
Report

Southeast Light Rail Transit Downtown to Mill Woods

Prepared for



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Prepared by



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1. Introduction

1.1 Report Purpose

This report details the decision-making process conducted by the City of Edmonton (the City) to determine the recommended corridor for the Southeast Light Rail Transit (SE LRT). This report explains the project structure, alternatives identification, screening process, evaluation criteria, and a summary of the technical analysis key points that resulted in the recommended SE LRT corridor extending from downtown Edmonton to Mill Woods.

1.2 Project Background

The City has taken a different approach to the SE LRT project compared to past LRT expansions. Based on public interest and an increased emphasis on sustainability, recent City policy has begun to look differently at Edmonton's development patterns, the transit network, and development of major transportation infrastructure. With this recent policy direction as a backdrop, the SE LRT study began in June 2008. The SE LRT study was given a directive to identify an appropriate LRT corridor that moves citizens efficiently, helps to shape the land use and form of the City in a more sustainable fashion, and integrates into established neighbourhoods with less impact.

The SE LRT study was led by the City of Edmonton Transportation Department to determine a recommended LRT corridor. The Transportation Department developed a cohesive project team including internal decision makers from the wide range of City departments involved in the project. Team members were selected to represent the positions of each of their departments. Given the diverse perspectives of the team members, the objective was to reach consensus among the project team members on key decisions. Consensus refers to concurrence and not unanimous agreement. The team included representatives from the following departments:

- Transportation Planning
- Transportation Operations
- Planning and Development
- Office of Natural Areas
- Parks and Recreation
- Edmonton Transit: Light Rail Transit, Service Development
- Capital Construction: LRT Design and Construction, LRT Expansion

The Transportation Department engaged CH2M HILL Canada Limited (CH2M HILL) as a transportation consultant to facilitate the group through its decision-making process and to

provide technical analysis. This blended group of City department representatives and consultants formed the “project team.”

The project team and its alternatives analysis was one piece in a triad of influences that would ultimately determine the SE LRT corridor recommended to City Council. **Figure 1** graphically displays the relationship of the following three key elements:

- **Technical Studies** – The work by the internal City project team. Project team representatives were responsible for conveying the work of the group back to their respective departments and obtaining input from their departments at each decision milestone.
- **Public Input** – The public consultation process conducted in parallel with the technical studies to understand the position of local stakeholders and the public at large.
- **LRT Network Plan** – The separate study conducted to examine the future growth and direction of the Edmonton LRT System as a whole. The SE LRT is one component of this larger system.

The project began by first developing consensus on the process the team would follow to identify a recommended SE LRT corridor. The project team agreed to a multi-step process with team decisions at each key milestone. The process served to identify the full range of potential corridors from the downtown to Mill Woods. Multiple criteria were developed that represented the guiding principals of the project. The criteria became increasingly more detailed as the screening advanced. The criteria helped to screen out those corridors that did not compare favorably and to advance the most promising corridors for additional consideration. The process and criteria were presented to City Council for review and approval in December 2008. Details on the decision-making process are provided in Section 2 of this document.

1.3 Project Study Area and Purpose Statement

Project Study Area

The SE LRT study area encompasses southeast Edmonton from the downtown area to the edges of Mill Woods. In general, the boundaries of the study were the downtown area to the north, 34 Street to the east, Anthony Henday Drive to the south, and the existing South LRT line to the west. **Figure 2** provides a map of the study area and constituent neighbourhoods.

The study area included major commercial centres at Bonnie Doon Mall, the Old Strathcona district, Mill Woods Town Centre, and Millbourne Mall. Major parkland and recreational landmarks in the area included Louise McKinney Park, Gallagher Park, the Mill Woods Golf Club, and Mill Woods Park. Significant educational, transportation, and health facilities were also located within the study area. These facilities included the Millgate Transit Centre, Grant MacEwan University, Wagner School of Science and Technology, Canadian National/Canadian Pacific railway lines, the Inner Ring Road, and the Grey Nuns Community Hospital.

Purpose Statement

The project purpose statement identifies the key elements and reasons for completing the project. The statement also includes a series of supporting principles that address specific issues or objectives. As well, the statement is intended to be specific enough to include the key project elements, while being broad enough to ensure that the team can develop a reasonable range of corridor options.

The resulting project purpose statement for the SE LRT study was reached with the consensus of the entire project team:

Establish an LRT connection between the downtown and Mill Woods.

The guiding principles supporting this purpose include the following:

- Maximize cost effectiveness
- Maximize use of existing transportation corridors
- Connect existing and future activity centres
- Plan in a manner consistent with the Transportation Master Plan (TMP), Municipal Development Plan (MDP), and the City's Strategic Vision
- Provide opportunities for future system expansion
- Increase transit system effectiveness
- Shape land use to promote a more compact urban form
- Respect neighbourhoods
- Respect parklands, the river valley, and ravine systems
- Promote economic development and redevelopment

1.4 LRT Network Plan

The City's Strategic Vision, the "Way Ahead," identifies strategic goals to be accomplished over a ten-year plan that provides the guidance for the long term development of a sustainable City.

To support the City's Strategic Vision, Administration staff have developed policy documents that provide direction on how the City should grow and how citizens should move around the City. The MDP, known as the "Way We Grow," and the TMP, known as the "Way We Move," offer the framework for developing a sustainable and livable City. Both plans identify that, for the City to grow in a sustainable way, LRT is a key tool to help in creating compact urban centres while offering a premium transit service and promoting a mode shift to transit.

To supplement the TMP, an LRT Network Plan has been developed for a long term LRT system serving the City of Edmonton and the region. The Network Plan creates a plan for the City and region when population approaches 3.2 million over the next century. The key

elements of the LRT Network Plan, which were endorsed by City Council and that assist in the corridor LRT definition, include the following:

- **System Style** – The LRT system should ultimately evolve into an urban-style system with shorter stop spacing and more community-based stops.
- **Technology** – New LRT lines not tying in to the existing system should be developed with low-floor LRT vehicles.
- **Central Area Circulation** – An East-West LRT connection should be developed through the area of Strathcona to provide greater overall operational flexibility and to increase the carrying capacity of the network.

Implementing the recommended urban-style LRT system for the SE LRT corridor would result in shorter stop spacing, enhancing opportunities to serve multiple activity centres and mature communities. As the recommended corridor does not interline with the existing LRT system, low-floor technology is recommended. This provides a better opportunity to integrate into mature neighbourhoods, improving the ability to fit within existing transportation corridors while minimizing the need for extensive property acquisition. The combination of the low-floor technology and the urban style offers the ability to reduce the scale of infrastructure and create a more condensed LRT footprint.

The central area, including the downtown and University, is the most transit-supportive area of the City, as it is a high density activity zone for both population and employment. All of the LRT routes serve the central area and interconnect there to provide multiple transfer and destination opportunities. New routes will operate in the downtown at the surface (street level), with convenient walking connections to the underground LRT stations.

An additional East-West LRT connection through the Strathcona area can provide an improvement in overall operational flexibility and can also increase the carrying capacity of the network.

The Central Area Circulation element assisted the SE LRT planning process in terms of the corridors under consideration. Realizing that the long term network plan supports a system covering the eastern *and* western edges of the downtown, the corridors with western gateways into the downtown were removed from consideration in the SE LRT study. These corridors with western gateways are less supportive of the Central Area Circulation plan, because LRT would not serve the eastern edge of the downtown. The western edge of the downtown is served with the existing system and the central circulation plan identifies additional service in the long term. Without an eastern entrance into the downtown, the central area circulation plan is incomplete. The SE LRT corridor entering the eastern edge of the downtown helps to complete the central area circulation system.

Figure 3 illustrates the LRT Network Plan.

2. Alternative Development and Evaluation Process

2.1 Process Overview

The Transportation Department chartered the project team to implement a multi-step decision-making process. **Figure 4** diagrams the decision-making process. The project team met in a series of six team workshops during 2008 and 2009. Each workshop focused on a specific step or decision milestone in the process of identifying the recommended corridor.

