THREE SISTERS MOUNTAIN VILLAGE PROPERTIES LTD. C/O QUANTUMPLACE DEVELOPMENTS LTD.

THREE SISTERS MOUNTAIN VILLAGE GLOBAL TRANSPORTATION IMPACT ASSESSMENT

JANUARY 06, 2021

FINAL

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THREE SISTERS MOUNTAIN VILLAGE PROPERTIES LTD. C/O QUANTUMPLACE DEVELOPMENTS LTD.

REPORT
FINAL

PROJECT NO.: 161-03959-00
DATE: JANUARY 06, 2021

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January 6, 2021

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January 6, 2021

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January 06, 2021

Town of Canmore
9902 7th Avenue (Civic Centre)
Canmore, AB
T1W 3K1

Attention: Claire Ellick, P.Eng., Transportation Planner

Dear Claire:

Subject: Three Sisters Mountain Village Global Transportation Impact Assessment

Please find enclosed the updated Final Global Transportation Impact Assessment (v2) completed for the remaining development areas contained within Three Sisters Mountain Village. This assessment is focused on evaluating the external impacts of the full build out of the Three Sisters Mountain Village area, which includes the proposed Three Sisters Village Area Structure Plan (ASP), a completed Stewart Creek ASP area including the commercial area called The Gateway at Stewart Creek, and the proposed future Smith Creek ASP area. The Three Sisters Village ASP (particularly Section 11) and the Smith Creek ASP are the definitive planning documents for these studies areas, and the TIA is informed by their policy.

This TIA submission is the outcome of the two previous drafts and one previous submitted Final Version, and incorporates comments received from the Town of Canmore up to and including the December 1, 2020 revision meeting with the Town of Canmore. Small adjustments following the January 6, 2021 comments have also been included.

The purpose of this study is to understand the long-term impact of the development on the overall road network within Canmore. We have presented a range of potential outcomes based on varying assumptions around development, mode split, and travel patterns. Long-term implications of the development will continue to be monitored through traffic data collection and mobility studies at concept scheme delivery.

Yours sincerely,

Carolyn Sherstone, M.Pl., P.Eng., RPP, MCIP
Senior Transportation Planner

CS/cs

cc: C. Ollenberger, QuantumPlace Developments Ltd, J. Karpat, QuantumPlace Developments Ltd, A. Esarte, Town of Canmore, J. Welsh, Town of Canmore.
WSP ref.: 161-03959-00

EXECUTIVE SUMMARY

PROJECT OVERVIEW

Three Sisters Mountain Village is proceeding with two Area Structure Plan (ASP) submissions to the Town of Canmore encompassing the completion of the Three Sisters Mountain Village community: Three Sisters Village ASP, Smith Creek ASP and the Stewart Creek Commercial (The Gateway at Stewart Creek) site. The following transportation study supports the remaining developable lands with an assessment of the transportation activity with full buildout of the community at the year 2040 horizon.

The purpose of this Transportation Impact Assessment (TIA) is to identify the transportation infrastructure requirements needed to accommodate growing multi-modal travel in Three Sisters Mountain Village area and nearby external network intersections. Report recommendations include road network upgrades, recommended intersection configurations and associated multi-modal infrastructure needs.

ASP CONCEPTS

Three Sisters Mountain Village ASP Concept presents an inclusive and connected community that will be achieved by providing a mix of market housing types and tenures, creating spaces for gathering, incorporating affordable and employee housing, as well as incorporating essential and enriching amenities for daily living by residents within the development area. The community goals align with the integrated land use and transportation goals for Canmore. The development areas will provide land uses that are compatible with residents, visitors and employees keeping many of their daily trips within their neighbourhood. The ASP concept proposes infrastructure options to allow those trips to be made by walking, cycling or taking public transit.

Smith Creek ASP Concept is a residential development that is supported by a commercial area that will provide job opportunities and retail options for residents within Smith Creek, Dead Man's Flats and the rest of Canmore. Between the two developments, and including the additional development from Stewart Creek, the land use mix proposed within Three Sisters Mountain Village provides the variety of amenities that will result in complete communities where residents, visitors and employees can meet many of their daily needs without leaving the community.

TRANSPORTATION ANALYSIS

For the purpose of the ASP submission, the study analyzes traffic generation at the upper end of the size of each land use area within the land use concept (i.e. number of units, building areas) and thus results in a conservative estimate of trip generation within this report. Given that the ranges by Land Use Concept district are meant to provide flexibility of development form and uses within the various phases it was necessary to predict the maximum impact of each phase.

Distribution of trips take into account the land uses proposed within Three Sisters Mountain Village (Three Sisters Village, Smith Creek and Stewart Creek) and the ability for residents to work, attend school and meet daily shopping needs within the community. Trips that leave the community are distributed to Canmore and external destinations based on background information researched for the report.

Travel mode choice is identified based on assumptions outlined in the Town of Canmore's Integrated Transportation Plan (2018). Three Sisters Village compact plan and active modes network facilitates a significant percentage of the daily trips to be made by walking or cycling. Smith Creek also provides walkable and bikeable mixes of uses. The mixture of land uses and active modes networks within both the development areas and the overall Three Sisters Mountain Village align with the policies and guidelines set out in the 2018 Town of Canmore Integrated Transportation Plan.

To evaluate the potential range of impacts on the overall transportation network, WSP has completed a number of sensitivity analysis scenarios which consider how changes in development assumptions, mode choices, and internal trip capture opportunities could impact the demand on the transportation network within Canmore. This provides a tool for comparison to future data collection and mobility assessments at concept scheme development to understand

how the development is achieving the desired outcomes.

MULTI-MODAL NETWORK

The TIA report recommends transportation network elements to facilitate and encourage active modes. These elements are reflected in the ASP plan and policy content. They include sidewalks adjacent to all roads, direct pathway connections to shorten trips, a network of dedicated bicycle lanes, connection to the surrounding pathway network and a planned route through the Plan Area(s) for public transit. Additionally, the plan identifies a need for improved trail connections specifically between Three Sisters Village and the rest of Canmore, as well as completion of facilities along the Three Sisters Parkway between Stewart Creek and Smith Creek.

Details of these networks are included in the respective ASP policy documents and represent underlying infrastructure assumptions of this study. The study assumes these networks will be constructed incrementally throughout the development of Three Sisters Mountain Village and be in place by 2040. A staging analysis to determine the timing of upgrades as related to development milestones should be included with future major development applications in the study area. Three Sisters will participate in an annual data collection program designed to build knowledge and inform future traffic analysis. The data collection will be designed to; capture increased travel due to TSMV growth; be focused on locations where TSMV traffic can be isolated; sample both summer peak and off-peak periods; sample both weekday and weekend travel and; include peak hour of travel. TSMVPL may choose to contribute to Town lead data collection actions

Recommendations on network maintenance and public transit operations are not within the scope of this report however, the report includes statements on the importance of operations in future decisions.

ROAD ANALYSIS

The transportation network operations analysis for this study provides a long-range look, over a broad area, of the potential traffic impacts from the build out of the Three Sisters Mountain Village community. Through discussions with Town of Canmore staff, it was agreed that this study would investigate current and future traffic operations for an area that extended from the west end of Canmore's Downtown through to Three Sisters Village along Three Sisters Parkway. The level of service of the background traffic is assessed based on current conditions as well as the future background without additional development in Three Sisters Mountain Village. Future analysis was carried out on the existing road infrastructure and on a road network that has been assumed to be developed by 2040 using the Town of Canmore's ITP as a guide.

The sensitivity analysis reveals that a high transit ridership and cycling/walking mode split is needed to minimize the need for additional vehicle traffic infrastructure, but new active mode facilities are likely needed to accommodate the cycling and walking users, and consideration should be given to transit priority measures.

This TIA findings identify network intersections that will need changes to managed travel in 2040 with the planned development as anticipated in the Three Sisters Mountain Village community (Three Sisters Village, Smith Creek and Stewart Creek ASP areas). Specifically, intersections along Three Sisters Parkway will be at or overcapacity in their current control by 2040. This report recommends that roundabouts be the preferred intersection management approach, both technically and based on anticipated preference by Alberta Transportation and the Town of Canmore. Where locations may not be suited to roundabouts due to topography, these would also be effectively managed with signals. The intersections on the Highway 1 interchange with Highway 742 can be managed with traffic signals or roundabouts depending on the future preference of Alberta Transportation and other factors.

Additional intersection revisions and roadway revisions are recommended in the report to address specific turning movements and traffic volumes within the community. The improvement recommendations seek to minimize physical impacts to the area and avoid overbuilding the road infrastructure and creating barriers to walking and cycling.

SUMMARY

The TIA finds that Three Sisters Mountain Village, including Three Sisters Village, Stewart Creek and Smith Creek can develop and result in a multi-modal transportation system that operates at an acceptable level of service with the following actions:

1. The ASPs, as written, accomplish a diverse mix of land uses to meet the daily needs of the community to benefit the residents through development of a complete community.

2. The land uses are arranged in a manner that benefits those wanting to walk and/or cycle by making it feasible and practical.
3. Sidewalk, pathway and public transit networks are incorporated into both the Three Sisters Village and Smith Creek ASPs improving connections to other areas of Canmore.
4. Intersection management through roundabouts and/or traffic signals can be implemented along with a modest series of specific roadway changes with the benefit of avoiding the need to construct large road projects that impact the natural surroundings and represent future operations and maintenance costs for Canmore. The range of transportation updates required will be managed through ongoing monitoring and interim mobility assessments to go with Concept Scheme development.

The combination of land use and infrastructure elements in the Three Sisters Village ASP and Smith Creek ASP, in addition to the existing Stewart Creek development, will provide a plan for Canmore's growth that is not reliant on only automobiles for daily travel. Three Sisters Mountain Village will embrace walking and cycling for both recreation and daily travel needs. The ASP also has public transit designed for the future development with bus stops located a short walking distance to the majority of the community. Through this emphasis on an integrated land use and transportation design in the ASPs, the community will deliver on the Town of Canmore's sustainability goals identified through the Integrated Transportation Plan.

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1 BACKGROUND AND APPROACH

1.1 INTRODUCTION

Three Sisters Mountain Village is preparing two Area Structure Plan (ASP) submissions to the Town of Canmore: Three Sisters Village and Smith Creek. WSP is supporting these ASPs submissions with an overall Transportation Impact Assessment (TIA).

The purpose of this document is to:

- Review the relevant sections of the Integrated Transportation Plan (2018) to present a proposed transportation policy framework that reflects the policies and targets within that document;
- Identify the total number of trips from users of all modes generated from Three Sisters Village, Smith Creek and Stewart Creek (referred to as Three Sisters Mountain Village community);
- Assign those trips to the multi-modal transportation network; and
- Review that network to identify network and infrastructure upgrades that will support the target mode split and accommodate a reasonable level of service for all users.

This Transportation Impact Assessment focuses on identifying the upgrades needed to the existing transportation network in Canmore to support future travel demand. The internal transportation network for the two ASP study areas is also discussed at a conceptual level.

1.2 STUDY AREA

1.2.1 THREE SISTERS MOUNTAIN VILLAGE

The overall study area for this TIA is illustrated in **Figure 1-1**. The lands owned by Three Sisters Mountain Village Partnership Limited are located south of downtown Canmore across the Bow River and will be referred to as Three Sisters Mountain Village in this report. The subject study area is generally broken down into three development areas:

- Three Sisters Village area is identified within the Town of Canmore Municipal Development Plan (MDP) as "Resort Centre" and "Private Recreation." The Three Sisters Village ASP area is located on the south side of the Three Sisters Parkway, south of the existing Cairns on the Bow neighbourhood, east of the Tipple Across Valley Corridor, predominantly west of the existing Three Sisters Creek and north of the Across Valley Wildlife Corridor.
- The Smith Creek Plan Area is located at the southeastern portion of the Town of Canmore and is partially adjacent to the Stewart Creek Golf & Country Club and lies south of the Trans-Canada Highway. The Plan Area includes the areas known informally as Sites 7, 8, 9, Parcel K, and the lands occupied by Thunderstone Quarries. The majority of the Plan Area is within the growth boundary identified within Canmore's Municipal Development Plan. The inclusion of Thunderstone within Smith Creek will require an amendment to the growth boundary within the MDP to allow for comprehensive development planning.
- Stewart Creek ASP area is an existing community with an existing ASP from 2004. Stewart Creek ASP is almost complete with only the Stewart Creek commercial site and some minor parcels within Stewart Creek Phase 3 awaiting development. The existing development can be described as predominantly low and medium density residential.

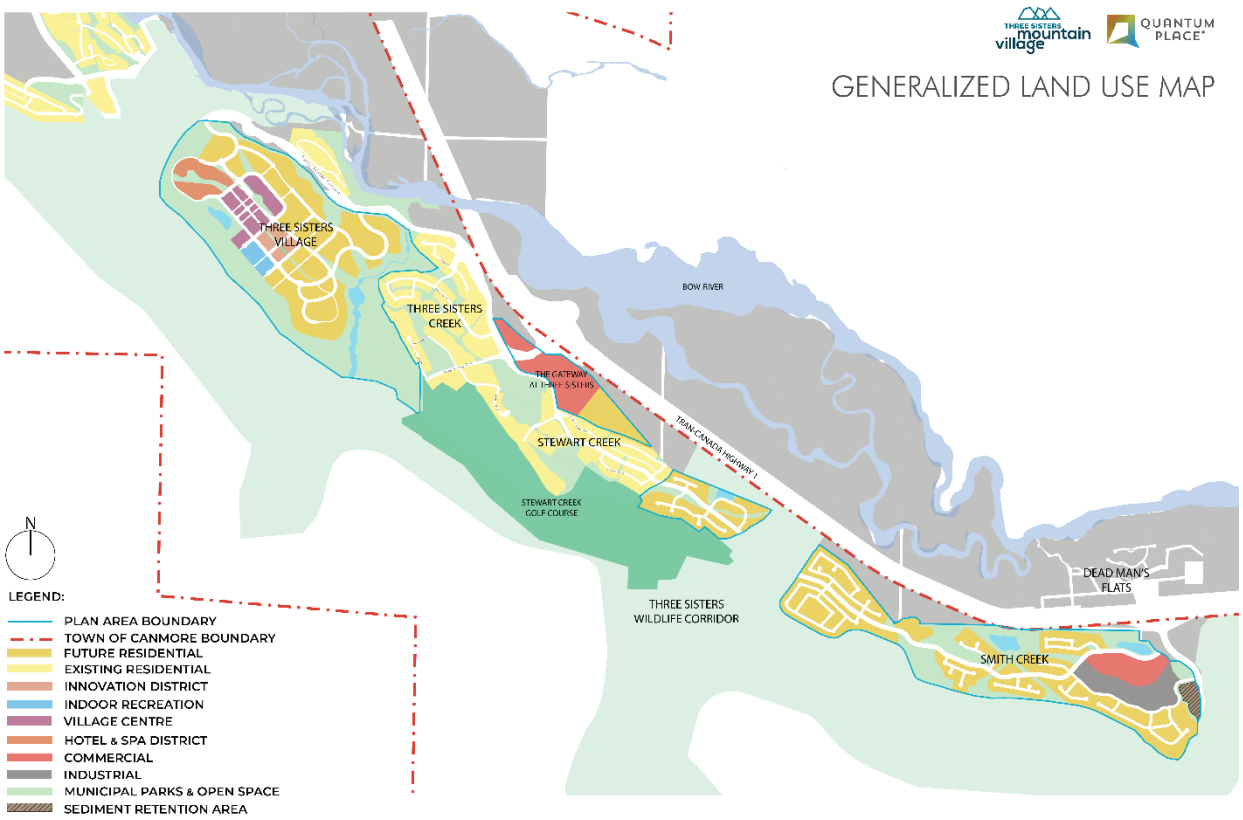


Figure 1-1 Three Sisters Mountain Village Study Area

1.2.2 EXISTING TRANSPORTATION NETWORK

The existing development within Stewart Creek is serviced through a number of multi-modal transportation options as outlined in the follow section.

WALKING/CYCLING

- Three Sisters Pathway (Trail 3 in **Figure 1-2**), is a predominantly paved multi-use pathway that starts at the current south boundary of Stewart Creek and travels through Stewart Creek, crossing Three Sisters Creek, and eventually drops south to follow the Bow River. The pathway changes to an unpaved trail and then continues to the Bow River Bridge Road crossing, which provides access into downtown Canmore.
- Within Stewart Creek there is a network of sidewalks and connecting pathways.

The existing trail network, and how it connects to the rest of the Town of Canmore, is shown in **Figure 1-2.**

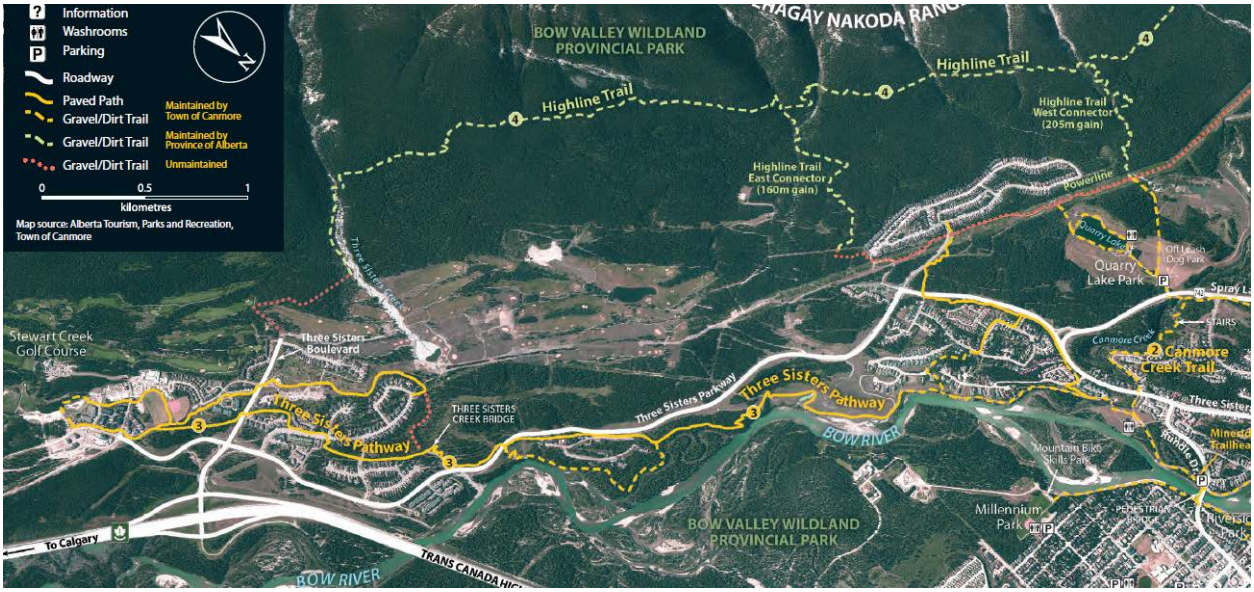


Figure 1-2 Trails and Pathways

TRANSIT

Canmore is serviced with transit through a regional transit service called Roam. There is an existing local transit route in Canmore that services Three Sisters Mountain Village and is illustrated in **Figure 1-3**. Canmore Local (Route 5) is currently a free service that runs seven days a week from Cougar Creek to Three Sisters Mountain Village. Most weekdays the service runs between Three Sisters Mountain Village and the Downtown between 6:30 am and 11 pm. Weekday service frequency is every 30 minutes for 3 hours during the am and pm peaks (7 am to 10 am and 3 pm to 7 pm), and hourly off-peak. Weekend service runs from 8:30 am to 8 pm. Saturday service runs every 30 minutes and Sunday service runs every 60 minutes. The current ROAM vehicle is a Nova brand LFS series 13 metre bus with a total seated and standing capacity of 80 persons.

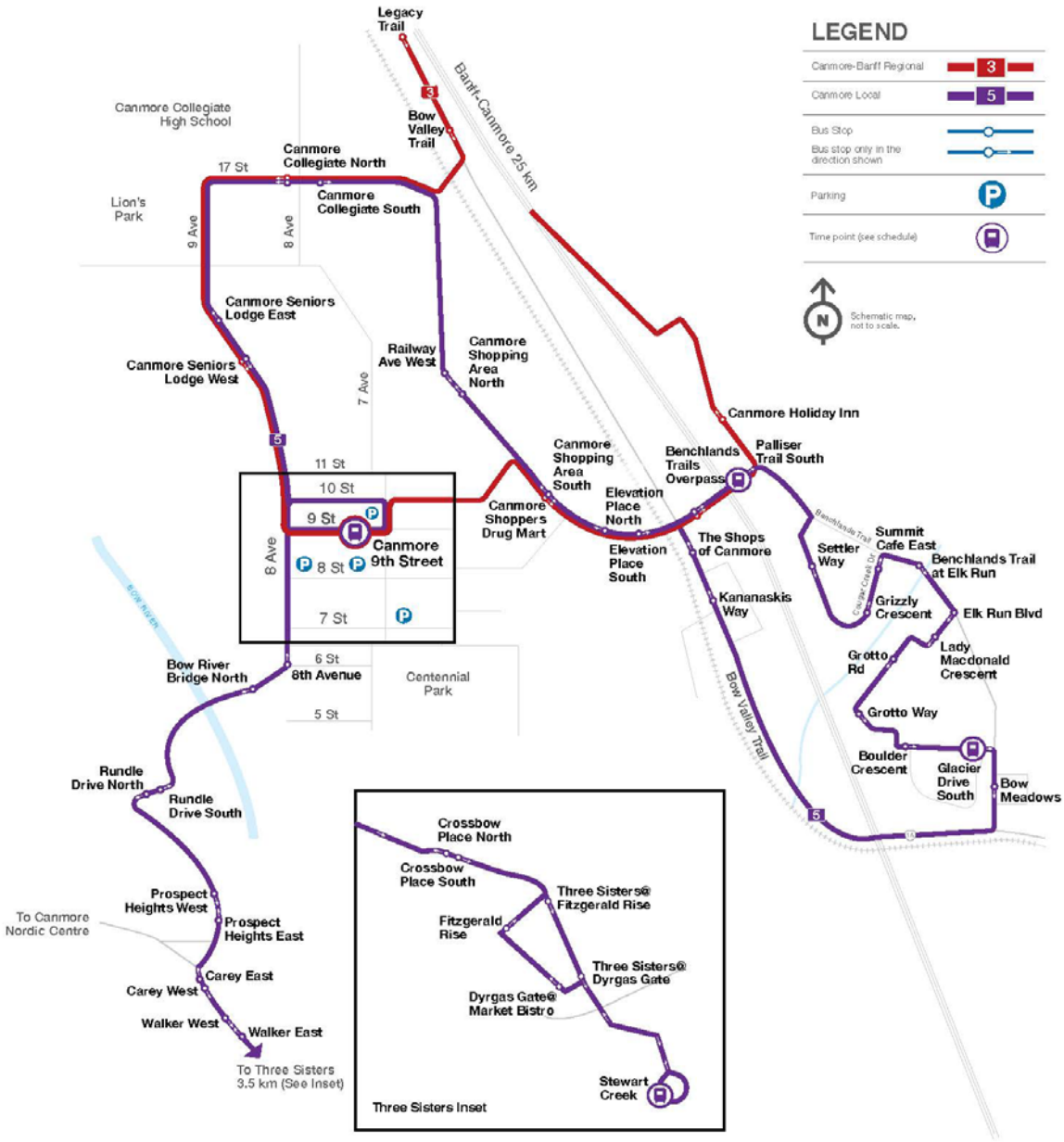


Figure 1-3 Canmore Transit Routes

ROAD NETWORK

The main road serving the study area is the Three Sisters Parkway (Highway 742), which is a two-lane road with a rural cross section that is owned by Alberta Transportation. The Three Sisters Parkway terminates at the end of the existing Stewart Creek boundary to the south and at Three Sisters Drive to the north. Three Sisters Parkway connects to Highway 1 at Three Sisters Boulevard.

This report does not study the existing and future interchanges at Trans-Canada Highway and George Biggy Sr. Road. Alberta Transportation retained AECOM Engineering to complete a functional plan for this interchange location in 2020. The functional plan was officially endorsed by Alberta Transportation in the Fall of 2020. For the functional planning study, AECOM applied the traffic volumes from the previous ASP TIA for full build out of the Three Sisters community. The functionally planning study appears to have included higher volumes at this location for the ASP subject area, and should therefore more than accommodate the traffic projected from this ASP/TIA update.

The Alberta Transportation plan includes designs for multi-modal users and their connections to Dead Man's Flats and the surrounding area. This TIA assumes the future interchange will be in place at the 2040 study horizon.

1.3 TRANSPORTATION POLICY FRAMEWORK

The guiding framework for transportation in Canmore is founded in the Integrated Transportation Plan (ITP) as updated in June 2018. The development of the policy within the Three Sisters Village and Smith Creek ASP align with the guiding principles outlined in that document. The ITP Guiding Principles and Policies, taken from the ITP, are summarized in **Table 1-1** below. Implementation tools for Canmore Three Sisters Mountain Village area are identified for each policy in the table.

Table 1-1 Three Sisters ITP Implementation

Guiding Principles from ITP (June 2018)		Implementation in Three Sisters Mountain Village
A multi-modal transportation network will connect neighbourhoods and places of interest.	— Active travel options will be available for all trips, year round — The severance impacts of the Trans-Canada highway and CPR will be mitigated through the provision of walking and cycling connections — Where vehicle capacity is required, new multi-modal linkages will be favoured over adding lanes to existing corridors	— All identified network options identified in ASP aligns to the EDCG guidelines for engineering design standards, including road cross-sections. Where an alternative standard would be required, this will be brought to the attention of the Town within in future TIAs or TIA update memos. — Trail and pathway options from Three Sisters Mountain Village to the rest of Canmore, as well as between the three ASP areas will consider directness but also grade and accessibility. — The Three Sisters Village and Smith Creek ASPs identify a multi-modal network that offers pedestrian friendly corridors and cycling routes in addition to the road network. — The TIA identifies upgrades to intersections to support development along the Three Sisters Parkway. In addition to these upgrades, the TIA has identified new trails options to help promote active modes and support the target mode splits. Transit routes will also use the new road network infrastructure.
The transportation network will provide mobility and access for all	— The cycling network will build on the existing trail system and roadway network to provide safe and convenient connections for all ages and abilities — A local transit service will provide a reliable, convenient, and efficient transit service to the largest proportion of the population possible — The regional transit service will be integrated with a local service in Canmore — A highly connected active transportation system will support a walkable urban form	— The Three Sisters Pathway will form the foundation of the cycling network for Three Sisters Mountain Village. The route travels through the proposed Smith Creek ASP area and will be connected with all ages and abilities cycling infrastructure through Stewart Creek and into the Three Sisters Village ASP area. — The existing Roam transit service to Stewart Creek can evolve to capture development from Stewart Creek, Smith Creek and Three Sisters Village. — Tourism travel can be supported with private shuttles and private bus/coach connections to Main Street, National Parks and Calgary/YYC as businesses see fit.
The transportation system will reinforce the Town Centre as a	— The transportation system within the Town Centre will be multi-modal, but will favour walking as the highest priority mode, supporting intense development in a walkable environment	— Mode split targets for Three Sisters Mountain Village will exceed the ITP targets to help not exceed the capacity of the network, especially the

Guiding Principles from ITP (June 2018)		Implementation in Three Sisters Mountain Village
commercial, civic, and cultural focal point in Canmore	— To achieve this multi-modal priority, set mode split targets for 2030 of 60% auto, 20% bike, 15% pedestrian and 5% transit — Land use form/density and the walking network will maximize 10-minute walking access to the Town Centre, major facilities, and other activity nodes	Bow River Bridge, and identified multi-modal infrastructure will support those targets. — The majority of units in Three Sisters Village, Stewart Creek and Smith Creek should be within a 10-minute walk to a neighbourhood commercial site in each area. — The Three Sisters Village and Smith Creek ASPs identify a multi-modal network that offers pedestrian friendly corridors and cycling routes.
Transportation corridors will be aesthetically pleasing and inviting as destinations as well as movement spaces	— All streets will serve multiple functions and major streets will support active, transit, and automobile modes — Land use and activity will front onto streets and be connected to the street at all levels of the street hierarchy.	— The street network within Three Sisters Village and Smith Creek Village ASPs will align with Complete Streets principles. Streets will include sidewalks. There will be opportunities for cycling and walking on All Ages and Abilities (AAA) facilities throughout the ASP Area. Individual links may have physical constraints; in those cases parallel facilities will be offered. Streetscapes will also include lighting and landscaping for safety and aesthetics. — Three Sisters Village ASP identifies zones where pedestrians will be the priority and make concessions to the mobility of other modes. — Three Sisters Village, particularly within the Village Centre will support land uses that front onto streets .The use of shared parking lots within Three Sisters Village will shift the majority of parking away from denser pedestrian areas, reduce circling for parking and result in more efficient use of lands dedicated to parking.
The transportation system will be developed and maintained in a responsible and sustainable manner	— Transportation investment in Canmore will be based on lifecycle costs, with consideration to capital, maintenance, and operational costs, as well as the economic benefit to users and the Town as a whole — Canmore's transportation network will be developed in a manner that leads to long-term efficiency and durability. — The transportation system should support economic prosperity within Canmore.	— The TIA evaluates the full build out of Three Sisters Village ASP, Smith Creek ASP, and the remaining development in Stewart Creek to help Canmore identify the full costs of infrastructure to support growth in the community. — Appropriate levels of service for all users will be considered that keep the transportation network functioning. — Travel demand management principles should be applied in the Three Sisters Village ASP to support the management of trip generation within the study area.

