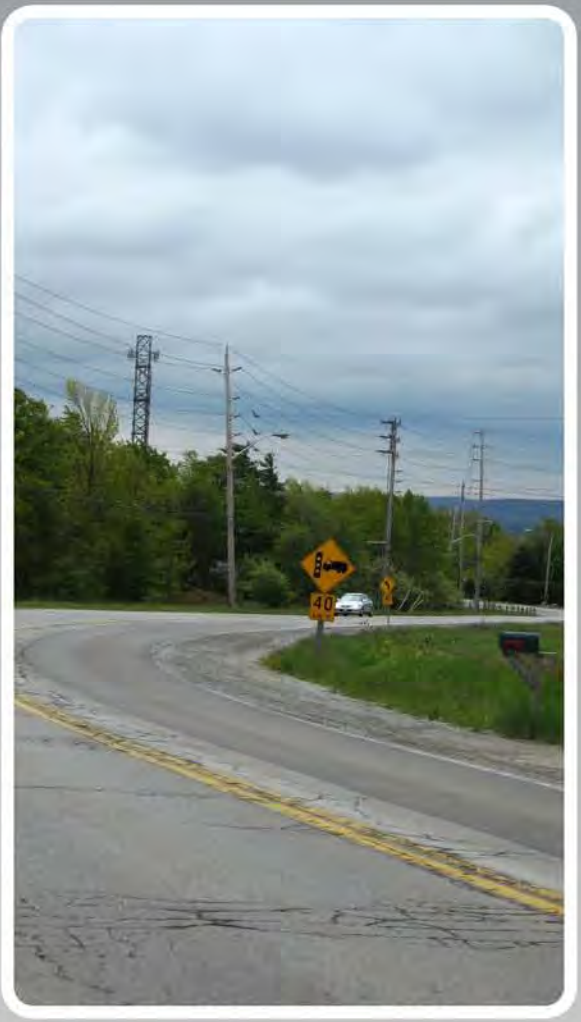
Waterdown Road Corridor
Class Environmental Assessment
(Craven Avenue to Dundas Street)

ENVIRONMENTAL STUDY REPORT

April 2012









DILLON CONSULTING

Waterdown Road Corridor (Craven Avenue to Dundas Street) Class Environmental Assessment

Environmental Study Report

April 2012

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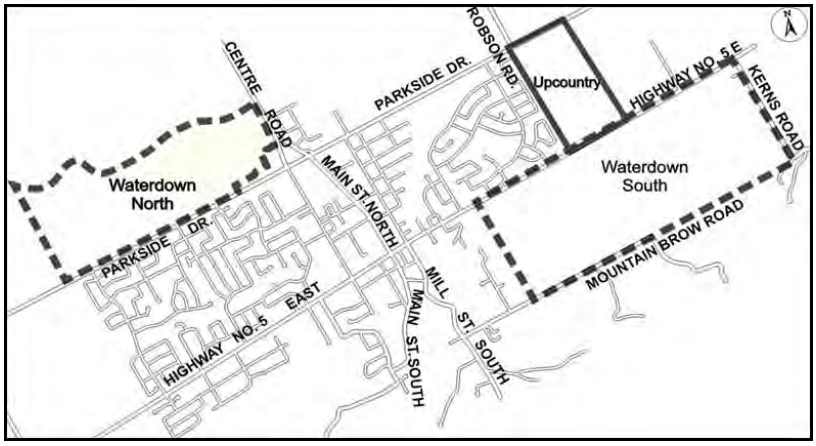
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Executive Summary

This Environmental Study Report (ESR) addresses four phases of the Waterdown Road Corridor Class Environmental Assessment. This main report includes a summary only of Phase 1 and Phase 2 work as this documentation had been released on the public record previously (Phase 1 report in July 2004 and Phase 2 report in February 2008). Updates of completed Phase 1 and 2 work and final reports were not undertaken during Phases 3 and 4. These reports are included in their entirety in the Appendix (Appendix N and Appendix O). The summary of this earlier work that is contained in this and other sections of the ESR has been left intact as it was originally documented with qualifying/updating footnotes notes added only where it was considered important as current context for the reader.

Overview

In 1992, the Council for the former Town of Flamborough approved a "Preferred Growth Strategy" to allow for the expansion of the urban area around Waterdown. The Preferred Growth Strategy recommended that Waterdown North and Upcountry Lands be placed within the urban boundary. Although initially adopted by Town of Flamborough Council in May 1992, a revised version of Official Plan Amendment (OPA) 28 and related Memorandum of Agreement was ultimately approved by Cabinet in June 2002 in response to a series of appeals. OPA 28 allowed for an additional 6,500 housing units, with an estimate of an additional 15,264 people at full build-out.



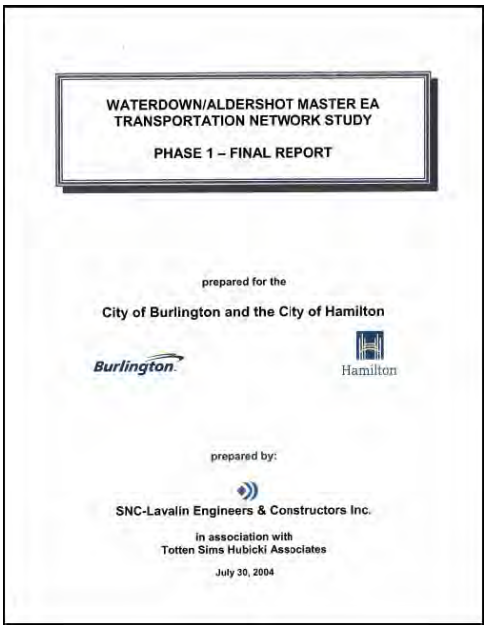
City of Hamilton Official Plan Ammendment 28 Areas

The approval of OPA 28 and the related agreement required the completion of:

- A Class Environmental Assessment for the Dundas Waste Water Treatment Plant expansion/diversion
- A Master EA Transportation Study
- A Waterdown South Subwatershed Study
- Secondary plans where Council deems necessary.

In September 1999, the former Town of Flamborough, the City of Burlington, the Regional Municipality of Halton and the former Region of Hamilton-Wentworth received the ***Aldershot/Waterdown Master EA Transportation Network Master Plan Report*** undertaken by Stantec Consulting Limited. The purpose of the study was to identify a future transportation network required to accommodate urban development in the communities of Waterdown and Aldershot. The report, however, did not receive Council approval from any of the involved municipalities.

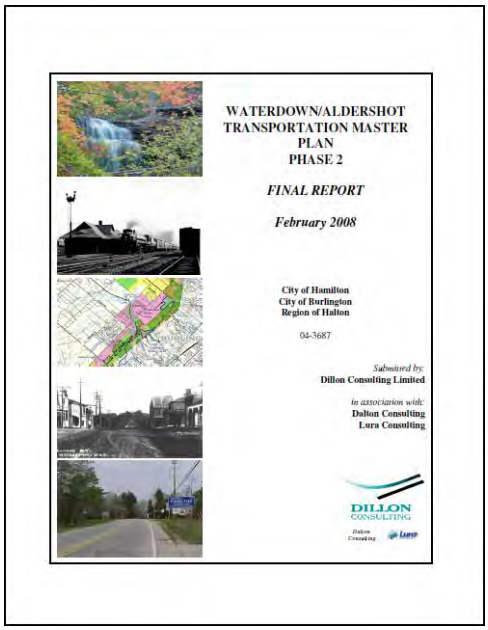
A Phase 1 Final Report of the ***Waterdown/Aldershot Master EA Transportation Network Study*** was completed on July 30th, 2004 by SNC-Lavalin (refer to Appendix N). The purpose of Phase 1 was to "review all the land use and transportation network changes, either proposed or constructed, which may affect the study area conclusions and recommendations of the previous 1999 Stantec Transportation Master Plan Study.



2004 Phase 1 Report

The report confirmed the need for additional east-west and north-south transportation capacity in the Waterdown/Aldershot area due to OPA 28, stating that additional capacity was needed in each direction. The report also recommended that the next phase consider all options to provide additional transportation capacity in the Waterdown and Aldershot areas. OPA 28 allowed for the expansion of the Waterdown Urban Area to accommodate residential growth to the year 2021.

The ***Waterdown/Aldershot Transportation Master Plan (WATMP) Phase 2 Report*** prepared by Dillon Consulting Limited was subsequently completed in February of 2008. The purpose of the WATMP was to confirm the results of the Phase 1 work and to complete Phase 2 of the Municipal Class Environmental Assessment (Class EA) planning and design process. The Phase 2 Report provided a set of recommendations and a variety of measures to increase transportation capacity, including public transit, bicycle routes, transportation demand management and road improvements. The WATMP identified a series of next steps for the implementation of its recommendations including undertaking Phase 3, 4, and 5 of the Municipal Class EA planning and design process for road improvements in the Waterdown Road Corridor from north of Highway 403 to Dundas Street.



WATMP Phase 2 Report

Transportation Master Plans (TMPs) deal with area wide system and network requirements leading to the development of a series of overall transportation goals and objectives and the identification of preferred projects and initiatives that will be necessary to achieve them. A Class Environmental Assessment deals with a specific project identified in the TMP. The ***WATMP Phase 2 Final Report (February 2008)*** is part of the documentation of this Class EA and as such, is subject to the same review requirements (the Phase 2 report is provided in ***Appendix O***)

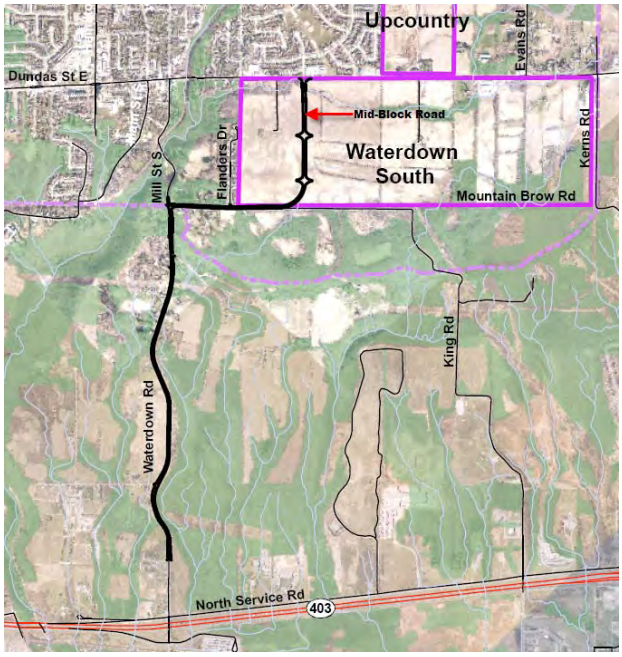
This project was carried out under the direction of a project partnering group (Project Partners) with staff from the following participating municipalities:

- City of Hamilton

- City of Burlington
- Halton Region

The complete Waterdown Road Corridor encompasses three road sections within which 4 lanes will be required by 2021:

- Waterdown Road from north of the North Service Road (just south of Craven Avenue) to Mountain Brow Road (two lanes currently exist)
- Mountain Brow Road from Waterdown Road east to a new Mid-Block Road to be constructed as part of the Waterdown South development lands (two lanes currently exist)
- Known as the Mid-Block Road, this new arterial road in the Waterdown South development will run from Mountain Brow Road northerly to Dundas Street.



Waterdown Road Corridor Sections

Note that the Mid-Block Road is part of the required road system for the Waterdown South development. The recommendation from the WATMP study was that this main north south collector road through the west end of the development should be constructed as a 4-lane arterial roadway with appropriate arterial road standards and elements. The location of the Mid-Block Road was confirmed in this Class EA study. Additional assessments of this road have been undertaken during Phase 3 to finalize the preferred alignment, indicate the general arterial road design requirements and intersection layouts and to document commitments to mitigation measures and future work that will need to be addressed during the design phase. The actual final design, development of mitigation measures, permitting and approvals, and construction of the Mid-Block Road will be the responsibility of the developer.

Definition of the Problem (Phase 1 & 2)

OPA 28 to the Town of Flamborough Official Plan allows for the expansion of the Waterdown urban area to accommodate residential growth to the year 2021. The three main expansion areas in OPA 28 are Waterdown North, Waterdown South, and Upcountry Lands. The OPA 28 lands consist of approximately 240 hectares of gross developable residential land. Population growth is expected to increase to 15,264 people upon build out.

The Phase 1 Final Report of the ***Waterdown/Aldershot Master EA Transportation Network Study*** was completed on July 30th, 2004 by SNC-Lavalin. The report confirmed the need for additional east-west and north-south capacity in the Waterdown/Aldershot area due to OPA 28, stating that additional transportation capacity was needed in each direction.

In late 2004, the development of the ***Waterdown/Aldershot Transportation Master Plan Phase 2*** was initiated. This work included a review of the transportation analysis in the July 2004 Phase 1 report as well as additional transportation modelling work to confirm the problem and provide details on the capacity requirements. The conclusion was that if no other growth in traffic were to occur – only traffic generated

by OPA 28, there would still be a north/south deficiency in the study area network south of Dundas Street. However, traffic will grow (i.e., as families mature, there will be more cars per household). If one considers a marginal growth of 1% per year to 2021, then the system will need to accommodate an additional 572 vehicles and move an additional 15,000+ people, which, when added to the un-served demand for OPA 28, equates to the equivalent of one arterial lane.

There was a clear conclusion that a north/south deficiency will exist. Therefore "The Problem" identified in the Phase 1 ***Waterdown/Aldershot Master EA Transportation Network Study, July 2004)***, was confirmed by the work undertaken in the Phase 2 Waterdown/Aldershot Transportation Master Plan.

Alternative Solutions

A number of possible transportation solutions to resolve the road capacity problem were initially identified, including:

- Do-nothing;
- Improved public transit;
- Transportation demand management; and
- New roadway capacity.

Attempts were made to solve as much of the problem as possible through non-roadway solutions such as improved public transit and Transportation Demand Management (TDM) measures. These solutions are considered preferred (by the project team and participants to this study) as they result in less reliance on the automobile and result in less environmental effects. The Phase 2 Transportation Master Plan makes recommendations in this regard. Alternative solutions to provide new roadway capacity were developed and evaluated. These are shown in ***Table 1, New Road Capacity Alternatives.***

Based on assessment and comparative evaluation work Waterdown Road Widening & Geometric Improvements (Option 2) was identified as the preferred North-South road improvement solution. In addition, the City of Burlington determined that King Road cannot be left in its current condition due to road safety concerns. As such, Burlington Council indicated that to keep it open, some amount of road/operational improvements or closure to through traffic may be necessary. A separate study was undertaken by the City of Burlington to assess technical options for King Road.

Table 1: New Road Capacity Alternatives

Option	Road Options Description
Option 1 – King/Waterdown Road Geometric Improvements (Both 2 lane roads)	• Geometric improvements to Waterdown Road from Highway 403 to Dundas Street (maintain as 2 lanes) • New Waterdown Road section north of Mountain Brow Road • King Road requires two sections of new ROW (2 lanes) with geometric improvements to sections of the existing King Road and an extension to Dundas Street • Widening of North Service Road between King Road and Waterdown Road to 4 lanes
Option 2 – Waterdown Road Widening & Geometric Improvements	• Geometric improvements and widen Waterdown Road to 4 lanes from Highway 403 to Dundas Street (from the existing 2 lanes) • New Waterdown Road ROW north of Mountain Brow Road • King Road remains as a 2-lane roadway • No improvements to North Service Road
Option 3 – King Road Geometric Improvements & Waterdown Road Widening	• Widen Waterdown Road to 4 lanes (no geometric improvements) • New Waterdown Road ROW north of Mountain Brow Road, • King Road requires two sections of new ROW (2 lanes) with geometric improvements to sections of the existing King Road and an extension to Dundas Street • Widening of North Service Road between King Road and Waterdown Road

During consultation on the Waterdown/Aldershot Transportation Master Plan Phase 2, the City of Burlington expressed concerns related to the preferred solution identified. In July 2007, the City of Burlington received the draft Phase 2 Report with a number of conditions and authorized staff to proceed with Phase 3 of the Class EA process. The City of Burlington Council resolution (Council Report No. 14-07) was as follows:

> *THAT the findings of the Phase 2 Waterdown/Aldershot Transportation Master Plan Study Report from Dillon Consulting be received; and*
>
> *THAT the Director of Engineering be directed to proceed with Phases 3 and 4 of the Waterdown/Aldershot Transportation Master Plan in conjunction with the City of Hamilton and Region of Halton, subject to the following conditions:*
>
> *(i) THAT Phase 3 of the Waterdown/Aldershot Transportation Master Plan Study evaluate options for a phased implementation of the 4-lane Waterdown Road that would include an initial 3-lane option as illustrated in Figure 1 of Engineering Department Report E-42/07, dated June 6, 2007 along with additional transportation considerations and/or design modifications as follows:*
>
> - *Increased road width only from 13.3 meters to 14.2 meters (i.e. minimum road width to accommodate 4-lanes)*
> - *Inclusion of a multi-use off-road pathway up to 4.0 meters on one side of the road only*
> - *Detailed evaluation of a counter-flow traffic control option utilizing 3-lanes to provide*

increased peak hour capacity in order to delay for as long as feasible, or possibly eliminate the need to reconfigure Waterdown Road to four lanes; and

- *THAT Hamilton implement a viable public transportation system with a utilization experience of 5% to service the OPA 28 lands at 80% build out; and*

ii) THAT prior to build-out of the OPA 28 lands, defined as not greater than 6,500 units, the City of Burlington undertake a separate Environmental Assessment (EA) Study pertaining to the reconfiguration of Waterdown Road to four lanes from Hwy. 403 to Mountain Brow Road; and

(iii) THAT this study have a steering committee and a stakeholder group to include at least three residents of Waterdown Road representing three separate families; and

(iv) THAT Phase 3 of the Waterdown/Aldershot Transportation Master Plan Study evaluate detailed alternatives and confirm a preferred design allowing King Road to remain open as a two lane roadway as illustrated in Figure 2 of Engineering Department Report E-42/07, dated June 6, 2007; and

(v) THAT a cost-sharing agreement with the City of Hamilton for the north-south road improvements be finalized to the satisfaction of the Director of Engineering, City Treasurer and City Solicitor and that the Director of Engineering report back to Council for final approval when an agreement is reached; and

(vi) THAT priority be given to the Phase 3 work required to fully address all of the detailed design questions raised by Waterdown Road residents including, but not limited to, confirmation of the road alignment, impacts to individual properties and land acquisition requirements; and

THAT the Director of Engineering report back to Council on the Phase 3 preferred design alternative for Waterdown Road and King Road as part of consideration and approval of the Phase 4 Waterdown/Aldershot Transportation Master Plan Environmental Study Report; and

THAT the Director of Planning be directed to initiate an amendment to the Burlington Official Plan to clarify the policies relating to Waterdown Road and distribute such draft amendment to residents of Waterdown Road in a timely fashion.

Note that, as directed above, a parallel project - the ***King Road Technical Feasibility Study*** was subsequently carried out by the City of Burlington at the same time as the Phase 3 work. Interim findings from this study were reviewed with the Technical Advisory Committee and at

the Public Information Centres. Documentation of this work is under separate cover and not part of this Class EA.

Existing Conditions

Waterdown Road and Mountain Brow Road are both two-lane roadways with sub-standard sections. Waterdown Road has sharp curves in the south end where the advisory speed limit is 50 km/h. Mountain Brow Road has a grade of 14% just east of Waterdown Road.

The Waterdown Road and Mountain Brow Road corridors are essentially residential in nature with a total of 39 residences on Waterdown Road (18 west, 21 east) and 13 residences on Mountain Brow Road (6 north and 7 south). The area through the Waterdown South lands is currently farmed with some natural areas, including a tributary of the Grindstone Creek just south of Dundas Street. Subdivision construction is underway on the north part of this development. The area includes components of the Bruce Trail including 2 trail crossings of Mountain Brow Road (east of Flanders Drive) and one trail entrance on Waterdown Road (just south of Mountain Brow Road). There are six buildings in the corridor that have been identified to be of heritage interest within 25 feet of the existing roadways.

Lands to the east of Waterdown Road are located within the Greenbelt Plan Area and as such are subject to Greenbelt Act (2005), and the designations of the Greenbelt Plan (2005). The northern portion of the Waterdown Road Corridor is located within the Niagara Escarpment Plan Area and as such is subject to Niagara Escarpment Act (1973), and the designations of the Niagara Escarpment Plan (2008). The south side of Mountain Brow Road and the east and west side of Waterdown Road is designated Escarpment Protected Area and the Escarpment Natural Area.

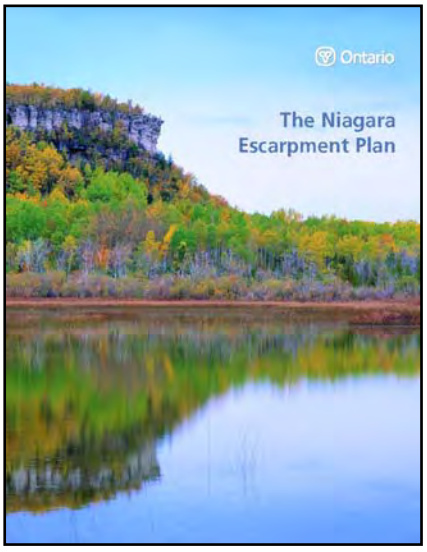
There are several significant natural areas within the study area that have been designated as such by either the Ministry of Natural Resources, Conservation Halton, or the municipalities. These include environmentally sensitive areas (ESAs) and areas of natural or scientific interest (ANSIs). The three main such areas are the Grindstone Creek Valley ESA, the Waterdown Escarpment Woods ESA and the Sassafras Woods ESA.

Future development lands in the area include the Waterdown South Development (Waterdown South) south of Dundas Street extending to Mountain Brow Road and the Eagle Heights development in the City of Burlington north of Flatt Road along the west side of Waterdown Road.

Alternative Design Concepts

Numerous alternative design concepts were identified and assessed. These included the following:

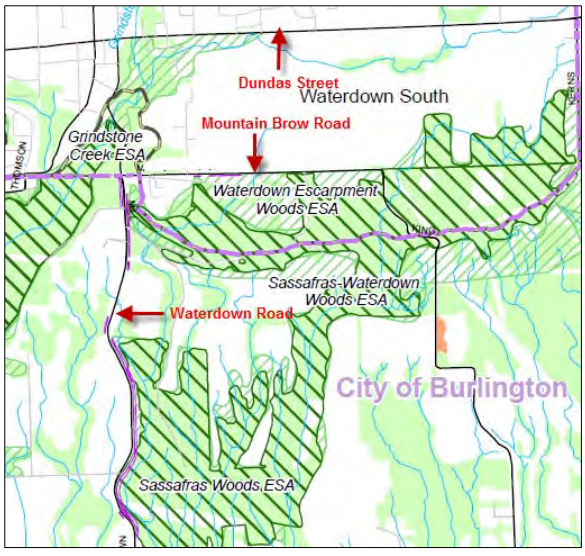
- Alternative alignments in the Eagle Heights development area toward the south part of the Waterdown Road corridor,



The Niagra Escarpment Plan



Built Heritage Property on Waterdown Road



Environmental Areas in the Corridor

- Alternative intersection treatments at Flatt Road, Waterdown/Mountain Brow Road, Mountain Brow/Mid-Block Road, along the Mid-Block at collector road intersections, and at Dundas Street.

In the Eagle Heights development area, an alignment just to the west of the existing road was selected over an alternative that straightened the road directly through the future subdivision. Roundabout intersections are recommended at two locations on the Mid-Block Road. As well, a turning roadway alignment is recommended that connects the Mid-Block Road directly into Mountain Brow Road. At Dundas Street an alternative intersection treatment is recommended that does not permit northbound traffic to cross Dundas Street from the south to address concerns with traffic infiltration on Burke Street.

Two corridor long alternative cross sections were assessed for Waterdown Road, one with on-road bicycle lanes and conventional sidewalks on both sides and one with narrower road pavement with a west side multi-use pathway and no sidewalk on the east side. The latter cross section was selected as it was more in character with the area and less costly.

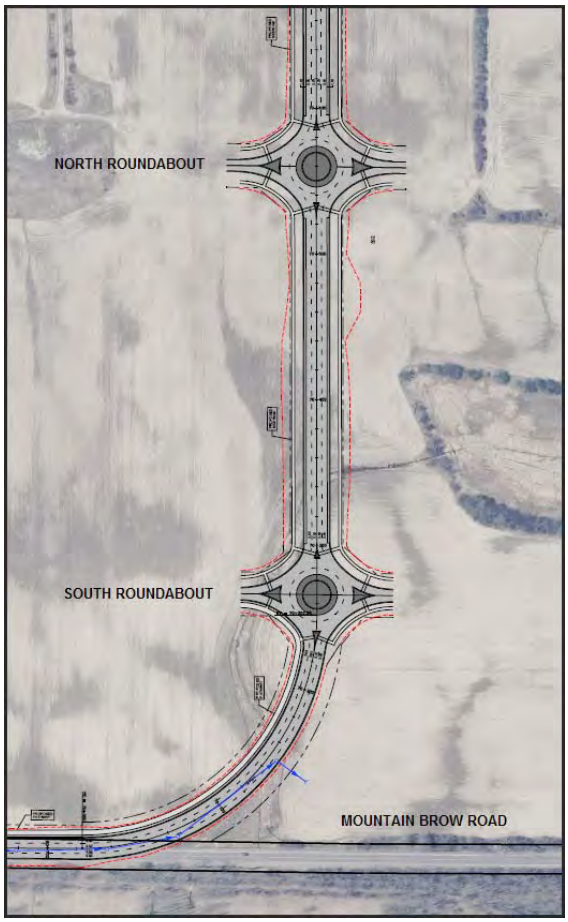


Recommended Treatment at Dundas Intersection

Preferred Design Concept

The preferred design concept is described in detail in Chapter 6 which includes detailed plans and profiles along all road sections. The following features are of note:

- It is recommended to build two additional lanes to provide a four-lane Waterdown Road in the initial stage but provide lane markings for two-lanes with a continuous left turn lane, plus on-road bicycles lanes. Excess road capacity will exist for at least 5 years as development proceeds and the conversion to 4-lanes can be deferred. Minimal costs will be associated with its future conversion to a four-lane operation.
- The new road opposite the Eagle Heights development (north of Flatt Road) should be positioned to the west such that the east side of the new east-side sidewalk in this area is located at the existing east edge of the current roadway. This will provide additional separation between the east side residences and the new roadway.
- It is recommended that the new pavement width along Waterdown Road be kept to a minimum. In this regard, the lane widths have been reduced to 3.3 m and on-road bicycle lanes are not recommended for the ultimate stage.
- It is recommended that the normal arterial road posted speed be reduced from 60 km/h to 50 km/h to address concerns with respect to traffic impacts and preserving the character of the area.
- It is recommended that the Mid-Block Road in the Waterdown South development be a four lane road with the introduction of two roundabouts at collector road intersections and that the road



Recommended Mid-Block Road Treatment

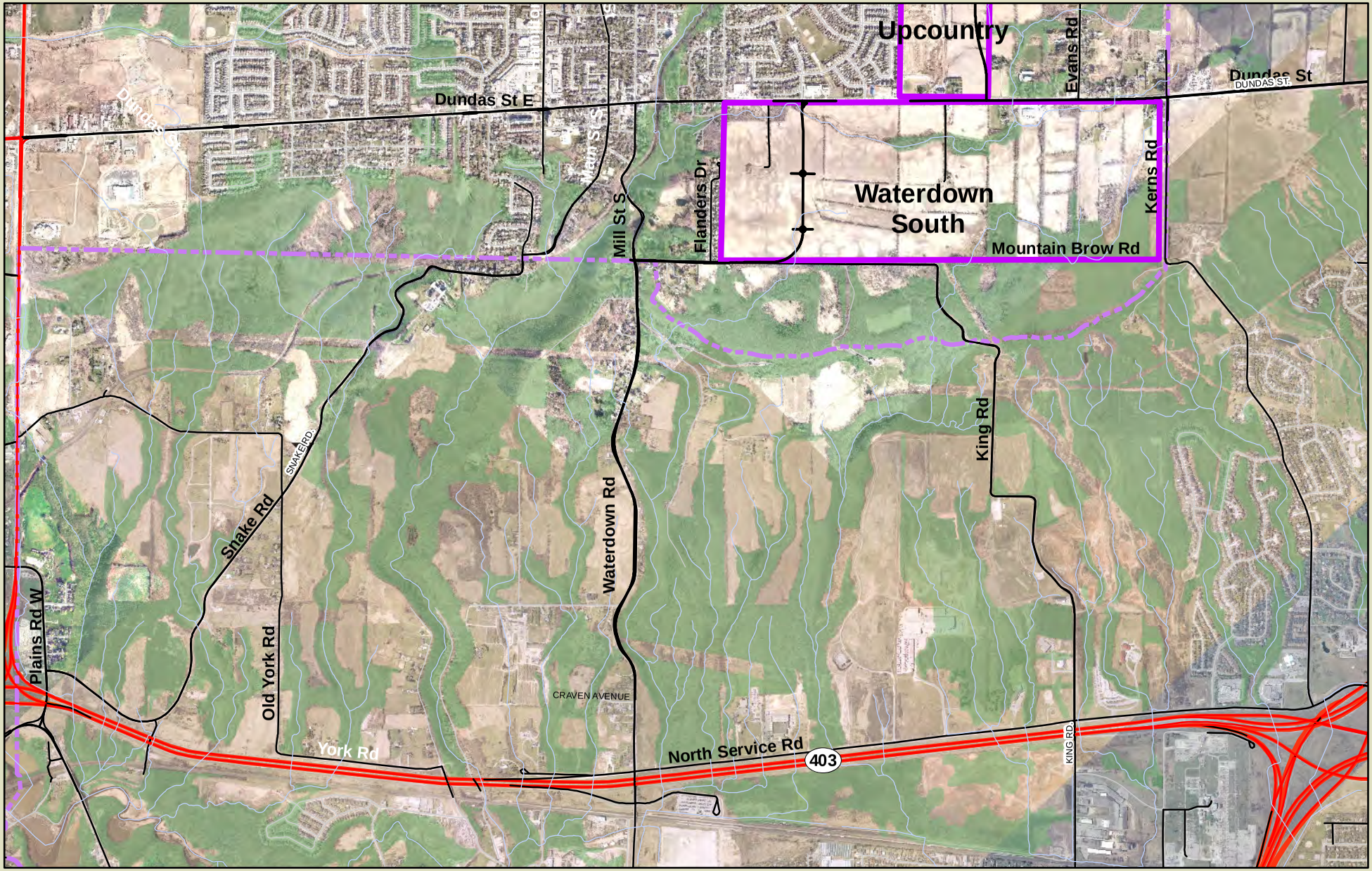


Figure 1 Waterdown Road Corridor - Key Plan

Legend

- Waterdown Road Corridor Alignment
- Municipal Boundary
- Watercourse
- Urban Expansion Area
- Forested Areas

1:28,000

0 0.25 0.5 1 1.5 Km

DILLON CONSULTING

Map Created By: PJK/SFG
Map Checked By: PM
Date Created: April 5, 2006
Date Modified: July 24, 2009
File Path:I:\GIS\089020 - Waterdown\PA-Waterdown 072309\Mapping\New Waterdown Road - Preferred Option.mxd

be curved at the south end to turn directly into Mountain Brow Road.
- Mountain Brow Road will be dead-ended east of the Mid-Block Road and re-routed to connect to a new east-west collector road within the Waterdown South subdivision.
- A comprehensive landscaping and streetscaping concept has been developed throughout the corridor.

Potential Impacts and Mitigation

The proposed improvements to Waterdown Road and Mountain Brow Road have the potential to result in impacts to the environment, including the natural and social environment. Further, considerable public concern has been raised by the residents of Waterdown Road regarding the proposed widening of the roads including:

- Loss of property
- Safety concerns
- Loss of trees
- Disturbance effects (e.g. noise and air quality)
- Loss of rural character of the area
- Changes to road access

Attempts have been made to address these issues and reduce the potential for effects to the environment through the design of the road facility and the incorporation of many mitigation measures. The proposed roadworks will require the acquisition of up to 3 properties along Waterdown Road due to proximity and difficulty providing proper driveways. Additional potential impacts and the proposed mitigation are summarized in Table 2 below for the key areas of concern:

Table 2: Key Impacts and Proposed Mitigation

Key Impact/Concern	Proposed Mitigation
Acquisition of 2-3 residential properties	• Acquisitions kept to a minimum through incorporation of appropriate design measures (e.g. road location, road profile adjustment, elimination of boulevards/sidewalks, grading features/retaining walls etc.) • Compensation at market value
Removal of approximately 475 street trees along the corridor	• Number of removals has been kept to a minimum • Comprehensive landscaping plan developed (approximately 850 street trees and screening trees to be re-planted)
Impacts to Sassafras Woods ESA/ANSI	• Road to be shifted as far west as possible opposite the Sassafras Woods area (additional shifting to be addressed as part of future design investigations) • Slope stability study recommended during the design phase to identify the top of bank • Edge Management/Compensation Plan with additional botanical surveys recommended in the design phase to address impact with 3:1 replacement of directly impacted forested area • Address potential for road light pollution/spillover in design phase
Impacts to Waterdown Woods Escarpment ESA (removal of approximately 50 trees)	• Road shifted as far north as possible in this area • Edge Management/Compensation Plan recommended to address impact with 3:1 replacement of trees
Increase in road runoff	• Stormwater Management Plan developed to address water quality and quantity issues

Key Impact/Concern	Proposed Mitigation
Loss of frontage property from approximately 52 residences	• Amount of property to be acquired has been kept to a minimum • Compensation at fair market value
Change in rural character of the area	• Use of narrow lanes and reduced overall pavement width • Lower posted speed recommended (50 km/h) • Extensive landscaping and streetscaping plan • Initial phase work calls for only 3-lane roadway (2 lanes plus centre left turn lane) with additional median landscaped treatments
Construction stage effects	• Use of appropriate construction practices

Public Consultation

Significant public consultation was carried out during Phase 1 and Phase 2. Refer to Section 7 and Appendix A for details of this earlier consultation. The public consultation process carried out during Phase 3 of the project was designed to exceed the formal public notice and consultation requirements of the Class EA process. Additional notices/events included:

- Pre-consultation stakeholder identification and discussions;
- A final Phase 2 Stakeholder Advisory Committee (SAC) meeting to wrap up the WATMP and obtain input on the Environmental Assessment process;
- The Path Forward Report;
- E-mail, print and mail notices to attend three Public Information Centres (PICs);
- Three rounds of PICs: the first one to present the WATMP's conclusions, and the proposed Study Plan and Public Consultation and Communications process; the second one to present the alternatives; and the third one to present the preferred alternatives;
- An additional public meeting for Waterdown Road residents to view the recommended road design concept plans (March 2010);
- Development of a Terms of Reference, recruitment and formation of the North-South Neighbourhood Advisory Committee (NAC), and the holding five NAC meetings (see ***Table 3***);
- A One-Window Communications Portal for stakeholders and the public;
- Project website (www.hamilton.ca/WaterdownTMP)
- Project Newsletters issued throughout the project
- Issuing of interim study reports for public review.

The consultation approach focused consultation and communications activities around the initiation of the project, and Phases 3 and 4 of the study. Using this approach, input received could be considered by the Project Team and incorporated into each separate phase of the study. ***Table 4*** contains a summary of the North-South NAC's main points of input by topic.



Public Discussion at March 2008 PIC



Review of Proposals with the Public at June 2008 NAC Meeting

It is important to note that many participants in the Neighbourhood Advisory Committee, other residents and interested stakeholders who attended the Public Information Centres remain opposed to the widening of Waterdown Road and Mountain Brow Road. However, each individual actively participated in the consultation process and provided valuable information that helped the Project Team undertake the evaluation of alternative alignments and the selection of the preferred alignment.

Table 3: NAC Meetings

NAC Meeting	Meeting Topics
Meeting #1 April 22, 2008	• NAC Terms of Reference • Phase 3 and 4 Work Plan • Alternative Design Concepts – Assessing Alternatives and Criteria • Consultation with Property Owners
Meeting #2 May 14, 2008	• Alternatives Evaluation Methodology • Issue Areas
Meeting #3 June 2, 2008	• Evaluation Criteria • Issues / Opportunities for Alternative Alignments
Meeting #4 June 11, 2008	• Preliminary Evaluation of Alternatives • Mitigation Options • Update on King Road
Meeting #5 October 30, 2008	• Review of Draft Plans • Mitigation Options/ Measures • Streetscape / Design Issues



Public Discussion at October 2008 NAC Meeting

Table 4: Summary of NAC Comments/Suggestions

Topic	Comments / Suggestions
General	• The Project Team should consider creating a connection between the North-South route and the new East-West Road. • The need to implement the City of Burlington's resolution on the expansion of Waterdown Road
Evaluation Criteria Ranking	• Overall the social and natural environments are very important criteria. • Cost is a very relevant criterion. • Safety was also identified as an important criterion.
Waterdown Road	• The Project Team should consider the longer-term needs of the local community, beyond the OPA 28, and consider the amount of road that would be required based on future development. • Concerns about impacts on septic systems in front yards along Waterdown Road. • Concerns about speed limits on Waterdown Road, suggestion for reduced speed limit of 50 km/h. • Suggested lane width reduction from 3.3 m to 3.0 m. • Many NS NAC members supported a roundabout at Waterdown Road and Mountain Brow Road.
King Road	• NS NAC members would like to see King Road left open and in good, safe condition.
Natural Environment	• NS NAC members advocated for the preservation of the continuity of the Waterdown North Wetland Trail.

Topic	Comments / Suggestions
	• Concerns about the Bruce Trail crossing, and possible impacts to the local Environmentally Sensitive Area (ESA). • Suggestion for a possible Bruce Trail crossing on Waterdown Road south of Mountain Brow Road. • Suggestion for a pedestrian island at the Bruce Trail crossings of Mountain Brow Road east of Flanders Drive. • Concerns about road salt contamination of local creeks and streams. • Concerns about noise, light and air pollution. • Suggested compensation for removal of local trees.
Social Concerns	• NS NAC members were concerned about property acquisition and expropriation of homes along Waterdown Road. • Suggested the need for compensation for home-owners directly impacted.

Three Public Information Centres were held during the study (March, June and November 2008). In addition to these three focused periods of consultation and communications activity, there were ongoing opportunities throughout the process for members of the public and stakeholders to receive information about the project (via the project website and other communications materials, as developed), and also to provide feedback to the Project Partners (e.g. through phone, fax, email, mail, and the project website). An additional public meeting was held for Waterdown Road residents to view the recommended road design concept plans (March 2010)

Individual meetings with some of the directly affected property owners were held throughout the project to discuss specific concerns and mitigation measures to address impacts. Table 5 contains a summary of the main points of input received at the PICs and throughout the public consultation process for Phases 3 and 4.



Public Discussion at November 2008 PIC

Table 5: Summary of Public Comments/Suggestions

Topic	Comments / Suggestions
General	• There were concerns that drivers will attempt to connect between the East-West Road and North-South route using residential streets in between. It was suggested that the two routes should connect and be continuous. • Concerns that Boulding Avenue will be used as a bypass to Dundas Street. • Members of the public requested that the Project Team consider the inclusion of sidewalks and bike lanes along Waterdown Road. • There was interest from the public in obtaining more details about public transportation plans.

Evaluation Criteria	• Results of the evaluation criteria survey indicate that members of the public ranked project issues as follows:
	  • The social environment and the natural environment as high;
	  • Transportation as medium;
	  • The economic environment as medium to low; and
	  • Cost as low.

Technical	• There was an overall impression among members of the public that the plan for Waterdown Road was realistic and viable. However, there were also concerns that the preferred roadway improvements would not fully solve the transportation issues in Waterdown. • Local residents questioned whether homes along Waterdown Road would be switched from a septic system to a sewer system.
Public	• Overall impression from the public that attended the public information meetings is that they were well

Topic	Comments / Suggestions
Consultation	planned and well laid out, that meetings were informative and that staff at the PICs was courteous and helpful. • Members of the public expressed their dissatisfaction with delays of the project team in getting back to the public with timely information requests. • Some people indicated that more information sessions were needed. • PIC participants felt that it would be helpful to have PICs with formal presentations and opportunities for questions.
Natural Environment	• Members of the public noted that noise pollution and air quality must be considered and addressed. • Suggestion for the creation of a safe crossing for the Bruce Trail over Mountain Brow Road. • Need for increased transparency in the provision of project-related information; e.g. some members of the public requested that detailed environmental information be released prior to the Environmental Study Report (ESR). • Local residents expressed their concerns about water drainage issues and about the removal of trees during construction.
Social Concerns	• A main concern of local residents was about fair compensation and acquisition of local homes. Local residents also questioned whether the City would provide compensation for land lost or fragmented. • There were concerns about the safety of Waterdown Road merging from four lanes into two lanes, and increased traffic on Craven Avenue. • Local residents suggested the Project Team implement calming measures to slow down traffic on Waterdown Road.
King Road	• The majority of the public was of the opinion that King Road needs to remain open (in both directions) as an alternate path.

The following summarizes how the input received was considered and influenced the decision process and recommended road improvement design:

- Significant public concern was expressed regarding the potential for traffic infiltration into the residential area (via Burke Street. /Boulding Avenue) north of the proposed Mid-Block Road/Dundas Street intersection location. In response to these concerns, an intersection design is recommended that prohibits northbound traffic from traveling north through this intersection – vehicles will be forced to turn right or left;
- Considerable discussion was held with the owner of the Waterdown South development located between Dundas Street and Mountain Brow Road. These discussions were focused on the design of the Mid-Block Road and addressing issues relating to: Grindstone Creek crossing location/design, the number of road lanes required, use/location of road medians, viability and location of proposed roundabouts/intersections, and the alignment of the road in relation to the watercourse at the south end of the development parcel. Based on these discussions and the inputs received, considerable change was made to the initially proposed draft road design for the Mid-Block Road. It was decided that addressing environmental, drainage and planning issues related to this development were best dealt with within the development approvals process, outside of this Class EA.
- Due to public concern regarding the change to the rural character of Waterdown Road the normal design speed for this

class of road was reduced from 70 km/h to 60 km/h which will result in a reduced posted speed along the road of 50 km/h.

- Due to the expressed concerns of residents along Mountain Brow Road in the vicinity of the Flanders Drive intersection, the road alignment was shifted slightly to the south in this area to avoid the requirement to purchase residential property at this location. Further, sidewalks have only been proposed on the north side of the roadway to further minimize road footprint impacts.
- Based on comments received by residents and the Bruce Trail Association, island refuge type crossing features are proposed along Mountain Brow Road and Waterdown Road to allow the safe crossing of the widened roadways by trail users.
- Consideration was given to the use of roundabouts at key intersection locations. Public comment was received regarding a proposed roundabout at the Waterdown Road/Mountain Brow Road intersection. These comments were considered in the decision to implement a 4-way intersection design instead of a roundabout (much greater property impacts would have resulted with the proposed roundabout design). This intersection provides a continuous right turning movement for northbound traffic.
- The design of Waterdown Road was influenced by comments received by several interests including Burlington City Council and several individual property owners. As a result of Burlington Council input, an off-road multi-use pathway design was considered and compared against an on-road bicycle lane design. The off-road pathway design was selected as preferred. Further, based on Council input, a 3-lane interim road design has been developed for Waterdown Road. Extensive streetscaping proposals have been incorporated into the recommended design to address Burlington Council's request for a "parkway" treatment along the road. This includes significant street tree planting, median treatments, pedestrian lighting and recommendations for the consideration of banners, hanging planters and burying of hydro service lines. As well, based on meetings with individual landowners, modifications were made to the alignment/use of retaining walls to minimize impacts on property, trees and property access. Alternative property access points in one case are also being explored.
- Comments were received from the public regarding lane widths and the desire to decrease them from the proposed 3.3 m to 3.0 m. While this was considered, the City of Burlington is concerned that the narrowing of the lane widths could be problematic for some vehicles (e.g. buses) and could result in safety concerns. A 3.3 m lane is Burlington's standard minimum lane width for new road construction.
- Requests were made to consider the need for wildlife crossings along Waterdown Road. Three areas where wildlife crossings should be considered were suggested: just south of the Mountain Brow intersection, at the hydro corridor crossing south of Ireson Road and at the hydro crossing south of Flatt Road. In reviewing these locations, it was determined that the

low road profile coupled with the need for new storm sewers would not allow the implementation of a grade separated crossing without incurring significant footprint impacts and costs. As such, wildlife crossings were not considered further.

- Discussions were held with the owner of the Eagles Heights development lands located on the west side of Waterdown Road, north of Flatt Road. An alternate alignment was initially proposed to run through these lands to allow a straightening of the roadway. Upon subsequent discussion with the owner of these lands, it was determined that this realignment would have substantial impact on this development parcel and result in substantial cost to the Project Partners. This information was then taken into account and the alignment alternatives re-evaluated. The preferred alignment was developed to widen the road to the west of the current roadway that would reduce the effect on these development lands while at the same time avoid impacting the residents on the east side of the road.
- To address concerns relating to the possible encroachment of the widened road onto the ESA lands south and in the vicinity of Flatt Road, the widened road was directed to the west side as much as possible.
- In response to concerns relating to tree removal as a result of road widening, an extensive landscape/streetscaping and tree planting plan was developed and included in this ESR. In total, approximately 475 existing street trees will require removal as a result of the road widening and approximately 850 new street trees will be planted.

Commitments to Future Work

It is recommended that additional studies be carried out during or before the design phase to finalize the required mitigation measures. These are recommended and include the development of Edge Management Plans along the Sassafras Woods and Waterdown Escarpment Woods Environmentally Sensitive Areas (ESAs), completion of additional botanical surveys to support the Edge Management Plans, completion of Slope Stability Studies to identify the stable top of bank along the west side of the Sassafras Woods ESA and the completion (where required, due to the need for channel works) of fluvial geomorphology assessments. ***Table 6, Commitments to Future Work***, below, details City of Hamilton and City of Burlington commitments to further studies/work as this project advances toward and into the detail design stage. Commitments for mitigation measures to address potential impacts are discussed in Section 6 of this report.

Table 6: Commitments to Future Work		
Item	**Future Work/Specifics**	**Details**
1. 2000 Waterdown Road	Establish alternative access or purchase this property	Discussions started. Included dealing with property owner to the east for easement for new driveway.
2. Completion of Edge Management Plans	Locations: • Sassafras Woods • Waterdown Woods ESA	To be completed in discussions with Conservation Halton
3. Vegetation Compensation Plans	Locations: • Sassafras Woods • Waterdown Woods ESA	3:1 replacement ratio to be located off-site on public lands (locations to be confirmed in discussions with Conservation Halton)
4. Light pollution study	Location: • Sassafras Woods	Requirement of Conservation Halton
5. Alignment Revision Study	Location: • South end – south from Flatt Road (adjacent to Sassafras Woods)	• Minimize direct impact to Sassafras Woods by assessing reducing the west side multi-use pathway width to a minimum (similar to the section to the south), possibly eliminating the boulevard and further reducing the lane widths in this section. • With a footprint reduction the road can be shifted to the west (while keeping the new west side grading limit) and most of Sassafras Woods direct impact could be eliminated. • This work should be carried out in consultation with Conservation Halton.
6. Wildlife Crossing Assessment	Locations: • Three locations have been suggested by Conservation Halton (2 south of Mountain Brow, one at the hydro corridor south of Flatt Road)	• Conservation Halton continues to request the installation of wildlife crossings at three locations in the corridor. • An assessment completed during Class EA indicated that the crossings are not recommended as specific movement corridors were not identified in the natural environment study and opportunities for installing crossing facilities at the three potential locations were problematic due to the road grades (all in cut) and conflict with the road's new storm sewer. • This issue remains unresolved and further talks with Conservation Halton will be required during the design of Waterdown Road.
7. Eagle Heights Development	Continue discussions with the developer.	Resolve common design elements/requirements including: • Finalize grading interface • Finalize property/easement requirements • Finalize road drainage outlet in this area and the possibility of shared SWM facilities
8. 265 Mill Street	Finalize driveway and gate treatment/location on Mountain Brow Road	This property has access off Mountain Brow Road. Discussions with the owner should continue related to finalizing the location and treatment details for the new driveway and entrance gate.
9. Geotechnical	Groundwater impacts	Additional geotechnical work may be needed in relation to structures/sewers to assess possible groundwater impacts and follow-up requirements.
10. Septic systems	Relocation requirements	Impacts to septic systems to be identified and mitigation developed (limited relocation options due to rock)
11. Stage 2 Archaeological Studies	Required throughout the Waterdown Road and Mountain Brow Road corridors	Recommended in Stage 1 study
12. Heritage Building (1917 Waterdown)	This property will require acquisition as a result of the widening recommendations.	Treatment issues to be resolved after purchase include: • Access and proximity issues • Use/preservation of the building • Bruce Trail potential (the Waterdown Road Bruce Trail crossing is adjacent to this property)

Table 6: Commitments to Future Work		
Item	**Future Work/Specifics**	**Details**
13. Karst Specialist Services	Address the potential for encountering/impacting karst formations – additional geotechnical work will be required.	Requested by Conservation Halton
14. Slope Stability Assessment	Complete slope stability assessment work at the south end of the project adjacent to Sassafras Woods	Related to the alignment revision work outlined above (see Item 5) Conservation Halton has requested additional Sassafras Woods slope stability work including additional field work (boreholes, monitoring, etc.) and the completion of a detailed slope stability assessment. This work should be carried out in consultation with Conservation Halton.
15. Species at Risk Assessment (SAR)	Follow-up work will be required related to additional field sampling/observation for species at risk	• The development of mitigation measures for marsh, field and woodland bird species will be dependent on additional breeding bird surveys if construction is to take place between May 15 and August 1. • An additional woodland vole survey will be required to maximize opportunities for observation • A work plan should be submitted outlining the proposed timing and methodology for the above work.

1. INTRODUCTION

Dillon Consulting Limited (Dillon) was retained by the City of Hamilton, City of Burlington and The Regional Municipality of Halton to undertake the requirements of Phases 3 and 4 of a Schedule C Municipal Class Environmental Assessment (EA) for the Waterdown Road Corridor. The project was carried out by the City of Hamilton as part of an overall management and steering group (Project Partners) comprising representatives from the City of Hamilton, City of Burlington, and Halton Region. The group met regularly throughout the course of the project to review and direct the work of the project.

This section of the Environmental Study Report (ESR) introduces the project and its purpose, indicates the limits of the study and the study area, outlines the environmental study processes that were followed and the organization of the Project Team that carried out the work. This is provided as a background for the more detailed presentation of the transportation problem addressed in Chapter 2, alternative solutions to addressing the problem in Chapter 3, the existing conditions in Chapter 4, alternative design concepts in Chapter 5, details of the preferred design concept in Chapter 6, and the public and agency consultation in Chapter 7.

