the Windfall deposit, while silver grade estimations were produced using Inverse Distance Squared ("ID2") interpolations. Gold estimation parameters are based on composite variography analyses. The gold estimation parameters were used for the silver estimation.
11. Density values between 2.74 and 2.93 were applied to the mineralized lenses.
12. The Windfall mineral resource estimate is categorized as Measured, Indicated, and Inferred mineral resource as follows:
    The Measured mineral resource category is manually defined and encloses areas where:
    a. drill spacing is less than 12.5 metres,
    b. blocks are informed by mostly four drill holes,
    c. lenses have generally been accessed by underground workings.
    d. geological evidence is sufficient to confirm geological and grade continuity.
    The Indicated mineral resource category is manually defined and encloses areas where:
    a. drill spacing is generally less than 25 metres.
    b. blocks are informed by mostly three drill holes.
    c. geological evidence is sufficient to assume geological and grade continuity.
    The Inferred mineral resource category is manually defined and encloses areas where:
    a. drill spacing is less than 100 metres,
    b. blocks are informed by a minimum of two drill holes,
    c. geological evidence is sufficient to imply, but not verify geological and grade continuity.
13. Tonnage and gold grade of the stockpiles were estimated using the grade control model. Densities by lithologies, ranging from 2.76 to 2.84, were used in the estimation of the tonnages. Gold grades were estimated using muck samples weighted average results for every round tonnage, based on muck samples with an average sample weight of 3.4 kg taken every 8-yard scoop bucket. The sampling capping varying between 60 g/t Au to 80 g/t Au was applied on the muck gold grade results. An average per silver grade in the stockpiles was reported from the resource block model as silver was not analyzed in the muck samples.

14. The mineral resource is reported at 3.5 g/t Au cut-off. The cut-off grade is based on the following economic parameters: gold price at 1,600 USD/oz, exchange rate at 1.28 USD/CAD, 93.0% mill recovery; payability of 99.95%; selling cost at 5 USD/oz, 2% NSR royalties, mining cost at 125 CAD/t milled, G&A cost at 39 CAD/t milled, processing cost at 42 CAD/t, and environment cost at 4 CAD/t.
15. Estimates use metric units (metres [m], tonnes [t], and g/t). Metal contents are presented in troy ounces (metric tonne x grade / 31.103475).
16. The independent qualified person is not aware of any known environmental, permitting, legal, title-related, taxation, socio-political or marketing issues, or any other relevant issue, that could materially affect the mineral resource estimate.

Mineral reserves at Windfall are estimated at 12.2 Mt with grades of 8.06 g/t Au and 4.1 g/t Ag. The reserves have all been classified as probable, are included in the resource estimate, and include material extracted during bulk sampling. Table 3-3 shows the original distribution of these reserves.

Table 3-3 Windfall project probable mineral reserves

Zone	Tonnes (000 t)	Grade Au (g/t)	Grade Ag (g/t)	Ounces Au (000 oz)	Ounces Ag (000 oz)
Lynx	8.882	8.83	4.58	2.523	1.307
Underdog	906	6.80	2.31	198	67
Main	2.363	5.55	3.44	422	261
Total *in situ*	**12.151**	**8.04**	**4.19**	**3.143**	**1.635**
Waste rock stockpile	33	15.24	3.74	16	4
Total	**12.183**	**8.06**	**4.18**	**3.159**	**1.639**

Notes:
1. The independent qualified person for the 2022 MRE, as defined by NI 43-101 guidelines, is Patrick Langlais, P. Eng. (OIQ#6021556), of Entech Mining Ltd. The effective date of the estimate is November 25, 2022.
2. The Windfall Mineral Reserve Estimate follows the May 19, 2014, "CIM Definition Standards – For Mineral Resources and Mineral Reserves" and the November 29, 2019 "CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines."
3. These Mineral Reserves have been diluted based on geotechnical recommendations and have had a mining recovery applied.
4. Values are rounded to the nearest thousand, which may result in apparent discrepancies.
5. The Mineral Reserve is depleted for all mining to November 3, 2022.
6. The Mineral Reserve is reported using a 3.5-g/t break-even, a 2.5-g/t stope incremental, and a 1.7-g/t marginal cut-off grade.
7. All Measured Mineral Resources have been classified as Probable Mineral Reserve.
8. Stockpile values were provided by Osisko and account for less than 0.1% of Mineral Reserve ounces.
9. Estimates use metric units [metres (m), tonnes (t), and g/t]. Metal contents are presented in troy ounces (metric tonne x grade / 31.103475).
10. The independent qualified person is not aware of any known environmental, permitting, legal, title-related, taxation, socio-political or marketing issues, or any other relevant issue, that could materially affect the mineral resource estimate.

The mineral reserve estimate on which the Windfall project feasibility study is based has been prepared and includes probable reserves based on cut-off grades of 3.5 g/t (operating), 2.5 g/t (incremental), and 1.7 g/t (development).

The mineral reserve estimate has an effective date of November 25, 2022, and is based on the mineral resource block model dated June 7, 2022.

Mineral reserve tonnage and metal content have been rounded to reflect the accuracy of the estimate and therefore may not add to the total shown.

The mineral reserves presented include internal and external dilution as well as the mining recovery rate. External dilution is estimated at 20%. An average recovery rate of 91% is assumed for production and 98% for development.

3.1.5 GEOCHEMISTRY

A study was conducted Golder, now WSP, to define the geo-environmental properties of the ore, tailings, waste rock, and overburden that will be handled by the Windfall project operations, in relation to the potential for acid mine drainage (AMD) and leaching of metals and contaminants (Appendix 3-1). The results are used to classify these materials according to the MELCC characterization guide for tailings and ore (Guide de caractérisation des résidus miniers et du minerai, MELCC, 2020). Process water chemistry was also assessed. These results were used to define the chemical loads, which are inputs to the design of the site water treatment facilities. The results are used to refine the design of the water treatment trains and to develop the water and industrial discharge management plans.

Representative ore and tailings samples have been provided by Osisko. Waste rock samples were selected by WSP and collected by WSP or Osisko and, a representative subset was inspected by WSP. Overburden samples were collected by WSP or by Osisko as requested by WSP. The number and source of samples were selected from the entire deposit to represent each lithology. Table 3-4 shows the material types, their anticipated extraction volume, and the number of samples tested.

Note that in the following tables, waste rock lithologies are identified by their lithological codes (MERN, 2014).

Table 3-4 Anticipated extraction volume and number of samples tested

Type of material	Lithological codes	Estimated quantity (tonnes)	% of total estimated quantity	Number of samples collected	% of total waste rock samples
Waste rock	V1	2,176,734	28	45	18
	V2	1,769,333	23	37	14
	I1 Frg	555,772	7	21	8
	I1P/I2P	1,677,114	21	77	30
	I2F/I13	528,848	7	28	11
	I3A	1,729,943	22	43	17
	S6	4,100	0.1	5	2
	Total	**7,816,553**	**100**	**256**	**100**
Overburden		[a]	-	230	-
Tailings		8 200 000[b]	-	7	-
Ore		12,200,000	-	21	-

Notes:
a The site designated for the overburden stockpile can accommodate 638,100 m^3 (Osisko, 2022).
b Considering that 40% of the tailings produced will be returned underground as paste backfill, it is estimated that 8.2 Mt of dry tailings will be stored in the surface tailings storage facility (Osisko, 2022).

The mining materials were tested for chemical composition (major elements in whole rock by X-ray fluorescence, extractable metals in the solid fraction [according to MA.200-Met 1.2], X-ray diffraction), acid generating potential (acid-base accounting [ABA] [according to MA.110 ACISOL 1.0] or total carbon and sulphur analysis), leaching potential (WTC-9, SPLP, TCLP [according to MA. 100-Lix.com.1.1]). A representative subset of the waste rock, ore, and tailings samples was submitted for humidity cell testing per Method D5744-13 (ASTM, 2018) with leachate analysis for a range of metals, major ions, nutrients, and general chemistry, including low-level mercury analysis on selected samples/leachate.

In general, most testing was discontinued when concentrations stabilized (i.e., 30-44 weeks). Some samples were tested for longer periods to provide a longer-term record of test results (Geochemistry sectorial report in Appendix 3-1).

The results of the static tests are presented in Tables 3-5 and 3-6. Based on the characterization guide criteria and static testing, the ore and tailings were classified as potentially acid generating (PAG). Most waste rock lithologies are classified as variable PAG, except for mafic and intermediate mafic intrusive rocks (I13/ I2F and I3A) which are classified as potentially not acid generating (NPAG). The overburden is classified as NPAG.

Based on the characterization guide criteria and static testing, none of the samples are classified as high risk. When compared to EC and RES values, the ore samples are classified as leachable for Hg, As, Cd, Cu, Pb, and Zn; the tailings samples are also classified as leachable for these parameters and Se. Again when compared to EC and RES values, each waste rock lithology has samples classified as leachable for As and Ag as well as Cu, Mo, and Hg for the granitoids (I1P/12P) and Cu and Mn for the intermediate volcanics (V2). The tailings are also classified as containing cyanide because a cyanidation process is used to treat the ore.

The results of the humidity cell tests in terms of the acid-generating classification are presented in Table 3-7. Time series plots for all tests and parameters are provided in Appendix D of the geochemistry sectorial report, in Appendix 3-1.

Based on the static acid-generating potential and metal leaching tests, the results of the humidity cell tests are generally consistent with expectations. For four samples subjected to the kinetic tests, the acid-generating classification from the depletion calculations differed from the classification from the static tests. Depletion calculations are most useful, however, for cells with stable depletion rates, which may not have been the case in these samples. Depletion calculations for acid-generating and neutralizing minerals suggest that most samples have the potential for acid generation over the life of the mine, based on conditions in the laboratory. Management measures considered the potential development of AMD and metal leaching in the tailings storage facility and ore and waste rock stockpiles.

Table 3-8 provides a summary of the geochemical testing.

For the overburden, 87% of the samples have extractable metals levels below the Soil A criteria. The exceedances of RES and EC in the leachate tests are generally for parameters that exceed or are near natural background concentrations in local surface groundwater. Overall, the results indicate that the overburden component does not pose a significant risk of metal leaching at concentrations above existing background conditions.

In addition, to support the assessment of the potential value of the I3A lithology as a construction material at the site, the concentrations obtained in the static tests for this lithology were also compared to the natural background levels of local groundwater (see Section 6.10). Values obtained for As exceeded background levels in 6 of 32 samples. Concentrations obtained in the humidity cell were also verified. Therefore, I3A was considered reasonable for use as a construction material at the site (Appendix 3-1).

Table 3-5 Static acid generating potential test results and classification of waste rock, tailings, overburden, and ore by sample type and lithology

Sample type	Lithology	Statistics	Total sulphur (%)	Maximum acidity potential (AP) (kg $CaCO_3$/tonne)	Ratio AP/NP NPR (bulk)	Ratio AP/NP-CO_3 NPR (CO_3)	Number of PAG samples		Classification of acid-generating potential according to the static tests
							bulk NPR	NPR (CO_3)	
Waste rock	V1 (n=45)	Moderate	0.82	25.77	5.74	5.21	18/45 (40%)	25/45 (56%)	PAG variable
		Min-Max	0.029-3.98	0.9-124	0.2-51	0.1-57			
	V2 (n=35)	Moderate	2.08	65.06	12.18	12.81	16/37 (43%)	18/37 (49%)	PAG variable
		Min-Max	0.067-10.9	2.1-341	0.043-95.6	0.00-100			
	I1 Frg (n=21)	Moderate	0.69	21.63	7.22	8.68	3/21 (14%)	2/21 (10%)	PAG variable
		Min-Max	0.08-2.33	2.5-72.8	0.28-23.6	0.10-41.4			
	I1P/I2P (n=77)	Moderate	1.27	39.70	4.56	4.22	40/77 (52%)	45/77 (58%)	PAG variable
		Min-Max	0.076-8.95	2.38-280	0.075-60.6	0.010-65.4			
	I2F/I13 (n=28)	Moderate	0.14	4.45	44.84	41.75	0/28 (0%)	0/28 (0%)	NPAG
		Min-Max	0.008-0.476	0.25-14.9	4.483-250.0	4.73-201.5			
	I3A (n=43)	Moderate	0.33	10.28	120.8	142.2	0/43 (0%)	0/43 (0%)	NPAG
		Min-Max	0.006-1.35	0,19-42,2	2.8-1,221	4.2-1,317			
	S6 (n=5)	Moderate	1.01	31.56	2.12	1.96	3/5 (60%)	3/5 (60%)	PAG variable
		Min-Max	0.585-1.83	18-57.2	1.31-3.15	1.0-3.3			
Overburden (n=117)		Moderate	0.03	1.04	54.55	89.0	0/27	0/117 (0%)	NPAG
		Min-Max	0.005-0.56	0.16-17.5	1.97-270.7	1.8-3,203			
Tailings (n=7)		Moderate	3.56	111.29	0.53	0.36	7/7 (100%)	7/7 (100%)	PAG
		Min-Max	2.42-4.79	75.6-150	0.22-0.75	0.1-0.7			
Ore (n=21)		Moderate	4.57	142.9	0.60	0.41	21/21 (100%)	21/21 (100%)	PAG
		Min-Max	1.28-12.2	40.0-381	0.04-1.9	0.0-1.4			

n = number of samples

Table 3-6 Static extractable metals and leachate test results for waste rock, tailings, overburden, and ore

Sample type		Extractable metals		Leaching tests								Leachable parameters
				SPLP			WTC-9			TCLP		
Material	Lithology	n	> Criteria A for soil	n	>RES	>EC	n	>RES	>EC	n	High-risk sample (> Appendix A)	
Waste rock	V1	45	Ag (12), As (44), Cd (2), Cr (1), Cu (1), Mo (1), Ni (2), Zn (2)	25	Hg (2), Ag (7)	Al (24), Sb (4), As (18), Mn (1)	25	Hg (6), Ag (3)	Al (25), Sb (24), As (25), Mn (1)	33	0/33	Ag (3), As (24)
	V2	37	Ag (15), As (34), Cd (2), Cr (4), Co (18), Cu (29), Mn (17), Mo (1), Ni (19), Pb (1), Zn (8)	26	Hg (5), Ag (4)	Al (25), Sb (2), As (18), Mn (2)	26	Hg (2), Ag (8), Cu (1)	Hg (1), Al (22), Sb (18), As (25), Mn (7), Se (1)	23	0/23	Ag (7), As (22), Cu (1), Mn (1)
	I1 Frg	21	Ag (13), As (20)	14	Ag (2)	Al (14), As (12)	14	Hg (1), Ag (1)	Al (14), Sb (14), As (14)	13	0/13	Ag (2), As (14)
	I1P/I2P	77	Ag (23), As (72), Ba (1), Cd (2), Co (1), Cu (30), Hg (1), Mn (1), Mo (6), Ni (1), Zn (2)	50	Hg (10), Ag (5), Cd (2), Cu (1), Zn (2)	Al (45), Sb (9), As (45), Cd (2), Mn (3), Mo (1), Pb (2), Zn (1)	50	Hg (19), Sb (1), Ag (18), Cu (6)	Al (49), Sb (49), As (50), Mn (4), Mo (5), Se (1)	39	0/39	Hg (1), Ag (10), As (45), Cu (5), Mo (4)
	I2F/I13	28	As (4), Ba (1)	13	Hg (1), Ag (2)	Al (13), As (11)	13		Al (13), Sb (4), As (13), U (1)	4	0/4	As (1)
	I3A	43	Ag (5), As (34), Cr (24), Co (25), Cu (18), Mn (29), Ni (41)	32	Ag (9)	Al (32), As (23)	32	Hg (1), Ag (1)	Al (32), Sb (13), As (32), Mo (1)	16	0/16	Ag (1), As (26)
	S6	5	Ag (2), As (5), Cd (1), Zn (1)	5	Ag (3)	Al (5), Sb (5), As (2)	5	Ag (1)	Al (4), Sb (5), As (5)	3	0/3	Ag (1), As (5)
Overburden		230	Ag (5), As (9), Cd (1), Cr (16), Co (1), Cu (1), Sn (2), Mn (4), Ni (3)	30	Ag (3)	Al (23), As (14), Mn (4)	29	Hg (8), Ag (2), Cu (14)	Al (29), As (29), Mn (17)	0	0/0	As (1)
Tailings		7	Ag (6), As (7), Cd (5), Cr (4), Cu (6), Hg (4), Mo (1), Pb (5), Zn (5)	7	Hg (1), Cu (2), Pb (2), Zn (2)	Al (3), Sb (5), As (7), Mn (1), Pb (2)	7	Ag (1), Cd (4), Cu (3)	Sb (6), As (7), Cd (2), Cu (1), Mn (6), Ni (2), Pb (2)	7	0/7	Hg (1), As (7), Cd (3), Cu (2), Pb (1), Zn (2)
Ore		21	Ag (21), As (21), Cd (12), Co (1), Cu (14), Hg (6), Mo (2), Ni (2), Pb (2), Se (4), Zn (10)	21	Hg (1), Ag (3)	Al (19), Sb (10), As (21), Mn (7)	21	Ag (17), Cd (5), Cu (2)	Hg (1), Al (15), Sb (21), As (21), Mn (11), Se (7)	17	0/17	Hg (5), Ag (17), As (21), Cd (5), Cu (2), Se (3), Zn (1)

n = number of samples

Table 3-7 Depletion calculation results for humidity cell tests

Type of material	Sample name	Lithological code	Sector	Static tests		Depletion calculations					Acid-generating potential based on all available results
				Total sulphur (S) (%)	Acid-generating potential based on ABA	Calculation period (weeks)	Total sulphur depletion (years)	CO_3-NP depletion (years)	NP bulk depletion (years)	Acid-generating potential based on depletion time	
Waste rock	OBM-16-671_23	I1P/I2P	Zone 27	0.34	NAG	25 - 30	286	304	284	Inconclusive	Inconclusive
	EAG-14-538_58	I1P/I2P	Zone 27	2.88	PAG	195 - 200	78	-2	11	PAG	PAG
	OBM-16-630_61	V1	Zone 27	2.98	PAG	39 - 44	570	35	96	PAG	PAG
	OBM-16-580_17	V2	Caribou	10.9	PAG	39 - 44	414	46	70	PAG	PAG
	OSK-W-16-743_93	I1P/I2P	Bobcat	2.92	PAG	25 - 30	735	16	62	PAG	PAG
	OBM-15-564_79	I1P/I2P	Underdog	1.16	PAG	39 - 44	307	40	77	PAG	PAG
	OSK-W-17-774_44	I2F/I13	Lynx Main	0.24	NAG	25 - 30	357	98	105	PAG	Inconclusive
	OSK-W-17-812_102	I1 Frg	Underdog	1.34	NAG	39 - 44	414	268	278	PAG	Inconclusive
	OSK-W-17-773_41	I3A	Zone 27	0.36	NAG	25 - 30	547	264	293	PAG	Inconclusive
	OSK-W-16-760_31	V1	Triple Lynx	0.85	PAG	25 - 30	383	92	138	PAG	PAG
	OSK-W-16-760_67	V2	Lynx Main	3.18	PAG	39 - 44	213	50	86	PAG	PAG
	EAG-13-485_3	V2	Caribou	1.34	PAG	25 - 30	178	81	90	PAG	PAG
Tailings	CND 1	Composite	Main and Lynx Main	4.79	PAG	26 - 31	17	4	7	PAG	PAG
	CND 4	Composite	Main, Lynx, and Underdog	3.99	PAG	26 - 31	26	5	12	PAG	PAG
	CND 5	Composite	Lynx and Underdog	3.62	PAG	39 - 44	28	5	13	PAG	PAG
	CND 6	Composite	Underdog	3.79	PAG	195 - 200	10	-3	3	PAG	PAG
	CIL 11 CND	Composite	Triple Lynx	2.42	PAG	20 - 25	22	8	15	PAG	PAG
	CIL 13 CND	Composite	Lynx 4 HP	3.26	PAG	69 - 74	51	14	12	PAG	PAG
Ore	E-27-U-H	V2	Zone 27 upper section/high-grade	7.49	PAG	39 - 44	309	10	32	PAG	PAG
	E-CA-U-H	I1P/I2P	Caribou upper section/high-grade	5.27	PAG	25 - 30	281	35	79	PAG	PAG
	P3-K	V2, I1P, I1 Frg, I3A	Lynx Main	2.48	PAG	39 - 44	603	195	306	PAG	PAG
	Underdog A	I1P/I2P	Underdog	4.39	PAG	25 - 30	564	23	46	PAG	PAG

Table 3-8 Summary of geochemical characteristics of materials

Sample type	Lithology	Classification
Waste rock	V1	PAG variable, leachable for Ag and As
	V2	PAG variable, leachable for Ag, As, Cu, and Mn
	I1 Frg	PAG variable, leachable for Ag and As
	I1P/I2P	PAG variable, leachable for Hg, Ag, As, Cu, and Mo
	I2F/I13	NAG, leachable for As
	I3A	NAG, leachable for Ag and As, considered reasonable for use as a construction material at the site, provided that appropriate monitoring is conducted and mitigation measures are implemented if necessary.
	S6	PAG variable, leachable for As and Ag
Overburden		NAG, no significant risk of metal leaching at concentrations above the natural background values of the environment.
Tailings		PAG, cyanide containing, leachable for Hg, As, Cd, Cu, Pb, and Zn
Ore		PAG, leachable for Hg, Ag, As, Cd, Cu, Se, and Zn

3.2 EXTRACTION

The extraction method depends on the geomechanical conditions of the rock masses. A study was conducted in 2022 (A2GC, 2022) to define the best mining methods for each of the geomechanical domains in the underground mine. The major geomechanical domains identified are: 1) mafic rocks; 2) felsic intrusive massifs; and 3) felsic volcanic (extrusive) rocks. The geomechanics of the rock masses are also affected by structural deformations.

On the mine property, two major fault systems have been identified: the Bank Fault which bounds the southern flank of the Lynx mine area, and the Romeo Fault which cross-cuts the Bank Fault and attenuates it in the middle of the property length. The Romeo Fault crosses the Bobcat and Caribou zone work sites. It is located on the border of a few other work sites in the Main zone. These geological structures influence the mining pattern of the deposit, i.e., the development route to the mineralized zones and the identification of the zones to be backfilled by the tailings-cement mixture are determined according to the stability of the rocks in situ as fault zones are generally more friable.

Another constraint to mining is the management of groundwater that is extracted as mine water. A hydrogeological study was conducted by Golder (2020). The results show that the average flow will be in the range of 2,000 m^3 to 4,500 m^3 per day depending on the year of operation, with the volume increasing gradually. Mine water management is discussed in Section 3.5.2.

3.2.1 PROPOSED MINING METHOD

All mineralized areas can be mined using the longitudinal longhole stoping method with backfill.

This method consists of developing drifts at the bottom and top of a sill, drilling between the two levels and then breaking up the material and drawing it from the bottom from a main ramp or haulage drift. The 20 m or 30 m thick stopes are set up to monitor mineralization and optimize the ore/waste rock ratio. No employees enter the stopes; scooping is remotely controlled from the control room located in the process plant or from another secure location.

Long hole mining is suitable for the Windfall project where the mineralization dips 45° or more and the mineralized zones are of sufficient width and grade that estimated dilution will not eliminate economic recovery of the material. Mining will consist of an undercut level and an overcut level, each accessible from the main ramp or access ramp. Each sill will be accessed perpendicularly from the ramp or access ramp and then developed along the vein line within the economic extent of the mineralization.

Once the development of the mineralized lenses is completed at each level, the production holes are drilled between the sills and then blasted until the stope is completed. After inspection, the drift is prepared for backfilling. Once a sufficient distance, i.e., one to two drift lengths, has been mined and backfilled, mining can progress upward or downward and extraction can continue. An example of production for a mining block is shown in Figure 3-3.

The production will be carried out through two portals, the Main portal and the Lynx portal, whose characteristics are presented in Table 3-9. Figure 3-4 shows a longitudinal view of the levels and various areas of the Main and Lynx portals.

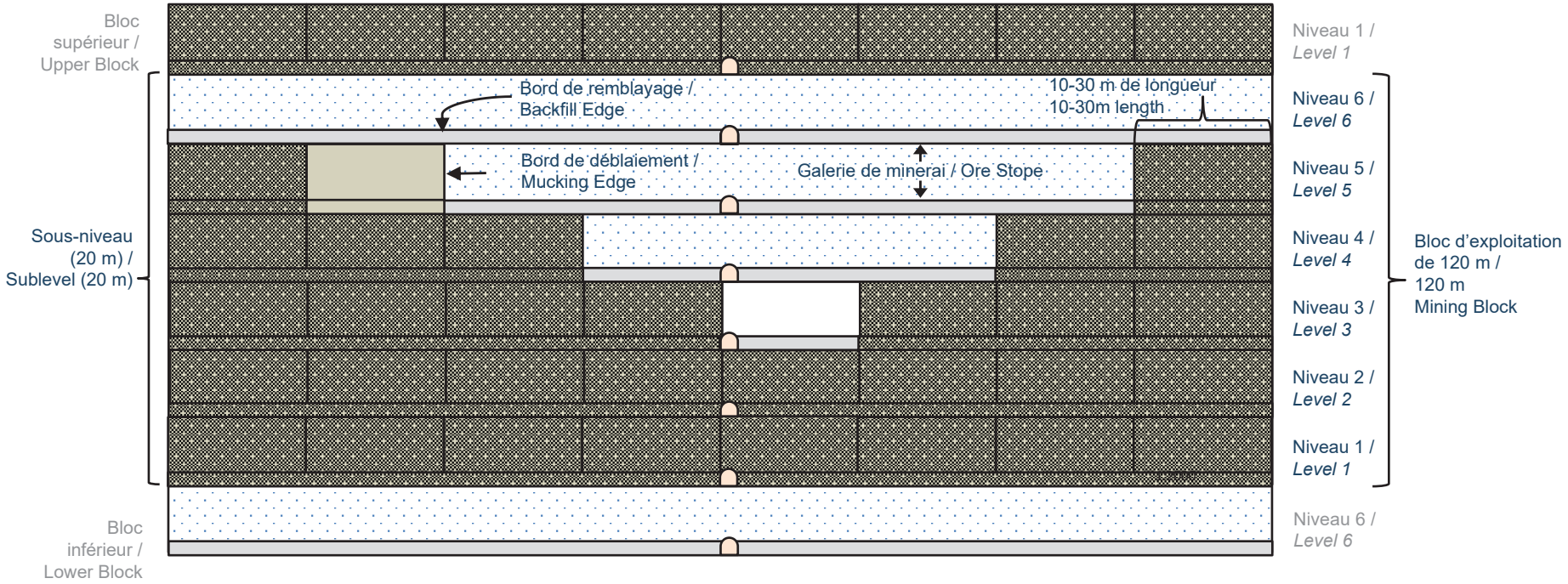


Figure 3-3 **Schéma d'exploitation de la méthode longitudinale par long trou /**
Operating Diagram of the Longitudinal Long-Hole Method (réf. BBA et al, 2023.)

Table 3-9 Key characteristics of the Windfall mine extraction zones

Characteristics	Main portal	Lynx portal
Location	West side of the deposit	East side of the deposit
Zones included	Caribou, Zone 27, Mallard, F-Zone, and Underdog	Bobcat, Lynx 4, Lynx Main, and Triple Lynx
Depth	Extends from the surface to 410 mRL down to -618 mRL	Extends from the surface at 390 mRL to -700 mRL
Number of levels	42	52
Spacing between levels	20 m	20 m
Lateral development	69 km	108 km
Total ore extraction	3.3 Mt	8.9 Mt

On each production level, there will be a sump with a drainage pump or hole to collect and dispose of mine water, ventilation access (return airway and escapeway), an electrical substation, an area to stockpile ore waiting to be sent to the surface, access to receive backfill cement from the work site when needed, and easy access to a refuge station.

In addition, the two operating areas, Lynx and Main, are connected near the surface by existing infrastructure and a connecting ramp from the 30 mRL level on the west side (Main zone) to the -140 mRL level on the east side (Lynx zone). These underground ramps will allow the movement of trucks between the two zones and thus limit surface traffic. A garage located on the ramp connecting the areas at the -140 mRL level will be accessible through both portals. The garage includes a bay for mechanical maintenance that can accommodate six to eight units, a welding bay, an oil bay, a wash bay, a storage area, a tire bay, an electrical bay, and a refuge station. The nearby fuel bay will have a fuel line from the surface to facilitate underground refuelling of diesel equipment.

Figure 3-6 illustrates the ramp systems and shared infrastructure of the mine as well as the location of the garage.

3.2.2 MINING PLAN

According to the mine plan dated November 3, 2022 (rev. 14), mining will begin in 2024 and end in 2035[1], over a period of approximately 10 years, the first and last not being full years. Operations will begin in the Lynx zone (Lynx 4, Lynx Main, and Triple Lynx), continue with the Main zone (Caribou and 27), and end with the Underdog zone; the Triple 8 zone has no classified resources and is therefore not included in this mine plan. Table 3-10 shows the number of tonnes of waste rock and ore expected to be mined per year.

The tonnage of waste rock and ore to be extracted per year of operation is approximately 2 Mt, half of which is development to access the zones that will become drifts. The grading of the material was done using a cut-off grade of 1.7 g/t gold for the development zones and 3.5 g/t gold for the drifts.

A total of 20.6 Mt of material will be mined, including 12.2 Mt of ore and 8.5 Mt of waste rock over a 10-year period.

A portion of the waste rock (approximately 20%) will not come to the surface. This material will be stored directly in the backfill drifts. This would leave 6.8 Mt of waste rock to be stored on the surface waste rock stockpile.

[1] The years 2024 and 2025 will be considered pre-production years since the process plant will not be in operation.