The process included identifying all reasonable corridor options for linking LRT from the downtown to Mill Woods. **Figure 5** illustrates the initial corridors considered. Criteria were developed for two levels (Level 1/Level 2) of screening the corridor options. Screening involves comparing each of the corridors against one another. In many cases, the corridors comparisons were very close based on the criteria, and one corridor was just incrementally better than another. The criteria became increasingly more detailed as the screening advanced. The criteria helped to screen out those corridors that did not compare favorably and advanced the most promising corridors for additional consideration. These criteria were presented to City Council for review and approval in December 2008.

The project team's screening was guided by its Purpose Statement and the ultimate goal to identify a recommended SE LRT corridor. Through the screening process, the project team worked to balance the key public and technical issues. The key issues included using land use to promote a more compact urban form; moving goods and people; technical feasibility and cost; impacts to parks and the river valley; and impacts to the social and natural environment. These issue areas are expressed by the Purpose Statement's guiding principles and the City Council approved criteria used to evaluate each corridor option.

Prior to each workshop, the project team developed appropriate levels of technical analysis and presented the findings to the group for feedback and direction. Following the major decision points, the results were provided to the public for their consideration and to further shape the process. Major project decisions were not finalized until public input was received to inform the project team's direction. The public consultation process included individual stakeholder surveys, on-line comment opportunities, and two rounds of public information workshops. The first public workshops were held on June 9 and 10, 2009, to present and describe the Level 1 analysis and the Level 2 corridor options. A second round of public information meetings were held on September 21 and 23, 2009, to present and describe the recommended corridor.

As noted previously, the recommended corridor was influenced by other studies and policy documents, such as the LRT Network Plan. The City has also conducted studies involving the desired future development patterns and the land use benefits of Transit Oriented Development (TOD). The potential land use effects and TOD opportunities were considered in the decision-making process and the evaluation criteria. Other key policy documents,

including the MDP and the TMP, established the City's strategic vision on how citizens of Edmonton will live in and move throughout the City in the future. These plans clearly informed the SE LRT study. The bullets below provide specific excerpts from these plans that were considered in the decision-making process.

Municipal Development Plan

- Accommodate a 2040 population of over 1 million people
- Manage growth to become a sustainable, healthy, and compact City
- Grow within an evolving regional context
- Design complete, healthy, and livable communities
- Align medium and higher density development with key transit node and corridor locations including LRT
- Protect, preserve, and enhance the natural environment

Transportation Master Plan

- Provide a comprehensive transit system as a cornerstone of the transportation system, offering travel choice and encouraging a shift in the public's mode of transportation
- Expand LRT to all sectors of the City to increase ridership and spur the development of compact, urban communities
- Integrate transportation and land use to optimize transportation investment and create an accessible, efficient, and urban form
- Provide an effective regional transportation system, including transit, for the movement of people and goods

2.2 Level 1 Screening

Level 1 screening refers to the initial fatal flaw analysis. The goal at Level 1 is to remove from consideration those corridors that simply do not meet the purpose of the project or those corridors where the high level of impact or cost makes them simply not viable. Figure 5 identifies the initial corridors examined in Level 1 screening. For organizational purposes, the criteria were grouped under the general categories of feasibility, community, and environment. The categories and a few examples of the Level 1 criteria examined under each are provided below. This list does not include all criteria used in the analysis.

Feasibility

- Meets project purpose
- Is technically feasible
- Primarily uses existing transportation corridors (existing roadways and rail lines)

Community

- Is consistent with the TMP and MDP
- Connects to current and/or future activity centers
- Serves current and future population along alignment

Environment

- Does not create irresolvable social impacts
- Does not create irresolvable environmental impacts
- Is not adjacent to multiple parks, open spaces, river valley or other protected areas

The project team compared each potential corridor to the Level 1 criteria. The project team also debated the challenges and benefits related to each corridor. The consultant was directed by the project team to conduct additional research regarding the technical viability of the High Level Bridge; utilizing Grandin Station as a major transfer point to the existing system; the viability of the existing tunnel south of the High Level Bridge; the river valley impacts of utilizing the pedestrian bridge crossing near Louise McKinney Park; and the Walterdale Bridge crossing. Additional research revealed no fatal flaws associated with these issues. Ultimately, consensus was reached by the project team to advance four key corridors including a variety of potential design options. These design options were multiple options on specific segments of the corridors. **Figure 6** displays the corridors advanced from Level 1 to Level 2 screening.

2.3 Level 2 Evaluation

Figure 6 illustrates the corridors carried forward for refined definition and detailed evaluation as Level 2 alternatives. All Level 2 alternatives required a crossing of the North Saskatchewan River and were generally grouped by their river valley crossing.

High Level (Canadian Pacific Railways) Corridor

The corridor would exit the downtown crossing the North Saskatchewan River via the High Level Bridge or the Walterdale Bridge corridor. The corridor would enter the Canadian Pacific Railways (CPR) right-of-way, exiting at approximately 28 Avenue and travelling east to Mill Woods Town Centre.

High Level (Whyte Avenue) Corridor

The corridor would exit the downtown, crossing the North Saskatchewan River via the High Level Bridge or the Walterdale Bridge corridor. The corridor would enter the CPR right-of-way exiting at approximately 82 Avenue (Whyte Avenue). The corridor would travel east on 82 Avenue and turn south on 83 Street, crossing Argyll Road above ground to 75 Street; or turn east on 82 Avenue and then turn south on 75 Street. The corridor would continue down 75 Street to 66 Street. Alternatively, the corridor would travel along 86 Street to 76 Street with service to Millbourne Mall before turning along 38 Avenue and then to 66 Street. The corridor would then travel along 66 Street to Mill Woods Town Centre.

Connors Road Corridor

This corridor would exit the downtown through the proposed Quarters redevelopment. The corridor would go underground and turn south under 95 Street, exiting a portal on the eastern edge of Louise McKinney Park. The corridor would cross the North Saskatchewan River in the vicinity of the existing pedestrian crossing, travelling over 98 Avenue and climbing Connors Hill adjacent to Connors Road. The corridor would follow Connors Road to 83 Street or turn east on 95 Avenue, to 85 Street, to 83 Street. At 82 Avenue, the corridor continues south on 83 Street crossing Argyll Road above ground to 75 Street or turns east on 82 Avenue and then south on 75 Street. The corridor continues down 75 Street to 66 Street. Alternatively, the corridor would travel along 86 Street to 76 Street with service to Millbourne Mall before turning along 38 Avenue and then to 66 Street. The corridor would then travel along 66 Street to Mill Woods Town Centre.

Dawson Bridge Corridor

This corridor would exit the downtown through the proposed Quarters redevelopment. The corridor would go underground and exit in a portal adjacent to Rowland Road in the Riverdale neighbourhood. The corridor would cross the North Saskatchewan River via the Dawson Bridge corridor with a new LRT crossing or reconstructed Dawson Bridge (for roadway and LRT). The corridor would climb Rowland Road, turning south on 84 Street, to 85 Street, to 83 Street. At 82 Avenue, the corridor continues south on 83 Street crossing Argyll Road above ground to 75 Street; or turns east on 82 Avenue and then south on 75 Street. The corridor continues down 75 Street to 66 Street. Alternatively, the corridor would travel along 86 Street to 76 Street with service to Millbourne Mall before turning along 38 Avenue and then to 66 Street. The corridor would then travel along 66 Street to Mill Woods Town Centre.

Level 2 Evaluation Criteria

The Level 2 criteria were reviewed and approved by City Council. However, all criteria apply not only to the SE LRT, but are now used as decision-making criteria for new LRT corridor planning studies. The comparative evaluation criteria were grouped into six weighted categories to reflect the strategic direction inherent in the City's policies. City Council approved weightings for each category of criteria.

Figure 7 illustrates the Council-approved evaluation criteria and weightings.

For the SE LRT study area, there were numerous specific criteria to compare corridors against one another. The categories and a few examples of the criteria examined under each are provided below.

Land-use and Promoting Compact Urban Form (Weighting = 4)

- What is the existing/future population density (population per hectare [ha]) within 800 metres (m) of the station?
- What is the future mix of land use types within 800 m of stations?
- Number of future activity centres connected by the route?
- Is the route consistent with the TMP, MDP, and the City's strategic direction?

Movement of People and Goods (Weighting = 3)

- What percentage of the route is within existing public and railroad rights-of-way?
- What is the projected ridership for the route?
- What is the projected travel time for the route?
- Does the route include existing and future bicycle and pedestrian facilities?