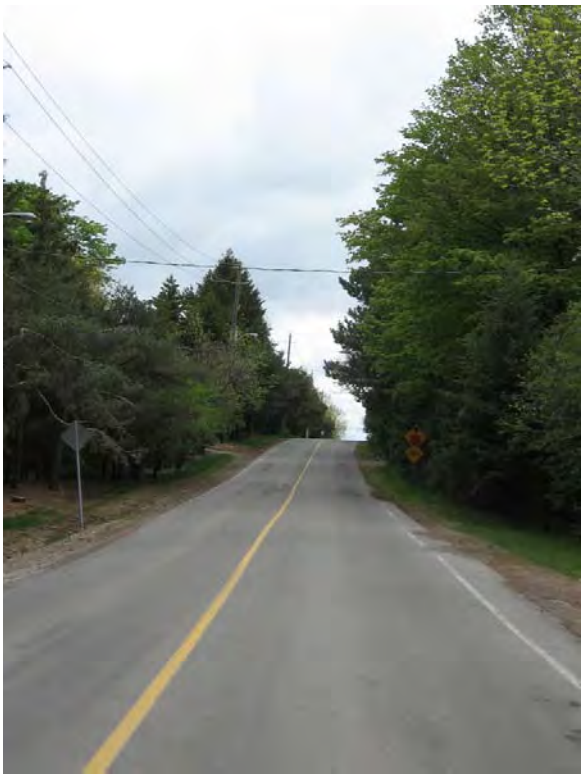


Exhibit 1-1: Mountain Brow Road Looking East from Waterdown Road

1.1 Background

In 1992, the Council for the former Town of Flamborough approved a "Preferred Growth Strategy" to allow for the expansion of the urban area around Waterdown. The Preferred Growth Strategy recommended that Waterdown North and Upcountry Lands be placed within the urban boundary. Although, initially adopted by Town of Flamborough Council in May 1992, a revised version of Official Plan Amendment (OPA) 28 and related Memorandum of Agreement was ultimately approved by Cabinet in June 2002 by Order in Council 1262/2002, in response to a series of appeals (refer to ***Figure 1.1, OPA 28 Lands*** on the next page). The approval of OPA 28 and the related agreement required the completion of:

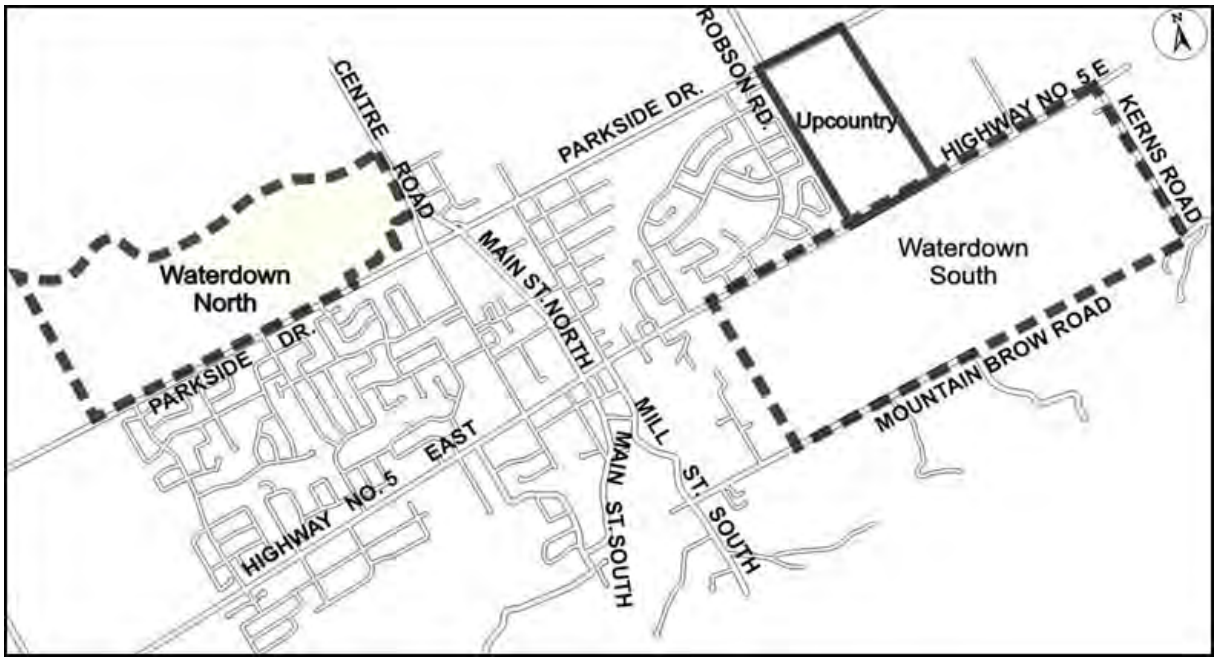
- a Class Environmental Assessment for the Dundas Waste Water treatment Plant expansion/diversion
- a Master EA Transportation Study
- a Waterdown South Sub-watershed Study
- Secondary Plans where Council deems necessary.

In September 1999, the former Town of Flamborough, the City of Burlington, the Regional Municipality of Halton and the former Region of Hamilton-Wentworth received the *Aldershot/Waterdown Master EA Transportation Network Master Plan Report* undertaken by Stantec Consulting Limited. The purpose of the study was to identify a future transportation network required to accommodate urban development in the communities of Waterdown and Aldershot. However, the report did not receive Council approval.



Exhibit 1-2: Mill Street Looking North from Mountain Brow Road

Figure 1-1: OPA Lands



The Phase 1 Final Report of the *Waterdown/Aldershot Master EA Transportation Network Study* was completed on July 30th, 2004 by SNC-Lavalin. The purpose of Phase 1 was to review all the land use and transportation network changes, either proposed or constructed, which may affect the study area conclusions and recommendations of the previous 1999 Stantec Transportation Master Plan Study. The report confirmed the need for additional east-west and north-south capacity in the Waterdown/Aldershot area due to OPA 28. The report also recommended that the next phase consider all options to provide additional capacity in the Waterdown and Aldershot areas.

Phase 2 of the Waterdown/Aldershot Transportation Master Plan (WATMP) was subsequently completed in February of 2008, which examined alternative ways to solve the identified problems outlined in the Phase 1 study, giving recognition to environmental, social, economic, cost, and transportation service considerations. The purpose of the WATMP was to confirm the results of the Phase 1 work and to complete Phase 2 of the Municipal Class EA planning and design process. The study built on the previous Phase 1 work (July 2004) and completed a Phase 1 update and undertook Phase 2 work which made recommendations to resolve the identified road capacity deficiencies. The Phase 2 Report (refer to ***Exhibit 1-3***) provided a set of recommendations and a variety of measures to increase transportation capacity, including public transit, bicycle routes, transportation demand management and road improvements. The WATMP identified a series of next steps for the implementation of its recommendation including undertaking Phase 3, 4, and 5 of the Municipal Class EA planning and design process for road improvements in the Waterdown Road Corridor between Highway 403 and Dundas Street.

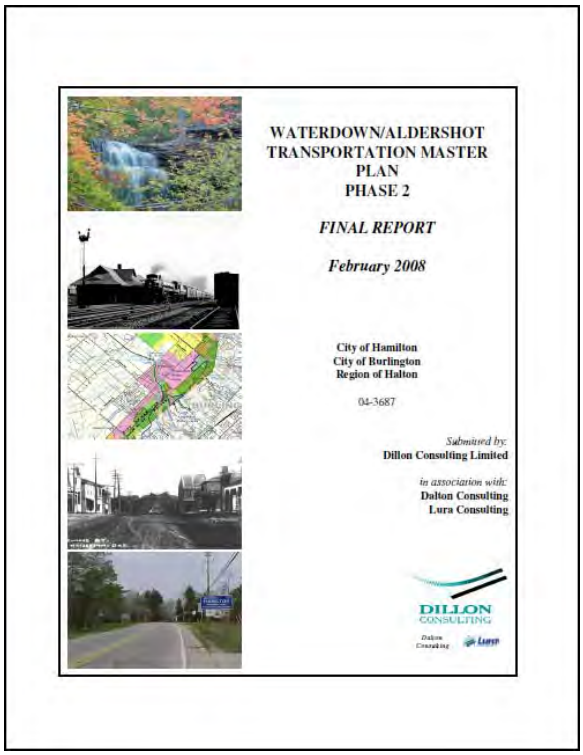


Exhibit 1-3: WATMP Phase 2 Report

1.2 Study Purpose

The purpose of the most recent work of the study was to complete Phases 3 and 4 Municipal Class EA process for required improvements to the Waterdown Road corridor and to provide an overall Environmental Study Report (ESR) for the project covering Phases 1 through 4. Phases 1 and 2 were carried out in previous studies identifying the overall problem and evaluating alternative solutions for addressing the problem. Phases 3 and 4 of the Municipal Class EA (Schedule C) required the examination of alternative methods of implementing the preferred solution identified in Phase 2 as well as detailing the requirements, impacts and mitigation measures associated with the preferred solution.

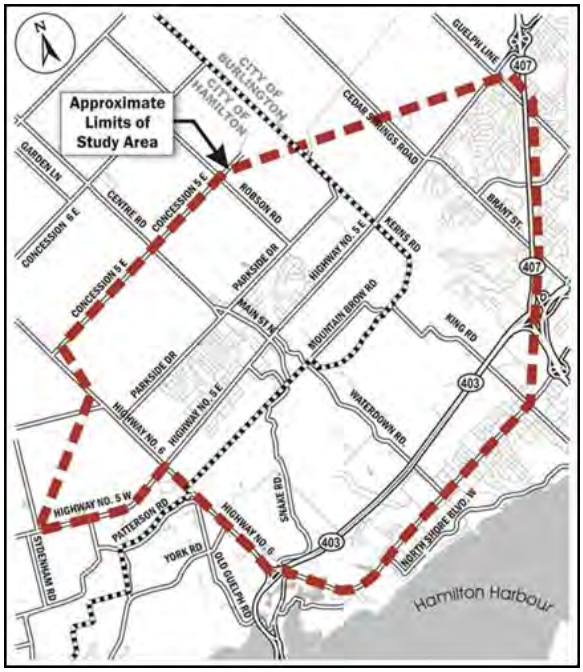


Exhibit 1-4: WATMP Phase 2 Study Area

1.3 Study Area

The Study Area for Phase 2 work is illustrated in ***Exhibit 1-4, WATMP Phase 2 Study Area***. It extends from west of Highway 6 to east of Brant Street and from Concession 5 in the north to south of Highway 403. The WAMTP identified a preferred N-S corridor (i.e. Waterdown Road corridor) for improvements as illustrated in ***Exhibit 1-5***. The complete Waterdown Road Corridor encompassed three road sections:

- Waterdown Road from north of the North Service Road (just south of Craven Avenue) to Mountain Brow Road
- Mountain Brow Road from Waterdown Road east to a new Mid-Block Road to be constructed as part of the Waterdown South development lands
- The new Mid-Block Road from Mountain Brow Road northerly to Dundas Street. This road is a proposed new subdivision road that is roughly located in the middle of the western block of lands in the proposed Waterdown South development

The Phase 3 Study Area was centred on the above three sections and extended various distances from the roads depending on the impacts being assessed. The south limit of the project (at Craven Avenue) was established to meet the proposed road works that were part of the Waterdown Road/Highway 403 interchange modifications (refer to ***Exhibit 1-6***).

The new Mid-Block Road is part of the road system for the Waterdown South development. The recommendation from the WATMP study was that this main north south collector road through the west side of the development should be constructed as a 4-lane arterial roadway with appropriate arterial road standards and elements. The location of the Mid-Block Road was confirmed in this Class EA study. Additional assessments of this road have been undertaken during Phase 3 to finalize the preferred alignment, indicate the general arterial road design requirements and intersection layouts and to document commitments to mitigation measures and future work that will be needed to be addressed during the design phase. The actual final design, development of mitigation measures, permitting and approvals, and construction of the



Exhibit 1-5: WATMP Preferred N-S Road Improvements

Mid-Block Road will be the responsibility of the developer of the Waterdown South development.

1.4 Class EA Study Process

This Waterdown Road Corridor Class Environmental Assessment was carried out according to the approved process of the Municipal Engineers Association Municipal Class Environmental Assessment (October 2000, as amended in 2007). This is an approved planning document which describes the process that municipal proponents can follow in order to meet the requirements of the *Environmental Assessment Act* (EAA). The Class EA approach allows for the evaluation of the environmental effects of alternatives to a project and alternative methods of carrying out a project. It includes mandatory requirements for public input and expedites the environmental assessment of smaller recurring projects.

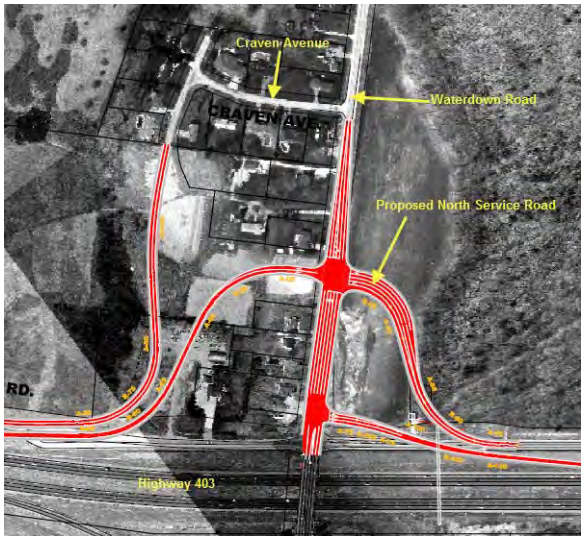


Exhibit 1-6: Waterdown Road/Highway 403 Interchange Concept

Class EA's are a method of dealing with projects, which display the following important common characteristics:

- recurring, usually similar in nature, usually limited in scale, have a predictable range of environmental effects; and,
- responsive to mitigating measures.

Projects are categorized according to their environmental significance and their effects on the surrounding environment. Planning methodologies are described within the Class EA and are different according to Class type: Schedule A projects are projects that involve minor modifications to existing facilities. Environmental effects of these projects are minimal and therefore the projects are considered pre-approved. Schedule A+ Projects are projects that also generally involve minor modifications to existing facilities and are considered to be pre-approved but a municipality is required to notify the public prior to project implementation. Schedule B Projects are projects that involve minor expansion to existing facilities. As there is some potential for adverse environmental effects, these projects are required to proceed through a screening process including public consultation. Schedule C Projects are projects that involve the construction of new facilities and/or major expansions to existing facilities. These projects must pass through the entire EA planning process outlined in the Municipal Engineers Association Class Environmental Assessment.



Exhibit 1-7: Waterdown Road Neighbourhood Advisory Committee Meeting

The term environment from Ontario's Environmental Assessment Act includes:

- air, land or water
- plant and animal life, including human life
- the social, economic and cultural conditions that influence the life of humans or a community
- any building, structure, machine or other device or thing made by humans
- any solid, liquid, gas, odour, heat, sound, vibration or radiation resulting directly or indirectly from human activities, or
- any part or combination of the foregoing and the interrelationships between any two or more of them

The Waterdown Road Corridor improvement project is considered to be a Schedule C project. As stated above, Schedule C projects are projects that involve the construction of new facilities and/or major expansions to existing facilities. Such projects have the potential for significant environmental effects and must proceed under the full planning and documentation procedures specified in the Class EA document. Schedule C projects require that an Environmental Study Report (ESR) be prepared and submitted to the Ministry of the Environment for a minimum 30 day review by the public. If concerns are raised that cannot be resolved, a Part II Order under the Municipal Engineers Association Class EA for municipal road projects may be invoked by the Minister of Environment. This is an appeal provision whereby a person or party with an outstanding concern may request the Minister of the Environment to make an order requiring a proponent to comply with Part II of the Environmental Assessment Act (EAA) before proceeding with a proposed undertaking to which the Class EA would otherwise apply.

All Part II Order ("bump-up") requests are reviewed by the Environmental Assessment and Approvals Branch of the Ministry of the Environment (MOE). MOE staff consult with the proponent and any other agency or group potentially affected by the Minister's decision. Information is summarized by staff and a recommendation is made to the Minister who is ultimately responsible for a decision. Evaluation criteria for bump-up requests include the purpose of EAA factors suggesting that the proposed undertaking differs from other undertakings in the class to which the class EA applies, the significance of these factors and differences, the nature of concerns raised by the requester(s), and the benefits of carrying out an individual EA. MOE staff also evaluate the applicability and effectiveness of other legislation and decision-making processes to address the concerns of the requester(s). Timelines for MOE's review or a decision on a request typically range from 30 to 66 days, depending on the class EA document. The MOE has four options for a decision on a Part II Order ("bump-up") request:

- deny the request
- deny the request with conditions
- refer to mediation
- grant the request and require the proponent to undergo an individual EA



Exhibit 1-8: Residence Identified with Heritage Interest on Waterdown Road

The ideology for the Class EA reflects the five key principals of planning as outlined in the EAA. They are:

1. Consultation with affected parties early in and throughout the process, such that the planning process is a co-operative venture.
2. Consideration of a reasonable range of alternatives, both the functionally different alternatives to the project (known as alternative solutions) and the alternative methods of implementing the preferred solution.
3. Identification and consideration of the effects of each alternative on all aspects of the environment.

4. Systematic evaluation of alternatives in terms of their advantages and disadvantages, to determine their net environmental effects.
5. Provision of clear and complete documentation of the planning process followed, to allow 'traceability' of decision-making with respect to the project.

The Class EA process includes five phases as follows:

- Phase 1: Problem/Opportunity Identification.
- Phase 2: Alternative Solutions.
- Phase 3: Alternative Design Concepts.
- Phase 4: Environmental Study Report Documentation.
- Phase 5: Implementation.

Figure 1.2, Municipal Class Environmental Assessment Process (Schedule C) on page 1-7 illustrates the general process followed on the Waterdown Road Corridor project with the general timing for the main points of public involvement/phase completion.

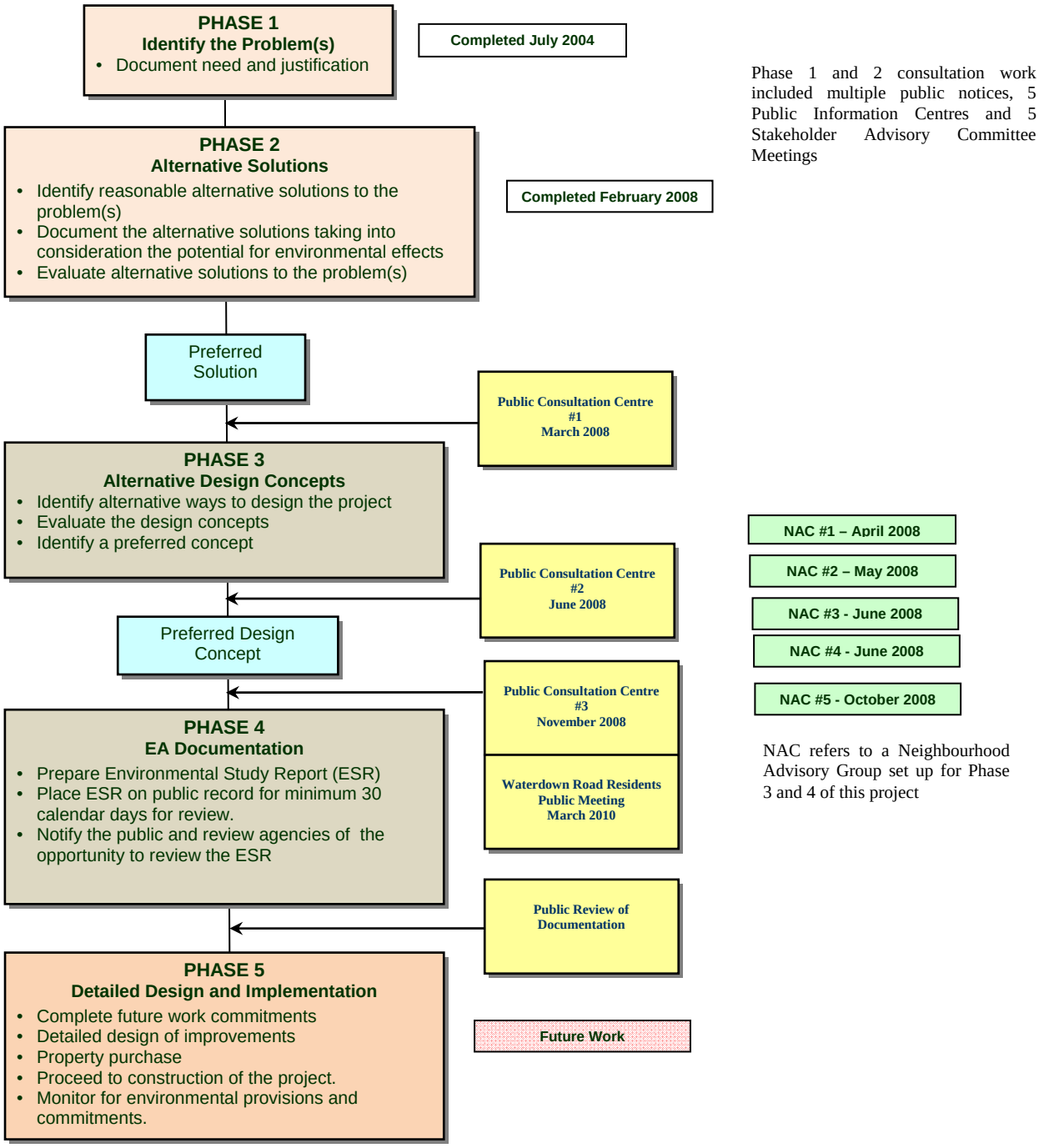
1.5 Class EA Relationship to the WATMP

Transportation Master Plans (TMP) deal with area wide system and network requirements leading to the development of a series of overall transportation goals and objectives and the identification of preferred projects and initiatives that will be necessary to achieve them. A Class Environmental Assessment deals with a specific project identified in the TMP.

The Waterdown/Aldershot Transportation Master Plan (WATMP) followed the "Master Planning Process" as set out in Ontario legislation for Municipal Class Environmental Assessments. This process integrated the planning of municipal infrastructure requirements for existing and future land use, with the principles of environmental assessment planning. The WATMP was prepared to meet the requirements of the *EAA* and is to be used to support subsequent environmental assessments for specific infrastructure improvements.

The ***Waterdown/Aldershot Master EA Transportation Network Study Phase 1 Report (July 2004)*** and the ***WATMP Phase 2 Final Report (February 2008)*** are part of the documentation of this Class EA and as such, are subject to the same review requirements. These reports are included as part of the Appendix materials (Appendix N and Appendix O).

Figure 1-2:
Municipal Class Environmental Assessment Process (Schedule C)



Phase 1 and 2 consultation work included multiple public notices, 5 Public Information Centres and 5 Stakeholder Advisory Committee Meetings

NAC refers to a Neighbourhood Advisory Group set up for Phase 3 and 4 of this project

1.6 Project Organization

The project was carried out under the direction of a project partnering group (Project Partners) comprising staff from the following participating municipalities:

- City of Hamilton
- City of Burlington
- Halton Region

The Project Partners provided general direction to the Study Team and supplied technical, environmental and input throughout the study. A diverse Study Team undertook the environmental, technical and public engagement work of the project. Team members were responsible for the following work:

- Dillon Consulting
  - Overall project management
  - Transportation planning and design
  - Drainage, stormwater management and hydraulic assessments
  - Structural planning
  - Natural environmental assessments
  - Socio-economic and land use assessments
  - Hydrogeological and well impact assessments
  - Noise and air quality assessments
- Lura Consulting
  - Public consultation and facilitation
- MBTW Group
  - Landscaping and urban design
- Peto MacCallum Limited
  - Pavement and foundations assessments
  - Geo-Environmental site assessments
- Jacques Whitford
  - Archaeological assessments
  - Built heritage assessments

1.7 Report Outline

This Environmental Study Report (ESR) builds on the work of the previous phases of this project. In addition to including the Phase 1 and 2 work reports as appendix materials, the ESR provides a summary of the earlier studies plus details of additional Phase 3 data collection works relating to the existing environmental conditions, details of design alternatives, specifics of the recommended plan, the effects that may result from the undertaking, proposed mitigation and monitoring measures, and the net effects of the project. Consultation with a wide range of community stakeholders and agencies was an integral part of this EA process. The activities and results of the consultation program are summarized in a separate section (Chapter 7), and ***Appendix A*** and ***P*** of this ESR.

The ESR has been divided into the following chapters:

1. Introduction

2. Identification of the Problem or Opportunity (Phase 1)
3. Alternative Solutions (Phase 2)
4. Existing Conditions
5. Alternative Design Concepts for Preferred Solution
6. Preferred Design Concept
7. Public and Agency Consultation

Additional reference materials generated during this study can be found in the Appendix. The following materials are provided:

A. Public Consultation Information
B. External Agency Consultation and Correspondence
C. Drainage and Stormwater Management
D. Air Pollution/Impacts
E. Noise Pollution/Impacts
F. Geotechnical
G. Environmental Site/Geo-Environmental Assessment
H. Archaeology
I. Built Heritage
J. Natural Environment
K. Wells and Groundwater Monitoring
L. Design Criteria
M. Cost Estimate
N. Phase 1 Report (SNC Lavalin)
O. Phase 2 Report (Dillon)
P. Record of One Window Comments and Responses
Q. Species At Risk Information

2. IDENTIFICATION OF THE PROBLEM OR OPPORTUNITY

2.1 Introduction

As noted in Chapter 1, there is documentation on transportation capacity problems in Waterdown/Aldershot going back to the original Master EA Transportation Network Study for the Waterdown/Aldershot Area completed in 1999. Since that time, additional growth approved for the area has resulted in further study and updates to the transportation planning work.

This chapter of the Environmental Study Report briefly summarizes the growth planned for Waterdown, the challenges identified with the existing transportation network and the work done to define the problem and opportunity and fulfill Phase 1 of the Class EA process. The last section of this chapter summarizes the problem/opportunity which is the focus of this Class EA. For more detailed information the reader is directed to the following reports in the appendices to this ESR:

- Waterdown/Aldershot Master EA Transportation Network Study Phase 1, July 2004 (***Appendix N***)
- Waterdown/Aldershot Transportation Master Plan Phase 2 Final Report, February 2008 (***Appendix O***)

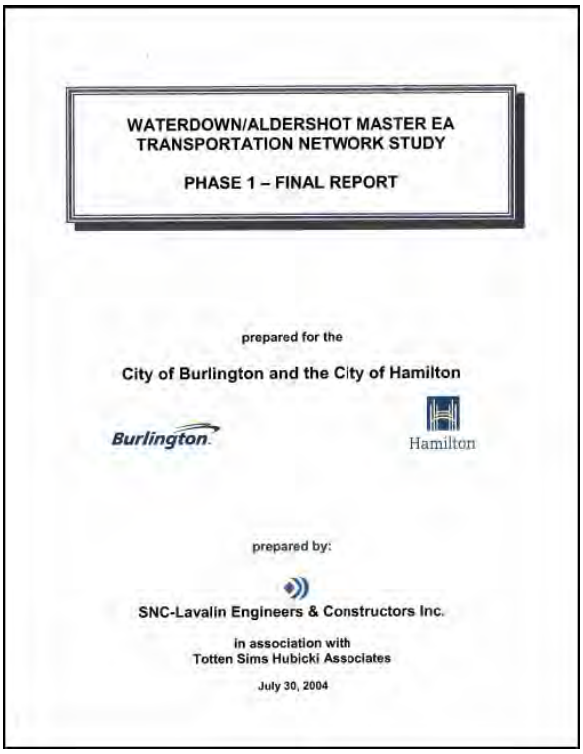


Exhibit 2-1: 2004 Phase 1 Report

2.2 Growth in Waterdown

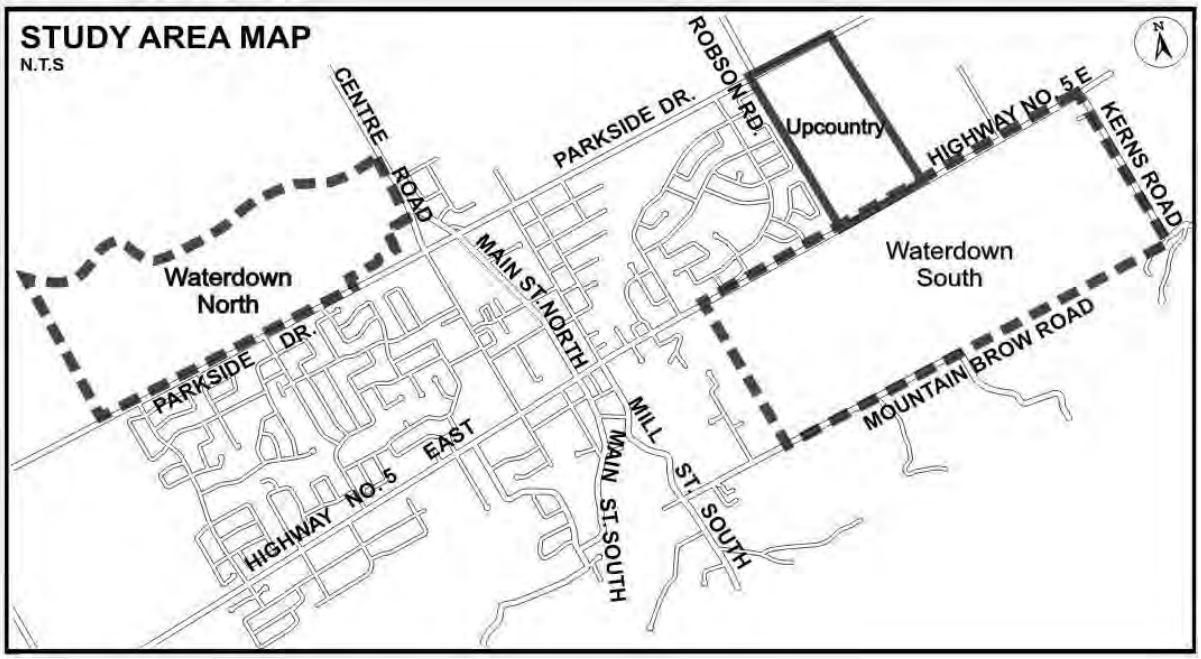
Waterdown currently[1] has a population of 15,000 (2001 census). Official Plan Amendment (OPA) 28 to the Town of Flamborough Official Plan was approved by the Executive Council of the Provincial Government of Ontario on June 19, 2002. This OPA allowed for the expansion of the Waterdown urban area to accommodate residential growth to the year 2021. The three main expansion areas in OPA 28 are Waterdown North, Waterdown South, and Upcountry Lands. These are illustrated in ***Figure 2-1, OPA 28 Lands***.

The OPA 28 lands consist of approximately 240 hectares of gross developable residential land. The rate of development in the past has been approximately 300 building permits annually[2]. This provides a 15 to 20 year supply of residential land if development continues at a similar rate. Population growth is expected to increase by 15,264 people upon build out. Conditions of approval for OPA 28 required the completion of a Master Environment Assessment Transportation Study.

[1] At the time of the Phase 1 and 2 studies

[2] Waterdown North lands are currently being serviced and the Upcountry development is partially built

Figure 2-1: OPA 28 Lands



2.3 Existing Transportation Network

2.3.1 Major Road Network

The report, *Waterdown/Aldershot Master EA Transportation Network Study Phase 1, July 2004*, identified that main gateways in and out of Waterdown are currently close to or at capacity during the peak periods. The primary north-south routes in the study area are Highway No. 6, Waterdown Road, and Brant Street (Regional Road 18).

Highway 403 is located along the southern portion of the study area. Access to the highway from the study area is limited to Highway 6 for eastbound and westbound traffic, and also Waterdown Road for westbound traffic only. Highway 6 is a 4 lane major north-south gateway into and out of the area located along the western portion of the study area. The highway is planned for widening in the near-term to a 5-lane cross-section (3 lanes northbound and 2 lanes southbound) and conversion to an access controlled highway between Highway 403 and Dundas Street[3].

Waterdown Road is another north-south gateway into and out of the study area, with connection to Highway 403 and Plains Road. This 2-lane road is under the jurisdiction of the City of Burlington. Figure 2-2 illustrates the area's existing road and transit network. Table 2-1 illustrates the primary roadway characteristics in the study area.

[3] This conversion was completed in 2009.

Waterdown - Aldershot Transportation Master Plan

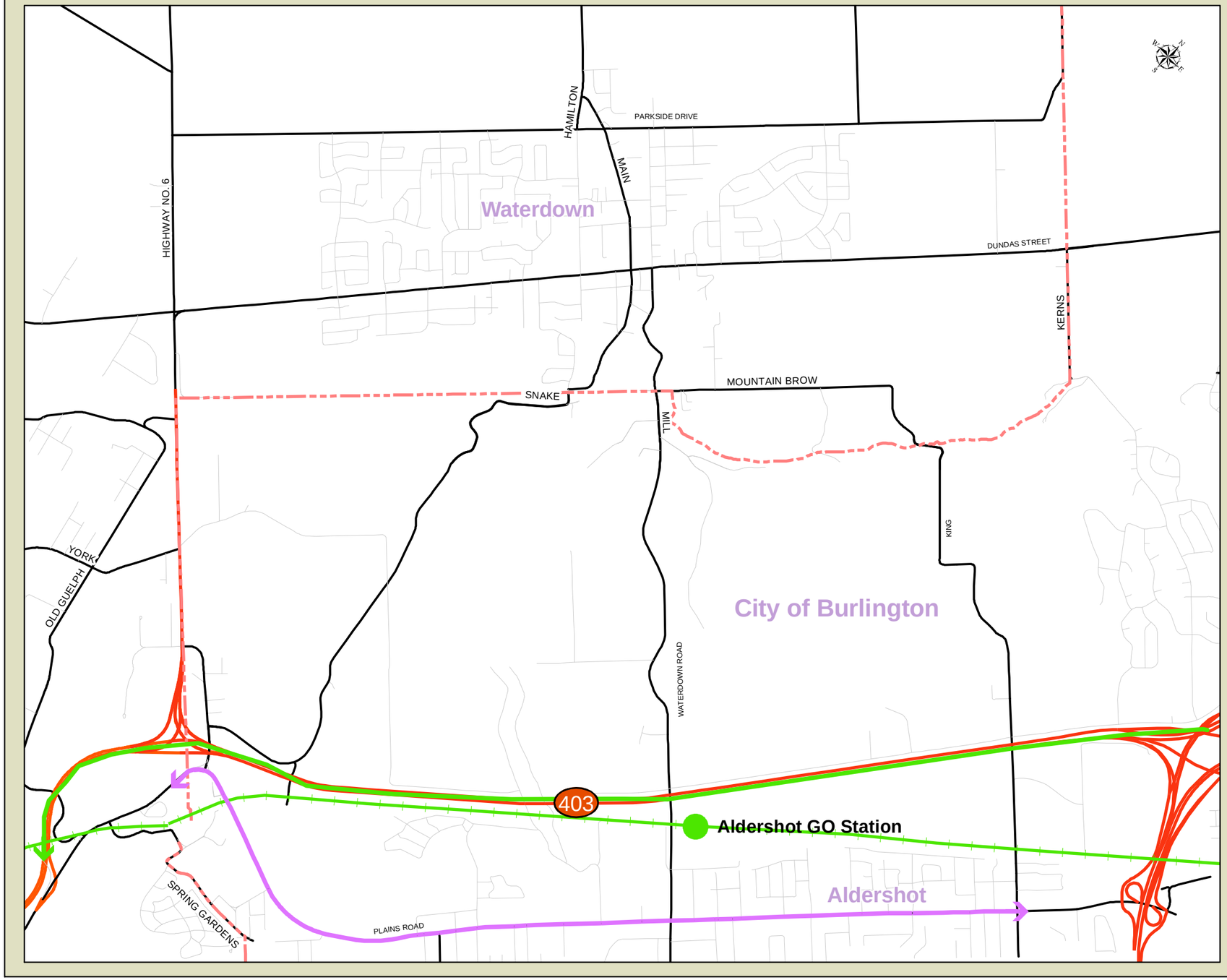


Figure 2.2: Existing Road and Transit Network

- Municipal Boundary
- GO Transit - Bus
- GO Transit - Rail
- Burlington Transit

Note:
Since Phase 2 work was completed HSR has introduced bus service in the Waterdown area.

Scale

0 250 500 1,000 1,500 Meters

Map Notes

Map created by: PJK
Map checked by: DPM/CC
Date created: September 18, 2007

Base mapping provided by the City of Hamilton, the City of Burlington and the Region of Halton. Additional mapping provided by Halton Region Conservation Authority.

Table 2-1: Existing Primary Roadway Characteristics

Street	From	To	Official Plan Road Classification	Jurisdiction
North-South Roads				
Highway 6	Highway 403	Dundas Street East	Highway	Province
	Dundas Street East	Concession 5 East	Highway	Province
Snake Road	Highway No. 6	Main Street	Collector	Burlington
Waterdown Road/Mill Street	Plains Road	Mountain Brow Road	Arterial	Burlington
	Mountain Brow Road	Dundas Street East	Arterial	Hamilton
Hamilton Street/Centre Road	Dundas Street	Parkside Drive	Arterial	Hamilton
	Parkside Drive	Concession 5 East	Arterial	Hamilton
Main Street	Snake Road	Centre Street	Collector	Hamilton
Robson Road	Parkside Drive	Concession 5 East	Collector	Hamilton
King Road	North Service Road	Mountain Brow Road	Collector	Burlington
Evans Road	Dundas Street	Parkside Drive	Arterial	Hamilton
Kerns Road	North Service Road	Dundas Street East	Collector	Burlington
Brant Street/Cedar Springs Road	Highway 407	Dundas Street East	Major Arterial	Halton Region
	Dundas Street East	North study limit	Arterial	Burlington

Phase 1 of the Municipal Class EA process as reported in the ***Master EA Transportation Network Review of Aldershot/Waterdown (July 2004)*** also identified existing critical turning movements at major intersections in the study area and screenline volumes for the major road network during the AM and PM peak periods. The results of the analysis indicate that "while most intersections are operating well, there are certain specific movements that are experiencing delays and evidence that capacity may soon be (or already has been) reached".

Table 2-2 reproduced from the Phase 1 report illustrates the congested movements at study area intersections during the AM and PM peak hour that exhibited a volume-to-capacity (v/c) ratio greater than 0.80. This is a numerical measure of the ratio between volume on a particular intersection turning movement and the available capacity to accommodate that volume. A v/c ratio greater than 0.80 generally means that critical capacity has been reached. This is represented as a high degree of congestion with long delays and queues at signalized intersections. Once a v/c ratio exceeds 1.0, this is defined as the point where the roadway section has failed, and the volume of vehicles on the roadway section has exceeded the available capacity to accommodate them. As illustrated, conditions during the PM peak hour are more congested than the AM peak hour, with a number of movements near to or at capacity. Key conclusions of the Phase 1 Work pertinent to this Class EA are provided below:

It is therefore recommended that Phase 2 of the Master EA process proceed in order to establish the location of the additional network capacity needs identified in this study. The study area for examining the location of these routes should be sufficient to consider all reasonable options.

In summary the main conclusions of this study are:

1. *The need for additional east-west capacity in the overall transportation network in the Waterdown North and Waterdown/Aldershot/Burlington area, due to the development of OPA 28 lands has been confirmed.*
2. *The need for additional north-south capacity in the overall transportation network in the Waterdown/Aldershot/Burlington area, due to development of OPA 28 lands, has been confirmed*
3. *All options to provide additional east-west and north-south capacity in the overall transportation network, to accommodate the additional demands due to the development of OPA 28 lands, need to be considered in the next phase of the Aldershot/Waterdown Transportation Master Plan Study Update (Municipal Class EA process–June 2000).*

Table 2-2: Current Critical Turning Movements

Intersection	Movement	Demand volume	v/c	Average delay/veh (s)
AM Peak Hour				
Dundas St. at Mill St.	EB through/right	985 through 53 right	0.88	EBT 33.3 EBR 33.2
Dundas St. at Evans Road	SB left/right	339 left 26 right	0.83	SBL 28.0 SBR 22.5
Regional Road 5. at Brant St.	EB through	1214	0.92	38.8
Hwy. 6 at Parkside Dr.	SB left	144	0.83	55.4
PM Peak Hour				
Hwy. 6 at Hwy. 5 / Dundas St.	WB left	432	0.85	62.8
Hwy. 6 at Parkside Dr.	SB left	155	0.83	43.1
Dundas St. at Hamilton St.	EB left	149	0.93	24.9
Dundas St. at Main St.	WB through	1040	0.89	30.9
Dundas St. at Mill St.[1]	WB through	927	0.83	56.6
Hamilton St. at Parkside Dr.	NB left	89	0.85	39.8
Regional Road 5 at Brant St.[2]	NB left WB left WB through	385 492 1562	1.10 1.21 0.94	NBL 233.3 WBL 335.2 WBT 56
North Service Rd. at Brant St.	EB right WB left NB left NB through	435 378 538 1376	0.85 0.82 0.93 1.03	EBR 14.6 WBL 349.7 NBL 108.0 NBT 101.7
Kerns Rd. at North Service Rd.	WB through	680	0.86	32.3
King Rd. at North Service Rd.	WB through	630	0.91	105.3
Waterdown Rd. at North Service Rd.	WB through/left	274 left 349 through	0.96	WBL 95.3 WBT 98.9

[1]*There is significant recurring queuing westbound on Dundas Street in the PM peak where the 4-lane section ends approaching Mill Street, and this meters demand making the intersection appear to function, when in reality there is a capacity deficiency on Dundas Street.*

[2]*This intersection is in need of improvement by the addition of double left turn lanes (NBL, WBL). This need was also identified in the Transportation Master Plan for Regional Road 5 (Dundas Street) and 25 Corridors, undertaken by Halton Region in 1999.*

[3]*Source – Waterdown/Aldershot Master EA Transportation Network Study Phase 1 – Final Report, (July 30, 2004) SNC Lavalin*

2.3.2 Existing Transit Service

Existing transit service in the study area is limited to the Aldershot community and the Brant Hills and Tyandaga neighbourhoods in Burlington near Brant Street and a newly introduced service on Waterdown Road to the Aldershot GO Station.

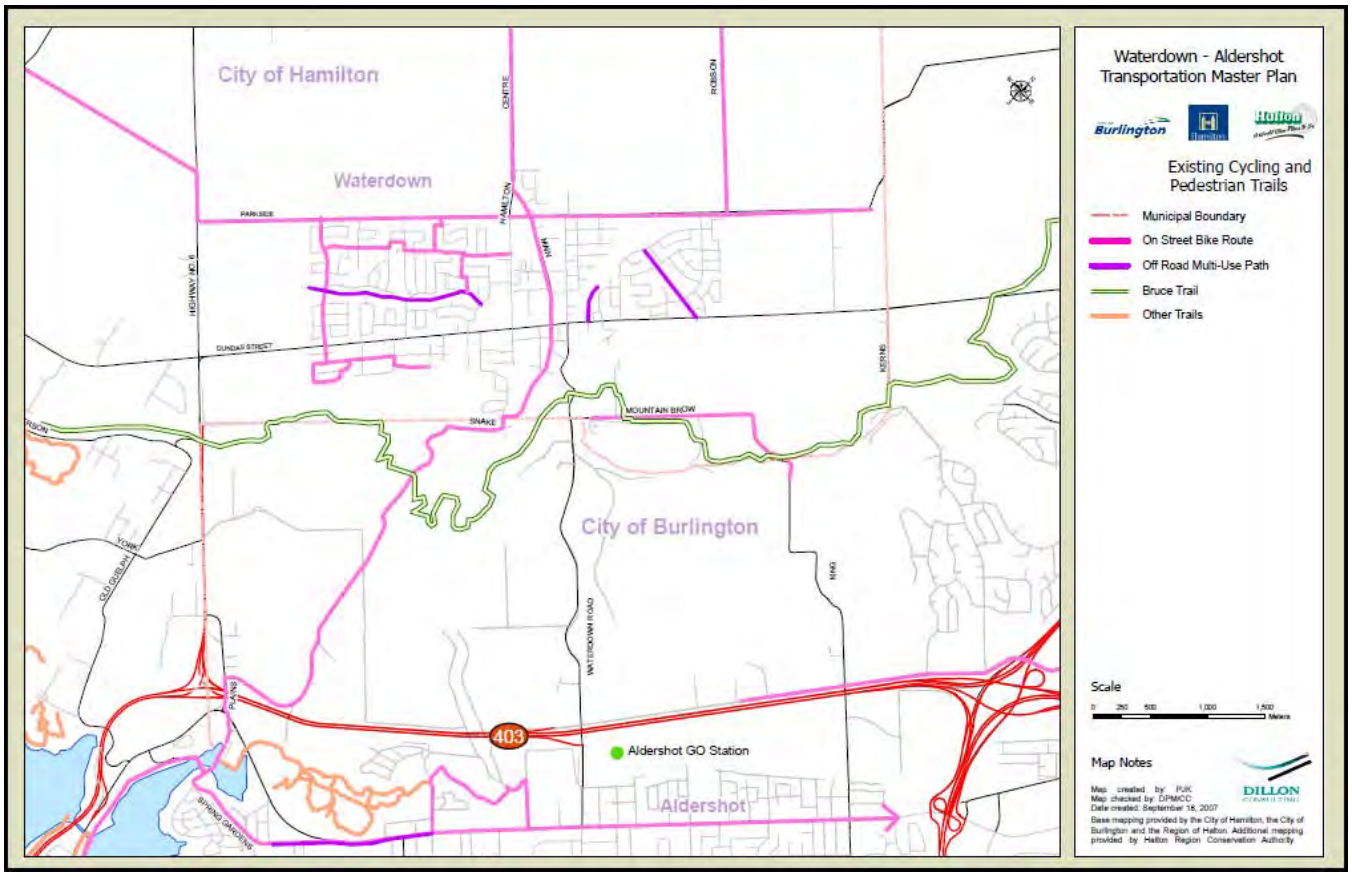
2.3.3 Cycling Network

Within the study area, there are a number of east-west and north-south cycling routes designated by the City of Hamilton and City of Burlington. These are illustrated in ***Figure 2-3*** on page 2-7. Some of the major routes include Parkside Drive between Highway 6 and Robson Road, Robson Road north of Parkside Drive, Mountain Brow Road, Main Street North and Centre Road between Dundas Street and Carlisle Road (north of the study area), and Plains Road. There exists a north-south disconnect in designated cycling routes between the communities of Waterdown and Aldershot.

2.3.4 Trails

A number of trails traverse the study area, the most notable being the Bruce Trail. The Bruce Trail is Canada's oldest and longest footpath, which provides the only public access to the Niagara Escarpment. The Bruce Trail is 782 km long, extending from Queenston on the Niagara Peninsula through Waterdown to Tobermory at the tip of the Bruce Peninsula. The trail has a number of picturesque views, scenic landscapes and 290 km of additional side trails. Through the study area, the Bruce Trail traverses the escarpment south of Dundas Street before heading north of Dundas Street and east of Kerns Road. Within the Waterdown Road corridor there are three Bruce Trail facilities: an entrance to the trail on Waterdown Road just south of Mountain Brow Road and two crossings on Mountain Brow Road east of Flanders Drive.

Figure 2-3: Existing Cycling and Pedestrian Trails



2.4 Planned Road Improvements

There are a number of planned roadway improvements that were considered when identifying transportation problems in the Waterdown Aldershot area. Planned improvements include:

Highway 6: Widening of Highway 6 to five lanes (3 northbound and 2 southbound) south of Dundas Street, and the construction of an interchange at Highway 6 and Dundas Street (EA was recently completed). These improvements are being undertaken by the Ontario Ministry of Transportation (MTO). A planning study will be initiated in the future by MTO to review the ultimate need and configuration of Highway 6 north of Highway 5/Dundas Street.[4]

Highway 5: Widening of Highway 5 west of Highway 6. The Preliminary Design and Environmental Assessment Study is currently underway.

[4] Construction on Highway 6 south of Dundas Street has been subsequently completed. Interchange construction is not currently programmed.

Waterdown Road and Highway 403 Interchange – Improvements to the Waterdown Road/Highway 403 interchange in the City of Burlington, including the addition of an eastbound on-ramp (for eastbound traffic to enter Highway 403) and a westbound off-ramp (for westbound traffic to exit Highway 403)[5]. The City of Burlington completed construction of this project in 2011.

2.5 Summary of Transportation Analysis – Defining the Problem

The Phase 1 Final Report of the ***Waterdown/Aldershot Master EA Transportation Network Study*** was completed on July 30th, 2004 by SNC-Lavalin. The purpose of Phase 1 was to review all the land use and transportation network changes, either proposed or constructed, which may affect the study area conclusions and recommendations of the previous Transportation Master Plan Study undertaken by Stantec Consulting Ltd. in September 1999.

The report confirmed the need for additional east-west and north-south capacity in the Waterdown/Aldershot area due to OPA 28, stating that additional capacity was needed in each direction.

The July 2004 report concluded "*based on the current network choices available, the main conclusion that can be drawn from these results is that both additional east-west capacity and north-south capacity is required for the study area around the Village of Waterdown and depending on what configuration this network would take, further improvements would likely be required in Burlington to receive this additional traffic, e.g., North Service Road widening. As this ultimately concludes, the next phase of this Master EA update has to analyze all potential north-south and east-west network improvement options in various combinations that could potentially cater to these very high traffic demands stemming from the future development of Waterdown and Aldershot*".

Later in 2003, the *Development of the Waterdown/Aldershot Transportation Master Plan Phase 2* was initiated with a Draft Report completed in August 2005. This work included a review of the transportation analysis in the July 2004 Phase 1 report as well as additional transportation modelling work to confirm the problem and provide detail on the capacity requirements. The Phase 2 Draft Report also included identification and evaluation of alternative ways to solve the identified capacity problem. Significant consultation with the general public, stakeholder advisory committee, and agencies was undertaken on the Phase 2 project over a two and a half year period. Generally, there was agreement on the need for additional capacity but was much discussion during this period on the alternative solutions.