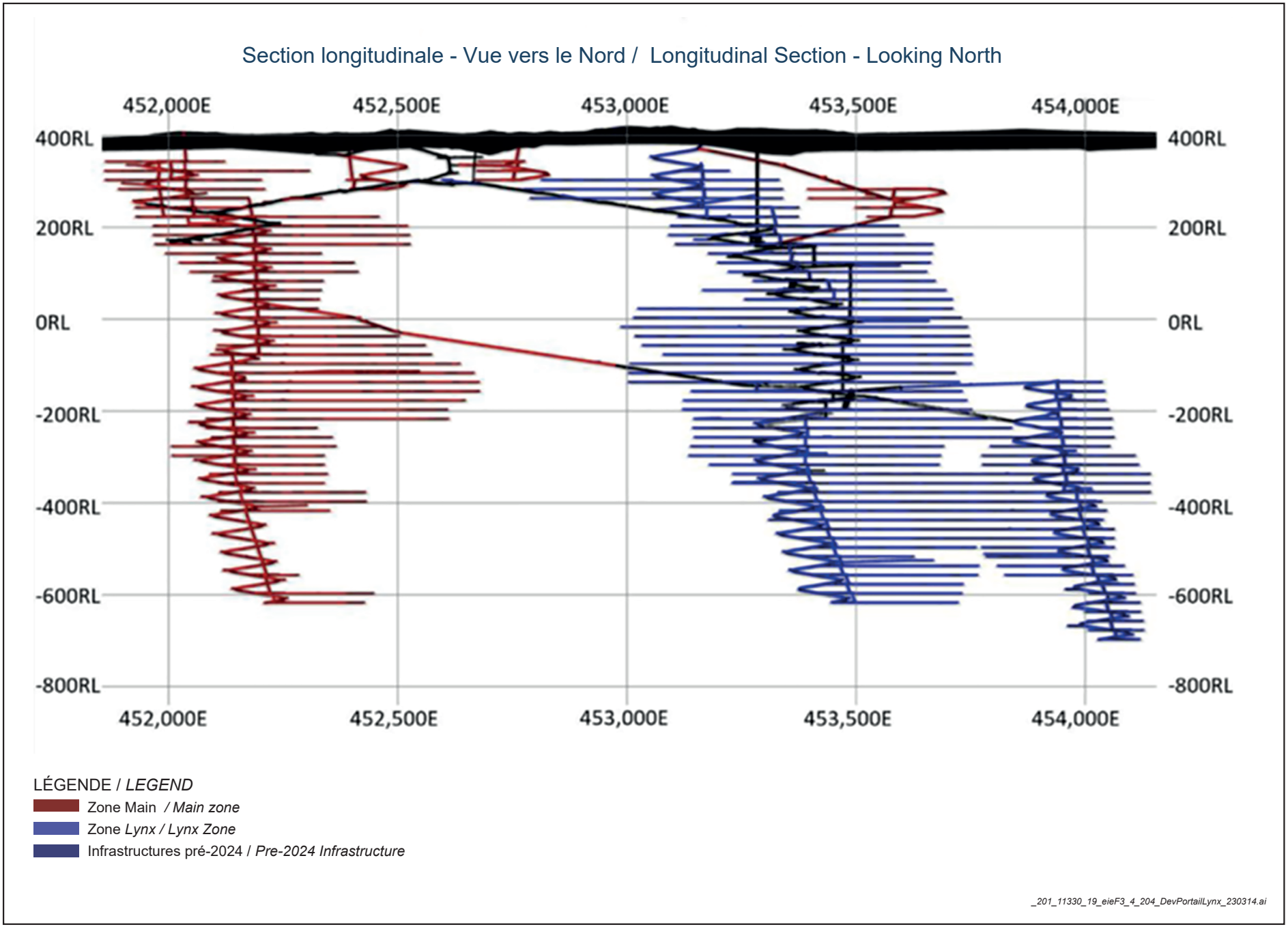
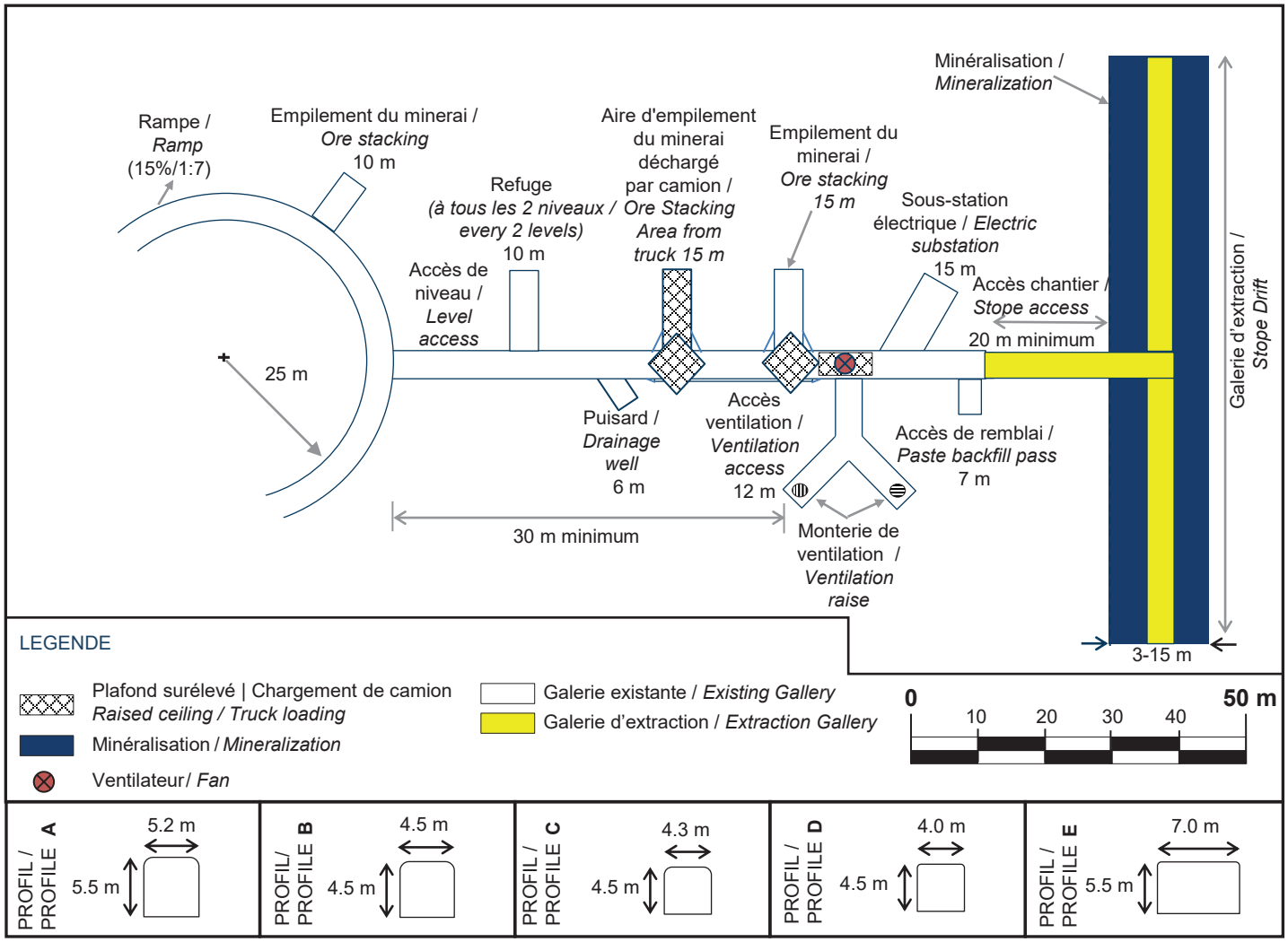


Figure 3-4 **Conception du développement à partir des portails Principal et Lynx / *Development Design from Main and Lynx Portals*** (réf. BBA, et al. ,2023)

Développement / *Development*	Profil / *Profile*
Rampe / *Ramp*	A
Accès de niveau / *Level Access*	A
Puisard / *Drainage Well*	B
Aire d'empilement du minerai / *Ore Stockpile*	A
Accès ventilation / *Ventilation Access*	A
Accès de niveau après ventilation / *Level Access after Ventilation Access*	C
Sous-station électrique / *Electric substation*	E
Conduite de remblai en pâte / *Paste Backfill Pipe*	C
Accès chantier / *Stope Access*	C
Galerie d'extraction *Stope Drift*	D



Note :

Les distances indiquées sont considérées minimales / The distances indicated are considered as miniumum

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Figure 3-5 **Aménagement typique d'un niveau d'exploitation / *Typical Layout of an Operating Level*** (réf. Modifié de BBA et al., 2023)

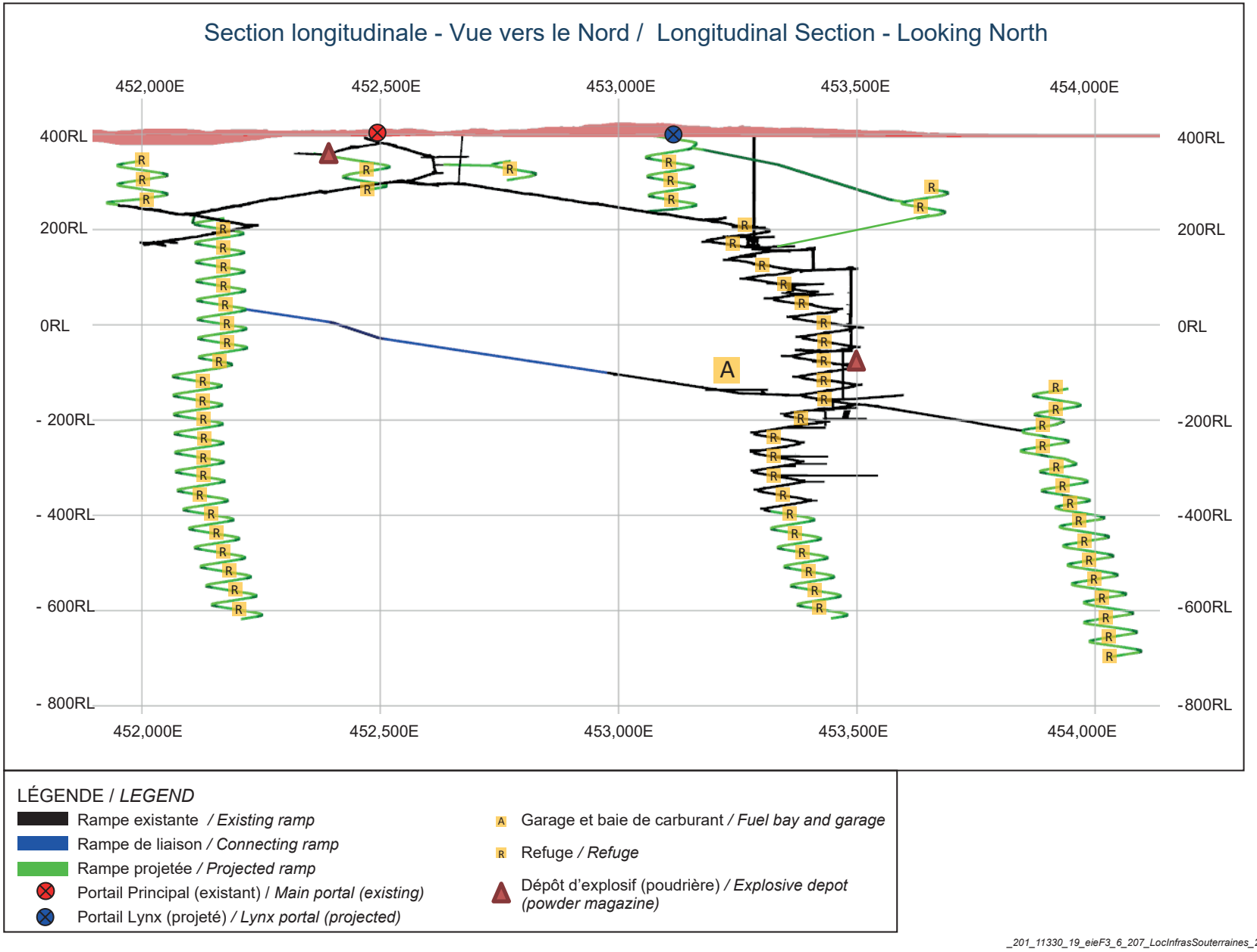


Figure 3-6 **Localisation du garage, rampes reliant les deux portails, des refuges et des dépôts d'explosifs /** ***Garage, Ramps Connecting the Two Gates, Refuges and Explosive Depots Locations*** (réf. Modifié de BBa et al., 2023)

Table 3-10 Mine plan (November 3, 2022)

Zone/Year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	Total
Development – waste rock (in thousands of tonnes)													
27	-	-	109	55	159	152	64	23	3	5	-	-	**569**
Bobcat	-	-	-	-	-	-	-	22	89	23	-	-	**53**
Caribou	7	-	101	165	248	191	88	68	159	102	6	-	**1,134**
F-Zones	-	-	2	-	-	-	-	-	206	233	19	-	**459**
Lynx 4	169	293	288	164	200	305	172	198	23	0	-	-	**1812**
Lynx Main	57	228	138	15	57	119	147	65	133	-	-	-	**960**
Triple Lynx	327	247	296	293	211	101	220	225	55	28	-	-	**2,002**
Underdog	-	-	-	-	-	7	186	284	255	370	396	-	**1,498**
Total	**560**	**768**	**934**	**692**	**875**	**875**	**877**	**884**	**843**	**760**	**421**	**-**	**8,487**
Development – ore (in thousands of tonnes)													
27	-	-	2	55	51	97	35	9	-	2	-	-	**252**
Bobcat	-	-	-	-	-	-	-	5	2	8	-	-	**15**
Caribou	-	-	-	8	24	9	8	38	84	56	4	-	**231**
F-Zones	-	-	-	-	-	-	-	-	14	15	19	-	**47**
Lynx 4	-	83	71	132	58	68	60	57	10	3	-	-	**542**
Lynx Main	9	97	75	18	5	29	97	37	49	-	-	-	**416**
Triple Lynx	84	164	81	116	107	35	48	64	26	25	-	-	**749**
Underdog	-	-	-	-	-	-	-	13	48	89	59	-	**209**
Total	**93**	**343**	**230**	**328**	**245**	**238**	**248**	**223**	**234**	**198**	**81**	**-**	**2,461**
Drifts – ore (in thousands of tonnes)													
27	-	-	-	23	163	211	270	109	47	-	19	-	**841**
Bobcat	-	-	-	-	-	-	-	-	5	33	-	-	**38**
Caribou	-	-	-	-	49	64	3	35	72	115	276	160	**774**
F-Zones	-	-	-	-	-	-	-	-	6	70	83	5	**164**
Lynx 4	-	22	183	211	226	264	282	240	277	241	116	60	**2,122**
Lynx Main	-	49	154	270	10	9	145	263	273	161	118	101	**1553**
Triple Lynx	-	215	533	398	383	466	319	264	443	338	140	-	**3,500**
Underdog	-	-	-	-	-	-	-	-	13	65	398	220	**697**
Total	**-**	**286**	**870**	**902**	**830**	**1,015**	**1,019**	**911**	**1,136**	**1,024**	**1,150**	**545**	**9,690**
												Grand total	**20,638**

It should be noted that an established mine plan can be modified during the course of the project; modifications can be justified by several factors, such as the market for the resource, the ease or difficulty of mining, the degree of concordance between the geology and the terrain, the discovery of additional resources, or even the availability of equipment.

As of March 2023, 32,774 t of ore are in storage on the surface; the ore stockpile will be able to accommodate a maximum of 157,750 t, or 46 days of production at the nominal rate of 3,400 tpd.

3.2.3 EXPLOSIVES

Mining-related activities require the use of explosives. For rock mining (ore and waste rock), drillers will be used to drill holes to load emulsion explosives. Explosives will be stored underground in specific bays set back from the access ramp. At the Main portal, this bay is located near the entrance at the +372mRL level. At the Lynx portal, this bay is located at the -080mRL level. It is planned to store 24 × 1,500 kg containers, or 36,000 kg of explosives per magazine, but each magazine will be able to accommodate a maximum of 54,000 kg total, or 36 × 1,500 kg containers.

The explosives used will be Senatel Pyromex emulsions in cartridges (packaged) and Subtek Eclipse unpackaged emulsions, chemically sensitized and specifically designed to moderate blasting in underground mines. The emulsions will be delivered mixed; these mixtures are made from ammonium nitrate and petroleum products (MSDS, Appendix 3-3).

Explosives and detonators are delivered and stored separately. In accordance with Osisko's internal procedure for the transportation of explosives (STY-RSK-STD-063):

- The transporter of explosives arriving at the site must check in at the gatehouse and wait until the unloading crew is ready to receive them.
- A security perimeter must be set up at the unloading site and the transporter must proceed straight to the site.
- The crew must proceed quickly with the unloading. The loader operator must place the pallets of explosives in a safe location in full view of any observers. The loader must be equipped with a Plexiglas module or other metal-free material.
- The transporter may then leave the premises.
- The explosives supervisor must secure the explosives with red tape and keep them in sight.
- The explosives should be moved to the temporary or main underground storage facility without delay.

The storage of explosives and detonators is governed by an internal procedure (STY-RSK-STD-062) which follows legal requirements, in particular the distance to be respected between detonators and explosives and the method of disposal of explosives packaging. Osisko also has a procedure for the storage and disposal of explosives waste.

3.3 ORE PROCESSING

The process plant will be built at the Windfall project site. The design of the project's process plant was based on laboratory-scale tests. It has been designed for a nominal throughput capability of 3,400 tpd with a 92% availability factor; its maximum throughput will be 4,080 tpd. Table 3-11 provides an overview of the key parameters of the design criteria considered.

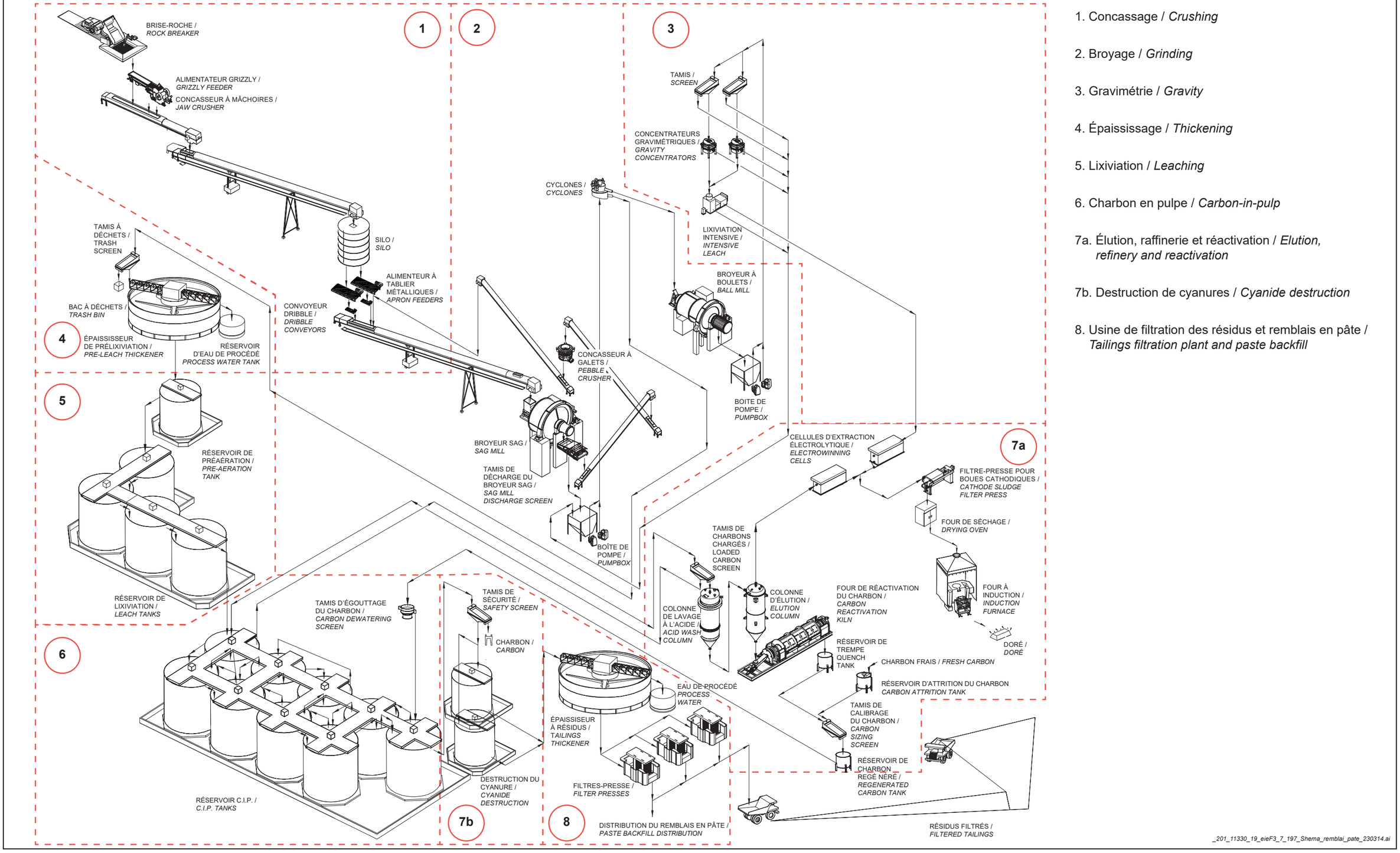
Table 3-11 Summary of key process design criteria

Description	Unit	Value
Plant throughput	tpd	3,400
Average Au feed grade	g/t	8.06
Average Ag feed grade	g/t	4.18
Crushing plant utilization	%	65
Process plant utilization	%	92
Au recovery by gravity circuit	%	31.2
Ag recovery by gravity circuit	%	22.4
Grind size to leaching, P80	µm	37
Leaching retention time	hr	36
Au recovery by CIP	%	90
Ag recovery by CIP	%	79.1
Carbon regeneration capacity	tpd	7
Overall recovery		
▪ Au	%	93.1
▪ Ag	%	83.8
Final tailings slurry density target	% w/w	48

The process plant consists of primary crushing, followed by a grinding circuit consisting of a semi-autogenous grinding (SAG) mill in closed circuit with a pebble crusher and ball mill (in closed circuit with cyclones – SABC circuit). A gravity circuit recovers free gold from the cyclone underflow, while the cyclone overflow is treated in a leaching circuit. Gold and silver are leached and recovered in a carbon-in-pulp adsorption circuit (CIP). Electrowinning cells recover the gold and silver to produce doré bars (silver and gold alloy). The plant also includes a reagent preparation area and process and industrial water circuits to service the entire plant A cyanide destruction circuit is also included to treat CIP tailings before being pumped 1 km further to the tailings filtration and paste backfill plant (Figure 3-7).

The tailings filtration and paste backfill plant includes a thickener, filter presses, a clarifier, a paste backfill production system and positive displacement pumps. The product, upon exiting the filter presses, is a filtered residue (84% solid by weight) that will be mixed with cement for underground backfill or sent for storage in the filtered tailings facility.

A simplified diagram of the process plant and paste backfill plant is shown in Figure 3-7.



1. Concassage / *Crushing*

2. Broyage / *Grinding*

3. Gravimétrie / *Gravity*

4. Épaississage / *Thickening*

5. Lixiviation / *Leaching*

6. Charbon en pulpe / *Carbon-in-pulp*

7a. Élution, raffinerie et réactivation / *Elution, refinery and reactivation*

7b. Destruction de cyanures / *Cyanide destruction*

8. Usine de filtration des résidus et remblais en pâte / *Tailings filtration plant and paste backfill*

Figure 3-7 **Schéma simplifié de l'usine de traitement du minerai et de remblais en pâte /** ***Simplified Ore Treatment and Paste Backfill Plant Flow Diagram*** (réf. Modifiée de BBA et al., 2023)

3.3.1 CIRCUITS AND EQUIPMENT

3.3.1.1 CRUSHING (1)

The ore transported from the underground mine will have 80% passing 400 mm material. Each Windfall dump truck will be able to carry a total of 54 t per load. An ore storage area (ore stockpile) will be built near the crushing building. A rock breaker and jaw crusher will reduce the material to 80% passing 114 mm. A dust collection system will remove the dust created by the crushing operations. The crushed material will be collected on a conveyor that will feed the crushed ore silo, and then by conveyor will feed the crushing circuit. The usable capacity of the silo is 4,010 t, or approximately 26 hours.

3.3.1.2 GRINDING (2)

The grinding circuit consists of an SABC grinding circuit with a variable speed SAG mill, a pebble crusher, and a fixed speed ball mill in closed circuit with a cyclone cluster. Water is added to control the density of the slurry and to reach about 65% solids in the mill. The product size of the grinding circuit will contain 80% passing 37 µm material. The overflow from the cyclones will be sent to the pre-leach thickener which feeds the CIP circuit.

3.3.1.3 GRAVITY CIRCUIT (3)

The gravity circuit located between the grinding and the CIP circuit receives the ball mill trommel undersize, which will feed two gravity screens via a split box. The coarse material from thescreens will be sent to the cyclone feed pump box. The undersized material from the screens will feed two gravity concentrators, arranged in parallel. The gold concentrate from both gravity concentrators will feed an intensive leaching reactor (“ILR”) operating in batch mode. The gravity concentrator tails will return to the cyclone feed pump box.

The pregnant gravity solution from the ILR will be pumped to a dedicated EW cell via a pregnant solution tank located in the gold room. The ILR tailings will be returned to the cyclone feed pump box via a pump.

3.3.1.4 PRE-LEACH THICKENING (4)

The ground slurry received from the cyclone overflow will pass through a trash screen before feeding the pre-leach thickener feed box. The pre-leach thickener thickens the slurry to 50% solids (w/w) before pumping it to the leach circuit feed box. The thickener overflow water is sent to the process water tank.

3.3.1.5 LEACHING (5)

The pre-leach thickener underflow slurry will be pumped to the leach circuit feed box. This circuit consists of a pre-aeration tank and four cyanide leaching tanks operating in series. In the pre-aeration tank, the slurry will be added with lead nitrate and aerated with sparged oxygen. This operation reduces cyanide consumption by optimizing gold leaching. Each tank will be 14 m in diameter and mechanically agitated. Lime and cyanide will also be added along with sparged oxygen to bring the gold and silver into solution as gold and silver ions.

3.3.1.6 CARBON ADSORPTION – CIP (6)

The slurry loaded with gold and silver ions is then directed to the CIP tanks; nine tanks 11 m in diameter each, mechanically agitated and operating in carousel mode.

In this mode of operation, the activated carbon is kept within the CIP tanks, while the slurry is pumped between tanks. A slurry flow countercurrent is created to the activated carbon flow. The gold and silver ions attach to the carbon particles, which are sent to elution via the initial tank. Filters prevent the carbon particles from following the slurry flow. The slurry, emptied of dissolved precious metals, becomes industrial waste and is called tailings.

3.3.1.7 ELUTION, REGENERATION, AND FINES HANDLING (7A)

Following the adsorption of gold and silver ions from the CIP circuits, the loaded carbon is transferred to a loaded carbon screen via loaded carbon pumps. The undersize from this screen is recycled to the CIP feed launder, while the oversize is sent to the acid wash vessel before being transferred to an elution column to separate the gold and silver ions and then to the electrowinning circuit where they will be returned to solid form and poured into doré bars.

The carbon is then sent to a high temperature rotary kiln to be reactivated and returned to the CIP circuit. To keep the right amount of activated carbon in the CIP circuit and to compensate for the loss of fine carbon, new activated carbon is also added to the circuit.

3.3.1.8 CYANIDE DESTRUCTION (7B)

After passing through the adsorption circuit, the tailings from the CIP circuit will be first sent to a carbon safety screen to separate any carbon that may be mixed in and then sent in a carbon bag. The tailings are then directed to cyanide destruction.

Cyanide destruction is carried out using the SO_2/oxygen process. The process takes place in two tanks operating in parallel. Liquid SO_2 is added to the tanks and oxygen gas is injected from the bottom of the tanks to oxidize the cyanide species present. Copper sulphate will also be added as a catalyst, if required, as well as hydrated lime to control the pH in the tanks. An agitator ensures adequate mixing and gas dispersion.

The treated tails are subsequently pumped to the tailings thickener. Their cyanide concentration is about 5 mg/L and their solid percentage is 50% (w/w).

3.3.1.9 TAILINGS THICKENER – UNDERGROUND FILTRATION AND BACKFILL PLANT (8)

The tailings thickener is located in a building to the southeast of the site, near Lakes SN6 and SN2. This building integrates the tailings filtration plant (the tailings thickener), the paste backfill circuit and the water treatment plant. The 28 m diameter thickener is followed by filter presses that treat all of the tailings from the plant and the underground sludge. After filtration, the dewatered tailings (84% solids) are directed to the backfill production circuit or to the tailings storage facility. Based on the mine's backfill requirements, the estimated proportion of tailings directed to the backfill plant is 39% and the proportion directed to the tailings storage facility is 61%. This ratio may vary depending on real time backfill requirements.

The filtration plant is located on the southeast side of the site, near the Lynx portal, along with the backfill circuit and the water treatment plant. The site will also include a 28 m wide by 51 m long by 18 m high canvas dome for dewatered tailings storage, as well as a traffic area for truck loading.

The demand for paste backfill is dependent on the stopes to be exploited. The backfill is used either to reinforce the surface pillar or to facilitate the use of new stopes adjacent to already opened areas, thus creating support walls for the stopes to be opened.

The tailings are mixed with cement and sent to the sites via pipelines directly to the stopes to be backfilled. Some stopes will be backfilled with cemented rockfill and uncemented rockfill, others will be backfilled with cemented paste backfill only. A total of 4.75 Mt of tailings and 450,000 t of cement are expected to be sent underground through the backfill operations. The density of the mixture is controlled to obtain a slurry that is easy to flow through the pipes, while resulting in a solid material.

A dust collector serves the cement storage and preparation area. A mobile high-pressure washing unit is available to clean the mixers and the paste pumps.

3.3.2 INPUTS AND OUTPUTS

INPUTS

The process plant will initially be supplied with water from one of the surface ponds. The water will be 77% recirculated and make-up water will be supplied continuously from the WTP via a heated pipe protected by a pipe trench.

In addition to process water, the list of products required and the reagent consumption per day for the maximum tonnage of 4,080 t of ore per day is presented in Table 3-12. This therefore presents the scenario where the reagent quantity is at its maximum. These specific products could be replaced by products deemed equivalent.

The products will be received at the gatehouse by employees certified in transportation of dangerous goods (TDG) and directed to their storage site in the process plant building. Depending on the type of reagent, it will be stored according to the requirements of the National Fire Code (NFC).

Material safety data sheets for reagents are available in Appendix 3-3.

Table 3-12 Reagents used in the cyanidation, filtration, and backfill plants

Sector/Circuit number	Product	Use	Consumption (tpd)
Process plant - 4	Flocculant	Flocculation of solids in thickeners	0.13
Process plant - 5	Quicklime (CaO)	pH modifier	11.16
Process plant - 5	Sodium cyanide (NaCN)	Gold leaching agent, gold eluent	12.09
Process plant - 5	Lead nitrate	Gold leaching agent	1.22
Process plant - 5	Sodium salts (LeachAid UL)	Improvement of leaching efficiency	0.02
Process plant - 6	Activated carbon	Gold adsorption	0.16
Process plant - 6	Anti-scalant (<25%)	Membrane protector	0.06
Process plant - 7a	Hydrochloric acid (HCl) 28%	Carbon washing	1.63
Process plant - 7a	Sodium hydroxide (NaOH) 50%	Carbon separation and washing	1.40

Table 3-12 (continued) Reagents used in the cyanidation, filtration, and backfill plants

Sector/Circuit number	Product	Use	Consumption (tpd)
Process plant - 7a	Refining flux (silica, borax)	Fines handling	0.01
Process plant - 7b	Liquid SO_2	Cyanide destruction	3.27
Process plant - 7b	Copper sulphate ($CuSO_4.5H_2O$)	Cyanide destruction reaction catalyst	0.21
Filtration and backfill plant	Flocculant	Flocculation of solids in thickeners	0.14
Filtration and backfill plant	Cement	Binder for backfill paste	147.98

OUTPUTS

Water extracted from the tailings filtration plant will be directed to the water treatment plant (WTP) and discharged to the environment as mine effluent. The quality of these waters is subject to MDMER requirements, D019 criteria, and is expected to meet the Environmental Discharge Objectives (EDOs) calculated by MELCCFP officials. Characterization of the mine effluent is discussed in Section 3.5.4.

The doré bars will be sold and transported off-site, and information on their transportation remains confidential for obvious safety reasons. Process tailings will be directed to the tailings storage facility or underground backfill, as requested by the operators.

The process plant and filtration plant will have dust collectors and exhaust ventilation raises. The following table presents the characteristics of the point sources of air emissions. Details of the characteristics of each air emission source are presented in Appendix 6-1.

Table 3-13 Emission source characteristics of the process plant and tailings filtration plant

Description	Number	Velocity (m/s)	Emitted substance
Main source			
Primary crusher dust collector	1	15.95	Ore dust
Ore silo dust collector	1	13.27	Ore dust
Ore silo vent	1	13.33	Ore dust
Acid fume extraction fan	1	5.34	Hydrogen chloride
Carbon regeneration kiln	1	3.65	Coal
Wet scrubber at reagent dispenser	1	16.69	Copper sulphate
Wet scrubber at reagent dispenser	1	16.69	Lead nitrate
Dust collector	1	10.85	Dust
Silo vent at reagent dispenser	1	13.35	Lime
Hydration unit at reagent dispenser	1	3.07	Lime
Ventilation of the process plant	10	15.60	Ore dust
Grinder dust collector	1	15.97	Ore dust
Filtration plant ventilation	8	14.84	Ore dust
Ventilation of dewatered tailings storage	1	14.92	Tailings dust
Dust collector for the binder section	1	14.02	Tailings and binder dust

Table 3-13 (continued) Emission source characteristics of the process plant and tailings filtration plant

Description	Number	Velocity (m/s)	Emitted substance
Main source (continued)			
Binder silo vent	1	13.35	Tailings and binder dust
Filter press exhaust vent	3	4.29	Tailings dust
Propane combustion source			
Carbon elution and regeneration	1	2.76	PM_{tot}, PM_{10}, $PM_{2.5}$, CO, NO_x, SO_2, VOC
Crusher ventilation unit	1	3.73	PM_{tot}, PM_{10}, $PM_{2.5}$, CO, NO_x, SO_2, VOC
Ventilation unit at the ore storage silo	1	4.61	PM_{tot}, PM_{10}, $PM_{2.5}$, CO, NO_x, SO_2, VOC
Process plant ventilation unit	1	16.22	PM_{tot}, PM_{10}, $PM_{2.5}$, CO, NO_x, SO_2, VOC
Process plant ventilation unit	1	29.73	PM_{tot}, PM_{10}, $PM_{2.5}$, CO, NO_x, SO_2, VOC
Air heaters at the crusher	3	0.31	PM_{tot}, PM_{10}, $PM_{2.5}$, CO, NO_x, SO_2, VOC
Air heaters at the ore storage silo	5	0.23	PM_{tot}, PM_{10}, $PM_{2.5}$, CO, NO_x, SO_2, VOC
Air heaters at the process plant	4	2.64	PM_{tot}, PM_{10}, $PM_{2.5}$, CO, NO_x, SO_2, VOC
Process plant ventilation unit	2	4.05	PM_{tot}, PM_{10}, $PM_{2.5}$, CO, NO_x, SO_2, VOC
Process plant ventilation unit	1	0.81	PM_{tot}, PM_{10}, $PM_{2.5}$, CO, NO_x, SO_2, VOC
Process plant ventilation unit	1	0.14	PM_{tot}, PM_{10}, $PM_{2.5}$, CO, NO_x, SO_2, VOC
Carbon elution and regeneration	1	0.18	PM_{tot}, PM_{10}, $PM_{2.5}$, CO, NO_x, SO_2, VOC
Tailings filtration plant ventilation unit	4	5.49	PM_{tot}, PM_{10}, $PM_{2.5}$, CO, NO_x, SO_2, VOC
Tailings filtration plant ventilation unit	4	0.42	PM_{tot}, PM_{10}, $PM_{2.5}$, CO, NO_x, SO_2, VOC

3.4 MANAGEMENT OF ACCUMULATION AREAS

Geotechnical surveys have been completed on the entire Windfall project site. A total of 190 drillholes and 22 test pits (WSP, 2022 a, c, d, e, f, g, h, i; Golder 2022a) were added to the previous 69 drillholes (GENIVAR, 2008; Golder, 2018). During these geotechnical campaigns, the lithologies were identified, in situ tests were carried out, and samples were taken for laboratory characterization.

