



EXPECTED BENEFITS OF RECOMMENDED LAND USE CONCEPT

Edmonton

This document was written by The City Plan Team to describe the expected benefits of the Recommended Land Use Concept of The City Plan. This recommended land use concept is still in draft and will be refined until the final concept is presented to City Council for approval at Public Hearing.

AUGUST 2019



Expected Benefits and Results of Recommended Land Use Concept

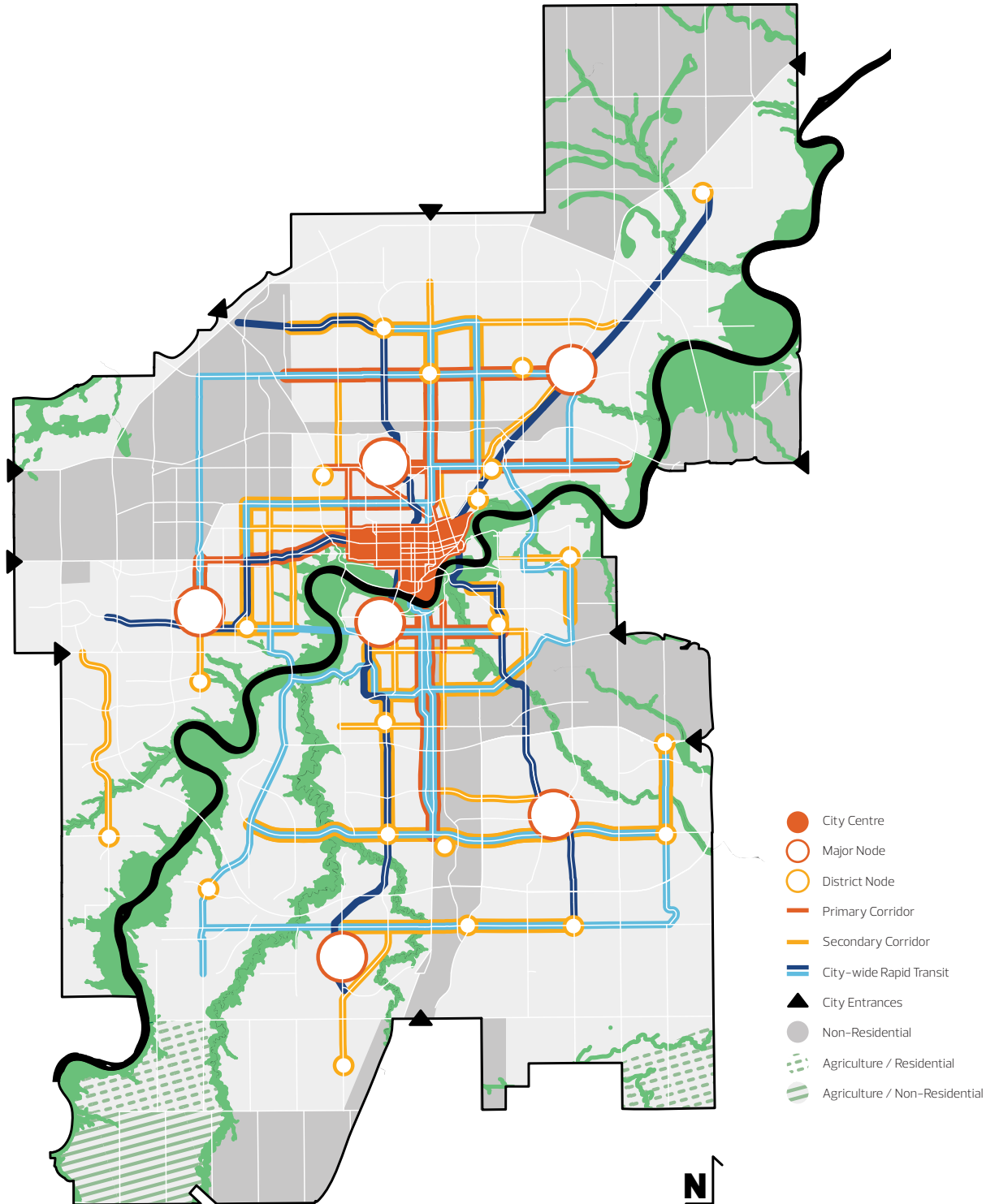
STEP 4

The path to develop the recommended (draft) land use concept was not a linear one. There was no single input or source that resulted in one recommended (draft) land use concept but rather it was a culmination and iteration of several sources of information and inputs. This included professional judgement of the City of Edmonton staff, public engagement feedback, stakeholder workshops (both internal and external to the City of Edmonton), technical studies and learnings derived as part of the modelling process of the evaluation scenarios. An important task was the development of a mass transit network (made up of both a city-wide rapid network and rapid-frequent network) that both informed and responded to the recommended land use concept. The result is a robust and integrated land use and mass transit city design that is expected to provide many benefits to City of Edmonton and its citizens.

In order to assess these benefits, the City Plan team performed the same type of analysis on the recommended land use concept as it did during the evaluation scenario testing phase (see steps 1 and 3). The results of the analysis undertaken on the business-as-usual case was carried forward and an analysis of the expected 2020 conditions was undertaken. This analysis assisted The City Plan team to quantify and compare-and-contrast the difference between Edmonton at 1 million and Edmonton at 2 million under different scenarios.

Recommended Land Use Concept

This document outlines the expected results and describes them as benefits as it relates to the recommended land use concept.



Recommended Land Use Concept: Overarching Benefits

There are five important benefits that result from the recommended land use concept. These represent what can be accomplished if Edmonton follows the recommended land use concept.



Save more than 5,000 hectares of land from development by containing growth within Edmonton's current urban boundary and developing more efficiently.

Growing in a business-as-usual manner would mean that Edmonton's current boundary is only able to accommodate 1.8 million people, meaning that additional annexations would be required to include 2 million within Edmonton's borders. By strategically allocating density and increasing the proportion of growth occurring through redevelopment, Edmonton will be able to easily accommodate a population of 2 million within its current boundary, thereby saving an estimated 5000 hectares of land from development.