[5] Northern limit of this work extends to just south of Craven Avenue

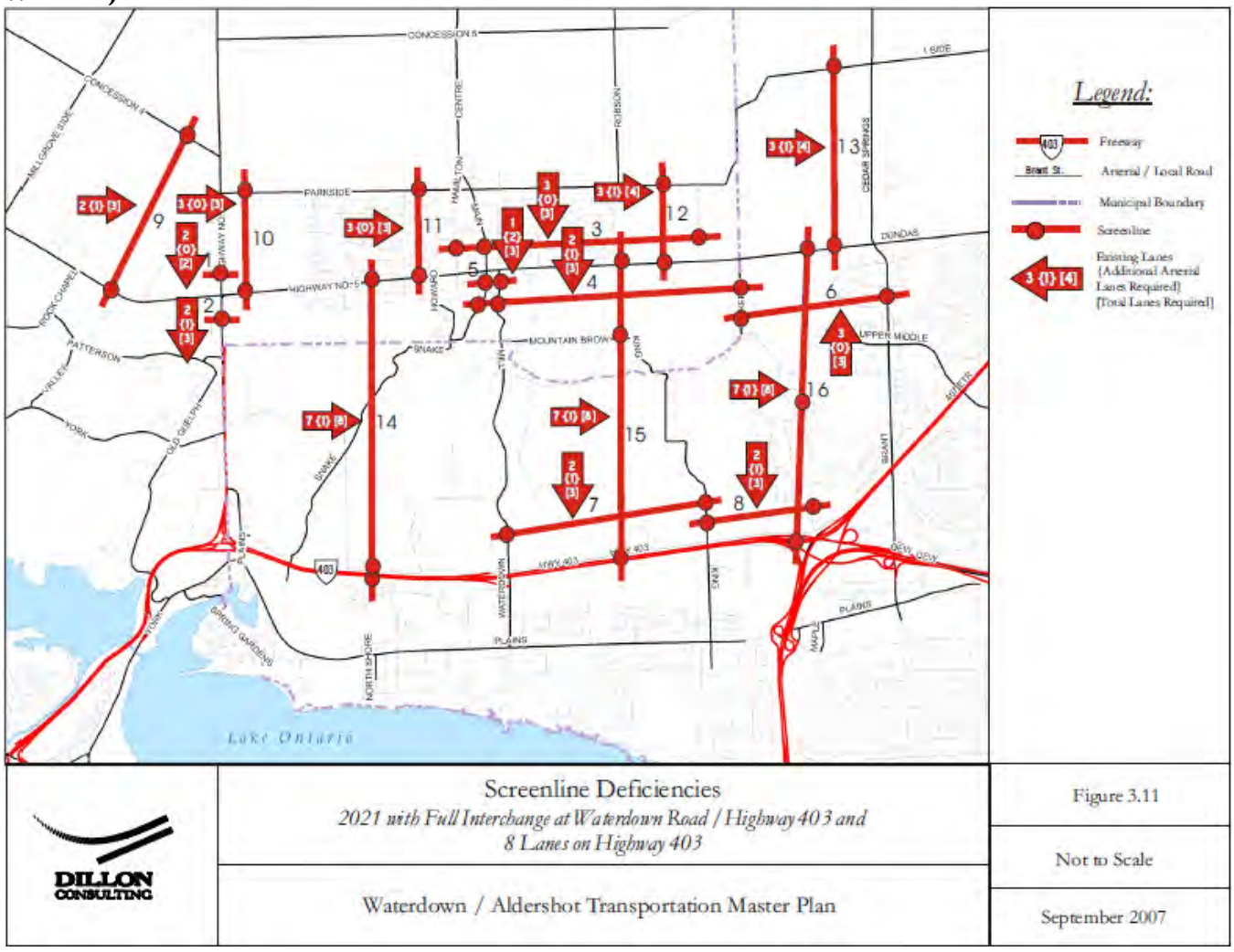
In February 2008 the ***Waterdown/Aldershot Transportation Master Plan Phase 2 Final Report*** was released. Two analyses were undertaken as part of the TMP Phase 2 work to confirm the North-South problem identified in Phase 1 of the Class EA process. These were:

- Screenline Analysis – an imaginary line defined in the network that captures a broad corridor through which traffic flows; and
- "Bottom Up" Approach – a "building block" analysis that works from current conditions and adds anticipated traffic from growth.

The north-south screenline analysis evaluated the combined demand and capacity of key north/south links. Links that cannot service this demand for design or operations reasons were not accounted for in the evaluation (i.e., Snake Road and Kerns Road).

As presented in ***Figure 2-4***, the screenline analysis reveals a deficiency in the southbound direction. For planning purposes, a v/c greater than 0.85 is considered "critical" in this analysis. Other morning peak hour models use 0.80 as the critical v/c ratio but a more conservative approach was used in this analysis, thus "triggering" system capacity improvements at more congested levels. Afternoon peak hour based models use a critical v/c ratio of 0.90.

Figure 2-4: Screenline Deficiencies (Figure 3.11 of the WATMP)



Taking an approach separate from the transportation demand forecasting tool, a "bottom up" analysis was undertaken to determine any significant north/south deficiencies. Current estimates for growth within OPA 28 indicate approximately 6,500 new homes will be built by 2021. The Phase 1 report identified that outbound trips from Waterdown Road are distributed as follows:

Internal (within Waterdown)	25.0%
To Hamilton	20.4%
To West Burlington	2.9%
To Downtown Burlington & Niagara Region	5.9%
To Halton, Peel and East	33.4%
To Milton, Brampton and North Mississauga	3.7%
To Guelph, Waterloo	4.3%
To West along Highway 5	4.4%
Total	100%

The distribution was aggregated as follows:

East along Dundas Street	20.4%
North along Highway 6	4.3%
Southwest along Highway 6 and Highway 5	24.8%
South and Southeast	25.5%
Internal	25.0%
Total	100%

Therefore, 50.3% of the trips will need to travel along one of the roads that make up the south study area screenline.

6,500 homes x 0.77 trips/home	=	5,005 trips
@ 75% outbound trips	=	3,754 trips
Less 10% for alternate modes	=	3,378 trips
Times 50.3% (southbound)	=	1,699 trips

Using "current" roadway volumes, the existing system has the following available capacity[6]:

Link	Capacity	Volume	Reserve
Highway 6	2,000	1,780	220
Waterdown Road	800	378	422
King Road	500	48	452
Brant Street	2,000	1,373	627
Total	5,300	3,579	1,721

Therefore, if no other growth in traffic were to occur (i.e. only traffic generated by OPA 28) there would still be a north-south deficiency in the study area network south of Dundas Street. However, traffic will grow (i.e. as families mature, there will be more cars per household). If one considers a marginal growth of 1% per year to 2021, then the system will need to accommodate an additional 572 vehicles, which when added to the un-served demand for OPA 28, equates to the equivalent of one arterial lane.

Regardless of the approach undertaken to estimate the demand of traffic to 2021, there is a clear conclusion that a north/south deficiency will exist. Therefore, "The Problem", identified in the ***Waterdown/Aldershot Master EA Transportation Network Study, July 2004***, was confirmed by the work undertaken in the ***Waterdown/Aldershot Transportation Master Plan 2008***.

Further considerations of this assessment were:

- The need to have a non-congested system to permit reasonable transit operations competitive with the automobile;

[6] AM peak hour by direction

- If improvements are not made, the growth in traffic will find its way onto Kerns Road, Tyandaga Park Drive and Snake Road, which already have their share of traffic operational issues (i.e. infiltration of through traffic); and
- The analysis has been undertaken for the A.M. peak, which generally has less traffic on the network, hence the findings provide a "best case" scenario.

3. ALTERNATIVE SOLUTIONS[7]

Phase 2 of the Class EA process requires the identification and evaluation of alternative solutions to address the identified problem(s) or opportunity(s). For this project, this involved alternative ways to address the roadway improvements that form the basis of the transportation strategy to 2021. The alternative solutions to address identified capacity problems on Waterdown Road were originally outlined in the ***Waterdown/Aldershot Transportation Master Plan Phase 2 Report*** (Appendix O). This section summarizes the alternative solutions work that was previously documented to select the preferred solution.

A number of possible transportation solutions to resolve the road capacity problem were initially identified including:

- Do-nothing;
- Improved public transit;
- Transportation demand management; and
- New roadway capacity.

Attempts were made to solve as much of the problem as possible through non-roadway solutions such as improved public transit and Transportation Demand Management (TDM) measures. These solutions are considered preferred (by the project team and participants to this study) as they result in less reliance on the automobile and result in less environmental effects. The following describes how these possible solutions were considered.

3.1 Identification of Alternative Solutions

3.1.1 Do Nothing

The Ontario EA Act requires the consideration of the "do-nothing" scenario. Typically, the do-nothing alternative does not solve the problem that has been identified but is used as a benchmark to better assess the impact of other alternatives. In some instances doing nothing could have less overall impact than some or all of the improvement alternatives.

The do-nothing scenario would mean that there would be no improvements to transportation infrastructure in the study area although transportation demand would increase as a result of new land development. The impact of the do-nothing scenario on the transportation system was modelled.



Exhibit 3-1: Waterdown Road South of Mountain Brow Road (Looking South)

[7] Refers to work conducted during Phase 2 work related to alternative solutions

A "do-nothing" modeling scenario was tested that placed the 2021 traffic demands on the roadway using the existing (2001) roadway network and modal splits. Without any road modifications or reductions in modal split (proportion of non-vehicle travel methods) or auto occupancy, peak period traffic on primary corridors in Waterdown will reach critical capacity by 2021 with the development of the OPA 28 lands. The model shows an increase in north-south congestion.

North-south traffic outside of Waterdown relies on four primary connections to Highway 403/North Service Road: Highway 6, Waterdown Road, King Road, and Brant Street. In the do-nothing scenario, all four roads will operate at or near capacity in the peak direction during the peak periods. Sections of Highway 6, Waterdown Road and King Road will operate beyond capacity, with a v/c ratio of 1.12, 1.18 and 1.02 respectively. This scenario would result in significant traffic congestion.

Another scenario was modelled based on road improvements to Highway 403 and changes in modal split and travel demand. This scenario assumed a full interchange at Waterdown Road and Highway 403, the widening of Highway 403 from 6 to 8 lanes, the introduction of transit service in Waterdown, resulting in an overall 5 % reduction in automobile trips, and the introduction of transportation demand management initiatives, further reducing automobile trips by 5 % (to arrive at a total 10 % reduction in trips). With these initiatives, congestion issues still continue on the majority of the corridors described above.

3.1.2 Improved Public Transit

Although at the time of the Phase 2 work there were no transit services within the Waterdown area, local and interregional transit services existed in the community of Aldershot and adjacent to the study area. (refer to Section 2.3.2 for the description of existing transit services in and adjacent to the study area). Several transit opportunities are currently being examined to provide transit service in Waterdown and increase the transit mode split for both local and interregional trips. These include:

1. **Create Inter-regional Terminal at Aldershot GO Station** – the area has a significant amount of interregional transit service, however, it lacks an appropriate connection to Waterdown. The Aldershot GO Station would provide a good terminus for feeder services with connections to GO Rail, GO Bus, Burlington Transit, and VIA Rail.
    a. As an initial step, provide a starter transit service beginning in 2008 (as outlined by the HSR) to/from the Aldershot GO Station to the existing urban area of Waterdown[8]. The terminus at the Aldershot GO Station

[8] Subsequent to the completion of Phase 2, HSR added Route 18 (Waterdown) that accesses the Aldershot GO Station from the north on Waterdown.

will provide a local bus connection to GO Rail and VIA Rail services. As ridership levels increase and the community grows, the service should be extended to the new development areas and the service levels increased to help meet modal split targets.

b. Reroute Burlington Transit Route 1 – Plains/Fairview West to connect to Aldershot GO Station. This will provide direct access to downtown Hamilton and the Burlington GO Station for Waterdown residents[9].
c. With the construction of a Waterdown Road ramp at Highway 403, discuss the opportunity for GO Transit to reroute the Highway 407 GO Bus to stop at the Aldershot GO Station, providing a direct connection to stops along Highway 407 between York University and McMaster University.

2. **Extend Interregional Dundas Service** – The Halton Transportation Master Plan identified opportunities to provide interregional transit service along Dundas Street, connecting downtown Hamilton to Toronto. Through Waterdown, this service is anticipated to provide 15-minute headways during the peak on Dundas Street, and south on Highway 6.

3. **Extension of Burlington Transit Routes** – opportunities exist to extend transit services from Burlington into Waterdown. These include:
   a. Extend Burlington Transit Route 7 – Tyandaga-North on Kerns Road to Waterdown South area.
   b. Extend Burlington Transit Route 2 Brant – Northwest along Dundas Street providing a direct downtown Burlington service for Waterdown residents.

Given the above transit opportunities, it was assumed that a transit mode split of 5% could be achieved in the study area. This mode split was assumed in the transportation capacity modeling work. As improved public transit in the study area can solve some of the transportation problem, it was retained as part of the overall solution. As it is not possible to solve the entire transportation problem through improved transit, other possible solutions are required.

3.1.3 Transportation Demand Management (TDM)

Transportation Demand Management strategies attempt to delay, defer or even eliminate the need for significant capital investment in new transportation infrastructure by:

- Influencing auto demands in the commuter peak periods;
- Promoting walking and cycling as alternatives to travel by private auto; and

[9] This has been implemented

- Promoting public transit and ride sharing as alternatives to travel by private auto.

As part of the Transportation Master Plan process, TDM policies were identified that could:

- ***Eliminate trips*** – through appropriate land use planning and tele-working initiatives;
- ***Reassign trips*** – by encouraging the use of less congested corridors;
- ***Reduce peak period trips*** – investigating opportunities to shift schedule start and end time of major employers;
- ***Link trips*** – by mixed used land-use planning, thereby promoting walking between activities;
- ***Increase transit use*** – through service and fare enhancements; and
- ***Increase vehicle occupancy*** – through ridesharing organizations.

It was assumed that TDM measures could reduce road capacity demand by 5 % and therefore it was assumed to be included as part of the overall solution. As it is not possible to solve the entire transportation problem through TDM measures combined with improved public transit, other possible solutions are required.

3.1.4 New Roadway Capacity

The City of Hamilton Emme/2 Model was used to provide initial inputs to the Waterdown/ Aldershot TMP. Dillon reviewed the transportation model to 2021 as documented in the Phase 1 Report, and updated the model based on current population and employment estimates.

The initial step was to establish a 2021 "do nothing" scenario to confirm the need for road capacity improvements. Through this process, it was determined that additional north-south and east-west road capacity was needed to accommodate growth up to 2021. The approach considered all modes of travel to solve the transportation problem prior to increasing the capacity on the road network. This included transit, Transportation Demand Management (TDM), cycling and walking. A 2021 "do nothing" scenario was modelled which conservatively reduced single occupant automobile travel in the study area by up to 15 % through increased transit use and use of Transportation Demand Management measures. This 15 % decrease in automobile use also did not solve the north-south or east-west transportation capacity deficiency.

Several corridor alternatives were considered in the evaluation to provide the needed capacity to accommodate the development proposed in the OPA 28 lands in Waterdown. Each corridor alternative assumed a 5 % transit modal split and an additional 5 % reduction in vehicle trips due to Transportation Demand Management (TDM) measures. Corridor alternatives were grouped into north-south alternatives for evaluation purposes. A pre-screening of corridor alternatives was conducted based on their ability to solve the transportation capacity problem.

Alternatives that did not solve the problem (where 2021 screenline v/c ratio continued to be greater than 0.85) were screened from further consideration. As a result of this pre-screening exercise, three north-south road improvement options were identified as being able to solve the roadway capacity deficiencies and are presented ***Table 3-1*** and in ***Figure 3-1***.

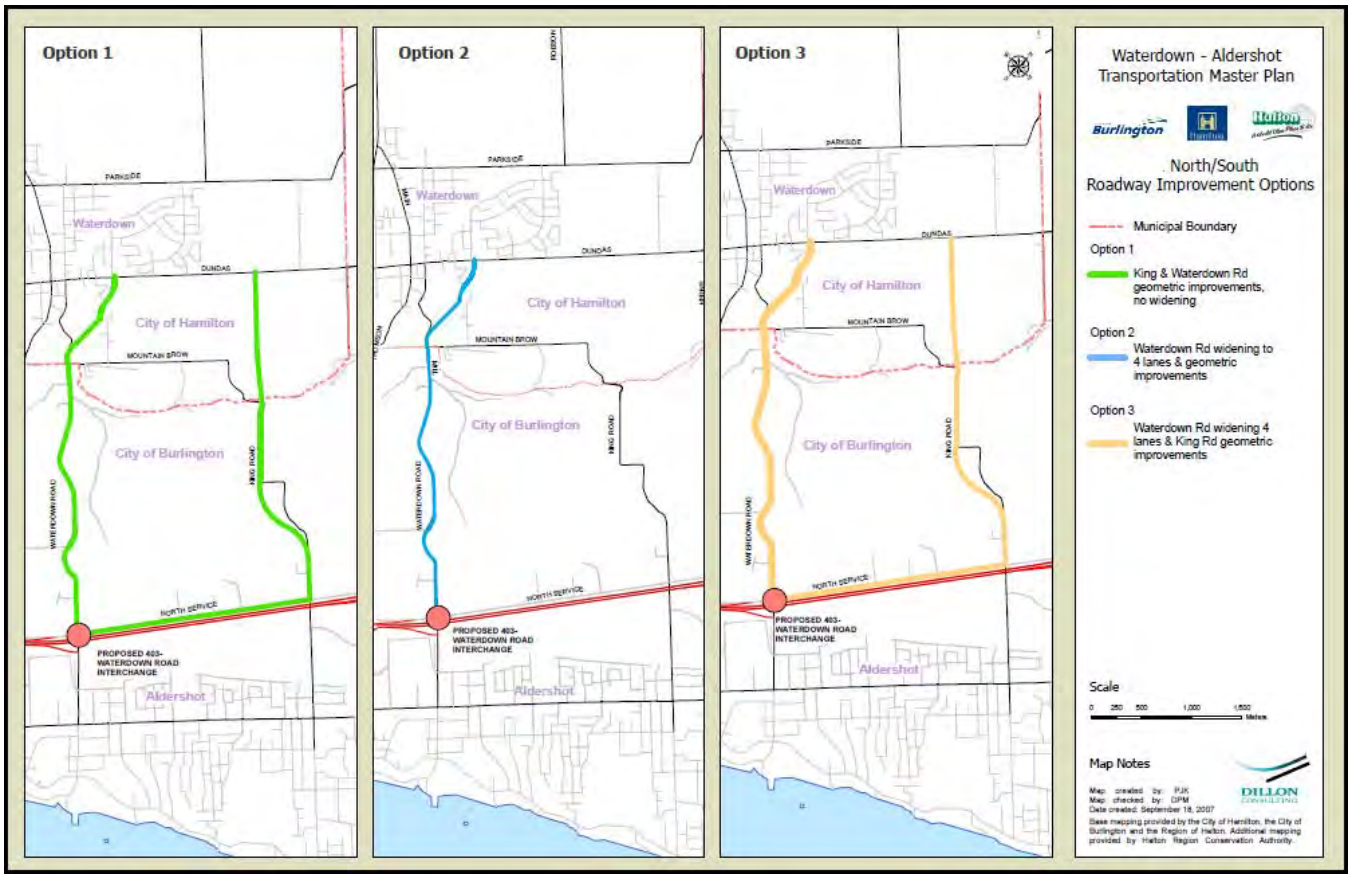
The road improvement alternatives were developed as "corridors" and should not necessarily be considered as the specific routes. As well, it may be possible to reduce the ROW widths for a number of roadway sections and thus, reduce the level of "footprint" effects.

Table 3-1: Alternative Road Improvement Options

Option	Road Options Description	ROW Needs[10]
North-South Alternatives		
Option 1 – King/Waterdown Road Geometric Improvements (Both 2 lane roads)	• Geometric improvements to Waterdown Road from Highway 403 to Dundas Street (maintain as 2 lanes) • New Waterdown Road ROW north of Mountain Brow Road • King Road requires two sections of new ROW (2 lanes) with geometric improvements to sections of the existing King Road and an extension to Dundas Street. • Widening of North Service Road between King Road and Waterdown to 4 lanes	42-80 m (for both King & Waterdown)
Option 2 – Waterdown Road Widening & Geometric Improvements	• Geometric improvements and widen Waterdown Road to 4 lanes from Highway 403 to Dundas Street • New Waterdown Road ROW north of Mountain Brow Road • King Road remains as a 2-lane roadway. • No improvements to North Service Road.	50-80 m
Option 3 – King Road Geometric Improvement & Waterdown Road Widening	• Widen Waterdown Road to 4 lanes (no geometric improvements) • New Waterdown Road ROW north of Mountain Brow Road, • King Road requires two sections of new ROW (2 lanes) with geometric improvements to sections of the existing King Road and an extension to Dundas Street. • Widening of North Service Road between King Road and Waterdown Road	42-80 m (for both King (& Waterdown)

[10] The RoW widths assumed for the purposes of the evaluation were based on applicable road standards and the general characteristics of the existing roadways. It was anticipated that RoW width may be reduced through the implementation of specific road treatments (e.g. retaining walls). This would be investigated in subsequent study phases. In any event, all options were treated equally in this regard.

Figure 3-1: North/South Roadway Improvement Options



3.2 Evaluation Criteria

To guide the assessment and evaluation of the alternative road improvement solutions, a set of evaluation criteria and indicators were developed. The evaluation criteria were organized on the basis of the following five criteria groups that represent the broad environmental components or areas of concern that the evaluation was based on:

- ***Natural Environment*** – addresses the potential for effects to natural environmental features (terrestrial and aquatic);
- ***Social Environment*** – addresses the potential for effects to people, community features and cultural features;
- ***Economic Environment*** – addresses the potential for effects to business and economic development activity;
- ***Cost*** – addresses the capital cost of the alternative; and
- ***Transportation Service*** – addresses the level of improved transportation service that the alternative provides.

Under each of the criteria groups several criteria were developed. The criteria identify the specific components of the environment potentially affected by the proposed road improvement alternatives. For each criterion, one or more indicators were developed that were used to measure potential effect. Table 3-2 presents the criteria and indicators that were considered in the evaluations.

Table 3-2: Evaluation Criteria and Indicators

Criteria Group	Criteria	Indicators
Natural Environment	Potential for impact on terrestrial features	Area of provincially significant wetland removed (ha)
		Area of core ANSIs removed *(not including Provincially Significant Wetland)* (ha)
		Area of edge ANSIs removed *(not including Provincially Significant Wetland)* (ha)
		Area of core ESAs removed *(not including Provincially Significant Wetland)* (ha)
		Area of edge ESAs removed *(not including Provincially Significant Wetland)* (ha)
		Length of corridor adjacent to ESAs & ANSIs *(on both sides of new road corridor)* (m)
		Area of other woodlots removed (non ESA/ANSI) (ha)
		Area of wetland removed (ha)
		Area of other natural habitat removed (ha)
		Number of new Niagara Escarpment crossings
	Potential for impact on aquatic features	Number of watercourses crossed
Social Environment	Potential for impact on residents	Number of residences displaced
		Number of residences within 25 m of the corridor *(widening of existing road)*
		Number of residences within 25 m of the corridor *(new road corridor)*
		Number of residences within 25-50 m of the corridor (*widening of existing road*)
		Number of residences within 25-50 m of the corridor (*new road corridor*)
		Number of residential properties required
		Area of residential properties required (ha)
	Potential for community character impacts	Length of route through existing residential communities (km)
	Potential for impact on community/recreation features	Number of community/recreation features displaced (e.g. schools, churches, parks, etc.)
		Number of community/recreation features within 25 m of the corridor
		Number of community/recreation features within 25-50 m of the corridor
	Potential for impact on cultural features	Number of cultural features removed
		Number of cultural features within 25 m of the corridor
Economic Environment	Potential for impact on business enterprises	Number of businesses displaced
		Number of businesses within 25 m of the corridor
		Number of businesses within 25-50 m of the corridor
		Number of commercial properties required
		Area of commercial properties required (ha)
	Potential for impact on downtown core business area	Length of route through downtown core business areas (m)
	Potential for impact on future land use	Area of land designated for development removed (ha)
	Potential for impact on agricultural land	Area of agricultural land designated for agriculture/rural removed (ha)
Cost	Capital Cost (million $)	Estimated capital cost
Transportation Service	Change in level of transportation service	Critical screenline volume/capacity ratio
		Mean network speed
		Average network volume/capacity ratio
	Change in safety levels	Number of residential property access points
		Number of commercial property access points
		Number of roadway access points

3.3 Evaluation Method

Since all road improvement options were considered capable to solve the transportation problem, the option that was identified to have the least overall impact was considered as the preferred option. The approach used to select the preferred east-west options and preferred north-south option involved the following three steps:

Step 1 – Determine the relative importance of the evaluation criteria groups/criteria – This was completed through a criteria ranking/weighting exercise with members of the project's Stakeholder Advisory Committee (SAC) and the public.

Step 2 – Determine the Simple Additive Weighting (SAW) scores – This is a computer tool used to assist in evaluations where there are large data sets. The tool highlights key differences among the alternatives to assist in decision making.

Step 3 – Considering the SAW scores and the data/impact levels, rationalize the selection of the preferred option(s) – the SAW results along with the actual data collected for the alternatives was considered to rationalize the selection of the preferred options.

It is noted that the Stakeholder Advisory Committee[11] was involved throughout this process and the results of their involvement were made available for public review and comment. The evaluation of alternative solutions was the key discussion topic for all four rounds of PICs, five SAC meetings and numerous individual meetings with stakeholders.

3.4 Selection of Preferred Solution

Based on the assessment and comparative evaluation work Option 2 - Waterdown Road Widening & Geometric Improvements was identified as the preferred North-South road improvement solution. The advantages of Option 2 include: much lower natural environment effects, lower economic effects and least cost. The options were considered to be fairly equal with respect to the social environment (as all three options involve some amount of improvement to Waterdown Road and result in similar social impacts). Although Option 2 was considered slightly less preferred from a transportation perspective, it still effectively addresses the capacity problem. For these reasons, Option 2 was considered as the preferred option.

This preferred solution includes:

- Geometric improvements and widen Waterdown Road to 4 lanes from Highway 403 to Mountain Brow Road;
- Widen Mountain Brow Road to 4 lanes east from Waterdown Road to the new north-south Waterdown Road ROW; and

[11] The SAC was part of Phase 2 work only. During Phase 3 a Neighbourhood Advisory Committee (NAC) was formed.

- New Waterdown Road ROW north of Mountain Brow Road to connect with Dundas Street through the OPA 28 future development lands.

In addition, the City of Burlington has determined that King Road cannot be left in its current condition due to road safety concerns. As such, to keep it open, some amount of road/operational improvements or closure to through traffic may be necessary.

During consultation on the Waterdown/Aldershot Transportation Master Plan Phase 2, the City of Burlington expressed concerns related to the preferred solution identified. In July 2007, the City of Burlington Council received the draft of Waterdown Road Phase 2 report and authorized staff to proceed with Phase 3 of the Master Plan process. The City of Burlington Council resolution (Council Report No. 14-07) was as follows:

> *THAT the findings of the Phase 2 Waterdown/Aldershot Transportation Master Plan Study Report from Dillon Consulting be received; and*
>
> *THAT the Director of Engineering be directed to proceed with Phases 3 and 4 of the Waterdown/Aldershot Transportation Master Plan in conjunction with the City of Hamilton and Region of Halton, subject to the following conditions:*
>
> *(i) THAT Phase 3 of the Waterdown/Aldershot Transportation Master Plan Study evaluate options for a phased implementation of the 4-lane Waterdown Road that would include an initial 3-lane option as illustrated in Figure 1 of Engineering Department Report E-42/07, dated June 6, 2007 along with additional transportation considerations and/or design modifications as follows:*
>
> - *Increased road width only from 13.3 meters to 14.2 meters (i.e. minimum road width to accommodate 4-lanes)*
> - *Inclusion of a multi-use off-road pathway up to 4.0 meters on one side of the road only*
> - *Detailed evaluation of a counter-flow traffic control option utilizing 3-lanes to provide increased peak hour capacity in order to delay for as long as feasible, or possibly eliminate the need to reconfigure Waterdown Road to four lanes; and*
> - *THAT Hamilton implement a viable public transportation system with a utilization experience of 5% to service the OPA 28 lands at 80% build-out; and*
>
> *ii) THAT prior to build-out of the OPA 28 lands, defined as not greater than 6,500 units, the City of Burlington undertake a separate Environmental Assessment (EA) Study pertaining to the reconfiguration of Waterdown*

Road to four lanes from Hwy. 403 to Mountain Brow Road; and

(iii) THAT this study have a steering committee and a stakeholder group to include at least three residents of Waterdown Road representing three separate families; and

(iv) THAT Phase 3 of the Waterdown/Aldershot Transportation Master Plan Study evaluate detailed alternatives and confirm a preferred design allowing King Road to remain open as a two lane roadway as illustrated in Figure 2 of Engineering Department Report E-42/07, dated June 6, 2007; and

(v) THAT a cost-sharing agreement with the City of Hamilton for the north-south road improvements be finalized to the satisfaction of the Director of Engineering, City Treasurer and City Solicitor and that the Director of Engineering report back to Council for final approval when an agreement is reached; and

(vi) THAT priority be given to the Phase 3 work required to fully address all of the detailed design questions raised by Waterdown Road residents including, but not limited to, confirmation of the road alignment, impacts to individual properties and land acquisition requirements; and

THAT the Director of Engineering report back to Council on the Phase 3 preferred design alternative for Waterdown Road and King Road as part of consideration and approval of the Phase 4 Waterdown/Aldershot Transportation Master Plan Environmental Study Report; and

THAT the Director of Planning be directed to initiate an amendment to the Burlington Official Plan to clarify the policies relating to Waterdown Road and distribute such draft amendment to residents of Waterdown Road in a timely fashion.

This Council resolution has provided direction to the Project Team for Phase 3 of the Class EA process.

4. EXISTING CONDITIONS

4.1 Introduction

This chapter describes the existing environmental and social-economic conditions of the Waterdown Road Corridor. Much of the information was generated during Phase 2 of the project and was augmented where appropriate, with more detailed assessments carried out during Phase 3 work. Additional detailed background reports are provided in the Appendix.

The information provided below builds upon information collected during Phases 1 and 2 of the Master Plan process. Much of the existing Waterdown area falls under the jurisdiction of the Niagara Escarpment Commission. The area is guided by the Niagara Escarpment Plan, an environmental land use plan that looks to protect, conserve and promote sustainable development to ensure that the Niagara Escarpment will remain a natural environment for the future. In addition the area is also guided by the Greenbelt Plan which serves to protect the agricultural land and ecological features of the area.

4.2 Land Use Designations

Several provincial policies affect land uses within the Waterdown Road Corridor area, including the Greenbelt Plan (2005) and the Niagara Escarpment Plan (2008). In addition, the Waterdown Road Corridor is subject to a number of municipal Official Plans, including Halton Region's Official Plan, the City of Burlington's Official Plan and the City of Hamilton's Official Plan. The policies and legislation affecting land uses within the corridor are presented below.

4.2.1 Greenbelt Plan

Lands to the east of Waterdown Road are located within the Greenbelt Plan Area and as such are subject to Greenbelt Act (2005), and the designations of the Greenbelt Plan (2005). Corridor segments are designated "Protected Countryside" on the east side of Waterdown Road.

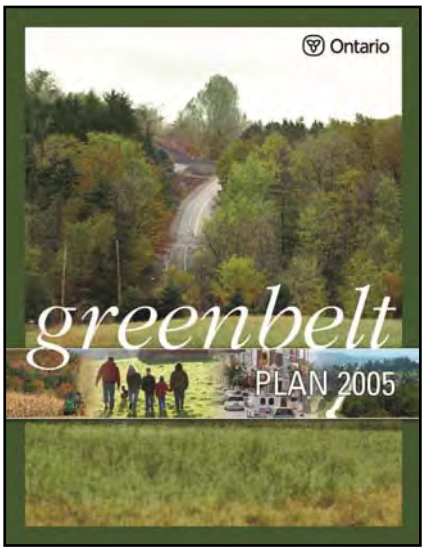


Exhibit 4-1: Greenbelt Plan 2005

The Greenbelt Plan builds upon other provincial policies, including the Provincial Policy Statement and the Niagara Escarpment Plan (NEP). The Greenbelt Plan protects agricultural uses, natural heritage features and open spaces linkages; protects surface and ground water sources; supports recreation, culture and tourism; supports rural economies; and supports infrastructure and natural resources.

Lands designated as "Protected Countryside" are intended to enhance the spatial extent of agriculturally and environmentally protected lands currently covered by the NEP while at the same time improving linkages between these areas and the surrounding major lake systems and watersheds. Section 4.2.1 of the Greenbelt Plan permits existing, expanded and new infrastructure within the Protected Countryside,

subject to and approved under the Canadian Environmental Assessment Act, the Environmental Assessment Act, and the Planning Act and provided that it serves significant growth and economic development in southern Ontario beyond the Greenbelt.

4.2.2 Niagara Escarpment

The northern portion of the Waterdown Road Corridor is located within the Niagara Escarpment Plan Area and as such is subject to Niagara Escarpment Act (1973), and the designations of the Niagara Escarpment Plan (2008). The south side of Mountain Brow Road and the east and west side of Waterdown Road is designated Escarpment Protected Area and the Escarpment Natural Area.

The Niagara Escarpment Plan (NEP) protects unique ecologic and historic areas; maintains and enhances the quality and character of natural streams and water supplies; provides adequate opportunities for outdoor recreation; maintains landscape character; and ensures that all new development is compatible with the Niagara Escarpment Act. The plan includes seven land use designations with differing levels of protection, providing for various restrictions for development and site alteration.

Under Section 1.3 of the NEP, "essential transportation and utility facilities" are permitted in the Escarpment Natural Area. Under Section 1.4 of the NEP, "transportation and utility facilities" are permitted in the Escarpment Protected Area. Should lands hold designation under multiple plans and policies, the NEP supersedes those plans and policies, including designations of the Greenbelt Plan.

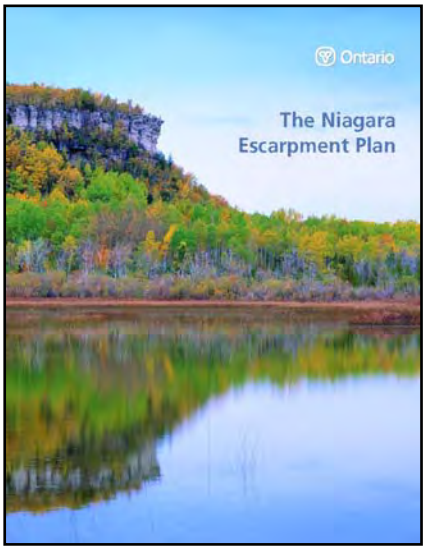


Exhibit 4-2: The Niagara Escarpment Plan

4.2.3 Other Plans Affecting the Study Area

Halton Region Official Plan

The lands east and west of Waterdown Road fall within Halton Region (in the City of Burlington's municipal boundary). As illustrated by Map 1 of the Halton Regional Official Plan (2006), the corridor is designated "North Aldershot Policy Area". Lands located east of Waterdown Road are designated as Greenlands B.

As per section 131(7) and 138(9) Halton Regional Official Plan, transportation and utility facilities are permitted on "Greenlands B" land areas and in the "North Aldershot Policy Area".

At the time of writing this report, the Halton Regional Official Plan (2006) is currently under a review to update its policies and designations to ensure conformity with the Places to Grow and the Greenbelt Plan.

City of Burlington Official Plan

The lands east and west of Waterdown Road fall within the City of Burlington's municipal boundary. Under the approved Official Plan (1997), the land uses along Waterdown Road were not yet determined (City of Burlington OP - Schedule B, 1997). In 2006, the City of



Exhibit 4-3: Waterdown Road looking south

Burlington undertook a review of its Official Plan, resulting in Official Plan Amendment (OPA) 55, and this was subsequently approved by Halton Region on January 4, 2008. OPA 55 has since been appealed to the Ontario Municipal Board. OPA 55 maintains a designation of "Land Use Designations to be Determined" for the corridor. According to Section 8.3 of OPA 55, the overall development concept for the North Aldershot Study Area shall be established following a review of the findings of the North Aldershot Inter-Agency Review Planning Study. In 1994, a land use concept was developed by an Inter-Agency Review, which determined the appropriateness of current plans and policies in the area.

City of Hamilton Official Plan

The land north and immediately south of Mountain Brow Road falls within the City of Hamilton's municipal boundary. The City of Hamilton is currently reviewing and updating their Official Plan. The update is being undertaken in two phases: Rural Hamilton Official Plan and Urban Area Official Plan. At the time of writing this report, the Rural Hamilton Official Plan had been approved by Council but was awaiting Ministerial approval. The Urban Area Official Plan was still being developed. Also, the former Town of Flamborough Official Plan is still in effect for the urban area of Waterdown.



Exhibit 4-4: Mountain Brow Road east of Waterdown Road looking east

Under the 2006 draft approved Rural Hamilton Official Plan lands located south of Mountain Brow Road are designated as "Open Space" while lands north of Mountain Brow Road are designated "Urban Area (subject to future amendment)". Lands that are located south of Mountain Brow Road are also designated Escarpment Natural Area and Escarpment Protection Area, consistent with the NEP designations and a recognized significant woodland area.

At the time of writing this report, policies and designations affecting the urban area were under development, and are not referenced in the Rural Hamilton Official Plan. Furthermore, the Rural Hamilton Official Plan does not address non-airport related transportation policies. As identified in Section 4.2 of the Rural Hamilton Official Plan, such policies will be added by a future Official Plan Amendment.

4.3 Natural Environment Features

4.3.1 Significant Natural Areas

The study area consists of the lands between Dundas Street and Mountain Brow Road, along Mountain Brow Road to Waterdown Road and Waterdown Road between Mountain Brow Road and North Service Road. Additional detailed natural heritage data was collected during Phase 3. This was done as one exercise for both the Waterdown Road Corridor Class EA and the New East-West Road Corridor Class EA and, as such, the natural environmental mapping for most of this data covers both corridors. Once the natural environment inventory was completed, the natural features that could be impacted by the preferred road improvements were identified. Field data collection included a detailed

vegetation survey, ecological land classification, an aquatic assessment, breeding bird survey and amphibian survey. Field data was supplemented with information obtained from the Ontario Ministry of Natural Resources (MNR) Natural Heritage Information Centre (NHIC) database, Halton Natural Areas Inventory (Conservation Halton) and natural heritage data managed by the Hamilton Conservation Authority.

The main natural environmental issues in the WATMP study area concern watercourse crossings, federal and/or provincial Species at Risk, Provincially Significant Wetlands (PSW's), Environmentally Sensitive Areas (ESAs) and Areas of Natural and Scientific Interest (ANSI's). See ***Figure 4.1*** for Significant Natural Area locations (i.e. ESAs, Candidate ESAs, PSWs, ANSIs). Other issues examined in this study concern regionally rare species and their habitat.

Grindstone Creek Valley ESA is located in the northwest corner of Waterdown South (south of Dundas Street). This 150 hectare area is comprised of the steep-sided valley of Grindstone Creek as it descends the Niagara Escarpment and crosses the south slopes. The area encompasses provincially significant bedrock exposures and supports many rare and uncommon plant species. The area is considered to be one of the top botanical sites in Halton Region, is excellent for nesting or migrating birds and contains many rare species. The area is also designated as a Life Science ANSI. The ESA provides a continuous wooded linkage between Hamilton Harbour and the Niagara Escarpment. The Grindstone Creek falls have been designated as a locally significant earth science ANSI, while the valley itself has been designated as a provincially significant earth science ANSI. The ESA serves as a major zone of groundwater discharge. The present land use consists primarily of floodplain and hazard lands. Residential areas in the community of Waterdown abut the northern portion of the valley, and Waterdown Road and the CPR railway cross the escarpment. Boundaries and buffers of this ESA are being confirmed through the Waterdown South Secondary Plan.

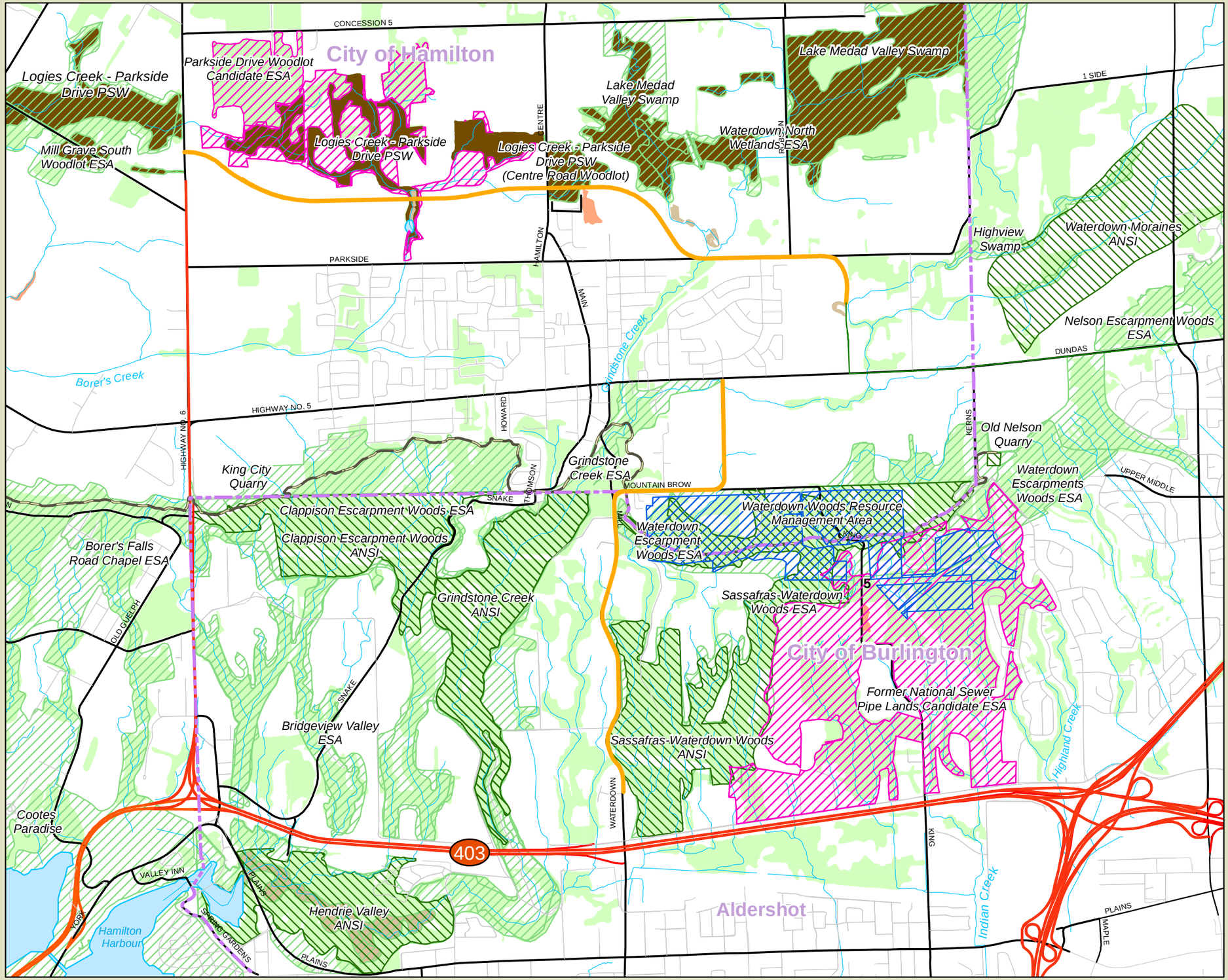


Exhibit 4-5: Vegetation on North Side of Mountain Brow Road

The **Waterdown Escarpment Woods ESA** is located south of the Waterdown South development, south of Mountain Brow Road. This ESA forms a 3.5 km link along the Niagara Escarpment. The ESA is considered significant because it serves an important ecological function in providing linkages along the escarpment, the area contains significant biotic communities, it provides habitat for rare species and is along the Niagara Escarpment. Moraine and limestone pavement areas in the ESA on the escarpment plateau act as groundwater recharge areas. Above the escarpment the vegetation diversity is high and includes a broadleaf upland forest, a broadleaf swamp, and successional communities. Along the escarpment rim, the White Cedar-Red Oak community is significant. Only a narrow area of field and hydro corridor separate this ESA from the provincially significant Sassafras Woods. These two areas together create a very complete cross-section of the natural biotic community associated with the Niagara Escarpment.

Waterdown Road Corridor and East - West Road Corridor Municipal Class EAs

Figure 4.1: Significant Natural Areas



Legend

- Municipal Boundary
- Preferred Alignment
- Provincially Significant Wetland
- Area of Natural or Scientific Interest
- Environmentally Sensitive Area
- Candidate Environmentally Sensitive Area
- Waterdown Woods Resource Management Area
- Local Wetland
- Woodlot
- Other Natural Habitat
- Niagara Escarpment

1:30,000

0 0.5 1 km

Map Notes

Map Created By: PJK/SFG
Map Checked By: DR
Date Created: April 5, 2006
Date Modified: April 7, 2009
File Path: I:\GIS\089020 - Waterdown\Natural Environment Figures April 2009\Mapping\Figure 2: Natural Areas.mxd
Base mapping provided by the City of Hamilton, the City of Burlington and the Region of Halton. Additional mapping provided by Halton Region Conservation Authority and the Ministry of Natural Resources.

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The Sassafras Woods ESA is located adjacent to the Waterdown Woods ESA in Halton Region east of Waterdown Road and north of Highway 403. It supports a secondary growth hardwood forest with an overstory of white pine. This is one of the few remaining woodlots of this type that once covered most of the region south of the escarpment. The area has been designated as a Carolinian site. Sugar maple is dominant with shagbark hickory, witch hazel, American hornbeam and red oak well represented. It is one of the top botanical sites in Halton Region and has been designated as a Life Science ANSI.

4.3.2 Ecological Land Classification and Vegetation

Ecological communities are the product of both the vegetation and physical substrates that comprise them. Ecological Land Classification (ELC) uses both parameters to objectively classify ecological communities according to the soil conditions, dominant vegetation communities, levels of disturbance and the natural versus anthropogenic forces that are driving the sustainability of the community. ELC has become the standard method of classifying ecological communities in Ontario and was conducted throughout the Waterdown Road Corridor and East-West Road Corridor Class EA study areas, generally within 50 m of the preferred road alignments. Vegetation communities were then mapped on aerial photography according to ELC nomenclature to graphically represent the specific spatial patterns in the vegetation cover according to species composition, physiognomy, and physical site characteristics.

In order to more fully understand the vegetation in the study area, to preclude activity in areas with provincially and/or federally listed Species at Risk (SAR) and to mitigate activity in areas with regionally significant species, a full botanical inventory was completed for the Waterdown Road Corridor study area, primarily within 50 m of the preferred road alignments. The vegetation study involved traversing these study areas on foot and recording all the vegetation observed during the late summer/fall in 2007 and early summer and fall 2008. Species nomenclature is based on the Ontario Plant List (Newmaster *et al.* 1998). The coefficient of conservatism and the coefficient of wetness for each plant was used to evaluate the quality and wetland potential of the habitat, respectively. Additional SAR work was completed during the development of the preferred design concept and this is summarized in Chapter 6. Additional SAR information is provided in ***Appendix Q***.

Natural features were excluded from the field assessment if there was a 30 m distance or greater from the preferred road alignment with a cultural attribute (i.e. agricultural field, urban development, etc.) between the road alignment and the feature. During field assessments, the location, abundance and condition of regionally rare and/or species at risk flora were documented. Regionally rare and/or provincially vulnerable vegetation communities were also noted. A geographic query on the NHIC database was also undertaken to identify historic element occurrences for species at risk and provincially vulnerable

vegetation communities in the study area. In addition, detailed edge vegetation assessments were conducted along proposed road alignments in sensitive natural features such as the Sassafras Woods ESA.

Twenty-two different ecological communities were identified through the ELC protocol including three cultural communities, nine different forest types, nine wetland types and one open water community (see ***Figures 4.2***). These communities are listed below and additional detail is provided for each in ***Appendix J – Table B1***.

The results of the vegetation inventory are summarized below and a detailed vegetation list is provided in ***Appendix J - Table B2***. The study area is comprised of approximately 70% native species and 30% exotic species. Based on the near urban setting of the site, this level of native vegetation indicates that exotic invasion is moderate, as exotic species in disturbed sites can often approach 50% of the species composition or higher.

The vast majority of the native species found within 50 m on either side of the WATMP preferred road alignment were classified as S5 (**Secure** - Common, widespread, and abundant in the nation or state/province) in Ontario). Four species (Smooth-sheathed sedge, black walnut, herbaceous carrion flower and bristly greenbrier) were identified as S4 (**Apparently Secure** - Uncommon but not rare; some cause for long-term concern due to declines or other factors). Impacts to provincially *Secure* and *Apparently Secure* species do not require mitigation or compensation.

Butternut which was identified in the north-eastern portion of the study area is listed as 'S3?' according to the Ministry of Natural Resources. Based on the location of the butternut, it is not anticipated to be impacted by the proposed road.

Sassafras Woods Edge Vegetation Survey

A detailed vegetation survey of a 600 m long vegetated slope along the western edge of Sassafras Woods was completed in order to estimate encroachment effects of the proposed widening of Waterdown Road. The area inventoried extended from approximately 200 m north of Flatt Road to 400 m south of Flatt Road on the west side of the woodland.

Overall abundance of all woody plants observed was estimated. The size and relative abundance of the trees and shrubs observed along the edge of Sassafras Woods is provided in ***Appendix J***. There were no species at risk or regionally rare species documented in this area (i.e. butternut, flowering dogwood, etc.). John Pisapio, Biologist with the Guelph District MNR, has indicated that all lands south of Mountain Brow Road are Jefferson salamander habitat and fall under the regulations of the new *Endangered Species Act* as Jefferson salamanders are considered a species at risk.



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Figure 4.2: Waterdown Road Corridor Ecological Land Classification and Significant Plant Species

- CUM1-1: Dry - Moist Old Field Meadow
- CUT1-4: Grey Dogwood Cultural Thicket
- CUT1-7: Hawthorn - Buckthron Cultural Thicket
- FOD5-1: Dry - Fresh Sugar Maple (Hardwood) Deciduous Forest
- FOD7-2: Fresh - Moist Ash Lowland Deciduous Forest
- FOD9-1: Fresh - Moist Oak - Sugar Maple Deciduous Forest
- Deciduous Forest
- Open Country
- Hay
- Agriculture
- Recreational Facility
- Buildings
- Preferred Route

Species at Risk

- Butternut (Individual Tree)

Rare

- Flat-Topped White Aster

Uncommon

- Early Goldenrod

0 0.2 0.4 Kilometers

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Map Notes

Map Created By: PJK/SFG
Map Checked By: DR
Date Created: April 7, 2006
Date Modified: April 2, 2009
File Path:I:\GIS\089020 - Waterdown\Natural Environment Figures April 2009\Mapping\Figure 5 Waterdown Corridor ELC.mxd
Base mapping provided by the City of Hamilton, the City of Burlington and the Region of Halton. Additional mapping provided by Halton Region Conservation Authority and the Ministry of Natural Resources.

National Heritage Information Centre (NHIC) Flora Query

An NHIC geographic query of the Waterdown Road Class EA study area revealed eleven plant species including three provincial/federal species at risk. Historically, these eleven plant species and one significant vegetation community (Dry Oak – Hickory Deciduous Forest Type), have been observed in the Sassafras – Waterdown Woods ANSI and surrounding area. A complete list of the element occurrences for flora historically observed in the study area, along with their federal, provincial and regional status is provided in ***Table 4.1***. None of these flora species or the oak-hickory deciduous forest community were observed during field assessments of the surveyed areas along the Waterdown Road Corridor.

Table 4-1: Flora NHIC Element Occurrences In and Adjacent to the WATMP Study Area

Scientific Name	Common Name	SRank[1]	ESA[2] and/or SARA[3]	Hamilton Region Rarity Status	Halton Region Rarity Status	Location of Element Occurrence[4]
Frasera caroliniensis	American columbo	S2	**Special Concern [2,3]**	Rare	Rare	WR
Morus rubra	Red mulberry	S2	**Endangered[2,3]**	Rare	Rare	WR
Oenothera pilosella	Evening primrose	S2	No	Rare	Rare	WR
Aureolaria virginica	Downy False-foxglove	S1	No	Rare	Rare	WR
Hybanthus concolor	Green violet	S2	No	Uncommon	Uncommon	WR
Uvularia perfoliata	Perfoliate bellwort	S1	No	Rare	Rare	WR
Panicum dichotomum	Cypress witchgrass	S2	No	Rare	Rare	WR
Sphenopholis nitida	Shiny wedge grass	S1	No	Rare	Rare	WR
Solidago arguta	Sharp-leaved goldenrod	S3	No	Rare	Rare	WR
Castanea dentata	American chestnut	S2	**Endangered[2,3]**	Uncommon	Uncommon	WR
Eurybia schreberi	Schreber's Wood Aster	S1	No	Unknown	Rare	WR
Euonymus atropurpurea	Burning bush	S3	No	Rare	Rare	WR

1. SRank: Provincial ranks used by the Natural Heritage Information Centre to set protection priorities for rare species and natural communities. By comparing the provincial ranks, the status, rarity, and the urgency of conservation, needs can be ascertained. [S1 – Critically imperiled in Ontario; S2 – Imperiled in Ontario; S3 – Vulnerable in Ontario; S4 – Apparently secure in Ontario; S5 – Secure in Ontario; SE – Exotic]
2. ESA – Endangered Species Act (COSSARO)
3. SARA – Species at Risk Act (COSEWIC)
4. WR – Waterdown Road Corridor Area and East-West – East-West Road Corridor Area.