Based on the geotechnical information gathered from the drillholes, the stratigraphy of the site generally consists of:

— a layer of organic matter varying in thickness from 0 m to 2 m.

— a layer of fine to medium sand with traces of silt and gravel. This layer varies from 1 m to 8 m in thickness. This layer is generally loose in the eastern sector of the site.

— a sand and gravel deposit between 0 m and 5 m thick, resting on the basement rock.

Map 6-6 in Section 6 shows the topography, indicating the location of rock outcrops, sand, gravel, silt and clay deposits, watercourses and water bodies, wetlands, and vegetation.

A summary of the geochemical characteristics of the materials to be moved from the Windfall site is presented in Section 3.1.5 and detailed information is available in the attached study in Appendix 3-1.

Hydrogeological information is presented in the hydrogeological sectorial report (Appendix 6-8). The studies provided in the appendices of Section 6-8 include the assessment of subsurface dewatering rates, percolation calculations under the proposed waste rock stockpile and tailings storage facility, and details on hydraulic conductivity and faulting. In addition, the reports signed by a member of the Ordre des Géologues attesting to the absence of geological potential under the accumulation areas (expansion of the waste rock stockpile and tailings storage facility) are available in Appendix 3-2.

3.4.1 OVERBURDEN STOCKPILE

The organic and inorganic material to be stockpiled and managed at the Windfall site comes primarily from the preparation of the infrastructure sites, i.e., the tailings storage facility, process plant, stockpiles, and ponds. The required storage capacity was estimated based on the area of the proposed infrastructure and the thickness of the organic layer estimated from the drillholes. The organic layer thickness is expected to range from 0.15 m to 2.3 m depending on the areas excavated.

The site designated for the overburden stockpile can accommodate 638,100 m³. The final geometric characteristics of the proposed overburden stockpile are presented in Table 3-15 in Section 3.4.3.

The overburden stockpile foundation will not be covered with a geomembrane. Runoff will still be collected by perimeter ditches, directed to a sedimentation pond (Pond J). Contact water will be sent to the WTP for removal of suspended solids (TSS) prior to discharge to the final effluent.

Inorganic overburden excavated during the planned construction will be reused as backfill to the maximum extent possible at the various construction sites on the Windfall mine site. Depending on the construction schedule, the overburden stockpile will serve as a temporary storage site for inorganic overburden. In addition, some of the overburden will be used to construct berms to serve as visual and acoustic barriers in the area of the new camp. Over the life of the mine, the amount of overburden stored will fluctuate depending on construction sequences, infrastructure, and reclamation needs as the project progresses.

3.4.2 ORE STOCKPILE

A 157,750 t (54,553 m³) capacity ore stockpile will be located adjacent to the crushing circuit, as shown on Map 3-1. The design was optimized to position the crusher and ore stockpile to limit the footprint in relation to the topography. The stockpile capacity was selected to accommodate as much material as possible, while respecting the drainage conditions deemed optimal. In addition, since crushing is generally the noisiest activity, the circuit was positioned as far away as possible from the workers' camp and sensitive receptors.

The stockpile is designed to have a maximum height of 10 m, composed of a single bench with slopes of 3H:1V. This stockpile, which will be used for temporary storage of ore prior to its transfer to the crusher, will rest on an elevated platform to facilitate the transfer of ore to the crusher. The final geometric characteristics of the proposed ore stockpile are presented in Table 3-15 in Section 3.4.3.

Since the ore is classified as PAG and possibly leachable for some metals (silver, arsenic, cadmium, copper, mercury, selenium and/or zinc), the right-of-way for the ore stockpile will be lined with a geomembrane and protected by a geotextile. A perimeter drainage ditch around the crusher platform will be built to collect runoff and direct it to Pond C and then to the WTP for treatment at the TSS and metals circuits.

3.4.3 WASTE ROCK STOCKPILE

The waste rock volumes to be stored have been calculated from the tonnage estimated in the mine plan, plus a contingency determined by Osisko, for a total of 9.11 Mt (4,46 Mm^3). This waste rock stockpile is permanent, although some of it could be recovered for construction and ongoing mine operations. The location of the waste rock stockpile is shown on Map 1-1.

The stockpile used since the acquisition of the Windfall site by Osisko was expanded and lined in 2018 and expanded again in 2020. All the material that was stored on the unlined area was used as a rolling base in the underground exploration ramp and as a protective layer for the membrane covering the 2020 extension. Currently at the Windfall site, all of the ore and waste rock is located on a lined surface where contact water is collected through collection ditches.

Figure 3-8 shows the various stages of construction of the waste rock stockpile.

The authorization issued in 2020 for the storage of material on the stockpile allowed for a total of 980 kt (0,48 Mm3) of waste rock. The maximum capacity was reached in 2022. Therefore, a third extension, located to the west, is planned for 2023, as well as an additional level on the expanded area in 202x. This extension will provide an additional 2.1 Mt (1.01 Mm^3) of capacity, for a cumulative total of 3.08 Mt of waste rock. The capacity of this extension is expected to be reached by the end of 2026. An additional 16 m high bench will then be added to the waste rock stockpile, for an additional capacity of 2.3 Mt and a cumulative total of 5.38 Mt of waste rock. This volume is expected to be reached in 2030. During the bulk sampling and construction phases, ore and waste rock will be stored side-by-side in the same stockpile area. The ore will be gradually removed after the process plant is commissioned. It is currently anticipated that by the end of year 4 of operation, there will be no ore left on the waste rock stockpile.

A final expansion will add 3.73 Mt, for a total of 9.11 Mt of waste rock stockpiled. The final expansion of the waste rock stockpile is anticipated toward the south to cover a portion of the existing overburden pile, which will have been reduced in size prior to this to accommodate progressive restoration work at the site.

The location and design of the waste rock stockpile are intended to reduce the impact on the environment by limiting the footprint of the mine site as well as transportation distances, which will have an obvious benefit on the project's greenhouse gas emissions.

The final geometric characteristics of the proposed waste rock stockpile are presented in Table 3-15.

The proposed design is consistent with the closure design, as the low-profile stockpiles reduce the amount of reworking that may be required during reclamation and allow for better integration into the surrounding landscape.

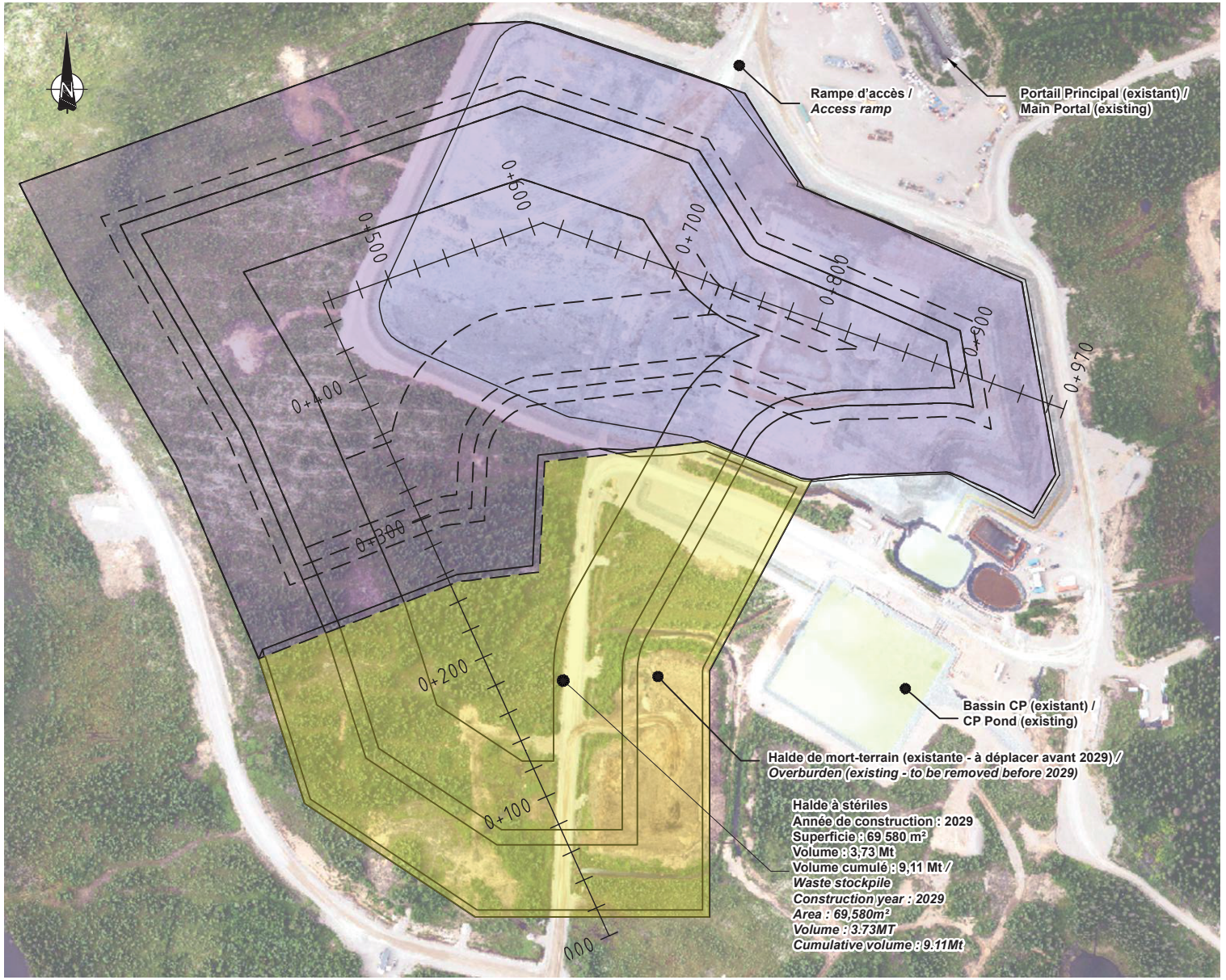


Figure 3-8 **Séquence d'aménagement de la halde à stériles /**
Waste Rock Stockpile Management Sequence (réf. Modifié de BBA et al, 2023)

The work required for the construction of the waste rock stockpile expansion will be similar to the method used for the 2018 and 2020 expansions. It includes topsoil removal, foundation preparation, and installation of an HDPE membrane. The membrane will be installed over the entire footprint of the waste rock stockpile. It will be reinforced with two layers of geotextile (one below and one above the membrane). A layer of 0-56 mm granular material will be placed on top of the geosynthetics to create a protection against heavy machinery traffic, thus avoiding punctures during operations. The liner will extend into perimeter ditches that will collect any contact water. Figure 3-9 shows a cross-sectional projection of the waste rock stockpile at the end of operations. Percolation criteria and measures to ensure groundwater protection are presented in Section 6.8.

The waste rock will be deposited from the bottom up and not poured forward. This method allows for better control of the footprint and ensures that all of the waste rock is deposited on the membrane.

Table 3-14 shows the final characteristics of the three stockpiles that will be present at the site.

Table 3-14 Final characteristics of the stockpiles (overburden, ore, and waste rock)

	Overburden stockpile	Ore stockpile	Waste rock stockpile
Height	21 m	10 m	32 m
Bench slopes	4H:1V for the first two benches and 3H:1V for the third bench	3H :1V	3H:1V
Bench width	7 m	Different piles according to content to be mixed at the plant	16 m
Final slope	4,6 H:1V	3H:1V	3,4 H:1V
Berm width between benches	10 m	One bench only	10 m
Total area	82,743 m^2	14,068 m^2	230,180 m^2
Volume capacity	638,100 m^3	54,553 m^3	4.9 Mm^3

3.4.4 MINE TAILINGS

The location of the tailings storage facility was selected through a site selection process. Further definition of its location was based on the topography of the selected area as well as the operational constraints of the site. The tailings storage facility is located less than 1 km northeast of the tailings filtration plant. The tailings will be trucked from the filtration plant and compacted in a controlled manner.

The tailings management facilities will include a filtered tailings stockpile, a water management system including ditches and two ponds, as a surrounding road. No tailings dams will be required for storage of filtered tailings. Figure 3-10 shows the location of the tailings storage facility and the associated water management infrastructure.

Current project planning indicates that 8.2 Mt of dry tailings (including approximately 5% of the mixed-in sludge from the underground water decantation system) will be stored in the tailings storage facility. This tonnage considers that around 40% of the tailings will be returned underground as a paste backfill material. To provide a contingency, Osisko has chosen to design a facility with a capacity of 9.0 Mt (including the mixed-in sludge). The final surface area of the tailings storage facility will be approximately 461,500 m^2.

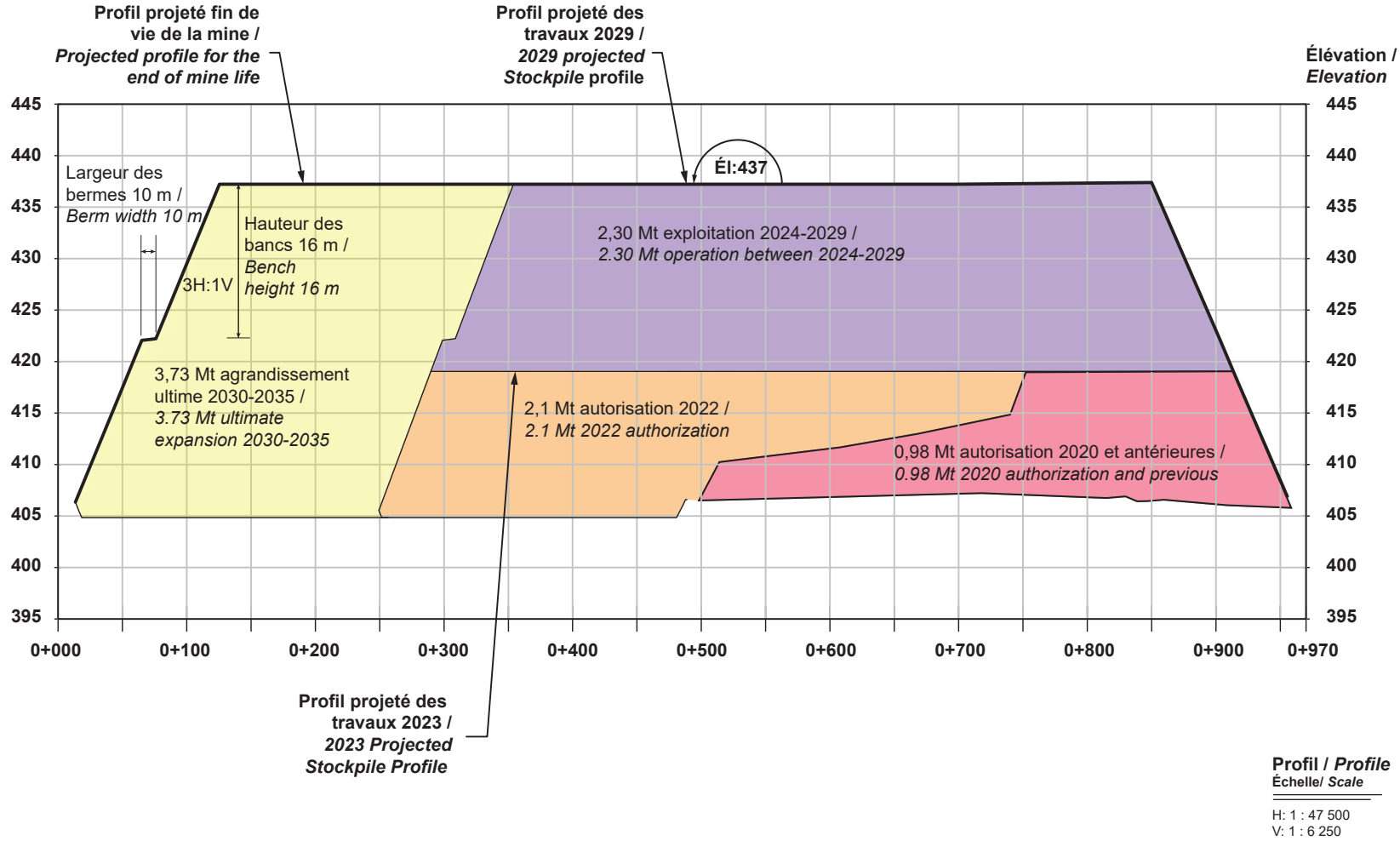


Figure 3-9 **Projection en coupe de la halde à stérile /**
Waste Rock Stockpile Section (réf. Modifié du plan émis par WSP pour Osisko (800-G-0606-ZB))

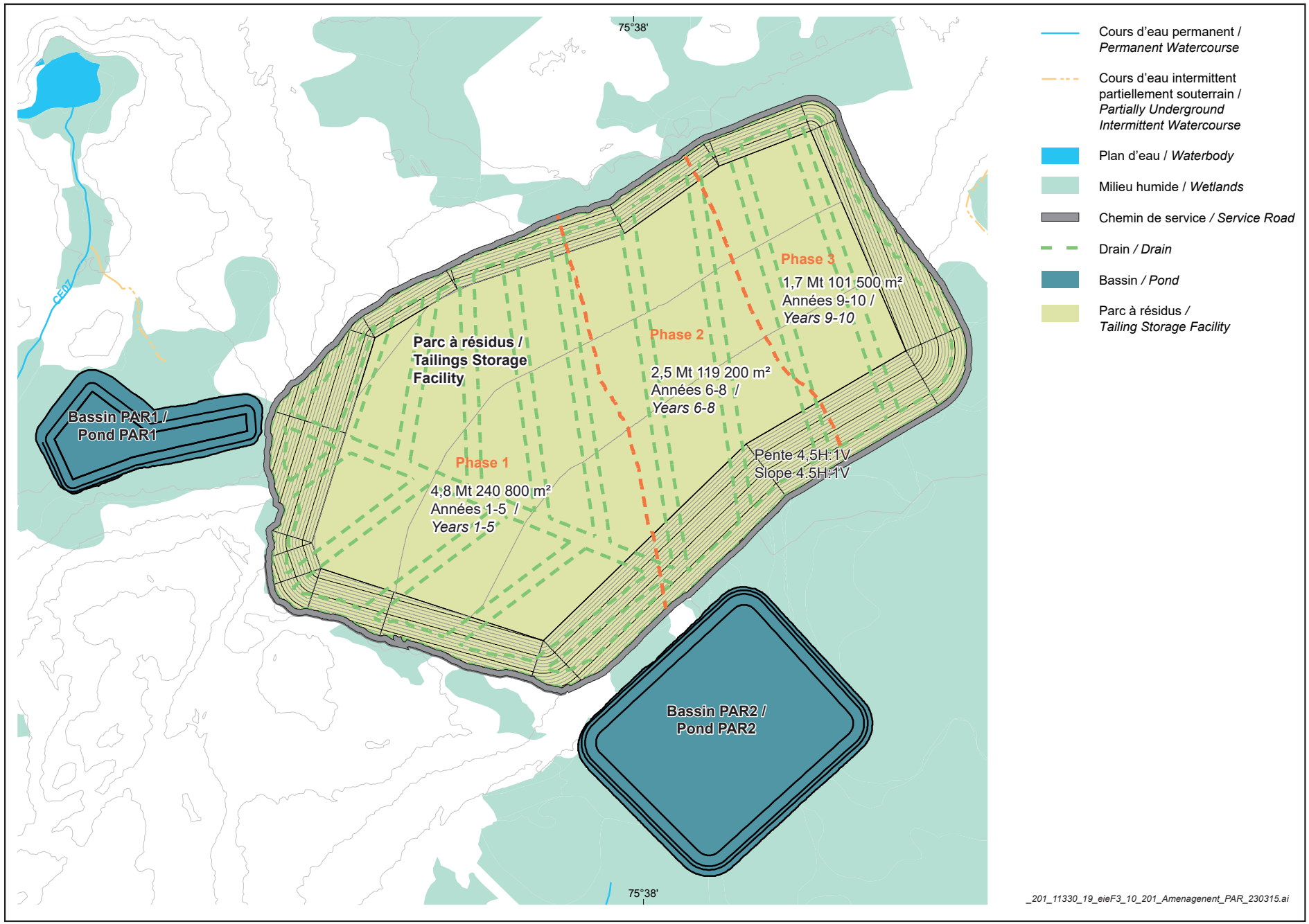


Figure 3-10 **Séquence d'aménagement du parc à résidus /**
Tailing Storage Facility Management Sequence (réf. Modifié de WSP, 2022)

Table 3-15 presents the main properties of the tailings based on the 2020-2021 geotechnical characterization (Golder, 2022b). Sludge coming from underground operations that will be mixed with tailings prior to filtering were not included in the 2020-2021 tailings characterization as it represents a marginal volume. The sludge consists of very fine particles and its content in the mixture with the tailings is expected to be around 5%. For the feasibility study, it is assumed that the tailings and sludge will form a homogeneous mixture and that the addition of sludge in the tailings will not have a significant impact on their geotechnical properties.

Table 3-15 Geotechnical characteristics of tailings

Description	Units	Filtered tailings
Total production	Mt	8.2
Solids content (w/w)	%	81 to 84
Grain size at 80% passing	µm	37
Relative density of solid grains	-	2.85 to 3.01
Maximum dry unit weight (standard Proctor test)	kN/m^3	16
Optimum water content (standard Proctor test)	%	21.6

The tailings storage facility will have a maximum height of 423 m in the northwestern section and 420 m in the southeastern section. This will result in a slope of approximately 0.5%, which will facilitate water runoff to the perimeter drainage ditch of the tailings storage facility. In addition, the tailings will be compacted, which will reduce water infiltration into the tailings, and a drain system will be installed at the base of the tailings storage facility to remove any water that may infiltrate.

The final side slopes of the filtered tailings stockpile will be 4.5H:1V. Figure 3-10 shows a plan view of the tailings storage facility and Figure 3-11 shows a typical cross-section.

Geochemical characterization indicates that the tailings are potentially acid generating and leachable for some metals. Details of the mineralogical composition of the tailings can be found in the geochemical sectorial study provided in Appendix 3-1. The metallurgical treatment includes a cyanide destruction step. Given the potential for acid generation, metal leaching, the potential presence of residual traces of cyanide in the tailings pore water, and a relatively permeable foundation, the tailings storage facility design includes a geosynthetic liner as a measure to prevent pore water infiltration into the groundwater to the extent possible. A liner system consisting of a 1.5 mm thick linear low-density polyethylene (LLDPE) liner and an overlay geotextile layer is currently proposed. The liner system will be installed on top of the granular foundation as required. This construction design allows the tailings storage facility to meet the groundwater percolation requirements of D019 (Section 6.9). With the exception of the granular material used to raise the tailings storage facility, it is assumed that no additional measures (granular material and/or underlying geotextile) will be required prior to installation of the liner system.

The tailings storage facility will be constructed on engineered pads. Preparation includes stripping of organic soils and surface clearing and brushing. Where necessary, the tailings storage facility foundation will be raised with granular material to ensure that the low points in the southeast and northwest sectors of the facility are at a minimum elevation of 400 m and 401 m, respectively. The purpose of this elevation is to have the base of the facility higher than the maximum water levels in the design of the ponds and contact water collection ditches. This elevation will be constructed with a minimum slope of 1% to promote water drainage away from the tailings storage facility.

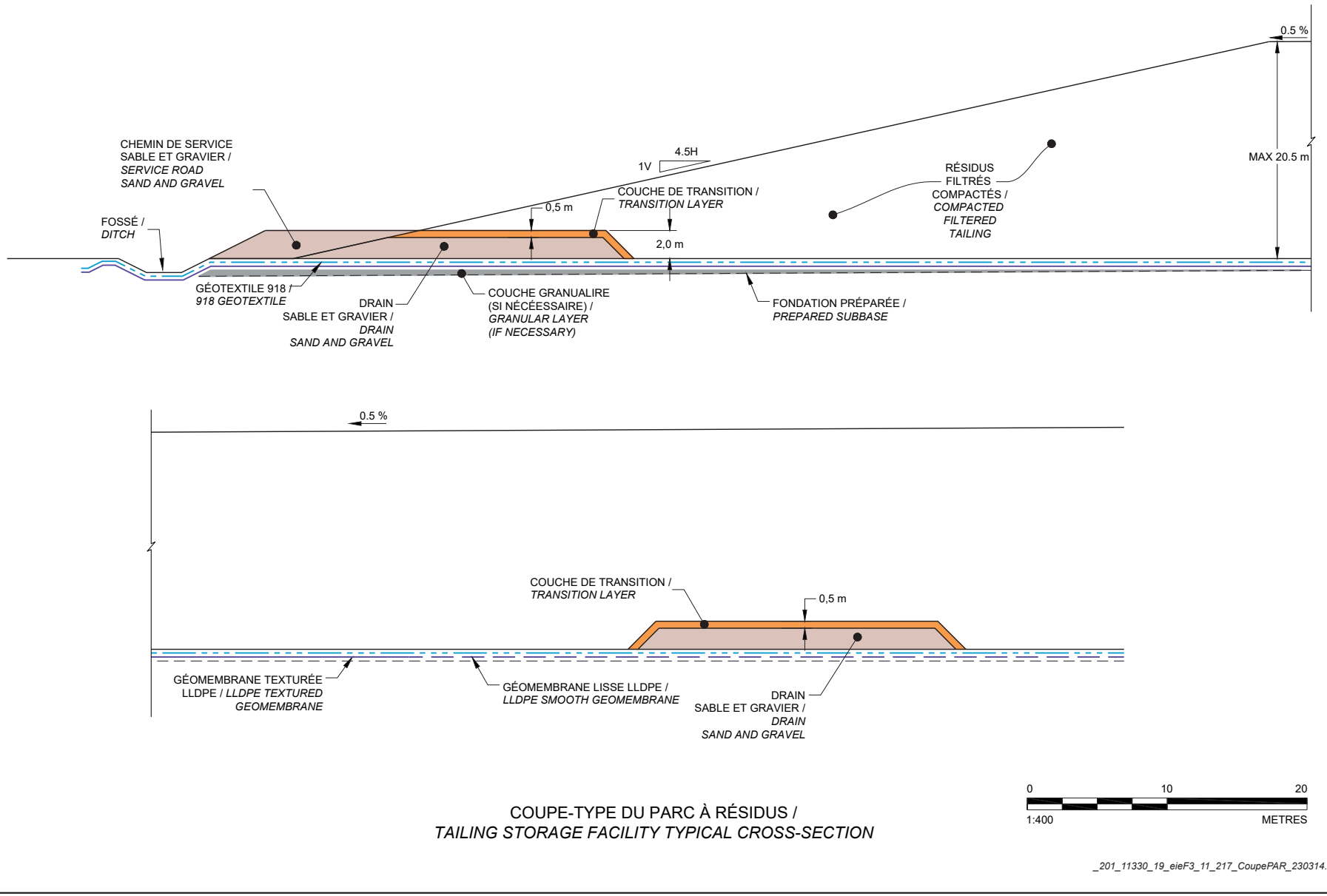


Figure 3-11 Projection en coupe du parc à résidus /
Cross-Section Projection of the Tailing Storage Facility (réf. Modifié du plan émis par WSP pour Osisko (805-C-1505_ZA))

A granular drainage system will be constructed on the geosynthetic liner to facilitate water drainage and promote desaturation of the tailings. The preliminary design of the drain system consists of 2 m high drains, including a granular transition layer to ensure compatibility of the material with the tailings. Drains will be placed parallel to natural drainage patterns with a minimum spacing of 100 m (centre to centre) and a minimum slope of 1%. Another drain will be installed at the base of the stockpile. A 2 m high service road, also made of granular material, will be constructed around the tailings storage facility to accommodate services and to serve as an extension of the toe drain.

The tailings will be mechanically placed directly on the geosynthetic system and compacted to 95% of the optimum dry density obtained from the Proctor test. Access roads will be periodically required in the tailings storage area during operations to facilitate tailings placement.

To ensure post-restoration stability of the southeast area of the tailings storage facility, a stability berm will be constructed in the tailings storage facility's Pond PAR1.

The tailings storage facility will be constructed in three phases to facilitate operations and promote progressive restoration, as recommended in the MERN closure guidelines (MERN, 2022). Table 3-16 presents the capacities and years of operation for the three phases. Phase 1 has the largest capacity and area to have contingency space in the early years of operation.

Table 3-16 Tailings storage facility development phases

Phase	Capacity (filtered tailings)	Footprint (m^2)	Years of operation
Phase 1	4.8 Mt	240,800	1 to 5
Phase 2	2.5 Mt	119,200	6 to 8
Phase 3	1.7 Mt	101,500	9 and 10

The proposed tailings storage facility meets the stability criteria recommended in D019 and is supported by engineering analyses (WSP, 2023a). These analyses were carried out according to the available geotechnical data and allowed to meet the stability criteria in the operations phase. Additional measurements will be required during the closure phase. Further studies will also be conducted to validate the possibility of raising the tailings storage facility while ensuring its long-term stability.

3.5 WATER MANAGEMENT

The unique topography of the Windfall site, which lies at the head of three different watersheds, makes it possible to minimize the amount of clean water that would come into contact with the mining infrastructure.

As such, watershed boundaries were considered in the design of retention ponds and ground infrastructure. Where small areas of undisturbed water remained within the right-of-way of the water infrastructure, they were incorporated into the system, as their diversion would not have been optimal or effective. These areas are minor in relation to the area of the site that is planned to be developed.

3.5.1 WATER BALANCE

The meteorological data used to establish the water balance are from the Chapais 2 station. Details of the site water balance assumptions, inputs, design, and results are provided in WSP (2023b). The design criteria for the water basins meet those stipulated in D019 with respect to design floods, freeboard, and emergency spillways. The design events are: 1) the annual 100-year 24-hour rainfall flood; 2) the 100-year 30-day spring flood (snowmelt); 3) the 2000-year 24-hour flood plus a 100-year 30-day snowmelt; and 4) the probable maximum flood, which is the probable maximum rainfall plus a 100-year 30-day snowmelt.

The water balance was developed for WTP phases 1 and 2, years 1-4 and 5-11 (Figures 3-12 and 3-13).

During the first years of operation, the volume of water treated and discharged to the environment will be in the order of 1.9 Mm^3 to 2 Mm^3 of water annually, depending on climate scenarios. For the final years, the annual volume discharged will be between 2.3 Mm^3 and 2.7 Mm^3. The six simulated climate scenarios were selected based on parameters known to be representative of drought and moisture indices (Table 3-17). All the climate scenarios were ordered according to the value of these parameters and the scenarios representing the 10^{th}, 50^{th}, and 90^{th} percentiles for each of these two parameters, i.e., six climate scenarios, were retained for simulation purposes. They represent water volumes under a variety of plausible future climatic conditions and are a function of different climate models.