Feasibility and Constructability (Weighting = 2)

- What are the estimated capital and operating costs per kilometre (km) for the route?
- How complex would it be to expand the system south and east in the future?
- How many km of the route are inside tunnel and protected from weather or other interference?
- How many at grade crossings (surface road crossings) are located along the route?

Parks, River Valley, and Ravine System (Weighting = 2)

- What are the impacts and benefits to parks, open space, and river valley accessibility (pedestrian, bike, vehicle, and other)?
- How many ha of public lands would be acquired for the route?

Social Environment (Weighting = 2)

- How many ha of private property (residential - single family/multifamily, commercial, and industrial) would be acquired for the route?
- What are the potential temporary employment opportunities related to construction?
- Does the route create physical barriers for neighbourhood residents?
- How many residences are within 150 m of the route alignment and may be impacted by noise or vibration impacts?

Natural Environment (Weighting = 2)

- How many ha of valuable riparian habitat would be acquired for the route?
- What is the number of stream and river crossings along the route?
- What are the total ha of area disturbed during construction?

Ridership Projections

Level 2 ridership projections were undertaken using an approach that considers three components to LRT patronage: the ability of adjacent land uses to support direct, walk-on trips; transfers from bus to LRT; and, park-n-ride users. The technique is well suited to corridor selection studies where a comparative evaluation of alternatives is required.

Usage patterns from Edmonton's existing LRT system, along with experience from other similar cities, were used to estimate bus transfer and Park and Ride usage. To estimate the direct walk-on patronage, future (2041) population and employment forecasts from the City's TMP were used. In consultation with the City staff, the population and employment growth from the relevant "zones" or communities within the City were concentrated around the potential stations, to reflect development patterns in the presence of LRT and supportive land use policies. To provide a conservative yet reasonable estimate, no induced population or employment growth was assumed beyond that already anticipated in the TMP. This represents re-allocation of the City's 2041 TMP growth forecasts.

Existing population and employment were also considered to approximate the ridership that could be expected on opening day. This analysis resulted in a similar relative ranking of ridership among the corridor alternatives.

2.4 Level 2 Evaluation Results

The Network LRT Plan examining the larger Edmonton LRT network as a whole was completed prior to the SE LRT Level 2 screening. Results of the Network review indicated the SE LRT would best support the future LRT network by entering on the eastern edge of the downtown. The High Level (CPR) corridor and the High Level (Whyte Avenue) corridor both utilized the High Level Bridge and entered from the western side of the downtown. The project team concluded these corridors should not be advanced for Level 2 analysis in consideration of the Network LRT Plan. Therefore, these two corridors were removed from consideration. To maximize its success, the SE LRT must support the overall goals of the larger transit network. The Connors Road and Dawson Bridge corridors were advanced for Level 2 screening.

Connors Road and the Dawson Bridge Corridors

The table in Exhibit 2-1 below provides a summary of the key findings from the Level 2 screening comparing the Connors Road corridor to the Dawson Bridge corridor. While both corridors preformed sufficiently well based on the Level 2 analysis, the Connors Road corridor presented better under several highly weighted criteria. This, along with consideration of public input (on-line consultation and the first series of public workshops), resulted in the Connors Road corridor being selected by the project team as the recommended corridor for City Council consideration.

When examining the most highly weighted criterion (which involves land use and promoting a more compact urban form), the Connors Road corridor showed an advantage over the Dawson Bridge corridor. The project team's analysis of the land use criteria examined land use plans, aerial photography, growth and employment patterns, and future opportunities for TOD. This analysis concluded there are greater opportunities in the northern portion of the Connors Road corridor that may benefit from LRT transit and the associated land use benefits. Access by populations surrounding the stations is critical to the success of LRT. A significant portion of the Dawson Bridge corridor is bounded by parkland and athletic facilities adjacent to the river valley along 84 Street. This is referred to as a "single loaded" corridor, where population accesses stations from just one side and the station does not have the opportunity to draw from a larger area of population.

The Level 2 analysis also demonstrated an advantage for the Connors Road corridor related to river valley and parkland impacts. While both corridors cross the river valley and will result in some impacts, the Connors Road corridor would require less disturbance as it traverses less parkland.

Both corridors would pass through established neighbourhoods; however, the Connors Road corridor would do a better job of directly serving more densely developed areas and areas of TOD infill opportunity. Providing LRT service to established areas and to potential TOD or infill areas also better achieves the land use goals of the City's policy documents. Serving established communities may also result in impacts to these neighbourhoods. However, impacts could be mitigated by utilizing the new urban design with low-floor technology to help better integrate the SE LRT into established neighbourhoods on existing City streets. Low-floor trains, with urban style operations, travelling at lower speeds, with minimal barriers other than raised curbs, provide the opportunity for a less intrusive LRT system.

The Connors Road corridor would also perform better than the Dawson Bridge corridor based on travel time and cost. These items are inter-related due to the length of the corridor. The Connors Road corridor would be a more direct corridor between the downtown and Mill Woods and therefore would require less physical infrastructure such as track and roadway reconstruction. For both the Connors Road and Dawson Bridge corridors, travel speed in denser, established neighbourhoods would likely be slower, travelling at or less than the speed of traffic. However, greater speeds could be achieved in the southern end of the corridor where the track would be located in wide roadway medians, physically separated from neighbourhoods. These speeds could make up for the slower travel times in the north end of the corridors. Both routes offer similar ridership.

EXHIBIT 2-1
Summary of Key Considerations

Criteria Group	Advantage	Connors Road Corridor	Dawson Bridge Corridor
Land Use/Promoting Compact Urban Form	Connors	<ul style="list-style-type: none"> Connors does a better job of serving denser communities north of Argyll Road. (See details above.) 	<ul style="list-style-type: none"> Dawson serves primarily established single family areas with less multifamily when compared to Connors. Fewer opportunities for TOD and infill. Corridor is parallel to expanses of parkland and athletic facilities with limited populations. (See details above.)
Movement of People/Goods	Connors	<ul style="list-style-type: none"> Estimated travel time: 18 to 19 minutes Projected future daily boardings 46,000 to 48,000 (year 2041) Traffic impacts range from minor to moderate. (Based on comparison to other corridor.) 	<ul style="list-style-type: none"> Estimated travel time: 20 to 21 minutes Projected future daily boardings 48,000 to 51,000 (year 2041) Traffic impacts range from minor to moderate. (Based on comparison to other corridor.) Dawson is longer and out of direction in comparison to the Connors corridor.
Feasibility/Constructability	Connors	<ul style="list-style-type: none"> Estimated cost: \$900 million to \$1.2 billion 	<ul style="list-style-type: none"> Estimated cost: \$1.0 billion to \$1.3 billion

EXHIBIT 2-1
Summary of Key Considerations

Criteria Group	Advantage	Connors Road Corridor	Dawson Bridge Corridor
Parks, River Valley and Ravine System	Connors	<ul style="list-style-type: none"> Connors has potential for less impact to river valley and park areas 	<ul style="list-style-type: none"> Dawson has potential for incrementally larger impact to river valley and park areas
Social Environment	Dawson	<ul style="list-style-type: none"> Both corridors maximize the use of existing City owned right-of-way (property). No corridor can be accomplished entirely within existing roadway right-of-way and would require some acquisition of private property. This includes the first row of residences on the east side of 83 Street, between 82 Avenue and 76 Avenue; as well as some commercial industrial properties south of Argyll Road. Connors includes additional residential acquisition impacts at the top of Connors Hill Connors Road between 95 Street and 89 Street would require residential property acquisition. (Only under the Connors Road design option.) 	<ul style="list-style-type: none"> Both corridors maximize the use of existing City owned right-of-way (property). No corridor can be accomplished entirely within existing roadway right-of-way and would require some acquisition of private property. This includes the first row of residences on the east side of 83 Street, between 82 Avenue and 76 Avenue; as well as some commercial industrial properties south of Argyll Road. Dawson would require additional residential acquisition to re-align Rowland Road in the Riverdale neighbourhood. A portion of the Dawson corridor is parallel to parkland and athletic facilities which incrementally reduces some of the potential impacts to mature neighborhoods
Natural Environment	Connors	<ul style="list-style-type: none"> Potential for less impact to riparian and other natural areas 	<ul style="list-style-type: none"> Potential for incrementally larger impact to riparian and other natural areas

Various design options (alternative routes on specific segments of each corridor) were evaluated during Level 2. The summary of key points in the analysis of each design option is presented below.