1.3.1 TRAVEL DEMAND MANAGEMENT

Travel Demand Management (TDM) is the use of strategies, programs and policies to reduce the demand for single occupancy vehicle trips on the transportation network. TDM measures for the Three Sisters Village and Smith Creek areas can take one of four principle approaches; land use mix, community form, provision of infrastructure and operational level of service. At the ASP stage, each principle can be discussed but decisions are made only on the first two, land use mix and community form (to a limited extent). Provision of infrastructure and the operational level of service decisions will be appropriately addressed within future municipal application processes. The intent of these policy directions is to minimize the generation of new automobile trips within Canmore as a result of the Three Sisters Mountain Village community.

LAND USE

Land use is at the root of all trip generation. Individuals make trips from origins to destinations depending on the type of land use. Residential properties generate trips to and from home to work, school, shopping and social/recreational destinations. Planning a community that provides most of the daily needs of residents will reduce vehicle travel external to the community. This approach to community planning is known as "Complete

Communities". Three Sisters Village and Smith Creek, combined with Stewart Creek, achieve this Complete Community measure through a land use plan that provides a diverse mix of land uses. Residents will be able to work, attend school (kindergarten through grade 12), shop for groceries and recreate within the overall Three Sisters Mountain Village community. Similarly, Canmore visitors staying in Three Sisters Village will be able to dine, shop and enjoy the mountains with local recreation such as cycling and hiking trails and golfing. Employees working in the community will have opportunities to get lunch, run errands and exercise all within the area.

LAYOUT

The arrangement of the land uses is the second principle in TDM. The distance or proximity of the origin and destination of a trip will influence how a person decides to travel. When trips are shorter, people are more likely to choose to walk or cycle to their destination. The Three Sisters Village ASP area achieves this measure through arranging and clustering land uses with a focus on the Village Centre. The hospitality land uses are closely positioned to the commercial hub where shopping, dining, entertainment and recreation opportunities will exist. Employees and residents in the Innovation District are also in close proximity to restaurants, services and lunch time or after work recreation options. Residential uses are the most concentrated in and around the Village Centre and are a short walk to restaurants, shops and services. The Smith Creek ASP plan outlines policy that positions the medium density residential near the commercial area and along the Parkway, where the walking, biking, and transit facilities will be located. It also has the school site generally located in the centre of the residential area.

INFRASTRUCTURE

The third key principle in TDM is the provision of appropriate infrastructure. Choosing to walk or cycle to a destination is dependent on availability of a sidewalk or pathway to do so. Pedestrians depend on direct connections with all weather surfaces. Cyclists also benefit from direct connections and routes that are safe and protected from fast moving traffic. The Three Sisters Village and Smith Creek ASPs incorporate a network layout combined with street designs that will meet these requirements. The ASPs includes multiple direct sidewalk and pathway connections which provide shorter travel distances than those available to automobiles. Each roadway has a design tailored to the intended users. The ASP parallels the Town of Canmore's ITP road hierarchy and classifications. Detailed design elements include lighting which must meet the requirements identified in the EDCG. Roadway elements are discussed at the ASP level and will be refined at the conceptual scheme and subdivision stages.

PARKING

An additional element of infrastructure provision is the supply, location and ownership of automobile and bicycle parking. The ASP document speaks to these principles with the specifics to be defined in the subsequent municipal approval processes. Each "use" in the plan area requires a certain type and amount of parking and loading space, in accordance with the Canmore Land Use Bylaw (LUB 2018-22). Where and how much vehicle and bicycle parking is supplied will influence travel behavior and the future supply should be a site-specific balance of Bylaw requirements with intended outcomes. Parking within the plan area will be supplied in four ways: public on-street, public off-street, private off-street and intercept lots.

At the appropriate phase of development, a parking strategy for the Innovation District, Indoor Recreation District, and Village Centre will be submitted. This strategy will consider innovative opportunities to both meet and manage demand and evaluate the range of parking requirements for the development. The objective of the area parking supply strategy is to provide parking in the most efficient manner possible that will mitigate the physical impacts of parking.

Policies around parking include:

- Provision of publicly accessible shared parking lots for vehicles and bicycles within the Three Sisters Village. Shared lots should be placed on the entry paths from the east and west to the village core in make them as visible and convenient as possible. These locations will present an opportunity for high quality and secure bicycle storage;
- Provision of parking at the rear of buildings or underground lots;
- On-street parking outside of the Pedestrianised Streets in the Village Centre; and

— Opportunity for an intercept parking lot near Highway 1 to manage summer peak visitor periods.

Bicycle parking within the employment areas and hotels will serve both employees with secure storage and visitors with convenient racks. Parking supply rate in the Village Centre should take into account shared use and be developed based on the combined uses and will consider that visitors will frequent multiple destinations.

The 2018 *Canmore Parking Study* discussed a number of parking management approaches which may be relevant to the Three Sisters Village intercept parking lots and on-street parking. These include flexibility in long-term and short-term parking based on seasons, residential parking management, an evaluation of where paid parking may help manage demand, provision of shuttles from intercept lots to high demand areas, and high-quality pedestrian and cycling infrastructure from intercept lots. Shared mobility (bicycles and scooters for example) can also help support the success of intercept parking lots by providing alternative easy means of travelling between destinations within Three Sisters Village.

OPERATIONS

The fourth key principle in achieving TDM results is ongoing operations. This is not an ASP level policy decision; however, it should be recognized and carried forward into future decision-making stages. Three Sisters Village is located in a northern climate and year-round service and maintenance will be essential to achieve TDM targets.

Provision of mass transit is seen as a combined effort of public transit for the overall plan area via Roam (or an evolution of that service), and potential private coach and shuttle service targeted to the needs of guests to the Three Sisters Village area. Visitors to Three Sisters Mountain Village will be more likely to take transit if the routes are easy to understand, the payment system is simple and if there is a predictable schedule.

The roadway network maintenance is the most established of the system and will continue to be predominately Town of Canmore and Alberta Transportation's service provision.

Table 1-2 Three Sisters TDM Implementation

TDM PRINCIPLE	HOW THIS ACHIEVED IN THREE SISTERS MOUNTAIN VILLAGE
Complete community mix of land uses	TSMV includes multiple forms of residential, employment, retail and service commercial along with an existing school in the Stewart Creek neighbourhood and a possible future K-12 school in the Smith Creek neighbourhood
Design with proximity of uses	Three Sisters Village has a compact, walkable mix of residential, hospitality, service commercial, employment and recreational uses within a 3 to 4 minute walking radius. Smith Creek includes service commercial and an office/industrial area adjacent to residential and a potential centrally located K-12 school site (depending on need).
Provision of Infrastructure	Smith Creek and Three Sisters Village includes integrated pedestrian, cycling and mass transit networks. Both community's multi-modal networks connect to the surrounding areas and regional systems. Proposed complete street network designs accommodate all users.
Supply of Parking	Each "use" will have an automobile and bicycle parking requirement balancing business/resident need, impact on travel behavior, physical space usage and efficiently meet the needs of the commercial businesses.

TDM PRINCIPLE	HOW THIS ACHIEVED IN THREE SISTERS MOUNTAIN VILLAGE
Operating the Network	The walking, cycling and mass transit systems will be designed and operated to meet the needs of the public day and night, throughout the year.

1.4 ANALYSIS SCOPE

The analysis focuses only on full build out of the study area and on trips generated that are external to each of the three ASP areas: Three Sisters Village, Smith Creek, and Stewart Creek. WSP has included a comparison to the findings of the previously submitted 2004 TIA in **Section 4-10** for comparison purposes.

The impact of internal trips (trips that stay within each of the development areas and use only the streets/sidewalks/bike paths/etc. within those areas) will be reviewed upon subsequent development submissions, as outlined in **Appendix C**. A**ppendix C** will also discuss when staging analysis to determine the timing of upgrades as related to development milestones should be included with future development applications in the study area.

1.4.1 WALKING/CYCLING MODES

The Town of Canmore, per the ITP, has identified a target of 35% of all future trips (by 2030) be taken by cycling (20%) or walking (15%). Achieving these outcomes will require investment in infrastructure to support those uses that is safe, meets demand and provides direct routes between origins and destinations.

This TIA identifies the location and types of cycling and walking infrastructure that are needed to safely and directly provide connections for people walking and cycling from Three Sisters Mountain Village to the rest of Canmore in and around the study area. Because of the mode split targets and potential constraints in the cycling and walking network over the Bow River Bridge and based on feedback from the Town of Canmore, we have identified the most critical "pinch-point" in the network as the crossing of the Bow River Bridge. WSP completed a capacity analysis of that crossing, as well as along the riverfront trail (called the Three Sisters Pathway in **Figure 1-2**) including the Prospect Bridge towards the existing underpass of the Three Sisters Parkway. The Bow River Bridge cross-sections south of the river currently consists of two vehicular travel lanes and a 2.5m effective width, 3.5 m actual width shared bike-walk facility. The Prospect Active Modes Bridge is 2 m effective width, 3.0 m actual width and provides a connection to the Three Sisters Pathway as shown in **Figure 1-2**. The Prospect Bridge is located north of Prospect Place along the Bow River west bank. The Three Sisters Pathway is mostly a paved 3.0 m multi-use trail with some segments that remain gravel.

1.4.2 TRANSIT MODE

Using the ITP target (5%) as a guideline, and based on feedback from the Town of Canmore, WSP has identified transit ridership estimates of 10% from Three Sisters Village for trips that stay within Canmore. We have identified transit requirements that will help achieve the transit mode share goal.

1.4.3 ROAD NETWORK (DRIVING)

The analysis of the road network focuses on the off-site intersections identified through scoping conversations with the Town of Canmore. These include existing intersections along the Three Sisters Parkway as well as the proposed access points for Three Sisters Village. The 2020 functional plan by Alberta Transportation for TCH/George Biggy Sr. Road considered previous ASPs and actually accounted for higher volumes than projected in this study. It will therefore provide sufficient capacity for the purpose of this analysis. The intersections being evaluated in this study are shown in **Figure 1-4** and itemized below.

1. 8th Avenue/10th Street

2. 8th Avenue/8th Street
3. 8th Avenue / 7th Street
4. Three Sister Drive/Rundle Drive
5. Three Sisters Parkway (Highway 742)/Three Sisters Drive/Spray Lakes Road
6. Three Sisters Parkway (Highway 742)/Peak Drive/Three Sisters Drive
7. Three Sisters Parkway (Highway 742)/Three Sisters Boulevard
8. Three Sisters Parkway/Highway 1 EB Off Ramp/Highway 1 WB On Ramp
9. Three Sisters Parkway/Highway 1 WB Off Ramp/Highway 1 WB On Ramp
10. Three Sisters Parkway / Three Sisters Mountain Village West Access (proposed)
11. Three Sisters Parkway / Three Sisters Mountain Village East Access (proposed)

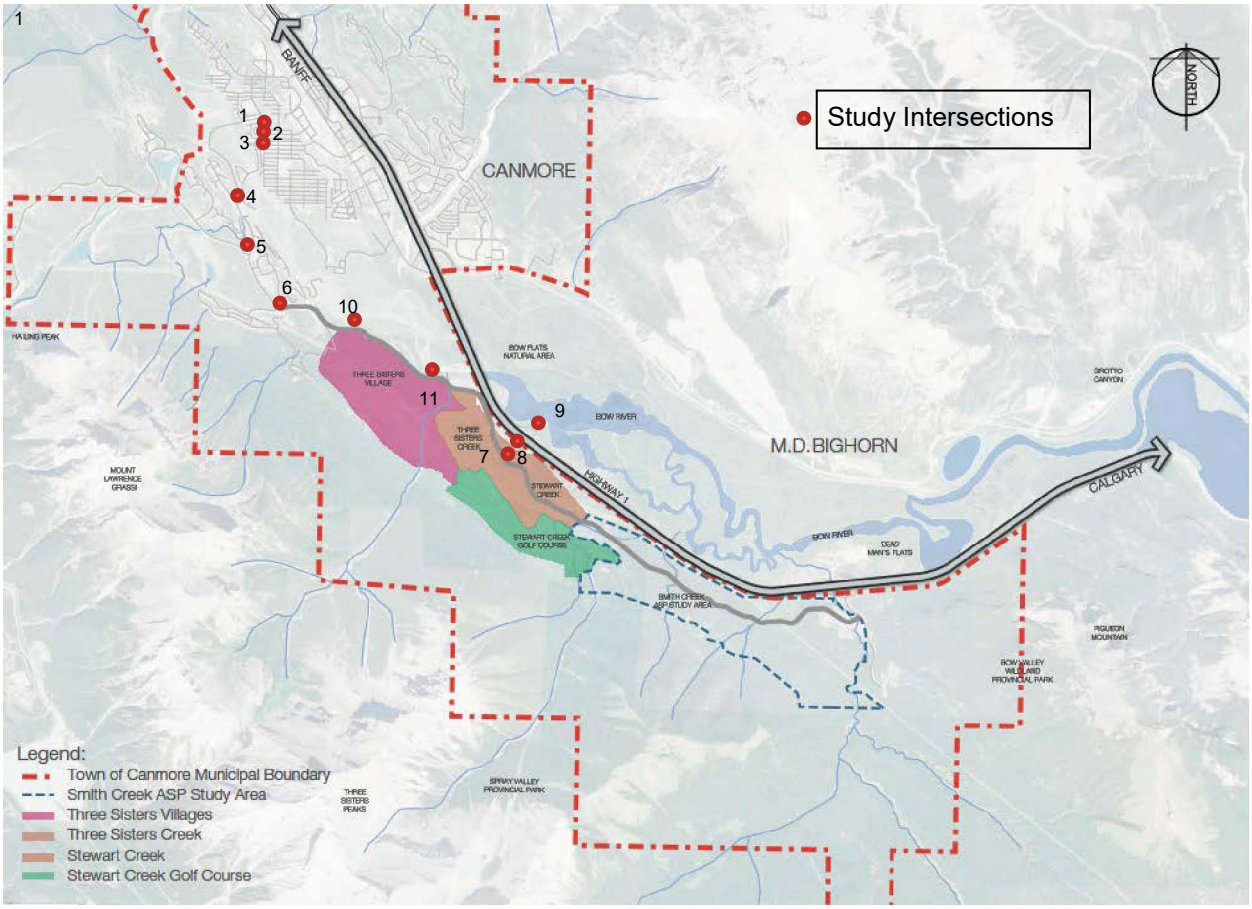


Figure 1-4 Study Intersections

1.5 STUDY HORIZONS

Three Sisters Mountain Village is assumed to be fully built out, including Smith Creek, by 2040 for the purposes of this study. The transit analysis will focus on the build out horizon only. For the driving, walking and cycling modes, WSP evaluated the traffic network on three horizons:

- 2019 Existing Conditions;
- 2040 Background Traffic Growth; and
- 2040 with Full Development.

The full development scenario is a conservative scenario, assuming "maximum case" in number of units. An additional sensitivity analysis has not been included, as the base scenario for this study is assumed to be

representative of a busy summer weekend. For all scenarios, the analysis has been completed on the PM Peak hour on a “typical” summer Friday and Saturday, as requested by the Town of Canmore.

2 EXISTING FACILITIES ANALYSIS

2.1 DATA COLLECTION

2.1.1 TRAFFIC COUNTS

Traffic volumes were obtained from three sources: traffic counts collected by WSP in August of 2019, additional volumes provided by the Town of Canmore, and Alberta Transportation data. Based on previous discussions with the Town of Canmore, analysis was completed based on the volumes collected on the Friday and Saturday of a regular, non-long weekend in the summer. This horizon represents a conservative estimate for traffic congestion, and also a season when there is potential for maximizing other modes. For both days, PM Peak is the analysis horizon as that time period has the highest demand.

Alberta Transportation counts were used at the Highway 1 and Highway 742 interchange intersections (study intersections 7 and 8) and converted to 2019 values by applying a growth factor obtained from the AADTs of Years 2015 and 2018, and applying it to the year 2015 12-hour counts (7:00 AM to 7:00 PM collected on Tuesday, July 7th). The 12-hour counts were also obtained from the Alberta website's highway traffic counts information.

WSP collected traffic counts in the study area at:

- Three Sisters Drive/Rundle Drive (Study intersection #3);
- Three Sisters Parkway (Highway 742)/Three Sisters Drive/Spray Lakes Road (Study intersection #4);
- Three Sisters Parkway (Highway 742)/Peak Drive/Three Sisters Drive (Study intersection #5); and
- Three Sisters Parkway (Highway 742)/Three Sisters Boulevard (Study intersection #6).

The traffic counts were completed during August of 2019 over two weekends: a "regular" summer weekend and a busy long weekend. Counts were conducted from 9:00 AM to 9:00 PM. **Table 2-1** below shows the days and dates of the WSP counts.

Table 2-1 Traffic Count Data Collection Dates (2019)

Weekend	Friday	Saturday	Sunday	Monday
Long Weekend	August 2nd	August 3rd	August 4th	August 5th
Regular Weekend	August 9th	August 10th	August 11th	NA

A review of the weather on the collection days indicate that the long weekend was sunny and hot with daily highs between 22C° and 26°C. The following weekend was somewhat cooler, with highs of 21°C, 16°C, and 18°C on Friday, Saturday and Sunday respectively.

Additional counts were obtained from the Town of Canmore for the intersections of 7th Street, 8th Street, and 10th Street with 8th Avenue in Downtown Canmore (Study intersection #3, #2, and #1 respectively). The following assumptions were applied to adjust the Downtown traffic counts for the study:

- The turning movements were collected on Tuesday, August 29, 2018 for the study intersections between 10th Street and 7th Street on 8th Avenue. A 0.5% background growth rate was applied to the 2018 Weekday PM Peak Hour Traffic Volumes.
- The Bridge Road / Rundle Crescent intersection weekday PM peak hour traffic count (Friday, August 9, 2019) was compared with the Saturday PM Peak hour traffic count (August 10, 2019) to determine the difference in traffic volumes. It was found that the Saturday PM peak hour traffic volumes were approximately 2.6% higher than the weekday PM peak hour traffic volumes in 2019 at this location.

— The 2019 Saturday PM Peak hour traffic volumes were estimated by applying a 2.6% increase to the 2019 weekday PM Peak hour traffic volumes.

The existing 2019 vehicle traffic volumes are summarized in **Figures 2-1 and 2-2**.

2.1.2 CYCLING AND WALKING COUNTS

All counts referenced above included cycling and walking volumes. Cyclist and pedestrian volumes were also obtained from the Town of Canmore for two locations (Bow River Bridge and Prospect Active Modes Bridge) between August 11, 2020 and September 15, 2020. Cycling and walking analysis at the pinch points was completed for the peak hour of those facilities.

Bow River Bridge

During the weekday vehicle peak hour (4-5 p.m.) there is an average of 115 people walking or biking across Bow River Bridge. Assuming a similar mode split as the assessment completed by Stantec for the *Bow River Bridge Corridor, Capacity and Background Growth Inputs for the TSMV TIA Memo* (2020) (**Appendix E**), 57% of users are classified as pedestrians (66) and 43% are cyclists (49) with a 50/50 directional split.

Prospect Active Modes Bridge

During the weekday vehicle peak hour (4-5 PM), there are an average of 54 people walking or biking across Prospect Bridge. In the absence of available data for pedestrian/cyclist split, the same assumption that was applied to the Bow River Bridge was applied to Prospect Bridge. 57% of users are classified as pedestrians (31) and 43% are cyclists (23) with a 50/50 directional split.

River Path North of Future West Access to Three Sisters Mountain Village:

No existing counts were collected at this location. Volumes were assumed to be 25% of those at Prospect Bridge as residential origins/destinations significantly decrease past this point. It was assumed that roughly 14 people walk or bike at this location with a split of 57% (8) pedestrians and 43% (6) cyclists.

Existing active mode volumes corresponding to the weekday vehicular peak hour are summarized in **Figure 2-3.** These volumes reflect the volume of active mode users during the weekday vehicle peak hour of the two pinch points.

LEGEND

XX - Summer Weekday PM Peak Hour Traffic Volumes (4:00 - 5:00 p.m.)

WSP Canada Group Limited
10909 Jasper Ave, Suite 1200
Edmonton, AB T5J 3L9
t. 306.205.7942
www.wsp.com

Issue Date - 2020-10-01
Scale: NTS
Aerial Imagery: 2019
Note: All Dimensions shown in metres unless otherwise noted

Figure 2-1 - Existing (2019) Weekday PM Peak Traffic Volumes

Three Sisters Mountain Village Transportation Impact Assessment

DRAWING:2019 Traffic Volumes.cdr DATE: 2020-10-01 DRAWN BY: piperde

LEGEND

XX - Summer Saturday PM Peak Hour Traffic Volumes (2:00 p.m. - 3:00 p.m.)

WSP Canada Group Limited
10909 Jasper Ave, Suite 1200
Edmonton, AB T5J 3L9
t. 306.205.7942
www.wsp.com

Issue Date - 2020-10-01
Scale: NTS
Aerial Imagery: 2019
Note: All Dimensions shown in metres unless otherwise noted

Figure 2-2 - Existing (2019) Saturday PM Peak Traffic Volumes

Three Sisters Mountain Village Transportation Impact Assessment

DRAWING:2019 Traffic Volumes.cdr DATE: 2020-010-01 DRAWN BY: piperde

TO DOWNTOWN

BOW RIVER

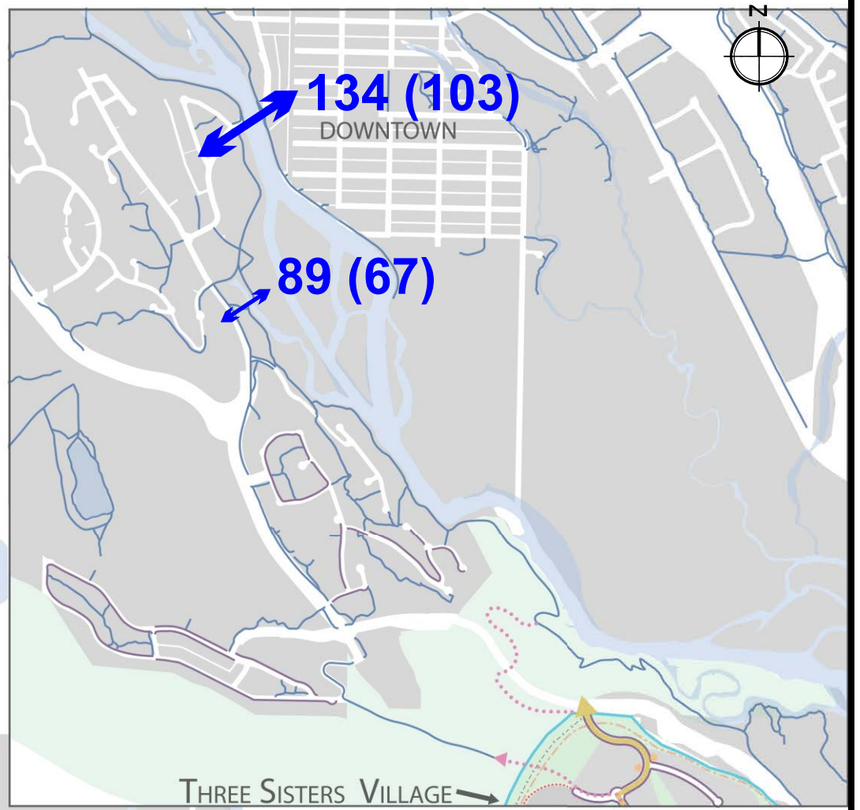
BOW RIVER

TRANS-CANADA HIGHWAY 1

STEWART CREEK GOLF COURSE

THREE SISTERS WILDLIFE CORRIDOR

DEAD MAN'S FLATS



N

LEGEND:

- PLAN AREA BOUNDARY
- TOWN OF CANMORE BOUNDARY
- RECREATIONAL TRAIL
- PEDESTRIAN STREET
- MULTI-USE PATHWAYS
- SIDEWALKS
- COMMUTER BICYCLE SPINE
- BUS/PUBLIC TRANSIT
- BUS STOPS
- TOWN OF CANMORE TRAILS

LEGEND

XX - Summer Saturday Peak Hour Two-way Pedestrian Volumes
(XX) - Summer Saturday Peak Hour Two-way Cyclist Volumes

WSP Canada Group Limited
10909 Jasper Ave, Suite 1200
Edmonton, AB T5J 3L9
t. 306.205.7942
www.wsp.com

Issue Date - 2020-10-07
Scale: NTS
Aerial Imagery: 2019
Note: All Dimensions shown in Metres unless otherwise noted

Figure 2-3 - Existing (2019) Cycling and Walking Volumes

Three Sisters Mountain Village Transportation Impact Assessment

2.2 2019 EXISTING ANALYSIS

2.2.1 CYCLING AND WALKING

The existing conditions analysis for the cycling and walking considers the available capacity in the cycling and walking network at the three locations in the network: Bow River Bridge, Prospect Bridge, and the riverfront pathway north of the future west active modes access to Three Sisters Mountain Village as discussed in **Section 1.4.1**.