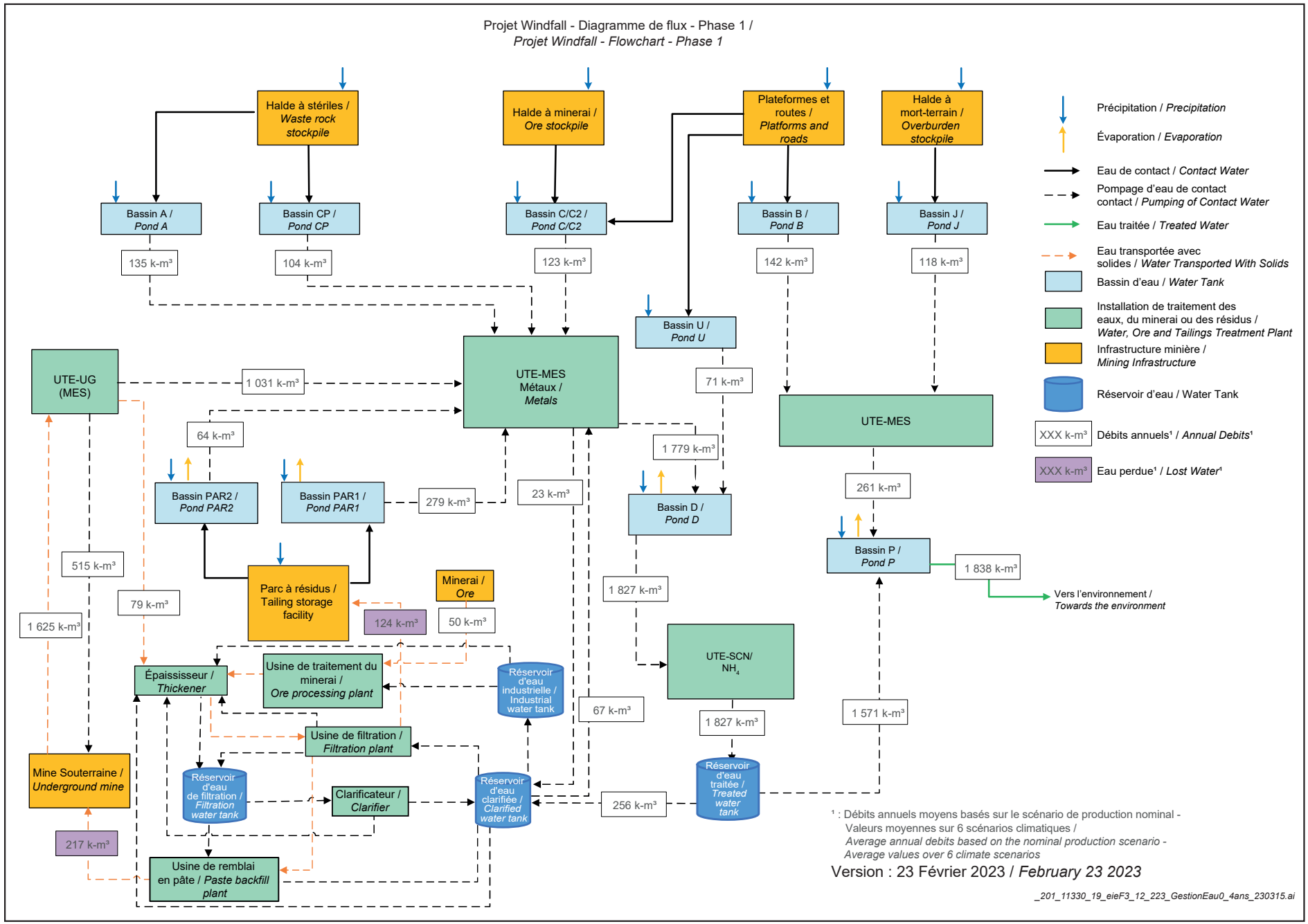


Figure 3-12 **Gestion des eaux - Bilan d'eau annuel ou mensuel (Phase 1 : 0-4 ans) /**
Water Management - Annual or monthly water balance (Phase 1: 0-4 years) (réf. Document interne Osisko)

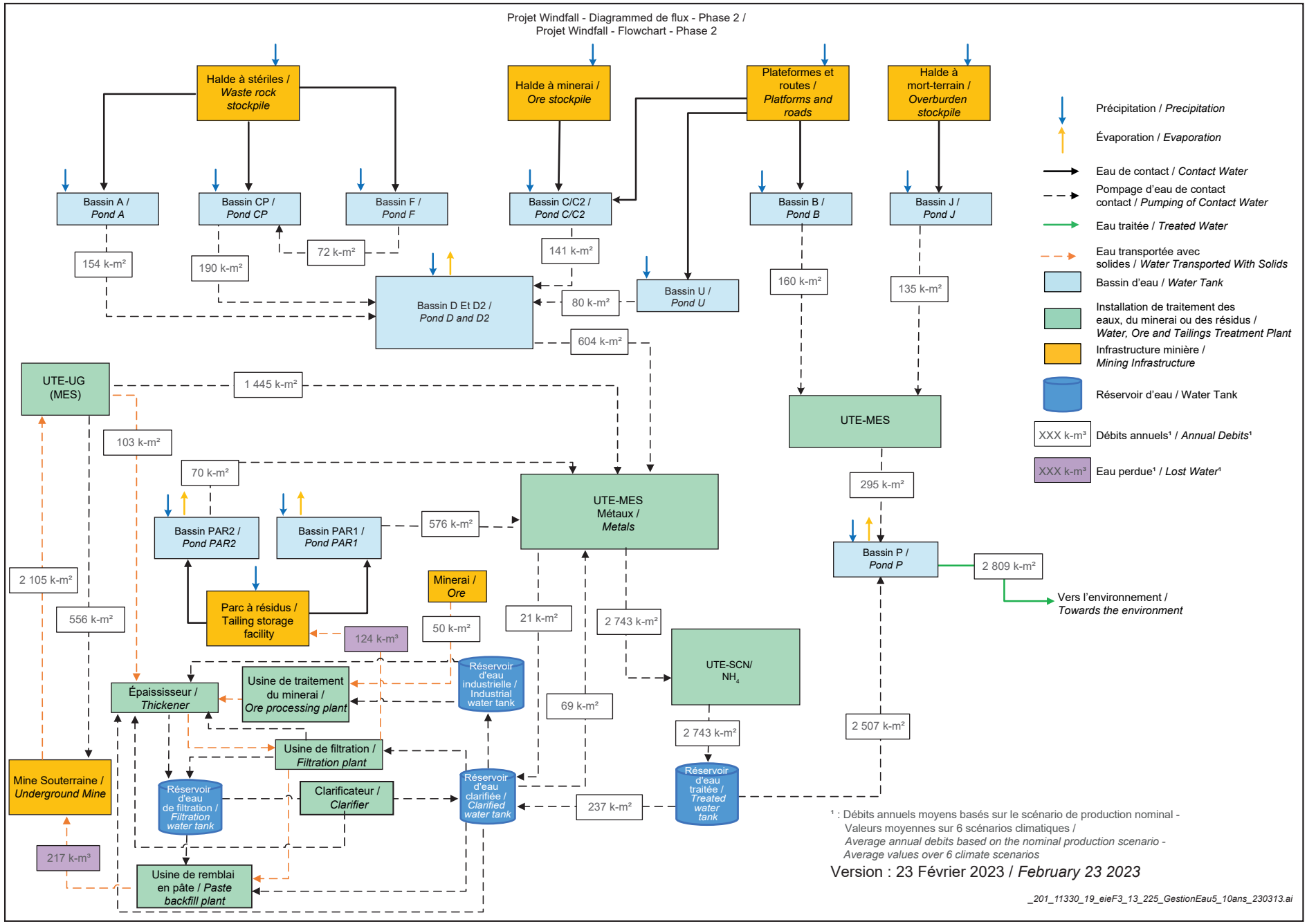


Figure 3-13 **Gestion des eaux - Bilan d'eau annuel ou mensuel (Phase 2 : 5-10 ans) /**
Water Management - Annual or monthly water balance (Phase 2: 5-10 years) (réf. Document interne Osisko)

Table 3-17 Estimated effluent volume under different climate scenarios for the last calendar year of each phase

Month	Units	Phase 1 - Total volume to effluent					
		Drought			Flooding or high precipitation		
		Scenario A 10th percentile	Scenario B 50th percentile	Scenario C 90th percentile	Scenario D 10th percentile	Scenario E 50th percentile	Scenario F 90th percentile
January	m^3/h	95	93	93	110	94	94
February	m^3/h	97	112	96	98	96	96
March	m^3/h	125	122	95	127	95	96
April	m^3/h	240	351	177	138	151	257
May	m^3/h	322	256	340	360	369	337
June	m^3/h	312	290	315	295	295	282
July	m^3/h	281	213	303	322	303	297
Aug.	m^3/h	241	320	302	278	305	308
Sept.	m^3/h	208	308	233	269	313	299
Oct.	m^3/h	314	329	347	313	285	286
Nov.	m^3/h	233	283	243	222	220	196
Dec.	m^3/h	112	139	105	133	109	105
Annual	Mm^3	1.89	2.06	1.94	1.95	1.93	1.94
Month	**Units**	**Phase 2 - Total volume to effluent**					
		Drought			Flooding or high precipitation		
		Scenario A 10th percentile	Scenario B 50th percentile	Scenario C 90th percentile	Scenario D 10th percentile	Scenario E 50th percentile	Scenario F 90th percentile
January	m^3/h	148	148	147	148	148	147
February	m^3/h	162	149	168	149	149	149
March	m^3/h	200	267	309	285	203	179
April	m^3/h	320	401	352	339	525	514
May	m^3/h	560	573	312	188	269	405
June	m^3/h	472	441	278	314	254	349
July	m^3/h	316	275	379	229	479	419
Aug.	m^3/h	496	325	342	304	390	365
Sept.	m^3/h	460	300	233	362	329	428
Oct.	m^3/h	322	309	218	327	368	402
Nov.	m^3/h	164	242	230	312	259	178
Dec.	m^3/h	152	152	152	227	154	154
Annual	Mm^3	2.76	2.62	2.28	2.33	2.58	2.70

3.5.2 WATER MANAGEMENT INFRASTRUCTURE

All water potentially in contact with the mine site will be monitored. All infrastructure will be drained by collector ditches to direct contact water to collection points, then by gravity or pumping to the WTP before being returned to the environment. The ditch and contact water collection pond systems will be lined with geomembranes and the collected water will be reused in the process plant or treated before being returned to the environment (Map 3-5).

The following water management infrastructure associated with the bulk sample work is considered to be in place:

- the perimeter ditch of the existing overburden stockpile;
- the perimeter ditch of the waste rock stockpile associated with the bulk sampling operations and Pond A, as well as the other existing sedimentation, collection, and polishing ponds (four in total);
- the WTP located to the southeast of the site as well as the Ponds D and P located nearby, and the pipes bringing the water back to the mine effluent site;
- the treatment units located at the base of the existing waste rock stockpile as well as the effluent development.

The water management infrastructure to be constructed for the mining operation will include:

- contact water collection ditches;
- collection ponds: two at the tailings storage facility (Ponds PAR1 and PAR2), three downstream of the industrial site (Ponds B, C1, and C2), one at the water treatment plant (Pond U), one to collect water from the 2030 extension of the waste rock stockpile (Pond F), one from the new overburden stockpile (Pond J), and one accumulation pond upstream of the water treatment plant (Pond D2 - Phase 2 only);
- a pumping system, including sumps, pumping stations, and pipes;
- expanded WTP to be used during the advanced exploration phase.

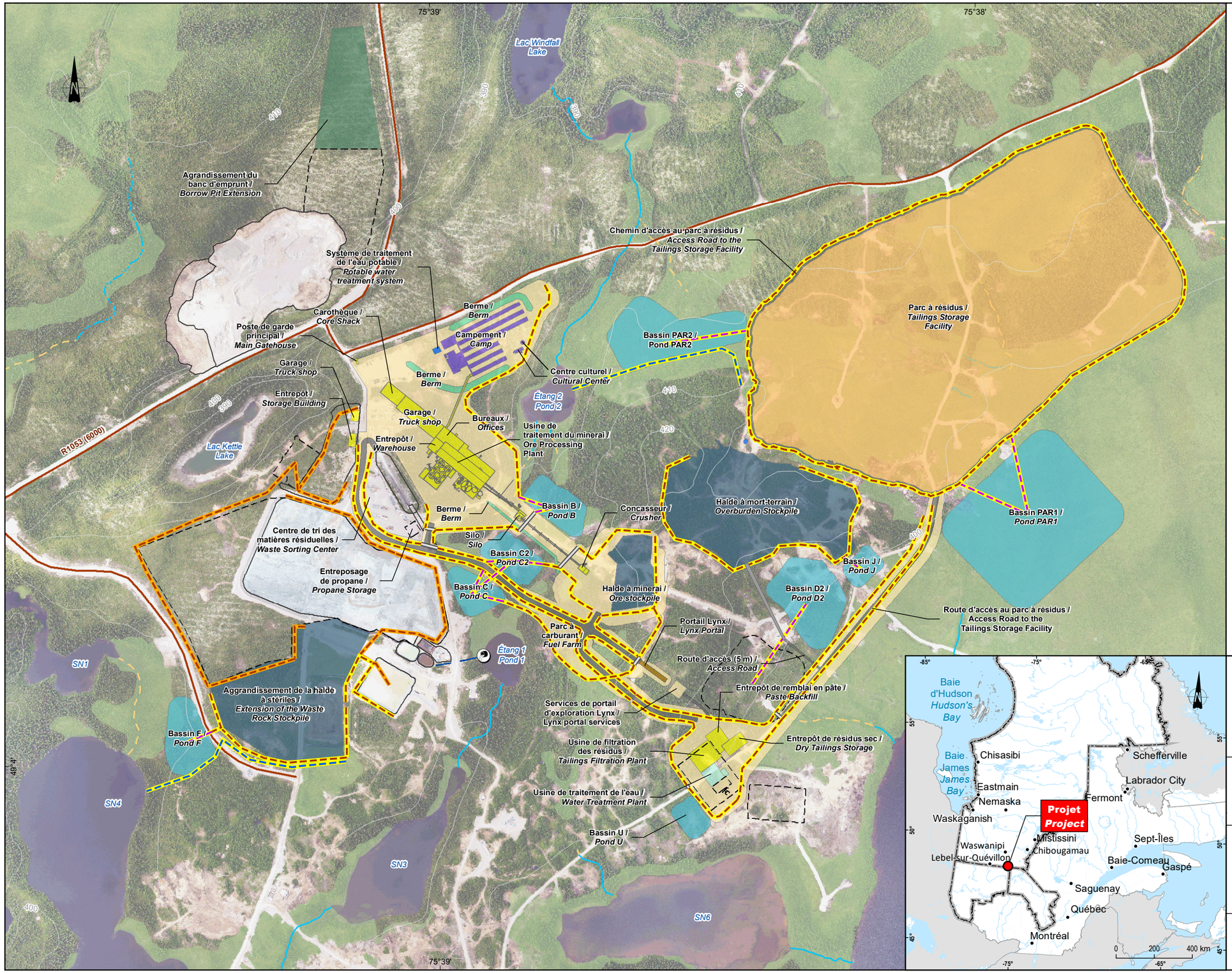
Map 3-5 shows the water management infrastructure (ponds and collection ditches). Site contact water includes water that has passed through the tailings storage facility, waste rock stockpile, ore stockpile, overburden stockpile, and the industrial area. This water will be collected and directed to the accumulation pond (D/D2) by a system of perimeter ditches, ponds, and pumps.

Water from the overburden stockpile and the industrial platform is collected in ditches, directed to sedimentation ponds (B and J), and treated for TSS and metals before being discharged to the environment.

Water collected in the tailings storage ponds (PAR1 and PAR2) will be pumped to the WTP (TSS and metals treatment) and then either reused at the process plant or treated prior to discharge to the environment.

Groundwater inflows will be managed underground with a separate treatment unit for TSS (Section 3.2.1). Groundwater from the mine is pumped to the process plant for retreatment in a second TSS circuit and then for metals, reused and/or treated before being discharged to the environment.

All water in contact with the accumulation areas going to the effluent will have passed through treatment with ammonia nitrogen and thiocyanates. The design criteria for the water basins meet those stipulated in D019 with respect to design floods, freeboard, and emergency spillways.



Infrastructures connexes / *Related Infrastructures*

- Chemin d'accès principal / *Main road*

Fossés et ponceaux / *Ditches and Culverts*

- Existant / *Existing*
- Projeté / *Projected*
- Fossé de déversement / *Dump ditch*
- Fossé de collecte / *Collecting ditch*
- Fossé de connexion / *Connecting ditch*
- Fossé de dérivation / *Diversion ditch*
- Ponceau projeté / *Projected culvert*

Composantes du projet / *Project Components*

Infrastructure existante / *Existing Infrastructure*

- Infrastructure actuelle / *Current infrastructure*
- Autorisée pour l'échantillonnage en vrac 2023-2024 / *Autorized for bulk sampling purpose 2023-2024*
- Qui sera retirée / *To be removed*

Catégories d'infrastructures projetées / *Categories of Planned Infrastructures*

- Effluent minier / *Mine effluent*
- Aire d'activité / *Activity area*
- Banc d'emprunt / *Borrow pit*
- Bassin / *Pond*
- Bâtiment / *Building*
- Camp de travailleurs / *Workers camp*
- Convoyeur / *Conveyer*
- Halde / *Stockpile*
- Parc à résidus miniers / *Tailings storage*
- Route / *Road*
- Système de traitement de l'eau potable / *Potable drinking water treatment system*
- Souterrain / *Underground*
- Structure / *Structure*
- Usine de traitement de l'eau / *Water treatment plant*

Végétation / *Vegetation*

- Milieu humide / *Wetland*

OSISKO MINIÈRE OSISKO

Projet minier Windfall - Étude d'impact sur l'environnement / *Windfall Mining Project - Environmental Impact Assessment*

Site minier Windfall, Eeyou Istchee Baie-James (Québec) / *Windfall Mining Site, Eeyou Istchee Baie-James (Quebec)*

Carte 3-5 / *Map 3-5*
Bassins et fossés collecteurs du site minier Windfall / *Windfall Mine Site Catch Ponds and Ditches*

Sources :
BDAT, 1/250 000, MRN Québec, 2002
BDTQ, 1/20 000, MRNF Québec, 2007
CanVec, 1/1 000 000, RNCan, 2020
CanVec Plus, 1/50 000, RNCan, 2015
SDA, 1/20 000, MERN Québec, 2020

0 85 170 m
MTM, fuseau 9, NAD83

2023-03-21

Préparée par : M.-H. Brisson
Dessinée par : J. Roy
Vérifiée par : M.-H. Brisson
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La précision des limites et les mesures montrées sur ce document ne doivent pas servir à des fins d'ingénierie ou de délimitation foncière. Aucune analyse foncière n'a été effectuée par un arpenteur-géomètre. / Boundary accuracy and measurements shown on this document are not to be used for engineering or land delineation purposes. No land analysis was carried out by a land surveyor.

RETENTION PONDS

Pond dimensions and design were based on the site's water balance and D019 (2012) criteria and best practices. Table 3-18 presents their design criteria; Table 3-19 presents the dimensions selected for the ponds. Optimization of pond sizes is ongoing, so the final pond characteristics may change, but in all cases the design criteria presented below will be met.

Table 3-18 Hydrological and hydraulic design criteria – Ponds

Parameter	Pond	Criteria	Reference
Design flood	Oversized PAR1, PAR2 ponds and retention ditches	2000-year 24-hour rainfall flood + climate change + 100-year 30-day snowmelt	D019 (MDDEP, 2012)
	Other ponds	Most critical among: ▪ 100-year 24-hour rainfall flood + climate change ▪ 100-year 30-day rainfall flood + snowmelt + climate change	D019 (MELCC, 2012)
Output rate	Ponds PAR1 and PAR2	No pumping during spring melt for WTP Phase 1 Limited by treatment capacities during WTP Phase 2	Load limit at WTP
	Ponds B and J	Pumping rate to optimize storage capacity	Best practice
	Other ponds	Limited by the treatment capacities of the WTP	Load limit at WTP
Freeboard (distance between the impermeable core of the dike at the spillway sill and the crest of the dike)	Ponds PAR1 and PAR2	1.5 m	D019 (MDDEP, 2012)
	Ponds D/D2	1 m	Best practice
	Other ponds	0.5 m	Best practice
Dead volume	All ponds	Depending on pond function and site conditions	Best practice
Emergency spillway dimensions	All ponds	Probable maximum flood (PMF) (min 3 m wide and 0.5 m deep)	D019 (MELCC, 2012) Best practice

Table 3-19 Pond characteristics and properties

Pond	Type	Useful volume (m^3)	Surface area (m^2)	Maximum depth (m)	Pumping rate (m^3/hr)
Pond A	Collection	9,650	5,839	5	90
Pond B	Collection	10,750	11,031	3	250
Ponds C and C2	Collection	17,350	18,736	2.5	65
Pond CP	Collection	7,500	9,245	1.5	Phase 1: 72 Phase 2: 97
Pond D	Accumulation	74,100	29,985	6	Phase 1: 293 Phase 2: 150
Pond D2	Accumulation	42,000	23,674	5.5	-
Pond F	Collection	21,800	14,066	4	Phase 2: 10*
Pond J	Collection	5,200	5,139	4.5	200
Pond P	Polishing	7,500	9,722	2.5	1,000
Pond U	Collection	5,450	5,139	4.5	100
Pond PAR1	Accumulation	205,500	94,412	5.0	200
Pond PAR2	Accumulation	34,200	30,587	4.5	30

* The pumping rate will have to be increased in subsequent design stages

COLLECTION DITCHES

The typical width of the base of the ditches is 1.0 m to 2.0 m. Ditch depths will generally be 1.0 m to 2.0 m with local depths greater for some ditches depending on the topography of the natural terrain. Typical cross-sections for the waste rock stockpile collection ditches are shown in Figure 3-14. Collection ditches for other infrastructure will be designed in a similar manner. Contact water ditches will be lined with an impermeable membrane to prevent percolation to groundwater.

A typical cross-section of road collection ditches is shown in Section 3.8 along with the road details. The design criteria used are presented in Table 3-20.

Table 3-20 Hydrological and hydraulic design criteria – Ditches

Parameter	Criteria	Reference
Design flood	100-year 24-hour rainfall flood + climate change	D019 (MDDEP, 2012)
Minimum ditch height (m)	1.0	Construction and best practice constraints
Minimum width of the bottom (m)	1.0	Construction constraints
Side slopes	2H:1V	Best practice
Minimum longitudinal slope (%)	0.3	Construction and best practice constraints
Freeboard (distance between the maximum water level during the design flood and the top of the embankment) (m)	Minimum 0.3 m[1]	Best practice
Minimum riprap size (mm)	0 - 200	MTQ/Guide to Bridge Hydraulics (TAC)
Minimum riprap thickness (mm)	300	MTQ/Guide to Bridge Hydraulics (TAC)

(1) For the contact water ditches on the periphery of the facility, the freeboard must be sufficient to contain the 2000-year flood without overflowing.

PIPES AND PUMPING STATIONS

The projected domestic and industrial pipelines are shown on Map 3-6; the nominal pumping rate is presented in Table 3-21. The pipes will be made of HDPE and their diameter could be between 76 mm and 254 mm depending on the flow rate to be handled. The pipes are located along the axis between the WTP and the camp; the industrial and domestic water pipes will be buried together in trenches or under berms (Figures 3-15, 3-18, and 3-19).

Since the site is located at the head of three watersheds, the design was made to avoid culverting.

Water for fire protection will be drawn from the polishing pond.

Table 3-21 Estimated annual groundwater inflow according to year of production

Groundwater infiltration in mine openings – Baseline scenario	
Year	**Dewatering rate (m^3/d)**
1	1,775
3	2,400
5	2,850
7	3,230
9	3,630
end of year 10	3,860
Groundwater infiltration in mine openings – Upper range	
Year	**Dewatering rate (m^3/hr)**
1	2,200
3	2,925
5	3,455
7	3,920
9	4,360
end of year 10	4,570

Source: Sectorial report - Hydrogeological study for the underground mine (Appendix 6-8).

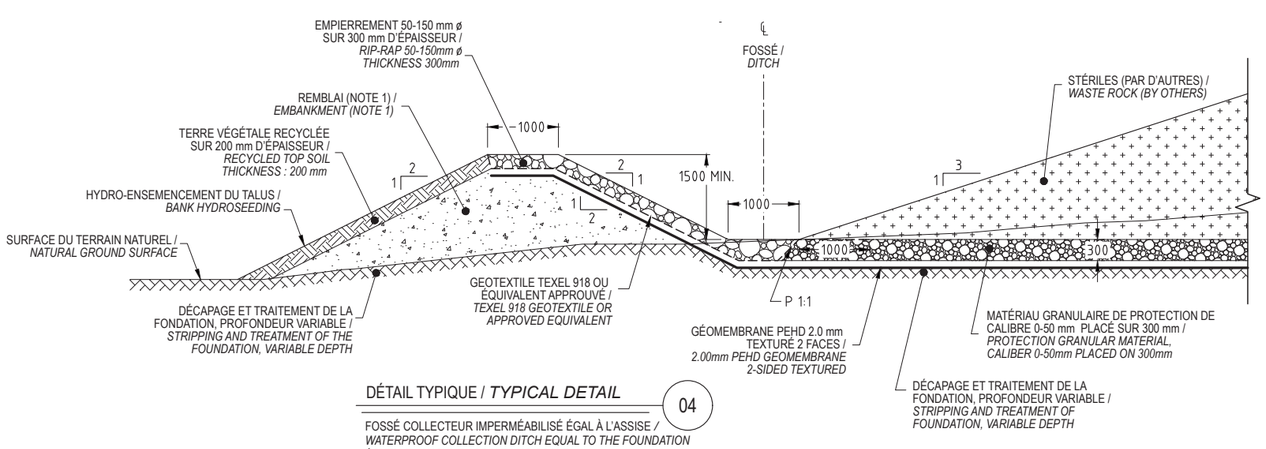
PUMPING OF GROUNDWATER

Groundwater inflow was estimated for average and high hydraulic conductivity values for the rock. Table 3-21 shows the calculated estimates for the duration of the project.

The potential drawdown resulting from mining activities was modelled to identify areas where the drawdown would be more than 1 m, which is within the range of seasonal fluctuations generally observed in Quebec. The main observations made from these modelling results are as follows:

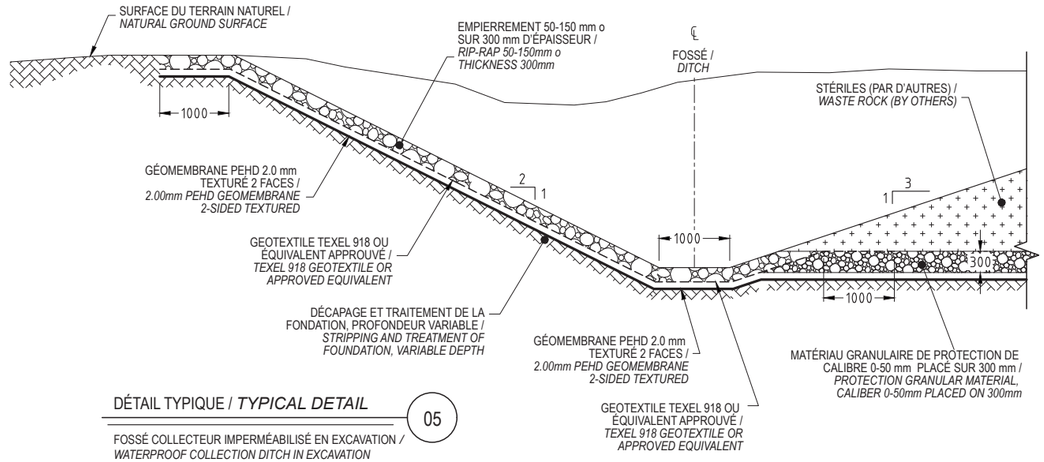
— In the area of Zone 27 and Underdog, the potential drawdown greater than 1 m of the groundwater table extends over a maximum length of approximately 300 m in a northwest/southeast direction and of approximately 150 m in a northeast/southwest direction.

— In the Lynx and Triple-Lynx region, the potential drawdown of the water table greater than 1 m extends over a maximum length of about 1,600 m in a northeast/southwest direction and about 850 m in a northwest/southeast direction.



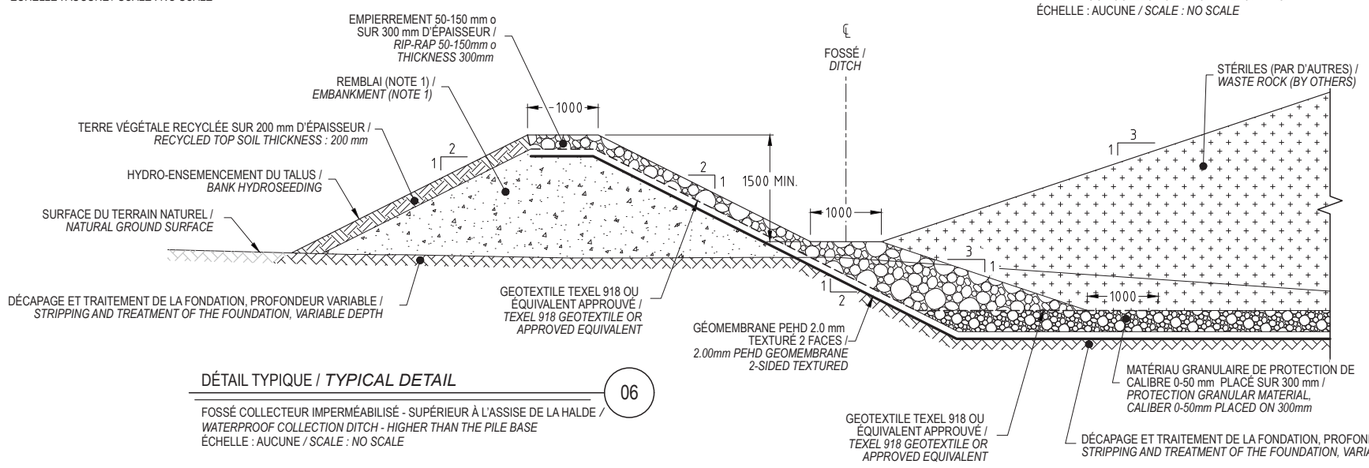
DÉTAIL TYPIQUE / *TYPICAL DETAIL* 04

FOSSÉ COLLECTEUR IMPERMÉABILISÉ ÉGAL À L'ASSISE /
WATERPROOF COLLECTION DITCH EQUAL TO THE FOUNDATION
ÉCHELLE : AUCUNE / *SCALE : NO SCALE*



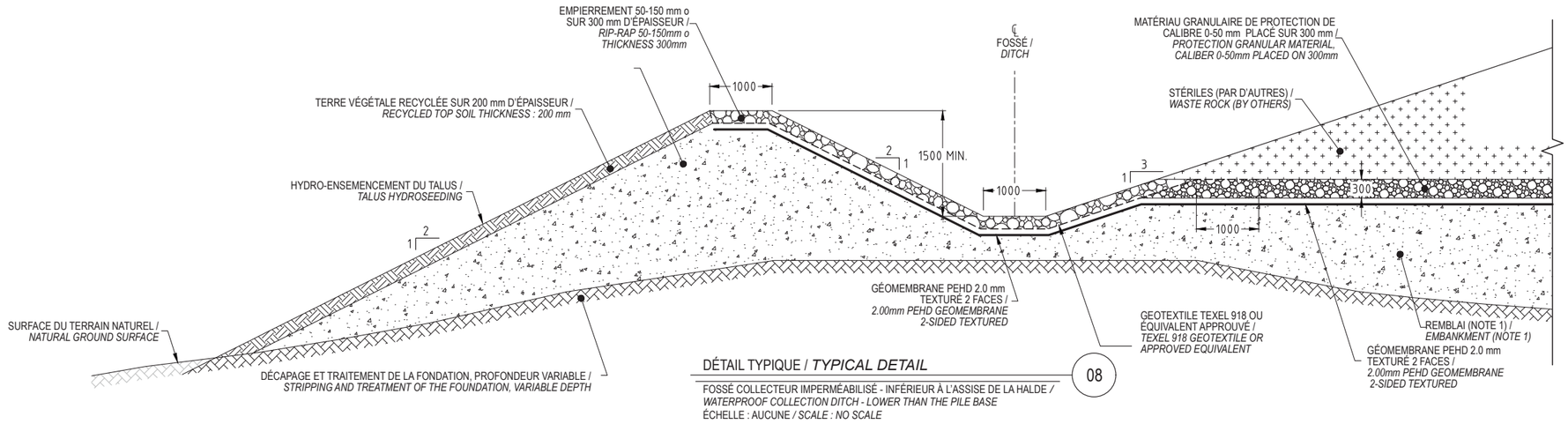
DÉTAIL TYPIQUE / *TYPICAL DETAIL* 05

FOSSÉ COLLECTEUR IMPERMÉABILISÉ EN EXCAVATION /
WATERPROOF COLLECTION DITCH IN EXCAVATION
ÉCHELLE : AUCUNE / *SCALE : NO SCALE*



DÉTAIL TYPIQUE / *TYPICAL DETAIL* 06

FOSSÉ COLLECTEUR IMPERMÉABILISÉ - SUPÉRIEUR À L'ASSISE DE LA HALDE /
WATERPROOF COLLECTION DITCH - HIGHER THAN THE PILE BASE
ÉCHELLE : AUCUNE / *SCALE : NO SCALE*



DÉTAIL TYPIQUE / *TYPICAL DETAIL* 08

FOSSÉ COLLECTEUR IMPERMÉABILISÉ - INFÉRIEUR À L'ASSISE DE LA HALDE /
WATERPROOF COLLECTION DITCH - LOWER THAN THE PILE BASE
ÉCHELLE : AUCUNE / *SCALE : NO SCALE*

NOTE 1 :
REMBLAI : MATÉRIAU GRANULAIRE COMPACTABLE NON GÉNÉRATEUR D'ACIDE, EXEMPT DE MATIÈRE ORGANIQUE ET DE PARTICULES SUPÉRIEURES À 200 mm DE DIAMÈTRE MIS EN PLACE PAR COUCHE SUCCESSIVE DE 300 mm D'ÉPAISSEUR ET COMPACTÉ À 95% DU P.M. LE DERNIER 150 mm ADJACENT AUX GÉOSYNTHÉTIQUES DOIT ÊTRE EXEMPT DE PARTICULES SUPÉRIEURES À 20 mm DE DIAMÈTRE.

