Commerce CITY

Quality Community for a Lifetime

Action Plan for Sustainability

The Environmental Policy Advisory Commitee's recommendations and strategies to improve community-wide environmental health and sustainability in Commerce City

LOTUS

Engineering & Sustainability

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Acronyms & Abbreviations

AQ	Air Quality
BACT	Best Available Control Technology
BAU	Business-As-Usual
C3	Commerce City
C&D	Construction and Demolition
CDOT	Colorado Department of Transportation
CDPHE	Colorado Department of Public Health and the Environment
EJ	Environmental Justice
EPA	United States Environmental Protection Agency
EPAC	Environmental Policy Advisory Committee
EV	Electric Vehicle
GHG	Greenhouse Gas
HAP	Hazardous Air Pollutant
HOA	Homeowners Association
HVAC	Heating, Ventilation, and Air Conditioning
ICE	Internal Combustion Engine
IECC	International Energy Conservation Code
IPPU	Industrial Processes and Product Use
LID	Low Impact Development
MS4	Municipal Separate Storm Sewer System
mt CO2e	Metric tons of carbon dioxide equivalent
NAAQS	National Ambient Air Quality Standards
NOx	Nitrogen Oxides (including Nitric Oxide and Nitrogen Dioxide)
PFAS/ PFOA	Perfluoroalkyl and Polyfluoroalkyl Substances and Perfluorooctanoic Acid
PM	Particulate Matter (Numbers associated with PM refer to the size classification of the particles)
PV	Solar Photovoltaic
RTD	Regional Transportation District
SACWSD	South Adams County Water and Sanitation District
SOx	Sulfur Oxides
State	State of Colorado
TMDL	Total Maximum Daily Load
VOC	Volatile Organic Compounds
WQ	Water Quality

Land Acknowledgement

The history of what we now call Commerce City begins not in 1952 as we celebrated in 2022, but centuries prior. Diving deeper into this land's past, we see that immigrants have always come to this region searching for a place to call home, just as thousands of newcomers to Commerce City have done so in recent years.

In the early 1800s, what is now called Adams County became home to Arapaho and Cheyenne people who arrived in the region after being forced out of their traditional homelands in the Midwest. Settlers then founded Commerce City on these historic Ute, Arapaho, Cheyenne, and Apache lands. Today, Commerce City's indigenous population stands at just under one percent and we acknowledge the history of systematic removal in shaping this community.

"Healing old wounds will make us stronger and more resilient for a future of uncertainty."

We recognize that we must do more to redress past and ongoing injustices. Many of the current environmental harms and community health issues we seek to remediate through this Plan trace their roots back to this history. By undertaking this work, we understand that we bear a responsibility to care for the Earth, the residents of Commerce City, and our non-human relations with respect and humility.

Commerce City prides itself on our sense of community; for every individual in this City to feel equally welcomed we must commit ourselves to repairing our relationships with the tribal nations whose traditions, history, and culture leave such indelible legacies on this land. The sustainability of Commerce City means sustaining the health of our land and broader community, including Native peoples. Healing old wounds will make us stronger and more resilient for a future of uncertainty.

Acknowledgements

Commerce City would like to express appreciation and gratitude to the many community members, businesses, and industry representatives who shared their time and energy to provide input and feedback on this work. We recognize their contributions as essential to the success of the planning process and the future implementation of the recommendations.

Environmental PolicyAdvisory Committee (EPAC)

Thank you to the Environmental Policy Advisory Committee (EPAC) for their time, energy, and valuable wisdom that shaped the recommendations in this Plan.

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Thank you to the City Council members who passed Res. 2021-38 on June 7, 2021 to establish the EPAC.

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Letter from the Environmental Policy Advisory Committee

On June 7, 2021, the City Council took a major leap into finding solutions to improve the environment in our community by establishing the Environmental Policy Advisory Committee (EPAC). This 11-member resident board was conceived to provide recommendations to the City about how to improve the environmental quality across our community. The EPAC was designed to inspire the City to create equitable environmental policies centered on the needs of populations and areas in the City that are most directly affected by negative environmental impact. The group has been meeting monthly with the City Environmental Planner and consultants from Lotus Engineering and Sustainability and AMBG to identify goals, policies, strategies, and regulations that will improve overall environmental quality in Commerce City to truly make Commerce City a "Quality Community for a Lifetime."

In addition to gathering research regarding current trends in sustainability, the EPAC has also received valuable input from significant stakeholders. These include members of the community, business owners, local leaders, city staff, and professionals with expertise from all areas of Commerce City, including the Core and North regions.

Goals were developed for the following sectors:

- Education and Outreach
- Energy Efficiency and Renewable Energy;
- Adaptation and Mitigation (i.e., GHG emission reductions);
- Waste Diversion and Recycling;
- Water Conservation and Quality Improvements;
- Alternative Fuels and Active Transportation (i.e., Air Quality)
- Funding
- Health Equity (i.e., Healthy Food and Medical Access)
- Land Use (i.e., biodiversity and forest canopy)

Sector targets from a 2019 baseline proposed by the EPAC are:

- Energy use reduction by 25% by 2030;
- Electrification is adopted by 15% of new buildings;
- Light-duty vehicles on the road are 30% EV's;
- Idling time is reduced by 78%; and
- Waste diversion increases to 85% by 2050.

We are excited about the potential regarding improving our environment and remain dedicated to supporting our community and the City government in pursuit of a better environment for all of Commerce City. The continued work of EPAC to support this process through becoming a permanent Committee is essential given the lack of staff dedicated to community health. As Commerce City is one of the fastest growing communities in Colorado, it is critical for us to consider the impacts we are having on our environment and what we can do to make this community a healthy, vibrant, economically sound, and quality place to live for everyone.

Sincerely,
The Environmental Policy Advisory Committee

Executive Summary

Environmental Action in Commerce City

Just 70 years after incorporation, Commerce City (the City/C3) has blossomed into one of the most popular places to move to in the State of Colorado (State). Sitting on the northern edge of Denver in Adams County, C3 now boasts one of Colorado's fastest growing economies and populations.

Under these conditions the City began updating its Comprehensive Plan to guide the next two decades of growth and development. In conjunction with this major planning effort, the City Council issued a directive commissioning a series of environmental policy recommendations that will support C3's efforts to grow sustainably, remediate environmental justice and public health issues, and prepare for a future with an uncertain, changing climate.

The result of this planning effort is a robust set of policy recommendations to enhance sustainability and community health, which the City will implement over the coming five to ten years. If all strategies and actions are implemented and the City's targets are reached, community-wide carbon pollution will reduce by 45% by 2030 and 75% by 2050*. This is short of the City's goal of aligning with the State's reductions of 50% by 2030 and 90% by 2050 but shows significant progress towards reaching those reductions. As carbon pollution declines, so too will other pollutants of concern (e.g., NOx, SOx, and VOCs) that create ozone formation and contribute to the community's health problems.

Commerce City Targets
Energy use is reduced by 25% by 2030 and 40% by 2050.
Electrification is adopted by 15% of all buildings by 2030 and 60% by 2050.
Rooftop and Community Solar is utilized by 40% of households by 2050.
The share of renewables in the C3 community's energy mix increases by 10% annually.
Vehicles on the road are 30% EVs by 2030 and 75% EVs by 2050.
Idling time is reduced by 78% by 2030.
There is a 20% mode shift by 2030 and 50% mode shift by 2050 towards greater use of transit, bikes, walking, etc.
Waste diversion increases to 85% by 2050.
Any new oil and gas wells developed within City limits are carbon neutral.
Reduce GHG emissions by 50% by 2030 and 90% by 2050, in line with the State of Colorado's goals.

* Emissions savings are based on the City's core 2019 GHG emissions, which includes emissions from building energy use, transportation activities, and waste. Industrial emissions are not included in the core baseline from which reduction goals are based.

Environmental Justice, Vulnerability, and Climate Equity

Commerce City community members have been active in the fight for environmental justice (EJ) for years. The public health impacts of industrial pollution, particularly in communities of color and those classified as disproportionately impacted by the State, drives much of the community's activism and remains a critical issue that the environmental policy recommendations in this Action Plan for Sustainability (Plan) seek to address.

Furthermore, the acceleration of extreme weather events (i.e., drought) and intensifying climatic conditions (i.e., wildfire) define the urgency of these policy recommendations. As the impacts of extreme weather accelerate, C3 must carefully plan and implement policies to end the historic cycles of inequity and disinvestment in the community. While extreme weather events affect all peoples, they harm those with vulnerabilities most, imposing a major equity concern. The City seeks to manage its growth more sustainably; this demands a focus on equity, to repair historic injustice, and on the environment, to mitigate extreme weather impacts. Ultimately, through these two lenses, this Plan envisions a C3 with a more diverse economic and housing base in which all can thrive.

In June of 2021, the City created a citizen-led Environmental Policy Advisory Committee (EPAC) that was charged with defining the actions the City should take over the coming years to improve community wide health and sustainability outcomes. This act recognized the impact of environmental justice issues on the residents of C3 and honored the wisdom and lived experiences of those who call C3 home. The EPAC first convened in the fall of 2021 and met regularly until the fall of 2022, when the recommendations in this Plan were finalized. The strategies recommended in this document represent the future state that community members believe is not only possible in Commerce City, but one that will support long-term community health and well-being, enhance the quality of life for residents, improve business opportunities, and ensure Commerce City truly remains a "quality community for a lifetime."

Air and Water Quality

Running concurrently to the policy development process were efforts to quantify and analyze air and water quality challenges and opportunities in C3. These analyses build a more accurate, detailed picture of the City's air and water pollution, capturing the community's concerns with the amount of industrial pollutants, including those beyond legacy contaminants, released into the local environment.

The air quality (AQ) work undertaken for this planning process culminated in a compilation of technical and operational recommendations that the City can implement to stem AQ degradation and potentially begin improvements. The recommendations include the following:

- Continue updating the community-wide AQ impacts inventory to keep residents informed of details regarding new pollutant sources and existing source modifications.
- Implement a monitoring network and database that supplements existing and planned monitoring to help the community better understand how existing pollutant sources impact public health, with a focus on locations such as schools and parks.
- Incorporate AQ threshold levels into City ordinances that would require additional analysis, reporting, and potentially mitigation for planned emission sources.
- Work with State and federal agencies to update oil and gas regulatory requirements on a continuous basis to keep up with evolving industry technologies and practices.
- Reduce current and future emissions by implementing practices such as best available control technology (BACT) analysis requirements and targeted emissions control requirements as needed.

The water quality (WQ) analysis encompassed several aspects of the City's water resources and the initial findings can be summarized by the following recommendations:

- Track WQ monitoring activities and discharge permit violations. While no immediate need was identified for selective WQ monitoring at the time of this analysis, the consultant team recommended that the City develop a system to track WQ monitoring activities and discharge permit compliance for water bodies within its boundaries. Additionally, non-point illicit discharges enter C3's receiving waters each year and staff regularly converse with Colorado Department of Public Health and Environment (CDPHE) to locate priority areas of pollution. Tracking WQ and violations in real-time will allow the City to flag and respond to pollution issues more quickly.
- Develop a high-level Stream Corridor Management Reference Document with a limited menu of easily implementable tools and approaches designed specifically for C3.
- Adopt City ordinances related to low-impact development (LID) requirements. The consultant team worked closely with City staff to develop an ordinance and detailed LID guidance materials.

> **"The quality of our water and air is horrible and affects our health. I love the area but have concerns about the health safety of my children."**
> **- Survey Respondent**

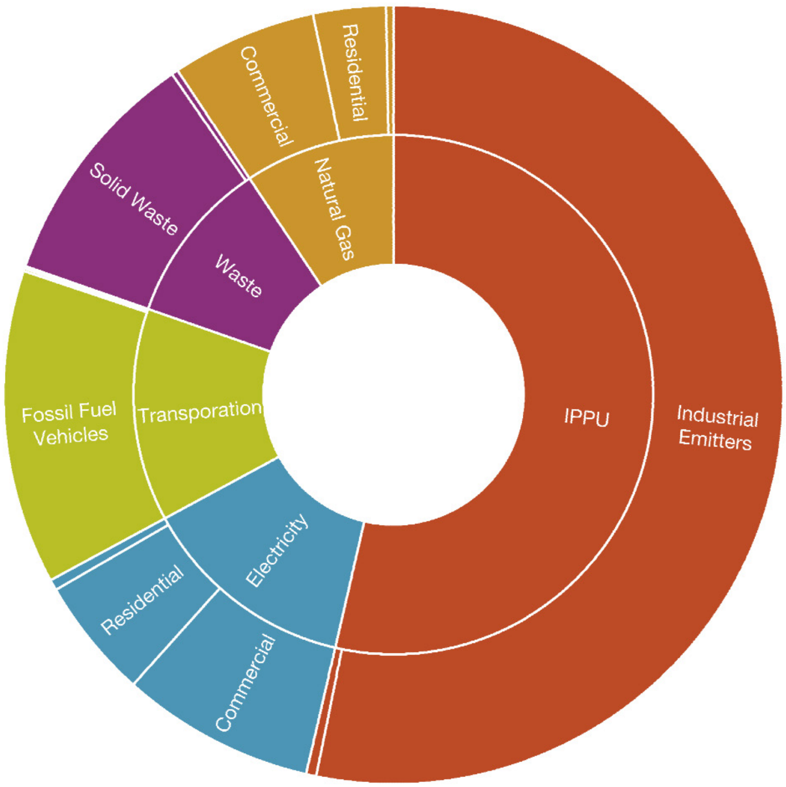

Figure ES 1 Total 2019 GHG emissions.

Electricity	**15%**
Residential	6%
Commercial	9%
Industrial	0.5%
Natural Gas	**10%**
Residential	4%
Commercial	6%
Fugitive Emissions	0.3%
Other Building Fuel Use	0.0%
Transportation	**14%**
Fossil Fuel Vehicles	14%
Electric Vehicles	0.1%
Transit	0.1%
Rail	0.0%
Waste	**4%**
Solid Waste	4%
Wastewater	0.3%
IPPU	**57%**
Refrigerants	0.4%
Industrial Emitters	56%

Greenhouse Gas Inventory

C3 recognizes the increasingly urgent need to address the rising onslaught of extreme weather events and enact strategies to adapt to these new uncertain patterns. To identify the strategies with the highest greenhouse gas (GHG) reduction impact in the community, the City completed its first community-wide GHG inventory, which accounted for all GHG emissions generated in the community for the year 2019. It will serve as the baseline against which the City's future inventories will be compared, and on which the City's mitigation strategies can be set. C3 has contracted with Lotus Engineering and Sustainability, LLC (Lotus) to update the municipal GHG inventory from 2010 in 2023.

The inventory revealed that Commerce City emitted a total of 1,945,937 metric tons of carbon dioxide equivalent (mt CO2e). As seen in *Figure ES 1*, the largest emissions-producing sector was the Industrial Processes and Product Use (IPPU) sector, which accounted for 57% of all GHG emissions; 86% of IPPU emissions are generated from activities at the Suncor facility. Following this, building energy use and transportation made up 15% and 14% of total emissions, respectively. However, when removing the IPPU sector and looking only at the City's core emissions, the building energy sector, broken out by source into electricity and natural gas in *Figure ES 2*, comprises half of the City's carbon pollution. Transportation

Figure ES 2 Core 2019 GHG emissions.

Electricity	**35%**
Residential	13%
Commercial	21%
Industrial	01.1%
Natural Gas	**23%**
Residential	9%
Commercial	14%
Fugitive Emissions	0.8%
Other Building Fuel Use	0.0%
Transportation	**33%**
Fossil Fuel Vehicles	32%
Electric Vehicles	0.3%
Transit	0.3%
Rail	0.0%
Waste	**9%**
Solid Waste	9%
Wastewater	0.7%

follows at 28%; last is waste at 21%.

This analysis of carbon pollution sources will help the City and the larger C3 community assess which policy strategies will result in the largest pollution reductions. From this information, the City can make decisions about where to direct its resources to achieve the greatest impact.

Modeling Strategies

Once the inventory process was complete, emissions were forecasted to 2050 based on a business-as-usual case scenario, accounting for population growth and state and utility level policies. Using these baseline analyses, a model was developed to evaluate the GHG emissions impact of the policy recommendations. The community's highest priority strategies were modeled against the baseline emissions provided by the inventory, as was the potential increase in GHG emissions due to potential newly permitted oil and gas wells. Ultimately, the most important strategies from a GHG emissions reduction perspective are the prioritization of residential and commercial building energy efficiency, which would together comprise 39% of emissions reductions by 2050, and, secondly, the prioritization of multi-modal transportation options, which would comprise 25% of total emissions reductions by 2050.

Figure ES 3 shows the carbon pollution reductions estimated by the model by sector, and underscores the significance of building energy and transportation strategies. By contrast, increased oil and gas activity would add back 19,985 mt CO2e, or approximately one-quarter of the anticipated GHG emissions savings from other strategies.

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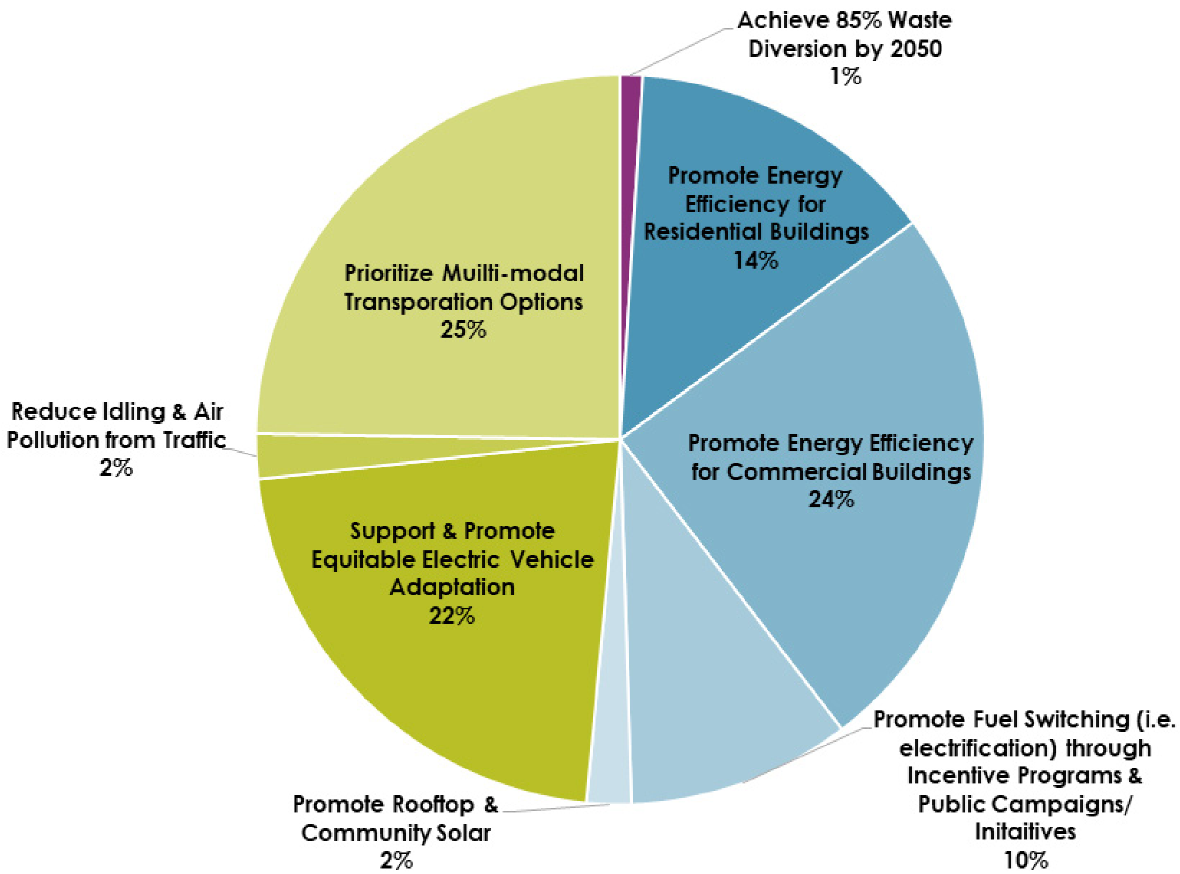

Figure ES 3 Share of emissions reductions by strategy type based on modeling.

Strategy Sector

Transporation	Building Energy	Waste

Strategy	Share of Emissions
Prioritize muilti-modal transporation options.	25%
Support & promote equitable electric vehicle adaptation.	22%
Reduce idling & air pollution from traffic.	2%
Promote energy efficiency for commercial buildings.	24%
Promote energy efficiency for residential buildings.	14%
Promote fuel switching (i.e. electrification) through incentive programs & public campaigns/initaitives.	10%
Promote rooftop & community solar.	2%
Achieve 85% waste diversion by 2050.	0.7%

Policy Development Process

A key EJ principle is that those most impacted should define the scope of the problems and drive their solutions. The City worked to incorporate this principle by turning policy development over to the citizen-led EPAC. EPAC members, in collaboration with policy and subject matter experts, developed the strategies and actions presented in this Plan over the course of seven months.

Beyond the EPAC, the City dedicated significant resources toward engaging the broader C3 community to collect input and feedback on the EPAC's work. To ensure this engagement and outreach remained authentic to the communities, the City worked closely with EPAC members to recruit residents' participation in a community-wide survey, a civic engagement training, key informant interviews, and a community meeting. Additionally, they worked with key City staff and business and industry leaders to

Mar-Aug 2021 | GHG Inventory

Jun-Oct 2021 | Organizational Sustainability Vision

Jun 2021- Sep 2022 | Community Engagement

- Oct 2021 | City Council approves EPAC
- Oct 2021 – Oct 2022 | EPAC convenes
- Jul-Sept 2022 | Community survey open
- Sep 2022 | Community meeting & Civics Engagement training, Business and Industry Workshop
- Oct 2022 | City staff vetting workshop

Sep - Dec 2022 | Policy Recommendations

- Oct-Nov 2022 | Modeling strategies
- Oct-Dec 2022 | Final policy recommendations

Mar 2021 - December 2022 | Air & Water Quality cultivate buy-in, vet the policies, and begin fostering the public-private collaborations and relationships necessary to push for community-wide implementation of the recommendations.

Commerce City has a long history of acknowledging environmental conservation and stewardship. Past planning documents have noted that communities and local governments are first to deal with volatile energy costs, diminishing natural resources, and the impacts of climate change. The 2010 Comprehensive Plan vision kicked off two key City initiatives to assess the City's baseline for sustainability work, the McKinstry Energy Performance Contract and the City's Green Team Sustainability Plan. In 2022, the City formed a Sustainability Committee to coordinate internal environmental initiatives and assist with implementing the EPAC's recommendations.

Process for Success

To assess current conditions and comprehensive strategies, the City contracted Lotus and Pinyon Environmental (Pinyon), Inc. to conduct several scientific technical tasks such as the GHG emissions inventory, the Air Quality Significance Threshold Report, Air Quality Modeling Guidance, and Significant Point and Nonpoint Pollutant Source Identification. Lotus, in collaboration with AMBG Consulting (AMBG), led efforts to engage the community and summarize the EPAC recommendations gathered through a year of monthly meetings.

"The most important piece is stakeholding- I've seen communities move forward without doing that and it's not efficient. To have stakeholders and gather feedback is important, as a resident and a business. It's important that we take part in it."
- Worker and Resident of Commerce City

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Sustainability Focus Areas

This community-led effort developed recommendations that focus on the needs and opportunities at the local level. The resulting impacts expect to positively contribute to the lives and health of Commerce City residents. The EPAC's journey of learning led the group to develop some initial high-level priorities for the City:

1. First and foremost, the EPAC has a desire to continue their work as a permanent City-sanctioned advisory committee. They desire to continue to be community led, by residents, for residents, with support from the City.

2. Second, there are opportunities throughout the Plan to leverage existing City initiatives and projects by further incorporating environmental and public health considerations.

3. Third, Commerce City has extensive networks that can be utilized to provide education and engagement opportunities to residents and businesses to accelerate sustainable transformation. Initial education and outreach should focus on air and water quality protection and restoration. Continued work should focus on developing deep and consistent partnerships with community institutions and organizations.

4. Lastly, the EPAC would relish ongoing study sessions throughout the year with the City Council to analyze sustainability solutions, evaluate implementation progress, and provide input into community decisions.

The policy recommendations in this plan are divided into 10 focus areas in which the City should target its sustainability work. Together these focus areas build a comprehensive, whole-of-government framework that can define the City's approach to environmental sustainability and community health, as well as a vision for a quality community for all residents. The recommendations represent what the City can effectively take action on in the next five to ten years.

Education and Outreach	Throughout this planning effort, the City has sought to invest in building trust with the community and to identify opportunities to reach the most impacted communities (i.e., those overburdened by environmental pollution). Additionally, building the capacity of businesses, City staff, and residents through communications, engagement, and training will support the implementation of the remaining policy recommendations and ensure this work remains community-driven and validated. Appendix D includes recommendations for community engagement and education campaigns based on community insight and best practices in equitable community engagement.
Energy Efficiency	As the City looks to act on the results of its inaugural GHG inventory, energy efficiency strategies have the potential to significantly reduce energy costs for residents and businesses while also reducing GHG emissions from across the community. Energy efficiency technologies are some of the most cost-effective strategies to reduce carbon pollution and support community members, including businesses, that cannot afford infrastructure overhauls immediately.
Renewable Energy	Renewable energy plays a crucial role in global efforts to reduce carbon pollution, improve AQ, and develop energy independence and resilience against predicted extreme weather events such as flooding and drought. The City can support its pollution reduction goals by demonstrating leadership in the community's conversion to renewable energy.
Adaptation and Mitigation	As the climate continues to shift, communities can respond to the associated rise in extreme weather through two approaches, adaptation (i.e., changing processes and infrastructure to thrive in a new normal) and mitigation (i.e., reducing carbon pollution). Implementing strategies from both of these approaches will ensure the community thrives against the escalation of extreme weather events and climatic shifts, while working to prevent additional future harm.
Recycling and Waste Diversion	By diverting certain kinds of waste from their endpoints in landfills, the City can reframe waste as "new" materials for reuse and provide new opportunities for job creation. Use of these materials can provide new business opportunities, extend the life of the landfill, reduce pollution of the natural environment, and cut air pollutants emitted by landfills. The diversion of organic material (i.e., yard and food waste) into compost can help improve soil health and reduce particulate matter (PM) emissions, which are currently three times higher in Adams County than surrounding Arapahoe and Denver counties.

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Water	Water challenges will undoubtedly continue to plague the City and the State as drought conditions contribute to the over-extraction of State waters and increases in the cost of water. Policies that encourage conservation, low impact development, and investment in infrastructure upgrades will be crucial to guaranteeing the continuation of C3's water supplies and WQ, including addressing emerging contaminants like per- and polyfluorinated (PFAS), which currently exceed federal health advisory levels.
Transportation	As the City reassesses its plans for sustainable growth into the future, it must consider the critical ways in which transportation infrastructure contributes to air pollution, resilience, and community accessibility. Transportation infrastructure – from public transit to active transportation – in many ways shapes what communities look like, how people behave, and the overall quality of life in the City. Strategies in this sector include those that address the lack of accessibility for public transit and active transportation networks (i.e., protected bike lanes).
Community Health	Industrial pollution issues impact all Commerce City residents, crossing racial and socioeconomic lines. This focus area seeks to tackle industry-related AQ issues and health justice, a major priority for all C3 residents, particularly residents of color who disproportionately live near industrial facilities.
Funding and Purchasing	Critical to the success of any City sustainability policy is the ability and commitment to invest resources towards implementing and sustaining this work. The community will recognize the allocation of City funds as a demonstration of genuine commitment to community health and sustainability; therefore, funding programs and hiring dedicated staff to manage grant requests and projects, along with providing support for community-level incentive programs, will work to build trust with the community.
Biodiversity, Tree Canopy, and Food	Access to green spaces and adequate tree canopy plays a critical mitigating role in environmental and public health, particularly as temperatures grow hotter and for vulnerable communities. Biodiversity is crucial to the resilience of natural ecosystems; local food access can likewise enhance resilience for urban communities. C3's current tree canopy level is at 3%, which is well below the 24% level recommended for a prairie ecosystem.

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What Comes Next

As Commerce City embarks on operationalizing and implementing the recommendations within this Plan, six key components will be integral to this work:

- Working closely with the community, including a permanent EPAC, to engage all of Commerce City in this work.
- Engaging institutional, organizational, and business partners throughout Commerce City to implement recommendations and leverage existing work to advance sustainability.
- Applying for relevant funding opportunities, including grants and forthcoming federal funds, to ensure this work is fully funded and fiscally sustainable in the long run.
- Developing a process for integrating economic, environmental, and social considerations – known as a triple bottom line analysis – into City-funded projects, policies and programs.
- Evaluating and implementing proposed amendments and ordinances necessary to address community health concerns and build a more diverse economic base.
- Coordinating policies with neighboring municipalities and jurisdictions to infuse sustainability principles into regional-scale short- and long-term planning.

Introduction

Just 70 years after incorporation, Commerce City (City/C3) has blossomed into one of the most popular places to move in the State of Colorado (State). Sitting on the northern edge of Denver in Adams County, C3 now boasts one of Colorado's fastest growing economies and populations. The State's professional soccer team, the Colorado Rapids, calls Commerce City home, along with over 64,000 residents. This number represents an approximate 40% increase since the 2010 Census[*]. With an abundance of parks, open space, and outdoor recreation opportunities, the City is known for its family-friendly, small-town community culture. The City is also one of the primary industrial and business centers in the Denver metro region, and is home to locally-owned businesses, along with a significant number of transportation, distribution, manufacturing, refining, and aggregate operations.

Established on ancestral Arapaho, Cheyenne, Apache, and Ute lands, the City traces its modern settler roots back to an 1859 trading post for miners on their way to the Pike's Peak Gold Rush. Native Americans were ultimately marginalized as a result. The area in and around what is now Commerce City has evolved many times since this modest beginning including cemeteries, agricultural land, and a slew of small, now largely-vacated towns[**]. Today, amidst a rapidly shifting urban landscape, Commerce City is once again undergoing a significant evolution in its community character. C3 is not alone; communities across the State face similar challenges with population growth, economic ups and downs, societal shifts, drought, threats to public health, and other environmental issues. The City recognizes that how it adapts and responds to this multitude of changes will determine its long-term vibrancy.

* https://www.census.gov/quickfacts/commercecitycitycolorado

** https://www.cchistoric.com/commerce-city-history

Introduction

To assess current conditions and strategies, the City contracted Lotus Engineering and Sustainability, LLC (Lotus) and Pinyon Environmental, Inc. (Pinyon) to conduct several scientific technical tasks such as the GHG emissions inventory, the Air Quality Significance Threshold Report, Air Quality Modeling Guidance, and Significant Point and Nonpoint Pollutant Source Identification. Lotus, in collaboration with AMBG Consulting (AMBG), led efforts to engage the community and summarize the recommendations from the citizen-led Environmental Policy Advisory Committee (EPAC), which the City convened for this planning process over the course of a year.

Synergies with the Comprehensive Plan Update

With this understanding, Commerce City is working hard to define itself against the recent population, economic, and environmental changes being experienced across the community. Currently, C3 is embarking on an update to its Comprehensive Plan, the document that will guide the City's development for the next 25 years. This effort will encapsulate the City's vision and goals related to planning out a future reflective of the City's changing priorities, values, and challenges. The 2045 Vision Statement states the City's desire to grow into:

- "a thriving community: economically strong, environmentally sustainable, and socially equitable;
- a healthy and safe city where fresh air, clean water, public health, and the preservation of natural open space are paramount;
- a financially sound city where businesses flourish through collaboration and innovation;
- [and] a diverse community that celebrates its unique history, identity, and culture, where families and individuals of all ages can live, work, and play."

Many of these aspirations hinge on Commerce City's ability to embrace and incorporate measurable targets, numerical goals, and sustainable policies that promote environmental and community health and restore compromised ecosystems. In recognition of the complex interconnectedness between population growth, economic development, environmental sustainability, and public health, C3 initiated a process to draft a set of specific environmental policy and community health recommendations. These recommendations set out to address some of the core challenges of the community's rapid change: economic growth; equity; energy use; and environmental impacts like drought, social well-being, health, and waste management. The resulting suite of policies aims to tackle this wide range of issues through a holistic, whole-of-government approach that will increase community resilience and improve public and environmental health. Ultimately, the policies in this document will play a critical role in realizing the vision for a thriving C3 laid out in its new Comprehensive Plan.

Local Sustainability Work

The recent Comprehensive Plan update and this Plan build on a long history of the City acknowledging environmental conservation and stewardship. Past planning documents have noted that communities and local governments are first to deal with volatile energy costs, diminishing natural resources, and the impacts of the environment on public health. The 2010 Comprehensive Plan recognizes that to achieve its goals of high environmental quality, economic prosperity, and community longevity and health, the City must reduce energy use, waste, and GHG emissions; improve water conservation; and increase renewable energy use.

The 2010 Comprehensive Plan vision kicked off two key City initiatives to assess the City's baseline for sustainability work. First, the City contracted McKinstry to conduct an Energy Performance Contract in 2010, resulting in numerous recommendations. In 2012, the City's Green Team published its first internal Sustainability Plan centered on maximizing the efficiency of operations and minimizing resource use. The combination of these efforts underpins many current and ongoing staff-led sustainability initiatives.

Current and Ongoing Initiatives

BUILDINGS | To begin implementing the recommendations developed through the recent Facility Assessment and the McKinstry Energy Performance Contract, the Community Development Building Safety Division determined that the City should adopt Leadership in Energy and Efficiency Design (LEED) Silver or equivalent for all new City buildings and remodels over 50,000 square feet. The City will be adopting the 2018 International Green Building Code, including the International Energy Conservation Code (IECC) and plans to amend the code to 2021 standards in 2025. The City began providing leave compensation for staff to attend LEED, WELL Building, Passive Building, and other sustainable building trainings to increase the City's capacity to support sustainable construction. These efforts have yielded a 43% reduction in water use for a City building and solar array on the Civic Center which reduces costs by over $4,000 annually. Staff continue to research grant opportunities for additional solar and low-impact green stormwater infrastructure installations.

WASTE | Waste reduction efforts include minimizing paper use in the Finance Department and transitioning to electronic file storage. The Community Development Department will also transition to an electronic permitting review software in 2023. In a situation that is fairly unique across the Front Range, Commerce City pays for the trash service for all residential accounts. Staff began examining trash bills to establish a baseline for trash collection costs and discovered an almost tripling in annual costs to approximately $3.3 million between 2018 to 2021. Given these trends, staff have begun examining opportunities to increase diversion rates and lower overall trash quantities, including recommendations by EPAC and Republic Services to increase education, recycling, and composting.

Local Sustainability Work

WATER | Given the ongoing State-wide drought and increase in severe wildfires, staff have also spearheaded several water conservation initiatives, including revising the City's tree and plant list to promote drought tolerant and fire-resistant species. In 2022, the Parks, Recreation, and Golf Department (Parks) hired its first park rangers to protect open space and trails. Parks also allocates annual funding for tree and shrub replacements, removing and replacing around 40 dead trees in 2022. A volunteer group also recently helped the City plant 16 trees at Pioneer Park. Moreover, the Community Development Department has observed a groundswell of interest in replacing turf and planting trees, but residents ultimately face challenges with code and homeowners' association (HOA) turf requirements.

The Parks Department uses irrigation controllers to detect overflows in the irrigation systems. The controllers allow Parks to utilize evaporation transpiration rates and weather stations to help monitor water use. On the other end of the water use spectrum, the Public Works and Community Development Departments are collaborating on a draft of new development standards to incorporate green infrastructure principles to manage stormwater flows and reduce pollution from entering water sources. To complement these efforts, the Community Relations Division launched a "Only Rain in the Drain" education campaign.

POLLUTION | Finally, to reduce carbon pollution associated with vehicle travel, many City departments encourage hybrid work options, including staff from the Finance Department working remotely on Fridays. Staff are evaluating options for electrifying various City fleets.

Sustainability Initiatives Committee

In 2022, the City formed an internal staff Sustainability Initiatives Committee (Committee) to begin coordinating the sustainability-related projects in various departments and encourage cross-departmental collaboration. The Committee began to ascertain current conditions, barriers, and opportunities to lead by example within municipal operations and address sustainability throughout the community.

To date, the Committee has focused largely on tackling building energy use, the City's largest source of carbon pollution and energy consumption (see Greenhouse Gas Inventory section for more information). Much of this work has gone toward meeting the requirements of the new State energy disclosure laws, planning to create a 100% renewable electricity system, and identifying opportunities to save on energy bills. Staff developed an informational fact sheet to help local businesses with the disclosure regulations. These efforts are likely to reduce community-wide electricity consumption, which also lowers energy costs and the amount of renewable electricity needed to achieve a 100% renewable electricity scenario.

Finally, the City publishes sustainability news through

Local Sustainability Work

Commerce City Connected and hosts resources on air and water quality conservation and information on the EPAC on the Sustainability webpage. Currently under development is a Green Code website to communicate new standards and an expedited permit review process to promote sustainable development.

State and Local Level Climate Policy

It should be noted that C3 did not initiate its sustainability work in a vacuum. Several City staff serve on sustainability-related State, regional, federal, and international organizations such as the Colorado Green Business Network, Metro Denver Public Health Climate Group, Municipal Water Conservation Working Group Urban Sustainability Directors Network, and the International Society of Sustainability Professionals. Many neighboring communities including Thornton, Westminster, Northglenn, Lakewood, and Denver have all developed climate and/or sustainability action plans. This regional momentum indicates popular support for a broad approach to sustainability, from strengthening building codes to expanding regional transportation networks. With the policy recommendations in this Plan, the City can join in a regional approach and leverage existing work with its neighbors.

At the State level, Colorado has grown into a national leader in climate action, spearheading significant steps towards mitigating carbon emissions, enhancing sustainability, and addressing environmental justice issues.

House Bill (HB) 19-1261, *Climate Action Plan to Reduce Pollution*, set the tone of recent legislation by outlining the State's official greenhouse gas (GHG) pollution reduction goals. Several following bills continue to define the State's goals for a climate-resilient, sustainable Colorado. This includes bold, cutting edge steps to reduce single-use plastic products (HB 21-1162, *Plastic Pollution Reduction Act*) and energy consumption (HB 21-1286, *Energy Performance for Buildings Act*). Crucially, this legislation was accompanied by an official definition for disproportionately impacted communities in HB 21-1266, *Environmental Justice Disproportionate Impacted Community*, so the State can begin addressing environmental justice (EJ) on a more systemic, statewide basis.

2022 saw a continuation of this state-wide momentum. The legislature expanded on its work in the built environment with Senate Bill (SB) 22-051, *Policies to Reduce Emissions From Built Environment,* and HB22-1362, *Building Greenhouse Gas Emissions.* As buildings comprise approximately one-third of all GHGs emitted globally, these bills provide significant incentives for clean building technologies, such as heat pumps and energy storage, and update the State's energy codes to spur building electrification. Notably, this legislation also codifies support for disproportionately impacted communities which will benefit many facing EJ harms like in Commerce City.

2022 Environmental Policy Recommendations

In 2021, the City Council resolved to tackle this wide-ranging, complex set of issues related to sustainability and environmental health in collaboration with the community, to ensure the current and future C3 community will be able to enjoy the same small-town atmosphere and an even better quality of life than today.

C3 hired the consultant team led by Lotus and including AMBG and Pinyon, to engage the community; develop organizational sustainability recommendations; analyze air and water quality issues and recommend improvements; analyze community-generated GHG emissions; and develop recommendations for the City to implement.

The result of this planning effort is a robust set of sustainability and community health recommendations that the City will implement over the coming five to ten years.

If all strategies and actions are implemented and the City's targets are reached, community-wide carbon pollution will reduce by 45% by 2030 and 75% by 2050*.

These targets fall short of the City's desire to align with the State's reductions of 50% by 2030 and 90% by 2050 but show significant progress towards reaching those reductions. Additionally, it should be noted that these carbon pollution reduction goals represent

Commerce City Targets
Energy use is reduced by 25% by 2030 and 40% by 2050.
Electrification is adopted by 15% of all buildings by 2030 and 60% by 2050.
Rooftop and Community Solar is utilized by 40% of households by 2050.
The share of renewables in the C3 community's energy mix increases by 10% annually.
Vehicles on the road are 30% EVs by 2030 and 75% EVs by 2050.
Idling time is reduced by 78% by 2030.
There is a 20% mode shift by 2030 and 50% mode shift by 2050 towards greater use of transit, bikes, walking, etc.
Waste diversion increases to 85% by 2050.
Any new oil and gas wells developed within City limits are carbon neutral.
Reduce GHG emissions by 50% by 2030 and 90% by 2050, in line with the State of Colorado's goals.

* Based on a 2019 baseline of core emissions from activities in Commerce City, which includes emissions from building energy use, transportation, and waste. Industrial process emissions are not included in the 2019 core emissions totals.

2022 Environmental Policy Recommendations

several other co-benefits that the City can achieve, including reductions in other criteria air pollutants and their precursors that contribute to public health issues.

Policy Development Process

The C3 team approached the development of environmental policy recommendations in multiple phases, beginning with Commerce City's first-ever community-wide GHG inventory and an assessment of air and water quality concerns and impacts. The GHG inventory process established a baseline of carbon pollution for the community in the year 2019. The inventory gives the City baseline data from which to establish all following work, such as guiding key strategies to develop measurable targets and maximize carbon pollution reductions and investment opportunities.

Next, the City underwent an evaluation of its internal municipal operations as they relate to sustainability. A vision statement for the City's organizational sustainability approach emerged from this work, as well as recommendations to increase the C3 organization's sustainability. Recommendations, which are detailed on pages 9-11, include opportunities to enhance energy efficiency, improve sustainability within fleet management, reduce waste, conserve water, and build internal capacity to support sustainability work. These recommendations were derived from extensive research into similar communities across the country and consultant expertise but tailored to meet the City's specific needs. See Appendix F for further information on the City's organizational sustainability opportunities.

Given the community's concern over public health and natural resources, the City also commenced an in-depth analysis of air and water quality. This analysis encompassed a wide range of work which added crucial data to the body of information on the quality of C3's environment, including:

- Community-wide air pollutant and impacts of concern inventory;
- Air quality (AQ) monitoring plan based on the above inventory;
- Strategies for reducing known air pollutants;
- AQ significance thresholds to screen future projects and plans;
- AQ modeling guidance for development projects that exceed screening standards;
- Policy analysis for setting local oil and gas AQ standards;
- Identification of significant nonpoint and point sources of water pollution;
- Water quality (WQ) Evaluation, Summary, and Recommendations;
- Low-impact development (LID) and stormwater infrastructure best management practices guidance; and
- Land use policy recommendations designed to improve WQ.

2022 Environmental Policy Recommendations

The analysis completed in this phase creates a baseline understanding of the current state of C3's natural resources, helps elucidate the community's confusion over local air and water quality, and provides valuable guidance on natural resource management to the City as it expands its infrastructure to meet population growth.

The air and water quality assessment work ran parallel to the environmental policy development phase. This process relied on extensive stakeholder and community engagement, featuring the aforementioned citizen EPAC to develop the policy recommendations. Recognizing the impact of EJ issues and extreme climate conditions on the residents of C3 and honoring the wisdom and lived experiences of those who call C3 home, the City opted to create the EPAC to serve as the broader C3 community's voice in guiding the City's actions over the coming years. The EPAC's goal is ultimately to define the community's desired outcomes and drive the City to improve community-wide health and sustainability.

The EPAC was formed in the fall of 2021 and met regularly until the fall of 2022, when they finalized their recommendations. The strategies and actions recommended in this document represent the future state that community members believe is not only possible in Commerce City, but one that will support long-term community health and well-being, enhance the quality of life for residents, improve business opportunities, and ensure Commerce City truly remains a "quality community for a lifetime." Outside of the EPAC meetings, a variety of additional creative strategies were employed to seek input from residents, businesses, and City staff, including a civics engagement training, community dinner conversations, a community survey, key informant interviews, and a community meeting (see Appendix E for an overview of insights gleaned from the survey and informational interviews.

> **"Living close to factories makes the air quality poor. In addition the lack of green spaces contributes to this. Poor air quality and poor water quality lead to public health concerns and increased illnesses that could be preventable."**
> **- Survey Respondent**

Commerce CITY

Organizational Sustainability Recommendations

Organizational Sustainability Recommendations

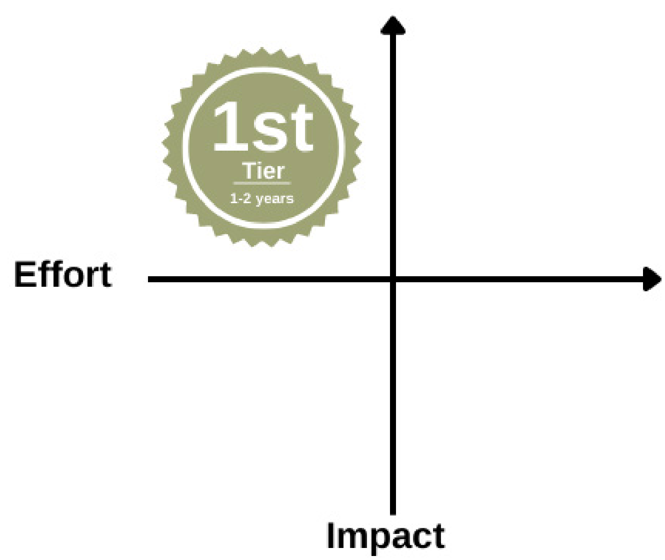
Consultants worked with staff from departments across C3 to develop a vision for organizational sustainability, as well as specific recommendations that the City can implement to improve sustainability throughout the City organization. Recommendations were developed based on input from staff interviews, a City staff-wide survey, focus groups, and a review of best practices implemented in other municipal organizations.

Vision Statement

The City of Commerce City is committed to environmental stewardship and is dedicated to making internal improvements that foster a sustainable future.

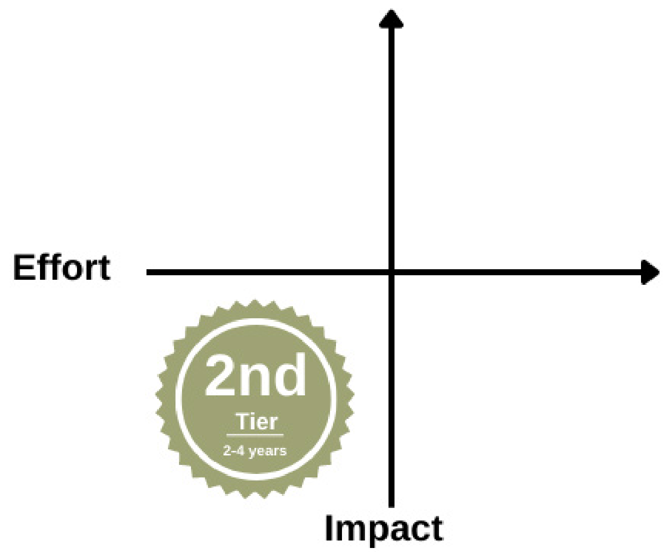
— First Tier Recommendations | High Impact, Low Effort (1-2 years)

1. Implement digital systems to reduce the amount of paper used.
2. Make it a policy to upgrade facility, street, and trail lights to high-efficiency LEDs.
3. Develop processes and policies for maintaining and replacing equipment to reduce energy use, conserve fuel, and reduce air pollution.
4. Develop a Green Meetings and Events Policy with checklists and resources for staff.
5. Ensure all waste disposal systems are consistent in terms of look, style, and signage.
6. Create a City-wide Green Team with representation from each department to lead sustainability efforts.
7. Provide incentives for sustainability-based professional development.
8. Recognize staff for sustainable decision-making.
9. Adopt work-from-home policies.
10. Purchase Renewable Energy Credits.



Organizational Sustainability Recommendations

— Second Tier Recommendations | Low Impact, Low Effort (2-4 years)



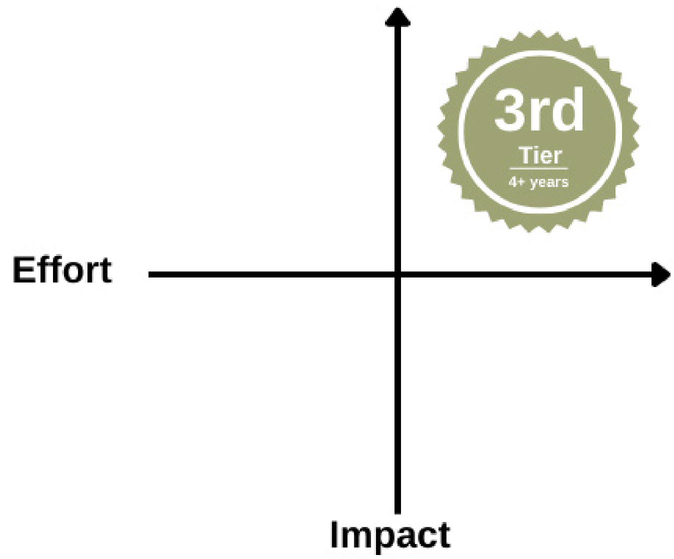
1. Improve AQ in buildings.
2. Develop a City-wide environmental management system (EMS) that is fully integrated and operational across all facilities.
3. Develop a program for employees that provides sustainable education, training, and incentives.
4. Develop a policy for recycling electronic office equipment and other hard to recycle items.
5. Establish an employee donation or volunteer program.
6. Require that new City infrastructure projects be evaluated for environmental and social impacts.
7. Develop a municipal policy and procedure to consider life-cycle costs in procurement.
8. Develop waste reduction and diversion policies that are aligned with zero-waste practices and include green standards.
9. Ensure facilities cleaning contractors are utilizing sustainable practices.

— Third Tier Recommendations | High Impact, High Effort (4+ years)

1. Improve building efficiency.
2. Introduce electric and hybrid vehicles into the fleet and invest in the charging infrastructure needed to support electric vehicles.
3. Implement xeriscaping in City landscaping.
4. Identify and develop projects to expand local renewable energy generation and use on City facilities and land.
5. Collect data to start building climate action plans and goals.

Organizational Sustainability Recommendations

6. Develop a policy to increase construction recycling for City-funded projects.
7. Diversify staff.
8. Develop a sustainability or innovation grant program for staff to implement and make operations more sustainable.
9. Adopt a policy that all new City facilities or major renovations will be built to a high-efficiency standard (e.g., LEED).



A final recommendation that is crucial to ensuring the success of both Commerce City's internal (i.e., organizational) and external (i.e., community-wide) sustainability work is to **build capacity and skill within the organization to lead sustainability efforts.** Commerce City should consider creating a staff position specifically dedicated to leading City-wide organizational and community sustainability efforts. This position could be housed in the City Manager's Office or Community Development, but it is recommended that the position be structured to specially work on sustainability projects alone, including implementing the recommendations herein and the forthcoming community-wide sustainability strategies developed in partnership with the EPAC. By maintaining the core functions of the position discreetly on sustainability, staff in this position would have the ability to focus time on implementing sustainability policies and programs, collaborating with other City departments to ensure success, and facilitating the City-wide Green Team to continue to build capacity for sustainability throughout the organization.

Environmental Justice, Vulnerability, & Climate Equity

As an EJ community, C3 must inevitably address its long history of industrial pollution as it embarks on the work of implementing the Comprehensive Plan and the Action Plan for Sustainability (Plan). The concept of EJ, according to the federal Environmental Protection Agency (EPA), encompasses the goals that all people should enjoy the same degree of protection from environmental and health hazards and equal access to the decision-making processes that shape the healthy environment in which they live, learn, and work.

The legacy and levels of pollution manifests in the community's stated mistrust in both government and polluters. The community is keenly aware of environmental and pollution issues and the health consequences. Although wealth does not prevent pollution, low-income communities, particularly those of color, face particularly severe impacts of industrial pollution. *Figure 1* reveals the many severe EJ concerns in the C3 community as compared to other communities in the State and the country. These percentiles are based on the US EPA's EJ index. Higher percentiles indicate higher levels of pollution.

Air and water quality both suffer as a result of this ongoing legacy of environmental injustice, impacting the City's public health. Residents near industrial facilities, often of Latinx heritage, report higher rates of cancer and other serious health issues like migraines, nausea, and difficulty breathing. According to the Colorado Department of Public Health and the Environment's (CDPHE) EnviroScreen, Adams County scored in the 86th percentile for environmental burden out of all Colorado counties (See *Table 1*). Several Census tracts within Commerce City ranked within the 90th percentile (*Figure 2*). While these analyses demonstrate the concerning impact of pollution, many of the recommendations in this Plan suggest studies and capacity-building groundwork that will prepare C3 to accept and implement a slew of 2023 State and federal grant funds to address health and economic disparities to maximum benefit.

Given that much of the available AQ measurements still rely on industries self-reporting data, an atmosphere of distrust, anger, and uncertainty exists amongst community members. Policies that strive to increase monitoring of local AQ, analyze

> **"I am concerned about the inequities that exist in CC. I'd love to see efforts supported in the lower and middle CC areas, led by residents of these areas with the history and lived experience to guide priorities."**
>
> **- Survey Respondent**

Environmental Justice, Vulnerability, & Climate Equity

EJScreen Report (Version 2.1)
1 mile Ring Centered at 39.805899,-104.897461
COLORADO, EPA Region 8
Approximate Population: 7,504
Input Area (sq. miles): 3.14
(The study area contains 1 blockgroup(s) with zero population.)

Selected Variables	Percentile in State	Percentile in USA
Environmental Justice Indexes		
EJ Index for Particulate Matter 2.5	93	77
EJ Index for Ozone	43	90
EJ Index for Diesel Particulate Matter*	91	84
EJ Index for Air Toxics Cancer Risk*	90	80
EJ Index for Air Toxics Respiratory HI*	90	81
EJ Index for Traffic Proximity	76	70
EJ Index for Lead Paint	88	80
EJ Index for Superfund Proximity	93	88
EJ Index for RMP Facility Proximity	92	87
EJ Index for Hazardous Waste Proximity	94	80
EJ Index for Underground Storage Tanks	83	76
EJ Index for Wastewater Discharge	80	83

EJ Index for the Selected Area Compared to All People's Blockgroups in the State/US

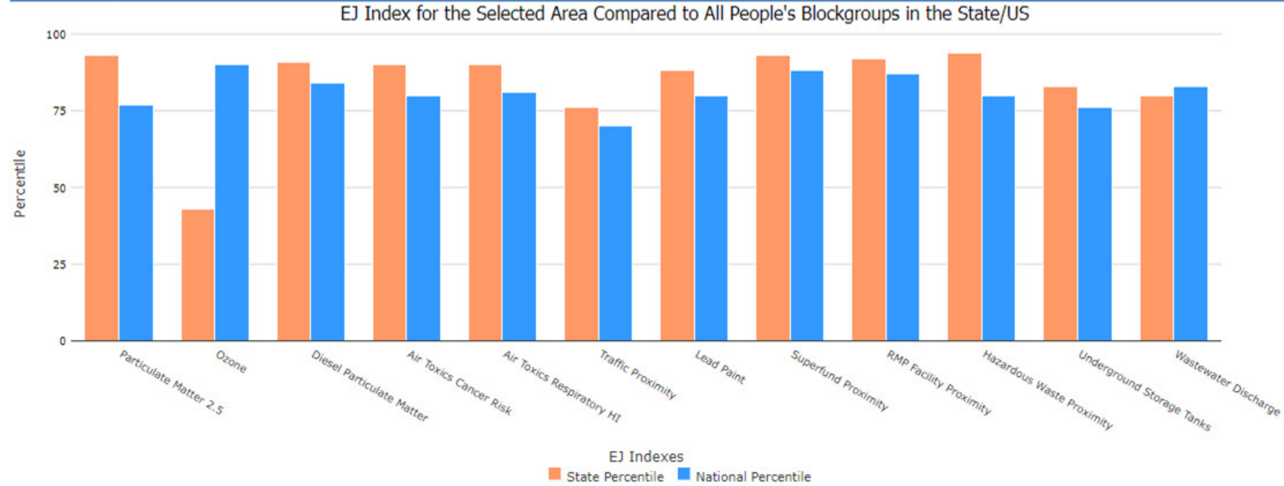


Figure 1 Commerce City's EPA EJScreen report.

cumulative pollutant exposure levels, and reduce toxic air pollutants emitted by industrial facilities will offer the community a step towards repairing the damage inflicted on community health and on the relationship between residents and City.

Ultimately, these community health concerns, particularly those involving AQ, underpin the motivation behind this Plan and define the urgency of its policy recommendations. Additionally, scientists predict that extreme weather events will continue to escalate unless drastic measures are taken to curb carbon pollution. Moreover, data shows that these climatic shifts degrade air and water quality, worsen flooding and drought, and harm public health. Some climate-related impacts will compound on existing issues like ozone pollution (see *Figure 3*), worsen health conditions like asthma, and lead to increases in mortality. In commissioning this Plan, C3 understands the urgent imperative of solving existing air and WQ issues and infrastructure shortcomings to reduce the public health and resource management issues.

Environmental Justice, Vulnerability, & Climate Equity

Table 1 Commerce City's EJ Index, 2021.

Selected Variables	Percentile in State	Percentile in EPA Region	Percentile in USA
EJ Index for Particulate Matter 2.5	94	96	85
EJ Index for Ozone	94	95	90
EJ Index for 2017 Diesel Particulate Matter*	96	98	91
EJ Index for 2017 Air Toxics Cancer Risk	97	98	93
EJ Index for 2017 Air Toxics Respiratory HI*	95	97	89
EJ Index for Traffic Proximity	92	94	86
EJ Index for Lead Paint	97	98	92
EJ Index for Superfund Proximity	99	99	98
EJ Index for RMP Facility Proximity	99	99	98
EJ Index for Hazardous Waste Proximity	99	98	90

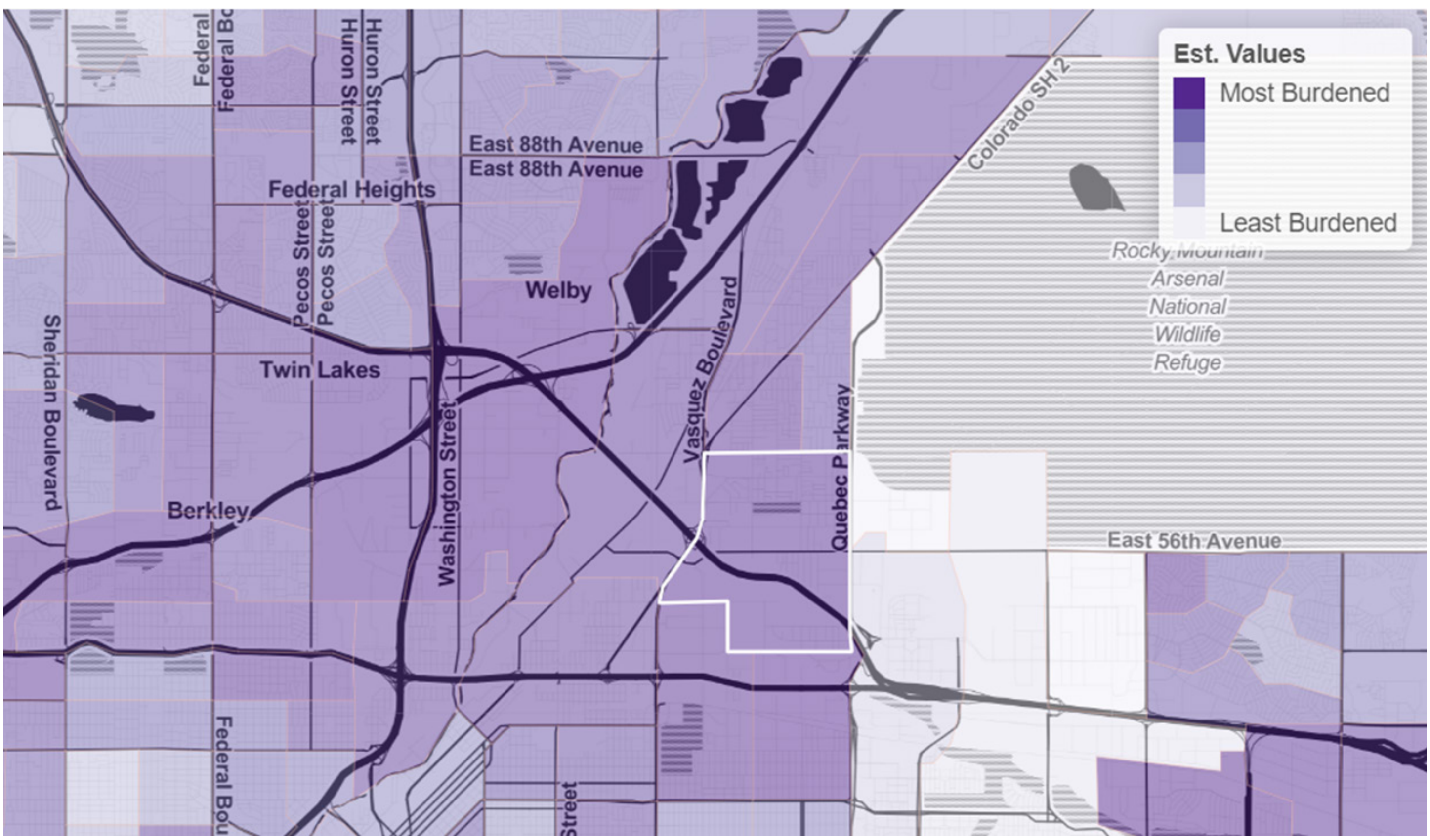


Figure 2 Environmental Justice burden in Commerce City.

Environmental Justice, Vulnerability, & Climate Equity

To that end, the Commerce City community has spearheaded multiple initiatives, described in the recommendations section below, to address EJ issues and monitor air and water quality. These initiatives and the air and water monitoring work completed through this planning process will prepare the C3 community for a future of ever-changing conditions and uncertainties.

Parallel to the community's health concerns is the issue of environmental equity. Rapidly changing climatic conditions exploit existing vulnerabilities, disproportionately harming already struggling communities and reducing their resiliency. Commerce City must carefully plan and implement policies that invest equitably in communities, reduce their cost burden, and build capacity. The recommendations made in this Plan offer ample opportunities to address equity issues while promoting economic vitality, such as through reducing energy burden*. The City seeks to manage its growth more sustainably; this demands a dual focus on equity and climate to break the cycle of carbon pollution and ensure all can thrive.

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* "Energy burden" refers to the percent of a household's income that goes to pay for energy expenditures, such as heating, cooling, and powering lights and appliances. An energy burden above 6% is considered high, and severe energy burden is defined as above 10%.

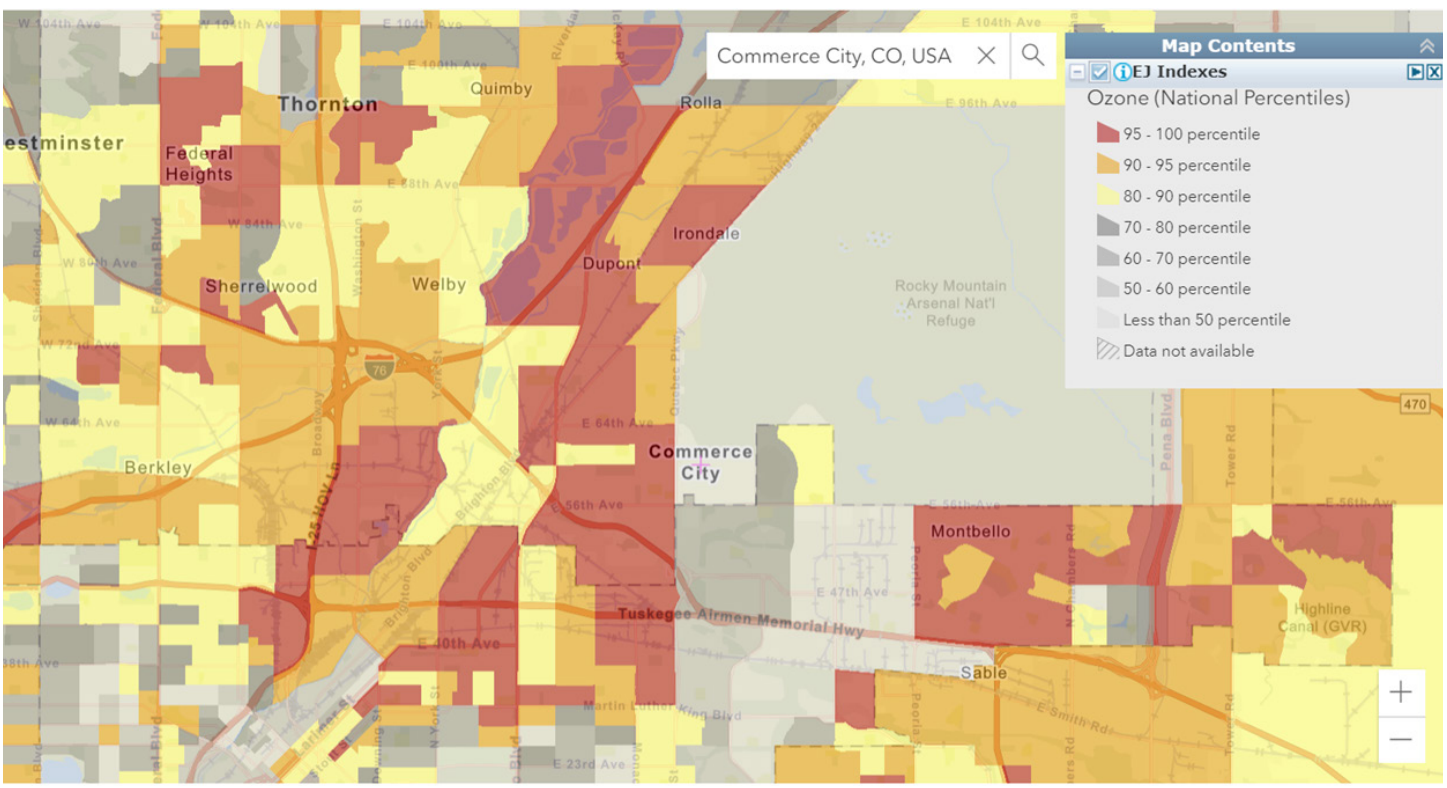


Figure 3 Ozone pollution in Commerce City relative to national levels.

Assessment of Air Quality Conditions & Concerns

Throughout the EPAC meetings, the team presented various datasets to provide context for environmental policy development and prioritization. For example, according to the CDPHE, Adams County far outstrips Arapahoe and Denver Counties in many of the federal Clean Air Act's criteria pollutant categories, known as the National Ambient Air Quality Standards (NAAQS). These pollutants trend are particularly high for carbon monoxide, nitrogen oxides (NOx), volatile organic compounds (VOCs), and sulfur oxides (SOx) (*Table 1*). These pollutants and their precursors contribute significantly to ozone formation and its associated health problems. As noted previously, the C3 area ranks within the 90th percentile State-wide and regionally for the EPA's EJScreen for almost every category.

Given this landscape of concerns, the consultant team completed several AQ analyses to develop a better understanding of potential pollution-related impacts to AQ, the amount of pollution in C3, and the location of pollutant sources. Air quality refers to the concentration of solid particle and chemical pollution in the air of a particular location. The results of these AQ analyses ultimately intend to clarify for C3 residents one of their top environmental priority issues and lead to strategies that limit and reverse the ongoing degradation of AQ in the City.

Completed analyses, such as the AQ Threshold report, reveal an inordinate amount of air emissions sources clustered in the City's residential areas. The following subsections summarize the information from each AQ analysis completed. Copies of the full reports can be found in Appendix B.

> "Suncore is killing us."
> - Survey Respondent

Table 2 Annual tons of criteria air pollutant by local county, 2021.

Annual Tons of Criteria Pollutant	Adams County	Arapahoe County	Denver County
Carbon Monoxide (CO)	2762	938	528
PM 10	773	557	209
PM 2.5	453	506	125
Nitorgen Oxides (NOx)	3367	895	750
VOCs	3719	2059	879
Sulfur Dioxide (SOx)	462	32	99

Assessment of Air Quality Conditions & Concerns

Community-Wide Air Pollutant and Impacts of Concern Inventory

The Community-Wide Air Pollutant and Impacts of Concern Inventory presents a summary of the City's pollutant sources, itemized by pollutant and ranked by the size of pollutant release, within a ½-mile of the City boundary, known as the study area (*Figure 4*). Data was compiled for each pollutant of interest, including their relevant precursors, along with total hazardous air pollutants (HAPs). The inventory for each pollutant contains the total potential emissions in the study area, a breakdown of emissions percentage by industry, and the top ten highest sources of the pollutant. The reported data is also presented visually to display the geographic distribution of emission sources and ground the analysis in the context of the community.

Figure 5 exemplifies this visual depiction of the pollutants of concern, in this case for the emissions sources of volatile organic compounds (VOCs) tabulated in the report. Similar figures for each analyzed pollutant of concern can be reviewed in the original inventory report on Commerce City's website and in Appendix B.

Air Quality Monitoring Plan

The Air Quality Monitoring Plan identified locations of existing air monitoring in the City, shown in *Figure 6*, potential locations that could fill in gaps in monitoring, and pollutants of concern that would build a more comprehensive pollutant impacts database.

Air Quality Significance Thresholds

The Air Quality Significance Thresholds report recommends levels of AQ significance, or the minimum amount of a pollutant released into the air that experts believe to warrant additional analysis. The City may wish to use these thresholds to prompt further evaluation, reporting, and mitigation actions. For example, dispersion modeling beyond CDPHE requirements could be implemented for future sources that exceed these thresholds.

Air Quality Modeling Guidance

The City can publicize the Air Quality Modeling Guidance document as a tool to help potential emission sources complete screening and/or refined dispersion modeling to demonstrate compliance with NAAQS. Dispersion modeling is a nuanced technical exercise, and the document provides direction on the various factors that shape the modeling results, like meteorological data, source input parameters, and more.

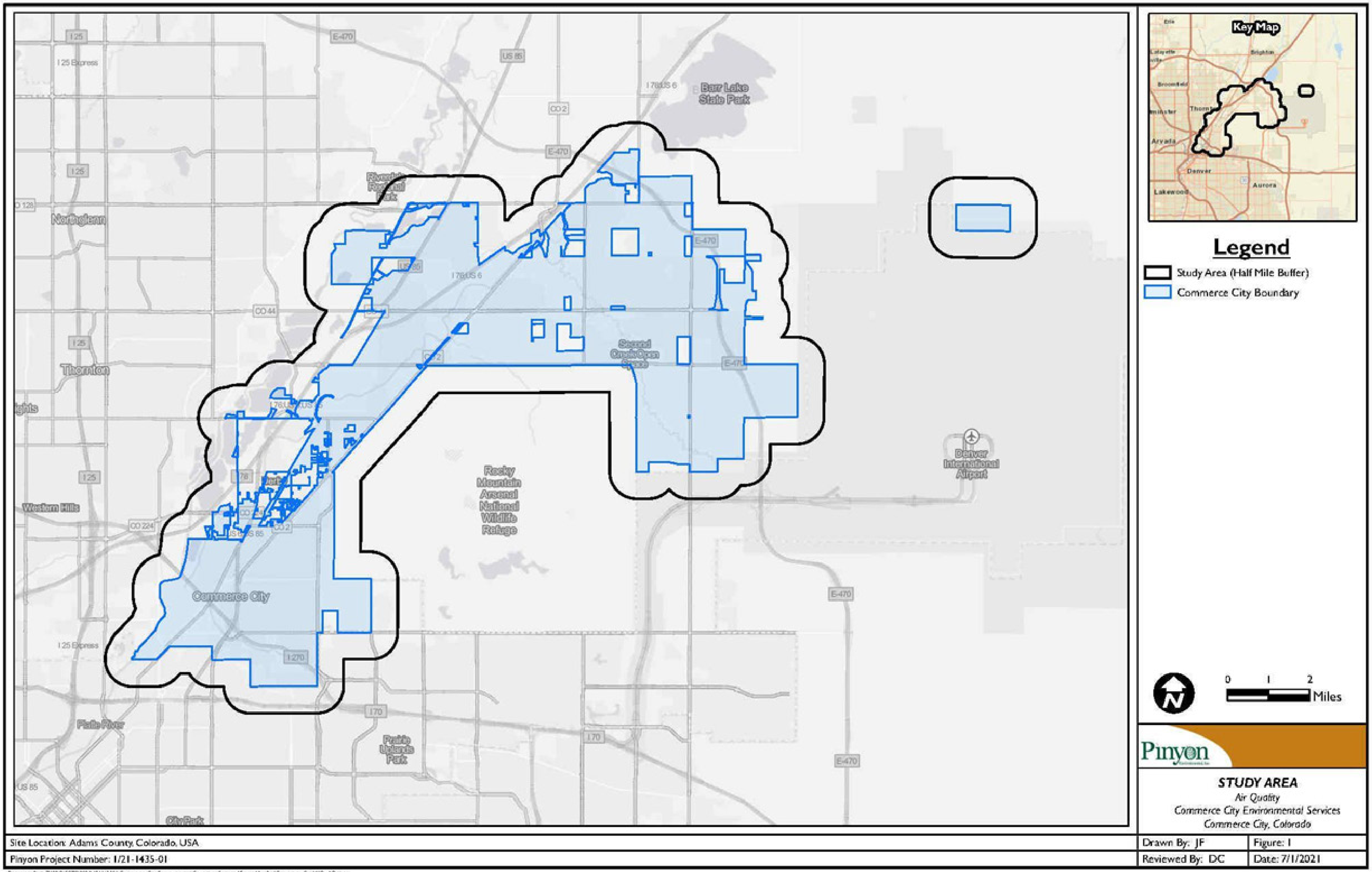


Figure 4 Air quality study area.

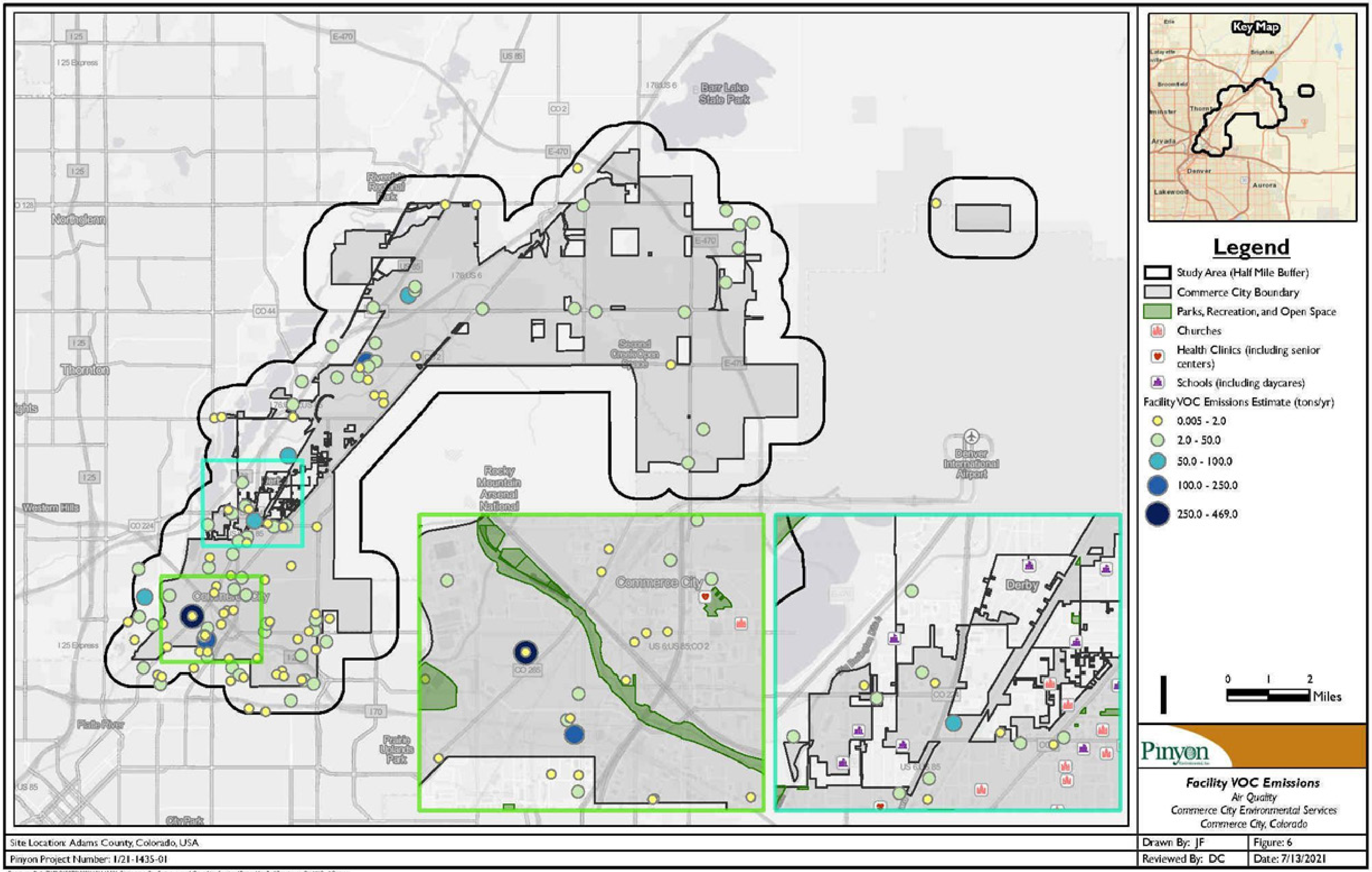


Figure 5 VOC facilities.

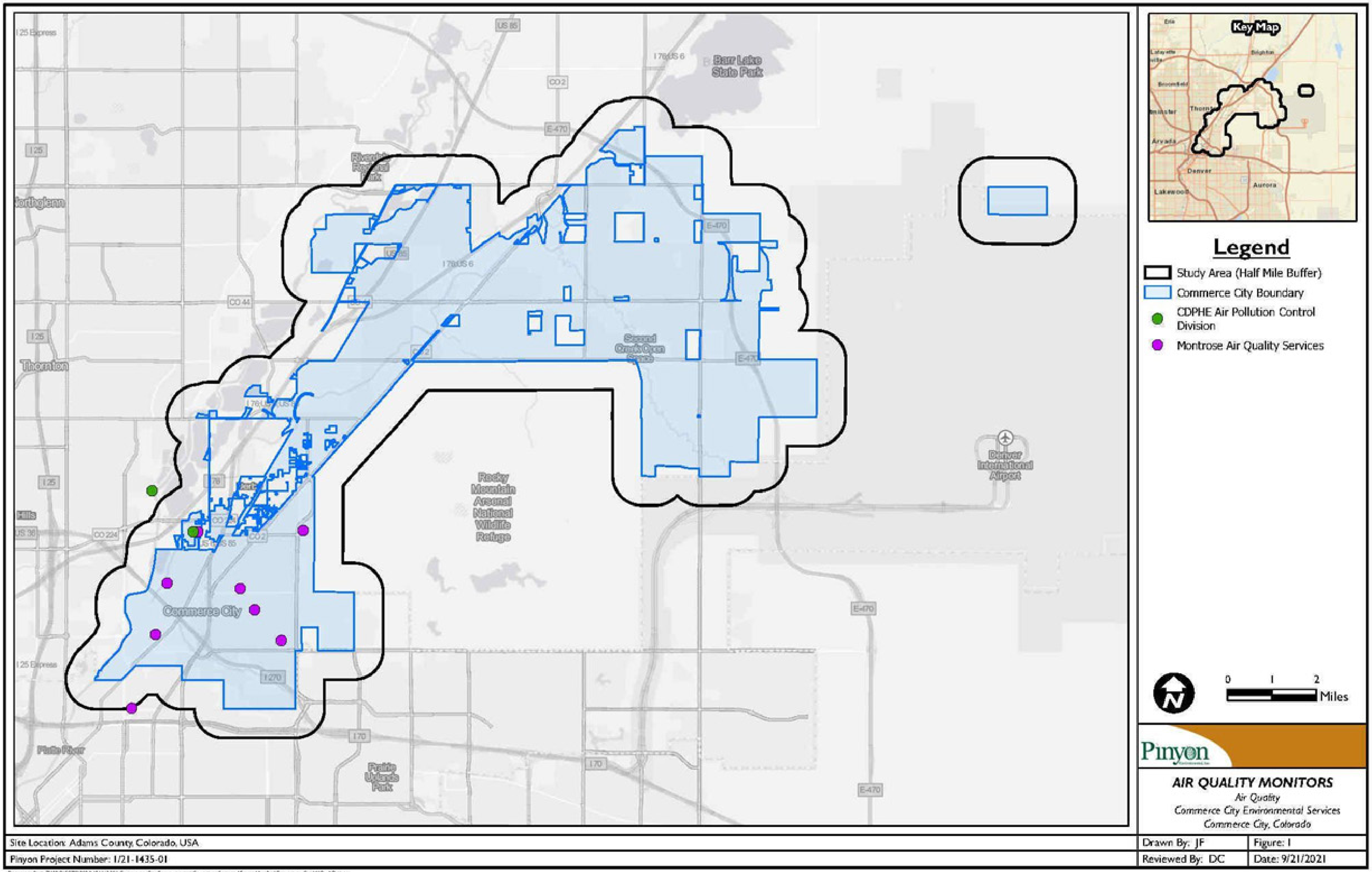


Figure 6 Existing air monitors in Commerce City.

Assessment of Air Quality Conditions & Concerns

Oil and Gas Air Quality Policy Analysis

This Policy Analysis originally intended to develop recommendations for additional oil and gas requirements, but due to the passage of Ordinance 2266 in 2021, was revised to encompass the completion of an analysis of that policy and a comparison to the policies of nearby municipalities. The Ordinance adds comprehensive AQ requirements that oil and gas companies must follow when drilling and operating new facilities. Examples of requirements in the Ordinance include equipment electrification, leak detection and repair programs, and green completion utilization.

Emissions Reduction Guidance

The Emissions Reduction Guidance document provides additional mitigation measures not identified in other tasks that the City could implement through rulemaking to reduce AQ pollutants and emissions. For example, integrating a best available control technology (BACT) analysis beyond current regulatory requirements will demonstrate that pollutant sources are keeping up with the rapidly changing technological advances in emissions control technologies. In addition to BACT, the City could work with CDPHE, Colorado Oil and Gas Conservation Commission, EPA, and local environmental regulators to set targeted control requirements to larger and more concerning emission sources in the City.

