Subject: Waste Management Technologies Feasibility Study

File Number: ACS2025-PWD-SWS-0003

Report to Environment and Climate Change Committee on 17 June 2025

and Council 25 June 2025

Submitted on June 6, 2025 by Alain Gonthier, General Manager, Public Works Department

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Ward: Citywide

Objet : Étude de faisabilité des technologies de gestion des déchets

Numéro de dossier : ACS2025-PWD-SWS-0003

Rapport présenté au Comité de l'environnement du changement climatique

Rapport soumis le 17 juin 2025

et au Conseil le 25 juin 2025

Soumis le 2025-06-06 par Alain Gonthier, Directeur général, Services des travaux publics

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Quartier : À l'échelle de la ville

REPORT RECOMMENDATION(S)

That the Environment and Climate Change Committee recommend that Council:

1. Receive, for information, the Feasibility Study for waste management technologies and other proven solutions that support the long-term solid waste diversion and management needs of the City of Ottawa, and support the goals of

the Council-approved Solid Waste Master Plan;

2. Direct staff to advance an in-depth evaluation of Scenario 1 (Status Quo and Private Facilities), Scenario 2 (Waste to Energy Incineration Facility), and Scenario 5 (Construct a New Landfill), as explained in this report and within the Feasibility Study; and,

3. Direct staff to report back with a recommendation and finalized business case for Ottawa's future waste management system, including decision-point timelines and budget implications, as soon as practical within the next Term of Council.

RECOMMANDATION(S) DU RAPPORT

Que le Comité de l'environnement et du changement climatique recommande au Conseil municipal :

1. de prendre connaissance, pour information, de l'Étude de faisabilité des technologies de gestion des déchets et des autres solutions mises à l'épreuve qui répondent aux besoins à long terme de la Ville d'Ottawa dans le réacheminement et la gestion des déchets solides et qui permettent d'atteindre les objectifs du Plan directeur de la gestion des déchets solides (PDGDS);

2. de demander au personnel de la Ville de mener au préalable une évaluation fouillée du scénario 1 (Statu quo et infrastructures privées d'élimination des déchets), du scénario 2 (Installation d'incinération pour la transformation des déchets en énergie) et du scénario 5 (Construction d'une nouvelle décharge), comme nous l'expliquons dans ce rapport et dans l'Étude de faisabilité;

3. de demander au personnel de déposer un rapport, ainsi qu'une recommandation et une analyse de rentabilité finalisée pour le futur système de gestion des déchets d'Ottawa, dont le calendrier des points de décision et les répercussions budgétaires, le plus tôt possible pendant le prochaine mandat du Conseil municipal.

EXECUTIVE SUMMARY

Assumption and Analysis

The purpose of this report is to provide Ottawa City Council with the Feasibility Study for

waste management technologies and other proven solutions that support Ottawa's long-term solid waste diversion and management needs and support the goals of the Council-approved Solid Waste Master Plan (ACS2024-PWD-SWS-0004). This report seeks further direction from Council to advance the in-depth evaluation of three of the five scenarios explored, and once complete, directs staff to report back with a recommendation and finalized business case for Ottawa's future waste management system, including decision-point timelines and budget implications, as soon as practical within the next Term of Council.

The City of Ottawa owns and operates the Trail Waste Facility Landfill (Trail). Trail is a key City asset, located at 4475 Trail Road, in the City's southwest end and has approved landfilling capacity of 16.9 million cubic metres. Trail began receiving waste in 1980 and was initially expected to receive waste for 20 years (until 2000). An expansion was approved in 2007 to add an additional 10 to 40 years. Through diversion program enhancements, airspace optimization and operational efficiencies, Trail is now (per the 2024 Annual Monitoring Report) forecasted to reach capacity between 2034-2035, based on status quo disposal rates.

Ottawa's new Official Plan projects a population of over 1.5 million people by 2053. Given this growth, the City anticipates a 31 per cent increase in the amount of waste that will require safe collection, management and disposal. To plan for this, Ottawa developed the SWMP which was approved by Ottawa City Council in June 2024.

The SWMP outlines 50 Actions to divert as much waste as possible from the landfill, recover resources and energy from the remaining garbage, and dispose of residual waste in an environmentally sustainable way, all while keeping services affordable. Actions supporting waste reduction and diversion, including the implementation of the City's new Curbside Waste Diversion Policy (ACS2024-PWD-SWS-0002), are underway.

Other Actions currently underway that support the Solid Waste Master Plan include:

- The expansion of the Trail Waste Facility Landfill within its existing boundary(ACS2023-PWD-SWS-0006);
- Material bans at Trail, including the ban of Industrial, Commercial and Institutional (IC&I) waste disposal starting July 1, 2025 (ACS2024-PWD-SWS-0004); and,

- The diversion of 60,000 tonnes of residential waste to private landfills, annually, starting in 2026 (ACS2023-PWD-SWS-0004).

Planning and implementing waste reduction and diversion Actions, imposing material bans, diverting waste to private landfills and exploring the possibility of a landfill expansion all help to delay the need for a long-term waste management solution; but they do not negate it.

In 2023, alongside tabling of the Draft Solid Waste Master Plan, Ottawa City Council directed staff through Motion NO 2023-08-06 to fast-track the exploration of proven technologies that could serve Ottawa's future waste management needs.The Motion resulted in advancing the feasibility study for Waste to Energy Incineration and Mixed Waste Processing as possible scenarios for Ottawa to consider for future waste management practices.

In response, Solid Waste Services retained technical consultants HDR Corporation and KPMG Consulting to develop a feasibility study for the following five waste management solutions:

- Scenario 1: Status Quo and Private Facilities
- Scenario 2: Waste to Energy Incineration Facility
- Scenario 3: Mixed Waste Processing Facility
- Scenario 4: Waste to Energy Incineration Facility and Mixed Waste Processing Facility
- Scenario 5: Construct a New Landfill

Exploring technology scenarios alongside proven and in-practice solutions, including the possibility of constructing a new landfill and diverting Ottawa's waste to private waste management facilities, was essential for comparator purposes and to provide full context to the decision framework.

The structured evaluation, incorporating technical, environmental, social and financial considerations, identified two top-ranked options: Scenario 1: Status Quo and Private Facilities and Scenario 2: Waste to Energy (WTE) Incineration Facility.

The WTE Incineration Facility was the highest ranked technology as it offers significant environmental benefits, including a 77 per cent landfill diversion rate and energy recovery, which aligns with the City's strategic priorities. However, the implementation

of a WTE Incineration Facility presents substantial capital costs ($497 million – $862 million), a complex regulatory approval process and divided public support. While WTE has the potential for long-term cost stabilization through energy revenue, its financial viability remains contingent on securing funding and identifying an appropriate delivery model to outline how the project will be planned, organized and implemented.

Under the Status Quo and Private Facilities scenario, the City would continue disposing of non-diverted waste at Trail until it reaches capacity, after which waste would be sent to a private waste facility for final disposal. This option tied for highest ranking; however, it exposes the City to long-term financial and environmental risks, including escalating landfill tipping fees, reduced airspace and/or capacity at regional waste facilities, limited control over disposal operations, and an increased risk of potentially higher GHG emissions as it is not known if the facility is a landfill with a poor landfill gas collection system, a yet to be built WTE incineration facility or another waste management facility. Nonetheless, it offers a minimal capital investment, regulatory simplicity, and ease of implementation.

This report recommends Council direct staff to advance an in-depth evaluation of Scenario 1 (Status Quo and Private Facilities), Scenario 2 (WTE Incineration Facility) and Scenario 5 (Construct a New Landfill). In recognition that a landfill will be required, regardless of whether WTE or MWP technologies are implemented, as both generate residual waste requiring disposal, staff recommend including Scenario 5 in the next steps of this project.

This report recommends that Scenario 3 and 4, both pertaining to MWP, not advance to the next phase. While MWP can be successful when all waste (garbage, organics, recycling) is disposed of in one bin, Ottawa has effective diversion programs where waste is separated by residents, creating a much cleaner garbage stream. The Feasibility Study only estimated an 8 per cent additional diversion from MWP, which will be further reduced as SWMP Actions are implemented and successfully adapted by residents. This could mean more than 92 per cent of incoming waste would still require landfilling. In addition to low diversion potentials, MWP ranked significantly lower compared to the WTE because of its high disposal costs and inconsistency with the SWMP. While the combination of MWP and WTE could yield a 79 per cent diversion rate, this is only two per cent higher than WTE alone, representing a large financial investment for marginal increased diversion potential. For this reason, the only technology recommended to move forward as a future waste management solution for Ottawa is Waste to Energy Incineration Facility (Scenario 2).

Upon Council’s receipt of this legislative report, staff will develop a recommendation and

finalized business case for Ottawa's future waste management system, including decision-point timelines and budget implications, as soon as practical within the next Term of Council. This will allow for the 10-year timeframe required for approvals, development and implementation of a new waste management solution, as explained in the report below.

Financial Implications

Upon receipt and direction from Council, staff would advance an in-depth evaluation of Scenario 1 (Status Quo and Private Facilities), Scenario 2 (WTE Incineration Facility) and Scenario 5 (Construct a New Landfill), to develop a recommendation and finalized business case for Ottawa's future waste management system. This work would be completed by the project's technical consultant HDR Corporation and would require approximately $600,000, which is already budgeted for within Solid Waste Services capital accounts.