Actively support redevelopment to enable more than 50% of new population growth to occur within already-established areas of the city.

The draft concept welcomes an additional half a million Edmontonians within Edmonton's current mature and established areas. The proposed approach to residential and employment intensification will allow Edmonton to accommodate more than 50% of its overall population growth through redevelopment over the lifespan of the City Plan as Edmonton grows to 2 million residents.



Increase the number of daily walking, cycling and public transit trips by 50% as compared to business-as-usual growth patterns.

As Edmonton's population doubles, the number of trips that future Edmontonians will carry out will also increase. Through the coordination of mass transit and urbanized nodes and corridors that accommodate greater density and diversity, the recommended land use concept can accommodate more people within the current boundary while maximizing the number of non-auto trips when compared to a traditional growth pattern (or business-as-usual). As a result, the recommended land use concept creates the opportunity for 50% more daily trips to be undertaken through cycling, walking and transit.



Improve Edmonton's long term fiscal performance as compared to business-as-usual growth pattern.

A city's long term fiscal outlook factors in both costs and revenues, and the combined effect of the two measures is known as 'fiscal efficiency.' Based on interim results of the ongoing technical analysis, it is reasonable to project that the fiscal efficiency of the recommended land use concept will likely outperform that of Edmonton's business-as-usual growth pattern. This is primarily achieved through urban intensification and a shift in the mix of residential unit types, which would result in increased tax assessment revenues.



Reduce greenhouse gas emissions by 6% per person over today through investment in mass transit and a more compact urban form.

The growth pattern in the recommended land use concept enables residents to live more compactly and make shorter trips by non-automobile transportation. This increase in medium and high density housing in the nodes and corridors growth areas and the associated reduction in the number of kilometres travelled by car leads to an 6% per person reduction in greenhouse gas emissions compared to today. Additionally there are a number of energy reducing actions beyond land use and transportation that must take place to put Edmonton on a low carbon path. These actions involve the City but may also require private sector partnerships, participation from the community, and cooperation with other levels of government. If these are advanced, in addition to transportation and land use changes, the preferred growth concept would achieve an 91% reduction in per person greenhouse gas emissions overall as compared to today.