> **"Muchos venenos como venceno en el aire y otros mas el agua no sabe bien y no es agradable tomar y muchas enfermedades en la comunidad en la piel respiratorio sangrado por la nariz migraña etc."- Survey Respondent**
>
> **"There are many toxins here, such as in the air and other places. The water does not taste good and it isn't pleasant to drink. There are many diseases in the community such as respiratory diseases, skin diseases, nose bleeds, migraines, etc."**
>
> **- Survey Respondent**

Assessment of Air Quality Conditions & Concerns

Summary Air Quality Recommendations

These various AQ analyses undertaken by the City, with support from Pinyon, culminated in a compilation of recommendations that the City can implement to stem AQ degradation and potentially begin improvements.

The following includes those recommendations:

1. Continue updates to the impacts inventory to keep residents informed on new pollutant source details and existing source modifications.

2. Implement a monitoring network that supplements existing and planned monitoring to help the community better understand how the existing pollutant sources impact residents and/or other specific locations such as schools and parks.

3. Incorporate AQ threshold levels into City ordinances that would require additional analysis, reporting, and potentially mitigation for planned emission sources.

4. Update oil and gas regulatory requirements on a continuous basis to keep up with evolving industry technologies, legal requirements, and best practices.

5. Reduce current and future emissions by implementing practices such as BACT analysis requirements and targeted emissions control requirements as needed.

> "The quality of our water and air is horrible and affects our health. I love the area but have concerns about the health safety of my children." - Survey Respondent

Assessment of Water Quality Conditions & Concerns

While AQ issues receive much of the C3 community's attention and resources, in recent years, WQ has become a greater priority for the public. With the State-wide drought impacting millions of Coloradans, water resources have an increasing significance in the State's long-term sustainability, as well as that of C3 by extension. When drought reduces the quantity of available water, WQ also suffers as a result, with less water to dilute pollution and lower stream flows to carry pollutants away. WQ specifically describes the condition of waterbodies - including chemical, physical, and biological characteristics - in relation to how suitable the water is for particular purposes such as drinking, recreation, irrigation, and more.

Moreover, anxieties surrounding emerging pollutants have spurred concern over the health impacts of industrial pollution in C3's water bodies. In response to the public's dual concerns, Pinyon completed several WQ-related analyses to improve understanding of the current conditions and potential pollutant sources for waterbodies flowing through the City and to develop policy recommendations to protect WQ through low-impact development (LID) strategies. Because C3 does not serve as a water provider or wastewater treatment utility, the City will ultimately need to work closely with South Adams County Water and Sewer District (SACWSD) to address WQ and quantity issues. The following subsections summarize the analyses completed as part of the City's overall sustainability planning process. Full reports related to the below analyses can be found in Appendix B.

Significant Point and Nonpoint Pollution Source Identification

Pollution of surface and groundwater resources occurs through point and nonpoint, or diffuse, sources. Point source pollution includes effluent, or liquid waste, from industries and wastewater treatment plants that enters a water body and can be controlled by treatment of waste materials prior to discharge. Under the federal *Clean Water Act*, the State requires all facilities that discharge into public water resources to obtain permits and administers enforcement actions to address permit violations.

In contrast, nonpoint source pollution results from land-use activities such as application of fertilizers and pesticides, chemical spills, mining, or illegal discharges to groundwater. Other sources may include natural contamination of groundwater due to geochemical conditions (e.g., arsenic and selenium). Unlike point sources, nonpoint sources of pollution are difficult to identify and quantify due to their dispersed nature. For example, excess nitrogen from synthetic fertilizers applied to golf courses or athletic fields will run off the grass in many distributed streams and may enter different water bodies via different entry points. In an attempt to corral nonpoint pollution, the federal *Clean Water Act* requires the State to develop reports identifying which water bodies exceed federal WQ standards. These reports designate water bodies with a status known as "impaired," and classify the water bodies by pollutant impairment.

Pinyon identified potential point and nonpoint pollutant sources for Commerce City that may impact WQ within the City boundary. A series of maps (see *Figure 7*) were developed to provide a high-level understanding of source categories, densities, and locations. The City may use this information for a range of planning and general information purposes such as developing construction or LID plans that position projects to avoid land disturbances that could release pollutants into vulnerable water bodies and remediate soils with high contaminant levels through tree plantings, mycellium, and other nature-based restoration and regeneration techniques.

Water Quality Evaluation

To kick off the WQ evaluation process, Pinyon began with a high-level assessment to understand the current conditions of C3's water resources. This analysis component included a review of stream monitoring activities to assess any data gaps and advise the City on any additional monitoring needed; additionally, an examination of WQ data was conducted to provide a basis for recommendations regarding the maintenance, improvement, and protection of C3's water resources.

The evaluation confirmed that most of the identified WQ issues within the City either have been, or are in the process of being, addressed through regulatory processes. The identification of WQ issues and subsequent impairment status will trigger certain treatment action requirements and unlock State or federal funds to remediate the pollution. Pinyon's evaluation did identify nutrients (total nitrogen and total phosphorus) and temperature as potential future contaminants of concern. Finally, despite efforts to achieve compliance with *E. coli* WQ standards, multiple stream segments are still in non-compliance for this pollutant.

Low-Impact Development Guidance Manual

The City can use the LID Guidance Manual (Manual) developed by Pinyon as a tool to help shape their sustainable response to growth by integrating the C3 community's environmental, social, and economic needs. LID is a comprehensive land planning and engineering design approach to managing stormwater runoff by mimicking how water used to cycle through the environment before significant manmade alterations

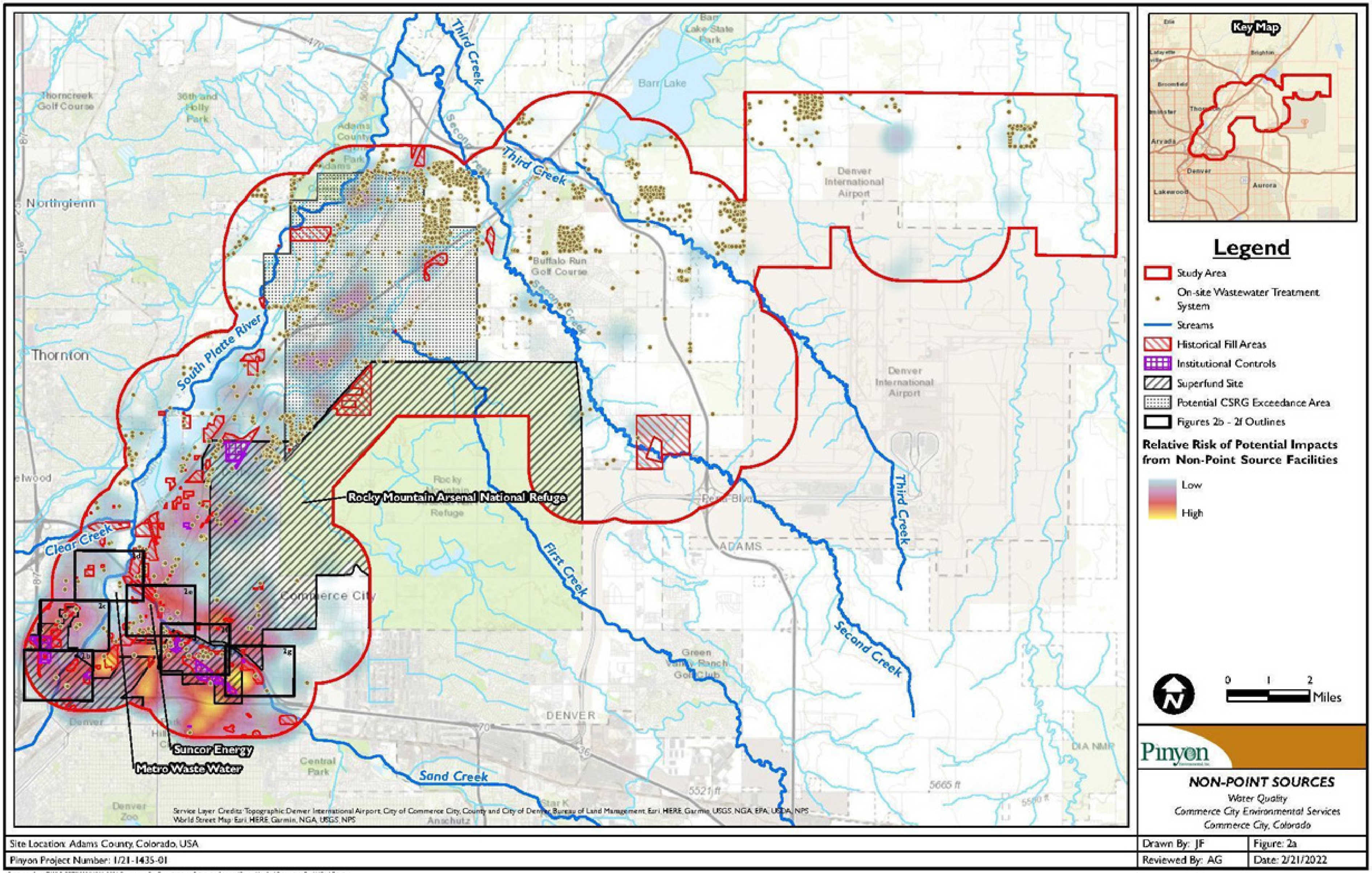


Figure 7 Point and nonpoint source pollution map.

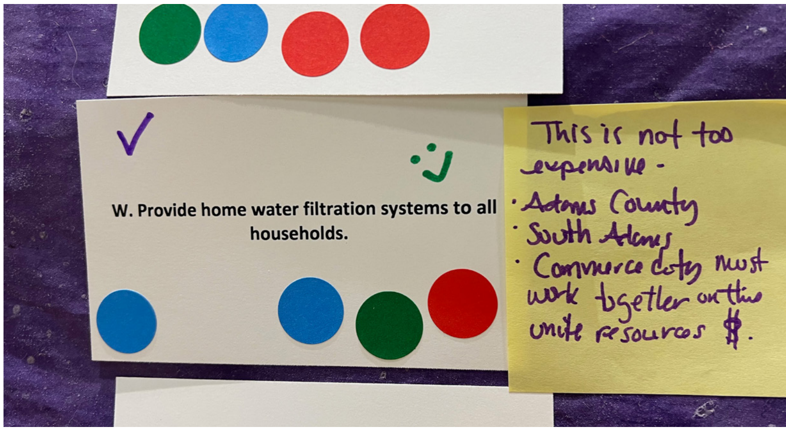
occurred, like paving over grasslands. The Manual provides a road map for City staff, developers, and designers to implement LID.

By maintaining the local watershed's historic water cycle, LID aims to protect the ecological quality of C3's water bodies. This approach accomplishes this goal by estimating what the region's pre-development water cycle looked like, through modeling of infiltration rates (how fast water absorbs into the ground), how much and how often water flows through the area, and groundwater recharge. Ultimately, these strategies slow down the flow of urban stormwater that typically contains a variety of harmful pollutants, remove those pollutants, and release cleaner water into the surrounding water bodies or drinking water sources.

LID emphasizes the conservation of green spaces, the use of native plants, and the implementation of dispersed stormwater control measures (SCMs), which means that stormwater is managed on a site-by-site basis throughout the City with many small installations rather than one large centralized SCM. Practitioners will often use the terms Green Infrastructure and Better Site Design interchangeably with LID.

Land-use Policy Recommendations

Pinyon and City staff also drafted a LID policy for passage into a City ordinance establishing a LID criterion for all projects that require a grading permit; checklists were developed that will be available to share with developers. For all grading permit applications reviewed by the City's Public Works Department, the policy would require the use of one or a combination of LID techniques, designed to treat the stormwater resulting from no less than 75% of the total disturbed project area. If, in the judgment of the City Engineer, the project site's unique engineering characteristics preclude the applicant from meeting one or more requirements, then a design alternative will be allowed, provided that the design results in equal or better stormwater quality than through compliance with the otherwise applicable requirement. The requirements must comply with Commerce City's municipal separate storm sewer system (MS4) permit, lessen the WQ impacts of development by using smart growth practices, and integrate LID practices and standards for stormwater pollution mitigation through means of infiltration, evapotranspiration, and rainfall harvest and use. LID shall be inclusive of new development or redevelopment requirements.



Assessment of Water Quality Conditions & Concerns

Summary Water Quality Recommendations

Based on the initial findings of the above WQ analyses, recommendations include:

1

Track WQ monitoring activities and discharge permit violations. While the Pinyon team concluded that there was no immediate need for selective WQ monitoring at this time, they recommended that the City develop a system to track WQ monitoring activities and discharge permit compliance for waterbodies within City boundaries. Illicit discharges enter all of C3's receiving waters each year and City staff regularly converse with CDPHE to locate priority areas for pollution. Tracking WQ and violations real-time will allow the City to flag issues of concern and facilitate discussions with CDPHE and Adams County to address these hotspots. Real-time monitoring will require the purchase of equipment and additional staff for data analysis.

2

Develop a high-level Stream Corridor Management Reference Document with a limited menu of easily implementable tools and approaches designed specifically for C3. Examples of the types of approaches that will help C3 improve the WQ in their rivers and streams include:

- Managing impacts associated with riparian buffer degradation and maintenance and protection of undeveloped buffers, or strips of land that protects a river ecosystem from human disturbance.
- Managing impacts associated with impervious cover, such as parking lots, roads, and buildings, and the associated urban runoff through the implementation of stormwater infrastructure design standards that incorporate LID and green infrastructure practices and design criteria.
- Managing impacts of pollutants associated with land-use activities such as establishing and enforcing restricted spray zones for pesticides; educating citizens, HOAs, and businesses about the use of lawn care chemicals; banning dangerous chemicals such as neonicotinoid and glyphosate; requiring licensing of pesticide applications; and establishing an Integrated Pest Management Policy.
- Investigating sources of *E. coli* (i.e., pet waste, human waste) and developing a program to install pet waste clean-up stations, public restrooms, and signs.

Greenhouse Gas Inventory

Beyond the City's existing and historic air and water pollution concerns, recent climatological data reveals a worrying acceleration in the impacts of shifting climate conditions across the State. C3 recognizes the increasingly urgent need to address its own role in the climate crisis and enact strategies to adapt to these new uncertain conditions, such as drought, extreme weather events, and wildfires.

To identify the strategies with the highest GHG reduction impact in the community, Lotus completed a GHG emissions inventory analysis on behalf of the City. The results of the inventory revealed high emissions per capita and per household rates as compared to several similar cities in the State and nationally, especially when factoring in the City's industrial sources (see *Table 3*).

The inventory will serve as the baseline against which the City's future inventories will be compared and which targets should be set. By tracking emissions reductions bi-annually, the City will improve their understanding of emissions reduction trends and sectors to focus efforts for improvement.

Based on the GHG inventory, a business-as-usual (BAU) model for the entire community was created, which estimates the predicted year-by-year emissions until 2050. BAU assumes current demographic and growth conditions and statewide policy trends, as well as no additional policy actions on the part of C3. During the policy development process, these findings were disseminated as background information to provide City staff and the community with real data and context for their feedback and input on policy development.

Methodology

The GHG inventory accounted for all carbon-emitting activities occurring within the municipal boundaries for the year 2019. This year was chosen to capture the most recently available, complete data that reflected typical activities and behaviors in the community, as the COVID-19 pandemic created unusual circumstances that impacted GHG emissions. The inventory involved calculating key metrics, including emissions by sector and by source. Sectors refer to the general categories of activities that produce emissions and include:

- Building Energy Use (residential and commercial).
- Transportation.
- Waste.
- Industrial Processes and Product Use (IPPU).

The accounting process employed a globally-accepted standard, the [Global Protocol for Community-Scale GHG Inventories](#) (GPC), to generate a standard BASIC inventory. A BASIC inventory standardizes the reporting of emissions by emissions source rather than scope, which refers in this context to the physical boundaries drawn around which emissions to count. Using this widely recognized method allows C3 to compare its GHG emissions to those of similar communities and measure changes over time.

Table 3 Commerce City's GHG emissions compared with regional and national counterparts.

Comparision City	Inventory Year	Population	Number of Households	BASIC GHG Emissions (mtCO2e)	Emissions per Capita	Emissions per Household
Commerce City, CO	**2019**	**56,448**	**16,818**	**842,144**	**14.9**	**50.1**
Commerce City, CO with Industrial Sources	**2019**	**56,448**	**16,818**	**1,945,937**	**34.5**	**115.7**
Denver, CO	2019	727,211	294,358	8,428,848	11.6	28.6
Boulder, CO	2019	119,006	46,217	1,466,276	12.3	31.7
Lakewood, CO	2018	151,411	67,238	1,480,119	9.8	22.0
Fort Collins, CO	2019	170,245	72,603	2,100,000	12.3	28.9
Longmont, CO	2019	96,577	36,336	991,627	10.3	27.3
San Antonio, TX	2019	1,508,083	501,400	15,612,494	10.4	31.1
Concord, NH	2019	43,244	18,663	415,727	9.6	22.3
San Jose, CA	2019	1,027,690	325,114	5,477,619	5.3	16.8
Tacoma, WA	2019	212,869	83,688	1,678,000	7.9	20.1
Eugene, OR	2019	186,302	70,332	1,000,000	5.9	14.2
Ann Arbor, MI	2019	120,735	47,765	2,100,000	17.4	44.0
Milwaukee County, WI	2018	954,209	382,070	12,550,249	13.2	32.8
Las Cruces, NM	2018	101,742	39,934	904,109	22.6	22.6

Greenhouse Gas Inventory

Data Sources

The consultant team aggregated data from across the municipality as well as regional, State, and federal sources to develop the inventory. A GPC BASIC inventory involves counting all emissions related to energy, which includes transportation fuels, electricity, natural gas from stationary sources, emissions generated from certain aspects of waste, and, importantly for C3, fugitive emissions. Additional data from industrial activities within the C3 boundary were obtained to capture a more accurate picture. The BAU and policy models were developed using predictions from commonly accepted assumptions, academic research, and trend analyses to estimate growth and external policy developments.

In 2019, total greenhouse gas emissions in Commerce City were 1,945,937 metric tons of carbon dioxide equivalent (mt CO2e). As shown in *Figure 8*, the largest emissions-producing sector was the IPPU sector, which accounted for 57% of all GHG emissions. When looking at only core emissions by source, building electricity produced the most emissions (35%), followed by on-road transportation activities (32%) and natural gas use (23%). 10% of emissions came from waste activities (including wastewater treatment). See *Table 3* for a breakdown of emission by sector and source.

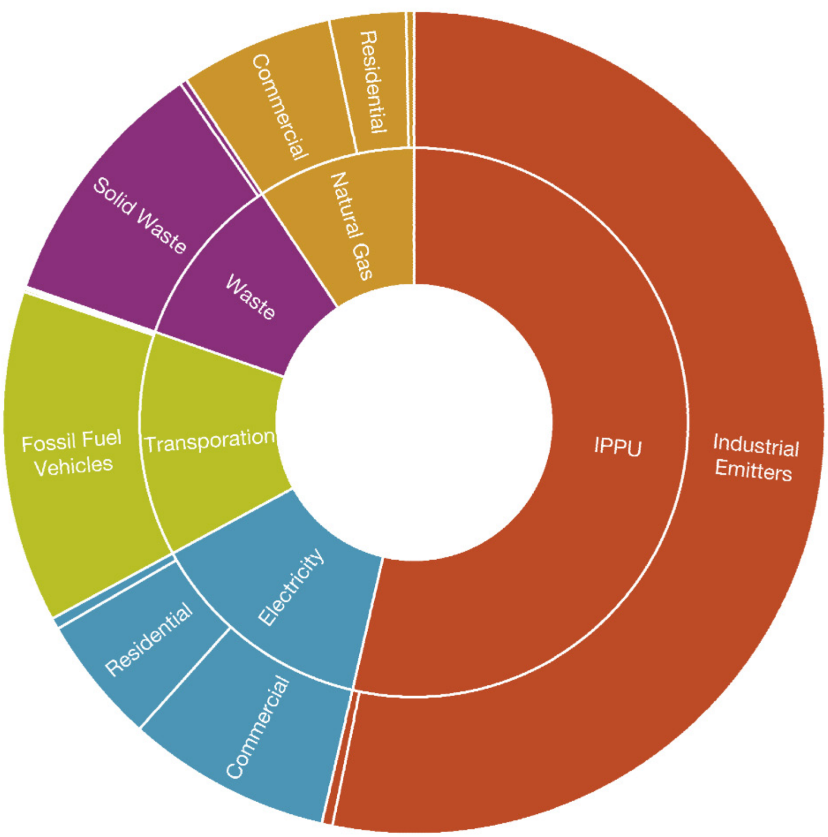


Figure 8 Total 2019 GHG emissions.

Electricity	**15%**
Residential	6%
Commercial	9%
Industrial	0.5%
Natural Gas	**10%**
Residential	4%
Commercial	6%
Fugitive Emissions	0.3%
Other Building Fuel Use	0.0%
Transportation	**14%**
Fossil Fuel Vehicles	14%
Electric Vehicles	0.1%
Transit	0.1%
Rail	0.0%
Waste	**4%**
Solid Waste	4%
Wastewater	0.3%
IPPU	**57%**
Refrigerants	0.4%
Industrial Emitters	56%

Greenhouse Gas Inventory

Table 4 Commerce City's total 2019 GHG emissions by source and sector.

Emissions Sector	GHG Emissions (mt CO2e)	Percent of Total	Percent of Core Emissions
Buildings	**489,212**	**25%**	**58%**
Electricity Use	293,612	15%	35%
Natural Gas	195,477	10%	23%
Other Energy Use	114	0.01%	0.01%
Transportation	**274,753**	**14%**	**33%**
Waste	**78,179**	**4%**	**9%**
Solid Waste	72,656	4%	9%
Wastewater Treatment	5,523	0.3%	1%
Industrial Processes & Product Use (IPPU)	**1,103,792**	**57%**	**NA**
Suncor Energy	949,972	49%	NA
Total	**1,945,937**	**100%**	

Based on this analysis, the greatest impact on overall GHG emissions will come from the City working with industry partners to develop targeted reduction strategies and policies addressing energy efficient and photovoltaic (PV) ready building codes. Another significant target for emissions reductions is the buildings sector (*Figure 9*), of which commercial and industrial buildings comprise 61% of the emissions. Homes accounted for 38% of building emissions. The source of those emissions was split 60% from electricity and 40% from natural gas use, indicating policies that encourage energy efficiency, deployment of renewables, building electrification, and engagement with the business and industry sector will play a major role in C3's GHG reduction strategy.

The third largest sector, transportation, can be broken down into type of vehicle: passenger vehicles account for 39% of transportation emissions, while light duty trucks comprise 50%. Freight contributed 10%, while rail, transit, and electric vehicles (EV) emitted an insignificant percentage of the total. Given these findings, community-wide promotion of EVs and support for accessible, creative multi-modal transportation options – from protected bicycle lanes to public transit to bike-, scooter-, and car-share programs – can significantly reduce overall emissions.

The inventory paints a picture of how the C3 community's activities contribute to global emissions and local AQ issues. When integrated with the final sustainability strategy

Greenhouse Gas Inventory

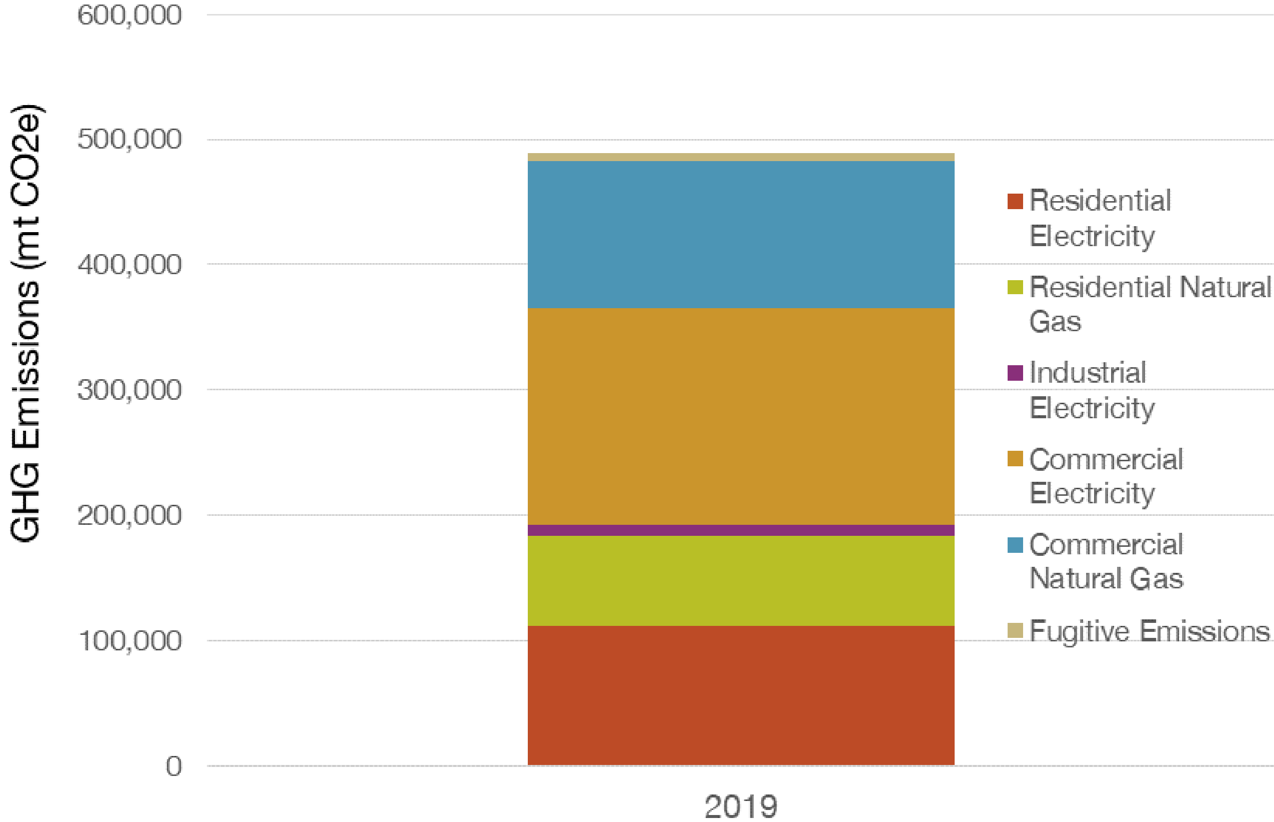


Figure 9 Stationary emissions detail.*

**3 sources were <1% and are not diplayed above: Residential Propane, Commercial Propane, Commercial Diesel*

Figure 10 Core 2019 GHG emissions.

Electricity	35%
Residential	13%
Commercial	21%
Industrial	01.1%
Natural Gas	**23%**
Residential	9%
Commercial	14%
Fugitive Emissions	0.8%
Other Building Fuel Use	0.0%
Transportation	**33%**
Fossil Fuel Vehicles	32%
Electric Vehicles	0.3%
Transit	0.3%
Rail	0.0%
Waste	**9%**
Solid Waste	9%
Wastewater	0.7%

matrix, the core emissions inventory results (see *Figure 10*) contextualizes the final set of policy recommendations and informs the prioritization of actions. As C3 pursues environmental action future inventories can be compared against the baseline and model results to assess progress towards C3's environmental goals. C3 can compare results with surrounding communities to set targets for regional collaboration and leadership (see below and *Table 3*).

Climate action goals adopted by neighboring communities:

State of Colorado

26% by 2025 | 50% by 2030 | 90% by 2050

Denver

65% emissions reductions by 2030

Carbon neutral by 2040

Westminster

26% by 2025, 50% by 2030, 90% by 2050

Thornton

50% by 2030

Longmont

66% by 2030 | 69% by 2050

Following the inventory process, a GHG emissions model was used to assess the impact of specific policy recommendations. This modeling effort will help inform the City's priorities moving forward and demonstrate to C3 residents and the business community the potential GHG emissions reduction impact of implementing their recommendations in the long run.

Business-As-Usual Forecast

Lotus began with building the City's BAU model, which estimated the community-wide GHG emissions by 2030 and 2050. The BAU model projections were based on estimates of population growth, number of registered vehicles, the intensity of greenhouse effect of different energy sources, and fuel efficiency forecasts. Ultimately, the model predicts C3 will reduce its total emissions by 2030 to 1,905,000 mt CO2e but see an increase by 2050 to 2,058,000 mt CO2e. *Figure 11* breaks down these projections by emissions source.

These conflicting results can be explained by analyzing the factors that build the model. As the grid serving C3 increases the percentage of renewable energy sources and grows cleaner, the intensity of the greenhouse gas effect of electricity will diminish. Critical to

Greenhouse Gas Inventory

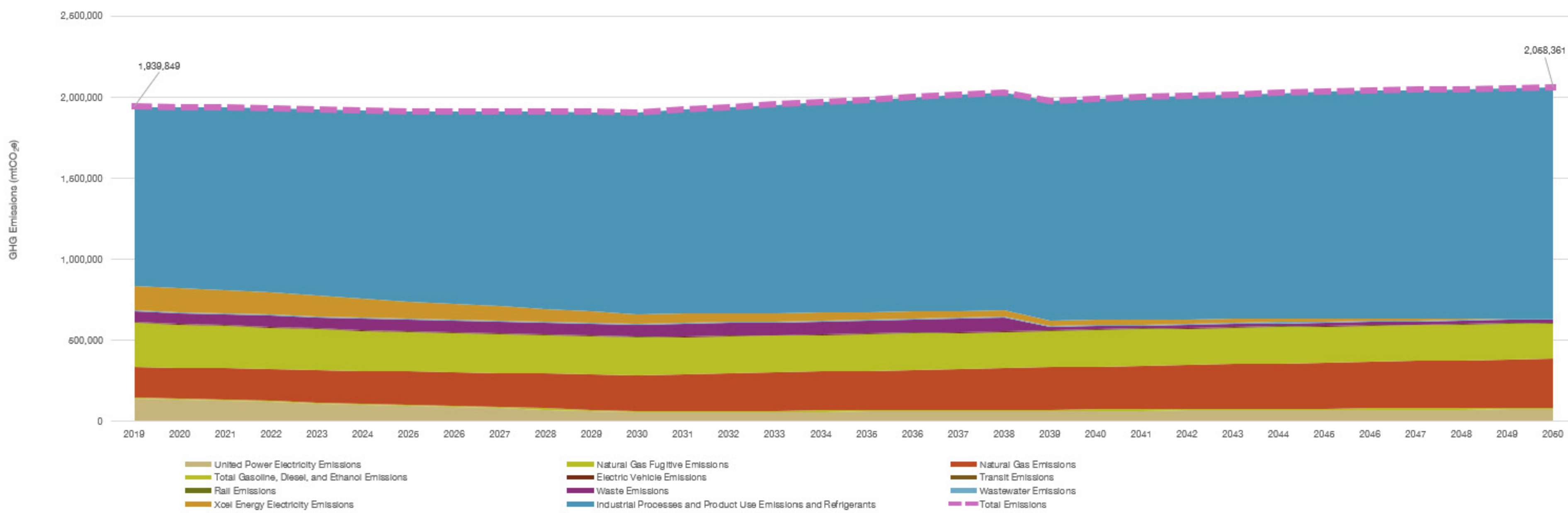


Figure 11 Business-as-Usual GHG emissions projections to 2050.

these projections is the assumption that Xcel Energy and United Power, the electricity providers in Commerce City, will meet their renewable energy targets on time and in accordance with the State's GHG roadmap. The State requires private utilities to meet renewable portfolio standards (RPS) and select utilities to transition to 100% clean energy by 2050. Xcel Energy has pledged to achieve an 80% reduction in carbon emissions from its electricity by 2030 and carbon-free electricity and net-zero emissions gas by 2050. The City will reap the benefits of these trends toward renewable energy by 2030, accounting for that decrease in BAU emissions.

However, by 2050, population growth and the diminishing returns of emissions savings from energy efficiency and building electrification will compensate for any reductions in emission factors. The balance between all these factors will ultimately tip towards increasing pollution if the City takes no significant actions, underscoring the need for sustainability policy, planning, and implementation.

Strategy Models

During the policy development process, the EPAC and the community provided input to select their highest priority policy strategies (see Sustainability Focus Area chapters below for more information on these policies). These top priorities were modeled against the 2019 baseline core emissions and the BAU forecast to determine the estimated reductions in GHG emissions (*Figure 12*). Also modeled was the potential increase in GHG emissions due to the newly permitted oil and gas wells.

Commerce City is striving to achieve GHG reductions that align with State level goals, which call for a 50% reduction in emissions by 2030 and a 90% reduction by 2050. The modeled strategies are estimated to result in a 45% reduction in emissions by 2030 and a 75% reduction by 2050. While Commerce City can make significant progress to reduce emissions, additional work will be needed to reach the City's goal of aligning with the State.

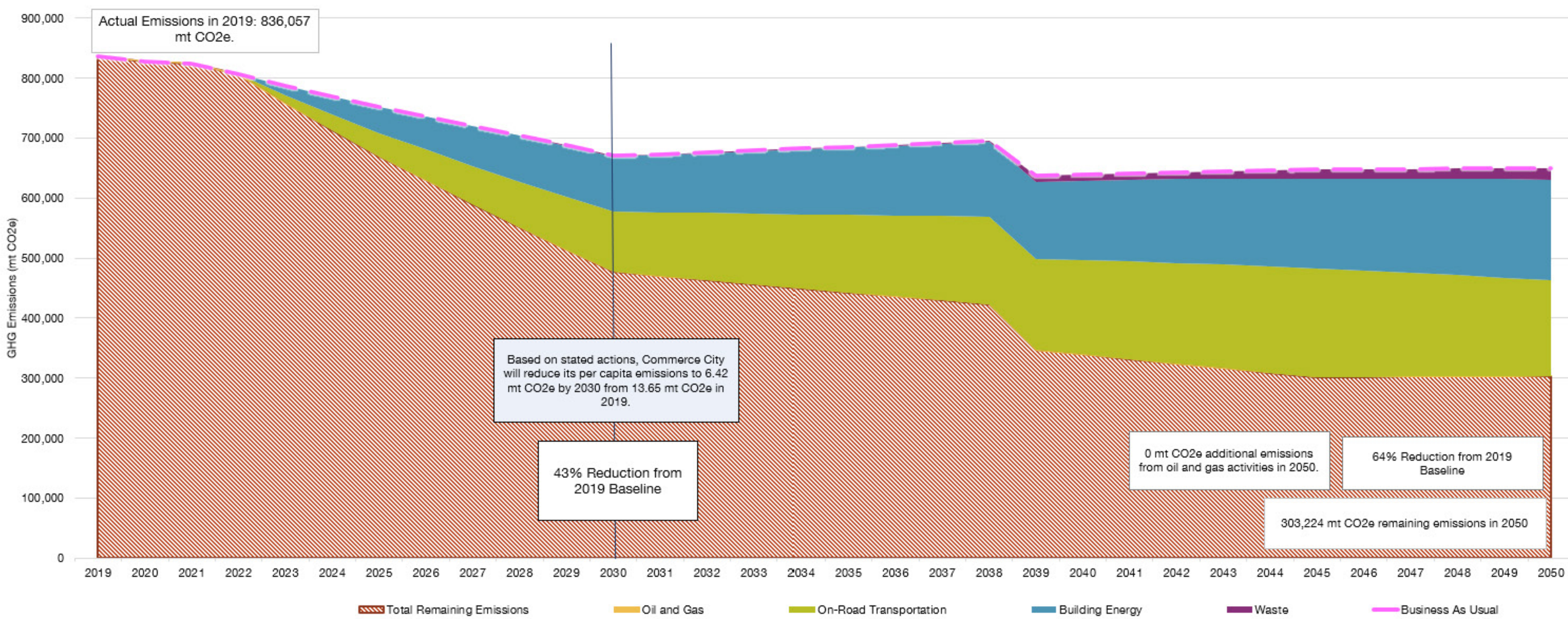


Figure 12 Emissions reduction model results.

Strategy Models

The modeled strategies include the following list:

Promote energy efficiency for residential buildings.

Promote energy efficiency for commercial buildings.

Promote fuel switching (i.e., building electrification) through incentive programs, public campaigns, and initiatives.

Promote rooftop and community solar energy production.

Support and promote equitable EV adoption.

Reduce idling and air pollution from vehicles.

Prioritize multi-modal transportation options.

Achieve 85% waste diversion by 2050.

All new oil and gas developments are carbon neutral.

Strategy Models

Table 5 Commerce City's Sustainability Aspirations.

Sector	Strategy		Model Assumptions
Building Energy		Promote energy efficiency for residential buildings.	Reduce energy use by 25% by 2030 and 40% by 2050.
		Promote energy efficiency for commercial buildings.	Reduce energy use by 25% by 2030 and 40% by 2050.
		Promote fuel switching (i.e., electrification) through incentive programs and public campaigns/ initiatives.	Electrify 15% of all buildings by 2030 and 60% by 2050.
		Promote rooftop and community solar.	15% increase in solar adoption in first 5 years after streamlined permitting.
On-Road Transporation		Support and promote equitable electric vehicle adoption.	30% of light duty vehicles in the community are EVs by 2030 and 75% of light duty vehicles in the community are EVs by 2050.
		Reduce idling and air pollution from traffic.	Reduce idling by 20% by 2030 and 80% by 2050.
		Prioritize multi-modal transportation options.	Mode shift of 20% by 2030 and 50% by 2050.
Waste		Achieve 85% waste diversion by 2050.	85% waste diversion by 2050.
Oil and Gas		All new oil and gas developments are carbon neutral.	Offsetting 46 standard new wells in 2024 with 5% annual increase.

Estimated Impact of Strategies

The estimated emissions reduction potential of the strategies as detailed in Table 4 above are compared against the City's 2019 core emissions (i.e., those from building energy use, transportation, and waste activities). While reducing industrial emissions is imperative to improving community health and sustainability, and preventing the worst impacts of the climate crisis, Commerce City has fewer opportunities to directly impact industrial emissions within its jurisdiction. Therefore, the City is focusing its emissions reduction work on the areas where it may be able to exert greater impact through policy and programs to reduce emissions.

All the highest priority strategies combined are estimated to reduce the City's core GHG emissions over the 2019 baseline by about 45% by 2030 and about 75% by 2050. By sector, the greatest reductions will come from the building energy sector, followed by on-road transportation.

Ultimately, the most important strategies from a GHG emissions reduction perspective are the prioritization of residential and commercial building energy efficiency, which would together comprise 39% of emissions reductions by 2050, and, secondly, the prioritization of multi-modal transportation options, which would comprise 25% of total emissions reductions by 2050.

Figure 13 shows the carbon pollution reductions estimated by the model by sector, and underscores the significance of building energy and transportation strategies. By contrast, increased oil and gas activity would add back 19,985 mt CO_2e, or approximately one-quarter of the anticipated GHG emissions savings from other strategies.

It should be noted that modeling these strategies provides an assessment only of their GHG emissions reduction potential. Many of these strategies, such as reducing idling and diverting waste, will provide the community with additional co-benefits including improving physical health and AQ and supporting economic development opportunities.

Finally, these modeling results are estimates built on many assumptions. The degree to which trends in the City end up following these assumptions and meet or exceed the assumed targets (see *Table 5)* will influence the accuracy of these predictions. The City may choose to pursue different combinations of strategies and with different targets as well; the modeled policies represent a few of many recommendations detailed in following sections of the Plan.

Strategy Models

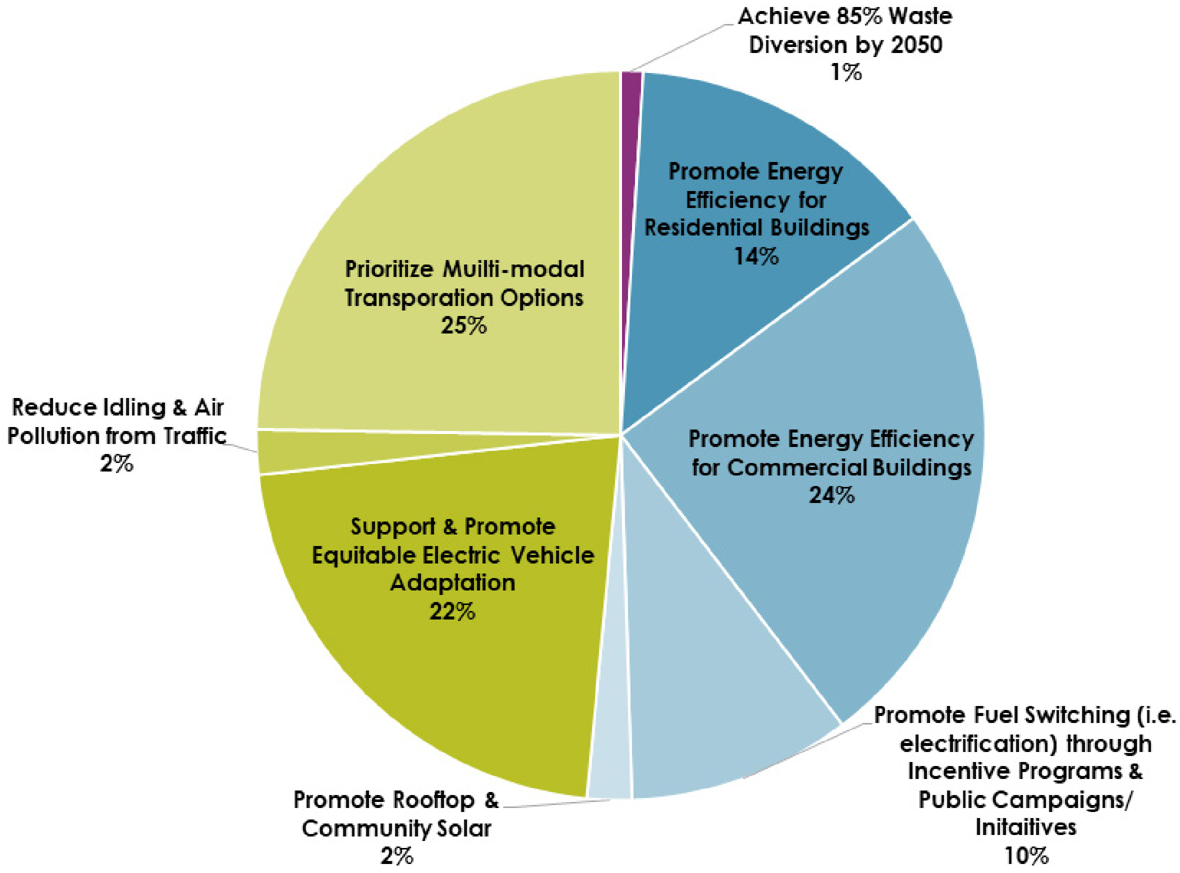


Figure 13 Share of emissions reductions by strategy type based on modeling.

Strategy Sector

Transporation	Building Energy	Waste

Strategy	Share of Emissions
Prioritize muilti-modal transporation options.	25%
Support & promote equitable electric vehicle adaptation.	22%
Reduce idling & air pollution from traffic.	2%
Promote energy efficiency for commercial buildings.	24%
Promote energy efficiency for residential buildings.	14%
Promote fuel switching (i.e. electrification) through incentive programs & public campaigns/initaitives.	10%
Promote rooftop & community solar.	2%
Achieve 85% waste diversion by 2050.	0.7%

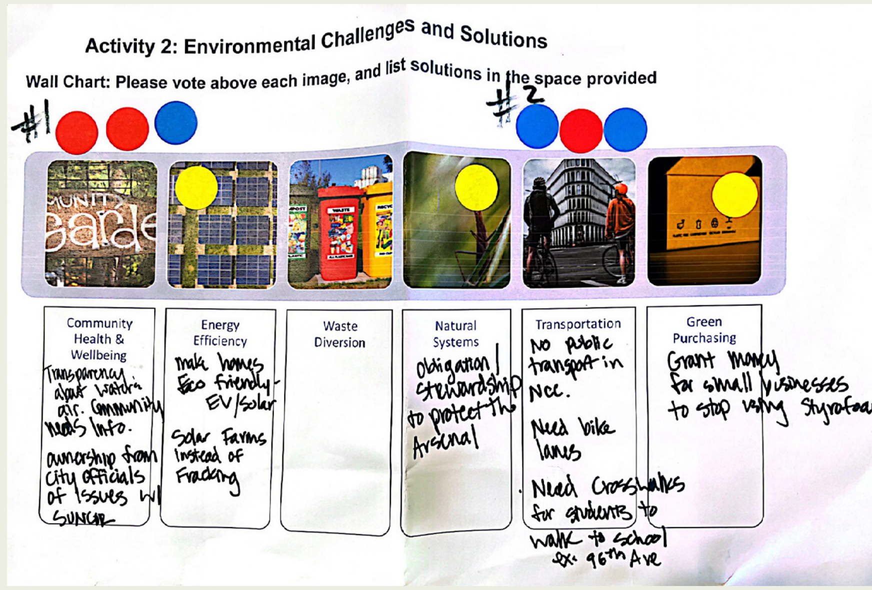
A Public Engagement-Driven Process

A key EJ principle is that those most impacted should frame the scope of the problems and drive their solutions. In recognition of this, the City supported an EPAC-driven process that developed most of the policy recommendations from community input and priorities. Some recommendations have been modified slightly to include C3 staff's expertise, as well as extensive research into best practices employed in other communities with characteristics similar to C3.

With assistance from the EPAC members, extensive public engagement was conducted to capture valuable feedback from the broader public on the draft policies. These include a variety of outreach opportunities such as community meetings, EPAC-hosted dinners (i.e., meetings in a box), high school student intern input, attendance at community events, intercept interviews, and a public survey (see the section Community Survey and Informant Interviews in Appendix E for details on the findings from these outreach efforts). By allowing the voices of the community to drive policy development, the City intends for the recommendations made in this Plan to reflect the specific C3 context and the community's values, priorities, and culture.

A Public Engagement-Driven Process

Meetings in a Box



In collaboration with the City, EPAC members hosted Meetings in a Box to seek community input on the environmental policy recommendations. The goals of these meetings were to connect community members to the planning process, gather feedback on key sustainability and environmental issues in their local communities, and capture their visions for the City's future.

Over dinner, EPAC members facilitated conversations with their invited guests through a number of activities including a worksheet to brainstorm civic engagement opportunities, a ranking of environmental concerns, and creative visioning exercises.

— Activity 1: Civic Engagement

In acknowledgement of the importance of building trust with the larger C3 community, the City has sought to improve ways to reach its residents. The consultant team and EPAC worked together to develop a brainstorming exercise to encourage dinner guests to think broadly about community engagement.

— Activity 2: Environmental Challenges

Guests were asked to discuss and rank their top environmental concerns in the City. After the ranking activity, guests brainstormed solutions and ways for the community to support the policy recommendations.

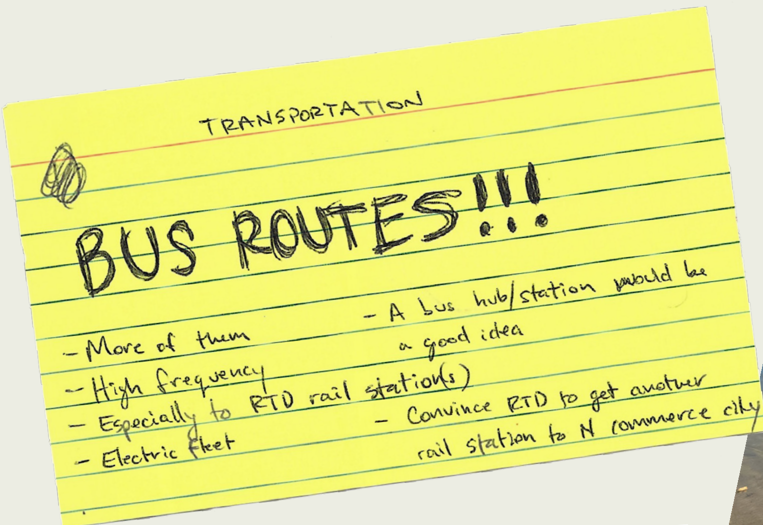
— Activity 3: Visualizations

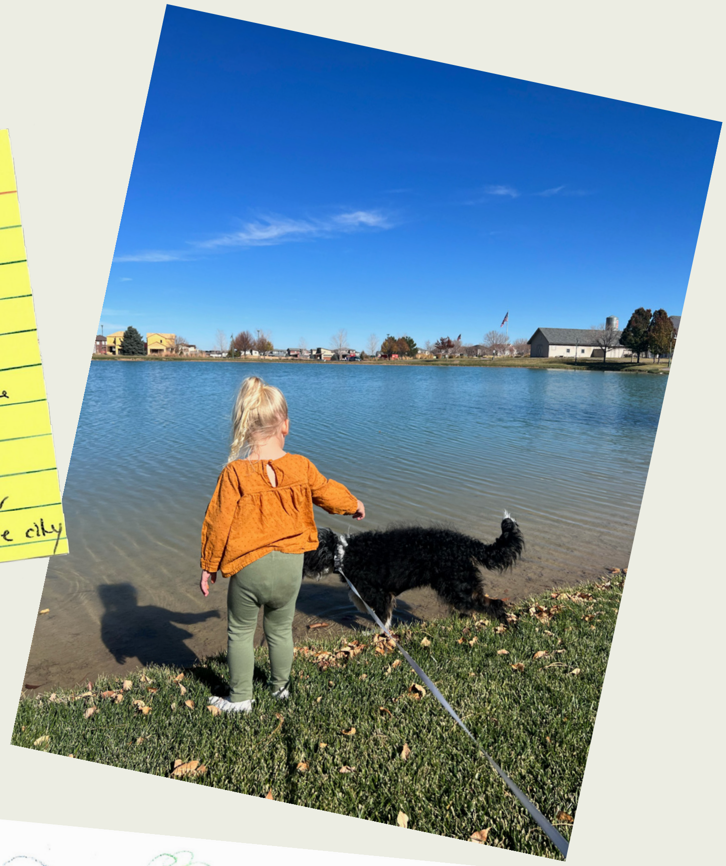
Guests were asked to use markers to draw out their vision for their ideal future Commerce City or take photos of what they love about their community, what they want to change, and what represents their community.

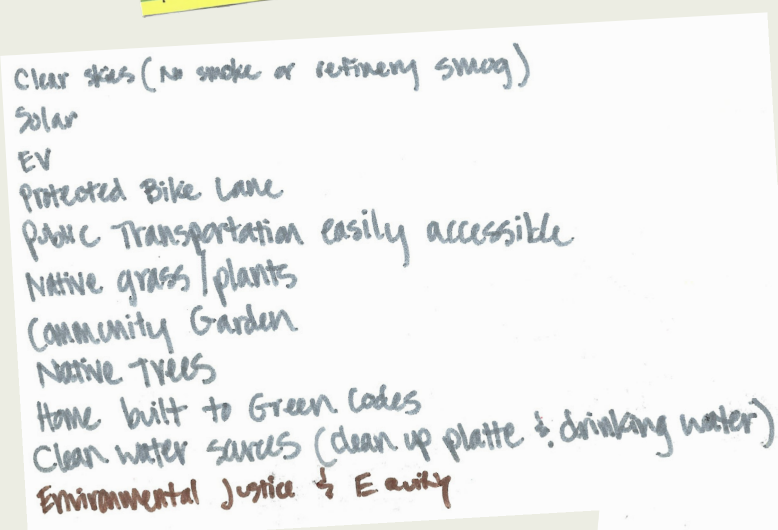
Throughout the dinner, guests were encouraged to jot down any thoughts, concerns, or questions on notecards as conversations progressed.

A Public Engagement-Driven Process

Meetings in a Box Artifacts







A Public Engagement-Driven Process

To supplement the policy recommendations and provide a more tangible implementation approach, the City hosted an additional outreach event with the business and industry community and vetted the strategies and actions with key City staff. These engagements focused on ensuring that the City and community can act on and integrate the proposed actions and strategies into existing operations; leverage partnerships and synergies to support existing and new work; and position C3 to stay competitive and implement upcoming federal and State funding opportunities, including turf replacement programs, EV and solar photovoltaic (PV) installations, and brownfield redevelopment. Ultimately, this comprehensive, whole-of-government approach works to realize the collective vision for a sustainable Commerce City.

Prioritizing the voices of the community roots the recommended strategies and actions in the City firmly in the local context and values. Equally important to consider is the potential cost, staff capacity requirements, and priority level of the various strategies; this information will allow the City to better plan and budget for subsequent implementation work.

Sustainability Focus Areas & Priorities

This community-led effort developed recommendations that focus on the needs and opportunities at the local level. The resulting impacts are expected to positively contribute to the lives and health of Commerce City residents as well as the vibrancy of the business community. The EPAC's journey of learning led the group to develop some initial high-level priorities for the City:

1. First and foremost, the EPAC has a desire to continue their work as a permanent City-sanctioned advisory committee. They desire to continue to be community led, by residents, for residents, with support from the City.

2. Second, there are opportunities throughout the recommendations to leverage existing City initiatives and projects by further incorporating environmental and public health considerations.

3. Third, Commerce City has extensive networks that can be utilized to provide education and engagement opportunities to residents and businesses to accelerate sustainable transformation. Initial education and outreach should focus on air and water quality preservation and restoration. Continued work should focus on developing deep and consistent partnerships with community institutions and organizations.

4. Lastly, the EPAC would relish ongoing study sessions throughout the year with City Council and utility providers to analyze sustainability solutions, evaluate implementation progress, and provide input into community decisions.

The City identified several key sustainability focus areas around which to center the policy recommendations. These were developed to reflect the broad scope of sustainability action that the City intends to take and each of the policy strategies and actions are categorized under one focus area. By adopting this expansive, comprehensive lens the City can work towards integrating climate considerations and sustainability actions throughout the government and the community. A whole-of-government, equity-focused approach to public and environmental health will ensure the entire community will be able to thrive in a future of uncertainty and change.

Sustainability Focus Areas & Priorities

The focus areas include the following:

- Education and Outreach
- Energy Efficiency
- Renewable Energy
- Adaptation and Mitigation
- Recycling and Waste Diversion
- Water
- Transportation
- Community Health
- Funding and Purchasing
- Biodiversity, Tree Canopy, and Food

Each of the following sections describes a particular focus area, the key policy strategies and actions, and opportunities to promote equity throughout C3. Although policies are grouped under one focus area each, they all interact and support cross-focus area strategies and actions to varying degrees. Some policies may fall into multiple categories, which will be noted, but are listed in the focus area by their greatest estimated impact. The sum total of these policies will ultimately push the City towards a more sustainable future. The recommendations represent actions that the City can effectively take over the next five to ten years.

Overview of Focus Areas

Commerce City has divided its sustainability work into 10 different focus areas to identify the key paths of action for the City to target its sustainability work. Together these focus areas build a comprehensive, whole-of-government framework that defines the City's approach to environmental and resiliency action and a vision for a sustainable C3.

> "The most important piece is stakeholding- I've seen communities move forward without doing that and it's not efficient. To have stakeholders and gather feedback is important, as a resident and a business. It's important that we take part in it."
>
> - Worker and Resident of Commerce City

Sustainability Focus Areas

Education and Outreach

Throughout this planning effort, the City has sought to invest in building trust with the community and to identify opportunities to reach the most impacted communities (i.e., those overburdened by environmental pollution). Additionally, building the capacity of businesses, City staff, and residents through communications, engagement, and training will support the implementation of the remaining policy recommendations and ensure this work remains community-driven and validated. Appendix D includes recommendations for community engagement and education campaigns based on community insight and best practices in equitable community engagement.

Energy Efficiency

As the City looks to act on the results of its inaugural GHG inventory, energy efficiency strategies have the potential to significantly reduce energy costs for residents and businesses while also reducing GHG emissions from across the community. Energy efficiency technologies are some of the most cost-effective strategies to reduce carbon pollution and support community members, including businesses, that cannot afford infrastructure overhauls immediately.

Renewable Energy

Renewable energy plays a crucial role in global efforts to reduce carbon pollution, improve AQ, and develop energy independence and resilience against predicted extreme weather events such as flooding and drought. The City can support its pollution reduction goals by demonstrating leadership in the community's conversion to renewable energy.

Adaptation and Mitigation

As the climate continues to shift, communities can respond to the associated rise in extreme weather through two approaches, adaptation (i.e., changing processes and infrastructure to thrive in a new normal) and mitigation (i.e., reducing carbon pollution). Implementing strategies from both of these approaches will ensure the community thrives against the escalation of extreme weather events and climatic shifts, while working to prevent additional future harm.

Recycling and Waste Diversion

By diverting certain kinds of waste from their endpoints in landfills, the City can reframe waste as "new" materials for reuse and provide new opportunities for job creation. Use of these materials can provide new business opportunities, extend the life of the landfill, reduce pollution of the natural environment, and cut air pollutants emitted by landfills. The diversion of organic material (i.e., yard and food waste) into compost can help improve soil health and reduce particulate matter (PM) emissions, which are currently three times higher in Adams County than surrounding Arapahoe and Denver counties.

Sustainability Focus Areas

Water	Water challenges will undoubtedly continue to plague the City and the State as drought conditions contribute to the over-extraction of State waters and increases in the cost of water. Policies that encourage conservation, low impact development, and investment in infrastructure upgrades will be crucial to guaranteeing the continuation of C3's water supplies and WQ, including addressing emerging contaminants like per- and polyfluorinated (PFAS), which currently exceed federal health advisory levels.
Transportation	As the City reassesses its plans for sustainable growth into the future, it must consider the critical ways in which transportation infrastructure contributes to air pollution, resilience, and community accessibility. Transportation infrastructure – from public transit to active transportation – in many ways shapes what communities look like, how people behave, and the overall quality of life in the City. Strategies in this sector include those that address the lack of accessibility for public transit and active transportation networks (i.e., protected bike lanes).
Community Health	Industrial pollution issues impact all Commerce City residents, crossing racial and socioeconomic lines. This focus area seeks to tackle industry-related AQ issues and health justice, a major priority for all C3 residents, particularly residents of color who disproportionately live near industrial facilities.
Funding and Purchasing	Critical to the success of any City sustainability policy is the ability and commitment to invest resources towards implementing and sustaining this work. The community will recognize the allocation of City funds as a demonstration of genuine commitment to community health and sustainability; therefore, funding programs and hiring dedicated staff to manage grant requests and projects, along with providing support for community-level incentive programs, will work to build trust with the community.
Biodiversity, Tree Canopy, and Food	Access to green spaces and adequate tree canopy plays a critical mitigating role in environmental and public health, particularly as temperatures grow hotter and for vulnerable communities. Biodiversity is crucial to the resilience of natural ecosystems; local food access can likewise enhance resilience for urban communities. C3's current tree canopy level is at 3%, which is well below the 24% level recommended for a prairie ecosystem.

Sustainability Focus Areas & Priorities

Throughout the remaining focus area chapters, the strategies, actions, and implementation details regarding the coming work are included. Strategy details may include the following components:

Estimated costs are defined as:	$	Low (<$50,000 annually)
	$ $	Medium ($50,000-$100,000 annually)
	$ $ $	High (>$100,000 annually)
Staffing Requirements are defined as:		Low (less than 5 hours/week of staff time)
		Medium (between 5-10 hours/week of staff time)
		High (more than 10 hours/week of staff time)
GHG reduction potentials is defined as the estimated GHG savings in 2050:		Low (0% - 5% potential reduction from total)
		Medium (5% - 9% potential reduction from total)
		High (10%+ potential reduction from total)
Level of City Control is defined as:		Low (the City has little control and would play a supporting and influencing role)
		Medium (the City has some control, but partnerships may be necessary for success)
		High (the City has near or full autonomy and jurisdiction to implement)
Responsible Party:		City—C3 will lead this effort
		Community—C3 will support and collaborate on community-led initiatives related to this work.
Implementation Timeline is provided at the action level, and is defined as:		Short term (next 1-2 years)
		Medium term (next 3-5 years)
		Long term (next 6-10 years)

Education & Outreach

Even as it experiences such rapid population growth, Commerce City prides itself on its small-town sense of community. Despite this close-knit atmosphere, ongoing, acute, chronic, and cumulative pollution issues due to heavy industrial activity – including those of the State's only major petroleum refinery – continue to erode the community's trust in institutions both public and private.

This distrust creates challenges for the City as it embarks on its sustainability and resiliency action work, especially as it seeks to implement community-validated actions and strategies. If residents do not trust government and industry as partners, they will not respond to the City's efforts to engage with environmental action. Throughout this policy development phase, the City has sought to invest in the process of building trust with the community and identify opportunities to reach the underserved communities where they are at, such as attending the Cultivando Eco-Fiesta celebration and providing community boards in Spanish (see *Figure 14*).

Because of this history, the C3 community has often embraced paths outside the government to make their concerns heard. Community groups and nonprofits continue to add to a rich legacy of activism, engagement, and organizing. Some examples include:

GreenLatinos organized their community to advocate for laws restricting industrial GHG pollution through the Greenhouse Gas Emissions and Energy Management for Manufacturing (GEMM) Phase 2 rulemaking process;

Cultivando installed AQ monitors around the City and at community members' homes to provide additional, third-party exposure data to improve the C3 community's understanding of its pollution issues; and

350 Colorado has partnered with staff on educational campaigns.

These non-governmental organizations will continue to play an important role in the promotion of community health and sustainability initiatives moving forward. For example, the City could build a more comprehensive AQ database if they aggregate the data from monitors installed by the local health department, Suncor's ten monitors, and the community monitors supported by Cultivando. The City is committed to cultivating positive relationships with community partners and building up its own capacity and the capacity of businesses, residents, and other partners to implement the recommendations through a community-driven and validated approach.

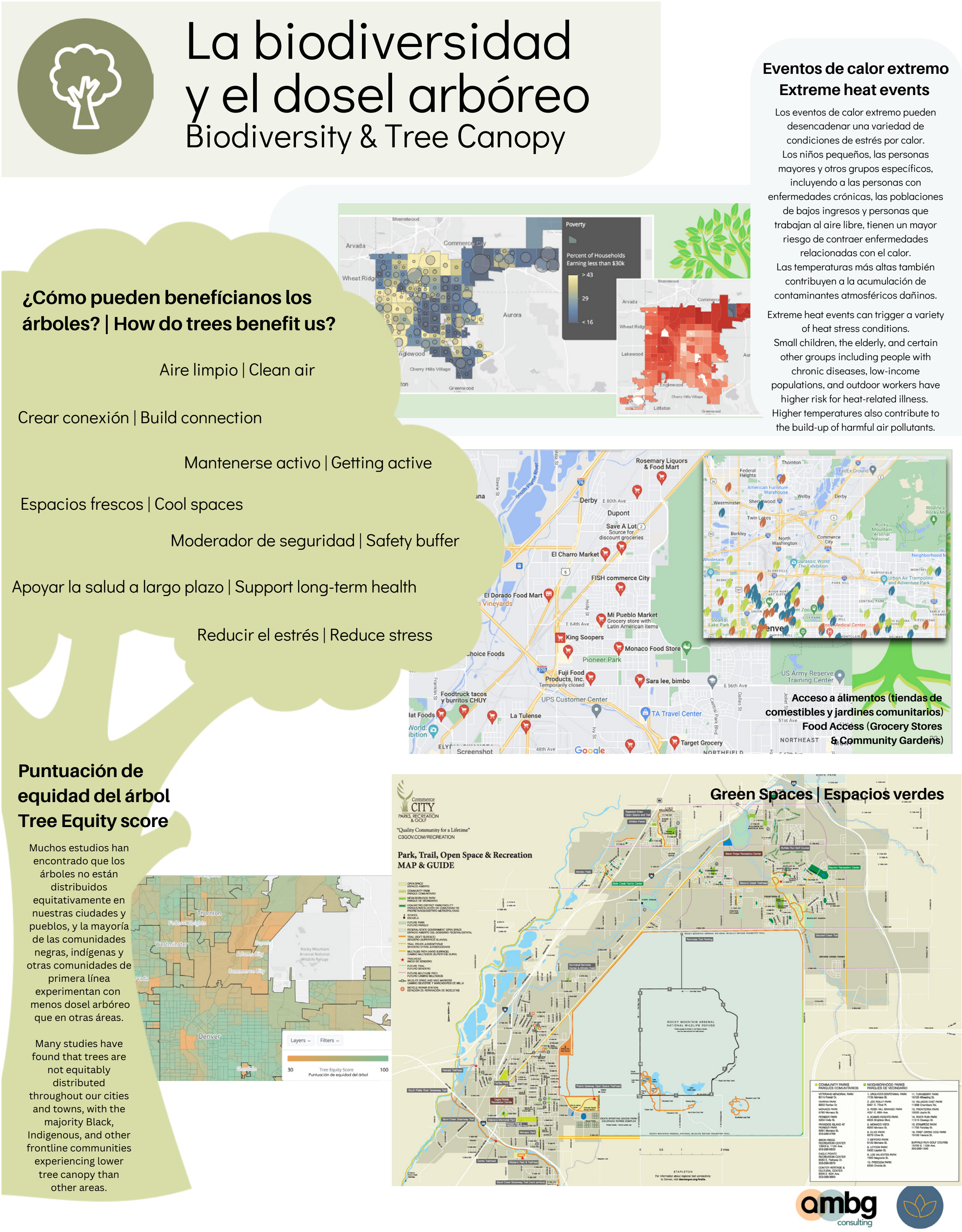


Figure 14 Community board in Spanish.

Education & Outreach

Community Vision

As the City considers its next steps towards environmental and community sustainability, the community wants to be consulted early, often, and throughout. The community is poised to actively support and collaborate with City efforts to remediate environmental and community health issues; rebuilding trust with the community through good-faith engagement will create space for the community to do so. Because their help is critical to the implementation of this work, the City must approach community engagement in culturally-sensitive ways, meaning tailored communications, education campaigns, and outreach activities aimed at different audiences. Moreover, the community needs to see a whole-of-government approach and whole-of-community involvement: the City must also demand action from its staff, business and industry, schools, and more.

More details on the suggested approach for a community engagement and education campaign to support the City's sustainability work can be found in Appendix D.

Strategies and Actions

The community identified numerous education and outreach opportunities that will help open City-wide conversations on sustainability over the course of this Plan's five-to-ten-year timeframe. The following strategies and actions will build the City's capacity to expand its environmental work while fostering the trust necessary to collaboration.

Education & Outreach

Strategy	Promote and publicize the City's climate and sustainability work through ongoing educational campaigns targeted towards various audiences, with a focus on connecting residents to the City's participatory opportunities.

Cost	Staffing Requirements
$	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
EO 1. Develop accessible, multilingual educational campaigns through a dedicated public outreach program targeted towards the community to disseminate information on City sustainability actions and goals and ways for the community to participate and provide feedback. Publicize information and public feedback opportunities through multimedia channels, including Commerce City Connected.	›››
EO 2. Create and publicize new web pages on the City's Sustainability and Environment webpages to display sustainability goals and other information, including important opportunities for residents to help the city achieve sustainability goals.	›››
EO 3. Develop a stronger feedback mechanism to improve the flow of information on City sustainability actions and goals and community experiences and knowledge on the ground between city leadership, staff, and council and their districts. Supplement with sustainability-focused workshops and other community engagement activities for residents, city staff, and leadership to increase collaboration and information-sharing.	›››

Education & Outreach

Strategy	Develop a culture of sustainability in local businesses and community organizations.
Cost $	**Staffing Requirements**
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
EO 4. Develop and promote a local sustainability business program or coordinate with the new State program, the Colorado Green Business Network.	›››
EO 5. Support local workforce development programs for the green transition (e.g., mechanics for EVs, HVAC, etc.). Partner with the local school district, community college, and businesses.	›››
EO 6. Develop a public education and awareness campaign to encourage small businesses, community organizations, and institutions such as schools to purchase green products, i.e., restaurant takeout containers, and transition away from purchases of single-use plastic products. Work with community members to advocate for strong State-level regulation of single-use plastics and incentives for green products.	››››››
EO 7. Create programs to support local businesses in their emissions reduction and sustainability work.	››››››

Strategy	CONTINUED: Develop a culture of sustainability in local businesses and community organizations.
Cost: $	Staffing Requirements: 2 of 3
GHG Reduction Potential: 1 of 3	Level of City Control: medium

Actions	Timeline
EO 8. Promote green networking programs.	»»»»»
EO 9. Explore options for City incentive programs aimed at attracting new clean and efficiency-related industries, including building retrofits, etc.	»»»»»
EO 10. Host sustainability brown bags for residents and businesses.	»»»»»
EO 11. Participate in and disseminate results from National Renewable Energy Laboratory (NREL) programs.	»»»»»

Implementation Notes

- The community engagement processes built into these environmental policy recommendations can serve as a basis for ongoing City outreach. Any momentum for EJ and resiliency action generated through this process must be leveraged to push for bold commitments and implementation of these community-driven strategies. Provided that a permanent EPAC is established, the EPAC can continue to lead conversations with the City as the community's voice.

Education & Outreach

Strategy	Create a City-wide brand and campaign for sustainability and partner with community entities to engage, educate, and empower the community to support a sustainable future.

Cost	Staffing Requirements
$	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
EO 12. Publicize on City websites and outreach materials the benefits and importance of native species, urban forest canopy, and biodiversity, and develop workshops to promote native landscaping and tree planting.	›››››››››
EO 13. Create a City-sponsored public education campaign on recycling, composting, and the energy transition, including the differences between electric and traditional internal combustion engine vehicles, for residents.	››››››
EO 14. Develop educational programs that recognize the history of Commerce City.	››››››
EO 15. Collaborate with HOAs and community organizations to encourage residents to participate in sustainable home practices such as employing clotheslines instead of energy-intensive dryers.	›››››››››
EO 16. Implement programs and hiring practices aimed at diversifying City staff and leadership.	›››
EO 17. Develop a roadmap to removing and preventing pollution created by the Suncor facility, including options to revoke the Suncor permit to operate.	›››››››››
EO 18. Partner with other local cities and communities on their sustainability programs.	›››››››››

Energy Efficiency

The 2019 GHG inventory revealed that buildings contributed a quarter of the City's total GHG emissions. Renewable energy is often pointed to as a silver bullet solution to carbon pollution; however, as the City looks to implement resiliency and sustainability policies, energy efficiency strategies have the potential to significantly cut emissions from buildings. Because energy efficient technologies reduce the amount of energy used to perform the same task, they are often the most cost-effective strategies to increase resilience while decreasing energy and maintenance costs for residents.

These technologies also bring several equity co-benefits because of their role in reducing energy burden and costs (*Figure 15* projects C3's energy expenditures by sector). As cost-burdened and low-income communities benefit from these reduced energy costs, they will also realize benefits from improved indoor AQ and more modern infrastructure. Communities of color shoulder greater energy burdens than do white households and are more likely to suffer from poor indoor AQ due to gas-powered appliances. The NREL estimates that across Adams County Low- and Middle-Income households could save almost $300 annually in electricity bills annually by upgrading to energy efficient appliances* (i.e., Energy Star-rated appliances).

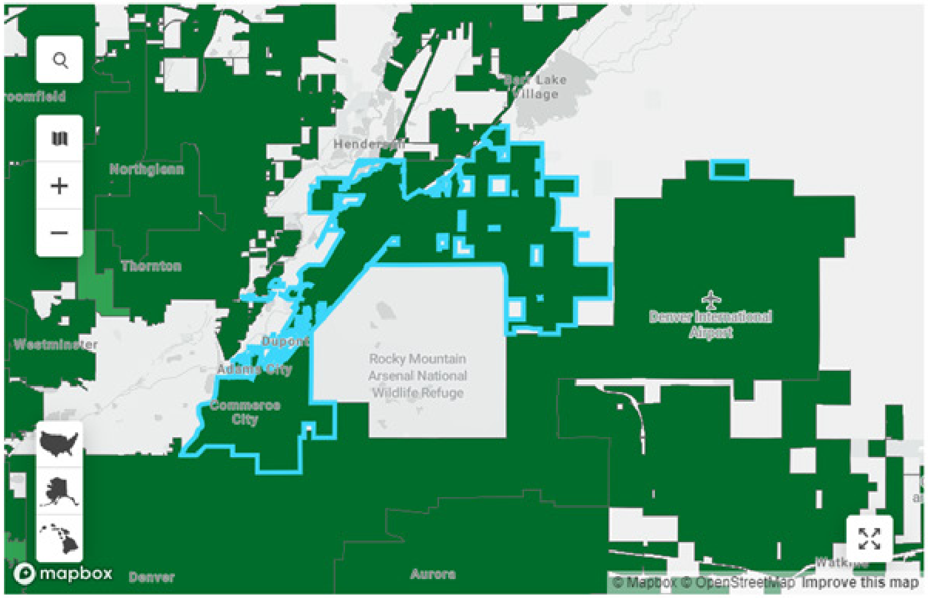
Similarly, integrating more energy efficient processes in manufacturing and industrial facilities will save businesses money, improving their competitiveness and long-term profitability, and reducing their environmental impact, including AQ impacts, on the surrounding community. Many communities that have set goals to reach net-zero emissions recognize that energy efficiency will reduce the amount of emissions that communities need to offset.

Despite these multiple positive impacts of energy efficient technology, the most cost-burdened households – which would benefit most from energy bill assistance – are least able to afford purchasing new appliances and other upgrades to their homes or businesses. Given this paradox, many energy efficiency programs have been developed to address this gap, through the utilities themselves, various government entities, and nonprofits. Programs accessible to C3 residents include:

- Xcel Energy and United Power rebate programs;
- Energy Outreach Colorado's CARES program (for Xcel customers only);
- Colorado Energy Office's Weatherization Assistance Program;
- Energy Smart Colorado; and
- Colorado Commercial Property Assessed Clean Energy (C-PACE), which helps finance general commercial improvements, including energy efficiency, EV infrastructure, and water conservation. Please visit the City's [Environment and Sustainability Resource webpage] for additional programs.

* https://maps.nrel.gov/slope/data-viewer?layer=eej.lmi-ami-energy-efficiency-bill-savings&res=county&year=2020&geoId=G0800010&filters=%5B%5D

Aggregate Electricity & Natural Gas Dollars Spent by City

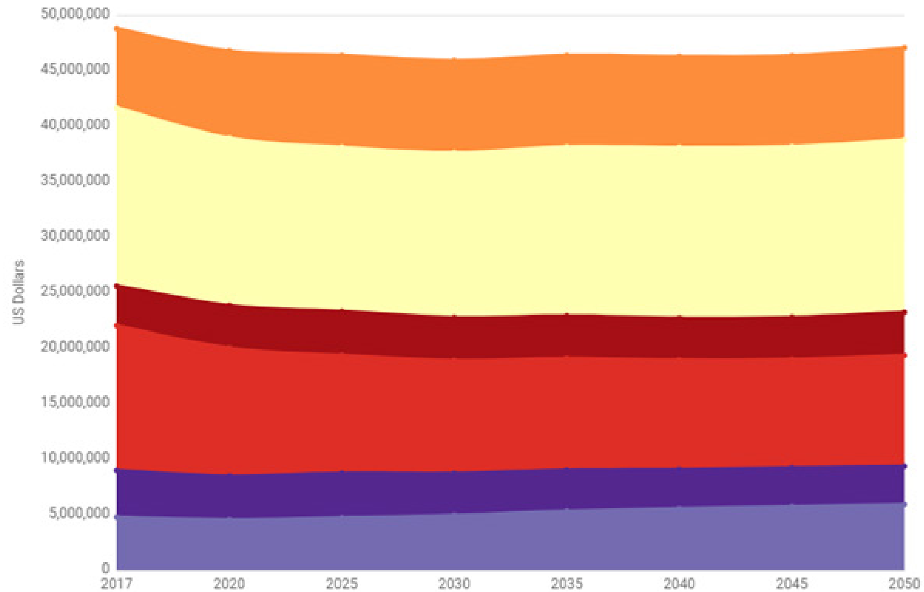


Map & Graph Resolution: City **State:** Colorado **City:** Commerce City

Map Legend
(US Dollars)

$9,063,000+ | $1,242,000 - $9,063,000 | $172,000 - $1,242,000

Projected Energy Expenditures by City, Business as Usual Case - Commerce City



Data Filters

- Residential Natural Gas
- Residential Electricity
- Commercial Natural Gas
- Commercial Electricity
- Industrial Natural Gas
- Industrial Electricity

Figure 15 Energy burden in Commerce City.

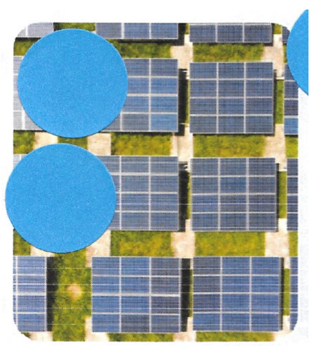
Energy Efficiency

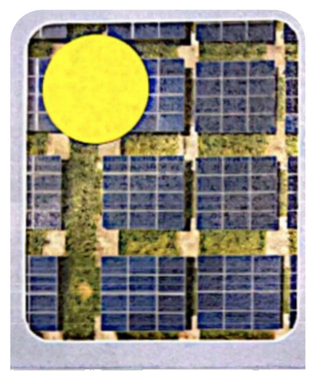
Community Vision

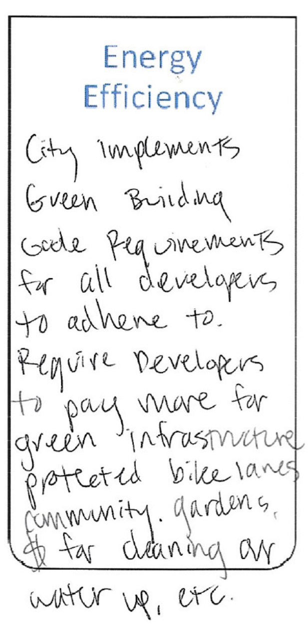
The community recognized the potential for energy efficiency to reduce residents' energy burden and promote AQ and expressed great interest in expanding energy efficiency technologies across the City. They sought a strong policy stance from the City to require sweeping energy efficiency improvements across C3, particularly in support of renters and low-income, energy burdened communities. Recommendations include increasing transparency from landlords; requiring energy efficient appliances and fuel switching in multi-family housing, rentals, and commercial buildings; and strengthening building codes.

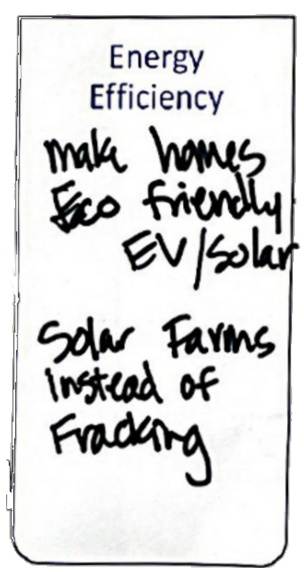
Strategies and Actions

While energy efficiency technologies are a cost-effective strategy to reduce energy costs and carbon emissions, the City could face significant infrastructural and jurisdictional challenges in implementing the blanket requirements desired by the community. The City can begin to make progress towards its carbon pollution reduction and equity goals by adopting several more incremental policy and programmatic approaches within this Plan's five-to-ten-year timeframe, detailed in the subsections below.









Energy Efficiency

Strategy	Promote energy efficiency for residential and commercial buildings.

Cost	Staffing Requirements
$ $	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
EE 1. Expand residential energy efficiency and retrofit programs, particularly those targeted towards low-income communities and landlords to prevent displacement due to costs of beneficial electrification transition. Supplement these programs with additional outreach and education.	›››››››››
EE 2. Adopt and enforce the most recent International Energy Conservation Code (IECC) within one year of it being released with options for strengthening amendments.	›››
EE 3. Develop and implement code language to require installation of solar panels and electrification in new large multi-family housing developments.	››››››
EE 4. Develop and implement code language to require inclusion of energy efficient appliance packages in new homes and new multi-family housing developments. Supplement with programs that help low-income families and affordable housing purchase packages and incentivize retrofits in rental and multi-family units to ensure core city residents can benefit.	›››
EE 5. Develop and implement code language that steps up the requirement for high efficiency lighting from 75% to 100%.	›››››››››

Energy Efficiency

Strategy	CONTINUED: Promote energy efficiency for residential and commercial buildings.

Cost	Staffing Requirements
$ $	2 of 3
GHG Reduction Potential	**Level of City Control**
3 of 3	Medium

Actions	Timeline
EE 6. Develop and implement code language that regulates exterior lighting power for residential buildings like dorms, boarding houses, care facilities and congregate living facilities.	››››››››››
EE 7. Require or incentivize building energy benchmarking for large multi-family housing developments and commercial/industrial buildings. Develop programs to help make benchmarking available to affordable housing and low-income communities.	››››››››››
EE 8. Continue to provide energy efficiency outreach and incentives for all energy users. Encourage energy efficiency through programs (such as current information and rebate and incentive support from local energy utility companies, Department of Energy, and the EPA) that encourage and/or reward citizens to use energy-efficient appliances, insulation, windows, etc. Help citizens become aware of costs and cost-savings in electrification and efficiency.	››››››››››

Implementation Notes

- These actions will include significant outreach and education components.
- The City could lead by example and begin with benchmarking for all municipal buildings and setting targets for specific municipal facilities.

Energy Efficiency

Strategy	Promote fuel switching (i.e., building electrification) through incentive programs and public campaigns/initiatives.

Cost	Staffing Requirements
$ $	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
EE 9. Educate and offer incentives for residents to replace combustion fuel (i.e., fossil fuel gas) appliances with electric ones, with a focus on low-income communities.	››››››
EE 10. Develop and implement code language to restrict natural gas use in new construction.	›››››››››
EE 11. Educate and offer incentives for businesses to replace combustion fuel appliances with electric ones.	›››

Energy Efficiency

Strategy	Adopt policies, programs, and design guidelines for resilient, healthy, energy efficient buildings and community infrastructure to enhance quality of life, reduce costs, and complement the natural environment.