There are a number of tools and methodologies available to evaluate the performance of a pathway capacity and outcomes can range based on those methodologies. Pathway capacity is complex and impacted by the volumes of users, types of users (ages, ability, use of other mobility), speeds, and tolerance for crowding. All methodologies provide an indication of how the user of the pathway may experience the facility but should be considered in conjunction with overall design considerations for a location. WSP used a combination of approaches to attempt to understand the existing conditions in the trail network and define a LOS for pedestrians and cyclists using these facilities, now and in the future. The methodology used is summarized as follows with all calculations included in **Appendix D**:

- Pedestrian level of service (LOS) was evaluated using HCM 2010 pedestrian LOS guidelines, which are based on pedestrian flow per minute (pedestrians/minute/metre). The target LOS for pedestrian and cycling facilities is a LOS C.
- Cyclist segment LOS for pathways and cycling facilities applied the same methodology described in Stantec's Memo Bow River Bridge Corridor, Capacity and Background Growth Inputs for the TSMV TIA (Stantec Memo 2020), which applies Operations Analysis of Uninterrupted Bicycle Facilities (TRB Record 1636, Paper No. 98-0066) and Design Manual for Bicycle Traffic, Fietsberaad CROW (CROW manual). FHWA's Shared-Use Path Level of Service Calculator – A User's Guide (Report Number FHWA-HRT-05-138, 2006) look-up tables were used to confirm capacities for multi-use paths.

Pedestrian LOS Methodology:

HCM 2010 provides recommended walkway LOS criteria based on space, flow rate and average speed as shown in **Table 2-2** below.

Table 2-2 HCM 2010 Walkway Level of Service Criteria

Intersection	Space (m^2/ped)		Flow Rate (ped/min/m)		Average Speed (m/s)	
	Min	Max	Min	Max	Min	Max
A	5.6	-	-	16	-	1.30
B	3.7	5.6	16	21	1.27	1.30
C	2.2	3.7	21	33	1.22	1.27
D	1.4	2.2	33	49	1.14	1.22
E	0.75	1.4	49	60	0.75	1.14
F	-	0.75	60	-	-	0.75

For the purposes of this study, pedestrian flow rate will be used to provide an approximation of the capacity of pedestrian facilities.

Cyclist LOS Methodology:

Cyclist LOS has been evaluated by combining the methodology presented in the Stantec Memo 2020 and the FHWA methodology for shared-use path LOS. The methodology is described as follows:

- Peak hour pedestrian and cyclist volumes are translated to frequency of interactions or events in the study hour based on the Operational Analysis of Uninterrupted Facilities (TRB Research Record 1636).
- A LOS is obtained based on those interactions for effective widths of 2.4 metre and 3.0 metre paths based on the Operational Analysis of Uninterrupted Facilities (TRB Research Record 1636).
- The CROW Manual is then used to evaluate the threshold where separation is required between pedestrians and other modes.(Table 5-5 Possibilities for joint use of pedestrian zones on the part of cyclists, page 126).
- Bicycle capacity of one-way and two-way exclusive bicycle paths is determined from the Operational Analysis of Uninterrupted Facilities (TRB Research Record 1636).

These results were then compared to the FHWA Shared-Use Path Level of Service Calculator (2006), which applies a mathematical formula to calculate a LOS score based on volumes, mode split, and presence or absence of a centre line.

2019 Pedestrian and Cyclist Capacity Results

Details of the capacity analysis are summarized in **Appendix D.**

A target LOS for cycling and walking facilities is **LOS C** to ensure that active modes are a competitive option to vehicles during the weekday peak hour for this study.

The results of the evaluation at the two study locations are summarized in **Table 2-3**. Based on this analysis, the Bow River Bridge does not have sufficient capacity for walking and cycling volumes on busier summer days in it's current configuration.

Table 2-3 Existing LOS for Bow River Bridge and Prospect Bridge

Location	Effective Width of Facility (m)	TRB Methodology		FHWA Methodology	CROW Ped Separation Index; Ped/Cyclist Separation Required?	Improvements Required?
		Frequency of Events	LOS	LOS		
Bow River Bridge	2.5 m	211	F	D	26; No	Yes
Prospect Bridge	2.0 m	99	C	B	16; No	No

2.2.2 DRIVING

The intersection capacity analysis was carried out using Synchro Studio 10 at the study intersections during the summer weekday afternoon peak hour (4:00 p.m. – 5:00 p.m.) and the summer Saturday afternoon peak hour (2:00 p.m. – 3:00 p.m.). Synchro is an industry standard software program, which is based on the methodology outlined in the Highway Capacity Manual (HCM). The HCM methodology considers the intersection geometry, the traffic volumes, the type of intersection controls, and the pedestrian and cyclist volumes. The methodology then defines a LOS which is based on the average delay per vehicle.

The LOS criteria for signalized and unsignalized (stop-controlled) intersections, as outlined in the HCM, is presented in **Table 2-4**. LOS A indicates good traffic flow with minimal delay (and generally represents an overbuilt network) and LOS F indicates congested traffic operations with considerable delay. LOS measurements are a qualitative measurement that focuses primarily on the delays experienced by motorists. LOS of all users of an

intersection and the associated impact on the surrounding area needs to be taken into consideration at the recommendation stage. Volume to capacity ratio is also a measure of intersection and link function; it evaluates the relationship between the theoretical capacity of an intersection and the estimated volumes. Typically, a v/c of less than 0.9 is operating within expected limits; a v/c between 0.9 and 1.0 is experiencing congestion and delay. A v/c of greater than 1.0 may represent a breakdown of the movement.

For the purpose of this report, LOS is an input to the decision making. Three Sisters Mountain Village and the Town of Canmore will work together to find a balance between the movement of traffic at peak periods and the type of mobility the Town wishes to encourage. Over emphasising the mobility of cars in the network will undermine some of the Town of Canmore's objectives of the ITP around focusing development outcomes on prioritizing people walking, cycling and taking transit. As a general rule, WSP has identified the following targets for intersection operations:

— LOS of E or greater for study intersections and individual movements; and
— V/C < 0.95 for intersections and individual movements.

Table 2-4 Level of Service Summary

Level-of-Service	Signalized Intersection (seconds)	Unsignalized Intersection (seconds)
A	≤ 10	≤ 10
B	>10 – 20	>10 – 15
C	>20 – 35	>15 – 25
D	>35 – 55	>25 – 35
E	>55 – 80	>35 – 50
F	>80	>50

Source: Highway Capacity Manual

The existing operating conditions analysis assumes existing roadway geometry, traffic control and observed traffic volumes. The results for the existing conditions operations analysis for the weekday afternoon peak hour and Saturday afternoon peak hour are summarized in **Table 2-5** and **Table 2-6**, respectively. The tables feature information on the overall intersection operations and details regarding the critical movement. The volume-to-capacity (v/c) criteria defines the ratio of demand volume to intersection capacity. The critical movement is defined as the movement experiencing the greatest delay. Detailed Synchro results can be found in **Appendix A**.

Table 2-5 Existing Operating Conditions (Weekday PM Peak Hour – 4:00 p.m. – 5:00 p.m.)

Intersection	Overall		Critical Movement			
	Delay	Max v/c	Movement	LOS (Delay)	v/c	95% Queue
8th Avenue / 10th Street	A (5.7 s)	0.39	WB-LT	C (17.0 s)	0.39	13 m
8th Avenue / 8th Street	B (11.2 s)	0.44	SB-LT	B (12.8 s)	0.44	15 m
8th Avenue / 7th Street	A (2.4 s)	0.21	WB-LR	C (16.6 s)	0.21	6 m
Three Sisters Drive / Rundle Drive	A (9.4 s)	0.31	SB-LT	D (26.2 s)	0.21	6 m
Three Sisters Parkway / Three Sisters Drive / Spray Lakes Road	A (4.9 s)	0.31	EB-LR	B (12.0 s)	0.21	9 m
Three Sisters Parkway / Peak Drive / Three Sisters Drive	A (7.9 s)	0.18	EB-LTR	A (8.1 s)	0.09	2 m
Three Sisters Parkway / Three Sisters Boulevard	A (9.7 s)	0.32	SB-LTR	B (11.5 s)	0.32	9 m
Three Sisters Parkway / Highway 1 Eastbound Off-Ramp	A (3.4 s)	0.19	EB-LR	A (9.3 s)	0.19	5 m
Three Sisters Parkway / Highway 1 Westbound Off-Ramp	A (8.0 s)	0.14	WB-LR	B (12.2 s)	0.14	4 m

Table 2-6 Existing Operating Conditions (Saturday PM Peak Hour – 2:00 p.m. – 3:00 p.m.)

Intersection	Overall		Critical Movement			
	Delay	Max v/c	Movement	LOS (Delay)	v/c	95% Queue
8th Avenue / 10th Street	A (5.9 s)	0.41	WB-LT	C (17.7 s)	0.41	13 m
8th Avenue / 8th Street	B (11.4 s)	0.45	SB-LT	B (13.2 s)	0.45	16 m
8th Avenue / 7th Street	A (2.5 s)	0.23	WB-LR	C (17.1 s)	0.23	6 m
Three Sisters Drive / Rundle Drive	A (9.6 s)	0.34	SB-LT	D (26.5 s)	0.16	5 m
Three Sisters Parkway / Three Sisters Drive / Spray Lakes Road	A (6.0 s)	0.36	EB-LR	B (12.9 s)	0.36	11 m
Three Sisters Parkway / Peak Drive / Three Sisters Drive	A (8.2 s)	0.21	SB-LTR	A (8.6 s)	0.21	6 m
Three Sisters Parkway / Three Sisters Boulevard	A (9.2 s)	0.27	SB-LTR	B (10.7 s)	0.27	8 m
Three Sisters Parkway / Highway 1 Eastbound Off-Ramp	A (3.1 s)	0.15	EB-LR	A (9.1 s)	0.15	4 m
Three Sisters Parkway / Highway 1 Westbound Off-Ramp	A (7.8 s)	0.12	WB-LR	B (11.9 s)	0.12	3 m

During the existing weekday PM peak hour all intersection movements have average intersection delays of under 10 seconds per vehicle (**Table 2-5**), with the exception of the 8th Avenue / 8th Street intersection, which experiences 11 seconds of delay. The intersection at 8th Avenue / 8th Street is the busiest of the study location during this weekday time period. The busiest movement, the southbound left through, has average queue lengths of 15 metres. This equates to two to three vehicles.

During the existing weekend afternoon PM peak hour all intersection movements have average intersection delays of under 10 seconds per vehicle (**Table 2-6**), with the exception of the 8th Avenue / 8th Street intersection, which experiences 11 seconds of delay. The busiest movement, the southbound left through, has average queue lengths of 16 metres. This also equates to two to three vehicles. A 2-3 car queue with 11 seconds of delays at 8th and 8th during the Saturday PM Peak hour does not necessarily reflect regularly observed operations at this location during peak times. These results are representative of the data available, but there may be occasions where the intersection operations are worse than the results reported.

Overall, all individual movements are operating very well (LOS D or better) during both peak hours. The capacity analysis indicates that the existing road network has reserve capacity available to accommodate future development.

2.3 2040 BACKGROUND ANALYSIS

The year 2040 is the design build out year for this TIA. This horizon provides a realistic time frame to test the full development of the subject site areas, which is the primary objective of the ASPs.

2.3.1 2040 BACKGROUND PEDESTRIAN AND CYCLIST VOLUMES

Using the traffic background growth process described in **Section 2.3.4**, WSP identified future background pedestrian and cycling volumes at the Bow River Bridge, Prospect Bridge, Riverfront Pathway north of West access to Three Sisters Mountain Village and on Three Sisters Parkway.

Bow River Bridge will need to accommodate 230 pedestrians and 230 cyclists in the vehicle peak hour with a 50/50 directional split. Prospect Bridge will carry 161 pedestrians and 162 cyclists during the vehicle peak hour with a 50/50 directional split.

Volumes on the Riverfront Pathway south of Prospect Bridge (3.0 m shared-use-path) were assumed with 25% of the volumes at Prospect Bridge with 40 pedestrians and 40 cyclists. Three Sisters Parkway is identified as an arterial roadway with complete streets elements in Canmore's Integrated Transportation Master Plan. Three Sisters Parkway north of the Peaks of Grassi was assumed to include uni-directional protected bike lanes (2.5 m) and sidewalks (2.0 m) on both sides. Volumes on Three Sisters Parkway was assumed to be 10% of those at Prospect Bridge in alignment with an advanced cyclist route resulting in 16 pedestrians and 16 cyclists.

These volumes are summarized in **Figure 2-4**.

TO DOWNTOWN

BOW RIVER

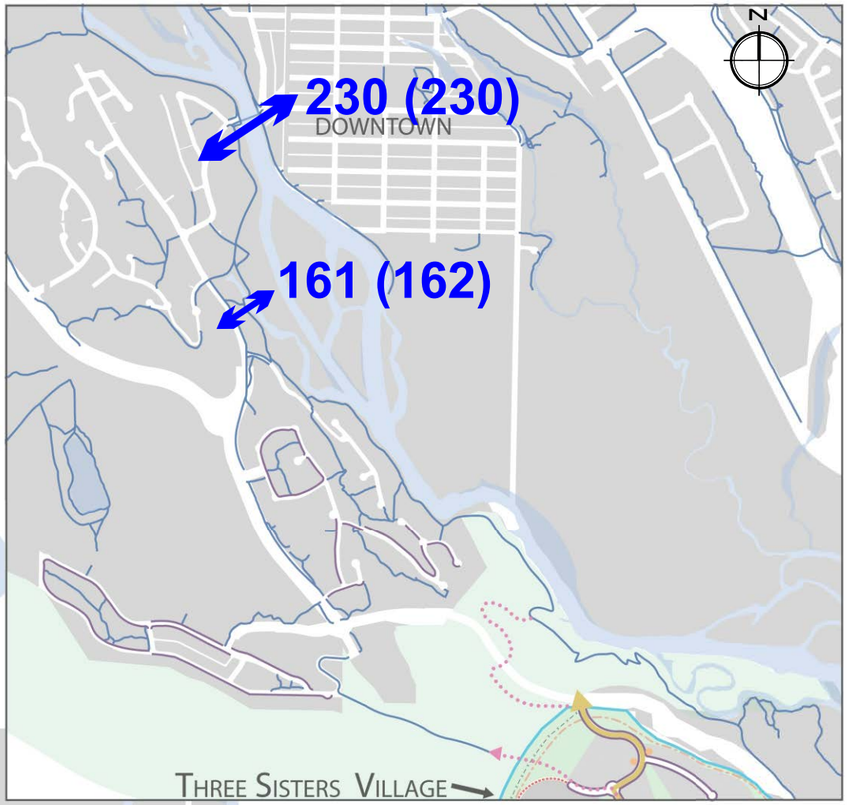
BOW RIVER

TRANS-CANADA HIGHWAY 1

STEWART CREEK GOLF COURSE

THREE SISTERS WILDLIFE CORRIDOR

DEAD MAN'S FLATS



N

LEGEND:

- PLAN AREA BOUNDARY
- TOWN OF CANMORE BOUNDARY
- RECREATIONAL TRAIL
- PEDESTRIAN STREET
- MULTI-USE PATHWAYS
- SIDEWALKS
- COMMUTER BICYCLE SPINE
- BUS/PUBLIC TRANSIT
- BUS STOPS
- TOWN OF CANMORE TRAILS

LEGEND

XX - Summer Saturday PM Peak Hour Two-way Pedestrian Volumes
(XX) - Summer Saturday PM Peak Hour Two-way Cyclist Volumes

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Figure 2-4 - Background (2040) Cyclist and Walking Volumes

Three Sisters Mountain Village Transportation Impact Assessment

DRAWING:Existing Pedestrian Flows.cdr DATE: 2020-10-07 DRAWN BY: piperde

2.3.2 2040 CYCLIST AND PEDESTRIAN ANALYSIS

The same methodology applied to the existing pedestrian and cyclist volumes was applied to the 2040 future background volumes. The results are summarized in **Table 2-7**.

Table 2-7 2040 Cyclist and Pedestrian Analysis

Location	Effective Width of Facility (m)	TRB Methodology		FHWA Methodology	HCM Ped Methodology	Improvement Required?
		Frequency of Events	LOS	LOS	LOS	
Bow River Bridge	2.5 m	769	F	F	-	Yes
Prospect Bridge	2.0 m	539	F	E - F	-	Yes
Riverfront Pathway	3.0 m	134	B	B - C	-	No
Three Sisters Parkway	2.5 m uni-directional protected bike lanes + 2.0 m sidewalks + two vehicle lanes	-	A*	-	A	No

***- Based on one-way exclusive bicycle capacity**

Bow River Bridge:

Improvements are required to support background growth of pedestrians and cyclists on the Bow River Bridge. With 92 pedestrians/metre of profile width, separation between cyclists and pedestrians are not required per the CROW Manual methodology. Two alternatives may be considered: 1) increasing the width of the existing multi-use trail from 2.5 metres to 3.0 metres or greater or 2) introducing unidirectional cycle paths, 2.0 m sidewalk on north side and maintaining the existing 2.5 metre effective width multi-use path (similar to the ITP recommendation). A third alternative includes the extension of the Trans-Canada Trail from Cougar Creek pedestrian underpass to the Three Sisters Boulevard Interchange or the construction of a new active modes bridge across the river. The Trans-Canada Trail extension or construction of a new bridge would divert a portion of the trips that are currently distributed towards Prospect Bridge and Bow River Bridge.

For the background analysis, only Option 1 and 2 are evaluated.

Option 1: An increased shared facility effective width of 3.0 metres, with the same frequency of events corresponds to a LOS E-F. However, if the width is increased to 5.0 metres (16 feet) the level of service improves to LOS C based on FHWA. Based on this analysis an increased effective width of 5.0 metres, 6.0 metres actual width would meet the needs of active transportation users in the 2040 background horizon.

Option 2: The same approach identified in Stantec's *Bow River Bridge Corridor, Capacity and Background Growth Inputs for TSMV TIA* was used for assessing the capacity of a complete street that includes 2.5 metre unidirectional cycle paths and maintaining the existing 2.5 metre effective width multi-use path. A 2.5 m effective width is less than the minimum width for bidirectional travel for cyclists in best practice. Future consideration may be given to widening this facility, or ensuring that signage indicates that it is a below ideal width facility. At 115 cyclists per direction, the LOS on a One-Way Exclusive Bike Path is LOS A. Although the 2.5 metre path will not be exclusive to pedestrians, the pedestrian flow rate using HCM provides an approximation of capacity. A pedestrian flow rate of 115 pedestrians per hour on 2.5 metre path (0.77 ped/min/m) corresponds to a LOS A and 0.96 ped/min/m on the 2.0 m sidewalk corresponds to an LOS A. The combination of 2.5 metre multi-use-trail, 2.5 metre unidirectional bike lanes and 2.0 m sidewalk is expected to meet the needs of active transportation users in the 2040 horizon.

The level of service results for the Bow River Bridge are summarized in **Table 2-8.**

Table 2-8 2040 Cyclist and Pedestrian Analysis for Bow River Bridge

Location	Cross Section	TRB Methodology	
		Walk	Bike
Bow River Bridge	2.5 m Multi-use path, 2 vehicle lanes, 2.5 m unidirectional bike lanes in each direction	1.5 ped/min/m LOS A[1]	Bow River Bridge LOS A[1]
Bow River Bridge	3.5 m Multi-use path	LOS D[3]	

1 – based on HCM Pedestrian Flow Rate; realistically, the LOS will be lower depending on the percentage of cyclists using the facility

2 – Based on TRB Operational Analysis of Uninterrupted Facilities

3- Based on FHWA look-up tables

Prospect Bridge:

With the projected future background volumes and the existing 2.0 metre effective width facility, the frequency of events at the Prospect Bridge is 539, which corresponds with a LOS F. FHWA look-up tables indicated a LOS of E-F for a 2.0 metre effective width facility. A review of the CROW Manual methodology confirms that with 161 pedestrians per 2.0 metre effective width, separation of pedestrians and cyclists is not yet required. This suggests that improvements are required to support the growth in pedestrians and cyclist volumes, though the facility may remain shared.

Two options may be considered for Prospect Bridge: 1) Widen the multi-use path to an effective width of 4.3 m or 2) separate pedestrians and cyclists using a painted line, curb or other physical separation permitting a 2.5m two-way bike path and 2.5 m sidewalk. The LOS analysis results for these two options are summarized in **Table 2-9**.

Table 2-9 2040 Cyclist and Pedestrian Analysis for Prospect Bridge

Location	Effective Width Cross Section	Performance	
		Walk	Bike
Prospect Bridge	4.3 m multi-use path	LOS C[3]	
Prospect Bridge	2.5 m two-way bike path + 2.5 m sidewalk	1.07 ped/min/m LOS A[1]	B-C[2]

1 – based on HCM Pedestrian Flow Rate; realistically, the LOS will be lower depending on the percentage of cyclists using the facility

2 – Based on TRB Operational Analysis of Uninterrupted Facilities – Two -way Exclusive Bicycle Path

3- Based on FHWA look-up tables

2.3.3 2040 BACKGROUND TRANSIT

Current transit ridership is estimated at 1.3% along the Bow River Corridor, which reflects the total anticipated transit ridership from the area and is relatively low (approximately 20 trips in the peak hour). As mode shifts through the future background growth, a shift towards 10% transit ridership could reflect approximately 160 trips in the PM Peak. This could be accommodated within the existing 30 min frequency schedule. A 30 minute frequency may not attract that level of usage of public transit. However, because without added traffic to the road network, the existing network is operating at a high level of service, and the 30 minute frequency will operate without significant delay. Recommended future transit service levels are discussed in report **Section 5.1.2**.

2.3.4 2040 BACKGROUND TRAFFIC

CHANGES IN DOWNTOWN TRAVEL BASED ON ITP IMPLEMENTATION

In the Summer of 2020, several traffic flow and control changes occurred in the Town Centre to align with the goals of the ITP, including:

- 8th Avenue / 10th Street was converted to an all-way stop-controlled intersection;
- 8th Avenue / 8th Street was changed to free-flow north-south along 8th Avenue, with a yield condition east-west along 8th Street; and,
- 8th Avenue / 7th Street was changed to free-flow north-south along 8th Avenue, with a yield condition east-west along 7th Street.

As the turning movement counts were collected in 2019 prior to these changes, the existing traffic volumes in the Town Centre needed to be revised to account for these new travel patterns. This was completed by referring to the ITP's Figure 4-20, 2030 typical summer daily traffic volumes with the successful implementation of the strategy. The percent of the total summer daily traffic volumes was estimated on each of the three east-west streets (10th Street, 8th Street, and 7th Street) and was found to be the following:

- 48% on 10th Street;
- 18% on 8th Street; and
- 34% on 7th Street.

The existing 2019 turning movements were then redistributed on the network to match the proportion identified in the ITP. For example, all the northbound right-turns from the three study intersections were added together and then multiplied by the percentage estimated for that street.

BACKGROUND TRAVEL GROWTH

Background traffic refers to traffic volumes that exclude the impact of the proposed development and is determined by projecting existing traffic volumes to the horizon year. Background growth must be considered for the study area, exclusive of the development traffic, to establish a base 2040 scenario. The background traffic for this study was identified with support from the Town of Canmore and based on the ITP goals and target mode splits.

The annual percentage growth rate for transportation trips of all modes in the Town of Canmore through this study area was provided to WSP as 0.5% per year (non-compounding). However, the transportation growth estimates must also consider the changing mode targets of the Town, which are based on a number of factors including Complete Streets Rehabilitation, ongoing bus system improvements, parking management, and successful integrated land use and transportation planning. The ITP identifies a future overall mode split target for the Town of Canmore as 60% private automobile, 20% cycling, 15% walking and 5% transit. Because the existing mode split across the study network and the future mode split across the study area will vary, the following methodology was used to estimate the future volumes in the network. This methodology was based on the Weekday PM Peak Hour:

- For Study Intersections 1 – 6
  - WSP identified a screen line in the network at Three Sisters Drive north of the intersection at Prospect Heights. At this location WSP has traffic volume counts and was provided trail volumes at the riverfront trail at Prospect Lane Bridge. At this location the current mode split was determined based on the data as

93% vehicles, 6% walking and cycling trips, and 1.3% transit (existing transit mode split in Canmore). This location was chosen instead of the Bow River Bridge because south of the Bow River, WSP felt that the mode split in this location more accurately reflected the mode split of study intersections 4, 5, and 6 than at the Bow River Bridge, where pedestrian and cycling traffic converges.

- Convert vehicle traffic counts into 'people' counts using an average vehicle occupancy of 1.7 people/vehicle (as provided by the Town of Canmore) to identify total people trips.
- Convert people trips back to the assigned mode using the target future mode split.
- At the screen-line location, this identified target mode split reduces people trips in vehicles to 65%. This reduction was applied to intersections 1 through 6
- Apply the annual growth rate of 0.5% to all modes to identify future background traffic volumes.
    - WSP acknowledges that the existing mode split for people driving is likely lower at Study Intersections 1 to 3 in the Downtown. A consistent methodology was regardless used for these intersections with the understanding that the future mode split target Downtown will include a higher proportion of people cycling and walking, and therefore a proportional reduction in automobile trips is appropriate.

- For study intersections 7 – 9
    - Because the majority of trips in this area are related to travel on Highway 1, the future mode split for background traffic that is unrelated to Three Sisters Mountain Village is not anticipated to shift significantly. Therefore, an annual growth rate of 0.5% was applied directly to the traffic counts at these locations to obtain background traffic estimates.

Background 2040 traffic volumes are illustrated in **Figure 2-5 and 2-6**.

DRAWING:2040 Background Traffic Volumes.cdr DATE: 2020-10-01 DRAWN BY: piperde

LEGEND

XX - Summer Weekday PM Peak Hour Traffic Volumes

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Figure 2-5 - Background (2040) Weekday PM Peak Traffic Volumes

Three Sisters Mountain Village Transportation Impact Assessment

DRAWING:2040 Saturday Traffic Volumes.cdr DATE: 2020-10-01 DRAWN BY: piperde

10 ST
8 ST
7 ST
RUNDLE CRES
THREE SISTERS DR
RUNDLE DR
SPRAY LAKES RD
PEAKS DR
THREE SISTERS PKWY
THREE SISTERS BLVD
HIGHWAY NO.1
HIGHWAY NO. 1
N
Google Earth

0 92 41 | 40 / 0 / 125
0 / 1 / 0 | 0 93 94
15 155 15 | 15 / 18 / 47
10 / 17 / 9 | 7 169 35
154 28 | 28 / 86
169 64

7 15 | 13 / 245
10 256
137 101 | 38 119
138 / 36 | 90 / 9 / 5
43 7 69 | 2 9 2
42 / 18 / 0

10 26 131 | 140 / 35 / 47
148 10 | 73 / 4
161 / 72
17 / 27 / 5 | 9 31 75
153 / 18 | 7 / 7
70 1

LEGEND

XX - Summer Saturday PM Peak Hour Traffic Volumes

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Figure 2-6 - Background (2040)Saturday PM Peak Traffic Volumes

Three Sisters Mountain Village Transportation Impact Assessment

2.3.5 2040 BACKGROUND TRAFFIC ANALYSIS

The impact of the background traffic growth was evaluated on the current road network in Canmore to identify if any upgrades may be required based on that growth. These results are summarized in **Table 2-10.**

The analysis indicates that all study intersections are anticipated to operate very well overall (LOS A) during both the weekday afternoon peak hour and the weekend afternoon peak hour. For the study intersections located south of the Bow River Bridge, all individual movements are anticipated to operate well with a LOS B or better during both the weekday afternoon peak hour and the weekend afternoon peak hour. For the study intersections located north of the Bow River Bridge, some side street delay is anticipated to occur at the 8th Avenue / 8th Street intersection and the 8th Avenue / 7th Street intersection, with individual movements operating at a LOS D or better during the weekday afternoon peak hour and the weekend afternoon peak hour. The capacity analysis indicates that the existing network has reserve capacity available to accommodate future development.