Attract and retain an additional one million people to Edmonton.

The doubling of Edmonton's population is not an outcome that can be expected to passively occur; Edmonton will have to work hard in a competitive global market to attract and retain new residents and ongoing investment. Projections forecast an aging population which will affect the proportion of working-age residents in Edmonton. Additionally, the volatility of the oil industry creates employment uncertainty over the long term. Attracting and retaining new residents will be integral to Edmonton's growth to a population of 2 million and the realization of the draft City Plan concept.

Further Technical Analysis

There are additional expected results derived through the technical analysis and modelling exercise related to the recommended land use concept. These expected results provide further insight into how Edmonton and its citizens will benefit and what Edmonton can hope to accomplish with regards to land use development, transportation behavioural changes and items related to climate change.

As described previously the expected "2020" conditions, which represent the world as it is today, were included in the technical analysis to allow for a fair comparison between

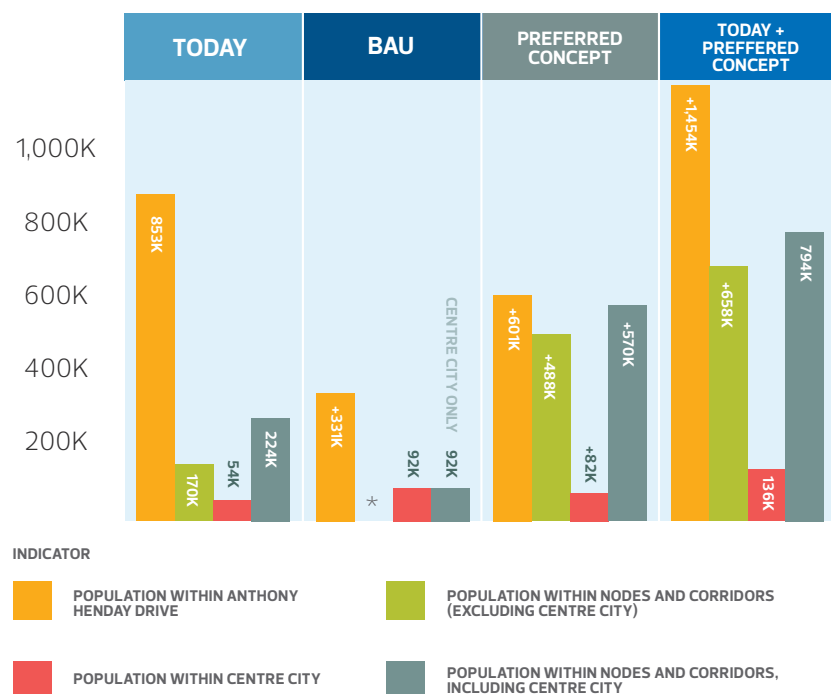
this starting point and a future recommended land use concept. Likewise, the analysis of the business-as-usual base case was carried forward from today's trend-line and further expanded for comparative purposes. By analyzing a business-as-usual case, expected results of a growing city following traditional growth pattern was established. Assuming many constants, it also serves to illustrate what Edmontonians could experience, going forward, if future growth continues trends occur in the same way they have in the past.

Outcomes and Benefits of the Recommended Land Use Concept

The recommended (draft) land use concept provides benefits from a change in land use. If Edmonton grows in this manner the following benefits will emerge related to population, employment and density expected in key geographical areas.