Cost	Staffing Requirements
$ $	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
EE 12. Require landlords to disclose energy efficiency, water efficiency and quality, and land issues (e.g., proximity to Suncor or major polluters) to potential tenants.	〉〉〉〉〉〉
EE 13. Work with landlords to encourage applying for energy efficiency programs to improve efficiency in their rental units. Develop a transition plan to ultimately require certain energy efficiency standards in all rental units.	〉〉〉〉〉〉
EE 14. Develop program to disburse air purifiers and filters to low-income, impacted households within a certain radius around Suncor refinery (or other metric to be determined) and communities where AQ metrics exceed federal NAAQS standards.	〉〉〉
EE 15. Require the EJ and Homes Energy Rating System (HERS) scores on every property for sale and rent.	〉〉〉〉〉〉〉〉〉
EE 16. Advocate for changes to federal weatherization programs to support/ fund projects for cooling in Commerce City.	〉〉〉〉〉〉〉〉〉

Energy Efficiency

Strategy	CONTINUED: Adopt policies, programs, and design guidelines for resilient, healthy, energy efficient buildings and community infrastructure to enhance quality of life, reduce costs, and complement the natural environment.

Cost	Staffing Requirements
$ $	🕒🕒🕒
GHG Reduction Potential	**Level of City Control**
🌲	——●

Actions	Timeline
EE 17. Add prescriptive building envelope requirements to building codes, including a blower door test and visual inspection of the air barrier, air sealing, and insulation installation in a home. Develop programs that help low-income households and small contractors in meeting new requirements.	〉〉〉〉〉〉〉〉〉
EE 18. Adopt code language to require a to-be-determined improvement in whole home air tightness by 2025, including requirements for more airtight air ducts.	〉〉〉〉〉〉
EE 19. Implement Modified Energy Rating Index rating values based on the 2018 IECC.	〉〉〉〉〉〉〉〉〉
EE 20. Develop and publicize a voluntary zero energy appendix that provides the design and construction industry with a code-based method of designing and constructing zero energy buildings.	〉〉〉〉〉〉〉〉〉

Energy Efficiency

Strategy	Lead by example through the operation and maintenance of City facilities.

Cost	Staffing Requirements
$ $ $	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
EE 21. Incorporate Energy Star, Enterprise Green Communities, International Living Future, WELL Building, Passive House into building codes.	
EE 22. Publish International Green Construction Code checklist.	
EE 23. Develop energy intensity baseline per square feet for City building and facilities.	
EE 24. Benchmark City facility performance, publish the results, develop and implement improvement plans for the facilities, and share the results via case studies with the community.	

Implementation Notes

- Families near the Suncor refinery spend thousands of dollars on air filters. The EJ and equity considerations for this significant cost burden should be factored into any actions undertaken by this strategy.

Renewable Energy

Renewable energy plays a crucial role in global efforts to reduce GHG emissions and develop energy independence and resilience against extreme weather events and climatic conditions. Ever-decreasing costs of renewable energy technology has accelerated the phasing out of coal, one of the dirtiest fossil fuels, while energy crises like the one triggered by the war in Ukraine clearly demonstrate the need to remove foreign fossil fuels from the nation's energy mix.

C3 is served by Xcel Energy and United Power as energy providers; United Power is an electric-only utility. 62% of electricity used in the community is provided by Xcel, while United Power provides the remaining 38%.

However, this electricity is not created equal: Xcel derives more of its electricity from clean energy and has vowed to produce 80% of its electricity from renewables by 2030; United Power has yet to announce any specific carbon reduction goals. United Power is an electric cooperative that provides members with power purchased wholesale from Tri-State Generation and Transmission; as of 2021, figures indicate that Tri-State's power supply mix is fossil fuel heavy, with approximately 50% of the power supply being generated by coal resources and 19% from natural gas.* United Power filed a notice of intent to leave its contract with Tri-State in December of 2021, in part due to concerns about rising energy costs and the lack of integration of renewables and clean power resources into Tri-State's resource mix.**

Furthermore, current production methods cannot provide gas in a renewable form on an economically feasible scale. Fossil gas, typically methane, produces a greater greenhouse effect than carbon dioxide. Therefore, beneficial electrification, or the conversion of traditionally fossil fuel-powered equipment to newer models that use electricity, ultimately reduces overall carbon pollution and energy costs, and is critical to C3's resilience. In C3, as the electricity grid continues to become 'cleaner' with more renewable resources, transitioning away from fossil fuel use in equipment, including space heating and water heating equipment, is a clear way to reduce carbon pollution.

As discussed in the energy efficiency

* Based on information obtained by the Denver Post: https://www.denverpost.com/2021/02/12/tri-state-generation-microcosm-of-changing-energy-landscape/

** See https://www.unitedpower.com/files-to-leave-tri-state.

chapter, many low-income communities and communities of color cannot afford to adopt clean energy technologies, including renewable energy infrastructure. These technologies continue to be out of reach for many market-rate households as well. Utility and State-level programs have been developed in response to this need for resources to support renewable deployment. To that end, C3 received an NREL Technical Assistance grant to increase the City's capacity to build up its clean energy infrastructure. The Colorado Residential Energy Upgrade (RENU), run through the Colorado Clean Energy Fund, provides low or no-interest loans to residential homeowners for renewable energy and energy efficiency projects. Xcel Energy operates a Solar Rewards Program that pays homeowners or businesses for the renewable energy credits generated by their customer-sited systems. This program helps Xcel meet their RPS requirements while allowing individuals to benefit from their investment in solar installations. Xcel also offers customers options to subscribe to wind power for an additional cost or receive credits on electric bills for subscriptions to nearby community solar gardens. C3 staff are currently in talks with Xcel to apply for their Partners in Energy program to develop an energy plan. United Power provides an option to purchase renewable power in kilowatt-hour blocks through their Green Power Partners program.

Community Vision

Perhaps one of the C3 community's clearest visions centers on a strong break from fossil fuels and rapid transition to renewable energy. The community well understands that the City cannot ultimately achieve its goals of mitigating its significant industrial pollution issues without leading by example and limiting oil and gas production. While some existing programs support renewable energy in the community, the community recognizes that renewable energy installation represents an equity issue and that not all in the community can afford it, including those who would benefit most from the indoor AQ benefits of electrification. Again and again, the community expressed their desire to build quickly on this work and ensure renewable energy is accessible to all.

Strategies and Action

The City recognizes both the importance of rapid scaling up of renewable energy as well as the significant engineering and infrastructural challenges that this energy transition presents. The expansion of renewables will require a simultaneous increase in battery storage, upgrade of distribution and transmission systems, and a focus on equity to ensure a just transition. C3 cannot push this work forward without partnerships with its utilities, Xcel Energy and United Power. As such, the policies presented below break down the community's vision into a few core approaches that are actionable and achievable in this plan's five-to-ten-year timeframe.

Renewable Energy

Strategy	Implement policies that support comprehensive renewable energy growth for the community.

Cost	Staffing Requirements
$ $ $	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
RE 1. Develop municipally-supported renewable energy projects and programs that benefit the whole community, including working with Xcel and United Power to explore programmatic options for rooftop community solar gardens, brownfield redevelopment into solar gardens, and rooftop solar on warehouses.	›››
RE 2. Increase on-site renewable energy installations at municipal buildings and the use of renewable energy for municipal operations. Supplement with investment in hiring and/or training Public Works staff to maintain PV installations.	››››››
RE 3. Develop programs to market and incentivize solar (e.g., bulk purchase programs, rebates for residents and businesses, etc.), including partnership opportunities for solar installations and renewable subscriptions. Work with utilities to improve incentive programs and opportunities that make electrification affordable and accessible.	››››››
RE 4. Develop an energy transition plan with Xcel Energy and United Power to increase the share of renewablesin the energy mix used across the C3 communityevery year by 10%.	››››››

Strategy	Implement policies that support comprehensive renewable energy growth for the community.

Cost	Staffing Requirements
$	

GHG Reduction Potential	Level of City Control

Actions	Timeline
RE 5. Advocate for aggressive renewable energy standards, a clean energy agenda, and improved incentives for energy efficient appliance purchases at the State level.	›››

Implementation Notes

- The City's advocacy work should extend to utility goals, RPS requirements, and other State policies.
- The State's HB 19-1261 will require utilities to achieve 80% reduction in GHG emissions by 2030, based on 2005 levels.

Renewable Energy

Strategy	Establish a resilient, equitable, and reliable energy future powered by low-carbon and renewable energy.

Cost	Staffing Requirements
$ $ $	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
RE 6. Explore opportunities for resilient energy systems, including the development of a city-wide microgrid.	
RE 7. Build regional renewable energy partnerships, particularly in collaboration with communities that are further along on microgrids and renewables.	
RE 8. Continue collaboration with Energy Outreach Colorado and Diversity, Equity, and Inclusion Board to prioritize reducing energy burden and expand energy services for low-income households.	

Strategy	Reduce impacts from oil and gas throughout the community.
Cost: $	Staffing Requirements
GHG Reduction Potential	Level of City Control

Actions	Timeline
RE 9. Develop regulations that require any new oil and gas development be emissions neutral and implement reverse setbacks for abandoned and plugged wells. Work with state partners to incorporate requirements for more stringent AQ standards and monitoring programs into oil and gas permits to alleviate associated health burdens along with compensation for impacted communities.	›››

AQ Technical Recommendation 4

- Update oil and gas regulatory requirements on a continuous basis to keep up with evolving industry technologies and practices.

Adaptation & Mitigation

As climatic conditions continue to shift, communities are responding to the dangerous increase in extreme weather through two main approaches: adaptation and mitigation. As C3 builds its capacity to respond to climate change and other EJ issues, both these lenses will shape how the City assesses its priorities and evaluates the anticipated impacts of these recommended strategies and actions. A mix of adaptation and mitigation strategies will ensure the community thrives against the inevitable impacts of extreme weather and climate conditions, while working to prevent additional harm.

Adaptation refers to the ways we adjust to anticipated future climatic shifts. Adaptation strategies and actions aim to improve our ability – as individuals and communities – to respond to negative effects of climate change either through reducing risks or taking advantage of new conditions.

Mitigation, on the other hand, involves reducing our GHG emissions to prevent worsening climate change and begin reversing the anthropogenic greenhouse effect in our atmosphere. This can be done through cutting sources of GHGs or building our capacity to absorb carbon in what we call "carbon sinks." Carbon sinks remove carbon from the atmosphere and include trees and plants.

Community Vision

Using this framework for environmental and resilience work, the C3 community currently focuses on mitigation of pollution due to the long, damaging history of industrial activity. The community has consistently singled out AQ as the City's central environmental issue and is actively involved in mitigation of pollution issues, particularly as it pertains to the Suncor refinery. As a result, climate action, both adaptation and mitigation, remains in earlier stages than in neighboring communities. However, because of the prominence of air pollution issues in C3, the community recognizes the interconnection between environmental pollution and climate issues and has voiced a desire for strong City action and investment into climate action.

Strategies and Actions

While the City acknowledges the impact of changing climatic conditions on its residents, adaptation and mitigation work has been slow to follow. This presents both challenges in meeting time-sensitive environmental and public health goals and opportunities to build a community-validated approach to action. Therefore, the strategies and actions below focus on opportunities for the City to build internal capacity and trust in the community within the five-to-ten-year timeframe of this Plan to encourage continued participation in EJ and resilience issues.

Strategy	Encourage public engagement with climate and sustainability work at the State level.

Cost	Staffing Requirements
$	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
AM 1: Publicize information on recent sustainability-related State legislature bills and ways to advocate for change.	〉〉〉〉〉〉
AM 2: Participate in the regulatory and legislative process at the State level on sustainability initiatives and bills.	〉〉〉
AM 3: Encourage and support school district applications for State grants to submit to State agency evaluations and implement sustainability and community health measures in public schools, such as electric school buses.	〉〉〉〉〉〉〉〉〉

Strategy	Foster a culture of public participation in an equitable, just climate transition.

Cost	Staffing Requirements
$	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
AM 4. Establish a permanent EPAC.	›››
AM 5. Encourage City staff and leadership attendance at EJ seminars hosted by City staff and partners and make these trainings publicly accessible to the local community.	››››››
AM 6: Work with City leadership to declare a climate crisis and create momentum behind sustainability actions, raise awareness to issues around resilience and environment, and potentially open up emergency funds to support programs that protect residents from environmental pollution and other harms.	›››
AM 7. Collaborate with CDPHE, community residents, and local industry in order to build resilient spaces in the City that reduce the health impacts associated with air pollution and mitigate the negative impacts caused by extreme weather events and shifting climate conditions. Resilient design can limit risks associated with these changes, so incorporating resilient solutions into future planning and policy could help to address present AQ issues and mitigate against future potential harms associated with the rise in extreme weather.	›››››››››

Implementation Notes

- Collaboration is key: the City should reach out to partners at locally-based organizations such as NREL and Cultivando for help getting data, information, and letters of support for a permanent EPAC and related just transition work. Provide community education and workshops regarding GHGs, EJ, AQ, and other community health issues.

Recycling & Waste Diversion

Between 2018 and 2021, Commerce City's trash costs tripled from approximately $1M to $3M. Waste and wastewater operations comprise approximately 10% of community-wide core emissions and generate a significant amount of HAPs - Allied Waste Industries, LLC produced more HAPs than Suncor did in 2021, at about 30.1 tons and 19.7 tons, respectively. Although not the most significant contributor to the City's overall GHG emissions, waste management impacts the City's sustainability in many ways, from economic to environmental and community health.

Sustainability principles work to develop a circular economy, which is a systems framework that involves eliminating waste, reusing and recycling materials, and regenerating nature. Many extractive industries and single-use products operate in linear processes; however, by diverting certain kinds of waste from their endpoints in landfills, the City can reframe waste as "new" materials for reuse. These "new" materials can also create new business and job opportunities; increasing compost rates and applications throughout the City will also contribute to soil health and reduce PM concentrations. Use of composting in public spaces can help to absorb PM, an important feature given the fact that Adams County measured PM concentrations approximately three times higher than in Denver County.

In C3, many former landfills and one active municipal solid waste (MSW) landfill dot the landscape. CDPHE and the EPA work together to seal and monitor the closed landfills. The Tower Landfill (Tower) serves most residents of C3 and, given the immense growth in waste and population, it has recently applied for a permit to expand the facility. Currently, Tower does not accept any hazardous, radioactive, or explosive wastes, carcinogenic polychlorinated biphenyls (PCBs), or tires, but still emits more HAPs than any other single entity in Commerce City, including the Suncor refinery. Waste data shows that acetaldehyde, benzene, toluene, and xylenes are emitted at an order of magnitude higher than in Denver.

Community Vision

Throughout the engagement process the C3 community reiterated their broad approach to environmental and sustainability policy, including a focus on waste diversion. The community recognizes the importance of recycling and composting in reducing the amount of solid waste entering the landfill but is frustrated at the inaccessibility of this diversion infrastructure in many C3 neighborhoods. The community wants to see a stronger, more comprehensive approach from the City to curbing landfilling, including increasing access to waste diversion opportunities, leading educational campaigns, and attracting new recycling and composting industries. A decentralized composting program and collaboration with A1-Organics could improve soil health and reduce PM, a pollutant that measures almost 30% higher in Adams County than surrounding counties.

Strategies and Actions

Given the City's ballooning trash bill, the City must improve the waste diversion infrastructure in the community, in collaboration with its waste management partners. The City relies on these partners to support an environment favorable to recycling, composting, and innovations in waste diversion. The strategies below lay the groundwork to cultivate the cultural, policy, and regulatory environment to realize the community's vision in an actionable and achievable approach within this plan's five-to-ten-year timeframe.

Recycling & Waste Diversion

Strategy	Implement policies and ordinances to purchase sustainable products, reduce solid waste, and increase waste diversion community-wide.

Cost	Staffing Requirements
$ $	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
WD 1. Update the City's waste management contract to implement policies aligned with Save-As-You-Recycle, which is aimed at increasing waste diversion and reducing consumption by ensuring all households have free access to recycling and waste disposal costs increase in proportion to the amount of waste disposed.	〉〉〉〉〉〉
WD 2. Develop an ordinance requiring large multi-family and commercial property owners to provide recycling and compost collection services.	〉〉〉
WD 3. Develop and implement an extra fee associated with purchases and use of Styrofoam products that avoids increasing costs to end consumers.	〉〉〉〉〉〉〉〉〉
WD 4. Develop policies to limit the use of single-use plastic bags community-wide.	〉〉〉〉〉〉〉〉〉

Recycling & Waste Diversion

Strategy	CONTINUED: Implement policies and ordinances to purchase sustainable products, reduce solid waste, and increase waste diversion community-wide.

Cost	Staffing Requirements
$ $	

GHG Reduction Potential	Level of City Control

Actions	Timeline
WD 5. Develop ordinances to mandate recycling in businesses such as restaurants and grocery stores.	>>>>>>>>>
WD 6. Develop waste reduction targets and collect data on key diversion and reduction metrics to measure success of waste generation and diversion programs and policies.	>>>>>>>>>

Implementation Notes

- With regard to Construction & Demolition (C&D) recycling, Allied Recycled Aggregates' central location drastically cuts truck drive times for disposal of concrete and asphalt as well as any associated GHG emissions. The City could support a C&D ordinance with a penalty for companies that stockpile concrete and asphalt without recycling in a timely fashion.
- Pay-As-You-Throw (or Save-As-You-Recycle) programs can lead to an increase in recycling or compost contamination, so the City must support a program like this with a significant public education effort and ensure the community is well-prepared.
- Waste Connections submitted a materials recycling facility permit, which could provide an outlet for any collected recyclables.
- A Styrofoam tax would be more successful and simpler for the City if regulated through the State. Moreover, the City can develop a more equitable Styrofoam tax by targeting the business side, avoiding another tax on residents.
- The City can support State initiatives and regulations around plastic bag use, recycling in restaurants and grocery stores, and the setting of waste reduction and diversion targets.
- Work with Allied Recycled Aggregates to ensure their capacity can accept the demand for C&D recycling.

Recycling & Waste Diversion

Strategy	Foster a zero-waste culture at C3 through zero-waste events and operations, education, and programs that reduce trash-related pollution and expand access to recycling and composting.

Cost	Staffing Requirements
$ $	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
WD 7. Work with community partners to ensure curbside composting and recycling services are publicly available within the community and support free community-led compost facilities, particularly in low-income, highly-impacted communities. This may come in the form of providing free at-home recycling and composting kits and self-contained composting containers.	>>>
WD 8. Work with school districts to implement waste diversion and reduction strategies, such as eliminating disposable food trays. Develop curriculum to educate students on recycling and composting.	>>>>>>
WD 9. Develop and publicize recycling and composting education campaigns aimed at residents to reduce contamination of recycling and compost streams, i.e., reducing lithium batteries in recycling and promoting rechargeable batteries.	>>>
WD 10. Develop and implement a plan to eliminate air pollution at the landfill.	>>>>>>
WD 11. Develop a waste diversion plan with metrics to measure composting rates and implement a plan to reach a 20% citywide increase in composting.	>>>>>>
WD 12. Provide small local businesses, community groups, and residents with grants or incentives to develop waste reduction or diversion strategies and expand community recycling and composting infrastructure.	>>>>>>

Recycling & Waste Diversion

Strategy	Improve waste diversion infrastructure in C3 to support low carbon transition and pollution reduction goals.

Cost	Staffing Requirements
$ $	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
WD 13. Adopt and enforce a C&D waste recycling ordinance. Consider requirements for using recycled concrete in all new projects.	››››››››
WD 14. Invest in solar Big Bellies and Slim Jims.	››››››››
WD 15. Set a cardboard recycling ordinance (See Appendix C).	››››››››
WD 16. Work with waste management partners to develop infrastructure for organics disposal and implement the City's waste diversion plan to reduce organics from landfill.	››››››››

Recycling & Waste Diversion

Strategy	CONTINUED: Improve waste diversion infrastructure in C3 to support low carbon transition and pollution reduction goals.

Cost	Staffing Requirements
$ $	🕓 🕓
GHG Reduction Potential	**Level of City Control**
🌲	——●

Actions	Timeline
WD 17. Work with waste management partners to develop infrastructure for recycling of concrete and appliances, to support transition to high efficiency and electric appliances.	〉〉〉〉〉〉〉〉〉

Implementation Notes

- The City can improve composting and recycling rates by providing at-home product kits for curbside composting and recycling.
- Working with the school districts to promote lessons on recycling and composting in middle and elementary schools will both educate children and help disseminate this information to their parents and guardians.
- Education is crucial to reduce contamination in composting and recycling.
- To support these initiatives the City needs to develop metrics and methods for tracking composting rates.
- Currently, the City's recycling suffers from a high contamination rate (around 7%). Some contamination stems from the amount of lithium batteries, which are not recyclable. The City needs to support its recycling initiatives with education and promotion of rechargeable batteries.
- Finally, the City should work with Public Works and industry partners such as A1-Organics to ensure any targets set to increase composting rates accounts for the existing infrastructure for organics disposal.

Water

Most Coloradans understand that water in this arid desert State has always been scarce. However, the National Oceanic and Atmospheric Administration's (NOAA) analysis of climatic and environmental data reveals concerning trends: the drought plaguing the Southwest United States will likely continue to scorch the region with little respite in sight. The drying of the region's water resources raises the importance of managing all water resources proactively, including stormwater, through sustainable approaches like LID.

70% of C3's water sources come from alluvial groundwater (which is stream-fed through loose sand, gravel, and silt); the City obtains the rest of its water from Denver and a mix of other local sources. SACWSD services the City's water and wastewater needs. Although the City estimates that current water supplies will meet projected increases in demand, water conservation will still play an important role in ensuring the community's long-term sustainability while also lowering water bills for residents and businesses.

On the WQ side, the City has faced recent challenges with several chemicals of concern, notably PFAS. Of the many WQ exceedances, PFAS pollution, largely the result of actions taken by the past owners of the Suncor refinery and fire-suppression chemicals used at local fire training facilities, has attracted public attention. A study performed by WestWater Hydrology, LLC and commissioned by the national nonprofit EarthJustice produced local samples that registered above the EPA's PFAS guidance. Estimates from the study reveal that Suncor's discharges may account for between 16 and 47% of Sand Creek's total PFAS levels. Of particular concern is Suncor's water outfalls to Sand Creek during precipitation and snowmelt events, which overwhelm its systems and discharge larger quantities of PFAS.*

* https://earthjustice.org/sites/default/files/files/final_suncor_surface_water_pfas_evaluation_1.pdf

Water

The EPA issued new guidelines for PFAS in June 2022, drastically reducing the exposure limit by over a thousandfold. This update has spurred rounds of new testing across the country. SACWSD is competing for the limited grant money disbursed from the federal *Bipartisan Infrastructure Act* to build a new water treatment plant capable of removing PFAS. Meanwhile, additional purchases of Denver Water's supply dilute Commerce City's water to put their WQ below the guidelines.

These recent issues with PFAS add to the long history of industrial pollution that contributes to the community's distrust in C3 institutions. Furthermore, although groundwater has proved a more stable source of water for C3, these resources recharge at much slower rates than surface water supplies. Water challenges will undoubtedly continue to plague the City and the State more broadly as the current ongoing drought places further pressure on State waters. Therefore, policies that encourage conservation and invest in infrastructure upgrades will be crucial to guaranteeing the continuation of C3's water supplies and WQ.

Community Vision

Throughout the City's engagement process, the community responded with great clarity to their vision for a sustainable future with C3's water resources and infrastructure. A concrete understanding of the two major issues facing the City's water systems underpins these recommendations: water quantity, with the threat of increasing drought conditions; and water quality, as new technologies introduce emerging pollutants into local waterways and extreme weather events contaminate stormwater. The community recognizes the immense value of clean water, choosing again and again to prioritize WQ in their homes and water conservation in their landscapes. They envisioned rigorous testing for PFAS, given recent concerns; robust reverse osmosis water filtration systems in every C3 home; and native plant and other water-efficient landscaping practices in yards across the City. City staff is aware of several additional chemicals of concern that may be able to be mitigated through specific action.

Strategies and Actions

Water does not heed political boundaries; therefore, the City cannot easily act alone on many initiatives deemed important to the community. Additionally, the WQ analyses completed through this planning process provided the City with a more accurate picture of the threats to C3's water resources, current state of monitoring, and the importance of integrating a LID approach to future growth. To focus the City on making progress, the community's vision was broken down into several key policy recommendations that are actionable and achievable in this plan's five-to-ten-year timeframe.

Water

Strategy	Develop policies and programs that will help residents and businesses conserve water.

Cost	Staffing Requirements
$	

GHG Reduction Potential	Level of City Control

Actions	Timeline
W 1. Work with SACWSD to develop a program to help convert "street yards" into native plant gardens and sprinklers for "street yards" into drip lines for street trees.	›››
W 2. Mandate that cool weather turf be restricted to 40% of backyards, or 500 square feet, whichever is smaller for new residential and commercial sites.	››››››
W 3. Work with SACWSD to provide incentives to existing residential and commercial sites to remove front yard lawns, then to xeriscape and/or replant with native species.	›››››››››
W 4. Develop programs to incentivize the use of greywater systems.	››››››

Strategy	CONTINUED: Develop policies and programs that will help residents and businesses conserve water.

Cost	Staffing Requirements
$	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
W 5. Work with SACWSD to develop stricter regulations on golf course siting and water consumption, including requirements for no-mow areas, water reuse, and low-water use landscape standards.	>>>>>>
W 6. Work with HOAs and SACWSD to reduce residential lawn area, encourage rock and water-efficient landscaping, and install water conservation projects. This may include development of a rebate program on stormwater fees, new landscape standards, etc.	>>>

Implementation Notes

- These programs offer the City opportunities to work with Adams County and SACWSD to collaborate and combine resources on filtration systems.
- City of Thornton has a good example of an educational resource for residential water conservation.
- The City should consider changing landscaping standards for commercial landscaping as well. Oftentimes, the City requires some amount of landscaping on commercial properties, so a commercial landscape standard can help define the choices of product and technique that businesses can employ.
- Some of these actions may be addressed in the existing City landscape code.
- Require municipal landscape contracts to utilize compost generated by local food and yard waste recycling programs.

Water

Strategy	Promote WQ and community trust in WQ.

Cost	Staffing Requirements
$ $	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
W 7. Provide opportunities to learn more about local water systems (i.e., tour at SACWSD).	〉〉〉〉〉〉
W 8. Work with SACWSD to develop an educational campaign on PFAS risks, regulations, and current and evolving state of PFAS in the local water system. Identify partnerships to support the distribution of PFAS tests in the community.	〉〉〉
W 9. Work with SACWSD to identify key threats to WQ in C3 and exceedances of any federal WQ standards and provide home water filtration systems to all households that exceed standards.	〉〉〉
W 10. Encourage use of nature-based filtration systems in new developments and infill/redevelopments.	〉〉〉〉〉〉〉〉〉
W 11. Pilot at least one greywater system installation in a publicly accessible City facility to ensure visibility.	〉〉〉〉〉〉〉〉〉

Strategy	CONTINUED: Promote WQ and community trust in WQ.

Cost	Staffing Requirements
$ $	2 of 3 (clock icons)

GHG Reduction Potential	Level of City Control
1 (tree icon)	Medium

WQ Technical Recommendations

1. Track WQ monitoring activities and discharge permit violations. Tracking WQ and violations real-time will allow the City to flag issues of concern and facilitate discussions with CDPHE to address these spill hotspots.
2. Develop a high-level Stream Corridor Management Reference Document with a limited menu of easily implementable tools and approaches designed specifically for C3. See Water Quality Recommendations section for additional information.

Implementation Notes

- Regarding the PFAS contamination issues, the City should focus on the generator side and improve remediation at the source. Moreover, a more effective legislative approach to PFAS pollution may be to remove these substances from firefighting foam, waterproof items, and non-stick cookware as opposed to treatment.
- Residents should not face the additional cost burden for contaminated water. The multiple entities responsible for providing safe drinking water to residents must collaborate to reduce the financial and health burden of water pollution.
- These initiatives must consider the state of existing PFAS testing, which cannot currently detect PFAS at the levels set in the new EPA guidelines. Furthermore, expanding blood tests to residents for PFAS would impose a significant cost to the City or residents.
- The City can support residents' WQ by offering discounted permit costs for new homes that install reverse osmosis treatment.
- While PFAS/PFOA contamination is a critical public health concern, the City must work with trusted partners to help residents differentiate between legal requirements and health advisory limits regarding PFAS/PFOA.
- Pilot the greywater installation on a City building or public space to demonstrate its benefits in a publicly visible location.

Transportation

Transportation accounts for the third largest sector of emissions in the City and approximately one-third of the City's core emissions. As the City reassesses its plans for sustainable growth into the future, it must consider the critical ways in which transportation infrastructure contributes to GHG emissions and, importantly, shapes what communities look like, how people behave, and the overall quality of life in the City.

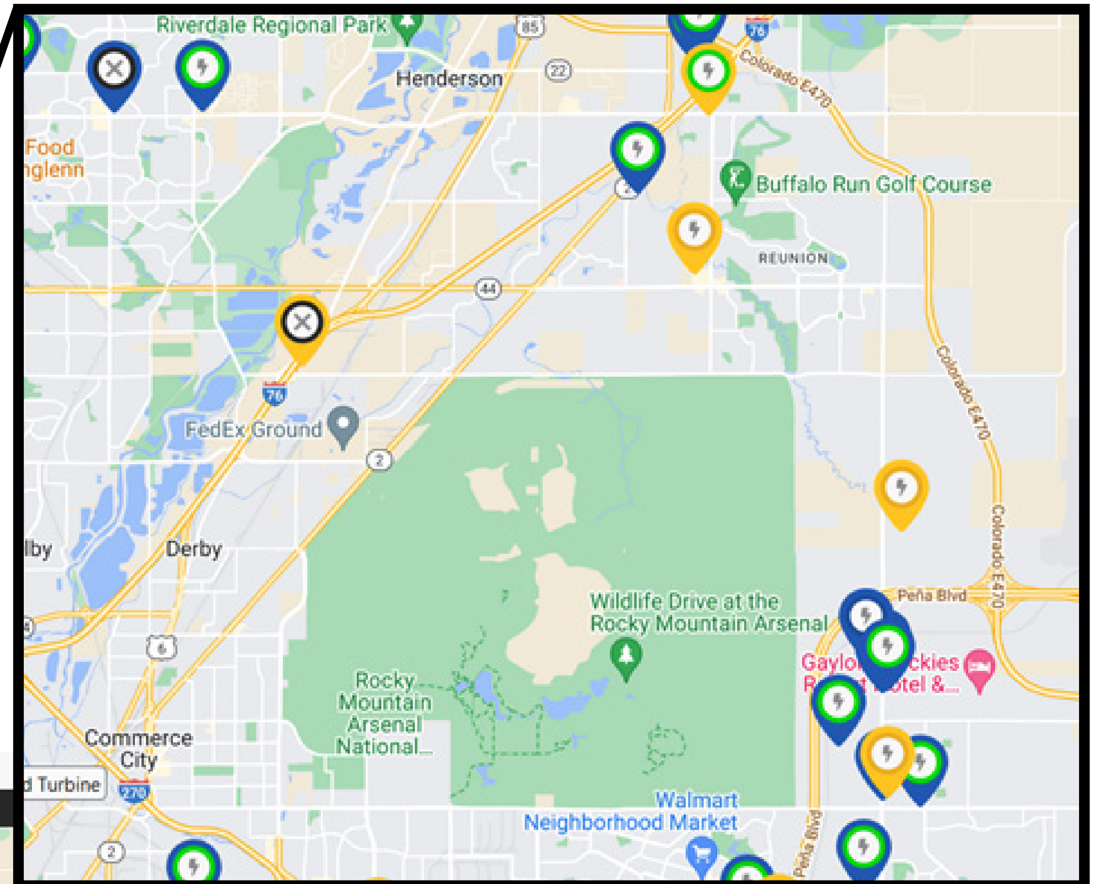
One of the most publicly recognizable ways to reduce GHG emissions and air pollution is transitioning from gas-powered vehicles to hybrids and all-electric. Because EVs do not create tailpipe emissions, the transition to a low-carbon transportation system will also benefit public health through AQ improvements as well as encouraging physical activity. This is especially important around schools because of the health impacts of air pollution on young children. Other policy options can reduce this harm, such as purchasing electric school buses, which EPA grants can support.

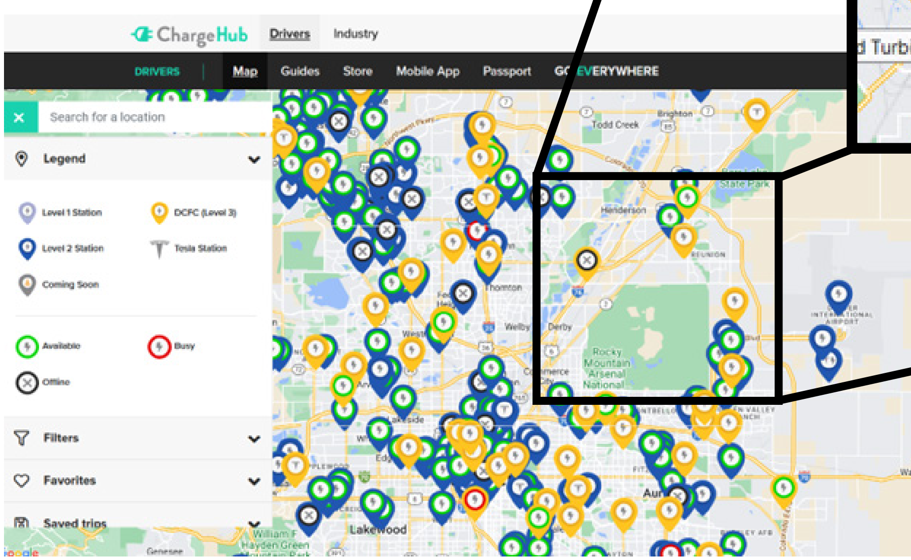
> **"I have asthma and the air quality is bad. When I get away from the neighborhood I can breathe better."**
>
> **- Survey Respondent**

The City of Denver has 463 public charging station ports (Level 2 and Level 3), over half of which offer free charging. The neighboring Denver-Aurora-Lakewood region maintains 1,582 public charging stations, 182 of which are free, and 336 DC Fast Chargers. However, in C3, the EV charging infrastructure, at only three available stations, cannot currently support widespread adoption of

Transportation

Figure 16 Regional and local EV charging stations.





EVs (see *Figure 16)*. Previously, the State's Division of Oil and Public Safety prioritized the redevelopment of old gas stations into EV charging stations, offering the City a good starting point to begin bolstering local EV infrastructure. Currently, the City itself does not own or operate any all-electric vehicles.

The purchase of a new vehicle poses a significant burden on many households. However, there are many policy options aimed at increasing equitable access to EVs and e-bikes. Other communities are experimenting with creative solutions to the dearth of EVs currently on the road: Denver, for example, offers rebates for e-bikes; others, like Denver and Minneapolis, operate EV car share programs. These programs recognize that not all residents can afford or want to purchase new or used personal vehicles.

Another pillar of a low-carbon transportation network is public transit. Connected by six major highways, transportation in C3 revolves heavily around private vehicles. The Regional Transportation District (RTD) services five local bus routes, three regional bus routes, and one direct route to Denver International Airport, as well as access to two regional commuter rail lines. In August of 2022, RTD offered free access to all its services to promote ridership. Expanding access to public transportation will enable the C3 community to not only reduce GHG emissions but also increase community connectivity and support low-income households who are less likely to be able to afford a personal vehicle and may travel longer distances to work.

Finally, the City may find partnerships with some of the many transportation and distribution companies with significant operations in C3; these entities would similarly benefit from a transition to low-carbon fleets through cost (i.e., operations and maintenance) savings, improvements in local AQ, and public relations.

Community Vision

The community understands the huge opportunity within a commitment to climate action to change the City's transportation infrastructure, reduce GHG emissions and air pollution, and maintain Commerce City's prized small-town community atmosphere all at once. Community engagement revealed a strong desire to see a rapid, comprehensive expansion of EV infrastructure, public transit, Safe Routes to School, and multimodal transportation networks.

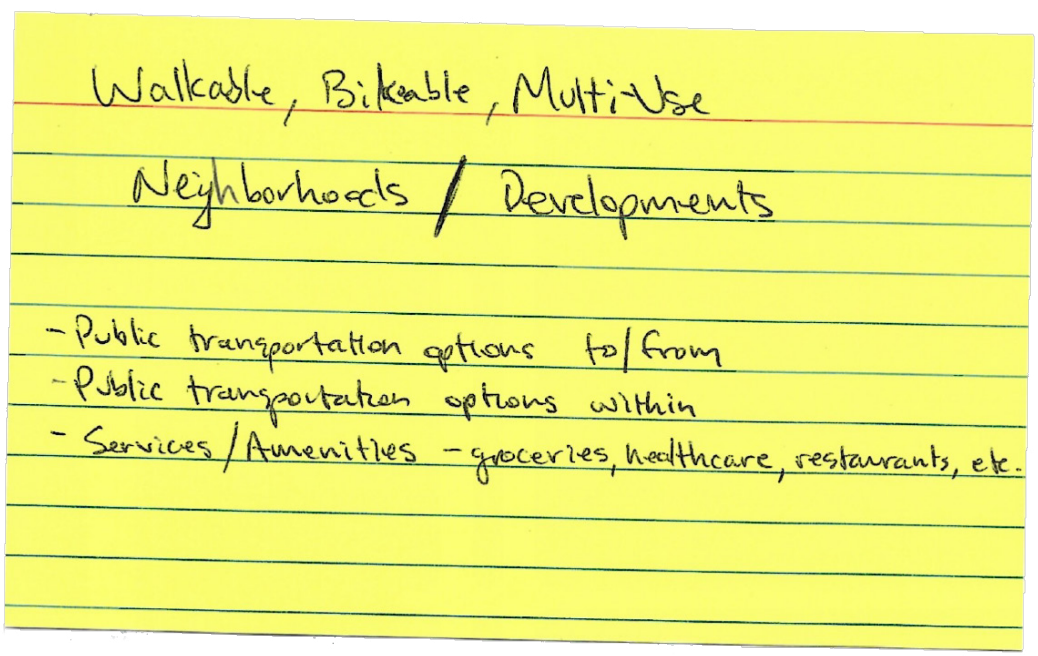
The community's desired approach toward this expansion is a multimodal focus on upgrading C3's transportation networks to fully and equitably connect all neighborhoods, reduce GHG emissions, and encourage active transportation. RTD's model of fixed route public transit alone will not create a fully connected community, leaving issues with first and last mile connections. A major emphasis in this vision involves the extension of urban pedestrian networks, protected bike lanes, and bike trails in conjunction with transit to create stronger community connections even as the City continues to grow.

Transportation

AQ once again drives a significant part of this vision: increasing public transit options, expanding active transportation routes, and converting the current gas-powered internal combustion engine (ICE) fleet to EVs will also reduce key airborne pollutants of great concern. Three major highways, Interstate 270, State Highway 265, and Interstate 76, run through C3; the traffic from this infrastructure contributes significantly to air pollution and adds up to an estimated average daily 1.16 million vehicle miles traveled. Strong partnerships with State and federal agencies can improve highway maintenance and address the poor AQ associated with highway traffic. The EPAC identified anti-idling near schools as a high priority policy. Ultimately, the community seeks a comprehensive, safety-first transportation network that opens access to all the places that community members live, work, and recreate while removing air pollution.

Five-Year Strategies and Actions

C3's transportation systems integrate into larger regional networks, including state and interstate highways, RTD, and the Denver airport. As such, the City must work with several other entities to complete an overhaul of its road and transit infrastructure in line with the community's vision. To prime the City for a low-carbon pollution transportation network, several key actionable and achievable steps outline a broad approach to implementation, including planning efforts, opportunities to educate the community, and targeted purchases of alternatives to ICE vehicles.



Transportation

Strategy	Increase the proportion of EVs in the City's fleet and in the community. Increase the number of light duty and medium duty EVs in the city fleet.
Cost $ $	**Staffing Requirements**
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
T 1. Develop a roadmap for transportation electrification in the community that includes City fleet electrification, connecting renewable energy supplies to charging infrastructure where feasible, education and awareness campaigns around EV adoption, and equity considerations for EV costs. This could also include converting old gas stations into EV charging stations.	›››››››››

Transportation

Strategy	Promote and educate residents on EVs and their related support network such as charging infrastructure.

Cost	Staffing Requirements
$	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
T 2. Host a public forum on EVs, covering education on vehicle performance, financing, network charging, tax credits, models, group buy programs, test drive events, etc.	〉〉〉〉〉〉
T 3. Improve public EV charging signage and options, e.g., larger signs, and initiate campaigns for education and awareness.	〉〉〉〉〉〉〉〉〉
T 4. Create and implement educational and awareness campaigns that promote EV adoption.	〉〉〉〉〉〉

Transportation

Strategy	Prioritize multi-modal transportation options in effort to broaden access to the places where people recreate, work, and live. Expand safe and convenient public transit, walking, and bicycling routes, including last-minute and last-leg transportation connections. Focus on improving and investing in transportation infrastructure, especially repairs and access to public transit and local and regional activity centers (such as shopping, jobs, and recreation).

Cost	Staffing Requirements
$ $ $	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
T 5. Explore options to reduce costs of public transportation for under-resourced populations and establish dedicated funding sources for expanding public transit and park-and-rides.	〉〉〉〉〉〉〉〉〉
T 6. Promote existing, and explore additional, alternative transportation options, including the N Line, shuttle service, bicycling, shared micro-mobility, carshare, and rideshare options.	〉〉〉〉〉〉〉〉〉
T 7. Develop and implement a City-wide multi-modal transportation plan that promotes transit-oriented development and multimodal connectivity and focuses on moving people efficiently and equitably. Focus infrastructure improvements and investments on reaching under-resourced communities. Engage public transit users where they are in order to solicit input in the plan.	〉〉〉〉〉〉
T 8. Improve road and traffic safety by repairing residential streets, filling in cracks and potholes, adding signage to slow drivers down, and piloting traffic-calming measures.	〉〉〉

Strategy	CONTINUED: Prioritize multi-modal transportation options in effort to broaden access to the places where people recreate, work, and live. Expand safe and convenient public transit, walking, and bicycling routes, including last-minute and last-leg transportation connections. Focus on improving and investing in transportation infrastructure, especially repairs and access to public transit and local and regional activity centers (such as shopping, jobs, and recreation).

Cost	Staffing Requirements
$ $ $	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
T 9. Expand protected bicycle lane networks and add bicycle racks, and lane barriers and restripe lane lines to increase visibility and protect bicyclists from motor vehicle traffic, particularly the large quantity of freight trucks.	››››››››››
T 10. Work with Colorado Department of Transportation (CDOT) and property owners near schools and in key commercial districts to widen sidewalks, improve street lighting, and add crossing paths at key intersections to improve pedestrian safety and encourage students to walk to schools and residents to walk and socialize. Develop code amendments to require wider sidewalks in new construction projects.	›››
T 11. Apply for Safe Routes to School Grant from CDOT (open Aug. 9-Nov. 4).	›››
T 12. Improve bus and light rail stop infrastructure, including by adding covers to bicycle racks and shelters to bus stops.	››››››

Strategy	CONTINUED: Prioritize multi-modal transportation options in effort to broaden access to the places where people recreate, work, and live. Expand safe and convenient public transit, walking, and bicycling routes, including last-minute and last-leg transportation connections. Focus on improving and investing in transportation infrastructure, especially repairs and access to public transit and local and regional activity centers (such as shopping, jobs, and recreation).

Cost	Staffing Requirements
$ $ $	3 of 3
GHG Reduction Potential	**Level of City Control**
3 of 3	High

Actions	Timeline
T 13. Meet with RTD and CDOT to analyze and develop improvement plans for public routes and accessibility in C3.	››››››››››
T 14. Sponsor limited, longer range bus routes as an alternative to driving through and around C3.	››››››››››
T 15. Develop strategy and action plan to increase City walk score.	››››››››››

Implementation Notes

- Many of these transportation strategies will also support the ongoing efforts and goals to expand affordable housing. The City can include a cohesive, comprehensive wayfinding system between neighborhoods, services, employment opportunities, and transit stations.
- The City can supplement these efforts by exploring bicycle-, scooter- and EV-share options.

Strategy	Support and promote equitable EV adoption.
Cost	**Staffing Requirements**
$	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
T 16. Work with utilities to develop incentive programs to encourage private citizens to charge EVs during energy off-peak hours (i.e., early mornings or late evenings).	››››››››
T 17. Develop a rebate program for e-bicycles.	››››››››
T 18. Develop and implement EV charging infrastructure installation community-wide, including introducing requirements for new gas station developments to incorporate EV charging.	››››››
T 19. Pilot bike and scooter share programs.	››››››››

Transportation

Strategy	Reduce idling and air pollution from vehicles by promoting anti-idling policies and educating the public on behavior changes that will support air pollution reduction goals.

Cost	Staffing Requirements
$	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
T 20. Lead public campaigns, particularly around schools and with fleet companies, to discourage idling and convert fleet to EV, highlighting public health benefits of no-idle zones.	〉〉〉〉〉〉〉〉〉
T 21. Develop an anti-idling resolution and work with the Adams 12 School District and private schools to establish and enforce no-idle zones around schools.	〉〉〉
T 22. Install intelligent traffic signals to reduce wait times for vehicles during off-peak hours.	〉〉〉〉〉〉〉〉〉
T 23. Explore train schedules to reduce wait times at crossings.	〉〉〉〉〉〉〉〉〉

Implementation Notes

- The City can support its anti-idling resolution by posting information about anti-idling at local schools and using signs throughout the community.

Community Health

Throughout the process of developing sustainability recommendations, the C3 community and the EPAC expressed major concerns over public health and health equity, particularly in the context of an ongoing history of industrial pollution. These pollution issues impact all Commerce City residents, crossing racial and socioeconomic lines. Consequently, robust community activism has sprung up around industry-related AQ issues and health justice.

Furthermore, ample data from multiple sources support these community concerns, including the AQ analyses completed through this planning process. AQ data from the federal EPA and CDPHE reveals high levels of criteria air pollutants (NAAQS) in C3, including some of the highest fine particle pollution in the State. At the county level, Adams County exceeds Denver County by three to five times for carbon monoxide, PM10, PM2.5, NOx, SOx, and VOCs. The EPA's EJScreen tool ranks Commerce City in the upper 75th percentile in the State for every key metric except ozone and in the country for all metrics except traffic proximity.

The escalation in extreme weather events and climatic conditions is predicted to exacerbate existing health disparities and threats to public health like poor AQ and extreme heat. C3 already experiences more serious respiratory problems than other communities locally and across the State (see *Figures 17 and 18*); these climatic shifts will aggravate such preexisting conditions through increases in allergens, ozone, PM, and other pollutants. Furthermore, rising temperatures and frequency of extreme weather events stresses already overburdened communities, creating additional mental health burdens.

Community Vision

A long history and depth of community organizing and activism informs the community's vision for a healthy Commerce City. The EPAC stressed the need for health justice as well as a stronger connection between and prioritization of a healthy environment and healthy community throughout the community engagement process. They sought greater transparency and monitoring of AQ and other pollution metrics from the City and more action to alleviate heat issues for vulnerable populations. Finally, the community has expressed over and over again their frustration over the Suncor refinery's pollution and desire for the City to regulate industrial activity more stringently; moves to partner with local, State, and federal agencies to do so would signal to the community a shift in City priority from industry and towards residents.

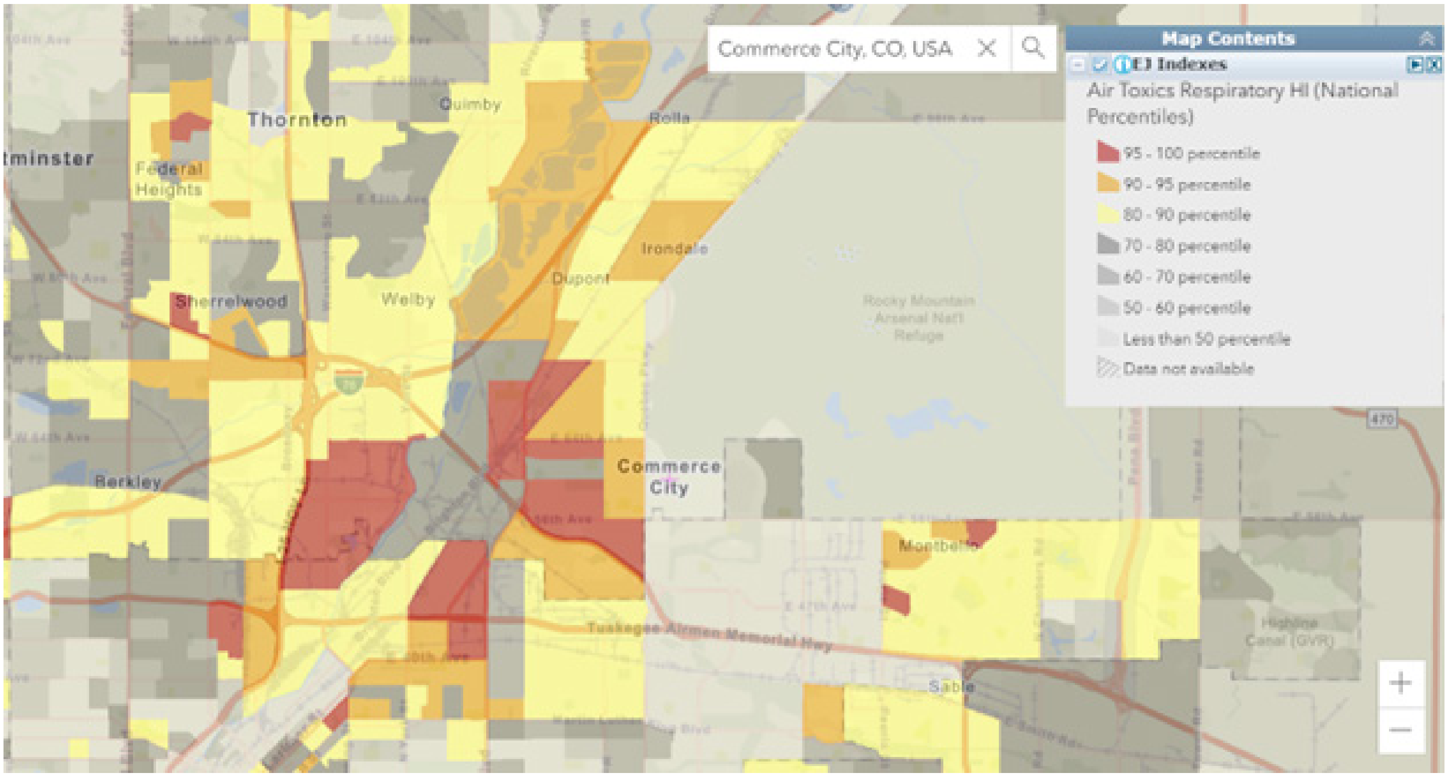


Figure 17 EPA EJ Screen results showing air toxics respiratory risk in Commerce City.

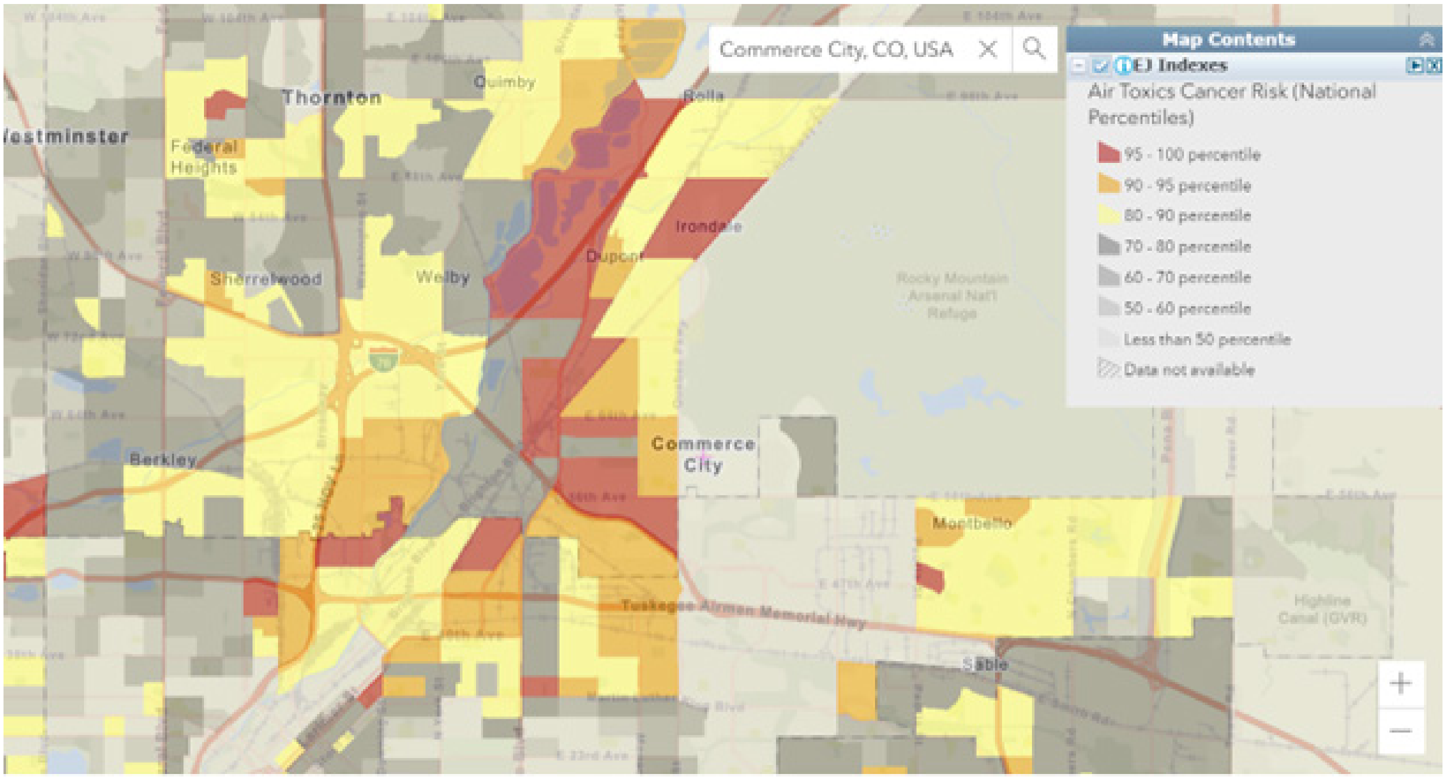


Figure 18 EPA EJ Screen results showing air toxics cancer risk in Commerce City.

Community Health

Strategies and Actions

A number of infrastructural, political, and economic obstacles prevent a rapid transition in the industrial economic engines, including oil and gas, in the City. Furthermore, the City does not hold the regulatory authority over industry that the community desires to see. However, to achieve its community sustainability goals, the City can begin by addressing its public health challenges and AQ issues mapped out in Pinyon's analyses. Hiring staff to support monitoring and restoration efforts will play a critical role in boosting C3's capacity to address these issues. Because of the dangerous rise in extreme weather conditions, strategies and policy actions that reduce urban heat island effect and air pollution will play an increasingly important role in closing health gaps.

The policy recommendations below identify key starting points based on the AQ analyses discussed in previous sections and the community's vision. These strategies also offer opportunities for the City to begin acting as a trusted public health partner.

Community Health

Strategy	Research characteristics of healthy communities and three most important healthcare concerns in Commerce City.

Cost	Staffing Requirements
$	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
CH 1. Work with community health partners to identify key metrics for monitoring that capture social, safety, and access barriers to obtaining mental and physical healthcare.	›››
CH 2. Work with community health partners to develop programs that increase access to mental and physical healthcare for people struggling with mental health and substance addictions.	••••••

Strategy	Track the increase in extreme heat days forecasted by NOAA and prepare by ensuring community members know about city cooling centers.

Cost	Staffing Requirements
$	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
CH 3. On extreme heat days, waive fees at Eagle Point and Bison Ridge Recreation Centers, or other relevant community facilities, for all community members to provide a cooling space.	›››
CH 4. Publicize to residents that they should seek shelter at cooling centers such as recreation centers, libraries, and bowling alleys.	››››››

Implementation Notes

- The residents in need of cooling centers may be the same as those who may not have access to or be able to afford air conditioning.
- Furthermore, recreational centers may not be easily accessible to those that may need this most. Additional locations or alternative solutions should be explored to best meet people where they are. The City should develop partnerships with community institutions, such as libraries and educational institutions.

Community Health

Strategy	Support health clinics that provide basic, necessary preventive care.

Cost	Staffing Requirements
$	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
CH 5. Increase permits for physicians' offices to reduce burden on health clinics and hospitals.	»»»»

Community Health

Strategy	Proactively manage air pollution concerns that harm public health and increase transparency around local AQ data.
Cost: $	Staffing Requirements: 2 of 3
GHG Reduction Potential: 1 of 3	Level of City Control: High

Actions	Timeline
CH 6. On severe AQ days for ozone, request that Suncor does not undertake maintenance.	〉〉〉〉〉〉
CH 7. Develop a prohibition that phases out the use of new gas-powered lawn equipment by 2025 to reduce emissions of VOCs and NOx. Work with big box retailers to develop incentives or discounts for e-mowers.	〉〉〉〉〉〉〉〉〉

According to recent research*, electric lawn equipment can offer significant pollution reductions over traditional gas equipment: a commercial gas-powered lawn mower produces the pollution equivalent of driving a car 300 miles in one hour, while a commercial leaf blower produces the equivalent of an 1,100-mile car trip in one hour.

* See: https://pirg.org/media-center/new-report-gas-powered-lawn-equipment-plays-outsized-role-in-colorados-unhealthy-ozone-pollution/

Actions	Timeline
CH 8. Ensure air monitoring and alert systems put greater emphasis on chronic, rather than acute, health impacts from air pollution. Current refinery notifications from Suncor focus on day-to-day impacts, while residents show great concern for chronic impacts that accumulate over time.	〉〉〉〉〉〉〉〉〉

Strategy	CONTINUED: Proactively manage air pollution concerns that harm public health and increase transparency around local AQ data.

Cost	Staffing Requirements
$	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
CH 9. Make accessible and publicize local AQ information and data and work with community partners to disseminate actionable information.	›››
CH 10. Conduct an epidemiological study in partnership with CO School of Public Health to look at biomarkers and the impacts of pollution in C3.	›››

AQ Technical Recommendations

1. Continue updating the impacts inventory to keep residents informed of details on new pollutant sources and existing source modifications.
2. Implement a monitoring network that supplements existing and planned monitoring to help the community better understand how existing pollutant sources impact residents and other specific locations such as schools and parks.
3. Incorporate AQ threshold levels into City ordinances that would require additional analysis, reporting, and potentially mitigation for planned emission sources.
4. Reduce current and future emissions by implementing practices such as BACT analysis requirements and targeted emissions control requirements as needed.

Implementation Notes

- Ensure the AQ information shared includes an analysis of immediate AQ impacts (i.e., day-to-day) and easily digestible results as well as cumulative impacts related to exposure.
- Allied Recycled Aggregates expressed willingness to provide space for AQ sensors.
- The community needs a lead agency that will spearhead an effort to unify all the many existing datasets on AQ in C3. Moreover, the ability for the City to communicate this data and analyses is critical to building trust and legitimacy in the City as well as increase accessibility and develop an inclusive understanding of the AQ data. The City can cultivate a more open conversation around public health and bring in the community.

Strategy	Develop a program for travel offsets.
Cost $ $	**Staffing Requirements**
GHG Reduction Potential Not modeled	**Level of City Control**

Actions	Timeline
CH 11. Work with regional partners, including Denver International Airport, on a carbon offset program that could be used for community projects such as tree plantings or protected bike lanes to improve local AQ.	›››

Implementation Notes

► Republic Services is looking into providing two-mile bike paths along Second Creek.

Funding & Economy

The onslaught of extreme weather events and shifting climate conditions threaten to create new systems of exclusion and hierarchy that privilege the same communities who already control most of the available resources. Many community members, including those likely to face the most severe impacts of this new normal, cannot afford to participate in the "green" economy. Communities across the State are spending significant financial resources on planning for and implementing key policies of a resiliency-focused future, including working to attract emerging industries to build a resilient, green economy. Crafting a vision for Commerce City's future economy will be important to ensuring all can participate moving forward and providing the tax base that can pay for the other aspects of this plan.

Community Vision

The community identified as a top priority the end of historic cycles of disinvestment and inequities, especially around environmental pollution issues. The community will recognize the allocation of City resources and funds as a demonstration of genuine commitment to climate action. They seek funding and purchasing assistance programs that specifically target under-resourced communities and support their transition to clean energy and remediate existing harm. Fully funding and committing scarce staff resources towards implementing the recommended programs and policies and applying for state and federal funding will work to build trust with the community while building up the future green economy.

Five-Year Strategies and Actions

Commerce City's legacy as an industrial economic engine can be leveraged to transition seamlessly into the new green economy. Critical to economic vitality and to the success of any City policy is the City's ability and commitment to invest resources towards implementing and sustaining key strategies and tactics. The policy recommendations listed below outline the starting points, based on the community's vision, for the City to begin positioning itself for a new green economy.

Strategy	Explore and develop strategies for bulk purchasing in residential and City buildings.

Cost	Staffing Requirements
$ $	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
FE 1. Explore bulk programs for solar installations with organizations like Solar United Neighbors or others.	›››
FE 2. Explore bulk purchase of e-bikes, regular bikes, or other similar alternative transportation methods.	››››››
FE 3. Explore bulk purchase of heat pumps or other electrification appliances for residents.	›››››››››
FE 4. Explore providing incentives or rebates that fill gaps in need, such as point-of-sale rebates for efficient appliances, or incentives for electric panel upgrades (which are generally required when installing solar or electrified equipment).	›››

Funding & Economy

Strategy	Develop and promote a diverse, sustainable economy within the City. Bring clean energy industries to C3, and make C3 a leader in clean energy product development.

Cost	Staffing Requirements
$	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
FE 5. Develop a roadmap to removing and preventing pollution created by industrial facilities, including the Suncor facility, and work with State and federal agencies to reassess pollution standards against AQ monitoring data collected to ensure permit rules achieve community health protection goals.	›››
FE 6. Work with warehouse owners and green industry partners to identify opportunities and barriers such as zoning and occupancy rules to converting empty storage space into usable industrial space for clean energy industries and products.	››››››
FE 7. Explore options for City incentive programs aimed at attracting new clean and efficiency industries, including building retrofits, etc.	››››››
FE 8. Support letter from Kristi Douglas to Climate Action Network asking for federal support.	›››

Biodiversity, Tree Canopy, & Food

Commerce City, like many communities in the Denver metropolitan area, is endowed with multiple parks, open spaces, and outdoor recreational spaces. The City has also been recognized for over 30 years as a "Tree City USA" by the National Arbor Day Foundation and often hosts tree seedling giveaways for Arbor Day. Access to green spaces and trees plays a critical mitigating role in environmental and public health, particularly for vulnerable communities. Moreover, these communities, such as the elderly, will be disproportionately impacted by a shifting climate; adequate green space and tree canopy coverage can significantly reduce these harmful impacts.

Urban heat island effect, the phenomenon by which impervious surfaces trap heat, exacerbates existing vulnerabilities in highly urban areas and impacts neighborhoods with fewer trees and hotter green spaces. These hotter temperatures will also decrease AQ by creating conditions favorable to pollutants: scientists predict longer pollen and allergen seasons, an increase in harmful air pollutants like ozone and PM, and a greater frequency of wildfires. Especially important for C3, green spaces and urban trees can improve AQ and trap these airborne pollutants.

Biodiversity, Tree Canopy, & Food

However, overall tree canopy coverage in the City stands at about 6%, with some neighborhoods in northern C3 at 3%; these numbers stand in contrast to the recommended 20% canopy coverage for prairie and grassland ecosystems. Similarly, the City maintains no community gardens in City parks or public housing. Urban trees and gardens provide a multitude of benefits to a community, including cooling, AQ, and calming. According to the American Forests Tree Equity Scores report, the City's overall tree equity score is 63 out of 100 (*Figure 19)*. This metric combines tree canopy coverage and land surface temperature and measures this against demographic characteristics, including income, employment, race, age, and health, to gauge whether a community contains enough trees to ensure its residents experience the benefits trees provide. In line with national trends, the neighborhoods with the lowest percentage of people of color contain above-average tree canopy coverage while the neighborhoods with the highest percentage of people in poverty suffer from the lowest tree canopy coverage.

Community Vision

Throughout the period of engagement, C3 residents drew connections between the sustainability of the community, public health, and their access to gardens, trees, and green spaces. A major concern expressed by many in the C3 community was equitable access to fresh produce and urban gardens. For many in urban neighborhoods, particularly low-income and communities of color, the most conveniently available foods are fast and heavily processed foods; to combat this, residents envisioned a publicly accessible network of farmers markets and community gardens in vacant lots and public spaces. The community also linked the expansion of green space to a need to implement water-conscious landscaping and reduce pollution. A mass conversion of grass, including golf courses, and street yards to native landscaping would promote responsible management of water and potentially capture water and air pollution.

> **"Trees are planted poorly and seem to have a 50/50 success ratio. It is really disappointing driving around seeing all the dead trees and nothing being done to support the ones that are still alive or clinging to life." - Survey Respondent**

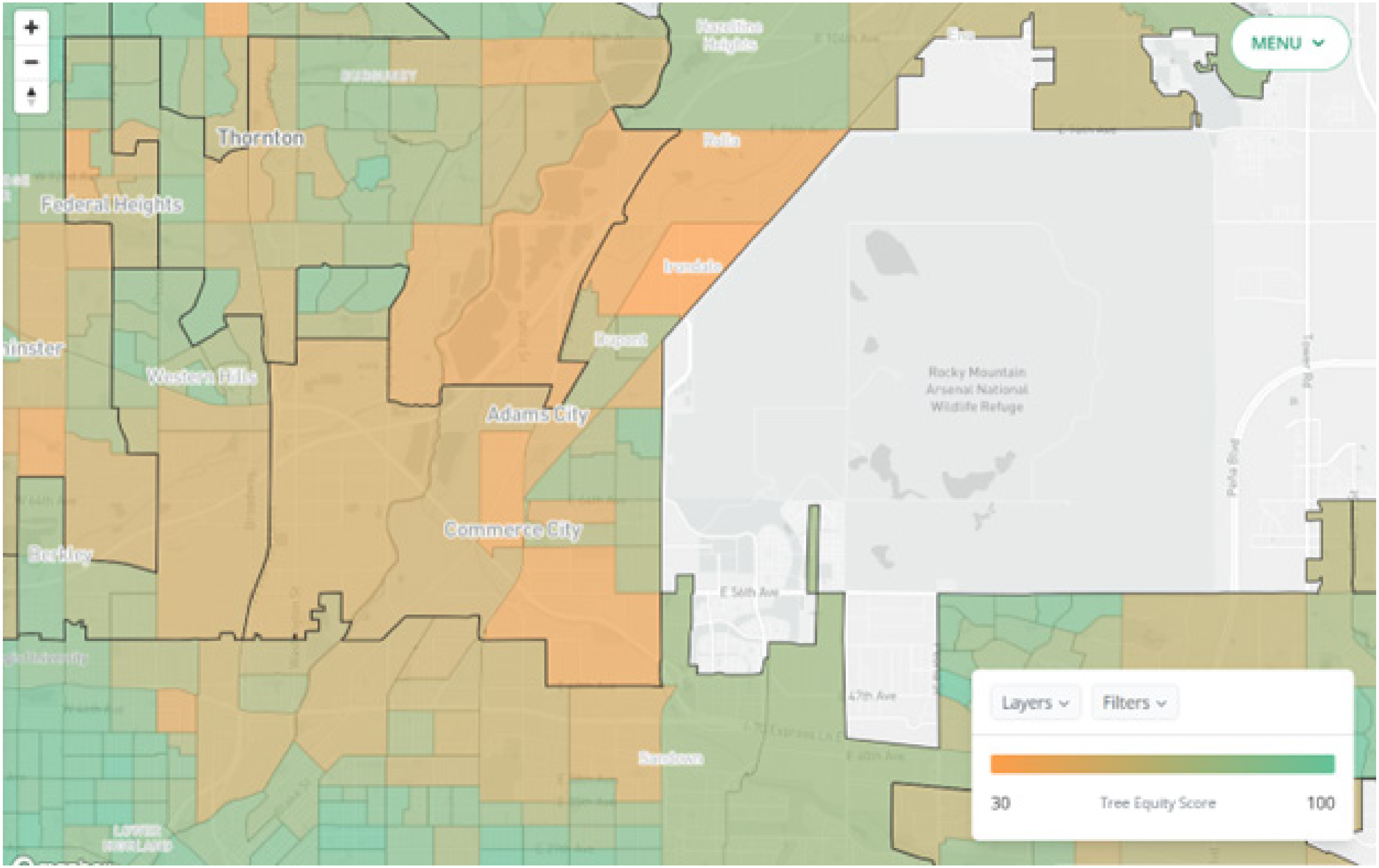


Figure 19 Commerce City's tree equity score.

Biodiversity, Tree Canopy, & Food

Strategies and Actions

This focus area offers many opportunities to foster relationships between the City, schools, and community members. However, to achieve the community's vision, the City should begin by assessing various standards, regulations, and policies to ensure a permissive policy and regulatory environment for urban agriculture and gardens. The strategies and actions below break down the community's vision into actionable, policy and planning-oriented steps intended to focus the City's efforts over the plan's five-year timeframe.

"As the cost of living rises, food, especially healthy food, is becoming inaccessible to a growing percentage of the population. It is putting large amounts of the population at risk that they can't protect themselves." - Survey Respondent

Biodiversity, Tree Canopy, & Food

Strategy	Protect and expand City green space and increase tree canopy coverage to 20%.

Cost	Staffing Requirements
$ $ $	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
B 1. Expand and maintain publicly managed street trees, tree planting, and tree-scale programs. Explore development of an incentive program to plant two trees for every removed tree. Develop City goals and policies to drive strategic purchases of land that add to existing green spaces and do not increase maintenance burdens on Parks Department staff.	››››››››
B 2. Develop and implement a plan to increase urban forest canopy to at least 20% across the entire City, particularly in low-income neighborhoods.	››››››
B 3. Work with Denver International Airport to implement a program for planting a new tree for every new flight added.	››››››››

Implementation Notes

- The nonprofit organization American Forest produces a report and "Tree Equity Score" map for municipalities across the country. Within each Commerce City neighborhood, they estimate a goal of 20% forest canopy density to achieve tree equity.

Biodiversity, Tree Canopy, & Food

Strategy	Increase biodiversity, local food production, and community gardens.

Cost	Staffing Requirements
$ $ $	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
B 4. Work with community partners to explore and develop programs and campaigns that expand access to locally grown produce and community gardens for low-income, highly impacted communities. These may include encouraging urban agriculture to new developments and infill projects.	›››
B 5. Develop programs and campaigns to encourage pollinator habitats and foster ladybug habitats.	››››››
B 6. Develop a program and/or campaign to help residents donate trees to one another.	›››››››››
B 7. Adopt and encourage the "No Lawn" movement and remove grass on City properties to lead by example.	›››››››››
B 8. Develop programs and incentives to encourage conversion of vacant lots and community spaces to community gardens and of "street yards" to native wildflower and plant gardens. Work with HOAs, more specifically the Reunion Metro District, nonprofits, and landowners to implement and publicize programs.	››››››

Biodiversity, Tree Canopy, & Food

Strategy	**CONTINUED: Increase biodiversity, local food production, and community gardens.**

Cost	Staffing Requirements
$ $ $	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
B 9. Keep agricultural zoning to ensure green spaces are maintained.	›››
B 10. Work with City facilities and Parks Department to identify feasible locations around the City, particularly City lands, for planting self-sustaining fruit trees and bushes to produce food, increase aesthetics, help with erosion and biodiversity, etc. Work with the Parks Department to develop maintenance plans for fruit trees and recruit volunteers to support. Map fruit trees around the community.	›››
B 11. Work with City Parks Department staff to identify target City trees for replacement with native species and develop a tree planting grant program for replacing aging or diseased non-native trees with City-approved native species on residential properties and planting native drought-tolerant, fire-resistant trees. Explore business and industry partnerships to sponsor grants or donate trees.	›››

Biodiversity, Tree Canopy, & Food

Strategy	CONTINUED: Increase biodiversity, local food production, and community gardens.

Cost	Staffing Requirements
$ $ $	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
B 12. Develop an incentive program for and work with residential neighborhoods and neighborhood associations to install permaculture landscaping within communities.	››››››
B 13. Develop incentive programs to encourage the use of natural weed killers and pesticides on residential properties.	›››››››››

Implementation Notes

- These actions offer the City opportunities to collaborate across focus areas, particularly with water conservation and agriculture work.
- Supplement programs with a workforce training program for permaculture landscapers. Leverage the potential opportunity to develop a local industry around native gardening and landscaping, including natural weed killers and pesticides.
- A ban of sales and applications of glyphosates and neonicotinoids within City limits would promote the use of natural treatments and reduce pollution.

Biodiversity, Tree Canopy, & Food

Strategy	Implement activities to improve and enhance land and water restoration.
Cost: $ $	Staffing Requirements
GHG Reduction Potential	Level of City Control

Actions	Timeline
B 14. Conduct an infill inventory to identify optimal opportunities for both development and green space.	〉〉〉〉〉〉〉〉〉
B 15. Implement City buy-back program to purchase and restore polluted Superfund and brownfield sites and repurpose them for appropriate and safe uses, including community gardens.	〉〉〉〉〉〉〉〉〉
B 16. Fund research to analyze the impact of fungal species that can remediate pollution.	〉〉〉〉〉〉
B 17. Encourage xeriscape projects on City-owned properties and promote xeriscaping with developers.	〉〉〉〉〉〉〉〉〉
B 18. Work with business and industry partners to develop landscaping standards that modify landscaping on municipal and commercial property near areas with AQ pollutant levels that exceed to-be-determined thresholds in an effort to capture those pollutants through nature-based solutions and increase resilient green spaces.	〉〉〉

Biodiversity, Tree Canopy, & Food

Strategy	CONTINUED: Implement activities to improve and enhance land and water restoration.

Cost	Staffing Requirements
$ $	
GHG Reduction Potential	**Level of City Control**

Actions	Timeline
B 19. Launch a community campaign to remove invasive species.	⟩⟩⟩⟩⟩⟩⟩⟩⟩
B 20. Amend ordinance to require mulching/composting to enrich soil.	⟩⟩⟩⟩⟩⟩⟩⟩⟩
B 21. Applying the precautionary principle, pass an ordinance banning the use of glyphosates and neonicotinoids, which are harmful to bees, near any sole source drinking water aquifers.	⟩⟩⟩⟩⟩⟩⟩⟩⟩
B 22. Promote the use of less toxic chemicals throughout the community, such as the EPA's Section 3 Reregistration Eligibility Decision pesticides list.	⟩⟩⟩⟩⟩⟩⟩⟩⟩
B 23. Work with Facilities and Parks departments to develop a soil health monitoring program to regularly sample soils around the City.	⟩⟩⟩⟩⟩⟩⟩⟩⟩

Implementation Notes

- Many actions in this strategy connect to actions in the water conservation focus area and offer collaborative opportunities with local business and industry to implement resilient green spaces.

Leading By Example

The City can spur broader community adoption of sustainability initiatives and actions by first modeling and piloting projects publicly to demonstrate feasibility. Many strategies and actions identified throughout this Plan offer the City opportunities to lead by setting an example and build on existing internal sustainability work such as the installation of solar PV arrays on the Civic Center. These include, but are not limited to the following:

- Conducting energy benchmarking and audits of municipal facilities and publicizing results.
- Developing energy intensity baseline for City buildings and facilities.
- Increasing onsite renewable energy installations on municipal buildings and using renewable energy for municipal operations.
- Training Public Works and Parks staff to maintain PV installations.
- Requiring City staff and leadership attendance at EJ and environmental sustainability seminars.
- Implementing zero-waste policies for City events and operations.
- Converting landscapes and grass on City properties to native, water-conscious landscaping.
- Planting trees on City property.
- Piloting at least one greywater system in a City facility.
- Converting the municipal fleet to EV and right-sizing vehicles.

> "[The city should] be more collaborative across the region. These pollutants don't know the boundaries created by humans and we need more regional cooperation."
> - Community Organizer

Commitment of City staff and resources to incorporating these sustainability principles into municipal facilities and properties will demonstrate the City's willingness to collaborate with the larger community on scaling up initiatives. Kicking off implementation of the policy recommendations in this Plan with City actions may begin to build both trust and capacity in the community to continue engaging with this work.

Next Steps & Implementation

As Commerce City embarks on operationalizing and implementing the recommendations within this Plan, six key components will be integral to this work:

1. Working closely with the community, including the EPAC, to engage all of Commerce City in this work.

2. Engaging institutional, organizational, and business partners throughout Commerce City to implement recommendations and leverage existing work to advance sustainability.

3. Applying for relevant funding opportunities, including grants and forthcoming federal funds from the American Rescue Plan, the Inflation Reduction Act, the Infrastructure Investment and Jobs Act, and Justice 40 to ensure this work is fully funded and fiscally sustainable in the long run.

4. Developing a process for integrating economic, environmental, and social considerations – known as a triple bottom line analysis – into City-funded projects, policies, and programs.

5. Evaluating and implementing proposed amendments and ordinances necessary to address community health concerns and build a more diverse economic base.

6. Coordinating policies with neighboring municipalities to infuse sustainability principles into regional-scale short- and long-term planning.

Commerce CITY

Next Steps & Implementation

Importantly, the EPAC developed a resolution for the City Council to make the committee a permanent advisory committee. It should be noted that the community overwhelmingly supports the EPAC and its permanence: the survey showed that around 85% of respondents agreed with passage of the resolution.

As this is a five-to-ten-year action plan, the City will track progress towards its aspirations and goals through biannual GHG inventory updates. The internal municipal Sustainability Committee will kick off several projects beginning in 2023, based on an internal ranking and the surveys conducted by Lotus. Results of this work will be shared with the community via a broad education and outreach campaign following the guidance provided in Appendix D. Finally, the City will reassess its ongoing sustainability work and determine the next steps necessary to achieving the community's vision of a healthy and sustainable Commerce City in ten years by developing an update to this Plan.