Public Consultation/Input

The SWMP was developed through extensive engagement with Councillors, stakeholders and members of the public. Approaches to engagement varied and feedback from diverse perspectives was captured. Feedback on emerging technologies was used during the development of the SWMP and directed this Feasibility Study.

In general, SWMP engagement participants were hopeful about the potential for waste management technologies to produce 'win-win' outcomes by diverting waste, cutting pollution and creating energy at the same time. However, there were concerns about the potential financial impact of these new technologies, with additional concerns about the environmental and human impacts. It is worth mentioning that many people are opposed to any type of new technology altogether, preferring a focus on scenarios that prioritize and support reuse, reduction and recycling and community behaviour change.

Some of the major advantages identified through the engagement activities included environmental benefits through reducing the use of landfills, energy generation, diverting waste from landfill and thus increasing landfill life, inducing positive spillover effects like creating jobs, and the potential for partnerships and funding.

While participants identified several advantages, they also noted significant concerns. These include high costs associated with these technologies, the environmental implications of energy generation, pollution potential, risks associated with any new technologies, the City's experience with similar past projects and the potential to disincentivize waste reduction initiatives and behaviour changes.

Further engagement will be completed in the next steps and upon the finalization of the recommended new waste management system for the City of Ottawa.

Staff recognize that the City is at a critical juncture in terms of timelines and planning for the future of waste management. The City's Trail Waste Facility Landfill is forecasted to reach capacity between 2034-2035 if status-quo waste disposal continues. Recent policy approvals and implementation, including the implementation of SWMP Actions, sending waste to private facilities, banning Industrial, Commercial and Institutional Waste from Trail, implementing the new three-item garbage limit, should have the potential to extend the life of Trail by six years, forecasting 2039-2041 as projected timeline for reaching capacity. Up to an additional fifteen years of landfill life could be realized should the landfill receive EA approval to be expanded within its current boundary. The additional six years provides vital lead time for implementing a long-term solution. From approvals to implementation, long term solutions can take upwards of 10 years. Therefore, a decision on Ottawa's future waste management system is required by 2029. This would allow for a new landfill or technology to be developed, and assumes the above noted initiatives are successful in extending the life of Trail.

RÉSUMÉ

Hypothèses et analyse

L'objectif de ce rapport consiste à soumettre, au Conseil municipal d'Ottawa, l'Étude de faisabilité des technologies de gestion des déchets et d'autres solutions mises à l'épreuve qui répondent aux besoins à long terme de la Ville d'Ottawa dans le réacheminement et la gestion des déchets solides et qui permettent d'atteindre les objectifs du Plan directeur de la gestion des déchets solides (ACS2024-PWD-SWS-0004) approuvé par le Conseil. Dans ce rapport, nous demandons au Conseil municipal d'autres directives pour mener à l'avance l'évaluation fouillée de trois des cinq scénarios explorés, puis d'inviter le personnel de la Ville à en rendre compte en déposant une recommandation et une analyse de rentabilité finalisée du futur système de gestion des déchets d'Ottawa, dont le calendrier des points de décision et les répercussions budgétaires, le plus tôt possible pendant le prochaine mandat du Conseil municipal.

La Ville d'Ottawa est propriétaire et exploitant de la décharge du chemin Trail (la décharge du chemin Trail). Cette décharge est un actif essentiel de la Ville; située au 4475, chemin Trail, dans le secteur sud-ouest de la Ville, elle est dotée d'une capacité d'enfouissement approuvée de 16,9 millions de mètres cubes. On a commencé à livrer

des déchets dans cette décharge en 1980, et à l'origine, on s'attendait à prendre livraison des déchets pendant 20 ans (jusqu'en 2000). On en a approuvé l'agrandissement en 2007, pour en prolonger la durée utile de 10 à 40 ans de plus. Grâce aux améliorations apportées aux programmes de réacheminement, à l'optimisation de l'espace en hauteur et aux efficiences opérationnelles, la décharge du chemin Trail devrait, selon les prévisions (du Rapport annuel de surveillance 2024), atteindre le maximum de sa capacité entre 2034 et 2035, d'après les taux d'élimination des déchets du scénario du statu quo.

Selon le nouveau Plan officiel d'Ottawa, la population de la ville devrait être supérieure à 1,5 million d'habitants d'ici 2053. Compte tenu de cette croissance, la Ville s'attend à une augmentation de 31 % du volume de déchets qu'il faudra ramasser, gérer et éliminer en toute sécurité. En prévision de cette augmentation, Ottawa a mis au point le Plan directeur de la gestion des déchets solides (PDGDS), qui a été approuvé par le Conseil municipal en juin 2024.

Le PDGDS décrit dans leurs grandes lignes 50 actions destinées à réacheminer le plus fort volume de déchets possible au lieu de l'enfouir, à récupérer les ressources et l'énergie à partir du reliquat des déchets et à éliminer écodurablement les déchets résiduels, en veillant à ce que les services restent abordables. La Ville mène actuellement des actions pour assurer la réduction et le réacheminement des déchets, notamment en mettant en œuvre la Politique sur le réacheminement des déchets déposés en bordure de rue (ACS2024-PWD-SWS-0002).

Les autres actions menées à l'heure actuelle pour permettre de réaliser le Plan directeur de la gestion des déchets solides consistent à :

- agrandir dans le périmètre existant la décharge du chemin Trail (ACS2023-PWD-SWS-0006);
- interdire dans la décharge du chemin Trail l'élimination des déchets industriels, commerciaux et institutionnels (ICI) à partir du 1er juillet 2025) (ACS2024-PWD-SWS-0004);
- réacheminer dans des décharges privées 60 000 tonnes de déchets résidentiels par an à partir de 2026 (ACS2023-PWD-SWS-0004).

La planification et la mise en œuvre des actions consacrées à la réduction et au réacheminement des déchets, l'imposition des interdictions sur certaines matières, le réacheminement des déchets dans des décharges privées et l'étude de la possibilité

d’agrandir la décharge sont autant d’actions qui permettent de retarder le besoin d’une solution à long terme dans la gestion des déchets, sans toutefois permettre d’éviter de répondre à ce besoin.

En 2023, en déposant le Plan directeur de la gestion des déchets solides, le Conseil municipal d’Ottawa a demandé au personnel, dans la motion nº 2023-08-06, d’accélérer l’étude des technologies qui ont fait leurs preuves et qui pourraient répondre aux besoins projetés d’Ottawa dans la gestion des déchets. Cette motion a permis de réaliser à l’avance l’Étude de faisabilité sur l’incinération pour la transformation des déchets en énergie et le traitement des déchets mixtes, qui sont autant de scénarios envisageables sur lesquels Ottawa doit se pencher pour adopter éventuellement ces pratiques de gestion des déchets.

C’est pourquoi les Services des déchets solides ont fait appel à des cabinets d’experts-conseils techniques, soit HDR Corporation et les Services-conseils KPMG, pour mettre au point une étude de faisabilité des cinq solutions suivantes de gestion des déchets :

- Scénario 1 : Statu quo et installations privées;
- Scénario 2 : Installations d’incinération pour la transformation des déchets en énergie;
- Scénario 3 : Installations de traitement des déchets mixtes;
- Scénario 4 : Installations d’incinération pour la transformation des déchets en énergie et installations de traitement des déchets mixtes;
- Scénario 5 : Construction d’une nouvelle décharge.

Pour permettre d’établir des comparaisons et pour donner tout le contexte permettant d’encadrer les décisions, il a fallu se pencher sur les scénarios technologiques de même que sur les solutions qui ont fait leurs preuves et qu’on a mises en application, dont la possibilité de construire une nouvelle décharge et de réacheminer les déchets d’Ottawa dans des installations privées de gestion des déchets.

L’évaluation structurée, dans laquelle on a tenu compte des considérations techniques, environnementales, sociales et financières, a permis de cerner deux options prioritaires : le scénario 1 (Statu quo et installations privées) et le scénario 2 (Installations d’incinération pour la transformation des déchets en énergie [TDE]).

L’installation d’incinération pour la TDE a été la technologie la mieux cotée, puisqu’elle apporte d’importants avantages environnementaux, dont un taux de réacheminement des déchets de 77 % et la récupération de l’énergie, ce qui cadre avec les priorités stratégiques de la Ville. Or, la mise en œuvre des installations d’incinération pour la TDE donne lieu à des dépenses en immobilisations substantielles (comprises entre 497 millions et 862 millions de dollars), à un processus d’approbation réglementaire complexe et à une division de l’opinion publique. Bien que la TDE puisse assurer à long terme la stabilisation des coûts grâce aux revenus apportés par l’énergie, sa viabilité financière reste tributaire du financement et de la définition d’un modèle de réalisation approprié pour décrire comment le projet sera planifié, organisé et mis en œuvre.