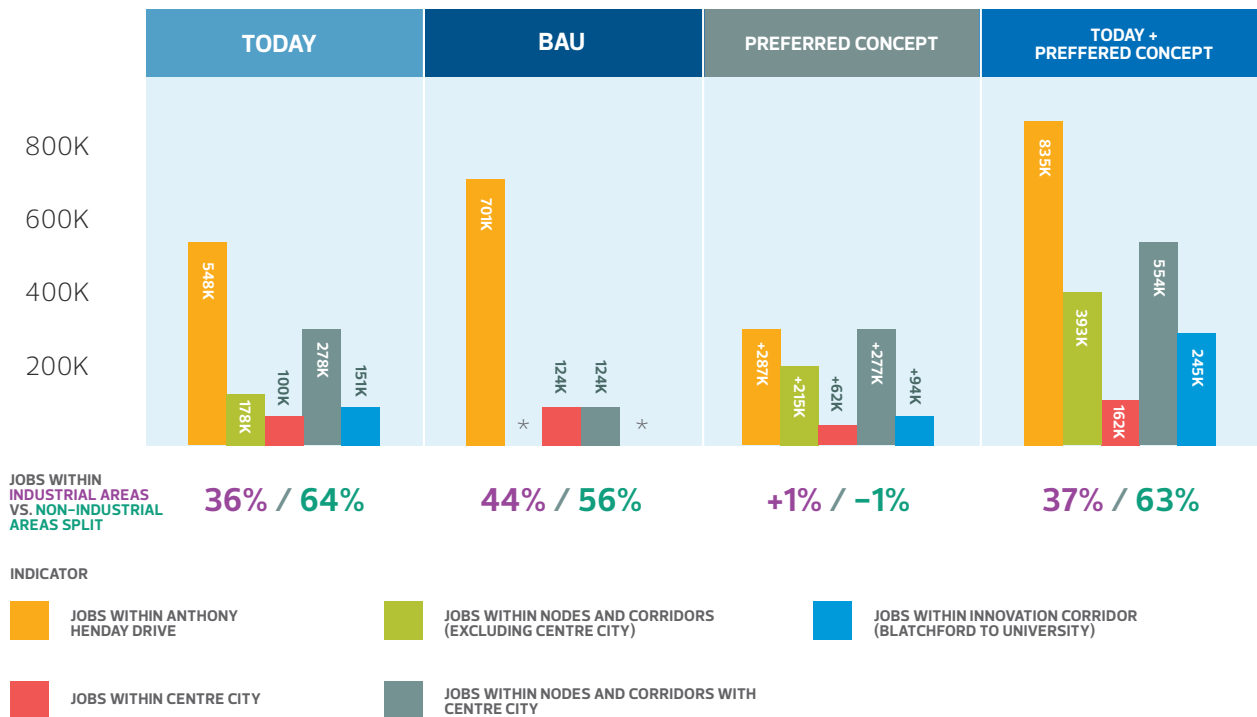
POPULATION & JOBS

TABLE 1 / Population Allocation



NOTE:
* THE BAU HAS NO SPATIAL DEFINITION OF NODES AND CORRIDORS OR INNOVATION CORRIDOR, HENCE THESE MEASURES ARE NOT AVAILABLE FOR COMPARISON.

TABLE 2 / Job Allocation



NOTE:
 * THE BAU HAS NO SPATIAL DEFINITION OF NODES AND CORRIDORS OR INNOVATION CORRIDOR, HENCE THESE MEASURES ARE NOT AVAILABLE FOR COMPARISON.

BENEFITS

The preferred land use concept can accommodate 2 million people within Edmonton's current boundary while BAU can only accommodate 1.8 million people. As a result, the preferred land use concept saves ~5000 hectares of land from potential annexation and subsequent premature development. This is accomplished through the allocation of 601K people inside of the Anthony Henday in the preferred scenario, which is 271K more than BAU. Of this additional 601K people living inside of the Anthony Henday Drive, 488K people will be strategically located

within a network of connected Nodes and Corridors, and 82K people located within Centre City. The remaining 31K people can be accommodated through the incremental infill expected to occur across Edmonton's hundreds of already-established communities.

The increase in population within these specific geographic locations also enables an increase in jobs to occur. Of particular note is the increase in jobs, when compared to today, throughout the network of nodes and corridors, City Centre, and Innovation Corridor by 215K, 62K, and 94K respectively.

When taken together, the increase in people and jobs within the Anthony Henday Drive, as well as the network of Nodes & Corridors, achieves a more efficient and sustainable use of land as more Edmontonians will be living in more strategically geographic areas close to employment and daily needs.