BACKFILL: COMPACTABLE GRANULAR MATERIAL THAT IS NOT ACID-GENERATING, FREE OF ORGANIC MATTER AND PARTICLES GREATER THAN 200mm IN DIAMETER INSTALLED IN 300mm THICK SUCCESSIVE LAYERS AND COMPACTED TO 95% OF P.M. THE LAST 150mm ADJACENT TO THE GEOSYNTHETICS MUST BE FREE OF PARTICLES GREATER THAN 20mm IN DIAMETER.

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Figure 3-14 Coupe-type des fossés collecteurs de la halde à stériles /
Waste Rock Stockpile Collection Ditch Typical Cross-Section (réf. Modifié du plan émis par WPS pour Osislo (515-C-0601-ZA))

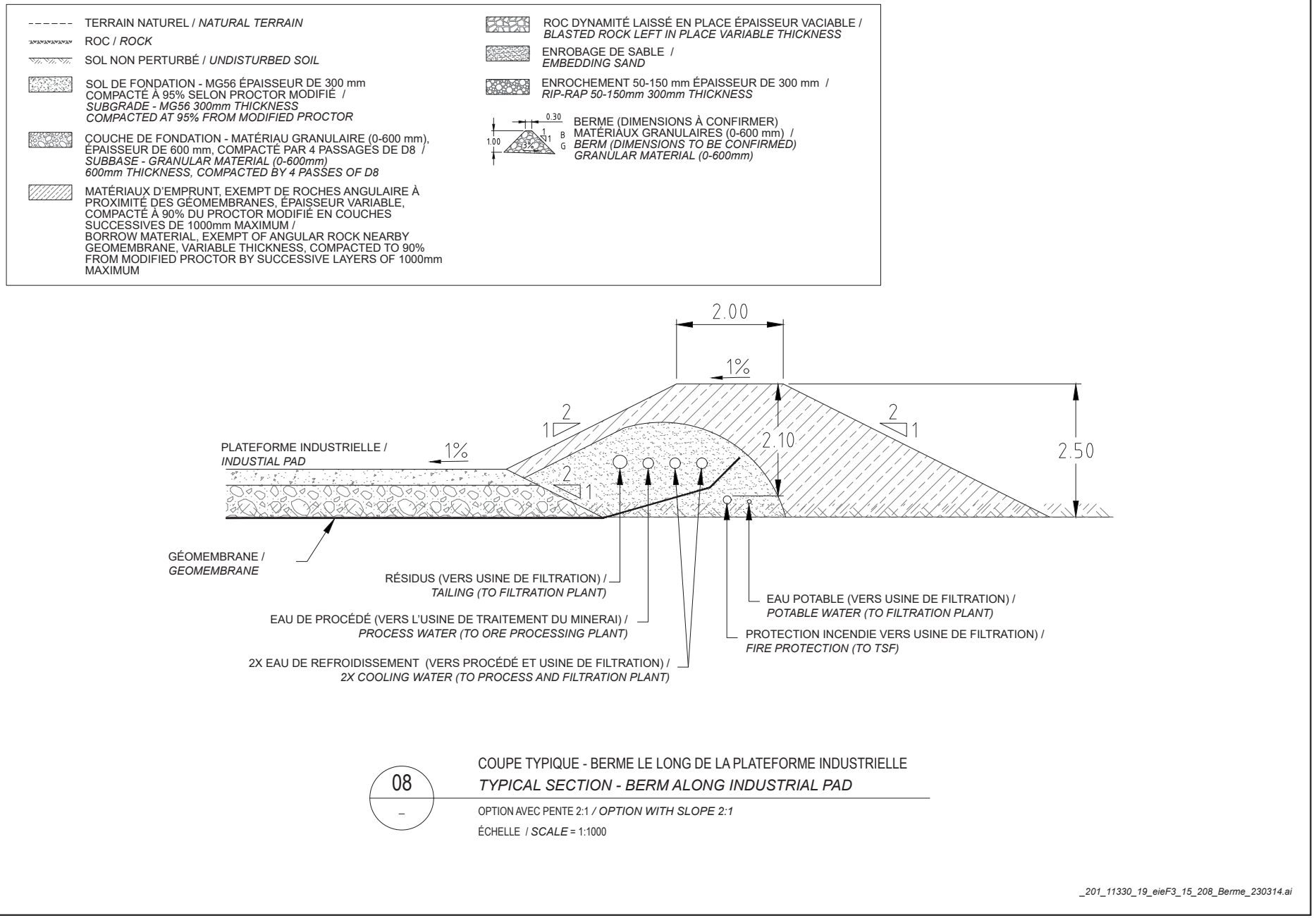


Figure 3-15 Coupe-type de la berme le long de la plateforme industrielle /
Typical Cross-Section of Berm Along Industrial Pad (réf. Modifié du plan émis par WSP pour Osisko (515-C-0601)

Infrastructures connexes / *Related Infrastructures*

Chemin d'accès principal / *Main access road*

Localisation approximative des conduites / *Approximate Location of Piping*

Existante (Autorisée pour l'échantillonnage en vrac 2023-2024) / *Existing (Authorized for bulk sampling 2023-2024)*

Projetée (Autorisée pour l'échantillonnage en vrac 2023-2024) / *Projected (Authorized for bulk sampling 2023-2024)*

Direction des écoulements / *Flow Direction*

Conduite entrant / *Input pipe*

Conduite sortante / *Output pipe*

Période applicable / *Applicable period*

En fonction durant la phase 1 de l'UTE seulement (années 0 à 4) / *In function during phase 1 of the WTP only (years 0 to 4)*

En fonction durant la phase 2 de l'UTE seulement (à partir de l'année 5) / *In function during phase 2 of the WTP only (from year 5)*

Infrastructures du projet / *Project Infrastructures*

Infrastructures existantes / *Existing Infrastructures*

Infrastructure actuelle / *Current infrastructure*

Autorisée pour l'échantillonnage en vrac 2023-2024 / *Autorized for bulk sampling purpose 2023-2024*

Qui sera retirée / *To be removed*

Infrastructures projetées / *Planned Infrastructures*

Effluent minier / *Mine effluent*

Aire d'activité / *Activity area*

Banc d'emprunt / *Borrow pit*

Bassin / *Pond*

Bâtiment / *Building*

Camp de travailleurs / *Workers camp*

Convoyeur / *Conveyer*

Halde / *Stockpile*

Parc à résidus miniers / *Tailings storage*

Route / *Road*

Système de traitement de l'eau potable / *Potable drinking water treatment system*

Souterrain / *Underground*

Structure / *Structure*

Usine de traitement de l'eau / *Water treatment plant*

Hypsométrie / *Hypsometry*

Courbe de niveau (10 m) / *Contour (10 m)*

Hydrographie / *Hydrography*

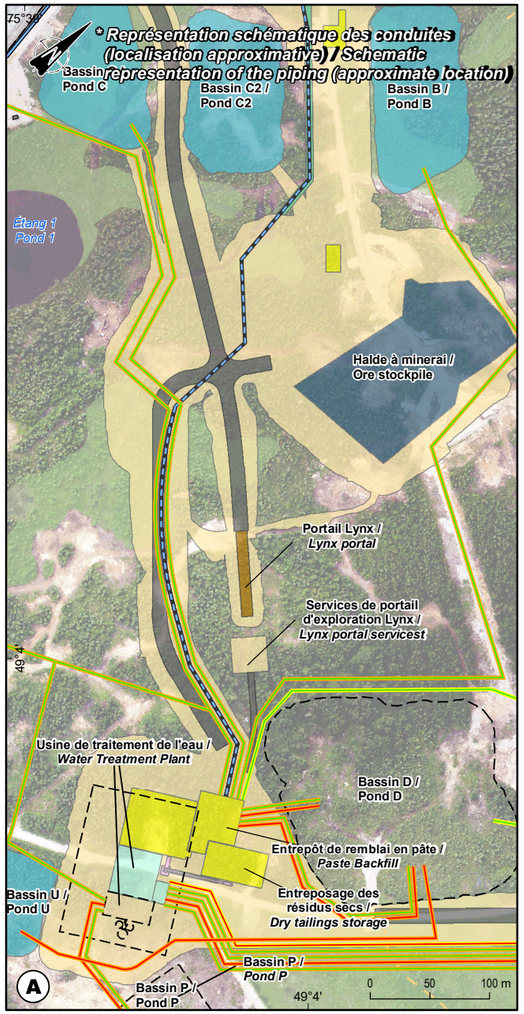
Cours d'eau permanent / *Permanent watercourse*

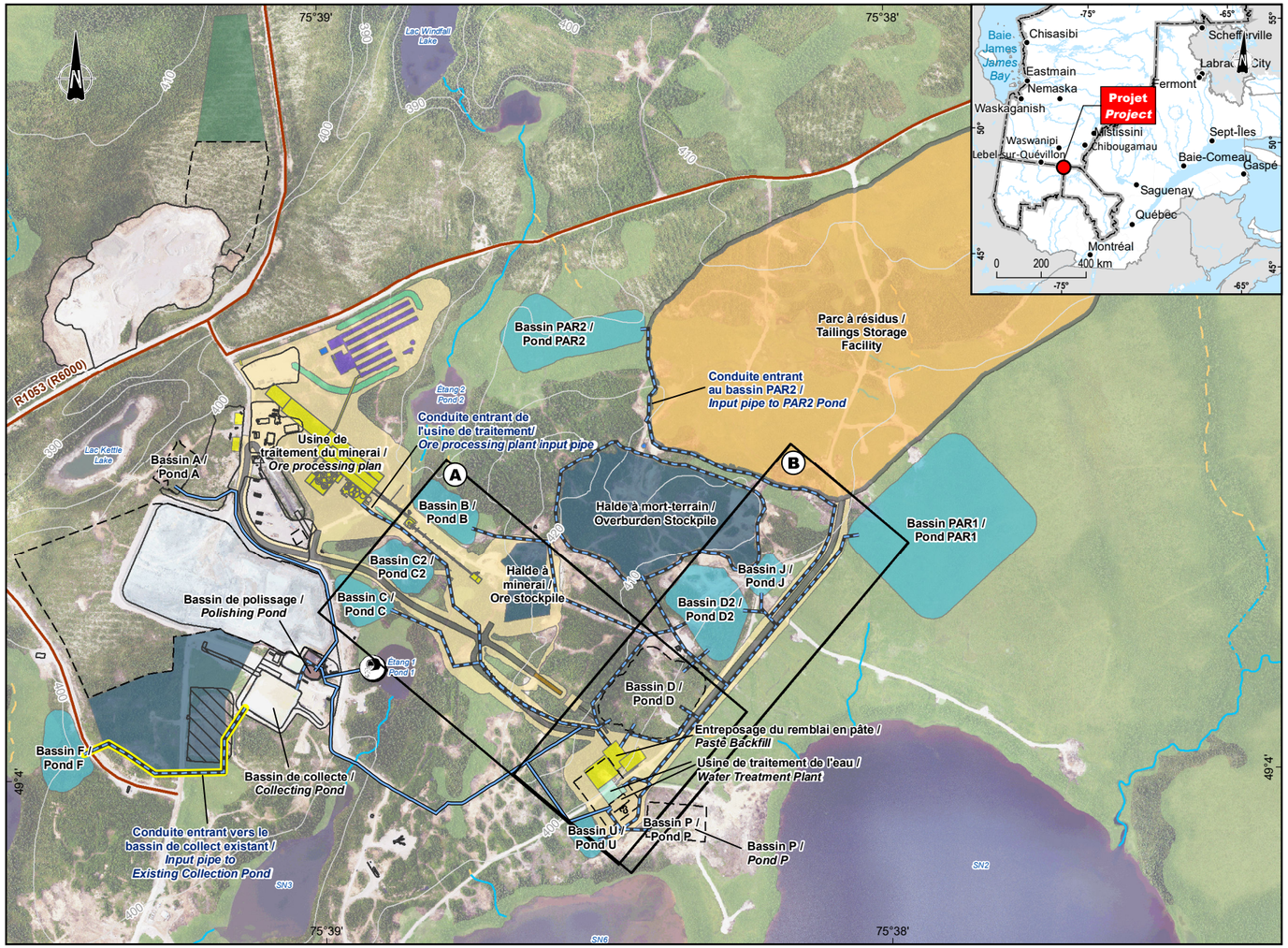
Cours d'eau intermittent / *Intermittent watercourse*

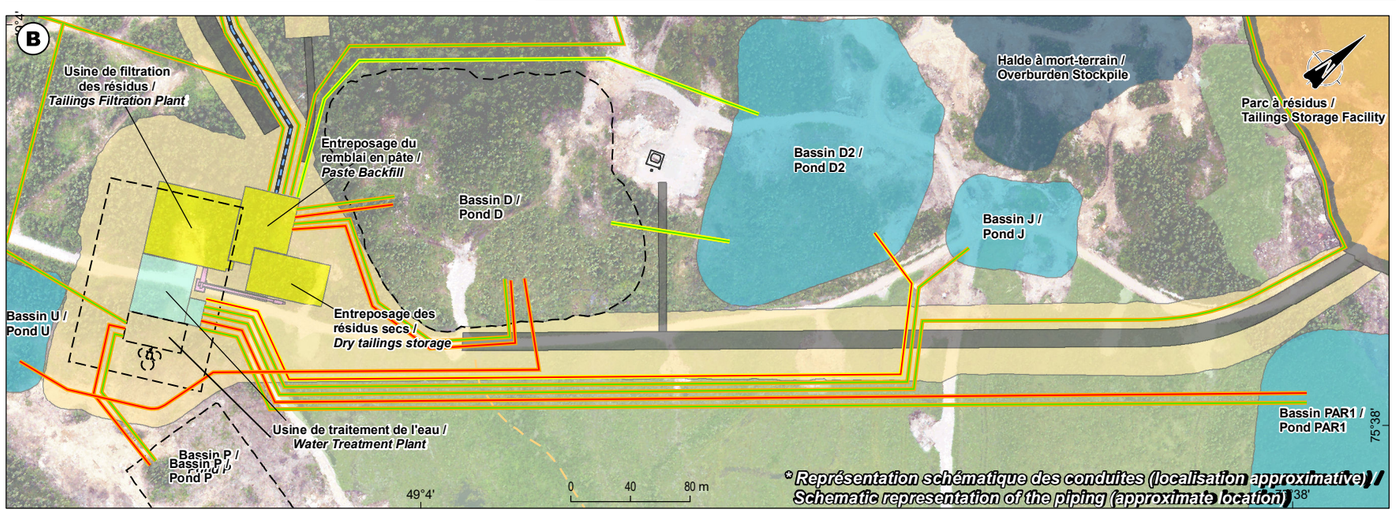
Cours d'eau souterrain / *Underground watercourse*

Végétation / *Vegetation*

Milieu humide / *Wetland*







OSISKO MINIÈRE OSISKO

Projet minier Windfall - Étude d'impact sur l'environnement / *Windfall Mining Project - Environmental Impact Assessment*

Site minier Windfall, Eeyou Istchee Baie-James (Québec) / *Windfall Mining Site, Eeyou Istchee Baie-James (Quebec)*

Carte 3-6 / *Map 3-6*
Canalisations projetées pour les eaux domestiques et industrielles / *Projected Pipelines for Domestic and Industrial Water*

Sources :
BDAT, 1/250 000, MRN Québec, 2002
BDTQ, 1/20 000, MRNF Québec, 2007
CanVec, 1/1 000 000, RNCan, 2020
CanVec Plus, 1/50 000, RNCan, 2015
SDA, 1/20 000, MERN Québec, 2020

0 120 240 m
MTM, fuseau 9, NAD83

2023-03-20

Préparée par : M.-H. Brisson
Dessinée par : J. Roy
Vérifiée par : M.-H. Brisson
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— Potential drawdowns greater than 1 m do not reach the supply wells located in the mining camp area south of the ramp area and are not expected to cause any loss of use.

— The potential drawdown zone of 1 m does not reach the surrounding lakes.

Hydrogeological information regarding mine water is presented in the hydrogeology sectorial report (Appendix 6-8).

3.5.3 WATER TREATMENT PLANT

Water treatment will be required at the Windfall project site to ensure that the quality of water returned to the environment meets D019 and MDMER standards (SOR 2002-222) and, within technical and economic limits, to meet the EDOs that will be defined for the Windfall project.

The water treatment system will be located in an existing building beside the filtration plant.

Most of the water treatment equipment will be installed in the ammonia nitrogen treatment plant building, installed in 2023, which will serve the treatment needs for the bulk sampling operations.

The construction of the water management infrastructure will be done in two phases. These phases will follow the construction progress of the waste rock stockpile and tailings storage facility. As the waste rock stockpile area is expanded, the water volume to be collected and treated will increase and the Ponds F and D2 will be constructed. The WTP will be fully built in year 1 to reduce the cost of adding several small reactors rather than one large reactor at start-up.

A simplified diagram of the water treatment process is presented in Figure 3-16, showing the four water treatment process lines.

The total suspended solids treatment process line (WTP-TSS) is dedicated to removing runoff suspended solids from stockpiles, roads, and building pads. Two parallel ballasted flocculation lamellar clarifiers are required to manage flow rate variations throughout the year and project flood event flow rate. The maximum design flow for the WTP-TSS is 450 m^3/hr based on the project's flood water balance (WSP, 2023b), with a maximum initial TSS concentration of 100 mg/L. The process line will generate 22 L/hr in phase 1 and 22 L/hr in phase 2 of sludge at 1% solids. The sludge will be directed to the mine water thickener and co-deposited in the tailings storage facility.

A second treatment process line will be dedicated to mine water (named WTP-UG), which will be pumped at a 2% to 6% solids content to thicken the sludge and achieve adequate water quality to feed the underground operations (TSS <50 mg/L). Wash water used at the underground wash station will be collected and either treated underground or sent off-site for treatment to reduce the risk of oil and grease contamination. The design flow rate for the WTP-UG process line is 360 m^3/hr, based on the maximum pumping capacity of the underground pump station. At the WTP, the mine water will first go through a screening step to remove any material larger than 3 mm to prevent any breakage of the filter cloth. The water will then be sent to a high efficiency thickener. The underflow containing solids at 45% will be sent to the filtration plant at a rate of 11 m^3/h in phase 1 and 15 m^3/h in phase 2 and be codeposited with the tailings. The overflow from the thickener will be returned to underground operations as required; the excess will be sent to the other treatment process lines to remove metals and ammonia nitrogen before discharge to the environment.

The third treatment process line (WTP-Metals) will remove metals, primarily aluminum, arsenic, copper, iron, and lead contained in runoff water from the accumulation areas. This metal process line will also be able to treat metals from the underground water pumped to the surface and process water bleed required to maintain adequate water quality at the process plant. The design flow is 563^3/h based on the project flood event and water balance (GCM, 2022). The treatment process allows for metals to be first complexed with sulphides in a reactor after which metal sulphides are precipitated into a ballasted flocculation lamellar clarifier. The clarifier sludge containing metal sulphides will be directed to the WTP-UG circuit, to be disposed of in the tailings pond with the sludge extracted from the mine water. They will represent a small portion (on the order of 0.028%) of the total volume of solids in the facility and therefore will not be a significant contributor to the quality of the facility's contact waters. According to the analyses performed, the sludge does not contain a grade of gold deemed economically viable for recovery. Depending on the results of the samples that will be taken during operations, the sludge could be sent to the process plant if there is an opportunity to recover more gold.

The fourth water treatment process line will take water from the metals circuit in a two-stage process using a MBBR (moving bed biofilm reactor) technology. In the first step, thiocyanates and cyanates—originally contained in process water and generated by cyanidation of sulphur-containing minerals—will be oxidized into ammonia nitrogen, bicarbonates, and sulphates. In the second step, the ammonia nitrogen produced by the first treatment step as well as that from other sources due to the use of explosives will be converted into nitrates (nitrification). Propane water heaters and a heat recovery loop will be used to maintain optimal water temperature for treatment. Generated biomass will be removed by dissolved air flotation (DAF) units and thickened in a screw press prior to disposal. The design flow rate for the treatment process line is 530 m^3/h based on the water balance of the project flood event, and the maximum design nitrogen load is 722 kg-N/d. The sludge generated by this process line is directed to the tailings storage facility at a rate of 0.3 m^3/h.

It should be noted that the fourth ammonia nitrogen treatment process line described above will be put in place during the advanced exploration work, upgrading the existing treatment plant. Thus, the WTP to be constructed in the summer of 2023 will have two MBBR tanks for ammonia nitrogen treatment. When putting in place the operations phase treatment process line, one of these tanks will be converted to a thiocyanate oxidation reactor and an additional nitrification reactor will be added to meet the desired water quality criteria. The water heater, two heat exchangers, a flocculation tank, and a DAF, already present at the WTP during the exploration phase, will be reused.

Through the treatment process lines presented above, it is expected that the water from the WTP will comply with current regulations, including lethality tests. The reagents currently expected and stored at WTP are shown in Table 3-22. As the project design progresses, the product list below may be modified to accommodate possible changes to the WTP to improve its performance.

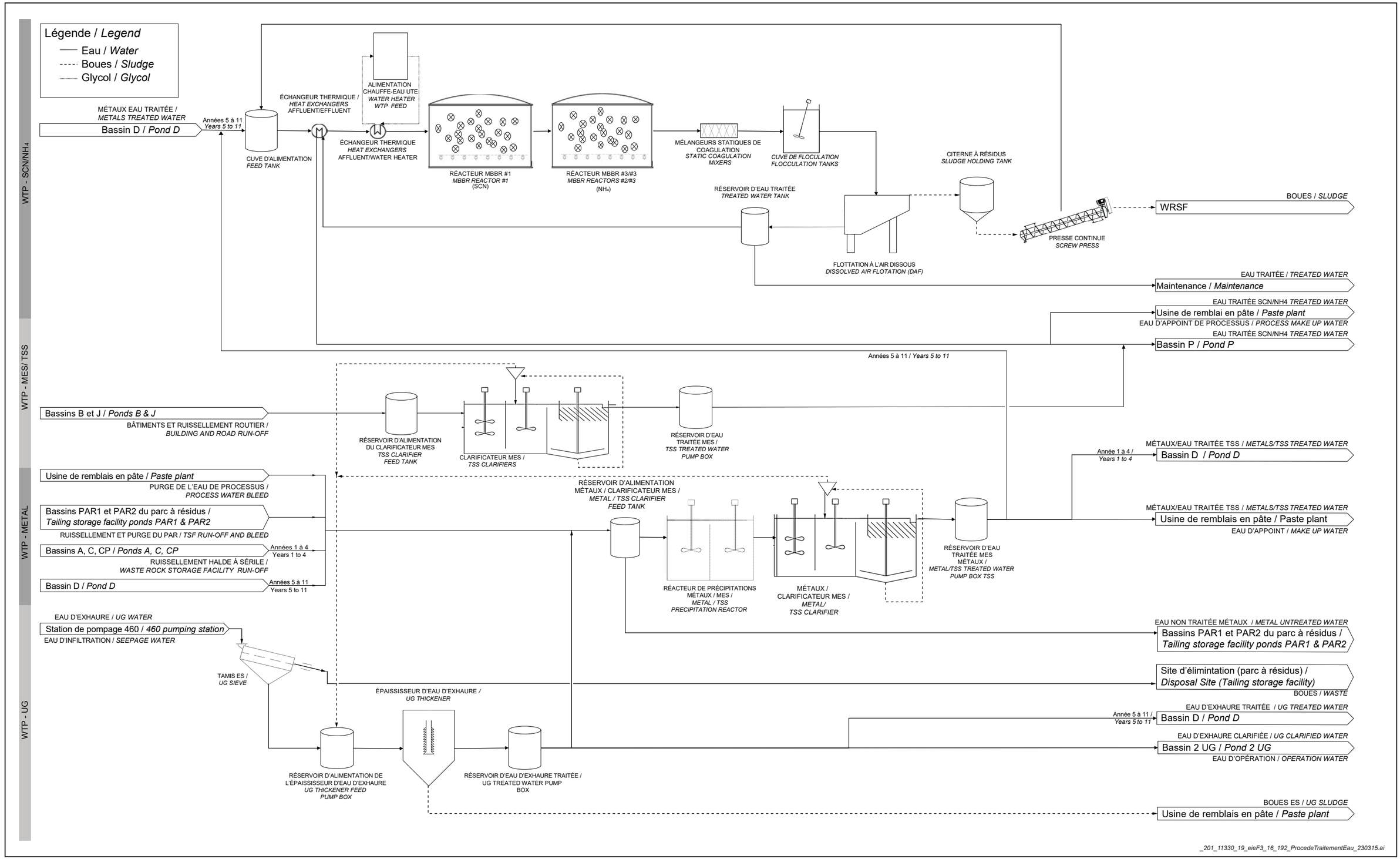


Figure 3-16 **Schéma simplifié du procédé de traitement de l'eau industrielle /**
Simplified Water Treatment Plan Flow Diagram (réf. Modifié de GCM Consultants 2022-11-19 (20-1219-0625))

Table 3-22 Consumption in tonnes per year

Chemical products				Storage			Quantity consumed (mt/year)	
#	Name	State	Delivery	Tank			Phase 1	Phase 2
				Number	Capacity	Maximum		
1	Phosphoric acid	Liquid (75% H_3PO_4)	Tote – 1 m^3	n/a	n/a	13 totes/20 mt	32	36
2	Sulphuric acid	Liquid (93% H_2SO_4)	Tank	1	30 m^3/55 mt	26 m^3/48 tm	51	56
3	Anti-foaming agent	Liquid	Tote – 1 m^3	n/a	n/a	20 totes/20 mt	8	9
4	Antiscaling agent	Liquid (<25%)	Tote – 1 m^3	N/A	N/A	Included with that of the process plant	8	9
5	Ferric sulphate	Liquid	Tank	2	50 m^3/78 mt	43 m^3/67 tm	447	561
					33 m^3/51 mt	29 m^3/45 tm		
6	Flocculant (AN 905 VHM)	Solid	Bag - 750 kg	n/a	n/a	Included with that of the process plant	4	5
7	Flocculant (for DAF)	Solid	Bag - 750 kg	n/a	n/a	27 bags/20 mt	6	7
8	Cationic flocculant (emulsion)	Liquid	Drum - 250 kg	n/a	n/a	40 drums/20 mt	1	1
9	Microsand (silica)	Solid	Bag - 25 kg	N/A	N/A	400 bags/20 mt	8	11
10	Metal precipitator	Liquid	Tote - 1 m^3	N/A	N/A	17 totes/20 mt	10	14
11	Caustic soda	Liquid (50% NaOH)	Tank	2	100 m^3/152 mt	90 m^3/137 tm	2,085	2,374
					35 m^3/53 mt	31 m^3/47 tm		
12	Sodium sulphide	Solid	Bag - 750 kg	n/a	n/a	27 bags/20 mt	14	20

n/a : not applicable.

Caustic soda will be used to adjust the pH upstream of the ballasted flocculation clarifiers (WTP-TSS and WTP-Metals) and in the MBBRs. Ferric sulphate will be used as a coagulant and AN 905 VHM as a flocculant in ballasted flocculation clarifiers for TSS and metals. Microsand will also be added to the clarifiers to promote floccular precipitation (ballast). AN 905 VHM flocculant will be used in the WTP-UG high performance thickener. The ferric sulphate will be delivered in bulk and stored in a tank while the flocculant will be delivered in powder form in mega bags and used to make a 0.5 g/L solution.

Sodium sulphide will be used as a source of inorganic sulphide in the precipitation of metals as metal sulphides. Powdered sodium sulphide will be used to make a solution at a concentration of 10 g/L that will be injected into the metal precipitation reactor. The antiscaling agent will be used mainly upstream of the heat exchangers of the biofilm treatment process to prevent their scaling, but could be used in the other treatment lines if the water quality is deemed to be at risk of scaling during operations.

Anti-foaming agent will be added as needed in the biofilm reactors in case of any inhibiting or other event that may have caused biomass mortality. Phosphoric acid will be used as a source of phosphorus for the biomass and will be injected into the feed tank of the biological WTP. At this stage of the project, consumption calculations have considered the use of ferric sulphate for biomass coagulation upstream of the DAF. However, as a result of site testing after start-up of the biological reactors, the use of an organic coagulant will be preferred to minimize the amount of metals ending up in the biological sludge. A specific anionic flocculant for biological sludge treatment will be used for flocculation of the biomass upstream of the DAF. This flocculant will be delivered in mega bags and a solution will be prepared.

These reagents will be stored on site to cover approximately one month's consumption; Material Safety Data Sheets are attached in Appendix 3-3.

3.5.4 MINE EFFLUENT

At the Windfall project site, there will be only one mine effluent. The mine effluent discharge site is located in Pond 1(Map 3-1). No additional development will be required; there is a channel toward Pond 1. This water discharge is a mixture of mine water, contact water, and water discharged from the filtration plant. It will be treated to ensure compatibility with the receiving environment and compliance with regulatory requirements. It should be noted that this pond currently receives treated water from the advanced exploration phase. Pond 1 drains into the Macho River watershed toward the Bell River.

Regarding water quality, an EDO application will be filed with the MELCCFP. The management of water treatment systems will be aimed at source reduction and achieving minimum discharge. Details on water treatment are presented in Section 3.5.2.

3.5.5 DRINKING WATER

Raw water for the Windfall site will be supplied by underground well P5, located ± 1.1 km from the drinking water production unit (Map 3-1). The pumped raw water is considered of good quality but requires treatment for the removal of iron and manganese (green sand filters), as well as chlorination before its distribution through the aqueduct network.

For the drinking water treatment process, a pre-assembled unit produced by H_2O innovation is being considered (https://www.h2oinnovation.com/). Currently, what is being considered is a potable water production system that would be located at the entrance to the site in a 12.2 m × 2.6 m prefabricated unit. Two insulated outdoor tanks with a total volume of 73 m³ will be used to store the treated water prior to distribution.

The preliminary design of the system is based on the various uses planned for the camp and other infrastructure. It has a capacity adjusted to a maximum occupancy of 600 workers (406 workers housed at the camp in the operations phase and additional capacity for the construction phase). The estimated average daily flow is 175 m³/d, with an hourly peak of 53 m³/h and an estimated daily peak of 350 m³/day. The follow-up and maintenance of this equipment will be done on a regular basis in accordance with the manufacturer's recommendations and the regulations on drinking water quality (CQLR, ch. Q-2, r.40).

3.5.6 SEWAGE WATER

Currently, it is planned that the wastewater generated by the Windfall site will be conveyed to a treatment system through an underground sewer network that will include ± 240 m of gravity lines, two pumping stations with an approximate capacity of 10 L/s, and ± 310 m of discharge pipes.

As mentioned in Chapter 2, the choice of sewage treatment technology is still under consideration.

The two options are:

— sewage treatment technology involving a membrane bioreactor system;

— water treatment by septic tank and an infiltration field as a sewage management method. Therefore, field validations will be required in the summer of 2023 to verify the feasibility of implementing such a solution.

In all cases, the proposed system will comply with the environmental requirements prescribed by current regulations and the EDOs proposed by MELCCFP representatives for this purpose, if required.

The membrane bioreactor wastewater treatment technology would be provided pre-assembled (Appendix 3 – see H2O-silo data sheet), in a 3.6 m diameter by 6 m high cylindrical prefabricated building. It would be able to reduce the incoming organic load and suspended solids to a concentration below 5 mg/L. Furthermore, the addition of coagulant would remove the phosphorus required for the planned environmental discharge about 50 m downstream of Pond 2, a tributary located 0.6 km from Windfall Lake in the Waswanipi River watershed (Map 3-1).

The preliminary design of the wastewater treatment system is based on the different uses planned for the camp and other infrastructure, the unit wastewater flows prescribed by the MELCCFP in its Guide pour l'étude des technologies conventionnelles de traitement des eaux usées d'origine domestique (Guide for the study of conventional domestic wastewater treatment technologies) and a maximum occupancy of 450 workers. The design flow considered for the treatment equipment is 118 m^3/d.

Sewage effluent quality will be monitored under the authorization conditions as agreed upon with the MELCCFP and adjustments will be made as necessary to ensure compliance with applicable standards.

Treatment sludge will be collected by a certified contractor and disposed of in accordance with applicable regulations.

3.5.7 OTHER WATER TREATMENT SYSTEMS

During the construction period, 600 workers are expected to be present at the camp simultaneously. Drinking and sanitary water treatment system capacities will need to be increased with additional equipment during the construction phase. Studies are underway to identify solutions to this required increase in systems.

In addition to the mine effluent and the domestic, potable, and sewage water treatment systems, the site will include treatment for oily water located in the mechanical shop (see Section 3.8.5) and underground mine.

To keep underground work areas dry, pumps collect groundwater and direct it to sumps. As this TSS-laden water cannot be used or discharged as is, four MUDWIZARD decanting units have been installed in the mine.