Appendix A. Actions Matrix Timeline Order

Education & Outreach Strategies

- Promote and publicize the City's climate and sustainability work through ongoing educational campaigns targeted towards various audiences, with a focus on connecting residents to the City's participatory opportunities. (EO 1-3)
- Develop a culture of sustainability in local businesses and community organizations. (EO 4-11)
- Create a City-wide brand and campaign for sustainability and partner with community entities to engage, educate, and empower the community to support a sustainable future. (EO 12-18)

Actions	Timeline*	Cost**
EO 1. Develop accessible, multi-lingual educational campaigns through a dedicated public outreach program targeted towards the community to disseminate information on City sustainability actions and goals and ways for community to participate and provide feedback. Publicize information and public feedback opportunities through multi-media channels, including the City newspaper.	Short	$
EO 2. Create and publicize new web pages on the City website to publicize sustainability goals and other information, including important opportunities for residents to help the City achieve sustainability goals.	Short	$
EO 3. Develop a stronger feedback mechanism to improve the flow of information on City sustainability actions and goals and community experiences and knowledge on the ground between City leadership, staff, and council and their districts. Supplement with sustainability-focused workshops and other community engagement activities for residents and City staff and leadership to increase collaboration and information-sharing.	Short	$
EO 4. Develop and promote a sustainability business program.	Short	$
EO 5. Support local workforce development programs for the green transition (e.g., mechanics for EVs, HVAC, etc.). Partner with Adams 12 school district, community colleges, and businesses.	Short	$
EO 16. Implement programs and hiring practices aimed at diversifying City staff and leadership.	Short	$

**Implementation timeline is defined as: Short (next 1-2 years); Medium (next 3-5 years); and long (next 6-10 years).*

***Estimated costs are defined as: $ (<$50,000 annually), $$ ($50,000-$100,000 annually), $$$ (>$100,000 annually).*

Education & Outreach Continued

Actions	Timeline*	Cost**
EO 6. Develop a public education and awareness campaign to encourage small businesses, community organizations, and institutions such as schools to purchase green products, i.e., restaurant takeout containers, and transition away from purchases of single-use plastic products. Work with community members to advocate for strong State-level regulation of single-use plastics and incentives for green products.	Medium	$
EO 7. Create programs to support local businesses in their emissions reduction and sustainability work.	Medium	$
EO 13. Create a City-sponsored public education campaign on recycling, composting, and the energy transition, including the differences between electric and traditional combustion engine vehicles, for residents.	Medium	$
EO 14. Develop educational programs that recognize the history of Commerce City.	Medium	$
EO 8. Promote green networking programs.	Long	$
EO 9. Explore options for City incentive programs aimed at attracting new clean and efficiency industries, including building retrofits, etc.	Long	$
EO 10. Host sustainability brown bags for residents and businesses.	Long	$
EO 11. Participate in and disseminate results from NREL programs.	Long	$
EO 12. Publicize on City websites and outreach materials the benefits and importance of native species, urban forest canopy, and biodiversity and develop workshops to promote native landscaping and tree planting.	Long	$
EO 15. Collaborate with HOAs and community organizations to encourage residents to participate in sustainable home practices such as employing clotheslines instead of energy-intensive dryers.	Long	$
EO 17. Develop a roadmap to removing and preventing pollution created by industrial facilities such as the Suncor facility, including options to revoke the permits to operate.	Long	$
EO 18. Partner with other local cities and communities on their sustainability programs.	Long	$

**Implementation timeline is defined as: Short (next 1-2 years); Medium (next 3-5 years); and long (next 6-10 years).*

***Estimated costs are defined as: $ (<$50,000 annually), $$ ($50,000-$100,000 annually), $$$ (>$100,000 annually).*

Appendix A. Actions Matrix Timeline Order

Energy Efficiency Strategies

- Promote energy efficiency for residential and commercial buildings. (EE 1-8)
- Promote fuel switching (i.e. electrification) through incentive programs and public campaigns/initiatives. (EE 9-11)
- Adopt policies, programs, and design guidelines for resilient, healthy, energy efficient buildings and community infrastructure to enhance quality of life, reduce costs, and complement the natural environment. (EE 12-20)
- Lead by example through the operation and maintenance of City facilities. (EE 21-24)

Actions	Timeline*	Cost**
EE 2. Adopt and enforce the most recent International Energy Conservation Code (IECC) within one year of it being released with options for strengthening amendments.	Short	$ - $$
EE 4. Develop and implement code language to require inclusion of energy efficient appliance packages in new homes and new multi-family housing developments. Supplement with programs that help low-income families and affordable housing purchase packages and incentivize retrofits in rental and multi-family units to ensure core city residents can benefitC	Short	$ - $$
EE 11. Educate and offer incentives for businesses to replace combustion fuel appliances with electric ones.	Short	$ - $$
EE 14. Develop program to disburse air purifiers and filters to low-income, impacted households within a certain radius around Suncor refinery (or other metric to be determined) and communities where AQ metrics exceed federal NAAQS standards.	Short	$$
EE 22. Publish International Green Construction Code checklist.	Short	$$$
EE 3. Develop and implement code language to require installation of solar panels and electrification in new large multi-family housing developments.	Medium	$ - $$
EE 9. Educate and offer incentives for residences to replace combustion fuel appliances with electric ones, with a focus on low-income communities.	Medium	$ - $$
EE 12. Require landlords to disclose energy efficiency, water efficiency and quality, and land issues (e.g., proximity to Suncor or major polluters) to potential tenants.	Medium	$$

**Implementation timeline is defined as: Short (next 1-2 years); Medium (next 3-5 years); and long (next 6-10 years).*

***Estimated costs are defined as: $ (<$50,000 annually), $$ ($50,000-$100,000 annually), $$$ (>$100,000 annually).*

Energy Efficiency Continued

Actions	Timeline*	Cost**
EE 13. Work with landlords to encourage applying for energy efficiency programs to improve efficiency in their rental units. Develop transition plan to ultimately require certain energy efficiency standards in all rental units.	Medium	$$
EE 18. Adopt code language to require a to-be-determined improvement in whole home air tightness by 2025, including requirements for more airtight air ducts.	Medium	$$
EE 1. Expand residential energy efficiency and retrofit programs, particularly those targeted towards low-income communities and landlords to prevent displacement due to costs of beneficial electrification transition. Supplement these programs with additional outreach and education.	Long	$ - $$
EE 5. Develop and implement code language that steps up the requirement for high efficiency lighting from 75% to 100%.	Long	$ - $$
EE 6. Develop and implement code language that regulates exterior lighting power for residential buildings like dorms, boarding houses, care facilities, and congregate living facilities.	Long	$ - $$
EE 7. Require or incentivize building energy benchmarking for large multi-family housing developments and commercial/ industrial buildings. Develop programs to help make benchmarking available to affordable housing and low-income communities. Could begin with the municipal benchmarking and setting targets for specific City facilities.	Long	$ - $$
EE 8. Continue to provide energy efficiency outreach and incentives for all energy users. Encourage energy efficiency through programs (such as current information and rebate and incentive support from local energy utility companies, Department of Energy, and the EPA) that encourage and/or reward citizens to use energy-efficient appliances, insulation, windows, etc. Help citizens become aware of costs and cost-savings in electrification and efficiency.	Long	$ - $$
EE 10. Develop and implement code language to restrict natural gas use in new construction.	Long	$ - $$
EE 15. Require the EJ and HERS scores on every property for sale and rent.	Long	$ - $$

**Implementation timeline is defined as: Short (next 1-2 years); Medium (next 3-5 years); and long (next 6-10 years).*

***Estimated costs are defined as: $ (<$50,000 annually), $$ ($50,000-$100,000 annually), $$$ (>$100,000 annually).*

Energy Efficiency Continued

Actions	Timeline*	Cost**
EE 16. Advocate for changes to federal weatherization programs to support/fund projects for cooling in Commerce City.	Long	$$
EE 17. Add prescriptive building envelope requirements to building codes, including a blower door test and visual inspection of the air barrier, air sealing, and insulation installation in a home. Develop programs that help low-income households and small contractors in meeting new requirements.	Long	$$
EE 19. Implement Modified Energy Rating Index rating values based on the 2018 IECC.	Long	$$
EE 20. Develop and publicize a voluntary zero energy appendix that provides the design and construction industry with a code-based method of designing and constructing zero energy buildings.	Long	$$
EE 21. Incorporate Energy Star, Enterprise Green Communications, International Living Future, Well Building, Passive House into building codes.	Long	$$$
EE 23. Develop energy intensity baseline in Kbtu per square feet for City building and facilities.	Long	$$$
EE 24. Benchmark City facility performance, publish the results, develop and implement improvement plans for the facilities, and share the results via case studies with the community.	Long	$$$

**Implementation timeline is defined as: Short (next 1-2 years); Medium (next 3-5 years); and long (next 6-10 years).*

***Estimated costs are defined as: $ (<$50,000 annually), $$ ($50,000-$100,000 annually), $$$ (>$100,000 annually).*

Appendix A. Actions Matrix Timeline Order

Renewable Energy Strategies

- Implement policies that support comprehensive renewable energy growth for the community. (RE 1-4)
- Support State-level policies to advance a clean energy agenda. (RE 5)
- Establish a resilient, equitable, and reliable energy future powered by low-carbon and renewable energy. (RE 6-8)
- Reduce impacts from oil and gas throughout the community. (RE 9)

Actions	Timeline*	Cost**
RE 1. Develop municipally-supported renewable energy projects and programs that benefit the whole community, including working with Xcel and UP to explore programmatic options for rooftop community solar gardens, brownfield redevelopment into solar gardens, and rooftop solar on warehouses.	Short	$$ - $$$
RE 5. Advocate at the State-level for aggressive renewable energy standards, a Clean Energy Agenda, and improved incentives for energy efficient appliance purchases.	Short	$
RE 9. Develop regulations that require any new oil and gas development be emissions neutral and implement reverse setbacks for abandoned and plugged wells. Work with State partners to incorporate requirements for more stringent AQ standards and monitoring programs into oil and gas permits to alleviate associated health burdens along with compensation for impacted communities.	Short	$
RE 2. Increase on-site renewable energy installations at municipal buildings and use of renewable energy for municipal operations. Supplement with investment in hiring and/or training Public Works staff to maintain PV installations.	Medium	$$ - $$$
RE 3. Develop programs to market and incentivize solar (e.g., bulk purchase programs, rebates for residents and businesses etc.), including partnership opportunities for solar installations and renewable subscriptions. Work with utilities to improve incentive programs and opportunities that make electrification affordable and accessible.	Medium	$$ - $$$
RE 4. Develop an energy transition plan with Xcel Energy and UP to increase share of renewables in the C3 energy mix every year by 10%.	Medium	$$ - $$$

**Implementation timeline is defined as: Short (next 1-2 years); Medium (next 3-5 years); and long (next 6-10 years).*

***Estimated costs are defined as: $ (<$50,000 annually), $$ ($50,000-$100,000 annually), $$$ (>$100,000 annually).*

Renewable Energy Continued

Actions	Timeline*	Cost**
RE 6. Explore opportunities for resilient energy systems including the development of a city-wide microgrid.	Long	$$$
RE 7. Build regional renewable energy partnerships, particularly in collaboration with communities that are further along on microgrids and renewables.	Long	$$$
RE 8. Continue collaboration with Energy Outreach Colorado and the Diversity, Equity, and Inclusion Board to prioritize reducing energy burden and expand energy services for low-income households.	Long	$$$

**Implementation timeline is defined as: Short (next 1-2 years); Medium (next 3-5 years); and long (next 6-10 years).*

***Estimated costs are defined as: $ (<$50,000 annually), $$ ($50,000-$100,000 annually), $$$ (>$100,000 annually).*

Appendix A. Actions Matrix Timeline Order

Adaptation and Mitigation Strategies

- Encourage public engagement with climate and sustainability work at the State level. (AM 1-3)
- Foster a culture of public participation in an equitable, just climate transition. (AM 4-7)

Actions	Timeline*	Cost**
AM 2. Participate in the regulatory and legislative process at the State level on sustainability initiatives and bills.	Short	$
AM 4. Establish a permanent EPAC. Reach out to employees at NREL for help getting stats and information, and a possible letter of support for a permanent EPAC. Provide community education and workshops regarding GHGs, EJ, AQ, and other community health issues.	Short	$
AM 6. Work with City leadership to declare a climate crisis to create momentum behind sustainability actions, raise awareness to the climate problem, and potentially open up emergency funds to support programs that protect residents from environmental pollution and other harms. Partner with other local cities and communities on their sustainability programs.	Short	$
AM 1. Publicize information on recent sustainability-related bills (e.g. 1244, 180, 1189, 1265) & ways to advocate for change.	Medium	$
AM 5. Encourage City staff and leadership attendance at EJ seminars hosted by City staff and partners and make these trainings publicly accessible to the local community.	Medium	$
AM 3. Encourage and support school district applications for State grants to submit to State agency evaluations and implement sustainability measures in public schools.	Long	$
AM 7. Collaborate with CDPHE, community residents, and local industry in order to build resilient spaces in the City that reduce the health impacts associated with air pollution and mitigate the negative impacts caused by climate change. Resilient design can limit risks associated with a shifting climate, so incorporating resilient solutions into future planning and policy could help to address present AQ issues and mitigate against future potential harms.	Long	$

**Implementation timeline is defined as: Short (next 1-2 years); Medium (next 3-5 years); and long (next 6-10 years).*
***Estimated costs are defined as: $ (<$50,000 annually), $$ ($50,000-$100,000 annually), $$$ (>$100,000 annually).*

Appendix A. Actions Matrix Timeline Order

Recycling and Waste Diversion Strategies

- Implement policies and ordinances to purchase sustainable products, reduce solid waste, and increase waste diversion community-wide. (WD 1-6)
- Foster a zero-waste culture at C3 through zero-waste events and operations, education, and programs that reduce trash-related pollution and expand access to recycling and composting. (WD 7-12)
- Improve waste diversion infrastructure in C3 to support low carbon transition and pollution reduction goals. (WD 13-17)

Actions	Timeline*	Cost**
WD 1. Update the City's waste management contract to implement policies aligned with Save-As-You-Recycle, which is aimed at increasing waste diversion and reducing consumption by ensuring all households have free access to recycling and waste disposal costs increase in proportion to the amount of waste disposed.	Short	$ - $$
WD 2. Develop an ordinance requiring large multi-family and commercial property owners to provide recycling and compost collection services.	Short	$ - $$
WD 7. Work with community partners to ensure curbside composting and recycling services are publicly available within the community and support free community-led compost facilities, particularly in low-income, highly impacted communities. This may come in the form of providing at-home recycling and composting kits.	Short	$$
WD 9. Develop and publicize recycling and composting education campaigns aimed at residents to reduce contamination of recycle and compost streams, i.e. reducing lithium batteries in recycle and promoting rechargeable batteries.	Short	$$
WD 8. Work with school districts to implement waste diversion and reduction strategies such as eliminating disposable food trays. Develop curriculum to educate elementary and middle school students on recycling and composting.	Medium	$$
WD 10. Develop and implement a plan to eliminate air pollution from the landfill.	Medium	$$
WD 11. Develop a waste diversion plan with metrics to measure composting rates and implement plan to reach a 20% citywide increase in composting. Work with the community to promote and provide free self-contained composting containers.	Medium	$$
WD 12. Provide small local businesses and community groups/members grants or incentives to develop waste reduction or diversion strategies and expand community recycling and composting infrastructure.	Medium	$$

**Implementation timeline is defined as: Short (next 1-2 years); Medium (next 3-5 years); and long (next 6-10 years).*

***Estimated costs are defined as: $ (<$50,000 annually), $$ ($50,000-$100,000 annually), $$$ (>$100,000 annually).*

Appendix A. Actions Matrix Timeline Order

Recycling and Waste Diversion Continued

Actions	Timeline*	Cost**
WD 3. Develop and implement an extra fee associated with purchases and use of Styrofoam products that avoids increasing costs to end consumers. Work with State partners and advocate for State policies that regulate plastic bags, Styrofoam, commercial recycling, etc.	Long	$ - $$
WD 4. Develop policies to limit the use of plastic bags community-wide.	Long	$ - $$
WD 5. Develop ordinances to mandate recycling in businesses such as restaurants and grocery stores.	Long	$ - $$
WD 6. Develop waste reduction targets and collect data on key diversion and reduction metrics to measure success of waste generation and diversion programs and policies.	Long	$ - $$
WD 13. Adopt and enforce a C&D waste recycling ordinance. Consider requirements for using recycled concrete in all new projects.	Long	$$
WD 14. Invest in solar-powered Big Bellies and Slim Jim's.	Long	$$
WD 15. Set cardboard recycling ordinances.	Long	$$
WD 16. Work with waste management partners to develop infrastructure for organics disposal and implement waste diversion plan to reduce organics from landfill.	Long	$$
WD 17. Work with waste management partners to develop infrastructure for recycling of concrete and appliances, to support transition to high efficiency and electric appliances.	Long	$$

**Implementation timeline is defined as: Short (next 1-2 years); Medium (next 3-5 years); and long (next 6-10 years).*

***Estimated costs are defined as: $ (<$50,000 annually), $$ ($50,000-$100,000 annually), $$$ (>$100,000 annually).*

Appendix A. Actions Matrix Timeline Order

Water Strategies

- Develop policies and programs that will help residents and businesses conserve water. (W 1-6)
- Promote water quality and community trust in water quality. (W 7-11)

Actions	Timeline*	Cost**
W 1. Work with SACWSD to develop program to help convert "street yards" into native plant gardens and sprinklers for "street yards" into drip lines for street trees.	Short	$
W 6. Work with HOAs and SACWSD to reduce residential lawn area, encourage rock and water-efficient landscaping, and install water conservation projects. This may include development of a rebate program on stormwater fees, new landscape standards, etc.	Short	$
W 8. Work with SACWSD to develop an educational campaign on PFAS risks, regulations, and current/evolving state of PFAS in the local water system. Identify partnerships to support the distribution of PFAS tests in the community.	Short	$$
W 9. Work with SACWSD to identify key threats to WQ in C3 and exceedances of any federal WQ standards, and provide home water filtration systems to all households that exceed standards.	Short	$$
W 2. Mandate that cool weather turf be restricted to 40% of backyards, or 500 square feet, whichever is smaller for new residential and commercial sites.	Medium	$
W 4. Develop programs to incentivize the use of greywater systems.	Medium	$
W 5. Work with SACWSD to develop stricter regulations on golf course siting and water consumption, including requirements for no-mow areas and water reuse and low-water use landscape standards.	Medium	$
W 7. Provide opportunities to learn more about local water systems (i.e. tours at SACWSD).	Medium	$$
W 3. Work with SACWSD to provide incentives to existing residential and commercial sites to remove front yard lawns, then to xeriscape and/or replant with native species.	Long	$
W 10. Encourage use of nature-based stormwater filtration systems in new developments and infill/redevelopments.	Long	$$
W 11. Pilot at least one greywater system installation in a publicly accessible City facility to ensure visibility.	Long	$$

**Implementation timeline is defined as: Short (next 1-2 years); Medium (next 3-5 years); and long (next 6-10 years).*

***Estimated costs are defined as: $ (<$50,000 annually), $$ ($50,000-$100,000 annually), $$$ (>$100,000 annually).*

Transportation Strategies

- Increase the proportion of EVs in the city's fleet and in the community. Increase the number of light duty and medium duty EVs in the city fleet. (T 1)
- Promote and educate residents on EVs and their related support network such as charging infrastructure. (T 2-4)
- Prioritize multi-modal transportation options in an effort to broaden access to the places where people recreate, work, and live. Expand safe and convenient public transit, walking, and bicycling routes, including last-minute and last-leg transportation connections. Focus on improving and investing in transportation infrastructure, especially repairs and access to public transit and local and regional activity centers (such as shopping, jobs, and recreation). (T 5-15)
- Support and promote equitable EV adoption. (T 16-19)
- Reduce idling and air pollution from traffic by promoting anti-idling policies and educating the public on behavior changes that will support air pollution reduction goals. (T 20-23)

Actions	Timeline*	Cost**
T 8. Improve road and traffic safety by repairing residential streets, filling in cracks and potholes, adding signage to slow drivers down, and piloting traffic-calming measures.	Short	$$$
T 10. Work with CDOT and property owners near schools and in key commercial districts to widen sidewalks, improve street lighting, and add crossing paths at key intersections to improve pedestrian safety and encourage students to walk to schools and residents to walk and socialize. Develop code amendments to require wider sidewalks in new construction projects.	Short	$$$
T 11. Apply for Safe Routes to School Grant from CDOT (open Aug. 9-Nov. 4).	Short	$$$
T 21. Develop an anti-idling resolution and work with the Adams 12 School District and private schools to establish and enforce no-idle zones around schools.	Short	$

**Implementation timeline is defined as: Short (next 1-2 years); Medium (next 3-5 years); and long (next 6-10 years).*

***Estimated costs are defined as: $ (<$50,000 annually), $$ ($50,000-$100,000 annually), $$$ (>$100,000 annually).*

Appendix A. Actions Matrix Timeline Order

Transportation Continued

Actions	Timeline*	Cost**
T 2. Host a public forum on EVs, covering education on vehicle performance, financing, network charging, tax credits, models, test drives, etc.	Medium	$
T 4. Create and implement educational and awareness campaigns that promote EV adoption.	Medium	$
T 7. Develop and implement a city-wide multi-modal transportation plan that promotes transit oriented development and multimodal connectivity and focuses on moving people efficiently and equitably. Focus infrastructure improvements and investments on reaching under-resourced communities. Engage public transit users where they are in order to solicit input in the plan.	Medium	$$$
T 12. Improve bus and light rail stop infrastructure, including by adding shelters to bus stops.	Medium	$$$
T 18. Develop and implement electric vehicle charging infrastructure installation community-wide, including introducing requirements for new gas station developments to incorporate EV charging.	Medium	$
T 1. Develop a roadmap for transportation electrification in the community that includes City fleet electrification, connecting renewable energy supplies to charging infrastructure where feasible, education and awareness campaigns around EV adoption, and equity considerations for EV costs.	Long	$$
T 3. Improve public EV charging signage and options, larger signs, campaigns for education and awareness.	Long	$
T 5. Explore options to reduce costs of public transportation for under-resourced populations and establish dedicated funding sources for expanding public transit and park-and-rides.	Long	$$$
T 6. Promote existing, and explore additional, alternative transportation options, including the N Line, shuttle service, bicycling, shared micro-mobility, and rideshare options.	Long	$$$
T 9. Expand bicycle lane networks and add bicycle racks, lane barriers and restripe lane lines to increase visibility and protect bicyclists from motor vehicle traffic, including the large quantity of freight trucks.	Long	$$$
T 13. Meet with RTD and CDOT to analyze and develop improvement plans for public routes and accessibility in C3.	Long	$$$
T 14. Sponsor limited, longer range bus routes as an alternative to driving through and around C3.	Long	$$$

**Implementation timeline is defined as: Short (next 1-2 years); Medium (next 3-5 years); and long (next 6-10 years).*

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Transportation Continued

Actions	Timeline*	Cost**
T 15. Develop strategy and action plan to increase City walk score.	Long	$$$
T 16. Work with utilities to develop and communicate incentive programs to encourage private citizens to charge electric vehicles during energy off-peak hours (i.e. early mornings or late evenings).	Long	$
T 17. Develop a rebate program for e-bicycles and pilot a bike and scooter share program.	Long	$
T 19. Pilot bike and scooter share programs.	Long	$
T 20. Lead public campaigns, particularly around schools and with fleet companies, to discourage idling and convert fleet to EV, highlighting public health benefits of no-idle zones. Post information about anti-idling at local schools and signs throughout the community.	Long	$
T 22. Install intelligent traffic signals to reduce wait times for vehicles during off-peak hours.	Long	$
T 23. Explore train schedules to reduce wait times at crossings.	Long	$

**Implementation timeline is defined as: Short (next 1-2 years); Medium (next 3-5 years); and long (next 6-10 years).*

***Estimated costs are defined as: $ (<$50,000 annually), $$ ($50,000-$100,000 annually), $$$ (>$100,000 annually).*

Appendix A. Actions Matrix Timeline Order

Community Health Strategies

- Research characteristics of healthy communities and three most important healthcare concerns in Commerce City. (CH 1-2)
- Track the increase in extreme heat days forecasted by NOAA and prepare by ensuring community members know about City cooling centers. (CH 3-4)
- Support health clinics that provide basic, necessary preventive care. (CH 5)
- Proactively manage air pollution concerns that harm public health and increase transparency around local air quality data. (CH 6-10)
- Develop a program for travel offsets. (CH 11)

Actions	Timeline*	Cost**
CH 1. Identify key metrics for monitoring that capture social, safety, and access barriers to obtaining mental and physical healthcare.	Short	$
CH 3. On extreme heat days, waive fees at Eagle Point and Bison Ridge for all community members to provide a cooling space.	Short	$
CH 9. Make accessible and publicize local air quality information and data and work with community partners to disseminate actionable information.	Short	$
CH 10. Conduct an epidemiological study in partnership with CO School of Public Health to look at biomarkers and the impacts of pollution in C3.	Short	$
CH 11. Work with regional partners, including Denver Airport, on a carbon offset program that could be used for community projects such as tree plantings or protected bike lanes to improve local air quality.	Short	$$

**Implementation timeline is defined as: Short (next 1-2 years); Medium (next 3-5 years); and long (next 6-10 years).*

***Estimated costs are defined as: $ (<$50,000 annually), $$ ($50,000-$100,000 annually), $$$ (>$100,000 annually).*

Community Health Continued

Actions	Timeline*	Cost**
CH 2. Work with community health partners to develop programs that increase access to mental and physical healthcare for people struggling with mental health and substance addictions.	Medium	$
CH 4. Publicize to residents that they should seek shelter at cooling centers such as recreation centers and bowling alleys.	Medium	$
CH 5. Increase permits for physicians offices to reduce burden on health clinics and hospitals.	Medium	$
CH 6. On severe air quality days for ozone, request that Suncor does not undertake maintenance.	Medium	$
CH 7. Develop a prohibition that phases out the use of new gas-powered lawn equipment by 2025 to reduce emissions of volatile organic compounds and nitrous oxides. Work with big box retailers to develop incentives or discounts for e-mowers.	Long	$
CH 8. Ensure air monitoring and alert systems put greater emphasis on chronic, rather than acute, health impacts from air pollution. Current refinery notifications from Suncor focus on day-to-day impacts, while residents show great concern for chronic impacts that accumulate over time.	Long	$

**Implementation timeline is defined as: Short (next 1-2 years); Medium (next 3-5 years); and long (next 6-10 years).*

***Estimated costs are defined as: $ (<$50,000 annually), $$ ($50,000-$100,000 annually), $$$ (>$100,000 annually).*

Appendix A. Actions Matrix Timeline Order

Biodiversity, Tree Canopy, and Food Strategies

- Protect and expand City green space and increase tree canopy coverage to 20%. (B 1-3)
- Increase biodiversity, local food production, and community gardens. (B 4-13)
- Implement activities to improve and enhance land and water restoration. (B 14-23)

Actions	Timeline*	Cost**
B 4. Work with community partners to explore and develop programs and campaigns that expand access to locally grown produce and community gardens for low-income, highly impacted communities. These may include encouraging urban agriculture to new developments and infill projects.	Short	$$ - $$$
B 9. Keep agricultural zoning to ensure green spaces are maintained.	Short	$$ - $$$
B 10. Work with City facilities and parks departments to identify feasible locations around the City, particularly City lands, for planting self-sustaining fruit trees and bushes to produce food, increase aesthetics, help with erosion and biodiversity, etc. Work with Parks department to develop maintenance plans for fruit trees and recruit volunteers to support. Map fruit trees around the community.	Short	$$ - $$$
B 11. Work with City Parks staff to identify target City trees for replacement with native species and develop a tree planting grant program for replacing aging or diseased non-native trees with City-approved native species on residential properties and planting native drought-tolerant, fire-resistant trees. Explore business and industry partnerships to sponsor grants or donate trees.	Short	$$ - $$$
B 18. Work with business and industry partners to develop landscaping standards that modify landscaping on municipal and commercial property near areas with air quality pollutant levels that exceed to-be-determined thresholds in an effort to capture those pollutants through nature-based solutions and increase resilient green spaces.	Short	$$
B 2. Develop and implement a plan to increase urban forest canopy to at least 20% across the entire City, particularly in low-income neighborhoods.	Medium	$$ - $$$
B 5. Develop programs and campaigns to encourage pollinator habitats and foster ladybug habitats.	Medium	$$ - $$$

**Implementation timeline is defined as: Short (next 1-2 years); Medium (next 3-5 years); and long (next 6-10 years).*

***Estimated costs are defined as: $ (<$50,000 annually), $$ ($50,000-$100,000 annually), $$$ (>$100,000 annually).*

Biodiversity, Tree Canopy, and Food Continued

Actions	Timeline*	Cost**
B 8. Develop programs and incentives to encourage conversion of vacant lots and community spaces to community gardens and of "street yards" to native wildflower and plant gardens. Work with HOAs, more specifically the Reunion Metro District, nonprofits, and landowners to implement and publicize programs.	Medium	$$ - $$$
B 12. Develop an incentive program for and work with residential neighborhoods and neighborhood associations to install permaculture landscaping within communities.	Medium	$$ - $$$
B 16. Fund research to analyze impact of fungal species that can remediate pollution.	Medium	$$
B 1. Expand and maintain publicly managed street trees, and tree planting and tree scale programs. Explore development of an incentive program to plant two trees for every removed tree. Develop City goals and policies to drive strategic purchases of land that add to existing green spaces and do not increase maintenance burdens on parks staff.	Long	$$ - $$$
B 3. Work with Denver International Airport to implement a program planting a new tree for every new flight added.	Long	$$ - $$$
B 6. Develop a program and/or campaign to help residents donate trees to one another.	Long	$$ - $$$
B 7. Adopt and encourage the "No Lawn" movement and remove grass on City properties to lead by example.	Long	$$ - $$$
B 13. Develop incentive & edu. programs to encourage use of natural weed killers & pesticides on residential properties.	Long	$$ - $$$
B 14. Conduct an infill inventory to identify optimal opportunities for both development and green space.	Long	$$
B 15. Implement City buy back program to purchase and restore polluted Superfund and brownfield sites and repurpose them for appropriate and safe uses, including community gardens.	Long	$$
B 17. Encourage xeriscape projects on City owned properties and promote xeriscaping with developers.	Long	$$
B 19. Launch community campaign to remove invasive species.	Long	$$
B 20. Amend ordinance to require mulching/composting to enrich soil.	Long	$$
B 21. Using the precautionary principle, pass ordinance banning glyphosates (and neonicotinoids) near any sole source drinking water aquifers.	Long	$$
B 22. Promote the use of less toxic chemicals throughout the community.	Long	$$
B 23. Work with Facilities & Parks depts. to develop a soil health monitoring prgm. to sample soils around the City.	Long	$$

**Implementation timeline is defined as: Short (next 1-2 years); Medium (next 3-5 years); and long (next 6-10 years).*

***Estimated costs are defined as: $ (<$50,000 annually), $$ ($50,000-$100,000 annually), $$$ (>$100,000 annually).*

Appendix B. AQ and WQ Technical Documents

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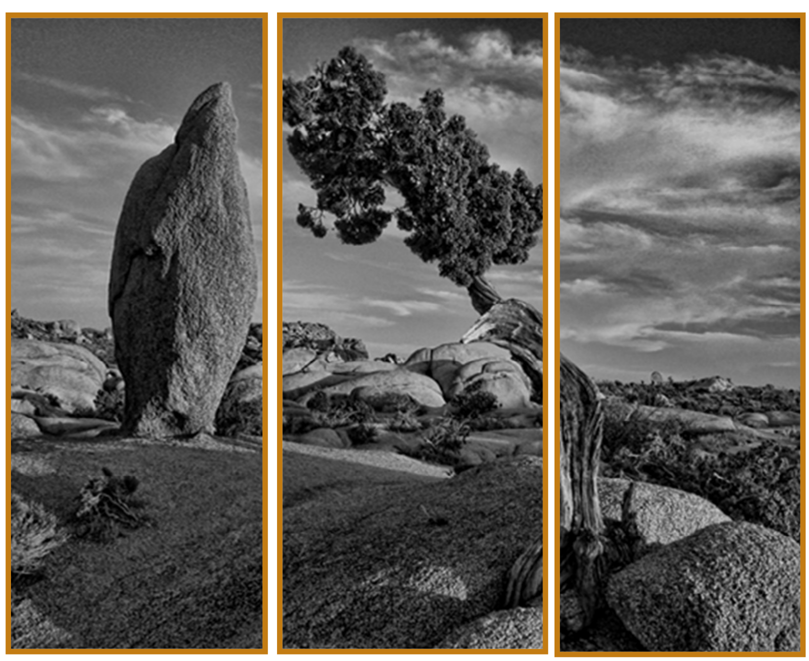
October 1, 2021

Commerce City Community-Wide Impacts Report

City of Commerce City
7887 East 60th Avenue
Commerce City, Colorado

Prepared for:
City of Commerce City
7887 East 60th Avenue
Commerce City, CO 80022

Pinyon Project No.:
1/21-1435-01



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Prepared by:

Anthony Der Tatevasion

Anthony Der Tatevasion
Air Quality Specialist

Reviewed by:

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Revision History

Version	Editor	Date	Discussion
0	Pinyon Environmental, Inc.	July 9, 2021	First Version
1	Pinyon Environmental, Inc.	October 1, 2021	Updated report to incorporate review comments made by Domenic Martinelli of Commerce City.

Revision History

Version	Editor	Date	Discussion
0	Pinyon Environmental, Inc.	July 9, 2021	First Version
1	Pinyon Environmental, Inc.	October 1, 2021	Updated report to incorporate review comments made by Domenic Martinelli of Commerce City.

Executive Summary

Pinyon Environmental, Inc. (Pinyon) prepared this community-wide impacts report for the City of Commerce City (Commerce City). This report provides a comprehensive summary involving air pollutant data collected in and within a ½ mile radius of Commerce City. Data were acquired from active air permits issued by the Colorado Department of Public Health (CDPHE) Air Pollution Control Division (APCD), in addition to oil and gas wells in operation reported by the Colorado Oil and Gas Conservation Commission (COGCC). The purpose of this report, including associated tables, figures, and online Story Map (see Section 12), is to provide air pollutant source data to Commerce City personnel and to inform the public on types, amounts, and locations of air pollutant sources.

Pinyon acquired air pollutant source data, including but not limited to the following CDPHE-classified source types:

- petroleum refining and related industries,
- food and kindred products,
- electric gas and sanitary services (e.g., landfills and sewage systems),
- oil and gas extraction and related services (e.g., terminals and storage facilities), and
- other industrial services (e.g., manufacturing plants, gas stations, auto repair shops, emergency power generation, etc.).

Pinyon created tables, figures, and an online story map organizing the data from active air permits on file with APCD. Facility locations where there is the potential to emit a specific pollutant can be found in Figures 2 through 8. Appendices A through G provide the same emissions data in a tabulated format for the following air pollutants:

- Nitrogen Oxides (NO_x) – criteria pollutant
- Carbon Monoxide (CO) – criteria pollutant
- Volatile Organic Compounds (VOCs) – regulated pollutant
- Sulfur Dioxide (SO_2) – criteria pollutant
- Particulate Matter less than 10 micrometers in diameter (PM_{10}) – criteria pollutant
- Particulate Matter less than 2.5 micrometers in diameter ($PM_{2.5}$) – criteria pollutant
- Total Hazardous Air Pollutants (HAPs) – toxic air pollutants

1. Introduction

Pinyon prepared this community-wide impacts report for Commerce City. The report includes a summary of sources emitting pollutants in and within a ½ mile radius around Commerce City (Figure 1) to inform the public of pollutants recognized by the U.S. Environmental Protection Agency (U.S. EPA). The eight (8) air pollutants discussed and analyzed in this report include Nitrogen Oxides (NO_x), Carbon Monoxide (CO), Volatile Organic Compounds (VOCs), Sulfur Dioxide (SO_2), Particulate Matter less than 10 micrometers in diameter (PM_{10}), Particulate Matter less than 2.5 micrometers in diameter ($PM_{2.5}$), and Total Hazardous Air Pollutants (HAPs).

Pinyon compiled emission source data in and within a ½ mile radius around Commerce City from current air permit information maintained by APCD and existing oil and gas wells in operation reported by COGCC. Pinyon did not evaluate mobile and non-road, and on-road sources of pollution such as vehicle exhaust, tractor-trailers, lawnmowers, wood-burning fires, etc., as these are not stationary sources that require any sort of documentation of emissions. For additional information on mobile source pollution and related health effects, you can visit the following link: https://www.epa.gov/mobile-source-pollution. Information on CDPHE APCD air permit requirements can be found in Section 1.3 of this report.

A complete list of the specific facilities for which there are estimated actual annual emissions from the listed air pollutants discussed in this report is further analyzed in Section 2, and the pollutant-specific tables are included as appendices. Pinyon's approach to gathering data presented in this report involved the following:

1. Extracting numerical data, information, and air pollutant emissions by source type from sources of emissions reported and issued air permits by APCD.
2. Verification of the operational status of oil and gas wells per current well information reported by COGCC.
3. Transcription of data into a master table for each pollutant type; recording source names, source descriptions, source locations, and total estimated actual annual emissions in tons per year (tons/yr) by the facility.
4. Facility locations of collected emissions data were georeferenced, and maps were created for the graphic presentation of emissions data.

1.1 Study Area

Commerce City is a municipality located north of Denver within Adams County and comprises, amongst other things, houses, parks, industrial businesses, and highways. Industries of note in the area include petroleum refineries, oil and gas well production facilities, landfills, and electricity-generating plants, among others. As of 2021, Commerce City has an estimated population of 64,612 people (Commerce City Community Development Department, 2021).

Notable emitters of air pollution in and within a ½ mile radius around Commerce City include but are not limited to:

- Suncor Energy – Denver Petroleum Refinery
- Public Service Co. – Cherokee Electrical Generation Plant

- Allied Waste Systems – Tower Landfill
- Ardent Mills – Commerce City Flour Mill
- Oil and Gas – Well Production Facilities

1.2 Source Types

One hundred fifty-four (154) unique sources of air pollution have been collected and analyzed within the study area. This community-wide impacts report is divided into the following source categories: petroleum refining and related industries, electric and sanitary services, oil and gas extraction, food and kindred products, and other industrial manufacturing services. Source classification for each source of emissions represented in this report was chosen by the owner/operator using the North American Industry Classification System (NAICS) and confirmed by APCD before permitting issuance. Pinyon chose the following source classification breakdown to highlight the variety of industries present within the study area and does not necessarily indicate that emissions originating from one source or industry have a more significant impact on public health than another.

Sources of air pollution in and within a ½ mile radius around Commerce City were separated into the following overarching source types and included but is not limited to:

- <u>Petroleum Refining and Related Industries:</u> refining, blending of lubricants and glycol, recycle plants, asphalt batch plants, asphalt paving, liquid asphalt blending, storage, and distribution, and hot mix asphalt plants
- <u>Electric Gas and Sanitary Services</u>: power generation plants, sewage systems, landfills, and water supply
- <u>Oil and Gas Extraction and Related Services:</u> well production facilities, petroleum products storage, distribution pipelines, and operation of vapor control equipment
- <u>Food and Kindred Products:</u> animal feed manufacturing facilities, flour mills, bread and bun bakeries, milk plants, and the operation of grain elevators
- <u>Other Industrial Sources:</u> bakeries, concrete manufacturing plants, retail gas stations, convenience stores, industrial laundry facilities, cremation facilities, millwork operations, corrugated paper products manufacturing, waste management facilities, government facilities, auto body repair shops, etc.

1.3 Air Permit Thresholds

CDPHE Regulation 3 outlines the applicability and requirements for stationary source permits and Air Pollution Emission Notice (APEN). Certain facilities and emissions sources are exempt from APEN and permit requirements based on their purpose, agency-determined emissions impact, and size. Should an emissions source not fall into one of the 84 listed exempted sources, APEN and permit applicability to depend on emissions from criteria and non-criteria reportable pollutants such as those addressed in this report.

Regulation 3 Section II.B.3 states that APENs are required if any of the following conditions are met (CDPHE, 2021):

- For nonattainment areas, each emissions point with actual uncontrolled emissions of one ton per year or more of any individual regulated pollutant for which the area is nonattainment

- For attainment areas, each emissions point in an attainment or attainment/maintenance area with actual uncontrolled emissions of two tons per year or more of any individual criteria pollutant
- Each emissions point with actual uncontrolled emissions of lead greater than 100 pounds per year
- Each emissions point with actual uncontrolled emissions of 250 pounds or more per year of any non-criteria reportable pollutant (regulated pollutant with emission limits but no National Ambient Air Quality Standards, NAAQS)

Regulation 3 Section II.D.2 and Section II.D.3 states that construction permits are required if total facility uncontrolled actual emissions equal or exceed the following thresholds depending on if the facility is located in a nonattainment or attainment/maintenance area (Table 1-1):

Table 1-1. CDPHE Air Permit Thresholds

Pollutant	Nonattainment Area Permit Threshold[1]	Attainment Area Permit Threshold	Number of Facilities (Per Pollutant) Subject to Permit Requirements
NO_x	5 tons per year	10 tons per year	11
CO	5 tons per year	10 tons per year	15
VOC	2 tons per year	5 tons per year	64
PM_{10}	1 ton per year	5 tons per year	34
$PM_{2.5}$	1 ton per year	5 tons per year	24
TSP	5 tons per year	10 tons per year	Not Applicable
SO_2	5 tons per year	10 tons per year	5
Lead	200 pounds per year	200 pounds per year	Not Applicable

1. Nonattainment is a geographic area that does not meet NAAQS established by the Clean Air Act and enforced by U.S. EPA.

Regulation 3 Section I.B.25 states that sources that meet the definition of Major Source are subject to the operating permit program. The following stationary sources are major sources (CDPHE, 2021):

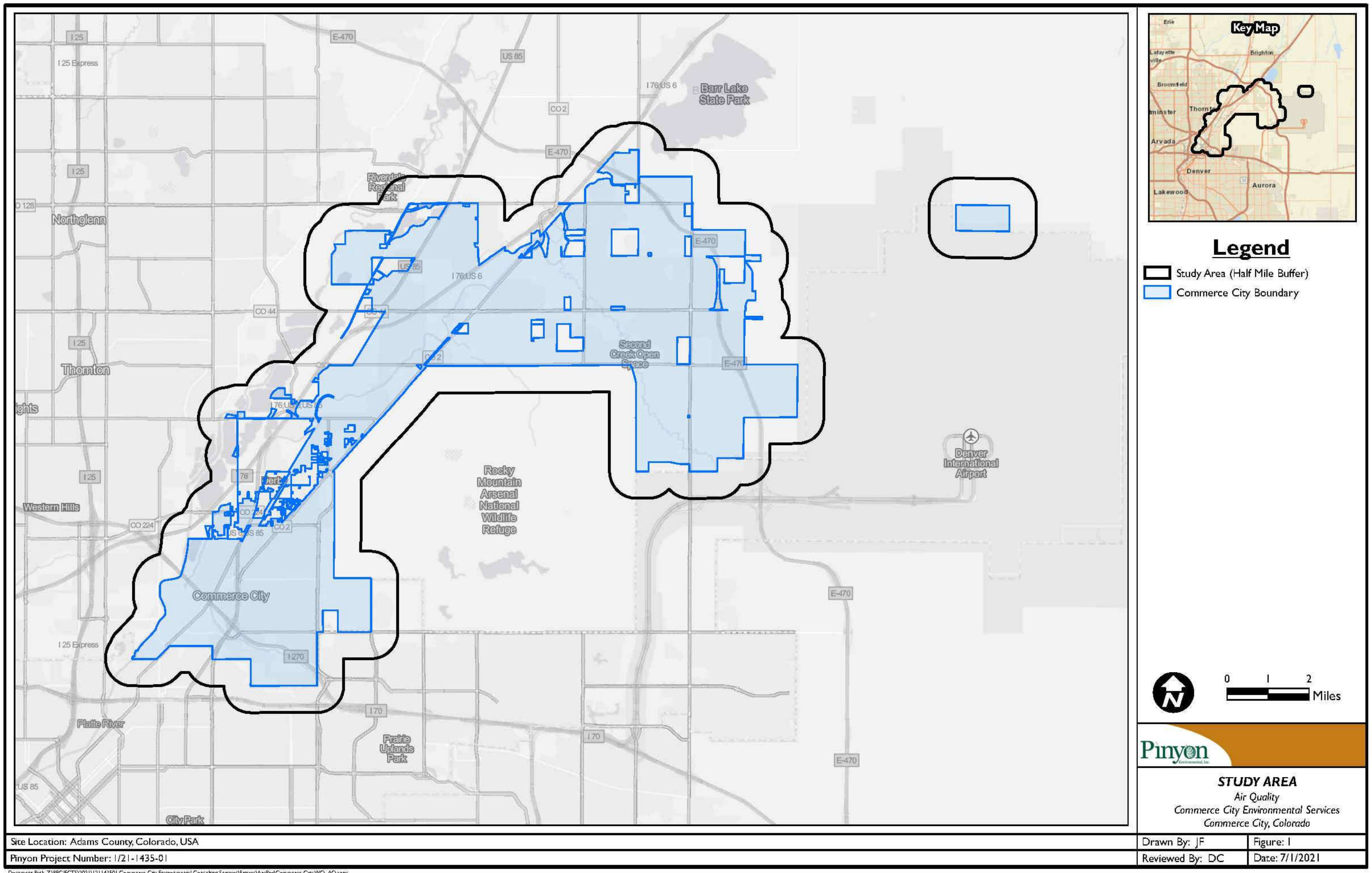
- Sources that directly emit, or have the potential to emit, 10 tons per year or more any single hazardous air pollutant or 25 tons per year or more of any combination of hazardous air pollutants.
- Sources that directly emit, or have the potential to emit, 100 tons per year or more of any pollutant subject to regulation.
- Sources subject to the Acid Rain Program.
- Sources that are subject to specific New Source Performance Standards or National Emission Standards for Hazardous Air Pollutants (e.g., landfills that are affected facilities under NSPS Subpart WWW).

- Sources that meet the definition of Major Stationary Source in Colorado Regulation No. 3, Part D, Section II.A.25.

Commerce City is located in the Denver Metro/North Front Range ozone nonattainment area, which was classified as a serious nonattainment area effective January 27, 2020 (U.S. EPA, 2021a). Ozone is a secondary pollutant that is formed by NOx and VOC emissions in the atmosphere. As a result, the major stationary source thresholds for NOx and VOC are lower than those in other areas. Specifically, a source that emits or has the potential to emit 50 tons per year or more of NOx or 50 tons per year or more of VOC is a major stationary source and is therefore subject to the operating permit program.

Please note not all sources of pollution are required to obtain an air permit. For example, sources that emit pollution at rates less than the above thresholds are not required to obtain a permit. Additionally, permit requirements can change, affecting the eligibility of sources presented in this report from reporting emissions in the future or requiring new emissions sources to obtain a permit. Because of those limitations, it's possible minimal emission sources were not identified in our searches and thus are not included in this report.

Figure 1. Study Area



2. Summarizing and Interpreting Data

Pinyon utilized data from several regulatory agencies in Colorado to prepare this community-wide impacts report for Commerce City. First, Pinyon extrapolated source data from active air permits on file with APCD and performed a data check for red flags and inconsistencies. Second, Pinyon identified oil and gas wells from well completion records on file with COGCC, including confirmation of their current operating status and discussions with Commerce City personnel. Finally, emissions source data in the study area were compared to nearby county total emissions estimates and state-wide total emissions estimates to provide insight into how air quality emissions within the study area compared to the remainder of Colorado.

Pinyon has extracted and consolidated NO_x, CO, VOC, SO_2, PM_{10}, $PM_{2.5}$, and Total HAPs data from active air permits. These data have been summarized into the following formats: tables, raw data transcribed into a master spreadsheet in Microsoft Excel; report figures; and an Arc GIS story map with interactive features.

2.1 Source Emissions Data from Air Permits

Numerous air pollutant source data have been collected in the study area released by APCD. Source emissions locations have been separated by pollutant type listed in Appendix A through G and illustrated in Figures 2 through 8. Source emissions rates extracted from each permit are represented as the estimated total actual emissions of each source. Please note air permits on file with APCD must complete a routine five (5) year renewal for an existing permitted source or report minor changes in emissions, production, or equipment by the following April after the change. Therefore, it is possible emissions estimates represented in this report have changed and are currently applying for an updated, modified, or renewal air permit.

Pinyon received data of source emissions rates from all active air permits on file with the APCD for the air pollutants specified in this report. Air permits present emissions data as an annual rate, generally in tons/yr units. Data was reviewed and compiled into tables based on pollutant type, source type, source description, and source total emissions rates in tons/yr. Emissions rates are represented from highest to lowest annual emissions in tons/yr. The top ten highest sources of emissions are represented in tables within each pollutant-specific section of this report.

It is possible that a facility exceeded the construction and/or APEN threshold for one pollutant and not another. Therefore, only the estimated actual emissions totals presented in this report and filed with APCD are for sources and pollutants that require an APEN and/or permit. For example, several industrial facilities presented in this report did not exceed nonattainment permit thresholds for NO_x or CO. Still, they did for PM_{10} and $PM_{2.5}$, and thus those facilities were required to obtain a permit, and all pollutant emissions were then reported.

2.2 Source Emissions Data from Well Records

Sources originating from oil and gas wells located within the study area were individually found in COGCC well site records to verify operational status. The oil and gas wells analyzed in this report are all currently "shut-in." The COGCC defines a shut-in well as "a well which is capable of producing but is not presently producing" (COGCC, n.d.). These wells are not actively producing product due to various factors, including a lack of a sustainable market, a lack of facilities to produce the product, or other cases defined within the shut-in provisions contained in the oil and gas lease. Although there are no actively producing wells located in the study area, Pinyon has chosen to include associated emissions in the pollutant totals due to these wells ability to begin producing oil and gas products again at any time.

3. Mobile Sources

The U.S. EPA has classified mobile sources of air pollution to include vehicles, engines, and equipment, that can be categorized as either on-road mobile sources (e.g., heavy-duty trucks, buses, passenger cars, and motorcycles) or non-road mobile sources (e.g., locomotives, marine vessels, construction equipment, lawn, garden, and snow equipment, personal recreation equipment, etc.) (U.S. EPA, 2020). Emissions associated with mobile sources include combustion pollutants such as CO and NO_X which can contribute to ozone formation. Additionally, vehicle exhaust emissions can be a source of particulate matter. A list of major roadways within the study area has been identified below, and an overview of vehicle miles traveled (VMT) and proximity to concentrated areas of pollutants.

3.1 Interstate 270

Interstate 270 (I-270) is a 7-mile-long highway in the northeastern portion of the Denver Metropolitan Area. I-270 enters Commerce City, where the highway crosses over the South Platte River and exits Commerce City shortly before intersecting with Quebec St for a total expanse of 3.5-miles within the city limits. I-270 is within the immediate vicinity of clusters of emission sources indicated by a green box within the individual figures for the pollutants identified in Sections 5-11. Based on the proximity of I-270 and the cluster of emissions sources, emissions from on-road vehicles traveling on I-270 may result in heightened impacts with the southern area of Commerce City. According to the Colorado Department of Transportation, the annual average daily VMT on I-270 is 521,309 (CDOT 2021).

3.2 State Highway 265

Colorado State Highway 265 (SH 265) is a 3.6-mile-long highway in the northeastern portion of the Denver Metropolitan Area. SH 265 enters Commerce City, where the highway meets York Street and ends at the intersection of U.S. Route 6 (US 6) and US 85 in Commerce City for a total expanse of approximately 2.4-miles within the city limits. SH 265 is within the immediate vicinity of clusters of emission sources indicated by a green and a blue box within the individual figures for the pollutants identified in Sections 5-11. Based on the proximity of SH 265 and the cluster of emissions sources, emissions from on-road vehicles traveling on SH 265 may result in heightened impacts along the southern and western areas of Commerce City. According to the Colorado Department of Transportation, the annual average daily VMT on SH-265 is 15,363 (CDOT 2021).

3.3 Interstate 76

Interstate 76 (I-76) is a 187-mile highway spanning from Arvada, Colorado, to Big Springs, Nebraska. From the intersection of I-76 and I-270 in the Denver Metropolitan Area, I-76 travels parallel and at specific points through the western boundary of Commerce City, ending at the junction with Colorado State Highway 470 for a total expanse of approximately 12.1-miles. I-76 is within the immediate vicinity of clusters of emission sources indicated by a green and a blue box within the individual figures for the pollutants identified in Sections 5-11. Based on the proximity of I-76 and the emissions sources, emissions from on-road vehicles traveling on I-76 may result in heightened impacts along the western boundary of Commerce City. According to the Colorado Department of Transportation, the annual average daily VMT on I-76 from the intersection with I-270 and ending at the junction with SH 470 is 621,462 (CDOT 2021).

4. National Ambient Air Quality Standards (NAAQS)

The U.S. EPA, through the CAA, regulates air pollution in an effort to protect public health. CAA regulations require stationary and mobile sources to determine their potential to emit as part of the state and federal permitting process, applicability to federal regulations, and evaluation of control technologies. As part of the CAA, U.S. EPA was required to set NAAQS for six (6) criteria pollutants that can be harmful to public health and the environment:

- Carbon Monoxide (CO),
- Lead (Pb),
- Nitrogen Dioxide (NO_2) (a subset of NO_x),
- Ozone (O_3),
- Particle Pollution (PM), and
- Sulfur Dioxide (SO_2).

The CAA identifies two types of national ambient air quality standards. Primary standards provide "public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly" (U.S. EPA, 2021b). Secondary standards proved "public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings" (U.S. EPA, 2021b). The primary and secondary NAAQS are concentrations where exceedances of the NAAQS values are a signal that public and environmental health is at risk. The NAAQS values that are generally in the units of parts per million (ppm), parts per billion (ppb), or micrograms per cubic meter (μg/m^3) Periodically, the standards are reviewed and may undergo revision, establishing new standards.

Monitoring data provide ambient air concentrations that can be directly correlated to the NAAQS to determine attainment status for a specific area. Colorado has a number of ambient air monitors in the eight (8) monitoring regions defined by CDPHE APCD in its air monitoring network (CDPHE, 2020). All criteria pollutants are monitored except for lead due to the cessation of the La Casa monitor after numerous years of low concentrations. The emissions data presented in this community-wide impacts report are an integral part of the translation to ambient air concentrations; however, emissions are not a direct indication of ambient air concentration levels. Meteorological data, emission source dispersion parameters, and terrain characteristics are also informative and essential factors to determine potential public health impacts and compliance with primary and secondary NAAQS.

5. Nitrogen Oxides (NO_x)

Nitrogen Oxides (NO_x) are a chemical compound of oxygen and nitrogen formed during their reaction with each other when burned at high temperatures, primarily from burning fuels such as oil, diesel, and natural gas (U.S. EPA, 2016b). NO_x is a common designation of nitrogen oxides NO and NO_2. NO_2, in combination with other NO_x, can react with other chemicals in the air to form both particulate matter and ozone (U.S. EPA, 2016b).

5.1 NO_x Health Concerns

Breathing air with elevated NO_x may affect individuals with respiratory conditions causing inflammation of the airways. Periods of short-term exposure to NO_2, a subset of NOx, can "aggravate respiratory diseases, particularly asthma, leading to respiratory symptoms (such as coughing, wheezing, or difficulty breathing), hospital admissions, and visits to emergency rooms" (U.S. EPA, 2016b). Periods of long-term exposure to NO_2 may contribute to the "development of asthma and potentially increase susceptibility to respiratory infections" (U.S. EPA, 2016b). The atmospheric chemistry determining how much NO_x is NO_2 will be discussed in future analyses by Commerce City related to monitoring and modeling.

5.2 Summary of NO_x Emissions

Using readily available data acquired from active APCD permits, 38 facilities have the potential to emit NO_x. These 38 facilities in and within a ½ mile of Commerce City limits total 1,215 tons/yr NO_x. In Table 5-1 below, the ten (10) highest emitters of estimated actual annual NO_x emissions have been identified.

Table 5-1. Ten (10) Highest Sources of NO_x Emissions

Source Name	Source Description	Source Location	Facility Estimated Actual Annual NO_x (tons/yr)
Suncor Energy – Denver Refinery	Petroleum Refinery	5801 Brighton Blvd	618.7
Public Service Co – Cherokee Generating Station	Electric Power Generation	6198 Franklin St	383.0
Metro Wastewater Reclamation District	Sewage Treatment Facility	6450 York St	70.33
Allied Waste Systems – Tower Landfill	Solid Waste Landfill	8480 Tower Rd	28.72
Phillips 66 Pipeline – Denver Terminal	Petroleum Products Storage/Distribution	3960 E 56th Ave	26.15
Adams County Government Center	Emergency Power Generation	4430 S Adams County Pkwy	13.25
Darling Ingredients Inc.	Rendering Plant (animal products)	5701 York St	9.08

Source Name	Source Description	Source Location	Facility Estimated Actual Annual NO_x (tons/yr)
Crystal Packaging	Petroleum Lubricating Oil and Grease Manufacturing	9155 Boston St	8.75
Aggregate Industries – Dahlia Plant	Hot Mix Asphalt Plant	4801 E 78th Ave	7.05
Trustile Doors, LLC	Millwork	1780 E 66th Ave	5.70

Source: CDPHE APCD 2021

5.3 Sources of NO_x Emissions

Sources of NO_x analyzed from data recorded in this report involve the following breakdown of industries, services, and products, including percent of total NO_x emissions estimates:

- Seven (7) petroleum refining and related industries (53% of total source emissions)
- Four (4) electric gas and sanitary services (40% of total source emissions)
- Six (6) oil and gas extraction and related services (3% of total source emissions)
- Five (5) food and kindred products (1% of total source emissions)
- Sixteen (16) other industrial services (3% of total source emissions)

5.4 Locations of NO_x Emissions

Locations of the 38 sources of NO_x analyzed from data recorded in this report are represented in Figure 2.

NO_x sources located in the southern portion of the study area south of E 80th Avenue include:

- Twenty-one (21) sources greater than or equal to 0.1 tons/yr and less than or equal to 5.0 tons/yr
- Five (5) sources greater than 5.0 tons/yr and less than or equal to 50.0 tons/yr
- One (1) source greater than 50.0 tons/yr and less than or equal to 100.0 tons/yr
- No sources greater than 100.0 tons/yr and less than or equal to 250.0 tons/yr
- Two (2) sources greater than 250.0 tons/yr and less than or equal to 618.7 tons/yr

NO_x sources along the western portion of the study area, west of Colorado State Highway 2 and north of E 80th Avenue include:

- Five (5) sources greater than or equal to 0.1 tons/yr and less than or equal to 5.0 tons/yr

- One (1) source greater than 5.0 tons/yr and less than or equal to 50.0 tons/yr
- No sources greater than 50.0 tons/yr and less than or equal to 100.0 tons/yr
- No sources greater than 100.0 tons/yr and less than or equal to 250.0 tons/yr
- No sources greater than 250.0 tons/yr and less than or equal to 618.7 tons/yr

NO_x sources located along the northern and eastern portion of Commerce City, east of Colorado State Highway 2, include:

- One (1) source greater than or equal to 0.1 tons/yr and less than or equal to 5.0 tons/yr
- Two (2) sources greater than 5.0 tons/yr and less than or equal to 50.0 tons/yr
- No sources greater than 50.0 tons/yr and less than or equal to 100.0 tons/yr
- No sources greater than 100.0 tons/yr and less than or equal to 250.0 tons/yr
- No sources greater than 250.0 tons/yr and less than or equal to 618.7 tons/yr

5.5 Breakdown of NO_x Emissions

Total NO_x emissions estimates extrapolated from the data provided by APCD for Adams, Arapahoe, Denver, and Weld Counties, in addition to estimated actual state-wide Colorado emissions totals, are as follows:

- Adams County – 3,367 tons/yr
- Arapahoe County – 895 tons/yr
- Denver County – 750 tons/yr
- Weld County – 13,246 tons/yr
- State-wide estimated actual emissions totals – 61,187 tons/yr

Table 5-2. NO_x Emissions Percentage of Commerce City in County and State Regions

NO_x Emissions within Study Area	Percent of Adams County Actual Emissions Totals	Percent of State-Wide Actual Emissions Totals
1,215 tons/yr	39%	2%

Source: CDPHE APCD 2021

Figure 2. Facility NO_x Emissions

6. Carbon Monoxide (CO)

Carbon Monoxide (CO) is a colorless, odorless, toxic gas produced when fossil fuels (oil, coal, natural gas) are burned. The primary sources of CO released into the atmosphere occur from motor vehicles, trucks, and other vehicles or machinery that burn fossil fuels (U.S. EPA, 2016b).

6.1 CO Health Concerns

Breathing air with elevated CO "reduces the amount of oxygen that can be transported in the bloodstream to critical organs such as the heart and brain" (U.S. EPA, 2016b). Elevated levels of CO outdoors can be of concern for people with certain types of heart disease due to reduced ability for getting oxygenated blood to their hearts during situations such as exercising or under increased stress where the heart needs more oxygen than usual. During these situations, short-term exposure to elevated CO may "result in reduced oxygen to the heart accompanied by chest pain, also known as angina" (U.S. EPA, 2016b).

6.2 Summary of CO Emissions

Using readily available data acquired from active APCD permits, 41 facilities have the potential to emit CO. These 41 facilities in and within a ½ mile of Commerce City limits total 1,158 tons/yr CO. In Table 6-1 below, the ten (10) highest emitters of estimated actual annual CO emissions have been identified.

Table 6-1. Ten (10) Highest Sources of CO Emissions

Source Name	Source Description	Source Location	Facility Estimated Actual Annual CO (ton/year)
Suncor Energy – Denver Refinery	Petroleum Refinery	5801 Brighton Blvd	494.3
Public Service Co – Cherokee Generating Station	Electric Power Generation	6198 Franklin St	315.8
Allied Waste Systems – Tower Landfill	Solid Waste Landfill	8480 Tower Rd	102.1
Phillips 66 Pipeline – Denver Terminal	Petroleum Products Storage/Distribution	3960 E 56th Ave	69.86
Metro Wastewater Reclamation District	Sewage Treatment Facility	6450 York St	41.76
Brannan Sand & Gravel	Hot Mix Asphalt Plant	7271 Colorado Blvd	27.87
City and County of Denver - Roslyn	Government Support	5440 Roslyn St	14.20
Aggregate Industries – Dahlia Plant	Hot Mix Asphalt Plant	4801 E 78th Ave	11.12
Sinclair – Denver Terminal	Petroleum Products Storage/Distribution	8581 E 96th Ave	10.80
Colorado Asphalt Services	Asphalt Paving	3700 E 56th Ave	8.87

Source: CDPHE APCD 2021

6.3 Sources of CO Emissions

Sources of CO analyzed from data recorded in this report involve the following breakdown of industries, services, and products, including percent of total CO emissions estimates:

- Eight (8) petroleum refining and related industries (48% of total source emissions)
- Four (4) electric gas and sanitary services (40% of total source emissions)
- Six (6) oil and gas extraction and related services (8% of total source emissions)
- Six (6) food and kindred products (1% of total source emissions)
- Seventeen (17) other industrial services (3% of total source emissions)

6.4 Locations of CO Emissions

Locations of the 41 sources of CO analyzed from data recorded in this report are represented in Figure 3.

CO sources located in the southern portion of the study area south of E 80th Avenue include:

- Twenty-five (25) sources greater than or equal to 0.004 tons/yr and less than or equal to 10.0 tons/yr
- Five (5) sources greater than 10.0 tons/yr and less than or equal to 100.0 tons/yr
- No sources greater than 100.0 tons/yr and less than or equal to 250.0 tons/yr
- Two (2) sources greater than 250.0 tons/yr and less than or equal to 500.0 tons/yr

CO sources located along the western portion of the study area, west of Colorado State Highway 2 and north of E 80th Avenue, include:

- Five (5) sources greater than or equal to 0.004 tons/yr and less than or equal to 10.0 tons/yr
- One (1) source greater than 10.0 tons/yr and less than or equal to 100.0 tons/yr
- No sources greater than 100.0 tons/yr and less than or equal to 250.0 tons/yr
- No sources greater than 250.0 tons/yr and less than or equal to 500.0 tons/yr

CO sources located along the northern and eastern portion of Commerce City, east of Colorado State Highway 2, include:

- Two (2) sources greater than or equal to 0.004 tons/yr and less than or equal to 10.0 tons/yr
- No sources greater than 10.0 tons/yr and less than or equal to 100.0 tons/yr

- One (1) source greater than 100.0 tons/yr and less than or equal to 250.0 tons/yr
- No sources greater than 250.0 tons/yr and less than or equal to 500.0 tons/yr

6.5 Breakdown of CO Emissions

Total CO emissions estimates extrapolated from the data provided by APCD for Adams, Arapahoe, Denver, and Weld Counties, in addition to estimated actual state-wide Colorado emissions totals, are as follows:

- Adams County – 2,763 tons/yr
- Arapahoe County – 938 tons/yr
- Denver County – 528 tons/yr
- Weld County – 23,013 tons/yr
- State-wide estimated actual emissions totals – 58,795 tons/yr

Table 6-2. CO Emissions Percentage of Commerce City in County and State Regions

CO Emissions within Study Area	Percent of Adams County Actual Emissions Totals	Percent of State-Wide Actual Emissions Totals
1,158 tons/yr	42%	2%

Source: CDPHE APCD 2021

Figure 3. Facility CO Emissions

7. Volatile Organic Compounds (VOCs)

Volatile Organic Compounds (VOCs) are any "carbon compounds, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participate in atmospheric photochemical reactions" (U.S. EPA, 2017a). In short, VOCs are chemicals that both vaporize into the air and dissolve in water. During hot summer days, VOCs react with NO_x to form ozone (smog). VOCs are pervasive in daily life due to their use in industry, agriculture, transportation, and day-to-day activities around the home. VOCs are emitted from various outdoor sources, including motor vehicles, chemical manufacturing facilities, refineries, and factories.

7.1 VOC Health Concerns

In addition to contributing to the formation of ground-level ozone, VOCs are of concern as indoor and outdoor air pollutants. However, the emphasis of that concern outdoors is different from indoors. The main concern indoors is the potential for VOCs to adversely impact people's health that is exposed from products such as paint, varnishes, cleaning products, etc. (U.S. EPA, 2017a). While VOCs can be a health concern outdoors, U.S. EPA regulates VOCs outdoors primarily due to their ability to create photochemical smog under certain conditions, which can be harmful.

7.2 Summary of VOC Emissions

Using readily available data acquired from active APCD permits, 121 facilities have the potential to emit VOCs. These 121 facilities in and within a ½ mile of Commerce City limits total 1,353 tons/yr. In Table 7-1 below, the ten (10) highest emitters of estimated actual annual VOC emissions have been identified.

Table 7-1. Ten (10) Highest Sources of VOC Emissions

Source Name	Source Description	Source Location	Facility Estimated Actual Annual VOCs (ton/year)
Suncor Energy – Denver Refinery	Petroleum Refinery	5801 Brighton Blvd	469.0
Sinclair – Denver Terminal	Petroleum Products Storage/Distribution	8581 E 96th Ave	128.8
Phillips 66 Pipeline – Denver Terminal	Petroleum Products Storage/Distribution	3960 E 56th Ave	128.0
Master Builders Solutions – Brighton Facility	Adhesive Manufacturing	10601 Fulton St	65.18
Public Service Co – Cherokee Generating Station	Electric Power Generation	6198 Franklin St	64.87
Bimbo Bakeries, Inc.	Commercial Bakery	7300 Brighton Blvd	61.83
Magellan Pipeline Co – Dupont Terminal	Petroleum Products Storage/Distribution	8160 Krameria St	54.48
Allied Waste Systems – Tower Landfill	Solid Waste Landfill	8480 Tower Rd	27.83
Cintas Corporation No. 2	Industrial Laundry	5100 Race Ct	25.27

Source Name	Source Description	Source Location	Facility Estimated Actual Annual VOCs (ton/year)
Metro Wastewater Reclamation District	Sewage Treatment Facility	6450 York St	17.46

Source: CDPHE APCD 2021

7.3 Sources of VOC Emissions

Sources of VOCs analyzed from data recorded in this report involve the following breakdown of industries, services, and products, including percent of total VOC emissions estimates:

- Eight (8) petroleum refining and related industries (36% of total source emissions)
- Four (4) electric gas and sanitary services (8% of total source emissions)
- Fourteen (14) oil and gas extraction and related services (26% of total source emissions)
- Seven (7) food and kindred products (6% of total source emissions)
- Eighty-eight (88) other industrial services (24% of total source emissions)

7.4 Locations of VOC Emissions

Locations of the 121 sources of VOCs analyzed from data recorded in this report are represented in Figure 5.

VOC sources located in the southern portion of the study area south of E 80th Avenue include:

- Forty-three (43) sources greater than or equal to 0.005 tons/yr and less than or equal to 2.0 tons/yr
- Thirty-three (33) sources greater than 2.0 tons/yr and less than or equal to 50.0 tons/yr
- Two (2) sources greater than 50.0 tons/yr and less than or equal to 100.0 tons/yr
- One (1) source greater than 100.0 tons/yr and less than or equal to 250.0 tons/yr
- One (1) source greater than 250.0 tons/yr and less than or equal to 469.0 tons/yr

VOC sources along the western portion of the study area, west of Colorado State Highway 2 and north of E 80th Avenue include:

- Eleven (11) sources greater than or equal to 0.005 tons/yr and less than or equal to 2.0 tons/yr
- Eleven (11) sources greater than 2.0 tons/yr and less than or equal to 50.0 tons/yr
- Two (2) sources greater than 50.0 tons/yr and less than or equal to 100.0 tons/yr
- One (1) source greater than 100.0 tons/yr and less than or equal to 250.0 tons/yr

- No sources greater than 250.0 tons/yr and less than or equal to 469.0 tons/yr

VOC sources along the northern and eastern portion of Commerce City, east of Colorado State Highway 2, include:

- Three (3) sources greater than or equal to 0.005 tons/yr and less than or equal to 2.0 tons/yr
- Twelve (12) sources greater than 2.0 tons/yr and less than or equal to 50.0 tons/yr
- One (1) source greater than 50.0 tons/yr and less than or equal to 100.0 tons/yr
- No sources greater than 100.0 tons/yr and less than or equal to 250.0 tons/yr
- No sources greater than 250.0 tons/yr and less than or equal to 469.0 tons/yr

7.5 Breakdown of VOC Emissions

Total VOC emissions estimates extrapolated from the data provided by APCD for Adams, Arapahoe, Denver, and Weld Counties, in addition to estimated state-wide Colorado emissions totals, are as follows:

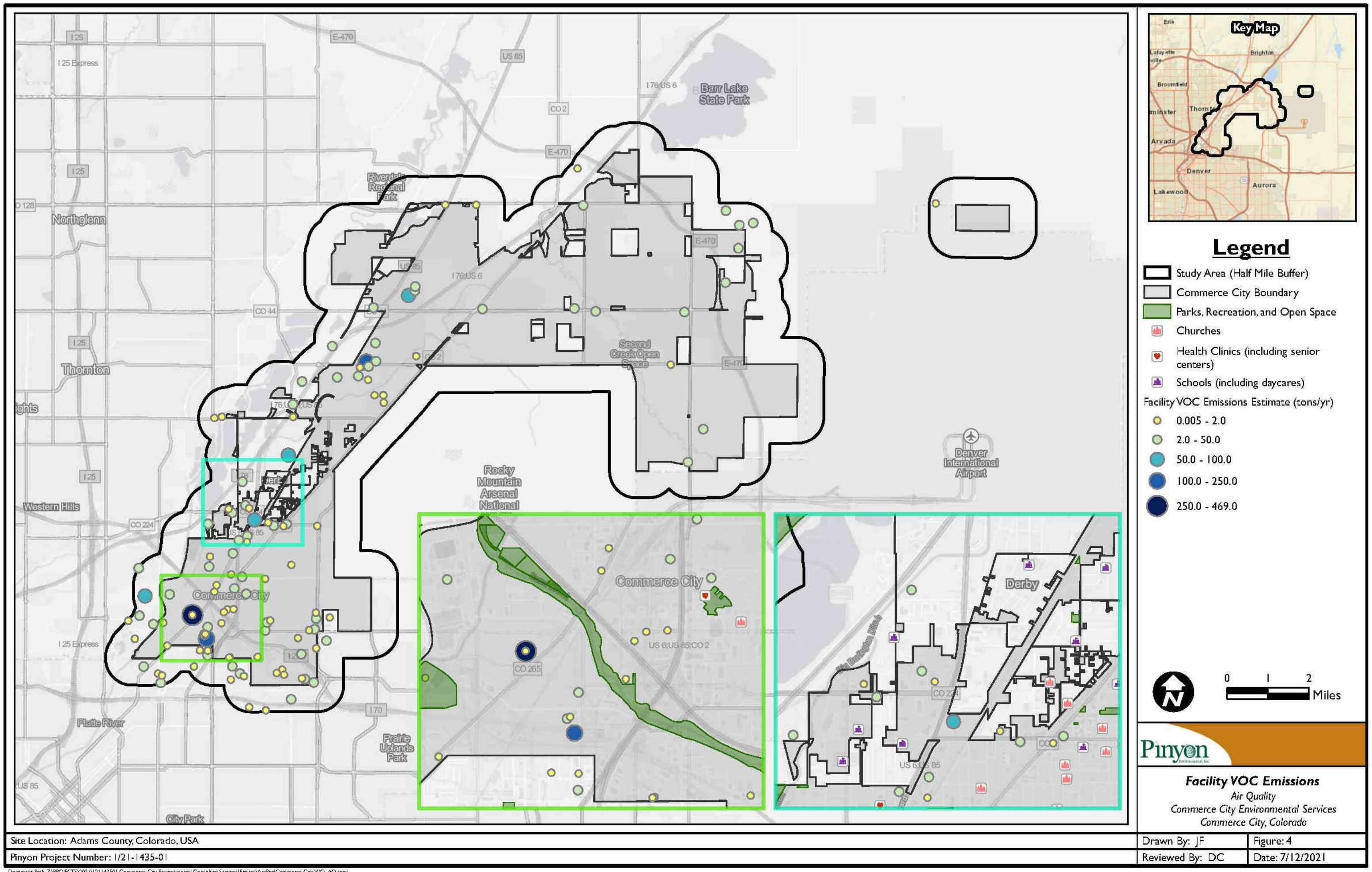
- Adams County – 3,719 tons/yr
- Arapahoe County – 2,059 tons/yr
- Denver County – 897 tons/yr
- Weld County – 26,870 tons/yr
- State-wide estimated actual emissions totals – 54,697 tons/yr

Table 7-2. VOC Emissions Percentage of Commerce City in County and State Regions

VOC Emissions within Study Area	Percent of Adams County Actual Emissions Totals	Percent of State-Wide Actual Emissions Totals
1,353 tons/yr	36%	2%

Source: CDPHE APCD 2021

Figure 4. Facility VOC Emissions



8. Sulfur Dioxide (SO_2)

Sulfur Dioxide (SO_2) is a colorless, foul-smelling, toxic gas part of a larger group of chemicals referred to as sulfur oxides (SO_x) (U.S. EPA, 2019). SO_2 is emitted by burning fossil fuels (coal, oil, natural gas) or other sulfur-containing materials. The largest source of SO_2 emitted into the atmosphere is the burning of fossil fuels by power plants and other industrial facilities (U.S. EPA, 2019). Other sources include industrial processes such as extracting metal from ore and vehicles and heavy equipment that burns fuel with high sulfur content.

8.1 SO_2 Health Concerns

Short-term exposures to SO_2 can harm the respiratory system and make breathing difficult. People with asthma, particularly children, are sensitive to the effects of SO_2. SO_2 can also lead to the formation of other SO_x. SO_x can react with other compounds in the atmosphere to form small particles, contributing to particulate matter pollution (U.S. EPA, 2019).

8.2 Summary of SO_2 Emissions

Using available data acquired from active APCD permits, 28 facilities have the potential to emit SO_2. These 28 facilities in and within a ½ mile of Commerce City limits total 376 tons/yr. In Table 8-1 below, the ten (10) highest emitters of estimated actual annual SO_2 emissions have been identified.

Table 8-1. Ten (10) Highest Sources of SO_2 Emissions

Source Name	Source Description	Source Location	Facility Estimated Actual Annual SO_2 (ton/year)
Suncor Energy – Denver Refinery	Petroleum Refinery	5801 Brighton Blvd	223.2
Metro Wastewater Reclamation District	Sewage Treatment Facility	6450 York St	90.84
Allied Waste Systems – Tower Landfill	Solid Waste Landfill	8480 Tower Rd	34.34
Public Service Co – Cherokee Generating Station	Electric Power Generation	6198 Franklin St	9.84
Aggregate Industries – Dahlia Plant	Hot Mix Asphalt Plant	4801 E 78th Ave	7.43
Adams County Government Center	Emergency Power Generation	4430 S Adams County Pkwy	4.47
4283929 Delaware, LLC - Henderson	Pet Crematory	9731 Hanover Ct E	1.60
City & County of Denver - Roslyn	Maintenance Complex	5440 Roslyn St	0.78
Brannan Sand & Gravel	Hot Mix Asphalt Plant	7271 Colorado Blvd	0.73

Source Name	Source Description	Source Location	Facility Estimated Actual Annual SO_2 (ton/year)
Chemtrade Holdco U.S. - Chemtrade Solutions	Aluminum Sulfate Solution Production Facility	5075 E. 50th Ave	0.65

Source: CDPHE APCD 2021

8.3 Sources of SO_2 Emissions

Sources of SO_2 analyzed from data recorded in this report involve the following breakdown of industries, services, and products, including percent of total SO_2 emissions estimates:

- Six (6) petroleum refining and related industries (62% of total source emissions)
- Three (3) electric gas and sanitary services (36% of total source emissions)
- Zero (0) oil and gas extraction and related services (0% of total source emissions)
- Six (6) food and kindred products (0.03% of total source emissions)
- Thirteen (13) other industrial services (2% of total source emissions)

8.4 Locations of SO_2 Emissions

Locations of the 28 sources of SO_2 analyzed from data recorded in this report are represented in Figure 5.

SO_2 sources located in the southern portion of the study area south of E 80th Avenue include:

- Eighteen (18) sources greater than or equal to 0.0001 tons/yr and less than or equal to 5.0 tons/yr
- Two (2) sources greater than 5.0 tons/yr and less than or equal to 50.0 tons/yr
- One (1) source greater than 50.0 and less than or equal to 100.0 tons/yr
- One (1) source greater than 100.0 and less than or equal to 223.2 tons/yr

SO_2 sources located along the western portion of the study area, west of Colorado State Highway 2 and north of E 80th Avenue, include:

- Four (4) sources greater than or equal to 0.0001 tons/yr and less than or equal to 5.0 tons/yr
- No sources greater than 5.0 tons/yr and less than or equal to 50.0 tons/yr
- No sources greater than 50.0 and less than or equal to 100.0 tons/yr
- No sources greater than 100.0 and less than or equal to 223.2 tons/yr

SO_2 sources located along the northern and eastern portion of Commerce City, east of Colorado State Highway 2, include:

- One (1) source greater than or equal to 0.0001 tons/yr and less than or equal to 5.0 tons/yr
- One (1) source greater than 5.0 tons/yr and less than or equal to 50.0 tons/yr
- No sources greater than 50.0 and less than or equal to 100.0 tons/yr
- No sources greater than 100.0 and less than or equal to 223.2 tons/yr

8.5 Breakdown of SO_2 Emissions

Total SO_2 emissions estimates extrapolated from the data provided by APCD for Adams, Arapahoe, Denver, and Weld Counties, in addition to estimated actual state-wide Colorado emissions totals, are as follows:

- Adams County – 462 tons/yr
- Arapahoe County – 32 tons/yr
- Denver County – 99 tons/yr
- Weld County – 428 tons/yr
- State-wide estimated actual emissions totals – 13,705 tons/yr

Table 8-2. SO_2 Emissions Percentage of Commerce City in County and State Regions

SO_2 Emissions within Study Area	Percent of Adams County Actual Emissions Totals	Percent of State-Wide Actual Emissions Totals
376 tons/yr	81%	3%

Source: CDPHE APCD 2021

Figure 5. Facility SO_2 Emissions

9. Particulate Matter less than 10 micrometers in diameter (PM_{10})

Atmospheric particulate matter with diameters generally 10 micrometers and smaller (PM_{10}) consists of microscopic solid or liquid particles suspended in the air. PM_{10} can be made up of several different components, including "acidic aerosols (e.g., nitrates and sulfates), organic carbon, metals, soil or dust particles, and allergens (such as fragments of pollen or mold spores)" (U.S. EPA, 2021c).

PM_{10} is typically formed in the atmosphere via various sources, primarily from fugitive dust sources rather than stack emissions or combustion sources. Fugitive emissions cannot be captured and often originate from equipment leaks, earth disturbing equipment vehicles, and windblown disturbances (U.S. EPA, 2021c).

9.1 PM_{10} Health Concerns

PM_{10} is inhalable and thus poses a health threat, such as irritation to the eyes, nose, and throat. In addition, it causes serious harm due to inflammation in the airways of people with respiratory diseases such as asthma, chronic obstructive pulmonary disease, and pneumonia.

9.2 Summary of PM_{10} Emissions

Using readily available data acquired from active APCD permits, 79 facilities have the potential to emit PM_{10}. These 79 facilities in and within a ½ mile of Commerce City limits total 490 tons/yr PM_{10}. In Table 9-1 below, the ten (10) highest emitters of estimated actual annual PM_{10} emissions have been identified.

Table 9-1. Ten (10) Highest Sources of PM_{10} Emissions

Source Name	Source Description	Source Location	Facility Estimated Actual Annual PM_{10} (ton/year)
Suncor Energy – Denver Refinery	Petroleum Refinery	5801 Brighton Blvd	130.0
Allied Waste Systems – Tower Landfill	Solid Waste Landfill	8480 Tower Rd	91.16
Public Service Co – Cherokee Generating Station	Electric Power Generation	6198 Franklin St	60.84
Ardent Mills – Commerce City Mill	Animal Feed and Flour Mill	4545 E 64th Ave	58.86
Commerce City Grain	Grain Elevator	4600 E 64th Ave	18.25
Albert Frei & Sons – Fernald Pit	Construction Sand and Gravel Mining	7281 Colorado Blvd	17.65
Basalite Concrete Products	Concrete Block and Brick Manufacturing	4900 Race St	11.94
General Scrap Inc.	Scrap Metal Recycling	5601 York St	7.58
JK Concepts	Woodwork Manufacturing	3333 E 52nd Ave	7.00
Brannan Ready Mix Company	Concrete Batching Plant	7291 Colorado Blvd	5.80

Source: CDPHE APCD 2021

9.3 Sources of PM_{10} Emissions

Sources of PM_{10} analyzed from data recorded in this report involve the following breakdown of industries, services, and products, including percent of total PM_{10} emissions estimates:

- Eight (8) petroleum refining and related industries (29% of total source emissions)
- Four (4) electric gas and sanitary services (32% of total source emissions)
- Zero (0) oil and gas extraction and related services (0% of total source emissions)
- Seven (7) food and kindred products (17% of total source emissions)
- Sixty (60) other industrial services (22% of total source emissions)

9.4 Locations of PM_{10} Emissions

Locations of the 79 sources of PM_{10} analyzed from data recorded in this report are represented in Figure 6.

PM_{10} sources located in the southern portion of the study area south of E 80th Avenue include:

- Thirty-four (34) sources greater than or equal to 0.1 tons/yr and less than or equal to 1.0 tons/yr
- Twenty-two (22) sources greater than 1.0 tons/yr and less than or equal to 50.0 tons/yr
- Two (2) sources greater than 50.0 tons/yr and less than or equal to 100.0 tons/yr
- One (1) source greater than 100.0 tons/yr and less than or equal to 130.1 tons/yr

PM_{10} sources located along the western portion of the study area, west of Colorado State Highway 2 and north of E 80th Avenue, include:

- Ten (10) sources greater than or equal to 0.1 tons/yr and less than or equal to 1.0 tons/yr
- Eight (8) sources greater than 1.0 tons/yr and less than or equal to 50.0 tons/yr
- No sources greater than 50.0 tons/yr and less than or equal to 100.0 tons/yr
- No sources greater than 100.0 tons/yr and less than or equal to 130.1 tons/yr

PM_{10} sources located along the northern and eastern portion of Commerce City, east of Colorado State Highway 2, include:

- One (1) source greater than or equal to 0.1 tons/yr and less than or equal to 1.0 tons/yr
- No sources greater than 1.0 tons/yr and less than or equal to 50.0 tons/yr

- One (1) source greater than 50.0 tons/yr and less than or equal to 100.0 tons/yr
- No sources greater than 100.0 tons/yr and less than or equal to 130.1 tons/yr

9.5 Breakdown of PM_{10} Emissions

Total PM_{10} emissions estimates extrapolated from the data provided by APCD for Adams, Arapahoe, Denver, and Weld Counties, in addition to estimated actual state-wide Colorado emissions totals, are as follows:

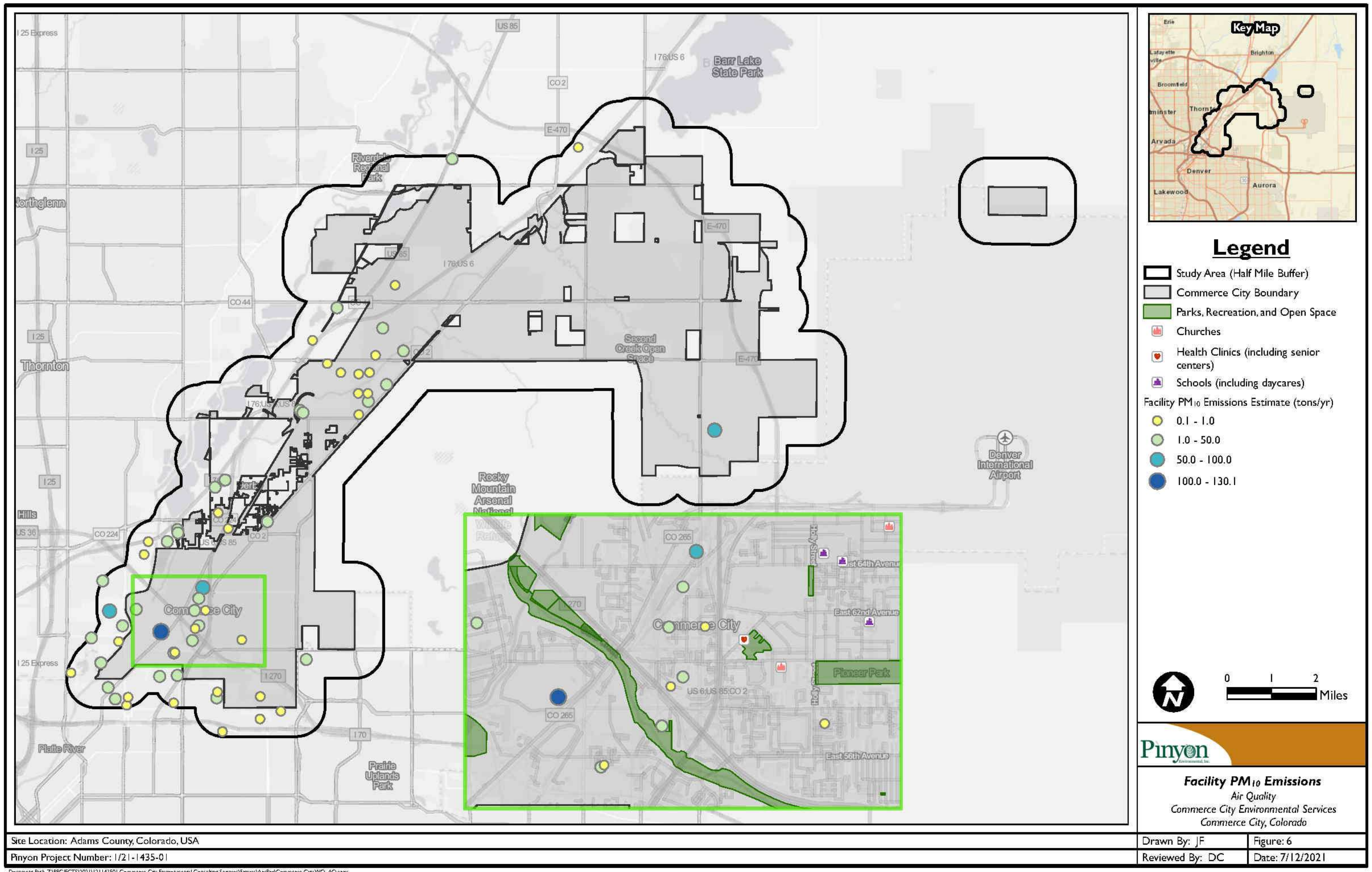
- Adams County – 773 tons/yr
- Arapahoe County – 557 tons/yr
- Denver County – 209 tons/yr
- Weld County – 1,841 tons/yr
- State-wide estimated actual emissions totals – 13,084 tons/yr

Table 9-2. PM_{10} Emissions Percentage of Commerce City in County and State Regions

PM_{10} Emissions within Study Area	Percent of Adams County Actual Emissions Totals	Percent of State-Wide Actual Emissions Totals
490 tons/yr	63%	4%

Source: CDPHE APCD 2021

Figure 6. Facility PM_{10} Emissions



10. Particulate Matter less than 2.5 micrometers in diameter ($PM_{2.5}$)

Atmospheric particulate matter with diameters generally 2.5 micrometers and smaller ($PM_{2.5}$) consists of microscopic solid or liquid particles suspended in the air. $PM_{2.5}$ can be made up of several different components, including "acidic aerosols (e.g., nitrates and sulfates), organic carbon, metals, soil or dust particles, and allergens (such as fragments of pollen or mold spores)" (U.S. EPA, 2021c).