4.3.3 Wildlife

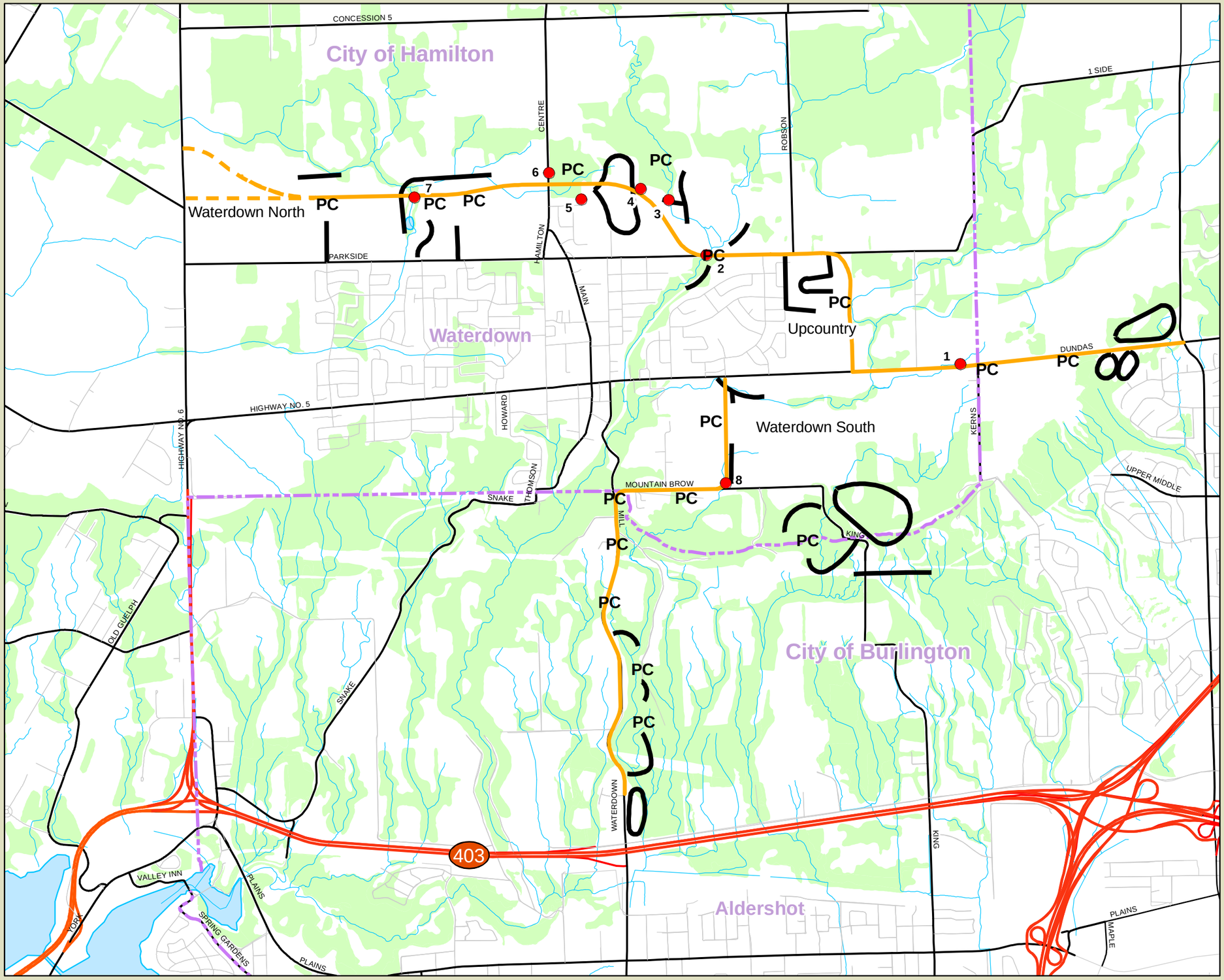
Incidental wildlife observations were recorded during field study of the Waterdown Road Corridor Class EA study area. The majority of the incidental wildlife species observed in the Waterdown Road Corridor study areas are common in Ontario as well as in Halton Region and the cities of Hamilton and Burlington. There were no federal or provincial species at risk observed incidentally. A giant swallowtail was observed in the cultural meadow habitat adjacent to the Waterdown Escarpment Woods Extension lands, approximately 100 metres south of Dundas Street. Giant swallowtail is a provincially ranked S2 or *imperilled* Lepidoptera (butterfly) species that may be at risk in Ontario according to the NHIC. The status of this species is *uncommon* in Hamilton/Burlington and *rare immigrant* in Halton Region.

4.3.4 Birds

Breeding bird surveys were conducted in the Waterdown Road Corridor in June and July, 2007. Specifically, surveys were conducted on June 20th and July 7th between dawn and 10am. The objective of the surveys was to document the breeding bird species and identify habitat that is used by breeding birds. The breeding bird surveys followed the Ontario Breeding Bird Atlas Guide for Participants (Environment Canada, 2001). The surveys utilized standard 10-minute point counts and area searches to determine species diversity, abundance and breeding evidence. Point counts and area searches were located in open country and forest communities within the proposed right of way lands and included agricultural, deciduous forest, shrubland, cultural field, riparian and residential habitat. Point count and area search locations are shown on ***Figure 4.3***.

Roadside point counts consisted of fifteen 10-minute, non-fixed radius point counts systematically spread out across the road network in the project area. Roadside point counts were spaced approximately 400 m apart to avoid re-sampling individuals and in areas representing major habitat types. A total of nine interior forest point counts were conducted, along with 1 thicket point count using 10-minute non-fixed radius point counts, divided amongst five forested areas. Forest point count sites were chosen systematically, based on their size (i.e. tended to be the larger forests in the study area), their proximity to the proposed new road right of way and accessibility (i.e. location, landowner permission). Stations were spaced approximately 250 m or more apart to avoid re-sampling individuals.

Standardized area searches were used to sample forest and open country habitats throughout the study area. Area searches were used at sites too small for point counts and between point counts at larger sites. These searches were conducted from dawn to approximately 5 hours after sunrise. All of the main habitat types at a site were noted and searched on foot and all species and individual birds detected were noted and a breeding evidence code was used when appropriate.



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Figure **4.3**: Breeding Bird and Amphibian Point Count and Area Search Locations

- 1 — Amphibian Point Count Location
- PC — Breeding Bird Point Count Location
- Breeding Bird Area Search Route
- Municipal Boundary
- Preferred Alignments
- Route to be Determined
- Woodlot

Scale

0 0.5 1 Kilometers

Map Notes

Map Created By: PJK/SFG
Map Checked By: DR
Date Created: April 4, 2008
Date Modified: April 2, 2009
File Path: I:\GIS\089020 - Waterdown\Natural Environment Figures April 2009\Mapping\Figure 3 Point Count and Area Search Locations.mxd

Base mapping provided by the City of Hamilton, the City of Burlington and the Region of Halton. Additional mapping provided by Halton Region Conservation Authority and the Ministry of Natural Resources.

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The federal and provincial conservation status of each species located on breeding bird surveys was obtained through the MNR's NHIC internet database. The North American Bird Conservation Initiative has divided the continent into bird conservation regions to facilitate regional bird conservation. The study area is located in Bird Conservation Region 13 (BCR-13), which encompasses the Lower Great Lakes and St. Lawrence Plain.

The Halton and Hamilton regional conservation priority status for each species observed was obtained from the report ***Conservation Priorities for the Birds of Southern Ontario (Couturier, 1999***). This report aims to help planning authorities set priorities for conservation efforts by targeting bird species (and their associated habitats) that are significant within their region. Specifically, this report advocates the use of prioritized lists of birds as tools that planning authorities might use when developing Official Plans (e.g., identifying significant wildlife habitat, Environmentally Sensitive Areas, etc.) and when evaluating development proposals.

Overall, 56 bird species were observed during the 2007 breeding season (see ***Appendix J – Table A1***). In order to supplement the Dillon survey data, historic breeding bird data was obtained from the ***Ontario Breeding Bird Atlas*** (OBBA). With this supplementary breeding bird information, the diversity of avian breeders in the WATMP study area was estimated to be 64 species.

The following is a list of *regional conservation priority species* observed by Dillon during the 2007 breeding season. Also, listed in italics are birds observed that have potential breeding habitat in the study area. Hamilton and Halton regional occurrence classifications are given in parenthesis.

<u>Forest Birds</u>

- American woodcock
- Turkey vulture (uncommon Hamilton)
- Yellow-billed cuckoo (rare Halton & Hamilton)
- *Black-billed cuckoo* (uncommon Halton & Hamilton)
- *Red-bellied woodpecker* (uncommon Halton & Hamilton)
- Eastern towhee (uncommon Halton & Hamilton)
- Black-capped chickadee
- Chestnut-sided warbler (uncommon Halton & Hamilton)
- Mourning warbler (uncommon Halton & Hamilton)
- Blue-gray natcatcher (uncommon Halton & Hamilton)
- Wood thrush
- Eastern phoebe (uncommon Hamilton)

<u>Open Country Birds</u>

- Spotted sandpiper
- Horned lark (uncommon Hamilton)
- Savannah sparrow
- Vesper sparrow (uncommon Halton & Hamilton)
- Field sparrow

- American goldfinch
- Barn swallow
- Bank swallow (uncommon Hamilton)
- Northern rough-winged swallow (uncommon Halton)
- Bobolink
- Eastern meadowlark
- Brown thrasher (uncommon Hamilton)
- Eastern kingbird

Three additional species are not *regional conservation priority species* as defined by Couturier (1999), but are *uncommon* in Hamilton Region. They are great blue heron, eastern screech owl and hairy woodpecker.

Follow-up work will be required related to additional field sampling/observation for species at risk including:

- The development of mitigation measures for marsh, field and woodland bird species that will be dependent on additional breeding bird surveys if construction is to take place between May 15 and August 1.

4.3.5 Amphibians

An assessment of the Waterdown Road Corridor study area was undertaken to determine the abundance and diversity of the amphibian community. Wetlands and vernal pools located in woodlots and adjacent to watercourses were surveyed for potential amphibian breeding habitat. The amphibian assessment consisted of conducting amphibian surveys at these potential habitats during the spring of 2007 and 2008 as well as collecting secondary source information. Incidental herpetofaunal wildlife observations were also recorded. Secondary source herpetofaunal resources included the Ministry of Natural Resources' (MNR) Natural Heritage Information Centre (NHIC) and the MNR's Ontario Herpetofaunal Summary Atlas (Oldham et al., 2000).

The amphibian survey protocol used in this study was adapted from the document entitled ***The Marsh Monitoring Program Training Kit and Instructions for Surveying Marsh Birds, Amphibians, and Their Habitats, Revised 2003 (Bird Studies Canada et al)***. Because the surveys began in May 2007, two amphibian survey events were conducted so that early and late breeders had an equal chance of detection by this protocol. In spring 2008, an additional amphibian survey was conducted in an expanded study area. The survey was conducted on April 8th in order to detect early amphibian breeding.

Surveys took place in 2007 when evening temperatures exceeded 5ºC and an attempt was made to distribute the surveys evenly between evenings that exceeded 5ºC (1-15th April), 10ºC (1-15th May) and 15ºC (1-15th June). Ideally, surveys were conducted at dusk and ended before midnight. Evenings with moderate to heavy precipitation were avoided. Each station was surveyed for three minutes. Routes were surveyed in their entirety, in the same sequence, starting at about the same time, on all visits. All amphibian species that were heard from each sample station were recorded.

Surveys determined which potential habitat contained breeding amphibians and estimated the population size of the species that demonstrated breeding behaviour in these habitats. A summary of amphibians identified during the 2007 and 2008 surveys is given in ***Table 4.2.*** There were no federal or provincial species at risk observed during the amphibian surveys. The majority of the amphibians documented in the study area are ranked *Secure* (S5) in Ontario, signifying that they are common, widespread and abundant in Ontario. Further, two amphibians observed in the study area, western chorus frog (*Pseudacris triseriata*) and pickerel frog (*Rana palustris*), are ranked S4 or *Apparently Secure*; meaning they are uncommon, but not rare, and usually widespread in Ontario, with the possibility of a long-term conservation concern (Oldham *et al.*, 2000). For additional information on amphibian species please refer to the complete Natural Environment Report located in ***Appendix J.***

Table 4-2: Amphibian Species Observed in the WATMP Study Area

Common Name	Scientific Name	Point Count Observed[1]			Provincial/ Federal Status	City of Hamilton Rarity Status[2]	Halton Region Rarity Status
		May 16/07	June 7/07	April 8/08			
Spring Peeper	*Pseudacris crucifer*	8	-	8	NAR	**Unknown**	**Abundant**
Wood Frog	*Rana sylvatica*	-	-	8	NAR	**Unknown**	**Common**

Note: NAR – Not At Risk, SC – Special Concern, THR – Threatened, END – Endangered, EXP – Expatriated, EXT – Extinct. Numbers refer to the point count station where amphibians were recorded (see Figure 3).
1. Amphibian point count locations (see *Figure 3 – Breeding Bird and Amphibian Point Count and Area Search Locations*)
2. Species listed as Unknown are presumed common in the Regional Municipality of Hamilton Wentworth

4.3.6 Aquatic Resources

A background investigation and general reconnaissance of Grindstone Creek and associated tributaries as they relate to the Waterdown Road Corridor was conducted on June 6th, 2007. This work was conducted at each of the anticipated watercourse crossings to provide the basis for input into the proposed road improvement works and make recommendations with respect to watercourse and fish habitat protection. Ultimately, information from this section is intended to be used in support of the fisheries approval process as the Detailed Design of the road improvement progresses.

Upon discussions with the Hamilton Conservation Authority (HCA), Conservation Halton (CH), and the Ontario Ministry of Natural Resources (MNR) with respect to the volume and availability of fisheries information on file, it was decided that a new fish community

survey was not needed in support of this Class EA. Therefore, existing background information from the involved regulatory agencies formed the basis of the preliminary assessment. Fieldwork concentrated on assessment of potential watercourse crossings and confirmation of current conditions as they pertain to aquatic organisms and fish habitat.

The following documents were reviewed for this study, and in some cases, referenced within the text:

- The South Waterdown Subwatershed Study prepared by Ecoplans Limited and McCormick Rankin Corporation in March 2006;
- The Grindstone Creek Watershed Study – Appendix 3: Aquatic Habitat Inventory and Assessment prepared by Conservation Halton in January of 1998;
- MC2 Lands, Waterdown – Environmental Impact Statement prepared by Stantec Consulting in September of 2005;
- Existing Conditions of the Borer's Creek Subwatershed, City of Hamilton – Final Report (revised 2005) prepared by Gartner Lee Limited;
- Upcountry Estates Environmental Implementation Report prepared by Paragon Engineering Limited in 1996;
- Fish and Fish Habitat Information from HRCA (Grindstone Creek System);
- Fish and Fish Habitat Information from HCA (Borer's Creek System);
- Species-At-Risk (SAR) Information from the MNR; and
- Natural Heritage Information Centre website (NHIC) - http://nhic.mnr.gov.on.ca/nhic_.cfm.

At all watercourse crossings, aquatic habitat features were characterized, including general channel morphology, channel characteristics, key habitat features, and the presence/absence of fish habitat. Key representative photographs were taken and are included in the text where appropriate to further document the different habitat types observed. All watercourses that cross the proposed route in the Waterdown Road Corridor Class EA study areas generally drain in a southerly direction towards Hamilton Harbour of Lake Ontario. Grindstone Creek originates above the Niagara Escarpment in Flamborough, and drains an area of 90 square kilometres making it one of the main tributaries discharging into the northwest-end of Hamilton Harbour. Just south of Dundas Street East (Highway 5), Grindstone Creek splits into two branches, which have been identified herein as the "Northwest Branch" and the "Northeast Branch". A separate headwater reach of a Grindstone Creek tributary that crosses the Waterdown Road Corridor, which drains into the main channel just south of Highway 403, has been identified herein as the "Southern Branch". Please see Figure 4.4 for orientation of watercourses within a regional context.

Historical Fish Species Information

Fish were not seen during field investigations; however, the community has been well documented in previous literature. Common fish species recorded are Pumpkinseed, Bluegill, Largemouth Bass, Fathead

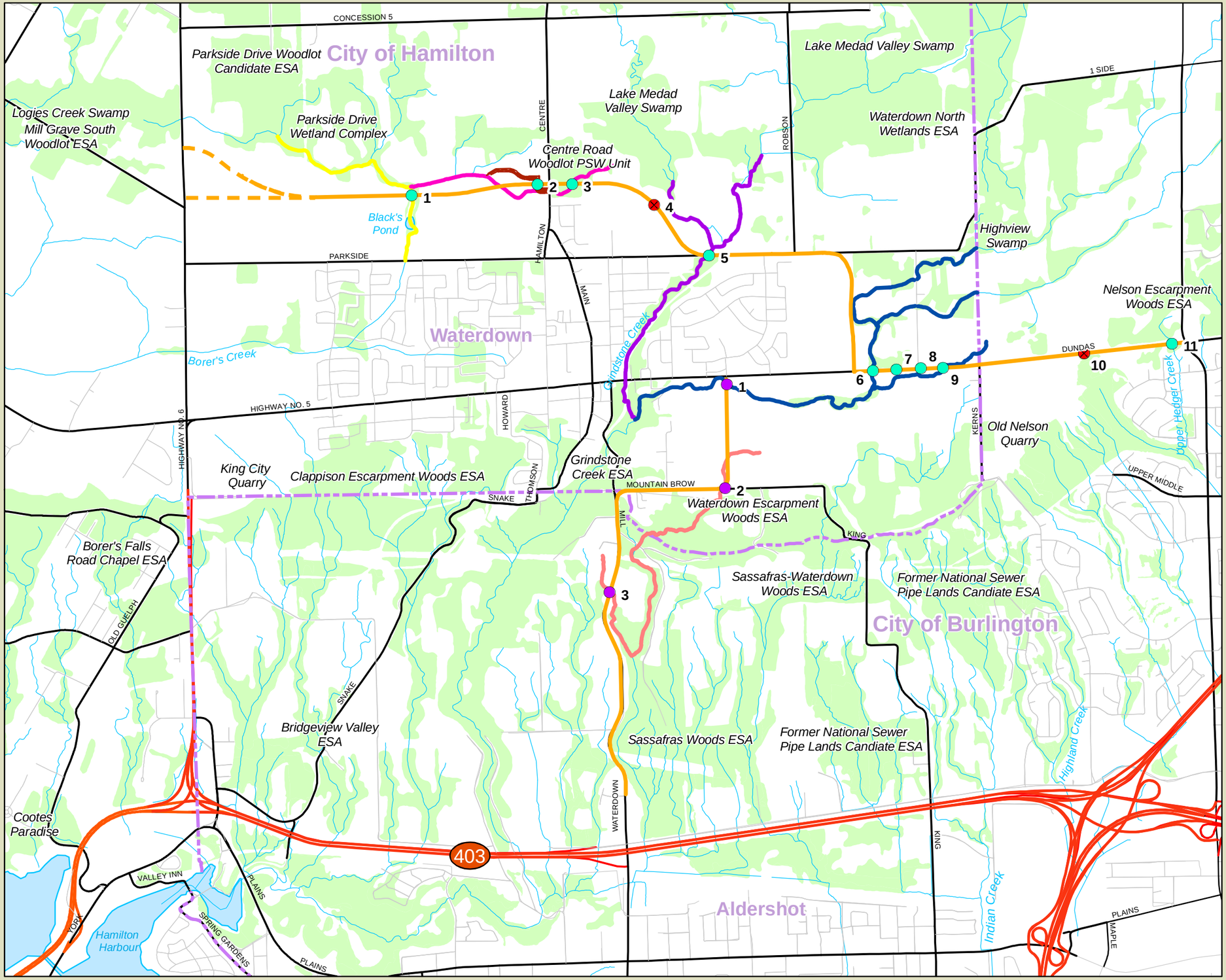
Minnow, Creek Chub, Brook Stickleback, and unknown Cyprinids YOY (Conservation Halton – Fisheries Database, 2007 and Hamilton Conservation Authority/Borer's Creek Watershed Report (Gartner Lee) Limited). It should be noted that a permanent groundwater discharge area occurs immediately downstream of this site (<50 m) which changes the conditions to potential coldwater habitat to the escarpment bluff.

According to Karine Beriault (Species at Risk biologist with the MNR) during personal correspondence on August 24th, 2007, the Ministry of Natural Resources has no historical records indicating that fish or other aquatic Species at Risk occur along the preferred alignment.

Table 4-3: Historical Fish Sampling Results for Grindstone Creek

Common Name	Scientific Name	Grindstone Creek		
		Northwest Branch	Northeast Branch	Southern Branch
Pumpkinseed	*Lepomis gibbosus*	✓	✓	
Bluegill	*Lepomis macrochirus*	✓	✓	
Green sunfish	*Lepomis cyanellus*	✓		
Brown bullhead	*Ameiurus nebulosus*	✓		
Common carp	*Cyprinus carpio*	✓		
Northern pike	*Esox lucius*	✓		
Largemouth bass	*Micropterus salmoides*	✓	✓	
White sucker	*Catostomus commersoni*	✓		
Finescale dace	*Phoxinus neogaeus*	✓		
Pearl dace	*Margariscus margarita*	✓		
Blacknose dace	*Rhinichthys atratulus*	✓		
Longnose dace	*Rhinichthys cataractae*	✓		
Northern redbelly dace	*Phoxinus eos*	✓		
Golden shiner	*Notemigonus crysoleucas*	✓		
Common shiner	*Luxilus cornutus*	✓		
Blackchin shiner	*Notropis heterodon*	✓		
Blacknose shiner	*Notropis heterolepis*	✓		
Brassy minnow	*Hybognathus hankinsoni*	✓		
Bluntnose minnow	*Pimephales notatus*	✓		
Fathead minnow	*Pimephales promelas*	✓	✓	
Creek chub	*Semotilus atromaculatus*	✓	✓	
Johnny darter	*Etheostoma nigrum*	✓		
Central mudminnow	*Umbra limi*	✓		
Brook stickleback	*Culaea inconstans*	✓	✓	
Unknown cyprinids YOY	*Cyprinidae spp.*	✓	✓	

For additional information on aquatic resources please refer to the complete Natural Environment Report located in ***Appendix J***.



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Figure **4.4**: Aquatic Features

Legend

- 1 Waterdown Road Corridor Water Course Crossing
- 1 East - West Corridor Watercourse Crossing
- Drainage Conveyance
- Main Branch (Borer's Creek)
- Eastern Tributary (Borer's Creek)
- Northwest Branch (Grindstone Creek)
- Northeast Branch (Grindstone Creek)
- Southern Branch (Grindstone Creek)
- Preferred Alignment
- Route to be Determined
- Municipal Boundary
- Proposed Borer's Creek West Tributary Alignment
- Woodlot

Scale

0 0.5 1 Kilometers

Map Notes

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Map Checked By: DR
Date Created: April 5, 2006
Date Modified: April 2, 2009
File Path: I:\GIS\089020 - Waterdown\Natural Environment Figures April 2009\Mapping\Figure 6 Aquatic Features.mxd

Base mapping provided by the City of Hamilton, the City of Burlington and the Region of Halton. Additional mapping provided by Halton Region Conservation Authority and the Ministry of Natural Resources.

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Historical Fish Habitat Information

With respect to existing background fish habitat information relevant to this Class EA, the following secondary resource documents were examined:

- Gartner-Lee Limited: "Existing Conditions of the Borer's Creek Sub-watershed: City of Hamilton – Final Report (revised 2005)";
- Stantec Consulting: "Environmental Impact Statement – MC2 Lands, Waterdown, Ontario (Sept 12th 2005)";
- Conservation Halton: "Grindstone Creek Watershed – Aquatic Habitat Inventory and Assessment (Appendix 3 – January 1998)"; and
- Ecoplans Limited: "South Waterdown Subwatershed Study – Stage 1 Report (final – March 2006)".

Key summary text was taken directly from these reports to supplement Dillon's field investigations of anticipated road crossings. Dillon concurs with the findings of these background reports and the aquatic enhancement recommendations with regard to road crossing impacts and mitigation strategies made in these documents.

Field Work Results

Table 6 in ***Appendix J*** summarizes fish and fish habitat conditions observed during Dillon's field investigations, including preliminary sensitivity rankings at each of the anticipated watercourse crossings based on both existing and recent field observations. All potential watercourse crossings along the proposed Waterdown Road Corridor in relation to the aquatic features are shown on ***Figure 4.4.*** The Waterdown Road Corridor has three (3) watercourse crossings. Overall, recent fish habitat characterization in each watercourse at, or near to, all of the proposed crossings sites are generally consistent with the descriptions and observations contained within the above-referenced supplemental documents.

Grindstone Creek – Northeast Branch (Crossing # 1)

The proposed Mid-Block Road alignment also crosses the Northeast Branch of Grindstone Creek in the south ditch line of Dundas Street (see ***Figure 4.4 and Exhibit 4-6***). The adjacent photograph was taken from the Dundas Street ditch looking downstream to where the proposed crossing is located. Similar to Crossing # 6, this creek conveys intermittent flows during the summer months, but may contain a warmwater fishery (both bait and sport fish) during active spring flow periods (as seen in the photograph). Habitat is best classified as mostly run morphology (when flowing) with moderate canopy cover and limited in-stream cover. The substrate was predominantly a mix of rock and cobble on top of a clay base. Fish were not seen during field investigations; however, the community has been well documented in previous literature. It should be noted that a permanent groundwater discharge area occurs <50 m downstream of this proposed culvert



Exhibit 4-6: Grindstone Creek Crossing South of Dundas Street

crossing site, which changes the stream classification to coldwater habitat south of the discharge point to the escarpment bluff.

Grindstone Creek – Southern Branch (Crossing # 2)

Currently, there are two culvert crossings, one main and one auxiliary crossing, along the Southern Branch of Grindstone Creek as it crosses Mountain Brow Road. It has been proposed (by others) that the capacity of these culverts will be amalgamated into one culvert crossing at the current location of the main culvert. The representative photograph (***Exhibit 4-7***) was taken from Mountain Brow Road looking upstream from the proposed crossing site. As seen in the photograph, this watercourse was essentially dry at the time of survey (exhibiting predominately swale conditions) but does convey overland flow during the spring months. This swale functions as drainage only and does not represent direct fish habitat. However, it is considered to potentially provide indirect fish habitat possibly contributing essential food items, nutrients, and organic matter to permanent fish habitat downstream in Grindstone Creek. The substrate was predominantly detritus and silt on a clay base. For a short distance downstream of Mountain Brow Road, the channel appears to branch out into a braided pattern, which conveys flows through the nearby Waterdown Escarpment Woods ESA to the edge of the escarpment bluff.



Exhibit 4-7: Grindstone Creek Tributary Crossing North of Mountain Brow Road

Grindstone Creek – Southern Branch (Crossing # 3)

There is a culvert crossing of a small tributary of the Southern Branch of Grindstone Creek on Waterdown Road (refer to **Exhibit 4-8**). This is a headwater area for the Southern Branch, which has intermittent flow and dries out seasonally immediately downstream of the culvert. The adjacent photo shows the watercourse downstream (east) of the culvert as it passes through a manicured landscape with sparse vegetative cover along the banks and minimal bottom substrates in the channel. Further downstream the watercourse has more of a defined channel classified as Type 3 direct fish habitat during active flow periods; although, barriers to fish migration (private driveway culverts) may prevent fish passage to these upstream reaches.



Exhibit 4-8: Grindstone Creek Tributary Crossing on Waterdown Road

4.4 Drainage

4.4.1 Data Collection

Background studies and information were collected and reviewed, and conditions associated with the road development were considered in the drainage analysis. Below is the list of documents reviewed:

<u>South Waterdown Subwatershed Study Stage 2 Report</u>

This report provides a management strategy for the South Waterdown development, reflecting opportunities and constraints to the development and providing a management guide for future land use changes within the South Waterdown lands. The recommended

stormwater management strategy was referred in the road drainage concept design.

Grindstone Creek Watershed Study, Halton Region Conservation Authority (HRCA), June 1998

In this study, the entire watershed was divided into four sections and regeneration plans for each area were prepared to promote the integrity and legacy of the creek. This includes the document: *Water Resources Support Study – Appendix 4*, Environmental Water Resources Group Ltd. (December 1997)

Grindstone Creek Subwatershed Study, Cosburn Patterson Wardman Ltd., January 1995

The subwatershed extends from Highway 403 in the south to Waterdown in the north and from the main Grindstone Creek Valley to the east of Waterdown Road, covering a 560 ha area. A Subwatershed Management Plan was recommended for the future development and considered into the road drainage analysis.

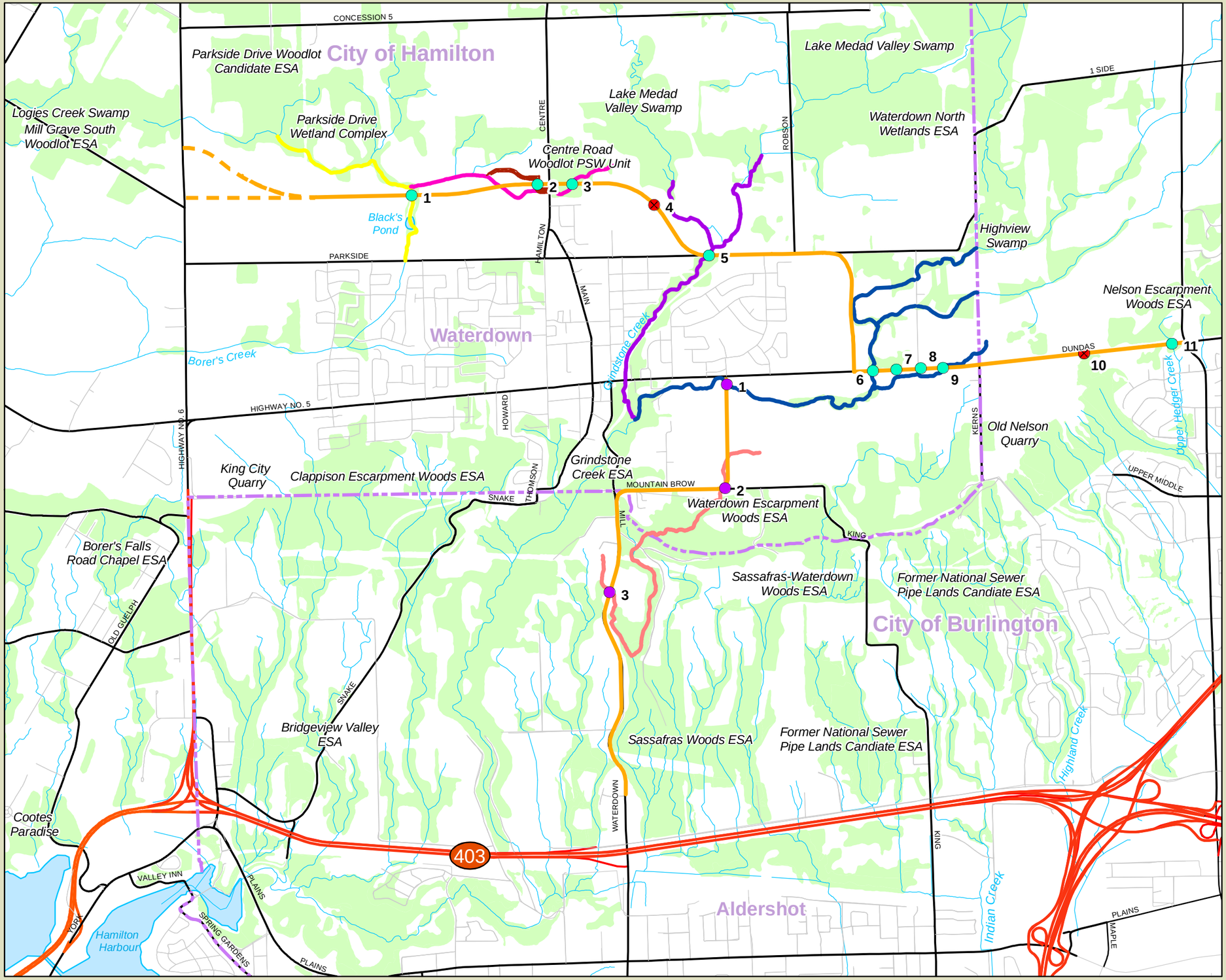
4.4.2 Hydraulic Assessment

The evaluation of hydraulic (i.e. flooding/backwater) conditions for the existing and proposed road crossing structures is summarized in Section 6.3.4 Stormwater Management and Hydraulics. Detailed hydraulic and hydrological modelling outputs are provided in **Appendix C**.

Road Drainage Area Characteristics

The section of Waterdown Road south of Craven Avenue is addressed by the Burlington/MTO Waterdown/Hwy 403 interchange improvement project for which construction was completed in 2011. The study area along the north-south corridor is within the Grindstone watershed under the jurisdiction of Conservation Halton (CH). Drainage features and water crossing locations within the study area are presented in ***Figure 4.5***.

Crossing W1 is a new structure associated with the new roadway to be constructed through the South Waterdown development land across a tributary of Grindstone Creek. Crossing W2 and W3 are existing structures which are to be replaced due to the road improvements.



Waterdown - Aldershot Trasportation Master Plan

Figure **4.4**: Aquatic Features

Legend

- 1 Waterdown Road Corridor Water Course Crossing
- 1 East - West Corridor Watercourse Crossing
- Drainage Conveyance
- Main Branch (Borer's Creek)
- Eastern Tributary (Borer's Creek)
- Northwest Branch (Grindstone Creek)
- Northeast Branch (Grindstone Creek)
- Southern Branch (Grindstone Creek)
- Preferred Alignment
- Route to be Determined
- Municipal Boundary
- Proposed Borer's Creek West Tributary Alignment
- Woodlot

Scale

0 0.5 1 Kilometers

Map Notes

Map Created By: PJK/SFG
Map Checked By: DR
Date Created: April 5, 2006
Date Modified: April 2, 2009
File Path: I:\GIS\089020 - Waterdown\Natural Environment Figures April 2009\Mapping\Figure 6 Aquatic Features.mxd

Base mapping provided by the City of Hamilton, the City of Burlington and the Region of Halton. Additional mapping provided by Halton Region Conservation Authority and the Ministry of Natural Resources.

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4.5 Geotechnical and Geo-Environmental Site Assessments

4.5.1 Geotechnical

A preliminary geotechnical investigation was conducted as part of this study. The primary objective of the study was to provide information concerning the composition of the soil and the bedrock depth along the study corridor for preliminary planning of the following aspects:

- road grades
- site grading and construction work
- design of the pavement structure
- foundations for structures that may be required
- constraints that may impact detailed design of the roadway.

In general, the land in this area is gently rolling. Topographic features to be considered include:

- The deep ravine on the east side of Waterdown Road south of Flatt Road
- The watercourse in the agricultural land on the west side of Waterdown Road, north of Flatt Road (tributary of the Grindstone Creek)
- The rock cut on Mountain Brow Road, east of the Waterdown Road intersection
- The watercourse north of Mountain Brow Road (Mid-Block)
- The Grindstone Creek Tributary wetland and Karst south of Dundas Street.

Published geological maps indicate that the overburden soil along the study corridor consists of Halton Till, a layered deposit of silty clay and clayey silt till. Bedrock along the Waterdown Road section is red shale of the Queenston Formation. Along Mountain Brow Road the bedrock consists of interbedded limestone, dolostone and sandstone of the Clinton and Cataract Groups. Lockport argillacious dolomite and shale is predominantly north of Mountain Brow Road.

The fieldwork consisted of nine boreholes and five rock probes. The subsurface stratigraphy revealed in all boreholes typically comprised topsoil or a flexible pavement structure (asphaltic concrete and Granular A type crushed limestone base/subbase), underlain by fill, and native silty clay or clay till. Bedrock was identified near the south limit of Waterdown Road and on Mountain Brow Road east of Waterdown Road. The groundwater conditions in the boreholes were closely observed during the course of the field work. Water was not observed in the boreholes during or at the completion of drilling.

The existing pavement structure revealed in the two boreholes drilled through the existing pavement structure on Waterdown Road and Mountain Brow Road is:

Location	Asphaltic Concrete Thickness (mm)	Granular Base Thickness (mm)
Borehole 5 Waterdown Road	125	675
Borehole 7 Mountain Brow Road	125	250

Future slope stability studies will be required in the design stage to delineate the stable top slope in areas south of Flatt Road that may be impacted by the new road facilities.

4.5.2 Geo-Environmental Assessment

A Geo-Environmental Assessment was conducted to evaluate the potential for soil/groundwater contaminants to exist on the site as well as to document present land uses. The assessment identified three potential sources of contamination (PSC) at the time of the assessment that could impact the proposed works, as follows:

PSC 1

The historical and existing use of portions of the site and surrounding lands for agricultural purposes, including the proposed Mid-Block Road alignment and the proposed section of Waterdown Road north of Flatt Road; indicates that there is the potential for contamination from pesticide and herbicide residues.

PSC 2

The potential for surface and/or subsurface soil/groundwater contamination from road runoff including metals, pH and organic compounds, and compounds such as salt deposited on the road.

PSC 3

The presence of a closed landfill site (Burlington Landfill) located on King Road, about 1.6 km east of Waterdown Road and 900 m south of Mountain Brow Road East.

Regarding PSC 1, the potential for pesticide and herbicides residues would be predominantly limited to areas of historic agricultural use, such as the proposed Mid-Block Road alignment, the proposed section of Waterdown Road north of Flatt Road and areas along the roadways that may have been sprayed for weed control. Based on our experience with similar projects however, elevated levels of pesticides and herbicides are not usually encountered above the applicable standards. In this regard, sampling and testing for pesticides/herbicides is not warranted for this Class EA.

Regarding PSC 2, the potential for contamination from metals, pH and salt has been assessed as part of the geo-environmental screening component of this project. No visual or olfactory (odour) evidence of contamination such as petroleum hydrocarbons (gas, diesel, oils) was noted in the samples obtained from the boreholes.

With regards to PSC 3, the Burlington Landfill is located in a downgradient direction relative to the road corridor. The landfill is separated from the road corridor by roadways and utility infrastructure which may act as hydrogeologic barriers/intercepts, and it is considered unlikely that they former landfill will impact the proposed works.

The results of chemical analyses indicate an exceedance in the levels of Electrical Conductivity (EC) and/or Sodium Adsorption Ration (SAR) in a number of areas. It is noted that EC and SAR are physical, non-health related parameters typically affecting vegetation and exceedances of these parameters are relevant to soils that must support plant growth. Elevated EC and SAR levels are usually an indication of salts within the soil, and may include de-icing salts. Where a site condition standard is exceeded solely because a substance has been used on a highway for purposes of keeping traffic safe under conditions of snow and ice, the applicable site condition standard is deemed not to be exceeded. Accordingly, the surplus site material can be reused on site and in locations where paved surfaces are to be constructed and continued de-icing salt application can be expected to occur for traffic safety. In this regard, the elevated levels of EC and SAR should not pose an environmental concern to the road widening and construction activities. A full copy of the Phase 1 Geo-Environmental Assessment Report can be found in ***Appendix G***.

4.6 Well and Groundwater Assessment

4.6.1 Introduction

The purpose of the hydrogeological component of the Class EA was to assess the potential impacts of the proposed road construction on the groundwater system and private groundwater users along the Waterdown Road Corridor. This assessment was based on published geological reports and maps, Ministry of Environment (MOE) computerized well record data base, and a field survey of private wells along the corridor.

The MOE records showed 21 historic wells located within a 100 m buffer zone along the road corridor. The computerized MOE records of these wells are provided in ***Appendix K***. A field survey was also completed of private wells along the preferred corridor within the 100 m buffer zone (***Figure 4.6***). During the field survey, only 2 wells were identified along the corridor. It is noted that municipal water service is available throughout the corridor along Waterdown Road and Mountain Brow Road.

4.6.2 Hydrogeology

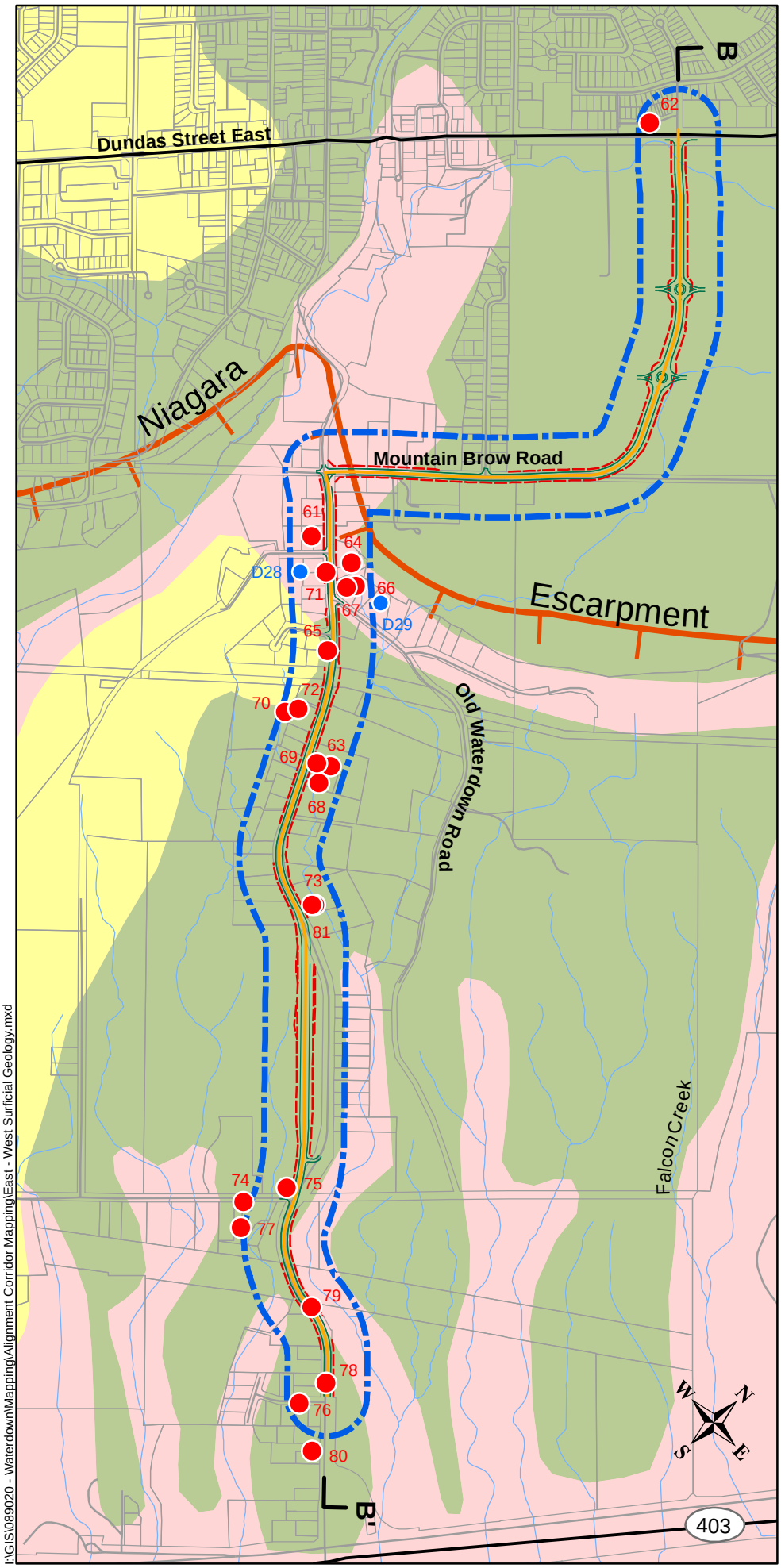
<u>Geological Setting</u>

The regional geology in the area around the Waterdown Road Corridor consists of glacial overburden overlying Paleozoic dolostone and shale bedrock, and has been described by Karrow (1987), Johnson et al (1992), and Ontario Geological Survey (1982, 1984). The information

from these reports was supplemented by geological logs in the MOE well records of private wells along the preferred corridor.

The Waterdown Road Corridor trends northwest-southeast, and lies above and below the Niagara Escarpment, which is the major physiographic and geological feature in the area. The Niagara Escarpment forms a cliff about 300 m high that trends northeast-southwest across the study area. Streams on the flat area above the Escarpment drain south-eastward off the Escarpment to Lake Ontario, the most prominent being Grindstone Creek.

Cross-Section B-B' in ***Figure 4.7*** was constructed using the MOE well records of the private wells, and illustrates elements of the geology and hydrogeology along the corridor, including surface topography, topography of the bedrock surface, overburden thickness and the approximate position of the water table. Cross-Section B-B' shows that the ground surface reflects the topography of the bedrock surface. Paleozoic bedrock formations are not differentiated.



Legend

- 81 — Private well, MOE well records
- D29 — Private well, Dillon field survey
- Preferred corridor
- Stream
- Niagara Escarpment
- B — Cross Section Line
- End of Pavement
- Property Boundary
- 100m Buffer Zone
- Parcels
- Halton Till
- Bedrock
- Glacial lake and outwash sand

Notes:

Geology based on Karrow (1987).
Private wells from MOE records summarized in Table 1.
Private wells from Dillon field survey summarized in Table 2.
MOE - Ministry of Environment

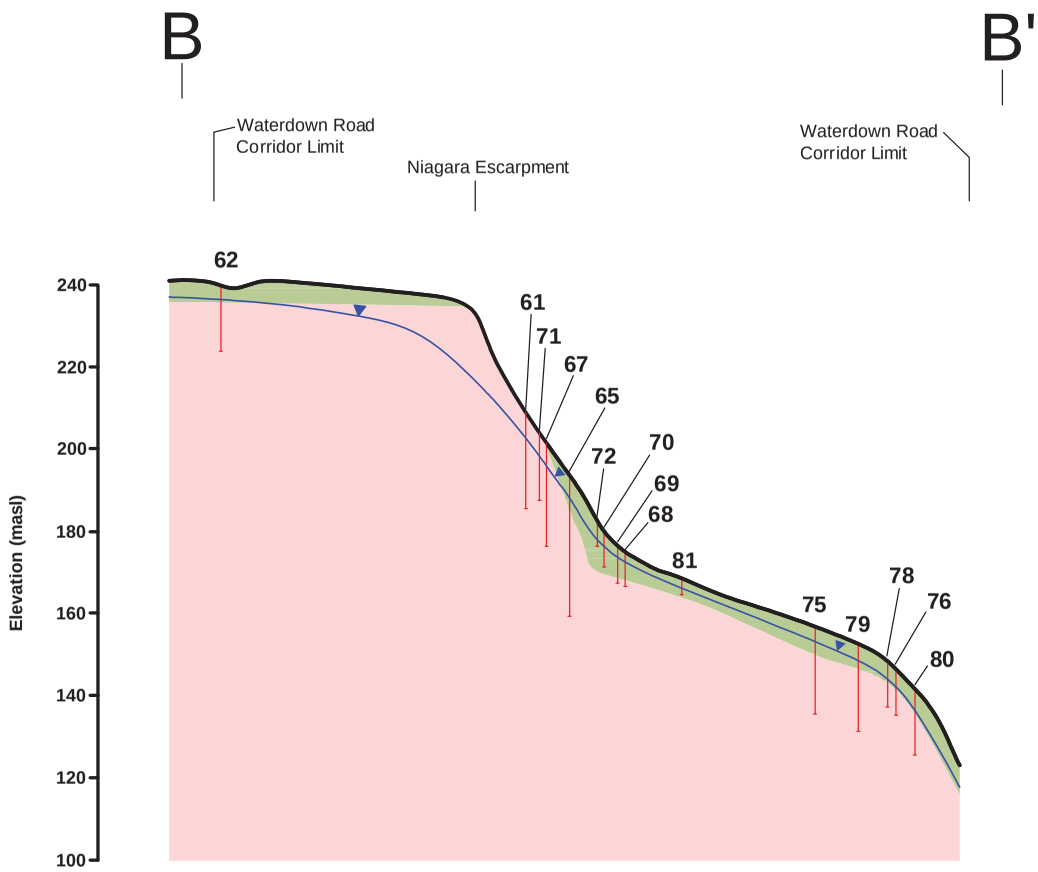
1:15,000

0 250 500 metres

Private Wells and Surficial Geology along the Waterdown Road Corridor

Figure 4.6

I:\GIS\089020 - WaterdownMapping\Alignment Corridor Mapping\East - West Surficial Geology.mxd



Legend

- Glacial lake and outwash sand
- Halton Till
- Bedrock (undifferentiated dolostones and shales)
- Water table (approximate)
- Private well

Notes:
Geological interpretation based on MOE well records (***Appendix A*** and ***Table 1***).
Surface topography based on NTS sheet 30 M/5, 1:50,000.
Cross-section line shown in ***Figure 2***.
Vertical exaggeration=25x.

Hamilton Public Works | City of Burlington | Halton Region

Waterdown Road
Class Environmental Assessment
Hwy 6 to Mountain Brow Road

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Figure 4.7:
Cross-section B-B'

FileName: G:\CAD\089020 Waterdown E-W Roads\Geotechnical\Well Depths (dwg)\well Depths-<30000.dwg Modified October 29, 2008

Bedrock

The Amabel Formation forms the caprock of the Niagara Escarpment in this area, and is an important regional aquifer in Southern Ontario. Underlying the Amabel is the Queenston Formation, which consists mainly of red shale. The Amabel Formation outcrops along the Escarpment, and Queenston Shale is exposed along streambeds below the Escarpment. The bedrock formations dip gently toward the southwest.

Overburden

The overburden in the study area consists of a regional till blanket (mainly Halton Till in this area) deposited by the advancing glacial ice, which is overlain by a deposit of fine-grained glacial lake sand, in areas west of Waterdown above the Escarpment, and west of the Waterdown Road corridor below the Escarpment. The Halton Till is a low-permeability clay-silt unit that extends as a sheet across much of the area, and is generally the basal overburden unit. The overburden thickness along the corridor ranges from 0 m to about 14 m.

Groundwater Flow

The depth to the water table along the corridor is estimated at about 1 m, based on the MOE records. Groundwater generally flows southward and discharges to Lake Ontario. The vertical component of groundwater flow is downward from the water table, through the till and into the underlying Amabel and Queenston Formations toward deeper zones in the bedrock.

Potential Impacts of Road Construction

Potential impacts on wells due to external factors generally fall into two categories: impacts on groundwater quality and impacts on groundwater quantity. Based on the available information it is considered unlikely that the proposed road construction will cause any significant impacts on private wells along the corridor. As noted previously all properties in the corridor are serviced by piped water.

Potential Impacts on Groundwater Quality

This project will involve a widening of the existing road allowance by a minimum of 3.3 m on each side. This proposed widening will reduce the setback from the widened road allowance to the existing wells on lots along the corridor. The reduced setback, combined with the increased traffic, could make some of the existing wells more susceptible to inflow of contaminants from surface sources, particularly road salt. However curb and gutters will be constructed as part of the improvements (over the majority of the road length) and migration of road runoff outside of the pavement area will not occur.