This equipment has a total treatment capacity of 90 m^3/h. A flocculant (MSDS in Appendix 3-3 along with the other sheets) is added to accelerate decantation; this polymer will be stored on a concrete slab near the MUDWIZARD. It is not classified as a hazardous product. It comes as tablets that are stored in 20 litre pails directly on site.

When it enters the system, the dirty water contains between 2% and 15% TSS; thanks to its TSS removal capacity, the MUDWIZARD can reduce the TSS concentration to around 100 ppm in the clear water that comes out. The criterion for the maximum amount of TSS in clear water has been set at 500 ppm for equipment operation.

Upon exiting the MUDWIZARD, the clear water is directed to a retention pond. Some of the clear water is pumped to the production area to be used by the work equipment, while the rest of the water is pumped to the surface for treatment in the WTP. The sludge is classified as non-hazardous waste and is currently pumped to the waste rock stockpile.

It should be noted that the existing WTP on site will be replaced by the WTP described in Section 3.5.3 of this document. When the WTP is replaced, the MUDWIZARD will be shut down, ready to be used again if necessary.

3.6 RESIDUAL MATERIALS MANAGEMENT

The waste management strategy consists of regular transportation of residual materials (RM) by a specialized contractor from the mine site to authorized sites for specific RM types. The RM categories, other than mineral, are presented in Table 3-23. As this project is designed according to the principles of resource conservation by applying the 3RV approach—reduction at source, reuse, recycling, and validation (or recovery)—sorting on the production site is essential. Therefore, appropriate bins and containers will be provided at various locations for work crews. Collection will be organized and systematic. An area will be dedicated for temporary storage to facilitate loading onto trucks and transport to authorized sites. This area is shown on Map 3-1.

Table 3-23 Residual material category and estimated annual volumes

Category	Description (non-exhaustive)	Estimated annual volume for operations	Disposal location or collection company
Reusable materials	New residual materials, uncontaminated packaging	n.a.	n.a.
Recyclable materials	Paper, glass, plastic, cans, uncontaminated metal, tires	Scrap metal: 261 t - 22 truckloads of 12 t each Copper: 277 t - 24 truckloads of 12 t each	Metal recovery site (currently AIM-Amos)
Compostable materials	Cafeteria food waste, expired food, brown cardboard	41,208 kg	Overburden stockpile
RHMs – Liquid	From mechanical shops or spill cleanups. Used oil, grease, wash bay sludge and oily water, contaminated snow	21,760 litres - 4 truckloads s of 6 000 L each	Specialized collection company (currently AmNor Industries)

Table 3-23 (continued) Residual material category and estimated annual volumes

Category	Description (non-exhaustive)	Estimated annual volume for operations	Disposal location or collection company
RHMs - Industrial and household solids	Antifreeze, solvents, aerosols, paints, fluorescent bulbs, lamps, batteries, smoke detectors, oil filters, rags, packaging, contaminated containers, halocarbons, used absorbents, computer scrap, laboratory products	340,000 kg - 14 truckloads of 25,000 kg each	Specialized collection company (currently AmNor Industries)
Contaminated soils	Spill cleanup; managed with RHMs	653 t - 33 truckloads of 20 t each	Specialized collection company (currently AmNor Industries)
Construction, renovation, and demolition debris	Wood, aggregate, drywall, uncontaminated dry materials.	Wood: 1 714 m^3 - 57 truckloads of 30 m^3 each	Lebel-sur-Quévillon landfill site
Residual materials for disposal	Bulky waste, litter bags, polystyrene foam, packaging, sanitary pads, composite objects, contaminated objects, non-recyclable plastic, rubber, ashes, process waste, various empty containers.	1,346 m^3 - 45 truckloads of 30 m^3 each	Lebel-sur-Quévillon landfill site
Sanitary sludge	Bioreactor sludge	34,000 USG - 14 truckloads of 2,500 USG each	Specialized collection company (currently AmNor Industries)
Biomedical waste	From the infirmary; handled in accordance with CQLR, Q-2, r.12	4 × 5.1 L containers	Specialized collection company (currently Steri-Cycle)

n.a. = no applicable

The residual hazardous materials (RHM) storage facility will be developed and managed in accordance with provincial regulations. Most of the RHMs will be placed in the process plant storage area, at least all of the RHMs produced by the industrial uses. Contaminated soil will be placed in closed containers.

In addition to storage in the designated area on the surface, a waste compactor will be used. It is the one already in place at the exploration camp that will be relocated. The composter at the exploration camp will also be moved to the residual materials storage area. Composting activities are expected to continue at the site. Waste material from the composter will be placed on the overburden stockpile for recovery during progressive reclamation work.

3.7 GREENHOUSE GASES

A detailed identification and quantification report of annual GHG emissions attributable to all sources of emissions from the project and the different phases of the project was completed by WSP (Appendix 6-2). This study takes into account the combustion of fossil fuels, including transportation activities, deforestation, the use of explosives, and the consumption of hydroelectricity for the construction and operations phases.

The closure phase is considered equivalent to the construction phase. The characteristics of the emission sources are presented in Section 3.3.2.

3.8 RELATED DEVELOPMENTS AND PROJECTS

3.8.1 SITE ACCESS AND FACILITY SECURITY

The Windfall project site is currently accessible by way of a 115 km gravel road branching off the Chemin du Moulin road, southeast of Lebel-sur-Quévillon. Access is via Grade 1 forest roads, the R-1000 for 10 km, and the R-5000 for 55 km, followed by a 47 km section of Grade 2 forest road, the R-6000. This forest road is called R-1053 in the MRNF network. The Grade 1 road was built as a primary route for transporting oversized commercial timber in the early 1990s, and was extended with a Grade 2 road to access new land to develop timber harvesting in the Windfall site area. All materials, equipment, and workers will travel via these roads to the Windfall site.

It should be noted that the process plant will be located at the Windfall site; it is no longer planned to transport the ore via forest roads to Lebel-sur-Quévillon.

A vehicle count on the road linking the mine site and Lebel-sur-Quévillon was conducted in 2019 at the junction of roads R-1000 and R-5000, where traffic flows are likely to be the highest. The counts were obtained in March, which is the busiest period on the area's forest roads on weekdays, for a period of 12 consecutive hours, from 6:00 a.m. to 6:00 p.m. The results show that current traffic volumes on the R-5000 section are low and spread out between 9:30 a.m. and 6:00 p.m., reaching a maximum hourly volume of 11 vehicles, including four trucks, during the middle of the day. This number includes Osisko's current operations at the Windfall site. The results for the R-1000 section show increased flows in the morning (6:00 a.m.) and afternoon (5:00 p.m.) peaks, reaching a maximum hourly volume of 64 vehicles, including seven trucks, in the afternoon peak.

It was estimated that 3,200 trips would be required during the construction phase to supply the materials and equipment that would be needed for the project. Over the duration of the construction, this would average six trips per day. During operations, it is expected that 783 trips will be required to bring fuel and process inputs to the site. This would correspond to two trips per day. These numbers do not include the transportation of employees and subcontractors who will travel by bus every 14 days, but do include the current Osisko trips to the site. It is therefore difficult to explain the percentage increase on this basis.

An inspection of the access road was conducted in July 2022 and a report was issued. In summary, the report indicated that the roads were generally in good condition and did not require immediate major improvements. The Wetetnagami River Bridge (R0853-03) is also in good condition. However, the wing walls are deteriorated, according to the expertise commissioned by Osisko (WSP, 2022b), but the authorities do not believe that immediate repairs are required. Therefore, required repairs are being considered prior to the transportation of project materials to prevent significant deterioration of the bridge, the resulting deposition of debris in the river, or bank erosion. The capacity of the bridge is 138 t for long logging trucks.

The access roads are currently maintained by Osisko. Discussions are underway with stakeholders using the roads and the Société du Plan Nord to agree on future maintenance procedures. The site is also accessible via 145 km of Level 2 forest roads from Chapais. These roads could be used for emergencies, but are not currently maintained.

A gatehouse will be located at the site entrance. Site access controllers will be able to track on-site personnel and material delivery. The gatehouse will be equipped with a surveillance camera system and an intercom system.

For user safety reasons, fences will be installed at strategic locations to prevent access to the site, including along the surrounding forest roads.

3.8.2 ACCOMMODATION FACILITIES

The camp will be composed of prefabricated modular units installed on steel tripods and will include the following sections: dormitories, cafeteria and dining room, fitness and games centre, reception centre, and laundry room. Each block will be supplied with potable water, wastewater services, electricity, heating, and fire protection (cafeteria and dining room only). Heating of the common areas and crawl spaces of the buildings, as well as the operation of the water heaters will be provided by propane gas units. Cooking equipment in the kitchen will also be fuelled with propane. The layout of the camp complex is shown in Figure 3-17.

The reception centre will receive workers upon arrival at the Windfall site. The camp logistics staff offices are also located in this building. A waiting room will be set up to allow workers finishing their rotation to gather before the bus arrives. A long-term luggage storage room and a first aid room as well as a service centre, including dispatching, will also be available.

There will be six dormitory rows of two floors each, for a total of 406 individual rooms, each with a private toilet and shower and equipped with a double bed. Each dormitory wing will include a laundry room for workers' clothing, a housekeeping room, a mechanical/electrical room, and a stairway.

During the construction period, the camp will include three additional wings to accommodate the additional 200 workers.

The cafeteria and dining area will offer food preparation, storage, and service for on-site staff. This area will also include a hand washing station, a locker room, restrooms, offices, garage doors for the reception area, a mechanical room, and a refrigerated room. The cafeteria and dining room will be equipped with sprinklers and a commercial exhaust hood with fire protection for safety reasons. Water from the cafeteria will be directed to a grease trap before disposal for treatment.

The gym/fitness centre and board room will be available for after-hours use. In addition, the laundry room for the lodging department (housing and cafeteria) will include commercial dryers and washers and will be equipped with carts and a garage door. All buildings will be connected by enclosed and heated corridors.

A Cree cultural centre for First Nations employees, visitors, and friends will be built near the camp. This centre will have a vantage point over Pond 2, with a large balcony to allow for contemplation and reflection by viewers. The cultural centre will include a meeting space, library, bathrooms, changing room, and a wood stove adjacent to the kitchen for cooking traditional foods. A teepee will be installed next to the building; it will be covered with a waterproof canvas according to traditional construction techniques. The positioning of the cultural centre was determined with the W25B tallyman.

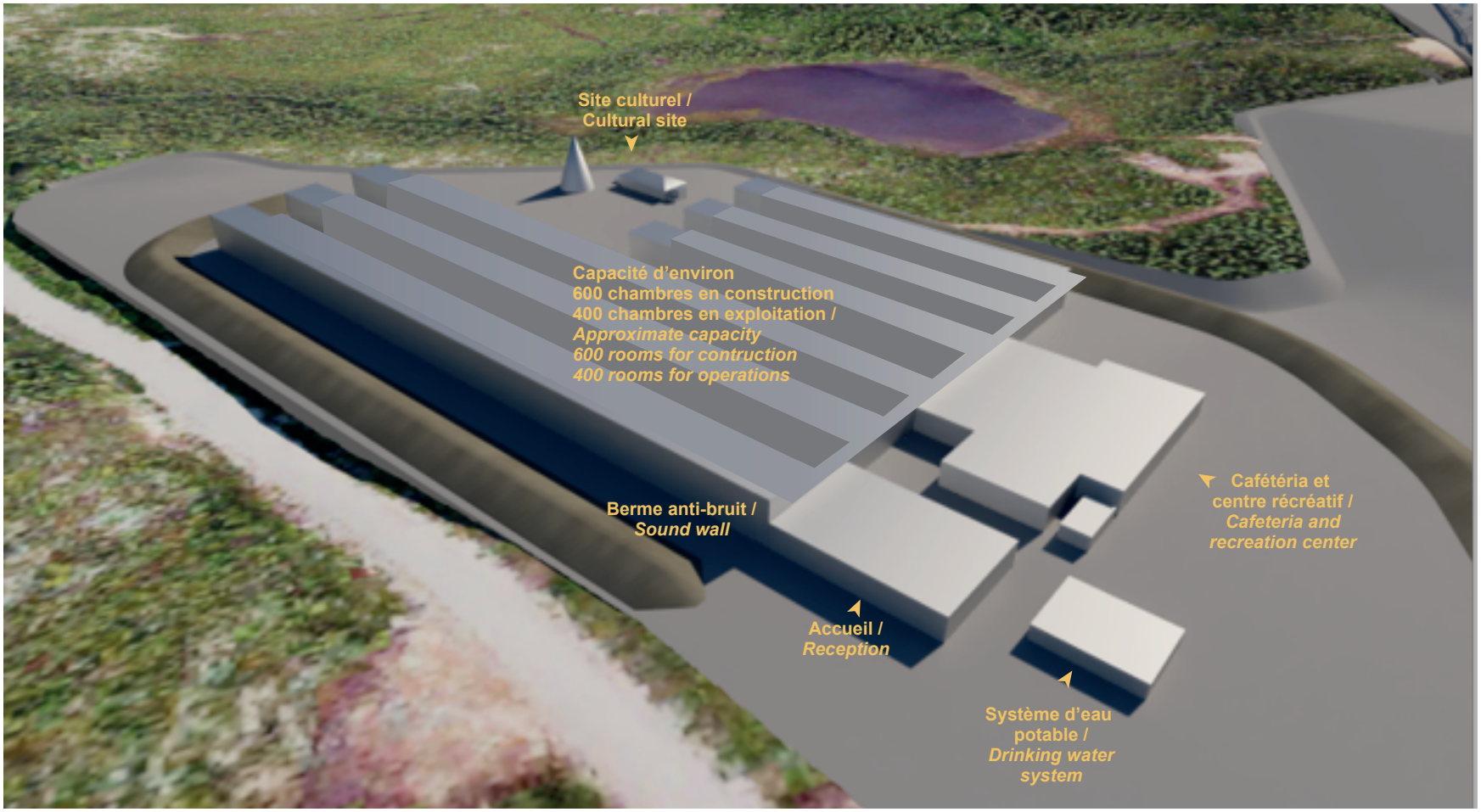


Figure 3-17 **Simulation 3D du campement minier /**
Mining Camp 3D Simulation (réf. BBA et al., 2023)

This camp will be used during the project's construction, operations, and closure phases. The existing exploration camp will be maintained to allow Osisko to continue regional exploration on the Windfall property, as well as exploration on the Urban-Barry property. During the construction phase, the exploration camp will be used to accommodate all the required workforce. Planning for the use of the camp at the end of the mine life has not yet been determined.

Water management systems (potable and domestic) are discussed in Sections 3.5.5 and 3.5.6. Regular and emergency power supply is described in Section 3.8.8.

3.8.3 OFFICES AND ADMINISTRATION

Space is reserved for offices and administrative services in the process plant building.

On the ground level, there will be an infirmary with direct access for the ambulance, a room for mine rescue equipment and training, as well as changing rooms for mine and plant workers. The emergency vehicles will be parked in the area reserved for this purpose, in the core library building. Osisko already has an ambulance and two fire trucks.

On the second floor, there will be offices, the metallurgical laboratory, the computer control room, meeting rooms, and a dining room. The third floor will house offices, control rooms for remote-controlled equipment, training rooms, meeting rooms, and another dining room.

3.8.4 STORAGE SITE FOR FUEL OR NEW HAZARDOUS MATERIALS

At the Windfall project site, hazardous materials can be classified into three categories: reagents, petroleum products, and residual hazardous materials. The RHMs are treated along with the other residual materials (Section 3.6).

Reagents will be stored in the plant buildings where they will be used. Cyanidation and cyanide destruction products will be stored at the process plant. Reagents for the WTP will be stored in an annex to the building (Map 3-1), products for filtration (flocculant and antiscaler) in the filtration plant building, and cement in a silo adjacent to the backfill plant.

The supply of reagents for the process plant and the filtration and paste backfill plant will be on a regular basis. Table 3-24 shows the supply frequency and type of delivery for each reagent.

Table 3-24 Reagent storage for the process plant and the filtration and paste backfill plant

Reagents	Supply	Type	Quantity
Sodium cyanide	2.54/week	Bulk	33 t
Quicklime	2.17/week	Bulk	36 t
Caustic soda	0.31/week	Bulk	32 t
Flocculant (concentrator)	0.20/month	Bags	27 × 750 kg
Flocculent (filtration)	0.21/month	Bags	800 × 25 kg
Copper sulphate	0.32/month	Bags	2,016 × 1.25 kg

Table 3-24 (continued) Reagent storage for the process plant and the filtration and paste backfill plant

Reagents	Supply	Type	Quantity
Activated carbon	0.24/month	Bags	40 × 500 kg
Hydrochloric acid (28%)	0.57/week	IBC tank	20 × 1 m^3
Antiscaling agent (<25%)	0.02/week	IBC tank	20 × 1 m^3
Liquid SO_2	0.76/week	Bulk	30 t
Lead nitrate	1.86/month	Bags	20 × 1,000 kg
Sodium salts	5.6/week	Bags	25 kg
Refining flux	4.1/week	Bags	25 kg
Cement	25.90/week	Bulk	40 t

Each storage location will be set up to comply with NFC (2020) rules.

Petroleum products will include diesel, gasoline, and propane. Propane is intended for heating purposes. Six propane tanks will be installed on site:

— a 40,000 USG (151,400 L) tank for heating the process plant;

— two 20,000 USG (75,700 L) tanks used for underground mine heating, installed near each of the portals; the one at the Main portal installed in 2023.

— a 20,000 USG (75,700 L) tank for heating the garage and storage building;

— a 20,000 USG (75,700 L) tank for heating the filtration, backfill, and water treatment plants;

— a 20,000 USG (75,700 L) tank for heating the camp and supplying the kitchen.

Each tank will be surrounded by protective bollards and connected to the building to be heated via a buried pipe. These tanks will be installed, fitted, and managed in accordance with federal (EER) and provincial (RMD) regulatory requirements. Total annual propane consumption is estimated at 23,000 L/day. A 35,000 L tank truck will therefore have to go to the site at least every other day on a seasonal basis when heating is required.

Diesel and gasoline will be stored on a designated site located midway between the process plant and the filtration, backfill, and water treatment plants. The site will include a one-week supply consisting of:

— four 45,000 L diesel tanks;

— one 1,000 L diesel tank;

— one 10,000 L gasoline tank.

The double-walled tanks include level and pressure monitoring sensors and a console for measurement readings. At the gasoline and diesel dispensing stations, a reinforced concrete slab will be installed to accommodate trucks during filling and to facilitate cleanup in the event of a spill.

The facility will be constructed in accordance with the requirements of the petroleum equipment chapter of the Construction Code (Building Act, r.2) and managed in accordance with the requirements of the petroleum equipment chapter of the Safety Code (Building Act, r.3). Permits and tank registrations with the RBQ will be kept up to date.

Details on environmental response, in addition to the preliminary emergency response plan, are presented in Chapter 12.

3.8.5 STORAGE, CORE SHACK, AND WORKSHOPS

A building attached to the process plant will include a storage area, a core shack, and a mechanical shop (Map 3-1).

The mechanical workshop will have five maintenance bays for large vehicles and four bays for small vehicles, and will be equipped with an oil-water separator that will collect water from the floor and direct its effluent to the site collection system. The treatment currently being considered is a coalescence separator that separates suspended solids, hydrocarbons, and clean water (Data sheet in Appendix 3-5). The mechanical workshop building will include a welding room with a welding fume extractor equipped with a mobile arm.

Outside, near the mechanical workshop building, canvas domes will be installed for the storage of spare parts and materials waiting to be used. All materials stored directly on the ground will be inert or protected to avoid soil contamination. The locations of the canvas domes as well as the ground storage areas are shown on Map 3-1.

3.8.6 BORROW PITS

The borrow pits were selected based on the quality of the materials and their proximity to the mine site. In addition, they had to be easily accessible and, to the extent possible, close to the mine site.

For the construction of roads and ponds, to level the ground where building foundations are located, and for any other use during the construction or maintenance of infrastructure, the estimated need for loose borrow material is 509,917 m^3, as well as 11,780 m^3 of riprap distributed according to the volumes presented in Table 3-25. Wherever possible, material from the infrastructure excavations and material with the I3A lithology will be reused instead of being disposed of in the overburden stockpile or the waste rock stockpile, respectively. The new unconsolidated material will come mainly from three banks located near the site: Flamb-1, Gravtest-3, and Gravtest-4.

Riprap material will be extracted from gravelly sands, if possible, or will be produced from waste rock lithologies meeting the criteria of the *Guide de valorisation des matières résiduelles non dangereuses de source industrielle comme matériau de construction* (2002) [Guide to the recovery of non-hazardous inorganic waste from industrial sources as a construction material], or if no such lithology exists, the waste rock will be used only on top of the infrastructure protection membranes. Currently, the I3A lithology is considered adequate (Appendix 3-1).

Table 3-25 Borrow pit materials required for construction

Type of material	Required volume	Use
Backfill MG 56	57,731	Roads, ponds
Backfill 0-600 and/or MG 112	126,188	Roads, ponds
Mass backfill	325,998	Roads, ponds, grading
Riprap	11,780	Ditches and ponds
Total	**521,697**	

For gravelly sand requirements, the existing Flamb-1 pit was selected. A 2.95 ha extension was required for the advanced exploration phase. However, given its capacity, it is still possible to expand it for the requirements of the project's construction and operations phases. This pit is located near the mine site (±100 m from the gatehouse). The materials of this pit are essentially gravelly sand with a low proportion of fines. There is no water or wetland environment in the vicinity of the site. As part of the project, it is expected that the Flamb-1 pit will be expanded to the north. Map 3-1 shows the potential future boundaries of Flamb-1. The total area of the borrow pit will exceed 3 ha. Grain size analyses of the borrow pits are presented in Figure 3-19.

In addition to the Flamb-1 borrow pit used for mining purposes, the BNE-32G04-15 borrow pit lies adjacent to it. This pit is authorized under the Regulation respecting the sustainable development of forests in the domain of the State. It is used for the maintenance of forest roads leading to the Windfall site as well as for the roads on the Windfall site. As part of the Windfall project, granular material requirements for road maintenance will continue to be sourced from this borrow pit until it is depleted.

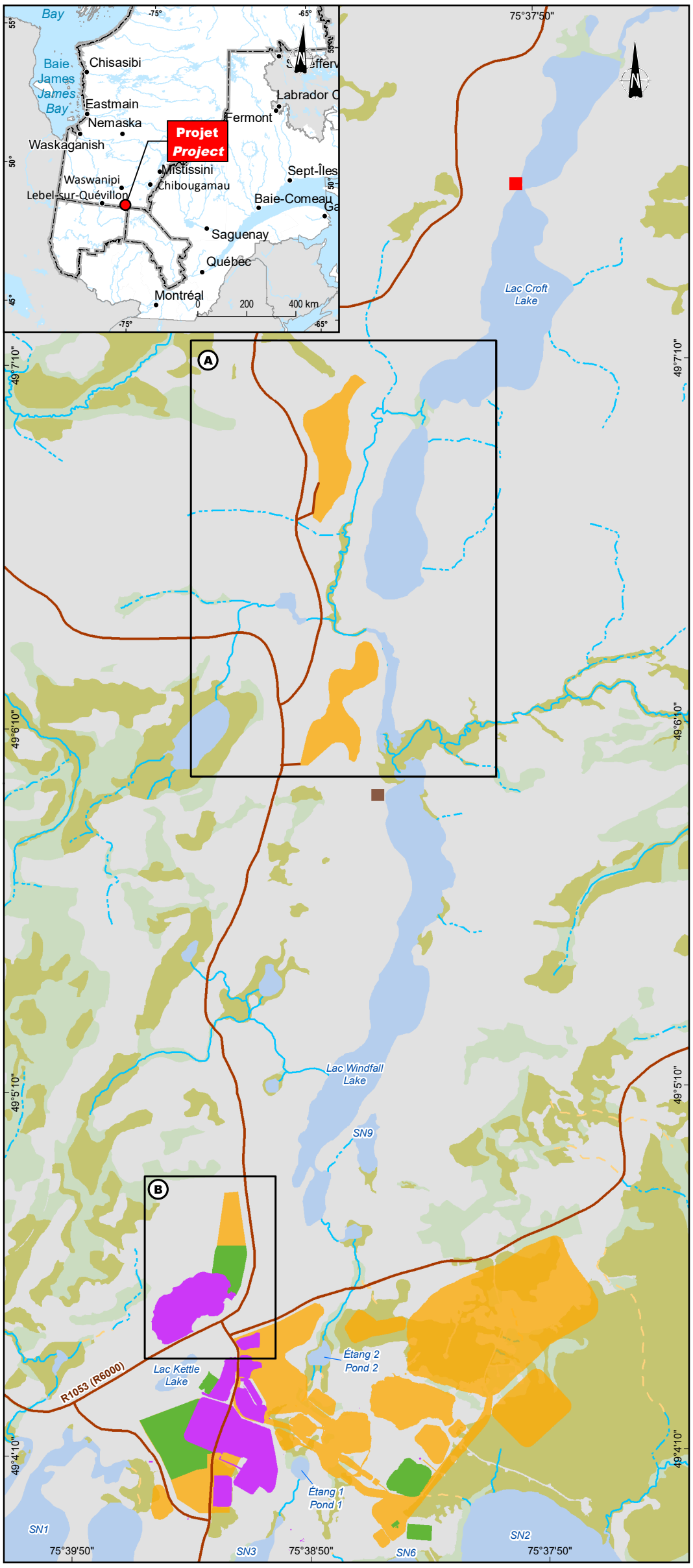
Gravtest-3 is located approximately 3 km north of the Windfall mine site (Map 3-7). This potential borrow pit is accessible by an existing road that once led to a former mining site. The material from this pit is fluvio-glacial in nature, with grain sizes ranging from sand to pebbles in varying proportions. Production of MG-20 type materials would be carried out from this site because of the quality of the materials. A screen and a crusher would be installed on site. The usable area of this pit is 9.86 ha (98,611 m^2). The volume of material is estimated at 345,138 m^3, for an average operating depth of 3.5 m. It is possible that operations will reach lower than 3.5 m, but the field inventories carried out to date have not gone deeper. It should be noted that its boundary respects the distances required by the Regulation respecting sand pits and quarries, s. 15, i.e., 30 m from a lake or river and 100 m from a peat bog.

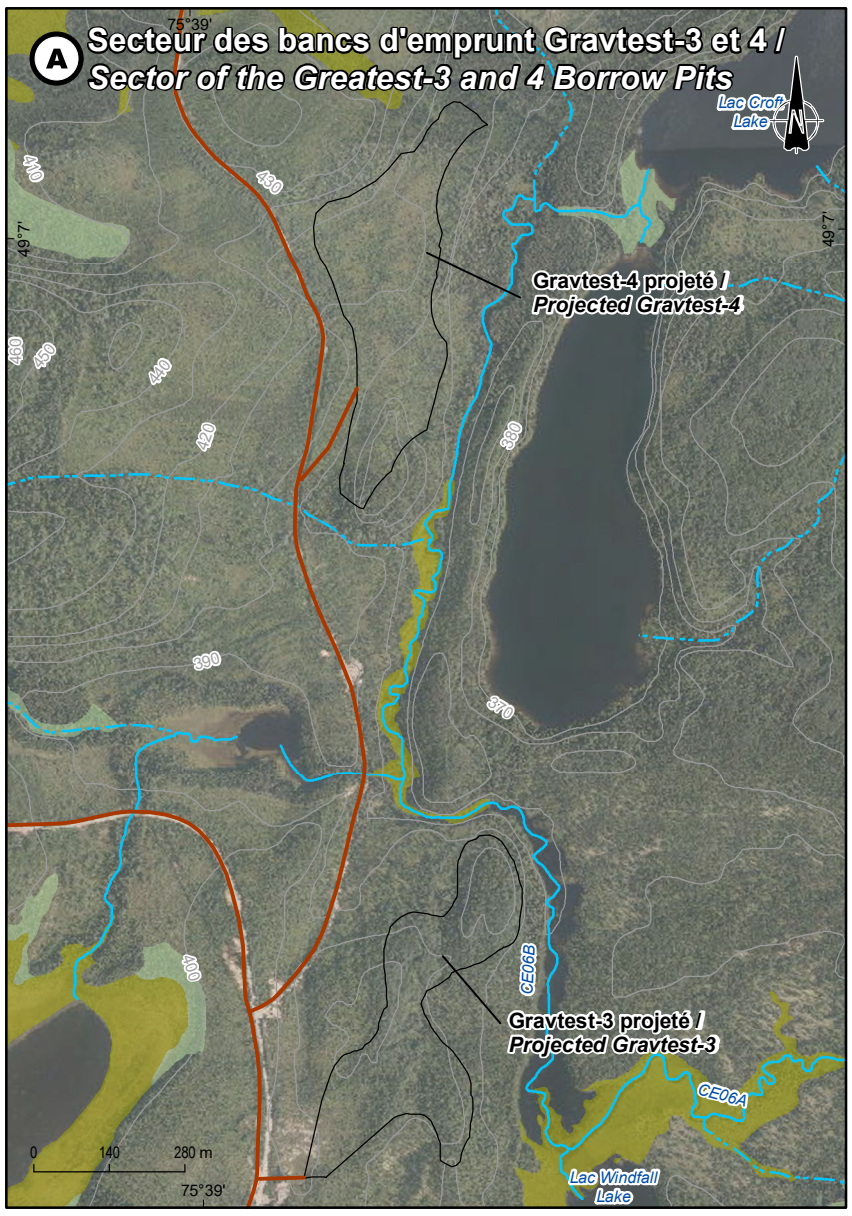
Gravtest-4 is located approximately 5 km north of the Windfall site (Map 3-7). The materials from this pit are also fluvio-glacial in nature, with grain sizes ranging from sand to pebbles in varying proportions. Production of MG-20 type materials would be carried out using a screen due to the quality of the materials. A crusher would also be installed on site. The usable area of this pit is 10.7 ha. The quantity of material is estimated at 535,028 m^3 for an average mining depth of 5 m. It should be noted that its boundary respects the distances required by the Regulation respecting sand pits and quarries, s. 15, i.e., 30 m from a lake or river and 100 m from a peat bog.

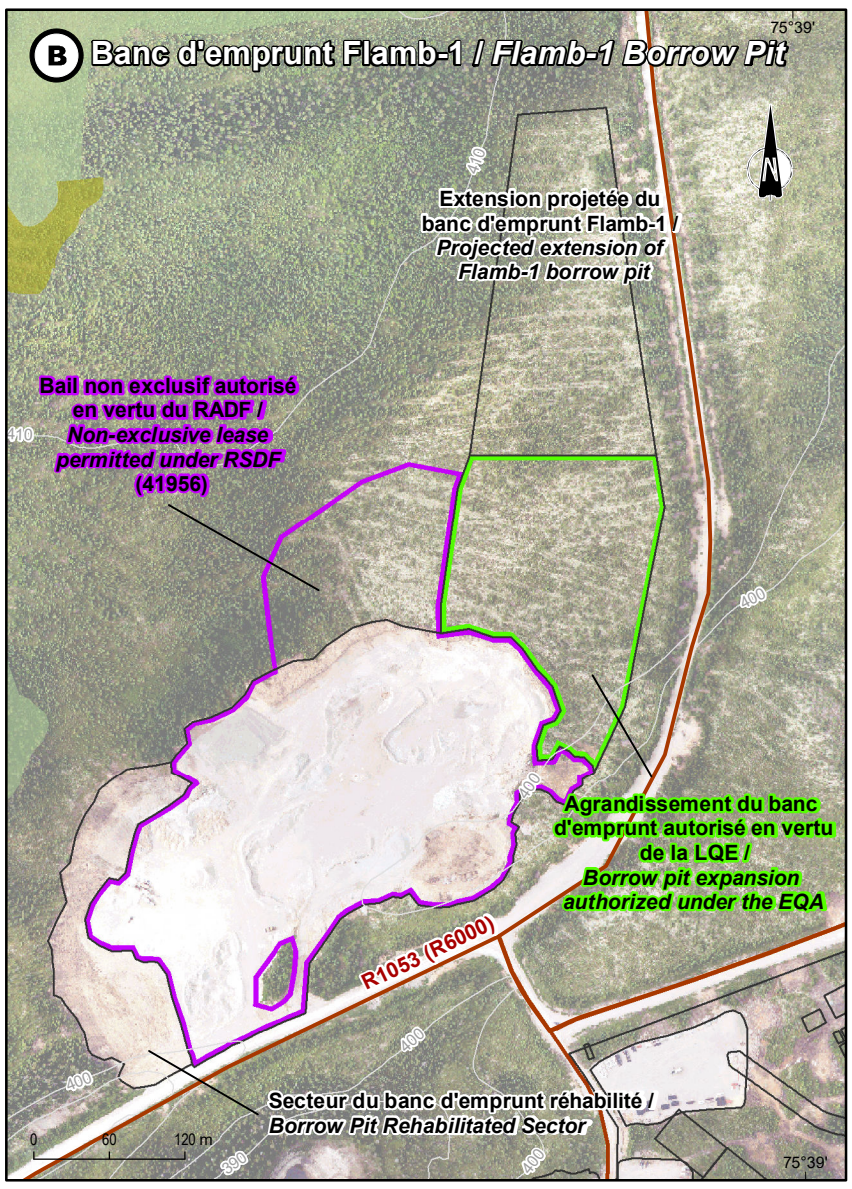
Borrow pits will be managed in accordance with the requirements of the Mining Act and the EQA, i.e., they will be subject to an authorization request to the MELCCFP and an application for a non-exclusive lease to the MERN, if they are located outside of Osisko's claims. The requirements attached to these permits will be respected, including restoration as stipulated in Chapter VIII of the Regulation respecting quarries and sandpits (CQLR, ch. Q-2, r. 7.1).