$PM_{2.5}$ is typically formed in the atmosphere via gas to particle conversion. It consists primarily of nitrates, sulfates, and organic carbon (black carbon from combustion can be an important primary source of particles in $PM_{2.5}$ size fraction) (U.S. EPA, 2021c). $PM_{2.5}$ is emitted directly from sources, such as construction sites, unpaved roads, fields, smokestacks, or fires.

10.1 $PM_{2.5}$ Health Concerns

$PM_{2.5}$ can penetrate the lungs, with particles less than 0.1 um (ultrafine particles) able to penetrate the bloodstream. The result of which can affect the lungs, the heart, and the cardiovascular system. For reference, the average human hair is about 70 micrometers in diameter – making it 30 times larger than the largest fine particle (U.S. EPA, 2021c).

10.2 Summary of $PM_{2.5}$ Emissions

Using readily available data acquired from active APCD permits, 79 facilities have the potential to emit $PM_{2.5}$. These 79 facilities in and within a ½ mile of Commerce City limits total 292 tons/yr $PM_{2.5}$. In Table 10-1 below, the ten (10) highest emitters of estimated actual annual $PM_{2.5}$ emissions have been identified.

Table 10-1. Ten (10) Highest Sources of $PM_{2.5}$ Emissions

Source Name	Source Description	Source Location	Facility Estimated Actual Annual $PM_{2.5}$ (ton/year)
Suncor Energy – Denver Refinery	Petroleum Refinery	5801 Brighton Blvd	119.5
Public Service Co – Cherokee Generating Station	Electric Power Generation	6198 Franklin St	60.84
Allied Waste Systems – Tower Landfill	Solid Waste Landfill	8480 Tower Rd	20.24
Ardent Mills – Commerce City Mill	Animal Feed and Flour Mill	4545 E 64th Ave	16.84
JK Concepts	Woodwork Manufacturing	3333 E 52nd Ave	7.00
Commerce City Grain	Grain Elevator	4600 E 64th Ave	6.29
United Asphalts Inc.	Asphalt Manufacturing	43606 E 60th Ave	5.63
Albert Frei & Sons – Fernald Pit	Construction Sand and Gravel Mining	7281 Colorado Blvd	5.19

Source Name	Source Description	Source Location	Facility Estimated Actual Annual $PM_{2.5}$ (ton/year)
Trustile Doors, LLC	Millwork	1780 E 66th Ave	4.00
Metro Wastewater Reclamation District	Sewage Treatment Facility	6450 York St	3.57

Source: CDPHE APCD 2021

10.3 Sources of $PM_{2.5}$ Emissions

Sources of $PM_{2.5}$ analyzed from data recorded in this report involve the following breakdown of industries, services, and products, including percent of total $PM_{2.5}$ emissions estimates:

- Eight (8) petroleum refining and related industries (44% of total source emissions)
- Four (4) electric gas and sanitary services (30% of total source emissions)
- Zero (0) oil and gas extraction and related services (0% of total source emissions)
- Seven (7) food and kindred products (9% of total source emissions)
- Sixty (60) other industrial services (18% of total source emissions)

10.4 Locations of $PM_{2.5}$ Emissions

Locations of the 79 sources of $PM_{2.5}$ analyzed from data recorded in this report are represented in Figure 7.

$PM_{2.5}$ sources located in the southern portion of the study area south of E 80th Avenue include:

- Thirty-five (35) sources greater than or equal to 0.003 tons/yr and less than or equal to 1.0 tons/yr
- Seventeen (17) sources greater than 1.0 tons/yr and less than or equal to 50.0 tons/yr
- One (1) source greater than 50.0 tons/yr and less than or equal to 100.0 tons/yr
- One (1) source greater than 100.0 tons/yr and less than or equal to 119.5 tons/yr

$PM_{2.5}$ sources located along the western portion of the study area, west of Colorado State Highway 2 and north of E 80th Avenue, include:

- Nineteen (19) sources greater than or equal to 0.003 tons/yr and less than or equal to 1.0 tons/yr
- Four (4) sources greater than 1.0 tons/yr and less than or equal to 50.0 tons/yr
- No sources greater than 50.0 tons/yr and less than or equal to 100.0 tons/yr
- No sources greater than 100.0 tons/yr and less than or equal to 119.5 tons/yr

$PM_{2.5}$ sources located along the northern and eastern portion of Commerce City, east of Colorado State Highway 2, include:

- One (1) source greater than or equal to 0.003 tons/yr and less than or equal to 1.0 tons/yr
- One (1) source greater than 1.0 tons/yr and less than or equal to 50.0 tons/yr
- No sources greater than 50.0 tons/yr and less than or equal to 100.0 tons/yr
- No sources greater than 100.0 tons/yr and less than or equal to 119.5 tons/yr

10.5 Breakdown of $PM_{2.5}$ Emissions

Total $PM_{2.5}$ emissions estimates extrapolated from the data provided by APCD for Adams, Arapahoe, Denver, and Weld Counties, in addition to estimated actual state-wide Colorado emissions totals, are as follows:

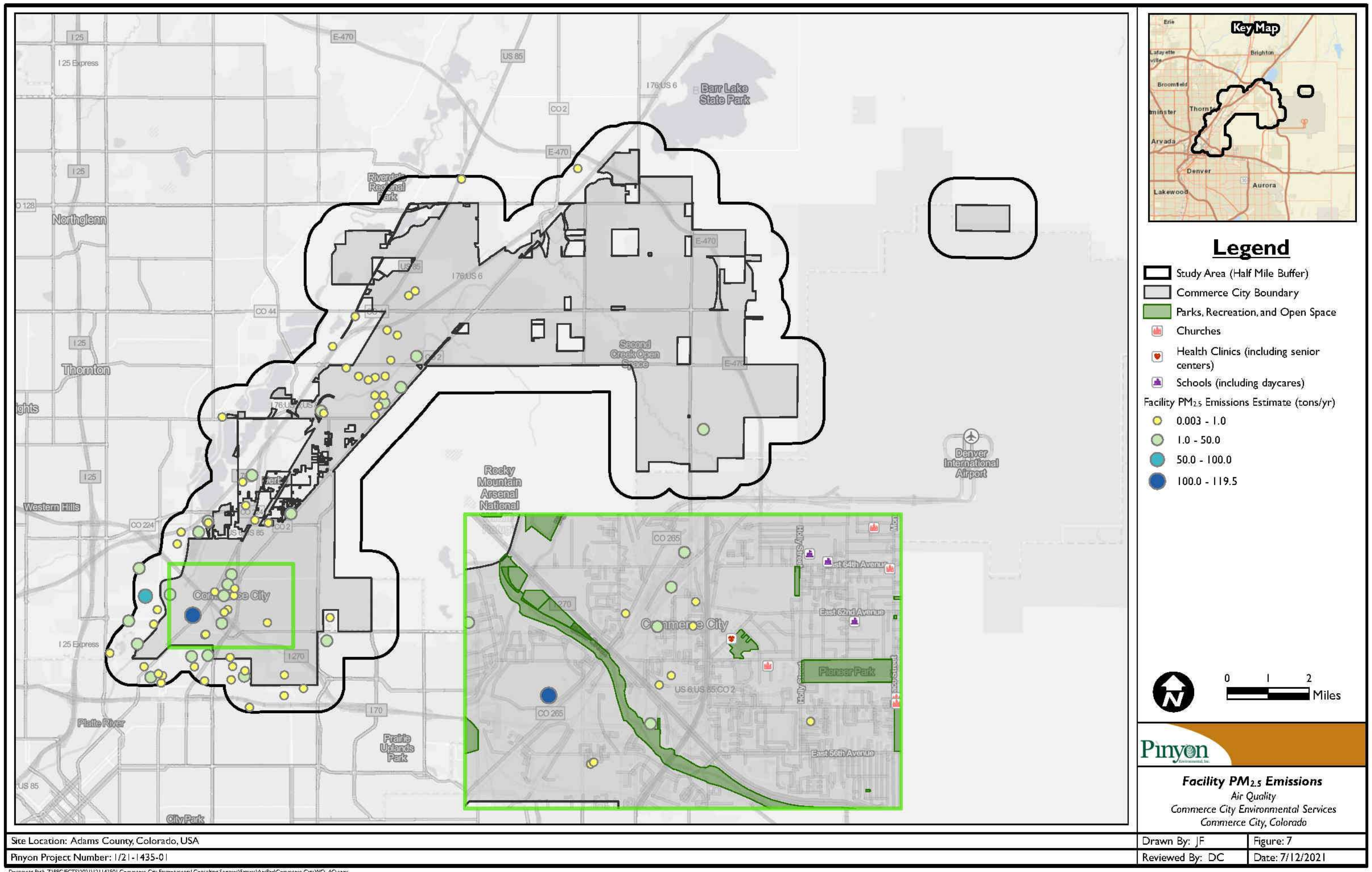
- Adams County – 453 tons/yr
- Arapahoe County – 506 tons/yr
- Denver County – 125 tons/yr
- Weld County – 1,316 tons/yr
- State-wide estimated actual emissions totals – 5,912 tons/yr

Table 10-2. $PM_{2.5}$ Emissions Percentage of Commerce City in County and State Regions

$PM_{2.5}$ Emissions within Study Area	Percent of Adams County Actual Emissions Totals	Percent of State-Wide Actual Emissions Totals
292 tons/yr	64%	5%

Source: CDPHE APCD 2021

Figure 7. Facility $PM_{2.5}$ Emissions



11. Total Hazardous Air Pollutants (HAPs)

Hazardous air pollutants, also known as toxic air pollutants or air toxics, are a series of "known or suspected pollutants to cause cancer or other serious health effects, such as reproductive effects or congenital disabilities, or adverse environmental effects" (U.S. EPA, 2017b). The U.S. EPA currently classifies 187 toxic air pollutants such as benzene, found in gasoline; perchloroethylene, which is emitted from some dry cleaning facilities; and methylene chloride solvent and paint stripper by several industries (U.S. EPA, 2017b). The Total HAPs categorized in the emissions data include acetaldehyde, benzene, ethylbenzene, formaldehyde, n-hexane, toluene, and xylenes.

11.1 Total HAPs Health Concerns

Exposure to toxic air pollutants for prolonged durations may increase the risk of cancer or experiencing other serious health effects. Health effects can damage the immune system and neurological, reproductive (e.g., reduced fertility), developmental, respiratory, and other health problems (U.S. EPA, 2017b).

11.2 Summary of Total HAPs Emissions

Using readily available data acquired from active APCD permits, 43 facilities have the potential to emit Total HAPs. These 43 facilities in and within a ½ mile of Commerce City limits total 124 tons/yr. In Table 11-1 below, the ten (10) highest emitters of estimated actual annual Total HAPs emissions have been identified.

Table 11-1. Ten (10) Highest Sources of Total HAPs Emissions

Source Name	Source Description	Source Location	Facility Estimated Actual Annual Total HAPs (ton/year)
Allied Waste Systems – Tower Landfill	Solid Waste Landfill	8480 Tower Rd	30.12
Suncor Energy – Denver Refinery	Petroleum Refinery	5801 Brighton Blvd	19.74
Public Service Co – Cherokee Generating Station	Electric Power Generation	6198 Franklin St	19.38
U.E Compression – Henderson Facility	Coating & Blasting – Structural Steel	9461 Willow Ct	9.20
Painting & Fiberglass Inc.	Fiber Glass Parts Manufacturing	10201 E 107th Pl	6.58
Phillips 66 Pipeline – Denver Terminal	Petroleum Products Storage/Distribution	3960 E 56th Ave	5.72
Nustar Logistics – Denver Terminal	Petroleum Products Storage/Distribution	3601 E 56th Ave	3.94
Good Paint, LLC	Heavy Equipment Surface Coating	4404 E 60th Ave	3.21
Birko Corp – Chemical Blending Plant	Chemical Mixtures	9152 Yosemite St	2.43

Source Name	Source Description	Source Location	Facility Estimated Actual Annual Total HAPs (ton/year)
Master Builders Solutions – Brighton Facility	Adhesive Manufacturing	10601 Fulton St	2.40

Source: CDPHE APCD 2021

11.3 Sources of Total HAPs Emissions

Sources of Total HAPs analyzed from data recorded in this report involve the following industries, services, and products, including percent of total HAPs emissions estimates:

- Five (5) petroleum refining and related industries (20% of total source emissions)
- Three (3) electric gas and sanitary services (41% of total source emissions)
- Six (6) oil and gas extraction and related services (11% of total source emissions)
- One (1) food and kindred products (0.3% of total source emissions)
- Twenty-eight (28) other industrial services (28% of total source emissions)

11.4 Locations of Total HAPs Emissions

Locations of the 43 sources of Total HAPs analyzed from data recorded in this report are represented in Figure 8.

Total HAPs sources located in the southern portion of the study area south of E 80th Avenue include:

- Twenty-six (26) sources greater than or equal to 0.0006 tons/yr and less than or equal to 10.0 tons/yr
- Two (2) sources greater than 10.0 tons/yr and less than or equal to 25.0 tons/yr
- No sources greater than 25.0 tons/yr and less than or equal to 30.1 tons/yr

Total HAPs sources located along the western portion of the study area, west of Colorado State Highway 2 and north of E 80th Avenue, include:

- Ten (10) sources greater than or equal to 0.0006 tons/yr and less than or equal to 10.0 tons/yr
- No sources greater than 10.0 tons/yr and less than or equal to 25.0 tons/yr
- No sources greater than 25.0 tons/yr and less than or equal to 30.1 tons/yr

Total HAPs sources located along the northern and eastern portion of Commerce City, east of Colorado State Highway 2, include:

- Four (4) sources greater than or equal to 0.0006 tons/yr and less than or equal to 10.0 tons/yr

- No sources greater than 10.0 tons/yr and less than or equal to 25.0 tons/yr
- One (1) source greater than 25.0 tons/yr and less than or equal to 30.1 tons/yr

11.5 Breakdown of Total HAPs Emissions

Total HAPs emissions estimates extrapolated from the data provided by APCD for Adams, Arapahoe, Denver, and Weld Counties, in addition to estimated state-wide Colorado emissions totals, are as follows:

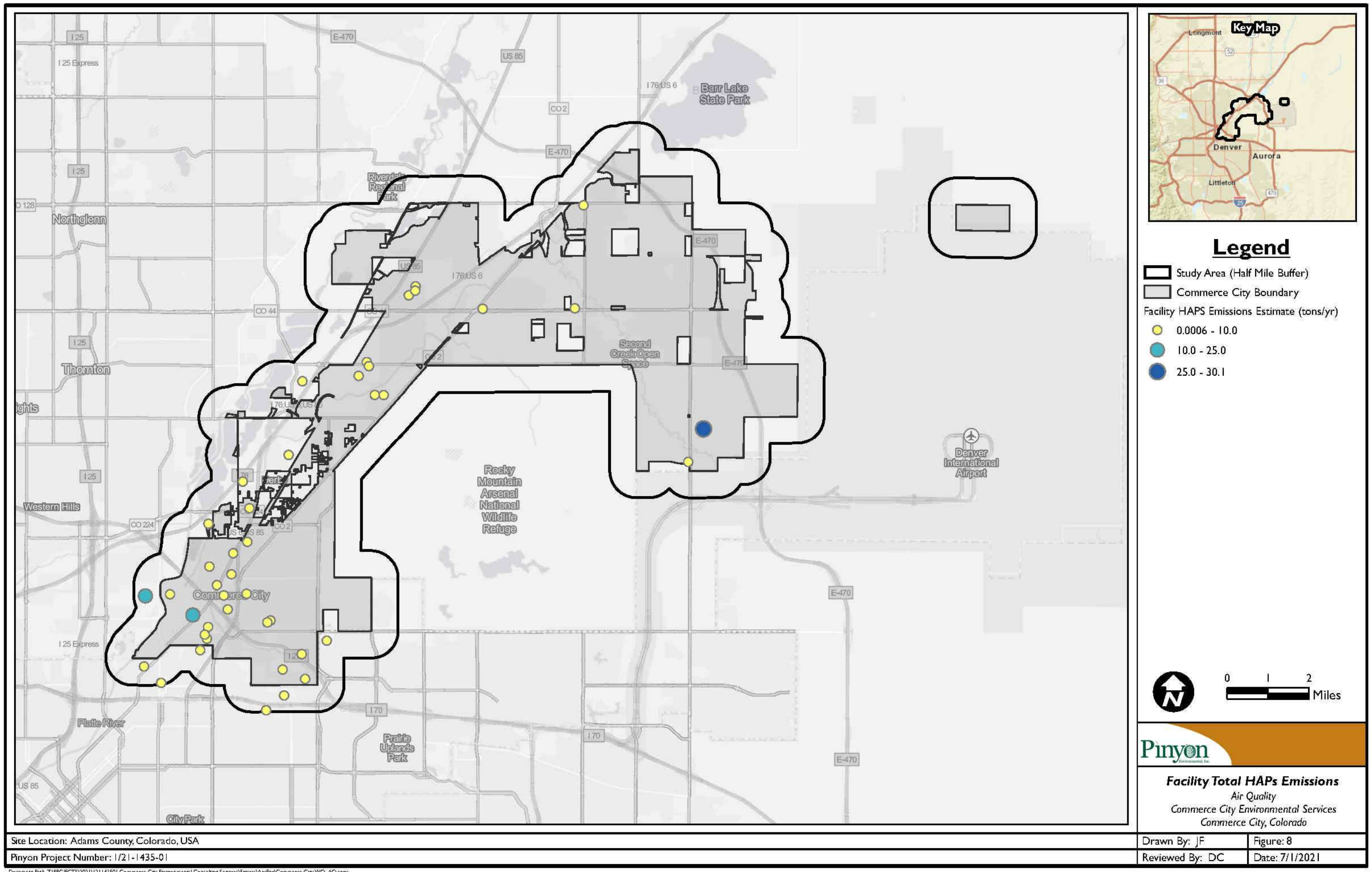
- Adams County – 406 tons/yr
- Arapahoe County – 113 tons/yr
- Denver County – 40 tons/yr
- Weld County – 2,116 tons/yr
- State-wide estimated actual emissions totals – 5,112 tons/yr

Table 11-2. Total HAPs Emissions Percentage of Commerce City in County and State Regions

Total HAPs Emissions within Study Area	Percent of Adams County Actual Emissions Totals	Percent of State-Wide Actual Emissions Totals
124 tons/yr	31%	2%

Source: CDPHE APCD 2021

Figure 8. Facility Total HAPs Emissions



12. Methane (CH_4)

For information on CH_4 emissions within Commerce City, please refer to the 2021 GHG emissions report prepared by Lotus Engineering and Sustainability for Commerce City.

13. Interactive Story Map

Pinyon has organized the air pollutant data within this report into an online, interactive ArcGIS story map. The story map is intended to supplement this community-wide impacts report, providing a narrative and easy access to visualize the associated data. Commerce City can use this as a tool to quickly scope air quality emissions that may be located near communities and businesses to make more informed decisions. In addition, the story map can be viewed and shared with the public or whomever Commerce City provides the ArcGIS login credentials. The story map can be accessed via most web browsers and devices.

To access the Story Map, visit the following hyperlink: __________

14. Data Gaps

Pinyon collected data from 154 emissions sources. Due to the high volume of data and variety of sources from which these data were collected, some data gaps in the community-wide impacts report may exist. In addition, there are thresholds in which sources of air pollution are not required to obtain a permit or file an APEN. Therefore, if a facility does not have a public record of emissions, this does not mean there are no potential emissions from the facility.

Below is a list of data gaps observed by Pinyon during the preparation of the community-wide impacts report:

- The air permits where emissions data were collected are active as of the date of this report. Future use of this report may not reflect estimated actual source emissions as equipment or production at these facilities may change. Pinyon compiled data from the most recent permit submittals filed with APCD. Additional emissions estimates of air pollutants may exist within the study area, such as those currently under APCD review that have not been issued air permits.

- Evaluation of mobile and non-road and on-road sources of pollution such as vehicle exhaust, tractor-trailers, lawnmowers, wood-burning fires, etc., did not occur, as these are not stationary sources that require any sort of documentation of emissions.

- The "shut-in" status of each oil and gas well recorded is current as of the date of this report. Therefore, future use of this report may not reflect future well status.

- Both the area attainment statuses and NAAQS screening levels presented in this report are current as of the date of this report. Therefore, future use of this report may not reflect then-current regulatory conditions.

15. References

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Appendix B. AQ and WQ Technical Documents

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Memorandum

Date:	December 22, 2021
To:	Anita Riley, Principal Planner, Commerce City
From:	Dustin Collins, Pinyon Environmental, Inc.
Subject:	Existing and Potential Ambient Air Monitoring in Commerce City

Introduction

Pinyon Environmental, Inc. (Pinyon) is pleased to present this memorandum detailing existing and upcoming ambient air monitoring within and near Commerce City, along with information for reference to support the development of a potential Commerce City operated monitoring network that would fill the gaps in areas not currently receiving air quality data. The existing and upcoming monitoring includes an evaluation of the Colorado Department of Public Health and Environment (CDPHE) Air Pollution Control Division's (APCD) network of air pollution monitoring stations within the vicinity of Commerce City. Additionally, this memo discusses air quality monitoring networks under development by third parties: Cultivando and Suncor Energy (Suncor). The purpose of this memo is to discuss air pollution monitoring occurring within the vicinity of Commerce City by both public and private entities and to identify areas where additional monitoring technology may be beneficial to bolster air quality public health transparency and awareness to the Commerce City community.

APCD Colorado Air Monitoring Network Overview

As of 2021, APCD conducts air quality and meteorological monitoring at 44 locations statewide. Of those 44 locations, two (2) air quality monitors are located within the vicinity of Commerce City. Ozone (O_3) and particulate matter (PM) monitors, including those for particulate matter less than 10 micrometers (µm) in diameter (PM_{10}) and particulate matter less than 2.5 µm in diameter ($PM_{2.5}$), are the most abundant and widespread monitors in the network. In addition, APCD operates 18 meteorological sites statewide, continuously measuring wind speed, wind direction, resultant speed, resultant direction, standard deviation of horizontal wind direction, and temperature. Both active and inactive APCD monitors located within the vicinity of Commerce City discussed in this memo can be found in Tables 1 and 2, respectively. Additionally, all active air quality monitors situated in the vicinity of Commerce City can be found in Figure 1.

Please note the pollutant concentrations outlined in this memo were retrieved from the Colorado APCD 2021 Ambient Air Monitoring Network Plan (CDPHE 2021), summarizing pollutant values recorded at monitoring stations in the Denver Metro/Northern Front Range region during the reporting year (RY) 2020.

Table 1. Active APCD Monitor Sites Located Within the Vicinity of Commerce City

Site Name	Monitor Location	Pollutants Monitored
Birch Street	7275 Birch St	PM_{10} & $PM_{2.5}$
Welby	3174 E 78th Ave	O_3, CO, NO_2, SO_2 & PM_{10}

Source: CDPHE 2021

Table 2. Inactive APCD Monitor Sites Located Within the Vicinity of Commerce City

Site Name	Monitor Location	Pollutants Monitored
Tri-County	4201 E 72nd Ave D	PM_{10} & $PM_{2.5}$

Source: CDPHE 2021

Active Monitor Sites Located Within the Vicinity of Commerce City

Adams County Birch Street

The Adams County Birch Street (Birch Street) monitor site began operation on March 1, 2021, and is located in a predominantly residential area with a large commercial and industrial district. It is located north of the Denver Central Business District (CBD) near the Platte River Valley, downstream from the Denver urban air mass. There are three (3) schools in the vicinity of the monitor, Alsup Elementary School to the south, Adams County Middle School to the east, and Lester Arnold High School to the east. In addition, there is a large industrial area to the south and east and gravel pits roughly a half mile to the west and northwest. The Birch Street monitor is part of the State or Local Air Monitoring Stations (SLAMS) Network and is population-oriented for a neighborhood scale.

Welby

The Welby monitor site began operation in 1973 and is located eight (8) miles north-northeast of the Denver CBD on the bank of the South Platte River. This site is ideally located to measure nighttime drainage of the air mass from the Denver metropolitan area and the thermally driven daytime upriver flows (CDPHE 2021). In addition, according to APCD, monitoring at this location shows that high carbon monoxide (CO) levels are associated with winds from the south-southwest (CDPHE 2021). The Welby monitor is also part of the SLAMS Network and is population-oriented for a neighborhood scale.

Inactive Monitor Sites Located Within the Vicinity of Commerce City

Tri-County Health Department – Commerce City

The Tri-County Health Department - Commerce City site was relocated to the Adams County Birch Street site on November 2, 2020, due to a roofing project and accessibility issues at the property during 2020.

As previously discussed, the pollutant concentrations recorded in this memo were retrieved from the Colorado APCD 2021 Ambient Air Monitoring Network Plan for RY 2020. Therefore, the pollutant concentrations presented in this memo are for the Tri-County Health Department – Commerce City and Welby monitor locations, respectively. In addition, the Birch Street monitor pollutant concentrations for 2021 will be recorded in Colorado APCD 2022 Ambient Air Monitoring Network Plan.

Pollutants Monitored at Sites Within the Vicinity of Commerce City

Carbon Monoxide (CO)

As of 2020, the APCD operated one (1) CO monitor within the vicinity of Commerce City located in Welby. The current National Ambient Air Quality Standards (NAAQS) for CO, primary standard only, has a concentration level of nine (9) parts per million (ppm) in an eight-hour period or 35 ppm in a one-hour period. CO does not currently have a secondary standard. Since 1973, CO levels have declined from a statewide maximum eight-hour value of 48.1 ppm to 2.0 ppm in 2020 (CDPHE 2021). The Welby monitor site has not recorded an exceedance of either the one-hour or eight-hour CO standard since January 1988 (CDPHE, 2021).

Mobile sources (primarily vehicles) are the main contributor to elevated CO levels in Commerce City (CDPHE 2021). Additional sources include controlled burns, wildfires, and biogenic influences, including oil and gas development (CDPHE 2021). CO National Ambient Air Quality Standards (NAAQS) standards and maximum one-hour and eight-hour CO concentrations recorded in 2020 at the Welby monitor site can be found in Tables 3 and 4, respectively.

Table 3. CO NAAQS Standards

Pollutant	CO 1-Hour Primary Standard (ppm)[1]	CO 8-Hour Primary Standard (ppm)[1]
CO	35	9

Source: U.S. EPA 2021

1. Not to be exceeded more than once per year.

Table 4. CO Values Recorded at the Welby Monitor Site

Site Name	CO 1-Hour Average (ppm)		CO 8-Hour Average (ppm)	
	1st Max	2nd Max	1st Max	2nd Max
Welby	1.9	1.9	1.2	1.2

Source: CDPHE 2021

Ozone (O_3)

As of 2020, the APCD operated one (1) O_3 monitor within the vicinity of Commerce City located in Welby. The current NAAQS for O_3, both primary and secondary standards, has a concentration level not to exceed 70 parts per billion (ppb) in an eight-hour time period. The United States Environmental Protection Agency (US EPA) state monitoring requirements for O_3 include placing a certain number of monitors in areas with high populations. For example, in Metropolitan Statistical Areas (MSAs) with a population of 350,000 – 4,000,000 people, the US EPA recommends the placement of at least two (2) monitors in areas with design value concentrations that are greater than or equal to 85% of the O_3 standard and one (1) monitor in areas with design value concentrations that are less than or equal to 85% of the O_3 standard (CDPHE 2021).

Commerce City is part of the Denver-Aurora-Lakewood Primary Metropolitan Statistical Area (PMSA), with a population of 2,963,821 as of the 2020 United States census (US Census 2021). Welby has not recorded an exceedance of either the one-hour or eight-hour O_3 standard since 1998 (CDPHE 2021). However, the trend in the 3-year average of the 4th maximum eight-hour average has been increasing since 2002 (CDPHE 2021).

Major sources of Nitrous Oxides (NO_x) and Volatile Organic Compounds (VOCs) in the atmosphere originate from emissions from industrial facilities and electric utilities, oil and gas development, vehicle exhaust, gasoline vapors, and chemical solvents (CDPHE, 2021). In the presence of sunlight, NO_x and VOCs chemically react to form ground-level ozone. O_3 NAAQS standards and first and fourth maximum eight-hour O_3 concentrations recorded in 2020 at the Welby monitor site can be found in Tables 5 and 6, respectively. Additionally, the current three-year design value for the Welby monitor site is listed.

Table 5. O_3 NAAQS Standards

Pollutant	O_3 8-Hour Primary & Secondary Standard (ppb)[1]
O_3	70

Source: U.S. EPA 2021

[1.] Annual fourth-highest daily maximum 8-hour concentration, averaged over three (3) years.

Table 6. O_3 Values Recorded at the Welby Monitor Site

Site Name	O_3 8-Hour Average (ppb)		
	1st Max	4th Max	3-Year Ave. of 4th Max. 8-Hr
Welby	86	78	69

Source: CDPHE APCD 2021

Nitrogen Dioxide (NO_2)

As of 2020, APCD operated one (1) NO_2 monitor within the vicinity of Commerce City located in Welby. The current NAAQS for NO_2, both primary and secondary, is a 1-hour standard at a level of 100 ppb based on the 3-year average of 98th percentile of the yearly distribution of 1-hour maximum daily concentrations and an annual standard at a level of 53 ppb. As of 2020, the Welby monitor has never exceeded the NO_2 annual average NAAQS of 53 ppb or the one-hour NAAQS of 100 ppb.

The formation of NO_2 in the atmosphere occurs primarily from fuel-burning, such as combustion from cars, trucks and buses, power plants, and off-road equipment. NO_2 NAAQS standards and the annual mean and 98th percentile one-hour NO_2 concentrations recorded in 2020 at the Welby monitor site can be found in Tables 7 and 8, respectively.

Table 7. NO_2 NAAQS Standards

Pollutant	NO_2 1-Hour Primary Standard (ppb)[1]	NO_2 1-Year Primary & Secondary Standard (ppb)[2]
NO_2	100	53

Source: U.S. EPA 2021

[1.] 98th percentile of 1-hour maximum daily concentrations, averaged over three (3) years.
[2.] Annual mean

Table 8. NO_2 Values Recorded at the Welby Monitor Site

Site Name	NO_2 (ppb)		
	Annual Mean	98th Percentile	3-Year Ave. of 98th Percentile
Welby	15.5	57.3	60

Source: CDPHE APCD 2021

Sulfur Dioxide (SO_2)

As of 2020, the APCD operated one (1) SO_2 monitor within the vicinity of Commerce City located in Welby. The current primary NAAQS for SO_2, established in 2010, is 75 ppb based on the 3-year average of the 99th percentile of the yearly distribution of 1-hour maximum daily concentrations. The current secondary NAAQS for SO_2, retained in 2012, is 500 ppb average over three hours, not to be exceeded more than once per year.

US EPA NAAQS for SO_2 are designed to protect against exposure to the entire group of sulfur oxides (SO_X) (CDPHE, 2021). The formation of SO_2 present in the atmosphere occurs primarily from the burning of fossil fuels by power plants and other industrial facilities (CDPHE, 2021). SO_2 NAAQS standards and the annual mean and 99th percentile one-hour daily maximum concentrations recorded in 2020 at the Welby monitor site can be found in Tables 9 and 10, respectively.

Table 9. SO_2 NAAQS Standards

Pollutant	SO_2 1-Hour Primary Standard (ppb)[1]	SO_2 3-Hours Secondary Standard (ppm)[2]
SO_2	75	0.5

Source: U.S. EPA 2021

1. 99th percentile of 1-hour maximum daily concentrations, averaged over three (3) years
2. Not to be exceeded more than once per year

Table 10. SO_2 Values Recorded at the Welby Monitor Site

Site Name	SO_2 (ppb)		
	Annual Mean	99th Percentile	3-Year Ave. of 99th Percentile
Welby	0.69	6	9

Source: CDPHE 2021

Particulate Matter (PM)

As of 2020, the APCD operated two (2) PM_{10} monitors and one (1) $PM_{2.5}$ monitor within the vicinity of Commerce City, located at Tri-County and Welby. The current primary NAAQS for PM_{10}, retained in 2020, is 150 micrograms per cubic meter ($\mu g/m^3$) based on 24-hour standards with one allowed exceedance. The current primary and secondary NAAQS for $PM_{2.5}$, retained in 2020, are annual average standards with levels of 12.0 $\mu g/m^3$ and 15.0 $\mu g/m^3$, respectively, and 35 $\mu g/m^3$ 24-hour standard with 98th percentile forms and levels.

The formation of PM in the atmosphere results from complex reactions of chemicals such as SO_2 and NO_2 formed from power plants, industries, and automobiles (CDPHE, 2021). Additionally, some PM is emitted directly from a fugitive dust source, such as construction sites, unpaved roads, fields, smokestacks, or fires. $PM_{10/2.5}$ NAAQS standards and the annual mean and 99th percentile one-hour maximum daily concentrations recorded in 2020 at the Tri-County and Welby monitor sites can be found in Tables 11, 12, and 13, respectively.

Table 11. $PM_{10/2.5}$ NAAQS Standards

Pollutant	PM_{10} 24-Hours Primary & Secondary Standard (µg/m³)[1]	$PM_{2.5}$ 24-Hours Primary & Secondary Standard (µg/m³)[2]	$PM_{2.5}$ 1-Year Primary Standard (µg/m³)[3]	$PM_{2.5}$ 1-Year Secondary Standard (µg/m³)[4]
PM_{10}	150	-	-	-
$PM_{2.5}$	-	35	12.0	15.0

Source: U.S. EPA 2021

1. Not to be exceeded more than once per year on average over three (3) years
2. 98th percentile, averaged over three (3) years
3. Annual mean, averaged over three (3) years
4. Annual mean, averaged over three (3) years

Table 12. PM_{10} Values Recorded at the Tri-County and Welby Monitor Sites

Site Name	PM_{10} (µg/m³)		
	Annual Average	24-Hr Max	3-Year Exceedances
Tri-County	36.6	139	0
Welby	34.8	111	0

Source: CDPHE 2021

Table 13. $PM_{2.5}$ Values Recorded at the Tri-County Monitor Site

Site Name	$PM_{2.5}$ (µg/m³)		
	Annual Average	Annual 98th Percentile	3-Year Ave. of 98th Percentile
Tri-County	9.8	27.8	26

Source: CDPHE 2021

Monitoring Performed by Third Parties

Cultivando

Cultivando is currently implementing a continuous monitoring network surrounding the Suncor oil refinery to characterize air pollution and the resulting health and societal impacts. Therefore, all information listed within this section is preliminary and could be subject to change as the monitoring network has not been implemented yet. Two (2) air pollution monitoring and reporting platforms will be deployed: one (1) fixed monitor within one-fourth mile of the refinery to characterize source emissions and one (1) mobile van deployed in adjacent neighborhoods to evaluate the community's exposure to the refinery's emissions. The monitoring data gathered from both sites will be processed in real-time for posting within minutes to a public web portal. Cultivando is confident this monitoring effort, once developed, will represent the most comprehensive air monitoring program conducted of the Suncor oil refinery and one of the most comprehensive air monitoring programs in the state.

Monitored pollutants will include Ozone, Methane, VOCs (including the classes of hazardous air pollutants (HAPs) and BTEX species (Benzene, Toluene, Ethylbenzene, and Xylenes), Hydrogen Cyanide, Carbon Monoxide, Carbon Dioxide, Sulfur Dioxide, Dimethylsulfide, Nitric Oxide, Nitrogen Dioxide, Particulate Matter, and airborne radioactivity.

Suncor Energy

Suncor has developed an air monitoring program, Commerce City North Denver (CCND) Air Monitoring, in a coordinated and collaborative manner with existing air monitoring networks in the Commerce City and North Denver communities. Suncor has contracted Montrose Air Quality Services, LLC (Montrose) to deploy, maintain, and operate CCND Air Monitoring around their operations facilities and local communities to provide real-time air quality data. Deployment of the network was completed on August 3, 2021, and includes a network of air pollution sensor technology redeveloped with solar power capabilities, battery storage, and data connectivity. The network currently consists of eight (8) separate monitoring locations with measurement data transmitted to a platform dashboard—the dashboard displays near real-time data and recent alerts. Information on the equipment deployed and community monitor locations can be found in Tables 14 and 15, respectively.

In addition to the CCND Air Monitoring, Montrose will periodically deploy a mobile lab to specific sensitive neighborhoods capable of detecting ethane, ethene, propane, benzene, toluene, ethylbenzene, xylene (BTEX), etc. and hydrogen cyanide.

Table 14. Summary of Equipment

Equipment Model	Pollutant/Parameter
Canary-S	Total VOC (TVOC), $PM_{2.5}$, Ambient Temperature, Relative Humidity, Wind Speed, and Direction
AQMesh Pod	SO_2, CO, NO, NO_2 & H_2S
AQM65	TVOC, SO_2, CO, NO, NO_2, H_2S, $PM_{2.5}$, Ambient Temperature, and Relative Humidity
Summa Canisters	Speciated VOC

Source: Montrose 2021

Table 25. Summary of Deployment

Location	Facility	Address	Equipment
Community Monitoring Site 1	Rose Hill Elementary	6900 E 58th Ave	Canary-S AQMesh
Community Monitoring Site 2	Suncor – Refinery Business Center	5801 Brighton Blvd	Canary-S AQMesh AQM65
Community Monitoring Site 3	Adams City High School	7200 Quebex Pkwy	Canary-S AQMesh

Location	Facility	Address	Equipment
Community Monitoring Site 4	Adams City Middle School	4451 E 72nd Ave	Canary-S AQMesh
Community Monitoring Site 5	Central Elementary School	6450 Holly St	Canary-S AQMesh
Community Monitoring Site 6	Focus Point Family Resource Center	2501 E 48th Ave	Canary-S AQMesh AQM65
Community Monitoring Site 7	Kearney Middle School	6160 Kearney St	Canary-S AQMesh AQM65
Community Monitoring Site 8	Suncor – Monroe St Property	6599-6401 Monroe St	Canary-S AQMesh

Source: Montrose 2021

Commerce City Monitoring Potential Network Locations

With consideration of the existing and upcoming monitoring detailed above, Pinyon recommends that Commerce City install 20 additional air monitors within city limits (see Figure 2). These locations are based on gaps identified in areas of Commerce City not currently capturing monitoring data. The monitors should collect measurement data as needed based on location but could include up to the following pollutants: Ozone, Methane, VOCs, HAPs BTEX, Hydrogen Cyanide, CO, Carbon Dioxide, SO_2, Dimethylsulfide, Nitric Oxide, NO_2, and Particulate Matter. Some pollutants may not be needed depending on the area, but Commerce City should decide the breadth of the network and its contractor before deployment. Data from the network of monitors should be transmitted to the platform dashboard, which would display near real-time data and alerts, as applicable. Information on the equipment deployed and proposed monitor locations can be found in Table 16. Following Table 16 is pertinent information specific to the proposed location.

Table 16. Proposed Air Monitor Sites Located Within the Vicinity of Commerce City

Location	Approximate Monitor Address
Proposed Monitoring Site 1	8221 E. 96th Avenue
Proposed Monitoring Site 2	Intersection at Highway 2 and E. 96th Avenue
Proposed Monitoring Site 3	Intersection at E. 104th Avenue and Potomac Street
Proposed Monitoring Site 4	9650 Ouray Street
Proposed Monitoring Site 5	Intersection at E. 96th Ave and Tower Road
Proposed Monitoring Site 6	9000 E-470
Proposed Monitoring Site 7	Intersection at E-470 and E. 96th Avenue
Proposed Monitoring Site 8	Intersection at Himalaya Road and E. 110th Avenue

Location	Approximate Monitor Address
Proposed Monitoring Site 9	Tower Road Bridge overpass, over E-470
Proposed Monitoring Site 10	E. 120th Avenue and E-470
Proposed Monitoring Site 11	E .120th Avenue and Buckeye Road
Proposed Monitoring Site 12	E-470 overpass at Cameron Drive
Proposed Monitoring Site 13	E. 120th Avenue and Chambers Road
Proposed Monitoring Site 14	Highway 2 and Potomac Street
Proposed Monitoring Site 15	E. 114th Avenue and Trussville Street
Proposed Monitoring Site 16	7740 Dahlia Street
Proposed Monitoring Site 17	Brighton Road and E. 88th Ave
Proposed Monitoring Site 18	9109 Monaco Street
Proposed Monitoring Site 19	Brighton Road and E. 112th Avenue
Proposed Monitoring Site 20	Havana Street and E. 112th Avenue

Proposed Monitoring Site 1

The proposed monitor at 8221 E. 96th Avenue is located in the heavy intensity industrial district (I-3), southeast of the RK Steel and RK Energy facility. There are three (3) schools in the vicinity, Dupont Elementary School, approximately two and a half (2.5) miles to the south, and Monterey Elementary and Clayton Partnership Schools, four (4) miles to the southwest.

Proposed Monitoring Site 2

The proposed monitor is located at Highway 2 and E. 96th Avenue intersection, just outside a large residential development. The monitor is located within the planned unit development (PUD) zoning district. There are two (2) schools in the vicinity, Second Creek Elementary School and Stuart Middle School, approximately three (3) miles to the east from the proposed monitor location.

Proposed Monitoring Site 3

The proposed monitor located at the E. 104th Avenue and Potomac Street intersection is situated just outside of large residential development. The monitor is located within the PUD zoning district. There are four (4) schools in the vicinity, Turnberry Elementary School, approximately one-half (0.5) mile northwest, Stuart Middle School one mile to the southeast, and Second Creek Elementary School one and a half (1.5) miles to the southeast.

Proposed Monitoring Site 4

The proposed monitor located at 9650 Ouray Street is positioned on the southeast corner of a large residential development within the PUD zoning district. There are two (2) schools in the vicinity, Second Creek Elementary School one-half (0.5) mile to the northwest and Stuart Middle School, just under a mile from the proposed monitor location.

Proposed Monitoring Site 5

The proposed monitor located at the E. 96th Ave and Tower Road intersection is situated southeast of several residential communities and west of the E-470 toll road. The monitor location is within the PUD zoning district and is approximately two (2) miles from Second Creek Elementary School and Stuart Middle School.

Proposed Monitoring Site 6

The proposed monitor is located south of the E. 96th Avenue on-ramp to E-470, at 9000 E-470. This monitor is situated northeast of Tower Landfill and southeast of several residential communities. The monitor location is positioned within two (2) PUD zoning districts and is approximately three (3) miles southeast of Second Creek Elementary School and Stuart Middle School.

Proposed Monitoring Site 7

The proposed monitor is located within the PUD zoning district, at the E-470 and E. 96th Avenue intersection. This monitor is situated on the easternmost portion of the Commerce City boundary and is approximately three (3) miles southeast of Second Creek Elementary School and Stuart Middle School.

Proposed Monitoring Site 8

The proposed monitor is located at the Himalaya Road and E. 110th Avenue intersection, to the northeast of a small residential community. The monitor location is situated approximately two (2) miles to the east of Reunion Elementary School and three miles northeast of Stuart Middle School and Second Creek Elementary School.

Proposed Monitoring Site 9

The proposed monitor is located on the Tower Road Bridge overpass, along E-470. This monitor location is situated between several residential communities and is approximately one (1) mile northeast of Reunion Elementary School.

Proposed Monitoring Site 10

The proposed monitor is located within the PUD zoning district, at the E. 120th Avenue on-ramp to northbound E-470. The monitor is situated between several residential communities and one (1) mile to the north of Reunion Elementary School.

Proposed Monitoring Site 11

The proposed monitor is located at the E. 120th Avenue and Buckeye Road intersection, on the east side of a residential community. This monitor is approximately one (1) to two (2) miles northeast of the Reunion Elementary School, Landmark Academy, and the Buffalo Run Golf Course.

Proposed Monitoring Site 12

The proposed monitor is located at the E-470 overpass at Cameron Drive. This monitor is located to the north of several residential communities and recreational facilities.

Proposed Monitoring Site 13

The proposed monitor located at the E. 120th Avenue and Chambers Road intersection is approximately two (2) miles northwest of Reunion Elementary School and Landmark Academy. Recreational facilities like HOA

Park to the north and the Stampede and Villages East Park to the south surround the suggested monitor location.

Proposed Monitoring Site 14

The proposed monitor located at Highway 2 and Potomac Street intersection is approximately one (1) mile north of Turnberry Elementary School and two (2) miles northwest of Reunion Elementary, Landmark Academy, and Rocky Mountain Lutheran High School. Additionally, the proposed monitor is northwest of the Bison Ridge Recreation Center and southwest of the Stampede and Villages East Parks.

Proposed Monitoring Site 15

The proposed monitor is located just south of Commerce City limits, at the E. 114th Avenue and Trussville Street intersection. This proposed monitor is within the PUD zoning district, north of the Denver Fire ARFF Fire Training Center.

Proposed Monitoring Site 16

The proposed monitor located at 7740 Dahlia Street is just north of Commerce City limits. It is situated between Interstate 76 and several industrial facilities. There are two (2) schools in the vicinity, Adams City Middle School, approximately one-half (0.5) mile southwest, and Adams City High School, just over one and a half (1.5) miles to the southeast.

Proposed Monitoring Site 17

The proposed monitor located at the Brighton Road and E. 88th Avenue intersection is situated to the north of a large, manufactured home community.

Proposed Monitoring Site 18

The proposed monitor located at 9109 Monaco Street is located in the medium industrial district (I-2), southeast of the A1 Organics facility.

Proposed Monitoring Site 19

The proposed monitor located at the Brighton Road and E. 112th Avenue intersection is within the PUD zoning district, to the southwest of a large residential community. There are three (3) schools in the vicinity, Hazeltine School, approximately one quarter (0.25) mile southwest, Belle Creek Charter School, one-half (0.5) mile south, and Thimmig Elementary School, one and a half (1.5) miles northeast.

Proposed Monitoring Site 20

The proposed monitor located at the Havana Street and E. 112th Avenue intersection is within the PUD zoning district, northwest of several residential communities. There are four (4) schools in the vicinity, Prairie View High School one (1) mile to the east, Thimmig Elementary School one (1) mile to the southeast, Belle Creek Charter School two (2) miles to the southwest and Turnberry Elementary School two (2) miles to the southeast.

Monitoring Hardware and Data

As presented in the existing and planned air monitoring sections above, many monitors being operated at a local level (non-EPA monitors) utilize low-cost "fence-post" or "bird-box" monitors that have many advantages. This monitoring technology is rapidly advancing to approach accuracy levels that rival EPA reference method monitors. Additionally, these low-cost monitors are more portable. They can have pollutant sensors added and removed from them that provide flexibility that is advantageous to municipalities like Commerce City, allowing for quick response to public air quality concerns or industrial pollutant releases.

This memo recommends that low-cost monitors be combined with a real-time data platform that provides user-friendly numeric and graphical displays for public access. These displays can better inform the community when the general population or those with higher high-risk conditions (such as asthma) should limit or adjust outdoor activities.

Pinyon will recommend specific monitors, data platforms, and associated costs after collaboration with Commerce City regarding specific needs and funding.

Summary and Conclusions

This Existing and Potential Ambient Air Monitoring Technical Memorandum has been developed to provide Commerce City with the information they need to potentially install a monitoring network that would provide the City with ambient air data focused mainly in areas in the City that are not currently collecting data. The monitoring network's purpose would be to provide citizens with air quality data. This plan is meant to provide the City with a base of information that can be tailored to specific pollutants or areas that the City underscores the need for.

As described above, ambient air monitoring is currently taking place, with plans for additional monitoring upcoming. But there are areas of the City, as seen in Figure 1, that do not currently have monitors or plans for monitors in the near future.

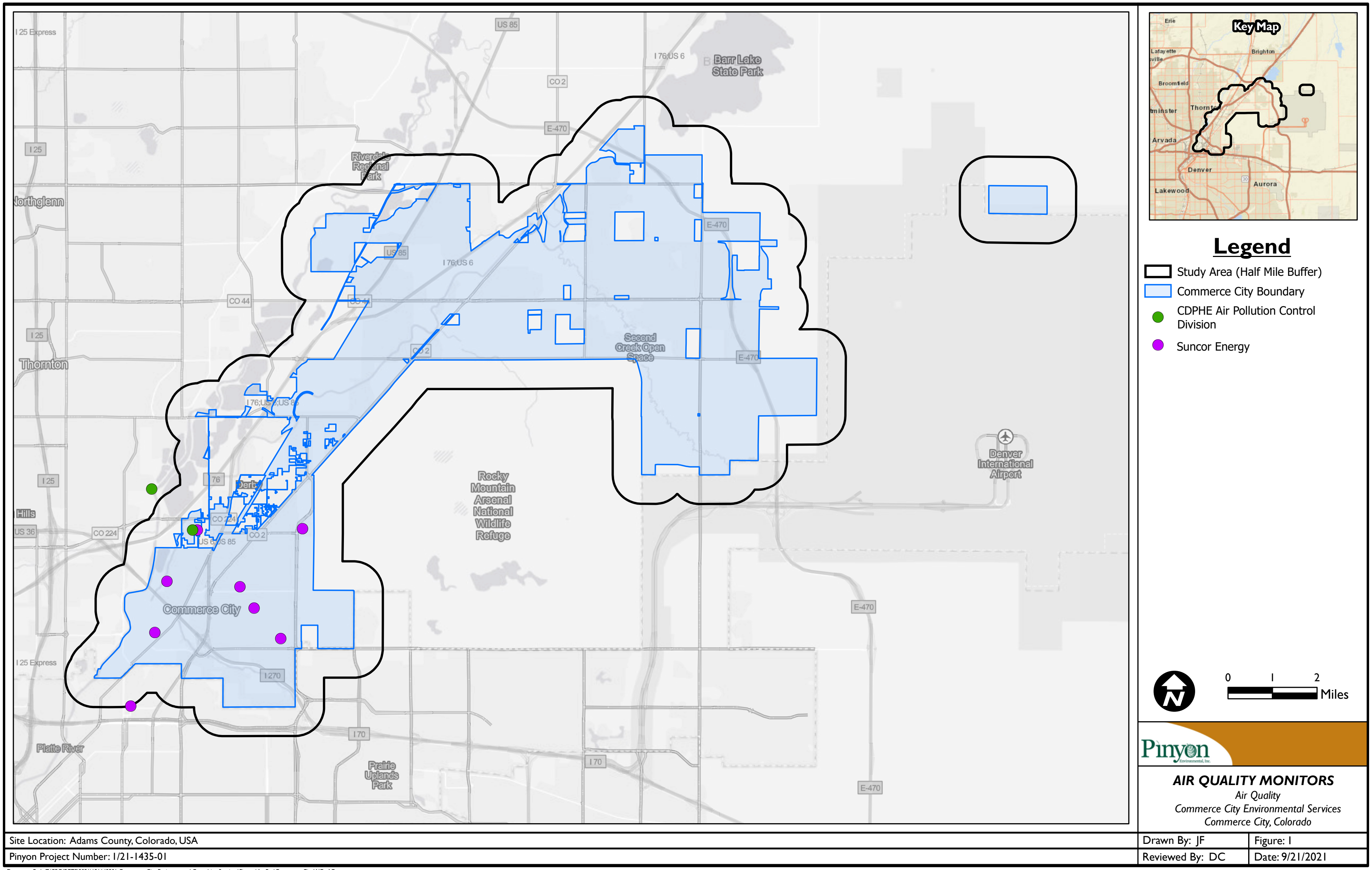
References

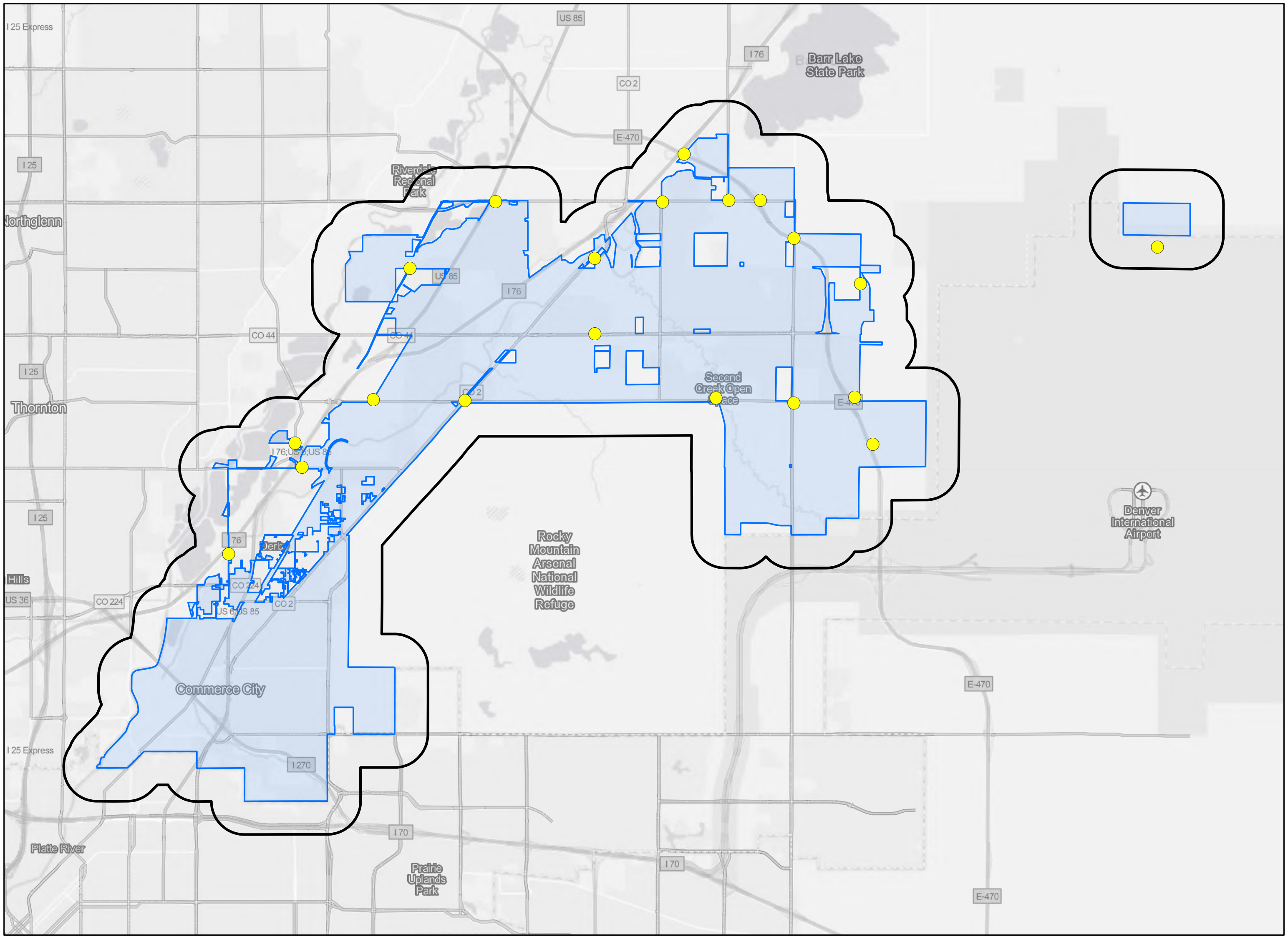
Colorado Air Quality Department of Public Health & Environment (CDPHE), 2021. *2021 Ambient Air Monitoring Network Plan*. Accessed from: https://www.colorado.gov/airquality/tech_doc_repository.aspx.

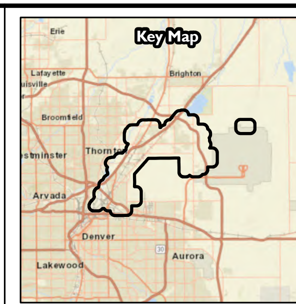
Montrose Air Quality Services (Montrose), 2021. *Quality Assurance Project Plan Suncor Energy (USA) – Commerce City Refinery Ambient Air Monitoring Program Commerce City, Colorado.* Accessed from: https://www.ccnd-air.com/Documents/.

United States Environmental Protection Agency (U.S. EPA), 2021. *NAAQS Table.* Accessed from: https://www.epa.gov/criteria-air-pollutants/naaqs-table.

United States Census Bureau, 2019. *Metropolitan and Micropolitan Statistical Areas Population Totals and Components of Change: 2010-2019*. Accessed from: https://www.census.gov/data/tables/time-series/demo/popest/2010s-total-metro-and-micro-statistical-areas.html


Key Map
Erie
Lafayette
Brighton
Broomfield
Thornton
Arvada
Denver
Aurora
Lakewood
Legend
Study Area (Half Mile Buffer)
Commerce City Boundary
CDPHE Air Pollution Control Division
Suncor Energy
0
1
2
Miles
Barr Lake State Park
Riverdale Regional Park
Northglenn
Thornton
Derby
Commerce City
Second Creek Open Space
Rocky Mountain Arsenal National Wildlife Refuge
Denver International Airport
Platte River
Prairie Uplands Park
I 25 Express
I 25
I 76;US 6
I 70
I 270
E-470
US 85
US 36
CO 2
CO 44
CO 224
Pinyon
AIR QUALITY MONITORS
Air Quality
Commerce City Environmental Services
Commerce City, Colorado
Site Location: Adams County, Colorado, USA
Pinyon Project Number: 1/21-1435-01
Drawn By: JF
Figure: 1
Reviewed By: DC
Date: 9/21/2021
Document Path: Z:\PROJECTS\2021\121143501 Commerce City Environmental Consulting Services\Figures\ArcPro\Commerce City WQ_AQ.aprx





Legend

- Study Area (Half Mile Buffer)
- Commerce City Boundary
- Suggested Monitor Location

N

0 1 2 Miles

Pinyon Environmental, Inc.

SUGGESTED MONITORS

Air Quality

Commerce City Environmental Services

Commerce City, Colorado

Site Location: Adams County, Colorado, USA	Drawn By: JF
	Figure: 2
Pinyon Project Number: 1/21-1435-01	Reviewed By: DC
	Date: 12/17/2021

Document Path: Z:\PROJECTS\2021\121143501 Commerce City Environmental Consulting Services\Figures\ArcPro\Commerce City WQ_AQ.aprx

Attachment A – January 2022 Equipment Information and Costs Estimates

Introduction

The monitoring equipment recommendation and specifications, along with the current cost estimate, are meant to represent Pinyon's recommendation as of January 2022. This recommendation takes into consideration currently available air monitoring technology, combined with Commerce City's financial and technical needs for air monitoring.

Monitoring Equipment

As presented in more detail in the report above, there is a range from high-cost stationary monitors to low-cost portable "bird-box" or "fence-post" type monitoring sensors. We are recommending that due to technological advances in the low-cost monitors, including increases in accuracy and reliability, that Commerce City take advantage of these monitors for multiple reasons including cost and location flexibility. EPA Reference Method monitors should be considered if monitoring data were going to be used to make regulatory decisions or determine an area's attainment status.

At this time, Pinyon is recommending the use of monitor sensors and associated equipment developed and manufactured by QuantAQ, Inc.; a company building these technologically advanced low-cost monitors that would serve the needs of Commerce City. QuantAQ builds sensor networks that have advanced machine learning capabilities allowing them to collect accurate data, while continuously acheiving remote calibrations and up-keep, limiting in-person maintenance needs and thus cost.

The specific monitors QuantAQ produces (and are itemized in the costs in Table A.1. below) are their MODULAIR monitors that can be provided with PM_1, $PM_{2.5}$, and PM_{10} size distribution capabilities, a long-term evolution (LTE) connection, a solar-power package, and 4 gaseous pollutant sensors per monitor. We would expect to pick and choose pollutant sensors based on nearby pollutant sources to individual locations in consultation with Commerce City personnel.

The specifications sheet for the MODULAIR product is included with this Attachment.

There are a number of other monitor options that can offer similar equipment capabilities that could be considered and utilized to meet Commerce City's needs.

Monitoring Costs

As requested by Commerce City, this cost estimate is meant to provide information for planning purposes, and is not meant to be taken as a specific quote at this time. It is possible costs could go increase or decrease depending on the timing when Commerce City is ready to purchase equipment and implement a monitoring network. This cost estimate is based on the 20 monitor network presented above, and could be scaled up or down, as needed.

The costs itemized in Table A.1 below total an estimate of $184,050 for a single year of operating the monitoring network. It's important to note that if monitors such as these are purchased by the City, it is likely they would be operated more than a single year, and the per monitor or per month costs will go down steadily after the first year with hardware costs being a one-time capital cost. The $184,050 first year cost breaks down to an estimated $9,202.50 per monitor, and could roughly be scaled linearly by number of monitors. It is expected the scaling would be somewhat less per monitor with labor costs of maintaining the monitors and network not being a full unit increase per monitor.

Table A.1. Itemized Estimated Monitoring Network Cost

Itemized Cost Description	Cost per Monitor if Applicable	Total Cost
20 MODULAIR Monitors With Solar	$5,745	$114,900
Added Meteorological Sonic Anemometors	$750	$9,900
QuantAQ Cloud and Data Presentation	$300	$6,000
Monitor Setup, Startup, Troubleshoot	-	$12,750
General Monitor Visits for Maintenance	-	$17,500
Data Analysis and Monthly Report Development	-	$17,000
Meetings and Administration	-	$6,000
Total Cost for One Year		**$184,050**

PRODUCT SPECIFICATION SHEET (*pre-release, subject to change)

MODULAIR™

MODULAIR™ provides real-time estimates of particulate matter concentrations (PM_1, $PM_{2.5}$, PM_{10}), particle size distribution, and up to five user-selected gas-phase pollutants (choose from CO, CO_2, NO, NO_2, O_3, SO_2). Each unit is internet connected and paired with the QuantAQ Cloud™. MODULAIR™ is easily deployed as a standalone unit or as part of a distributed air quality sensor network. Available add-on accessories include meteorological measurements (wind speed and wind direction via a sonic anemometer) and a stand-alone solar and battery solution to allow off-grid use.

AIR QUALITY MEASUREMENTS

PARAMETER	RANGE	ACCURACY
PM_1, $PM_{2.5}$, PM_{10}	0 to 2,000 μgm^{-3}	See page 2.
Particle size distribution	0.35 to 40.0 µm (24 bins)	Not yet determined
Ozone	0 to 500 ppb	5 ppb or 20%
Carbon Monoxide	0 to 13,000 ppb	40 ppb or 20%
Carbon Dioxide	0 to 5,000 ppm	Not yet determined
Nitrogen Oxide	0 to 5,000 ppb	5 ppb or 20%
Nitrogen Dioxide	0 to 5,000 ppb	6 ppb or 35%
Sulfur Dioxide	0 to 10,000 ppb	5 ppb or 20%
Temperature	-40 to 85 °C	±0.2°C
Relative Humidity	0 to 100 %	±2 %

FEATURES

- ✓ 2+ years on-board data storage
- ✓ Full access to all raw sensor data
- ✓ No co-location or remote calibration required
- ✓ 5min time resolution (cloud), 5s (on-board)

POWER & COMMUNICATION

PARAMETER	DETAILS
Power	5V, 2A (supply); 300 mA avg. consumption
Communication	LTE CAT-M1 (NorAm) LTE CAT-M1/3G/2G (Europe)
Data	Web interface (quant-aq.com) Programmatic access (QuantAQ API) Local storage (µSD card)

OPERATING SPECIFICATIONS

PARAMETER	DETAILS
Weatherproof rating	IP68
Operating temperature	-20 to 60 °C
Operating humidity	5 to 95 %, non-condensing
Dimensions	11.04" x 9.04" x 5.72"
Weight	6 lbs (2.72 kg)

Contact sales@quant-aq.com for more information.

QUANTAQ

PRODUCT SPECIFICATION SHEET

MODULAIR™

MEASUREMENT ERROR - Particulates[1]

Time Interval	PM_1	$PM_{2.5}$	PM_{10}
5min	$R2 = 0.875$, $CV_{MAE} = 0.30$ MAE = 2.9 μgm^{-3}	N/A	N/A
1h	$R2 = 0.899$, $CV_{MAE} = 0.29$ MAE = 2.8 μgm^{-3}	$R2 = 0.936$, $CV_{MAE} = 0.14$ MAE = 1.3 μgm^{-3}	$R2 = 0.810$, $CV_{MAE} = 0.32$ MAE = 7.6 μgm^{-3}
24h	$R2 = 0.919$, $CV_{MAE} = 0.26$ MAE = 2.4 μgm^{-3}	$R2 = 0.967$, $CV_{MAE} = 0.12$ MAE = 1.2 μgm^{-3}	$R2 = 0.874$, $CV_{MAE} = 0.31$ MAE = 7.6 μgm^{-3}

[1]All statistics were determined via co-location experiments with research and/or regulatory-grade instruments such as the TSI SMPS or Teledyne T640 in environments across the United States. 5min data was not available for $PM_{2.5}$ and PM_{10}. The coefficient of determination (R2) describes how well the MODULAIR-PM predicts the desired outcome. The mean absolute error (MAE) describes the measure of error between the observed and predicted values. The coefficient of variation of the mean absolute error (CV_{MAE}) can be thought of as a 'percent error' as a function of the MAE. This table was last updated in April of 2021.

MEASUREMENT ERROR - Gases[2]

Time Interval	CO	CO_2	NO	NO_2	O_3	SO_2
5min	$CV_{MAE} = 0.16$ MAE = 40 ppb	MAE = 35 ppm	$CV_{MAE} = 0.37$ MAE = 3.1 ppb	$CV_{MAE} = 0.48$ MAE = 6.0 ppb	$CV_{MAE} = 0.16$ MAE = 4.0 ppb	MAE = 3.3 ppb*
15min	$CV_{MAE} = 0.15$ MAE = 37 ppb	NA	$CV_{MAE} = 0.34$ MAE = 2.8 ppb	$CV_{MAE} = 0.48$ MAE = 5.9 ppb	$CV_{MAE} = 0.15$ MAE = 3.9 ppb	NA
60min	$CV_{MAE} = 0.14$ MAE = 36 ppb	NA	$CV_{MAE} = 0.32$ MAE = 2.6 ppb	$CV_{MAE} = 0.47$ MAE = 5.8 ppb	$CV_{MAE} = 0.15$ MAE = 3.7 ppb	NA

[2]All statistics were determined via co-location experiments with research and/or regulatory-grade instruments in realistic environments across the United States.The mean absolute error (MAE) describes the measure of error between the observed and predicted values. The coefficient of variation of the mean absolute error (CV_{MAE}) can be thought of as a 'percent error' as a function of the MAE. This table was last updated in April of 2021. Gases marked as "NA" do not yet have enough data to be listed. Please check back for updates.

*Results are from Hagan, et al (2018), Calibration and assessment of electrochemical air quality sensors by co-location with regulatory-grade instruments, Atmos. Meas. Tech.

Contact sales@quant-aq.com for more information.

QUANTAQ

Appendix B. AQ and WQ Technical Documents

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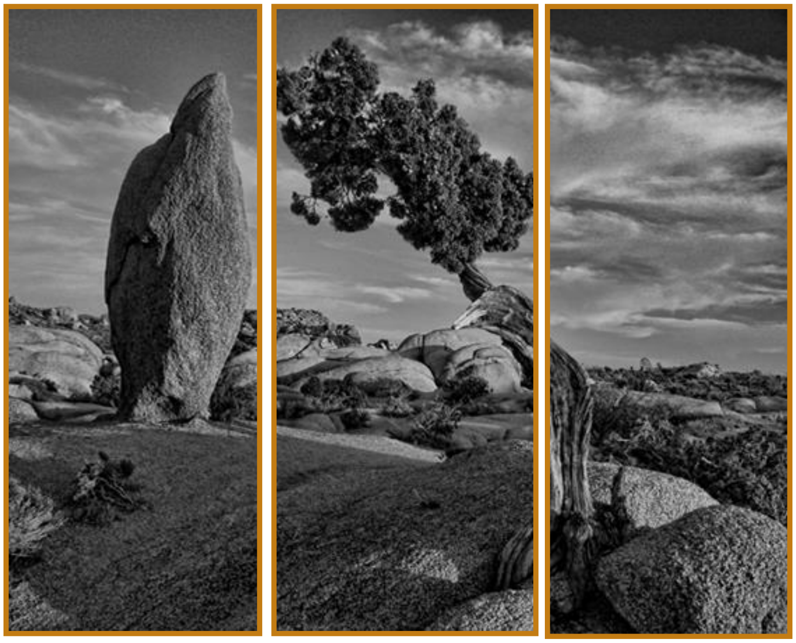
July 31, 2022

Modeling Thresholds Report

Commerce City Environmental Consulting Services
7887 East 60th Avenue
Commerce City, Colorado

Prepared for:
City of Commerce City
7887 East 60th Avenue
Commerce City, CO 80022

Pinyon Project No.:
1/21-1435-01



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July 31, 2022

Modeling Thresholds Report

Commerce City Environmental Consulting Services
7887 East 60th Avenue
Commerce City, Colorado

Prepared for:
City of Commerce City
7887 East 60th Avenue
Commerce City, CO 80022

Pinyon Project No.:
1/21-1435-01

Prepared by:

Kaitlin A Meszaros

Kaitlin Meszaros

Reviewed by:

Dustin J. Collins

Dustin Collins

Table of Contents

Tables

Figures

Executive Summary

Pinyon Environmental, Inc. (Pinyon) has completed a Modeling Thresholds Report for the City of Commerce City (Commerce City) to establish levels of air quality significance that recommend further evaluation and analysis to determine the potential for human health and environmental impacts. The report details pollutants of concern including criteria pollutants, precursors for criteria pollutants, and toxic pollutants that may occur within the Commerce City boundary and where scientific literature has provided health impact levels. The document then provides steps for Commerce City to evaluate the potential air quality impacts of future projects and plans, which could determine the need for mitigation or emissions reduction. The steps can be described as a type of flow chart beginning with an emissions threshold for which screening would be recommended, to acceptable screening methods for a screening single-source analysis, to impacts thresholds for which a screening cumulative analysis would be recommended, and then impacts thresholds for which refined modeling would be recommended. Then similarly, the document details the same format for refined modeling as is done for screening modeling. Lastly, due to the nonattainment status for the area in and surrounding Commerce City, steps for evaluating secondary pollutants such as ozone (O_3) are included based on approved methodologies. Concluding the report are recommendations for Commerce City to consider as means to propose mitigation for those projects that demonstrate a potential to have air quality impacts near or above thresholds of health concern.

This report and recommendations are meant to provide technical information to support Commerce City with potential policy recommendations that are a future deliverable to be submitted to Commerce City. Additionally, future work will be conducted to create modeling guidance for Commerce City which will detail appropriate modeling methodologies, assumptions, and results analysis for the mentioned screening and refined models in this document.

A revision to the document was made in July of 2022 following revised modeling guidance from the Colorado Department of Public Health and Environment (CDPHE) in May of 2022. The revisions include clarification on modeling thresholds, when cumulative analyses are triggered, and other editorial updates.

1. Introduction and Purpose

The City of Commerce City (Commerce City) tasked Pinyon Environmental, Inc. (Pinyon) to create a Thresholds Report. The Thresholds Report is to provide a Commerce City-specific document for evaluating new or modified facilities' air quality significance as it relates to community residents and environment. With current reliance on the Colorado Department of Public Health (CDPHE) air quality significance screenings and determinations, Commerce City determined that additional attention and scrutiny may be required for future projects within the City's boundaries due to community air quality concerns and the continued nonattainment status of the area for ozone.

A review of state and federal requirements was conducted along with a review of best practices for determining air quality significance from other states and air districts within the United States. The scope of air quality significance evaluations extended beyond current state guidance to include specific toxic air pollutants currently emitted within the City's boundaries and secondary air pollutants that are formed as a result of emissions within the City's boundaries. From this review, emissions thresholds are proposed for any new or modified project within Commerce City to conduct impacts screening. This document suggests impacts thresholds to determine whether a more refined analysis, such as ones required by CDPHE for air permit applications, may be warranted. Lastly, mitigation recommendations are provided to assist Commerce City in framing potential options for new or modified facilities in the future to reduce emissions and/or pollutant impacts on its residents and environment.

This document, in conjunction with a future document of air quality modeling guidelines, will better inform and direct Commerce City in evaluating future projects within its boundaries to initiate practical discussion with residents and project proponents as well as potentially mitigating future negative air quality impacts.

2. Pollutants of Concern

The following list bullets the different pollutants whose emissions that can cause or contribute to ambient air concentrations that when compared to the standards above can demonstrate a potential harm to human health or public welfare. These pollutants and the sources and activities that may result in their emissions are detailed in the Community Impacts Report (Pinyon, 2021). Note, lead is not discussed in detail in this report even though it is a criteria pollutant. As mentioned in the Community Impacts Report, a lead monitor was taken offline due to many years of low or zero concentrations.

- Carbon monoxide (CO)
- Nitrogen oxides (NOx)
- Particulate matter less than 10 micrometers in diameter (PM_{10})
- Particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$)
- Sulfur Dioxide (SO_2)
- Volatile organic compounds (VOC)

Toxic air pollutants of concern are discussed below based on public concern over the pollutants in and around the Commerce City area. This is not a comprehensive list of all pollutants but is meant to include released pollutants reported to the Colorado Department of Public Health (CDPHE) with public health concern.

- Acetaldehyde
- Benzene
- Ethylbenzene
- Formaldehyde
- Hydrogen cyanide
- Hydrogen sulfide
- n-Hexane
- Toluene
- Xylenes

There are also secondary pollutants that form following chemical reactions in the atmosphere. There are no direct emissions of these pollutants, however health and environmental standards are developed for these pollutants.

- Ozone (O_3)

- Secondary $PM_{2.5}$

The Clean Air Act (CAA) provided the United States Environmental Protection Agency (EPA) the authority to establish National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The NAAQS are categorized as primary standards which are thresholds for public health protection and secondary standards are thresholds for public welfare protection. The NAAQS have been modified and added to since the initial promulgation of the CAA and the current NAAQS are in Table 2-1.

Table 2-1. National Ambient Air Quality Standards

Pollutant	Averaging Time	Primary NAAQS	Secondary NAAQS	Form of Standard
Carbon Monoxide (CO)	1 hour	35 ppm	Not applicable	Not to be exceeded more than once per year
	8 hours	9 ppm		
Lead (Pb)	Rolling 3-month average	0.15 μg/m³	0.15 μg/m³	Not to be exceeded
Nitrogen Dioxide (NO_2)[1]	1 hour	100 ppb	Not applicable	98th percentile of 1-hour daily maximum, averaged over 3 years
	Annual	53 ppb	53 ppb	Annual mean
Ozone (O_3)[2]	8 hours	70 ppb	70 ppb	Annual 4th highest 8-hour daily maximum, averaged over 3 years
Particulate Matter less than 2.5 microns ($PM_{2.5}$)	24 hours	35 μg/m³	35 μg/m³	98th percentile, averaged over 3 years
	Annual	12 μg/m³	15 μg/m³	Annual mean, averaged over 3 years
Particulate Matter less than 10 microns (PM_{10})	24 hours	150 μg/m³	150 μg/m³	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)	1 hour	75 ppb	Not applicable	99th percentile of 1-hour daily maximum, averaged over 3 years
	3 hours	Not applicable	0.5 ppm	Not to be exceeded more than once per year

Source: EPA, 2021a

ppm parts per million

ppb parts per billion

μg/m³ micrograms per cubic meter

[1] The level of the annual NO_2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

[2] Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O_3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O_3 standards and transitioning to the current (2015)

standards will be addressed in the implementation rule for the current standards. The standard is presented as 0.070 ppm but is shown in ppb for the purposes of clearer comparison to the SIL.

Air quality monitoring data accounting for the averaging time and form of the standard are compared against primary and secondary NAAQS to determine whether an area is in attainment (below the NAAQS) or nonattainment (at or above the NAAQS) for the standard. Areas can be classified as maintenance if they were previously nonattainment but are currently meeting the NAAQS. Maintenance areas may be redesignated as attainment after 20 years of no NAAQS exceedances. Currently, Commerce City is considered in marginal nonattainment for the 2015 O_3 standard and serious nonattainment for the 2008 O_3 standard and likely to go to severe nonattainment for the 2008 O_3 standard in 2022 (EPA, 2021b). Also, Commerce City is considered a maintenance area for CO and PM_{10} NAAQS, and the 20-year maintenance periods end in 2022 (EPA, 2021b).

Additionally, EPA has released significant impact levels (SIL) for some criteria pollutants. SIL is a threshold which can help predict when a project impact will be inconsequential. Based on these EPA guidelines, Colorado air quality regulations (Regulation 3) have identified Prevention of Significant Deterioration (PSD) increments and SIL levels for all minor and major sources. Table 2-2 below shows the Colorado SILs. A SIL is not listed for O_3 and therefore the EPA recommended value is included (EPA, 2018). Where applicable, the values presented are for Class II areas since Commerce City is greater than 10 kilometers (approximately 6.2 miles) from a Class I area. The nearest Class I area is the Rocky Mountain National Park approximately 45 miles to the northeast.

Table 2-2. Significant Impact Levels

Pollutant	Averaging Time	SIL[1,2]
Carbon Monoxide (CO)	1 hour	2,000 μg/m^3
	8 hours	500 μg/m^3
Nitrogen Dioxide (NO_2)	1 hour	7.5 μg/m^3
	Annual	1 μg/m^3
Ozone (O_3)[3]	8 hours	1 ppb
Particulate Matter less than 2.5 microns ($PM_{2.5}$)	24 hours	1.2 μg/m^3
	Annual	0.2 μg/m^3
Particulate Matter less than 10 microns (PM_{10})	24 hours	5 μg/m^3
	Annual	1 μg/m^3
Sulfur Dioxide (SO_2)	1 hour	4 μg/m^3
	3 hours	25 μg/m^3
	24 hours	5 μg/m^3
	Annual	1 μg/m^3

1 EPA, 1996

2 AQCC, 2021

3 EPA, 2018

Pinyon Environmental, Inc.

Hazardous air pollutants defined by the EPA along with other toxic pollutants identified by public health organizations such as the American Conference of Governmental Industrial Hygienists (ACGIH) also have the potential to cause human harm. Toxic pollutant impacts are generally categorized into acute which can occur from short-term inhalation exposure such as a 1-hour interval, chronic which can occur from long-term inhalation exposure such as over the course of a year, and cancerous which are reserved for long-term inhalation exposure to cancer-causing toxics. Table 2-3 below identifies specific toxic air pollutants of concern based on public concern over the pollutants in and around the Commerce City area and the acute, chronic, and cancerous threshold limit values (TLV). Acute exposure TLVs are also referred to as Reference Exposure Levels (RELs) and non-cancer chronic TLVs are also referred to as Reference Concentrations for Chronic Inhalation (RfC). Cancerous TLVs are determined based on an Inhalation Unit Risk (IUR) which is the increased cancer risk from 1 $\mu g/m^3$ inhalation exposure for a lifetime. The form of the acute and chronic threshold limit values is not to be exceeded and, per EPA guidelines, the cancer risk threshold is less than 1 in 1 million (1×10^{-6}). It is important to note that some, but not all of the pollutants in Table 2-3 are identified as hazardous air pollutants by the EPA.