Connors Road or 95 Avenue

For the Connors Road corridor, the 95 Avenue option was selected over continuing directly down Connors Road. First, the 95 Avenue option has the potential to better serve the established Strathearn neighbourhood. Low-floor LRT with an urban-style operation, travelling at the speed of traffic, has the potential to be an amenity to this neighbourhood. Second, the existing Connors Road south of 95 Avenue is constrained with buildings directly adjacent to the roadway. Continuing directly down Connors Road would require a high level of private property acquisition between 95 Street and 89 Street. With the exception of the major turns, property acquisition is not anticipated on 95 Avenue. The team examined limiting Connors Road to one lane in each direction. However, 95 Avenue was deemed a better option due to less property acquisition, fewer traffic impacts, and the ability to better serve the local community with transit service.

83 Street or 75 Street (via 82 Avenue)

Both corridors included an option between turning south on 75 Street or 83 Street at 82 Avenue (Whyte Avenue). Developing a standard double track configuration through this constrained area of 83 Street would result in the acquisition of the first row of residences on the east side of 83 Street between 76 Avenue and 82 Avenue. This is a significant impact. The recommendation to follow 83 Street was based on the key land use and promoting compact urban form criterion. While this option does result in greater impacts, it also serves an area of denser population when compared to 75 Street. Development surrounding 75 Street has focused away from the corridor and also must be maintained as a six-lane roadway for the Inner Ring Road facilitating goods movement around the City. Such an environment does not provide the optimum setting to maximize walkable, transit friendly neighbourhoods, and TOD opportunities. The project team believes utilizing 83 Street would better serve the vision of a more compact and sustainable City than utilizing 75 Street. However, this must be balanced with the associated impacts to residents on 83 Street. The team is continuing to examine an option to provide only one lane of traffic in each direction on 83 Street, between 82 Avenue and 76 Avenue. It is possible this option may avoid significant property acquisition. The conclusions of this analysis will be available by the time City Council meets to consider the SE LRT corridor. Additionally, given the status of 75 Street as a major goods movement corridor and part of the City's Inner Ring Road, the LRT turn from 82 Avenue to 75 Street would create severe traffic issues.

86 Street to 76 Street or Private Property to Wagner Road to 75 Street

Moving south of Argyll Road, the development patterns change significantly. They move away from the historic grid pattern neighbourhoods to industrial development and then (south of the Whitemud Drive) curvilinear residential areas. Many of the grid pattern neighbourhoods north of Argyll Road have a walkable and transit-friendly design that would benefit from low-floor, urban-style LRT operations. However, many of the neighbourhoods south of the Whitemud Drive developed with consideration of major transit on the major arterial roadways, fed through bus service in the neighbourhoods. Given these residential and industrial development patterns, the conclusion of the project team was that south of Argyll Road the corridor should use the wide medians of 75 Street and 66 Street to achieve high speeds and utilize bus service to feed stations along this corridor. Land use benefits such as TOD and infill opportunities would likely be limited to key activity centres (Mill Woods Town Centre, Grey Nuns Community Hospital, and so on). Millbourne Mall was identified as a potential area for future redevelopment; however, the potential of this site did not outweigh the lower neighbourhood impacts and benefits of faster travel times along 75 Street.

The 75 Street option would result in property acquisition impacts to the light industrial area south of Argyll Road. The 86 Street/76 Street option included some minor property acquisition where the track required more space for turns.

The 75 Street option includes a potential transit centre and Park and Ride at the Whitemud Drive. The existing Millgate Transit Centre does not currently have freeway access. Future consideration would be given to moving the Millgate Transit Centre to the Whitemud location to enhance the transit and Park and Ride connections.

Connors Road and Dawson Bridge Corridors Summary

Based on the detailed analysis of the specific criteria, the Level 2 findings were presented to the project team and at the public workshops. The table in Exhibit 2-1 below provides a high level summary of key considerations during the Level 2 screening process. This table provides only a summary and does not include the full analysis

2.5 The Recommended Corridor

The technical studies, the public input, and the LRT Network Plan all influenced the recommendation of the SE LRT corridor. This is a recommendation to City Council for its consideration.

Based on the analysis completed by the Network LRT Plan, it is proposed that the SE LRT use low-floor LRT technology implemented with urban-style operations. The urban-style operations are characterized by shorter distances between stations, limited physical barriers between the track and surrounding development and streets, and the ability to better integrate into existing developed neighbourhoods. The urban style differs from the existing LRT system in Edmonton, considered more of a heavy rail style.

The recommended Connors Road corridor would exit the downtown in a tunnel at approximately 102 Avenue and 95 Street.¹ The tunnel would continue south under 95 Street. The corridor would exit the tunnel in a portal on the eastern edge of Louise McKinney Park. At approximately the location of the current pedestrian bridge, the corridor would cross the North Saskatchewan River and 98 Avenue. The corridor would touch down along the service road west of the Muttart Conservatory, and would then continue adjacent to Connors Road to the top of Connors Hill. The corridor would transition into 95 Avenue, and travel east until reaching 85 Street. The corridor would turn south on 85 Street and continue south along 83 Street until Argyll Road. As the corridor approaches Argyll Road, it transitions to a bridge structure and crosses Argyll Road and the existing freight rail corridors, touching down just before Roper Road. The corridor then travels along 75 Street and across the Whitemud Drive. The corridor continues south along 66 Street to 23 Avenue. Various locations in the vicinity of Mill Woods Town Centre were examined as the terminus point. Additional engineering and analysis will determine the ultimate terminus point during the next phase of engineering design. The recommended corridor is primarily on the surface, potentially in the median of existing roadways. **Figure 8** shows a map of the recommended corridor. **Figures 9 to 14** show the proposed alignment in more detail.

Given the potential residential property acquisition needed on the east side of 83 Street, between 82 Avenue and 76 Avenue, the team is continuing to examine options to minimize the impact. The team is currently analyzing an option to reduce 83 Street in this area to one lane of traffic in each direction. It is possible this change may eliminate much of the acquisition impacts. The results of this analysis will be presented to City Council at the November 2009 meeting.

¹ The exact location of the SE LRT connection across the downtown to Grant MacEwan University will be determined by a separate study currently being conducted by the City. The intent is to link the SE LRT to the West LRT at Grant MacEwan University.

Through the process of evaluation, the team has developed an initial set of station locations for further study. The stations were developed by examining existing and future land use patterns, existing transit and roadway infrastructure, existing and future activity centres, and potential redevelopment opportunities. Figure 8 shows a map of the recommended corridor with station locations that will be carried forward for further evaluation. If the recommended corridor is advanced, additional analysis and public consultation will be necessary to finalize the number and locations of stations.

This recommendation was supported by strong rationale based the extensive analysis and debate by the project team. The process included examining both the benefits and the impacts of the Connors Road corridor in relation to the evaluation criteria and the City's strategic goals. In summary, the Connors Road corridor was recommended (over other corridors) for the following reasons:

- The corridor is consistent with Network planning objectives.
- The proposed urban-style LRT integrates well with and supports the mature and established neighbourhoods along the corridor. Urban-style LRT also provides the smallest impact footprint when traveling along existing transportation corridors and roadways.
- The corridor best meets the highly weighted criteria related to land use and promoting a more compact urban form. The Connors Road corridor does the best job of directly serving areas of greater density, as well as areas of areas of future redevelopment or infill. The northern portion of the corridor would likely benefit from LRT transit and the associated land use benefits.
- The corridor provides the most direct connection between the downtown and Mill Woods, while best serving the established neighbourhoods and activity centres in between.
- The corridor provides a strong potential ridership along existing established transit routes from the downtown to Mill Woods.
- The corridor results in the best balance of service between established neighbourhoods, potential infill opportunities, and planned redevelopment areas.

Following the general discussion, the project team reached consensus in support of the recommended Connors Road corridor as the draft recommendation for the September 2009 public meetings and for consideration by City Council in November 2009.