DENSITY

TABLE 3 / **Population & Job Density**

	TODAY	BAU	PREFERRED CONCEPT
DENSITY WITHIN ANTHONY HENDAY DRIVE	66 (people+job) / nha 28 units / nha	62 (people+job) / nha 24 units / nha	93 (people+ job) / nha 42 units / nha
DENSITY WITHIN NODES AND CORRIDORS (EXCLUDING CENTRE CITY)	101 (people + job) / nha 50 units / nha	N/A	240 (people+job) / nha 129 units / nha
DENSITY WITHIN NODES (EXCLUDING CENTRE CITY)	116 (people+job) / nha 66 units / nha	N/A	223 (people+job) / nha 129 units / nha
DENSITY WITHIN CORRIDORS	87 (people+Job) / nha 43 units / nha	N/A	256 (people+job) / nha 130 units / nha
DENSITY WITHIN CENTRE CITY	395 (people+job) / nha 197 units / nha	419 (people+job) / nha 197 units / nha	581 (people+job) / nha 304 units / nha

NHA = NET HECTARES

HOUSING DENSITY

TABLE 4 / **Low Density Residential (LDR) / Medium Density Residential (MDR) / High Density Residential (HDR) Split**

	TODAY	BAU	PREFERRED CONCEPT
LDR / MDR / HDR % SPLIT CITY-WIDE	52 / 36 / 12	53 / 30 / 16	41 / 33 / 26

NOTE:

*THE HOUSING DIVERSITY SPLIT FOR BAU HAS BEEN CALCULATED FOR A TOTAL POPULATION OF 1.8 MILLION PEOPLE AS OPPOSED TO THE PREFERRED CONCEPT'S 2 MILLION PEOPLE. THIS IS DUE TO BAU ONLY BEING ABLE TO ACCOMMODATE 1.8 MILLION WITHIN EDMONTON'S CURRENT BOUNDARY.

BENEFITS

The recommended (draft) land use concept results in a lower relative share of LDR dwelling units, as well as an increased share of HDR dwelling units when compared to today as well as the business-as-usual case (BAU). As a result, a more equitable split between the housing typologies is established which creates more housing options throughout Edmonton at a city-wide scale. From a macro perspective, this supports more diverse communities, as well as the supporting range of services and amenities.

OPEN SPACE

TABLE 5 / **Open Space**

	TODAY	BAU	PREFERRED CONCEPT
ACCESS TO OPEN SPACE (% OF PEOPLE WITHIN 400M)	100%	99%	99%
AMOUNT OF OPEN SPACE*	11 (ha /1000 people)	6 (ha /1000 people)	7 (ha /1000 people)

NOTE:
 * FOR THIS CALCULATION, THE HORSE HILL AND RABBIT HILL DISTRICTS WERE REMOVED AS THEY ARE LARGELY COMPRISED OF UNDEVELOPED LAND AND ARE NOT REPRESENTATIVE OF THE CURRENT DEVELOPMENT CONDITIONS OF THE OTHER 13 PLANNING DISTRICTS.

BENEFITS

The results of the recommended (draft) land use concept indicates when Edmonton grows by an additional 1 million people, access to open space remains effectively unchanged. Maintaining this access to open space can be attributed to the reconnection of fragmented ecological habitats, bringing nature into existing and new communities, and by focusing on the current gaps in green spaces by improving existing areas such as utility right of ways.

TRANSPORTATION

The regional travel model was used to simulate the interaction between land use policy and the transportation network. The resulting data was summarized using key indicators. These indicators were used to help understand and interpret the implications to travel patterns/behaviour and the associated benefits when compared to “2020” and “Business as Usual” conditions.

Comparison of Regional Travel Model indicators between today, business-as-usual and the recommended (draft) land use concept.