Table 2-3. Toxic Air Pollutant Threshold Limit Values

Pollutant	Acute REL/MRL ($\mu g/m^3$)[1]	Chronic RfC ($\mu g/m^3$)[2]	Cancer Inhalation Unit Risk ($1/\mu g/m^3$)[2]
Acetaldehyde	470	9	2.2×10^{-6}
Benzene	27	30	7.8×10^{-6}
Ethylbenzene	22,000	260	2.5×10^{-6}
Formaldehyde	49	9.8	1.3×10^{-5}
Hydrogen Cyanide (HCn)	340	0.8	Not applicable
Hydrogen Sulfide (H_2S)	42	2	Not applicable
n-Hexane	None identified	700	Not applicable
Toluene	5,000	5,000	Not applicable
Xylenes	8,700	100	Not applicable

[1] EPA, 2021c; when a REL and MRL both exist, the lower threshold of the two is used.

[2] EPA, 2021d

3. Guidelines for Air Quality Significance Analysis

The following three subsections detail a methodology for evaluating a new or modified facility's impacts for any of the criteria, precursor, or toxic air pollutants discussed in Section 2. These steps are also visually represented in Figure 1 as a flow chart to guide Commerce City in the process of evaluating air quality significance.

3.1 Screening Modeling Methodology

3.1.1 Emissions Thresholds

The need for impacts evaluations to provide information to Commerce City and its residents is determined by new or modified facility's potential to emit specified pollutants over certain thresholds. Table 3-1 shows the emissions thresholds of specified pollutants in this document. Should a new or modified facility have maximum potential emissions above these thresholds, screening modeling is recommended.

Table 3-1. Emissions Thresholds for Screening

Pollutant	Averaging Time	Emissions Threshold
Criteria Pollutants		
Carbon Monoxide (CO)	Hourly	23 pounds per hour
Nitrogen Oxides (NOx)	Hourly	0 pounds per hour
Particulate Matter less than 2.5 microns ($PM_{2.5}$)	Daily	11 pounds per day
Particulate Matter less than 10 microns (PM_{10})	Daily	82 pounds per day
Sulfur Dioxide (SO_2)	Hourly	0.46 pounds per hour
Volatile Organic Compounds (VOC)	Hourly	0 pounds per hour
Toxic Air Pollutants		
Acetaldehyde	Hourly	1 pound per hour
Benzene	Hourly	0.06 pound per hour
Ethylbenzene	Annual	33 pounds per year
Formaldehyde	Hourly	0.12 pound per hour
Hydrogen Cyanide (HCn)	Hourly	0.75 pound per hour
Hydrogen Sulfide (H_2S)	Hourly	0.093 pound per hour
n-Hexane	Hourly	4.43 pound per hour
Toluene	Hourly	82 pounds per hour
Xylenes	Hourly	49 pounds per hour

For all pollutants listed above except for VOC, a direct threshold is proposed and discussed in Section 3.1.3. Only a secondary threshold exists and is proposed for VOCs and the methodology for screening is discussed in Section 3.3.

Emissions thresholds for criteria pollutants were retrieved from Colorado Interim Guidance (CDPHE, 2022) for all pollutants except NOx and VOC. Due to the growing concern over these pollutants and the nonattainment status of Commerce City for O_3 whose precursors are NOx and VOC, all sources with the potential to emit NOx and VOC are recommended for screening. Emissions thresholds for toxic air pollutants were retrieved from available California Guidance (BAAQMD, 2016) and Utah Guidance (UDAQ, 2018). Where emissions thresholds exist for both sources, the lower emissions threshold is used in Table 3-1.

3.1.2 Acceptable Screening Models

The EPA-approved screening model is AERSCREEN. The latest version is 21112 and is a free download through EPA's Support Center for Regulatory Atmospheric Modeling (SCRAM). It is important to note that AERSCREEN is a single source evaluation of impacts and estimates worst-case 1-hour concentrations. Details on procedures to complete screening modeling will be detailed in a Modeling Guidance document for Commerce City use.

3.1.3 Impacts Thresholds

Impacts thresholds used for screening evaluations will reference current CDPHE Air Pollution Control Division "Interim Colorado Modeling Guideline for Air Quality Permits" released in October of 2021 and updated in May of 2022 (CDPHE, 2022). Table 3-2 is included below for ease of reference. Where two averaging times exist for the same pollutant, both averaging times should be evaluated.

Table 3-2. Significant Impact Levels for Primary Pollutants

Pollutant	Averaging Time	SIL ($\mu g/m^3$)
Carbon Monoxide (CO)	1 hour	2,000
	8 hours	500
Nitrogen Dioxide (NO_2)	1 hour	7.5
	Annual	1
Particulate Matter less than 2.5 microns ($PM_{2.5}$)	24 hours	1.2
	Annual	0.2
Particulate Matter less than 10 microns (PM_{10})	24 hours	5
	Annual	1
Sulfur Dioxide (SO_2)	1 hour	4
	3 hours	25
	24 hours	5
	Annual	1

[1] CDPHE, 2022

Since Colorado does not explicitly note thresholds for hazardous air pollutants or other toxic compounds, air data from California state and air quality districts were evaluated. Published data was found from the California

Office of Environmental Health Hazard Assessment (OEHHA) and Bay Area Air Quality Management District (BAAQMD). Additionally, State of Utah has adopted Toxic Screening Levels (TSLs), which are used during the air permitting process (UDAQ, 2018). The TSLs are derived from TLVs published in the ACGIH – "Threshold Limit Values for Chemical Substances and Physical Agents". These levels are not standards that must be met, but screening thresholds which if exceeded, would suggest that additional information is needed to evaluate potential health and environmental impacts. For the majority of the acute pollutants the TSL is lower than the EPA acute risk threshold save xylenes. Where the EPA risk threshold, either acute or chronic, is lower than the published TSL by either BAAQMD, OEHHA, or UDAQ, the EPA risk threshold (EPA, 2021c; EPA, 2021d) is the TSL.

Cancer inhalation risk is calculated by multiplying the annual model result by the IUR shown in Table 2-3 along with an exposure adjustment factor. Two exposure scenarios can be evaluated: the maximum exposed individual (MEI) and the most likely exposure (MLE). For the MEI risk, it is assumed that a person is exposed continuously (24 hours per day, 365 days per year) for the life of a project (e.g., 30 years). For the MLE risk, an adjustment should be made for the amount of time a person stays at a residence. No adjustment will be made for time away from home, to conservatively assume that people live and work in Commerce City. A typical residence time at the same location for a residential receptor can be from 6 to 30 years (EPA, 2009), so a midrange of 18 years was used for the average residential exposure. Exposure adjustment factors of 0.43 for the MEI (30/70) and 0.26 for the MLE (18/70) were applied to the estimated cancer risk to account for the actual time that an individual could be exposed during a 70-year lifetime.

Table 3-3. Toxic Screening Levels

Pollutant	Averaging Time	Acute TSL ($\mu g/m^3$)	Averaging Time	Chronic TSL ($\mu g/m^3$)
Acetaldehyde	1 hour	470[1]	Annual	9[5]
Benzene	1 hour	27[1]	Annual	3[1,3]
Ethylbenzene	24 hours	2,895[2]	Annual	260[5]
Formaldehyde	1 hour	37[2]	Annual	9[1,3]
Hydrogen Cyanide (HCn)	1 hour	340[1]	Annual	0.8[5]
Hydrogen Sulfide (H_2S)	1 hour	42[1]	Annual	2[1,3]
n-Hexane	24 hours	5,875[2]	Annual	7,00[5]
Toluene	1 hour	5,000[3]	Annual	300[1]
Xylenes	1 hour	8,700[4]	Annual	100[5]

1 BAAQMD, 2016
2 UDAQ, 2018
3 OEHHA, 2021
4 EPA, 2021c; when a REL and MRL both exist, the lower threshold of the two is used.
5 EPA, 2021d

Procedures to determine the potential cancer risk of a new or modified facility will be discussed in the Commerce City Modeling Guidance document. As discussed in Section 2, the screening threshold for potential cancer risk is 1 in 1 million (1×10^{-6}).

The new or modified facility should evaluate its impacts using approved screening models against the appropriate significant impact levels and toxic screening levels. If the modeled impact is below the appropriate significant impact levels and toxic screening levels, no further analysis is required. The conservative nature of the screening models and the low impacts thresholds provide confidence in the low impact on public health and environment.

3.1.4 Cumulative Analysis Requirements

If the screening modeling shows maximum receptor (i.e., highest first high receptor of the averaging period) results equal to or higher than any of the significant impact levels (Table 3-2), a cumulative analysis is recommended. A cumulative analysis is not appropriate for toxic air pollutants. For any screening modeling that shows results equal to or higher than toxic screening levels (Table 3-3), refined modeling or mitigation options should be considered. At a high level, a cumulative analysis will take into account surrounding emissions sources to the new or modified facility and instead of comparing to significant impact levels, will compare the combined result of the surrounding facilities and new or modified facility with the NAAQS (Table 2-1). Details on conducting a cumulative analysis will be discussed in the Commerce City Modeling Guidance document.

3.2 Refined Modeling Methodology

3.2.1 Emissions Thresholds

For refined modeling evaluations, the emissions thresholds detailed in the modeling guidance document released by CDPHE should be used. CDPHE Air Pollution Control Division released their "Interim Colorado Modeling Guideline for Air Quality Permits" in October of 2021 and updated in May of 2022 (CDPHE, 2022). Table 1 in Section 2 of the interim modeling guideline details the emissions thresholds CDPHE requires impacts evaluations. Note that CDPHE currently doesn't routinely require or perform modeling to determine impacts from toxics and Table 1 only includes criteria pollutants.

3.2.2 Acceptable Refined Models

For refined modeling evaluations, the approved models detailed in the modeling guidance document released by CDPHE should be used. CDPHE Air Pollution Control Division released their "Interim Colorado Modeling Guideline for Air Quality Permits" in October of 2021 and updated in May of 2022 (CDPHE, 2022). More detail regarding modeling software will be included in the Commerce City Modeling Guidance document.

3.2.3 Impacts Thresholds

Per the CDPHE "Interim Colorado Modeling Guideline for Air Quality Permits" (CDPHE, 2022), modeling is first conducted for evaluation of the new or modified facility alone against the SIL levels detailed in Table 2 and Table 3, based on facility classification (e.g., minor, major, or PSD) of Section 3. Should initial modeling evaluation determine that the new or modified facility alone exceeds at least one of the SIL levels, then a cumulative analysis is required by CDPHE.

3.2.4 Cumulative Analysis Requirements

The CDPHE "Interim Colorado Modeling Guideline for Air Quality Permits" (CDPHE, 2022) should be followed to conduct a cumulative analysis of a new or modified facility's impacts. The cumulative analysis results are compared to the appropriate Colorado Ambient Air Quality Standards (CAAQS) and NAAQS standards as shown in Table 6 and Table 7 of Section 3 of the interim modeling guideline.

3.3 Secondary Impacts Methodology

For secondary pollutants such as O_3 and $PM_{2.5,}$ EPA has released guidance commonly referred to as MERPs (Modeled Emission Rates for Precursors) to estimate their impacts (EPA, 2019). MERPs are used for the 8-hour O_3, 24-hour $PM_{2.5}$, and annual $PM_{2.5}$ secondary standards only. There are also secondary NAAQS for annual NO_2, Pb, 24-hour PM_{10}, and 3-hour SO_2. In some cases, the primary NAAQS is equal to the secondary NAAQS (e.g., annual NO_2 and 24-hour PM_{10}). To evaluate impacts against the secondary NAAQS that are not covered under MERP guidance, it is conservatively proposed that these standards be treated as primary for the purposes of screening. Further discussion on these will be discussed in subsequent sections.

3.3.1 Emissions Thresholds

The need for secondary impacts evaluations to provide information to Commerce City and its residents is determined by new or modified facility's potential to emit specified pollutants over certain thresholds. There are no secondary impacts thresholds for toxic air pollutants. Table 3-4 shows the emissions thresholds of specified pollutants in this document. Should a new or modified facility have maximum potential emissions above these thresholds, screening modeling is recommended.

Table 3-4. Emissions Thresholds for Screening

Pollutant	Averaging Time	Emissions Threshold
Criteria Pollutants		
Nitrogen Oxides (NOx)	Hourly	0 pounds per hour
Particulate Matter less than 2.5 microns ($PM_{2.5}$)	Daily	11 pounds per day
Particulate Matter less than 10 microns (PM_{10})	Daily	82 pounds per day
Sulfur Dioxide (SO_2)	Hourly	0.46 pounds per hour
Volatile Organic Compounds (VOC)	Hourly	0 pounds per hour

Emissions thresholds for criteria pollutants were retrieved from Colorado Interim Guidance (CDPHE, 2022) for all pollutants except NOx and VOC. Due to the growing concern over these pollutants and the nonattainment status of Commerce City for O_3 whose precursors are NOx and VOC, all sources with the potential to emit NOx and VOC are recommended for screening.

3.3.2 Acceptable Secondary Impacts Tools

As previously mentioned, EPA has released MERP guidance that details methodologies and thresholds regarding estimating secondary impacts of O_3 and $PM_{2.5}$ (EPA, 2019). The guidance relies on previously completed sophisticated photochemical modeling where emissions rates of precursors such as NOx, SO_2 and VOCs were demonstrated to equal the SIL level for the appropriate secondary NAAQS (i.e., 8-hour O_3, 24-hour $PM_{2.5}$ and annual $PM_{2.5}$). These emissions rates along with primary impacts modeling results such as those discussed in Section 3.2 are then used to estimate a new or modified facility's secondary impacts for comparison against the SIL (Table 2-2) and/or NAAQS (Table 2-1). It is recommended that the MERP guidance along with other modeling guidance released by Commerce City be used to estimate secondary impacts from O_3 and $PM_{2.5}$.

To determine the appropriate MERPs for precursors, new or modified facilities should use the Lowest emissions rate for the Rockies/Plains climate zone in Table 4-1 of the MERP guidance (EPA, 2019).

For secondary pollutants not covered under the EPA MERP guidance, tools outlined for primary impacts should be used (see Section 3.2). As noted in Table 2-1, the primary and secondary standard for annual NO_2 and 24-hour PM_{10} are the same threshold. Therefore, no evaluation for secondary impacts of NO_2 and PM_{10} would be recommended so long as the primary impacts of these standards are modeled below the SIL or NAAQS per Section 3.2.

3.3.3 Impacts Thresholds

Table 3-5 includes the thresholds that should be used for secondary impacts evaluations. Where two averaging times exist for the same pollutant, both averaging times should be evaluated.

Table 3-5. Significant Impact Levels for Secondary Pollutants

Pollutant	Averaging Time	SIL[1,2]
Nitrogen Dioxide (NO_2)	Annual	1 μg/m^3
Ozone (O_3)	8 hours	1 ppb
Particulate Matter less than 2.5 microns ($PM_{2.5}$)	24 hours	1.2 μg/m^3
	Annual	0.2 μg/m^3
Particulate Matter less than 10 microns (PM_{10})	24 hours	5 μg/m^3
Sulfur Dioxide (SO_2)	3 hours	25 μg/m^3

[1] CDPHE, 2022

[2] EPA, 2018

The new or modified facility should evaluate its impacts using approved screening models and tools against the appropriate significant impact levels. If the modeled impact is below the appropriate significant impact levels, no further analysis is required. The conservative nature of the screening models and the low impacts thresholds provide confidence in the low impact on public health and environment.

3.3.4 Cumulative Analysis Requirements

If the screening modeling shows results equal to or higher than any of the significant impact levels (Table 3-5), a cumulative analysis is recommended. At a high level, a cumulative analysis will take into account surrounding emissions sources to the new or modified facility and instead of comparing to significant impact levels, will compare the combined result of the surrounding facilities and new or modified facility with the NAAQS (Table 2-1). Details on conducting a cumulative analysis for O_3 and $PM_{2.5}$ are detailed in the EPA MERP guidance (EPA, 2019) and will be discussed in the Commerce City Modeling Guidance document.

4. Mitigation Recommendations

In the instance a new or modified facility models impacts, either through screening or refined modeling methodologies, mitigation recommendations can be provided to a project proponent to reduce the facility's potential emissions, reduce the facility's potential impacts, or both. Below is a bulleted list of potential mitigation recommendations that may achieve lower impacts for one or more criteria, toxic, or precursor pollutants. This is not meant to be a comprehensive list, as unique emission sources could require source specific consideration for best mitigation options.

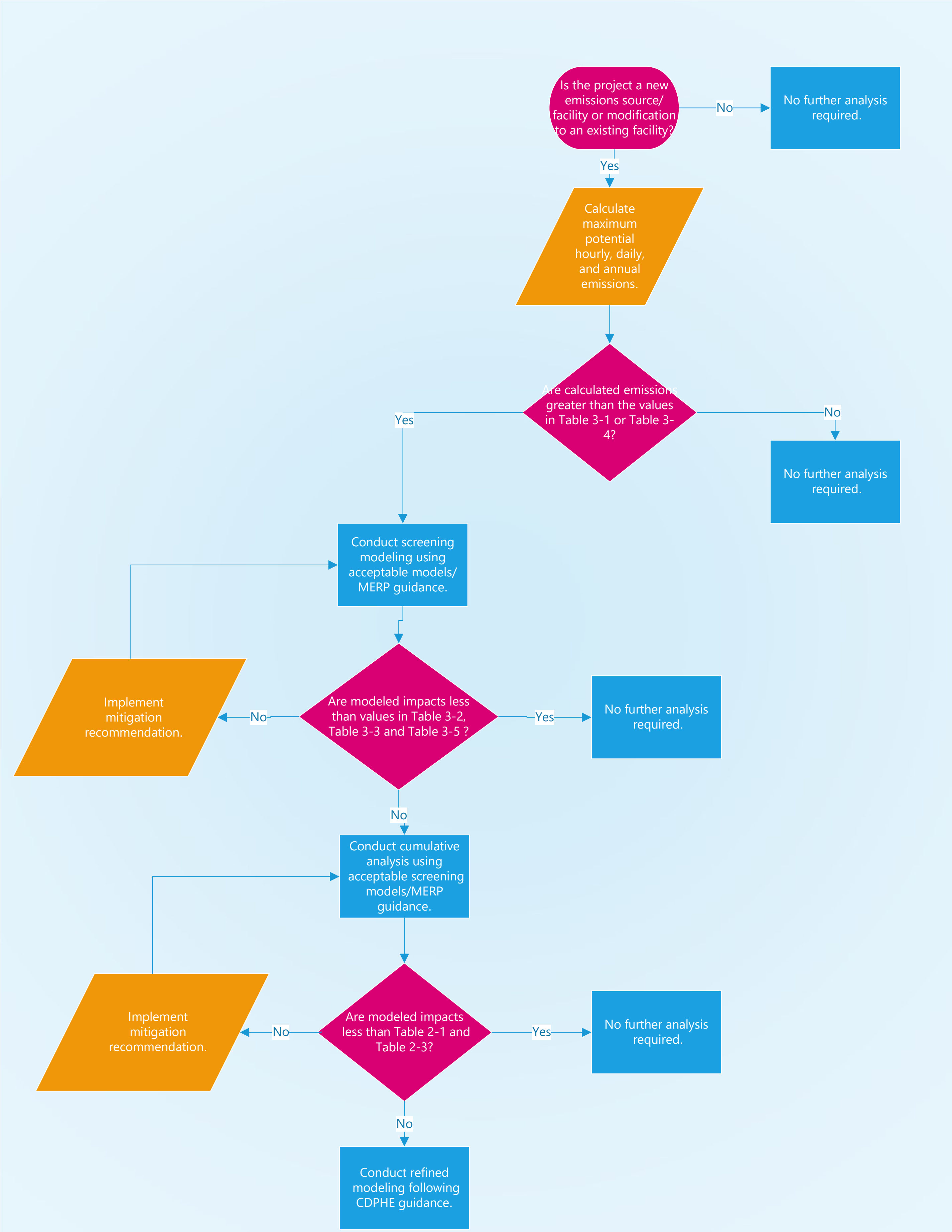
- Review the EPA Best Available Control Technology (BACT), Lowest Achievable Emissions Rate (LAER), and Reasonable Available Control Technology (RACT) Clearinghouse for potential control devices or equipment that can result in lower emissions to complete the same process or operation.

- Modify exhaust parameters for a specific source especially those that have stacks to allow better dispersion. Higher release heights, faster exit velocities, and warmer gas temperatures generally result in better dispersion and less localized impacts.

- Determine if high impact sources at a facility can be located farther from residential housing, gathering areas, and sensitive communities.

- Limit a high impact source's operation to periods of calmer meteorology such as low winds and/or the time of day to reduce the effects of unexpected, exceptional weather conditions.

Figure 1 Air Quality Significance Evaluation Flowchart


Is the project a new emissions source/ facility or modification to an existing facility?
No
No further analysis required.
Yes
Calculate maximum potential hourly, daily, and annual emissions.
Are calculated emissions greater than the values in Table 3-1 or Table 3-4?
No
No further analysis required.
Yes
Conduct screening modeling using acceptable models/ MERP guidance.
Implement mitigation recommendation.
No
Are modeled impacts less than values in Table 3-2, Table 3-3 and Table 3-5 ?
Yes
No further analysis required.
No
Conduct cumulative analysis using acceptable screening models/MERP guidance.
Implement mitigation recommendation.
No
Are modeled impacts less than Table 2-1 and Table 2-3?
Yes
No further analysis required.
No
Conduct refined modeling following CDPHE guidance.

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Pinyon Environmental, Inc., 2021. "Commerce City Community-Wide Impacts Report". October 1, 2021.

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Appendix B. AQ and WQ Technical Documents

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August 5, 2022

Modeling Guidance Document

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Prepared for:
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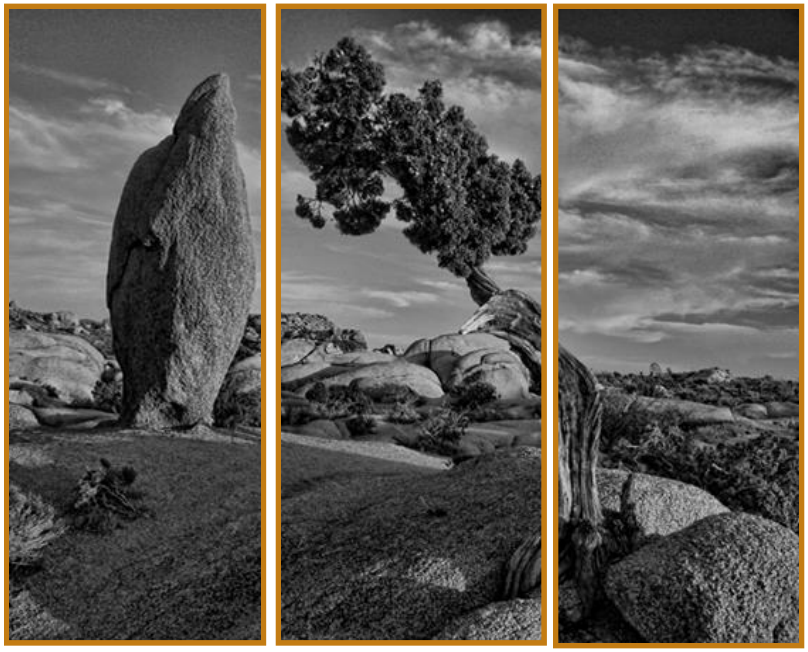
7887 East 60th Avenue
Commerce City, CO 80022

Pinyon Project No.:
1/21-1435-01



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Modeling Guidance Document

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Prepared by:

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Tables

Appendices

Executive Summary

Pinyon Environmental, Inc. (Pinyon) has completed a Modeling Guidance Document for the City of Commerce City (Commerce City) to detail procedures for conducting screening and refined dispersion modeling analyses as briefly outlined in the Modeling Thresholds Report (Pinyon, 2022). The report outlines acceptable screening and refined modeling tools, methodology steps, appropriate assumptions, and review of results for comparison against Significant Impact Levels (SIL), National Ambient Air Quality Standards (NAAQS), and Threshold Limit Values (TLV). Due to the nonattainment status for the area in and surrounding Commerce City, methodologies for evaluating secondary pollutants such as ozone (O_3) are included that follow Environmental Protection Agency (EPA) procedures though do not include direct modeling of secondary pollutants.

The document goes through appropriate methodologies for screening using approved models for first comparison against SIL or TLVs and, if a cumulative analysis is required, then the NAAQS. This document also details circumstances when more refined modeling should be required such as when cumulative analyses may be overly conservative or if the facility details or nearby sources are more complex. Lastly, the document details the methodologies for evaluating secondary pollutant impacts following EPA guidance. This document should be utilized concurrently with the Modeling Thresholds Report (Pinyon, 2022) as it is referenced throughout.

This report and recommendations are meant to provide technical information to support Commerce City with emissions mitigation options and potential policy recommendations that are future deliverables to be submitted to Commerce City.

1. Introduction and Purpose

The City of Commerce City (Commerce City) tasked Pinyon Environmental, Inc. (Pinyon) to create a Modeling Guidance Document. The Modeling Guidance Document provides Commerce City a step-by-step process for conducting quantitative analyses including, but not limited to, screening and refined modeling to evaluate new and modified facilities' air quality significance as it relates to community residents and the environment. This Modeling Guidance Document should be used with the Modeling Thresholds Report (Pinyon, 2022) and will be referenced throughout. With current reliance on the Colorado Department of Public Health (CDPHE) air quality significance screenings and determinations, Commerce City determined that additional attention and scrutiny may be required for future projects within the City's boundaries due to community air quality concerns and the continued nonattainment status of the area for ozone.

A review of state and federal modeling guidance was conducted along with a review of appropriate potential assumptions or default parameters for the topography, urban nature, and types of emissions sources in Commerce City. This document includes steps to complete air quality significance evaluations of specific toxic air pollutants currently emitted within the City's boundaries and secondary air pollutants that are also formed as a result of emissions within the City's boundaries. The document also includes a generic data request Commerce City can use to request information to conduct their own screening and/or refined modeling for emissions sources within the City's boundaries. Multiple guidance documents, including those released by EPA and CDPHE, should be considered for unique circumstances possibly not covered in this document.

This document, in conjunction with the Modeling Thresholds Report, provides Commerce City a step-by-step procedure to evaluate future projects within its boundaries to initiate practical discussion with residents and project proponents as well as potentially mitigating future negative air quality impacts.

2. Pollutants of Concern

The following list bullets the different pollutants (criteria, toxic air, and secondary) that can cause or contribute to ambient air concentrations that when compared to standards can demonstrate a potential harm to human health or public welfare. These pollutants and the sources and activities that may result in their emissions are detailed in the Community Impacts Report (Pinyon, 2021).

Criteria Air Pollutants

- Carbon monoxide (CO)
- Nitrogen oxides (NOx)
- Particulate matter less than 10 micrometers in diameter (PM_{10})
- Particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$)
- Sulfur Dioxide (SO_2)
- Volatile organic compounds (VOC)

Toxic Air Pollutants

- Acetaldehyde
- Benzene
- Ethylbenzene
- Formaldehyde
- Hydrogen cyanide (HCn)
- Hydrogen sulfide (H_2S)
- n-Hexane
- Toluene
- Xylenes

Secondary Air Pollutants

- Ozone (O_3)
- Secondary $PM_{2.5}$

The tables for National Ambient Air Quality Standards (NAAQS), Significant Impact Levels (SILs), and Toxics Threshold Limit Values (TLVs) are listed again for reference in Table 2-1, Table 2-2, and Table 2-3, respectively.

The details and reference for these values can be found in the Modeling Thresholds Document (Pinyon, 2022). Currently, Commerce City is considered in marginal nonattainment for the 2015 O_3 standard and serious nonattainment for the 2008 O_3 standard and likely to go to severe nonattainment for the 2008 O_3 standard in 2022 (EPA, 2021b). Also, Commerce City is considered a maintenance area for CO and PM_{10} NAAQS, and those 20-year maintenance periods end in 2022 (EPA, 2021b). The SILs for Class II areas are listed based on the distance from Commerce City to the nearest Class I area (Rocky Mountain National Park). The form of the acute and chronic threshold limit values is not to be exceeded and, per EPA guidelines, the cancer risk threshold is less than 1 in 1 million (1×10^{-6}). It is important to note that some, but not all of the pollutants in Table 2-3 are identified as hazardous air pollutants by the EPA.

Table 2-1. National Ambient Air Quality Standards

Pollutant	Averaging Time	Primary NAAQS	Secondary NAAQS	Form of Standard
CO	1 hour	35 ppm	Not applicable	Not to be exceeded more than once per year
	8 hours	9 ppm		
Lead (Pb)	Rolling 3-month average	0.15 µg/m^3	0.15 µg/m^3	Not to be exceeded
Nitrogen Dioxide (NO_2)[1]	1 hour	100 ppb	Not applicable	98th percentile of 1-hour daily maximum, averaged over 3 years
	Annual	53 ppb	53 ppb	Annual mean
O_3[2]	8 hours	70 ppb	70 ppb	Annual 4th highest 8-hour daily maximum, averaged over 3 years
$PM_{2.5}$	24 hours	35 µg/m^3	35 µg/m^3	98th percentile, averaged over 3 years
	Annual	12 µg/m^3	15 µg/m^3	Annual mean, averaged over 3 years
PM_{10}	24 hours	150 µg/m^3	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
SO_2	1 hour	75 ppb	Not applicable	99th percentile of 1-hour daily maximum, averaged over 3 years
	3 hours	Not applicable	0.5 ppm	Not to be exceeded more than once per year

Source: EPA, 2021a
ppm parts per million
ppb parts per billion
µg/m^3 micrograms per cubic meter

[1] The level of the annual NO_2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

[2] Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O_3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O_3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards. The standard is presented as 0.070 ppm but is shown in ppb for the purposes of clearer comparison to the SIL.

Table 2-2. Significant Impact Levels

Pollutant	Averaging Time	SIL[1,2]
CO	1 hour	2,000 μg/m^3
	8 hours	500 μg/m^3
NO_2	1 hour	7.5 μg/m^3
	Annual	1 μg/m^3
O_3[3]	8 hours	1 ppb
$PM_{2.5}$	24 hours	1.2 μg/m^3
	Annual	0.2 μg/m^3
PM_{10}	24 hours	5 μg/m^3
	Annual	1 μg/m^3
SO_2	1 hour	4 μg/m^3
	3 hours	25 μg/m^3
	24 hours	5 μg/m^3
	Annual	1 μg/m^3

1 EPA, 1996

2 AQCC, 2021

3 EPA, 2018

Table 2-3. Toxic Air Pollutant Threshold Limit Values

Pollutant	Acute REL/MRL (μg/m^3)[1]	Chronic RfC (μg/m^3)[2]	Cancer Inhalation Unit Risk (1/μg/m^3)[2]
Acetaldehyde	470	9	2.2×10^{-6}
Benzene	27	30	7.8×10^{-6}
Ethylbenzene	22,000	260	2.5×10^{-6}
Formaldehyde	49	9.8	1.3×10^{-5}
HCn	340	0.8	Not applicable
H_2S	42	2	Not applicable
n-Hexane	None identified	700	Not applicable
Toluene	5,000	5,000	Not applicable
Xylenes	8,700	100	Not applicable

1 EPA, 2021c; when a REL and MRL both exist, the lower threshold of the two is used.

2 EPA, 2021d

3. Screening Modeling Methodology

3.1 Emissions Thresholds

The need for impacts evaluations to provide information to Commerce City and its residents is determined by a new or modified facility's potential to emit individual pollutants over certain thresholds. Table 3-1 shows the emissions thresholds of specified pollutants in this document. Should a new or modified facility have maximum potential emissions above these thresholds, screening modeling is recommended.

Table 3-1. Emissions Thresholds for Screening – Primary & Toxic Pollutants

Pollutant	Averaging Time	Emissions Threshold
	Criteria Pollutants	
CO	Hourly	23 pounds per hour
NOx	Hourly	0 pounds per hour
$PM_{2.5}$	Daily	11 pounds per day
PM_{10}	Daily	82 pounds per day
SO_2	Hourly	0.46 pounds per hour
VOC	Hourly	0 pounds per hour
	Toxic Air Pollutants	
Acetaldehyde	Hourly	1 pound per hour
Benzene	Hourly	0.06 pound per hour
Ethylbenzene	Annual	33 pounds per year
Formaldehyde	Hourly	0.12 pound per hour
Hydrogen Cyanide (HCn)	Hourly	0.75 pound per hour
Hydrogen Sulfide (H_2S)	Hourly	0.093 pound per hour
n-Hexane	Hourly	4.43 pound per hour
Toluene	Hourly	82 pounds per hour
Xylenes	Hourly	49 pounds per hour

For all pollutants listed above except for VOC, a direct threshold is proposed and discussed in Section 3. Only a secondary threshold exists and is proposed for VOCs as it is a precursor for O_3. The reasoning and methodology for screening for O_3 is discussed in Section 5.

3.2 Acceptable Screening Models

The EPA-approved screening model is AERSCREEN. The latest version is 21112 and is a free download through EPA's Support Center for Regulatory Atmospheric Modeling (SCRAM). AERSCREEN is the EPA approved screening tool that analyzes one source and is based on AERMOD that produces worst-case 1-hour concentrations. AERSCREEN does not utilize hourly meteorological data but uses default meteorological data sets based on land type and average weather through the use of MAKEMET (version no. 21112). AERSCREEN is a Disk Operating System (DOS) program so should be able to be downloaded and run on any computer.

The following sections detail the use of AERSCREEN for emissions sources in Commerce City, though the EPA user's guide for AERSCREEN can also be referenced (EPA, 2021e).

3.3 Source Parameters

Once opened, AERSCREEN will request a title for your project. It is recommended to title your project as such "Company Emissions Unit Pollutant" or for an example "Company X Boiler NO_2". To move to the next section, press "Enter".

AERSCREEN will then request to choose units: English (E) or Metric (M). There is no preference recommended, but a reminder to remain consistent with the units throughout the model run. To move to the next section, press "Enter".

AERSCREEN will then request to choose an emissions source type: Point or Vertical Stack (P), Volume (V), Rectangular Area (A), Circular Area (C), Flare (F), Capped Stack (S), or Horizontal Stack (H). Based on the type of emissions sources researched in the Community Impacts Report (Pinyon, 2021), there are the potential for each of these types of sources. Therefore, tables below are included for necessary data to be collected for each source type and then typed into the AERSCREEN model. Both English and Metric units are included depending on the earlier choice.

Table 3-2. Emissions Source Type Parameters

Parameter	English Units	Metric Units
Vertical Stack (P), Capped Stack (S), Horizontal Stack (H)		
Emissions Rate	pound per hour (lb/hr)	gram per second (g/s)
Stack Height	feet (ft)	meters (m)
Stack Diameter	inches (in)	meters (m)
Stack Temperature	Fahrenheit (deg F)	degrees Kelvin (K)
Exhaust Flow Option 1 Exit Velocity (m/s) Option 2 Exit Velocity (ft/s) Option 3 Flow Rate (ACFM)	Option 1 – Not applicable Option 2 – feet per second (ft/s) Option 3 – actual cubic feet per minute (ACFM)	Option 1 – meters per second (m/s) Option 2 – Not applicable Option 3 – Not applicable
Flares (F)		
Emissions Rate	pound per hour (lb/hr)	gram per second (g/s)
Stack Height	feet (ft)	meters (m)
Total Heat Release[1]	calories per second (cal/s)	Not applicable
Radiative Heat Loss Fraction	Use default value of 0.55	
Volume (V)		
Emissions Rate	pound per hour (lb/hr)	gram per second (g/s)
Center of Volume Height	feet (ft)	meters (m)
Initial Lateral Dimension	feet (ft)	meters (m)
Initial Vertical Dimension	feet (ft)	meters (m)
Rectangular Area (A)		

Parameter	English Units	Metric Units
Emissions Rate	pound per hour (lb/hr)	gram per second (g/s)
Release Height Above Ground	feet (ft)	meters (m)
Long Side Dimension	feet (ft)	meters (m)
Short Side Dimension	feet (ft)	meters (m)
Initial Vertical Dimension	feet (ft)	meters (m)
Circular Area (C)		
Emissions Rate	pound per hour (lb/hr)	gram per second (g/s)
Release Height Above Ground	feet (ft)	meters (m)
Radius of Source	feet (ft)	meters (m)
Initial Vertical Dimension	feet (ft)	meters (m)

[1] Can be converted from permitted value of MMBtu/hr multiplied by 69,998.8225.

3.4 Emissions Rates

As discussed above, the emissions rate for the individual source is entered either in English or Metric units. The emissions input should be a maximum hourly rate. Details are provided in Section 3.11 in this document to convert the model output for pollutants with averaging periods longer than 1-hour.

To estimate NO_2 concentrations, there are more refined options for modeling: ozone limiting method (OLM), and plume volume molar ratio method (PVMRM). With OLM and PVMRM, the background ozone concentration can be used in conjunction with in-stack ratios for each emission unit type (e.g., reciprocating engine, turbine, heater, flare, etc.). The in-stack ratios should be retrieved from the most recent version of the EPA NO_2 In-Stack Ratio (ISR) database released in October of 2020. Non-zero values should not be included when determining the average ISR used in the AERSCREEN model. The "No Chemistry" option should be used for CO, SO_2, PM_{10}, $PM_{2.5}$ and all toxic air pollutant model runs.

3.5 Source Location

The next screen following the stack parameters will ask if the area surrounding the emissions source is Rural or Urban. Commerce City is considered an urban area and should therefore enter "U". Following that choice, the screen will ask to enter the population of the Urban area. The 2020 census data for Commerce City shows a population of 62,418 (US Census Bureau, 2022).

Since AERSCREEN is a single-source model, the location of an individual source and its distance relation to other sources cannot be directly modeled. Two approaches to determining model results of more than one source against the SIL, NAAQS, or TLV can be taken. These are discussed further in Section 3.11.

3.6 Receptors

Since AERSCREEN models only one source at a time, a receptor grid is generated by AERSCREEN based on the minimum distance to ambient air, set receptor spacing, and radius length of a receptor grid from the single source. Receptors should be set with the below parameters to estimate worst-case impacts surrounding the source. Based on known data and default parameters within AERSCREEN, the following was used for each of the AERSCREEN runs.

- Distance to Ambient Air: 1 meter (default)
- Maximum Distance to probe: 5,000 meters (default)
- Receptor spacing: 25 meters (default)
- Discrete receptors: none
    - Up to 10 discrete receptors may be used should individual public receptors require separate analysis such as public parks, hospitals, child-care facilities, etc. In such cases, choose yes (Y) and include the exact distance from the emitting source to the individual public receptors.
- Flagpole receptors: none

3.7 Background Concentrations

Generally for screening modeling analyses, background concentrations are not utilized unless for a cumulative analysis (Section 3.12) and/or when using the OLM or PVMRM method discussed in Section 3.4. This is because modeling analyses when comparing to the SIL do not include nearby sources or ambient air concentrations. The next line following choosing NO_2 OLM or PVMRM option is to input an in-stack ratio and then the background ozone concentration. Table 3-3 below details the appropriate monitoring stations by pollutant for Commerce City in lieu of onsite data. Should onsite monitoring data be available, the most recent year's data should be used. If the representative monitoring stations in Table 3-3 are used, the average of the three previous years will be the background concentration. The CDPHE annual monitoring values can be found in annual reports on the CDPHE website (https://www.colorado.gov/airquality/tech_doc_repository.aspx). The values are also available on the EPA AirData where exceptional events data should be included, to be conservative (https://www.epa.gov/outdoor-air-quality-data/monitor-values-report). Annual data is usually finalized and reported in the summer of the following year and only finalized data should be used for background concentrations.

As discussed in the Modeling Thresholds Report (Pinyon, 2022), there are no background values used in modeling analyses for toxic air pollutants. Moreover, Colorado doesn't monitor background concentrations of toxic air pollutants. Therefore, toxics are not included in the table below.

Table 3-3 Monitoring Stations for Cumulative Analysis

Pollutant	Averaging Time	Monitoring Station (AQS Site Number)	Background Concentration
CO	1 hour	Welby (08-001-3001)	Average of previous three years of final data
	8 hour		
NO_2	1 hour	Welby (08-001-3001)	
	Annual		
O_3	8 hours	Welby (08-001-3001)	
$PM_{2.5}$	24 hours	Birch Street (08-001-0010)	
	Annual		
PM_{10}	24 hours	Birch Street (08-001-0010)	

Pollutant	Averaging Time	Monitoring Station (AQS Site Number)	Background Concentration
SO_2	1 hour	Welby (08-001-3001)	

3.8 Terrain Options

AERSCREEN, as a screening tool, does not necessarily require location-specific or representative terrain data. Due to the relatively flat nature of the Commerce City, the terrain heights were not included with a source elevation of 0 meters in an urban setting. Because the majority of the land surrounding the Facility is developed with a high population density, urban dispersion was chosen. If it is decided to include terrain heights, the source coordinates type are either latitude/longitude (LATLON) or Universal Transverse Mercator (UTM) datum type. Otherwise default to 0 m source elevation

3.9 Meteorology

Generally, no onsite meteorological data are available for minor sources of air pollutants. AERSCREEN does not require any meteorological data and instead uses a program called MAKEMET to generate basic meteorological parameters based on surface characteristics, wind speed, and temperature. Based on the site location, known data, and default parameters within AERSCREEN, the following was used for each of the AERSCREEN runs. Note that the worst-case meteorology wind speed, wind direction, and temperature were used, making the modeling of emission sources conservative.

- Minimum Temperature: - 10 degrees Fahrenheit (default)
- Maximum Temperature: 100 degrees Fahrenheit (default)
- Minimum Wind Speed: 0.5 meters per second (default)
- Anemometer Height: 10 meters (default)
- AERMET seasonal tables: option 2
- Dominant Surface Profile: Urban (7)
- Dominant Climate Profile: Average Moisture (1)
- Non-adjusted (default)

After this response, AERSCREEN will ask for your file name. The OUT file name must end in .out. It is recommended the OUT file name be Company_Source_Pollutant.out or for example "CompanyX_Boiler_NO2.out".

3.10 Building Downwash and Fumigation

It is recommended building downwash and fumigation not be included in the AERSCREEN runs. There is little sensitivity in the use of downwash for AERSCREEN runs. Fumigation is also used for sources near shorelines which is not applicable for new or modified facilities in Commerce City.

3.11 Impacts Thresholds

Impacts thresholds used for screening evaluations reference current CDPHE Air Pollution Control Division "Interim Colorado Modeling Guideline for Air Quality Permits" released in October of 2021 and revised in May 2022 (CDPHE, 2022) and in Table 2-2. Where two averaging times exist for the same pollutant, both averaging times should be evaluated.

Based on how AERSCREEN operates, the form of the standard is not considered in the model output. Instead, the maximum potential 1-hour concentration is modeled and, if applicable, persistence factors are applied to the maximum 1-hour result for longer averaging times. Based on AERSCREEN guidance, the maximum 1-hour result is multiplied by 1 for 3-hour standards, multiplied by 0.9 for 8-hour standards, multiplied by 0.6 for 24-hour standards, and multiplied by 0.1 for annual standards. The results summary in the AERSCREEN OUT file for AERSCREEN applies these persistence factors when presenting the scaled longer average time period results.

There are two conservative approaches to estimate impacts from a new or modified facility with multiple emissions points. These approaches are conservative in that they do not account for realistic conditions such as the space between sources and gaps that would occur between individual source dispersion plumes.

- Assume that all of the sources originate at the same central point where dispersion plumes overlap completely.
- Evaluate the maximum 1st high through 8th high results of each individual source additively regardless of location (i.e., one sources' maximum 1st high at 200 meters added to another sources' maximum 1st high at 1 meter).

As previously mentioned, the highest first high of either the 1-hour, 8-hour, 24-hour or annual impact should be compared to the SIL for criteria pollutants or TLV for toxic air pollutants.

Cancer inhalation risk is calculated by multiplying the annual model result by the Cancerous TLV shown in Table 2-3 along with an exposure adjustment factor. Two exposure scenarios can be evaluated: the maximum exposed individual (MEI) and the most likely exposure (MLE). For the MEI risk, it is assumed that a person is exposed continuously (24 hours per day, 365 days per year) for the life of a project (e.g., 30 years). For the MLE risk, an adjustment should be made for the amount of time a person stays at a residence. No adjustment will be made for time away from home, to conservatively assume that people live and work in Commerce City. A typical residence time at the same location for a residential receptor can be from 6 to 30 years (EPA, 2009), so a midrange of 18 years was used for the average residential exposure. Exposure adjustment factors of 0.43 for the MEI (30/70) and 0.26 for the MLE (18/70) were applied to the estimated cancer risk to account for the actual time that an individual could be exposed during a 70-year lifetime. Therefore, the annual model result of a cancer-causing toxic air pollutant (either one source's annual output or the sum of multiple source's output as bulleted in the conservative approaches above) should be multiplied by 0.43 and then by the IUR for the specific pollutant. Note that EPA only has IUR for acetaldehyde, benzene, ethylbenzene, and formaldehyde. The result of the multiplication should be less than 1 in 1 million (1×10^{-6}).

All emissions sources at a modified facility should be included in the screening analysis even if only one source is being modified. New facilities should model all emissions sources in the screening analysis, as well. Sources with the same pollutant emissions will be evaluated together; namely all the CO emissions sources will add modeled impacts in the two conservative approaches, all the SO_2 emissions sources will add their modeled impacts in the two conservative approaches, and so on.

The new or modified facility should evaluate its impacts using approved screening models against the appropriate SILs, TLVs, and cancer risk threshold (1×10^{-6}). Background values for specific pollutants should not be added to model results. If the modeled impact is below the appropriate SILs, TLVs, and cancer risk threshold, no further analysis is recommended to be necessary. The conservative nature of the screening models and the low impacts thresholds provide confidence in the low impact on public health and environment.

3.12 Cumulative Analysis

If the screening modeling shows results equal to or higher than any of the significant impact levels (Table 3-1), a cumulative analysis is recommended. A cumulative modeling analysis is conducted as outlined above for the new or modified facility sources but will also include modeling of nearby sources and background concentrations. If there are more than 5 nearby sources, it is recommended to skip additional screening and conduct a refined modeling analysis due to the overly conservative nature of the screening process.

With a cumulative modeling analysis using screening, the same steps for running AERSCREEN should be used. Additionally, instead of just conducting modeling of the sources at the new or modified facility, inclusion of model results from nearby sources should also be completed. The combined model results (all at the new or modified facility plus the nearby sources) for both conservative approaches detailed in Section 3.11 should then be added to the appropriate pollutant background concentration (Section 3.7) and then compared against the appropriate NAAQS.

For the criteria pollutants and averaging periods that are percentiles (i.e., 1-hour NO_2, 1-hour SO_2, 24-hour $PM_{2.5}$), AERSCREEN alone is unable to compare model results to the form of the standard of NAAQS. Therefore, further analysis of the results should be completed to determine if the combined model result of the second conservative approach (evaluate the maximum 1st high through 8th high results of each individual source additively regardless of location) is above the NAAQS. Table 3-4 notates how to further analyze each pollutants' model results.

Table 3-4. National Ambient Air Quality Standards with Form of Standard Interpretation of Model Result

Pollutant	Averaging Time	Primary NAAQS	Model Result to Compare to NAAQS
CO	1 hour	35 ppm	2nd highest 1-hour result of combined sources plus background
	8 hours	9 ppm	2nd highest 8-hour result of combined sources plus background
NO_2[1]	1 hour	100 ppb	8th highest 1-hour result of combined sources plus background
	Annual	53 ppb	1st highest annual result of combined sources plus background
$PM_{2.5}$	24 hours	35 μg/m^3	8th highest 24-hour result of combined sources plus background
	Annual	12 μg/m^3	1st highest annual result of combined sources plus background
PM_{10}	24 hours	150 μg/m^3	6th highest 24-hour result of combined sources plus background

Pollutant	Averaging Time	Primary NAAQS	Model Result to Compare to NAAQS
SO_2	1 hour	75 ppb	4th highest 1-hour result of combined sources plus background
	3 hours	Not applicable	2nd highest 3-hour result of combined sources plus background

Note that the combined model results determined using the first conservative approach (assume that all of the sources originate at the same central point where dispersion plumes overlap completely) plus the background should be compared directly to the NAAQS without the further analysis tabulated above.

A cumulative analysis is not appropriate for toxic air pollutants. For any screening modeling that shows results equal to or higher than TLVs (Table 2-3) or the cancer risk threshold, refined modeling or mitigation options should be considered.

4. Refined Modeling Methodology

4.1.1 Emissions Thresholds

For refined modeling evaluations, the emissions thresholds detailed in the modeling guidance document released by CDPHE should be used. CDPHE Air Pollution Control Division released their "Interim Colorado Modeling Guideline for Air Quality Permits" in October of 2021 and updated in May 2022 (CDPHE, 2022). Table 1 in Section 2 of the interim modeling guidelines detail the emissions thresholds in which CDPHE requires impacts evaluations. Note that CDPHE currently doesn't routinely require or perform modeling to determine impacts from toxics and Table 1 only includes criteria pollutants.

4.1.2 Acceptable Refined Models

For refined modeling evaluations, the approved models detailed in the modeling guidance document released by CDPHE should be used. The recommended model currently is AERMOD which is available through external graphic user interfaces (GUI). There is no preferred external GUI, but the most common are available for purchase through software developers such as Lakes Software or Providence-Oris.

4.1.3 Impacts Thresholds

Per the CDPHE "Interim Colorado Modeling Guideline for Air Quality Permits" (CDPHE, 2022), modeling is first conducted for evaluation of the new or modified facility alone against the SIL levels detailed in Table 2 and Table 3, based on facility classification (e.g., minor, major, or PSD) of Section 3. Should initial modeling evaluation determine that the new or modified facility alone exceeds at least one of the SIL levels, then a cumulative analysis is required by CDPHE.

4.1.4 Cumulative Analysis Requirements

The CDPHE "Interim Colorado Modeling Guideline for Air Quality Permits" (CDPHE, 2022) should be followed to conduct a cumulative analysis of a new or modified facility's impacts. The cumulative analysis results are compared to the appropriate Colorado Ambient Air Quality Standards (CAAQS) and NAAQS standards as shown in Table 6 and Table 7 of Section 3 of the interim modeling guideline.

5. Secondary Impacts Methodology

For secondary pollutants such as O_3 and $PM_{2.5,}$ EPA has released guidance commonly referred to as MERPs (Modeled Emission Rates for Precursors) to estimate their impacts (EPA, 2019). MERPs are used for the 8-hour O_3, 24-hour $PM_{2.5}$, and annual $PM_{2.5}$ secondary standards only. There are also secondary NAAQS for annual NO_2, Pb, 24-hour PM_{10}, and 3-hour SO_2. In some cases, the primary NAAQS is equal to the secondary NAAQS (e.g., annual NO_2 and 24-hour PM_{10}). To evaluate impacts against the secondary NAAQS that are not covered under MERP guidance, it is conservatively proposed that these standards be treated as primary for the purposes of screening. Further discussion on these will be discussed in subsequent sections.

5.1 Emissions Thresholds

The need for secondary impacts evaluations to provide information to Commerce City and its residents is determined by a new or modified facility's potential to emit specified pollutants over certain thresholds. There are no secondary impacts thresholds for toxic air pollutants. Table 3-4 shows the emissions thresholds of specified pollutants in this document. Should a new or modified facility have maximum potential emissions above these thresholds, screening modeling is recommended.

Table 5-1. Emissions Thresholds for Screening – Secondary Pollutants

Pollutant	Averaging Time	Emissions Threshold
Criteria Pollutants		
Nitrogen Oxides (NOx)	Hourly	0 pounds per hour
Particulate Matter less than 2.5 microns ($PM_{2.5}$)	Daily	11 pounds per day
Particulate Matter less than 10 microns (PM_{10})	Daily	82 pounds per day
Sulfur Dioxide (SO_2)	Hourly	0.46 pounds per hour
Volatile Organic Compounds (VOC)	Hourly	0 pounds per hour

Emissions thresholds for criteria pollutants were retrieved from Colorado Interim Guidance (CDPHE, 2022) for all pollutants except NOx and VOC. Due to the growing concern over these pollutants and the nonattainment status of Commerce City for O_3 whose precursors are NOx and VOC, all sources with the potential to emit NOx and VOC are recommended for screening.

5.2 Acceptable Secondary Impacts Tools

As previously mentioned, EPA has released MERP guidance that details methodologies and thresholds regarding estimating secondary impacts of O_3 and $PM_{2.5}$ (EPA, 2019). The guidance relies on previously completed sophisticated photochemical modeling where emissions rates of precursors such as NOx, SO_2 and VOCs were demonstrated to equal the SIL level for the appropriate secondary NAAQS (i.e., 8-hour O_3, 24-hour $PM_{2.5}$ and annual $PM_{2.5}$). These emissions rates along with primary impacts modeling results such as those discussed in Section 3.2 are then used to estimate a new or modified facility's secondary impacts for comparison against the SIL (Table 2-2) and/or NAAQS (Table 2-1). It is recommended that the MERP guidance along with other modeling guidance released by Commerce City be used to estimate secondary impacts from O_3 and $PM_{2.5}$.

To determine the appropriate MERPs for precursors, new or modified facilities should use the Lowest emissions rate for the Rockies/Plains climate zone in Table 4-1 of the MERP guidance (EPA, 2019). These are tabulated below.

Table 5-2. Lowest Illustrative MERP Values by Precursor for Rockies/Plains

Averaging Time-Pollutant	NOx Emissions (tons per year)	VOC Emissions (tons per year)	SOx Emissions (tons per year)
8-hour O_3	184	1,067	Not applicable
24-hour $PM_{2.5}$	1,740	Not applicable	251
Annual $PM_{2.5}$	9,220	Not applicable	2,263

The methodology to determine potential impacts against the 8-hour O_3 SIL is as follows:

- Divide new or modified facility's total NOx emissions in tons per year by 184 (tabulated above)
- Divide new or modified facility's total VOC emissions in tons per year by 1,067 (tabulated below)
- Add the results of Step 1 and Step 2
- If the result of Step 3 is less than 1, then the project is not expected to exceed the 8-hour O_3 SIL
- If the result of Step 3 is greater than or equal to 1, then the new or modified facility will need to conduct a cumulative analysis described in Section 5.3.

The methodology to determine potential impacts against the 24-hour $PM_{2.5}$ SIL is as follows:

- Divide new or modified facility's total NOx emissions in tons per year by 1,740 (tabulated above)
- Divide new or modified facility's total SO_2 emissions in tons per year by 251 (tabulated below)
- Add the results of Step 1 and Step 2
- If the result of Step 3 is less 1, then the project is not expected to exceed the 24-hour $PM_{2.5}$ SIL
- If the result of Step 3 is greater than or equal to 1, then the new or modified facility will need to conduct a cumulative analysis described in Section 5.3.

The methodology to determine potential impacts against the annual $PM_{2.5}$ SIL is as follows:

- Divide new or modified facility's total NOx emissions in tons per year by 9,220 (tabulated above)
- Divide new or modified facility's total SO_2 emissions in tons per year by 2,263 (tabulated below)
- Add the results of Step 1 and Step 2
- If the result of Step 3 is less 1, then the project is not expected to exceed the annual $PM_{2.5}$ SIL

- If the result of Step 3 is greater than or equal to 1, then the new or modified facility will need to conduct a cumulative analysis described in Section 5.3.

For secondary pollutants not covered under the EPA MERP guidance, tools outlined for primary impacts should be used (see Section 3.2). As noted in Table 2-1, the primary and secondary standard for annual NO_2 and 24-hour PM_{10} are the same threshold. Therefore, no evaluation for secondary impacts of NO_2 and PM_{10} would be recommended so long as the primary impacts of these standards are modeled below the SIL and/or NAAQS per Sections 3 and 4, respectively.

5.3 Cumulative Analysis Requirements

If the screening modeling shows results equal to or higher than 1, a cumulative analysis is recommended. At a high level, a cumulative analysis will take into account already modeled results as part of the MERP guidance and background values for comparison against the NAAQS (Table 2-1). Below are tabulated modeled results for the Rockies/Plains at specific emissions rates.

Table 5-3. Modeled Values at Emissions Rates by Precursor for Rockies/Plains

Averaging Time-Pollutant	Modeled Impact at NOx Emissions Rate	Modeled Impact at VOC Emissions Rate	Modeled Impact at SOx Emissions Rate
8-hour O_3	1.314 ppb at 184 ton/yr	0.0407 ppb at 1,067 ton/yr	Not applicable
24-hour $PM_{2.5}$	0.047 $\mu g/m^3$ at 1,740 ton/yr	Not applicable	0.094 $\mu g/m^3$ at 251 ton/yr
Annual $PM_{2.5}$	0.047 $\mu g/m^3$ at 9,220 ton/yr	Not applicable	0.094 $\mu g/m^3$ at 2,263 ton/yr

The methodology to determine potential impacts against the 8-hour O_3 NAAQS is as follows:

- Multiply new or modified facility's total NOx emissions in tons per year by 1.314 ppb and divide by 184 (tabulated above)

- Multiply new or modified facility's total VOC emissions in tons per year by 0.0407 ppb and divide by 1,067 (tabulated below)

- Add the results of Step 1 and Step 2 and the background 8-hour O_3 value determined in Table 3-3 (Section 3.7)

- If the result of Step 3 is less than the 8-hour O_3 NAAQS in Table 2-1, then the project is not expected to exceed the 8-hour O_3 NAAQS

- If the result of Step 3 is greater than or equal to 8-hour O_3 NAAQS in Table 2-1, then the new or modified facility will need to conduct further, complex modeling or pursue mitigation options.

The methodology to determine potential impacts against the 24-hour $PM_{2.5}$ NAAQS is as follows:

- Multiply new or modified facility's total NOx emissions in tons per year by 0.047 $\mu g/m^3$ and divide by 1,740 (tabulated above)

- Multiply new or modified facility's total SO_2 emissions in tons per year by 0.094 μg/m^3 and divide by 251 (tabulated below)
- Add the results of Step 1 and Step 2 to the 24-hour $PM_{2.5}$ result of the new or modified facility only and the background 24-hour $PM_{2.5}$ value determined in Table 3-3 (Section 3.7)
- If the result of Step 3 is less than the 24-hour $PM_{2.5}$ secondary NAAQS in Table 2-1, then the project is not expected to exceed the 24-hour $PM_{2.5}$ secondary NAAQS
- If the result of Step 3 is greater than or equal to 24-hour $PM_{2.5}$ NAAQS in Table 2-1, then the new or modified facility will need to conduct further, complex modeling or pursue mitigation options.

The methodology to determine potential impacts against the annual $PM_{2.5}$ SIL is as follows:

- Multiply new or modified facility's total NOx emissions in tons per year by 0.047 μg/m^3 and divide by 9,220 (tabulated above)
- Multiply new or modified facility's total SO_2 emissions in tons per year by 0.094 μg/m^3 and divide by 2,263 (tabulated below)
- Add the results of Step 1 and Step 2 to the annual $PM_{2.5}$ result of the new or modified facility only and the background annual $PM_{2.5}$ value determined in Table 3-3 (Section 3.7)
- If the result of Step 3 is less than the annual $PM_{2.5}$ secondary NAAQS in Table 2-1, then the project is not expected to exceed the annual $PM_{2.5}$ secondary NAAQS
- If the result of Step 3 is greater than or equal to annual $PM_{2.5}$ NAAQS in Table 2-1, then the new or modified facility will need to conduct further, complex modeling or pursue mitigation options.

References

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Appendix B. AQ and WQ Technical Documents

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Memorandum

Date: June 2, 2022

To: Rosemarie Russo, Environmental Planner III, Commerce City

From: Dustin Collins, Pinyon Environmental, Inc.

Subject: Oil & Gas Plan Submittal Guidance Overview

Introduction

Pinyon Environmental, Inc. (Pinyon) is pleased to present this memorandum outlining existing oil and gas regulations involving air quality within the Commerce City Land Development Code (LDC) Ordinance 2266: Revised Oil and Gas Regulations (Ordinance 2266) – adopted March 15, 2021. Additionally, this memo provides a comparison to existing oil and gas air quality regulations within nearby Boulder and Larimer Counties to determine if Ordinance 2266 is comprehensive in its list of requirements involving oil and gas activities within Commerce City.

Ordinance 2266: Revised Oil and Gas Regulations

Adoption Process

Commerce City spent two years working to update its comprehensive oil and gas regulations to reflect current regulatory trends and industry best practices more accurately. Initially presented in 2019, the draft regulations adopted in Ordinance 2266 underwent several rounds of feedback from City Council and stakeholders, including regulatory and government agencies, industry representatives, advocacy groups, and the Commerce City oil and gas focus group. Additionally, Commerce City held two public open houses prior to the adoption of Ordinance 2266 on March 15, 2021.

Regulatory Agencies

Oil and gas development in Colorado is regulated by the Colorado Oil and Gas Conservation Commission (COGCC), a division of the Colorado Department of Natural Resources. COGCC manages all below-ground aspects of oil and gas drilling and conducts the state permitting process. To obtain permits, operators must follow the permitting process from the COGCC, Colorado Department of Public Health and Environment (CDPHE), and Commerce City through separate processes before any new oil and gas activity can begin.

Summary of Air Quality Regulations

A series of Best Management Practices (BMPs), standards, protections, and specifications related to air quality have been developed by Commerce City to prevent or mitigate the degradation of Commerce City's air and visibility resources; prevent odors and air pollution problems; and to improve the quality of life and general welfare in Commerce City. This was done through a series of BMPs adopted in Ordinance 2266, covering the following activities and processes related to air quality:

- Minimization of Emissions – minimization efforts include hydrocarbon destruction efficiency of 98% or better, use of no-bleed continuous and intermittent pneumatic devices, glycol dehydrators prohibited, operating all equipment in accordance with manufacturer recommendations, etc.

- Ambient Air Monitoring – creation and submittal of a plan detailing how the operator will conduct baseline monitoring prior to construction of the well site. Additionally, the plan must also describe how the operator will conduct continuous monitoring and collect periodic canister samples (or equivalent method) during the drilling, completion, and production phases of development.

- Leak Detection and Repair (LDAR) – development and maintenance of an acceptable LDAR program as required by CDPHE using modern leak detection technologies such as infrared (IR) cameras for equipment used at a well site.

- Ozone Air Quality Action Days – implementation of CDPHE suggested air emission reduction measures during air quality action day advisories including reductions in vehicle idling, traffic, refueling, etc.

- Electric Equipment – requirement for all permanent production equipment, such as compressors, motors, and artificial lift equipment to utilize electric line power to mitigate noise and reduce emissions.

- Exhaust – requirement for all exhaust from engines, motors, coolers, and other mechanized equipment vented up or in a direction away from the nearest occupied building.

- Flares and Combustion Devices – designed and operated using manufacturer specifications, 98% hydrocarbon destruction efficiency, no visible emissions, etc.

- Fugitive Dust – minimization of dust associated with onsite activities and traffic on access roads throughout construction, drilling, and operation activities to ensure no visible dust emissions from access roads or well sites.

- Odor Containment – control and prevent odors from operations from affecting adjacent properties and proactively address and resolve complaints by impacted members of the community.

- Reduced Emission Completions (Green Completions) – employment of reduced emission completions ("Green Completions") in compliance with federal and state requirements.

- Annual Report – annual report certifying compliance with air quality requirements contained within Ordinance 2266.

For a detailed summary of air quality revisions included in Ordinance 2266, please refer to Exhibit I, Part C of Ordinance 2266 (Commerce City, 2021).

Comparison to Nearby Oil and Gas Development Regulations

The air quality oil and gas regulations adopted by Commerce City in Ordinance 2266 were compared to the Boulder County Land Use Code (LUC) Resolution 2020-95 Article 12: Regulations of Oil and Gas Development, Facilities and Operations adopted on December 15, 2020 (Boulder, 2020) and the Larimer County LUC Article 11: Oil & Gas Facilities adopted on July 29, 2021 (Larimer, 2021). Pinyon has determined the oil and gas regulations related to air quality in Ordinance 2266 as compared to Boulder County Article 12 and Larimer County Article 11 is comprehensive in its list of requirements above and beyond state and federal air quality requirements. Examples include a minimum 98% hydrocarbon destruction efficiency from flares and combustion devices, prohibiting the use of glycol dehydrators or desiccant gas processing dehydrators, and requiring all permanent production equipment (such as compressors, motors, and artificial lift equipment) to utilize electric power to mitigate noise and emissions reduction. Requirements within Ordinance 2266 that are also present within the Boulder or Larimer Counties regulations include but are not limited to the minimization of emissions through equipment limitations, air quality modeling, LDAR, fugitive dust control, use of electric equipment, odor containment, and prohibiting routine flaring.

Environmental Justice Screening

Based on Colorado's environmental justice screening tool, the Commerce City community is subject to air quality impacts from industry that are above average. Specifically, criteria pollutants regulated by EPA and CDPHE are emitted from large industrial sources into the Commerce City area at levels higher than other communities. The enforcement of oil and gas regulations included in City Ordinance 2266 may not result in a reduction of these pollutants in the near term but may help to mitigate future increases in air pollutants if oil and gas activity were regulated to a lesser degree.

Conclusion

Based on the overview above, Pinyon has concluded the air quality oil and gas regulations included in Commerce City Ordinance 2266 adopted on March 15, 2021, is comprehensive in its list of requirements. Should any of the above regulatory requirements be modified or removed, further analysis may be beneficial to determine continued minimization of air quality impacts through BMPs with City Ordinance 2266, and COGCC and CDPHE air quality requirements.

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Appendix B. AQ and WQ Technical Documents

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December 7, 2022

Air Quality Emissions Reduction Guidance

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Prepared for:
City of Commerce City
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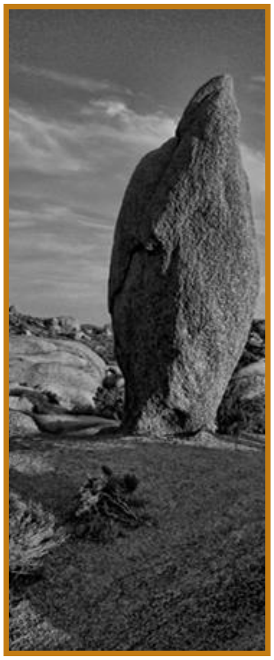
Pinyon Project No.:
1/21-1435-01



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December 7, 2022

Air Quality Emissions Reduction Guidance

Commerce City Environmental Consulting Services
7887 East 60th Avenue
Commerce City, Colorado

Prepared for:
City of Commerce City
7887 East 60th Avenue
Commerce City, CO 80022

Pinyon Project No.:
1/21-1435-01

Prepared by:

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Reviewed by:

Dustin Collins

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Tables

Executive Summary

Pinyon Environmental, Inc. (Pinyon) has prepared this Air Quality Emissions Reduction Guidance document for the City of Commerce City (Commerce City) to establish emission reduction strategies for air quality pollutants identified in the Community-Wide Impacts Report (Pinyon, 2021a). The Community-Wide Impacts Report identifies pollutants of concern including criteria pollutants, precursors for criteria pollutants, and toxic pollutants that may occur within and near the Commerce City boundary. This Emissions Reduction Guidance builds upon that previous Impacts Report by presenting what emissions reduction strategies can be developed to potentially reduce those pollutants quantities and impacts. Specifically, this report includes emissions and impacts reduction information including impacts inventory updates, monitoring network enhancements, emissions thresholds implementation, oil and gas requirements reviews, utilization of best available control technology (BACT) and other similar analyses, and other emissions control suggestions.

1. Introduction and Purpose

The City of Commerce City (Commerce City) tasked Pinyon Environmental, Inc. (Pinyon) to provide Air Quality Emissions Reduction Guidance to address emissions concerns within Commerce City. The Air Quality Emissions Reduction Guidance is intended to establish emissions reductions strategies Commerce City can improve, develop and/or implement for those pollutants identified in the Community Impacts Report for both existing and future sources of air quality emissions.

A review of state and federal requirements was conducted along with a review of best practices for reducing air quality emissions. The scope of air quality significance evaluations extends beyond current state guidance to include specific toxic air pollutants currently emitted within Commerce City's boundaries and secondary air pollutants that are formed as a result of emissions within the City's boundaries. From this review, recommendations are provided to assist Commerce City in framing potential options for ongoing policy efforts for existing, new, or modified facilities in the future to reduce emissions and/or pollutant impacts on its residents and environment.

This document, in conjunction with the previous deliverables Pinyon has completed for Commerce City, will better inform and direct Commerce City in evaluating future projects within its boundaries to inform residents, initiate practical discussion with project proponents, as well as potentially mitigating future negative air quality impacts.

2. Pollutants of Concern

The following list bullets different pollutant emissions that can cause or contribute to ambient air concentrations that can demonstrate a potential harm to human health or public welfare. These pollutants and the sources and activities that may result in their emissions are detailed in the Community Impacts Report. Note, lead is not discussed in detail even though it is a criteria pollutant. As mentioned in the Community Impacts Report, a lead monitor was taken offline due to many years of low or zero concentrations.

- Carbon monoxide (CO)
- Nitrogen oxides (NO_x)
- Particulate matter less than 10 micrometers in diameter (PM_{10})
- Particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$)
- Sulfur dioxide (SO_2)
- Volatile organic compounds (VOC)

Toxic air pollutants of concern are presented below based on public concern over the pollutants in and around the Commerce City area. This is not a comprehensive list of all pollutants but is meant to include released pollutants reported to the Colorado Department of Public Health (CDPHE) with public health concern.

- Acetaldehyde
- Benzene
- Ethylbenzene
- Formaldehyde
- Hydrogen cyanide
- Hydrogen sulfide
- n-Hexane
- Toluene
- Xylenes

There are also secondary pollutants that form following chemical reactions in the atmosphere. There are no direct emissions of these pollutants, however health and environmental standards are developed for these pollutants. It's important to note that Commerce City is in the Denver Metro/North Front Range, CO ozone nonattainment area, which was re-classified as severe nonattainment in 2022.

- Ozone (O_3)

- Secondary $PM_{2.5}$

The Clean Air Act (CAA) provided the United States Environmental Protection Agency (EPA) the authority to establish National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The NAAQS are categorized as primary standards, which are thresholds for public health protection, and secondary standards, are thresholds for public welfare protection. The NAAQS have been modified and added to since the initial promulgation of the CAA and the current NAAQS are in Table 2-1.

Table 2-1. National Ambient Air Quality Standards

Pollutant	Averaging Time	Primary NAAQS	Secondary NAAQS	Form of Standard
Carbon Monoxide (CO)	1 hour	35 ppm	Not applicable	Not to be exceeded more than once per year
	8 hours	9 ppm		
Lead (Pb)	Rolling 3-month average	0.15 $\mu g/m^3$	0.15 $\mu g/m^3$	Not to be exceeded
Nitrogen Dioxide (NO_2)[1]	1 hour	100 ppb	Not applicable	98th percentile of 1-hour daily maximum, averaged over 3 years
	Annual	53 ppb	53 ppb	Annual mean
Ozone (O_3)[2]	8 hours	70 ppb	70 ppb	Annual 4th highest 8-hour daily maximum, averaged over 3 years
Particulate Matter less than 2.5 microns ($PM_{2.5}$)	24 hours	35 $\mu g/m^3$	35 $\mu g/m^3$	98th percentile, averaged over 3 years
	Annual	12 $\mu g/m^3$	15 $\mu g/m^3$	Annual mean, averaged over 3 years
Particulate Matter less than 10 microns (PM_{10})	24 hours	150 $\mu g/m^3$	150 $\mu g/m^3$	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)	1 hour	75 ppb	Not applicable	99th percentile of 1-hour daily maximum, averaged over 3 years
	3 hours	Not applicable	0.5 ppm	Not to be exceeded more than once per year

Source: EPA, 2021

ppm parts per million

ppb parts per billion

$\mu g/m^3$ micrograms per cubic meter

[1] The level of the annual NO_2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

[2] Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O_3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O_3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards. The standard is presented as 0.070 ppm but is shown in ppb for the purposes of clearer comparison to the significant impact level (SIL).

3. Emissions Reduction Efforts

Air quality emissions reduction and data collection efforts can be implemented to better inform the public and establish more stringent requirements for current/future sources of air quality pollution in and surrounding Commerce City. Below is a bulleted list of mitigation recommendations that may achieve lower impacts for one or more criteria, toxic, or precursor pollutants. This list is not meant to be a comprehensive list, as changes to regulations could require additional consideration for best mitigation options. Additional discussion on each mitigation effort bulleted below can be found in Sections 3.1 through 3.5.

- Continue making updates to the impacts inventory to keep residents informed on new pollutant source details and existing source modifications.
- Implement a monitoring network that supplements existing and planned monitoring to help the community better understand how the existing pollutant sources are impacting residents and/or other specific locations such as schools and parks.
- Incorporate air quality threshold levels into City ordinances that would require additional analysis, reporting, and potentially mitigation for planned emission sources.
- Update oil and gas regulatory requirements on a continuous basis to keep up with evolving industry technologies and practices.
- Reduce current and future emissions by implementing practices such as BACT analysis requirements and targeted emissions control requirements as needed.

3.1 Impacts Inventory

Pinyon developed the Community-Wide Impacts Report to identify and analyze permitted air quality emissions sources in and near Commerce City. In conjunction with source data maintained by the CDPHE Air Pollution Control Division (APCD) and oil and gas wells in operation registered with Colorado Oil and Gas Conservation Commission (COGCC), one hundred fifty-four (154) unique sources of air pollution were identified.

Pinyon recommends regular review and updates to the Community-Wide Impacts Report, which would include updates to CDPHE APCD and COGCC source inventories, in order to keep residents informed of permitted pollutant source locations and emission totals in and near Commerce City. It is important to note not all sources of pollution are required to obtain an air permit from CDPHE. For example, sources that emit pollution at rates less than the thresholds detailed in Table 1-1 of the Community-Wide Impacts Report are not required to obtain a permit. Permit requirements can change, affecting the eligibility of sources presented in the Community-Wide Impacts Report from reporting emissions in the future and/or requiring new emissions sources to obtain a permit. Additionally, permitted sources may undergo modifications that result in an increase in pollutant emissions levels. Therefore, the sources represented in the Community-Wide Impacts Report may not accurately represent the full extent of sources within Commerce City in future months/years and should be reviewed and updated at least annually.

3.2 Enhanced Monitoring Network

Pinyon developed the Existing and Potential Ambient Air Monitoring Plan (Pinyon, 2021b) to identify existing and proposed monitor locations in and near Commerce City, along with information for reference to support the development of a potential Commerce City operated monitoring network. As of 2022, APCD conducts air quality and meteorological monitoring at two (2) locations in and surrounding Commerce City (CDPHE, 2022). The monitors and pollutants monitored include the following: Birch Street (PM_{10} & $PM_{2.5}$) and Welby (O_3, CO, NO_2, SO_2 & PM_{10}). Additional monitoring data is being collected by third parties Suncor Energy and Cultivando. An overview of each respective monitoring network currently developed in and near Commerce City is detailed in the Existing and Potential Ambient Air Monitoring Plan.

Pinyon recommends the implementation of a monitoring network operated by Commerce City to supplement existing and planned monitoring in locations throughout Commerce City not currently collecting data to enhance community understanding on the impacts of existing air pollutants to residents and/or sensitive locations such as schools and parks. This recommendation aligns with a recommendation from the City's Environmental Policy Advisory Committee (EPAC) for the City to provide clearer and more robust communications, data, and information regarding monitoring results and air quality emissions and impacts in the community. Pinyon identified twenty (20) potential monitor deployment site locations within the Existing and Potential Ambient Air Monitoring Plan. The monitors should collect measurement data based on pollutant concerns at the location but could include up to the following pollutants: O_3, CH_4, VOCs, HAPs BTEX, Hydrogen Cyanide, CO, CO_2, SO_2, Dimethylsulfide, Nitric Oxide, NO_2, and Particulate Matter. Some pollutants may not be needed depending on the area, but Commerce City should decide the breadth of the network with its contractor before deployment.

3.3 Air Quality Threshold Levels

Pinyon developed the Modeling Thresholds Report (Pinyon 2022a) to establish levels of air quality significance with recommendations on further evaluation and analysis to determine the potential for human health and environmental impacts. A review of state and federal requirements was conducted along with a review of best practices for determining air quality significance. The scope of air quality significance evaluations extended beyond current state guidance to include specific toxic air pollutants currently emitted within Commerce City's boundaries and secondary air pollutants that are formed as a result of emissions.

Pinyon recommends following the emissions thresholds proposed in Table 3-1 of the Modeling Thresholds Report for any new or modified project within Commerce City to conduct impacts screening. The Modeling Thresholds Report suggests impacts thresholds to determine whether a more refined analysis, such as analyses required by CDPHE for air permit applications, may be warranted.

3.4 Oil and Gas Regulatory Requirements

Pinyon developed the Oil and Gas Plan Submittal Guidance Overview (Pinyon 2022b) to outline current air quality compliance requirements related to oil and gas activities. Commerce City spent two years working to update its comprehensive oil and gas regulations to reflect current regulatory trends and industry best practices more accurately. Following several rounds of feedback from City Council and stakeholders including regulatory and government agencies, industry representatives, advocacy groups, and the Commerce City oil and gas focus group, Ordinance 2266 was adopted on March 15, 2021.

Pinyon recommends the continued review of regulations pertaining to oil and gas development published by COGCC. Should any of the regulatory requirements be modified or removed, further analysis is recommended to determine continued minimization of air quality impacts through Best Management Practices (BMPs) and future city ordinances. Additionally, periodic review of oil and gas regulatory requirements in neighboring cities and jurisdictions within Colorado is recommended to ensure the most comprehensive regulations are in effect within Commerce City.

3.5 BACT and Emissions Control

Best Available Control Technology (BACT) is the level of air contaminant emission control or reduction required for new, modified, relocated, and replacement emission sources. BACT is intended to reduce emissions to the maximum extent practicable considering technological and economic feasibility.

BACT includes the lowest emitting of any of the following:

- the most stringent emission limitation, or most effective emission control device or control technique, which has been proven in field application and which is cost-effective for such class or category of emission unit unless demonstrated that such limitation, device or control technique is not technologically feasible;
- any emission control device, emission limitation or control technique which has been demonstrated but not necessarily proven in field application and which is cost-effective for such class or category of emission unit unless demonstrated that such limitation, device or control technique is not technologically feasible;
- any control equipment, process modifications, changes in raw material including alternate fuels, and substitution of equipment or processes with any equipment or processes, or any combination unless demonstrated that such limitation, device or control technique is not technologically feasible or cost-effective
- the most stringent emission limitation, or the most effective emission control device or control technique, contained in any State Implementation Plan (SIP) approved by the federal EPA for such emission unit category, unless demonstrated that such limitation or technique has not been proven in field application, that it is not technologically feasible or that it is not cost-effective for such class or category of emission unit

BACT is commonly determined based on specific equipment categories such as diesel engines, utility boilers, or turbines. BACT changes with time as improved control technologies are developed and are proven in field applications and as the cost-effectiveness of control technologies improve.

Pinyon recommends that Commerce City require existing and/or potential emission sources to implement the EPA BACT, Lowest Achievable Emissions Rate (LAER), and/or Reasonable Available Control Technology (RACT) Clearinghouse (EPA, 2022) for potential control devices or equipment that can result in lower emissions to complete the same process or operation. Commerce City could also internally review these data specific to facilities or emissions of concern to implement targeted policies and requirements. Examples of BACT may include but are not limited to the following:

- Operate facilities in accordance with BMP's and good air pollution practices.
- Minimizing the duration of maintenance, startup, and shutdown (MSS) activities and operate facilities in accordance with BMPs.
- Fire equipment using low sulfur fuels and BMPs. Limit fuel to firing pipeline quality natural gas.
- Install control equipment on sources where applicable to reduce emissions.
- Implement leak detection and repair programs to identify and repair leaks from equipment as soon as possible.

- Use water sprays during material handling and reduce speeds when driving on unpaved roads.

4. Emissions Reduction Efforts – New or Modified Sources

In the instance of a new or modified facility, mitigation recommendations can be provided to a project proponent to reduce the facility's potential emissions, reduce the facility's potential impacts, or both. Below is a bulleted list of potential mitigation recommendations that may achieve lower impacts for one or more criteria, toxic, or precursor pollutants. This is not meant to be a comprehensive list, as unique emission sources could require source specific consideration for best mitigation options.

- Review the EPA BACT, LAER, and RACT Clearinghouse for potential control devices or equipment that can result in lower emissions to complete the same process or operation.
- Modify exhaust parameters for a specific source especially those that have stacks to allow better dispersion. Higher release heights, faster exit velocities, and warmer gas temperatures generally result in better dispersion and less localized impacts.
- Determine if high impact sources at a facility can be located farther from residential housing, gathering areas, and sensitive communities.
- Limit a high impact source's operation to periods of calmer meteorology such as low winds and/or the time of day to reduce the effects of unexpected, exceptional weather conditions.

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Appendix B. AQ and WQ Technical Documents

December 14, 2022

Identification of Potential Point and Nonpoint Sources of Impacts to Water Quality

Commerce City, Colorado

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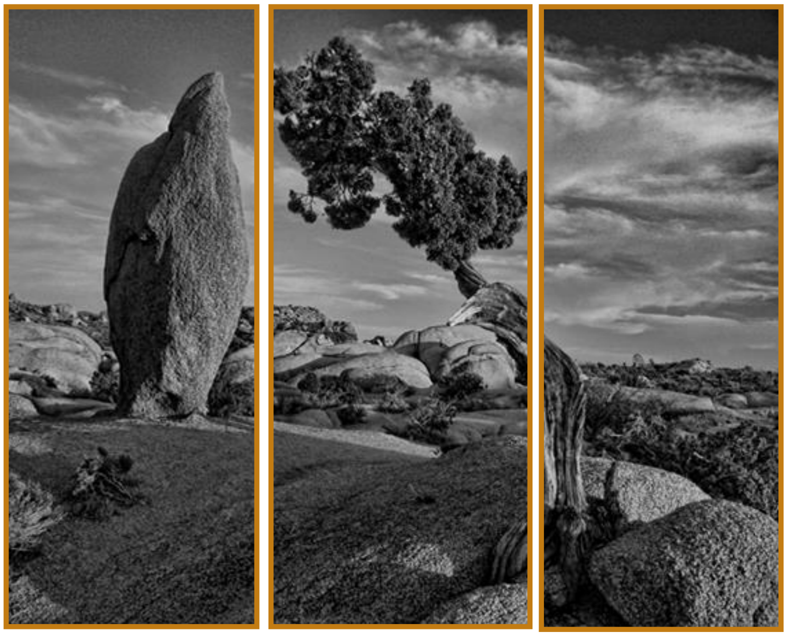

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Figures

1. Purpose

Pinyon Environmental, Inc. (Pinyon) was tasked with identifying potential point and non-point[1] pollutant sources for Commerce City that could impact water quality within the city boundary. Pinyon conducted the evaluation based on available data for permitted and non-permitted entities, and land uses, with potential to discharge pollutants to groundwater and surface water bodies. A series of maps have been developed that are intended to support Commerce City's understanding of locations of potential pollutant sources and are designed for use in high-level planning evaluations where qualitative information regarding the types, distribution, and density of facilities are of interest. The information provided can be used for a range of pre-project planning and informational purposes. Pre-planning examples may include site orientation for construction or low-impact development projects where land disturbance could release pollutants. The maps can also be used for general information purposes including, but not limited to, identifying areas of concern that may warrant further investigation.