Alternatively, such contaminants could migrate downward from the water table to the well intakes in the bedrock due to the strong

downward hydraulic gradient that exists in the saturated zone. The risk of downward migration would be relatively low where the surficial material is low-permeability till. In the area near the brow of the Escarpment where the overburden is very thin or absent, the potential for downward migration would be greater due to the higher permeability of the bedrock. The potential for downward migration is mitigated by the fact that almost all the wells in the MOE well records are deep bedrock wells.

Potential Impact on Groundwater Quantity

Impacts on the groundwater quantity in wells, i.e. those involving a reduction in yield or an increase in drawdown, are typically caused by interference from another pumped well nearby. In this case, the proposed road construction along the preferred corridor will not have any foreseeable impacts on the local wells, because the construction activities will likely not involve any significant groundwater extraction.

Based on the above discussion, we present the following conclusions:

- The characterization of private wells along the preferred corridor was done using the Ministry of Environment (MOE) computerized well record data base, and also by a field survey of private wells along the corridor. This information was supplemented by government geological reports and maps.
- Based on the available information, we consider it unlikely that the proposed road construction or operation will cause any significant impacts on private wells along the corridor.

4.7 Socio-Economic Environment

Much of the existing community of Waterdown, as well as the Waterdown South development area fall under the jurisdiction of the Niagara Escarpment Commission. The area is guided by the Niagara Escarpment Plan, an environmental land use plan that looks to protect, conserve and promote sustainable development to ensure that the Niagara Escarpment will remain a natural environment for the future. In addition, the area is also guided by the Greenbelt Plan which serves to protect the agricultural land and ecological features of the area.

Generally, the Waterdown Road Corridor area is rural in character with a mix of residential properties, farms, and related businesses. Higher densities of residential use are located in the northern portion of the study area.

The predominant recreation feature in the area is the Bruce Trail which crosses Mountain Brow Road east of Flanders Drive at two locations (refer to ***Exhibit 4.9***). There is also an entrance to the Bruce Trail on Waterdown Road just south of Mountain Brow Road.



Exhibit 4-9: Bruce Trail Road Crossing Sign (Mountain Brow Road)

4.8 Existing Land Use

4.8.1 Residents and Community Recreation Features

The most southern section of the study area along Waterdown Road contains a combination of open land and related buildings, residential buildings, and community facilities. The Sassafras Woods dominate the entire eastern side of the road while the western side contains a mix of farms, residences, and woodlots. Residences are predominantly single-detached dwellings. Approximately fifteen houses have access onto Waterdown Road with an additional fifteen houses located on two residential streets, Craven Avenue and off of the main road. Two transmission towers are located close to the west side of Waterdown Road. A utility corridor transects the road in an east-west fashion. Approximately 150 m west of Waterdown Road on Flatt Road is the Woodview Children's Mental Health and Autism Services facility.



Exhibit 4-10: Open Field West of Waterdown Road at south End

The Sassafras Woods continue through to north of Flatt Road. Fifteen houses are located on the east side of Waterdown Road and one house on the west. Several of the residences are situated close to the road and several have additional buildings on their properties.

Agriculture land and woodlots are predominant throughout the western portion. The vacant lands to the west are part of a future residential subdivision (Eagle Heights development). The section north of these lands is characterized by a mix of residential properties, woodlots, ANSIs, and environmentally sensitive areas (ESA). Residences are located on either side of Waterdown Road. Eleven houses are located on the east side of the road. An additional two are situated close to the road but are accessed via Old Waterdown Road. Twenty houses are located on the west side of Waterdown Road. An additional four homes are accessed via Ireson Road and Horning Road; one of these properties is adjacent to Waterdown Road. Generally, the houses are larger and are situated on relatively large lots. Several of the houses are in close proximity to the existing road while others are set relatively far back and are accessed via long driveways. Many houses in this area are not associated with farm lands. A hydro corridor crosses Waterdown Road south of Ireson Road.



Exhibit 4-11: Intersection of Mountain Brow Road and Waterdown Road (looking east)

Waterdown Road ends with an intersection at Mountain Brow Road. The western portion of Mountain Brow Road contains a small dead-end residential street with five houses. The houses are relatively large and are set on larger-sized lots. Two of these properties are adjacent to Waterdown Road, one of which has an in-ground pool. Two houses are located on the east side of Waterdown Road; however, both are accessed via Mountain Brow Road. The house located on the north side of Mountain Brow Road has a tennis court set close to the existing road.

Mountain Brow Road runs east-west through the study area. It is comprised of residences, woodlots, agricultural land, ANSIs and ESAs. Many of the houses are large and are relatively close to the road, others

are accessible via long driveways off Mountain Brow Road. Five houses are located on the north side of the road. Two of these houses are in close proximity to the existing road. 357 Mountain Brow Road has a tennis court that is set close to the north side of the road. Four houses are located on the south side of the road; three of these houses are in close proximity to the existing road. The property at 348 Mountain Brow Road was recently rebuilt due to a fire.

Flanders Drive runs north from Mountain Brow Road and dead ends to the north. Two houses on either side of Flanders Drive border on Mountain Brow Road.

The Bruce Trail crosses Mountain Brow Road at the eastern part of this section. Entrances for the trail are located on the north and south side of the road. A Waterdown Trail connection is also located on the south-eastern side of Mountain Brow Road in this section.

The north section of the study areas is completely comprised of agricultural land to the north and woodlots, ANSIs, and ESAs to the south. These lands are all part of the Waterdown South subdivision.

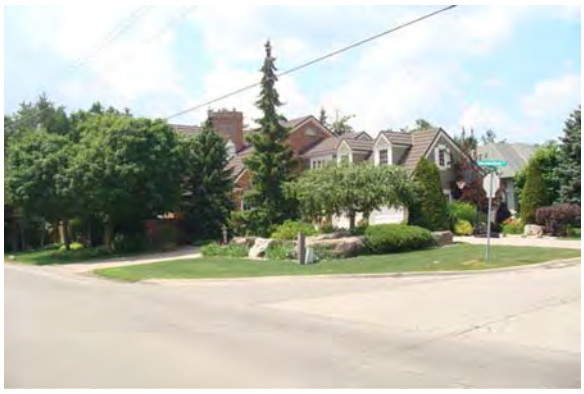


Exhibit 4-12 Mountain Brow Road at Flanders Intersection (looking north west)

4.8.2 Agriculture and Businesses

The east side of Waterdown Road is predominantly designated "Protected Countryside" under the Greenbelt Plan. As stated in the Greenbelt Plan "Protected Countryside lands are intended to enhance the spatial extent of agriculturally and environmentally protected lands currently covered by the NEC, while at the same time improving linkages between these areas and the surrounding major lake systems and watershed. The Protected Countryside is made up of an Agricultural System and a Natural System, together with a series of settlement areas."

There are no businesses or active agricultural operations in the immediate Waterdown Road corridor.

The Aldershot Landscape Contractors Limited and Burlington Tree Farms Limited properties are located in the south section on Flatt Road. With the exception of a small metal works business at the south end, no other commercial activities were identified.



Exhibit 4-13: Aldershot Landscape Contractors Limited (Flatt Road)

4.8.3 Archaeological Resources

A Stage 1 Archaeological Assessment was completed for the proposed corridor between Dundas Street and Mountain Brow Road, west of Waterdown Road, as well as the lands along both sides of Waterdown Road between Mountain Brow Road and Highway 403. The Stage 1 Archaeological Assessment included a review of archival material and a site reconnaissance. The full report is contained in ***Appendix H***. Based on the presence of attractive landscape features for prehistoric period habitation (e.g. access to navigable watercourses and potable water, as well as a number of registered prehistoric period archaeological sites in

the vicinity) the project area has elevated potential for undiscovered prehistoric period archaeological resources. Furthermore, archival research suggests elevated potential for historical period archaeological resources. Areas having elevated potential for undiscovered archaeological resources may require further archaeological assessment, depending upon the final project design.

The assessment of archaeological potential for the site considered both prehistoric and historic period resources. Archaeological potential modeling for prehistoric era sites is based largely on the identification of landscape features which are either known to have attracted past habitation or land use, or which appear to have potential for attracting human use. These features include: navigable rivers and lakes; confluences of watercourses; smaller sources of potable water; ridges or knolls overlooking areas of resource potential; outcrops of high-quality stone for tool making; and, most importantly, combinations of these features. In general it has been demonstrated that areas within 200-300 metres of watercourses, or other significant bodies of water (ASI, 1990; Cox, 1989), and in particular those areas with multiple water sources (Young et al., 1995), are considered to be of elevated archaeological potential.

Patterns of land use by historical Euro-Canadians to some extent mirror those of the prehistoric period. This is not surprising, since the same general needs must be met, i.e., proximity to potable water, access to natural resources, and a level, well drained habitation site. On the other hand, the Euro-Canadian conversion of both fertile and more marginal land for agricultural purposes, the development of non-water travel routes, the exploitation of different resources such as subsurface mineral deposits, and other differences in land use patterns make potential modeling of Euro-Canadian and other non-Aboriginal historic sites somewhat less reliable. Fortunately, these sites are more visible than their prehistoric counterparts, which helps offset this lower level of predictive reliability.

With well-drained soils, access to several watercourses, and a prominent vantage point at the Niagara Escarpment, the project area demonstrates many of the preferred landscape features associated with the presence of archaeological sites.

4.8.4 Built Heritage Resources and Cultural Lands

A Built Heritage Assessment was completed for lands along the Waterdown Road corridor. The assessment included a review of archival material and a windshield survey. A total of thirteen built heritage resources, including four designated buildings, were documented for the project area and confirmed through visual reconnaissance of the project route. Six built heritage resources are located within 25 metres of the proposed project, but all are avoidable through project design. The full report is contained in ***Appendix I***.



Exhibit 4-14: Built Heritage Resource along Waterdown Road

4.9 Infrastructure

4.9.1 Road Network

Waterdown Road

Waterdown Road is a major north-south arterial road providing service to the City of Burlington in Halton Region. Under the City of Burlington's jurisdiction, Waterdown Road supports a considerable volume of commuter traffic from the Waterdown community and is intended to provide access to Highway 403 and the Aldershot GO Transit station just south of Highway 403. The current posted speed limit along Waterdown Road is 60 km/h with some sections having advisory speed tabs of 40 and 50 km/h.

South of Craven Avenue, Waterdown Road has been reconstructed to a 4-lane facility as part of the City of Burlington/MTO Highway 403/Waterdown Road interchange project.

Intersections located in the vicinity of the Waterdown Road are described below:

1. **Craven Avenue**: This side road is under the jurisdiction of the City of Burlington. It connects with Waterdown Road on the west side only, forming a 'T' type intersection. The stop controlled intersection of Craven Avenue is outside of this project's study area; however, the proposed improvements at this intersection (and south to Highway 403) are crucial to maintain continuity through the facility.

2. **Flatt Road**: This stop-controlled road is under the jurisdiction of the City of Burlington and is located approximately 500 m north of Craven Avenue. It connects with Waterdown Road on the west side only. The existing road consists of one through lane in each direction. Flatt Road currently intersects Waterdown Road at a skew angle of approximately 73 degrees.

3. **Ireson Road**: This road is under the jurisdiction of the City of Burlington and is located approximately 1,500 m north of Flatt Road. It connects with Waterdown Road on the west side only, forming a 'T' type intersection. Ireson Road serves approximately 8 homes on the west side of Waterdown Road. The intersection is currently stop-controlled and consists of one through-lane in each direction.

4. **Old Waterdown Road**: This road is under the jurisdiction of the City of Burlington and is located approximately 100 m north of Ireson Road. It connects with Waterdown Road on the east side only, forming a 'T' type intersection. The intersection is currently stop-controlled and consists of one through lane in each direction. Old Waterdown Road currently intersects Waterdown Road at a skew angle of approximately 71 degrees.

5. **Horning Road**: This road is under the jurisdiction of the City of Burlington and is located approximately 200 m south of Mountain Brow Road. It connects with Waterdown Road on the west side only, forming a 'T' type intersection. The intersection is currently stop-controlled and consists of one through lane in each direction.

6. **Mountain Brow Road**: This road is under the jurisdiction of the City of Hamilton and is located just north of the municipal boundary between the city of Hamilton and the City of Burlington. The intersection is currently four-legged though it should be noted that the west leg of the intersection serves a small number of homes (approximately 8). At the north leg of the intersection, Waterdown Road turns into Mill Street (also under the jurisdiction of the City of Hamilton). The existing intersection is currently stop-controlled and consists of one through lane in all directions.

Mountain Brow Road

Mountain Brow Road is identified as an east-west arterial road in the City of Hamilton's Official Plan. The current posted speed limit along Mountain Brow Road is 50 km/hr. Aside from Waterdown Road/Mill Street (described above), only one other road (Flander's Drive) intersects Mountain Brow within the study limits.

1. **Flander's Drive**: This side road is under the jurisdiction of the City of Hamilton and is located approximately 400 m east of Waterdown Road. It connects with Mountain Brow Road on the north side only, forming a 'T' type intersection. Flanders Drive serves a community of approximately 45 homes. The existing intersection is currently stop-controlled in all directions and consists of one through lane in all directions.

4.9.2 Road Geometry

Waterdown Road

Waterdown Road currently has a posted speed limit of 60 km/h. The horizontal alignment of Waterdown Road, between Mountain Brow Road and Craven Avenue, is generally curvilinear with some tangent sections. Although the existing horizontal curves along this road are within the accepted geometric standards for a fully super-elevated section, speed advisory tabs (varying from 40 km/h to 50 km/h) have been installed at curve locations to alert drivers of the turning roadway.

The existing profile along Waterdown Road is characterized by its steep decline from Mountain Brow Road south towards Craven Avenue and beyond. Some segments of the profile descend at grades of approximately 7%, which is just outside the desired maximum grade of 6% for an arterial road with rolling topography. The existing crest and

sag vertical curves within the project limits were found to be within the accepted design standards for the currently posted speed.

For much of the study area, Waterdown Road has a rural two lane cross section with wide gravel shoulders and open ditches. From approximately 300 m south of Ireson Road to Mountain Brow Road, Waterdown Road consists of a two lane urban cross section with mountable curb and gutter and a storm sewer system. The existing width of asphalt on Waterdown Road is approximately 6.5 m on average and the existing width of shoulders is approximately 3.0 m.

Mountain Brow Road

Mountain Brow Road is currently posted at 50 km/h. This road is mostly tangential with minor horizontal alignment deflections at the approach to Waterdown Road. All existing deflections fall within the accepted geometric standards.

The prevalent profile features along this segment of Mountain Brow Road are the sharp crest vertical curve and steep 14% grade at the approach to Waterdown Road. Both the crest curve and the existing graded at this location are deficient for the posted speed of 50 km/h and improvements to this area should be undertaken.

Mountain Brow Road is currently a two lane rural cross section with narrow gravel shoulders and open ditches. The existing width of asphalt is approximately 6.75 m on average and the existing width of shoulders is approximately 1.0 m.

4.9.3 Traffic Signals and Illumination

There are currently no traffic signals located within the study limits on either Waterdown Road or Mountain Brow Road. The intersection of Waterdown/Mountain Brow operates as a stop-controlled intersection with vehicles on Mountain Brow Road yielding to vehicles on Waterdown Road. South of the project limits, as part of the City of Burlington/MTO interchange upgrade work, signals have been installed at the new Waterdown Road/North Service Road intersection.

Illumination along Waterdown Road is currently provided from the east side through luminaires mounted on hydro poles. Illumination along Mountain Brow Road between Waterdown Road and Flander's Drive is provided from the north side through luminaries mounted on hydro poles.

4.9.4 Right-of-Way

The existing right-of-way (ROW) width on Waterdown Road varies from approximately 20 m at some locations up to approximately 45 m in the section immediately north of Flatt Road. North of the future Eagle

Heights development lands up to Mountain Brow Road, the existing road allowance is generally 26 m. The minimum right-of-way requirement for Waterdown Road, as specified in the City of Burlington Official Plan is 30 m.

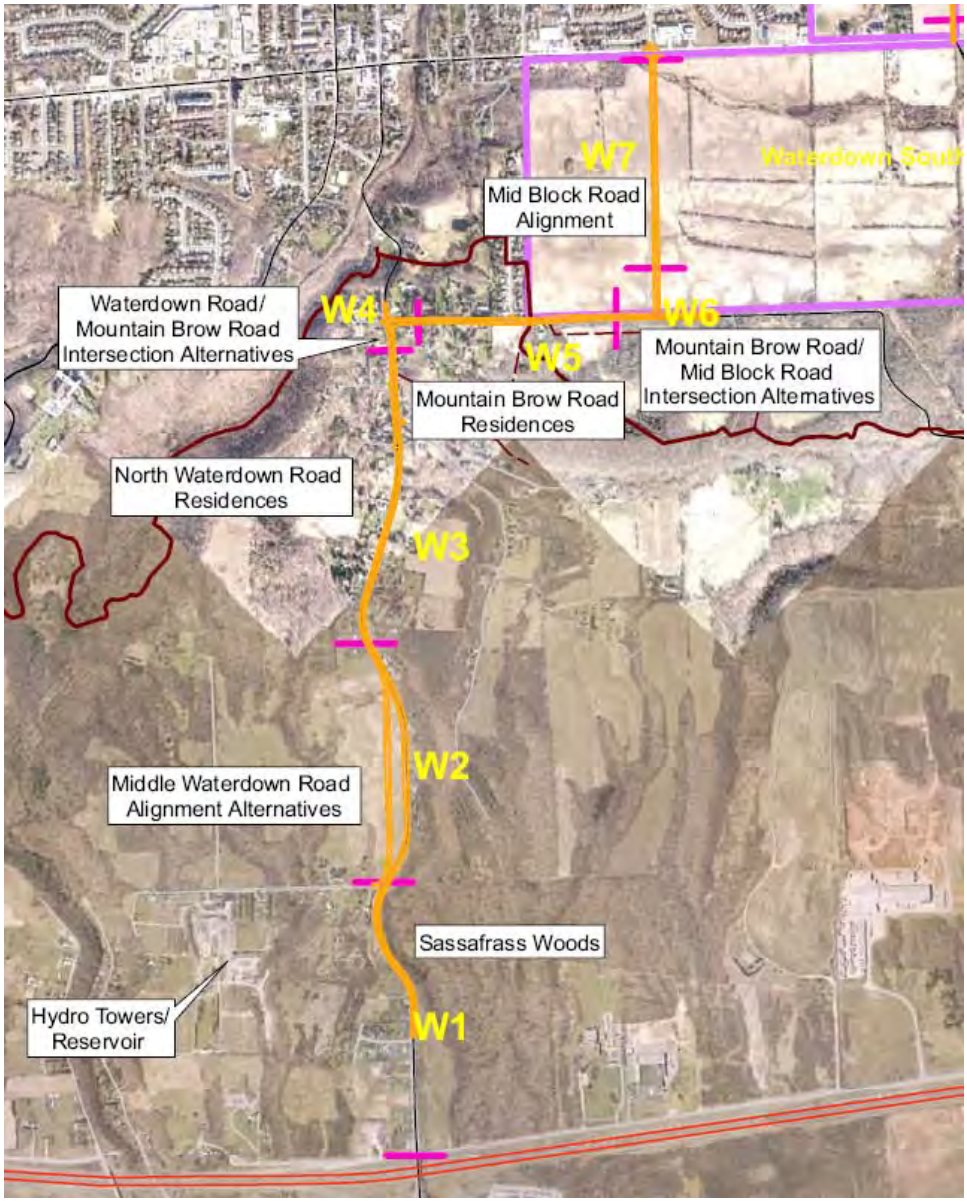
The existing right-of-way width on Mountain Brow Road is approximately 20 m throughout. The minimum right-of-way requirement identified for Mountain Brow Road in the City of Hamilton's Official Plan (Schedule C-2) is 30 m.

5. ALTERNATIVE DESIGN CONCEPTS FOR THE PREFERRED SOLUTION

5.1 Introduction

This section of the report discusses the design alternatives identified, developed, and evaluated during the study for the Waterdown Road, Mountain Brow Road, and Mid Block corridors. ***Figure 5.1***, below illustrates the analysis sections that were addressed (Sections W1 to W7).

Figure 5-1: Analysis Sections



Identified within each of the road sections are alignment alternatives and/or "issue areas". The alternative alignments were subject to an alternative evaluation process (outlined further within this section). In addition to the alignment alternatives, road cross section alternatives were considered. Depending on the road/road section, this included the consideration of: sidewalks, multiuse pathways, road medians, bike lanes (on or off road), landscaping, reduced lane widths, boulevard widths, etc.

The following outlines by road section, the various alignment alternatives that were evaluated and the issues identified and addressed along the Waterdown Road corridor. As noted previously, cross section alternatives were also considered.

Section W1 – Waterdown Southern Section

Due to the presence of steep slopes and the Sassafras Woods ESA on the east side and a hydro tower and reservoir on the west side., it was necessary to consider the use of retaining walls and shifting the roadway widening to the west side as much as possible.

Section W2 – Waterdown Mid Section

To straighten the horizontal alignment of the roadway, reduce the number of entrances and to reduce disturbance effects to residents on the east side of Waterdown Road, a new western alignment (through the proposed development lands) was considered and compared against improvements within the existing road corridor.

Section W3 – Waterdown Northern Section

In the northern section of Waterdown Road, due to the close proximity of several residences to the roadway, there exists the potential for displacement and disruption effects. Minimizing the potential for property impacts on both sides of the road was required.

Section W4 – Waterdown/Mountain Brow Intersection

Alternative intersection configurations were assessed that included the consideration of a roundabout and a conventional intersection at this location.

Section W5 – Mountain Brow Road

Residential properties and the steep terrain on both the north and south side of Mountain Brow Road provide challenges for the widening of the roadway. Alternative widening alignments and cross section treatments were developed and evaluated.

Section W6 - Mountain Brow Road/Mid-Block Road Intersection

Alternative intersection configurations were considered that included the consideration of a roundabout and a conventional intersection at this location.

Section W7 – Mid Block Road

The alignment of the mid-block roadway through the Waterdown South development lands needed to be confirmed in discussions with the Project Team for the Secondary Plan. Also requiring assessment were the intersection designs within the development and at Dundas Street. Key concerns that were considered included impacts to a watercourse at the south end, additional traffic volume/congestion on Dundas Street as a result of the new roadway and the potential for infiltration of traffic onto the existing residential area on the north side of Dundas Street (through Burke Street).

For the "issue areas", specific roadway designs/mitigation measures were developed to address the issues. Details of the Preferred Design and mitigation measures are presented in the next chapter.

5.2 Evaluation Methodology

The evaluation criteria developed during the Phase 2 work was the starting point for the evaluation. Input on the criteria was received from the both the New East-West Road Corridor and the Waterdown Road Corridor Neighbourhood Advisory Committees (NACs) and the public at Public Information Centres. The NAC members commented on the criteria and ranked their importance levels from high to low in order to assist in the evaluation (refer to Table 5.1 below). Where an importance level applied only to one of the corridors (i.e. the New East-West Road Corridor) this is noted in the table.

The basic criteria set was revised for each of the alternatives being evaluated as not all the criteria were necessarily applicable in each road section. Data was collected on the basis of the criteria and was considered in the evaluation of the alternatives. Both quantitative and qualitative data was collected. This evaluation methodology was developed for the Phase 3 assessments. Phase 2 evaluations utilized a numerical Simple Additive Weighting (SAW) methodology which converts net impacts of alternatives to a numeric base for comparison. It was felt that the alternatives to be evaluated in Phase 3 would require fewer considerations/criteria to differentiate among them. This was because the alternatives being considered in Phase 3 involve, for the most part, only slight differences as they are essentially located within a relatively narrow corridor (unlike the Phase 2 evaluations where the alternative road alignments passed through substantially different environments). As well it was thought that the criteria rankings using a scale of "high, medium and low" importance (and not weightings) would be sufficient for the purposes of the evaluation to differentiate among the alternatives considered during Phase 3.

The following report Sections (5.5 to 5.10) contain a description of the alternative design evaluations that were conducted in this Class EA.

Table 5-1: Evaluation Criteria and Indicators

Criteria Group	Criteria	Criteria Importance (NAC)	Criteria Importance Project Partners	Indicators
Social Environment	Potential for impact on residents	High	High	Number of residences displaced
				Amount of residential property removed (ha)
				Change in access to residential property
				Potential for change in air quality
				Potential for change in noise levels
				Potential for light pollution
				Potential for impact to wells and septic tanks
				Potential for traffic infiltration to existing residential areas and resulting effects
	Potential for community character impacts/ change in views	High	High	Opportunity to enhance character of community
				Potential for negative change to community character and views in the area
	Potential for impact on community/ recreation features	Medium	Medium	Removal of community/recreation property
				Disruption to use of community/recreation property
	Potential for effects on historical features	n/a	Medium	Potential for removal of heritage/archaeological features
Natural Environment	Potential for impact on terrestrial features	High-Medium	High-Medium	Amount, nature and significance of natural habitat removed
				Number of significant trees along existing roadway removed
				Potential for effects to adjacent habitat
				Fragmentation of natural areas
				Effect on terrestrial corridor connectivity / linkages
				Opportunity to enhance degraded natural areas (terrestrial and aquatic)

Criteria Group	Criteria	Criteria Importance (NAC)	Criteria Importance Project Partners	Indicators
	Potential for Impact on aquatic features	Medium (EW)[12]	Medium (EW)	Amount and quality of aquatic habitat altered/disturbed/removed
Economic Environment	Potential for impact on business enterprises	Medium (EW)	Medium (EW)	Area of commercial properties required (ha)
				Potential for change to property values
				Potential for change (disruption or enhancement) to business operations
	Potential for impact on residential property value	Medium	Medium	Potential for change to property values
	Potential for impact on future land use	Medium	Medium	Compatibility with future land use plans
	Potential for impact on agricultural land	Medium (EW)	Medium (EW)	Area of designated agricultural land removed (ha)
Cost	Capital Cost (million $)	Low[13]	Medium	Estimated capital cost (including land acquisition)
	Operation and Maintenance Cost (million $)	Low	Medium	Relative maintenance costs as reflected by road length and design features
Transportation	Change in traffic operations, delay and capacity	Low	Low	Potential to increase level of traffic service
				Ability to accommodate local and through traffic
	Potential for change to traffic and public safety levels	High	High	Potential to improve roadway operations, geometry and sightlines
	Opportunity to support transit use, pedestrians and cycling	Medium	Medium	Extent that alternative supports/promotes transit use, pedestrians and cycling

[12] Established for the New –East-West Road Corridor project only. No comparable importance was developed for the Waterdown Road project.
[13] This level of importance was re-considered at the final NAC Meeting on October 30, 2008.

5.3 W1 – Waterdown Southern Section

The roadway in this section has been shifted as far to the west as possible to minimize impacts to the Sassafras Woods that runs along the east side of the road. Limiting the ability to shift the road west is the existence of an underground water reservoir and hydro tower. The installation of a small retaining wall is recommended along the east side to limit the amount of grading encroachment into the woodlands. Keeping the road as far west as possible will result in the requirement to acquire one residential property on the west side.

5.4 W2 – Waterdown Mid-Section

The W2 section encompasses the section of Waterdown Road that curves to the east with residential uses (approximately 17 residences) on the east and an open (farmed) field to the west. The lands along the west side are part of the proposed Eagle Heights subdivision lands for which draft plan approval has been issued.

An initial evaluation was undertaken for two road alignment options in this area: one that follows the existing alignment (Option 1) and one that straightens out the alignment by going through the development lands (Option 2). This assessment was completed pending information from the developer of the lands. The conclusion was that Option 2, extending through the development lands, was the superior alternative due to less impacts to the existing residential lands and fewer private entrances. The preliminary evaluation was presented to the NAC and at PIC #2.

Additional input from the Eagle Heights landowner was subsequently incorporated into the evaluation and the two options were re-assessed. This information is presented in ***Table 5.2.*** The new input included the potential for significant impacts to the existing plan of subdivision and the consideration of the costs for property acquisition (approximately $4.0 million more that Option 1).

The conclusion of the re-assessment was that a modified Option 1 should be developed that shifts the road further away from the residences but does not involve severing lands off of the Eagle Heights subdivision. This will address the proximity effects to the residents, reduce the impacts to the future development and cost considerably less than Option 2.

The full details of the recommended treatment are provided in Section 6.0. The recommendation is to locate the future east edge of proposed east side sidewalk at the location of the existing east edge of road pavement. This will result in a much greater separation from the east side residences to the road and allows for the establishment of a landscaped buffer.

Table 5.2 - Waterdown Road (North of Flatt Road) Alternative Alignments Comparison Table

Criteria Group	Criteria	Criteria Importance (NAC)	Criteria Importance Proj. Partners	Indicators	Option 1 Existing Alignment	Option 2 New Western Alignment
Social Environment	Potential for impact on residents	High	High	Number of residences displaced	None	None
				Amount of residential property removed (ha)	No residential property removed. Proposed that the road can be entirely widened to the west side.	None
				Change in access to residential property	None affected	Access to Waterdown Rd would be via a new intersection. Residents would experience less difficulty in leaving their driveways due to less traffic volume on the existing roadway as it would become a collector road.
				Potential for change in air quality	Potential for increased air emissions to existing residents	Potential for improved air quality to residents along Waterdown Rd.
				Potential for change in noise levels	Potential for increased noise levels to existing residents	Potential for reduced noise levels to residents along Waterdown Rd.
				Potential for light pollution	Greater potential for effects from road lights	Less potential for effects from road lights
				Potential for impact to wells and septic tanks	No impacts expected	No impacts expected
				Potential for traffic infiltration to existing residential areas and resulting effects	None	None
	Potential for community character impacts/ change in views	High	High	Opportunity to enhance character of community	Streetscaping can mitigate some of the impacts of widened roadway.	Streetscaping of land between existing Waterdown Rd and new alignment (if not developed) could enhance character of the area.
				Potential for negative change to community character and views in the area	Rural nature of roadway will change.	Rural nature of affected section of Waterdown Rd will remain as is
	Potential for impact on community/recreation features	Medium	Medium	Removal of community/recreation property	None	None
				Disruption to use of community/recreation property	None	None
	Potential for effects on historical features	n/a	Medium	Potential for removal of heritage/archaeological features	No known features	No known features
Natural Environment	Potential for impact on terrestrial features	High-Medium	High-Medium	Amount, nature and significance of natural habitat removed	None	Small area of natural vegetation removed next to Waterdown Rd at north end of new alignment. Not considered to be significant
				Number of significant trees along existing roadway removed	Some potential for removal. Number of trees to be removed TBD	None
				Potential for effects to adjacent habitat	Minimal	Minimal
				Fragmentation of natural areas	NA	NA
				Effect on terrestrial corridor connectivity / linkages	None	None
				Opportunity to enhance degraded natural areas (terrestrial and aquatic)	NA	NA
	Potential for Impact on aquatic features	Low	Low	Amount and quality of aquatic habitat altered/disturbed/removed	None	Direct impacts to small swale west of existing road.

Table 5.2 - Waterdown Road (North of Flatt Road) Alternative Alignments Comparison Table

Criteria Group	Criteria	Criteria Importance (NAC)	Criteria Importance Proj. Partners	Indicators	Option 1 Existing Alignment	Option 2 New Western Alignment
Economic Environment	Potential for impact on business enterprises	Low	Low	Area of commercial properties required (ha)	None	None
				Potential for change to property values	None	None
				Potential for change (disruption or enhancement) to business operations	None	None
	Potential for impact on residential property value	Medium	Medium	Potential for change to property values	Greater potential for property value effects to residents along Waterdown Rd.	Potential for a positive effect on residential property values for properties along this section of Waterdown Rd as the properties would no longer front onto an arterial roadway
	Potential for impact on future land use	Medium	Medium	Compatibility with future land use plans	Consistent with land use plans. Approximately 0.25 ha will be required from the development lands.	Under the current draft plan of subdivision, this alignment would result in the loss of six planned residential lots that front onto Waterdown Rd. The alignment also runs through an area proposed for parkland although potential for these lands to also be considered for development. Approximately 2.29 ha will be required from the development lands. Option also results in approximately 0.98 ha of severed land between the new roadway corridor limits and the existing Waterdown road corridor limits.
	Potential for impact on agricultural land	Low	Low	Area of designated agricultural land removed (ha)	None	None
Cost	Capital Cost (million $)	Low	Medium	Estimated capital cost (including land acquisition)	Approximately $2,132,500.	Approximately $2,701,800.
	Operation and Maintenance Cost (million $)	Low	Medium	Relative maintenance costs as reflected by road length and design features	Lower, as only one road would need to be maintained	Higher due to the need to maintain two roads (existing Waterdown Rd as a collector road and the new alignment)
Transportation	Change in traffic operations, delay and capacity	Low	Low	Potential to increase level of traffic service	Lower due to 13 residences accessing directly onto to Waterdown Rd. Plan of subdivision for lands on west side show 5 additional residences accessing the roadway	Higher level of service as there would be no residential driveways accessing onto the roadway
				Ability to accommodate local and through traffic	No difference	No difference
	Potential for change to traffic and public safety levels	High	High	Potential to improve roadway operations, geometry and sightlines	Similar to existing roadway	Improved safety levels due to straightening of roadway and removal of direct residential access. Decrease traffic levels on the diverted section of Waterdown Rd.
	Opportunity to support transit use, pedestrians and cycling	Medium	Medium	Extent that alternative supports/promotes transit use, pedestrians and cycling	No difference	No difference
Status of Comparison **Additional assessment and evaluation to be carried out to select a preferred alternative.**						

5.5 W3 – Waterdown Northern Section

For this section of Waterdown Road (from the curve north of the future Eagle Heights subdivision to south of Mountain Brow Road) no alignment alternatives were identified. The design challenges involved minimizing the impacts to adjacent properties on both sides of the roadway recognizing the complicated terrain conditions throughout this section with relatively higher lands to the east and lower lands to the west. This required the consideration and development of a series of road and profile options leading to the current design which minimizes overall property impacts with an alignment essentially matching the existing centre-line of the road. Further details are contained in Section 6.

5.6 W4 – Waterdown/Mountain Brow Intersection

Two design alternatives were developed and assessed for this intersection; conventional intersection and roundabout. A conventional intersection was selected as preferred for the following reasons:

- Less impact on residential properties;
- Less trees removed;
- Similar cost and road capacity; and
- More supportive of pedestrians and cyclists.

Refer to ***Table 5.3*** for a summary of the evaluation.

Table 5.3 - Waterdown-Mountain Brow Intersection Alternatives - Comparison Table

Criteria Group	Criteria	Criteria Importance (NAC)	Criteria Importance Proj. Partners	Indicators	Option 1 Conventional Intersection	Option 2 Roundabout
Social Environment	Potential for impact on residents	High	High	Number of residences displaced	None	1 to 3 residences removed
				Amount of residential property removed (ha)	Less residential property removed	More residential property removed
				Change in access to residential property	No change	No change
				Potential for change in air quality	No difference expected	No difference expected (potential for minor benefit)
				Potential for change in noise levels	No difference expected	No difference expected (potential for minor benefit)
				Potential for light pollution	Some lighting effects to residence in SW corner expected.	None as closest residences would have been removed
				Potential for impact to wells and septic tanks	None expected	None expected
				Potential for traffic infiltration to existing residential areas and resulting effects	None	None
	Potential for community character impacts/ change in views	High	High	Opportunity to enhance character of community	Similar potential	Similar potential
				Potential for negative change to community character and views in the area	Similar potential for effects	Similar potential for effects
	Potential for impact on community/recreation features	Medium	Medium	Removal of community/recreation property	None	None
				Disruption to use of community/recreation property	None	None
	Potential for effects on historical features		Medium	Potential for removal of heritage/archaeological features	No known features	No known features
Natural Environment	Potential for impact on terrestrial features	High-Medium	High-Medium	Amount, nature and significance of natural habitat removed	None	None
				Number of significant trees along existing roadway removed	Fewer trees removed	Higher number of trees removed
				Potential for effects to adjacent habitat	No adjacent habitat	No adjacent habitat
				Fragmentation of natural areas	None	None
				Effect on terrestrial corridor connectivity / linkages	None	None
				Opportunity to enhance degraded natural areas (terrestrial and aquatic)	NA	NA
	Potential for Impact on aquatic features	Low	Low	Amount and quality of aquatic habitat altered/disturbed/removed	NA	NA
Economic Environment	Potential for impact on business	Low	Low	Area of commercial properties required (ha)	None	None
				Potential for change to property values	None	None

Criteria Group	Criteria	Criteria Importance (NAC)	Criteria Importance Proj. Partners	Indicators	Option 1 Conventional Intersection	Option 2 Roundabout
	enterprises			Potential for change (disruption or enhancement) to business operations	None	None
	Potential for impact on residential property value	Medium	Medium	Potential for change to property values	Similar potential for change	Similar potential for change
	Potential for impact on future land use	Medium	Medium	Compatibility with future land use plans	No development plans for lands in immediate vicinity	No development plans for lands in immediate vicinity
	Potential for impact on agricultural land	Low	Low	Area of designated agricultural land removed (ha)	None	None
Cost	Capital Cost (million $)	Low	Medium	Estimated capital cost (including land acquisition)	Both alignments are expected to result in similar cost	Both alignments are expected to result in similar cost
	Operation and Maintenance Cost (million $)	Low	Medium	Relative maintenance costs as reflected by road length and design features	Both alignments are expected to result in similar cost	Both alignments are expected to result in similar cost
Transportation	Change in traffic operations, delay and capacity	Low	Low	Potential to increase level of traffic service	Both options will provide an appropriate level of service	Both options will provide an appropriate level of service
				Ability to accommodate local and through traffic	Both options can accommodate local and through traffic	Both options can accommodate local and through traffic
	Potential for change to traffic and public safety levels	High	High	Potential to improve roadway operations, geometry and sightlines	Both options will improve roadway operations over existing conditions	Both options will improve roadway operations over existing conditions
	Opportunity to support transit use, pedestrians and cycling	Medium	Medium	Extent that alternative supports/promotes transit use, pedestrians and cycling	Supportive of pedestrians and cycling	Roundabouts are less supportive of pedestrians and cycling
Comparison Summary					**Preferred as will result in less effects on residents and residential property and can accommodate future traffic volumes**	

5.7 W5 – Mountain Brow Road Section

Various combinations of horizontal, vertical (profile) and cross section elements were considered for this road section. Of note is the section of road immediately west of the Mountain Brow Road/Waterdown Road intersection that has a road grade of 14% (to be replaced with an 8% road grade). An initial design was considered that widened the existing road with a standard cross-section consisting of 4 lanes, on-road bicycle allowance, and a boulevard and sidewalk on both sides. This resulted in significant grading encroachment onto numerous residential properties.

Considering input that was received through discussions with directly affected property owners and members of the N-S Neighbourhood Advisory Committee, a design for road improvement was developed. This included the following elements:

- Variable horizontal alignment that involves shifting the road centre-line to the south opposite Flanders Drive. West of this location (at Waterdown Road) the centre line is shifter slightly to the north and to the east the road is shifted to the north.
- Elimination of the south side sidewalk and boulevard
- Elimination of the on-road bicycle allowance (1. 2m in both directions)
- Elimination of the north side boulevard in constraint areas
- Introduction of a multi-use pathway along the north side
- Reduction of the standard lanes widths to 3.3 m

5.8 W6 - Mountain Brow Road/Mid-Block Intersection

It was determined that instead of using an intersection to connect these two roads, that the Mid-Block road would be curved to connect directly into Mountain Brow Road without an intersection. This configuration was selected to enhance traffic flow through this area.

5.9 W7 – Mid-Block Road Section

Three alignments were identified for the south end of the Mid-Block Road through the Waterdown South development;

- Straight through tangent alignment;
- Shift to the west to avoid the existing watercourse (Grindstone Creek Tributary); and
- Shift to the west with the introduction of a turning roadway connection into Mountain Brow Road.

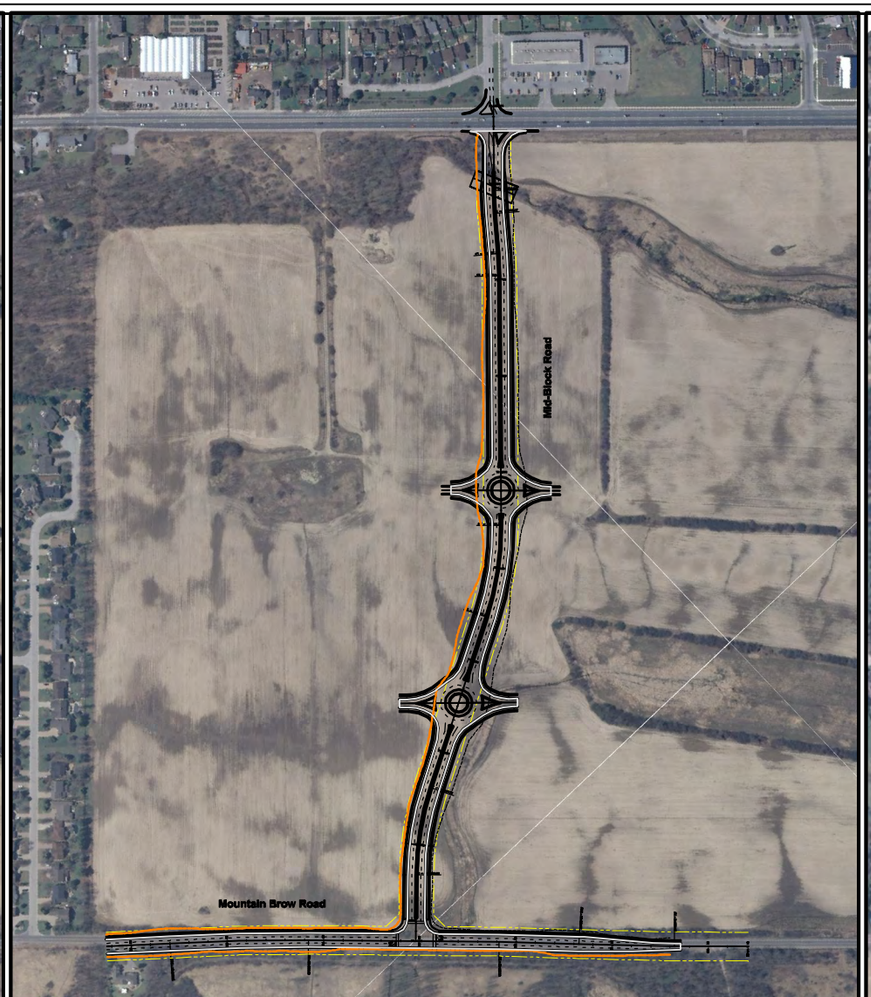
These alternatives are shown on ***Figure 5.2*** below and the assessment is summarized in ***Table 5.4.*** The turning roadway alternative with a shift to the west was selected and presented as the preferred alternative. This was presented for discussion at PIC #2.

Subsequent to PIC #2 considerable discussion with the design team for the Waterdown South development took place to refine the preferred alternative. Their work with Conservation Halton resulted in an acceptance of an alignment that impacted the drainage swale pending a permit from Conservation Halton. This eliminated the need to shift the road to the west at its south end. The details of the preferred plan for this road section are presented in Section 6.0.

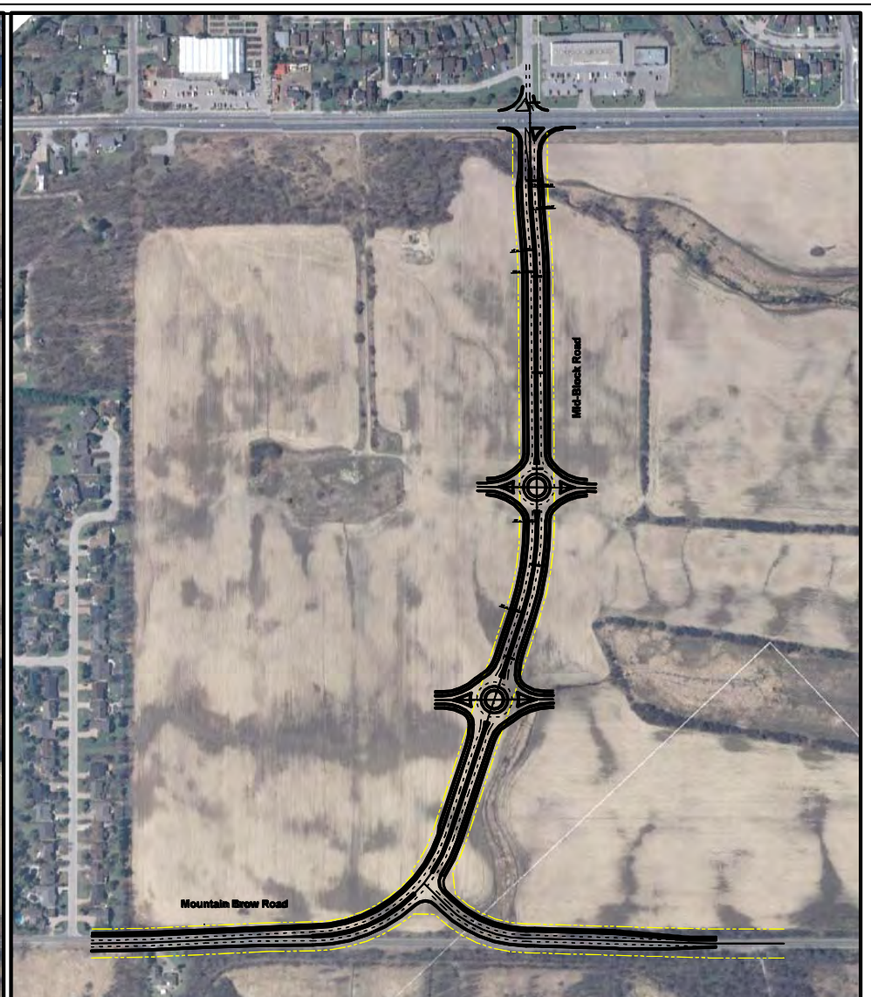
Figure 5.2 - Mid Block Road Section Alignment Alternatives



Alternative A (Tangent)



Alternative B (West shift at south end)



Alternative C (Curved roadway)

Table 5.4 – Mid Block Road Section Alternatives – Comparison Table

Criteria Group	Criteria	Indicators	Option A (Tangent)	Option B (West Shift)	Option C (Curved Roadway)
Social Environment	Potential for impact on residents	Number of residences displaced	None	None	None
		Amount of residential property removed (ha)	None	None	None
		Change in access to residential property	No Change	No Change	No Change
		Potential for change in air quality	No difference	No difference	No difference
		Potential for change in noise levels	No difference	No difference	No difference
		Potential for light pollution	No difference	No difference	No difference
		Potential for impact to wells and septic tanks	Future development will be serviced	Future development will be serviced	Future development will be serviced
		Potential for traffic infiltration to existing residential areas and resulting effects	No difference	No difference	No difference
	Potential for community character impacts/ change in views	Opportunity to enhance character of community	No difference	No difference	No difference
		Potential for negative change to community character and views in the area	No difference	No difference	No difference
	Potential for impact on community/ recreation features	Removal of community/recreation property	None	None	None
		Disruption to use of community/recreation property	None	None	None
	Potential for effects on historical features	Potential for removal of heritage/archaeological features	No difference	No difference	No difference
Natural Environment	Potential for impact on terrestrial features	Amount, nature and significance of natural habitat removed	All options cross Grindstone Creek at the north end and will result in the same loss of riparian habitat. The alignment crosses a small swale at the south end and would result in the loss of some riparian habitat.	All options cross Grindstone Creek at the north end and will result in the same loss of riparian habitat. This alignment is shifted to the west side of the swale and would result in less habitat being removed.	All options cross Grindstone Creek at the north end and will result in the same loss of riparian habitat. This alignment is shifted to the west side of the swale and would result in less habitat being removed.
		Number of significant trees along existing roadway removed	None	None	None
		Potential for effects to adjacent habitat	All options could disrupt adjacent habitat associated with the Grindstone Creek at the north end and the small swale at the south end.	All options could disrupt adjacent habitat associated with the Grindstone Creek at the north end and the small swale at the south end.	All options could disrupt adjacent habitat associated with the Grindstone Creek at the north end and the small swale at the south end.
		Fragmentation of natural areas	All options will result in the fragmentation of habitat from the crossing of the Grindstone Creek at the north end.	All options will result in the fragmentation of habitat from the crossing of the Grindstone Creek at the north end.	All options will result in the fragmentation of habitat from the crossing of the Grindstone Creek at the north end.
		Effect on terrestrial corridor connectivity / linkages	All options have the same impact on the Grindstone Creek crossing at the north end. Crossing of the swale at the south end will have impact on the movement of wildlife along the swale.	All options have the same impact on the Grindstone Creek crossing at the north end. Less impact on the swale at the south end with respect to wildlife movement linkages.	All options have the same impact on the Grindstone Creek crossing at the north end. Less impact on the swale at the south end with respect to wildlife movement linkages.

Criteria Group	Criteria	Indicators	Option A (Tangent)	Option B (West Shift)	Option C (Curved Roadway)
		Opportunity to enhance degraded natural areas (terrestrial and aquatic)	Similar for Grindstone Creek crossing. Less potential along swale at south end.	Potential in regards to improvement of habitat along the Grindstone Creek and the swale at the south end.	Potential in regards to improvement of habitat along the Grindstone Creek and the swale at the south end.
	Potential for Impact on aquatic features	Amount and quality of aquatic habitat altered/disturbed/removed	All options have the same impact on the Grindstone Creek crossing at the north end. Greatest impact on aquatic habitat for the swale at the south end.	All options have the same impact on the Grindstone Creek crossing at the north end. Less impact on aquatic habitat for the swale at the south end.	All options have the same impact on the Grindstone Creek crossing at the north end. Less impact on aquatic habitat for the swale at the south end.
Economic Environment	Potential for impact on business enterprises	Area of commercial properties required (ha)	None	None	None
		Potential for change to property values	No change	No change	No change
		Potential for change (disruption or enhancement) to business operations	None	None	None
	Potential for impact on residential property value	Potential for change to property values	No difference	No difference	No difference
	Potential for impact on future land use	Compatibility with future land use plans	All routes are compatible	All routes are compatible	All routes are compatible
	Potential for impact on agricultural land	Area of designated agricultural land removed (ha)	No land designated for agriculture is affected	No land designated for agriculture is affected	No land designated for agriculture is affected
Cost	Capital Cost (million $)	Estimated capital cost (including land acquisition)	Additional costs for storm sewer (approximately $200,000)	Less expensive	Less expensive
	Operation and Maintenance Cost (million $)	Relative maintenance costs as reflected by road length and design features	All routes expected to have similar cost	All routes expected to have similar cost	All routes expected to have similar cost
Transportation	Change in traffic operations, delay and capacity	Potential to increase level of traffic service	All routes will address traffic service level requirements. The T-intersection at Mountain Brow will provide a lower service level.	All routes will address traffic service level requirements. The T-intersection at Mountain Brow will provide a lower service level.	All routes will address traffic service level requirements. Replacing the T-intersection with a curved connection into Mountain Brow Rd will provide for a higher service level.
		Ability to accommodate local and through traffic	All routes can accommodate local and through traffic	All routes can accommodate local and through traffic	All routes can accommodate local and through traffic
	Potential for change to traffic and public safety levels	Potential to improve roadway operations, geometry and sightlines	NA	NA	NA
	Opportunity to support transit use, pedestrians and cycling	Extent that alternative supports/promotes transit use, pedestrians and cycling	No difference	No difference	No difference
Evaluation Result Summary		***For most of the criteria, there is little difference among these alignment options. Option C was selected as the preferred option as it results in less impact on the swale at the south end and the road curve into Mountain Brow Road will provide a high traffic service level.***			

5.10 Waterdown Road 4 Lane Treatment

Based on discussions and comments received on the Waterdown Road alternatives after PIC #2, the originally proposed design that included on-road bicycle lanes (Option A) was compared to a new design alternative that included an off-road multi-use pathway located on the west side of Waterdown Road (Option B). Option A was shown at PIC #2 and contained two on-road bicycle lanes. The Option B cross section is slightly narrower than the originally proposed cross section with Option A. Refer to ***Figures 5.3 and 5.4*** below for a depiction of the two alternatives.