Dans le scénario du statu quo et des installations privées, la Ville continuerait d’enfouir dans la décharge du chemin Trail les déchets non réacheminés jusqu’à ce que cette décharge atteigne le maximum de sa capacité; par la suite, les déchets seraient livrés dans un établissement privé de gestion des déchets pour y être finalement éliminés. Cette option a été notée au premier rang, sur un pied d’égalité avec une autre option; or, elle expose la Ville à des risques financiers et environnementaux à long terme, dont la hausse des frais d’enfouissement dans la décharge, la réduction de l’espace en hauteur ou de la capacité des installations régionales de gestion des déchets, le contrôle limité exercé sur les opérations d’élimination et le risque accru de hausse potentielle des émissions de GES, puisqu’on ne sait pas si l’installation sera une décharge dont le système de collecte des gaz sera médiocre, s’il s’agira d’une installation d’incinération pour la TDE à bâtir ou s’il faudra aménager une autre installation de gestion des déchets. Toujours est-il que cette option prévoit un investissement minimal dans les infrastructures, qu’elle assure la simplicité dans la mise en conformité à la réglementation et qu’elle est facile à mettre en œuvre.

Dans ce rapport, nous recommandons au Conseil municipal de demander au personnel de mener d’avance une évaluation fouillée du scénario 1 (Statu quo et installations privées), du scénario 2 (Installation d’incinération pour la TDE) et du scénario 5 (Construction d’une nouvelle décharge). En sachant qu’il faudra compter sur une décharge, qu’il s’agisse de faire appel à la technologie de la TDE ou à la technologie du TDM, puisque ces technologies génèrent toutes deux des déchets résiduels qu’il faut éliminer, le personnel de la Ville recommande d’inclure le scénario 5 dans les prochaines étapes de ce projet.

Dans ce rapport, nous recommandons de ne pas enchaîner avec la phase suivante les scénarios 3 et 4, qui se rapportent tous deux au TDM. Bien que le TDM puisse être fructueux lorsqu’on élimine tous les déchets (ordures, matières organiques et matières

recyclables) dans le même bac, Ottawa s'est dotée de programmes de réacheminement efficaces, dans le cadre desquels les résidents séparent les déchets, ce qui crée un courant de déchets beaucoup plus propre. Dans l'Étude de faisabilité, nous n'avons estimé qu'à 8 % le taux supplémentaire de réacheminement du TDM, et ce taux sera encore réduit lorsque les actions du PDGDS seront mises en œuvre et que les résidents auront réussi à les adapter. Autrement dit, il se pourrait qu'on doive toujours enfouir plus de 92 % des déchets entrants. Outre les faibles potentiels de réacheminement, le TDM a été nettement moins noté que la TDE en raison de ses frais élevés d'élimination et parce que cette méthode ne concorde pas avec le PDGDS. Si dans l'ensemble le TDM et la TDE peut donner un taux de réacheminement de 79 %, il s'agit seulement de 2 % de plus que la TDM à elle seule, ce qui représente un important investissement financier pour un potentiel de réacheminement légèrement augmenté. C'est pour cette raison que l'incinération pour la transformation des déchets en énergie (scénario 2) est la seule technologie recommandée comme solution projetée pour la gestion des déchets.

Lorsque le Conseil municipal aura pris connaissance de ce rapport législatif, le personnel mettra au point une recommandation et une analyse de rentabilité finalisée pour le système projeté de gestion des déchets d'Ottawa, dont le calendrier des points de décision et les répercussions budgétaires, le plus tôt possible pendant le prochaine mandat du Conseil municipal. Nous pourrons ainsi tenir compte du délai de 10 ans nécessaire pour les approbations et pour l'élaboration et la mise en œuvre d'une nouvelle solution de gestion des déchets, comme nous l'expliquons dans le rapport ci-après.

Répercussions financières

Dès que le Conseil le lui aura demandé, le personnel mènerait d'avance une évaluation approfondie du scénario 1 (Statu quo et installations privées), du scénario 2 (Installations d'incinération pour la transformation des déchets en énergie) et du scénario 5 (Construction d'une nouvelle décharge), afin de mettre au point une recommandation et une analyse de rentabilité finalisée pour le système projeté de gestion des déchets d'Ottawa. Ces travaux seraient confiés à l'expert-conseil technique du projet, soit HDR Corporation, et se chiffreraient à 600 000 $ environ, somme qui est déjà budgétée dans les comptes de dépenses en immobilisations des Services des déchets solides.

Consultation et apport du public

Le PDGDS est le fruit d'une vaste consultation auprès des conseillers municipaux, des parties prenantes et du public. On a adopté différentes approches dans cette consultation et capté les commentaires exprimés selon les divers points de vue. Dans l'élaboration du PDGDS, nous nous sommes inspirés des commentaires sur les technologies émergentes, qui ont orienté l'Étude de faisabilité.

En règle générale, les participants à la consultation sur le PDGDS misaient sur le potentiel des technologies de gestion des déchets afin de produire des résultats qui ne font que des gagnants, en réacheminant les déchets, en réduisant la pollution et en produisant de l'énergie dans le même temps. On s'inquiétait toutefois de l'impact financier potentiel de ces nouvelles technologies, et on a exprimé d'autres inquiétudes à propos des répercussions environnementales et humaines. Il est utile de mentionner que nombreux sont ceux qui s'opposent d'emblée à tous les nouveaux types de technologies nouvelles, en préférant miser sur des scénarios qui priorisent et favorisent la réutilisation, la réduction et le recyclage des déchets, ainsi que le changement de comportement dans la collectivité.

Les bienfaits environnementaux apportés par la réduction de l'utilisation des décharges, par la production de l'énergie, par le réacheminement des déchets au lieu de les enfouir et par le fait même, grâce à l'accroissement de la durée utile de la décharge, font partie des grands avantages constatés dans les activités de consultation, ce qui induit des effets secondaires positifs comme la création d'emplois et le potentiel de partenariats et de financement.

Si les participants ont fait état de plusieurs avantages, ils ont aussi exprimé d'importantes inquiétudes. Ces inquiétudes portent entre autres sur les coûts élevés associés à ces technologies, sur les répercussions environnementales de la production de l'énergie, sur le potentiel de pollution, sur les risques associés aux technologies nouvelles, sur l'expérience de la Ville dans des projets comparables déjà réalisés et sur la possibilité de décourager les initiatives de réduction des déchets et les changements de comportement.

Une nouvelle consultation se déroulera dans les étapes suivantes et lorsqu'on aura finalisé le nouveau système de gestion des déchets recommandé pour la Ville d'Ottawa.

Le personnel sait que la Ville se situe à un point de jonction décisif du point de vue des délais et de la planification de la gestion des déchets. La décharge du chemin Trail de la Ville devrait atteindre le maximum de sa capacité d'ici 2034 et 2035 si on maintient le statu quo dans l'élimination des déchets. Les politiques récemment approuvées et mises en œuvre, dont les actions du PDGDS, la livraison de déchets dans des

installations privées, l'interdiction d'enfouir les déchets industriels, commerciaux et institutionnels dans la décharge du chemin Trail et l'application de la nouvelle limite de trois articles devraient permettre d'augmenter de six ans la durée utile de la décharge du chemin Trail, ce qui permet de fixer à 2039-2041 l'horizon projeté pour atteindre le maximum de la capacité de cette décharge. On pourrait augmenter encore de 15 ans la durée utile de la décharge si l'autorisation délivrée dans le cadre de l'évaluation environnementale permet d'agrandir cette décharge dans son périmètre actuel. Ces six années supplémentaires représentent un délai d'exécution essentiel pour mettre en œuvre une solution à long terme. On peut calculer une durée de plus de 10 ans entre l'approbation et la mise en œuvre de solutions à long terme. Il faut donc prendre d'ici 2029 une décision sur l'avenir du système de gestion des déchets d'Ottawa, ce qui permettrait d'aménager une nouvelle décharge ou de faire appel à une nouvelle technologie, en supposant que les initiatives évoquées ci-dessus permettront d'étendre la durée utile de la décharge du chemin Trail.

BACKGROUND

The City of Ottawa (the City) - the Nation's capital and sixth largest City in Canada - is in the process of implementing a 30-Year SWMP which was approved by Ottawa City Council in June 2024 (ACS2024-PWD-SWS-0004). Ottawa's population is expected to reach 1.5 million by 2053, and the amount of waste the City will need to manage is forecasted to increase by 31 per cent. The City-owned Trail Waste Facility Landfill is estimated to reach capacity between 2034 and 2035, if today's disposal habits remain the same. To address the need for a long-term waste management solution, staff developed Ottawa's new Solid Waste Master Plan.

Preserving the Life of the Trail Waste Facility Landfill

The City of Ottawa owns and operates the Trail Waste Facility Landfill (Trail) as its disposal facility for municipal solid waste. Trail has been in operation since 1980, has a total approved capacity of approximately 16.9 million cubic metres and accepts approximately 225,000 tonnes of mixed (garbage) municipal solid waste annually. As explained through Inquiry Response ECCC 2023-04, landfill capacity is approved by the Ministry of Environment, Conservation, and Parks (MECP) in cubic meters based on final contours of space. The rate at which airspace is consumed is dependent on a variety of factors, including but not limited to:

- Tonnage received;

- Settlement of waste mound;
- Diversion policies and regulations;
- Pre-processing equipment (shredding waste or sorting waste);
- Equipment and operations (number of compactors, efficiency of compacting);
- Feedstock (the type of waste accepted at the landfill);
- Economy (quantity, construction development, packaging of items purchased); and,
- Climate.

Landfills are highly engineered operations and parameters vary significantly from landfill to landfill, and year to year as well. As of the end of 2024, the Trail Waste Facility Landfill has approximately three million cubic metres of capacity remaining and could reach capacity between 2034 and 2035 with status quo disposal rates.