2. Approach and Study Area

Several categories of pollutant sources in the study area were considered in the evaluation, including hazardous materials sites, land-use associated with nutrient loading (e.g., agriculture, onsite wastewater treatment systems (septic systems) and impervious surfaces, and point sources such as wastewater, industrial, and stormwater discharges.

Mapping the source categories generally considered a review of:

- Areas within a 1-mile buffer outside of the city boundary and inclusive of the growth boundary (Figure 1)
- Facility types and the potential for a facility to degrade the environment
- Density and distribution of known facilities
- Source Types – point or non-point sources

2.1 Heat Mapping

In addition to individual point or polygon map layers that are used to differentiate pollutant sources and locations, Pinyon developed a "heat map" for a subset of the hazardous materials (nonpoint source) map layers. The heat map represents a combination of the geographic density of features on a map and their associated likelihood of potential for causing degradation denoted by a color range (cooler to hotter). Heat maps are useful for layers with many features.

The heat map in Figure 3a was created using ESRI's ArcGIS Pro software. Facilities classified as "high" are "hotter" indicating greater potential impact, which is denoted by red to yellow color gradations; facilities classified as low are "colder," indicating a lower potential impact denoted by blue to pink color gradations. Where a higher density of facilities is present, the heat map illustrates a "hotter" signature; if the higher density of sites also includes facilities with "high" classifications, the heat signature is pushed further up the color gradation toward yellow. Heat signatures also register "hotter" at the center point of the high-ranked facility,

[1] A point source is defined in the Clean Water Act as "any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged." A non-point source is defined to mean any source of water pollution that does not meet the legal definition of "point source" in section 502(14) of the clean water act.

or cluster, then grade to "colder" moving away from the facility or facilities denoting that the risk from the facility reduces with increased distance. Importantly, the heat map does not represent the presence or distribution of potential contamination, but rather illustrates the likelihood of potential for causing degradation based on the methodology described herein. Most of the facilities included in the heat map are represented by a point depicting the facility address.

3. Identification of Pollutant Sources

Sections 3.1 through 3.3 discuss in more detail the different categories of pollutant sources, Pinyon's approach for identifying the sources, and the final map products.

3.1 Point Sources

Pinyon identified a point source as being a localized or stationary point of discharge to groundwater or surface water that is regulated under a National Pollution Discharge Elimination System (NPDES) permit.

Wastewater and industrial treatment facilities are point sources that are heavily regulated by the Colorado Water Quality Control Division. A check of EPA's Enforcement and Compliance History Online database indicates that neither of the 2 major dischargers in the area - the Suncor Refinery and Metro Wastewater Reclamation Facility - had violated their surface water discharge permit limitations within the last 3 years. These facilities would be sources of harmful contaminants if the terms of the permits are violated, or pollutants not regulated by the permit are discharged.

Many stormwater discharges are also regulated under the NPDES permitting system. Most regulated stormwater discharges in the study area are associated with property development and highway construction. Note that NPDES permit discharge locales classified as "Expired", "Not Needed", and "Terminated" were not included in the map. Generally, permitted stormwater point sources are considered a relatively low risk for causing water quality degradation.

The Point Source Map (Figure 2) includes point sources with NPDES permits and impervious surfaces and cropland, which are land uses that can contribute pollutants to groundwater or surface water. Impervious surfaces can cause sheet runoff or runoff that is channeled to both regulated and unregulated stormwater sewers during precipitation events. During these events, contaminants that have accumulated on the impervious surface are mobilized. Uncontrolled or unregulated runoff can impact water quality through pushing excess sediment, pesticides and fertilizers, motor oil, metals, chloride, and other contaminants into rivers and streams in high concentrations. In the early runoff stage, a pulse of contaminants in high concentrations can be delivered to receiving waters and cause shocks to water quality and aquatic organisms in surface waters. Cropland or agricultural land can be a source of nutrients, pesticides, herbicides, and other potential contaminants, which can also impact water quality.

3.2 Nonpoint Sources

The non-point source maps (Figures 3a and 3b through 3f) primarily include hazardous materials sources. Figure 3a is a map of the entire study area and Figures 3b through 3f are map segments showing non-point sources near Sand Creek and the South Platter River within the southern portion of the study area. The locations of these figures are shown in the Figure 3a legend. For purposes of this document, the term "hazardous materials" is used to collectively describe hazardous substances as defined by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, commonly known as Superfund); hazardous and solid wastes as defined by the Resource Conservation and Recovery Act (RCRA); asbestos; and petroleum products.

A facility source was identified as being a distributed area of potential groundwater or surface water impacts resulting from uses that may have resulted in releases into the environment. To generate maps that graphically illustrate where potential sources occurrences are *more likely*, Pinyon:

- utilized readily available georeferenced on-line downloadable data from agency databases (e.g., U.S. Environmental Protection Agency (EPA), Colorado Department of Public Health and Environment (CDPHE));
- developed a georeferenced database of facility types that occur within 1 mile of the city boundary and inclusive of the growth boundary; and
- categorized facility type based on the relative potential for hazardous materials to have been released into the environment (i.e., low, medium, high)

3.2.1 Hazardous Materials Facility Type Classification

The facility types have been classified as follows:

- Low: Based on the facility type, it is *unlikely* that the facility has degraded soil, soil vapor, or groundwater
- Medium: Based on the facility type, it is *possible,* although unknown, that the facility has degraded soil, soil vapor, or groundwater
- High: Based on the facility type, it is *likely* that the facility has degraded soil, soil vapor, or groundwater

Table 3-1 summarizes the facility types and non-point source classifications, whether the facilities were included in the heatmap, and the rationale for the classification assignment. Using publicly available and geolocatable data, facility types were identified and classified into categories based on facility type and operations. Note that only a subset of facilities has been included in the heatmap analysis. The map layers not included in the heatmap are differentiated as polygons or points rather than color gradations.

On-site wastewater treatment systems (OWTSs) are mapped as points and also not included in the heat map analysis because the density of the systems would have overwhelmed the heat map making it less useful. Further, OWTSs are important primarily when considering potential nutrient impacts of surrounding ground and surface waters as opposed to hazardous material facilities (included in the heat map) that may contribute chemical pollutants.

Other layers not included in the heat map have significant footprints which also showed potential for overwhelming the heat map. These facilities are included in the map as polygons and generally include Superfund sites, historical fill areas (solid waste facilities and landfills), and sites with institutional controls.

Table 3-1. Nonpoint Source Classifications

Facility Type	Classification	Included in Heat Map?	Discussion/Rationale
Brownfields (EPA and CDPHE)	High	Yes	Brownfields are generally commercial or industrial facilities or properties that have been scrutinized by a regulatory agency, and possibly remediated to some level. Generally, these facilities have had, or are perceived to have, environmental constraints such as releases of hazardous materials that may require clean up. Therefore, there is a high potential that degradation of the environment has occurred, and these impacts may persist.
EPA RCRA Generators, Enforcement, Compliance	Medium/High	Yes	These are facilities that are regulated under the RCRA regulations, and that use and/or dispose of hazardous materials, including hazardous wastes. Although regulated materials are potentially used in normal business operations, compliance with regulations may not be understood; impacts related to this facility type tend to be localized near the source facility.
EPA TSCA Facilities	Medium	Yes	These are facilities that are regulated under the Toxic Substances Control Act (TSCA) regulations, which address the production, importation, use, and disposal of specific chemicals such as polychlorinated biphenyls (PCBs), asbestos, radon, and lead-based paint.
Leaking Tanks (CDLE OPS Release Events)	Medium	Yes	These facilities may have leaking storage tanks and are usually associated with gas stations. When reported, impacts are generally well documented and tend to be relatively localized near the source facility. Note, for this analysis, active gas stations that have not reported a release were not included in the evaluation as the impacts would be considered low. Further, the Colorado Division of Oil and Public Safety does not have easily downloadable GIS data for facilities that have not reported a release.
CDPHE Voluntary Cleanup and Redevelopment Program (VCUP)	High	Yes	Like Brownfields described above, these tend to be blighted properties with environmental liabilities that impact property uses and redevelopment. As a result, there is a high potential for environmental issues to be present at these facilities.

Facility Type	Classification	Included in Heat Map?	Discussion/Rationale
COGCC Oil and Gas Spills	Low	Yes	These are spill reports on record with Colorado Oil & Gas Conservation Commission (COGCC). Based on the nature of oil and gas spills (which do not transition into a VCUP, Brownfield, or other type of facility), there is a low potential for these to impact soil, soil vapor, and groundwater. Note, for this analysis, oil and gas wells that have not reported a spill were not included in the evaluation as the impacts would be considered low.
National Priority List (NPL)	High	No (Polygon Layer)	Often referred to as "Superfund" sites, these facilities tend to be some of the most polluted facilities in the country. Many of these facilities have been remediated, and are no longer on the NPL, but it is possible that residual impacts could persist. An example is the Rocky Mountain Arsenal, which is within 1 mile of the city boundary, although most has remediated.
Containment System Remediation Goals (CSRG) Potential Exceedance Area	Medium	No (Polygon Layer)	This is the area identified as part of the Rocky Mountain Arsenal Land Use Control Plan (Navarro, 2013), where groundwater could potentially exceed CSRGs.
CDPHE Solid Waste Facilities or Operating Commercial Landfills	High	No (Polygon Layer)	Regulated or potentially unregulated solid waste disposal sites where controlled or uncontrolled filling has likely impacted soil, soil vapor, and groundwater.
Tri-County Onsite Wastewater Treatment Systems	Site-Specific	No (Point layer)	These systems are also known as septic systems. Onsite wastewater treatment systems have potential to cause nutrient loading to groundwater and surface waters. These are denoted as points on the map but are not the same as point sources as defined by the Clean Water Act.

3.3 Alluvial Aquifer / Well Map

The Groundwater Vulnerability Atlas has been developed by the Colorado Environmental Public Health Tracking Program (CDPHE, 2021) with data compiled by CDPHE, COGCC, Colorado Department of Natural Resources (DNR), Colorado Department of Labor and Employment, and the EPA. Using Source Water Assessment and Protection (SWAP) methodologies, an aquifer vulnerability coverage map was generated (Figure 4). The alluvial aquifer vulnerability is the most relevant when considering potential impacts to surface water. In addition, drinking water wells less than 100 feet in depth have been included on the map. This allows the user to potentially identify drinking water wells that may be in higher risk areas based on the alluvial aquifer vulnerability.

4. Key Observations

The maps provide a birds-eye view of point and non-point sources within the study area and a way to screen for potential large-scale impacts over a broad area. Having broad knowledge of potential sources of pollutants could also help inform additional sampling and analyses for site-specific projects. Pinyon recommends that impacts to hazardous materials be avoided, then minimized. If conflicts cannot be avoided or minimized, mitigation options are available including remediation or implementing engineering solutions. It should be noted that remediation of hazardous materials can be costly; often, depending on the magnitude of the impacts, the costs could be prohibitive to the goals of the overall project.

A few key observations of the mapping exercise are as follows:

- The area south of the confluence of Sand Creek and South Platte River contains multiple areas of potentially moderate or high-risk sources and concentrated areas of point sources. This is expected based on the industrial nature of the area.

- Cropland and agricultural land uses are located primarily in the northern and eastern portions of the study area. Impacts to water quality could include increased nutrient loading in these areas.

- Multiple areas are identified with a high density of on-site wastewater treatment systems, which are sources of nutrient loading to ground and surface waters. If development is to occur in these areas, additional evaluation of the systems should be completed. Evaluation may include review of documents to understand age and condition of the system or inspection of the systems for damage or leaks.

- The CSRG and Rocky Mountain Arsenal have both been identified as potential non-point sources of pollutants (Figure 3a); however, there is a large quantity of data available for these areas which may allow better definition of specific areas of high risk within the site boundaries.

5. References

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Appendix B. AQ and WQ Technical Documents

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Technical Memorandum

Date:	December 14, 2022
To:	Rosemarie Russo, Environmental & Sustainability Planner, City of Commerce City
From:	Pam Wegener and Caroline Byus, Pinyon Environmental, Inc.
Subject:	Commerce City Water Quality Evaluation, Summary, and Recommendations

1. Purpose

Pinyon Environmental, Inc. (Pinyon), on behalf of Commerce City, has completed research to evaluate existing stream water quality in Commerce City. As part of these services, Pinyon 1) compiled and screened water quality data from existing stream monitoring stations within a 0.25-mile buffer of Commerce City, and 2) conducted a high-level assessment of overall stream monitoring activities and water quality conditions. The information was used to assess data gaps and provide insight on whether additional monitoring is advised, and to provide a basis for recommendations regarding the maintenance, improvement, and protection of water quality.

2. Water Quality Standards and Stream Impairment - Overview

Water quality standards define the water quality goals of a water body by designating the uses and setting criteria that protect the designated uses. "Water quality standards are integral for the protection and propagation of fish, shellfish and wildlife and for recreation in and on the water….."(40 CFR § 131.2)

Section 303(d) of the Clean Water Act requires that states submit a list to the U.S. Environmental Protection Agency (EPA) of those waters for which effluent limitations and other required controls are not stringent enough to implement water quality standards. The Colorado Water Quality Control Commission's (Commission) Regulation 93 – *Colorado's Section 303(d) List of Impaired Waters* (CDPHE, 2022) – fulfills this requirement by establishing a list of water-quality limited segments requiring Total Maximum Daily Loads (TMDLs). Once "listed", the state is required to prioritize these waterbodies or segments based on the severity of pollution and other factors. The state will then determine the causes of the water quality problem and allocate responsibility to point and non-point dischargers for controlling the pollution through the issuance of TMDLs. Colorado also establishes a Monitoring and Evaluation (M&E) list for segments, which identifies water bodies where there is reason to suspect water quality challenges, but there is also uncertainty regarding one or more factors. These segments require more monitoring data to determine whether a listing is necessary in the future. The M&E list is a Colorado-only document that is not subject to EPA approval.

The Colorado Department of Health and Environment (CDPHE) 303(d) and M&E listed stream segments that occur within the Commerce City study area and for which TMDLs have been issued are included in Table 1. Figure 1 shows a map of the stream segments and monitoring stations.

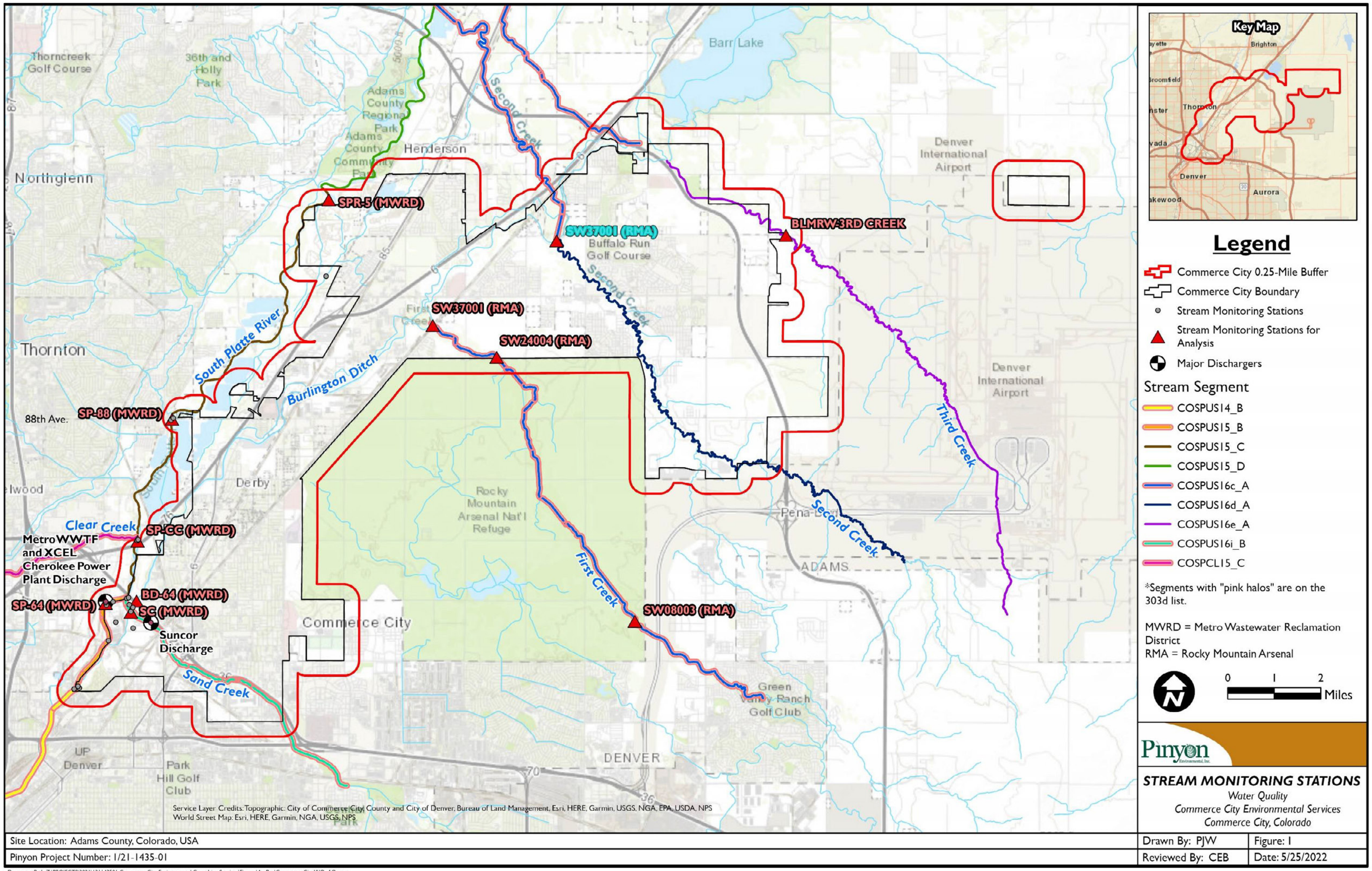
Table 1. Listed Parameters on the TMDLs by Stream Segment

Stream Segment	Parameters on M&E List	Parameters on 303(d) List	TMDLs
COSPUS14_B Mainstem of the South Platte River from Bowles Avenue to the Burlington Ditch diversion in Denver, Colorado	--	• Total Arsenic	• *Escherichia Coli* ((*E. coli* (2007))
COSPUS15_B Mainstem of the South Platte River from the Burlington Ditch diversion in Denver, Colorado to Sand Creek	• Temperature	• Sulfate • Total Cadmium	• Total Cadmium (2011) • Dissolved Oxygen (2000) • *E. coli* (2016)
COSPUS15_C Mainstem of the South Platte River from Sand Creek, to 180 meters below 120th Ave.	• Temperature	--	• Total Cadmium (2011) • Dissolved Oxygen (2000) • *E. Coli* (2016)
COSPUS15_D Mainstem of the South Platte River from 180 meters below 120th Ave, to a point immediately below the confluence with Big Dry Creek.	• Temperature	--	• Total Cadmium (2011) • Dissolved Oxygen (2000) • *E. coli* (2016)
COSPUS16c_A All tributaries to the South Platte River, including all wetlands, from the outlet of Chatfield Reservoir to a point immediately below the confluence with Big Dry Creek, except for specific listings.	--	• *E. coli* (May – October) • Dissolved Selenium	--
COSPUS16d_A Second Creek from the source to the O'Brian Canal at 39.898789, -104817661.	--	--	--
COSPUS16e_A Third Creek from the source to the O'Brian Canal at 39.917346, -104.784028.	--	--	--
COSPUS16i_B Mainstem Sand Creek from the confluence with Westerly Creek to the confluence with the South Platte River	--	• *E. coli* • Dissolved Selenium	--
COSPCL15_C Mainstem of Clear Creek from Wadsworth Boulevard to the confluence with the South Platte River	--	• Temperature • *E. coli* (May – October) • Total Arsenic • Dissolved Manganese • Organic Sediment	--

M&E List = Monitoring and Evaluation List; TMDL = Total Maximum Daily Load

Notes: The table includes stream segments of the South Platte River, Sand Creek, First Creek, Second Creek, Third Creek, and Clear Creek located within a 0.25-mile buffer of Commerce City.

Information Sources: CDPHE, 2021; CDPHE, 2007a


Key Map
Legend
Commerce City 0.25-Mile Buffer
Commerce City Boundary
Stream Monitoring Stations
Stream Monitoring Stations for Analysis
Major Dischargers
Stream Segment
COSPUS14_B
COSPUS15_B
COSPUS15_C
COSPUS15_D
COSPUS16c_A
COSPUS16d_A
COSPUS16e_A
COSPUS16i_B
COSPCL15_C
*Segments with "pink halos" are on the 303d list.
MWRD = Metro Wastewater Reclamation District
RMA = Rocky Mountain Arsenal
0 1 2 Miles
Pinyon
STREAM MONITORING STATIONS
Water Quality
Commerce City Environmental Services
Commerce City, Colorado
SPR-5 (MWRD)
SW37001 (RMA)
BLMRW-3RD CREEK
SW24004 (RMA)
SP-88 (MWRD)
SP-CC (MWRD)
BD-64 (MWRD)
SP-64 (MWRD)
SC (MWRD)
SW08003 (RMA)
Metro WWTF and XCEL
Cherokee Power Plant Discharge
Suncor Discharge
South Platte River
Burlington Ditch
Clear Creek
Sand Creek
First Creek
Second Creek
Third Creek
Barr Lake
Henderson
Northglenn
Thornton
Derby
Commerce City
Rocky Mountain Arsenal Nat'l Refuge
Buffalo Run Golf Course
Denver International Airport
Green Valley Ranch Golf Club
Thorncreek Golf Course
36th and Holly Park
Adams County Regional Park
Adams County Community Park
88th Ave.
ADAMS
DENVER
Park Hill Golf Club
UP Denver
Service Layer Credits: Topographic: City of Commerce City, County and City of Denver, Bureau of Land Management, Esri, HERE, Garmin, USGS, NGA, EPA, USDA, NPS
World Street Map: Esri, HERE, Garmin, NGA, USGS, NPS
Site Location: Adams County, Colorado, USA
Pinyon Project Number: 1/21-1435-01
Drawn By: PJW
Figure: 1
Reviewed By: CEB
Date: 5/25/2022

3. Data Compilation and Screening

Streams within the study area have been monitored by multiple agencies or organizations for multiple purposes. Publicly available monitoring station data indicate that data periods of record range from 2 years or less to many years. An inventory of water quality monitoring stations and water quality data within Adams County was compiled from the following sources:

- U.S. Environmental Protection Agency (EPA)'s National Water Quality Monitoring Council (NWQMC) Database (EPA, 2021).
- Colorado Data Sharing Network (CDSN) Ambient Water Quality Monitoring System (AWQMS) Portal (CDSN, 2021).
- U.S. Department of the Army (U.S. Army) Draft Fifth Five-Year Review Report for the Rocky Mountain Arsenal, Commerce City, Adams County, Colorado (U.S. Army, 2021).

The geographic information system (GIS) monitoring station location layer was clipped using ArcGIS Pro to include only those stations within 0.25 mile of Commerce City and along the South Platte River; Sand Creek; First, Second, and Third Creeks; and Burlington Ditch. Though there are no enforceable water quality standards for Burlington Ditch, water quality was analyzed because: 1) Burlington Ditch represents the major arterial waterway within Commerce City; 2) First, Second, and Third Creeks flow directly into Burlington Ditch; 3) Burlington Ditch flows directly into Barr Lake, a popular state park utilized for hiking, horseback riding, fishing, boating, and wildlife viewing, just downstream of Commerce City, and; 4) TMDLs for pH and dissolved oxygen have been implemented for Barr Lake to control pollutant loads received from Burlington Ditch and other upstream point and non-point source contributors.

Complete water quality datasets were downloaded from the NWQMC and AWQMS databases for stations of interest and screened to assess data composition and availability at each site. The water quality monitoring station names, organizations responsible for collecting the data, stream segments where stations are located, and period of record for the available data are included in Table 2. Shaded rows indicate stations that were chosen for the analysis. Chosen stations have a minimum of 10 sample results for pollutants of interest where sampling occurred after January 1, 2016). The monitoring stations chosen for the analysis are also shown in Figure 1 above as red triangles.

Table 2. Summary of Water Quality Monitoring Stations

Stream	Monitoring Stations	Stream Segment	Organization	Period of Record
South Platte River	21COL001_WQX-5170	COSPUS14_B	CDPHE	10/11/2007 - 05/22/2018
South Platte River	THORNTON-SP@BUR CANAL	COSPUS15_B	City of Thornton	09/16/1998 - 12/01/2004
South Platte River	21COL001-5170	COSPUS15_B	CDPHE	02/27/1998 - 06/05/2008
South Platte River	MWRD_WQX-SPR-1.8	COSPUS15_B	MWRD	09/08/2011 - 08/27/2020
South Platte River	21COL001-5165	COSPUS15_B	CDPHE	02/27/1998 - 03/03/1999
South Platte River	THORNTON-SP UP CC	COSPUS15_B	City of Thornton	09/16/1998 - 12/01/2004

Stream	Monitoring Stations	Stream Segment	Organization	Period of Record
South Platte River	21COL001_WQX-CO0026638-U/S	COSPUS15_B	CDPHE	03/06/2013 - 12/18/2019
South Platte River	MWRD_WQX-SP-64	COSPUS15_B	MWRD	01/03/2001 - 12/12/2018
South Platte River	MWRD_WQX-SPR-2	COSPUS15_B	MWRD	09/27/1993 - 09/18/2012
South Platte River	CORIVWCH_WQX-788	COSPUS15_C	Colorado River Watch (Volunteer)	02/11/2000 - 05/12/2000
South Platte River	MWRD-SP-CC	COSPUS15_C	MWRD	05/18/1995 - 12/16/2004
South Platte River	MWRD_WQX-SP-CC	COSPUS15_C	MWRD	01/03/2001 - 12/12/2018
South Platte River	MWRD_WQX-SPR-3.5	COSPUS15_C	MWRD	09/27/1993 - 10/22/2020
South Platte River	CORIVWCH_WQX-227	COSPUS15_C	Colorado River Watch (Volunteer)	10/30/1992 - 11/15/2016
South Platte River	21COL001_WQX-5160	COSPUS15_C	CDPHE	01/25/2012 - 02/21/2012
South Platte River	CORIVWCH_WQX-213	COSPUS15_C	Colorado River Watch (Volunteer)	11/19/1992 - 01/28/2004
South Platte River	MWRD_WQX-SP-88	COSPUS15_C	MWRD	01/03/2001 - 12/18/2018
South Platte River	MWRD-SP-88	COSPUS15_C	MWRD	03/12/1987 - 12/16/2004
South Platte River	MWRD_WQX-SPR-5	COSPUS15_C	MWRD	10/18/2007 - 10/06/2020
Sand Creek	21COL001-5210	COSPUS16i_B	CDPHE	11/12/1997 - 01/26/2000
Sand Creek	21COL001_WQX-CO0026638-SC	COSPUS16i_B	CDPHE	03/06/2013 - 12/18/2019
Sand Creek	MWRD-SC	COSPUS16i_B	MWRD	04/08/1991 - 12/16/2004
Sand Creek	MWRD_WQX-SC	COSPUS16i_B	MWRD	01/03/2001 - 12/12/2018
Sand Creek	21COL001-5261	COSPUS16i_B	CDPHE	02/25/1998 - 03/03/1999
Sand Creek	21COL001_WQX-5210	COSPUS16i_B	CDPHE	07/07/2004 - 01/15/2019
First Creek	SW08003	COSPUS16c_A	U.S. Army (RMA)	7/29/2015 – 7/17/2019
First Creek	SW24004	COSPUS16c_A	U.S. Army (RMA)	7/29/2015 – 7/17/2019
First Creek	SW37001	COSPUS16c_A	U.S. Army (RMA)	7/29/2015 – 7/17/2019
Second Creek	BLMRW-2ND CREEK	COSPUS16c_A	BLMRW	05/20/2014 - 12/02/2014
Third Creek	BLMRW-3RD CREEK	COSPUS16e_A	BLMRW	04/30/2013 - 12/02/2014
Burlington Ditch	MWRD_WQX-BD-64	--	MWRD	01/11/1996 – 12/16/2021
Burlington Ditch	MWRD_WQX-DBU-SC	--	MWRD	3/10/2010 –

Stream	Monitoring Stations	Stream Segment	Organization	Period of Record
				12/14/2011
Burlington Ditch	MWRD_WQX-DBU-88	--	MWRD	3/10/2010 – 12/14/2011
Burlington Ditch	MWRD_WQX-DBU-104	--	MWRD	3/10/2010 – 12/14/2011
Burlington Ditch	MWRD_WQX-DBU-PEOR	--	MWRD	3/10/2010 – 7/13/2011
Burlington Ditch	MWRD_WQX-DBU-BARR	--	MWRD	3/10/2010 – 12/14/2011

MWRD = Metro Wastewater Reclamation District; CDPHE = Colorado Department of Health and Environment; BLMRW = Barr Lake Milton Reservoir Watershed; RMA = Rocky Mountain Arsenal

4. Data Analysis Approach

Pinyon designed the data analysis approach to provide a high-level assessment of water quality for stream segments in the study area. The assessment is intended to identify potential areas of concern, inform additional data collection needs, and support land-use management strategy decisions through evaluating the spatial distribution of water quality and how it compares to stream water quality standards. Note that the analysis was limited to data that were available through publicly accessible databases. Due to the nature of the Commerce City area, additional pollutants can enter surface water through groundwater, non-point source discharges, and point source discharges. Therefore, pollutants not included in the analysis should not be construed to mean that those pollutants are not present.

Having said that, multiple water quality monitoring activities and studies have been conducted within Adams County over the years to assess both point and non-point sources of pollution. While the water quality overview presented in this memorandum is specific to surface water, Pinyon has developed maps showing locations of potential point and non-point pollution source locations in Commerce City as a whole, and more specifically along the banks of waterbodies within the industrialized areas (i.e., Sand Creek and the South Platte River). These maps are provided in a separate technical memorandum.

To best analyze and track water quality conditions from upstream to downstream, the study area was divided into five sub-areas:

- Sand Creek and the South Platte River Upstream of 88th Avenue
- South Platter River Downstream of 88th Avenue;
- First Creek;
- Second and Third Creeks; and,
- Burlington Ditch.

Additional detail regarding the data and the analysis approach are provided below. Results of the data analysis are discussed in Section 5 – "Data Analysis Results". Conclusions and recommendations are discussed in Section 6.

4.1 Sand Creek and the South Platte River Upstream of 88th Avenue

Four stream water quality monitoring stations were chosen for analysis of Sand Creek and the South Platte River Upstream of 88th Avenue. The stations have a robust dataset with a current period of record (includes data after January 1, 2016). The stations are as follows:

- MWRD_WQX-SP-64 ("SP-64"): South Platte River at 64th Avenue. Located in South Platte River Segment COSPUS15_B upstream the Metro Wastewater Reclamation District (WRD) and Sand Creek.
- MWRD-SP-CC ("SP-CC"): South Platte River at Clear Creek. Located in South Plate River Segment COSPUS15_C downstream the Metro WRD and Sand Creek.
- MWRD_WQX-SP-88 ("SP-88"): South Platte River at 88th Avenue. Located in South Plate River Segment COSPUS15_C downstream the Metro WRD and Sand Creek.
- MWRD_WQX-SC ("SC"): Sand Creek on Burlington Ditch Flume. Located in Sand Creek Segment COSPUS16i_B upstream of the confluence with the South Platte River.

4.1.1 Calculation of existing water quality

Existing quality (EQ) is defined in the Commission's Regulation 31 - *The Basic Standards and Methodologies for Surface Water* (CDPHE, 2007b) as the numeric value that represents the quality of a waterbody and is generally used for comparison with the water quality standard. (31.5(20)). The following analysis generally follows protocols outlined in Regulation 31 and Colorado's 303(d) Listing Methodology to assess compliance with stream standards.

For each of the chosen monitoring stations, the existing quality of metals, dissolved oxygen, total nitrogen, total phosphorus, sulfate, chloride, and *E. coli* over a five-year period of record (2016 – 2021) were calculated. For metals in total or total recoverable form, total nitrogen, and total phosphorus, EQ was calculated as the 50th percentile of the data. For *E. coli*, EQ was calculated as the geometric mean of the data. For the remaining parameters, EQ was calculated as the 85th percentile of the data. Non-detect values for all parameters were set equal to zero in the calculation. The EQ was then compared with the relevant water quality standards. Figures showing the EQ concentrations of the parameters analyzed for current conditions (except for Burlington Ditch) versus the water quality standards are included in Appendix A. Additional data statistics, including the 25th, 50th, and 85th percentiles of the data sets, maximum concentrations, mean concentrations, and standard deviations are summarized in Appendix B. Burlington Ditch EQ compared to standards is included in Appendix C.

4.1.2 Water quality standards

The water quality standards were determined as follows:

- For the South Platte River stations, the water quality standards were set equal to (with a few exceptions) to those determined in the Water Quality Assessment for the Metro Wastewater Reclamation District, Robert W. Hite Wastewater Treatment Facility ("MWRD WWTF"); Colorado Discharge Permit System [CDPS] Permit #CO0026638), issued May 31, 2018 (CDPHE, 2018a). The MWRD WWTF discharges into Stream Segment COSPUS15_C.
- For the Sand Creek monitoring station, the water quality standards were set equal (for the most part) to those determined in the Water Quality Assessment for the Suncor Energy (USA) Inc. Refinery (Suncor),

Commerce City Refinery (CDPS Permit #CO0001147), last revised September 5, 2012 (CDPHE, 2012). Suncor discharges into Stream Segment COSPUSi_B.

For some parameters, the water quality standards listed in the MWRD WWTF or Suncor Water Quality Assessments were inappropriate to use. For these parameters, the following alternate approaches were used to determine the stream segment water quality standards:

- Dissolved copper standard at COSPUS15: Pursuant to Regulation 38, the table value standard (TVS) applies upstream of the MWRD WWTF for dissolved copper, and a separate standard based on toxicity (the "FMB/BLM standard") applies downstream of the MWRD WWTF. The FMB/BLM standard was revised in the June 8, 2020 Rulemaking Hearing and described in the Regulation 38 Statement of Basis and Purpose language (CDPHE, 2007c). The revision occurred after the 2018 MWRD WWTF permit was issued. The chronic dissolved copper standard used in this analysis is therefore based on the revised value listed in Regulation 38 and not the 2018 MWRD WWTF water quality assessment.

- Total nitrogen (TN) and total phosphorus (TP) "interim" standards at COSPUS15 and COSPUS16i: For this analysis, the interim "warm stream" TN (2010 ug/L) and TP (170 ug/L) values were used. However, it should be noted that these values are not currently effective in the segments and are pending revisions in 2027 as described in Clean Water Policy 8 (CDPHE, 2018b). The interim standards are not effective in these segments and intended only for as informational use. Future nutrient standards may be more stringent. EQ values above the interim values are not necessarily true exceedances of the standards. Nutrients standards for both warm and cold water streams are expected to be submitted to the Commission for approval in 2027.

- Dissolved oxygen standards at COSPUS15 and COSPUS16i. Site-specific acute and chronic dissolved oxygen (DO) standards are in place for Segment 15 of the South Platte River that require specific sample collection protocols and data needs. Therefore, an analysis of DO was not possible for Segment 15. The chronic 5 mg/L DO standard for Segment 16 is a table value standard and an analysis of DO for this segment was completed.

4.2 South Platte River Downstream 88th Avenue

Only one stream water quality monitoring station (MWRD_WQX-SPR-5 ["SPR-5"]) occurs along the South Platte River downstream of 88th avenue. This monitoring station's data set had less than 10 samples for each analyte and no samples were collected after 2013. Therefore, the data were not included in the current conditions analysis conducted by Pinyon. However, these data are still of value and were discussed qualitatively. The data were also included in the statistical summary that can be accessed in Appendix B. General observations related to this monitoring station are included in Section 5.

4.3 First Creek

Most of First Creek in Commerce City occurs within the Rocky Mountain Arsenal (RMA) (Figure 1). The RMA is a Superfund site, and as such has various requirements for surface and groundwater monitoring per the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The U.S. Army, in collaboration with Shell Oil Co., EPA, CDPHE, and Tri-County Health Department completed a draft Five-Year Review covering the period from 2015 to 2020 for the RMA (U.S. Army, 2021). The Five-Year Review includes monitoring at three water quality surface water stations along First Creek:

- SW08003: Located in First Creek near Buckley Road

- SW24004: Located in First Creek near 96th Avenue

- SW37001 Located in First Creek near Highway 2

The locations of these three stations are shown in Figure 1. According to the Five-Year Review, pollutants were analyzed annually from 2015 to 2020 at the three stations and include aldrin, arsenic, chloride, diisopropylmethyl phosphate (DIMP), dieldrin, n-nitrosodi-n-propylamine (NDPA), and sulfate (U.S. Army, 2021). The pollutant concentrations were compared with the Containment System Remediation Goals (CSRGs) and/or Practical Quantitation Limits (PQLs) (U.S. Army, 2021). The CSRGs were established based on maximum contaminant levels, the Colorado Basic Standard for Groundwater, or health-based criteria (U.S. Army, 2021).

4.4 Second and Third Creeks

Only two water quality stations were found on Second Creek (BLMRW-2nd CREEK) and Third Creek (BLMRW-3rd CREEK). These stations were established by the Barr Lake Milton Reservoir (Barr-Milton) stakeholder group. Physical parameters were collected for both stations that include pH, specific conductivity, water temperature, and dissolved oxygen. The station on Third Creek also included nutrients, some metals, and some ions (i.e., sulfate, sodium and potassium). However, the data sets are small and samples were collected nearly 10 years ago (2013 to 2014). These stations were not included in the current conditions analysis, but a qualitative review of the data is discussed in the results section below.

4.5 Burlington Ditch

Of the water quality monitoring stations evaluated for Burlington Ditch, the station at 64th Avenue (BD-64), had a robust dataset that met the analysis criteria. The station is located 0.18 mile downstream of where Burlington Ditch flows under Sand Creek.

EQ concentrations of metals, dissolved oxygen, total nitrogen, total phosphorus, sulfate, chloride, and *E. coli* over a five-year period of record (2016 – 2021) were calculated. According to Regulation 31 (31.13), ditches are not subject to water quality standards. Therefore, no water quality standards exist for Burlington Ditch. However, because Burlington Ditch contains point and nonpoint source pollutants that are allocated under a TMDL for the Barr-Milton watershed, Pinyon applied water quality standards equivalent to those of South Platte Segment 15 for assessment purposes. Burlington Ditch diverts from the South Platte River Segment 15 directly upstream of Commerce City. Figures showing the EQ concentrations of the parameters versus the water quality standards are included in Appendix C, and a statistical summary of the data (25th percentile, 50th percentile, 85th percentile, and standard deviation) is presented in Appendix B.

4.5.1 Existing Water Quality

For metals in total or total recoverable form, total nitrogen and total phosphorus, EQ concentrations were calculated as the 50th percentile of the data. For *E. coli*, EQ concentrations were calculated as the geometric mean of the data. For the remaining parameters, EQ concentrations calculated as the 85th percentile of the data. Non-detect values for all parameters were set equal to zero.

4.5.2 Water quality standards

Water quality standards for the stream segment COSPUS15 of the South Platte River (see Section 4.1.2) were used as a basis of comparison for pollutant concentrations in Burlington Ditch.

5. Data Analysis Results

5.1 Sand Creek and South Platte River Upstream of 88th Avenue

Three South Platte River stations (SP-64, SP-CC, and SP-88) and one Sand Creek station (SC) were analyzed in Sand Creek and the South Platte River Upstream of 88th Avenue. It is recommended that the figures in Appendix A be referred to while reading the following results summary. Statistical summaries of each data set are included in Appendix B.

Table 3 lists the calculated EQ concentrations for each parameter at each site for the 2016 – 2021 period of record. Results are color coded as follows:

- Green shading represents EQ concentrations that *are less than* 50 percent of the water quality standard. These results indicate the stream is meeting the standard with a considerable amount freeboard between the result and the standard;

- Yellow shading represents EQ concentrations that are *within* 50 percent of the water quality standard. These results indicate that while the stream is meeting the standard, they should be monitored for upward trending.

- Red shading represents EQ concentrations that are *greater than* the water quality standard. These are parameters that require further investigation, if not already being addressed in a 303(d) listing or TMDL for the segment.

Table 3. Comparison of EQ Concentrations to the Water Quality Standards

Parameter	South Platte River			Sand Creek	Water Quality Standard[1]
	COSPUS15_B	COSPUS15_C		COSPUS16i_B	
	MWRD_WQX-SP-64	MWRD_WQX-SP-CC	MWRD_WQX-SP-88	MWRD_WQX-SC	
Arsenic, Total (µg/L)	1.4	1.0	1.0	1.7	10 (COSPUS15) / 7.6 (COSPUS16i)
Cadmium, Dissolved (µg/L)	27.9	1.0	0.7	0.1	0.67 (COSPUS15) / 1.2 (COSPUS16i)
Cadmium, Total (µg/L)	14.4	0.7	0.6	0.0	5 (All Segments)
Chloride, Total (mg/L)	271	157	163	N/A	250 (COSPUS15) / No standard (COSPUS16i)
Chromium, Dissolved (µg/L)	1.0	0.6	0.6	0.4	11 (All Segments)
Copper, Dissolved (µg/L)	3.9	4.6	5.3	2.4	18 (COSPUS15) / 29 (COSPUS16i)
E. coli (CFU/100 mL)	427	243	279	390	126 (All Segments)
Iron, Dissolved (µg/L)	91.4	146	174	117	300 (COSPUS15)
Iron, Total (µg/L)	374	364	400	480	1,000 (All Segments)
Lead, Dissolved (µg/L)	0.2	0.4	0.5	0.0	4.9 (COSPUS15) / 11 (COSPUS16i)
Lead, Total (µg/L)	0.9	0.9	1.0	0.7	50 (COSPUS15)

Parameter	South Platte River			Sand Creek	Water Quality Standard[1]
	COSPUS15_B	COSPUS15_C		COSPUS16i_B	
	MWRD_WQX-SP-64	MWRD_WQX-SP-CC	MWRD_WQX-SP-88	MWRD_WQX-SC	
Manganese, Dissolved (µg/L)	329	163	200	342	400 (COSPUS15) / 2,618 (COSPUS16i)
Molybdenum, Total (µg/L)	8.4	6.9	7.3	5.3	150 (COSPUS15)
Nickel, Dissolved (µg/L)	3.9	2.6	2.9	2.3	87 (COSPUS15) / 168 (COSPUS16i)
Nitrogen, Total (mg/L)	4.6	5.1	5.4	3.3	2.01[2] (All Segments)
Phosphorus, Total (mg/L)[1]	0.23	0.69	0.75	0.35	0.17[2] (All Segments)
Selenium, Dissolved (µg/L)	3.0	2.2	1.9	11.3	4.6 (All Segments)
Sulfate, Total (mg/L)	322	177	170	475	532 (COSPUS15) / 535 (COSPUS16i)
Zinc, Dissolved (mg/L)	36	45	49	17	211 (COSPUS15) / 405 (COSPUS16i)

[1]The acute water quality standards are used for total lead and total cadmium; the chronic water quality standards are used for all other pollutants.

[2]Interim water quality standard

According to Table 3, the following parameters are greater than the water quality standards at one or more of the four water quality monitoring stations: dissolved and total cadmium, total chloride, *E. coli*, and dissolved selenium. Total nitrogen, total phosphorus concentrations are greater than the interim standards, indicating that a more thorough evaluation should be conducted when the revised standards are adopted in 2027. Results of the analysis track with existing regulatory actions described below.

- <u>Dissolved and total cadmium</u>: Dissolved and total cadmium EQ concentrations exceed standards and are significantly higher at station SP-64 than other downstream stations. Station SP-64 is in the South Platte River upstream of the Metro WWTF discharge and upstream the confluence with Sand Creek. At SP-64, the dissolved cadmium EQ concentration is 27.9 µg/L (compared with the chronic dissolved cadmium water quality standard of 0.67 µg/L) and total cadmium EQ concentration is 14.4 µg/L (compared with the chronic total cadmium water quality standard of 5.0 µg/L).

  EQ concentrations of dissolved and total cadmium at stations SP-CC and SP-88, which are in the South Platte River downstream of the Metro WWTF and the confluence with Sand Creek, are considerably lower than the upstream station but are still slightly higher than the standard at 1.0 µg/L and (0.7 µg/L), respectively. These results indicate the source of the cadmium contributions to the South Platte originate above the Metro WWTF. The effluent discharge from Metro WWTF significantly dilutes the cadmium concentrations observed upstream.

  A dissolved cadmium TMDL was approved for stream Segment 15 in July 2011 (CDPHE, 2011). When the TMDL was developed, the portion of the segment between the Burlington Ditch headgate and the confluence with Clear Creek (where SP-64 and SP-CC are located) was not in attainment with the dissolved cadmium aquatic life use-based water quality standard. The primary driver of higher cadmium concentrations in this area has been attributed to groundwater contamination from the now decommissioned Globeville American Smelting and Refining Company (ASARCO) facility (CDPHE, 2011).

- Total chloride: The total chloride EQ concentration at SP-64 (South Platte River upstream of the Metro WWTF discharge and upstream of the confluence with Sand Creek) is 271 mg/L, which is greater than the chronic chloride standard (250 mg/L) for the stream segment. The other two South Platte River stations (downstream the Metro WWTF discharge and Sand Creek confluence; SP-CC and SP-88) have EQ concentrations below, but approaching (i.e., within 50 percent of), the standard. Despite the EQ value being higher than the standard at SP-64, stream segment 15 is not currently on the 303(d) list and a TMDL has not been previously prepared for total chloride for segment 15. Chloride is a water supply standard based on a secondary maximum concentration level for drinking water. Currently, there are no aquatic life standards for chloride, but that could change in the near future.

- *E. coli*: The *E. coli* EQ concentrations are greater than the water quality standard (126 colony forming units (CFU)/100 mL) at all three South Platte River stations upstream 88th avenue (SP-64, SP-CC, and SP-88). The maximum *E. coli* concentration at station SP-64 upstream of the Metro WWTF discharge and the Sand Creek confluence is 427 CFU/100 mL. A TMDL for *E. coli* for stream segment COSPUS15 was approved in 2016. Following the approval of the TMDL, the WQCC delisted *E. coli* from the 303(d) list for COSPUS15.

  The *E. coli* EQ concentration at SC (Sand Creek upstream the confluence with the South Platte River) is 390 CFU/100 mL, compared with the water quality standard of 126 CFU/100 mL. This value is within the range observed for the three South Platte River stations. Stream segment COSPUS16i is on the 303(d) list for *E. coli*; however, no approved TMDL exists at this time.

- Total nitrogen: TN EQ concentrations are greater than the interim water quality standard (2.01 mg/L) at all three South Platte River stations (SP-64, SP-CC, and SP-88. Likewise, the TN EQ value at SC (Sand Creek upstream the confluence with the South Platte River) is greater than the interim water quality standard at 3.3 mg/L. It should be noted again that the TN interim criteria is a benchmark from which to compare stream concentrations, but this criteria is not currently enforceable in any of the segments above 88th Street. A revised TN standard is expected in 2027 at which point more evaluation would be needed.

- Total phosphorus: TP EQ concentrations are greater than the interim water quality standard (0.17 mg/L) at all three South Platte River stations (SP-64, SP-CC, and SP-88). However, like TN, the TP standard isn't applied to Segment 15. It is also used as a benchmark for comparison. Once new stream standards are adopted in 2027, additional evaluation will be needed.

  Unlike Segment 15, Segment 16 (Sand Creek upstream the confluence with the South Platte River) does have a chronic TP standard of 0.17 mg/L. The EQ for TP calculated using data at the SC station is 0.35 mg/L, which is above the interim standard. However, because new standards are expected to be adopted in 2027, it is unlikely that CDPHE would pursue a TMDL prior to the adoption of the revised standards.

- Dissolved selenium: All of the South Platte River stations in Segment 15 upstream of 88th Avenue have dissolved selenium EQ that is lower than the selenium water quality standard. However, the EQ for dissolved selenium at SC (Sand Creek upstream the confluence with the South Platte River) is 11.29 µg/L, which is over two times the water quality table value standard of 4.6 µg/L.

  In addition, the dissolved selenium EQ for Sand Creek (SC) is over three times higher than those observed in the South Platte River stations. At least a portion of the selenium is likely from natural background concentrations associated with the geology of the area that includes shale formations. Shale is known to leach selenium and salinity into ground and surface water sources in areas of the Denver basin that exceed aquatic life standards.

The Suncor refinery is required by the EPA to remove selenium from fuel products; however, the facility has been unable to discharge levels low enough to ensure compliance with the standard downstream. Accordingly, the Commission adopted a discharger specific variance (DSV) for the South Platte River (COSPUS15) and Sand Creek (COSPUS16i) for selenium. The alternative chronic and acute effluent limits for selenium assigned to Suncor are 24 µg/L and 37 ug/L, respectively. These limits represent the highest degree of protection of the classified uses that Suncor could feasibly meet. The DSV expires on December 31, 2023. In early 2022, the Water Quality Control Division released a draft Suncor renewal permit that includes effluent selenium limits of 4.6 ug/L (chronic) and 18 ug/L (daily maximum) that would become effective in January, 2025. The renewal permit has not yet been finalized.

Stream segment COSPUS16i is on the 303(d) listed for selenium; however, there is currently no TMDL.

Parameters that are approaching the standard (yellow shading), but less than the standard include dissolved iron, dissolved manganese, and dissolved sulfate. Note that in 2020, a portion of the South Platte River (Segment 15_B) located just below the confluence with Sand Creek was listed for total cadmium and sulfate.

5.2 South Platte River Downstream 88th Avenue

The one South Platte River station that occurs downstream of 88th Avenue – "SPR-5" – is in stream segment (COSPUS15c) which includes the mainstem of the South Platte River from Sand Creek to 180 meters below 120th Avenue. This segment has approved TMDLs for dissolved cadmium (2011), dissolved oxygen (2000), and *E. coli* (2016). It is also on Colorado's M&E list for temperature (Table 1). The station had neither the 10 data points nor recent data to meet the criteria set by Pinyon for current conditions. However, the data are still valuable in helping to define water quality at a moment in time, which in this case is prior to 2013. General observations gleaned from the summary statistics table presented in Appendix B indicate that, based on an average hardness of 256 mg/L $CaCO_3$, this station was likely meeting standards for copper, cadmium, zinc, silver, and manganese. Results for both TN and TP were higher than the interim standards but recall that the TN and TP interim standards are in the process of being revised. No data were available for *E. coli*, pH, or dissolved oxygen.

5.3 First Creek

First Creek is stream segment COSPUSc-A, which is listed for *E. coli* (May-October) and dissolved selenium. Pinyon was unable to find the data used to support the 303(d) listing in the publicly accessible databases. There are no approved TMDLs for this segment. Water quality data based on the U.S. Army Rocky Mountain Arsenal (RMA) water quality sampling program along First Creek are documented in the *Draft Fifth Five-Year Review Report for the Rocky Mountain Arsenal* (US Army, 2021) and are included below in Table 4. Concentrations that exceeded the CSRGs or practical quantitation limits (PQLs) are shaded in red.

Most of First Creek flows through the RMA National Refuge. The RMA was established in 1942 to produce chemical warfare agents and incendiary munitions to be used in World War II. Starting in 1946, a portion of the RMA facilities were leased to private companies to manufacture industrial and agricultural chemicals, including pesticides. These activities resulted in contamination of approximately 3,000 acres of soil, 15 groundwater plumes, and 790 structures. The principal contaminants included organochlorine pesticides, heavy metals, agent-degradation products, manufacturing by-products, and chlorinated and aromatic solvents.

Contaminated areas that posed risks to human health and the environment were addressed through the 1996 On-Post Record of Decision ("On-Post ROD") (Foster Wheeler, 1996). The On-Post ROD required the interception and treatment of groundwater through groundwater pump-and-treat systems. However, these treatments occurred after some groundwater contamination had already migrated to the north and northwest of the RMA boundaries ("off-post" area). In response, a ROD for the *off-post* area ("Off-Post ROD") was prepared and approved in 1995 (HLA, 1995). The Off-Post ROD required operation of an Off-Post Groundwater Intercept and Treatment System (OGITS) to treat contaminated alluvial groundwater. The OGITS consist of two separate extraction systems (the First Creek Pathway System and the Northern Pathway System) located along Highway 2 north of the RMA. The OGITS removes groundwater from the system via extraction wells, treats the extracted groundwater by carbon adsorption, and returns the groundwater to the alluvial system using recharge wells or recharge trenches.

The Off-Post ROD established a long-term groundwater and surface water monitoring program to assess contaminant concentrations and evaluate the success of remediation. Surface water monitoring for the three stations along First Creek indicated that arsenic is the only parameter currently not meeting its containment system remediation goal (CSRG, Table 1). Arsenic has historically occurred at higher concentrations in samples at SW37001 (First Creek near Highway 2) compared to samples collected at SW24004 (the RMA boundary at 96th Avenue). This historical trend has remained consistent; therefore, it is likely that high arsenic concentrations in surface water at SW37001 are naturally occurring and not attributable to activities at the RMA (U.S. Army, 2021). All other pollutants are currently meeting goals at First Creek. Treatment of groundwater contaminants at the OGITS is likely having a positive impact on First Creek water quality.

Table 4. First Creek Water Quality Results

Site	Sampling Date	Analyte Concentrations (µg/L)						
		Aldrin	Arsenic	Chloride	DIMP	Dieldrin	NDMA	Sulfate
SW08003 First Creek Near Buckley Road	7/29/15	LT 0.00499	1.25	92,200	LT 0.5	LT 0.00361	LT 0.00115	172,000
	7/12/16	LT 0.00499	LT 1	102,000	LT 0.5	LT 0.00361	LT 0.0015	176,000
	8/22/17	LT 0.00499	1.14	92,800	LT 0.5	LT 0.00361	LT 0.003	153,000
	6/07/18	LT 0.00898	LT 1	77,300	LT 0.5	LT 0.00263	LT 0.003	144,000
	7/17/19	LT 0.00898	1.25	96,500	LT 0.5	LT 0.00263	LT 0.003	147,000
SW24004 First Creek Near 96th Avenue	7/29/15	LT 0.00499	1.82	115,000	LT 0.5	LT 0.00361	LT 0.00115	229,000
	7/12/16	LT 0.00499	1.14	134,000	LT 0.5	LT 0.00361	LT 0.0015	227,000
	8/22/17	LT 0.00499	1.70	127,000	LT 0.5	LT 0.00361	0.00445	222,000
	6/07/18	LT 0.00898	1.66	105,000	LT 0.5	LT 0.00263	LT 0.003	189,000
	7/17/19	LT 0.00898	2.56	121,000	LT 0.5	0.00327	LT 0.003	172,000
SW37001 First Creek Near Highway 2	7/29/15	LT 0.00499	2.43	136,000	LT 0.5	LT 0.00361	LT 0.00115	250,000
	7/12/16	LT 0.00499	2.83	135,000	LT 0.5	0.00908	LT 0.0015	223,000
	8/22/17	LT 0.00499	2.07	142,000	LT 0.5	LT 0.00361	0.00409	242,000
	6/07/18	LT 0.00898	2.60	127,000	LT 0.5	0.00659	LT 0.003	230,000
	7/17/19	LT 0.00898	3.12	129,000	LT 0.5	0.00535	LT 0.003	179,000
CSRG/PQL (µg/L)		0.014	2.35[1]	250,000	8	0.013	0.009	540,000

DIMP = diisopropylmethyl phosphate; NDPA = n-nitrosodi-n-propylamine; CSRG = Containment System Remediation Goal; PQL = Practical Quantitation Limit; LT = Concentrations less than the method reporting limit.

Values shaded in red exceeded the CSRG/PQL
Table source: U.S. Army, 2021
[1]Established based on health-based criteria

5.4 Second and Third Creeks

Neither Second nor Third Creeks are listed as impaired. There are also no approved TMDLs for these segments. Data collected by the Barr-Milton watershed stakeholders at the Second Creek (BLMRW-2nd CREEK) and Third Creek (BLMRW-3rd CREEK) stations included a short period of record (2013 to 2014) with relatively few results for each parameter. Though not robust enough for the current conditions analysis, the data were qualitatively reviewed:

- Sulfate values ranged 260 to 1720 mg/L compared to the sulfate standard of 250 mg/L.
- Temperatures were lower than the Warm Stream III standards.
- Dissolved oxygen values ranged from 0.8 to 11.1 mg/L. The stream standard is 4.0 mg/L (15th percentile of data collected between 6:30 am and 6:30 pm). No times were provided for the samples, but it is likely they were collected during daylight hours. More data would be necessary to assess compliance.
- Dissolved iron values ranged from less than 0.05 mg/L to 0.72 mg/L compared to the water supply standard of 0.3 mg/L.
- All pH values were within the standard range of 6.5 to 9.
- Total phosphorus ranged from 0.25 to 3.96 mg/L. The interim standard is 0.17 mg/L.
- Total nitrogen was not collected at this location.

Observations of the Second Creek data include:

- Dissolved oxygen values ranged from 3.8 to 13.3 mg/L. The stream standard is 3.33 mg/L (15th percentile of data collected between 6:30 am and 6:30 pm). Not enough information is available to assess compliance.
- pH ranged from 7.51 to 8.19 compared to the standard range of 6.5 to 9.
- Temperature values were lower than the standards for Warm Stream III.

5.5 Burlington Ditch

Burlington Ditch at 64th Avenue (BD-64) had sufficient data for the current conditions water quality data analysis. Figures showing the EQ concentrations of the parameters versus the water quality standards are included in Appendix C, and a statistical summary of the data (25th percentile, 50th percentile, 85th percentile, and standard deviation) is available in Appendix B. According to the Commission's Regulation 31, ditches are not classified and therefore do not have water quality standards. Despite this, Burlington Ditch is subject to pollutant loading allocations defined in TMDL(s) for the Barr-Milton watershed. To gain a sense of water quality in the Burlington Ditch, data were analyzed against the same standards used for the South Platte River upstream of 88th Avenue, except for sulfate where the table value standard of 250 mg/L was substituted for the site-specific standard of 532 mg/L.

Table 5 lists the calculated EQ concentrations compared to water quality standards at BD-64 for the 2016 – 2021 period of record. Results are color coded as follows:

- Green shading represents EQ concentrations that *are less than* 50 percent of the water quality standard. These results indicate the stream is meeting the standard with plenty of freeboard between the result and the standard;

- Yellow shading represents EQ concentrations that are *within* 50 percent of the water quality standard. These results indicate that while the stream is meeting the standard, they are flagged as within 50 percent of the standard indicating a need to track them.

- Red shading represents EQ concentrations that are *greater than* the water quality standard. These are parameters that should be further investigated, if not already included in a 303(d) listing for the segment.

Table 5. Analyte Concentrations in Relation to the Water Quality Standards

Parameter	Burlington Ditch at 64th Avenue	COSPUS15 Water Quality Standard[1]
Arsenic, Total (µg/L)	1.0	10
Cadmium, Dissolved (µg/L)	0.1	0.67
Cadmium, Total (µg/L)	0.0	5
Chloride, Total (mg/L)	137	250
Chromium, Dissolved (µg/L)	0.6	11
Copper, Dissolved (µg/L)	3.5	18
E. coli (CFU/100 mL)	471	126
Iron, Dissolved (µg/L)	76	300
Iron, Total (µg/L)	427	1,000
Lead, Dissolved (µg/L)	0.0	4.9
Lead, Total (µg/L)	1.0	50
Manganese, Dissolved (µg/L)	129	400
Molybdenum, Total (µg/L)	6.2	150
Nickel, Dissolved (µg/L)	2.3	87
Nitrogen, Total (mg/L)	4.40	2.01[2]
Phosphorus, Total (mg/L)[1]	0.57	0.17[2]
Selenium, Dissolved (µg/L)	2.7	4.6
Sulfate, Total (mg/L)	172	250
Zinc, Dissolved (mg/L)	24	211

[1]The acute water quality standards are used for total lead and total cadmium; the chronic water quality standards are used for all other pollutants. Water quality standards are based on standards for stream segment COSPUS15

[2]Interim water quality standard

As shown in Table 5, the geometric mean for *E. coli* at BD-64 is greater than water quality standard of 126 cfu/mL for COSPUS15. TN and TP were also higher than the interim standards, which indicates these parameters should be further evaluated when revised standards for nutrients are adopted. Additionally, total chloride and dissolved selenium are approaching (i.e., are within 50 percent of) the water quality standards for those constituents, but not an immediate concern.

6. Per- and Polyfluoralkyl Substances (PFAS) in Ground- and Surface Water

6.1 PFAS in Groundwater

PFAS are a large, complex group of manufactured chemicals that are used widely in everyday goods including food packaging, stain resistant carpets, clothing, non-stick products, and firefighting foam. The chain linked carbon and fluorine atoms of PFAS form one of the strongest chemical bonds, which is why PFAS are also called "forever chemicals". It is unknown how long it takes for them to degrade in the environment and it may take many years for them to leave the human body. PFAS has been linked to health effects that include pregnancy complications, developmental effects, and liver and kidney effects. (CDPHE, Policy 20-1, 2020)

PFAS have been detected in several different locations across Colorado, including Commerce City. In mid-2018, the South Adams County Water and Sanitation District (SACWSD) detected PFAS in samples of water tested from certain shallow groundwater wells in the Quebec/I-270 corridor that feed into the water supply. In 2019, after learning of PFAS contamination impacting SACWSD's public drinking water wells, CDPHE partnered with Tri-County Health Department to conduct a large, bilingual campaign to find which residents drink well water in the area and educate them on how to reduce possible exposure to the chemicals. Tri-County notified and educated residents of the campaign through press releases, letters, and door-to-door contact. During this time, Tri-County identified private wells in the area and tested many of them. The private wells that tested above the current EPA health advisory of 70 parts per trillion[1] (ppt) combined were owned by residents who did not drink the water. The remaining private wells that were not tested are: 1) either used for irrigation, 2) are located at a depth not likely to be contaminated by PFAS, or 3) not used for drinking.

In 2021, CDPHE again partnered with the Tri-County Health Department to identify designated areas in Adams County with the potential for PFAS contamination. Ten private wells for 31 different types of PFAS were tested. The analytical laboratory could measure most of the PFAS compounds down to 10 ppt. All of the water samples collected during this project were below detection levels for the PFAS compounds: Perflourooctanoic acid (PFOA) and Perfluorooctanesulfonic acid (PFOS). Nine of the ten samples collected during this project were below detection levels for all the PFAS compounds analyzed. One sample had measurable levels for two of the PFAS compounds, Perfluoro-n-hexanoic acid (PFHxA) at 11.5 ppt and Perfluoro-n-pentanoic acid (PFPeA) at 16.6 ppt. These two compounds are not part of the current EPA health advisory. The Tri-County Health Department website provides a report and regional map containing private well test results from this sampling effort[2].

CDPHE has found that for the SACWSD drinking water wells, PFAS groundwater contamination originates at the Denver Fire Training Facility. Together, CDPHE and the City of Denver are conducting PFAS sampling and evaluation at this site to fill in data gaps, better understand the impacts and identify other possible sources of contamination. The extent of the contamination is still being investigated and CDPHE hopes to have more information available after Phase II of the investigation is completed. A final report summarizing findings is

[1] EPA has established the combined total health advisory level for PFOA and PFOS in drinking water at 70 parts per trillion..
[2] PFAS Testing | Tri-County Health Department - Official Website (tchd.org)

expected in June or July of 2022. Phase I of the investigation was to confirm the contamination and Phase II is designed to identify the plume boundary.

6.2 PFAS in Surface Water

In addition to concerns regarding PFAS contamination at the Denver Fire Training Facility, a large quantity of firefighting foams containing PFAS have been used on the Suncor refinery property resulting in levels above 1,000 ppt (PFOA+PFOS) in some groundwater monitoring wells on the facility's site. High levels of PFAS have also been observed in Sand Creek and the South Platte River below the confluence of Sand Creek.[3] In accordance with the Commission's Policy 20-1 (CDPHE, 2020), several actions, conditions, monitoring, requirements, and limits have been proposed in Suncor's draft permit – currently in the process of renewal - to protect downstream surface waters from PFAS discharge and groundwater impacts. For example, new PFAS limits have been proposed for the facility's primary discharge outfall and for three stormwater outfalls. The limits are set equal to the EPA's health advisory threshold of 70 ppt. These proposed limits are subject to change until the final permit is adopted, which is expected within the next several months. Commerce City has been actively engaged in CDPHE's outreach efforts and has provided public comment during the permit renewal process.

7. Summary

Key findings of the water quality evaluation provided in this technical memorandum are as follows:

- Extensive water quality monitoring for both surface and ground water within Commerce City has been conducted for many years for multiple purposes and by multiple agencies/organizations.

- Portions of Sand Creek, the South Platte River, the Burlington Ditch, and First, Second, and Third Creeks are within Commerce City boundaries.

- Several stream segments within Commerce City have been placed on the 303(d) list for impaired waters, including the following:

    - Sand Creek Segment 16i_B: *E. coli*, dissolved selenium.

    - South Platte River Segment 15_B (below Sand Creek): sulfate, total cadmium and M&E List for temperature.

    - South Platte River Segment 15_C (mainstem to below 120th Ave.): M&E List for temperature.

    - First Creek Segment 16c_A: *E. coli* (May – October), dissolved selenium.

- Several TMDLs have been written for segments within Commerce City with the goal of bringing these streams back into compliance with standards. Once TMDLs are written and approved, the stream is delisted for the parameter of concern. The following segments have completed TMDLs:

    - South Platte River Segment 15_B (below Sand Creek): Dissolved cadmium, dissolved oxygen, *E. coli.*

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3 Results of PFAS analysis for Sand Creek can be accessed at: https://drive.google.com/file/d/1jYC20sjvBXP5M4mvavGpFkJOnzBt4HWB/view

  - South Platte River Segment 15C (mainstem to below 120th Ave.): Total cadmium, dissolved oxygen, *E. coli*.

- Analysis results that compare existing quality to water quality standards track well with 303 (d) listings and TMDLs, and show that:

  - Dissolved cadmium concentrations in the South Platte River upstream of 88th Street may not be meeting standards. A TMDL is in place for Segment 15_B.

  - The total cadmium standard is not being met in the South Platte River Segment 15_B, however; this segment was placed on the 303(d) list for total cadmium in 2020.

  - Existing quality for total chloride concentrations in the South Platte River Segment 15_B is slightly higher than the standard indicating that this segment may be out of compliance with the standard. Chloride is a secondary drinking water standard and not highly toxic.

  - E. coli standards are not being met in Sand Creek or in the South Platte River segments upstream of 88th. The South Platte River segments have TMDLs for *E. coli* (2016). Sand Creek does not have a TMDL for *E. coli*. Concentrations of *E. coli* in Burlington Ditch are also higher than the standard, but this information is for comparison only since ditches are not subject to water quality standards.

  - The dissolved selenium standard is not being met in Sand Creek, which is listed for this parameter. A TMDL has not yet been developed.

  - All surface water sampling sites analyzed (including Burlington Ditch) indicate that existing quality for total nitrogen and total phosphorus are higher than the interim nutrient standards. For sites where EQ could not be evaluated due to data limitations, maximum TN and TP concentrations were generally higher than the interim standards. Revised nutrient standards will be adopted in 2027.

  - First Creek is subject to containment system remediation goals, all of which are being met except for arsenic. It is believed that arsenic concentrations are primarily driven by the geology of the area. Note that the CDPHE is in the process of revising total arsenic standards and there has been talk that the arsenic standard may become less stringent.

  - Second and Third Creeks had limited data sets. Data that were available for metals, dissolved oxygen, pH, and temperature were reviewed and indicated, generally, that these constituents are of low concern. However, maximum TN and TP values were higher than the interim standard, and sulfate values for Third Creek were substantially higher than the standard.

- PFAS threats in South Adams County continue to be investigated by CDPHE. Groundwater source remedial actions will be identified once the investigations conclude. Surface water threats from point source discharges are addressed through water quality permits. CDPHE has included limits for PFAS in recent permit renewals.

8. Recommendations

The water quality evaluation conducted by Pinyon indicates that most identified water quality issues within Commerce City either have been, or are in the process of being, addressed through regulatory means (e.g., 303(d) listings, TMDLs, CSRGs, specialized PFAS investigations). The evaluation also shows that nutrients (TN and TP) and temperature have potential to be future contaminants of concern. *E. coli* standards are also not met in multiple segments despite TMDLs that have been developed to control point and non-point contributions for this contaminant. Based on these observations, Pinyon makes the following recommendations:

1. Delay implementation of water quality monitoring. One purpose of the water quality evaluation presented above was to assess whether there were significant data gaps that should be addressed through a synoptic water quality sampling event, or a sustained monitoring program. Pinyon finds that there would be little immediate benefit to selective monitoring at this time. Several long-term monitoring stations have been established throughout the City's stream segments over the years including those monitored by CDPHE, Metro WRD, the City of Thornton, Barr-Milton Watershed group, Colorado Riverwatch, and the US Army. Most of the current monitoring stations are established and maintained by Metro WRD, which has conducted frequent sampling for many years. Parameters monitored are generally the same as those that exist for water quality standards.

   Additionally, CDPHE is working to revise several water quality standards in an ongoing Water Quality Forum workgroup that include temperature, nutrients (both stream and lake), arsenic, selenium, and ammonia. The proposed standards will be considered by the Commission over the next several years through 2027. At that time, all the "new" standards are expected to become immediately effective in individual Colorado basin standards. Pinyon recommends that Commerce City track the progress of the standards revisions and consider conducting baseline monitoring in 2024 or 2025, if appropriate.

2. Develop a Stream Corridor Management Reference Document. The Environmental Services contract includes a task to develop long-term management for creek corridors. Pinyon proposes that this be designed as a high-level reference document that would include a limited menu of available tools/approaches that are designed specifically for Commerce City and relatively easy to implement. The goal would be to ideally limit the scope to non-controversial regulatory alternatives (code and enforcement), education and outreach activities, and development/re-development strategies that focus on reduction of land-use impacts. Examples include:

   a. Managing impacts associated with riparian buffer degradation and maintenance/protection of undeveloped buffers. Examples include redefining (if necessary) and enforcing setback requirements; implementing no-mow zones; encouraging voluntary or incentive programs to restore and protect riparian areas. Strategies and design elements should focus on reducing nutrients, temperature, and *E. coli* to the degree possible.

   b. Managing impacts associated with impervious cover and urban runoff such as implementation of stormwater infrastructure design standards that incorporate low impact development (LID) and green infrastructure (GI) practices and design criteria. This may also include updating (if necessary) the City's operations and maintenance Plan(s) for existing and new infrastructure, and education and outreach to inform people about regulatory requirements and LID and GI.

   c. Managing impacts of pollutants associated with land-use activities. The adverse effects of pollutants in stormwater and urban runoff on water quality and aquatic health are well documented in scientific literature. In residential and commercial areas, a variety of pollutants are generated in stormwater that may include sediment, pesticides, lawn chemicals, nutrients, de-icers, *E. coli*, trace metals, oil, grease and hydrocarbons. Examples of managing land-use activities may include actions like establishing and enforcing "restricted spray zones", educating citizens about the use of lawn care chemicals (quantity, composition, toxicity, application, etc.), and establishing an Integrated Pest Management (IPM) Policy to name a few.

3. Track water quality monitoring activities and discharge permit violations. Pinyon recommends that Commerce City develop a system to track water quality monitoring activities and discharge permit compliance for waterbodies within City boundaries. Tracking violations will allow the City to flag non-compliance issues of concern and facilitate discussions with CDPHE regarding if/how concerns are/will be addressed.

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Appendix C. Resolutions for Consideration

RESOLUTION ESTABLISHING A STANDING ENVIRONMENTAL POLICY ADVISORY COMMITTEE

NO. 2023-XX

WHEREAS, the City of Commerce City ("City"), by and through the City Council of the City of Commerce City ("City Council"), on June 7, 2021, approved and adopted Resolution 2021-38, establishing the Environmental Policy Advisory Committee ("EPAC");

WHEREAS, EPAC was created as an advisory committee with limited duration to enhance the efforts of community organizations and grassroots movements in furthering environmental justice, elevating the voices of historically disengaged community members, and providing policy design reflective of the concerns, needs, and desires of the community;

WHEREAS, EPAC was charged with providing recommendations to City Council to improve environmental quality outcomes across a broad spectrum of environmental concerns and issues;

WHEREAS, EPAC has held community meetings, training sessions and a Business Outreach meeting to solicit feedback and additional sustainability strategies;

WHEREAS, since its inception the EPAC has developed 124 strategies, prioritized recommendations, and produced measureable goals to further environmental restoration and protection to enhance community health and economic development, all summarized in the EPAC Action Plan for Sustainability, to be presented to City Council on January 9, 2023;

WHEREAS, in recognition of the progress made by EPAC and the value it has contributed to Commerce City and the City Council, the City Council has resolved to make it a standing committee so that the City may continue to receive the contributions and added value of EPAC efforts; and

WHEREAS, pursuant to Section 11.1 of the City Charter, the City Council is authorized to create advisory commissions and appoint members to such commissions as set forth in the Charter, the Commerce City Revised Municipal Code, and the City of Commerce City Council Policies.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF COMMERCE CITY, COLORADO, AS FOLLOWS:

SECTION 1. Findings. The recitals to this resolution are incorporated as findings of the City Council. This resolution is found to be necessary for the preservation of the public health, safety, and welfare and in the public interest.

1. Committee Established. An advisory committee known as the Commerce City Environmental Policy Advisory Committee ("EPAC") was established pursuant to Section 11.1 of the City Charter by Resolution 2021-38 on June 7, 2021. The duties of EPAC, described below, previously scheduled to be completed by the end of December 2022, are hereby extended indefinitely, and EPAC shall now be a permanent committee, for as long as the City Council deems appropriate;

RESOLUTION ESTABLISHING A STANDING ENVIRONMENTAL POLICY ADVISORY COMMITTEE

NO. 2023-XX

WHEREAS, the City of Commerce City ("City"), by and through the City Council of the City of Commerce City ("City Council"), on June 7, 2021, approved and adopted Resolution 2021-38, establishing the Environmental Policy Advisory Committee ("EPAC");

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RESOLUTION ESTABLISHING A STANDING ENVIRONMENTAL POLICY ADVISORY COMMITTEE

NO. 2023-XX

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WHEREAS, EPAC was created as an advisory committee with limited duration to enhance the efforts of community organizations and grassroots movements in furthering environmental justice, elevating the voices of historically disengaged community members, and providing policy design reflective of the concerns, needs, and desires of the community;

WHEREAS, EPAC was charged with providing recommendations to City Council to improve environmental quality outcomes across a broad spectrum of environmental concerns and issues;

WHEREAS, EPAC has held community meetings, training sessions and a Business Outreach meeting to solicit feedback and additional sustainability strategies;

WHEREAS, since its inception the EPAC has developed 124 strategies, prioritized recommendations, and produced measureable goals to further environmental restoration and protection to enhance community health and economic development, all summarized in the EPAC Action Plan for Sustainability, to be presented to City Council on January 9, 2023;

WHEREAS, in recognition of the progress made by EPAC and the value it has contributed to Commerce City and the City Council, the City Council has resolved to make it a standing committee so that the City may continue to receive the contributions and added value of EPAC efforts; and

WHEREAS, pursuant to Section 11.1 of the City Charter, the City Council is authorized to create advisory commissions and appoint members to such commissions as set forth in the Charter, the Commerce City Revised Municipal Code, and the City of Commerce City Council Policies.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF COMMERCE CITY, COLORADO, AS FOLLOWS:

SECTION 1. Findings. The recitals to this resolution are incorporated as findings of the City Council. This resolution is found to be necessary for the preservation of the public health, safety, and welfare and in the public interest.

1. Committee Established. An advisory committee known as the Commerce City Environmental Policy Advisory Committee ("EPAC") was established pursuant to Section 11.1 of the City Charter by Resolution 2021-38 on June 7, 2021. The duties of EPAC, described below, previously scheduled to be completed by the end of December 2022, are hereby extended indefinitely, and EPAC shall now be a permanent committee, for as long as the City Council deems appropriate.

Appendix C. Resolutions for Consideration

RESOLUTION ESTABLISHING MEASUREABLE SUSTAINABILILTY GOALS
NO. 2023-XX

WHEREAS, the City of Commerce City ("City"), by and through the City Council of the City of Commerce City ("City Council"), on June 7, 2021, approved and adopted Resolution 2021-38, establishing the Environmental Policy Advisory Committee ("EPAC");

WHEREAS, EPAC was charged with providing recommendations to City Council to improve environmental quality outcomes across a broad spectrum of environmental concerns and issues that include some voluntary and mandatory actions in the form of resolutions; ordinances and measureable reduction and restoration goals;

WHEREAS, EPAC has held community meetings, training sessions and a Business Outreach meeting to solicit feedback regarding the sustainability strategies;

WHEREAS, in order to measure and track, EPAC recommends setting the following goals:

- Energy use reduction by 25% by 2030;
- Increase percentage of renewable by 10% each year;
- Rooftop and community solar is utilized by 40% of households by 2050;
- Electrification is adopted by 15% of new buildings;
- 30% of light-duty vehicles are EVs by 2030;
- Idling time is reduced by 78%;
- Waste diversion increases to 85% by 2050;
- Reduction of carbon pollution by 50% by 2030 and 90% by 2050; and
- Tree canopy is increased to 20% by 2030.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF COMMERCE CITY, COLORADO, AS FOLLOWS:

SECTION 1. Findings. The recitals to this resolution are incorporated as findings of the City Council. This resolution is found to be necessary for the preservation of the public health, safety, and welfare and in the public interest.

SECTION 2. Repealer. All other resolutions or portions thereof inconsistent or conflicting with this resolution or any portion hereof are hereby repealed to the extent of such inconsistency.

SECTION 3. Effective Date. This Resolution shall be effective immediately upon passage.

RESOLVED AND PASSED THIS 23rd DAY OF FEBRUARY 2023

CITY OF COMMERCE CITY, COLORADO

____
Benjamin A. Huseman, Mayor

ATTEST

____
Dylan A. Gibson, City Clerk

Appendix C. Resolutions for Consideration

RESOLUTION ESTABLISHING COMMERCE CITY AS A EV GO CITY AND PLEDGING TO IMPLEMENT STRATEGIES TO REDUCE TRANSPORTATION –RELATED EMISSIONS

NO. 2023-XX

WHEREAS, the transportation sector is a contributing factor to air pollution and climate change, threatening the health and well-being of our residents; and

WHEREAS, the Denver metropolitan area, including Commerce City, is in violation (non-attainment) of federal health-based standards for ground-level ozone pollution; and

WHEREAS, the transportation sector needs support to move toward adoption of clean energy technology with zero-emission vehicles (ZEVs), which include battery-electric vehicles (BEVs), plug-in hybrid electric vehicles (PHEVs), and hydrogen fuel cell vehicles, that reduce our dependence on foreign fuels and support a healthy environment and economy; and

WHEREAS, Commerce City will not be able to meet its goals for reductions in transportation emissions without a thoughtful effort to electrify the transportation sector; and

WHEREAS, Commerce City is dedicated to being a leader in the use of clean energy, establishing policies and programs that conserve energy, promote sustainability, and support Colorado's goal of nearly one million EVs on the road by 2030; and

SECTION 1. Findings. The recitals to this resolution are incorporated as findings of the City Council. This resolution is found to be necessary for the preservation of the public health, safety, and welfare and in the public interest.

SECTION 2. Commerce City is a EVGO City and pledges to develop and implement policies and strategies to meet the following transportation electrification goals and priorities:

A) Commerce City will establish a "ZEV First" procurement policy to ensure that all new light duty vehicles purchased by the City Fleet are electric vehicles when the technology accommodates the needs of the vehicle use and departmental budgets can accommodate both vehicle acquisition and the associated charging infrastructure. The City will include the total cost of vehicle ownership, including fuel and maintenance costs, and the social cost of carbon in its vehicle procurement calculations.

B) Commerce City will transition its municipal fleet to medium- and heavy-duty zero-emission vehicles and off-road equipment as these vehicles become available and cost competitive in Colorado.

C) Commerce City will support the electric vehicle charging station infrastructure needed to accommodate the transition of fleet and privately-owned vehicles.

D) Commerce City will implement community and resident-focused programs, policies, incentives, and infrastructure to support transition of 30% of all vehicles registered within the City to zero-emissions by 2030, and near-100% of all vehicles by 2050.

E) Commerce City will advocate that public transit providers (including, but not limited to the Regional Transportation District (RTD) and the Adams County School District) transition all of their vehicles within C3 to electric or zero-emission vehicles by 2035.

F) Commerce City will encourage shared fleets operating within the City such as taxis, Uber and Lyft, and carshare companies to transition all shared fleet vehicles to full electric or zero-emission fleets by 2040.

G) Commerce City will develop partnerships with micro-mobility companies to promote the use of electric assisted bicycles.

H) Commerce City will work across City departments, with residents, businesses, developers and partners throughout the region and state to create an inclusive, low carbon, and healthy community.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF COMMERCE CITY, COLORADO, AS FOLLOWS:

RESOLVED AND PASSED THIS _____TH DAY OF FEB. 2023.