In addition to the three options presented, granular material requirements will be optimized and new sources of borrow material near the site may be discovered.

Once the borrow pits are no longer in use, Osisko will work to progressively restore them, if possible, as sections are no longer required. This will be accomplished by restoring the site(s) to a visually acceptable condition in harmony with the surrounding environment. Restoration could include slope re-profiling and planting activities, while complying with existing regulations. Section 3.13 provides more details on the overall closure and restoration of the Windfall site.







Infrastructures connexes / *Related Infrastructures*

- Chemin d'accès principal / *Main access road*

Baux de villégiature / *Vacation Leasures*

- Fins d'abri sommaire en forêt / *Temporary forest shelter*
- Fins de villégiature / *For vacationing purposes*

Infrastructures du projet / *Project Infrastructures*

- Existante / *Existing*
- Autorisée pour l'échantillonnage en vrac 2023-2024 / *Authorized for bulk sampling purpose 2023-2024*
- Projetée / *Projected*

Hydrographie / *Hydrography*

- Cours d'eau permanent / *Permanent watercourse*
- Cours d'eau intermittent / *Intermittent watercourse*
- Cours d'eau souterrain / *Underground watercourse*

Végétation / *Vegetation*

- Tourbière ouverte / *Open bog*
- Autre type de milieu humide / *Other type of wetland*

Hypsométrie / *Hypsometry*

- Courbe de niveau (10 m) / *Contour (10 m)*

OSISKO MINIÈRE OSISKO

Projet minier Windfall - Étude d'impact sur l'environnement / *Windfall Mining Project - Environmental Impact Assessment*

Site minier Windfall, Eeyou Istchee Baie-James (Québec) / *Windfall Mining Site, Eeyou Istchee Baie-James (Quebec)*

Carte 3-7 / *Map 3-7*
Bancs d'emprunt / *Borrow Pits*

Sources :

BDAT, 1/250 000, MRN Québec, 2002
BDTQ, 1/20 000, MRNF Québec, 2007
CanVec, 1/1 000 000, RNCan, 2020
CanVec Plus, 1/50 000, RNCan, 2015
SDA, 1/20 000, MERN Québec, 2020
ESRI, World Shaded Relief, 2014
GESTIM, Baux non exlusifs, 2023
MFFP, Hillshade (MNT), 2021

0 250 500 m
MTM, fuseau 9, NAD83

2023-03-20

Préparée par : M.-H. Brisson
Dessinée par : J. Roy
Vérifiée par : M.-H. Brisson
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La précision des limites et les mesures montrées sur ce document ne doivent pas servir à des fins d'ingénierie ou de délimitation foncière. Aucune analyse foncière n'a été effectuée par un arpenteur-géomètre. /Boundary accuracy and measurements shown on this document are not to be used for engineering or land delineation purposes. No land analysis was carried out by a land surveyor.

3.8.7 TRAFFIC

ON-SITE TRAFFIC

The Windfall site is designed to minimize traffic between the various infrastructure and facilities required for mining activities. Only authorized vehicles will be allowed to drive on the site. As the ore processing is done at the Windfall site, traffic of trucks transporting the ore will be limited to the roads constructed within the site. The maximum speed limit on haul roads will be set at 50 km/hr. Employees and suppliers will have to be familiar and comply with the traffic rules at the site, and signage will also be posted along these roads. As part of Osisko's traffic procedures, special mention is made of the need to drive carefully and respect the speed limit at all times.

Three types of roads are present on the site: haul roads, access roads, and service roads. Table 3-26 presents the characteristics of the roads at the site. Haul roads are used by oversized trucks to transport waste rock, ore, and tailings. Service roads provide access to infrastructure, particularly around the tailings storage facility and the waste rock stockpile. Access roads provide access to the site. There is always room for optimizing the layout and length of the roads. The access roads at the Windfall site are shown on Map 3-1.

Table 3-26 Access road characteristics

Type of road	Use	Total length (m)	Width (m)	Surface area (m^2)
Haul	Heavy equipment Truck	1,937	12	23,240
Access	Truck	450	8	3,600
Service	Truck	3,558	5	17,790

The surface vehicle fleet consists primarily of diesel-powered vehicles, but also includes some gasoline-powered vehicles and electric equipment. The underground fleet includes almost 50% electric vehicles. Osisko hopes to continually increase this ratio by closely monitoring the availability of electrical equipment on the market with each vehicle purchase and renewal.

Tables 3-27 and 3-28 show the mobile surface and underground equipment currently planned for the project. This list may be revised based on equipment availability and performance. Optimization of the number and type is done to improve site efficiency and reduce GHGs.

Table 3-27 Mobile surface equipment

N°	Description	Qty	Model	Position	Type of fuel
1	Pickup truck	12	RAM 2500	Construction and follow-up on site	Gasoline
2	Grader	1	JD 772G	Site maintenance	Diesel
3	Loader	1	Komatsu, WA 320	Site and core library support	Diesel
4	Water truck	1	Terex TA-400	Dust and sand blasting control	Diesel
5	Loader	1	Komatsu, WA 600	Power supply for the concentrator	Diesel
6	Loader	1	Komatsu, WS 380	Support for surface infrastructure	Diesel
7	Bulldozer	1	CAT D8T	Work on the waste rock stockpile	Diesel
8	Loader	1	Komatsu, WA 500 High Lift	Loading of filtered tailings	Diesel

Table 3-27 (continued) Mobile surface equipment

N°	Description	Qty	Model	Position	Type of fuel
9	Articulated truck	2	CAT 740	Transport of filtered tailings	Diesel
10	Bulldozer	1	CAT D6	Deposition of filtered tailings	Diesel
11	Excavator	1	Komatsu, PC-360	Deposition of filtered tailings	Diesel
12	Excavator	1	CAT 320	Site maintenance	Diesel
13	Compactor	1	BOMAG DH-5	Compaction of filtered tailings	Diesel
14	Forklift	1	CAT P-6000	Miscellaneous handling in the plant and storage area	Electric
15	Loader	1	CAT 2424D3	Plant cleaning and miscellaneous handling	Diesel
16	Stand-up forklift truck	1	Raymond 7300	Storage handling	Electric / battery
17	Ambulance	1	Chevrolet	Emergency	Gasoline
18	Fire truck	1	Volvo WCN	Fire control	Diesel
19	Emergency truck	1	International 40S	First responders on the surface	Diesel
20	All terrain vehicle (ATV) – 6 wheels	1	Can-Am Outlander	Site supervision/emergencies	Gasoline
21	Snowmobile	1	Ski-doo Skandic	Site supervision/emergencies	Gasoline
22	Bus rental (per contractor)	2	Not available	Transportation of employees	Diesel

Table 3-28 Mobile underground equipment

Mining equipment	Model	Power supply	Quantity 2024	Quantity 2024-2035
Production and development equipment				
Front face drilling rig (Jumbo)	Epiroc M20-EV	Battery	3	5
Bolter	MacLean 975 - EV Omnia	Battery	5	7
Bolter	MacLean 975 - EV Omnia High Reach	Battery	1	1
Emulsion charger (development)	MacLean EC3-EV	Battery	2	3
Cassette truck (production)	MacLean CS3-EV	Battery	0	2
Underground loader – 14 t	Epiroc ST14	Diesel	2	5
Underground loader – 18 t	Epiroc ST18	Diesel	2	3
Truck – 54 t	Epiroc MT54	Diesel	6	10
Hydraulic long hole production drill rig	Epiroc Simba ME7C-EV	Battery	0	5
Long hole drill	Sandvik DL 432i	Diesel	1	2
Scissor lift	MacLean SL3-EV	Battery	2	5
Service equipment				
Blockholer	MacLean BH3-EV	Battery	1	1
Boom truck	MacLean BT3-EV	Battery	1	2
Underground loader – 3.6 t	Epiroc ST2	Diesel	1	2
Grader	MacLean GR5-EV	Battery	1	2
Shotcrete machine – SWATcrete Mobile CRF Unit	Contractor	Diesel	1	1
Shotcrete machine - SWATcrete Sprayer	Contractor	Diesel	1	1

Table 3-28 (continued) Mobile underground equipment

Mining equipment	Model	Power supply	Quantity 2024	Quantity 2024-2035
Service equipment (continued)				
Personnel carrier – 14 to 22 passengers	MacLean PC3-EV	Battery	1	2
Personnel carrier– 2 to 4 passengers	Kovaterra - K200 - IFIX10017	Diesel	6	12
Service truck – Technical services	Kovaterra - K200 - IFIX10049	Diesel	1	5
Service truck – Surveying	Kovaterra - K200 - IFIX10029	Diesel	2	2
Service truck with crane	Kovaterra - K200 - IFIX10022	Diesel	1	1
Service truck – Mechanic	Kovaterra - K200 – IFI10528	Diesel	3	3
Service truck – Construction	Kovaterra - MT100 - IFIF99338	Diesel	2	3

Access and service roads (Figure 3-18) will be constructed to allow delivery of materials and access for the operation or inspection of pits, ponds, ventilation raises, and other infrastructure. Contact water from these roads will be collected in ditches and pumped to the WTP.

To transport ore and dry tailings with mining trucks, three sections of 12 m wide haul road will be constructed (Figure 3-19) Regular vehicles will be allowed to use these roads with specific safety procedures:

1. from the Main portal to the Lynx portal with access to the unloading area to the crusher, the ore stockpile, and the waste rock stockpile;
2. from the tailings filtration plant to the tailings storage facility;
3. from the tailings filtration plant to the fuel farm.

The haul road ditches will be equipped with a geomembrane to collect contact water and contaminants generated by the mine materials. Contact water from the roads will be collected in ditches and ponds and pumped to the WTP.

Drinking water, process water, fire water and tailings management pipes will be installed along these ditches and covered with a berm. These berms could also accommodate electrical cables or fibre optics, if necessary.

A traffic management procedure will be implemented to ensure the safe operation of all vehicles. Road signs will also be installed. A team of dispatchers will be assigned to implement the procedure.

On site, street lighting will be limited to intersections. Exterior lighting will be installed on buildings at all garage doors or man-doors. There will also be exterior lighting in pedestrian areas and in work or storage areas. For all exterior lighting, LED fixtures will be used, controlled with photocells to reduce energy consumption.

Northern walkways will be built between the site buildings in the area of the process plant and the camp to allow employees to move around on foot and thus limit the number of trucks on the site.

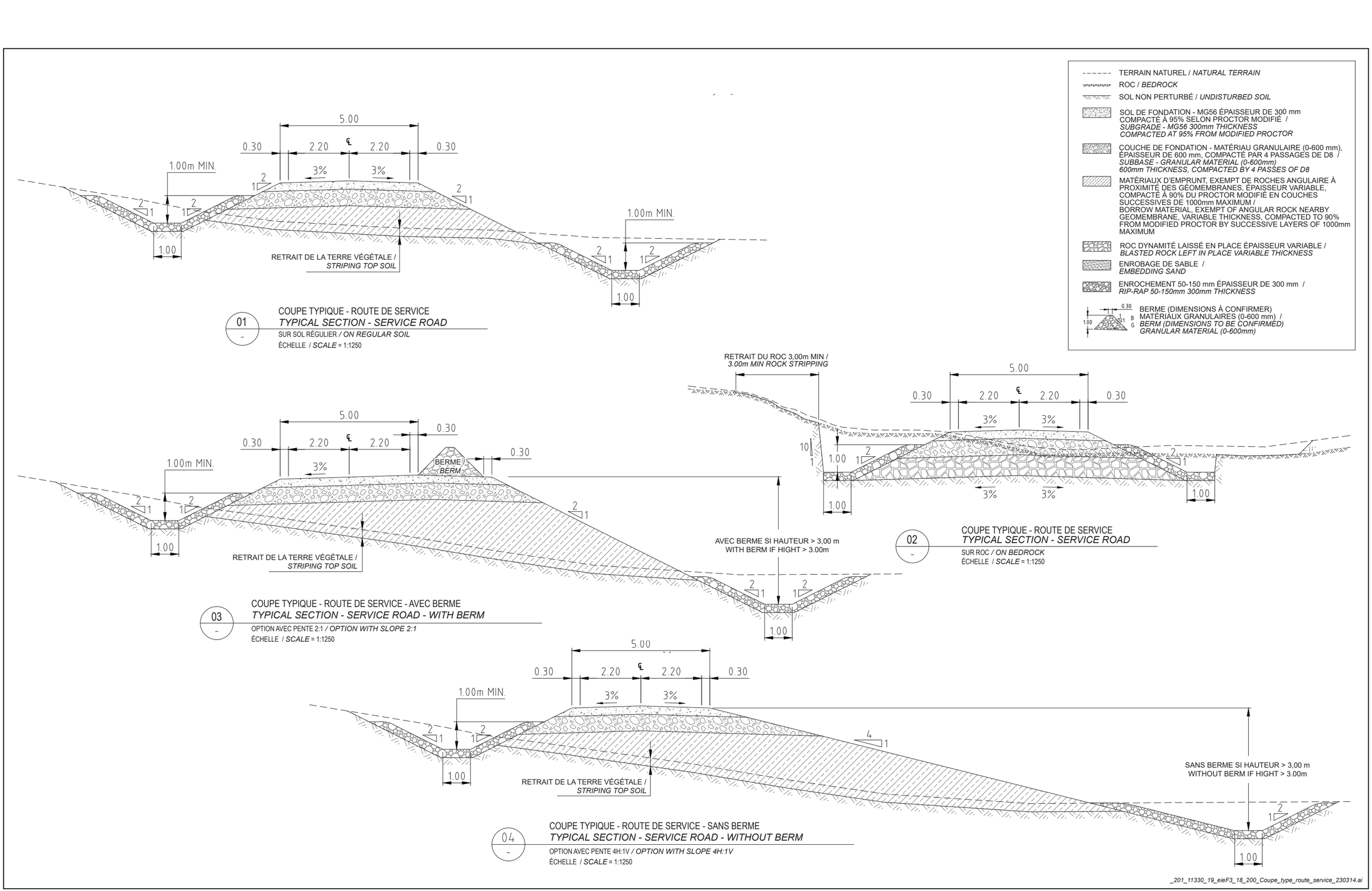


Figure 3-18 **Coupe-type d'une route de service standard /**
Service Road Typical Cross-Section (réf. Modifié du plan émis par WSP pour Osisko (515-C-0601-ZA))

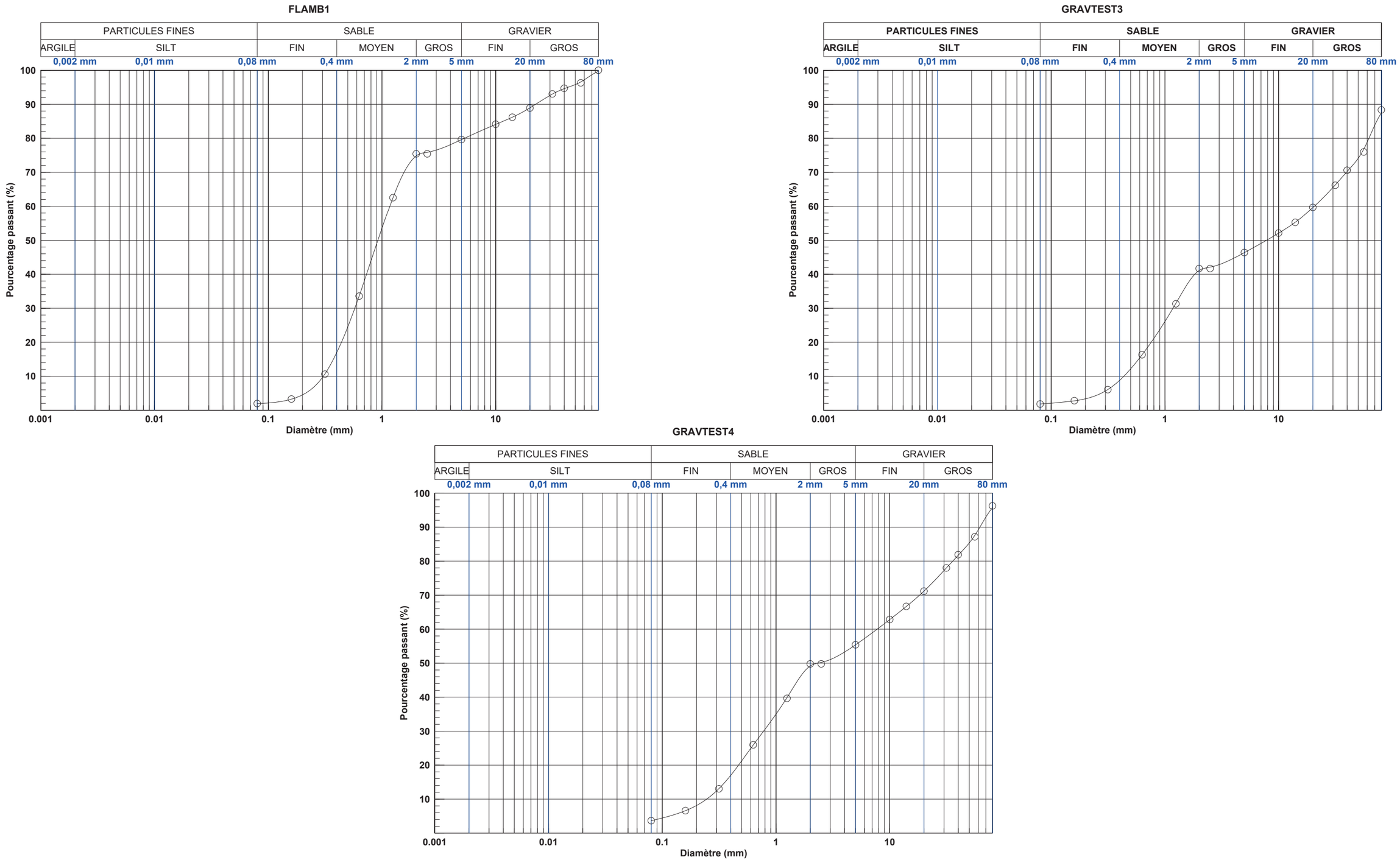


Figure 3-19 **Analyse granulométrique des bancs d'emprunts**
Granulometric analysis of borrow pits (réf. Modifiée de WSP, 2023)

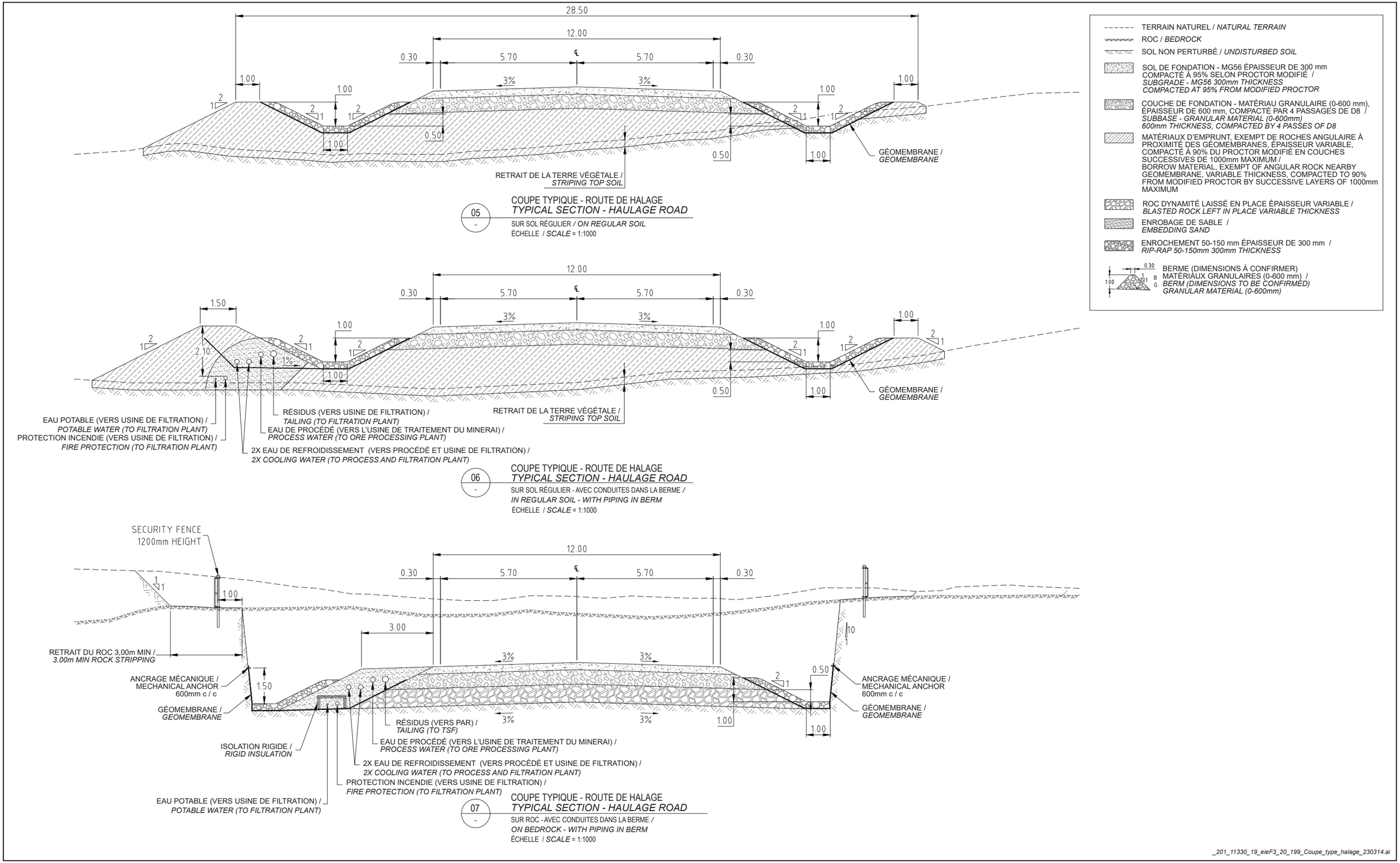


Figure 3-20 Coupe-type d'une route de halage /
Hauling Road Typical Cross-Section (réf. Modifié du plan émis par WSP pour Osisko (515-C-0601-ZA))

TRANSPORTATION OF GOODS TO THE SITE

The transport of equipment and materials takes place mainly during the construction phase. The hypothetical route considered for these inputs is between the Port of Montréal and the project site. Transportation during the operations and closure phases includes regular refuelling of the site. The hypothetical route considered for these inputs is between the city of Montréal and the project site, i.e., approximately 715 km. Once past the municipality of Lebel-sur-Quévillon, trucks will have to use the forest roads, where the maximum allowable speed is 70 km/h. Coordination with road users is achieved by means of a radio system through which users call in every 5 km to prevent running into unannounced vehicles. This is particularly important during the hunting season.

Average diesel fuel consumption data for transportation to the site are presented in Table 3-29.

Table 3-29 Fuel consumption (diesel) – Transportation

Phase	Products transported	One-way distance (km)	Number of trips	Round-trip diesel consumption (L)
Construction	Materials/equipment	715	3,200	1,830,400
Operations (annually)	Process inputs	715	340	194,480
	Fuel	715	443	253,396

3.8.8 ENERGY SUPPLY

ELECTRICAL SUPPLY

The total anticipated electricity demand for the Windfall site is 27.4 MW. The electricity will be supplied via a new Kuikuhaacheu transmission line, about 85 km long with a voltage level of 69 kV. It will connect the MICO station to the Windfall station. This line will also provide fibre optics to the site. This new line will cross mainly wooded areas and some wetlands. The chosen route was developed in collaboration with the forestry department and five tallymen of the Cree First Nation of Waswanipi (CFNW), and will be mainly in natural areas and lands cleared by the forest industry. The route bypasses biological refuges and areas of interest to tallymen, minimizes impacts on wetlands, and follows existing infrastructures when possible (Road 113, forest roads, 735 kV high-voltage lines).

At the north end of the power line, a substation will raise the voltage level from 25 kV to 69 kV at the Hydro-Québec Waswanipi substation. At the south end of the power line, another substation will lower the voltage to 13.8 kV for distribution to the Windfall site. In 2022, Osisko signed a binding agreement with Miyuukaa Corporation (Miyuukaa), a wholly owned subsidiary of CFNW, for the transmission of hydroelectric power to the Windfall site. In this agreement, it was agreed that Miyuukaa would fund, construct, operate, and maintain the transmission line and the two new substations (Waswanipi and Windfall). The location of the 69 kV power line is shown on Map 8-1. As a user, Osisko will pay a service fee to Miyuukaa.

This agreement solidifies the collaborative approach between Osisko and the CFNW for the sustainable development of energy infrastructure, which will create robust employment opportunities for CFNW members. The use of hydroelectricity during the final stages of advanced exploration and throughout the construction and operations phases will reduce GHG emissions and the Windfall project's reliance on fossil fuels. Preparation work on the existing access roads will begin in the winter of 2023, in preparation for clearing and construction of the transmission line. The work is scheduled to be completed over a 12-month period, with an anticipated service connection date in the first half of 2024. The Cree community has welcomed this promising project.

Irene Neeposh, Chief of the Cree First Nation of Waswanipi, stated:

> *"The Cree First Nation of Waswanipi will always have as a priority the protection of its territory and the traditional way of life of its members, but this does not prevent us from participating in the economic development of our territory. The fact that this transmission line is owned by the Cree is a great example of what can be accomplished when resource development companies engage honourably and genuinely with First Nations people and when the concerns of all parties are reconciled and considered from the beginning. By owning and operating this critical infrastructure for the region, with Osisko as a partner, the Cree First Nation of Waswanipi is continuing its efforts to control development on its traditional territory. "*

As the power line is a different project from the Windfall project, its impacts are not assessed in this study.

ENERGY DISTRIBUTION ON SITE

The mills, underground mine, and camp area will be supplied with 13.8 kV power via 15 kV cables on overhead lines. A 13.8 kV air insulated switchgear (AIS) will be installed in the main electrical room on the first floor of the process plant to supply power to the transformers and further step down the distribution voltage to usable levels of 600 V, while other switchgear will be dedicated to the crushing and grinding circuits that require peak power. The SABC crushing circuit motors, consisting of a variable-speed SAG mill, pebble crusher, and closed-circuit fixed-speed ball mill, will alone account for 20% of the site's total energy demand.

The energy demand for the entire Windfall project is approximately 27.4 MW. The power demand was calculated from the list of mechanical and processing equipment, while accounting for backup equipment and applying representative efficiency and load factors.

Table 3-30 shows the energy breakdown for the site by sector.

Table 3-30 Electricity demand by sector

Sector	Electrical demand (MW)
Underground mine and surface mining infrastructure	8.9
Support infrastructure (camp and other)	2.8
Process plant	11.7
Filtration and backfill plant & WTP	3.3
Loss of 2.5% to the power grid	0.7
Total	**27.4**

The Windfall mine project site is currently powered by diesel generators with a 13.8 kV overhead line between the mine areas and the exploration camp. The overhead line will be maintained and the generators will be used for emergency backup power and during Hydro-Quebec's peak periods. In this regard, additional power may be added at the request of Hydro-Quebec, up to 6 MW. The generators will be relocated separately. The generators are planned to be installed to secure the minimum needs of the process plant, the filtration, backfill, and water treatment plants, the camp, and the electrical substation. Their locations have yet to be confirmed.

3.8.9 COMMUNICATIONS

The Windfall mine project is intended to be a modern mine with all the services required for an Industry 4.0 operation, such as short-interval control, predictive maintenance, on-demand ventilation, remote operation, and an Integrated Operations Centre (IOC).

The Windfall mine project will be operated from an integrated operations centre (IOC). The management of the mining and processing operations will be carried out from this site, which will be in the administrative area of the process plant. All areas of the site, including the process plant, underground operations, tailings management, and water management will be integrated into the IOC. This centre will collect data on all operations to facilitate interrelations between the various stakeholders and partners.

Communication between employees moving around the site will be via Wi-Fi and radio. A Wi-Fi antenna is already installed at the current site (Map 3-1), just east of the Lynx portal.

The security team will also have access to a few satellite phones in case of network outages and for employees who may need to perform work in areas not covered by local Wi-Fi. As mentioned earlier, the site will be connected via fibre optics through the transmission line.

3.9 CARRYING OUT THE CONSTRUCTION WORK

To present the Windfall site prior to the EIA, an aerial photograph of the site was taken in the summer of 2022 and is shown in Appendix 3-6. Preparatory activities and work are required for the Windfall project even before construction of the infrastructure begins. Map 3-8 shows the water management during construction. The planned steps are as follows.

1. Clearing and stripping

In the first few months of the project, clearing and site preparation activities will be the first steps in setting up the infrastructure. The project's footprint will then be determined with the clearing of the targeted areas. These areas are mainly the workers' camp site, the overburden stockpile, the process plant, the paste backfill plant, the crushing area, and the ore stockpile. The areas involved are presented in section 7.1. Wood will be chipped on site and the organic material will then be moved to the new overburden stockpile area.

Subsequently, surplus inorganic material will also be moved to the overburden stockpile. Suitable material will be reused where possible. The material around the workers' camp will only be moved to build the berm that will serve as a noise barrier. The work will be performed by excavators, wheel loaders, tractors, and haul trucks.

2. Blasting and earthwork

To develop the site and accommodate the infrastructure, some areas will require blasting. The areas to be blasted are mainly located at the process plant site and along the conveyor belt transporting the ore to the plant. Some blasting is also required along the haul road between the fuel farm and the water treatment plant.

The various steps associated with blasting are: surface drilling with drilling machines, adding explosives to the drillholes, adding blasting mats, and detonating. Following the blast, the mats will be set aside and the blasted rock will be transported to the borrow pit. At this location, the jaw crusher, screen, and pebble crusher will be used to prepare the material for site development. Stockpiles of granular material of various sizes will be created. Excavators will load the jaw crusher and take the material from the pebble crusher to create the stockpiles. In addition, the equipment in the Flamb-1 borrow pit will move material from the active face to the pit entrance to ensure efficient loading of haul trucks.

The material from the Flamb-1 borrow pit will then be brought to the infrastructure to grade the surfaces. The ground will then be graded and, when required, membranes will be placed under the proposed infrastructure.

3. Diversion of construction water

To ensure the stability of the infrastructure and to minimize the contact of natural waters with the mine site, an encroachment in a watercourse will be required (CE18).

Where possible, temporary water retention ponds will be constructed first to collect surface and access road drainage. Thus, water runoff from cleared areas will be blocked by sediment barriers, which will limit the entrainment of sediment into nearby watercourses and water bodies. If it is not possible to construct the water retention ponds prior to the construction of the access roads, temporary sedimentation ponds will be constructed on site and the water controlled (whether “pretreated” and/or “delivered”) more than 30 m from a watercourse. Exposed surfaces will be vegetated or stabilized to avoid leaching of ground material into watercourses. The methods proposed will allow for the effective catchment and management of water during the construction period.