As explained below, various Actions approved through the Solid Waste Master Plan (SWMP) are underway to address the dwindling site life of Trail, with a focus on reducing the amount of waste requiring disposal, and diverting as much avoidable waste as possible from the landfill. In addition to reduction and diversion efforts, other key actions are underway to extend the life of Trail:

- In 2023, concurrent to the SWMP's development, Ottawa City Council directed staff to begin the Individual Environmental Assessment (EA) process with the MECP for the expansion of Trail, within the existing landfill property boundary (ACS2023-PWD-SWS-0006). This project could take upwards of 10 years to complete, and offers the potential opportunity to extend the life of Trail by up to 15 years. At the time of the 2023 report tabling, staff anticipated the expansion could provide eight additional years of landfill life based on a preliminary report conducted by Dillon Consulting Ltd in 2021. Since 2023, the project's technical consultant, WSP, has presented additional development area opportunities within the landfill property boundaries as well as updated disposal projections, increasing the forecasted airspace. Up to 15 years of additional landfill life could be achieved if the EA expansion is approved by the MECP, in its entirety, and successfully implemented. The EA process is well-underway and the first of

two primary public engagement sessions are complete. Staff are finalizing the Terms of Reference including feedback received and will be submitting for approval to the MECP in Q4 2025.

- In 2024, Ottawa implemented the new Curbside Diversion Policy (ACS2024-PWD-SWS-0002), reducing the set-out allowance of curbside garbage from six items to three items, bi-weekly. This change supports increased use of diversion programs including the City's recycling and organics programs, and reduces the average amount of garbage disposed of at Trail.

- In 2025, the City of Ottawa is implementing material bans at the Trail Waste Facility Landfill as part of the approved Solid Waste Master Plan (ASC2024-PWD-SWS-0004). Starting July 1, waste from the Industrial, Commercial & Institutional (IC&I) sector will no longer be permitted for disposal at Trail. IC&I waste is bulky and hard to compact which takes up airspace much quicker than residential waste. Approximately 24,000 tonnes of IC&I is disposed of at Trail annually; with this ban in place, it could extend the life of Trail by approximately one year.

- In 2026, as approved through the 2026 Residential Curbside Collection Contract report (ACS2023-PWD-SWS-0004), Ottawa will send one third (60,000 tonnes) of residential waste to private landfills, annually. This is expected to extend the life of Trail by up to two years with the potential for more if diversion efforts are increased. Further, by using private landfills in the west and east end, garbage can be processed closer to where it is collected, increasing collection efficiencies (mitigating collection cost increases), by reducing the number of kilometers travelled which in turn reduces fuel costs and provides for greenhouse gas (GHG) emissions reductions as opposed to hauling it to Trail.

The above listed projects support the goal of the SWMP to prolong the life of Trail as long as possible. These, in combination with efforts to increase diversion, reuse and recycling, and reduce unnecessary waste going to Trail for disposal will all help to extend its life expectancy; however, a long-term waste management system will still be required.

Developing Ottawa's Solid Waste Master Plan

The SWMP provides direction to sustainably manage Ottawa's waste with various

initiatives aimed at:

- diverting as much waste as possible from the landfill through waste reduction and increased use of diversion programs (recycling and organic);
- recovering maximum resources and energy from the waste remaining once diversion is optimized; and,
- disposing of residual waste in an environmentally sustainable way;

all while keeping waste management affordable for Ottawa's residents. The City recognizes that there is no single solution to addressing future waste management challenges and developed the SWMP to address these issues through a multi-pronged approach.

Solid Waste Services took a phased approach to developing the Solid Waste Master Plan and completed extensive engagement throughout each phase of development. The Solid Waste Master Plan's scope covers the collection and management of waste from curbside-residential and multi-residential properties, parks and other public spaces, City facilities and operations, and existing partner programs.

Several factors that were considered identifying scenarios for Ottawa's future waste management system, included:

- the role of all three levels of government in Canada (i.e. federal, provincial, and municipal);
- the impacts of climate change;
- leveraging innovation and technology alternatives to traditional methods of waste processing and disposal; and,
- consideration of the waste management hierarchy with the aspirational goal of moving the City closer to its Zero Waste vision for the future.

In 2019, Council approved the development of a Solid Waste Master Plan which provides the framework and direction for waste management over the short (0-5 years), medium (5-10 years), and long (10and years) term.

In 2020, Council received the Phase 1 legislative report. Following receipt, staff completed Engagement Series 1 and worked with the project's technical consultant to determine Ottawa's future waste needs, scenarios to address those needs, and an evaluation tool to determine which scenarios would be best suited

to address those needs based on a triple bottom line evaluation process.

In 2021, Council approved the Phase 2 legislative report, including the SWMP's vision statement, guiding principles and goals. This report provided members of Council with key information relating to the City's future waste management needs, a long list of high-level scenarios to address these needs and the evaluation process to be used to evaluate the long list of scenarios, as developed by the SWMP's technical consultants, in conjunction with the SWMP's Council Sponsors Group, key City of Ottawa staff and stakeholders. Staff then completed the triple bottom line evaluation of the options, generating the Actions considered for inclusion in the SWMP, and conducted Engagement Series 2.

Engagement Series 2 engaged residents, stakeholders and equity-denied groups on specific scenarios that will be implemented through the SWMP. Participants were asked to provide input on the possible Actions for implementation to better inform the SWMP to help work toward the Council-approved goal of a Zero Waste Ottawa. As outlined in the 2019 Roadmap report, Council approved the 5Rs Waste Management Hierarchy as a guide for developing the SWMP. This conceptual framework rethinks the well-known 3Rs Waste Management Hierarchy of "Reduce, Reuse, Recycle" and looks at the totality of a products or services' environmental impact – from raw material extraction, processing and manufacturing, to distribution, usage and disposal. Staff worked with the project's technical consultant to ensure this philosophy is embedded in the SWMP and is being followed throughout the development of and forthcoming refreshes of the SWMP. Feedback received through engagement reinforced the desire to prioritize Actions to reduce waste, divert waste, reuse waste, and recycle waste.

In recognition that the Actions will only delay, rather than eliminate, the need for a new long-term waste management solution, during the tabling of the Draft SWMP, staff were directed to advance the Feasibility Study and business case for the MWP and WTE Incineration Actions (Motion NO 2023-08-06). The Waste Recovery and/or Treatment Facility Study Action Suite (in which the above Action falls) recommends the City advance a Feasibility Study and Business Case during the short-term to identify a technology(ies) that can reduce the amount of waste sent to landfill and potentially recover additional resources and energy.

The SWMP and final Engagement Series continued to completion, and, in June 2024, Ottawa City Council approved the City's new Solid Waste Master Plan. Concurrently, staff advanced work to explore waste technology scenarios as

directed to through the above-mentioned Motion. The SWMP is now being implemented and positive trends are already transpiring in Ottawa's waste management system.

Motion: Advancing Feasibility Study for Alternative Technologies for Waste Management

One of the SWMP goals is to "extend the life of Trail significantly beyond its existing anticipated end of life to eliminate the need for a new residential landfill". The Trail Waste Facility Landfill is a key City asset and could reach capacity within the next decade if scenarios to divert and manage waste, and preserve airspace, are not actioned as soon as possible.

Prior to the tabling of the final SWMP, a Motion was tabled directing staff to begin the Feasibility Study and business case for alternative technologies for waste management ahead of the timelines outlined in the Draft SWMP. The Motion was carried at Council in December 2023.

The Motion directed staff to:

- Begin the Feasibility Study and business case for alternative technologies for waste management that are available, in operation, proven for managing and diverting municipal waste from landfills, that meet or exceed all current applicable environmental regulations, and that align with the SWMP's vision, guiding principles and goals
- Include a fulsome triple bottom line evaluation of the environmental, social and financial considerations and engage members of the public and key stakeholders on the completion of the terms of reference
- Prioritize technologies that have the greatest impact on reducing Greenhouse Gas (GHG) emissions
- Begin consultation and issue scoping with the MECP to ensure any considerations and concerns are incorporated
- Specifically seek to learn from the experiences of other municipalities in Ontario that have implemented similar solutions
- Take advantage of any opportunities that may exist to expedite the process without compromising the rigour and quality of the overall analyses

- Report back to Council during Q2 2025

Solid Waste Services retained HDR Corporation (HDR) and KPMG Consulting to conduct the Feasibility Study. As the Feasibility Study neared completion, it became apparent that further direction from Council would be required prior to the finalization of the business case. This is to ensure Council's concurrence with the Feasibility Study findings ahead of staff completing a final, in-depth analysis of highest-ranked scenarios and forming a final recommendation for Ottawa's future waste management system. An overview of the Feasibility Study's development and the recommended scenarios for advancement are outlined in the discussion section before, and further in the Feasibility Study appended to this legislative report as Supporting Document 1.

DISCUSSION

The purpose of this report is to provide the Feasibility Study for waste management technologies that are available, in operation, proven for managing and diverting municipal waste from landfills, that meet or exceed all current applicable environmental regulations, and that align with the Council-approved SWMP vision statement, guiding principles and goals, as directed by Council on December 6, 2023.