Table 5.5 summarizes the assessment of these two options.

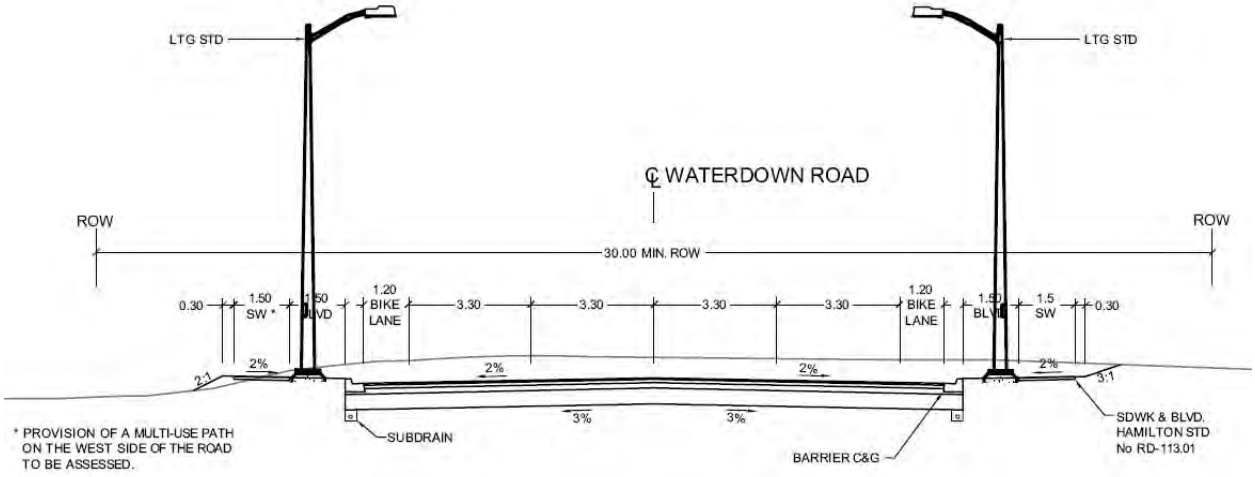
The originally proposed cross-section for Waterdown Road (Option A) had sidewalks on both sides of the road and a pavement width of 16.6 m. The alternative removes the on-road bicycle lanes resulting in a pavement width of 14.2 m.

Option A would result in slightly better access to Waterdown Road from residential properties as a result of the existence of a sidewalk and boulevard along the east side. This would allow a level platform for residents turning out onto Waterdown Road. With Option B the east side sidewalk is removed. Option A provides for a more forgiving design including separation of cyclists from pedestrians. On-road cycling lanes are typically preferred by commuting cyclists. Option A would be more conducive to truck use and the wider pavement better facilitates bus transit use of roadway. Sidewalks on both sides of the roadway allow better access to transit stops.

Option B will result in less change to the character of the area and is considered more consistent with the desired “Parkway” design. Option B will be approximately $2 million less expensive to construct.

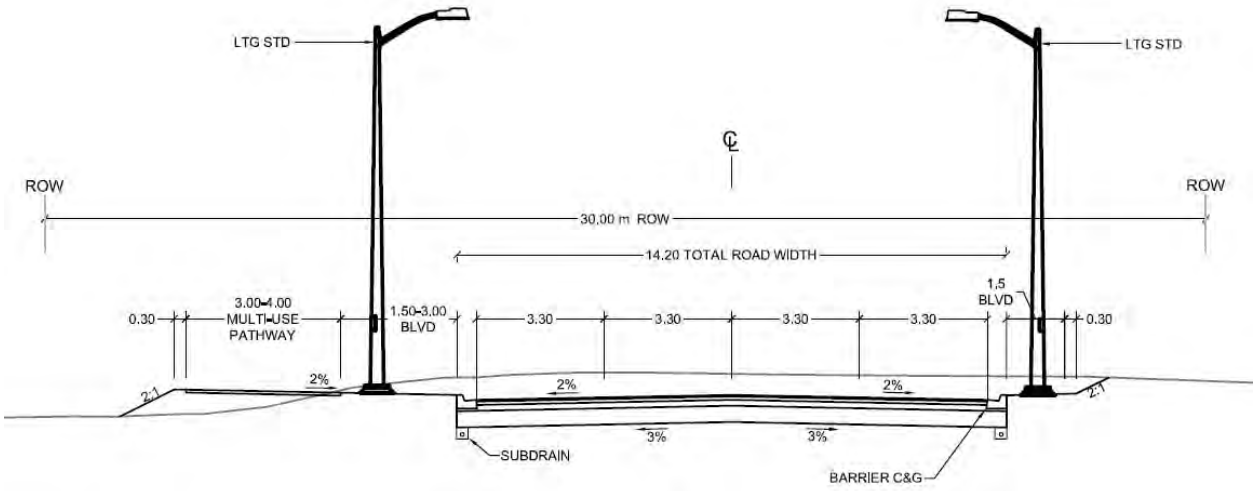
Overall Option B was selected as the preferred alternative for Waterdown Road.

Figure 5-3: Option A - Originally Proposed Waterdown Road Cross Section



Originally Proposed Waterdown Road Cross Section

Figure 5-4: Option B – Off-Road Multi-Use Pathway Design Cross Section (Recommended)



Recommended Waterdown Road Cross Section

Table 5-5: Waterdown Road 4-Lane Option Evaluation

Criteria Group	Criteria	Indicators	Option A (With On-Road Bicycle Lanes)	Option B (With West Side Multi-Use Pathway)
Social Environment	Potential for impact on residents	Number of residences displaced	2 or 3	2 or 3
		Amount of residential property removed (ha)	0.92 ha	0.90 ha
		Change in access to residential property	The sidewalk and boulevard on both sides of the road provides a level platform where vehicles can wait for a gap in traffic to enter the road. The 1.2m bicycle lane also provides a buffer to the traffic lanes.	Only vehicles on the west side of the road will have a level platform where they can wait for a gap in traffic. Vehicles on the east side will generally have steeper driveways compared with Option A because the edge of pavement is closer to their properties.
		Potential for change in air quality	No difference	No difference
		Potential for change in noise levels	No difference	No difference
		Potential for light pollution	No difference	No difference
		Potential for impact to wells and septic tanks	No impact expected	No impact expected
		Potential for traffic infiltration to existing residential areas and resulting effects	NA	NA
	Potential for community character impacts/ change in views	Opportunity to enhance character of community	Similar Potential	Similar Potential
		Potential for negative change to community character and views in the area	Greater impact due to wider road lanes	Less impact due to narrower road lanes. Off road pathway is more consistent with desired "Parkway Belt" character
	Potential for impact on community/ recreation features	Removal of community/recreation property	None	None
		Disruption to use of	None	None

Criteria Group	Criteria	Indicators	Option A (With On-Road Bicycle Lanes)	Option B (With West Side Multi-Use Pathway)
		community/recreation property		
	Potential for effects on historical features	Potential for removal of heritage/archaeological features	Similar Potential	Similar Potential
Natural Environment	Potential for impact on terrestrial features	Amount, nature and significance of natural habitat removed	Both options will result in a similar amount of habitat removed. Both options minimize effects on the Sassafras Terrestrial Community.	Both options will result in a similar amount of habitat removed. Both options minimize effects on the Sassafras Terrestrial Community.
		Number of significant trees along existing roadway removed	Both options will result in the loss of about 600 trees greater than 200mm, and about 750 in total.	Both options will result in the loss of about 600 trees greater than 200mm, and about 750 in total.
		Potential for effects to adjacent habitat	Some effects to adjacent habitat with widening of road	Some effects to adjacent habitat with widening of road
		Fragmentation of natural areas	Minimal fragmentation of natural areas as option includes widening of the pre-existing road only	Minimal fragmentation of natural areas as option includes widening of the pre-existing road only
		Effect on terrestrial corridor connectivity / linkages	Equal potential effect on terrestrial connectivity/linkages	Equal potential effect on terrestrial connectivity/linkages
		Opportunity to enhance degraded natural areas (terrestrial and aquatic)	Equal potential in regards to improving habitat along Waterdown	Equal potential in regards to improving habitat along Waterdown
	Potential for Impact on aquatic features	Amount and quality of aquatic habitat altered/disturbed/removed	Similar in both options.	Similar in both options.
Economic Environment	Potential for impact on business enterprises	Area of commercial properties required (ha)	None present	None present
		Potential for change to property values	Similar potential for change	Similar potential for change

Criteria Group	Criteria	Indicators	Option A (With On-Road Bicycle Lanes)	Option B (With West Side Multi-Use Pathway)
		Potential for change (disruption or enhancement) to business operations	None	None
	Potential for impact on residential property value	Potential for change to property values	No difference	No difference
	Potential for impact on future land use	Compatibility with future land use plans	0.26 ha will be required from the Eagle Heights development lands	0.25 ha will be required from the Eagle Heights development lands
	Potential for impact on agricultural land	Area of designated agricultural land removed (ha)	No land designated for agriculture is affected	No land designated for agriculture is affected
Cost	Capital Cost (million $)	Estimated capital cost (including land acquisition)	Approximately $12,879,000	Approximately $10,854,000
	Operation and Maintenance Cost (million $)	Relative maintenance costs as reflected by road length and design features	No Difference	No Difference
Transportation	Change in traffic operations, delay and capacity	Potential to increase level of traffic service	Both options will address traffic service level requirements	Both options will address traffic service level requirements. Some concern regarding use of narrower curb lanes by trucks.
		Ability to accommodate local and through traffic	All routes can accommodate local and through traffic	All routes can accommodate local and through traffic
	Potential for change to traffic and public safety levels	Potential to improve roadway operations, geometry and sightlines	The on-road bicycle lanes contribute to make this option a more forgiving design, in that the raised curb is not located directly adjacent to the narrow lanes. This option also separates pedestrian traffic from cyclists.	This option places the raised curbs adjacent to the narrow lanes, making the road less forgiving to minor driver errors and during winter driving conditions. Cyclists using the pathway need to pay special attention to the large number of driveways, as well as pedestrian and other users.
	Opportunity to support transit use, pedestrians and	Extent that alternative supports/promotes transit use, pedestrians and cycling	On-road bicycle lanes and sidewalks on both sides of the road encourage pedestrian and cycling use. Potential	A multi-use pathway on the west side only will force residents on the east side to cross the road in order to use that facility. Without a sidewalk on the east side,

Criteria Group	Criteria	Indicators	Option A (With On-Road Bicycle Lanes)	Option B (With West Side Multi-Use Pathway)
	cycling		transit stops along the route would be easier to access with sidewalks on both sides.	potential transit stops in the northbound direction could be problematic to access. Some concern regarding use of narrower curb lanes by trucks
Tradeoff Summary			Slightly better access to Waterdown Road from residential properties. Provides for a more forgiving design including separation of cyclists from pedestrians. On road cycling lanes typically preferred by commuting cyclists Wider road lanes better facilitates transit uses of roadway. Sidewalks on both sides of the roadway allow better access to transit stops.	Will result in less change to the character of the area – more consistent with desired "Parkway" design concept requested by Burlington Council. About $2 million less expensive

5.11 King Road Technical Feasibility Study

A King Road Technical Feasibility Study was carried out in parallel to the Waterdown Road Corridor Class Environmental Assessment as requested by Burlington Council (refer to Section 3.4, Selection of Preferred Solution, Page 3-8). The Waterdown Aldershot Transportation Master Plan noted that further assessment regarding the form of any King Road improvement would be needed to address the safety concerns identified by Burlington (as reference, the following text is provided from page 131 of the WATMP Report: *There are safety concerns associated with King Road in its current condition should it be subject to additional traffic use (which are likely as a result of the OPA #28 developments))* It was thought that there could be some level of improvement, below the major King Road realignments identified and studied in the 2008 Transportation Master Plan, that would result in acceptable impacts.

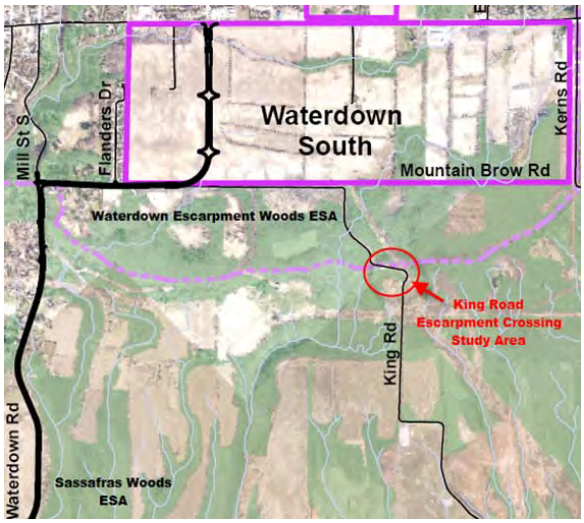


Exhibit 5-1: King Road Technical Feasibility Study Area

The King Road Technical Feasibility Study identified, assessed and evaluated a full range of improvement options for King Road through the escarpment area (refer to Exhibit 5-1). The improvement options were the following

1. Do-nothing
2. Close King Road
3. Improve road to a higher design standard
4. Improve road standard to a minimum standard
5. **Rehabilitate the existing road**
6. Reconfigure to a permanent one-way single lane road
7. Reconfigure to a two-way single lane

Rehabilitation of the existing road was the preferred alternative.

The improvement works required with the preferred alternative will address the deteriorating condition of the existing pavement and concrete barrier, incorporate additional safety treatments (barrier extension, improvement to sight lines), include mitigation measures to address potential impacts to the Jefferson salamander and slightly widen the road through at the existing pinch point. The overall new pavement width through the improved section of road will be 6.0 m, the same as the average existing pavement width. This type of work is considered a pre-approved project (Schedule A+) under the Municipal Engineers Association's Municipal Class Environmental Assessment document (i.e. *Reconstruction where the reconstructed road will be for the same purpose, use, capacity, and at the same location as the facility being reconstructed*). Additional mitigation measures will need to be incorporated into the preferred design to address specific concerns related to vegetation removal, rock construction methods, truck haulage and road barrier design. An Environmental Impact Statement (EIS) that addresses the environmental impacts of the proposed works and recommended mitigation measures will be required. This is to be prepared in consultation with the NEC and Conservation Halton.

6. PREFERRED DESIGN CONCEPT

6.1 Introduction

The preferred design concept identified for the various road segments in Section 5.4 was further refined to incorporate comments received from the Project Partners, review agencies, NAC, property developers and members of the public. This section describes the key elements of the recommended design, the potential environmental effects, including the natural and social environment, and the recommended mitigation measures. Preliminary design plan and profile drawings of the proposed roadway improvements are included at the end of this section; please refer to the following plates:

- Preferred Ultimate Design Concept: Waterdown Plates 1-16
- Preferred Interim Design Concept : Waterdown Plates 17-24
- Preferred Design Concept: Mountain Brow Plates 1-6
- Preferred Design Concept: Mid-Block Road Plates 1-6

Specific topics addressed include the following:

- recommended road design criteria and standards
- description of the horizontal and vertical alignments
- cross section elements
- drainage and stormwater elements
- structural elements
- utilities
- landscaping and streetscaping aspects
- geotechnical and soils/pavement design
- entrance treatments
- intersection treatments
- property requirements
- construction staging and phasing
- cost estimates
- requirements for follow-up work

WATERDOWN ROAD

To address the year 2021 road capacity demand requirements it is recommended that Waterdown Road be upgraded from a, essentially, a rural 2-lane cross section to an urban 4-lane cross section from north of Craven Avenue to Mountain Brow Road. Rural roads generally have shoulders and side ditches and no sidewalks while urban roads have curbs and gutters to handle road drainage and generally have sidewalks on both sides of the road. The recommended design accommodates a multi-use asphalt pathway on the west side of Waterdown Road and provides full illumination throughout. An auxiliary northbound left turn lane will be provided at Flatt Road in anticipation of the future Eagle Heights development. The intersection with Mountain Brow Road will be upgraded to include traffic signals.

In the interim this widened roadway can be operated as a 3-lane roadway for approximately 5 years before the 4-lane treatment will likely be required due to the additional anticipated traffic growth from new developments. The phasing aspects of the proposed design are further discussed in Section 6.3.13.

MOUNTAIN BROW ROAD

It is recommended that Mountain Brow Road be upgraded from a rural 2-lane section to an urban 4-lane section (with road curbs and gutters) from Waterdown Road to the new Mid-Block Arterial Road. The proposed design accommodates a multi-use asphalt pathway on the north side of the road and provides full illumination throughout. Immediately east of the new Mid-Block Road, Mountain Brow will be closed and re-routed north to connect with a new east-west collector road within the new Waterdown South sub-division. This will be determined/finalized through the Secondary Plan process.

MID-BLOCK ROAD

The recommendation from the WATMP study was that this main north south collector road through the west end of the development should be constructed as a 4-lane arterial roadway with appropriate arterial road standards and elements. The location of the Mid-Block Road was confirmed in this Class EA study. Additional assessments of this road have been undertaken during Phase 3 to finalize the preferred alignment, indicate the general arterial road design requirements and intersection layouts and to document commitments to mitigation measures and future work that will be addressed before or during the design phase. The actual final design, development of mitigation measures, permitting and approvals, and construction of the Mid-Block Road will be the responsibility of the developer.

The recommended design is to accommodate arterial road elements including dedicated on-road bicycle lanes, sidewalks on both sides of the road and full illumination throughout. Two roundabouts will be installed at the new arterial/collector intersections. New traffic signals will be installed at the intersection with the mid-block road and Dundas Street where the traffic islands will be designed to eliminate northbound through traffic into Burke Street. Implementation of the arterial road requirements is not part of this Class EA. This will be undertaken as part of the subdivision design, approval and construction process by the developer.

6.2 Design Criteria

Design Criteria (DCs) are formalized documents that specify the class of roadway to be provided, design elements, their dimensions and standards and property widths. The purpose of the DC is to summarize in one document the specific performance, dimensional and required components of the new road. These are discussed below for each of the three road sections in the Waterdown Road corridor.

WATERDOWN ROAD

Waterdown Road will be designed in accordance with City of Burlington Standards or (where necessary) the TAC Geometric Design Guide for Canadian Roads. The Design Criteria (DC) for Waterdown Road is summarized in ***Table 6-1*** below. The full DC document is found in ***Appendix L.***

Table 6-1: Waterdown Road Design Criteria

	PRESENT CONDITIONS	DESIGN [a] STANDARDS	PROPOSED[b] STANDARDS
ROADWAY CLASSIFICATION	RAU 70	UAU 60	UAU 60
MIN STOPPING SIGHT DIST	150 m	75 – 85 m	150 m
EQUIVALENT MIN 'K' FACTOR	± 30 (Crest) ± 8 (Sag)	10 - 13 (Crest) 15 - 18 (Sag - Headlight) 8 - 9 (Sag - Comfort)	30 (Crest) 28 (Sag)
GRADES MAXIMUM	7.0%	6% (c)	7.0% (d)
MINIMUM RADIUS	185 m	120 m (e)	190 m (f)
PAVEMENT WIDTH	3.5 m	3.5 m - 3.7 m	4 traffic lanes at 3.3 m (g)
BOULEVARD WIDTH	N/A	3.0 m	1.5 m - 4.0 m (h)
SIDEWALK	No Sidewalks	1.2m min.	4.0m (i)
MEDIAN WIDTH	No Median	N/A	No Median (j)
LANE WIDTHS (thru lane -TL) - right turn - left turn - left turn adjacent to median	No turning lanes	TL less 0.2 m TL less 0.2 m 3.0m min.	3.3 m 3.3 m 3.0 m
RIGHT TURN LANE - taper ratio or length - parallel length	N/A	14:1 – 17:1 40 – 90 m	50 m (k) 30 m (k)
LEFT TURN LANE - taper ratio or length - parallel length	N/A	15:1 – 42:1 50.4 – 62.2 m	100 m (l) 30 m (l)
R.O.W. WIDTH	20 m – 30 m	30 – 36 m	30 m (m)
POSTED SPEED	60 km/h	40 - 50 km/h	50 km/h (n)

Notes:

a) Design Standards are based on City of Burlington Standards or (where necessary) TAC Geometric Design Guide for Canadian Roads (1999 Edition).

b) The Proposed Standards meet or exceed City of Burlington Standards. The one exception is the proposed maximum grade, which City Standards stipulate should not exceed 5%. It is noted that the existing maximum grade on Waterdown Road is 7%. See note 'd' for more details.

c) Based on rolling topography for UAU DS 60 km/h roads. (Table 2.1.3.1 of TAC).

d) Matches existing grade south of Old Waterdown Road. The proposed 7% grade avoids impacts to an existing underground TransCanada pipeline and limits the amount of cut through this section of Waterdown Road, which is already below the surrounding ground elevation.

e) Based on maximum superelevation rate of 0.06 m/m. Minimum radius for reverse crown is 220 m. Minimum radius for normal crown is 1290 m (Table 2.1.2.4 of TAC).

f) Matching existing curve. Radius corresponds to a superelevation of 3%.

g) As part of a potential construction phasing approach, a three lane cross section can also be accommodated within the proposed asphalt width. Refer to note 'j' and typical sections.

h) A standard boulevard width of m is provided on the west side of the road. A 1.5 m minimum boulevard width is used in areas where property is constrained, and on most segments on the east side of the road. A 4 m boulevard is used on the east side of the road opposite the Eagle Heights development, in front of the existing residential development.

i) A 4m multi-use asphalt pathway is proposed throughout on the west side of the road. In areas of property constraint, the pathway width is reduced to 3.0 m. A 1.5 m wide east side sidewalk is proposed opposite the Eagle Heights Development. No additional west-side sidewalk is proposed in front of the existing residential development.

j) Phasing of construction to be assured by initially providing a 3-lane roadway on the 4-lane roadbed, as per City of Burlington request. Refer to typical sections for details.

k) Based on MTO Geometric Design Standards for Ontario Highways, Table E7-1.

l) Based on MTO Geometric Design Standards for Ontario Highways, Table E9-1.

m) Right-of-way width is based on City of Burlington Official Plan. Additional property may be required at some locations to account for grading lines, utility poles, illumination, etc.

n) A reduction in posted speed is recommended to meet roadside safety clear zone requirements associated with planted boulevards, utility poles and illumination.

MOUNTAIN BROW ROAD

Mountain Brow Road will be designed in accordance with City of Hamilton Standards or (where necessary) the TAC Geometric Design Guide for Canadian Roads. The Design Criteria (DC) for Mountain Brow Road is summarized in ***Table 6-2*** below. The full DC document is found in ***Appendix L***.

Table 6-2: Mountain Brow Road Design Criteria

	PRESENT CONDITIONS	DESIGN [(a)] STANDARDS	PROPOSED[(b)] STANDARDS
ROADWAY CLASSIFICATION	RCU 60	UAU 60	UAU 60
MIN STOPPING SIGHT DIST	5 3m	75 – 85 m	125 m
EQUIVALENT MIN 'K' FACTOR	± 3 (Crest) ± 5 (Sag)	10 - 13 (Crest) 15 - 18 (Sag - Headlight) 8 - 9 (Sag - Comfort)	20 (Crest) 8 (Sag)
GRADES MAXIMUM	14%	9% (c)	8% (d)
MINIMUM RADIUS	Tangent	120 m (e)	250 m
PAVEMENT WIDTH	3.35 m	3.5 m - 3.7 m	2 centre lanes at 3.3 m, 2 curb lanes at 3.5 m
BOULEVARD WIDTH	N/A	3.0 m	1.5 m (f)
SIDEWALK WIDTH	No Sidewalks	1.2 m Min	3.5 m (g)
MEDIAN WIDTH	No Median	N/A	No median
LANE WIDTHS (thru lane -TL) - right turn - left turn - left turn adjacent to median	N/A	TL less 0.2 m TL less 0.2 m 3.0 m min.	3.30 m 3.30 m 3.00 m
RIGHT TURN LANE - taper ratio or length - parallel length	N/A	14:1 – 17:1 40 – 90 m	50 m (h) 30 m (h)
LEFT TURN LANE - taper ratio or length - parallel length	N/A	15:1 – 42:1 50.4 – 62.2 m	100 m (i) 30 m (i)
R.O.W. WIDTH	20m	30 – 36 m	3 0m (j)
POSTED SPEED	50 km/h	40 - 50 km/h	50 km/h (k)

Notes:

a) Design Standards are based on City of Hamilton standards or (where necessary) TAC Geometric Design Guide for Canadian Roads (1999 Edition).

b) The Proposed Standards meet or exceed City of Hamilton Standards for roads with a design speed of 60km/hr. The one exception is the proposed maximum grade, which City Standards stipulate should not exceed 5%. It is noted that the existing maximum grade on Mountain Brow Road is 14%. See note 'd' for more details.

c) Based on mountainous topography for UAU DS 60 km/h roads. (Table 2.1.3.1 of TAC).

d) An 8% grade (for approximately 50m) is proposed just east of the approach to Waterdown Road. Existing grade at this location is approximately 14%. Proposed grade will reduce the cut/fill limit of grading.

e) Based on maximum superelevation rate of 0.06 m/m. Minimum radius for reverse crown is 22 0m. Minimum radius for normal crown is 1290 m (Table 2.1.2.4 of TAC).

f) A 1.5m boulevard is proposed on the north side of the road, east of Flanders Drive. Due to property constraints, no boulevard is proposed west of Flanders Drive. The south side of Mountain Brow Road will also have a 1.5 m wide boulevard throughout.

g) A 3.5 m wide multi-use asphalt pathway is proposed on the north side only.

h) Based on MTO Geometric Design Standards for Ontario Highways, Table E7-1.

i) Based on MTO Geometric Design Standards for Ontario Highways, Table E9-1.

j) City of Hamilton Geometric Design Elements for Minor and Major Arterials specifies a right-of-way width of 30 m – 36 m. Additional property may be required at some locations to account for grading lines, utility poles, illumination, etc.

k) It is recommended to maintain the existing posted speed of 50 km/h in order to meet roadside safety clear zone requirements associated with planted boulevards, utility poles and illumination.

MID-BLOCK ROAD

The new Arterial Mid-block Road will be designed in accordance with City of Hamilton Standards or (where necessary) the Transportation Association of Canada's (TAC) Geometric Design Guide for Canadian Roads. The Design Criteria (DC) for Mid-Block Road is summarized in ***Table 6-3*** below. The full DC document is found in ***Appendix L***.

Table 6-3: Mid-Block Road Design Criteria

	PRESENT CONDITIONS	DESIGN [(a)] STANDARDS	PROPOSED[(b)] STANDARDS
ROADWAY CLASSIFICATION	N/A	UAU 60	UAU 60
MIN STOPPING SIGHT DIST	N/A	75 – 85 m	135 m
EQUIVALENT MIN 'K' FACTOR	N/A	10 - 13 (Crest) 15 - 18 (Sag - Headlight) 8 - 9 (Sag - Comfort)	20 (Crest) 8 (Sag)
GRADES MAXIMUM	N/A	6% (c)	3.5%
MINIMUM RADIUS	N/A	120 m (d)	160 m
PAVEMENT WIDTH	N/A	3.5 m - 3.7 m	2 centre lanes at 3.5 m, 2 curb lanes at 3.65 m, 1.5 m bicycle lanes (e)
BOULEVARD WIDTH	N/A	3.0 m	5.0 m (f)
SIDEWALK WIDTH	N/A	1.2 m Min	2.0 m (g)
	N/A	N/A	No Median

	PRESENT CONDITIONS	DESIGN [a] STANDARDS	PROPOSED[b] STANDARDS
MEDIAN WIDTH			
LANE WIDTHS (thru lane -TL) - right turn - left turn - left turn adjacent to median	N/A	TL less 0.2 m TL less 0.2 m 3.0 m min.	3.50 m 3.50 m 3.25 m
RIGHT TURN LANE - taper ratio or length - parallel length	N/A	14:1 – 17:1 40 – 90 m	50 m (h) 30 m (h)
LEFT TURN LANE - taper ratio or length - parallel length	N/A	15:1 – 42:1 50.4 – 62.2 m	100 m (i) 30 m (i)
R.O.W. WIDTH	N/A	30 – 36 m	36 m (j)
POSTED SPEED	N/A	40 -50 km/h	50 km/h (k)

Notes:

a) Design Standards are based on City of Hamilton Standards or (where necessary) TAC Geometric Design Guide for Canadian Roads (1999 Edition).

b) The Proposed Standards meet or exceed City of Hamilton Standards.

c) Based on rolling topography for UAU DS 60 km/h roads. (Table 2.1.3.1 of TAC).

d) Based on maximum superelevation rate of 0.06 m/m. Minimum radius for reverse crown is 220 m. Minimum radius for normal crown is 1290 m (Table 2.1.2.4 of TAC).

e) 1.5 m bicycle lanes are proposed on both sides of the road from Dundas Street to the southern roundabout.

f) A 5 m boulevard will result in the sidewalks being approximately 1m from the ultimate property line.

g) Sidewalk proposed on both sides of the road from Dundas Street to the southern roundabout.

h) Based on MTO Geometric Design Standards for Ontario Highways, Table E7-1.

i) Based on MTO Geometric Design Standards for Ontario Highways, Table E9-1.

j) City of Hamilton Geometric Design Elements for Minor and Major Arterials specifies a right-of-way width of 30 m – 36 m. As this is a new development, it is recommended to protect for 36 m right-of-way.

k) A posted speed of 50 km/h is recommended in order to meet roadside safety clear zone requirements associated with planted boulevards, utility poles and illumination.

l) Traffic islands have been introduced at the intersection of the Mid-Block Road and Dundas Street to prevent northbound traffic from travelling past the intersection. Northbound traffic will be forced to turn east or west at Dundas Street.

6.3 Recommended Plan

6.3.1 Horizontal Alignment

WATERDOWN ROAD

Due to the mostly residential land use on both sides of the road, it is recommended that the existing right-of-way corridor for Waterdown Road be utilized as much as possible. The proposed horizontal alignment for this road deviates from the existing centreline at a number of locations in order to minimize impacts to adjacent properties.

As a result of the proposed asymmetrical cross section (multi-use path on the west side only), the road centre line has been shifted to the east through the majority of the roadway in order to accommodate the west side multi-use pathway and boulevard. One exception is in the vicinity of the Eagle Heights development, (that runs along the west side of Waterdown Road) where the road centreline has been shifted west to create a greater degree of separation from the roadway for the existing residents on the east side of the roadway.

At the south limit of the project, the proposed work will tie into the improvements constructed at the Highway 403/Waterdown Road interchange, which included the 4-laning of Waterdown Road up to the Craven Avenue intersection. It is proposed to carry the 4-lane configuration north to Mountain Brow Road, at which point the northbound (NB) right lane will exit onto Mountain Brow Road and the centre NB lane will continue onto Mill Street as a 2-lane road.

Within the project limits, Waterdown Road is intersected by Flatt Road, Ireson Road, Old Waterdown Road, and Horning Road. All of the above "T" – type intersections with Waterdown Road will remain stop controlled, as currently exists.

It is proposed that a portion of Flatt Road at the tie-in to Waterdown Road be realigned to provide improved sight lines for vehicles turning onto Waterdown Road. In its present condition, the angle of intersection at this location is 72.5 degrees. The proposed realignment will make the intersection angle 90 degrees, which is more desirable in light of the proposed development in this area. Refer to the Waterdown-2 Plate of the Ultimate Design Concept at the end of this chapter for a layout of this intersection.

Adjacent to the deep ravine on the east side south of Flatt Road (Sassafras Woods) the alignment has been shifted as far to the west as was practical, consistent with the design criteria. Constraints to further shifts include the existing water reservoir, hydro tower, sub-station and private residences along the west side. Based on future slope stability studies to be carried out in detailed design, the need to address shifting the alignment further may be identified. If this is the case such an alignment shift should be carried out by reducing the new road's footprint by narrowing the west-side multi-use pathway, boulevard, and, perhaps, pavement widths. This will allow the road to be shifted

slightly while maintaining the west side grading limit and identified property line.

While it is noted that the intersection with Old Waterdown Road is also skewed (approximately 71 degrees), realigning this road would result in significant impacts to the residence located at the south-east quadrant. In addition, realigning the road further south would place the new intersection throat opposite to the residential driveway at # 1890 Waterdown Road which is not an ideal intersection configuration. Given that the existing skew is still within the accepted standard (70-90 degrees) and the relatively low traffic volumes using Old Waterdown Road, it is not considered practical to realign the road at this time.

MOUNTAIN BROW ROAD

The area of Mountain Brow Road is severely constrained by homes in close proximity to both sides of the road, as well as natural features including very mature trees in close proximity to the road. The horizontal alignment for Mountain Brow Road has been carefully designed to mitigate impacts on adjacent properties west of Flanders Drive, as well as impacts to environmental features east of Flanders Drive.

At Flanders Drive, the proposed alignment has been shifted to the south in order to save several rows of mature pine trees on the north side (west of Flanders Drive) and to create a greater degree of separation from the residents on Flanders Drive at the intersection. At this location, the proposed north edge of pavement will be shifted approximately 3.5m south from its current location.

East of the intersection, Mountain Brow Road has been shifted north (maintaining the south edge of pavement location) so that all of the proposed widening occurs on the north side of the road. This centreline shift protects the wooded area on the south side of Mountain Brow. It is noted that this area has been identified as potential habitat for Jefferson salamander by Conservation Halton.

At the approach to the new Mid-Block Arterial Road, it is proposed to introduce a 160 m radius curve that will facilitate the traffic flow for vehicles wanting to access the Waterdown South development lands and Dundas Street. As a result, Mountain Brow Road, immediately east of the new Mid-Block Road will be closed and re-routed through the southern portion of the new Waterdown South subdivision to a new east-west collector road. This will introduce a small component of out-of-the-way travel for road users wishing to continue westbound on Mountain Brow Road as they will be forced to use subdivision roads to complete their trip. This was considered to be a minor impact as the current through traffic volumes along Mountain Brow Road from King Road are very low and the length of out-of-the-way travel will be short. Please refer to the Mountain Brow plates for a layout of this configuration.

MID-BLOCK ROAD

As described above, the new Mid-Block Road will be connected to Mountain Brow via a new 160m curve that will facilitate traffic flow between Dundas Street and Mountain Brow Road. North of this curve, the horizontal alignment for the Mid-Block is mostly tangential. Two roundabouts are proposed at the future intersections with collector roads.

6.3.2 Vertical Alignment

WATERDOWN ROAD

The relatively steep nature of the existing road and the adjacent residential land use makes it challenging to introduce major changes to the existing profile. Nonetheless, modifications to the vertical alignment have been undertaken at various locations to mitigate grading impacts on adjacent properties. It is not anticipated that major modifications to existing driveways will be required as a result of the proposed profile. Two exceptions are noted and further discussed in Section 6.2.12 of this report. Refer to the Ultimate Design Concept Plates 9-16 at the end of this chapter for a layout of the proposed profile.

MOUNTAIN BROW ROAD

It is proposed to reconstruct the steep approach to Waterdown Road (currently about a 14% grade) to an 8% grade. This modification will be accompanied with a flattening out of the existing sharp crest vertical curve near station 60+140. Other minor modifications are recommended throughout the Mountain Brow Road profile to provide a more even driving surface. It is not anticipated that major modifications to existing driveways will be required as a result of the proposed profile. Refer to the Preferred Design Concept: Mountain Brow Plates 4-6 at the end of this chapter for a layout of the proposed profile.

MID-BLOCK ROAD

The proposed profile for the Mid-Block Road has been developed in coordination with the Waterdown South development and with regard for several physical constraints. At the approach to Dundas Street, the profile elevation is constrained by the need to tie into Dundas Street, as well as by the Grindstone Creek Tributary crossing. For these reasons, the road elevation quickly rises immediately south of Dundas Street. Refer to the Preferred Design Concept: Mid-Block Plates 4-6 at the end of this chapter for a layout of the proposed profile.

6.3.3 Recommended Road Elements and Typical Sections

WATERDOWN ROAD

The basic roadway cross section for Waterdown Road consists of two 3.3 m lanes in each direction (4 lanes total). Curb and gutter will be provided throughout, as is a west side multi-use asphalt pathway. The proposed pathway width is 4 m; however, in areas of property

constraint, the pathway has been reduced to 3m. Similarly, the proposed west boulevard is 3 m, but this has been reduced to 1.5 m in areas of property constraint. A localized east side sidewalk is provided for the section north of Flatt Road, opposite the Eagle Heights development area to service area residents. At this location, it is proposed to include a 4m wide boulevard on the east side. Please refer to the Waterdown Road Typical Sections Plate at the end of the chapter. As indicated previously, at the south end of the corridor (south of Flatt Road) further reductions to the width of the multi-use pathway and west sidewalk may need to be addressed once a detailed slope stability study along the ravine on the east side has been completed.

MOUNTAIN BROW ROAD

The basic roadway cross section for Mountain Brow Road consists of two 3.3 m centre lanes and two 3.5m curb lanes (4 lanes total). Curb and gutter will be provided throughout, as is a north side multi-use asphalt pathway. For the section of road west of Flanders Drive, no north boulevard is proposed due to property constraints. East of Flanders Drive, it is proposed to install a 1.5m wide boulevard on the north side. Throughout the entire segment, it is proposed to construct a 1.5m platform on the south side of the road. The proposed north side asphalt pathway will be 3.5m in width which will be used by pedestrians and cyclists. Please refer to the Typical Sections Plate at the end of the chapter.

MID-BLOCK ROAD

The basic roadway cross section for the Mid-Block Arterial Road consists of two 3.5 m centre lanes, two 3.65 m curb lanes (4 lanes total), and 1.5 m dedicated on-road bicycle lanes. It is noted that the bicycle lanes terminate at the north leg of the south roundabout due to the presence of the 3.5 m asphalt multi-use pathway on the west side of the road linking up with Mountain Brow Road. Curb and gutter will be provided throughout.

From north of the south roundabout up to Dundas Street, 2.0 m sidewalks will be installed on both sides of the road approximately 1 m back from the right-of way boundary line. The sidewalks will terminate at the north leg of the south roundabout due to the presence of the 3.5 m asphalt multi-use pathway linking up to Mountain Brow Road. The resulting boulevards vary in width from 4.85 m to 5.85 m. At the approach to Dundas Street, it is proposed to install a 2 m wide raised median island. For the proposed treatments along Mid-Block Road, please refer to the Typical Sections Plate.

6.3.4 Stormwater Management & Hydraulics

A drainage and hydrology study was completed as part of this project and detailed in this section of the report. ***Appendix C*** contains further drainage assessment reference materials. The objectives of this drainage study were to evaluate the impacts of the proposed roadway improvements on the surface water systems, to assess potential impacts

of roadway runoff on receiving watercourses, and to assist in the selection of appropriate management measures. These management measures have been taken to a preliminary level of design. The drainage study results will provide input and guidance to the detailed design process with the objective of achieving protection, preservation, and enhancement of the local subwatershed environments. Specifically, the purpose of this study was to undertake the following activities within the context of the Waterdown Road areas:

- establish existing hydraulic conditions of the watercourses at existing and proposed crossing locations within the Waterdown Road;
- establish design criteria;
- evaluate proposed road crossing structures to meet design criteria;
- identify the potential impacts on natural water systems and hydrologic processes resulting from proposed changes, such as increased flooding and erosion potential and water quality impairment;
- identify specific opportunities for protection, enhancement and rehabilitation of local watercourses, including SWM measures that meet design criteria;
- prepare preliminary design details for watercourse crossing and SWM measures; and,
- identify criteria for detailed design.

Specific drainage management goals include the following:

- to convey upstream run-off through the roadway without adverse impacts on the road and upstream and downstream lands;
- to convey runoff from the road right-of-way to downstream watercourses; and
- to ensure that runoff from the right-of-way does not adversely impact the natural environment of receiving water bodies.

Background studies and information were collected and reviewed, and conditions associated with the road development were considered in the drainage analysis. Below is the list of the main documents reviewed:

South Waterdown Subwatershed Study Stage 2 Report
This report provides a management strategy for the South Waterdown development, reflecting opportunities and constraints to the development and providing a management guide for future land use changes within the South Waterdown lands. The recommended stormwater management strategy was utilized in finalizing the recommended road drainage design.

Grindstone Creek Watershed Study, Halton Region Conservation Authority, June 1998
In this study, the entire watershed was divided into four sections and regeneration plans for each area were prepared to promote the integrity and legacy of the creek. The areas identified in the regeneration plans and located within the road EA study area were considered in the road

drainage analysis. This includes the document: *Water Resources Support Study – Appendix 4*, Environmental Water Resources Group Ltd. (December 1997)

Grindstone Creek Subwatershed Study, Cosburn Patterson Wardman Ltd., January 1995
This subwatershed extends from Highway 403 in the south to Waterdown in the north and from the main Grindstone Creek Valley to the east of Waterdown Road, covering a 560 ha area. A Subwatershed Management Plan was recommended for the future development and considered in the road drainage analysis.

HYDRAULIC ASSESSMENT

The evaluation of hydraulic conditions for the existing and proposed road crossing structures was based on the study objectives and is summarized in the sections below. Detailed hydraulic and hydrological modelling outputs are provided in ***Appendix C***.

Road Drainage Area Characteristics

The proposed north-south corridor extends southerly from Dundas Street through the Waterdown South development lands, turns west along Mountain Brown Road and south on Waterdown Road, and ends near Craven Avenue. Drainage of the section of Waterdown Road south of Craven Avenue was addressed by the City of Burlington/MTO Waterdown Road-Highway 403 interchange improvement project. This area is within the Grindstone Creek watershed and under the jurisdiction of Conservation Halton (CH). Drainage features and water crossing locations within the study area are presented in ***Figure 6.1***.

There are three water crossings within the proposed Waterdown Road corridor. As shown in ***Figure 6.1***, Crossing W1 is a new structure associated with the new roadway to be constructed through the South Waterdown development land across a tributary of Grindstone Creek. Crossing W2 and W3 are existing structures which are to be replaced due to the road improvement.

Drainage Design Criteria

Consultation with the City of Hamilton and CH was conducted at the beginning of the study. Comments on the preliminary road alignment were provided by CH in a letter dated September 17, 2008. The comments related to road drainage components in the letter have been fully addressed in this drainage assessment. Based on City of Hamilton Design Guidelines and comments from CH, the road crossing structures have been designed to meet the following design criteria:

- Based on the road classification and the span of the proposed structure, the appropriate design event should be determined according to the design flood criteria indicated in MTO Directive B-100 (and as per the City of Hamilton Design Guidelines);
- Required freeboard (culverts) or clearance (bridges) of the structure is to be provided as per the design flood criteria;

- At existing watercourse crossings, upstream flood levels for all storms up to the 100-year or Regional storm (whichever is greater) have to be maintained or improved, if possible;
- At new watercourse crossings, the existing flood levels for the Regulatory event (i.e., Hurricane Hazel) must be established so that it can be demonstrated that there are no adverse impacts on the flood hazard; and,
- Safe access and egress should be provided for both pedestrian and vehicular traffic during the flood event. Per MNR guidelines, safe access and egress is defined by a depth velocity product of less than 0.4 m^2/s, with a maximum flooding depth over the road of less than 0.3 m, and a maximum velocity over the road of less than 1.7 m/s.

HYDRAULIC EVALUATION OF ROAD CROSSING STRUCTURES

This section presents the evaluation of each of the existing and proposed structures along the corridor. Existing hydraulic conditions were evaluated first to establish control targets for future conditions. The design event and check flows for each structure were determined based on MTO Highway Drainage Design Standards January 2008 and are shown in Table 6-4.

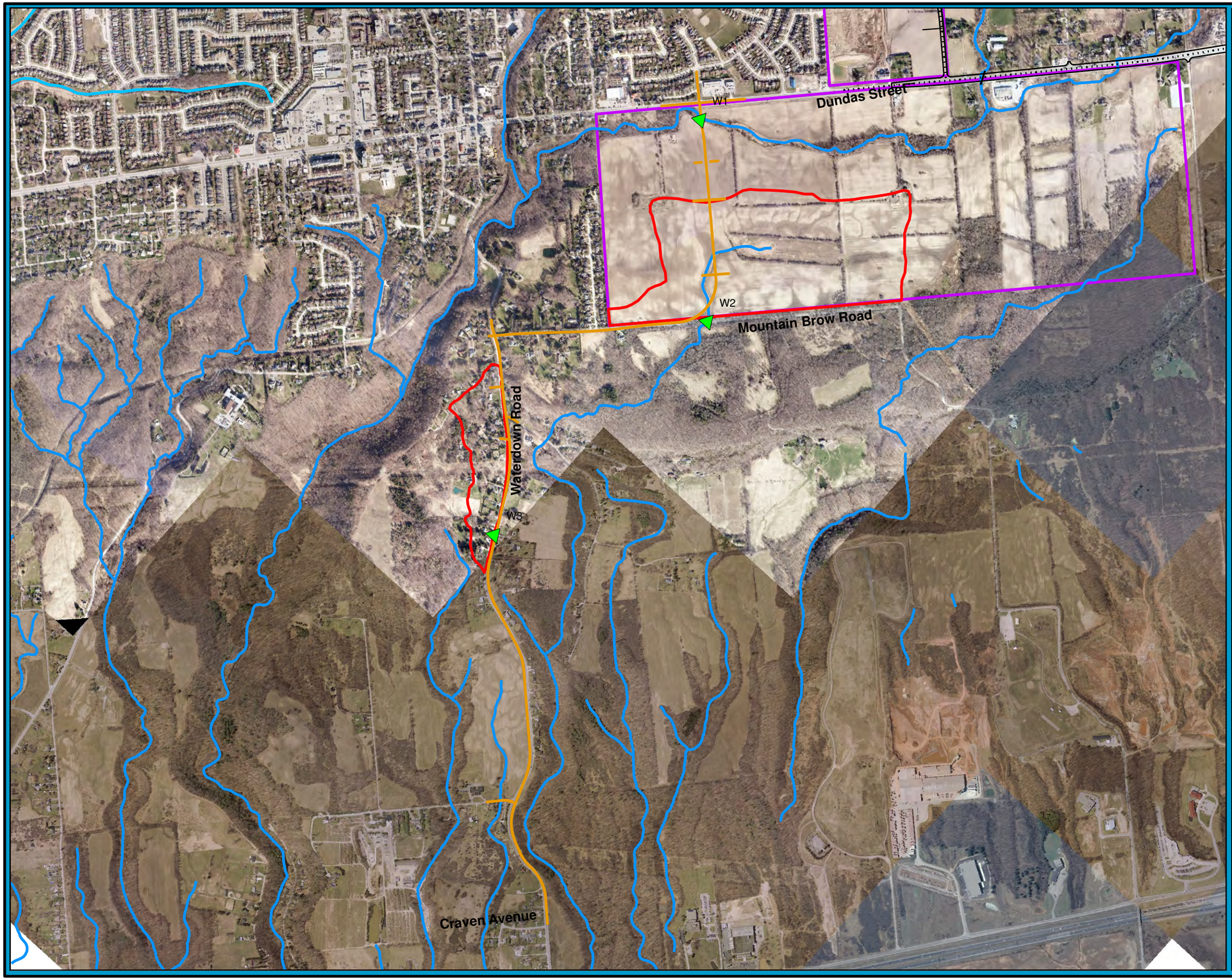
The freeboard/clearance at culvert/bridge crossings shall be greater than or equal to 1.0 m for freeways, arterials and collectors. The freeboard at water crossings shall be greater than or equal to 0.3 m for local roads. The minimum freeboard is measured vertically from the high water level for the design flow to the edge of the travelled lane. The clearance is measured vertically from the high water level for the design flow to the lowest point on the soffit.

Table 6-4: Design Flow Return Period for Bridges and Culverts

Functional Road Classification	Return Period of Design Flows (Years)		Check Flow for Scour
	Total Span less than or equal to 6.0 m	Total Span greater than 6.0 m	
Freeway, Urban Arterial	50	100	130% of 100 year
Rural Arterial, Collector Road	25	50	115% of 100 year
Local Road	10	25	100% of 100 year

Crossing W1

This is a new structure along the new Mid-Block roadway to be implemented as part of the Waterdown South development. As previously mentioned, the design of this structure, including the type of structure, length of span, associated permits, and size of opening are to be determined as part of development approvals and verified by the project team. Design of this structure is not within the scope of this study.



Proposed Waterdown Road Corridor

Figure 6.1
Road Crossing Structures

Legend

- Preferred Waterdown Corridor
- Road Crossing Structure
- structure_drainage_WD
- Grindstone Creek System
- UrbanExpansionBoundary

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240 120 0 240 480

Notes:
Base mapping provided by the City of Hamilton, the City of Burlington and the Region of Halton. Additional mapping provided by Halton Region Conservation Authority and the Ministry of Natural Resources.

Please note that the land uses depicted on this map reflect the land uses derived from the City of Hamilton and City of Burlington OPs and airphotos in order to derive the nature of the land use. Areas along Waterdown Road were classified as residential.

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Crossing W2

Currently two culverts cross Mountain Brow Road at this location and drain the upstream overland flow from the farm land to the downstream water course. The existing structure information was obtained from the topographical field survey completed by the City of Hamilton and listed in ***Table 6.5***.

Table 6-5: Crossing W2 Existing Structure Information

Crossing No	Diameter (mm)	Length (m)	Upstream Invert (m)	Downstream Invert (m)
W2a	600	12	233.35	233.28
W2b	400	10.6	233.22	233.07

The treatment of Crossing W2 will be the responsibility of the South Waterdown development. Due to the current development proposals within the structure drainage area, the small watercourse upstream of the structure will be filled in as part of the subdivision works. A preferred stormwater management plan for the development site is recommended in the South Waterdown Subwatershed Study Stage 2 Report which is SWM alternative 2B. Several SWM ponds are proposed to manage the post development runoff. The current drainage area to this crossing structure will be controlled by SWM Pond 4. Controlled outflows from Pond 4 will be outlet through Crossing W2 to the downstream watercourse. This structure and watercourse work is separate from this EA study and it is the responsibility of the land developer to secure approvals, and designs for construction.

Crossing W3

Currently there is an 1100 mm CSP culvert draining about 10.1 ha of the upstream overland flow area to the downstream watercourse. An open footing arch shaped CSP pipe culvert with the dimension of 1490 mm x 910 mm is proposed at this location to replace the existing structure. Hydraulic modeling results in terms of head water levels under the 25 year and Regional events for the existing and proposed structure are shown in ***Table 6.6***. Results show that the proposed structure meets the design criteria, i.e., no adverse impacts to the existing water levels. Approval from Conservation Halton will be required for the proposed treatment. If required, in consultation with Conservation Halton, a fluvial geomorphic stability study will be carried out at this location during the design phase.