3. Next Steps

Future actions are necessary for the project to proceed successfully. These actions include the need to continue to engage stakeholders, advance concept engineering, address environmental issues, and further develop the rail operating scenarios. Five key next steps are described below

1. Work with community to refine station locations, area plans, access needs, and design elements to ensure efficient operations, community integration, and maximized ridership. This will entail further specific public involvement efforts to continue to build on dialogue with key stakeholders.
2. Evaluate potential environmental, geotechnical, noise and vibration, and historical resource impacts. Mitigation measures will be context specific and based on industry best practices in response to results of technical analysis.
3. Further develop conceptual engineering to identify land requirements and refine capital costs. Future cost estimates will include more engineering details and assessments of risks associated with implementation methods. Additional traffic studies will be performed to ensure a balanced transportation system integrated within existing conditions.
4. Conduct development planning to ensure maximum return on transit investment. Economic analysis at appropriate levels of scale will be key to ensuring infrastructure framework is conducive to stimulate desired further development.
5. Prioritize overall LRT network expansion. Multiple account evaluation will be presented to Council for scheduling further planning and engineering work related to the overall network expansion.

Figures

FIGURE 1
LRT Corridor Planning Process

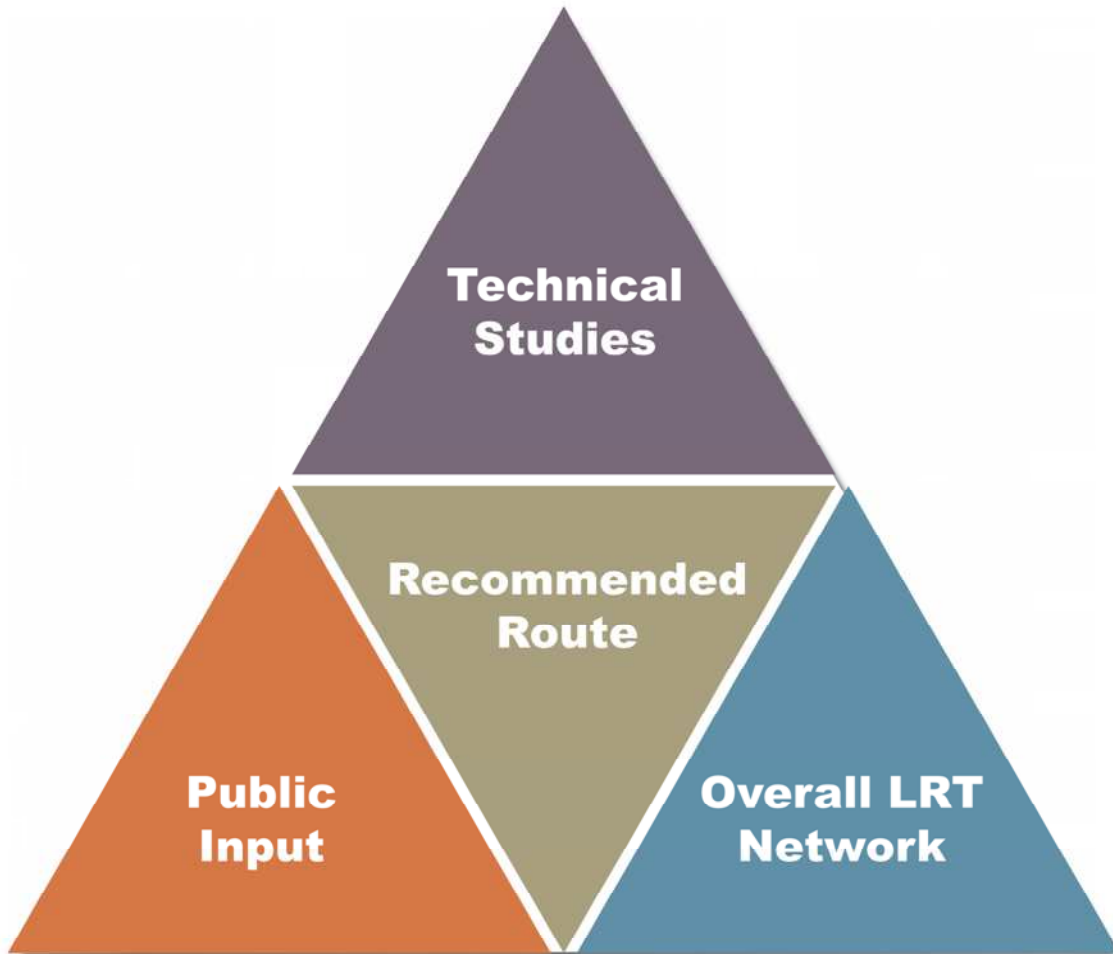


FIGURE 2
Study Area Overview



FIGURE 3
LRT Network Plan Findings



FOR INFORMATION PURPOSES ONLY

FIGURE 4
Alternatives Analysis Process

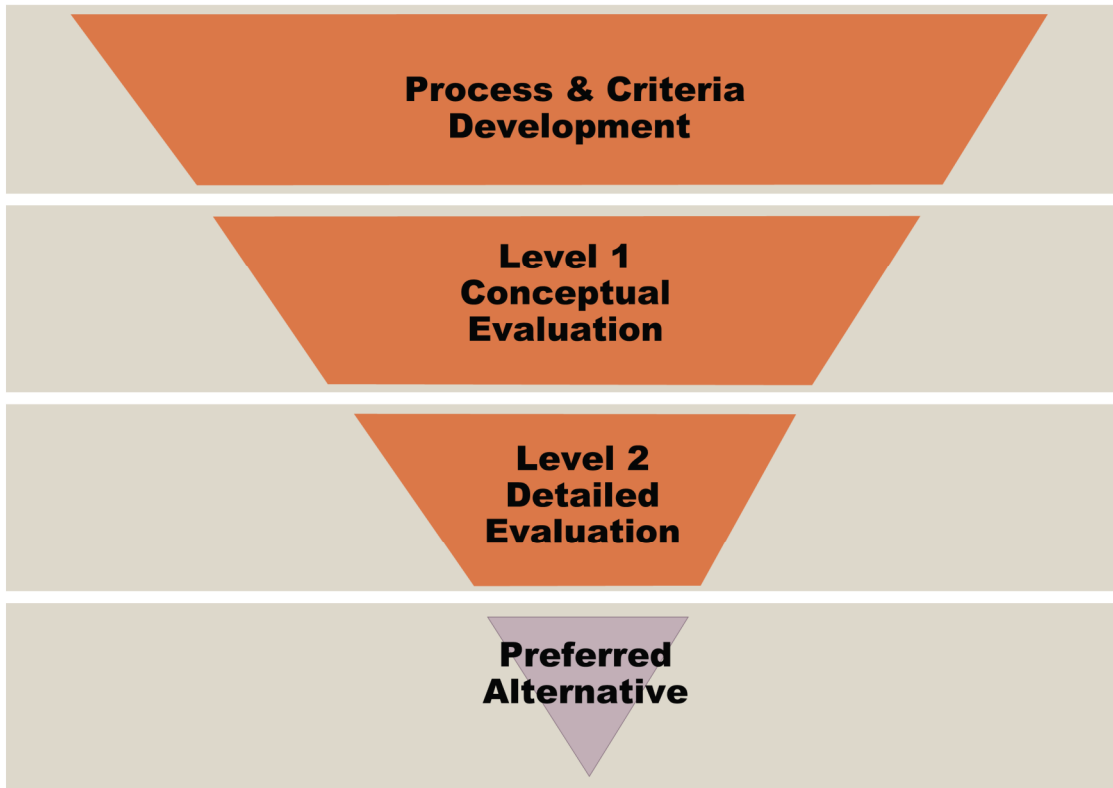
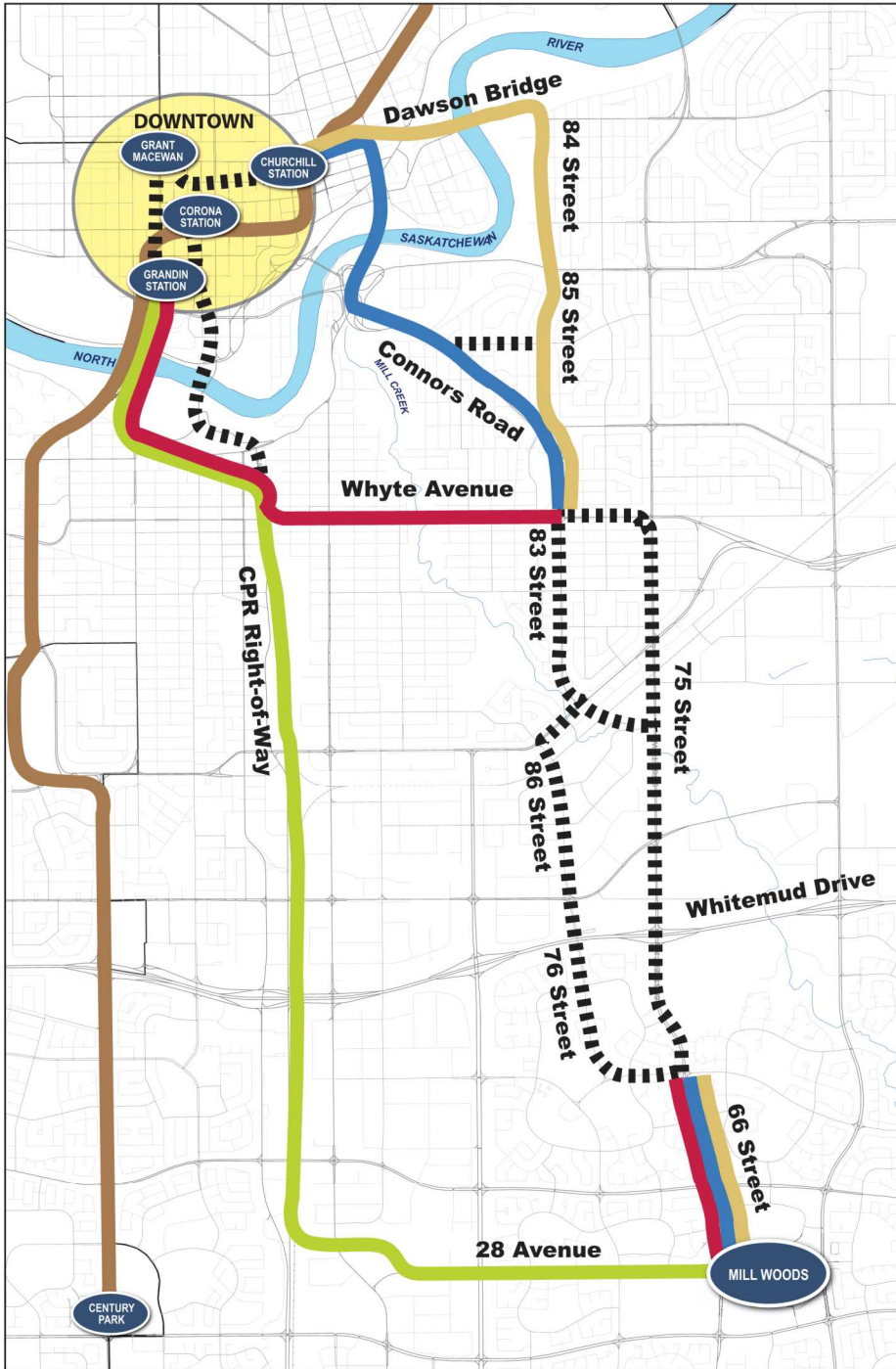