Upon direction from Council to advance this work ahead of the SWMP timelines, staff retained technical consultants HDR Corporation and KPMG Consulting to compare Waste to Energy (WTE) Incineration Facility, Mixed Waste Processing (MWP) Facility, acquiring a new landfill, and disposing of Ottawa's residential waste at privately-owned waste facilities once the City's Trail landfill reaches capacity as possible scenarios for Ottawa's future waste management system. The waste management landscape is dynamic, and ever evolving. Exploring technology options alongside proven and in-practice solutions, including the possibility of constructing a new landfill and diverting Ottawa's waste to private landfill, was essential for comparator purposes and to provide the full context of waste management system options.

Implementing a New Waste Management System

In Ontario, landfill capacity is dwindling and expected to be exhausted across the province within the next nine years. Ontario has 805 active public and private sector landfills, with only 15 landfills holding 82 per cent of the remaining capacity. This further emphasizes the value of the asset that is the City's Trail Waste Facility Landfill.

While recent projections estimate Trail will reach capacity within the next decade, various initiatives are underway with the possibility to extend its life by over six years,

these include:

- The ban of IC&I waste disposal at Trail which could result in one additional year of landfill life;
- Redirecting 60,000 tonnes of waste, annually, to private landfill, which could result in two additional years of landfill life; and.
- Waste reduction and diversion efforts which could result in four additional years of landfill life.

Additionally, work on the Individual Environmental Assessment for the expansion of Trail within its current boundaries continues. This expansion could provide 15 additional years of landfill life if approved and successfully implemented. However, while this is promising, the additional capacity was not included in the evaluation of options given the uncertainty of its actuality. At the time of the 2023 report (ACS2023-PWD-SWS-0006) tabling, staff anticipated the expansion could provide eight additional years of landfill life based on a preliminary report conducted by Dillon Consulting Ltd in 2021. Since 2023, the project's technical consultant, WSP, has presented additional development area opportunities within the landfill property boundaries as well as updated disposal projections, increasing the forecasted airspace. The first stage of the EA process is well-underway and the first of two primary public engagement sessions are complete. WSP and staff are finalizing the Terms of Reference including feedback received and plan to submit a final draft to the Ministry in Q4 2025 for approval, in order to proceed to the EA stage.

As realized through the Individual Environment Assessment currently underway for Trail's expansion, the timeframe required for approvals, construction, and operationalization of a long-term waste management solution, regardless of whether a new landfill or technology is developed, is approximately 10 years. The process and timeline are set by the MECP and is largely beyond the control of the City.

To ensure the City of Ottawa is best positioned to decide on Ottawa's long term waste management solution as other projects are underway or being implemented, staff have completed a Feasibility Study on five possible scenarios for Council to consider. The completion of a Feasibility Study is a critical step in any significant future planning process. The sections below provide details on the components of the Feasibility Study and recommend next steps for finalizing a recommendation for Ottawa's future long-term waste management system. The Feasibility Study can be found appended to this report at Supporting Document 1.

Overview of Feasibility Study

The Feasibility Study evaluated the two waste management technologies identified in the SWMP and compared them to familiar, proven and in-practice disposal options. In total, five scenarios were identified and explored through this Feasibility Study:

- **Scenario 1: Status Quo and Private Facilities**
    - City continues to dispose of non-diverted waste for final disposal at Trail until it reaches capacity and then disposal at a private waste facility.
- **Scenario 2: WTE Incineration Facility**
    - City builds a new WTE incineration facility that can process all post-recycled residual waste and recover energy with disposal of rejects and ash residue at a private waste facility.
- **Scenario 3: MWP Facility**
    - City builds a MWP facility that can process all of the City's waste, recover additional recyclables and organics, and dispose of remaining residual waste at a private waste facility.
- **Scenario 4: WTE Incineration and MWP Facilities**
    - City builds a MWP facility to recover additional recyclables and organics and builds a WTE incineration facility to process and recover energy from the remaining residual waste. Rejects and ash residue from WTE will be disposed of at a private waste facility.
- **Scenario 5: Construct a New Landfill**
    - City builds a new greenfield landfill within the region to take all non-recyclable residuals after Trail reaches capacity.

The objective of the Feasibility Study is to evaluate and prepare a comprehensive, up-to-date, and substantiated comparison of the five possible scenarios identified to determine which scenario (or combinations of scenarios) could be commercially deployed and successfully integrated into the City's future residual waste management system. To meet this objective, the Feasibility Study uses a stepwise approach where each step in the process involves a greater level of detail to successively refine and rank the list of alternative residual waste management scenarios. Table 1: Approach and Organization, provides the steps taken to develop the Feasibility Study.

Table 1: Approach and Organization

Section	Approach

City-Generated Waste Characteristics	Presents waste and diverted materials quantity and composition estimates using data from existing City of Ottawa studies and plans (specifically, the SWMP). Identifies waste and diverted material classes that could be directly diverted or processed for use as a WTE and MWP technology feedstock.
Overview of Scenarios and Background Summary	Presents a summary overview of the detailed information provided in standalone Technical Memo #1 that describes each of the five scenarios being evaluated, including the WTE and MWP technology scenarios, plus best management practices, and current industry trends.
Overview of Siting and Approvals Requirements	Presents a summary overview of the detailed information provided in standalone Technical Memo #2 that defines the general siting criteria and the varied planning and approvals requirements for each scenario.
Overview of Project Delivery Models and Funding Opportunities	Presents a summary overview of the detailed information provided in standalone Technical Memo #3 that focuses on the varied project delivery models (the way a project is planned, organized, and carried out) and potential funding opportunities available to each scenario, as well as provided a summary of the independent market sounding that was performed to inform some of the conclusions in the technical memos and this Feasibility Study.
Evaluation Methodology and Approach	Presents a summary overview of the detailed information provided in standalone Technical Memo #4 that summarized the criteria and methodology that was used to evaluate each scenario and perform a quadruple bottom line analysis that included environmental, social, financial and technical considerations.
Evaluation Summary, Conclusions, and Recommendations	Presents a summary of the evaluation, including how each scenario was ranked in comparison to each other, as well as provides conclusions, recommendations, risks, and potential next steps in pursuing one or a combination of solid waste management scenarios.

Detailed within this legislative report are City-waste characteristics as well as future waste projections. An overview of each Scenario explored, including their description, financial analysis and environmental assessments is also provided. The Feasibility Study appended to this legislative report as Supporting Document 1 contains four Technical Memoranda that include key information on each phase on the study's development.

Waste Characteristics

Waste and diverted materials quantity and composition estimates (or waste characteristics) are key planning elements in development of long-term waste management projects. The planning elements are important in sizing waste management facilities to ensure that sufficient capacity is allowed for disposal, material handling, processing, energy generation (if applicable), and process by-product/residue management. The following elements can significantly affect design and operation of the scenarios being considered, adding to the importance of developing accurate estimates during the planning phase:

- Suitability of a particular choice of processing;
- Potential for impacts and needs for mitigation resulting from processing and/or landfill disposal;
- Energy content and recovery potential of the waste being processed; and,
- Quantity and nature of residues resulting from processing.

The SWMP identified a methodology for projecting waste quantity and composition and evaluated influencing factors, such as regulations, legislation, and operational or programmatic changes that may impact projections. This Feasibility Study used the results of the SWMP's projections and anticipated waste generation tonnages for the end of the 30-Year planning period in the SWMP (2053) that would require landfill disposal or processing by the WTE, MWP, or combination of the technology scenarios. Results are shown below in Table 2.

The Solid Waste Master Plan divided projections into two parts: the "status quo" tonnage is based on the assumption that the current diversion programs within the City remain in place and that some of the impacts described in the SWMP are not successful in increasing diversion during the 30-year planning period; and, the "SWMP Diversion" tonnage assumes the City is successful implementing all of the diversion programs identified in the SWMP.

For purposes of the Feasibility Study, the “status quo” tonnage of 267,600 tonnes per year was used to evaluate the technical, social, environmental, and financial impacts of each of the five scenarios. It is important to note that using the “SWMP Diversion” tonnages of 199,500 may result in slightly lower costs, but GHG emissions would be similar, and the overall rankings of each scenario would not change.

Table 2: Current and Anticipated Waste Generation Volumes

Type of Waste	2024 (Tonnes)	2053 (Tonnes) “Status Quo”	2053 (Tonnes) “SWMP Diversion”
Garbage and Bulky Waste	201,100	267,600	199,500

The City performed an audit in 2019 to estimate the material composition of the waste stream after material was diverted by residents. The projects technical consultants, HDR, used the material composition data from the 2019 Waste Audit to estimate the tonnage of potentially recoverable material from a MWP facility, as well to assess the potential energy content in the waste stream that will be considered in the design of the WTE incineration facility scenario.

Based on the review of the projected City-generated waste characteristics, it was determined that the waste quantity and composition feedstock will be compatible with all five scenarios being considered in the Feasibility Study.

A jurisdictional scan of recent WTE and MWP projects in Canada, the United States of America, the United Kingdom, Europe, Australia, and some parts of Asia was also conducted to provide a broader context of some of the challenges, opportunities, and costs associated with these types of projects. It should be noted that due to evolving technological advances in the waste processing industry, not all new and/or evolving technologies in development now or in the near future could be included in this analysis.

This Feasibility Study identified the pros and cons of each scenario, including identifying planning-level costs and implementation considerations. Technical Memorandum 1 within the Feasibility Study provides full details on each scenarios’ analysis.