Table 2-10 2040 Background Forecast Operating Conditions

Intersection	Weekday PM Peak Hour		Saturday PM Peak Hour	
	Overall LOS (Delay)	Max v/c	Overall LOS (Delay)	Max v/c
8th Avenue / 10th Street	A (9.0 s)	0.20	A (9.1 s)	0.22
8th Avenue / 8th Street	A (5.8 s)	0.33	A (7.1 s)	0.41
8th Avenue / 7th Street	A (3.9 s)	0.25	A (4.6 s)	0.31
Three Sisters Drive / Rundle Drive	A (8.6 s)	0.23	A (8.8 s)	0.25
Three Sisters Parkway / Three Sisters Drive / Spray Lakes Road	A (4.1 s)	0.18	A (4.9 s)	0.22
Three Sisters Parkway / Peak Drive / Three Sisters Drive	A (7.5 s)	0.13	A (7.8 s)	0.15
Three Sisters Parkway / Three Sisters Boulevard	A (10.0 s)	0.35	A (9.4 s)	0.29
Three Sisters Parkway / Highway 1 Eastbound Off-Ramp	A (3.5 s)	0.20	A (3.1 s)	0.16
Three Sisters Parkway / Highway 1 Westbound Off-Ramp	A (8.1 s)	0.16	A (7.8 s)	0.13
Three Sisters Parkway / Mountain Village West Access	A (9.0 s)	0.20	A (9.1 s)	0.22
Three Sisters Parkway / Mountain Village East Access	A (5.8 s)	0.33	A (7.1 s)	0.41

3 PROPOSED DEVELOPMENT

3.1 PROPOSED ASP LAND USE CONCEPTS

The overall study area was shown in **Figure 1-1**. This section identifies the specific land use concepts proposed within each of the two ASP areas (Three Sisters Village and Smith Creek) and the remaining development considered for the Stewart Creek commercial areas. For the purpose of this study, the land use typologies in each of the three study subareas was segmented into land uses that will experience similar travel behaviors. Land use assumptions are subject to change in future applications.

3.1.1 THREE SISTERS VILLAGE

The land use concept for Three Sisters Village provides a complementary variety of uses in a compact area. Land uses include residential in multiple formats, commercial and service retail including restaurants, accommodation in hotel and tourist homes, a recreation centre and an innovation employment district. The Innovation District will be a place to support the current and future diversification of Canmore's economy and will include a diverse range of uses including creative manufacturing, retail, office, institutional, light industrial, live/work units and artist lofts. With its close proximity to the Village Centre, the Innovation District has strong potential to build on synergies with the businesses located in the Village Centre and elsewhere in Canmore and provide for flexibility and new ideas to evolve. The land uses for Three Sisters Village are shown in **Figure 3-1**, and the land uses for analysis are summarized in **Table 3-1**.

Figure 3-1 Three Sisters Village Land Use Concept

Table 3-1 Three Sisters Village Land Use Summary

Land Use	Units for Analysis**, ***
Residential	
Semi-Detached/Semis* **	2,600 Units
Apartments	900 Units
Tourist Homes (30% of Apartments)	400 Units at 80% occupancy*
Village Centre	
Mixed Use Building Residential (Tourist Apartments)	800 Units at 80% occupancy*
Mixed Use Building Retail	221,000 ft^2
Mixed Use Building Restaurant	119,000 ft^2
Landmark Hotel Conference Centre	450 Rooms
Spa District/Boutique Hotel	
Boutique Hotel/Spa	350 Rooms
Recreational	
Indoor Recreation Centre	263,000 ft^2
Outdoor Space	Outdoor recreation space to support indoor amenities
Innovation District	
Retail	10,000 ft^2
Restaurant	6,0000 ft^2
Office	65,000 ft^2
Creative Manufacturing/Light Industrial	156,000 ft^2

*Based on November 18, 2015 article identifying summer occupancy for condos and suites (http://siliconvalleytrails.pbworks.com/f/davis_etc_study.pdf)

The unit estimates within the analysis are based on the maximum range provided in the ASP to allow for flexibility within the various districts within the policy (5,500 units). This unit estimate exceeds the maximum units (4,890) that have been identified for the overall ASP. To assess the potential impact of reduction in units down to the maximum, a sensitivity analysis has been completed in **Section 6.2.2 to determine if this reduction could result in any reductions in infrastructure needs at the final horizon. Additionally, ongoing revisions to the ASP have identified small changes in the total land uses for some uses, including the total mix of retail and restaurant in the village core. These changes are tested as part of the "Travel Mode Shift" Sensitivity Analysis in **Section 7**. The change in land use tested result in a total reduction in trips, even when accounting for the change in internal trip capture generated by the change. As a result, the core analysis presented in **Section 5** and **6** of this report still identify a more conservative estimate of traffic and identify the maximum infrastructure needs that could possibly be generated by build out of the site.

***This unit total accounts for all possible units. The type of units may vary and include lock off suites, but the total would not exceed the unit counts estimated here.

3.1.2 SMITH CREEK ASP

The Smith Creek area is an area that combines low and medium density residential uses with a possible K-12 school site (depending on demand) as well as a commercial site incorporating retail, residential and office uses to support the overall Three Sisters community. The Smith Creek Land Use concept is illustrated in **Figure 3-2** and summarized in **Table 3-2**.

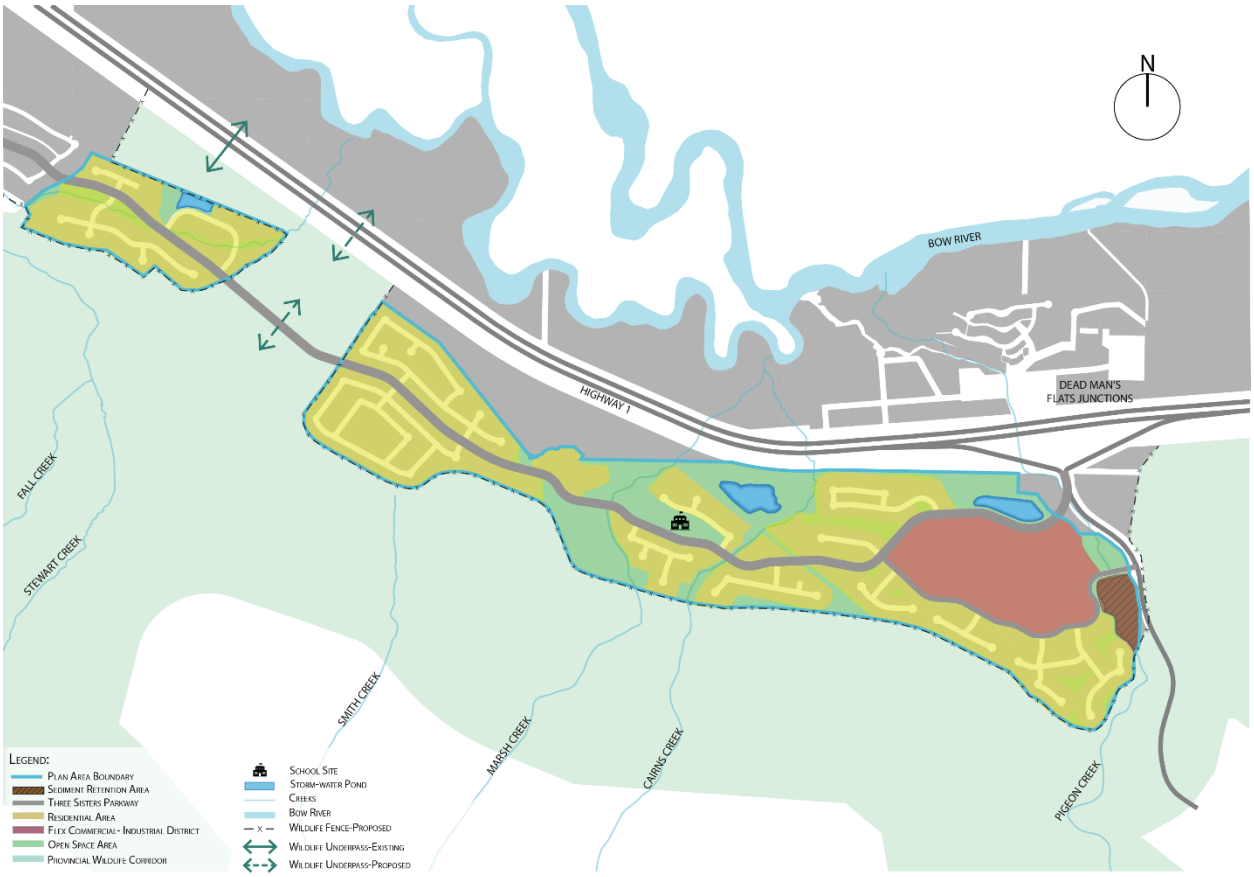


Figure 3-2 Smith Creek Land Use Concept

Table 3-2 Smith Creek Land Use Summary

Land Use	Units for Analysis*
Single Detached/Semi Detached	1,250 Units
Townhouses/Stacked Apartments	500 Units
Suites in Suite Ready Single Detached/Semi Detached	375 Units (30% of Single/Semi Detached at 80% Occupancy)
School	500 Students (K – 12)
Retail	106,000 ft^2
Restaurant	18,700 ft^2
Office	74,300 ft^2

*As within the Three Sisters Village ASP, the unit estimates defined within this analysis are based on the maximum range provided in the ASP to allow for flexibility within the various districts and exceeds the unit maximum (1730) identified within the ASP. Smith Creek is disbursed along the Three Sisters Parkway, with shorter local roads connecting directly to the Parkway. A collector road serves the residential south of the commercial site. Natural slopes and steep creek considerations in the area may prevent the collector road from directly accessing the south side of the commercial site. The ASP alignment is based on preliminary engineering of the area. The overall road network is shown in the associated ASP documents. Access points to Three Sisters Parkway will be determined at the Concept Scheme phase of development taking into account a variety of site specific, policy, planning and engineering factors

3.1.3 STEWART CREEK

This study includes the planned uses for the balance of the Stewart Creek neighbourhood, namely the Stewart Creek commercial site called The Gateway at Stewart Creek. The existing development in the area is low and medium density residential supported by the proposed commercial development and schools. The new development will include additional residential uses including employee housing and a commercial site combining a mix of retail uses with office campus development, and is summarized in **Table 3-3**.. In addition to the Gateway development, WSP has also included trip generation for the remaining approximately 140 residential units, located in Zone 2 in **Figure 3-3**.

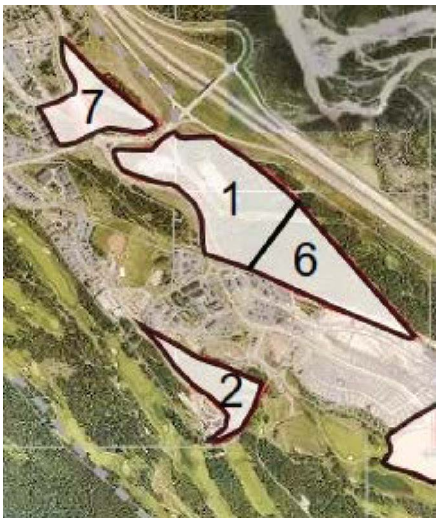


Figure 3-3 Stewart Creek Remaining Residential Build Out

Table 3-3 Stewart Creek Land Use Summary

Land Use	Units for Analysis
Retail	128,000 ft^2
Office	126,000 ft^2
Staff Housing	60 Staff
Multi-Family Housing	246 Units
Remaining Residential	140 Units

4 TRIP GENERATION

All multi-modal trips generated by the Three Sisters Mountain Village area have been identified in the following section. Trip generation considers a number of assumptions, and is impacted by the proposed land uses, industry standards, existing and predicted future travel patterns, and existing and future multi-modal infrastructure. The trip generation assumptions are based on the future network assumptions outlined in the ITP and the travel demand management principles as outlined in Section 1.

4.1 ITE TRIP RATES

The Institute of Transportation Engineers (ITE) Trip Generation Manual (10th Edition) has been used to identify trip generation rates for this study. All trips within the study area have been classified into one of the land use types described in **Tables 4-1 through 4-3**. Weekday trips are based on the Urban/Suburban rate and the PM Peak Hour of Adjacent Street Traffic (unless otherwise noted). Saturday Trips are also based on the Urban/Suburban type. Saturday values are generally only provided for the PM Peak Hour of the Generator, so they were then adjusted using a methodology described in more detail below, and summarized in **Table 4-4**.

Table 4-1 Three Sisters Village Trip Rates

Land Use	ITE Trip Type	ITE Trip Description	Exceptions
Residential			
Semi-Detached/Semis	220	Multifamily Housing (low-rise)	Saturday Peak – Use "Trips In/Trips Out" percentage from Type 221
Apartments	221	Multifamily Housing (mid-rise)	
Tourist Homes (30% of Apartments)	221	Multifamily Housing (mid-rise)	
Village Centre			
Mixed Use Building Residential (Tourist Apartments)	221	Multifamily Housing (mid-rise)	
Mixed Use Building Retail	820	Shopping Centre	
Mixed Use Building Restaurant	931/932	931 – Quality Restaurant 932 – High Turnover Restaurant	50% 931 50% 932
Landmark Hotel Conference Centre	310	Hotel	
Spa District			
Boutique Hotel/Spa	330	Resort Hotel	
Recreation			
Indoor Recreation	495	Recreational Community Centre	
Open Space	495	Recreational Community Centre	Identified additional 10% of indoor recreation
Innovation District			
Retail	820	Shopping Centre	
Restaurant	931/932	931 – Quality Restaurant 932 – High Turnover (Sit Down) Restaurant	50% 931 50% 932
Office	710	General Office Building	
Creative Manufacturing/Light Industrial	50% - 140 25% - 820 25% - 710	140 – Manufacturing 820 – Shopping Centre 710 – General Office Building	Site is mix of creative manufacturing which includes workspaces and retail opportunities. 50% - 140 25% - 820 25% - 710

Table 4-2 Smith Creek ITE Trip Rates

Land Use	ITE Trip Type	ITE Trip Description	Exceptions
Single Detached/Semi Detached	220	Multifamily Housing (low-rise)	
Townhouses/Stacked Apartments	221	Multifamily Housing (mid-rise)	80% occupancy
Suites in Suite Ready Single Detached/Semi Detached	221	Multifamily Housing (mid-rise)	80% occupancy
School	522	Middle School/Junior High School	
Retail	820	Shopping Centre	
Restaurant	931/932	931 – Quality Restaurant 932 – High Turnover (Sit Down) Restaurant	50% 931 50% 932
Office	710	General Office Building	

Table 4-3 Stewart Creek ITE Trip Rates

Land Use	ITE Trip Type	ITE Trip Description	Exceptions
Retail	820	Shopping Centre	
Office	710	General Office Building	
Staff Housing	225	Employee Housing	Over ½ Mile from Campus Saturday – Use 220 rate
Multi-Family Housing	220	Multifamily Housing (mid-rise)	
Remaining Residential	210	Single Family House	

Table 4-4 summarizes the methodology used to project trip generation for the Saturday Peak Hour. This methodology was applied to more accurately estimate the site trip generation during the peak hour of traffic on the adjacent street. The data collection in 2019 identified that the existing Saturday peak hour of traffic occurs between 3 and 4 pm.

Saturday volumes in the ITE Trip Generation Manual are typically identified for the Peak Hour of the Generator, which is not the same as the peak hour of adjacent street traffic. Using the Peak Hour of Generator for all generators would overestimate trip generation because it assumes that the peak hours of all generators occur at the same time, which they do not. Therefore, to convert the peak hour of the generators to the peak hour of the adjacent street traffic, WSP used the ITE Parking Generation Manual to identify the percent of parking occupied during the peak hour of adjacent traffic. WSP then assumed that the trip generation can be reduced to this corresponding percentage.

Table 4-4 Saturday Peak Hour Adjustment

ITE Code	ITE Trip Description	Peak Hour of Generator	% Occupied at Peak Hour of Adjacent Street Traffic
140	Manufacturing	No adjustment available, just use peak hour of generator	
220	Multifamily Housing (low-rise)	5 am (Saturday General Urban/Suburb)	68% (3-4 pm Saturday)
221	Multifamily Housing (mid-rise)	12 – 4 am (parked at home)	69% (3-4 pm Saturday)
225	Off-Campus Student Apartment	Use weekday rate (no Saturday rate)	
310	Hotel	9 pm	64% (3-4 pm Saturday)
495	Recreational Community Centre	9 am	53% (3 – 4 pm Saturday)
522	Middle School/Junior High School	No trips generated on weekend.	
630	Clinic	Use Weekday as weekend trip generation for spa will be similar to weekday.	
710	General Office Building	No adjustment factor for 710. Just use Saturday peak hour of generator.	
820	Shopping Centre	1 pm	92% (3 – 4 pm Weekday)
932/93	Restaurant	8 pm	22% (3 – 4 pm Friday)

4.2 PERSON TRIPS

The ITE Trip Generation Manual identifies automobile trips, and the data is generally based on primarily auto-oriented, suburban locations. These trips must be adjusted to convert them into people trips, so that trip generation can more accurately reflect the multi-modal travel environment. This section summarizes how those trips have been adjusted for this study.

Because the majority of data collected in the ITE Trip Generation Manual is taken from suburban United States locations, the 2017 United States National Household Survey (US NHS) data has been used to identify vehicle occupancies for the study data (**Tables 4-5, 4-6** and **4-7**). The US NHS provides occupancy in person mile/vehicle mile, which represents the total number of person trips in a vehicle per total vehicle trips. The vehicle occupancies are used to convert the forecast automobile trips into person trips. Note that these occupancies are more detailed than the general occupancy used for the background growth assessment.

Table 4-5 Vehicle Occupancy

Trip Type	Person Mile / Vehicle Mile
To/From Work	1.18
Other Family/Personal Errands	1.82
Social Recreational	2.10
All Purpose	1.67

Table 4-6 Vehicle Occupancy by Type (Weekday)

ITE Code	ITE Trip Description	PM Peak Hour Occupancy	Daily Occupancy
130	Industrial Park	1.18	1.18
210	Single Family Housing	1.18	1.67
220	Multifamily Housing (low-rise)	1.18	1.67
221	Multifamily Housing (mid-rise)	1.18	1.67
225	Off-Campus Student Apartment	1.18	1.67
310	Hotel	2.10	2.10
495	Recreational Community Centre	2.10	2.10
522	Middle School/Junior High School	1.82	1.82
630	Clinic	1.82	1.82
710	General Office Building	1.18	1.18
820	Shopping Centre	1.82	1.82

Table 4-7 Vehicle Occupancy by Type (Saturday)

ITE Code	ITE Trip Description	PM Peak Hour Occupancy	Daily Occupancy
130	Industrial Park	1.18	1.18
210	Single Family House	1.82	1.82
220	Multifamily Housing (low-rise)	1.82	1.82
221	Multifamily Housing (mid-rise)	1.82	1.82
225	Off-Campus Student Apartment (used for Employee Housing)	1.82	1.82
310	Hotel	2.10	2.10
495	Recreational Community Centre	2.10	2.10
522	Middle School/Junior High School	1.82	1.82
630	Clinic	1.82	1.82
710	General Office Building	1.18	1.18
820	Shopping Centre	1.82	1.82

4.3 INTERNAL TRIP CAPTURE AND PASS-BY

INTERNAL TRIP CAPTURE

Internal trip capture is the portion of trips generated by a mixed-use development that begin and end within the same development; in other words, these trips do not need to use transportation facilities outside the development. For example, by building residential development in close proximity to office space or retail space, more of the trips that are generated within the residential development will use their local office and retail centres, keeping those trips off the greater external road network. Internal trip capture will be calculated for each development (Three Sisters Village, Smith Creek and Stewart Creek separately) using the NCHRP 684 methodology. This methodology is a tool developed to more accurately estimate the potential trips within a development that would be captured without leaving the area.

To use this tool, all trips must be classified into one of five categories: Office, Retail/Restaurant, Cinema/Entertainment, Residential, and Hotel. The three key factors influencing the internal trip capture rates are mix of uses, proximity of uses, and size of those uses.

The analysis was completed for the Weekday PM Peak and the Saturday PM Peak. The Internal Trip Capture Methodology identifies a separate trip capture for trips in and trips out for each of the five land use types. The internal trip capture spreadsheets can be found in **Appendix B**.

Three Sisters Village ASP

Three Sisters Village ASP is anchored by a pedestrianized mixed-use village centre. The compact ASP area supports connections that are easily achievable by walking and cycling, and the supporting internal network of sidewalks, pedestrianized streets, and cycling routes will make trips within the development easy and appealing. Residents and visitors within Three Sisters Village will have options for work, play and rest all within the ASP area. These features support a high internal trip capture rate within the development, which is summarized in **Table 4-8**.

Table 4-8 Three Sisters Village Internal Trip Capture

Land Use	Entering Trips Captured	Exiting Trips Captured
Three Sisters Village Weekday PM Peak Internal Trip Capture		
Office	98%	20%
Retail	47%	60%
Restaurant	39%	72%
Cinema/Entertainment (Recreation Centre)	15%	17%
Residential	23%	23%
Hotel	22%	15%
Three Sisters Village Saturday PM Peak Internal Trip Capture		
Office	98%	20%
Retail	22%	40%
Restaurant	46%	73%
Cinema/Entertainment (Recreation Centre	32%	37%
Residential	25%	15%
Hotel	20%	9%

Smith Creek ASP

Smith Creek will predominantly be a residential area for Canmore's permanent population. However, developments of office space, retail and restaurant development will support residents to start and finish many of their trips within their own neighbourhood. The overall internal trip capture in Smith Creek is estimated to be about half that of Three Sisters Village; this is due primarily to the increased distances between land uses and less variety in the types of land use. The estimated internal trip capture for Smith Creek is summarized in **Table 4-9**. Smith Creek likely includes a school site. Because schools typically attract mainly local trips, a total of 50% of school trips are assumed to be internal to Smith Creek. The remaining trips will come from the rest of Three Sisters Mountain Village as well as potentially from other areas in Canmore and the Bow Valley.

Table 4-9 Smith Creek Internal Trip Capture

Land Use	Entering Trips Captured	Exiting Trips Captured
Smith Creek Weekday PM Peak Internal Trip Capture		
Office	100%	16%
Retail	17%	22%
Restaurant	32%	48%
Cinema/Entertainment	32%	48%
Residential	2%	2%
School	50%	50%
Hotel	NA	NA
Smith Creek Saturday PM Peak Internal Trip Capture		
Office	95%	17%
Retail	6%	11%
Restaurant	35%	48%
Cinema/Entertainment	NA	NA
Residential	6%	4%
Hotel	NA	NA

Stewart Creek Area

Similar to Smith Creek, Stewart Creek is also primarily residential, augmented with a mix of retail and restaurant space. Internal Trip Capture is summarized in **Table 4-10**.

Table 4-10 Stewart Creek Area Internal Trip Capture

Land Use	Entering Trips Captured	Exiting Trips Captured
Stewart Creek Weekday PM Peak Internal Trip Capture		
Office	48%	17%
Retail/	8%	18%
Restaurant	NA	NA
Cinema/Entertainment)	NA	NA
Residential	41%	16%
Hotel	NA	NA
Stewart Creek Saturday PM Peak Internal Trip Capture		
Office	37%	17%
Retail/	7%	11%
Restaurant	NA	NA
Cinema/Entertainment	NA	NA
Residential	49%	17%
Hotel	NA	NA

Additional Internal Trip Capture

Because the NCHRP methodology is only appropriate for smaller sites and areas, it cannot be applied to the overall Three Sisters Mountain Village (Three Sisters Village, Smith Creek and Stewart Creek). However, many of the same principles developed in the NCHRP report apply to the greater Three Sisters Mountain Village area. Residents and visitors of the three neighbourhoods are provided opportunities for recreation, shopping, eating and staying within the Three Sisters Mountain Village, and the well-established system of trails and pathways between these neighbourhoods will help facilitate these trips. Using the total trip capture from Smith Creek as a reference, WSP has assumed that an additional 10% of total trips from Three Sisters Mountain Village will be trips between the three neighbourhoods.

PASS-BY TRIPS

According to the ITE Trip Generation Manual, pass-by trips are defined as trips made as intermediate stops along the course of a trip between an origin and primary trip destination. Although these trips will be included in the driveway volumes to a site, they will not increase the overall traffic volumes on the study roads. A diverted trip is attracted from the traffic volume on roadways within the vicinity of the site but without direct access to the site. A diverted trip adds traffic to the streets adjacent to the site. A total of 35% of all retail trips and 43% of all restaurant trips were identified as either Pass-by or Diverted Link trips, based on the ITE Trip Generation Manual.

For this study it was assumed that 20% of the pass-by trips were diverted trips generated from Highway 1. This equates to 118 total trips during the weekday afternoon peak hour and 110 total trips during the Saturday afternoon

peak hour. The diverted trips generated from Three Sisters Village and Stewart Creek were added to the turning movements at the Highway 1 and Westbound Ramps intersection, the Highway 1 and Eastbound Ramps intersection, and the Three Sisters Parkway and Three Sisters Boulevard intersection, as well as the site accesses for those sub-development areas. The diverted trips from Smith Creek were assumed to use Dead Man's Flat interchange at the full build out of the site and this TIA horizon, though they may use the existing interchange in the short-term.

The remaining 80% of the pass-by trips were assumed to be generated along Three Sisters Parkway itself. These trips were included in the driveway volumes to the site but will not increase the overall traffic volumes on the study area roads.

4.4 TRIP DISTRIBUTION

WSP reviewed 2020 origin/destination data that was obtained through Streetlight, which uses Bluetooth data to track travel patterns. WSP reviewed 2020 origin/destination data that was obtained through Streetlight, which uses Bluetooth data to track travel patterns. COVID-19 may have impacted the travel behavior observed but still provides insight into the likelihood of users travelling via the Highway vs. Three Sisters Parkway and is still valuable for understanding potential trends in distribution. The existing distribution per the streetlight data is summarized in **Table 4-11**.

Table 4-11 Existing Trip Distribution from Streetlight Data

From Three Sisters to and from	PM Peak Weekday	PM Peak Saturday
Stewart Creek Weekday PM Peak Internal Trip Capture		
Hwy 1 West – Banff	5%	9%
Hwy 1 West – Canmore North	27%	22%
Hwy 1 West – Canmore South	20%	17%
Hwy 1 East	10%	8%
Three Sisters Parkway	38%	44%

Using these as the foundation for our trip generation with the following adjustments:

- Three Sisters Village travelling to Downtown will be more likely to take the Parkway to access Canmore, while Smith Creek residents will be more likely to take Highway 1.
- Trip distribution for hotels have been assigned a different trip distribution to represent that trips are more likely to be destined towards the west and the National Parks than the average commuter and shopping trip.
- Schools and the recreation centre have also been assigned a different trip distribution because more trips are local within the Town of Canmore.

With those considerations, the trip distribution assumed for this TIA is summarized in **Table 4-12**. The same distribution will be used for Weekday and Saturday trips.

4.4.1 INTERCEPT LOT

An intercept lot has been proposed for the northeast corner of the intersection of Three Sisters Boulevard and Three Sisters Parkway. This lot would be used primarily by people making day trips to the Three Sisters Village to access retail and restaurant. With an estimated capacity of 700 stalls, WSP has assumed that approximately 10% of trips into the Three Sisters Village could be captured by the intercept lot. Success of this lot would require parking supply management in the Three Sisters Village and frequent shuttle access. The proposed lot location is directly adjacent to the existing Roam transit routes and this transit access is assumed to continue into the future. Public transit

expands the travel options for drivers parking and makes the site more attractive for users. When appropriate (i.e. TSV parking cost increased), a charge for this parking could be introduced to help offset the cost of the shuttle and lot operation.