Table 6-6: Crossing W3 Existing Structure Information

Crossing No	Diameter (mm)	Length (m)	Upstream Invert (m)	Downstream Invert (m)
W3	1100	26	171.59	171.33

The drainage area is mainly a natural area with low density residential usage. A hydrologic simulation model (VO2) was used to determine design flows to the crossing structure. Results are shown in ***Table 6.7***.

Table 6-7: Design Flows to Crossing W3 (m3/s)

Crossing Structures	Drainage Area (ha)	2yr	5yr	10yr	25yr	50yr	100yr	Regional
W3	10.1	0.26	0.46	0.60	0.79	0.94	1.07	1.24

Due to the relatively small drainage area to the structure, the software package, Bentley CulvertMaster was used to evaluate the existing and proposed hydraulic conditions of the structure. This software package was developed to design and analyze culvert hydraulics, from single barrel to complex multi-barrel culverts with roadway overtopping. The general inputs required in the model are the structure size, length, inlet and outlet inverts or the culvert slope, design flows, and tail water conditions. The constant tail water elevation at the structure obvert was used in this analysis to provide a relatively conservative head water estimation.

An open footing arch shaped CSP pipe culvert with the dimension of 1490 mm x 910 mm is proposed at this location to replace the existing structure. Hydraulic modeling results in terms of head water levels under the 25 year and Regional events for the existing and proposed structure are shown in ***Table 6-8***. Results show that the proposed structure meets the design criteria, i.e., no adverse impacts to the existing water levels.

Table 6-8: Crossing W3 Existing/Proposed Hydraulic Conditions

Opening Dimension (mm)	Length (m)	Upstream Invert (m)	Downstream Invert (m)	Tail water Elevation (m)	25yr HW* Level (m)	Regional HW* Level (m)
1100 mm (CSP pipe)	26	171.59	171.33	172.43	172.55	172.71
1490 mm x 910 (mm open arch)	30	171.59	171.33	172.43	172.48	172.55

- = high water level

STORMWATER MANAGEMENT

The effects of urbanization and intensification are well documented and can dramatically alter the natural hydrologic cycle. As roads are built and corridors expanded, the amount of impervious area within a watershed increases. Increases in impervious areas increase the volume and peak rate of runoff, while decreasing groundwater recharge. Older approaches to stormwater management have focused on efficiently collecting and conveying stormwater offsite. Newer approaches to stormwater management seek to retain natural features of drainage

systems and provide onsite management to address water quality and water quantity goals. This approach views stormwater as a resource to be used to recharge groundwater and to supply fresh water to surface water features. Properly managing stormwater can avoid problems with erosion, flooding, and adverse impacts on natural drainage feature.

The new road will also serve as a conveyance facility for major system storm flows in excess of what can be handled in the road's storm sewer. This also required consideration in finalizing the road' design elements.

In addition to causing runoff volume impacts, stormwater can also be a major source of non-point source pollution within the urban environment. The type and quantity of pollutants carried by stormwater runoff, commonly resulting in non-point source pollution of receiving waters are highly variable. The pollutant characteristics of stormwater runoff are largely based on land use characteristics and vary with the duration and intensity of rainfall events.

Stormwater Management Targets

Review of background studies within the Grindstone watershed, City of Hamilton Stormwater Master Plan Class Environmental Assessment Report (City-Wide), May 2007 by Aquafor Beech Ltd, City of Hamilton Criteria and Guidelines for Stormwater Infrastructure Design, September 2007, and consultation with staff from the City of Hamilton and CH were conducted to identify the stormwater management targets related to proposed road improvements within the EA study area. The criteria are defined as follows:

- Water quality control is designated at an Enhanced Level (80% TSS Removal)
- Erosion control is based on the 25 mm event
- Quantity control is post- to pre-development peak flow control

It is noted that given the small scale of the road improvements relative to the size of watersheds, and given constraints associated with road development, erosion and quantity control targets may not be met at some locations. Details at specific outlet locations are provided in later sections of this report.

In detailed design of the drainage and stormwater facilities, reference should be made to the recommendations from the Grindstone Creek Subwatershed Study, Cosburn Patterson Wardman Limited, January 1995 and specifically to erosion control targets established in Section 8.2 and Table 7.1.

Roadway Stormwater Management Alternatives

The *MOE Stormwater Management Planning and Design Manual* provides extensive lists of stormwater Best Management Practices (BMPs) in three categories: source, conveyance and end-of-pipe controls. City of Hamilton also issued the *City of Hamilton Stormwater Master Plan Class Environmental Assessment Report (City-Wide)* in May 2007 to identify appropriate stromwater management strategies

within the City. However, measures which are generally applicable to the road runoff control are limited by the nature of the project, i.e., linear corridor with limited adjacent properties and multiple water crossing locations and outlets.

Source control measures usually refer to the measures implemented at the lot level such as surface storage and reduced grading to allow greater ponding. Generally source control measures are not applicable to road runoff control. ***Conveyance control measures*** refer to best management practices (BMPs) that are used to transport stormwater from drainage areas to receiving waters. These measures may include grassed swales/ditches, pervious pipe systems, vegetated buffer strips and oversized pipes (i.e., super pipe storage). ***End-of-pipe stormwater management measures*** are located at the outlet of the drainage system. Measures may include wet ponds, dry ponds, wetlands, infiltration basins, and oil/grit separators (OGS). As indicated previously, consideration for combining stormwater flows and control facilities with those in the future Eagle Heights development north of Flatt Road should be investigated during the design phase.

Stormwater management practices were screened with the consideration of the practicality, feasibility, and limitations of each management option based on site specific conditions. The following site specific conditions were considered:

- Classification of receiving watercourses, sensitivity of aquatic resources;
- The proposed roadway classification and cross-sections (i.e., urban sections with sewer/ditch system and rural sections with ditches);
- The limited physical space within the roadway right-of-way to implement large-scale stormwater management facilities;
- The limited property available adjacent to Waterdown Road, precluding the use of wet/dry ponds for quantity and erosion control of stormwater runoff;
- Local soils (clay/silt clay) having low percolation rates, limiting the use of infiltration type stormwater management practices;
- The high sediment loading caused by construction activities and winter sanding practices, which significantly reduce the life-expectancy of infiltration type stormwater management facilities; and,
- Location of proposed development SWM facilities (e.g., within South Waterdown development) that could accept ROW and adjacent area drainage.

A variety of stormwater best management practices have been considered for use within the Waterdown Road corridor. The 'do nothing' alternative was generally eliminated for further consideration on the basis that any modification to the lands contained within the right-of-way will result in some degree of environmental degradation whether it be on a temporary basis during construction or a permanent basis over the life expectancy of the reconstructed infrastructure. The proposed increase in imperviousness and construction activities within the right-of-way may result in negative effects such as reduced water

quality, increased water quantity, degradation of in-stream aquatic resources, and erosion and sediment loading. These impacts result in the need for appropriate mitigation measures.

Extended detention stormwater management facilities can effectively provide quality/quantity and erosion control for surface runoff. In general, storage-type stormwater management facilities are not feasible for linear transportation facilities such as roads and highways. The general configuration and size of the drainage areas associated with a roadway make it difficult to meet design requirements such as minimum contributing drainage area and levels of imperviousness. Quality enhancement and erosion control is based on the premise of extended detention with a controlled outlet. Small contributing drainage areas results in impractical outlet sizes which are prone to clogging with debris during normal and winter operation. Space limitations within the existing right-of-way often result in undesirable pond geometry. Ponds having seriously compromised layout geometry generally under-perform and result in short-circuiting, significantly reducing long-term total suspended solids removal rates. Because of this, City of Hamilton has the intention to coordinate with developers of adjacent properties when the road corridor traverses proposed development lands to utilize their on-site stormwater detention facilities to centrally manage the road runoff.

Generally, infiltration facilities are not recommended to treat road runoff for either quantity or quality control. This is because of the high suspended solids load from the road surface which reduces the facility life expectancy with limited performance during winter months when the ground is frozen. Also, road runoff may contain a high concentration of dissolved solids (i.e., chlorides) which could contaminate baseflow/groundwater through infiltration.

Grassed ditches have historically been associated with rural drainage and have been constructed primarily for stormwater conveyance. Stormwater management objectives have changed and grassed ditches are also being promoted to filter and detain stormwater runoff. Routing flow through wide, flat bottom ditches has a number of benefits with respect to stormwater quantity and quality control. Grassed swales and ditches can be effective for pollutant removal if designed properly. The water quality benefits associated with grassed ditches depend on the contact area between the water and the swale, and the swale slope. Grassed swales are most effective for stormwater treatment when a minimum channel slope is maintained (e.g., <1%) and a wide bottom width (> 0.75m) is provided. Grassed swales with a slope of up to 2% can be used for water quality purposes, but effectiveness diminishes as velocities increase. Wide, flat bottom ditches provide a degree of peak flow attenuation that normally would not be achieved. Treatment of runoff is provided in a grassed swale by four processes: sedimentation, filtration, infiltration, and vegetative uptake. In swales with flat gradients, suspended particles within slow moving surface runoff have time to settle out or get captured by the vegetation. Soil conditions may also allow for some infiltration into the local topsoil within the swale or

subsequently into the lower soil masses. Long residence times will allow for some minor vegetative uptake.

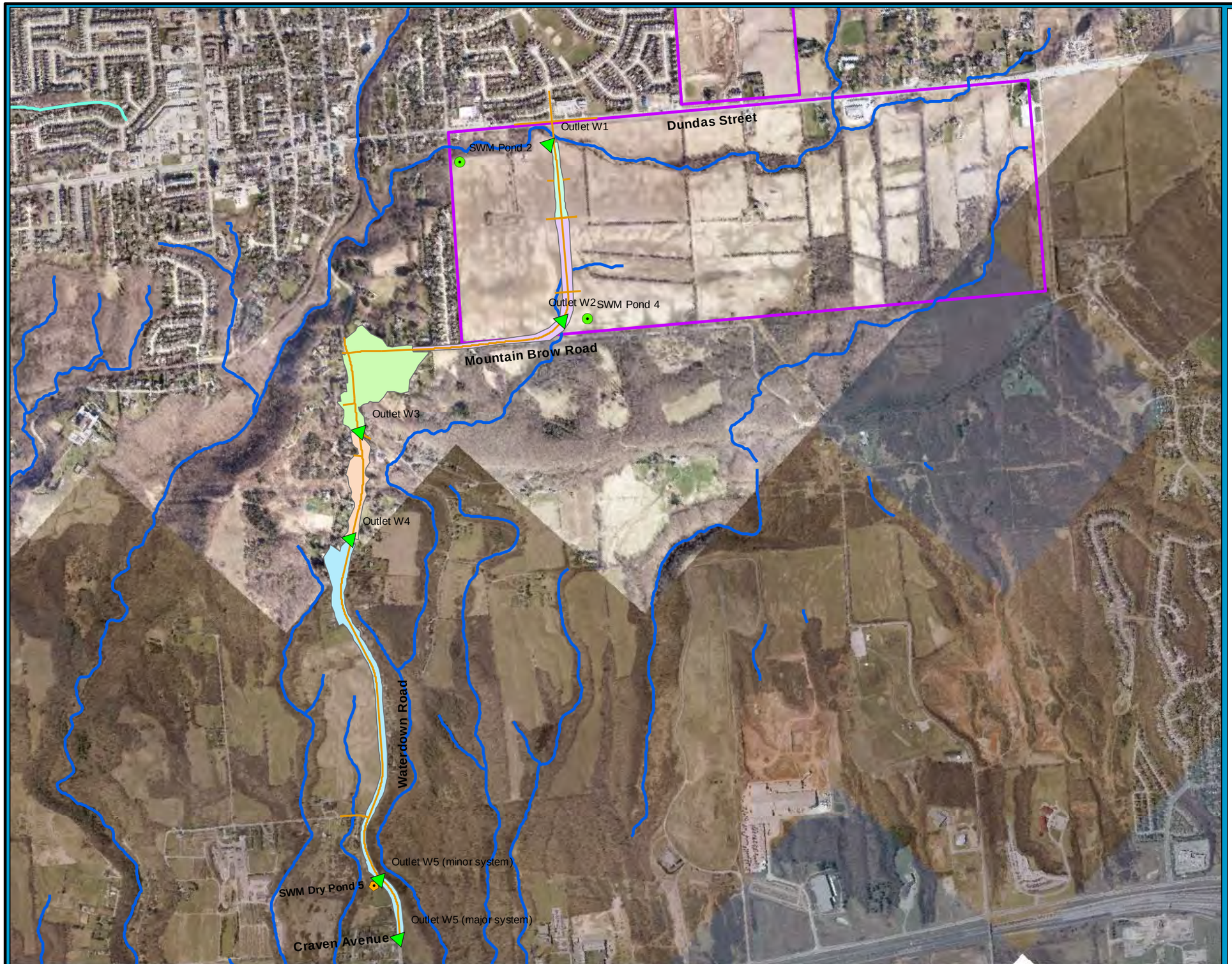
Special purpose stormwater management devices such as oil/grit separators are becoming more common for linear facilities such as roadways and highways. The drainage area characteristics and the point source outlet locations from local storm sewer systems servicing the roadway makes the use of an oil/grit separator a feasible alternative to providing quality treatment within a Study Area. An oil/grit separator requires a maintenance schedule similar to that of a standard roadside catch basin and has proven efficiency in removing trash, grit, suspended solids, and a range of oil and oil by-products from stormwater runoff. High volume commercial truck traffic with the potential for spills and limited space make an oil/grit separator a feasible alternative for addressing stormwater runoff quality from the corridor.

Recommended Stormwater Management Strategy

The proposed Waterdown Road corridor crosses the Grindstone Creek systems at several locations (see ***Figure 6.2***). In general, right-of-way (ROW) runoff is directed to the receiving watercourse at these locations. This section outlines the different catchment characteristics, stormwater management targets, and specific road design requirements as well as the proposed stormwater management strategy for each outlet. The construction of new roadways and improvements to the existing roads (i.e., changes in horizontal and vertical alignments) result in changes to existing drainage boundaries. A drainage scheme has been developed for the entire Waterdown Road corridor based on the recommended preliminary road design. The proposed road drainage pattern and road runoff outlet locations are shown in ***Figure 6.2***.

Proposed Waterdown Road Corridor

Figure 6.2
Road Drainage Areas and Outlets



Legend

- Road Drainage Outlet

Outlet Drainage Area

- Outlet W1
- Outlet W2
- Outlet W3
- Outlet W4
- Outlet W5
- Grindstone Creek
- UrbanExpansionBoundary
- Proposed Waterdown Road Alignment
- SWM Facilities in South Waterdown
- SWM Facility for Minor System Flows

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Notes:
Base mapping provided by the City of Hamilton, the City of Burlington and the Region of Halton. Additional mapping provided by Halton Region Conservation Authority and the Ministry of Natural Resources.

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Visual OTTHYMO (VO2) hydrologic modeling was conducted for each outlet under existing (no road improvement) and proposed (after road improvement) conditions to identify the road improvement impacts on receiving watercourses and to assist in selecting appropriate stormwater management measures.

Intensity – Duration-Frequency data from the Mount Hope rain gauge station were used to develop storm files. The 12 hour SCS Type II design distribution for the 25 mm, 2 year, 5 year, 10 year, 25 year, 50 year, 100 year events, and Regional event were simulated. The NASHYD command was applied given the rural land use along the corridor. Model input parameters in terms of catchment drainage areas, time to peak (Tp), and curve numbers (CN) were determined based on specific catchment characteristics. Typical values for other input parameters required in NASHYD include the number of linear reservoir (N = 3) and pervious area depression storage (IA = 5 mm).

The hydrologic modeling focused on the changes within the road drainage boundary but not the total subwatershed area to the point of road drainage outlet. Subwatershed studies are not practical for addressing roadway impacts alone since the road drainage area generally represents a small portion of the watershed therefore the changes to the entire watershed are minimal. Furthermore, the roadway crosses multiple watercourses which results in multiple watersheds to study. In general, the roadway impacts to the watershed in terms of the peak flow increases are negligible, especially for the mainly rural watershed the Waterdown Road corridor crosses through. Nevertheless, the hydrologic changes caused by the road improvement work within the roadway drainage boundary itself may be relatively large. The purpose of the hydrologic modeling was mainly to demonstrate the local hydrologic changes caused by the roadway works and to guide the selection of appropriate stormwater management measures to mitigate the impacts to the extent possible.

As mentioned previously, due to property limitations and relatively small drainage areas, detention facilities are not a practical means to achieve erosion and peak flow control. Also, the increases of peak flows within the road drainage boundary caused by the road improvement do not necessarily mean increased peak flows at the watershed scale. Therefore, at some outlet locations, there are only locally increased peak flows from the road drainage area.

The hydrologic analysis for each of the road drainage outlets was conducted starting from the north end of the road corridor moving southward. As agreed with the Project Partners and to manage road runoff in a cost-effective way, when the road corridor traverses proposed development lands, the on-site stormwater detention facilities will be utilized to centrally manage the road runoff. Where possible, the final drainage concept should consider the use of future off-site stormwater management facilities that will be part of adjacent developments.

Outlet W1&W2

The road section (Mid-Block Road) within the South Waterdown development land is integrated into the proposed site plan. Road runoff from Mid-Block is addressed in the Waterdown South Sub-watershed Study – Stage 2 Report. In the preferred SWM Alternative 2B, road runoff from the north half section of Mid-Block Road is collected and treated by Pond 2 located in the north-west corner. The pond outlet connects to the Grindstone Tributary 1. Road runoff from the south half section of Mid-Block and a part of Mountain Brow Road is collected and treated by Pond 4. The pond outlet connects to the downstream watercourse through the culvert across Mountain Brow Road. Pond 2 and Pond 4 are designed for quality/quantity/erosion control to meet the subwatershed management targets.

It is noted that in the preferred drainage plan of the Waterdown South Sub-watershed Study – Stage 2 Report only the road runoff from the north half side of Mountain Brow Road within the development boundary is managed by the SWM Pond 4. However, according to the preferred road design and with the opportunity (i.e. given Pond 4 is located beside the road corridor) to manage road runoff with centralized SWM facilities, road runoff from the section of Mountain Brow from the road high point towards east to Mid-Block should be collected and treated by Pond 4 before discharging to the watercourse.

As an additional consideration, flooding downstream of Mountain Brow Road has occurred in the past and the role of the existing Mountain Brow Road north ditch, east of Flanders Drive, identified as an important element in controlling the flooding. The proposed north ditch along Mountain Brow Road has been sized to ensure that the storage characteristics match or exceed those of the existing ditch. It should be noted that the new Mountain Brow Road storm sewer adjacent to the Waterdown South development, east of Flanders Drive, is proposed to drain to SWM Pond 4 and this will further address downstream flooding.

Outlet W3

Currently road runoff from this section of the corridor is discharged to the 600 mm storm sewer on Old Waterdown Road. The proposed road improvement is to widen the road from 2 lanes to 4 lanes with storm sewers under the road surface and grassed ditches along the road sides. Adding two lanes to the existing roadway results in minor changes to the catchment's hydrologic parameters as indicated in ***Table 6.9***.

Table 6-9: Outlet W3 Catchment Hydrologic Parameters

Outlet Location	Area (ha)	Existing			Future		
		T_p (hr)	CN(AMCII)	CN(AMCIII)	T_p (hr)	CN(AMCII)	CN(AMCIII)
W3	7.53	0.35	87.1	94.0	0.35	88.3	95.0

The catchment area's hydrologic parameters under existing and future conditions were input into the VO2 model to develop peak flows and runoff event volumes to identify hydrologic impacts at Outlet W3 caused by the road improvements. Results are summarized in ***Table 6.10***, indicating that increases on peak flows and runoff volumes are minimal at this outlet location. Storm sewer sizing shows that the current 600 mm storm sewer has the capacity to receive the proposed road runoff. Since the existing sewer design information was not available for this study, further capacity assessment of the sewer on Old Waterdown Road should be conducted during the detail design stage.

Table 6-10: Outlet W3 Existing and Future and Hydrologic Parameters

Storm Event	Existing		Future	
	Peak flow (m^3/s)	Runoff Volume (mm)	Peak flow (m^3/s)	Runoff Volume (mm)
25 mm	0.084	7	0.099	7
2 year	0.284	20	0.300	21
5 year	0.494	34	0.516	35
10 year	0.641	44	0.666	46
25 year	0.839	58	0.866	60
50 year	0.977	68	1.005	70
100 year	1.117	77	1.146	79
Regional	1.045	189	1.049	191

Outlet W4

Outlet W4 is located at a small tributary across Waterdown Road flowing southbound. The proposed road improvement is to add two more lanes to the existing road. Road drainage will be collected and conveyed by storm sewers under the roadway and grass swales long the both sides. Hydrologic modeling results as summarized in ***Table 6.11*** indicate that under the future conditions, peak flows of road runoff at the outlet have some minor increases. However, since the total drainage area of the tributary to this outlet location is relatively small, i.e., 10.1 ha, the small creek is susceptible to a minor flow increase, especially changes under the 25 mm erosion control event. A creek geomorphology analysis should be conducted during the detail design to provide appropriate creek erosion protection at this location.

Grassed swales along the road sides provide stormwater conveyance as well as quality treatment. An oil and grit separator is recommended to treat road runoff collected by the storm sewer before discharging to the creek. A Stormceptor® unit STC 2000, or equivalent, will be required to provide 80% TSS removal.

Table 6-11: Outlet W4 Catchment Hydrologic Parameters

Outlet Location	Area (ha)	Existing			Future		
		T_p (hr)	CN(AMCII)	CN(AMCIII)	T_p (hr)	CN(AMCII)	CN(AMCIII)
W4	2.38	0.155	87.8	94.8	0.155	91.1	96.0

Table 6-12: Outlet W4 Existing and Future Hydrologic Conditions

Storm Event	Existing		Future	
	Peak flow (m^3/s)	Runoff Volume (mm)	Peak flow (m^3/s)	Runoff Volume (mm)
25 mm	0.03	6	0.039	7
2 year	0.098	16	0.117	19
5 year	0.172	28	0.197	31
10 year	0.223	36	0.251	40
25 year	0.293	47	0.323	51
50 year	0.341	55	0.372	59
100 year	0.390	63	0.421	67
Regional	0.272	152	0.273	154

Outlet W5

At this outlet location, the section of Waterdown Road under study ends but the road continues southerly and intersects with Highway 403. The recent re-configuration of the Waterdown/Hwy 403 interchange was completed in 2011. Major overland road runoff from this section of Waterdown Road will continue to flow downstream. Minor system flows (up to including the 5 year design storm) are proposed to be captured into the roadway storm sewer and conveyed to a proposed stormwater management facility adjacent to the roadway (approximately 0.13 ha), which is located on the west side of the roadway. Due to size limitations on the SWM block, a dry pond is proposed to provide extended detention erosion control and post-to-pre quantity control for events up to and including the 5 year design event. The dry SWM facility will achieve Basic Quality control. Alternative quality control measures (i.e. infiltration gallery, enhanced outlet swale) will be investigated during the detailed design phase to achieve the requisite Enhanced Quality control. Additional pond design details will also be provided at the detailed design stage.

The hydrologic parameters under existing and future conditions were input into a VO2 hydrologic model to simulate peak flows and runoff volumes for a range of design events to identify hydrologic impacts at Outlet W5. Results are summarized in ***Table 6.13***, which shows an increase in flows and runoff volume for the range of design storms analyzed. However, the proposed dry pond, although sized to attenuate

only the 5 year runoff, will reduce the impacts of the proposed roadway improvements for less frequent events. The required 5-year storage is approximately 390 m^3 based on the VO2 model.

Table 6-13: Outlet W5 Catchment Hydrologic Parameters

Outlet	Existing				Future			
Location	Area (ha)	T_p (hr)	CN(AMCII)	CN(AMCIII)	Area (ha)	T_p (hr)	CN(AMCII)	CN(AMCIII)
W5	5.46	0.48	89.7	96	5.68	0.48	92.4	97

Table 6-14: Outlet EW1 Existing and Future Hydrologic Conditions

Storm Event	Existing		Future	
	Peak flow (m^3/s)	**Runoff Volume (mm)**	**Peak Flow (m^3/s)**	**Runoff Volume (mm)**
25 mm	0.064	8	0.083	10
2 year	0.189	22	0.226	26
5 year	0.317	38	0.370	42
10 year	0.408	48	0.470	53
25 year	0.530	63	0.600	68
50 year	0.615	73	0.690	78
100 year	0.701	83	0.780	89
Regional	0.706	196	0.736	199

Conservation Halton have noted the following considerations regarding a dry pond in this location:

- Need for a 15 m buffer from top of bank to the pond,
- Need to determine the stable top of bank at this location,
- The possible need for lining of the pond to prevent seepage,
- Set-backs from the adjacent woodlot,
- Outlet design treatment,
- Need for thermal mitigation,
- Potential for impact on the adjacent reservoir,
- Potential for channel erosion.

These aspects will be addressed during the design phase.

Stormwater Management Summary

In brief, the stormwater management strategy within the Waterdown Road corridor is as follows:

- Utilize stormwater management facilities within the South Waterdown development to control road runoff from the corridor section across the development.

- Ensure that the existing storage capacity of the north side ditch along Mountain Brow Road east of Flanders Drive is matched or exceeded with the new north side ditch in this location to address downstream flooding issues.
- Grassed road side ditches are designed to provide stormwater conveyance and quality control. Oil Grit Separators are designed at the sewer outlet to provide TSS removal.
- South of Flatt Road provide a stormwater management facility on the west side of the corridor to which the road's storm sewer will outlet.
- Additional consideration should be given in detail design to directing road flows to a future Eagle Heights storm water management facility.

In addition to the stormwater management measures recommended for each outlet described above, the following general guidelines will be used as a basis for stormwater management during the detailed design to provide source, conveyance, and end-of-pipe control of surface water runoff, minimizing any adverse impacts:

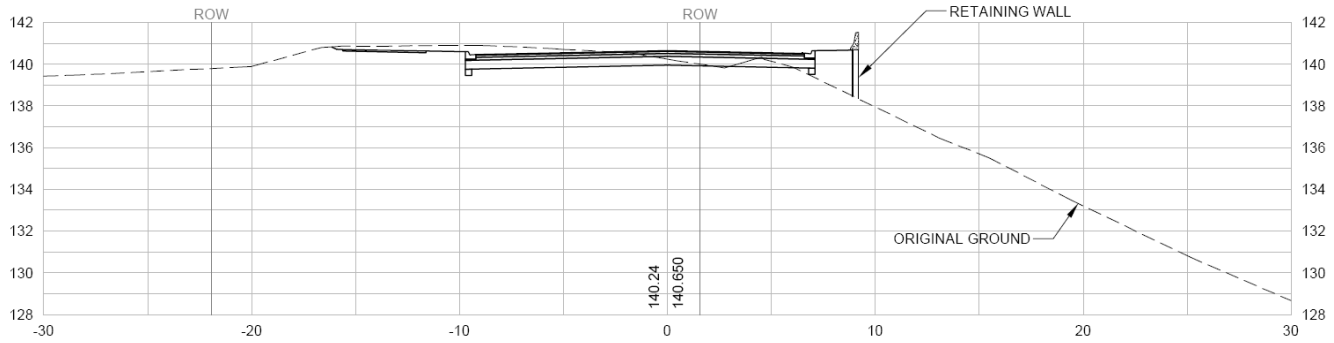
- Minimize disturbance of all existing well vegetated ditches and grassed slopes where grading is required.
- Promote some short-term stormwater ponding within the right-of-way ditches where sub-grade drainage is not adversely affected.
- Design the road storm sewers and ditch outlets with adequate erosion protection measures.
- Maximize the length of overland flow through ditches between outlets and points where stormwater leaves the right-of-way.
- Where ditch re-grading is required, consider utilization of flat bottom ditches in lieu of 'v' ditches to reduce velocities and erosion potential, promote peak flow attenuation and provide short-term stormwater storage.
- Appropriate erosion and sediment control plan during the road construction should be prepared and implemented.

6.3.5 Structures

Retaining walls are recommended on the east side of Waterdown Road from station 40+240 to 40+500 in order to minimize impacts to the adjacent Sassafras Woods. The average height of wall is approximately 2.0 m. At this location, it is proposed to incorporate a jersey barrier over the wall to prevent errant vehicles from leaving the roadway. Refer to ***Figure 6-3*** for a typical section of this treatment. Note that proposed structural works in this area must consider the results of a slope stability assessment that will be carried out in the design phase. Retaining wall needs may be lessened with the recommended new road footprint shift recommended for further assessment in the design phase.

Additional retaining walls are required on the east side of Waterdown Road between stations 42+180 and 42+300 in order to reduce grading impacts to adjacent home owners. The average height of wall at this location is approximately 1.8 m.

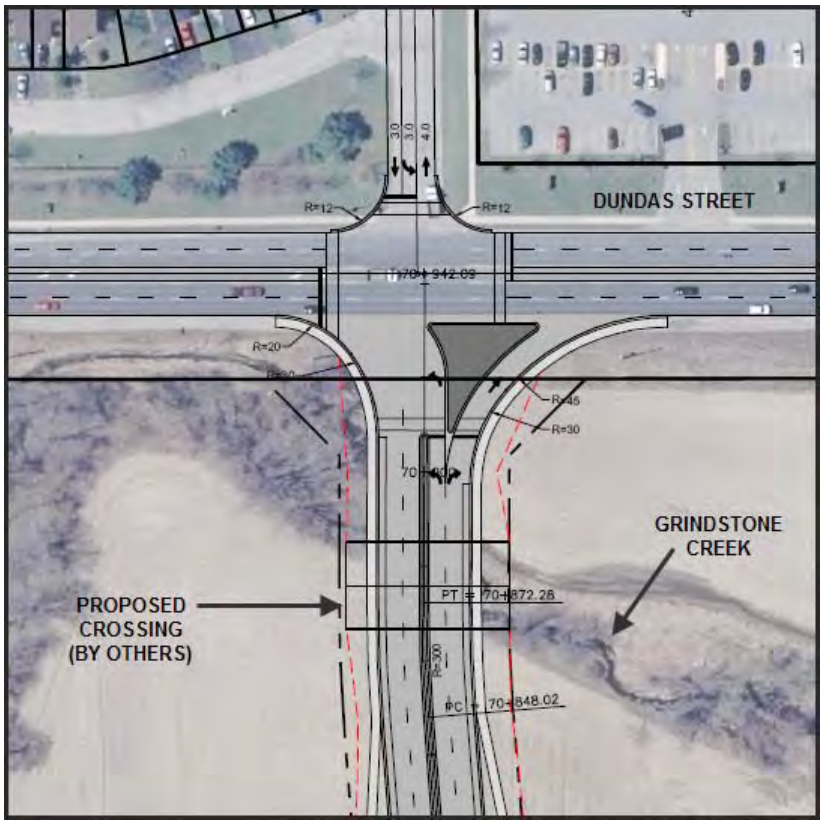
Figure 6-3: Sassafras Woods Treatment[14]



As part of the Waterdown South development, a new structure will be required at the new Mid-Block Road crossing of the Grindstone Creek Tributary, immediately south of Dundas Street. The design of this structure, including the type of structure, length of span, associated permits, and size of opening are to be determined by the developer and verified by City of Hamilton staff. It is recommended that further coordination with the Waterdown South development be conducted during the detailed design phase of the project. The general location of the crossing is shown in ***Figure 6-4***.

[14] Note that the impacts to the valley slope and the required height of retaining wall at this location are subject to further study.

Figure 6-4: Grindstone Creek Tributary Crossing



6.3.6 Utilities

Utilities identified as part of this study are shown on the Preliminary Design plates provided at the end of this section. Several underground and above ground utilities will be impacted as a result of this project. The assessment of utility relocation requirements has been initiated; however, it is recommended that all utility companies be contacted early in the detailed design phase to confirm location and establish relocation strategies.

BURLINGTON HYDRO INC.

Burlington Hydro owns and operates an aerial wood pole line along the east side of Waterdown Road that will be in conflict with the proposed road improvements. Due to the urbanized (curb and gutter) design and the proposed design speed of 60 km/h, clear zone requirements do not apply to new pole locations, and these can be placed at any convenient location behind the curb. It is recommended that the new pole line remain on the east side of the road to avoid potential height restriction conflicts with the landscaping treatment on the west side boulevard. It is also recommended that service connections to homes along Waterdown Road be buried to minimize aerial clutter along the corridor. During detailed design, Burlington Hydro should be consulted regarding the mounting of lighting luminaries on their poles.

HORIZON UTILITIES CORPORATION

Horizon Utilities owns and operates an aerial wood pole line along the north side Mountain Brow Road. They also own and operate an aerial pole line on the south side of Dundas Street. The poles on Mountain Brow Road will be in conflict with the proposed works and will require relocation. It is recommended that these poles be relocated to the south side of Mountain Brow Road to avoid potential conflicts with the future multi-use pathway system. Conflicts with the poles on the south side of Dundas Street are not anticipated, however, this should be confirmed during the detailed design phase.

BELL CANADA

Bell currently runs an aerial line on the east side of Waterdown Road as a tenant on Burlington Hydro poles. This line will need to be moved as the hydro poles are relocated throughout. Several Bell pedestals will also require relocation as a result of the proposed improvements. North of Craven Avenue, for approximately 160 m, Bell also owns a buried conduit on the east side of the road and it is recommended that test pits be conducted during detailed design to identify potential conflicts. Along Mountain Brow Road, Bell owns an aerial wood pole line on the south side of the road. This line will be in conflict with the proposed design and will require relocation. Bell should be further contacted at the design phase to explore the possibility of running their relocated aerial line as a tenant on the new Horizon Utility poles.

UNION GAS

An underground gas main (150mm diameter) is located on the west side of Waterdown Road throughout the project limits. At some locations, the existing gas main will be located under the proposed widened roadway and relocation may be required. Union Gas also owns an underground line along Mountain Brow Road, on the north side of the road. This line terminates east of Flanders Drive. It is recommended that Union Gas be contacted and test pits be conducted during detailed design to identify potential conflicts and relocation strategies.

HYDRO ONE NETWORKS INC.

Hydro One owns and operates three large overhead hydro tower lines that cross Waterdown Road. The first line crosses Waterdown Road at approximately station 40+300. The hydro tower at this location is in very close proximity to the road and represents a hazard that must be protected with a guide rail system. Grading impacts will not affect the hydro tower and no relocation of the tower is anticipated. The two remaining lines are in the vicinity of station 41+900 and run parallel to each other through an Ontario Hydro easement. Although no impacts are anticipated to Hydro One's lines, it is recommended that they be contacted during the detailed design phase regarding property impacts.

TRANSCANADA PIPELINES

TransCanada owns and operates an underground east-west high pressure gas main that crosses Waterdown Road at approximately station 41+670. Although the proposed grading and ditching are not anticipated

to impact this pipe, it is recommended that test pits be conducted during detailed design to confirm this.

COGECO CABLE

Cogeco owns and operates an aerial cable line on the east side of Waterdown Road as tenants on the existing Burlington Hydro pole line. This line will need to be moved as the hydro poles are relocated throughout. Along Mountain Brow Road, Cogeco operates an aerial cable line on the north side of the road on the existing Horizon hydro pole line. This line will also require relocation as a result of the hydro line requiring relocation. Coordination between Cogeco and the hydro companies will be required during detail design to ensure that the hydro design also suits Cogeco.

ROGERS COMMUNICATIONS INC.

Rogers confirmed that they do not have any existing or proposed plant within our study area and did not request to remain on the project mailing list.

TELUS

Telus confirmed that they do not have any existing or proposed plant within our study area and did not request to remain in the project mailing list.

TRANS NORTHERN PIPELINE

Trans Northern confirmed that they do not have any existing or proposed plant within our study area and did not request to remain in the project mailing list.

STORM SEWERS

A new storm sewer system is proposed along Waterdown Road, Mountain Brow Road and the new Mid-Block Road. On Waterdown Road, the existing 600mm storm sewers north of Old Waterdown Road will be maintained, though relocation of the catchbasins and leads will be required. A new storm sewer will be installed south of this point to connect with the new storm sewer constructed south of Craven Avenue. The proposed Waterdown Road storm sewer system will be designed according to City of Burlington standards and is estimated to be approximately 600mm in diameter. Along Mountain Brow Road, a new storm sewer system is proposed to be installed. This new storm sewer should be designed to City of Hamilton sewer standards and is expected to be approximately 600mm in diameter. Along the new Mid-Block Road, the storm sewer will be designed and installed by the developer (including all permits). It is expected that this sewer will outlet into the new development pond located on the north-east quadrant of the intersection.

SANITARY SEWERS

There are currently no sanitary sewers within the project study limits. Throughout the course of this study there has been no direction to

include a sanitary sewer system as part of the proposed undertaking; however, this should be confirmed with the City of Burlington/ Halton Region at the detailed design phase of the project. The 2008 Halton Water/Waste Water Update (2008) indicated a 300 mm future gravity sanitary sewer would be extended through North Aldershot to the existing trunk sewer near Waterdown Road and Highway 403, south of the study area. The exact alignment of this extension will be determined through an Area Servicing Plan. Individual septic systems are currently in use throughout the corridor. Detailed investigation of the potential disruption to these systems will be undertaken in the design phase. Some facilities may have to be relocated, if disturbed.

WATERMAINS

An existing 600mm diameter watermain is located on the east side of Waterdown Road from south of Craven Avenue to the Waterdown reservoir at #1376 Waterdown Road. The 600mm watermain crosses under Waterdown Road at approximately station 40+130 en route to the reservoir. The proposed road improvements will result in this watermain being located directly under the northbound lanes and for this reason, relocation may be required. It is recommended that test pits be conducted at the design phase to determine possible conflicts with new catch basins, sewer leads, etc.

An existing 350 mm diameter watermain exists on the west side of Waterdown Road, from south of Craven Avenue to the Waterdown reservoir. This pipe will be located directly under the future multi-use pathway and for this reason, relocation may be required. A fire hydrant connected to this watermain will require adjustment or relocation.

A 250 mm diameter watermain exists on the west side of Waterdown Road from the Waterdown reservoir to Mountain Brow Road. This watermain will be located under the proposed road or pathway for much of its length and it is recommended that test pits be conducted during detailed design to determine potential conflicts and relocation strategies. Four fire hydrants connected to this watermain will also require adjustment or relocation.

An existing 150 mm diameter watermain runs along the south side of Mountain Brow Road to Flanders Drive. This watermain will be located under the new roadway and relocation may be required. Two fire hydrants connected to this main will also require adjustment or relocation. It is recommended that test pits be conducted at the design phase to determine possible conflicts with new catch basins, sewer leads, etc. All watermain work should be carefully coordinated with the hydro companies (Burlington and Horizon) to ensure that relocated poles will not conflict either existing or relocated watermains.

6.3.7 Landscaping/Streetscaping

An important component in the project development was the provision of both landscape and streetscape recommendations for the preferred design concept. Acknowledging that the construction of the new

expanded corridor will result in significant changes to both the natural and built landscape environment, one of the principle purposes was to provide recommendations that would serve to both mitigate the impacts of the construction of the new corridor and also serve to enhance the corridor itself.

VISION

The Waterdown Road Corridor traverses an area that is characterized by both rural residential and future residential neighbourhood communities as well as agricultural lands and areas of natural habitat. The landscape vision, developed in consultation with the Project Partners, includes the following objectives:

- To create a safe, visually attractive and pedestrian oriented expanded vehicular corridor with a well-connected street pattern, enhanced by a system of street trees and other vegetation as well as other landscape/streetscape elements that contribute to the creation of a new *"Parkway-style "* corridor
- To preserve and enhance natural areas, wetlands and significant woodlots and create access and views to these amenities;
- To ensure that the special open space and natural features are enhanced with landscaping and are recognized through visual and pedestrian access such as the Bruce Trail where appropriate;
- To enhance the sense of community and neighbourhood throughout the entire Waterdown Road Corridor;
- To create a unified and cohesive streetscape that serves to enhance the resident's 'sense of place' surrounded by natural features.

In this case, the reference to a "parkway-style " corridor implies a landscaped thoroughfare that has been specifically designed as a scenic vehicular route with both naturalized and manicured landscaping of both the boulevards and where applicable, expanded road medians. The intent was to integrate pedestrian and traffic access while enhancing the setting of this enlarged roadway. Unlike traditional historical parkways, neither pedestrians nor commercial vehicles, trucks or other heavy vehicles will be excluded from accessing this road. The basic vision and landscape/streetscape elements of the plan were reviewed through the NAC and Public Information Centre processes and considerable input was received. This included input and discussion on the type and scale of plantings, surfacing materials, road and pedestrian lighting, screening of residences from the road through landscaping and the need to, in general, mitigate frontage impacts throughout the corridor.

INTENT

In general, the intent is to create a continuous landscape character for the entire Waterdown Road Corridor that would act to unify the entire length of the corridor and would assist in creating a 'sense of place.' Signature or iconic features such as light poles, banners, signature planting as well as streetscape planting, street furniture all contribute to creating a sense of community, wholeness and belonging.



Exhibit 6-1: Example of Multi-use Path/Trail



Exhibit 6-2: Example of Hanging Baskets

STREETSCAPE ELEMENTS

Multi-use Pathways and Trails

- Multi-use pathways should be integrated into the public realm streetscape where possible as these paths provide opportunities to integrate pedestrians in a friendly and safe environment.
- These multi-use pathways or trails would include wheelchair accessibility that would also allow bikes, roller bladers, and strollers to access the community in a safe manner, separate from the road traffic.
- These pathways would be illuminated by lower height, more pedestrian friendly light fixtures (white lights), designed to illuminate the pathway surfaces and not just the roadway.

Site Furniture

- Throughout the corridor, repetitive streetscape elements, such as similar light fixtures; both road and pedestrian scale are integrated throughout the streetscape.
- In addition street furniture such as banners and hanging flower baskets could be incorporated onto the light poles to create identifiable streetscape features.
- Other opportunities for street furniture such as benches, waste receptacles and bike racks are limited but if necessary in isolated and limited areas, all of these features should be of a similar design to act as unifying elements.

Lighting

- Lighting will be consistently designed and will provide for appropriate function.
- The location of streetlights is coordinated with the location of streetscape elements.
- Streetlights should also be located to light open spaces and community mailbox locations.
- Street light fixtures will be located and designed in accordance with City of Hamilton, and City of Burlington standards.
- Lighting fixtures with a capability to meet “Dark Skies” performance standards or similar is encouraged
- Where adjacent natural areas exist light spill over may be an issue
- The appropriateness of the use of separate pedestrian scale lighting will be reviewed in the design phase.

Utilities

- Utility structures such as hydro, telecommunications and cable boxes within the new subdivisions should be addressed in the preliminary stages of development, in order to avoid negative streetscape impacts.

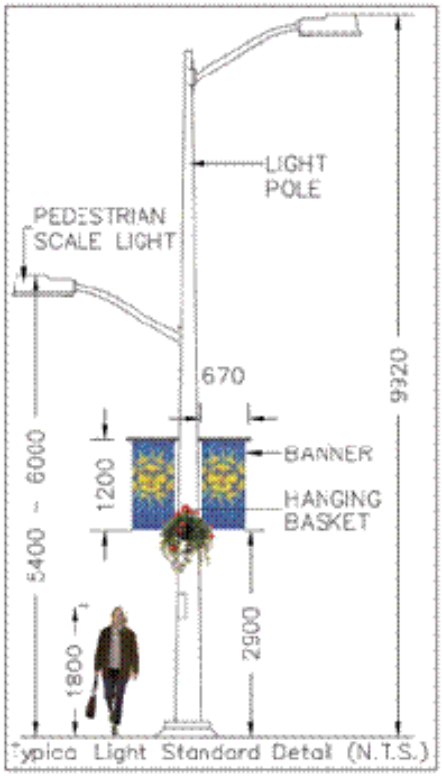


Exhibit 6-3: Example of Iconic Light Standard for Waterdown Road Corridor

- Prior to approval of the development, all interested utilities and telecommunication providers shall be consulted to determine appropriate locations for large utility equipment and utility cluster sites, as required.
- The location of all utility structures shall be coordinated and located per road right-of-way cross-sections with the City of Hamilton & City of Burlington and/or may also be located on other lands within easements.
- Alternative methods of containing utility services on or within streetscape features, such as street light poles that accommodate multiple utilities should be encouraged to reduce street clutter.
- The street light poles that will be used along the Corridor will be as per the City of Hamilton, City of Burlington and Halton Region standards
- Utilities should be located away from highly visible areas.
- Utilities should be visually screened with landscaping where possible.

APPROACH

As previously stated, the general intent was to create a continuous landscape character for the entire Waterdown Road Corridor. One of the strongest visual elements is a continuous pattern of street trees. Throughout the Corridor, as illustrated in the following ***Figure 6-5*** thru ***Figure 6-19***, a continuous row of street trees creates a rhythm and living connection to the streetscape. Trees enhance and green our living environment and create a physical buffer to the roadway. In many instances the proposed street trees within the municipal boulevard and /or property line are the only vegetation separating the residences or uses from the expanded roadway.



Exhibit 6-4: West side of Waterdown Road between Horning Road and Mountain Brow Road

In other instances, the proposed construction is dramatically impacting the existing vegetation that currently screens the properties and serves as a buffer to the existing roadway. The new construction proposals in the instance of ***Figure 6 – 12***: Typical Waterdown Road North of Horning Road (South of Mountain Brow Road), and ***Figure 6 – 13***: Typical Mountain Brow Road East of Waterdown Road (to Flanders Drive) and ***Figure 6 – 14***: Typical Mountain Brow Road West of Flanders Drive, are impacting the existing vegetation and adjacent residences such that additional landscape treatments have been proposed for these areas that warrant special remediation measures. Approximately 475 street trees will require removal as part of the road works. The landscaping plan is replacing these with approximately 850 new trees.

Waterdown Road North of Horning Road (South of Mountain Brow Road

The existing homes on the west side of Waterdown Road will be impacted adversely by the expansion of the Waterdown Road Corridor (refer to ***Figure 6-12***). The existing vegetation that currently screens the two residences located between Horning Road and Mountain Brow Road will be impacted and in much of the area, may need to be removed

in order to construct the expanded road and multi-use trail. In order to preserve as much of the existing vegetation as possible and to create the widest buffer area within the road property, the multi-use trail was shifted in this location to be immediately adjacent to the curb. This allows the area between the multi-use path and the property line to have additional screening to buffer the trail and road from the existing properties. The pattern of street trees continues behind the pathway but in between each street tree the buffer screen is reinforced by additional coniferous trees. These trees will range in height from 1.8-2.4 m.

Note:
There is a stepped progression regarding the location of the multi-use trail along the northernmost section of Waterdown Road. The multi-use path is located immediately adjacent to the curb from Mountain Brow Road to Horning Road. From Horning Road to Ireson Road the multi-use path is located a minimum of 1.5 m from the curb until south of Ireson Road the path is fully 3.0 m from the curb on the west side of Waterdown Road.

Mountain Brow Road

Mountain Brow Road has a distinct landscape character and is unique within the study area. The existing 2 lane road seems enveloped by vegetation and extensive tree cover in places and creates the illusion of an enclosed green canopy. This section of Mountain Brow Road has a very private and intimate character, created by mature vegetation immediately adjacent to the road on both sides. Unfortunately, the construction of the expanded corridor will severely and adversely impact the character of this section of roadway. The character of the expanded corridor will bear little resemblance to the existing road in this specific area (refer to ***Figure 6-13*** and ***Figure 6-14***).

The road widening in this area will be accommodated by a significant southerly shift opposite Flanders Drive, all but eliminating the mature vegetation screening the existing residences located on the south side of the road. The residences to the north will be impacted to a much lesser degree although the construction and installation of the multi-use pathway will likely impact the triple row of conifers along the frontage of one residence and trees along the existing sideyard fencing for the corner lot on Flanders Drive. The new construction may necessitate the removal of some of the trees located nearest the roadway adjacent to both properties and will involve the removal of some of the perennial groundcovers as well.

In order to attempt to mitigate the impact along Mountain Brow Road in general, the spacing for the continuous street trees has been reduced to 10m on centre (everywhere else in the corridor the spacing is 12m on centre.). In addition, for these two properties the continuous row of street trees had been supplemented with additional coniferous trees, ranging in height from 1.8-2.4 m, planted between the deciduous street trees. Furthermore, for the property on the south side, an additional continuous mixed shrub buffer is proposed along the property line within the road property. This mixed band of coniferous and deciduous



Exhibit 6-5: Mountain Brow Road looking west, just west of Flanders Drive



Exhibit 6-6: Mountain Brow Road looking east of Flanders Drive

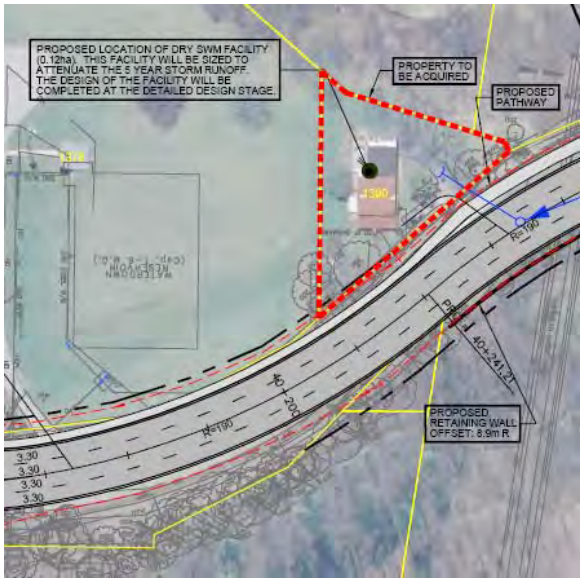


Exhibit 6-7: Storm Pond North of Craven Avenue

shrubs will undulate and meander between the trees to create a barrier to the expanded corridor.

OTHER AREAS OF SPECIAL NOTE

Waterdown Road North of Craven Avenue

A new storm water management (SWM) pond is required for the corridor area. This pond will be located on the west side of Waterdown Road, just north of Craven Avenue. The landscape planting for the pond will incorporate native species and will be in accordance with Conservation Halton standards and subject to their approval. The planting plan for the SWM pond will be developed as part of the detail design stage and will incorporate both coniferous and deciduous material; as well as woody and herbaceous plants. In addition, requirements regarding screening, fencing and access will be determined in the detail design phase.



Exhibit 6-8: Waterdown Road looking south towards Sassafras Woods

Waterdown Road between Craven Avenue and Flatt Road (Sassafras Woods) and South of Ireson Road (Waterdown Escarpment Woods)

Sassafras Woods and the Waterdown Escarpment Woods are both important natural biotic communities associated with the Niagara Escarpment located within the study area. As these areas are both ESA's and the new construction abuts these significant natural areas, careful consideration was given to the landscape treatment. It was determined that the continuous street tree pattern would continue within these areas but the species of trees would be subject to recommendations by the Team Biologists, as the species for the street tree planting within these areas should be in keeping with the natural communities within the woodlots. Any woody shrub or herbaceous groundcover and perennial remediation planting along the edges of either wooded area required to mitigate the impact of construction activity will be a combination of deciduous and coniferous plant material. The detailed planting plan for this area will be completed in consultation with the Team Biologists. Retaining walls and regrading of the adjacent lands at the immediate interface to both the provincially significant Sassafras Woods and the Waterdown Escarpment Woods and the widened corridor will be required.