Scenarios Overview

A summary of each Scenario is provided below, and includes:

- An explanation of each scenario, including how they could be incorporated into Ottawa's waste management system and their potential waste diversion percentage;
- Initial cost projections for development, implementation and operation;
- Potential environmental impacts; and,
- A summary of risks for the scenario.

Scenario 1: Status Quo and Private Facilities

Scenario 1 would see the City of Ottawa continue to dispose of non-diverted waste at Trail until the landfill reaches capacity. Sometime before Trail reaches capacity, this scenario assumes the City will negotiate long-term waste supply agreements with one or several regional third-party owned waste management facilities for disposal of City-generated wastes. If those facilities are at end of life, then the City will need to secure another third-party waste management facility to cover the balance of their waste disposal services over the next 30-year term.

Trail is the second largest municipal landfill in Ontario and has been a key asset for the City since it first opened to receive waste in May 1980. Currently, all residential garbage collected by the City is brought to Trail for final disposal. Trail is permitted to accept solid, non-hazardous waste generated from within the boundaries of the City on a 153-hectare site, of which 85 hectares is currently approved for landfilling. For the purposes of the Feasibility Study, the Status Quo and Private Facilities scenario only considered the current permitted capacity of Trail and that the facility will reach capacity by 2035.

As a component of this scenario, waste would be transferred by the City starting in 2035 to a private waste facility (whether currently in existence or a facility developed in the future) for processing to remove recyclable material and/or for final disposal. For this scenario, it is understood that the available landfill capacity in Ontario is expected to decrease and have extremely limited capacity (if not none) within the next 10 years unless additional airspace/capacity is approved by the Province of Ontario.

Currently, in addition to Trail, eastern Ontario has up to four landfill waste management facility sites that are owned and operated by the private sector. Of the four private sector-owned landfills, only two (Green For Life's Eastern Ontario Waste Handling Facility and West Carleton Environmental Centre) have available capacity and are currently operational and approved to receive residential waste. These sites were both recently approved for an expansion and have annual receiving rates of approximately 755,000 tonnes per year and 400,000 tonnes per year over an anticipated lifespan of 25 and 10 years, respectively. These sites have the potential to receive portions or all of

the City's waste for the majority, but not all, of the City's 30-year planning period.

The City would need to enter into waste disposal agreements with one or more private facilities for the disposal of City-generated waste after the closure of Trail. It is important to consider that the current available and approved capacity for existing landfills within the province is anticipated to be depleted within the next 10 years. As a result, there could be considerable competition from other communities and jurisdictions for the available landfill or other waste processing capacity in eastern Ontario given the shortage in available waste disposal capacity throughout the province. This could significantly impact the future disposal capacity that would be available to the City and will likely drive up the disposal costs offered by the private third-party owners. Given the anticipated competition for remaining disposal capacity in eastern Ontario over the next 10 years, a sensitivity analysis using tipping fees of $250 per tonne was also evaluated. This is compared to the $150 per tonne charged in today's dollars.

GHG emissions for private facilities would not contribute to the City's corporate accounting of GHG emissions; however, they would still contribute to community GHG emissions. It is unknown what type of facility the waste would go to for the full 30 year term so understanding the GHG emissions is not possible at this time. For example, the waste may go to a landfill that does not have as good of a methane capture rate as Trail or it could go to a yet-to-be constructed private WTE facility or another type of facility all together. This creates a risk of potentially sending our waste to a facility that creates more GHG emissions than one of the other scenarios evaluated.

While the Status Quo and Private Facilities scenario avoids the complexities of implementing new waste management technologies, it exposes the City to moderate financial risks due to unpredictable tipping fee increases and long-term disposal capacity constraints. Additionally, reliance on third-party landfills reduces operational control, potentially leading to service disruptions. The environmental and social risks associated with increased waste transportation (GHG emissions, odour, dust, and litter) remain notable considerations.

Scenario 2: Waste to Energy Incineration Facility

Mass burn incineration of municipal solid waste is still the dominant WTE technology used when developing new large- and medium-scale facilities. There are currently five mass burn incineration WTE facilities operating in Canada, including two in Ontario. One is in the Durham-York Region. The other, known as the Emerald Energy and Waste Facility, is located in Brampton and just received approval from the MECP to

expand by almost four times to accept 900,000 tonnes of waste per year.

In a traditional mass burn process, waste is fed into a hopper or feed chute where it enters the furnace and is combusted using excess air to generate heat and reduce the volume of waste by up to 90 per cent (or up to 75 per cent by weight). An advantage of mass burn technology is that it requires little to no pre-processing or size reduction of the incoming waste, other than the removal of large bulky items. The latent heat generated from the combustion process is recovered in a boiler to generate steam, which can be used directly for heating and industrial purposes or passed through a steam turbine-generator to create electricity. For Ottawa, it is estimated that a WTE incineration facility could result in a 77 per cent diversion rate from landfill. WTE incineration facilities are fitted with extensive flue gas treatment systems to capture and reduce emissions from air pollutants to meet the stringent environmental and regulatory standards that are typically required for their operation.

The preliminary estimate of probable construction costs for the Scenario 2 is between roughly $497M and $862M for initial capital expenditures and an average of $47M annual direct Operating and Maintenance (O&M) costs. Annual revenues from the WTE scenario in the form of electricity sales and the sale of ferrous and non-ferrous metals recovered post-combustion process are estimated to be on the order of approximately $17.9M annually, which could help offset some of the O&M expenditures. The assumption for evaluation was that the WTE incineration facility is primarily designed for electricity generation. However, if approximately 30 megawatts of thermal energy/hot water production goes towards district energy then as much as $20M in additional annual revenues could be possible as an upper limit given the projected market rate for district energy in Ottawa. Understanding where a WTE incineration facility is located would be required to determine if district energy is an option. Since it is unknown if district energy is possible at this time, these revenues were not included in the financial evaluation for this Feasibility Study. There may also exist the opportunity for the City to receive additional revenue in the form of higher tipping fees from other regional municipalities outside of Ottawa and/or the IC&I sector that may lack their own disposal or processing capacity.

A WTE incineration facility produces more GHG emissions compared to a well-managed landfill site with 85 per cent methane capture rate. Through the comparative evaluation, WTE’s greatest strengths are in the environmental requirements which are due to the significant amount of waste diverted from disposal facilities, the opportunity to recover marketable material, to generate energy, and a primarily indoor operation which will eliminate or minimize the common community impacts of open-air landfills.

The WTE incineration facility presents significant financial, social, and regulatory risks, despite its potential long-term benefits in waste reduction and energy generation. The high cost, strong potential for public opposition, and stringent air emissions requirements make this a high-risk investment. However, if the technology is proven and the EA process is navigated successfully, WTE could offer a long-term waste management solution with reduced landfill reliance.

Scenario 3: Mixed Waste Processing Facility

Mixed Waste Processing (MWP) Facilities are mechanical processing systems designed to recover recyclable commodities and, in some cases, organic waste from a mixed waste stream. Various types of mechanical, optical, and density screening equipment, as well as manual labour, are used to open bags, sort materials by size and weight, and separate fiber, plastic, metal, and glass containers, organics, and other materials. The sorted materials are then baled (fiber, plastic, metal) or loaded (glass, wood, organics, scrap metal) into bins for transportation to recycling markets and the remaining residue is typically sent to the landfill for disposal.

The City of Ottawa has very well-established recycling programs, like the existing blue box materials and household organics collection, that are successful in separating and recovering a large portion of recyclable materials. This could impact the quantity of available commodities and potential recovery rates of the City's non-diverted waste that would be sent to a MWP facility. It is estimated that a MWP Facility in Ottawa would divert eight per cent of waste. The remaining waste would require landfilling. It should be noted that as more SWMP Actions are implemented and diversion increases, the amount of divertable material available for recovery in a MWP Facility would decrease.

The preliminary estimate of probable construction costs for the Scenario 3 is between roughly $97M and $168M for initial capital expenditures and an average of $70.1M annual O&M costs. The higher O&M costs account for the significant disposal costs for the process residuals that will likely need to be taken to a third-party private waste management facility. Annual revenues from the MWP scenario in the form of sales from the recovered commodities are estimated to be on the order of approximately $4.4M annually, which could slightly offset some of the O&M expenditures.

The GHG emissions related to a MWP facility are similar to, but slighter better than a landfill. Given that the City's current and evolving future planned curbside recycling and diversion programs have been successful in capturing a large portion of the available commodities and recoverable materials in the waste stream, a new MWP facility would

divert a relatively small proportion of remaining materials (approximately 8.3 per cent). As a result, a large portion of the non-diverted City generated waste that could not be recovered or marketed from the MWP option would require landfill disposal or additional processing at a third-party waste management facility which contribute directly to GHG emissions. In addition, MWP would offer minimal opportunities for cost savings and little change in the environmental considerations relative to the Status Quo and Private Facilities scenario.

While MWP offers the lowest social risk, it presents significant financial, operational, and market risks due to its reliance on third-party landfills, fluctuating tipping fees, and unstable commodity markets for recovered materials. The high capital and operational costs coupled with potential maintenance and performance challenges, make long-term viability a concern. Successful implementation would require careful site selection, odour mitigation strategies, and securing long-term disposal agreements to mitigate cost risks.