Table 4-12 Three Sisters Village / Stewart Creek Trip / Smith Creek Distribution by Land Use (PM Peak Hour)

Destination	All Trips (Except Hotels /School/Rec)	Hotels	School/Rec Centre
Three Sisters Village/Stewart Creek			
Hwy 1 West Via Blvd	45%	55%	25%
Hwy 1 West Via DMF	0%	0%	0%
Hwy 1 East Via Blvd	5%	7.5%	5%
Hwy 1 East Via DMF	5%	7.5%	5%
Three Sisters Pkwy West	45%	30%	65%
Smith Creek			
Hwy 1 West Via Blvd	25%	NA	10%%
Hwy 1 West Via DMF	25%	NA	15%
Hwy 1 East Via Blvd	0%	NA	0%
Hwy 1 East Via DMF	10%	NA	05%
Three Sisters Pkwy West	40%	NA	65%

4.5 MODE SPLIT

The core goal of the Canmore ITP is to provide a multi-modal transportation network that facilitates year-round opportunities for people to walk, bike and take transit for their daily transportation needs. The priority is to provide high-quality multi-modal linkages over new driving lanes where possible.

4.5.1 ITP MODE SPLIT GOALS

The overall mode split goal identified in the ITP for 2030 is 60% auto, 5% transit, and 35% active modes. The ITP presents a complete streets approach to accomplish this goal, an approach which is met within the Three Sisters Village ASP, the Smith Creek ASP, and within the existing development in Stewart Creek. The desired active mode share is dependent on the street type, as identified in Table 4-2 in the ITP. Future study of the individual ASP areas will identify individual mode splits for travel within each neighbourhood. However, for this study, WSP is focused on the trips leaving the neighbourhoods and their impact on the existing trails, pathways, transit, and road network. Therefore, only external (to each ASP area) trip mode split is being identified at this point.

Reviewing the ITP, the target active mode split for arterial roads is 30% of trips on active modes (walking and cycling). This assumption is predicated on the development of safe, direct and high-quality connections for people cycling and walking, either directly paralleling the main arterial street, or an off-street trail which provides a similar or better quality of service than an on-street cycling facility. Additionally, end of trip facilities like secure bike parking and change rooms at offices support cycling trips. Restrictions on parking to incentivize other modes, either through pricing or supply, can also encourage people to walk, bike or take transit. The recommended cycling and walking infrastructure will be detailed to support this target.

The overall transit target mode identified in the ITP is 5% for all of Canmore. This is a modest target and should be achievable with regularly schedule bus service on a well located route and stop locations. This report also recommends inclusion of bus shelters are the most active locations. Stop locations and shelters will be confirmed at the Concept Plan stage of development.

4.5.2 THREE SISTERS MOUNTAIN VILLAGE MODE SPLIT GOALS

The timeline for full build out of the Three Sisters Mountain Village area is ten years past the timeline of the ITP. Assuming continued investment in active modes and transit as identified within the ITP, and specific to the Three Sisters Village as is identified in this Transportation Study, WSP has assumed that the mode splits for trips to and from the Three Sisters Village will align with the ITP goals for trips that are travelling to and from the rest of Canmore. For the Smith Creek and Stewart Creek neighbourhoods; however, we have assigned a more conservative mode split to pedestrians and cyclists, based on the understanding that the distances and grades to reach Canmore may impact the ability of people cycling, and particularly people walking, from making their trips by bike or on foot.

Based on these standards and targets and input from the Town of Canmore, WSP has identified a 30% active mode split (15% walking and 15% cycling) for trips to and from the rest of Canmore for all of Three Sisters Village and 20% for Smith Creek and Stewart Creek (10% walking and 10% cycling). For trips that are ultimately starting or ending outside of Canmore (the National Parks or the City of Calgary, for example), no trips are assigned as active modes due to the anticipated distance of these trips and lack of supportive long-distance infrastructure.

Based on discussions with the Town of Canmore and a high-level review of mode splits in other resort communities, WSP recognizes that there are a large range of transit mode splits within other communities. The community of Aspen, Colorado, for example has a 17% summer transit ridership rate and a 29% winter transit ridership rate. WSP has targeted a transit mode split of 10% for trips into and out of the Three Sisters Mountain Village to the rest of Canmore.

The overall target mode split for Three Sisters Village is summarized in **Tables 4-13 and 4-14.** The table highlights the importance of the active modes infrastructure along Three Sisters Boulevard.

Table 4-13 Mode Split by Distribution (Three Sisters Village)

Destination	Automobile	Walking/ Cycling	Transit
Hwy 1 East Via TS Boulevard	95 %	0%	5%
Hwy 1 East Via Dead Man Flats	95%	0%	5%
Hwy 1 West Via TS Boulevard	95%	0%	5%
Hwy 1 West Via Dead Man Flats	95%	0%	5%
Three Sisters Blvd West	60%	30%	10%

Table 4-14 Mode Split by Distribution (Smith Creek and Stewart Creek)

Destination	Automobile	Walking/ Cycling	Transit
Hwy 1 East Via TS Boulevard	95 %	0%	5%
Hwy 1 East Via Dead Man Flats	95%	0%	5%
Hwy 1 West Via TS Boulevard	95%	0%	5%
Hwy 1 West Via Dead Man Flats	95%	0%	5%
Three Sisters Blvd West	70%	20%	10%

4.6 VEHICLE TRIP ASSIGNMENT

Trips assigned to the existing road network followed existing turning movement percentages at existing intersections. Trips assigned to the new intersections were based on final destination and proximity to new accesses.

WSP did not remove trips from the network to account for people changing their retail destinations as a result of increased retail opportunities in Three Sisters Mountain Village. The majority of trips currently accessing Railway Avenue commercial from Three Sisters Mountain Village are likely using Highway 1, and many of those trips will continue to have to travel through the intersection of Three Sisters Parkway and Three Sisters Boulevard even if their retail destination changes. These ongoing shifts in travel destinations as development builds out are not anticipated to overall significantly impact the infrastructure requirements in the study area, but can be monitored through the ongoing monitoring of traffic volumes from the study area.

4.7 TOTAL VOLUMES

Total trip generation accounting for all the previously stated assumptions are summarized in **Tables 4-15** and **4-16**. Total intersection traffic volumes can be found in **Figures 4-1 and 4-2** with total link volumes for the design weekday on **Figure 4-3**.

The cumulative traffic volumes represent a conservative set of assumptions for total trip generation. Any number of inputs could adjust and result in lower trip generation including:

- Ranges in ultimate occupancy of residential units;
- Higher internal trip capture than predicted between the integrated land uses; and
- Higher mode split (impacted by parking availability, parking cost, demographics of residents, and transit and multimodal infrastructure).

This analysis also represents the peak season, peak period scenario in terms of annual traffic fluctuations, as the analysis was completed for a busy weekend in the summer. This analysis focuses on recommending adequate infrastructure to keep traffic flowing during this peak period, albeit at a reduced capacity.

Table 4-15 Trip Distribution - Multi Modal (Weekday PM)

Destination	Driving Vehicle Trips		Walking/Bike Person Trips		Transit Person Trips	
	In	Out	In	Out	In	Out
Three Sisters Village						
Hwy 1 West Via TS Blvd	815	499	0	0	68	48
Hwy 1 West Via DMF Interchange	0	0	0	0	0	0
Hwy 1 East Via TS Blvd	99	63	0	0	7	5
Hwy 1 East Via DMF Interchange	99	63	0	0	7	5
Three Sisters Pkwy West	545	351	434	321	145	107
Total External Trips	**1558**	**976**	**434**	**321**	**227**	**165**
Internal Trips between Developments (additional 10%)	173	108	48	36	25	18
Smith Creek						
Hwy 1 West Via TS Blvd	111	65	0	0	8	5
Hwy 1 West Via DMF Interchange	444	254	0	0	31	21
Hwy 1 East Via TS Blvd	0	0	0	0	0	0
Hwy 1 East Via DMF Interchange	111	65	0	0	8	5
Three Sisters Pkwy West	333	194	124	87	62	45
Total External Trips	**999**	**578**	**124**	**87**	**109**	**76**
Internal Trips between Developments (additional 10%)	111	64	14	10	12	8
Stewart Creek						
Hwy 1 West Via TS Blvd	127	149	0	0	10	12
Hwy 1 West Via DMF Interchange	0	0	0	0	0	0
Hwy 1 East Via TS Blvd	14	16	0	0	1	1
Hwy 1 East Via DMF Interchange	14	16	0	0	1	1
Three Sisters Pkwy West	94	111	41	48	22	23
Total External Trips	**249**	**292**	**41**	**48**	**34**	**37**
Internal Trips between Developments (additional 10%)	28	32	5	5	4	4

Table 4-16 Trip Distribution - Multi Modal (Saturday PM)

Destination	Driving Vehicle Trips		Walking/Bike Person Trips		Transit Person Trips	
	In	Out	In	Out	In	Out
Three Sisters Village						
Hwy 1 West Via TS Blvd	564	482	0	0	50	42
Hwy 1 West Via DMF Interchange	0	0	0	0	0	0
Hwy 1 East Via TS Blvd	67	57	0	0	5	5
Hwy 1 East Via DMF Interchange	67	57	0	0	5	5
Three Sisters Pkwy West	340	288	269	251	89	83
Total External Trips	**1038**	**884**	**269**	**251**	**149**	**135**
Internal Trips between Developments (additional 10%)	115	98	30	28	16	15
Smith Creek						
Hwy 1 West Via TS Blvd	48	42	0	0	4	4
Hwy 1 West Via DMF Interchange	194	168	0	0	14	14
Hwy 1 East Via TS Blvd	0	0	0	0	0	0
Hwy 1 East Via DMF Interchange	48	42	0	0	4	4
Three Sisters Pkwy West	143	123	58	61	29	31
Total External Trips	**433**	**375**	**58**	**61**	**51**	**53**
Internal Trips between Developments (additional 10%)	48	42	6	7	6	6
Stewart Creek						
Hwy 1 West Via TS Blvd	87	82	0	0	12	10
Hwy 1 West Via DMF Interchange	0	0	0	0	0	0
Hwy 1 East Via TS Blvd	9	10	0	0	1	1
Hwy 1 East Via DMF Interchange	9	10	0	0	1	1
Three Sisters Pkwy West	65	60	43	40	21	20
Total External Trips	**170**	**162**	**43**	**40**	**35**	**32**
Internal Trips between Developments (additional 10%)	19	18	5	4	4	4

LEGEND

XX - Summer Weekday PM Peak Hour Traffic Volumes
- Three Sisters Mountain Village Site

WSP Canada Group Limited
10909 Jasper Ave, Suite 1200
Edmonton, AB T5J 3L9
t. 306.205.7942
www.wsp.com

Issue Date - 2020-10-07
Scale: NTS
Aerial Imagery: 2019
Note: All Dimensions shown in Metres unless otherwise noted

Figure 4-1 - Total (2040) Weekday PM Peak Traffic Volumes

Three Sisters Mountain Village Transportation Impact Assessment

DRAWING:2040 Total Peak Traffic Volumes.cdr DATE: 2020-10-07 DRAWN BY: piperde

10 ST
8 ST
7 ST
RUNDLE CRES
THREE SISTERS DR
RUNDLE DR
SPRAY LAKES RD
PEAKS DR
HIGHWAY NO.1
THREE SISTERS PKWY
WEST ACCESS
EAST ACCESS
THREE SISTERS BLVD
HIGHWAY NO. 1
N

0 172 41 | 40 / 0 / 199
0 / 1 / 0 | 0 171 167
15 310 15 | 15 / 18 / 82
10 / 17 / 16 | 14 320 70
350 28 | 28 / 187
362 164

15 15 | 13 / 545
22 551
137 410 | 137 426
138 / 149 | 496 / 50 / 29
43 7 490
42 / 130 / 0 | 2 9 16

437 / 391
462 / 215 | 186 343
625 / 181 | 158 425
670 / 483

10 406 730 | 799 / 35 / 205 | 868 10 | 170 / 4 | 7 / 7
17 / 27 / 5 | 9 443 142 | 788 / 160 | 780 / 18 | 167 1

Google Earth

LEGEND

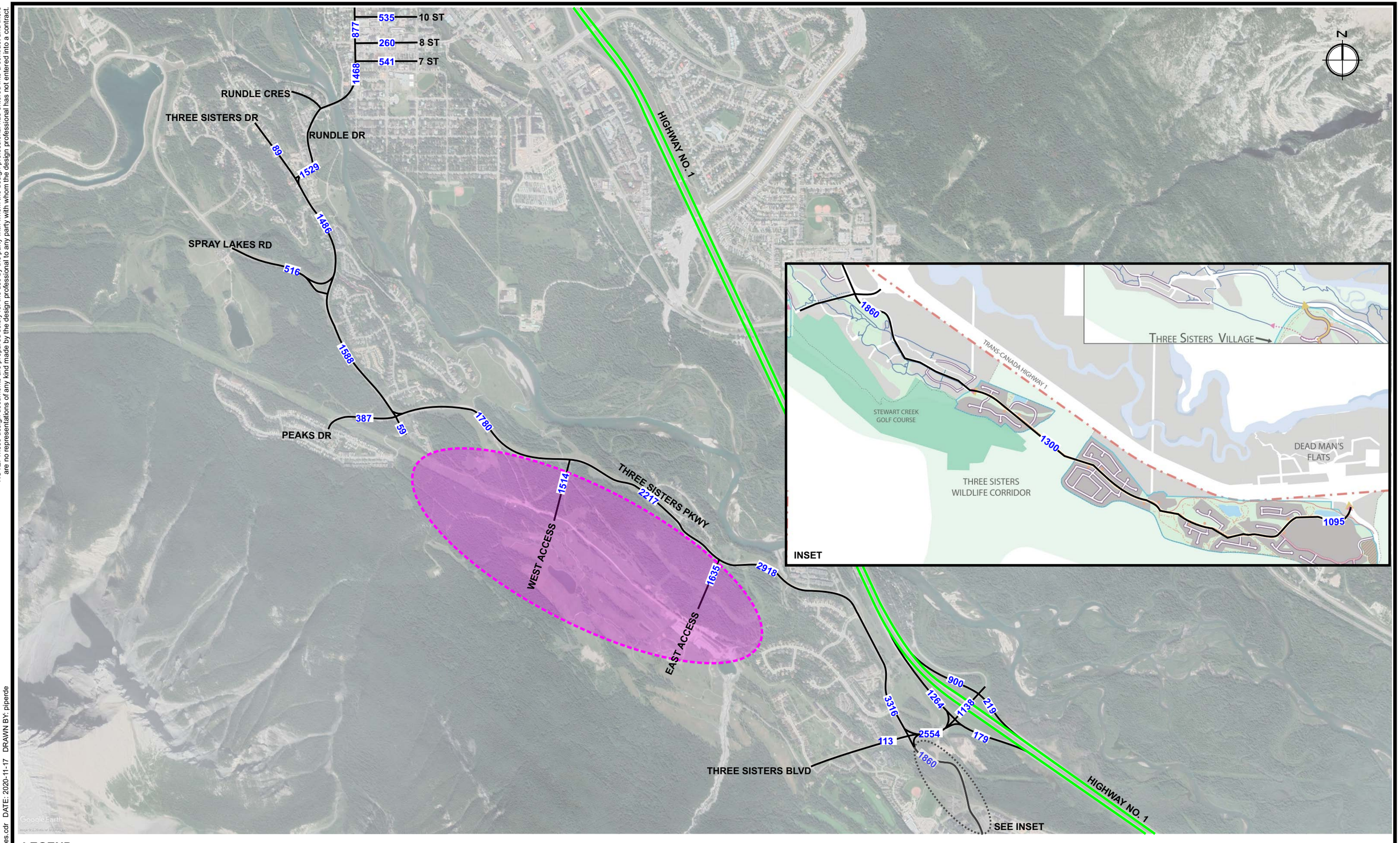
XX - Summer Saturday PM Peak Hour Traffic Volumes
- Three Sisters Mountain Village Site

WSP Canada Group Limited
10909 Jasper Ave, Suite 1200
Edmonton, AB T5J 3L9
t. 306.205.7942
www.wsp.com

Issue Date - 2020-10-07
Scale: NTS
Aerial Imagery: 2019
Note: All Dimensions shown in Metres unless otherwise noted

Figure 4-2 - 2040 Total Saturday Afternoon Peak Hour Traffic Volumes

Three Sisters Mountain Village Transportation Impact Assessment



LEGEND

XX - Total (2040) Weekday PM Peak Link Volumes
- Three Sisters Mountain Village Site

WSP Canada Group Limited
10909 Jasper Ave, Suite 1200
Edmonton, AB T5J 3L9
t. 306.205.7942
www.wsp.com

Issue Date - 2020-11-17
Scale: NTS
Aerial Imagery: 2019
Note: All Dimensions shown in metres unless otherwise noted

Figure 4-3 - Total (2040) Weekday PM Peak Link Volumes

Three Sisters Mountain Village Transportation Impact Assessment

DRAWING:Link Volumes.cdr DATE: 2020-11-17 DRAWN BY: piperde

A summary comparison of the total study area shows that personal travel will be significantly higher on an average weekday than a weekend (**Table 4-17**).

Table 4-17 Total Trips Weekday Vs Saturday

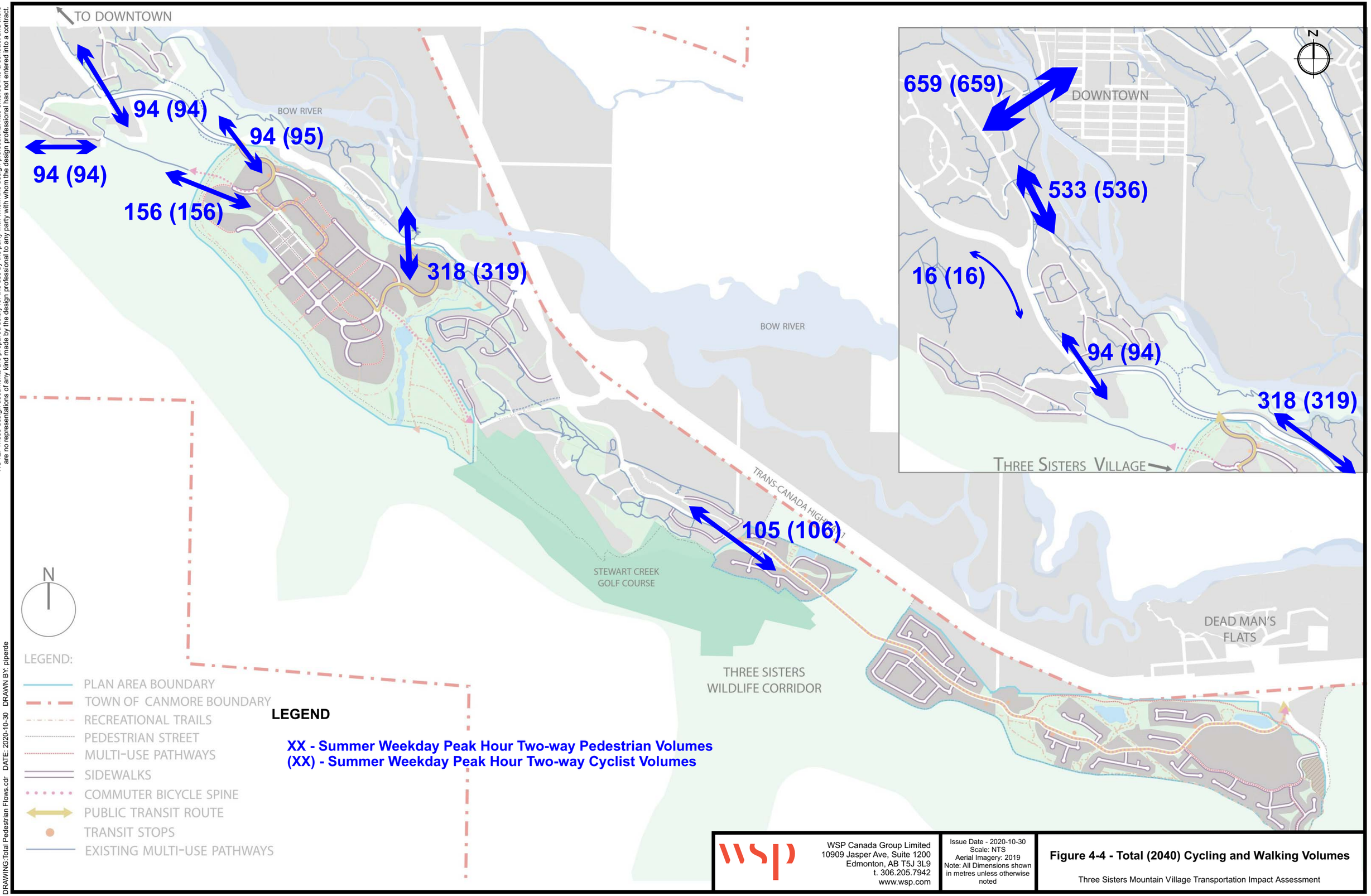
Destination	Driving Vehicle Trips		Walking/Bike Person Trips		Transit Person Trips	
	In	Out	In	Out	In	Out
Three Sisters Village						
Weekday - Total External Trips	**1558**	**976**	**434**	**321**	**227**	**165**
Saturday - Total External Trips	**1038**	**884**	**269**	**251**	**149**	**135**
Smith Creek						
Weekday - Total External Trips	**999**	**578**	**124**	**87**	**109**	**76**
Saturday - Total External Trips	**433**	**375**	**58**	**61**	**51**	**53**
Stewart Creek						
Weekday - Total External Trips	**249**	**292**	**41**	**48**	**34**	**37**
Saturday - Total External Trips	**170**	**162**	**43**	**40**	**35**	**32**
Total Study Area						
Weekday - Total External Trips	2806	1846	599	456	370	278
Saturday - Total External Trips	1641	1421	370	352	235	220

4.8 WALKING/CYCLING VOLUMES

Active transportation trips generated by the development were distributed based on destinations (commute and recreational), availability of active transportation infrastructure, and the availability of AAA facilities. Key destinations that were considered outside of the development area include Quarry Lake Park, Grassi Lake, the Canmore Nordic Centre and downtown Canmore. Trips were distributed to facilities cumulatively beginning with Smith Creek and proceeding north east to Stewart Creek, and finally the Three Sisters Village area.

The distribution of trips did not consider the future extension of the Trans-Canada Trail from the Cougar Creek Pedestrian Underpass at Trans Canada Highway to the Three Sisters Interchange paralleling the Trans-Canada Highway. If this extension is built, it's estimated that between 20 and 25% of trips destined towards the Bow River Bridge would be diverted to the Trans-Canada Trail Connection to Three Sisters Interchange.

These volumes are summarized in **Figure 4-4**.



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Issue Date - 2020-10-30
Scale: NTS
Aerial Imagery: 2019
Note: All Dimensions shown in metres unless otherwise noted

Figure 4-4 - Total (2040) Cycling and Walking Volumes

Three Sisters Mountain Village Transportation Impact Assessment

DRAWING:Total Pedestrian Flows.cdr DATE: 2020-10-30 DRAWN BY: piperde

4.9 TRANSIT VOLUMES

Table 4-15 summarizes the total identified transit trips for the peak transit period, the Weekday PM Peak hour. A total of 719 transit trips are identified, with 400 of those trips on the Three Sisters Boulevard towards Canmore. The remaining trips would include regional trips to Banff and Calgary, as well as trips which may be destined towards other areas in Canmore.

4.10 COMPARISON TO 2004 TIA/ASP

The previous approved ASP for the Three Sisters Village Area was completed in 2004. A study to review the operations of the Three Sisters Parkway was completed at that time (*Three Sisters Development Operational Review of Three Sisters Parkway – 2004)*. WSP has reviewed the units identified in the 2004 TIA and applied updated trip generation rates to compare the projected impacts between the current and past plans for the area. WSP has also attempted to determine what proportion of the total trips identified from the 2004 TIA are westbound on the Three Sisters Parkway into Canmore for further comparison of the relative difference between the two studies in relation to the impact on key infrastructure in the Town of Canmore.

4.10.1 THREE SISTERS VILLAGE ASP AREA

A comparison of the total units proposed for Three Sisters Village ASP and remaining development in Stewart Creek is included in **Table 4-17**.

Table 4-17 Three Sisters Village Land Use Comparison

Land Use	2004 TIA	2020 TIA
Low Density	159 Units (resort) – 90% Occupancy	-
Medium Density	1163 Units (resort) – 90% Occupancy	2600 Units
Apartments	-	2100 Units
Retail/Office/Manufacturing/Restaurant	15,000 ft^2 (retail)	577,000 ft^2
Hotel	370 rooms	800 Rooms
Medi Centre/Sport Complex	180,000 ft^2	263,000 ft^2

Applying the 2010 ITE Trip Generation Rates to the 2004 TIA, but with 100% automobile trips (as assumed in the 2004 TIA), the total trips are summarized in **Table 4-18**. It appears all resort units in the 2004 TIA had the same trip rate; to approximate this WSP has applied the ITE Trip Rate 221 with 90% occupancy, which aligns with the assumptions in the 2004 TIA. To estimate the number of trips that were bound for Canmore on the parkway in the 2004 TIA, the trip distribution identifying westbound trips was used.

Table 4-18 Three Sisters Village Trip Generation Comparison

Land Use	2004 TIA	2020 TIA
Total Trips (Vehicle)	1128	2534
Total Trips on Three Sisters Parkway Toward Canmore (Vehicle)	**567**	**896**

COMPARISON OF ASP MAXIMUM ALLOWABLE UNITS

The 2004 TIA is not based on the 2004 ASP maximum of 2525 units which are allowable in the Resort Centre ASP area. Further, missing from that number is the estimated amount of Entry Level Housing, which in the existing ASP does not officially count towards unit count, and was not predicted in the TIA trip generation. Current levels of ELH in other areas are built up with 25% of all units. The 2020 ASP identifies the maximum units in all district ranges, and the TIA is based on those units, which exceeds the 4890 cap for reasons previously discussed in this report.

As a comparison, **Table 4-19** summarizes the comparison in units available in 2004 ASP, aligning with the maximum allowable units plus 25% PAH with the actual maximum allowable units in the 2020 ASP.

Table 4-19 Comparison of 2004/2020 Maximum Allowable Units

Land Use	2004 ASP	2020 ASP
Low Density	1159 Units (resort) – 90% Occupancy	-
Medium Density	1366 Units (resort) – 90% Occupancy	2400 Units
25% Additional ELH	630 units – 90% occupancy	-
Apartments	-	1900 Units
Retail/Office/Manufacturing/Restaurant	15,000 ft^2 (retail)	577,000 ft^2
Hotel	370 rooms	600 Rooms
Medi Centre/Sport Complex	180,000 ft^2	263,000 ft^2

The comparison in trips with this adjustment is included in **Table 4-20**. With the adjustments to make the total units more comparable, the 2020 ASP still identifies more trips, however the trips on the Parkway towards Canmore become higher in the 2004 ASP.

Table 4-20 Updated Three Sisters Village Trip Generation Comparison

Land Use	2004 ASP	2020 ASP
Total Trips (Vehicle)	1746	2371
Total Trips on Three Sisters Parkway Toward Canmore (Vehicle)	**886**	**851**

4.10.2 SMITH CREEK (SITES 7,8,9)

The update to the Smith Creek ASP reflects an increase in retail and office space. The total units for each study are provided for comparison in **Table 4-21**.