CITY OF COMMERCE CITY, COLORADO

____

Benjamin A. Huseman, Mayor

ATTEST

____

Dylan A. Gibson, City Clerk

Appendix C. Resolutions for Consideration

RESOLUTION ESTABLISHING LOW IMPACT DEVELOPMENT

NO. 2023-XX

WHEREAS, on August 16, 2021, the City Council adopted a set of technical criteria governing the design and performance of storm water improvements and related practices, referred to as the "Storm Drainage Design and Technical Criteria Manual (herein referred to as Drainage Manual"; and

WHEREAS, the Drainage Manual consists of certain portions of the Mile High Flood District Criteria Manual (MHFD), a locally applied and referenced set of storm water-related standards adopted by reference, and a separately codified set of guidelines outlined in the Low Impact Development Guidance document customizing the standards, policies, and practices for use in Commerce City; and

WHEREAS, the Drainage Manual, including the separately codified Commerce City' Amendments, has been modified from time to time by limited technical revisions adopted administratively by the Public Works Director and filed with the City Clerk; and

WHEREAS, the City is a Municipal Separate Storm Sewer System (MS4) “permittee”; and

WHEREAS, the City is committed to a storm water management program that protects water quality and water supply by employing watershed-based approaches that balance environmental and economic considerations; and

WHEREAS, urbanization and a long history of industrial activities has led to increased impervious surface areas, resulting in increased contaminated water runoff and less percolation to groundwater aquifers, causing the transport of pollutants to receiving waters; and

WHEREAS one element of the integrated, sustainable storm water management system established under the Drainage Manual is the use of low impact development ("LID") criteria to require and encourage more distributed and landscaping-based storm water runoff management and control, relying on filtration and infiltration to treat and manage storm water runoff; and

WHEREAS staff has recommended that the LID criteria set forth in the Low Impact Development Guidance document be included in the approved Drainage Manual and amended LDC Article VII. Development and Design Standards Sec. 21-7511 Water Conservation Requirements; Sec. 21-7530 Detention/Retention Areas; and Sec. 21-7532 to clarify the Low Impact Development Criteria set forth therein; and Drainage Manual Chapters 1.0, 2.0, 3.0, 14.0, and newly-created Appendix A

WHEREAS the City's Sustainability Initiatives Committee considered staff’s recommendation at the meeting on August 25, 2022 and voted to recommend City Council adopt such amendments to the LID criteria in the Drainage Manual; and

WHEREAS, Council has determined that the adoption and implementation of this Ordinance will facilitate the holistic and integrated management of storm water in Commerce City.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF COMMERCE CITY, COLORADO, AS FOLLOWS:

SECTION 1. Findings. The recitals to this resolution are incorporated as findings of the City Council. This resolution is found to be necessary for the preservation of the public health, safety, and welfare and in the public interest.

SECTION 2. Repealer. All other resolutions or portions thereof inconsistent or conflicting with this resolution or any portion hereof are hereby repealed to the extent of such inconsistency. Furthermore, Article VII, Section Division 5 Landscaping, Sec 21-7530 – Sec -7532 of the Commerce City LDC and Drainage Manual is hereby amended to read as follows:

Low Impact Development Criteria

Once the WQCV has been calculated in accordance with the specifications provided in Chapter 14 of the Drainage Manual, the total WQCV must be treated by one or more of the methods outlined in the Low Impact Development Guidance Manual. In addition, the requirements set forth below in this Section, referred to as Low Impact Development (LID) Criteria, must be met. For the purposes of this Section, the LID methods and techniques described in the Drainage Manual, together with any methods or techniques determined by the Public Works Director to be functionally equivalent, shall,be considered *LID techniques.*

The LID Criteria are as follows:

(a) No less than seventy five percent (75%) of total disturbed project area for which a grading permit is required under City codes and regulations must be treated using one or a combination of LID techniques on new developments, redevelopment; or

(b) If, in the judgment of the City Engineer, one or more requirements of this Section cannot be met due to site engineering constraints, then a design alternative will be allowed, provided that the design results in equal or better storm water quality than by compliance with the otherwise applicable requirement.

(c) The provisions of this Ordinance establish requirements for construction activities and facility operations of Development and Redevelopment projects to comply with the current MS4 Permit, lessen the water quality impacts of development by using smart growth practices, and integrate LID practices and standards for storm water pollution mitigation through means of infiltration, evapotranspiration, biofiltration, and rainfall harvest and use. LID shall be inclusive of new development or redevelopment requirements.

(d) This Ordinance authorizes the City to further define and adopt storm water control measures, and to develop LID principles and requirements, including, but not limited to the objectives and specifications for integration of LID strategies. Except as otherwise provided herein, the City shall administer, implement and enforce the provisions of this Ordinance.

SECTION 3. Effective Date. This Resolution shall be effective immediately upon passage.

RESOLVED AND PASSED THIS 13 TH DAY OF FEBRUARY 2023

CITY OF COMMERCE CITY, COLORADO

____
Benjamin A. Huseman, Mayor

ATTEST

____
Dylan A. Gibson, City Clerk

Appendix C. Resolutions for Consideration

AN ORDINANCE AMENDING THE CITY OF COMMERCE CITY MUNICIPAL CODE, CHAPTER 11: VEHICLES AND TRAFFIC
CITY OF COMMERCE CITY 2023 – XX

The following findings describe the intent and purpose of this ordinance:

WHEREAS**,** the City Council ("Council") adopted the Municipal Code ("Code") and especially Chapter 11, also known as "Vehicles and Traffic" in an effort to promote safe use of all City streets and vehicles within the City limits; and

WHEREAS, the City has noticed that there is a need to amend the Code in order to clarify existing uses or prohibit activities that may be deemed unsafe and contribute to poor health; and

WHEREAS, the increase in vehicle traffic and idling is negatively impacting air quality (i.e., SOx, NOx and VOCs) and exacerbating the severity and number of allergies and asthma attacks, and other health conditions; and

WHEREAS**,** the two air pollutants that cause the most problems in Colorado are ground level ozone and PM2.5. African Americans are exposed to 64 percent higher PM2.5 concentrations from on-road transportation than the average PM2.5 exposure for all Coloradans. Asian Americans and Latinos experience concentrations 24 percent and 15 percent higher, respectively, than the average resident. At the same time, white residents have an average exposure that is 9 percent lower than the average for the state.[i]

WHEREAS, exposure to PM2.5 is the largest environmental risk factor in the United States, responsible for 63 percent of deaths from environmental causes.

WHEREAS, communities in South Commerce City are exposed to a confluence of impacts from multiple emission sources in addition to the refinery, such as multiple interstate highways, the Cherokee Generating Plant, the Robert W Hite Treatment Facility, and a variety of other industrial land uses, a condition not otherwise seen in the Denver Metro Area, or the State of Colorado, at such a scale, density, or intensity. Transportation related emissions are significant with the annual average daily vehicle miles travelled ("VMT") on I-270 within City limits at 521,309; the annual average daily VMT at SH-265 is 15,363; and the annual average daily VMT on I-76 from the intersection with I- 270 and ending at the junction with SH 470 at 621,462 (CDOT 2021).

WHEREAS**,** the Colorado Air Pollution Control Division has observed that the unnecessary idling or cars, trucks and buses affects the quality of air we breathe both at the point of idling (often most concentrated in front of schools and homes), and regionally due to pollutants released into the atmosphere; and

WHEREAS, in addition to health impacts, air pollution imposes significant economic costs and negative impacts on our quality of life; and

WHEREAS, vehicle exhaust is a source of carbon monoxide, particulate matter, toxic air contaminants, and greenhouse gases; and

WHEREAS, the City has received noise complaints from residents due to commercial trucks and recreational vehicles parking for hours on public streets while running or idling; and

WHEREAS, the City of Commerce City has found that unattended idling vehicles attract vehicle theft and pose a public safety hazard to pedestrians and motorists on public rights-of-way;

WHEREAS, City of Commerce City should play an important role in improving air quality by limiting the amount of time engines in City-owned vehicles are allowed to idle and thereby will led the effort to improve air quality; and

WHEREAS, according to the Environmental Protection Agency, fuel costs alone from engine idling are enormous, as car engines use over a gallon of fuel for each hour they idle. In addition, according to the U.S. Department of Energy, more than 3 billion gallons of fuel are used every year fueling idling engines.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF COMMERCE CITY, COLORADO, AS FOLLOWS:

SECTION 1. Findings. The recitals to this ordinance are incorporated as findings of the City Council. This ordinance is found to be necessary for the preservation of the public health, safety, and welfare and in the public interest.

SECTION 2: CHAPTER 11 – MOTOR VEHICLES AND TRAFFIC shall be amended as follows:

Article II. – Miscellaneous Provisions specifically Section 11-2100 and 11-2106 as follows:

Unlawful Idling or Camping

A. Definitions. As used in this section:
  1. "Block" means the distance on both sides of a street between two (2) intersecting streets.

  2. "Commercial vehicle" means a motor vehicle in excess of one-ton capacity of whatever make or type designed for or adapted to commercial or agricultural purposes, regardless of the use to which such vehicle is put at any particular time. The term "commercial vehicle" includes, without limitation, all so- called "semi" truck tractors and "semi" truck-trailers, as well as motorized equipment, such as loaders, backhoes, excavators, or the like.

  3. "Idling:" means running an engine on a motor vehicle while parked.

  4. "Public Street" means any right of way owned by the Commerce City, Adams County or Colorado Department of Transportation (CDOT) within the city limits of the City of Commerce City. This includes roads, streets and alleys.

  5. "Running" means any vehicle, as defined in this section, parked with a motor-powered generator or refrigeration unit in operation.

  6. "Trailer" means any truck trailer or other trailer designed or adapted

primarily for the transportation of materials, debris, or property of whatever kind, including, without limitation, boats, personal watercraft, snowmobiles, all- terrain vehicles, or motorcycles, whether occupied or empty.

7. "Travel trailer," "camping trailer," or "fifth wheel trailer" means a portable vehicle without motive power, whether occupied or empty, designed as a temporary dwelling for travel, recreational or vacation use that does not require a special highway movement permit when drawn by a self-propelled motor vehicle.

B. Idling or Running Prohibited. It is unlawful for any person to park or to cause to park or leave standing, idling, or running any motor vehicle commercial vehicle, or recreational vehicle as defined in this section on any public road, street, alley or municipal property for a period of time in excess of twenty (20) minutes. Any vehicle parked or left standing in violation of this subsection may be impounded or removed by any certified peace officer or other designated official, and the owner may be fined as provided in this chapter, except for the following kinds of idling:

1. Idling while stopped:
   a. For an official traffic control;
   b. For an official traffic control signal;
   c. At the direction of a police officer.

2. Idling as needed to operate heaters or air conditioners where the temperature is below zero degrees Fahrenheit (0°F) or above ninety degrees Fahrenheit (90°F) as determined by the National Weather Service, for the health or safety of a driver or passenger, including service animals and pets.

3. Idling as needed for emergency vehicles to operate equipment.

4. Idling as needed to ascertain that a vehicle is in safe operating condition and equipped as required by all provisions of law, and that all equipment is in good working order, either as part of the daily vehicle inspection, or as otherwise needed.

5. Idling as needed for testing, servicing, repairing, installation, maintenance or diagnostic purposes.

6. Idling for the period recommended by the manufacturer to warm up or cool down a turbocharged heavy duty vehicle.

7. Idling as needed to operate auxiliary equipment for which the vehicle was primarily designed or equipped, other than transporting goods, such as: operating a transportation refrigeration unit (TRU), lift, crane, pump, or drill.

8. Idling as needed to operate a lift or other piece of equipment designed to ensure safe loading and uploading of goods or people.

9. Idling to recharge a battery or other energy storage unit of a hybrid electric vehicle.

10. Idling as needed for vehicles that house K-9 or other service animals.

11. Idling by on duty police officers as necessary for the performance of their official duties.

C. Camping Prohibited. It is unlawful to park any motor vehicle, commercial vehicle, or recreational vehicle on a public road, street, alley, or private property, for purposes of human habitation or overnight camping. Any vehicle parked or left standing in violation of this subsection for a period exceeding four consecutive hours may be impounded or removed by a peace officer or other designated official, and the owner may be fined as provided in this chapter.

1. Vehicles moved from a parking spot and then re-parked on the same block, as defined in this section, within twenty four (24) hours from the time of removal shall be deemed to have been continuously parked for the purposes of this subsection.

D. Impoundment. For purposes of impoundment and removal, a certified peace officer, or other designated official, may, after placing a visible notification on the vehicle and making a reasonable effort to locate the owner, impound and remove any motor vehicle which has been unmoved for four consecutive hours. The cost of impoundment and removal shall be charged to the owner or any person who claims the impounded motor vehicle.

E. Ownership. The presence of any motor vehicle, commercial vehicle, or recreational vehicle when parked in violation of this section is prima facie evidence that the registered owner or lessee of such vehicle parked the same, or that the driver was acting as the agent of the owner or lessee.

F. Relocation. No motor vehicle, commercial vehicle, or recreational vehicle that has been the subject of a violation of this section shall be subsequently relocated or parked on the same block where the violation occurred for a period of one hundred eighty days from the date of violation, while idling. Relocation or parking of the vehicle in violation of this subsection shall be a separate violation.

G. Continuing Violations. In the case of a continuing violation under this section, each day of violation shall be deemed a separate offense.

H. Conflicting Ordinances. This section shall control and take precedence over any conflicting provisions in this code concerning parking or storage of vehicles. (Sec. 11-2105 and Article III, Sec. 11-41)

Editor's note: Ord. No. 2315 §2 (Exh. A), 1-4-21; Ord. No. 2318, §2 (Exh. A), 3-1-21

SECTION 3. Repealer. All other ordinances or portions thereof inconsistent or conflicting with this ordinance or any portion hereof are hereby repealed to the extent of such inconsistency.

SECTION 4. Effective Date. This ordinance shall be effective immediately upon passage on second and final reading.

RESOLVED AND PASSED THIS 27 TH DAY OF FEBUARY, 2023.

CITY OF COMMERCE CITY, COLORADO

Benjamin A. Huseman, Mayor

ATTEST

Dylan A. Gibson, City Clerk

Appendix C. Resolutions for Consideration

CARDBOARD ORDINANCE AMENDING THE CODE OF THE CITY OF COMMERCE CITY TO PROHIBIT THE DISPOSAL OF CARDBOARD IN THE COMMUNITY'S WASTE STREAM AND TO AMEND REQUIREMENTS FOR RECYCLING APPLICABLE SOLID WASTE COLLECTION

ORDINANCE NO. 2023-XX

WHEREAS, the City of Commerce City ("City) created the Environmental Policy Advisory Committee (EPAC) in 2021. EPAC was charged with providing recommendations to City Council to improve environmental quality outcomes across a broad spectrum of environmental concerns and issues;

WHEREAS, EPAC recommends increasing waste diversion rates through amending the City's solid waste requirements set in Chapter 6, Article II of the City Code'

WHEREAS, the disposal of 10,056 tons/year of cardboard material from Commerce City's' waste stream contributes an estimated 72, 656 tons of carbon dioxide equivalents, a damaging greenhouse gas, to the earth's atmosphere;

WHEREAS, the monetary value of 10,056 tons/year of cardboard that is sent to landfills for disposal from the community is currently worth $583,248 in commodity markets; and

WHEREAS, the number of jobs in the recycling industry that it takes to process cardboard is calculated to be ten times as great as the number of jobs that it takes to bury cardboard in landfills, so that recycling results in economic benefit and greater revenue for communities, including Commerce City; and '

WHEREAS, in addition to lost commodity rebates and fewer jobs, the landfill disposal of 10,056 tons/year of cardboard costs $1,500,000 in current landfill gate fees; and

WHEREAS, the disposal of 10,056 tons/ year of cardboard in landfills that could otherwise be recycled reduces the lifespan of local landfills, including the Tower landfill;

WHEREAS, the solid waste in Commerce City accounts for 4% of greenhouse gas emissions;

WHEREAS, residential customers of trash hauling companies who live in single-family homes or in multi-family complexes of fewer than eight units are able to receive curbside cardboard recycling services at no additional cost on their trash bills; and

WHEREAS, all businesses and residential generators of waste cardboard may take cardboard to be recycled at no cost at the City's recycling drop-off facility; and

WHEREAS, in addition to the licensure provisions for solid waste haulers, Article II of Chapter 6 - 2003 of the City Code also addresses generally the collection and disposal of solid waste, currently referred to in those provisions as "garbage and trash"; and

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF COMMERCE CITY, COLORADO, AS FOLLOWS:

SECTION 1. Findings. The recitals to this resolution are incorporated as findings of the City Council. This resolution is found to be necessary for the preservation of the public health, safety, and welfare and in the public interest.

SECTION 2. Repealer. All other resolutions or portions thereof inconsistent or conflicting with this resolution or any portion hereof are hereby repealed to the extent of such inconsistency specifically that Section 6-2004 of the Code of the City of Commerce City is hereby amended by the addition of a new definition *"Recyclable cardboard"* which reads in its entirety as follows:

> *Recyclable cardboard* shall mean corrugated cardboard, and shall include, but not be limited to, materials used in packaging or storage containers that consist of three or more layers of Kraft paper material, at least one of which is rippled or corrugated. Cardboard shall be considered *recyclable cardboard* regardless of whether it has glue, staples or tape affixed, but not if it is permanently attached to other packing material or a non-paper liner, waxed cardboard, or cardboard contaminated with oil, paint, blood or other organic material.
>
> *Required Recycling*: No person shall place recyclable cardboard in refuse containers for collection, nor shall any person bury or otherwise dispose of recyclable cardboard in or on private or public property within the City. All recyclable cardboard must either be stored and presented or delivered to a licensed solid waste collector for recycling in accordance with the provisions of Section 6 - 2004, or delivered directly to a qualified recycling facility appropriate for recyclable cardboard.

It shall be the duty of any owner or occupant of any premises to ensure that bags or containers do not contain materials required to be recycled under this Section when such bags or containers are offered for solid waste collection.

SECTION 3. Effective Date. This Resolution shall be effective immediately upon passage.

RESOLVED AND PASSED THIS 23rd DAY OF FEBRUARY, 2023.

CITY OF COMMERCE CITY, COLORADO

____
Benjamin A. Huseman, Mayor

ATTEST

____
Dylan A. Gibson, City Clerk

CONSTRUCTION AND DEMOLITION DEBRIS ORDINANCE AMENDING THE CODE OF THE CITY OF COMMERCE CITY TO PROHIBIT THE DISPOSAL OF CONSTRUCTION AND DEMOLITION IN THE COMMUNITY'S WASTE STREAM AND TO AMEND REQUIREMENTS FOR APPLICABLE SOLID WASTE COLLECTION

ORDINANCE NO. 2023-XX

WHEREAS, the City of Commerce City ("City) created the Environmental Policy Advisory Committee (EPAC) in 2021. EPAC was charged with providing recommendations to City Council to improve environmental quality outcomes across a broad spectrum of environmental concerns and issues;

WHEREAS, EPAC recommends increasing waste diversion rates through amending the City's solid waste requirements set in Chapter 6, Article II of the City Code'

WHEREAS, The Construction and Demolition Ordinance applies to projects that fit the following criteria: 1. The new construction or full demolition of any residential or commercial buildings. 2. Any alteration (addition, tenant improvement) of a commercial building when the value of the project exceeds $200,000 or increases building size by 1,000 square feet.

WHEREAS, According to the Disposal Facility-Based Characterization of Solid Waste Report construction and demolition (C&D) materials are estimated to account for between 21.7 to 25.5 percent of the disposed waste stream. [i]

WHEREAS, The cement industry is a major producer of carbon dioxide, a potent greenhouse gas. Concrete damages the most fertile layer of soil, topsoil. Concrete is used to create hard surfaces that contribute to surface runoff that can cause soil erosion, water pollution and flooding. If the cement industry were a country, it would be the third largest emitter in the world, behind China and the United States.[ii]

WHEREAS, Common C&D materials include lumber, drywall, metals, masonry (brick, concrete, etc.), carpet, plastic, pipe, rocks, dirt, paper, cardboard, or green waste related to land development. Many of these materials can be reused or recycled, thus prolonging our supply of natural resources and potentially saving money in the process.

WHEREAS, the disposal of Commerce City's' waste stream contributes an estimated 201,944 tons of carbon dioxide equivalents, a damaging greenhouse gas, to the earth's atmosphere;

WHEREAS, the solid waste in Commerce City accounts for 4% of greenhouse gas emissions;

WHEREAS, the number of jobs in the recycling industry at least three times the number of jobs that it takes to bury material in landfills, so that recycling results in economic benefit and greater revenue for Commerce City; and '

WHEREAS, in addition to lost commodity rebates and fewer jobs, the landfill disposal of in current landfill gate fees; and

WHEREAS, the disposal of concrete and demolition debris in landfills that could otherwise be recycled reduces the lifespan of local landfills, including the Tower landfill;

WHEREAS, in addition to the licensure provisions for solid waste haulers, Article II of Chapter 6 - 2003 of the City Code also addresses generally the collection and disposal of solid waste, currently referred to in those provisions as "garbage and trash"; and definitions will be added to Chapter 6.

Chapter 6

XX - Definitions.

A. Applicant means any individual, firm, limited liability company, association, partnership, political subdivision, government agency, municipality, industry, public or private for profit or nonprofit corporation, or any other entity whatsoever who applies to the City for the applicable permits to undertake any construction, demolition, or renovation project within the City.
B. Construction means the building of any improvement or any portion thereof including any tenant improvements to an existing facility or structure.
C. Construction and Demolition Debris ("C&D Debris") means used or discarded materials removed from premises during construction or renovation of a structure resulting from construction, remodeling, repair, deconstruction, or demolition operations on any pavement, house, garage, greenwaste, commercial building, or other structure.
D. Conversion rate means the rate set forth in the standardized conversion rate table approved by the city pursuant to this chapter for use in estimating the volume or weight of materials identified in a waste management plan.
E. Deconstruction means the process of carefully dismantling a building or structure in order to salvage components for reuse and recycling.
F. Demolition means the decimating, razing, ruining, tearing down or wrecking of any facility, structure, pavement or building, whether in whole or in part, whether interior or exterior.
G. Divert means to use construction or demolition debris for any purpose other than disposal in a landfill.
H. Emergency: A sudden, unexpected occurrence demanding immediate action to prevent or mitigate loss of or damage to life, health, property or public services
I. .Project means any activity which requires an application for a building or demolition permit or any similar permit from the City.
J. Recycling means the process of collecting, sorting, cleansing, treating, and reconstituting materials that would otherwise become solid waste, and returning them to the economic mainstream in the form of raw material for new, reused, or reconstituted products which meet the quality standards necessary to be used in the marketplace.
K. Remodel means any change, addition, or modification in an existing structure.
L. Renovation means any change, addition, or modification in an existing structure.
M. Reuse means the use, in the same form as it was produced, of a material which might otherwise be discarded.
N. Salvage means the controlled removal of construction or demolition debris from a permitted building or demolition site for the purpose of recycling, reuse, or storage for later recycling or reuse.
O. Waste Management Plan (WMP) review fee means the fee for processing WMP applications as adopted by the City Council by resolution, if any.
P. WMP report means the final calculation of construction and demolition debris diversion for the project.

Submission of Waste Management Plan.

A. Waste Management Plan (WMP) Forms. Applicants for a Building Permit plan check shall complete and submit a Waste Management Plan on a City-approved form and pay a WMP review fee, if any, before a building or demolition permit may be issued. The completed WMP shall indicate all of the following:

1. Estimated weight of C&D debris, by materials type, to be generated;
2. Maximum weight of such materials that can feasibly be diverted via reuse or recycling;
3. Vendor or facility that the applicant proposes to use to collect or receive that material;
4. .Estimated weight of C&D materials that will be landfilled; and
5. Total square footage of the project.

6. Indicates that the minimum required percentage set forth of all C&D debris generated by the project will be diverted.
7. Calculating Weight of Debris. In estimating the weight of materials identified in the WMP, the applicant shall use the standardized conversion rates approved by the City
8. .Deconstruction. In preparing the WMP, applicants for a building permit plan check involving the removal of all or part of an existing structure shall consider deconstruction, to the maximum extent feasible, and shall make the materials generated thereby available for salvage prior to sending to a landfill.

Review of Waste Management Plan.

A. Approval. Notwithstanding any other provision of this code, no Building Permit shall be issued unless the WMP has been approved. Approval shall not be required, however, where an emergency demolition, as determined by the Planning and Community Development Director, is required to protect public health or safety. The WMP shall not be approved unless it provides all of the information set forth above.
B. Non-approval. If the WMP is incomplete or fails to indicate that the minimum required percentage set forth above of all C&D debris generated by the project will be diverted, the WMP shall be returned to the applicant marked "Denied," including a statement of reasons, and so notify the Community Development Department, which shall withhold permit issuance until the WMP is resubmitted and approved.

Compliance with Waste Management Plan.

A. Documentation. Prior to final inspection, the applicant shall submit documentation to the Building Official that the diversion requirement for the project has been met. If the applicant does not submit the required documentation, the applicant may be subject to enforcement action pursuant to XXX. The documentation for compliance shall include the following:
    - (i) Copies of receipts from the vendor or facility that collected or received each material, showing the actual weight of that material.
    - (ii) A copy of the approved WMP for the project adding the actual weight of each material diverted and landfilled.
    - (iii) Weighing of Wastes. Applicants shall make reasonable efforts to ensure that all C&D debris diverted or landfilled is measured and recorded using the most accurate method of measurement available. To the extent practical, all C&D debris shall be weighed by measurement on scales. Such scales shall be in compliance with all regulatory requirements for accuracy and maintenance. For C&D debris for which weighing is not practical due to small size or other considerations, a volumetric measurement shall be used. For conversion of volumetric measurements to weight, the applicant shall use the standardized conversion rates.
    - (iv) Determination of Compliance.
        1. Full Compliance. If the applicant has fully complied with the diversion requirement for the project, the final WMP report shall be approved.
        2. Good Faith Effort to Comply. On a very limited basis, if the diversion requirement has not been achieved, the Planning and Community Development Director shall determine on a case-by-case basis whether the applicant has made a good faith effort to comply considering the following:
            a. The availability of markets for the C&D debris landfilled
            b. The percent of total waste diverted.
            c. The size of the project; and
            d. The documented efforts of the applicant to divert C&D debris.

        If the Planning and Community Development Director determines that the applicant has made a good faith effort to comply with this chapter, the Director may approve the final WMP report.

3. Noncompliance. If the applicant has been found to have not made a good faith effort to comply with the diversion requirement applicable to the project, or if the applicant fails to submit the documentation required by Subsection A of this Section, then the applicant shall be subject to the enforcement provisions. Any penalty assessed must be paid to the City prior to final inspection.
4. Noncompliance Notification and Appeal. Upon a determination of noncompliance, the applicant shall be notified of the WMP report findings. The notice shall be in writing and shall identify the specific area(s) of noncompliance with the WMP and inform the applicant that it has a right to a hearing to appeal the determination.

Exemptions

A. The following project types are exempt from the requirements of this Chapter:

1. Emergency demolition projects, if the projects are required to protect public health or safety, as determined by the Planning and Community Development Director in consultation with the City's Building Official.
2. Infeasibility Exemption Application. If unique circumstances make it infeasible for a project applicant to comply with the diversion requirement, the applicant may apply for an exemption at the time that the applicant submits the required WMP. The applicant shall indicate on the WMP the maximum rate of diversion he or she believes is feasible for each material and the specific unique circumstances that make it infeasible to comply with the diversion requirement.
3. Granting of Exemption. The Director of Planning and Community Development shall not issue an infeasibility exemption unless the Director can make at least one of the following findings:
    a. That circumstances exist that are unique to the project to the effect that compliance with the provisions of this Chapter would create an unusual burden on the project that is different than that of similarly situated properties.
    b. That for a specific project compliance with this Chapter would result in minimal or no increase in recycled materials or reduction in waste stream.
    c. That diversion of one or more substances involved in the project presents unique and burdensome obstacles and would create an especially onerous economic burden on the project unless diversion of that substance is reduced or eliminated.

If one or more of the above findings may be made for a project, the project may be exempted from compliance with this chapter or determine the maximum feasible reduced diversion rate for each material as reported by the applicant and shall indicate this rate on the WMP submitted by the applicant. A copy of the WMP shall be returned to the applicant marked "Approved for Exemption".

Denial of Exemption. If the Director of Planning and Community Development does not approve the exemption request, the applicant shall be informed in writing. The applicant shall have 30 days to resubmit a WMP form in full compliance. If the applicant fails to resubmit the WMP, or if the resubmitted WMP does not comply with stated requirements, the Director of Planning and Community Development shall deny the WMP. Notwithstanding any other provision of this Code, the determination of the WMP shall be final.

Enforcement.

A. Criminal Action. Any applicant who violates or fails to comply with any provision of this Chapter shall be guilty of a misdemeanor and subject to the enforcement provisions.
B. Civil Action. The City may redress a violation of, or failure to comply with, any provision of this Chapter.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF COMMERCE CITY, COLORADO, AS FOLLOWS:

SECTION 1. Findings. The recitals to this resolution are incorporated as findings of the City Council. This resolution is found to be necessary for the preservation of the public health, safety, and welfare and in the public interest.

SECTION 2. Repealer. All other resolutions or portions thereof inconsistent or conflicting with this resolution or any portion hereof are hereby repealed to the extent of such inconsistency specifically that Section 6-2004 of the Code of the City of Commerce City is hereby amended by the addition of a new definition *XXX"* which reads in its entirety as follows:

SECTION 3. Effective Date. This Resolution shall be effective immediately upon passage.

RESOLVED AND PASSED THIS 27 TH DAY OF FEBRUARY, 2023.

CITY OF COMMERCE CITY, COLORADO

____
Benjamin A. Huseman, Mayor

ATTEST

____
Dylan A. Gibson, City Clerk

[i] 2014 Disposal Facility-Based Characterization of Solid Waste in California.
[ii] https://www.concreterecruiters.com/why-is-concrete-bad-for-the-environment

Appendix D. Community Engagement & Education

Suggested Approach for a Community Engagement and Education Campaign to Support the City's Sustainability Work

Throughout this project, community members shared several suggestions regarding how they would like to best be informed and engaged throughout this process. However, there are additional things that could be done to ensure a robust community engagement and education campaign to ensure the City's future sustainability work is holistic, collaborative, and long-lasting. Based on the feedback heard throughout this process, as well as industry best practices, we recommend the following:

- **Stay connected to community members through a variety of communication methods.** Survey respondents noted that email, Commerce City Connections, and Facebook were the most used methods of communication. However, using a variety of methods such as social media, texting, mailed flyers, face-to-face events, and communication through local nonprofits will help expand reach.
- **Build capacity of community members to meaningfully participate in this process.**
  - This includes sharing available data in clear, concise, and understandable ways, helping community members understand the issues and feel a sense of agency in addressing them (i.e., through Civics Academy training, tours, or free opportunities to learn about how things work behind the scenes).
  - Supporting a permanent EPAC is also an example of this.
- **Build trust between stakeholders, including community members.**
  - Allocate funding, time, and resources to meaningfully engage stakeholders. If possible, provide stipends, food, childcare, and transportation assistance.
  - Ensure that materials are available concurrently in English and Spanish.
  - Foster the growth of community partnerships and hire community connectors to strengthen community engagement and create meaningful change.
  - Agencies should coordinate and communicate with each other on outreach events to ensure community time is used wisely and partner on events where possible.
  - Follow up with incremental, actionable steps to implement change. Practice transparency in communication whenever possible.

Appendix D. Community Engagement & Education

- **Meet people where they are.**
  - Host updates at regularly occurring community events, recreation centers, and other gatherings. Offer a hybrid option when planning meetings.
  - Plan meetings that are accessible via public transportation, safe, and close to the focal community.

> "[We] focus our resources on civics education. If you teach the people how to use the tools, they can work on whatever comes next; whatever else is important to them." - Community Organizer

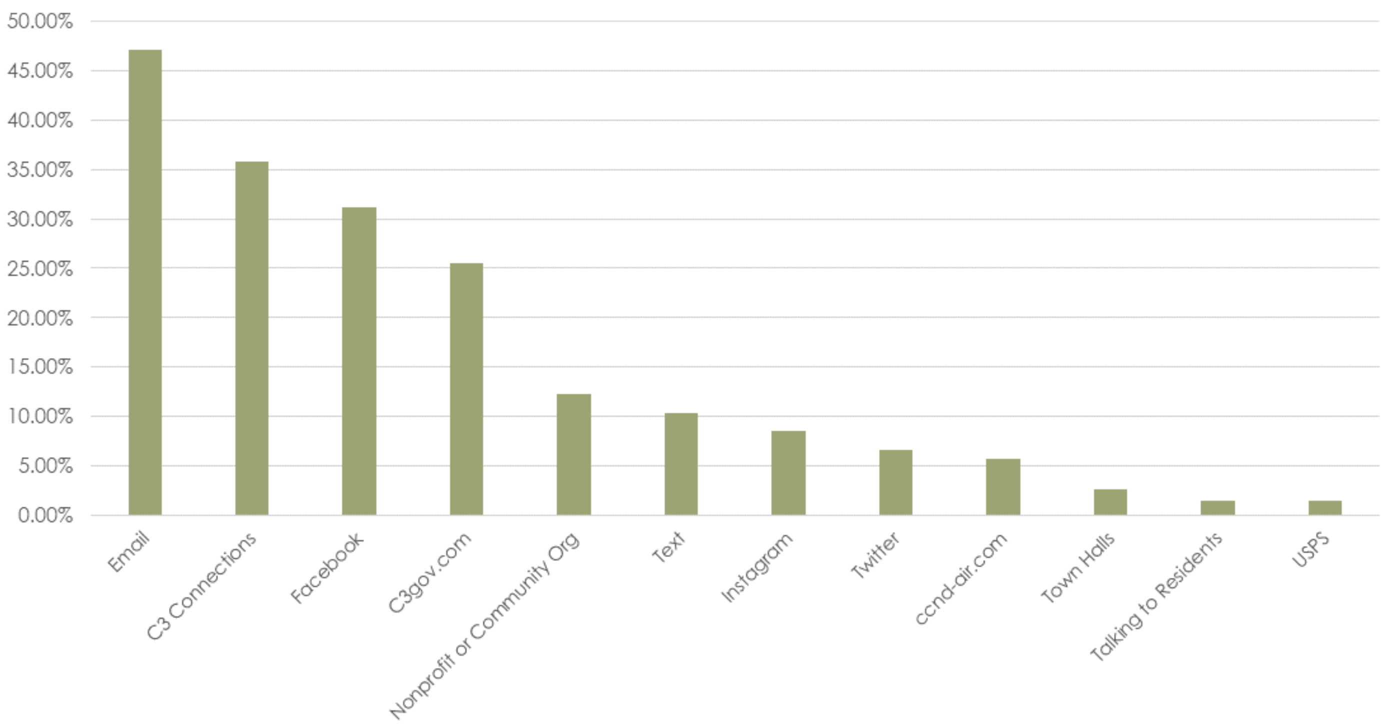


Figure AD1 Preferred method of communication by survey respondents

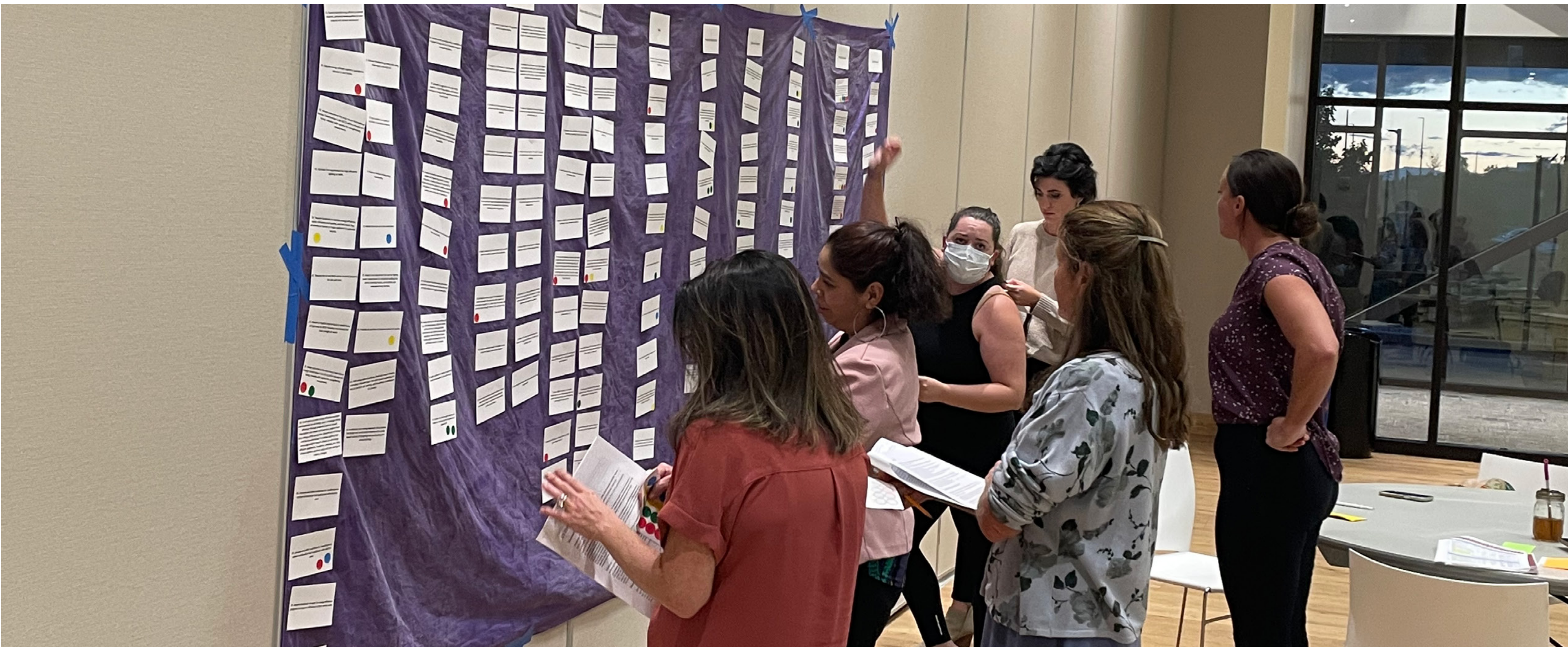
Appendix D. Community Engagement & Education

The State's Environmental Justice Task Force is finalizing recommendations for the State in regard to EJ policy and initiatives in Colorado, which include specific guidance on community outreach and engagement.

Commerce City should integrate the EJ Task Force's guidance for community engagement wherever and whenever possible, specific as it relates to:*

- Timing and locations of meetings—meeting times should be scheduled based on data regarding most attended meetings in the past. Meetings should be held at community locations that are easily accessible by transit or bike paths, safe, include free parking, accessible for people with disabilities, and in close proximity to local businesses.
- Outreach materials and methods—materials should be culturally relevant, easily understood (i.e., avoid technical language), available on diverse platforms, in multiple languages, and disseminated across several types of media.
- Accessibility in gathering input—a wide variety of methods should be used to gather input, including traditional methods (i.e., public meetings, surveys) and more innovative methods that reach people where they are (i.e., monthly coffee meetings, 'office hours', etc.).

* Find the final report on the CDPHE's EJ website: https://cdphe.colorado.gov/environmental-justice



Appendix E. Community Survey & Intercept Interviews

The community-wide engagements, survey, and intercept interviews reflected the complexity of the C3 community. In conducting these outreach activities, the City sought to obtain feedback on the policy recommendations and insights into the City's environmental and sustainability issues from a wide swath of the community. In summary, over 100 people responded to the survey with various ages, genders, and areas of the city represented. Many respondents spoke about a variety of issues, with "water quality," "air quality," "concerns about waste and pollutants from living near an industrial facility," "concerns around waste and pollutants from living near a landfill," "healthy food access," "industrial waste," and "transportation" being the primary areas of concern.

> **"I am concerned about the inequities that exist in CC. I'd love to see efforts supported in the lower and middle CC areas, led by residents of these areas with the history and lived experience to guide priorities. "**
> **- Survey Respondent**

Additionally, interviewees noted that they would like the City's sustainability actions to be focused on understanding and addressing root causes (i.e., poverty, homelessness, land use) in tandem with environmental recommendations; ensuring that stakeholders are engaged and educational opportunities are present; and creating change that is incremental, thoughtful, and sustainable.

Survey Results

During the two-month window that the survey was publicly available on Survey Monkey, the City recorded over 100 responses from people who lived or worked in C3, with an additional four responses from people familiar with C3.*

Respondents noted that they lived or worked in different areas of the City, with 69% of respondents coming from the north section of the City (96th Ave and North), 18% from the south section of the City (72nd and South) and 13% from the middle section of the City (72nd – 96th Ave).

When asked to rank their top environmental concerns in C3, the majority of survey respondents noted that "water quality" and

* The respondents were majority female-identified (66%), with 32% identifying as male and two percent identifying as non-binary. Most of the respondents were between the ages of 31-40 (31%) or 41-50 (24%). The race respondents selected ranged from American Indian/Alaska Native, Asian, Black or African American, Mexican, Mestizo, and Native Hawaiian, but the largest survey respondent group identified as White or Caucasian. 79% of respondents did not identify as Hispanic or Latino/a/x, and 18% noted that they did identify as Hispanic or Latino/a/x. The majority of respondents filled out the survey in English; four respondents answered the open-ended questions in Spanish.

Appendix E. Community Survey & Intercept Interviews

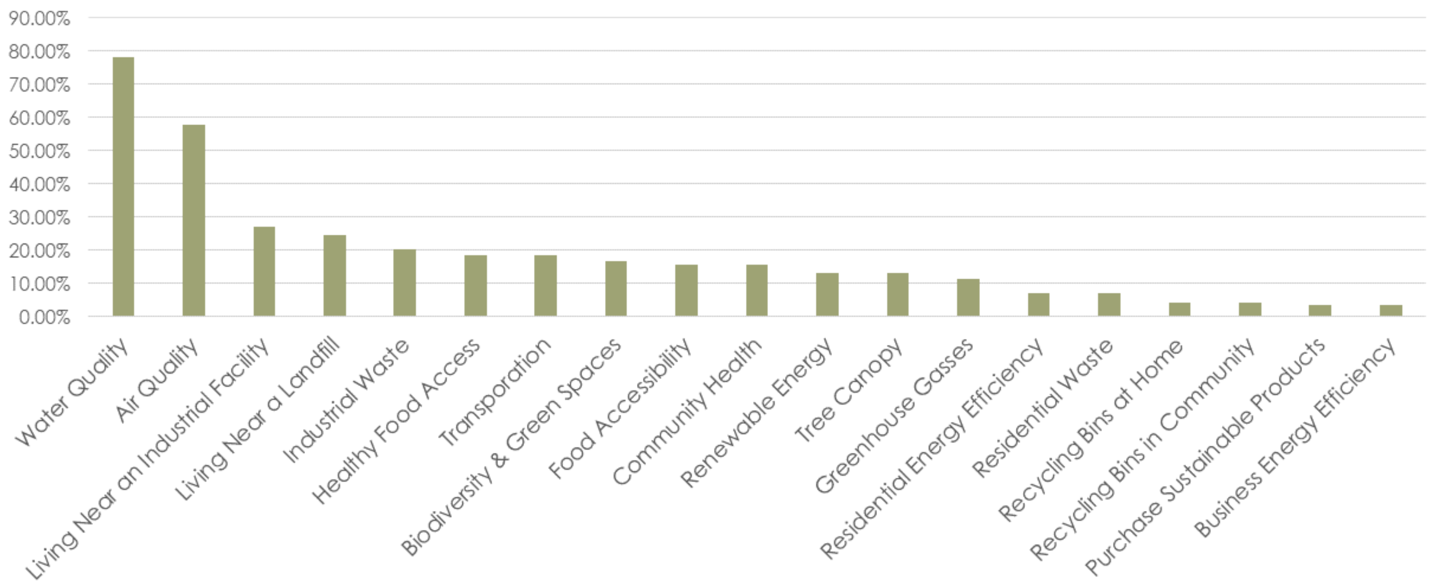


Figure AE1 Survey respondents top environmental concerns.

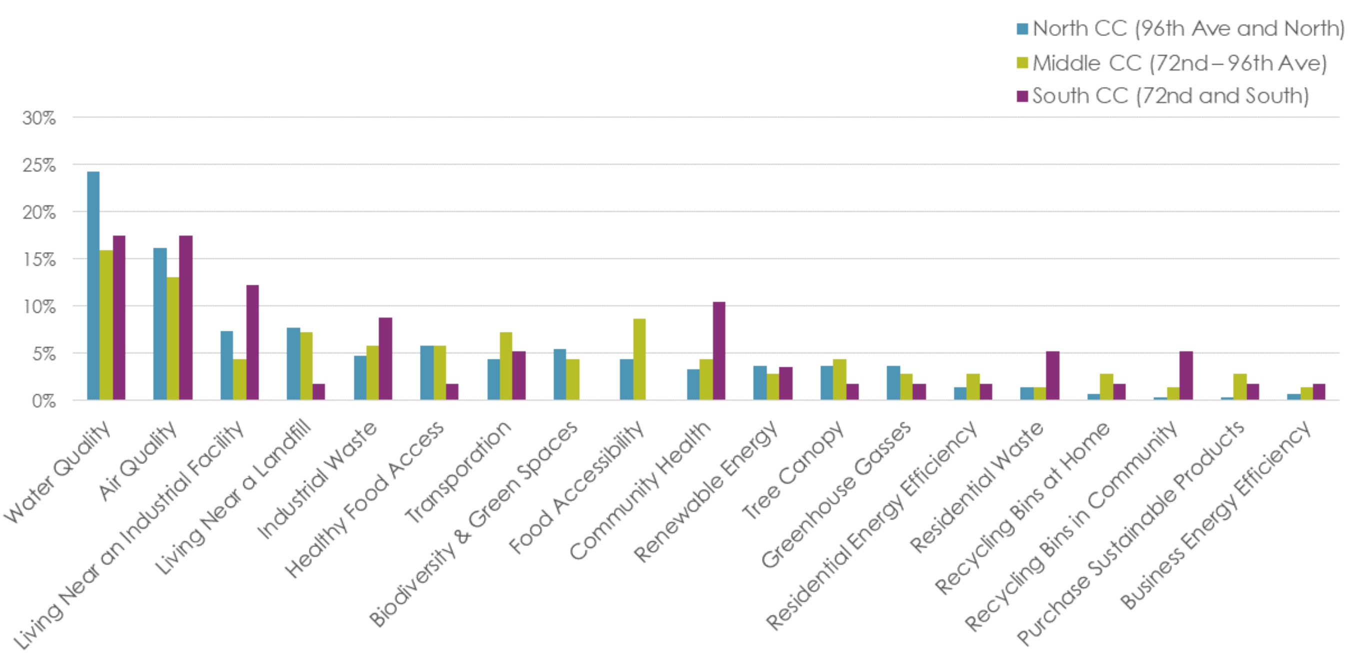


Figure AE2 Top environmental concerns by geographic location.

"air quality" were most important, followed by "concerns about waste and pollutants from living near an industrial facility," "concerns around waste and pollutants from living near a landfill," "healthy food access," "industrial waste," and "transportation." *Figure AE1* shows the range of environmental concerns presented to respondents and distribution of their top concerns.

The respondents' environmental priorities differed slightly depending on the part of C3 in which respondents lived and/or worked. Virtually all respondents cited concerns regarding air and water quality. Respondents who said they lived and/or worked in northern Commerce City listed concerns about waste and pollutants from living near a facility from living near the landfill, as well as biodiversity and green space. Similarly, respondents who reported that they lived in the southern portion of Commerce City, where the Suncor refinery is located, identified concerns from living near an industrial facility, plus transportation, as chief concerns. In contrast, the concerns from the remaining respondents reflected their location in the center of the City: availability of recycling bins at home, availability to purchase products made of recycled materials or compost, food accessibility, healthy food access, industrial waste, residential energy efficiency, and transportation.

When asked **"what specific concerns do you have to the items selected,"** many respondents expressed how these issues impact them significantly.

Water & Air Quality

Several respondents noted similar concerns with the local air and water quality:

- Concern regarding chemicals and pollution from fire retardants the levels and impact of PFAS chemicals in the water.
- Dissatisfaction with the water softening system without addressing underlying issues.
- Concern regarding health-related issues, such as asthma, due to poor air and water quality, and the impact on vulnerable populations.
- Overall distrust that the water and air quality are safe for people and animals in the area.

Waste & Pollution

Concerns about waste and pollutants from living near an industrial facility, landfill and industrial waste pollution:

- Concern about the environmental justice impact for vulnerable populations living near facilities such as Suncor.
- Concern regarding the public health impact for the broader community, including adjacent communities to Suncor.

Appendix E. Community Survey & Intercept Interviews

- Concerns about proper industrial waste disposal and accountability.

Healthy Food Access & Transportation

Several respondents noted concerns about healthy food access and transportation. These comments followed the general themes:

- Concern about the prevalence of junk food and lack of healthy food options.
- Acknowledgement of a lack of grocery stores in Commerce City, contributing to car dependence and Vehicle Miles Traveled to access food.
- Concern over the cost of food.
- Concern regarding an inadequate supply of food options overall, especially as Commerce City population grows.

Other Topics

In addition to the categories listed, survey respondents voiced concerns with:

- Homelessness and lack of adequate homeless services.
- Rapid residential growth near pollutants and without adequate infrastructure to support the growth.
- The need for more equitable and community-focused solutions.
- The need for long-term sustainability over short-term solutions (i.e., planting trees and having minimal plans of how to take care of the trees long-term.)

The community engagement process relied heavily on the involvement of the Environmental Policy Advisory Committee, who were tasked with providing recommendations to staff, Planning Commission, and City Council on ways to improve environmental quality outcomes in an equitable manner across the community. Survey respondents overwhelmingly voiced support for the continuation of this committee, and this did not vary by geographic area.

> **"[Commerce City] needs more resources for equitable community health, such as food access, medical, resources for homelessness, programming, and efforts in the well-being of the community and its housed/unhoused residents. I am also concerned about the homeless population and waste they are leaving in/around their campsites and the city. Help them help themselves." - Survey Respondent**

Appendix E. Community Survey & Intercept Interviews

Key Informant and Intercept Interviews

To complement the breadth of the survey results, the consultant team also conducted interviews with community leaders to gather qualitative data through more in-depth one-on-one conversations. The interviewees, all residents of Commerce City, included business operators, employees at small businesses, City Staff, Councilmembers and community organizers, as well as both youth and adult perspectives. They covered similar topics as did the survey, such as air and water quality concerns, availability of food sources, concerns around affordable housing and homelessness, transportation, and prevalence of garbage in some C3 neighborhoods.

Interviewees' comments centered around three key themes that the community would like to see reflected in the City's sustainability actions:

1. Understanding and addressing root causes (poverty, homelessness, land use) in tandem with environmental recommendations.
2. Ensuring that stakeholders are engaged and educational opportunities are present.
3. Creating change that is incremental, thoughtful, and sustainable.

Addressing Root Causes as an Environmental Issue

Interviewees spoke about the history of Commerce City, chiefly its founding based on industries whose toxic byproducts affect air and water quality. They noted that a successful environmental approach will need to ensure that resources are dedicated towards actions that lower harmful pollution, update technologies that support the industry while promoting clean energy, pursue bioremediation and soil and water testing, and address health and economic disparities so that all residents can actively participate in advancing environmental solutions in the City.

Ensuring That Stakeholders are Engaged, and Education is Key to Implementing Change

Another theme that arose out of the interviews was the importance of building a culture of collaboration amongst stakeholders and ensuring that businesses, residents, and industry know how to create change. Interviewees spoke about the looming environmental issues facing the City as well as the importance of collaboration and open discussion to understand the impact of potential solutions on various stakeholders. Several interviewees highlighted their sense that Commerce City feels divided geographically, politically, and culturally; and that a more collaborative approach would ensure that the City's environmental policies meet the needs of a variety of stakeholders.

As a corollary, the interviewees also stressed the importance of education, noting that both sharing data and creating opportunities to educate the community on environmental issues would develop a shared baseline of knowledge across C3. This collective understanding would ultimately lead to creating more innovative, impactful solutions to priority issues. Their suggested avenues for community education included civics trainings, networking or connection opportunities, multilingual educational materials, an ongoing EPAC, and regional collaboration.

> **"I'm nervous about community gardens when there are toxins in the environment. Primary focus is addressing the toxins and then the food comes after. If you have pollution coming down, is the soil safe to grow? Is the water safe? If your toxins are in the food you're only increasing your exposure." - Community Organizer**

Creating change that is incremental, thoughtful, and sustainable

Several interviewees emphasized the importance of an incremental approach to a fiscal, economic, and technological transition and of fully understanding the adverse impacts of any policy change on businesses and residents. A couple interviewees noted that pursuing a pilot program approach could smooth out the necessary, but sometimes difficult, transition periods and help adjust the C3 community to a concept over time: for example, the City may adopt forward-thinking energy efficiency initiatives by first creating voluntary programs, then re-assessing their feasibility, and ultimately phasing in a mandate or ordinance.

In terms of pursuing a just transition, interviewees reaffirmed the need to center equity: for example, the City should consider housing justice and renters' rights as they develop plans to expand green space and tree canopy to avoid gentrification issues. Another example includes working with the business community to identify solutions to replace the tax base if any large industries shutter. Finally, interviewees suggested leaning on connections with various regional, State, and federal programs to ensure the solutions implemented are accessible for C3 residents of any income level.

Appendix E. Community Survey & Intercept Interviews

"Policies that the City of Commerce City may consider should ensure that there is a view of the holistic picture. Things to consider are balance, reasonableness and business certainty, while weighing the whole community's needs. It's critical that you look beyond the policy language on paper and understand the practicality of the policy, including any unintended consequences. Finally, ensure that there is time built into the policy to realize and understand benefits of the new policies' implementation." - Local Business Operator

Appendix F. Municipal Government Implementation Plan

LOTUS
Engineering & Sustainability

Commerce City Organizational Sustainability Recommendations

Introduction

The purpose of this memo is to identify the key components of a vision for organizational sustainability and recommendations for the City of Commerce City (the City / Commerce City) to consider regarding energy efficiency, fleet management, waste reduction, water use, and organizational capacity-building strategies as it pertains to municipal facilities and operations. This is an organization-wide effort; therefore, outreach was conducted across all departments. Consultants from Lotus Engineering and Sustainability, LLC. (Lotus) conducted research, facilitated informational interviews and a focus group with staff, and disseminated a citywide survey to ensure a comprehensive outlook of organizational sustainability recommendations. This effort took place from April to September 2021.

This document outlines the findings and the top sustainability recommendations for the organization based on those activities. Recommendations are sorted by sector, and the items that were prioritized by staff rose to the top tier of recommendations, with a focus on those activities that are expected to have the most impact with little effort. The second tier of recommendations can be done with little effort but have a lower impact. The third tier recommendations have a high impact but are likely to require more effort, which may be more appropriate for longer-term implementation.

Vision Statement:

To drive sustainability work within Commerce City, consultants developed three vision statements based on staff input. Staff who participated in the focus group voted in their top choice for a vision statement that aligned with this work. Below is the vision statement for organizational sustainability that received the most votes.

The City of Commerce City is committed to environmental stewardship and is dedicated to making internal improvements that foster a sustainable future.

LOTUS
Engineering & Sustainability

Table of Contents

Overview of Organizational Sustainability Recommendations

Below is an overview of the top recommendations sorted by impact and effort based on staff input and consultant expertise. The recommendations are listed based on the priority level that they were assigned by staff that attended the focus group and responded with their prioritized recommendations. Please see the section "Detailed Recommendations by Sector" for further information on each recommendation, including the level of impact and effort involved, which department is responsible, and a more detailed description of the activity.

First Tier Recommendations | High Impact, Low Effort (1-2 years)
1. Implement digital systems to reduce the amount of paper used. 2. Make it a policy to upgrade facility, street, and trail lights to high-efficiency LEDs. 3. Develop processes and policies for maintaining and replacing equipment to reduce energy use, conserve fuel, and reduce air pollution. 4. Develop a Green Meetings and Events Policy with checklists and resources for staff. 5. Ensure all waste disposal systems are consistent in terms of look, style, and signage. 6. Create a City-wide Green Team with representation from each department to lead sustainability efforts. 7. Provide incentives for sustainability-based professional development. 8. Recognize staff for sustainable decision-making. 9. Adopt work-from-home policies. 10. Purchase Renewable Energy Credits.
Second Tier Recommendations | Low Impact, Low Effort (2-4 years)
1. Improve air quality in buildings. 2. Develop a City-wide environmental management system (EMS) that is fully integrated and operational across all facilities. 3. Develop a program for employees that provides sustainable education, training, and incentives. 4. Develop a policy for recycling electronic office equipment and other hard to recycle items. 5. Establish an employee donation or volunteer program. 6. Require that new City infrastructure projects be evaluated for environmental and social impacts.

7. Develop a municipal policy and procedure to consider life-cycle costs in procurement. 8. Develop waste reduction and diversion policies that are aligned with zero-waste practices and include green standards. 9. Ensure facilities cleaning contractors are utilizing sustainable practices.
Third Tier Recommendations | High Impact, High Effort (4+ years)
1. Improve building efficiency. 2. Introduce electric and hybrid vehicles into the fleet and invest in the charging infrastructure needed to support electric vehicles. 3. Implement Xeriscaping. 4. Identify and develop projects to expand local renewable energy generation and use on City facilities and land. 5. Collect data to start building climate action plans and goals. 6. Develop a policy to increase construction recycling for City-funded projects. 7. Diversify staff. 8. Develop a sustainability or innovation grant program for staff to implement and make operations more sustainable. 9. Adopt a policy that all new City facilities or major renovations will be built to a high-efficiency standard (e.g., LEED).

A final recommendation that is crucial to ensuring the success of both Commerce City's internal (i.e., organizational) and external (i.e., community-wide) sustainability work is to build capacity and skill within the organization to lead sustainability efforts. **Lotus recommends that Commerce City consider creating a staff position specifically dedicated to leading City-wide organizational and community sustainability efforts**; this position could be housed in the City Manager's Office or Community Development Department, but it is recommended that the position be structured to specially work on sustainability projects alone, including implementing the recommendations herein and the forthcoming community-wide sustainability strategies that Commerce City is developing in partnership with a community Environmental Policy Advisory Committee. By maintaining the core functions of the position discreetly on sustainability, staff in this position would have the ability to focus time on implementing sustainability policies and programs, collaborating with other City departments to ensure success, and facilitating a City-wide Green Team to continue to build capacity for sustainability throughout the organization.

Data Collection and Methodology

Peer City Research

Research was conducted on the current sustainability practices within peer cities both within and outside Colorado. The cities chosen were based on similar demographics and structure to Commerce City, or unique and innovative approaches to sustainability. Below is a list of peer cities and organizations that help guide recommendations:

- City of Fort Collins.
- City of Thornton.
- City of Westminster.
- City of Lancaster, MA.
- City of Portland, ME.
- Anchorage, AK.
- New Belgium Brewery (B-Corp).
- Adam's County.

High Level Takeaways from Peer Cities Research

The organizations researched are at varying levels of the depth of their sustainability efforts. Some organizations have been engaged with sustainability for 5+ years (City of Fort Collins, City of Portland, ME, Anchorage, AK, Adams County, New Belgium) and are focusing on organizational sustainability goals that will help them reach their climate targets. These organizations often have a specific staff member (or team) dedicated to leading the organization's sustainability work (both internally and externally). Based on staff engagement, access to resources, alignment with other efforts, and perceived impact, the largest efforts within these organizations are generally in building efficiency and fleet management.

Other organizations are just beginning to develop policies and programs around sustainability (City of Westminster, City of Thornton, City of Lancaster). These organizations that are newer to sustainability are focusing on staff education and policy development, data collection, and waste diversion. Some of these organizations (e.g., the City of Westminster) have dedicated staff to lead this work, while others have integrated sustainability into other staff roles. In general, having a specific staff member (or a team) dedicated to implementing sustainability related work is more likely to result in success, especially when the organization is approaching sustainability from both an internal (i.e., organizational) and external (i.e., community-wide) perspective. Based on this research, it is best practice to start with data collection, goal setting, and recommendations that are considered low effort/high impact.

Recommended Best Practices in Organizational Sustainability

Starting with data collection and goal setting in regard to organizational sustainability opportunities will allow the City to focus on opportunities for integrating sustainability that have the highest impact with the least amount of effort.

Formalizing a staff position that is specifically devoted to implementing and advancing the City's sustainability goals is more likely to result in successfully implementation and collaboration across City departments and levels of leadership.

See Appendix A: Research Matrix for more detailed information on the specific policies and procedures that are being implemented within each of these organizations.

Recommended Best Practices in Organizational Sustainability

Strategies and actions that are chosen for implementation should:

- Be developed by sector, not by department, to encourage cross-collaboration.
- Be data-driven and have clear metrics.
- Be tied to current and future plans/policies/programs.
- Include employee education and culture changes.
- Include incentives and be coupled with tools and resources for success.

Staff Informational Interviews

Five departments across Commerce City engaged in informational interviews. These interviews allowed Lotus to dive deeper into the specific needs, pinch points, and ideas around sustainability particular to each department. The five departments that participated were:

- Public Works.
- Fleet and Facilities.
- Information Technology.
- Parks, Recreation, and Golf.
- Emergency Management.

High Level Takeaways from Informational Interviews

The commonality these departments shared was a desire for more sustainable practices across the organization. It was agreed that implementation should happen in phases, be developed cross-collaboratively, and that staff who would be directly impacted should be involved in the planning process for sustainability work. The recommendations that were similar across departments were around waste diversion and building efficiency. However, because operations differ across departments, there were some differences in prioritization around some recommendations. There were also some hesitations expressed by staff due to a lack of proven available technology on the market currently (i.e., a challenge for converting maintenance equipment to electric engines), infrastructure (i.e., lack of current access to transit near City facilities), and safety (i.e., difficulty of banning space heaters before building occupant comfort issues are improved).

Recommended Best Practices in Organizational Sustainability

- Practice phased implementation to allow the organization to iterate on its own successes.
- Develop and implement sustainability strategies and actions collaboratively across departments, divisions, and levels of management.
- Involve staff who will be directly impacted by strategies and actions in the planning process.

Citywide Staff Survey

The citywide staff survey was open for several weeks. Seventy-three employees filled out the survey, and at least one staff member per department participated. The survey had questions regarding:

- Current sustainability efforts within departments.
- Areas of improvement for sustainability by sector.
- What actions need to be taken in order to implement recommendations.

- The level of support staff has for recommendations.
- Barriers that exist to implementation.
- Potential risks associated with implementation.

High Level Takeaways from the Staff Survey

Staff had many recommendations to share for each sector, with the most ideas and enthusiasm around waste diversion and organizational culture/employee education. It was evident from the survey that staff believes there is a lack of current policies in place to support sustainability, and developing such policies is critical for implementation.

Staff also shared what barriers they believe need to be addressed in order to turn opportunities into action. The key takeaways are that the organization's most significant challenges to enhancing sustainability are a lack of current policy and a lack of support for change, including from leadership. It is important to note that staff seemed willing to take this work on and, in general, do not feel they are too busy to implement sustainability practices.
Further details on the survey results can be found in Appendix B: Staff Survey Results.

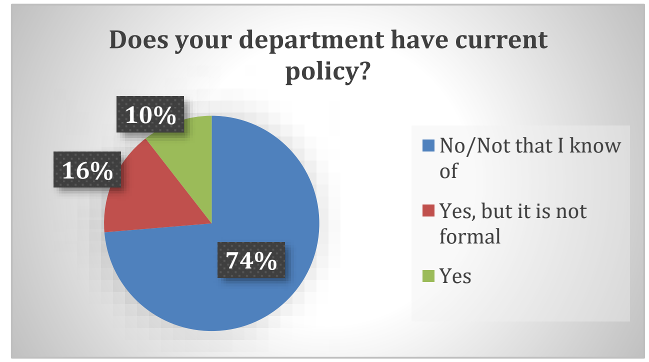


Figure 1. Results from the staff survey regarding current policy.

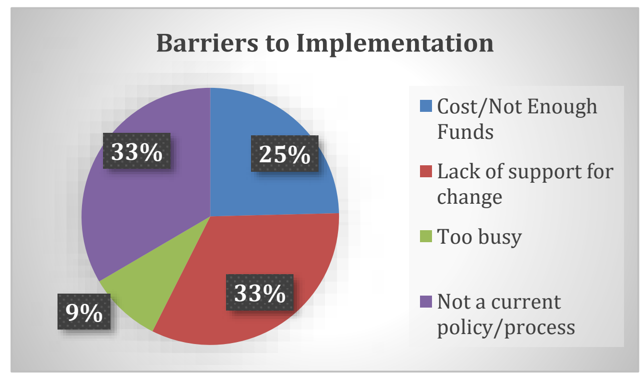


Figure 2. Results from the staff survey regarding barriers to implementation.

Staff Focus Group

Staff from various departments joined a focus group to review the findings and recommendations of the research, interviews, and citywide staff survey. They were asked to provide additional feedback and sort the various opportunities into an impact and effort matrix. Following that sorting, staff provided input on the ways that different opportunities may align with or conflict with current work, any synergistic efforts happening, and some of the critical first steps that should be taken to implement this work. Finally, staff were asked to rank their top three recommendations.

Full details on the input provided by staff can be found in Appendix C: Focus Group Notes.

Detailed Recommendations by Sector

Further information on the recommendations within each sector are provided in the table below, including the level of impact and effort involved, predicted duration, a more detailed description of the activity, and which department is responsible. Note: this is an organization-wide effort, therefore the department noted here is the suggested 'lead' department. However, collaboration across departments and levels of management will be essential for the success

Commerce City Staff Interest in Sustainability

In the staff survey, Commerce City employees showed the greatest enthusiasm for sustainability actions that would address waste diversion and they would provide employee education around sustainability. Staff noted they were interested in pursuing this work and do not feel they are too busy to implement sustainability in their workflow.

Perceived Barriers to Organizational Sustainability in Commerce City

In the staff survey, Commerce City employees expressed that the barriers to organizational sustainability include:

- A lack of current policy.
- A lack of support for change at the leadership level within the organization.
- A lack of sustainability being woven through organizational culture.

for the majority of recommendations. Impact, effort, and duration were defined by Lotus based on research and past experience and then further informed by staff input during the focus group.

Impact, effort, and duration were defined as:

Impact (i.e., Social, Environmental, and Economic benefits)

High	Likely to significantly reduce energy use, costs, or greenhouse gas (GHG) emissions.
Medium	Likely to somewhat reduce energy use, costs, or GHG emissions.
Low	Likely to reduce energy use, costs, or GHG emissions by a small amount.

Effort (i.e., Complexity of implementation)

High	Likely to require significant staff resources (i.e., greater than 0.25 Full-Time Employees [FTE] per week).
Medium	Likely to require moderate staff resources (i.e., between 0.1-0.25 FTE/week).
Low	Likely to require minimal staff resources (i.e., less than 0.1 FTE/week).

Duration (i.e., length of time for full implementation)

Long		Likely to require 12 months or more to complete.
Medium		Likely to require 6-12 months to complete.
Short		Likely to require less than 6 months to complete.
Ongoing	Ongoing	This effort will continue into perpetuity once started. Note, if an effort is ongoing, the initial duration for implementation of the effort will be listed first.

It should be noted that the final groupings into first, second, and third tier were based on the level of impact and effort as well as the level of priority placed on the action by staff that participated in the focus group.

First Tier Recommendations

Energy and Water Use	Department	Impact	Effort	Duration
Adopt a policy to upgrade the facility, street, and trail lights to high-efficiency LEDs. While facilities often already replace lights with LEDs, a concrete policy will ensure this is standard practice.	Facilities	✔✔	✔	✔
Purchase Renewable Energy Credits (RECs). RECs can be purchased through the local electricity utility to offset the carbon emissions associated with energy used in City facilities. When on-site renewable energy is not an option, this is an easy and low-cost way to offset emissions and energy use.	Finance; Facilities	✔✔✔	✔	✔, Ongoing

TRANSPORTATION	Department	Impact	Effort	Duration
Adopt work-from-home policies. Staff have already become accustomed to working from home throughout the COVID-19 pandemic. By continuing to provide opportunities for staff to work remotely, energy use, GHG emissions, and air quality impacts associated with staff commuting can be mitigated. This additionally is seen as a quality-of-life benefit for many employees.	Human resources	✔✔✔	✔	✔

WASTE DIVERSION	Department	Impact	Effort	Duration
Implement digital systems to reduce the amount of paper used. Staff frequently noted the use of redundant and excessive paper for processes that could be digitized, including building permits and internal documentation. Digital systems may also help to reduce staff time associated with tasks as these systems can be more efficient; proper training on the use of the systems will be necessary.	Information Technology	✔✔✔	✔✔	✔✔, Ongoing
Develop processes and policies for maintaining and replacing equipment. Ensuring there is a formalized and written process for maintaining equipment (e.g., mowers, lawn equipment, and office equipment) to ensure that it is functioning well and efficiently can save staff time and energy in the long run. This policy should also include details on when equipment should be replaced and the criteria that should be used for replacement.	Purchasing	✔✔✔	✔	✔✔
Develop a Green Meetings and Events Policy with checklists and resources for staff. This policy should include information on the types of materials that can be used for events and meetings (i.e.,	City Manager's Office	✔✔	✔	

banning the use of Styrofoam or single-use items) and guidance on how to host a "green" event or meeting.	**Duration:**	✓
Ensure all waste disposal systems are consistent in terms of look, style, and signage. A tenet of a strong waste diversion program is consistent collection bin style and signage that is clear, illustrative, and hung at eye level for the user. Trash and recycling bins should always be co-located.	**Department:** Facilities	
	Impact:	✓ ✓ ✓
	Effort:	✓
	Duration:	✓, Ongoing
CULTURE AND RESILIENCY		
Create a City-wide Green Team with representation from each department to lead sustainability efforts. Many staff noted the desire to participate in a formal group that was moving sustainability work forward within the City. A Green Team would ensure there is a group accountable for identifying opportunities and supporting implementation.	**Department:** City Manager's Office	
	Impact:	✓ ✓ ✓
	Effort:	✓
	Duration:	✓, Ongoing
Provide incentives for sustainability-based professional development. This may include providing formal opportunities for staff training (i.e., through sustainability associations or professional development organizations) or creating internal trainings that may be led by outside experts or staff themselves (i.e., on proper recycling, how to compost, use of digital tools, etc.). This could be coordinated by the Green Team.	**Department:** City Manager's Office; Human Resources	
	Impact:	✓ ✓
	Effort:	✓ ✓
	Duration:	✓ ✓, Ongoing
Recognize staff for sustainable decision-making. Either through the existing staff rewards and recognition program (i.e., Kazoo) or through developing another recognition platform (e.g., 'Sustainability Star of the Quarter'), a rewards program can be a useful driver for behavioral change. This could be managed by the Green Team.	**Department:** Human Resources	
	Impact:	✓
	Effort:	✓ ✓
	Duration:	✓, Ongoing

Second Tier Recommendations

ENERGY AND WATER USE				
Improve air quality in buildings through policies and purchasing. Improved indoor air quality can result from multiple actions that the City can take: 1) improving air flow in buildings through the use of fans or the ability to open windows; 2) ensuring cleaning staff and contractors are using low-toxicity cleaning products; 3) developing a policy that requires only low- or no-VOC materials (furniture, carpets, paint, etc.) be used in City facilities.	**Department:** Facilities	**Impact:** ✓✓✓	**Effort:** ✓✓	**Duration:** ✓✓, Ongoing
Develop a City-wide environmental management system (EMS) that is fully integrated and operational across all facilities. An EMS will establish a system and allow for the real-time tracking, monitoring, and communication of environmental policies, procedures, trainings, and data throughout City facilities and operations.	**Department:** City Manager's Office	**Impact:** ✓✓✓	**Effort:** ✓✓	**Duration:** ✓✓, Ongoing
Ensure facilities cleaning contractors are utilizing sustainable practices. This includes both ensuring that contractors are using sustainable and low-toxicity products and materials in their work in City buildings, and also that recycling and other waste diversion activities are prioritized.	**Department:** Facilities	**Impact:** ✓	**Effort:** ✓	**Duration:** ✓
Require that new City infrastructure projects be evaluated for environmental and social impacts. A sustainability checklist/assessment for City infrastructure projects that can be used as a decision-making tool is a key way to guide staff on conducting and evaluation for social and environmental impacts of projects. This could include staff training to encourage systematic use of the Triple Bottom Line Scan for decision making. Additionally, updating the Transportation Master Plan to include requirements for sustainable practices in public works projects will ensure this policy is followed.	**Department:** Community Development; Public Works	**Impact:** ✓✓	**Effort:** ✓✓	**Duration:** ✓, Ongoing
WASTE DIVERSION				
Develop a policy for recycling electronic office equipment and other hard to recycle items. Many items and materials are recyclable but cannot be placed in a traditional recycling bin to be recycled properly. The City should ensure that all materials that are recyclable (e.g., electronics [including computers, cell phones, media, etc.), chemicals and paints, oils, etc.). are diverted from the landfill	**Department:** Facilities	**Impact:** ✓✓	**Effort:** ✓✓	**Duration:** ✓

by establishing relationships with proper recycling entities and providing facilities and training/education for staff to recycle these items properly.		
Develop a municipal policy and procedure to consider life-cycle costs in procurement. The City may establish an online decision-making tree for staff to look at before purchasing and develop guidelines for RFP and purchasing processes that ensure that sustainability of a material or service is considered as a scoring criterion when making a purchasing decision. Many peer communities have policies that could be considered as an example of a starting point.	**Department:** City Manager's Office; Purchasing	
	Impact:	
	Effort:	
	Duration:	
Develop waste reduction and diversion policies that are aligned with zero-waste practices and include green standards. This may include employee-based programs such as implementing a recycling challenge across City facilities, building floors, or departments. The City may also consider an office-supply exchange program, where unused or gently-used office supplies that are no longer needed by one employee/department can be reused by another. A key component to any waste reduction program will be education and training for staff.	**Department:** City Manager's Office	
	Impact:	
	Effort:	
	Duration:	
CULTURE AND RESILIENCY		
Develop a program for employees that provides sustainable education, training, and incentives. Education, training, and providing incentives for behavior change are key components to getting staff excited and engaged in the City's internal sustainability efforts. The Green Team may be the ideal group to facilitate an education and training program, in collaboration with the Human Resources department or other staff training programs.	**Department:** Human Resources	
	Impact:	
	Effort:	
	Duration:	, Ongoing
Establish an employee donation or volunteer program. While not directly related to sustainability, providing staff with the opportunity to give back to their community through a donation or volunteer program is an effective way to increase staff morale and create and improve a culture of service within the organization.	**Department:** Human Resources	
	Impact:	
	Effort:	
	Duration:	Ongoing

Third Tier Recommendations

ENERGY AND WATER USE	
Improve building efficiency (e.g., weatherize buildings, install automatic light switches and smart thermostats, retrofit City facilities with high efficiency (HE) plumbing fixtures and appliances, lighting, and HVAC in existing buildings). Many staff interviews and survey responses noted the need to improve building operational efficiency both to reduce energy use and improve occupant comfort. The Facilities team at Commerce City is actively working to address noted issues and starting with implementing any recommendations from the recent McKinstry building audit, as Facilities is planning to do, is a first step. Developing additional policies around building efficiency and the replacement of equipment and technology with high-efficiency options may be supportive of this effort.	**Department:** Facilities **Impact:** ✔✔✔ **Effort:** ✔✔ **Duration:** ✔✔✔, Ongoing
Implement Xeriscaping (i.e., create Xeriscape demonstration gardens on City land; convert turf to native grasses; plant more trees on City-owned properties). Utilizing Xeriscape design techniques can help to reduce water use on City properties and infrastructure, while also providing useful pilot and demonstration sites for low-impact development that can be used to communicate these design principals and any forthcoming requirements in City development code to project developers in the community. Pinyon Environmental, which are supporting the Water Quality scope of work in the Environmental Consulting Services contract, is currently working with City staff to identify sites and projects that may be useful for a low-impact development demonstration site, which could include Xeriscaping.	**Department:** Facilities; Parks, Recreation, and Golf **Impact:** ✔✔ **Effort:** ✔✔ **Duration:** ✔✔, Ongoing
Identify and develop projects to expand local renewable energy generation and use on City facilities and land. The use of renewable energy, including on-site solar, to power City facilities and infrastructure is one of the most immediate and effective ways to reduce the environmental impact of the City's daily operations. The City should consider rooftop space, open pieces of land, and other resources (e.g., geothermal or wind resources) that may be appropriate to deploy for a renewable energy project. Working closely with the City's utilities will be necessary for project success. The City could consider outright ownership of a renewable energy system, leasing a system, a power purchase agreement with a solar provider, or another model deemed appropriate in conversations with utility providers and renewable technology companies.	**Department:** Planning; Facilities **Impact:** ✔✔✔ **Effort:** ✔✔ **Duration:** ✔✔✔

Develop a City-wide municipal GHG inventory and set targets for emissions reduction and climate action. Without knowing the City's baseline GHG emissions, it is impossible to know whether any of the other recommended policies or strategies result in emissions reductions. Additionally, setting climate action and emissions reductions goals sends a strong signal to the community and to staff about the importance of this work.	**Department:** Community Development; City Managers Office	
	Impact:	✓✓✓
	Effort:	✓✓
	Duration:	✓✓, Ongoing
Adopt a policy that all new City facilities or major renovations will be built to a high-efficiency standard (e.g., LEED).	**Department:** Facilities	
	Impact:	✓✓✓
	Effort:	✓✓
	Duration:	✓✓✓
TRANSPORTATION		
Incorporate electric vehicles through right-timing purchases with a planned vehicle replacement schedule. Introduce electric and hybrid vehicles into the fleet and invest in the charging infrastructure needed to support electric vehicles. After investments in renewable energy, transitioning to a cleaner and greener fleet is a clear way to reduce carbon emissions and improve air quality. If appropriate models of fleet vehicles (e.g., sedans) are replaced with electric vehicles (EVs) and powered by carbon-free energy (e.g., solar), the environmental impact of these vehicles' operation is near to zero. As the City looks at the opportunity to renew its lease with Enterprise for the current fleet, significant consideration should be given to the ability to achieve green fleet objectives through this tool, and what other opportunities there may be to green the fleet by investing in EVs. While EVs sometimes come with a higher upfront cost (which can in some cases be offset by grants), the operational cost of these vehicles is much lower. In addition to vehicle replacements, the City should consider installing a networking of charging infrastructure to power any fleet vehicles and also provide access to charging for employees or members of the public that visit City facilities. Grants and support for both the purchase of EVs and the installation of charging stations are available through the Regional Air Quality Council's Charge Ahead Colorado program.	**Department:** Fleet	
	Impact:	✓✓✓
	Effort:	✓✓✓
	Duration:	✓✓✓, Ongoing
Work to obtain the Government Fleet and American Public Works Association Leading Fleets Award. This award recognizes public sector fleets leadership, efficiency, and vision. Staff noted this as a goal to strive for and a useful framework for how to approach the green fleet transition.	**Department:** Fleet	
	Impact:	✓✓✓
	Effort:	✓✓✓
	Duration:	✓✓✓

WASTE DIVERSION		
Develop a policy to increase construction recycling for City-funded projects. Construction and Demolition (C&D) projects result in a large amount of waste being produced; while a large portion of that waste can be diverted from the landfill, it frequently is not due to a lack of infrastructure or policy requiring such diversion. City-funded C&D projects, including Public Works projects, should require that waste diversion by prioritized by contractors completing the work, and the evaluation of potential bids should include a scoring metric for the ability to divert waste.	**Department:** Community Development; Public Works; Facilities	
	Impact:	✓ ✓ ✓
	Effort:	✓ ✓ ✓
	Duration:	✓ ✓

CULTURE AND RESILIENCY		
Diversify staff. Comments from staff surveys illustrated that there is a level of concern regarding how well the current City staff represent the broader Commerce City community in terms of culture, race, and heritage. A need for more Spanish-speaking staff was specifically noted by multiple interviewees and survey respondents. From a sustainability and resiliency perspective, ensuring that the civil servants that are accountable to the community reflect that community and their lived experiences is important to creating space for community-drive dialogue and public participation.	**Department:** City Manager's Office; Human Resources	
	Impact:	✓ ✓ ✓
	Effort:	✓ ✓ ✓
	Duration:	✓ ✓ ✓, Ongoing
Develop a sustainability or innovation grant program for staff to implement and make operations more sustainable. Providing staff the opportunity to identify potential projects in the sustainability, resiliency, or innovation spaces (i.e., operational efficiency, employee well-being, etc.) is a unique and effective way to create a culture of sustainability and innovation and allow for a more engaged and invested staff community. The City could facilitate a mini-grant program where staff can propose small projects (e.g., those up to $2,000, or another limit deemed appropriate) that will improve organizational sustainability, efficiency, or general culture. The Green Team could help to facilitate this program.	**Department:** City Manager's Office	
	Impact:	✓ ✓ ✓
	Effort:	✓ ✓ ✓
	Duration:	✓ ✓, Ongoing

Future Recommendations to Consider

Throughout conversations with staff and analyzing the survey data, it is recommended to consider the following opportunities once certain parameters are in place.

- As infrastructure improves (i.e., transit access increases or development around City facilities increases to facilitate non-vehicular trips), reduce vehicle miles travelled for business purposes by incentivizing alternatives for getting around such as walking, biking, carpooling, and taking public transit.
- As technology advances, convert municipal small engines, such as lawn and garden equipment, to be fossil fuel free.
- Once more data is collected, enhance the traffic operations center equipment to be more efficient.
- As buildings become more efficient and occupant comfort improves, ban the use of space heaters.

Data Collection

Through research of best practices in other municipalities, it is clear that an integral component of organizational sustainability work is to develop metrics and collet data prior to implementing policies or strategies; this allows one to measure the action against the baseline and the intended result. Below are some opportunities for this:

- **Citywide:**
  - Collect data to start building climate action plans and goals. This will help prioritize the following data and allow for the setting of metrics and a timeline.
- **Energy and Water Use:**

- Develop a Citywide building assessment to identify strategies and determine opportunities for building efficiency. Adopt green building standards for City facilities and establish policies that increase the efficiency of all new buildings.
  - Gather system-wide data on municipal uses of water and identify efficiency opportunities to incorporate into policies and standard operating procedures.
  - Conduct regular water and energy audits in all facilities.
- **Transportation:**
  - Conduct a fleet analysis to determine types of cars and opportunities for efficiency.
- **Waste:**
  - Conduct a waste analysis for municipal buildings and improve waste data collection and tracking to evaluate life-cycle costs in planning and procurement.
- **Funding:**
  - Explore third party financing models and credit systems for clean energy projects to offset City facility energy use (e.g., on-site solar, community solar, purchase RECs, etc.).

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