Scenario 4: Waste to Energy Incineration Facility and Mixed Waste Processing Facility

This scenario explores the City building a MWP Facility to recover additional recyclable materials, as well as a WTE Incineration Facility to process residuals from the MWP Facility and compost all diverted waste to recover energy. The MWP and WTE scenario consists of the same technology components as the individual technologies described above.

The benefits of this scenario are utilizing the MWP facility to maximize the recovery of commodities that still have market value and utilizing the WTE incineration facility to maximize diversion from landfill. In this scenario, any material that is rejected from the MWP facility (process rejects) or not recovered as a commodity as part of the MWP process (process residuals) can be processed at a WTE incineration facility instead of going directly to landfill. HDR has assumed that the WTE facility would be co-located on the same property as the MWP facility or on an adjacent site, which would minimize the transportation costs and emissions associated with transporting the MWP process residuals and process rejects to the WTE operation.

Waste would be delivered to a receiving and tipping building, and the small percentage of waste that is not acceptable for the MWP facility will be removed and sent to the WTE incineration facility or transported off-site to a landfill. The remaining material stream will continue through the MWP processing train where the various mechanical separation and optical sorting equipment will remove recoverable commodities. The remaining

process residuals stream (removed at the back end of the MWP facility) will be transported to the WTE waste storage pit to be processed and to recover energy. As described above, Ottawa's waste diversion programs are optimized by residents and a MWP Facility would only likely yield an eight per cent diversion rate; this, in conjunction with a WTE Incineration Facility (which is projected to yield a 77 per cent diversion from landfill rate), estimates Scenario 4 would result in a 79 per cent diversion from landfill rate.

The preliminary construction costs are between roughly $556M and $965M for initial capital expenditures and an average of $72.8M annual direct O&M costs. Annual revenues from Scenario 4 are in the form of recovered commodities, plus electricity sales and the sale of ferrous and non-ferrous metals recovered post-combustion process are estimated to be on the order of approximately $21M annually, which could help offset some of the O&M expenditures. This scenario, like the WTE standalone scenario, would be capable of generating electricity and hot water for district energy. Based on the current projected market rate for district energy in the Ottawa region, an additional revenue source of up to $20M annually is the upper limit of what may be possible. However, these revenues were not included in the financial evaluation for this Study. Like the standalone WTE scenario, there may also exist the opportunity for the City to receive additional revenue in the form of higher tipping fees from other regional municipalities outside of Ottawa and/or the IC&I sector that may lack their own disposal or processing capacity. However, the available design capacity of the WTE incineration facility would need to be evaluated if non-City-generated wastes were considered.

The GHG emissions are similar to the WTE incineration facility alone since the majority of the material from the MWP facility will go to the WTE facility. However, a combination of the WTE and MWP facility does gain the benefits of both facilities and maximized diversion from landfill disposal, resulting in the greatest environmental score. This option also has the greatest additional cost and technical complexity of constructing and operating both facilities which impacted the overall score and ranking for the option.

The risks associated with this scenario are similar to Scenarios 2 and 3 where a WTE and MWP are considered on their own, with the exception that the risk associated with higher tipping fees in the MWP scenario are not valid for Scenario 4 since the volume of material going to landfill will be more in line with a WTE incineration facility on its own.

Scenario 5: Construct a New Landfill

The fifth and final scenario explores the potential of constructing a new landfill. Under

this scenario, the City would purchase a large enough parcel of land within the region to build and operate a new greenfield landfill to take all non-recyclable residuals after Trail reaches capacity. The implementation of a new landfill was thoroughly assessed during the development of the SWMP and although initially considered for deferral, this scenario is being included for comparison purposes as part of the Feasibility Study.

Landfilling remains the most widely used waste disposal method globally and will continue to play a role in the City's waste management strategy, regardless of whether WTE or MWP technologies are implemented, as both generate residual waste requiring disposal.

Ontario Regulation 232/98 outlines design criteria for new or expanding landfills, including base liners, leachate management, and landfill gas (LFG) collection.

1. Liner Systems: Clay liners are standard, though geosynthetic clay liners are gaining acceptance. The City would have to demonstrate that the design is protective of the environment. Key concepts within the Regulation are understanding the hydrogeology behind the groundwater that will allow for environmental monitoring and a realistic contingency plan should the landfill discharge to the natural environment.

2. Leachate Management: Engineered landfills require a collection system to manage leachate over the site's contaminating lifespan (typically decades). Treatment is usually on-site.

3. Landfill Gas (LFG) Collection: Required for sites exceeding a volumetric capacity of 1.5 million cubic metres. LFG consists of approximately 50 per cent methane and 50 per cent CO2. While regulations imply full capture, systems are typically designed for 85 per cent efficiency, with some Ontario sites exceeding 90 per cent.

4. Energy Recovery: LFG can be flared, used for electricity generation, or upgraded to renewable natural gas (RNG) for injection into the gas grid, an area of growing interest.

The preliminary estimate of probable construction costs for the Scenario 5: Construct a New Landfill would be on the order of roughly $439M to $761M for the total capital expenditures and an average of $15.6M annual direct O&M costs. The addition of an RNG collection and conditioning system added between $45M-$60M in capital expenditures and another $2M in O&M costs. Annual revenues from the new landfill

scenario could be in the form of either electricity sales from a LFG-to-electricity system, or from the sale of RNG for direct pipeline injection. The revenues for either the sale of electricity or RNG will vary depending on the market rates and the availability of other incentives. Based on a preliminary estimate of the potential LFG generation, it is estimated that the of sale of electricity could yield an additional $1M-$2M in annual revenues versus an estimated $12M in annual revenues from the sale of RNG.

Landfills have the potential to have the highest GHG emissions of the scenarios evaluated, however, with a robust LFG collection system that captures 85 per cent to 90 per cent of the methane, the GHG emissions reduce drastically. Engineered systems reduce the potential of environmental impacts to groundwater, surface water and air, but it is an outdoor facility and will produce odour, noise and dust. A new landfill does not produce opportunities for diversion with the exception of potentially having a drop-off area associated with the landfill for divertable material.

A new landfill presents high regulatory, social, environmental, and economic/financial risks, particularly due to hydrogeological uncertainty, land acquisition requirements, and leachate management challenges. Landfills also have strong potential for public opposition, and, while landfill technology is well-established, securing approvals, managing long-term liabilities, and mitigating social resistance make this a highly challenging option for the City.

Evaluation Methodology and Scoring

A critical aspect of the Feasibility Study is the development of an evaluation criteria, weighting and scoring system that can be applied to the five scenarios. To accomplish this task, HDR utilized past technical experiences with similar studies, analyzed the information obtained during the development of this project’s Technical Memoranda and collaborated with City staff.

As part of the evaluation of the five scenarios, the technical characteristics, potential environmental impacts, siting needs/requirements, associated challenges and opportunities, and estimates of probable costs were identified. In addition, the regulatory and environmental approvals and timelines required for implementation of each of the five scenarios was reviewed, as well as the potential funding opportunities and project delivery models. A project delivery model outlines the way a project is planned, organized, and carried out. It explains who is responsible for what, how things work together, and how contracts are set up between the owner, designers, builders, and others involved in the project. For the purposes of this project, the choice of project

delivery model determines whether private sector financing is involved, who will operate the facility, and how risks and costs are shared between the public and private partners.

The four primary factors making up the quadruple-bottom line analysis were selected with consideration to the goals identified in the City's 30-Year SWMP, as well as the objectives of this Feasibility Study. Each of the primary criterion was developed with consideration of specific subset factors that are valuable for the City's assessment of the five scenarios.

There are different methods (qualitative or quantitative or a combination of both) that can be used to evaluate the potential technologies and systems. The qualitative and quantitative information for each criteria subset was used to grade each scenario to determine whether it provides the most preferred, preferred, neutral, less preferred, or least preferred outcome. Furthermore, the grades were weighted to calculate a score for each criterion to support the ranking of the five scenarios being considered. There were instances in this evaluation where the grade for a specific criterion for one or more scenarios was the same.

A table of the comparative evaluation for all five scenarios can be found appended to this report as Supporting Document 2, and included within the Feasibility Study appended to this document at Supporting Document 1. A summarized version of the comparative evaluation table is provided below as Table 3.