FIGURE 5
Initial Routes Considered



FIGURE 6
Southeast LRT Route Options



- **High Level - CPR Route**
- **High Level - Whyte Avenue Route**
- **Connors Road Route**
- **Dawson Route**
- Route Options**
- **Existing/Planned LRT**

FIGURE 7
Level 2 Evaluation Criteria

Level 2 - Evaluation Criteria		
Grouping	Weighting	Criteria
Land Use/ Promoting Compact Urban Form	4	How many existing transit centres or park-n-ride locations are within 800 m of proposed stations?
		How many ha of vacant and/or underutilized properties are located within 800 m of stations?
		What is the existing/future population density (population per ha) within 800 m of the station?
		What is the existing/future employment density (jobs per ha) within 800 m of the station locations?
		What is the housing density (housing units per ha) within 800 m of the station locations?
		What is the existing mix of zoning types within 800 m of stations?
		What is the future mix of land use types within 800 m of stations?
		How many large development proposals are formally submitted for approval or under construction along the route?
		Number of existing activity centres connected by the route?
		Number of future activity centres connected by the route?
		Do the City land use plans and bylaws support development or redevelopment of the activity centres along the route?
		Would proposed activity centres development/redevelopment occur within a reasonable time frame (within 5 years)?
		Is the route consistent with the TMP, MDP, and the City's strategic direction?
		What percentage of the route is within existing public and railroad ROW?
What is the projected ridership for the route?		
What is the estimated cost per rider for the route?		
What is the projected travel time for the route?		
What are the potential changes in roadway capacity (level of service or % capacity change) for routes proposed within existing transportation corridors?		
Does the route include existing and future bicycle and pedestrian facilities?		
Does the route allow for park-n-ride locations?		
Feasibility/ Constructability	2	What is the estimated capital and operating costs per kilometer (km) for the route?
		How many km does the route require of track at grade, on structure, on retained fill, and in tunnel?
		How complex would it be to expand the system south and east in the future?
		If the route directly connects with the existing LRT system, what is the distance to the Maintenance Facility?
		How many km of the route are inside tunnel and protected from weather or other interference?
How many at grade crossings are located along the route?		
Parks, River Valley and Ravine System	2	What are the impacts/benefits to parks, open space, and river valley accessibility (pedestrian, bike, vehicle, etc.)?
		How many ha of public lands would be acquired for the route?
Social Environment	2	How many hectares (ha) of private property (residential - single family/multifamily, commercial, and industrial) would be acquired for the route?
		How many residences are located within 800 m of station sites that may benefit from increased property values?
		What are the potential temporary employment opportunities related to construction?
		Could neighbourhood impacts be avoided, minimized, or mitigated; or are they irresolvable?
		Does the route create physical barriers for neighbourhood residents?
		How many residences are within 150 m of the route alignment that may be impacted by noise or vibration impacts?
		How many known cultural resource/heritage sites are adjacent to the route?
		What is the post secondary student population within 800 m of proposed station sites?
		What is the high school student population within 800 m of proposed station sites?
What is the number of low income, no car, and senior households within 800 m of proposed station sites?		
Natural Environment	2*	How many ha of valuable riparian habitat would be acquired for the route?
		What are the number of stream/river crossings along the route?
		What are the total ha of area disturbed during construction?