Table 4-21 Smith Creek ASP Land Use Comparison

Land Use	2004 TIA	2020 TIA
Single Family	1000 Units	1250 Units (mix of Single/Semi-detached/Townhomes)
Multifamily	1500 Units	500 Units
Shopping or Restaurant	-	124,700 ft^2
Office	-	74,300 ft^2
School	-	500 Students

The 2004 TIA is not clear what proportion of the identified trips that are westbound on the Three Sisters Boulevard would exist at the Highway 1 interchange. The 2020 TIA identifies that approximately 40% of westbound trips on the Parkway continue on towards Canmore past the interchange; this same allocation is used for the comparison in **Table 4-22.**

Table 4-22 Smith Creek Trip Generation Comparison

Land Use	2004 TIA	2020 TIA
Total Trips (Vehicle)	1605	1577
Total Trips on Three Sisters Parkway toward Canmore (Vehicle)	**257**	**527**

4.10.3 STEWART CREEK AREA

The land use comparison and trip generation comparisons for Stewart Creek are summarized in **Table 4-23** and **4-24**. WSP has assumed all westbound trips on Three Sisters Parkway identified are bound for Canmore; this may be a conservative assumption.

Table 4-23 Stewart Creek Land Use Comparison

Land Use	2004 TIA	2020 TIA
Commercial	116,205 ft^2	128,000 ft^2
Office	107,000 ft^2	126,000 ft^2
Multifamily Residential	330 Units	246 Units

Table 4-24 Stewart Creek Trip Generation Comparison

Land Use	2004 TIA	2020 TIA
Total Trips (Vehicle)	701	541
Total Trips on Three Sisters Parkway toward Canmore (Vehicle)	**362**	**205**

4.10.4 SUMMARY

Table 4-25 summarizes the difference in total trips between the two ASPs and subsequent TIAs. The 2020 TIA represents approximately a 35% increase in traffic compared to the previous TIA. Comparing the differences in land use, the 2020 application includes approximately 65% more residential development, 120% more hotel rooms, and approximately 800,000 ft^2 additional retail and office space development.

Table 4-25 Total Trip Comparison

Land Use	2004 TIA	2020 TIA
Total Trips (Vehicle)	3434	4652
Total Trips on Three Sisters Parkway toward Canmore (Vehicle)	**1186**	**1628**

5 MULTI-MODAL ANALYSIS

Per the 2018 ITP, the focus of new development in Canmore should be on prioritizing multi-modal infrastructure to accommodate people walking, cycling, and taking transit wherever possible. Providing facilities for people walking and cycling are a lower-cost investment than new roads and intersection upgrades. Three Sisters Mountain Village, including Three Sisters Village, Smith Creek, and Stewart Creek, are all being developed (or are currently developed) with a mixture of Complete Streets, pedestrianized connections and cycling routes within the developments that will facilitate a high internal mode split. This TIA also identifies the required linkages for people cycling and walking between Three Sisters Mountain Village and the rest of Canmore.

This section focuses on total trips from Three Sisters Mountain Village areas by bicycle, on foot or on transit.

5.1 EXTERNAL MULTI-MODAL TRIPS

5.1.1 CYCLING/WALKING

Table 5-1 through **5-4** below provides the bi-directional number of trips anticipated at Bow River Bridge, Prospect Bridge, riverfront pathway north of the west access to Three Sisters Mountain Village and Three Sisters Parkway including development trips and background growth for weekday vehicle peak hour. A pedestrian and cyclist mode split of 50/50 was assumed for active transportation trips.

Table 5-1 Bow River Bridge Future Total Trips

Mode	2040 Background Growth Trips	Development Trips	Total
Pedestrian	230	429	659
Cyclists	230	429	659

Table 5-2 Prospect Bridge Total Trips

Mode	2040 Background Growth Trips	Development Trips	Total
Pedestrian	161	373	534
Cyclists	162	373	535

Table 5-3 Riverfront Pathway Total Trips

Mode	2040 Background Growth Trips	Development Trips	Total
Pedestrian	40	373	413
Cyclists	40	373	413

Table 5-4 Three Sisters Pathway Total Trips

Mode	2040 Background Growth Trips	Development Trips	Total
Pedestrian	16	105	121
Cyclists	16	105	121

A summary of the assessment using frequency of events and FHWA look-up tables is are provided in **Table 5-5**. Details of that analysis are located in **Appendix D**.

Table 5-5 Total Development Pedestrian/Cycling Analysis

Location	Effective Width of Facility (m)	TRB Methodology		FHWA Methodology	Improvement Required?
		Frequency of Events	LOS	LOS	
Bow River Bridge	2.5 m	2204	F	F	Yes
Prospect Bridge	2.0 m	1786	F	F	Yes
Riverfront Path	3.0 m	1381	F	F	Yes
Three Sisters Parkway	2.5 m uni-directional protected bike lanes + 2.0 m sidewalks + 2 vehicle lanes	-	A	-	No

Based on this analysis, improvements are required to the Bow River Bridge, Prospect Bridge and the Three Sisters Pathway/Riverfront Trails.

The CROW Manual indicates that segregation of cyclists and pedestrians is required for Bow River Bridge at 264 pedestrians per hour per metre of profile width and Prospect Bridge at 267 pedestrians per hour per metre of profile width.

Improvement options that should be considered include the conversion of Bow River Bridge into a Complete Street (effective widths of 2.5 metre path, 2.0 m sidewalk and 2.5 metre unidirectional bike lanes), widen Prospect Bridge to support an effective width of 3.0 m two-way bike path and 2.5 m sidewalk, and widen the riverfront path to support a 3.0 m two-way bike path and 2.5 m sidewalk up to the eastern connection to the Three Sisters Village.

While WSP has evaluated a 2.5 metre shared use path as part of the infrastructure on the Bow River Bridge, it is acknowledged that this reflects the currently available facility. This effective width is lower than would be ideal for a facility of this type, and future opportunities to widen it should be considered.

Active modes accessing the Bow River crossing will also use the Rundle Drive/Three Sisters Drive corridor. This corridor lacks dedicated cycle lanes warranted by the projected volumes from background traffic and growth from TSMV. Rundle Street has an existing 1.0 to 1.5 m mono sidewalk on both sides, directly beside the travel/parking lane. Three Sisters Drive sidewalk is similar with the eastern sidewalk terminating at Rummel Place. A complete street plan is required to identify the corridor cross section. The corridor plan should align with recommendations

identified in the ITP. WSP understands that the Town of Canmore is contemplating a complete streets plan to be undertaken as funding permits.

Prospect Bridge and the trail surrounding it exceeds the desired capacity with 2040 background growth. Improvements that include bridge and trail widening are required to support increased trips driven by development. Effective widths of 3.0 m two-way exclusive bike path and 2.5 m sidewalks is not able to achieve the desired LOS C needed to support the pedestrian and cyclist peak hour background and development traffic.

The riverfront pathway north of the west access to Three Sisters Mountain Village approaches the desired capacity of the trail network in the 2040 build out horizon. The 3.0 m two-way exclusive bike path and 2.5 sidewalk has an identified LOS of between C and D.

The results of the upgrade requirements and their achieved LOS are summarized in **Table 5-6.**

Table 5-6 Summary of Upgrade Requirements

Location	Effective Width Cross Section	Performance		LOS C Achieved?
		Walk	Bike	
Bow River Bridge	2.5 m multi-use path, 2.0 m sidewalk, 2 vehicle lanes, 2.5 m unidirectional bike lanes in each direction	2.74 ped/min/m on sidewalk; LOS A[1] 2.20 ped/min/m on multi-use path; LOS A[1]	LOS B-C[2]	Yes
Prospect Bridge	3.0 m two-way bike path and 2.5 m sidewalk	3.56 ped/min/m; LOS A[1]	LOS D-E[3]	No
Riverfront Path	3.0 m two-way bike path and 2.5 m sidewalk	2.75 ped/min/m; LOS A[1]	LOS C-D[3]	No

1 – based on HCM Pedestrian Flow Rate; realistically, the LOS will be lower depending on the percentage of cyclists using the facility

2 – Based on TRB Operational Analysis of Uninterrupted Facilities – One-Way Exclusive Bike Path

3- Based on TRB Operational Analysis of Uninterrupted Facilities – Two-Way Exclusive Bike Path

Future construction of the Trans-Canada Trail extension from Cougar Creek Pedestrian Underpass to the Three Sisters Interchange or construction of a new active modes bridge over the river may divert the volume of active modes users towards Bow Bridge, Prospect Bridge and the Riverfront Pathway.

The results show a LOS of D-E on the Prospect Bridge, which does not achieve the required LOS for an active modes facility. WSP evaluated what change in volumes/infrastructure would be needed to achieve the desired LOS C. A total reduction in 185 bicycle trips per hour (35% of the total cycling trips on the facility) is needed. As the facility becomes more congested, some of those trips would redirect to the Three Sisters Parkway on-street facility. However, if volumes approach this capacity, the TransCanada Trail Extension, or other additional crossing of the Bow River may be needed before the 2040 horizon. The potential impact of this facility is discussed further in **Section 7**, which evaluates a scenario in which higher walking and cycling volumes indicate a need for it within the study horizon.

The proposed trail network and recommended upgrades are highlighted in **Figure 5-1.** Note that all connections through the wildlife corridor will require approval from the Province. The Three Sisters Parkway crossing that links

Smith Creek to the rest of the community has a single crossing of the wildlife corridor. Future design of this section of roadway will need to balance the EDCG with the need to minimize impacts on wildlife movements.

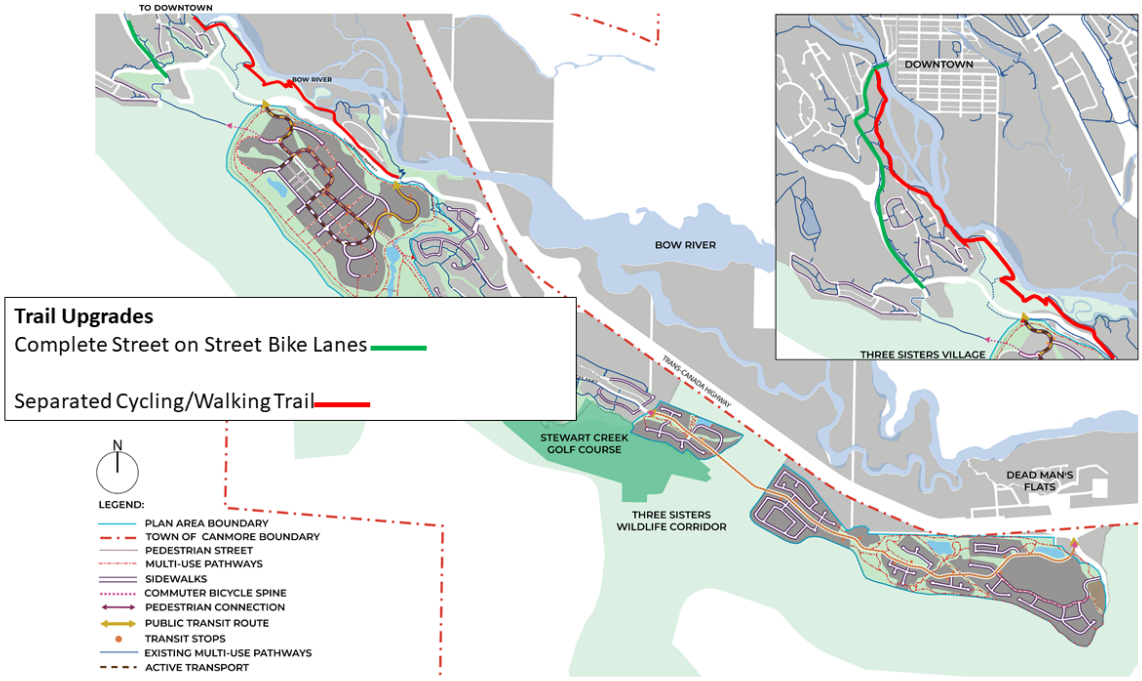

Figure 5-1 Proposed Canmore Trail Network

5.1.2 TRANSIT

Table 4-15 summarizes the total identified transit trip for the peak transit period, the Weekday PM Peak hour. A total of 719 transit trips are identified, with 400 of those trips on the Three Sisters Boulevard towards Canmore. The remaining trips would include regional trips to Banff and Calgary, as well as trips which may be destined towards other areas in Canmore.

To accommodate this potential transit demand, continued investment in regional transit between Banff and Canmore, and other key tourist destinations should be prioritized. To accommodate trips within Canmore on the Bow Valley Parkway, adding the 400 development transit trips to the 160 future background trips indicates a total of 560 transit trips in the PM Peak Hour.

By buildout horizon, the recommended service for the Three Sisters Community is three routes. Route "A" would be an evolution of the current ROAM service. It would provide service from Smith Creek to the Town Centre. Route "B" would connect Three Sisters Village to the town centre bus hub running on a 30 minutes route round trip time. The buses operating on a 10-minute frequency of service, with rated load of the current Nova buses of 80 person capacity, would service 480 riders an hour. This assumes 100% of the riders are going in the same direction during peak hour which will not happen. Route "C" would connect directly from the Three Sisters Village tourists' hub to Banff. This would be a growth of the ROAM existing service.

Overall, bus based public transit service is flexible and can evolve with the development. The ASP must plan the routes, apply the associated road standards as per the Town of Canmore's engineering guidelines and include stop locations into the development. Vehicle technology is also evolving with a shift from diesel to natural gas and likely from nature gas to electrification within the time horizon.

5.2 INTERNAL MULTI-MODAL NETWORK

5.2.1 THREE SISTERS VILLAGE

Three Sisters Village is a multi-modal, mixed use, compact development that provides opportunities for residents and visitors to walk and cycle for many of their trips. The use of intercept lots within the Plan Area and within other areas of Three Sisters Mountain Village should further support users dropping their car in one location and proceeding to complete their remaining trip(s) on foot or by bike.

Three Sisters Village has two accesses to the Parkway, both of which have been recommended as roundabouts unless physical constrains of the site do not allow for a properly designed roundabout without significant retaining design (discussed in Section 4.3). These access streets are collector roads and connect to a network of local roads. Due to slope sensitive earthwork and road grades, it has been discussed that cycle facilities on the first leg of the entrance roads may not match EDCG design. In order to achieve AAA guidelines, the pathway and cycle tracks may be decoupled from the roadway but generally run parallel.

Collector and local road design should align with the current Town of Canmore Engineering Design and Construction Standards (EDCS). These standards will not only support the accommodation of traffic within the areas, but also support the desired outcomes of walking and cycling. The Final Three Sisters Village Road network is available in the ASP documents but illustrated here for reference in **Figure 5-2**.

Figure 5-2 Three Sisters Road Network

CYCLING/WALKING

Three Sisters Village is anticipated to have the highest mode split of the three development areas, with as much as 50% of internal trips during the peak hour being completed on foot or by bike based on the target mode split for collector and local streets as identified within the ITP. Over 90% of the Village residents are within a 1,000 metre walking distance to the Village Centre. Within the Three Sisters Village, the Village Centre will have the most significant pedestrian and cycling volumes. The proposed active transportation network to support these volumes is based on the Town's current EDCG with a focus on developing centralized walking and cycling networks that prioritize efficient and safe movement of people cycling between generators and destinations. The recommended pedestrian and cycling networks for Three Sisters Village is shown in **Figure 5-3**.

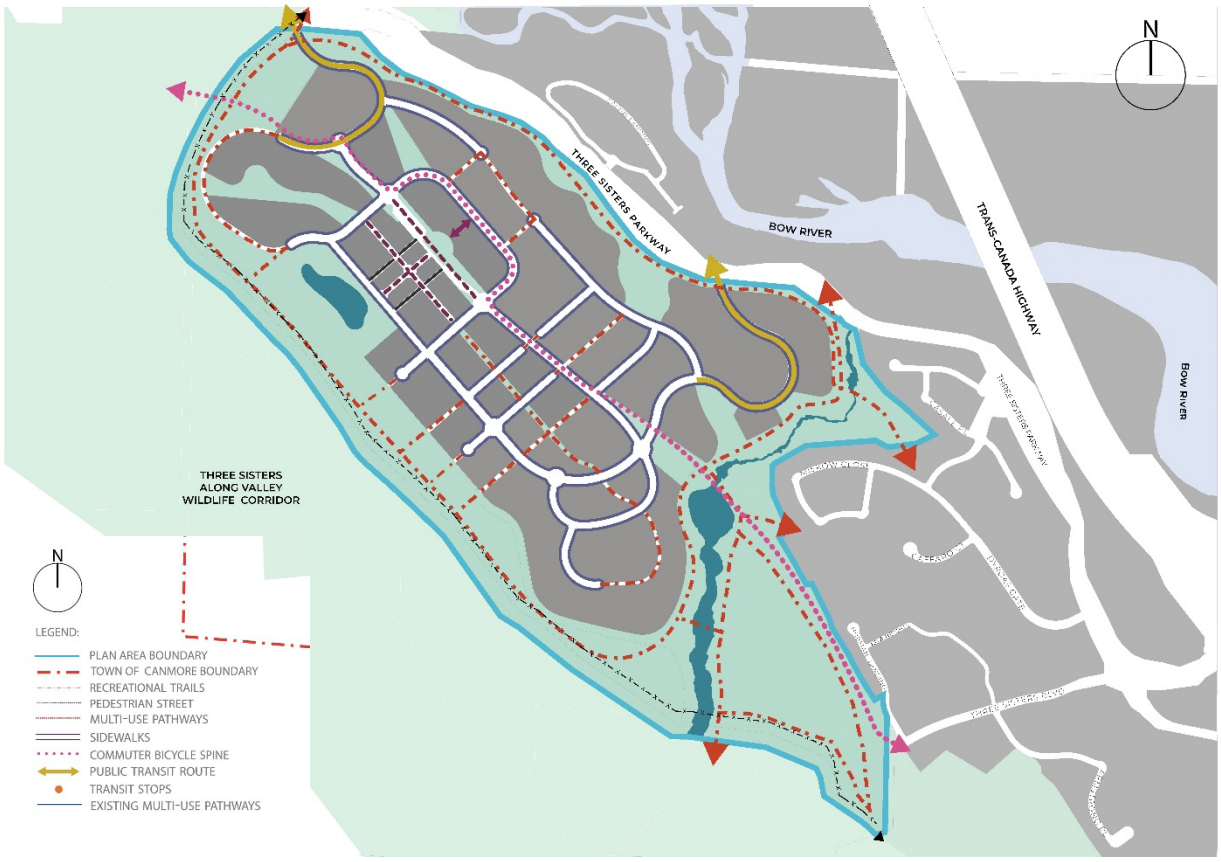

Figure 5-3 Three Sisters Village Multi-Modal Network

Additional policies that will support the target mode splits within the Three Sisters Village include:

- Potential intercept parking lots at the periphery of the Village Centre area;
- Provision of bike parking as directed by the Land Use Bylaw;
- Bike Share Strategy for Three Sisters Mountain Village; and
- Ongoing review of parking minimums to minimize oversupply of parking infrastructure over time as demand decreases.

TRANSIT

Tables 4-15 summarized the potential transit ridership for the Weekday PM Peak from the study area. Within the Village plan area, the longest walking trip to a planned bus stop is approximately 600 metres or 10 minutes.

This analysis identifies a similar amount of internal transit ridership on both the weekday and the weekend within Three Sisters Village. Internal transit may be warranted within Three Sisters Mountain Village when development is complete. The likely recommended format for this type of transit is higher frequency/lower capacity shuttles. Again, this transit should be integrated to allow for people walking and cycling at either trip end.

A potential transit network for Three Sisters Village is shown in **Figure 5-4**.

Figure 5-4 Three Sisters Village Transit Network Map

5.2.2 SMITH CREEK ASP

Smith Creek is disbursed along the Three Sisters Parkway, with shorter local roads connecting directly to the Parkway. A collector road serves the residential south of the commercial site. Natural slopes and steep creek considerations in the area may prevent the collector road from directly accessing the south side of the commercial site. The ASP alignment is based on preliminary engineering of the area. The overall road network is shown in the associated ASP documents. The overall road network is shown in the associated ASP documents. Access points to Three Sisters Parkway will be determined at the Concept Scheme phase of development taking into account a variety of site specific, policy, planning and engineering factors.

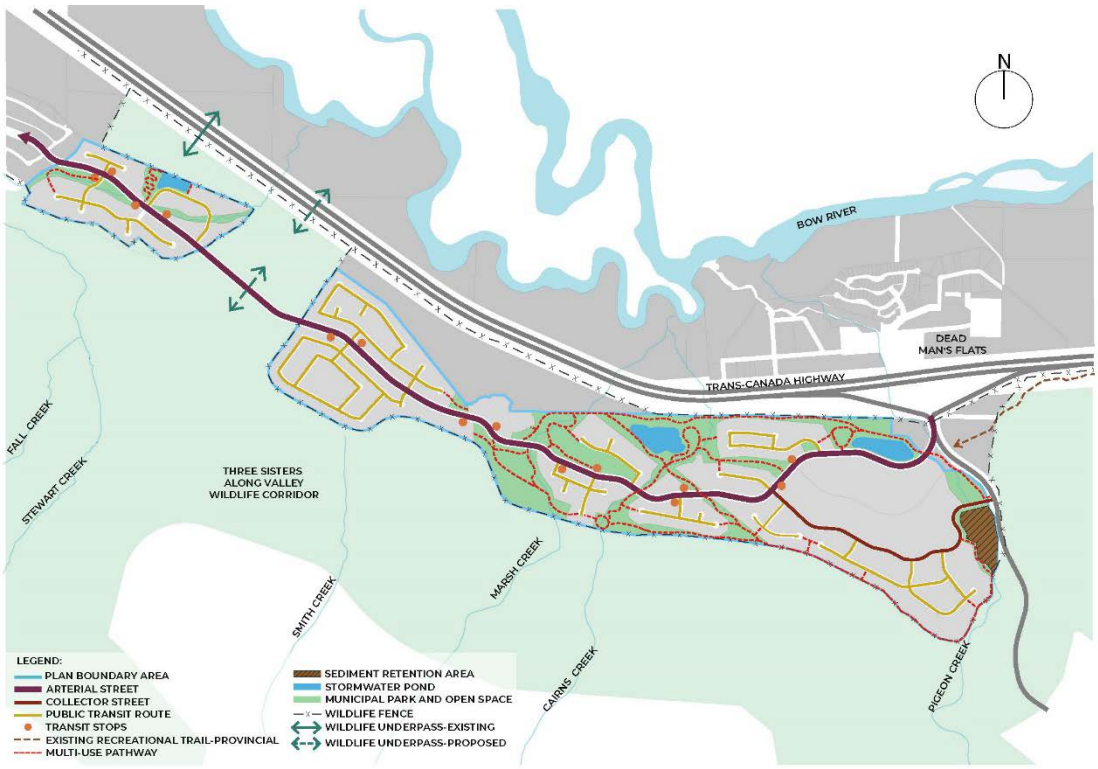

Figure 5-5 Smith Creek Road Network

WALKING/CYCLING

Active modes are accommodated in the Smith Creek neighbourhood with similar street designs as the Three Sisters Village. The mix of land uses in Smith Creek and more linear arrangement of uses, are anticipated to result in a lower percentage of overall trips being made by walking and cycling in Smith Creek than Stewart Creek and Three Sisters Village; however, it is important to still provide direct and safe access for those accessing Smith Creek via bike or foot. The recommended Active Mode Network for Smith Creek is summarized in **Figure 5-6**. Sidewalks should be provided along all local roads and a trail is provided on the Three Sisters Parkway, which will support walking and cycling trips within Smith Creek and external between the rest of Three Sisters Mountain Village.

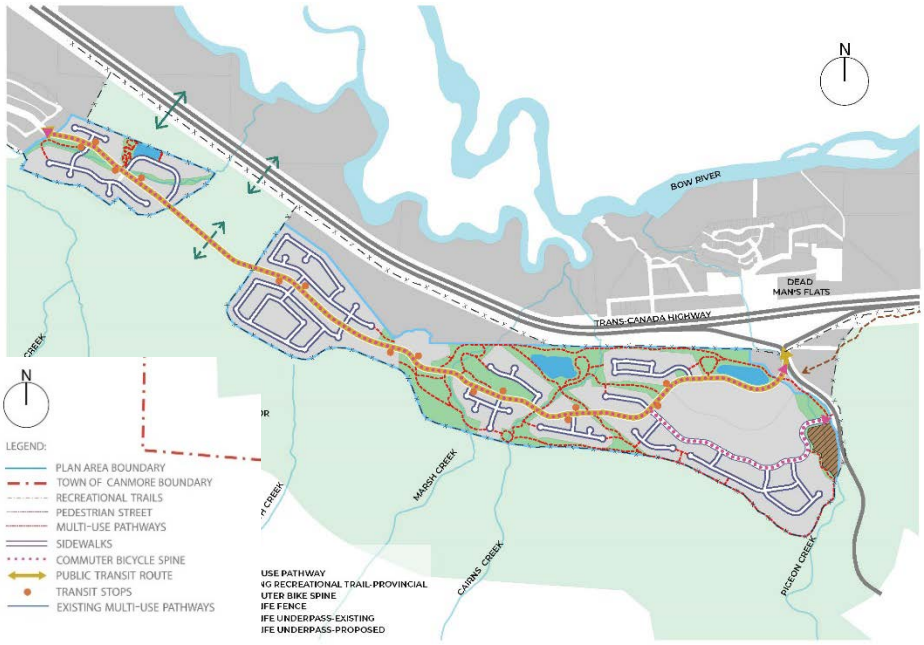

Figure 5-6 Smith Creek Multi-Modal Network

TRANSIT

Conceptual transit stop locations for Smith Creek are also shown in **Figure 5-6**. These stops are primarily focused on facilitating external transit trips between Smith Creek and the rest of Canmore, but will also allow local residents to choose transit to supplement their other mode trips to the Village Centre and Stewart Creek office/retail sites. The public transit routing allows for future extension of ROAM service into the Dead Man's Flat community. The policy in Smith Creek prioritizes multi-family residential along the Parkway which will allow more residential population to be within walking distance of transit stops.

6 TRAFFIC ANALYSIS

The intersection operations were evaluated to consider overall operation of the network, with a target v/c of 0.95 and LOS of E for individual movements at the intersection. This level of service seeks to avoid over emphasising vehicular mobility at the expense of other multimodal usage goals of the ITP. By allowing a certain level of delay without causing overall network gridlock, the plan can help encourage people to use other modes of travel.

Traffic analysis at the 2040 horizon was completed for two infrastructure scenarios. The first analysis reviewed the impact of additional vehicular traffic caused by background growth combined with vehicular traffic resulting from new development on the existing street network. This analysis assumed the Parkway was completed to Dead Man's Flat interchange. As previously stated the TCH/George Biggy Sr. interchange is outside this study's scope. The analysis identified that, without upgrades to existing intersections, the study intersections would face delays and degrades in current level of service.

Two sensitivity analyses were also completed. The first reviewed an option for the accesses to Three Sisters Village with minimal intersection upgrade to identify what delay may be experienced during the peak hour.

As was discussed in **Section 3.1**, this TIA evaluates the infrastructure needed to accommodate the maximum identified units for each ASP area. However, because the structure of the ASP includes a range of units for flexibility within phasing that ultimately exceeds the total permitted units within the area, the full build out will reflect less units than was analyzed, though its unknown where these units may change (what type of housing, or hotel room for example). In the Three Sisters Village ASP, this accounts for an additional 610 units. As a sensitivity test, WSP has analyzed a scenario which includes 200 fewer hotel rooms, 200 fewer semi-detached residences, and 200 fewer apartments.

The traffic analysis was completed using Synchro to review the intersection delay and queuing. For scenarios including roundabouts, SIDRA was used, using the SIDRA methodology.

6.1 2040 HORIZON WITH EXISTING INFRASTRUCTURE

The results for the 2040 weekday afternoon peak hour and the 2040 weekend afternoon peak hour with the existing road network infrastructure are summarized in **Table 6-1**. The analysis indicates that delay and congestion is likely to occur on the network and that modification are needed to achieve acceptable traffic operations in the future if the Town of Canmore wishes to achieve a LOS of E or better along the corridor. The identified v/c ratios reflect a network that is exceeding acceptable capacities.