Table 3: Comparative Evaluation

ENVIRONMENTAL REQUIREMENTS					
	Status Quo + Private Facilities	WTE	MWP	MWP + WTE	New landfill
Energy Recovery Potential	LEAST PREFERRED	MOST PREFERRED	LEAST PREFERRED	MOST PREFERRED	PREFERRED
Landfill Diversion Percentage	LEAST PREFERRED	MOST PREFERRED	LESS PREFERRED	MOST PREFERRED	LEAST PREFERRED
Opportunity to Recover Marketable Commodities	LEAST PREFERRED	PREFERRED	PREFERRED	MOST PREFERRED	LESS PREFERRED
Emissions-Discharges to Air, Land and Water	NEUTRAL	PREFERRED	NEUTRAL	PREFERRED	LEAST PREFERRED
Potential for GHG Impacts	LESS PREFERRED	NEUTRAL	PREFERRED	NEUTRAL	PREFERRED
ENVIRONMENTAL REQUIREMENTS SCORE	-7	+6	-1	+7	-3
SOCIAL REQUIREMENTS					
	Status Quo + Private Facilities	WTE	MWP	MWP + WTE	New landfill
Potential Visual Impacts	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL	LEAST PREFERRED
Other Nuisance Impacts	NEUTRAL	PREFERRED	PREFERRED	PREFERRED	LEAST PREFERRED
System Transportation Impacts	MOST PREFERRED	PREFERRED	LESS PREFERRED	PREFERRED	MOST PREFERRED
Potential for Property Value Impacts	MOST PREFERRED	NEUTRAL	NEUTRAL	LESS PREFERRED	LEAST PREFERRED
Opportunity for Community Support	MOST PREFERRED	LESS PREFERRED	NEUTRAL	LESS PREFERRED	LEAST PREFERRED
SOCIAL REQUIREMENTS SCORE	+6	+1	0	0	-6
ECONOMIC/FINANCIAL REQUIREMENTS					
	Status Quo + Private Facilities	WTE	MWP	MWP + WTE	New landfill
Capital Costs	MOST PREFERRED	LESS PREFERRED	PREFERRED	LESS PREFERRED	LESS PREFERRED
Operations and Maintenance Costs	NEUTRAL	NEUTRAL	LESS PREFERRED	LESS PREFERRED	PREFERRED
Revenue Generation Potential	LEAST PREFERRED	MOST PREFERRED	PREFERRED	MOST PREFERRED	PREFERRED
Overall Financial Feasibility	NEUTRAL	NEUTRAL	LESS PREFERRED	LESS PREFERRED	PREFERRED
ECONOMIC/FINANCIAL REQUIREMENTS SCORE	0	+1	0	-1	+2
TECHNICAL REQUIREMENTS					
	Status Quo + Private Facilities	WTE	MWP	MWP + WTE	New landfill
Technical Complexity	MOST PREFERRED	LESS PREFERRED	LESS PREFERRED	LEAST PREFERRED	PREFERRED
Timing/Schedule Requirements	MOST PREFERRED	LESS PREFERRED	LESS PREFERRED	LESS PREFERRED	LESS PREFERRED
Feedstock Flexibility	NEUTRAL	PREFERRED	LESS PREFERRED	PREFERRED	MOST PREFERRED
Scalability	LESS PREFERRED	LESS PREFERRED	PREFERRED	LESS PREFERRED	PREFERRED
Process Reliability (Risk Potential)	LESS PREFERRED	PREFERRED	LESS PREFERRED	PREFERRED	MOST PREFERRED
Siting Requirements	MOST PREFERRED	NEUTRAL	NEUTRAL	NEUTRAL	LEAST PREFERRED
Approvals/Permitting/Regulatory Requirements for Implementation	MOST PREFERRED	LESS PREFERRED	PREFERRED	LESS PREFERRED	LEAST PREFERRED
Number and Complexity of Contracts	NEUTRAL	LESS PREFERRED	LESS PREFERRED	LEAST PREFERRED	PREFERRED
ECONOMIC/FINANCIAL REQUIREMENTS SCORE	+6	-3	-3	-5	+2
TOTAL (SCORE)	**+5**	**+5**	**-4**	**+1**	**-5**

The complete evaluation results are below:

1. **Scenario 1:** Status Quo and Private Facilities

1. **Scenario 2:** Waste to Energy Incineration Facility

3. **Scenario 4:** Waste to Energy Incineration Facility and Mixed Waste Processing Facility

4. **Scenario 3:** Mixed Waste Processing Facility

5. **Scenario 5:** Construct a new Landfill

With the Feasibility Study now complete, staff require further direction to finalize a business case and recommendation for Ottawa's future waste management system.

Next Steps

This report recommends Council direct staff to advance an in-depth evaluation of Scenario 1 (Status Quo and Private Facilities), Scenario 2 (WTE Incineration Facility) and Scenario 5

(Construct a New Landfill). In recognition of the need for a landfill regardless of a technology chosen, and with the landfill capacity across the province quickly being consumed, and to continue to provide context and comparison against the options moving forward, staff recommend including Scenario 5 in the next steps of this project.

The next steps, if directed, will include:

- A siting analysis for Scenarios 2 and 5, including district energy consultation;
- Consultation and engagement with residents, stakeholders and Councillors;
- A regional municipal scan to understand potential for taking other waste to offset tipping fees;
- Finalization of a procurement model options analysis;
- Refining financial updates, including updates to tonnage projections based on waste audits, re-stabilization of tonnages since COVID and implementation of new programs/initiatives; and,
- Developing a finalized business case on the preferred option (using all the above information).

This report recommends that Scenario 3 and 4, both pertaining to MWP, not advance to the next phase. While MWP can be successful when all waste (garbage, organics, recycling) is disposed of in one bin, Ottawa has effective diversion programs where waste is separated by residents, creating a much cleaner garbage stream. The Feasibility Study only estimated an 8 per cent additional diversion from MWP, which will be further reduced as SWMP Actions are implemented and successfully adapted by residents. This could mean more than 92 per cent of incoming waste would still require landfilling. In addition to low diversion potentials, MWP ranked significantly lower compared to the WTE because of its high disposal costs and inconsistency with the SWMP. While the combination of MWP and WTE could yield a 79 per cent diversion rate, this is only two per cent higher than WTE alone, representing a large financial investment for marginal increased diversion potential. For this reason, the only technology recommended to move forward as a future waste management solution for Ottawa is Waste to Energy Incineration Facility (Scenario 2).

Staff recognize that the City is at a critical juncture in terms of timelines and planning for the future of waste management. The City’s Trail Waste Facility Landfill is forecasted to reach capacity between 2034-2035 if status-quo waste disposal continues. Recent

policy approvals and implementation, including the implementation of SWMP Actions, sending waste to private facilities, banning Industrial, Commercial and Institutional Waste from Trail, implementing the new three-item garbage limit, should have the potential to extend the life of Trail by six years, forecasting 2039-2041 as projected timeline for reaching capacity. Up to an additional fifteen years of landfill life could be realized should the landfill receive EA approval to be expanded within its current boundary. The additional six years provides vital lead time for implementing a long-term solution. From approvals to implementation, long term solutions can take upwards of 10 years. Therefore, a decision on Ottawa's future waste management system is required by 2029. This would allow for a new landfill or technology to be developed, and assumes the above noted initiatives are successful in extending the life of Trail.

Staff recognize that there is no one-size fits all solution for waste management, and regardless of the success of SWMP Action implementation or the expansion of Trail within its current boundary, a waste management system will be required for the long-term. By 2029, the City must decide on a new waste management system in order to successfully manage Ottawa's waste for the long term. Following Council's final direction on Ottawa's future waste management system, an Environmental Assessment (EA) process will begin. This will include further engagement, site specific studies, and a preliminary design of a landfill or technology, if required. The receipt of this feasibility study and direction to advance next steps will ensure all possible, proven and compatible scenarios for Ottawa, as observed through the quadruple-bottom-line evaluation within this report and appended Feasibility Study, are being considered.

FINANCIAL IMPLICATIONS

There are no financial implications associated with the report recommendations because the funds required for the development of the business case are available within approved capital budgets.

LEGAL IMPLICATIONS

There are no legal impediments to Committee and Council approving the recommendations of this Report.

CONSULTATION

This project is a component of the SWMP. Extensive engagement took place throughout the development of the SWMP and feedback received through that engagement was used to develop the Feasibility Study that this document reports on.

ACCESSIBILITY IMPACTS

The City of Ottawa is committed to ensuring that all actions within and resulting from the Waste Management Technologies Feasibility Study are in accordance with the *Accessibility for Ontarians with Disabilities Act*, 2005 and the *Integrated Accessibility Standards Regulation*, 191/11. Additionally, the City's Accessibility Design Standards (ADS), where applicable, as well as the City of Ottawa's Accessibility Policy will be followed.

As this report is a part of the broader Solid Waste Master Plan, consultations with persons with disabilities has been undertaken in its development and will continue to occur as further actions are identified. Following approval of the recommendations outlined in the report, staff would continue engaging with stakeholders, including staff in the Accessibility Office and the Accessibility Advisory Committee, as well as the wider community of accessibility-related stakeholders to receive feedback. Continuing to engage with these stakeholders with disabilities will help identify and mitigate barriers and challenges prior to implementation from a cross-disability perspective and understand the unique needs and feedback from residents with disabilities, thus reducing or eliminating barriers and challenges faced by these residents.

TERM OF COUNCIL PRIORITIES

This report supported the 2022-2026 Term of Council priority: a city that is green and resilient. Outcomes that support this priority include:

- Reduce emissions associated with the City's operations and facilities;
- Increase waste reduction and diversion; and,
- Improve key infrastructure through asset management.

SUPPORTING DOCUMENTATION

Document 1: Feasibility Study

> This document is available in English only and may be translated in whole or in part upon request. For more information, please contact Shelley McDonald at 613-580-2424, extension 20992.

Document 1A: Feasibility Study Executive Summary

Document 2: Scenario Evaluation

DISPOSITION

Should Council approve the recommendations of this report, Solid Waste Service would move forward with an in-depth evaluation of Scenario 1 (Status Quo and Private Facilities), Scenario 2 (Waste to Energy Incineration Facility), and Scenario 5 (New Landfill), as explained in this report and within the Feasibility Study, and report back with a recommendation and finalized business case for Ottawa's future waste management system, including decision-point timelines and budget implications, as soon as practical within the next Term of Council.