	2020*	BAU**	CITY PLAN
AVERAGE TRIP LENGTH (KM) AVERAGE DISTANCE A RESIDENT UNDERTAKES FOR TYPICAL TRIP CARRIED OUT BY ANY TRANSPORTATION MODE	7.9	8.8	8.1
AVERAGE COMMUTING DISTANCE (KM) TOTAL ONE WAY DISTANCE FROM HOME TO WORK FOR A RESIDENT	12.6	15.5	13.6
TOTAL TRANSIT TRIPS DAILY TOTAL TRANSIT TRIPS UNDERTAKEN BY RESIDENTS TO COMPLETE DAILY ACTIVITIES	~340,000	~650,000	~960,000
AVERAGE TRANSIT TRIPS PER PERSON AVERAGE DAILY TRANSIT TRIPS UNDERTAKEN BY A RESIDENT TO COMPLETE DAILY ACTIVITIES	0.3	0.3	0.5
DAILY TRANSIT MODE SHARE TRANSIT MODE SHARE FOR ALL DAY TRAVEL	9.3%	9.8%	12.9%
HOUSEHOLD AUTO OWNERSHIP CITY WIDE HOUSEHOLD AUTO OWNERSHIP	1.7 cars	1.7 cars	1.5 cars
AVERAGE TRANSPORTATION COSTS PER HOUSEHOLD AVERAGE ANNUAL COSTS FOR DAILY TRANSPORTATION NEEDS PER HOUSEHOLD	\$10,300	\$11,000	\$9,600
AVERAGE AUTO KM PER PERSON AVERAGE KILOMETRES TRAVELED BY CAR ON A TYPICAL WEEK DAY BY A RESIDENT	18.9 km	22.1 km	18.6 km

* OPENING DAY CONDITIONS OF BUS NETWORK REDESIGN AND VALLEY LINE SOUTHEAST LRT

**INCLUDES CURRENT LRT EXPANSION PLANS AND IMPLEMENTATION AND EXPANSION OF BUS NETWORK REDESIGN

BENEFITS

With the expected population and employment growth, travel demand also increases resulting in pressure building on Edmonton's transportation system. As a result, investments are required to keep up with growing demand and provide non-auto options to Edmontonians as roadway congestion increases. The recommended land use concept and associated mass transit system provides key opportunities to address the challenges Edmonton will face as the population doubles. Some relevant observations are summarized on the following page.

- Transit mode shift gains will be modest; however, cities in general struggle to maintain transit demand without significant investment.** An increase in transit mode shift, even by a few percentage points as growth occurs, indicates a favourable outcome. This outcome occurs due to the interaction of land use and the mass transit network. Without additional initiatives to attract new transit users, the ability to maintain or increase non-auto transit mode share will be difficult resulting in an inability to properly manage congestion.
- The number of kilometers Edmontonian travel by car slightly decreases, indicating that Edmontonians are driving less.** Typically, as a city grows and expands, it is expected that the number of kilometers resulting from automobile travel will increase proportionally. However, modelling results show the recommended land use concept decreases the amount of driving as the city grows. This will provide a benefit to decreasing greenhouse gas emissions and increasing equity in Edmonton's transportation system.
- Average travel time by car will increase while travel time by transit will decrease.** A growing city means more cars on the road resulting in increased congestion and the amount of time it takes to get around by car. However, the recommended land use concept provides a more efficient mass transit network resulting in a decrease in the amount of time it takes to get around by transit. Transit travel time competitiveness is key to increasing ridership and moving people more efficiently which is also the best way to mitigate congestion.
- Opportunities to access jobs within 45 mins by Transit significantly increases in each district.** In order for Edmontonians to thrive access to employment is required. Currently, accessing employment is done primarily by automobile. The recommended land use concept and mass transit network makes a shift providing Edmontonians more access to jobs within a 15, 30 and 45 minute transit ride. This provides a relief in peak hour travel times for all residents during the AM and PM commuting hours.

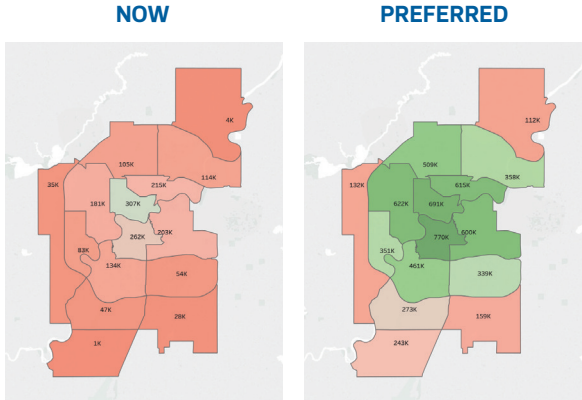
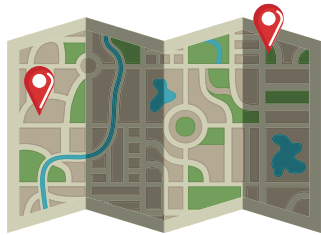


FIGURE 1 / Number of jobs accessible by district in 45 mins (door to door) using Transit "Now" condition vs Preferred land use concept

AS EDMONTON'S POPULATION DOUBLES, THE RECOMMENDED (DRAFT) LAND USE CONCEPT PROVIDES THE FOLLOWING BENEFITS:



Daily transit trips (per resident) increase by 40% city wide and at least 25% in all districts.