* Adjusted from 1 to 2 based on Council Motion on December 17, 2008

FIGURE 8
Southeast LRT Recommended Corridor

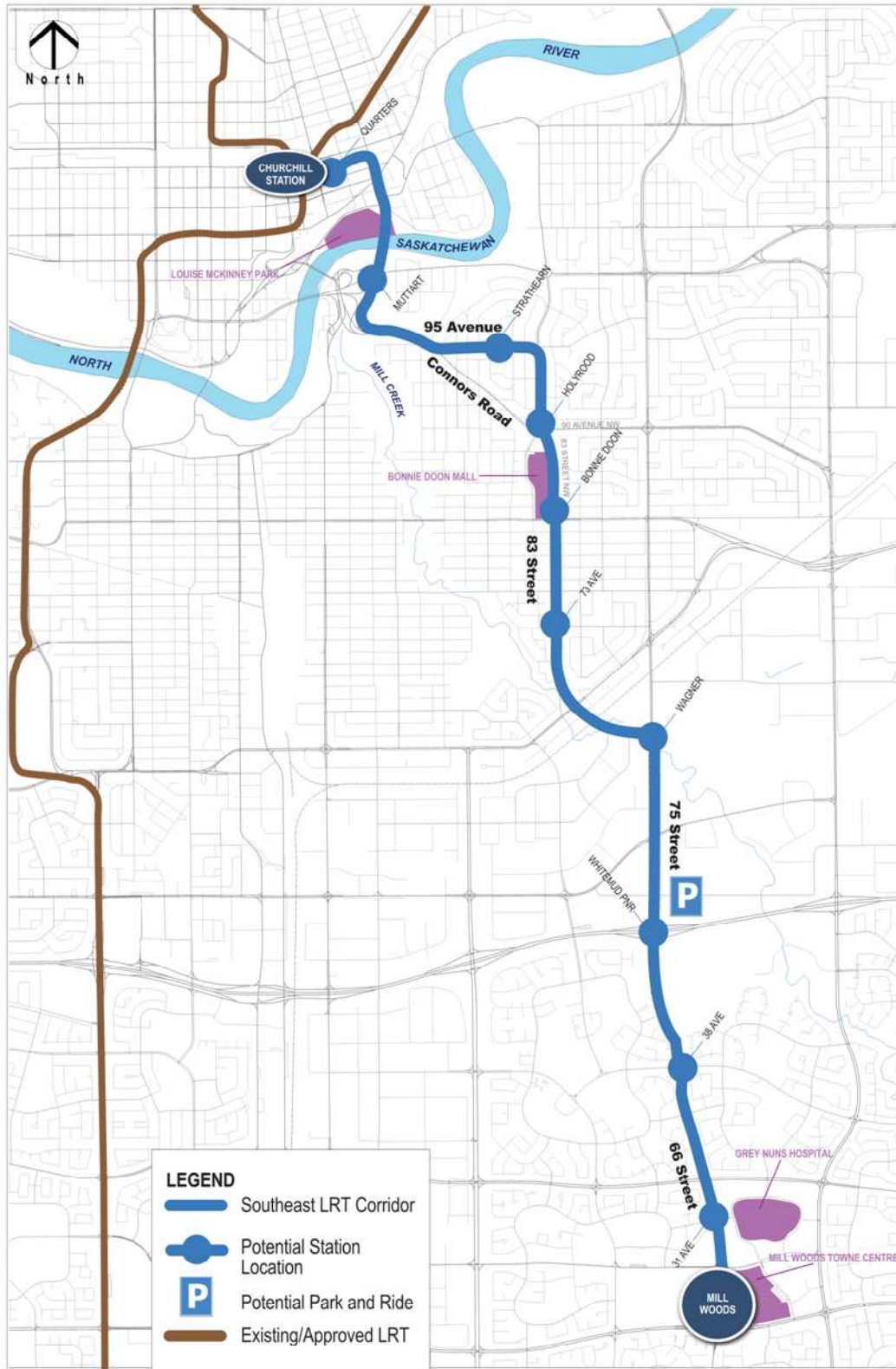


FIGURE 9
Corridor Map 1 – The Quarters to Connors Road

Key Features:

- LRT in tunnel under 95 Street
- New LRT bridge over North Saskatchewan River and 98 Avenue
- Maintaining existing lanes on Connors Road
- Service to Downtown, Muttart Conservatory and River Valley
- Transfer to existing LRT system via Churchill Station

Next Steps:

- Station location and area planning
- Neighbourhood access evaluation
- Route alignment refinement
- Property impact assessment
- Roadway configuration refinement
- At-grade LRT connection to proposed West LRT corridor

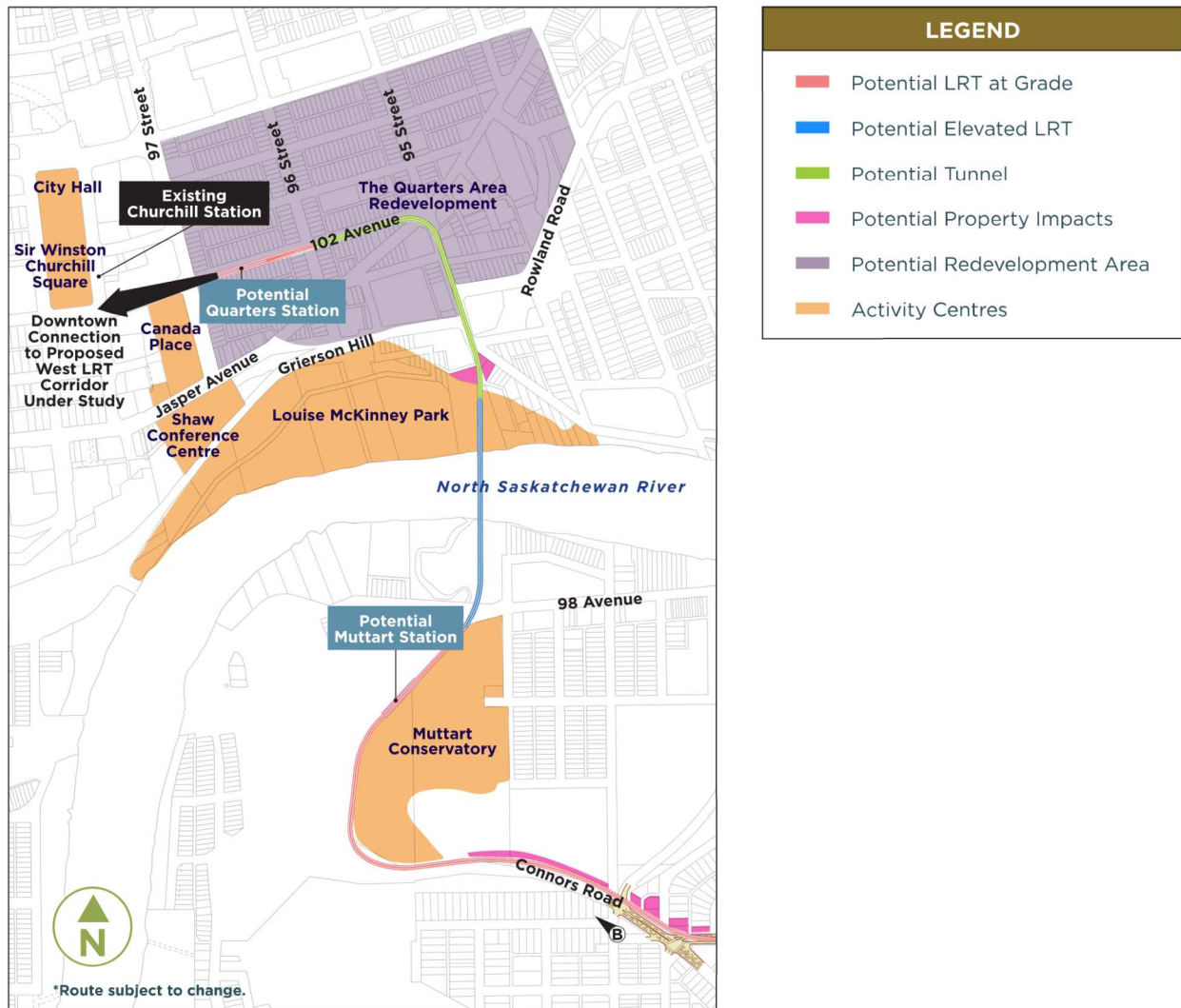


FIGURE10
Corridor Map 2 – Strathearn to Bonnie Doon Mall

Key Features:

- Maintain one lane of traffic in each direction on 95 Avenue
- Maintain two lanes of traffic in each direction on 83/85 Street
- Service to Bonnie Doon Mall

Next Steps:

- Station location and area planning
- Neighbourhood access evaluation
- Route alignment refinement
- Property impact assessment
- Roadway configuration refinement
- Evaluation of LRT at grade through traffic circle
- Traffic impact assessment

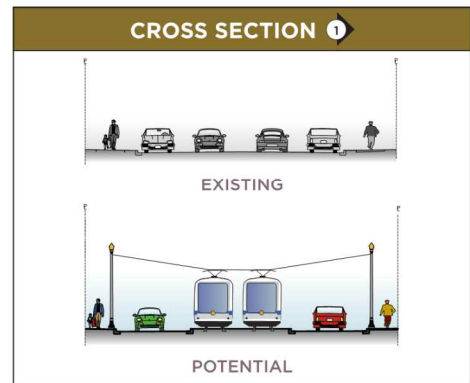


FIGURE 11
Corridor Map 3 – Bonnie Doon Mall to Wagner Road

Key Features:

- Maintaining two lanes of traffic in each direction on 83 Street
- Maintaining on-street parking along 83 Street
- Elevated LRT over Argyll Road and Railway

Next Steps:

- Station location and area planning
- Neighbourhood access evaluation
- Route alignment refinement
- Property impact assessment
- Roadway configuration refinement
- Evaluate reducing 83 Street (south of Whyte Avenue) to one lane of traffic in each direction.