The critical point on the road network is the Three Sisters Boulevard / Three Sisters Parkway intersection (Intersection #8). At the Three Sisters Boulevard / Three Sisters Parkway intersection (existing all-way stop-controlled), there are 1,123 westbound rights competing to using the channelized right turn. These right turns are generated from the Highway 1 eastbound and Highway 1 westbound ramps and are merging to use the one right-turn lane. The westbound right-turns must yield to the 681 northbound throughs. The all-way stop control intersection does not provide sufficient gaps in traffic to process the westbound right turns. Adding a second westbound right-turn lane that merges the traffic further north on Three Sisters Parkway would only push the problem away from the intersection as the vehicles try to merge together.

North of the Three Sisters Parkway / Three Sisters Boulevard intersection the two-way traffic volumes are greater than 3,315 vehicles per hour (approximately 1,655 vehicles per hour per lane). The typical capacity of a street like the Three Sisters Parkway is approximately 1,000 vehicles per hour per lane, and during the PM Peak Hour overall traffic is exceeding the capacity of the street, causing delays at most intersections as is often seen during peak hours/events in Canmore. Additional capacity in the intersections and along the street would help to decrease delays both along the Parkway and in Downtown.

The traffic volumes estimated for the weekend afternoon peak hour are lower than those estimated for the weekday afternoon peak hour. However, the overall trends are similar, and portions of the existing network are insufficient to support the projected traffic volumes without mitigation, particularly at the Three Sisters Parkway and Three Sisters Boulevard intersection.

Table 6-1 2040 Total Forecast Operating Conditions – Existing Infrastructure

Intersection	Weekday PM Peak Hour		Saturday PM Peak Hour	
	Overall LOS (Delay)	Max v/c	Overall LOS (Delay)	Max v/c
8th Avenue / 10th Street	B (14.1 s)	0.53	B (11.3 s)	0.38
8th Avenue / 8th Street	F (1260 s)	3.52	F (54.7 s)	1.59
8th Avenue / 7th Street	F (1999 s)	3.40	F (60.6 s)	1.50
Three Sisters Drive / Rundle Drive	F (263 s)	3.53	B (13.0 s)	0.54
Three Sisters Parkway / Three Sisters Drive / Spray Lakes Road	E (37.0 s)	1.30	A (10.0 s)	0.78
Three Sisters Parkway / Peak Drive / Three Sisters Drive	F (196 s)	1.73	E (46.9 s)	0.91
Three Sisters Parkway / Three Sisters Boulevard	F (832 s)	5.00	F (525 s)	3.45
Three Sisters Parkway / Highway 1 Eastbound Off-Ramp	F (175 s)	1.73	D (32.9 s)	1.08
Three Sisters Parkway / Highway 1 Westbound Off-Ramp	F (609 s)	7.43	F (227 s)	3.47
Three Sisters Parkway / Mountain Village West Access	F (4596 s)	118.42	F (145 s)	4.00
Three Sisters Parkway / Mountain Village East Access	D (26.8 s)	9.72	F (512 s)	11.88

6.2 2040 HORIZON WITH INFRASTRUCTURE UPGRADES

A number of proposed upgrades to the road network were tested through an iterative process to identify what infrastructure changes could be implemented to accommodate the projected growth in traffic caused by the development of the Three Sisters Mountain Village. Both roundabouts and traffic signals were tested at all study intersections.

The results for both the roundabouts and traffic signals as potential infrastructure upgrades for the 2040 weekday afternoon peak hour are summarized in **Table 6-2** and the 2040 weekend afternoon peak hour are summarized in **Table 6-3**. The results include all anticipated auxiliary lanes required to meet the minimal operational parameters (LOS E and v/c ≤ 0.95).

The analysis indicates the following intersection modifications are needed to accommodate the forecast 2040 post development traffic at the study area intersections and are summarized in **Figure 6-1**.

1. **8th Avenue / 10th Street**
   a. No modifications required to current all-way stop.
2. **8th Avenue / 8th Street**
   a. Convert to All-Way Stop-Control intersection.
3. **8th Avenue / 7th Street**
   a. Install Traffic Signals.
   b. Add northbound right-turn lane.
   c. Add southbound left-turn lane.
4. **Three Sisters Drive / Rundle Drive**
   a. Convert to single-lane roundabout.
5. **Three Sisters Parkway / Three Sisters Drive / Spray Lake Road**
   a. Convert to single-lane roundabout.
      i. Maintain southbound to westbound channelized right-turn.
6. **Three Sisters Parkway (Highway 742) / Peak Drive / Three Sisters Drive**
   a. Convert to single-lane roundabout.
7. **Three Sisters Parkway / Three Sisters Boulevard**
   a. Install Traffic Signals (unable to meet requirements with a roundabout*).
      i. Construct two southbound left-turning lanes.
      ii. Add second receiving lane on Three Sisters Boulevard towards Highway Ramp Terminal (intersection 8)
      iii. Add a receiving lane on Three Sisters Parkway north up to the next access.
      iv. Add northbound left-turn lane.
8. **Three Sisters Parkway / Highway 1 Eastbound Off-Ramp**
   a. Convert to single-lane roundabout.
9. **Three Sisters Parkway / Highway 1 Westbound Off-Ramp**
   a. Convert to single-lane roundabout.
10. **Three Sisters Parkway / Three Sisters Village West Access**
    a. Construct a single-lane roundabout (geometry permitting).
       i. Add northbound to eastbound channelized right-turn lane.
       ii. Add eastbound to southbound channelized right-turn lane.
       iii. Add westbound through slip lane.
    b. Or signalize with associated upgrades.
       i. Add eastbound right-turn lane.
       ii. Add westbound left-turn lane.
       iii. Separate northbound left-turn and right-turn lanes.
11. **Three Sisters Parkway / Three Sisters Village East Access**
    a. Construct a single-lane roundabout (geometry permitting).
       i. Add northbound to eastbound channelized right-turn lane.
       ii. Add eastbound to southbound channelized right-turn lane.
       iii. Add westbound through slip lane.
    b. Or signalize with associated turning lane upgrades.
       i. Eastbound right-turn lane.
       ii. Add a second eastbound through lane.
       iii. Two westbound left-turn lanes.
       iv. Separate northbound left-turn and right-turn lanes.

*A 5 legged “turbo” roundabout is being evaluated as a possible alternative at the time of this report. Consider the signalized intersection the default future configuration for this report recommendation.

At the Three Sisters Drive / Rundle Drive intersection (Intersection # 4), the Synchro results indicate a v/c ratio greater than 1.0 and the HCM 2010 results do not support the existing traffic control configuration. The Synchro Stop Control results indicated that all movements operate acceptably during both peak hours, with the exception of the southbound through movement which experiences delay (LOS F) during the weekday afternoon peak hour. The southbound approach has a relatively low traffic volume when compared to the northbound and westbound approaches. The intersection should be monitored, and modifications should be implemented prior to the delay and congestion reaching unacceptable levels.

With the recommended intersection modifications noted above, all study intersections are anticipated to operate well within acceptable limits during the weekday afternoon peak hour, with individual movements operating at a LOS E or better. Similarly, during the Saturday PM Peak, all study intersections are anticipated to operate within acceptable limits with individual movements operating at a LOS D or better. However, the volumes along the links exceed the typical capacity that would be acceptable for these types of streets.

The inclusion of roundabouts at the intersections of 8th Avenue/10th Street and 8th Avenue/7th Street is recommended in the 2018 ITP for the long term 2030 analysis horizon. The traffic analysis completed for this study identifies that an all-way stop control will be sufficient to accommodate the future traffic volumes at the 8th Avenue /10th Street intersection and the 8th Avenue / 8th Street intersection. Either a roundabout or traffic signals will be sufficient to accommodate the projected traffic volumes at the 8th Avenue / 7th Street intersection in the 2040 horizon. The intersection of 8th Avenue /10th Street was reviewed by the Town and found to have insufficient right-of-way to accommodate a roundabout with separate pedestrian and cyclist facilities.

The roundabout analysis completed for this TIA for the 2040 full build out horizon identified that the projected traffic volumes could be well accommodated by single lane roundabouts at all locations reviewed except at the Three Sisters Parkway/Boulevard intersection, where significant queues and delays (LOS F and v/c ratio >1.00) are expected to occur for northbound traffic during the weekday afternoon peak hour. In order to accommodate the projected traffic volumes at this intersection, a number of infrastructure modifications, auxiliary lanes, and traffic signals are necessary to meet the target intersection operation parameters. At the time of finalizing this report, the intersection of Three Sisters Parkway & Three Sisters Boulevard was under review for the inclusion of a roundabout with a 5th leg to access the Gateway commercial site. The operational performance and physical impacts have not been determined and will be evaluated by the TSMVPL and the Town in comparison to the configuration recommended in the TIA. Pending confirmation that a roundabout would be functionally equivalent to signals and meet the minimum LOS criteria for this location, a roundabout may be deemed an acceptable alternative to the signalized intersection.

The study recognizes that roundabouts may not be physically possible or desirable at all locations and signals may be used as an alternative to roundabouts. Signals are anticipated to provide similar level of service at some locations and other locations may require additional auxiliary lanes to achieve desired operations.

If traffic signals are preferable over single-lane roundabouts at Three Sisters Village access, the operations analysis indicates that a number of auxiliary lanes are required to meet the minimal operational parameters, including eastbound right-turn lanes, a single westbound left-turn lane at the west access and two westbound left-turn lanes and a second eastbound through lane at the east access, as well as separate northbound right- and left-turn lanes at both accesses.

The volumes identified on the network during the peak hours exceed a typical two-lane capacity between the east access of Three Sisters Village and Three Sisters Boulevard on the Three Sisters Parkway. In addition to the additional turning lanes noted, this segment of road may need to be upgraded to a four-lane cross section at some point. This outcome will be continually evaluated as part of future TIAs. The additional lanes could be used as HOV lanes or bus priority lanes, which will further help achieve the transit ridership goals of the development. Volumes between the east and west access must also be monitored, as they are just over the typical capacity of a two lane road as well.

The results are summarized in **Table 6-2 and 6-3**.

Table 6-2 2040 Total Forecast Operating Conditions (Weekday PM Peak Hour) – Signals vs Roundabouts

Intersection	Traffic Signal Results		Roundabout Results	
	Overall LOS (Delay)	Max v/c	Overall LOS (Delay)	Max v/c
8th Avenue / 10th Street	B (14.1 s)*	0.53	B (14.1 s)*	0.51
8th Avenue / 8th Street	C (21.3 s)*	0.79	C (21.3 s)*	0.79
8th Avenue / 7th Street	B (17.0 s)	0.66	A (1.8 s)	0.54
Three Sisters Drive / Rundle Drive	B (14.9 s)	0.85	A (5.3 s)	0.54
Three Sisters Parkway / Three Sisters Drive / Spray Lakes Road	C (31.3 s)	0.91	A (4.6 s)	0.55
Three Sisters Parkway / Peak Drive / Three Sisters Drive	D (42.2 s)	0.95	A (6.3 s)	0.65
Three Sisters Parkway / Three Sisters Boulevard	C (33.3 s)	0.95	C (33.7 s)	1.30
Three Sisters Parkway / Highway 1 Eastbound Off-Ramp	A (4.7 s)	0.84	A (2.0 s)	0.75
Three Sisters Parkway / Highway 1 Westbound Off-Ramp	D (35.5 s)	0.93	A (9.0 s)	0.56
Three Sisters Parkway / Mountain Village West Access	D (40.2 s)	0.95	A (8.7 s)	0.72
Three Sisters Parkway / Mountain Village East Access	C (26.0 s)	0.83	C (29.8 s)	1.07

*Analysis indicated that an All-way Stop Control was sufficient to accommodate future traffic volumes.

Table 6-3 2040 Total Forecast Operating Conditions (Saturday PM Peak Hour) – Signals vs Roundabouts

Intersection	Traffic Signal Results		Rounabout Results	
	Overall LOS (Delay)	Max v/c	Overall LOS (Delay)	Max v/c
8th Avenue / 10th Street	B (11.3 s)*	0.38	B (11.3 s)*	0.38
8th Avenue / 8th Street	B (13.0 s)*	0.53	B (13.0 s)*	0.53
8th Avenue / 7th Street	B (14.0 s)	0.53	A (1.2 s)	0.36
Three Sisters Drive / Rundle Drive	B (14.2 s)	0.82	A (4.9 s)	0.37
Three Sisters Parkway / Three Sisters Drive / Spray Lakes Road	B (19.3 s)	0.65	A (4.4 s)	0.46
Three Sisters Parkway / Peak Drive / Three Sisters Drive	D (38.3 s)	0.91	A (5.3 s)	0.43
Three Sisters Parkway / Three Sisters Boulevard	C (21.9 s)	0.85	A (7.3 s)	0.76
Three Sisters Parkway / Highway 1 Eastbound Off-Ramp	A (2.3 s)	0.57	A (2.0 s)	0.51
Three Sisters Parkway / Highway 1 Westbound Off-Ramp	C (21.3 s)	0.86	A (8.4 s)	0.49
Three Sisters Parkway / Mountain Village West Access	C (25.6 s)	0.88	A (6.3 s)	0.39
Three Sisters Parkway / Mountain Village East Access	C (21.9 s)	0.88	A (7.0 s)	0.69

*Analysis indicated that an All-way Stop Control was sufficient to accommodate future traffic volumes.

WSP notes that these upgrades indicate a high level of service at all intersections. With the ongoing desire to promote the use of cycling, walking and transit, considerations for how the road network can discourage the use of a personal vehicle extend beyond the capacity at intersections. Traffic calming considerations along the corridor should discourage high speed vehicle travel while promoting safe and comfortable cycling, walking and even transit priority where possible.

All-Way Stop-Control

10 ST

Install All-Way Stop-Control

8 ST

7 ST

Install Traffic Signals
- Add Northbound Right-turn Lane
- Add Southbound Left-turn Lane

RUNDLE CRES

THREE SISTERS DR

RUNDLE DR

Install Single-lane Roundabout

SPRAY LAKES RD

Convert to Single-lane Roundabout
- Maintain Southbound to Westbound Channelized Right-turn Lane

HIGHWAY NO.1

N

Convert to Single-lane Roundabout

PEAKS DR

Construct Single-lane Roundabout
- Add Northbound to Eastbound Channelized Right-turn Lane
- Add Eastbound to Southbound Channelized Right-turn Lane
- Add Westbound Through Slip Lane
- Or signalize with associated upgrades

THREE SISTERS PKWY

WEST ACCESS

EAST ACCESS

Install Traffic Signals
- Construct Two Southbound Left-turning Lanes
- Add second receiving lane on Three Sisters Boulevard towards Highway Ramp Terminal
- Add receiving lane on Three Sisters Parkway north up to next access
- Add Northbound Left-turn Lane

Convert to Single-lane Roundabout

THREE SISTERS BLVD

HIGHWAY NO. 1

Google Earth

LEGEND

XX - Recommended Road Network Modifications

- Three Sisters Mountain Village Site

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Issue Date - 2021-01-05
Scale: NTS
Aerial Imagery: 2019
Note: All Dimensions shown in metres unless otherwise noted

Figure 6-1 - Recommended Road Network Modifications

Three Sisters Mountain Village Transportation Impact Assessment

DRAWING:Road Network Modifications.cdr DATE: 2020-10-29 DRAWN BY: piperde

7 SENSITIVITY ANALYSIS

The results discussed in Section 6 outline a potential road network that may be able to accommodate the development at Three Sisters Mountain Village. However, the analysis and volumes identified volumes that may exceed the capacity of the streets, particularly at the Bow Bridge Crossing and along the Three Sisters Parkway just north of Three Sisters Boulevard access to Highway 1. Additionally, the total infrastructure identified, particularly at intersections 7, 10, and 11 may exceed the space available to easily develop along the Three Sisters Parkway. There are a number of options that may reduce the impact of the Three Sisters Mountain Village, and warrant consideration when thinking about the final recommendations as part of this TIA. This section evaluates three alternatives:

- A Minimal Improvement Scenario: This alternative considers how the two accesses at Three Sisters Village would operate with reduced turning lanes. This option considers no changes to the traffic generated, but just provides the results for these two intersections in a scenario where the minimum LOS and V/C ration at those two intersections is not achieved.
- Three Sisters Village Residential Unit Reduction: This alternative shows how the recommendations may change if Three Sisters Village develops at a lower end of the maximums identified in the ASP.
- Future Travel Shift Scenario: The base analysis for this TIA identified that the auto volumes generated from Three Sisters Mountain Village may not be able to be accommodated on the existing road network, or without adding more road capacity to existing streets. WSP has worked with the Town of Canmore to identify a scenario that considers more significant mode shift, increased auto occupancy and internal trip capture to identify what how Three Sisters Mountain Village can help Canmore achieve their both their ITP targets and a compact growth pattern, and what active mode infrastructure may be needed to support that goal.

7.1 MINIMAL IMPROVEMENT SCENARIO

Given the physical constraints present on the Three Sisters Parkway, a minimal improvements scenario was analyzed that included one eastbound right-turn lane and one westbound left-turn lane into the development at each of the accesses. **Table 6-4** summarized the intersection operations at the Three Sisters Village accesses with minimal improvements implemented for the weekday afternoon peak hour horizon. The weekday afternoon peak hour horizon was chosen for evaluating the network as the traffic volumes are higher when compared to the future weekend afternoon peak hour volumes. This analysis was completed using Synchro Studios. While delays are significant for some movements, this scenario may be considered acceptable to minimize physical impacts over time with ongoing monitoring to identify traffic growth patterns.

For completeness, the overall level-of-service and maximum v/c ratios for the other study intersections, with recommended intersection improvements from **Section 6.2**, are provided in **Table 6-5**. The minimal improvements scenario only assesses the Three Sisters Mountain Village accesses and thus does not impact the results at the other study intersections.

Table 7-1 Three Sisters Mountain Village Accesses – Minimal Improvement Scenario

TRAFFIC MOVEMENTS	WEEKDAY PM PEAK HOUR			
	LOS	Delay (s)	V/C	95th Queue Length (m)
10. Three Sisters Parkway (Highway 742) / Three Sisters Village West Access				
EBT	E	60.9	0.96	271
EBR	B	11.4	0.44	46
WBL	E	62.6	0.96	203
WBT	A	6.7	0.40	64
NBL	E	78.8	0.85	99
NBR	B	16.9	0.48	75
INT Summary	**D**	**39.9**		
11. Three Sisters Parkway (Highway 742) / Three Sisters Village East Access				
EBT	F	84.3	1.05	360
EBR	B	14.5	0.37	49
WBL	F	111.9	1.12	308
WBT	A	8.7	0.64	135
NBL	F	106.4	0.91	107
NBR	D	50.4	0.83	171
INT Summary	**E**	**60.1**		

7.2 THREE SISTERS VILLAGE REDUCED UNIT SENSITIVITY ANALYSIS

The TIA assesses the maximum number of units that could be developed in order to have a conservative assessment of the network. Reducing the units by 600 results in 165 fewer vehicle trips on the network during the weekday afternoon peak hour. The results for the network using the recommended intersection modifications identified in Section 6.2 are summarized in **Table 7-2** for the future weekday afternoon peak hour. The weekday afternoon peak hour horizon was chosen for evaluating the network as the traffic volumes are higher when compared to the future weekend afternoon peak hour volumes.

As the Three Sisters Village Accesses and the Three Sisters Parkway / Three Sisters Boulevard intersection are the critical points on the network, additional information on how the individual movements are operating at these intersections are provided in **Table 7-3**. This analysis was completed using Synchro Studios.

The following intersection modifications were utilized at the Three Sisters Mountain Village Accesses for this scenario to identify if single auxiliary lanes could be utilized at the development's accesses:

10 Three Sisters Parkway / Three Sisters Village West Access
- a Signalize with associated upgrades
  - i Eastbound right-turn lane
  - ii Westbound left-turn lane
  - iii Separate northbound left-turn and right-turn lanes

11 Three Sisters Parkway / Three Sisters Village East Access
- a Signalize with associated turning lane upgrades
  - i Eastbound right-turn lane
  - ii Westbound left-turn lane
  - iii Separate northbound left-turn and right-turn lanes

This scenario reduces the impact on the accesses to the Three Sisters Village, but not other locations. With these changes, the west access meets the capacity parameters with only a single left turn lane and a right turn lane. The east access continues to exceed the capacity parameters. This scenario may be considered acceptable with a "wait and see" monitoring approach for traffic growth as the area develops.

Table 7-2 2040 Total Forecast Operating Conditions (Weekday PM Peak Hour) – Reduced Unit Sensitivity Analysis

Intersection	Traffic Control	Overall LOS (Delay)	Max v/c
1 - 8th Avenue / 10th Street	AWSC	B (13.9 s)	0.52
2 - 8th Avenue / 8th Street	AWSC	C (20.2 s)	0.78
3 - 8th Avenue / 7th Street	Traffic Signals	B (16.7 s)	0.65
4 - Three Sisters Drive / Rundle Drive	Roundabout	A (5.3 s)	0.53
5 - Three Sisters Parkway / Three Sisters Drive / Spray Lakes Road	Roundabout	A (4.5 s)	0.54
6 -Three Sisters Parkway / Peak Drive / Three Sisters Drive	Roundabout	A (6.2 s)	0.64
7 - Three Sisters Parkway / Three Sisters Boulevard	Signals	C (32.1 s)	0.95
8 - Three Sisters Parkway / Highway 1 Eastbound Off-Ramp	Roundabout	A (2.0 s)	0.70
9 - Three Sisters Parkway / Highway 1 Westbound Off-Ramp	Roundabout	A (8.9 s)	0.54
10 - Three Sisters Parkway / Mountain Village West Access	Signals	E (61.3 s)	1.16
11 - Three Sisters Parkway / Mountain Village East Access	Signals	C (31.9 s)	0.95

Table 7-3 Sensitivity Analysis Intersection Capacity Results

TRAFFIC MOVEMENTS	WEEKDAY PM PEAK HOUR			
	LOS	Delay (s)	V/C	95th Queue Length (m)
8. Three Sisters Parkway (Highway 742) / Three Sisters Boulevard				
EBL	D	50.4	0.28	22
EBT	D	50.4	0.28	22
EBR	D	50.4	0.28	22
WBL	E	57.2	0.84	105
WBT	C	32.9	0.08	14
WBR	A	2.5	0.69	0
NBL	C	23.4	0.03	5
NBT	E	58.6	0.95	230
NBR	A	4.5	0.24	14
SBL	E	62.9	0.94	128
SBT	B	13.2	0.58	121
SBR	B	13.2	0.58	121
INT Summary	**C**	**32.1**		
11. Three Sisters Parkway (Highway 742) / Three Sisters Village West Access				
EBT	D	48.3	0.95	194
EBR	A	4.2	0.39	18
WBL	D	49.7	0.95	137
WBT	A	5.7	0.41	45
NBL	E	76.0	0.90	80
NBR	B	11.4	0.70	26
INT Summary	**C**	**31.9**		
11. Three Sisters Parkway (Highway 742) / Three Sisters Village East Access				
EBT	F	92.1	1.09	299
EBR	B	10.4	0.36	35
WBL	F	123.1	1.16	246
WBT	B	11.5	0.68	141
NBL	E	57.5	0.64	67
NBR	D	46.6	1.00	64
INT Summary	**E**	**61.3**		

7.3 TRAVEL SHIFT OPTION

Following review of the base scenario evaluated in **Section 5 and 6** of this report, WSP and the Town of Canmore identified opportunities within the development assumptions which could result in future shifts in travel patterns that may better help the Town of Canmore achieve its traffic mode shift goals. The goal of this analysis is to identify what shifts are needed to maintain the volumes at the Bow River Bridge at or below a total of 10,000 vpd on the peak analysis day. The following section outlines what assumption changes were made to achieve this outcome, how the Three Sisters Mountain Village develop can help achieve these outcomes, and what infrastructure investments may be needed to support those findings.

7.3.1 CHANGED ASSUMPTIONS

BACKGROUND TRAFFIC GROWTH

For the shifting travel pattern horizon, WSP has reduced the background growth to 0.25% from the previously assumed 0.5%. This assumption reflects the expectation that the majority of growth along the constrained corridor at Three Sisters Boulevard and along the Bow Valley Corridor is related to growth within the Three Sisters Mountain Village development, and a higher background growth may actually result in double counting trips. Furthermore, this will help to account for some of the trips that will be eliminated by residents who previously had to travel into the rest of Canmore for core services who will now be able to remain in the Three Sisters Mountain Village area to access those needs.

LAND USE

The ASP identified a range of land uses that could be developed, and a previous sensitivity analysis was completed to also consider how the traffic may be impacted by reducing residential development. For the changing travel patterns scenario, WSP and QPD have investigated the ASP scenario which considers a 15% reduction in total commercial land use development, and a shift of that development to be a higher proportion of retail compared to restaurant build out. As with all ASPs, this land use will be further refined at the Concept Scheme level which will allow for more detailed analysis on the actual anticipated land uses and unit counts. The land use for Three Sisters Village for the sensitivity analysis is summarized in **Table 7-4.**

Table 7-4 Modified Land Use (Three Sisters Village)

Land Use	Units for Analysis**, ***
Residential	
Semi-Detached/Semi*s**	2,600 Units
Apartments	900 Units
Tourist Homes (30% of Apartments)	400 Units at 80% occupancy*
Village Centre	
Mixed Use Building Residential (Tourist Apartments)	800 Units at 80% occupancy*
Mixed Use Building Retail	217,000 ft^2
Mixed Use Building Restaurant	72,000 ft^2
Landmark Hotel Conference Centre	300 Rooms
Spa District/Boutique Hotel	
Boutique Hotel/Spa	350 Rooms
Recreational	
Indoor Recreation Centre	118,000 ft^2
Outdoor Space	Outdoor recreation space to support indoor amenities
Innovation District	
Restaurant	5,0000 ft^2
Office	55,525 ft^2
Creative Manufacturing/Light Industrial	135,000 ft^2

AUTO OCCUPANCY

Based on research completed by Stantec, referenced in **Appendix F**, three factors are generally contributing to an anticipated increase in vehicle occupancy: decreasing number of passenger cars vs sports utility vehicles, increasing occupancy rates for sport utility vehicles, and increased urbanization (which generally is associated with higher vehicle occupancy rates). Based on this research, WSP has applied a 0.7% annual increase to the auto occupancy, for a total increase of 14% to all trip types.

MODE SPLIT

The base scenario of this TIA identified a mode split assumption that was based on the ITP goals for trips within the Three Sisters Mountain Village area and for trips travelling along the Three Sisters Parkway to the Bow Valley Corridor into Downtown, However, a higher percentage of people walking and cycling were assumed for trips traveling along the Highway 1 corridor, which represents a significant proportion of trips from the development. There are a number of opportunities which could help increase the proportion of people walking, cycling and taking transit from Three Sisters Mountain Village include:

— Transit ridership increase through parking management, introducing shuttle service, higher frequency transit, and considering the potential for transit priority measures at congested intersections.

- Increasing mode split for walking and cycling through inclusion of additional high-quality walking and cycling infrastructure through a TransCanada Trail Extension along the Highway 1 Corridor.
- Considering the opportunity for shared mobility and e-bikes and e-scooters on making the opportunities for walking and cycling the longer distances and more challenging grades in Canmore more accessible to all users.

The revised mode split assumptions can be seen in **Tables 7-5** and **7-6**.