EXPECTED RESULT: Total number of Transit trips almost triples (with bus boardings almost quadrupling and LRT boardings almost tripling).

BENEFIT: Edmontonians take more transit trips providing the opportunity to move more people efficiently across the city.



Household auto ownership drops by 10% city wide.

EXPECTED RESULT: The preferred land use concept creates more 1 or 0 car households than 2+ car households.

BENEFIT: Edmontonians become less reliant on car ownership allowing them to perform more daily activities through other means. Due to the high costs of owning a private vehicle, low income households benefit greatly.



City-wide daily transit and active mode share increase by 40% and 20% respectively coming at the expense of single occupancy vehicle mode share.

EXPECTED RESULT: City-wide transit daily mode share increases to 12.9% and active daily mode share increases to 15.9% coming at the expense of auto mode share which decreases to 71.2%.

BENEFIT: A greater proportion of Edmontonians are able to carry out daily activities such as shopping, going to school, work, recreation, and social functions through more sustainable forms of travel.



Household transportation costs decreases city wide by \$700 annually. The range in household transportation costs decreases amongst the districts.

EXPECTED RESULT: On average, Edmontonians see savings in transportation cost of up to \$700 per household. Additionally, where an Edmontonian lives geographically and the associated transportation cost with that location choice becomes less relevant.

BENEFIT: A more equitable transportation system is created as the location of a home and the associated transportation costs decreases with low income households benefiting greatly.

ADVANTAGES AND BENEFITS OVER HISTORICAL GROWTH PATTERN

Reviewing how other cities' transportation systems respond to growth provides useful insight. However, analyzing how Edmonton's transportation responds with our own traditional growth patterns is even more informative in terms of testing out what benefits could emerge with a change of land use and a change in urban form.

The following benefits are gained by changing Edmonton's traditional growth pattern as the city's population reaches 2 million:

- DISTANCE TO WORK DECREASES BY 4 KM PER RESIDENT DAILY.** Through the recommended land use concept Edmontonians save a total of 8 million km a day in commuting distance, allowing them to be more productive and spend less time travelling to work.
- TRIPS TO PERFORM DAILY ACTIVITIES ARE SHORTER.** Given that shorter trips are more easily undertaken by non-auto modes, the recommended (draft) land use concept creates a city where trips can be taken using more sustainable forms of transportation.
- COMPARABLE AUTO TRAVEL TIMES BUT SIGNIFICANT DECREASE IN TRANSIT TRAVEL TIME.** As expected, auto travel time increases in the growth scenarios showing that an increase to auto travel times are inevitable in a growing city. However, the recommended (draft) land use concept provides the opportunity to reduce transit travel time by creating a mass transit system competitive with travel times of the auto. This will mitigate congestion levels, although not eliminate them, by shifting a higher proportion to more sustainable and efficient travel options

The following benefits are lost by maintaining a traditional/historical growth pattern as the city's population reaches 2 million:

- HOUSEHOLD DEPENDENCY ON AUTO OWNERSHIP INCREASES.** Through modelling of a traditional growth pattern, it was confirmed that household auto ownership increases showing more households relying on two cars or more for their daily activity. As a result, the benefits from reduced auto ownership, such as transportation equity to lower income households, are eliminated.

- \$1,400 DOLLARS IN TRANSPORTATION COSTS SAVING ARE ELIMINATED.**

Transportation costs increase in the traditional growth pattern and eliminate the savings earned in the preferred land use concept. Additionally, transportation costs increase based on the geographical location creating an unequal spread of transportation costs around the city.