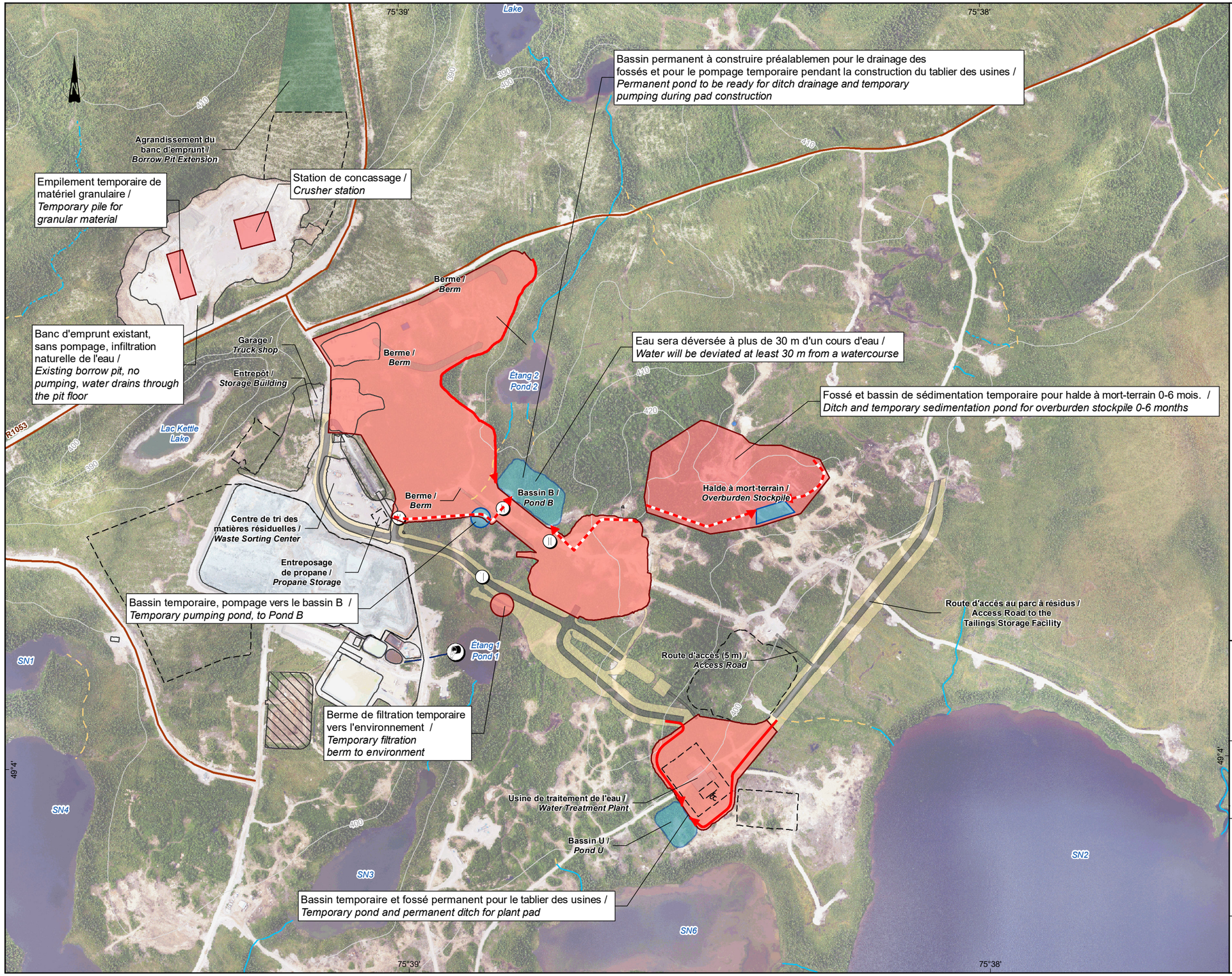
4. Construction of roads, ponds, and buildings

Once the site preparation work is completed, the buildings can be constructed on a concrete foundation and the interior work can begin. A temporary concrete plant, possibly located at the Flamb-1 borrow pit, will be required to complete this work. The permanent ponds may be constructed and the collection ditches connecting them will be built later.

The following table outlines the major stages of construction in the planned sequence.

Table 3-31 Main stages of the construction phase

Construction phase	Activity	Infrastructure
0-6 months	Clearing and stripping	Worker's camp Overburden stockpile Process plant Ore stockpile and crusher Backfill and filtration plant Ponds B, U, C, and C2
	Blasting and earthwork	
	Implementation of temporary water management measures	
	Construction of infrastructure	
6-12 months	Building foundations and structure assembly	Process plant Crushing area and silo Multi-service building Backfill and filtration plant Water treatment plant Ponds J, PAR1, and PAR2, and ditches
	Construction of permanent ponds	
	Clearing and stripping at the tailings storage facility	
12-18 months	Development inside the process plant, WTP, and filtration and paste backfill plant Development of the tailings storage facility	Process plant Paste backfill plant Filtration plant WTP Pumping stations and pipelines Tailings storage facility



Infrastructures connexes / *Related Infrastructures*

- Chemin d'accès principal / *Main road*

Composantes du projet / *Project Components*

Infrastructure existante / *Existing Infrastructure*

- Infrastructure actuelle / *Current infrastructure*
- Autorisée pour l'échantillonnage en vrac 2023-2024 / *Autorized for bulk sampling purpose 2023-2024*
- Qui sera retirée / *To be removed*

Infrastructures projetées / *Planned Infrastructures*

- Ponceau / *Culvert*
- Effluent final / *Final effluent*
- Fossé / *Ditch*
- Aire d'activité / *Activity area*
- Banc d'emprunt / *Borrow pit*
- Halde / *Stockpile*
- Route / *Road*

Hypsométrie / *Hypsometry*

- Courbe de niveau (10 m) / *Contour (10 m)*

Hydrographie / *Hydrography*

- Cours d'eau permanent / *Permanent watercourse*
- Cours d'eau intermittent / *Intermittent watercourse*
- Cours d'eau souterrain / *Underground watercourse*
- Canal / *Canal*

Gestion de l'eau - Période de construction / *Water Management - Construction Period*

- Fossé permanent / *Permanent ditch*
- Fossé temporaire / *Temporary ditch*
- Infrastructure / *Infrastructure*
- Bassin temporaire ou de rétention permanent à construire / *Temporary pond or permanent pond to be built*

OSISKO
MINIÈRE OSISKO

Projet minier Windfall - Étude d'impact sur l'environnement / *Windfall Mining Project - Environmental Impact Assessment*

Site minier Windfall, Eeyou Istchee Baie-James (Québec) / *Windfall Mining Site, Eeyou Istchee Baie-James (Quebec)*

Carte 3-8 / *Map 3-8*
Gestion de l'eau durant la période de construction 0-6 mois / *Water Management During Construction Period 0-6 Months*

Sources :
BDAT, 1/250 000, MRN Québec, 2002
BDTQ, 1/20 000, MRNF Québec, 2007
CanVec, 1/1 000 000, RNCan, 2020
CanVec Plus, 1/50 000, RNCan, 2015
SDA, 1/20 000, MERN Québec, 2020

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2023-03-20

Préparée par : M.-H. Brisson
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Vérifiée par : M.-H. Brisson
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La précision des limites et les mesures montrées sur ce document ne doivent pas servir à des fins d'ingénierie ou de délimitation foncière. Aucune analyse foncière n'a été effectuée par un arpenteur-géomètre. /Boundary accuracy and measurements shown on this document are not to be used for engineering or land delineation purposes. No land analysis was carried out by a land surveyor.

3.10 PROJECT TIMELINE

The major phases and milestones of the Windfall project are summarized in Table 3-32. Note that the dates presented are those presented in the Osisko project feasibility study. Some of the expected deadlines may be extended during the process. In all cases, for project planning purposes, the following dates were selected.

Table 3-32 Project timeline

Phase	Period
Inventories of the receiving environment	2018-2022
Submission of the feasibility study	Q1-2023
Submission of the environmental impact assessment	Q1-2023
Detailed engineering	Q4-2022 – Q2-2024
Environmental assessment process	Q2-2023 – Q2-2024
Issuance of COMEX authorization	Expected in Q2-2024
Obtaining permits/authorizations	Expected in Q2-2024
Start of construction	Q2-2024
Opening of the camp	Q3-2024
Commissioning of the concentrator	Q3-2025
End of construction	Q4-2025
Start of commercial production	Q4-2025
End of commercial production	Q4-2035
Mine reclamation	2036-2037
Post-closure follow-ups	2036-2047*

* Once all water analysis tests are compliant and there are no more exceedances of criteria.

3.11 EMPLOYMENT AND TRAINING

In total, approximately 500 Osisko employees will be required for Windfall project operations (Table 3-33). In addition, approximately 170 people will be employed by Osisko's subcontractors or contractors. During the construction period, there will be a maximum of 1,100 workers (Figure 3-21). Both the exploration camp (existing camp) and the new camp will be used during construction.

Most workers will do rotations of 15 days on site and 13 days off site, while a few will do 8 days on site and 6 days off site. Every Thursday, charter flights will bring workers from the Saint-Hubert, Quebec City, and Bagotville airports to the Lebel-sur-Quévillon airport. On the same day, some buses will transport workers from Rouyn-Noranda, Val-d'Or, and Senneterre to Lebel-sur-Quévillon, while other buses will take workers there from Chibougamau, Chapais, and Waswanipi. Workers arriving by charter plane and bus will be transported from Lebel-sur-Quévillon by bus to the Windfall site. The contractors' employees will also be transported by bus from Lebel-sur-Quévillon to the Windfall site. Busing workers reduces the number of vehicles on the roadways used to get to the Windfall site and increases safety for road users.

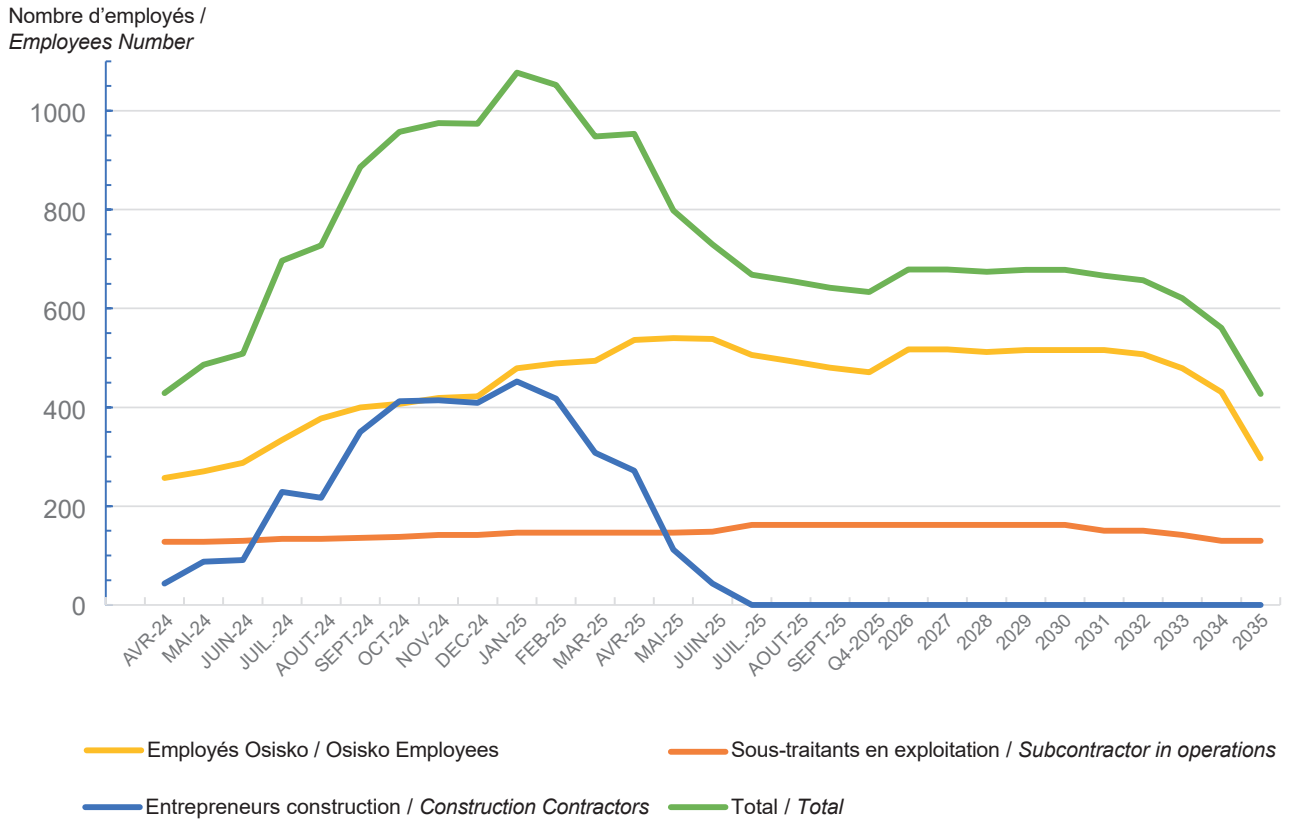


Figure 3-21 **Évolution de la main-d'oeuvre en phases de construction et d'exploration /**
Labor Evolution for Construction and Exploration Phases (réf. Document interne Osisko)

Table 3-33 Anticipated Osisko workforce for the operations phase

Department	Role	Total
Administration and services	Management	2
	Administration, communications, and IT	19
	Human resources and community relations	7
	Health and safety	5
	Surface services at the site	10
	Camp administration	5
	Subtotal	**48**
Underground mine operations	Maintenance	75
	Operations	202
	Supervision and other workforce	25
	Technical services (engineering and geology)	70
	Subtotal	**372**
Process plant and tailings filtration plant	Supervision and other workforce (lab)	35
	Operations	24
	Maintenance	10
	Subtotal	**69**
Environment and water management	Superintendents and supervisors	6
	Technicians, operators, and labourers	5
	Subtotal	**11**
Windfall mine project	**Total**	**500**

In Osisko's governance system, there is already a Human Resources policy available on the company's website (https://www.osiskomining.com/sustainability/workforce/). This commitment will be renewed and existing hiring and professional development policies will continue to be applied and updated as necessary.

Workers in unskilled trades will come from the surrounding areas by bus. Whether in the skilled or unskilled trades, Cree, then Jamesian, and lastly Abitibi employees will always be given preference under the regional hiring policy. In addition to promoting regional employment, the hiring of women will be prioritized as implicitly stated in Osisko's hiring and career development policy.

Osisko does not intend to set a hiring target for Cree workers, but aims to optimize the number and quality of employees who are beneficiaries of the JBNQA. Osisko is working to develop an *Impact and Benefit Agreement (IBA) with the host communities of* the Windfall project. This contractual document will contain the hiring and retention mechanisms for First Nations workers, the commitment to intercultural training for certain groups of employees, and the commitment to protect First Nations women against harassment.

General mining training and social partnership projects are already being developed by the Human Resources team. Osisko would like to get involved in vocational training with the Cree School Board and facilitate the hiring of members of the Cree community residing on the JBNQA territory. In addition to the projects under development, initiatives already in place were also presented in Chapter 8, namely the *Essentiel les mines* program and the mine-school of the AEQ mineral processing program run by the Commission scolaire de la Baie-James.

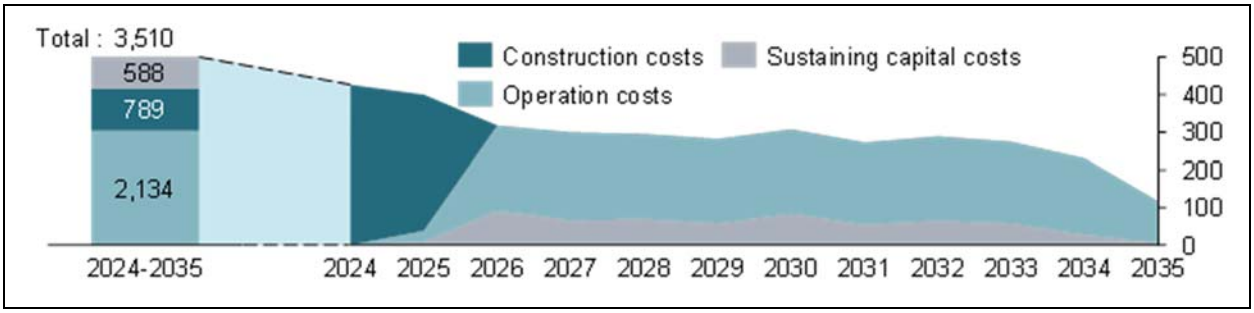
In addition to these training opportunities, the Responsible Procurement Policy will be applied to encourage mutually beneficial business opportunities for local stakeholders. Osisko's objective remains to establish ongoing relationships with local contractors and suppliers to increase efficiency in the company's supply chain.

3.12 ECONOMIC AND FISCAL BENEFITS

Aviseo Conseil (2023) conducted an analysis of the economic benefits of the Windfall project. The summary document including the methodology and details on certain elements can be found in Appendix 1-1.

3.12.1 WINDFALL MINE PROJECT EXPENDITURES

Capital expenditures (CAPEX) for the construction, operations, and closure phases of the Windfall mine site are estimated at $3,594 million by 2047, of which $3,510 million will be incurred by 2035. Figure 3-21 shows the expenditure intensity over time depending on project phase.



Source: Aviseo Conseil, 2023 (based on data in BBA Inc. et al., 2023 and internal Osisko Mining data).

Figure 3-22 Breakdown of capital expenditures (CAPEX) for the Windfall mine project

Capital expenditures fall into three broad categories, namely construction phase expenditures estimated at $789 million, sustaining capital expenditures estimated at $588 million, and mine site restoration and closure expenditures estimated at $83 million. In addition to capital expenditures, operations at the Windfall mine (OPEX) will require expenditures of $2,134 million.

The vast majority of the capital expenditures will be incurred between 2024 and 2035. In fact, expenditures for mine construction will be entirely incurred in 2024 and 2025, while expenditures for mine operations will be incurred between 2025 and 2035. Overall, mine operations expenditures—including Sustaining CAPEX—are expected to be $2,722 million.

3.12.2 ESTIMATED ECONOMIC AND FISCAL BENEFITS OF CAPITAL EXPENDITURES

Windfall project-related capital expenditures ("CAPEX"-including sustaining capital and restoration) are expected to contribute $545.4 million to GDP over the period 2024-2035 (Table 3-34). Fifty-four percent of the value added is expected to be generated during the construction phase (2024-2025). The salary and benefits component paid to workers will be responsible for 66% of the total economic contribution of the capital expenditures.

The Abitibi-Témiscamingue and Nord-du-Québec regions will be the major beneficiaries of the investment activities as it is estimated that 53% of the value added, or $287.8 million, will be generated in these regions.

The capital expenditures will also support a total of 4,917 full-time equivalent (FTE) jobs across Quebec, including 2,636 in the Abitibi-Témiscamingue and Nord du-Québec regions. These two regions will host 54% of the total jobs. In addition, of the 2,636 jobs, 642 will be located in the Nord-du-Québec region.

Table 3-34 Distribution of value added and jobs supported by capital expenditures (2024 to 2035) in millions of dollars

	Abitibi-Témiscamingue & Nord-du-Québec	Rest of Quebec	All of Quebec
Value added ($M)	287.8	257.6	545.4
In %	53%	47%	100 %
Jobs supported (FTE)	2,636	2,282	4,917
In %	54 %	46 %	100 %

Source: Aviseo Conseil (2023) (based on Osisko Mining's internal data and Eco Tec's cross-sector model).

Capital expenditures will generate $65.3 million in tax revenues for the Government of Quebec and $42.6 million for the Government of Canada (Table 3-35). Personal income tax will be the main source of revenue for both levels of government. It will account for 60% of tax revenues for the Quebec government and 89% for the federal government.

Table 3-35 Gross tax revenues of the governments of Quebec and Canada (2024 to 2035) in millions of dollars

	Government of Quebec	Government of Canada
Personal income tax	37.0	35.7
Health Services Fund (HSF)	11.8	N/A
Sales tax and specific taxes	12.7	4.4
Total	**61.5**	**40.1**

Source: Aviseo Conseil (2023) (based on Osisko Mining's internal data and Eco Tec's cross-sector model).

3.12.3 ESTIMATED ECONOMIC AND FISCAL BENEFITS OF THE OPERATIONS PHASE EXPENDITURES

Between 2024 and 2035, mine operations will contribute a total of $1,783 million to Quebec's GDP. Of this amount, $1,155 million will be generated directly in the Abitibi-Témiscamingue and Nord-du-Québec regions, or 65% of the value created. The remainder will be distributed throughout the various regions of Québec.

In addition, of the $1,783 million in value added generated in Quebec, $1,083 million will be in wages and benefits. Therefore, 61% of the wealth created through Windfall mine operations will be returned to Quebec workers as wages and benefits. Workers in the Abitibi-Témiscamingue and Nord-du-Québec regions will share $765 million in wages and benefits. More than 90% of this amount will be for workers directly employed by Osisko. These employees will work at the mine, but a certain proportion will not remain in the Nord-du-Québec region due to the limited pool of workers.

On an annual basis, operating expenditures ("OPEX") will generate an average of $148.6 million in GDP, as shown in Table 3-36. The Abitibi-Témiscamingue and Nord-du-Québec regions will be able to count on an average annual economic contribution of $96.2 million. Of this amount, the Nord-du-Québec region will be able to count on an economic contribution of $85.4 million, 92% of which will be due to direct effects. The indirect effects will mainly benefit the Abitibi-Témiscamingue region, which is home to a significant number of suppliers.

Table 3-36 Average annual value added and jobs supported by operating phase expenditures (2024 to 2035) in millions of dollars

	Abitibi-Témiscamingue & Nord-du-Québec	Rest of Quebec	All of Quebec
Value added	**96.2**	**52.4**	**148.6**
Direct	78.6	0.0	78.6
Indirect	17.7	52.4	70.0
Jobs	**635**	**382**	**1,017**
Direct[1]	475	0	475
Indirect	160	382	542

1 Direct jobs are counted entirely in the Nord-du-Québec region since the Windfall site is the place of work. The employees' places of residence could differ. This element is taken into account in the project's induced effects.
Source: Aviseo Conseil (2023) (based on Osisko Mining's internal data and Eco Tec's cross-sector model).

On an annual average basis, a total of 1,017 direct and indirect jobs will be supported during the mine operating period between 2024 and 2035 (Figure 3-22). Of this number, 475 jobs will be directly supported by Osisko and indirect jobs will account for an average of 542 FTE jobs per year.

The Abitibi-Témiscamingue and Nord-du-Québec regions will have an average of 635 jobs per year. While all the direct jobs will be in the Nord-du-Québec region, the indirect jobs will be mainly in Abitibi-Témiscamingue. It is estimated that an annual average of 70 indirect jobs will be supported in the Nord-du-Québec region by the mine's operating expenses. The following figure illustrates the annual breakdown of the added value generated by the operations phase and the jobs (2024-2035).

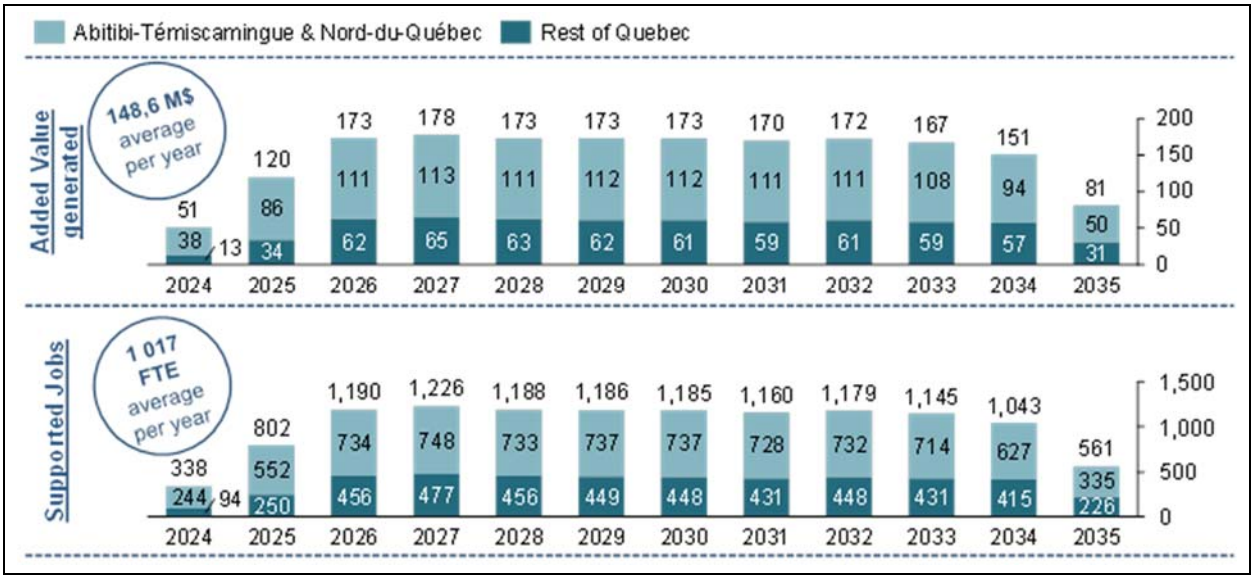


Figure 3-23 Annual breakdown of the value added generated by the operations phase and the jobs supported by the operating expenses (2024-2035)

Source: Aviseo Conseil (2023) (based on Osisko Mining's internal data and Eco Tec's cross-sector model).

These workers will share $90 million annually in salaries and benefits, of which $51 million will be paid directly to Osisko employees. Direct jobs will therefore have an average salary approaching $110,000 and indirect jobs, $72,000. In comparison, the 2022 average salary for workers was $62,500 in Nord-du-Québec and $61,000 in Abitibi-Témiscamingue. Thus, the jobs supported by the Windfall mine project's operating expenditures will benefit from average salaries that are up to 75% higher than those in these two regions.

Between 2024 and 2035, the operating expenditures will provide the Quebec government with fiscal benefits of $711.5M. Of this amount, direct tax revenues will account for $633.6 million, of which mining taxes will be the largest component (55%) and corporate income taxes (27%) the second largest. Indirect tax revenues will be $77.9 million between 2024 and 2035 (Table 3-37).

Over the same period, the Government of Canada would receive gross tax revenues of $332.8 million. The vast majority of tax revenues will come from direct effects (84%). Corporate income tax will contribute close to 60% of total tax revenues and personal income tax will contribute 37%.

In addition to tax revenues paid to the governments of Quebec and Canada, Osisko will pay $68.7 million in property and school taxes between 2024 and 2035, for an average annual amount of $5.9 million.

Table 3-37 Total gross tax revenues of the governments of Quebec and Canada (2024 to 2035) in millions of dollars

	Government of Quebec			Government of Canada		
	Direct	**Indirect**	**Total**	**Direct**	**Indirect**	**Total**
Personal income tax	79.0	47.2	**126.2**	78.4	45.6	**123.9**
Health Services Fund (HSF)	26.2	8.7	**34.9**	n/a	n/a	**n/a**
Sales tax and specific taxes	5.6	22.0	**27.6**	2.0	7.8	**9.7**
Personal income tax	173.4	n.d.	**173.4**	199.1	n.d.	**199.1**
Mining tax	349.2	n/a	**349.2**	n/a	n/a	**n/a**
Total	**633.6**	**77.9**	**711.5**	**279.5**	**53.3**	**332.8**

Source: Aviseo Conseil (2023) (based on Osisko Mining's internal data and Eco Tec's cross-sector model).

3.12.4 ESTIMATION OF INDUCED EFFECTS

As discussed earlier, the Windfall project will support thousands of jobs across Quebec throughout the construction, operations, and closure phases. In turn, employees with increased income from project-related activities will purchase goods and services (food, housing, recreation, etc.) in their regions with part of their earnings. These consumer expenditures will contribute to the regional and Quebec economy by creating value added and supporting other jobs.

It is estimated that consumer spending on goods and services by workers associated with the Windfall project will support 1,205 jobs in Quebec, 397 of which will be in the Abitibi-Témiscamingue and Nord-du-Québec regions. Since the induced jobs are supported by worker demand for goods and services, these jobs will be located mainly in local businesses and services. In addition to supporting induced jobs, Windfall's activities will generate an induced added value of nearly $121 million for Quebec, including more than $33 million in the Abitibi-Témiscamingue and Nord-du-Québec regions.

Finally, the induced tax benefits for the Quebec government will total more than $25.6 million, 75% of which would be associated with sales tax.

3.13 CLOSURE AND RECLAMATION

The objective of the mine site reclamation is to restore the site to a satisfactory state, ensuring that the environment as a whole can eventually return to normal. Satisfactory condition is defined in the *Guidelines for preparing mine closure plans in Quebec* (MERN, 2022) and consists of:

- eliminating unacceptable health risks and ensuring personal safety;
- limiting the generation and spread of contaminants that may affect the receiving environment and, in the long term, aiming to eliminate all forms of maintenance and follow-up;
- restoring the site to a visually acceptable condition;
- restoring the infrastructure site (excluding tailings and waste rock stockpile areas) to a condition compatible with future use.

Therefore, the restoration plan focuses on the restoration of areas affected by mining activities, i.e., roads, traffic, and work areas, buildings, ponds and ditches, the tailings storage facility, and the waste rock and overburden stockpiles. A copy of the restoration plan has been provided under separate cover to the EIA and will be submitted to the MRNF for analysis. At the Windfall mine site, the tailings and most of the waste rock lithologies are potentially acid generating (PAG) and leachable based on tests conducted in accordance with the *Guide de caractérisation des résidus miniers et du minerai* (MELCC, 2020) by WSP (Appendix 3-1).

Various activities are included in the restoration plan:

- Mine openings, i.e., ventilation raises, will be covered with a concrete slab and then backfilled with an inert granular material. Appropriate hazard signage will be installed;
- Access ramps to underground workings will be backfilled to seal off access. Appropriate signage will be installed;
- All buildings (mobile or permanent) and infrastructure that will not be useful for post-restoration follow-up will be moved off-site or dismantled. Regulation respecting the landfilling and incineration of residual materials chapter Q-2, r. 19), the dismantled waste material will be sent to an authorized disposal site. Metal, sheet metal, and wood will be recovered and disposed of at a licensed recycling site;
- All support infrastructure will be dismantled and sent to a licensed disposal site. This includes pipes and tanks for various uses. The sites where this infrastructure was used for the storage and transportation of hazardous materials will be characterized and decontaminated according to the environmental standards in force;
- A soil quality assessment for all potentially contaminated sites will be performed and corrective actions will be applied according to the requirements of *the Guide d'intervention - Protection des sols et réhabilitation des terrains contaminés* (Beaulieu M., 2021);
- All soils contaminated with oil, grease, and petroleum products beyond criterion "B" of the indicative criteria grid established by the MELCCFP will be treated on site or sent to an authorized disposal site;

- The land affected by the activities will be scarified to promote drainage and will be covered with a 150 mm layer of loose overburden from the overburden stockpile before being seeded to control erosion and restore the natural appearance of the site;
- The tailings storage facility is expected to be restored gradually prior to the end of operations. As such, phases 1 and 2 of the tailings storage facility will be restored during site operations. Phase 3 of the tailings storage facility will be restored at the end of the mine's life. The restoration concept is supported by engineering studies to verify the long-term stability of the tailings storage facility and its cover, in accordance with MERN's guide for the preparation of the mine site reclamation and rehabilitation plan (*Guide de préparation du plan de réaménagement et de restauration des sites miniers*; MERN, 2022). These studies have led to the proposal of corrective measures for the tailings storage facility to ensure its long-term stability. To prevent the generation of acid mine drainage, an engineered cover consisting of a geomembrane and granular material will be installed to limit water and oxygen infiltration. A minimum 150 mm thick layer of loose material from the overburden stockpile or construction work will be placed at the tailings storage facility before it is seeded. Provided stability criteria can be maintained, adjustments may be made to the surface of the tailings storage facility to better blend in with the surrounding landscape;
- The waste rock stored on the stockpile will first be covered with a layer of granular material to serve as a base for the geomembrane, which will then be covered with a protective layer of granular material and overburden before being seeded. The proposed cover is similar to the proposed tailings storage facility cover and is intended to prevent the generation of acid mine drainage;
- At the end of the mine life, it is expected that the overburden stockpile will be depleted to the extent possible by the completion of restoration work. It is possible, however, that the overburden stockpile will still contain material at the end of the mine life. Therefore, it will only be graded and seeded;
- The geomembrane under the infrastructure will be removed and the surface will be graded and seeded;
- No residual hazardous materials will be present on the site after exploration activities cease. All petroleum tanks and associated piping will be managed in accordance with applicable regulations. For example, all used oil will be collected, transported, and stored in accordance with current environmental standards;
- Maintenance and integrity follow-up over a five-year period following site restoration will include inspection of concrete slabs covering the openings, the physical integrity of engineered covers installed on the waste rock stockpile and tailings storage facility, as well as their geotechnical stability;
- Agronomic follow-up will be carried out over a minimum of five years following the revegetation of the site to verify the sustainability of the vegetation cover. If required, remedial work will be carried out in areas where revegetation is not satisfactory;
- Post-operational environmental follow-up will be conducted following the end of operations and during restoration work in accordance with the requirements of Section 2.10 of D019;
- Post-restoration environmental follow-up, i.e., after the restoration work, will be conducted for a minimum of ten years, in accordance with the requirements of Section 2.11 of D019;

— Ten years after the end of the restoration work, if the results of the water quality analyses are compliant, and following the approval of the MRNF, the ponds will be emptied and the sludge present at the bottom will be excavated and disposed of underground. The geosynthetics will be removed and the slopes of the ponds and ditches will be reshaped to restore the natural appearance of the site.

Since the design phase of the project, special attention has been paid to minimize the corrective work to be done during the restoration phase and to test the proposed restoration concepts by promoting, among other things, progressive restoration. Particular attention was also paid to identifying opportunities to minimize transportation distances on the site by optimizing the positioning of surface infrastructure. The details of the restoration work are presented in the restoration plan that will be submitted with the EIA to the MRNF.