FIGURE 12
Corridor Map 4 – Wagner Road to Whitemud Drive

Key Features:

- Elevated LRT over Argyll Road and Railways
- New bridge over Whitemud Drive with LRT
- Potential Park and Ride site along Whitemud Drive
- 75 Street widened to three lanes in each direction

Next Steps:

- Station location and area planning
- Neighbourhood access evaluation
- Route alignment refinement
- Property impact assessment
- Roadway configuration refinement
- Confirm transit centre location

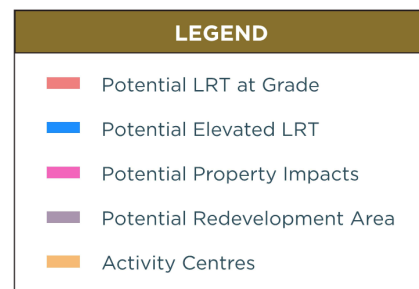
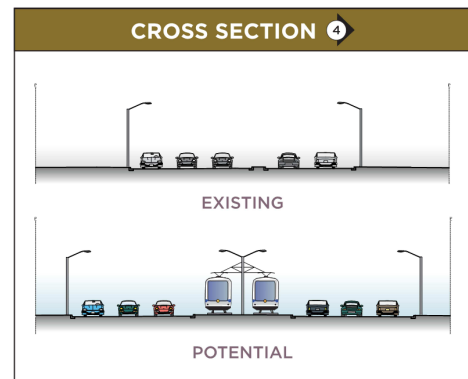
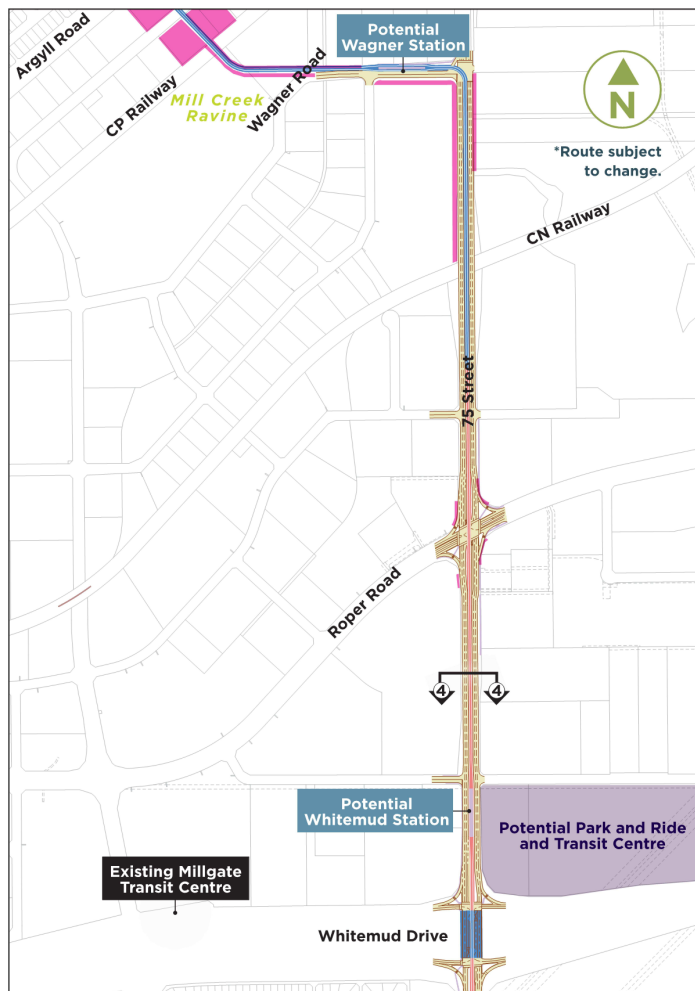


FIGURE 13
Corridor Map 5 – Whitemud Drive to Millbourne

Key Features:

- Maintain existing traffic lanes on 66 Street
- New bridge over Whitemud Drive with LRT

Next Steps:

- Station location and area planning
- Neighbourhood access evaluation
- Route alignment refinement
- Property impact assessment
- Roadway configuration refinement

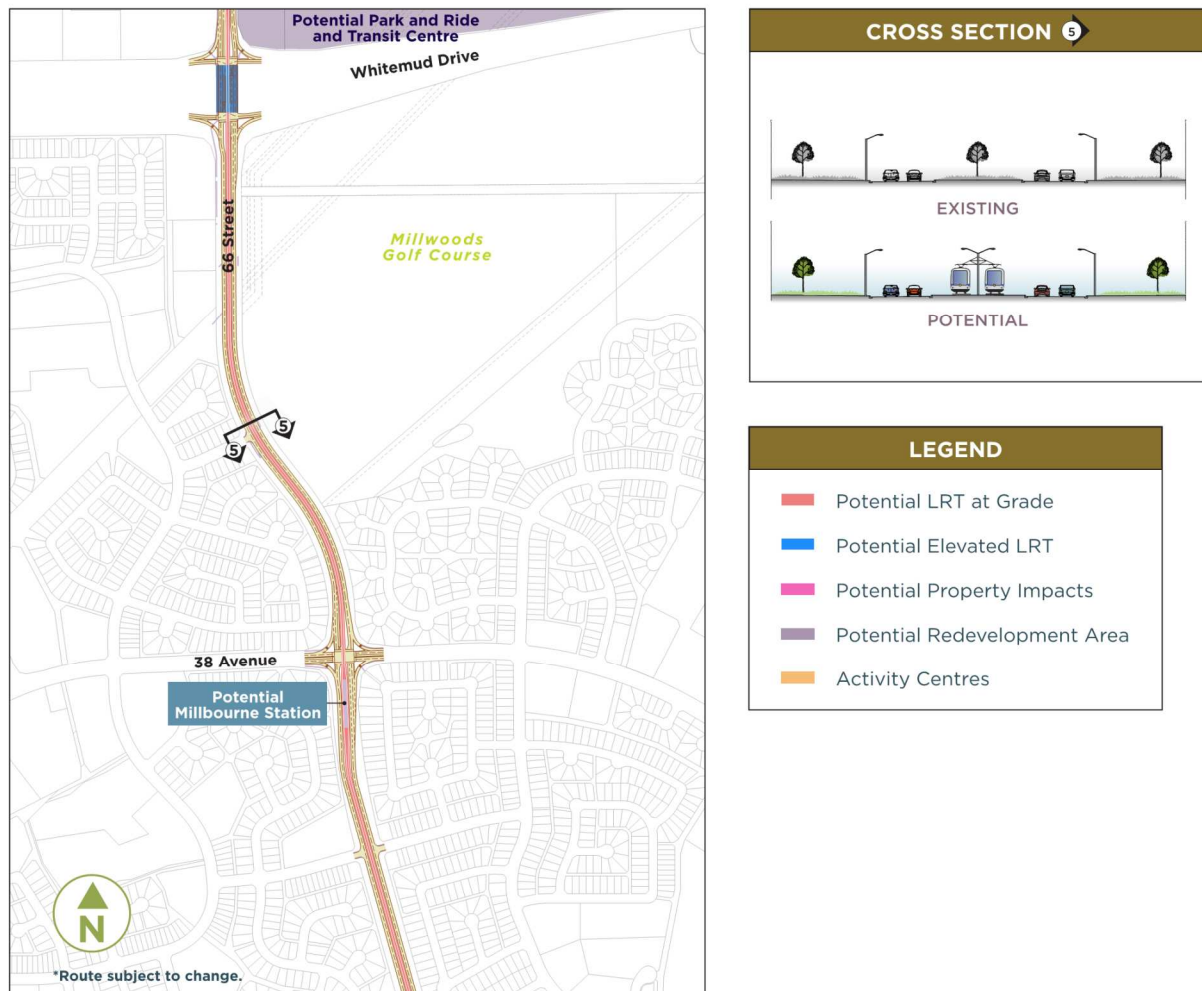


FIGURE 14
Corridor Map 6 – 34 Avenue to Mill Woods Town Centre

Key Features:

- Maintaining existing traffic lanes on 66 Street
- Service to Grey Nuns Hospital and Mill Woods Town Centre

Next Steps:

- Station location and area planning
- Neighbourhood access evaluation
- Route alignment refinement
- Property impact assessment
- Roadway configuration refinement
- Confirm transit centre location.