- OPPORTUNITIES TO ACCESS JOBS WITHIN 15 TO 45 MINUTES BY TRANSIT REDUCES BY HALF.**

Without an equitable distribution of jobs available in mix used nodes and corridors and the accessibility mass transit provides, Edmontonians ability to access jobs by transit will decrease despite the equal proportional growth of jobs in the city in both conditions.

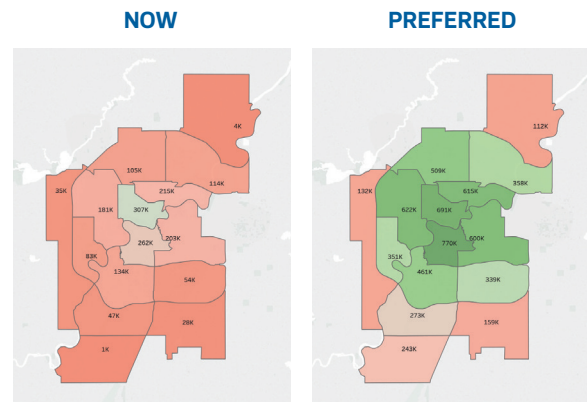


FIGURE 1 / Number of jobs accessible by district in 45 mins (door to door) using Transit "Now" condition vs Preferred land use concept

There are numerous city benefits resulting from the preferred land use concept and the associated mass transit network. For individual travellers, an integrated land use and mass transit system increases access to rapid and frequent mass transit and improves reliability. Many of these benefits are particularly important for low-income persons and other groups that rely on public transportation.

In terms of regional prosperity, an integrated land use concept and mass transit network improve the region's competitiveness and productivity by connecting workers to their places of work, providing businesses access to markets through different modes of transportation. Additional economic benefits will come from transit infrastructure and operations that will help create jobs in construction, supply chain and service industries.

Greenhouse Gas and Climate Resilience Analysis

(Preliminary results; study is ongoing)

The recommended (draft) land use concept was analyzed to show how greenhouse gas emissions and energy consumption perform relative to the business-as-usual scenario. The results also helped to determine how the recommended land use concept holds up against the effects of climate change. The main advantage of the recommended land use concept and associated mass transit network is a reduction in overall greenhouse gas emissions. There are other results providing added benefits:

- **An increase in non-automobile mode share reduces greenhouse gas emissions.** A coordinated land use and mass transit network results in a real (net) and proportional increase in the number of active and transit trips made by Edmontonians. The benefits stemming from this increase will help make Edmonton a healthier city and assist in mitigating greenhouse gas emissions.
- **Areas of lower greenhouse gas emissions are correlated with more concentrated and compact development.** By creating conditions where infill development around primary nodes and a strong centre node surpasses lower density suburban development, the city is able to control greenhouse gas emissions as a whole.
- **Housing intensification increases the potential for district energy systems to be implemented.** As compared to today, the preferred land use concept creates more areas in the city where the heat density of dwelling units and non-residential floor spaces exceeds heat density thresholds that enable district energy. This increases the opportunity for viable district energy systems in the preferred land use concept. District energy systems can provide clean energy sources to heat and cool Edmonton homes.
- **The preferred land use concept is more resilient to climate change.** Climate-related economic costs are projected to be lower in the long-term relative to a business-as-usual scenario. The vulnerability of residential buildings, road infrastructure and natural sites to climate change impacts is lower under the preferred land use concept, reducing damages and service disruption for the City, businesses and residents.
- **The amplifying effect of climate change on ozone-related health effects in Edmonton is also expected to be lower under the preferred land use concept;** fewer pollutants that contribute to the formation of Tropospheric ozone are emitted relative to the business-as-usual scenario. Tropospheric ozone affects air quality and can have adverse effects on human health and ecosystems. Warmer temperatures with climate change amplify poor air quality. The greatest benefactors from reductions in these adverse effects under the preferred land use concept are children, asthmatics and the elderly.
- **Edmonton must commit to other policy initiatives and use other levers to maximize the full benefits of the preferred land use concept.** Although a more compact city designed with integrated mass transit contributes meaningfully to a reduction in greenhouse gases, the largest reductions will come if Edmonton commits to, and goes beyond, the actions outlined in Edmonton's Community Energy Transition Strategy.