Table 7-5 Three Sisters Village Mode Split

Destination	Automobile	Walking/ Cycling	Transit
Hwy 1 East Via TS Boulevard	95 %	0%	5%
Hwy 1 East Via Dead Man Flats	95%	0%	5%
Hwy 1 West Via TS Boulevard	50%	30%	20%
Hwy 1 West Via Dead Man Flats	50%	30%	20%
Three Sisters Blvd West	30%	40%	30%

Table 7-6 Smith Creek and Stewart Creek Mode Split Assumptions

Destination	Automobile	Walking/ Cycling	Transit
Hwy 1 East Via TS Boulevard	95 %	0%	5%
Hwy 1 East Via Dead Man Flats	95%	0%	5%
Hwy 1 West Via TS Boulevard	70%	20%	10%
Hwy 1 West Via Dead Man Flats	70%	20%	10%
Three Sisters Blvd West	70%	20%	10%

TRIP DISTRIBUTION

The trip distribution was modified slightly to account for more trips taking the highway, with the presumption that more drivers would be inclined to use the Highway if additional capacity is provided in that direction. The trip distribution is summarized in **Table 7-7.**

Table 7-7 Revised Trip Distribution

Destination	All Trips (Except Hotels /School/Rec)	Hotels
Three Sisters Village/Stewart Creek		
Hwy 1 West Via Blvd	50%	55%
Hwy 1 West Via DMF	0%	0%
Hwy 1 East Via Blvd	5%	7.5%
Hwy 1 East Via DMF	5%	7.5%
Three Sisters Pkwy West	40%	30%
Smith Creek		
Hwy 1 West Via Blvd	15%	NA
Hwy 1 West Via DMF	40%	NA
Hwy 1 East Via Blvd	0%	NA
Hwy 1 East Via DMF	10%	NA
Three Sisters Pkwy West	35%	NA

INTERNAL TRIP CAPTURE

The Three Sisters Village ASP promotes development on an integrated community that will provide many of the recreational, retail and social opportunities residents need within the community. The internal trip capture for the base scenario was estimated using the NCHRP Report 684. This tool provides a useful baseline, but may underestimate the true potential for internal trip capture in this community. The physical separation of this site from the rest of Canmore, combined with a lack of road network capacity dedicated to people driving into town will further encourage residents to stay as local as possible for many trips. To test the potential impact of increased internal trip capture, WSP increased the NCHRP estimates by 10% for all uses except for office space, which was almost at 100% internal trip capture already. The adjusted internal trip captures is summarized in **Table 7-8**.

Table 7-8 Revised Three Sisters Village Internal Trip Capture

Land Use	Entering Trips Captured	Exiting Trips Captured
Three Sisters Village Weekday PM Peak Internal Trip Capture		
Office	98%	20%
Retail	46%	66%
Restaurant	56%	82%
Cinema/Entertainment (Recreation Centre)	25%	28%
Residential	28%	27%
Hotel	32%	25%

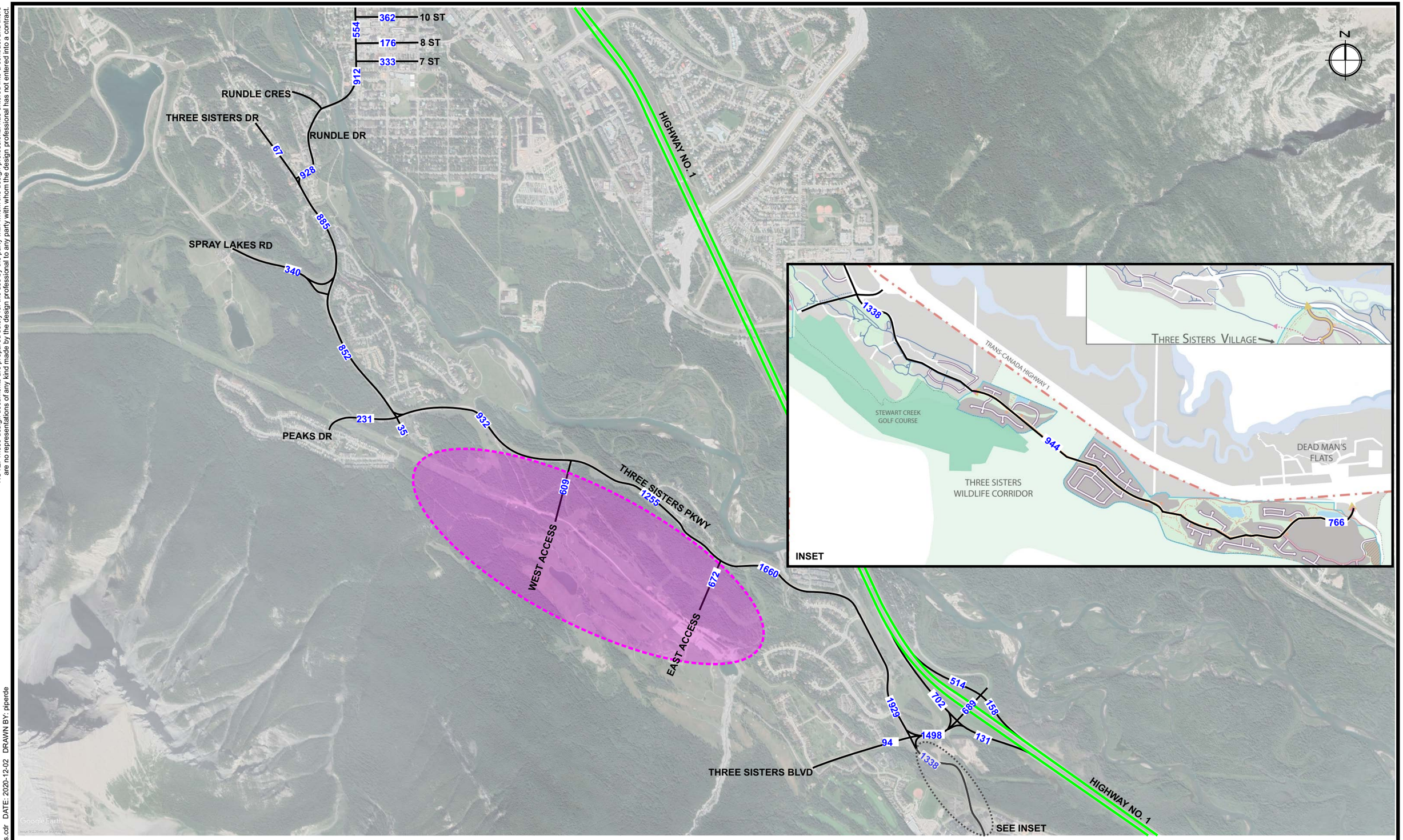
7.3.2 VOLUMES

Based on the changes noted above, the resulting Weekday PM Peak hour development volumes are summarized in **Table 7-9.**

Table 7-9 Travel Shift Scenario Weekday PM Peak Hour Volumes

Destination	Driving Vehicle Trips		Walking/Bike Person Trips		Transit Person Trips	
	In	Out	In	Out	In	Out
Three Sisters Village						
Hwy 1 West Via TS Blvd	335	208	355	263	236	176
Hwy 1 West Via DMF Interchange	0	0	0	0	0	0
Hwy 1 East Via TS Blvd	66	42	0	0	6	5
Hwy 1 East Via DMF Interchange	66	42	0	0	6	5
Three Sisters Pkwy West	157	95	363	263	272	197
Total External Trips	**624**	**387**	**718**	**526**	**520**	**383**
Internal Trips between Developments (additional 10%)	69	43	80	58	58	42
Smith Creek						
Hwy 1 West Via TS Blvd	111	65	48	33	23	16
Hwy 1 West Via DMF Interchange	289	166	122	85	61	43
Hwy 1 East Via TS Blvd	0	0	0	0	0	0
Hwy 1 East Via DMF Interchange	98	58	0	0	8	5
Three Sisters Pkwy West	256	148	108	76	54	38
Total External Trips	**754**	**437**	**278**	**194**	**146**	**102**
Internal Trips between Developments (additional 10%)	84	48	31	22	16	11
Stewart Creek						
Hwy 1 West Via TS Blvd	89	94	47	52	23	26
Hwy 1 West Via DMF Interchange	0	0	0	0	0	0
Hwy 1 East Via TS Blvd	12	13	0	0	1	1
Hwy 1 East Via DMF Interchange	12	13	0	0	1	1
Three Sisters Pkwy West	72	76	37	41	18	21
Total External Trips	**185**	**196**	**84**	**93**	**43**	**49**
Internal Trips between Developments (additional 10%)	21	22	9	10	5	5

When added to the background traffic, the resulting total link volumes are shown in **Figure 7-1** for traffic volumes and **Figure 7-2** for active mode volumes.



LEGEND

XX - Total (2040) Weekday PM Peak Link Volumes
- Three Sisters Mountain Village Site

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Issue Date - 2020-12-02
Scale: NTS
Aerial Imagery: 2019
Note: All Dimensions shown in metres unless otherwise noted

Figure 7-1 - Travel Mode Shift Scenario Weekday PM Peak Hour Total Link Traffic Volumes

Three Sisters Mountain Village Transportation Impact Assessment

DRAWING:Link Volumes.cdr DATE: 2020-12-02 DRAWN BY: piperde

TO DOWNTOWN

313 (313)

63 (63)

152 (152)

465 (465)

159 (159)

165 (165)

132 (133)

BOW RIVER

BOW RIVER

TRANS-CANADA HIGHWAY 1

STEWART CREEK GOLF COURSE

THREE SISTERS WILDLIFE CORRIDOR

DEAD MAN'S

103 (104)

670 (670)

DOWNTOWN

410 (410)

87 (87)

313 (313)

159 (159)

THREE SISTERS VILLAGE

N

LEGEND:

- PLAN AREA BOUNDARY
- TOWN OF CANMORE BOUNDARY
- RECREATIONAL TRAILS
- PEDESTRIAN STREET
- MULTI-USE PATHWAYS
- SIDEWALKS
- COMMUTER BICYCLE SPINE
- PUBLIC TRANSIT ROUTE
- TRANSIT STOPS
- EXISTING MULTI-USE PATHWAYS

LEGEND

XX - Summer Weekday Peak Hour Two-way Pedestrian Volumes
(XX) - Summer Weekday Peak Hour Two-way Cyclist Volumes

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Issue Date - 2020-12-07
Scale: NTS
Aerial Imagery: 2019
Note: All Dimensions shown in metres unless otherwise noted

Figure 7-2 - Travel Mode Shift Scenario Weekday PM Peak Hour Total Active Mode Volumes
Three Sisters Mountain Village Transportation Impact Assessment

DRAWING:Total Pedestrian Flows.cdr DATE: 2020-12-07 DRAWN BY: piperde

7.3.3 ANALYSIS

ROAD NETWORK

The future travel shift for the weekday afternoon peak hour was modeled in Synchro and Sidra to identify what impacts a larger active mode split and higher vehicle occupancy would have the network. The weekday afternoon peak hour horizon was chosen for evaluating the network as the traffic volumes are higher when compared to the future weekend afternoon peak hour volumes.

The analysis indicated the following changes to the network, when compared to the baseline scenario:

4. **8th Avenue / 7th Street**
    a. The 8th Avenue and 7th Street intersection is anticipated to operate acceptably with the revised traffic volumes as an all-way stop-controlled intersection.
5. **Three Sisters Parkway / Three Sisters Drive / Spray Lakes Road**
    a. The traffic volumes at the Three Sisters Parkway / Three Sisters Drive / Spray Lakes Road intersection do not result in the need for additional traffic control. However, due to the projected number of walking and cycling trips that are anticipated to travel through this intersection, a higher degree of traffic control may eventually be needed, in the form of signals or a roundabout, which should be explored further when the corridor is designed.
    b. Analysis identified that a single lane roundabout would be acceptable for traffic volumes.
6. **Three Sisters Parkway/ Peaks Drive / Three Sisters Drive**
    a. The traffic volumes at the Three Sisters Parkway / Peaks Drive / Three Sisters Drive intersection do not result in the need for additional traffic control. However, due to the projected number of walking and cycling trips that are anticipated to travel through this intersection, a higher degree of traffic control is anticipated to be needed.
    b. Convert the Three Sisters Parkway / Peaks Drive / Three Sisters Drive intersection to a single-lane roundabout.
7. **Three Sisters Parkway / Three Sisters Boulevard**
    a. The future travel shift results in significantly less vehicular traffic using the Three Sisters Parkway / Three Sisters Boulevard intersection during the weekday afternoon peak hour. As a result, less infrastructure is required to maintain acceptable operations during the peak hour.
    b. Convert the Three Sisters Parkway / Three Sisters Boulevard intersection to a single-lane roundabout with a westbound channelized right-turn lane.
8. **Three Sisters Parkway / Highway 1 Eastbound Off-Ramp**
    a. The Three Sisters Parkway / Highway 1 Eastbound Off-ramp intersection was found to operate within acceptable limits during the weekday afternoon peak hour as a stop-controlled intersection. It is likely that the this may be converted to a roundabout if the westbound off ramp is converted to a roundabout.
9. **Three Sisters Parkway / Highway 1 Westbound Off-ramp**
    a. Convert the Three Sisters Parkway / Highway 1 Westbound Off-ramp intersection to a single-lane roundabout.
10. **Three Sisters Parkway / Mountain Village West Access**
    a. The future travel shift results in significantly less vehicular traffic using the Three Sisters Parkway / Mountain Village West Access intersection during the weekday afternoon peak hour. As a result, less infrastructure is required to maintain acceptable operations during the peak hour.
    b. Construct a single-lane roundabout at the Three Sisters Parkway / Mountain Village West Access or signalize. If signalized, no additional auxiliary lanes are anticipated to be needed to maintain acceptable traffic operations.
11. **Three Sisters Parkway / Mountain Village East Access**
    a. The future travel shift results in significantly less vehicular traffic using the Three Sisters Parkway / Mountain Village East Access intersection during the weekday afternoon peak hour. As a result, less infrastructure is required to maintain acceptable operations during the peak hour.
    b. Construct a single-lane roundabout at the Three Sisters Parkway / Mountain Village East Access or signalize. If signalized, a single westbound left-turn auxiliary lane will be needed to maintain acceptable traffic operations.

The overall level-of-service and maximum v/c ratios for the study intersections, with the above intersection modifications, are summarized in **Table 7-10.** It should be noted that, while the intersection are showing a high level of service, the links are operating at near capacity, particularly across the Bow River Bridge, where an estimated 920 vph will cross in the peak hour. With an estimated capacity of 1000 vph identified in the Stantec Memo (Appendix E), this bridge is operating at an approximate V/C ratio of 0.92 with a residual capacity of approximately 80 vph. At Three Sisters Drive north of Three Sisters Boulevard, there are an estimated 1930 vph in the peak hour. The estimated capacity of this road is generally around 1000 vehicles per hour per lane, meaning there is a residual capacity of approximately 70 vph in the peak hour.

To add an all-pedestrian phase at the Three Sisters Parkway and the Mountain Village East Access intersection, a northbound right-turn additional auxiliary lane would be needed. The signal timing would also require an overlapping phase that allows the northbound right-turn to run concurrently with the westbound left-turn. This configuration results in the intersection operating at a LOS C with an average intersection delay of 26.9 s. The maximum v/c ratio observed was 0.80.

Table 7-10 2040 Total Forecast Operating Conditions (Weekday PM Peak Hour) – Future Travel Shift

Intersection	Traffic Control	Overall LOS (Delay)	Max v/c
1 - 8th Avenue / 10th Street	AWSC	B (10.2 s)	0.30
2 - 8th Avenue / 8th Street	AWSC	B (10.9 s)	0.44
3 - 8th Avenue / 7th Street	AWSC	B (12.4 s)	0.52
4 - Three Sisters Drive / Rundle Drive	Roundabout	A (5.2 s)	0.32
5 - Three Sisters Parkway / Three Sisters Drive / Spray Lakes Road	Roundabout	A (3.7 s)	0.35
6 -Three Sisters Parkway / Peak Drive / Three Sisters Drive	Roundabout	A (5.1 s)	0.35
7 - Three Sisters Parkway / Three Sisters Boulevard	Roundabout	B (12.4 s)	0.94
8 - Three Sisters Parkway / Highway 1 Eastbound Off-Ramp	TWSC	A (0.2 s)	0.02
9 - Three Sisters Parkway / Highway 1 Westbound Off-Ramp	Roundabout	A (2.8 s)	0.57
10 - Three Sisters Parkway / Mountain Village West Access	Roundabout	A (4.7 s)	0.50
	Signals	B (17.2 s)	0.85
11 - Three Sisters Parkway / Mountain Village East Access	Roundabout	A (5.1 s)	0.73
	Signals	C (22.6 s)	0.88

ACTIVE MODES

To accommodate the shift in future modes from people driving to people walking, upgrades are needed to the existing active modes network, and an additional river crossing is warranted. To identify active mode trip distribution, WSP assumed that an available connection along the Highway 1 Corridor as a future extension of the TransCanada Trail would be available by the study horizon. The analysis reveals that the following upgrades are needed to accommodate the added walking and cycling traffic (summarized in **Table 7-10**). Details of this analysis can be found in **Appendix D**.

Table 7-11 Summary of Active Mode Requirements

Location	Effective Width Cross Section	Performance		LOS C Achieved?
		Walk	Bike	
Bow River Bridge	2.5 m multi-use path, 2.0 m sidewalk, 2 vehicle lanes, 2.5 m unidirectional bike lanes in each direction	2.79 ped/min/m on sidewalk; LOS A[1] 2.23 ped/min/m on multi-use path; LOS A[1]	LOS C[2]	Yes
Prospect Bridge	3.0 m two-way bike path and 2.5 m sidewalk	2.73 ped/min/m; LOS A[1]	LOS C-D[3]	Yes[4]
Riverfront Path	3.0 m two-way bike path and 2.5 m sidewalk	1.79 ped/min/m; LOS A[1]	LOS B-C[3]	Yes
Trans Canada Trail	3.0 m two-way bike path and 3.0 m sidewalk	0.92 ped/min/m; LOS A[1]	LOS A-B[3]	Yes

1 – based on HCM Pedestrian Flow Rate; realistically, the LOS will be lower depending on the percentage of cyclists using the facility

2 – Based on TRB Operational Analysis of Uninterrupted Facilities – One-Way Exclusive Bike Path

3- Based on TRB Operational Analysis of Uninterrupted Facilities – Two-Way Exclusive Bike Path

4 – Volumes are slightly higher than LOS C but it is reasonable to expect that cyclists may redistribute to bike lanes on Three Sisters Drive.

TRANSIT

The adjustments to the mode split identifies a potential 1000 trips/hour of transit ridership in the PM Peak Hour from Three Sisters Village. Of those trips, approximately 600 are inbound in the peak hour, and 400 are outbound. There are approximately an additional 200 inbound trips and 150 outbound trips from Smith Creek and Stewart Creek. A 10 minute frequency, 80 person capacity bus would provide service for 480 people/direction/hour. This leaves a service shortage for about 120 riders in the peak hour from Three Sisters Village and an additional 200 travelling further south. Opportunities to overcome this include: operating at 5 minute frequency for part of the peak hour, providing higher capacity buses, and working with private operators at the hotels to offset some of the

demand. The TRB manual on transit capacity[2] suggest that a high frequency transit service could operate in the congested traffic and deliver sufficient capacity to meet demand. The road network infrastructure upgrades are more minimal in this scenario, which provides an opportunity to explore transit priority measures, in particular at the intersection of Three Sisters Parkway and Three Sisters Boulevard, where providing transit priority lanes/signal timing may encourage higher levels of service for people using transit, further encouraging a shift to transit away from private vehicles.

[2] Transit Capacity and Quality of Service Manual, Transportation Research Board,

8 SUMMARY OF RECOMMENDATIONS

Three Sisters Mountain Village, which includes the neighbourhoods of Smith Creek, Stewart Creek and Three Sisters Village, will add significant residential and commercial growth to the Town of Canmore along with the associated travel of residents, employees, and visitors. This development requires numerous infrastructure upgrades including, the build out of Three Sisters Parkway, the construction of additional pedestrian and cycling pathways and sidewalks, and contributes to need for upgrades to some existing intersections within the Town of Canmore.

WSP evaluated a number of scenarios to investigate the range of outcomes that could be expected, depending on how future travel patterns and land uses build out.

The base analysis case of this TIA identifies that during peak summer weekends for trips that are external to the Three Sisters Mountain Village, 75% of all new trips generated will be taken by private vehicle, while approximately 15% will be completed by foot or bike, and 10% in public or private transit. The rate of trips in private vehicles is higher than that identified in the ITP because it reflects only external trips and because the trips using the Highway 1 having limited “active modes” or anticipated mass transit options. For trips that are using the Three Sisters Parkway to access the rest of Canmore, the mode split is approximately 60% private vehicle, 30% active modes, and 10% transit which reflects the active mode opportunities available to those users. In comparison, the Travel Shift Option evaluates an alternative which presents an overall mode split from the three neighbourhoods of 60% driving, 25% active modes, and 15% transit ridership. The range of analysis identifies that the higher mode split, along with other noted shifts in travel habits may be necessary to allow the road network to continue to operate without adding significant capacity. To accommodate the extra walking, cycling, and transit trips, additional infrastructure to accommodate those users is needed in both scenarios.

The ASPs have identified land use concepts and supportive internal infrastructure which encourages walking, cycling, and taking transit within the development and out to Canmore. The land use concepts and associated infrastructure recommendations align with the 2018 ITP, and the overall mode split assigned to people cycling and walking is slightly lower than the highest recommendation in the ITP. Recommended infrastructure upgrades are summarized in the next sections.

WALKING/CYCLING RECOMMENDED INFRASTRUCTURE

Both the Three Sisters Village ASP and the Smith Creek ASP identify a network of cycling connection and pedestrian corridors and routes that create walkability and a highly-bikeable environment. When combined with a dense, mixed-use land form and end of trip facilities, the individual ASPs result in a mobility environment that align with the goals and objectives of the 2018 ITP.

To achieve the desired mode split for travel into and out of the overall Three Sisters Mountain Village, this TIA identifies a network of trails and pathways that connection each of the Three Sisters Mountain Village communities to each other, and then to the rest of Canmore. These routes are critical to achieving the desired outcomes of both the ITP and the ASP. These routes should be winter-friendly, appropriate lit per EDCG standards and maintained through all seasons. There are a number of options of how to achieve this, including existing trails along the Parkway and connections through existing utility corridors.

- Pathway connection west connecting to the existing Quarry Lake area network;
- Pathway connections east and west to the existing Three Sisters Pathway in as direct a manner as feasible;
- Pathway connection east to the Trans-Canada Trail and Dead Man’s Flats community;
- Upgrades needed for pedestrians and cyclists at the Bow River Bridge (new complete streets cross section);
- Widening and separation of walking and cycling infrastructure along the Three Sisters Pathway/Waterfront Trail; and
- Unidirectional, dedicated cycling lanes along the Bow Bridge Corridor (as identified in the ITP).

An additional Bow River crossing in the form of either the extension of the TransCanada Trail along Highway 1 (or other route) is required in the travel shift option, and may be needed in the base analysis horizon.

TRANSIT RECOMMEDED INFRASTRUCTURE AND SERVICE

The ASP document outlines an intended public transit route through the Three Sisters Village, Stewart Creek, and Smith Creek. This study assumes that Three Sisters Parkway through to Smith Creek Village will be designed to accommodate public transit. The study also assumes that transit stops will be provided within the communities. Operation tools that will help achieve transit ridership outcomes include public transit connections between Three Sisters Mountain Village and the rest of Canmore, public/private transit routing that connects both Canmore and the National Parks, and public/private transit routing between Canmore to Calgary and the International Airport. Potential rail connections may also support these outcomes. Transit infrastructure can be coordinated with intercept parking facilities and high-quality pedestrian and cycling routes to complement these goals. Recommendations to accommodate transit and transit ridership goals for this study include:

- Design internal roadway route and associated roundabouts to accommodate ROAM public transit service.
- Include roads linking to hotel sites designed to accommodate private coach and shuttle vehicles.
- Provide public transit bus stops along the Roam route with all weather surfaces and lighting.
- Increase frequency to 10 – 15 minute frequency during the peak hour.
- Provide shuttle service to/from the intercept lot.

ROAD NETWORK RECOMMENDED INFRASTRUCTURE

To accommodate the growth in Canmore identified within the overall Three Sisters Mountain Village area, through the build out of the Three Sisters Village ASP, the Smith Creek ASP and the remaining development in Stewart Creek, the following intersection upgrades have been recommended. The phasing and timing of these upgrades will depend on staging of the development and the fluctuating background growth of the community. Intersection numbers related to **Figure 1-4**. Sensitivity analysis indicated that there may be potential for reduced infrastructure needs at intersections 7, 10 and 11 depending on willingness to accept reduced capacity during peak times at those locations. The Travel Shift Sensitivity Analysis identifies that a more significant shift in mode split and other travel pattern shifts would reduce the need for some of the upgrades identified below, and result in a traffic option which maintains a desired capacity for driving along the Three Sisters Parkway, and across the Bow River Bridge. These are discussed in detail in **Section 7.** The recommendations identified below represent the maximum upgrades that could be needed as identified in this TIA.

1. **8th Avenue / 10th Street**
   a. No modifications required to current all-way stop.
2. **8th Avenue / 8th Street**
   a. Convert to All-Way Stop-Control intersection.
3. **8th Avenue / 7th Street**
   a. Install Traffic Signals.
   b. Add northbound right-turn lane.
   c. Add southbound left-turn lane.
4. **Three Sisters Drive / Rundle Drive**
   a. Convert to single-lane roundabout.
5. **Three Sisters Parkway / Three Sisters Drive / Spray Lake Road**
   a. Convert to single-lane roundabout.
      i. Maintain southbound to westbound channelized right-turn.
6. **Three Sisters Parkway (Highway 742) / Peak Drive / Three Sisters Drive**
   a. Convert to single-lane roundabout.
7. **Three Sisters Parkway / Three Sisters Boulevard**
   a. Install Traffic Signals (unable to meet requirements with a roundabout*).
      i. Construct two southbound left-turning lanes.
      ii. Add second receiving lane on Three Sisters Boulevard towards Highway Ramp Terminal (intersection 8)
      iii. Add a receiving lane on Three Sisters Parkway north up to the next access.
      iv. Add northbound left-turn lane.
8. **Three Sisters Parkway / Highway 1 Eastbound Off-Ramp**

a Convert to single-lane roundabout.

9. **Three Sisters Parkway / Highway 1 Westbound Off-Ramp**
   a Convert to single-lane roundabout.
10. **Three Sisters Parkway / Three Sisters Village West Access**
   a Construct a single-lane roundabout (geometry permitting).
      i Add northbound to eastbound channelized right-turn lane.
      ii Add eastbound to southbound channelized right-turn lane.
      iii Add westbound through slip lane.
   b Or signalize with associated upgrades.
      i Add eastbound right-turn lane.
      ii Add westbound left-turn lane.
      iii Separate northbound left-turn and right-turn lanes.
11. **Three Sisters Parkway / Three Sisters Village East Access**
   a Construct a single-lane roundabout (geometry permitting).
      i Add northbound to eastbound channelized right-turn lane.
      ii Add eastbound to southbound channelized right-turn lane.
      iii Add westbound through slip lane.
   b Or signalize with associated turning lane upgrades.
      i Eastbound right-turn lane.
      ii Add a second eastbound through lane.
      iii Two westbound left-turn lanes.
      iv Separate northbound left-turn and right-turn lanes.

In addition to the infrastructure requirements identified at the intersections, the street corridors should be traffic calmed, prioritize cycling and walking movements, and promote easy access to high quality transit.