Exhibit 6-9: Waterdown Road looking south-east towards the Waterdown Escarpment Woods

Refer to ***Figure 6-6*** and ***Figure 6-10***.

Waterdown Road North and South of Flatt Road

Of special note within this area is that included in this section of the Waterdown Road streetscape are two extensive and significant planters located within the median on either side of the Flatt Road intersection. These two large planters contribute to the creation of the "Parkway-style" enhanced landscape treatment for Waterdown Road. The landscape within the planters will be a combination of deciduous tree and shrub planting. All plant material within these median planters should be extremely salt tolerant as it is anticipated that the planting



Exhibit 6-10: Example of Typical Median Planter

located within the median will be exposed to exceptionally adverse conditions. Salt spray from the road surface will create an extremely harsh environment. It is for this reason, in an attempt to mitigate the impact of salt spray, that the vegetation within the median will be planted within a planter elevated a minimum of 600 mm from the road surface, thus minimizing the impact of lateral salt spray.

The planter itself provides an opportunity to create a special signature element. The planter wall may incorporate municipal logos or the name of the community or area and act as a signage as well as a landmark element.

Refer to ***Figure 6-7*** and ***Figure 6-8***.

Waterdown Road Opposite Future Eagle Heights Development

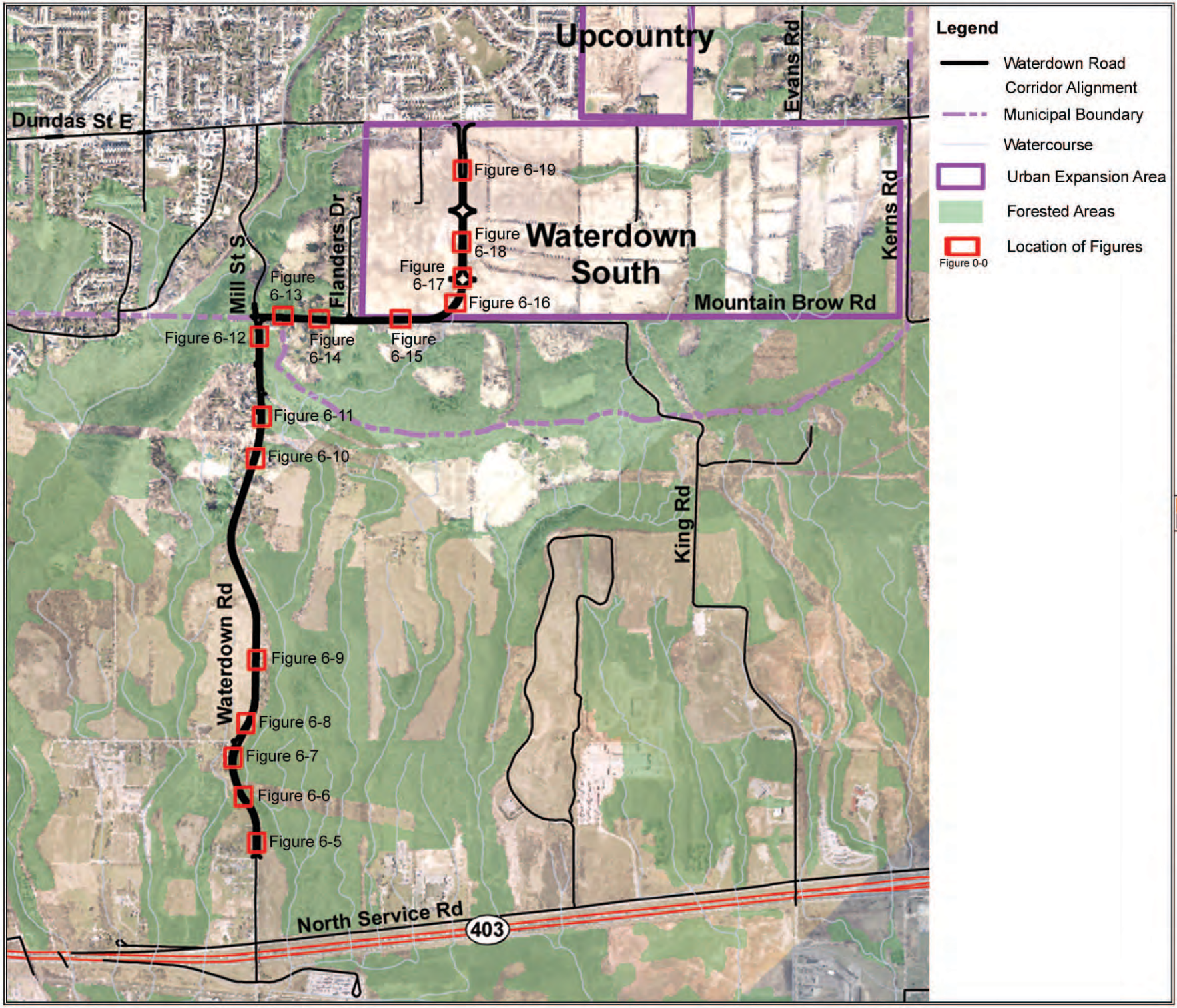
This area is of special note only in that opposite the future Eagle Heights Development is a cluster of existing single family rural residential lots located along the east side of Waterdown Road. Currently backing out of these driveways onto Waterdown Road is extremely difficult due to the amount of traffic. Additional landscaping for these residences was considered but no other planting beyond the proposed continuous row of street trees (on 12metre centres) is proposed for this area. Concerns regarding reduced visibility to oncoming traffic on Waterdown Road resulted in a simplified treatment for this area. Refer to ***Figure 6-9***.



Exhibit 6-11: Waterdown Road Opposite Future Eagle Heights Development

Mid-Block Connection Roundabout Section

Included in the study area along the new Mid-Block Road are 2 new roundabouts. ***Figure 6-17***: Typical Mid-Block Connection – Roundabout Section, indicates a typical landscape treatment for both the roundabouts and sets out a standard template for the design of all roundabouts within the entire Waterdown Road Study Corridor.



WATERDOWN ROAD CORRIDOR CLASS EA

LANDSCAPE/ STREETSCAPE RECOMMENDATIONS DRAWING KEY PLAN

the mbtw group

Scale: As Noted

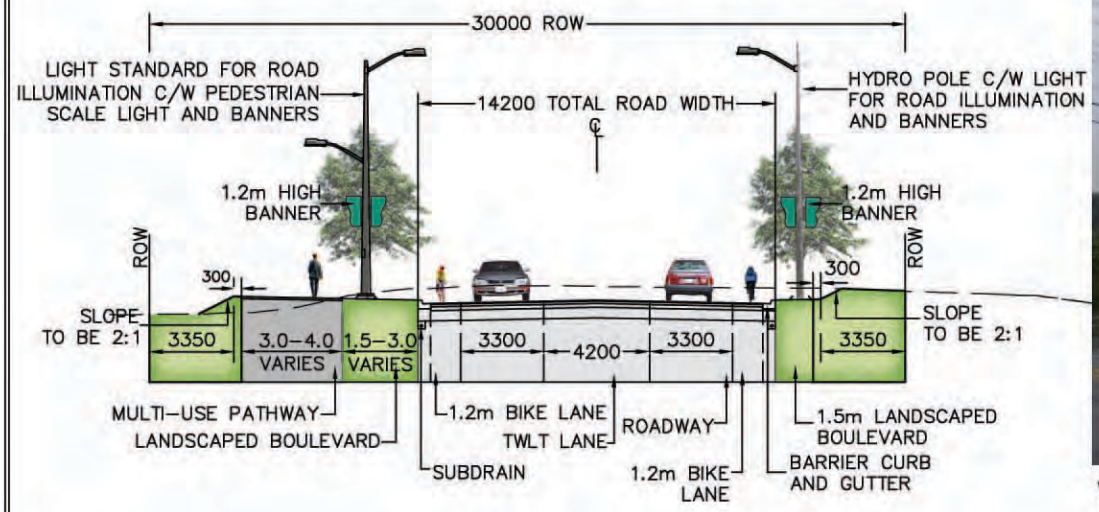
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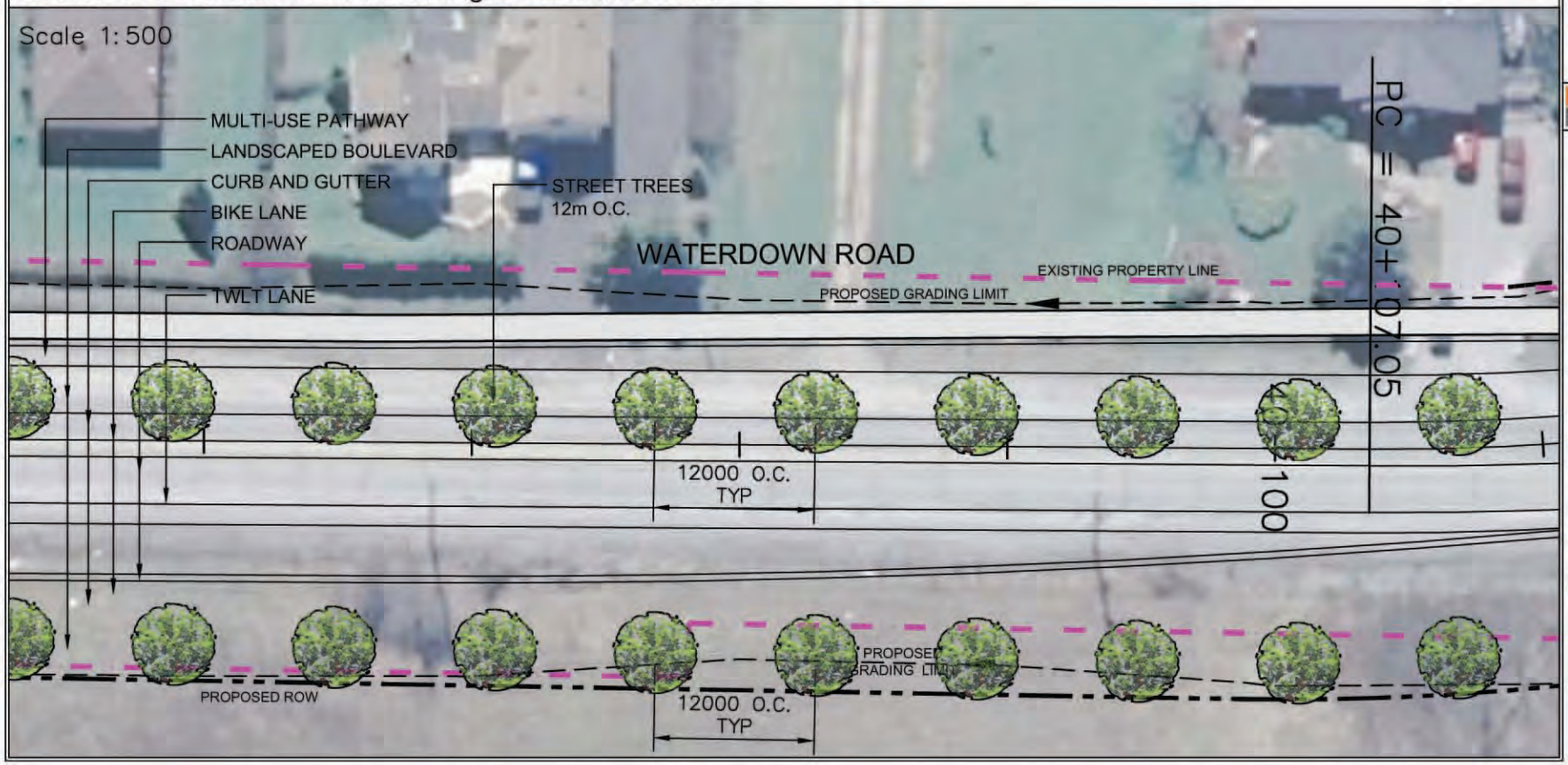
Figure 6–5A



Section thru Waterdown Road looking North. Scale 1:300



Waterdown Road #1390 looking South.



WATERDOWN ROAD CORRIDOR CLASS EA

TYPICAL WATERDOWN ROAD NORTH OF CRAVEN AVENUE

the mbtw group

Scale: As Noted

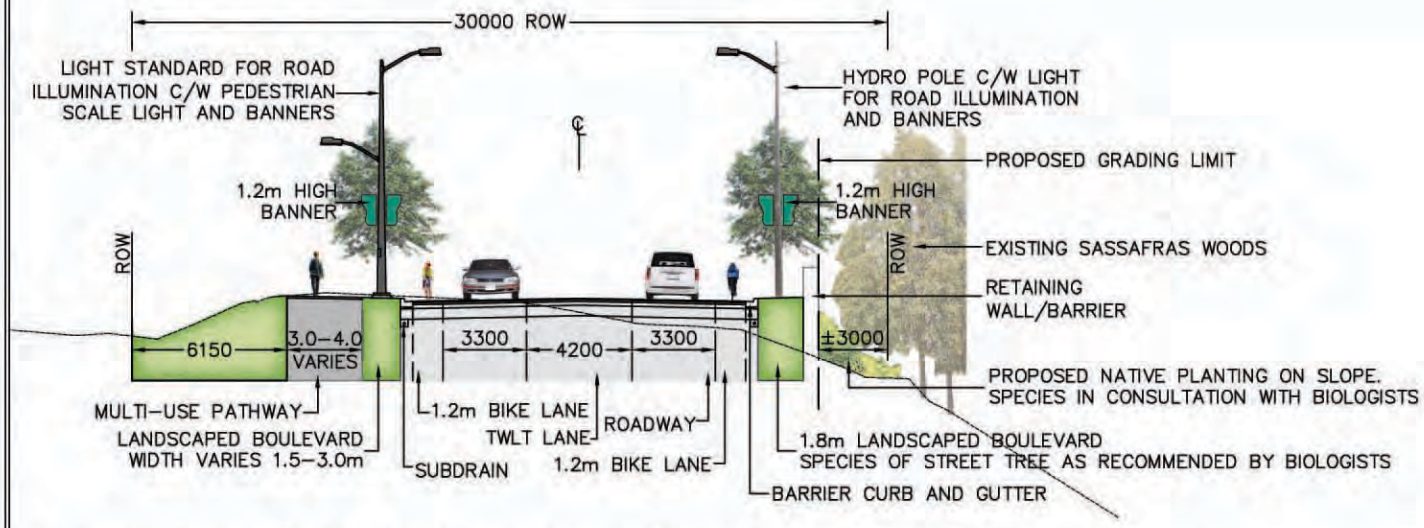
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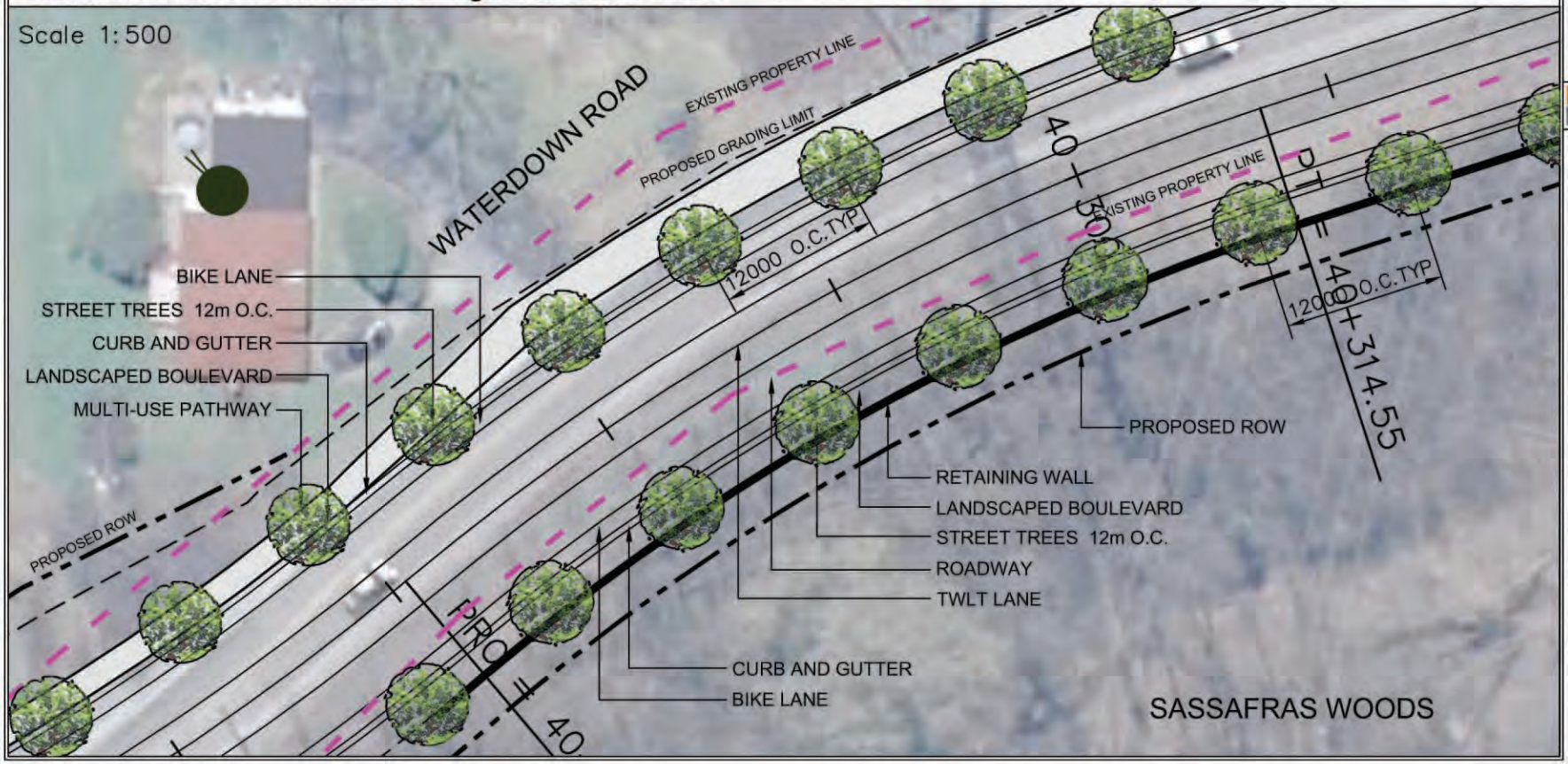
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Figure 6–5



Section thru Waterdown Road looking North. Scale 1:300



WATERDOWN ROAD CORRIDOR CLASS EA

TYPICAL WATERDOWN ROAD BETWEEN CRAVEN AVENUE AND FLATT ROAD

the mbtw group

Scale: As Noted

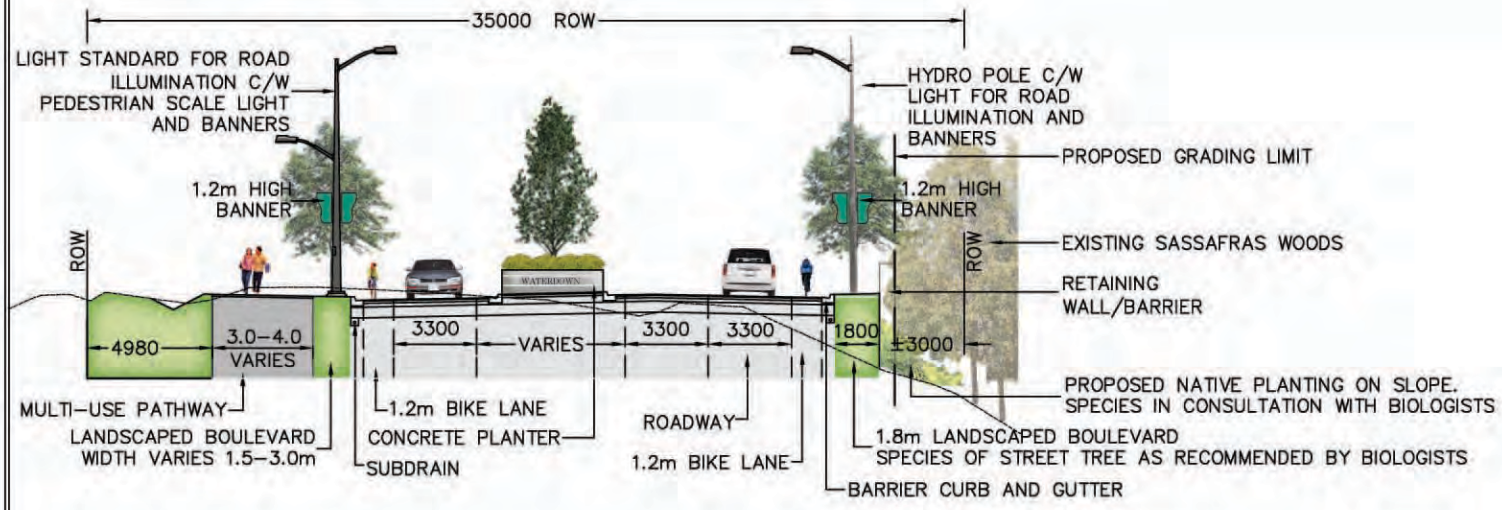
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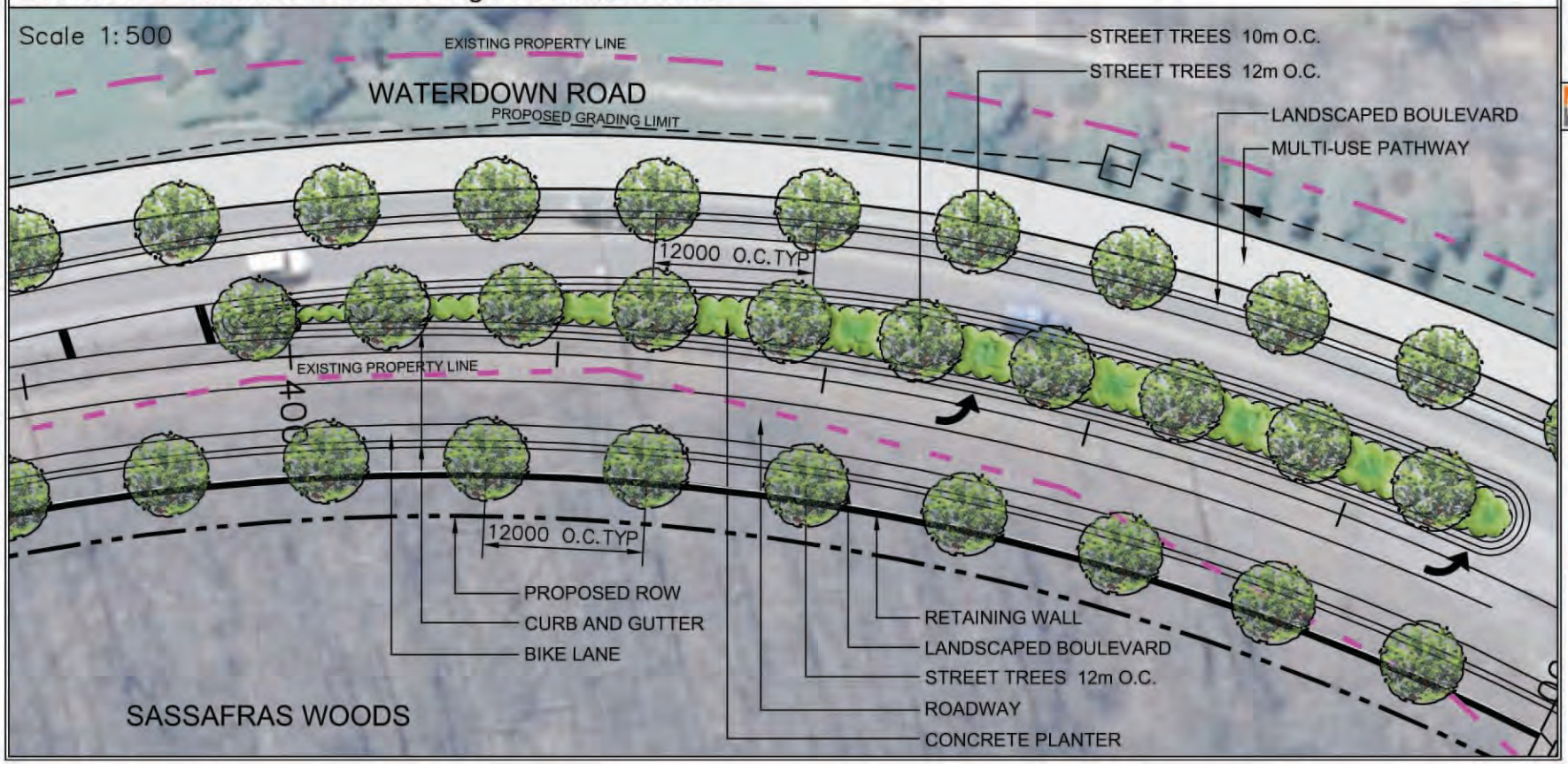
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Figure 6–6



Section thru Waterdown Road looking North. Scale 1:300



WATERDOWN ROAD CORRIDOR CLASS EA

TYPICAL WATERDOWN ROAD SOUTH OF FLATT ROAD

the mbtw group

Scale: As Noted

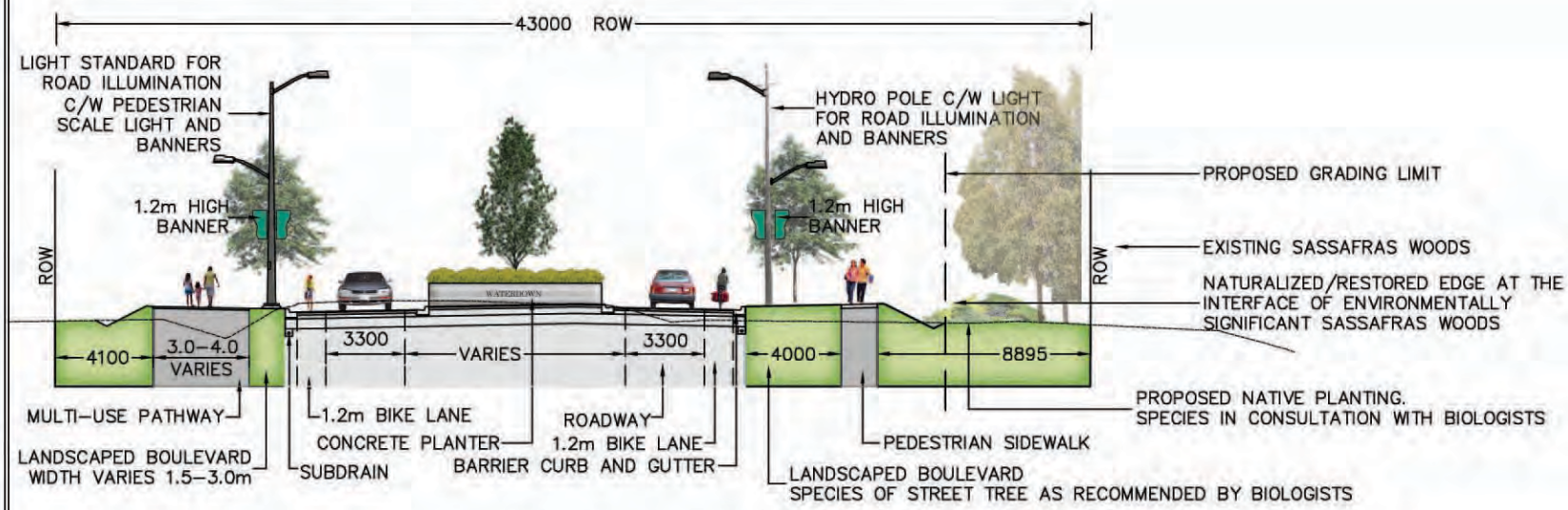
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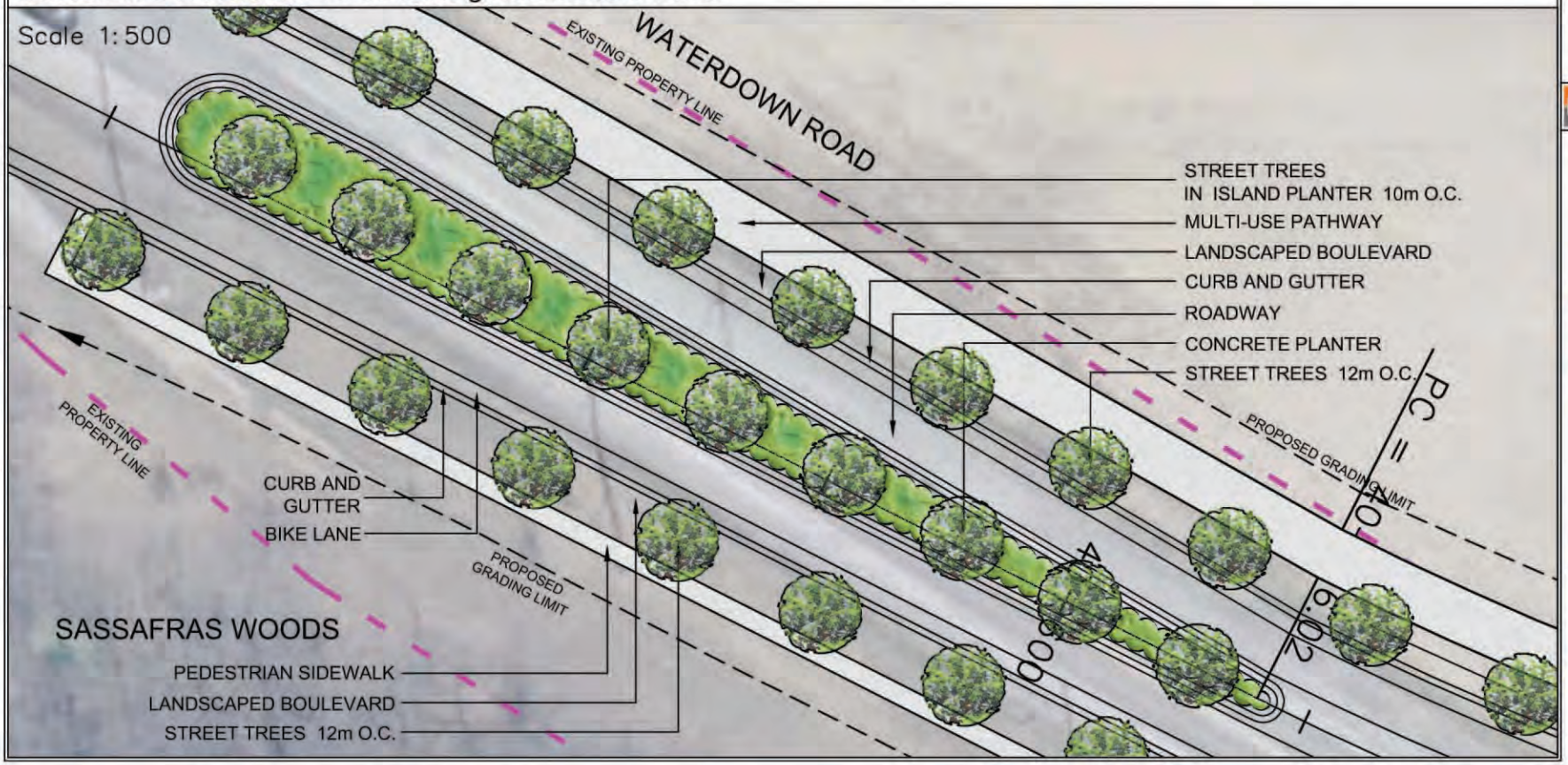
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Figure 6–7



Section thru Waterdown Road looking North. Scale 1:300



WATERDOWN ROAD CORRIDOR CLASS EA

TYPICAL WATERDOWN ROAD NORTH OF FLATT ROAD

the mbtw group

Scale: As Noted

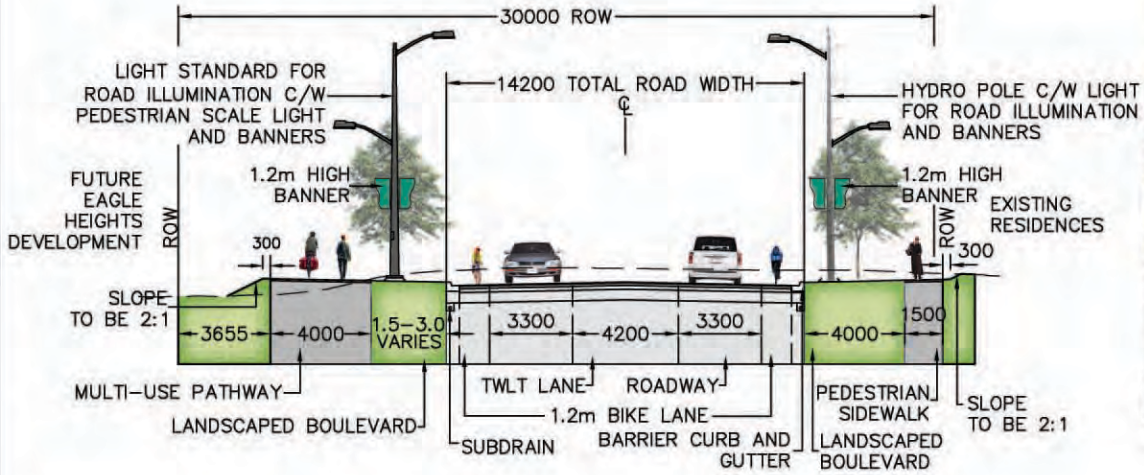
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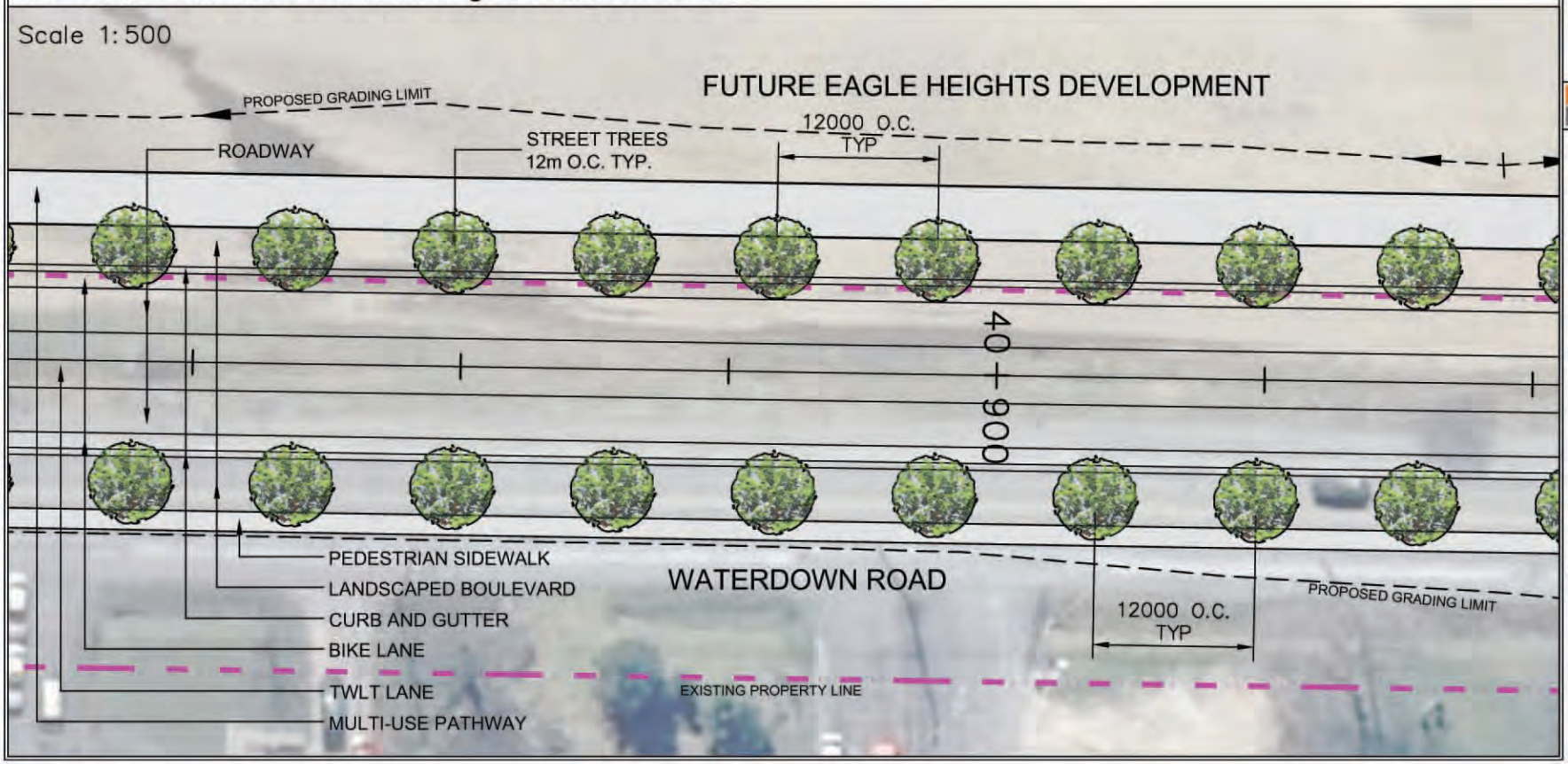
Figure 6–8



Section thru Waterdown Road looking North. Scale 1:300



Waterdown Road #1605 looking North.



WATERDOWN ROAD CORRIDOR CLASS EA

TYPICAL WATERDOWN ROAD OPPOSITE FUTURE EAGLE HEIGHTS DEVELOPMENT

the mbtw group

Scale: As Noted

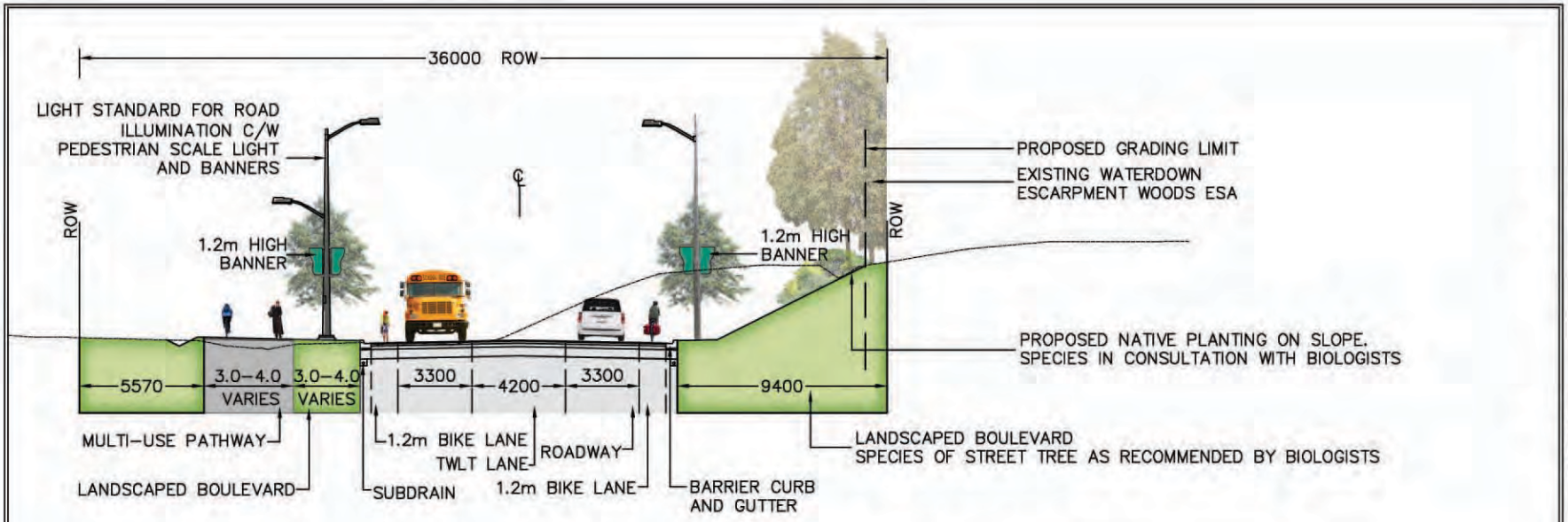
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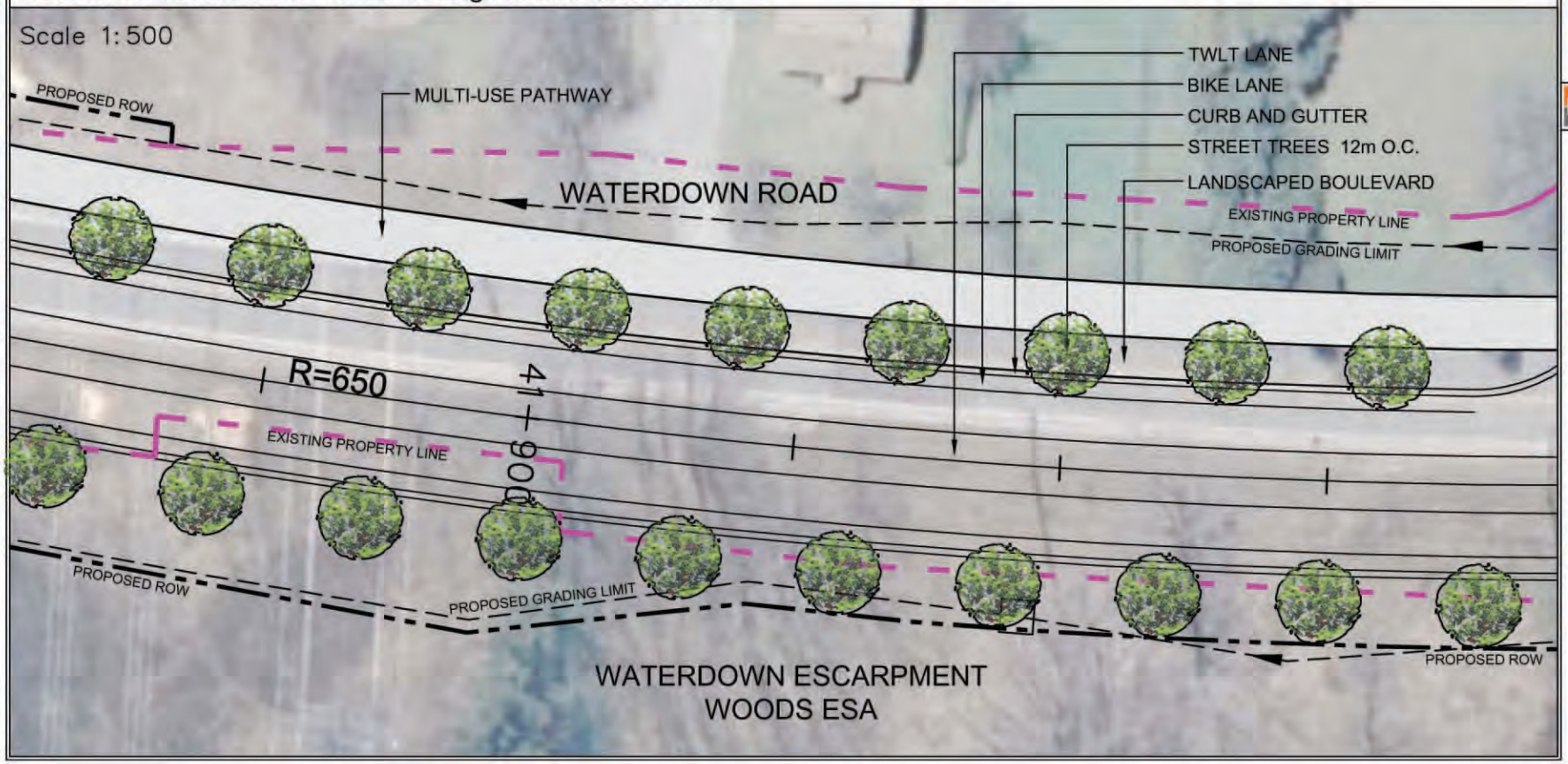
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Figure 6–9



Section thru Waterdown Road looking North. Scale 1:300



WATERDOWN ROAD CORRIDOR CLASS EA

TYPICAL WATERDOWN ROAD SOUTH OF IRESON ROAD

the mbtw group

Scale: As Noted

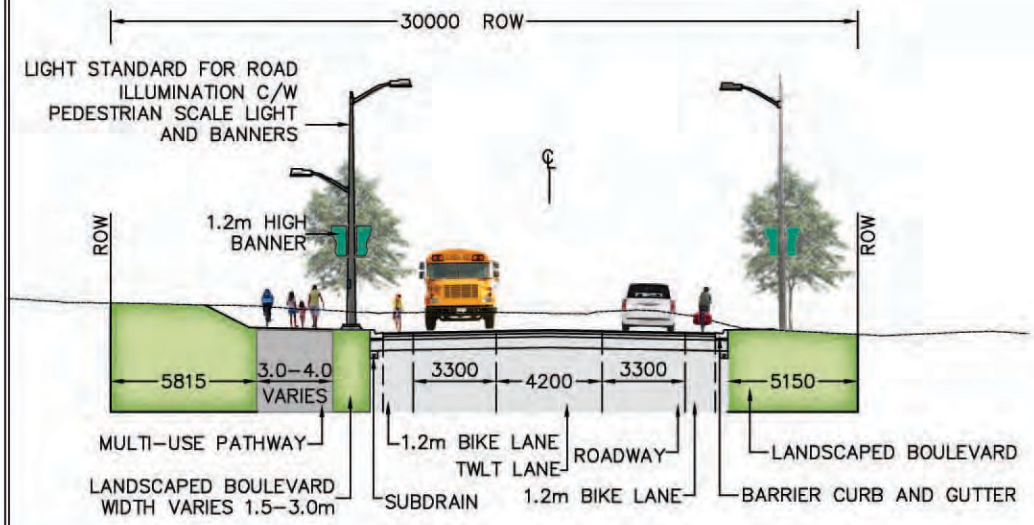
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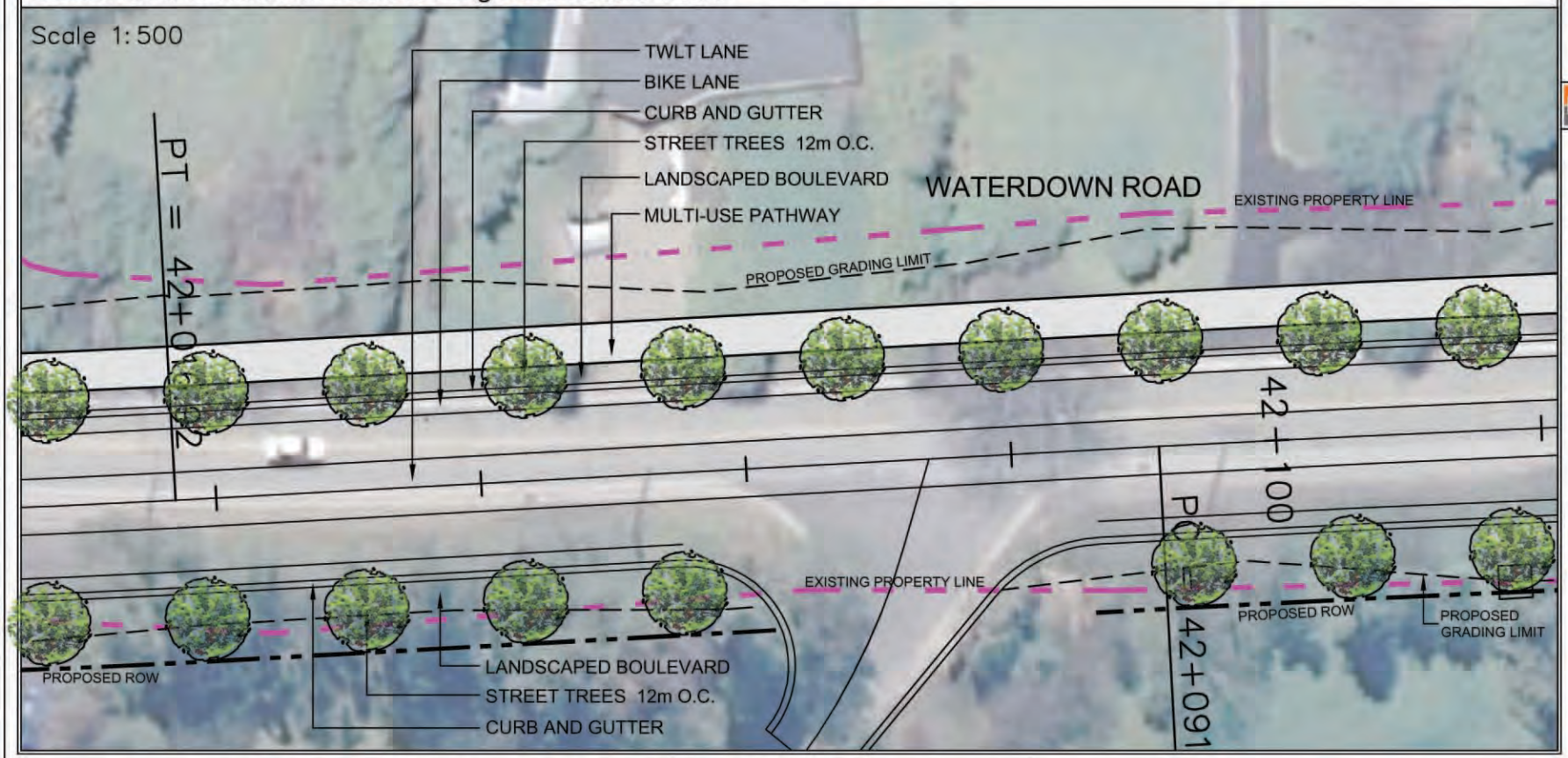
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Figure 6–10



Section thru Waterdown Road looking North. Scale 1:300



WATERDOWN ROAD CORRIDOR CLASS EA

TYPICAL WATERDOWN ROAD BETWEEN IRESON ROAD AND HORNING ROAD

the mbtw group

Scale: As Noted

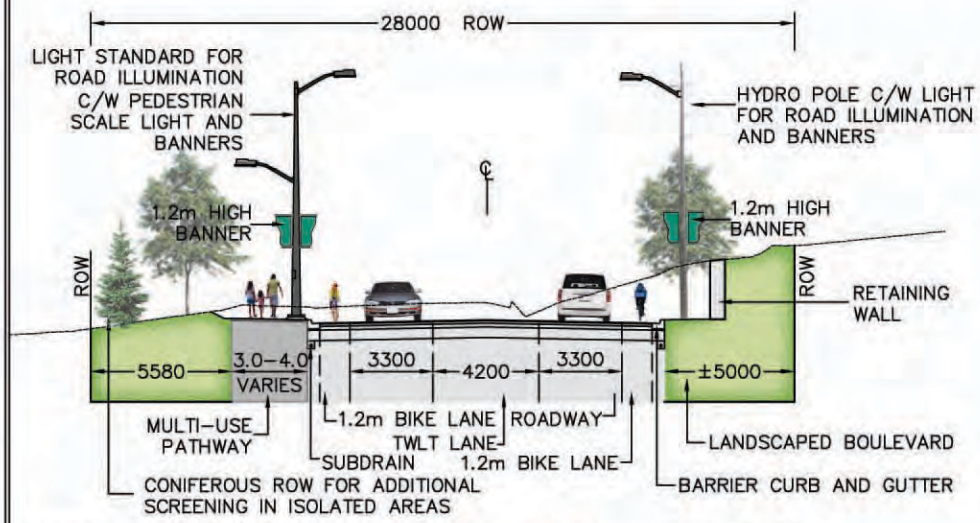
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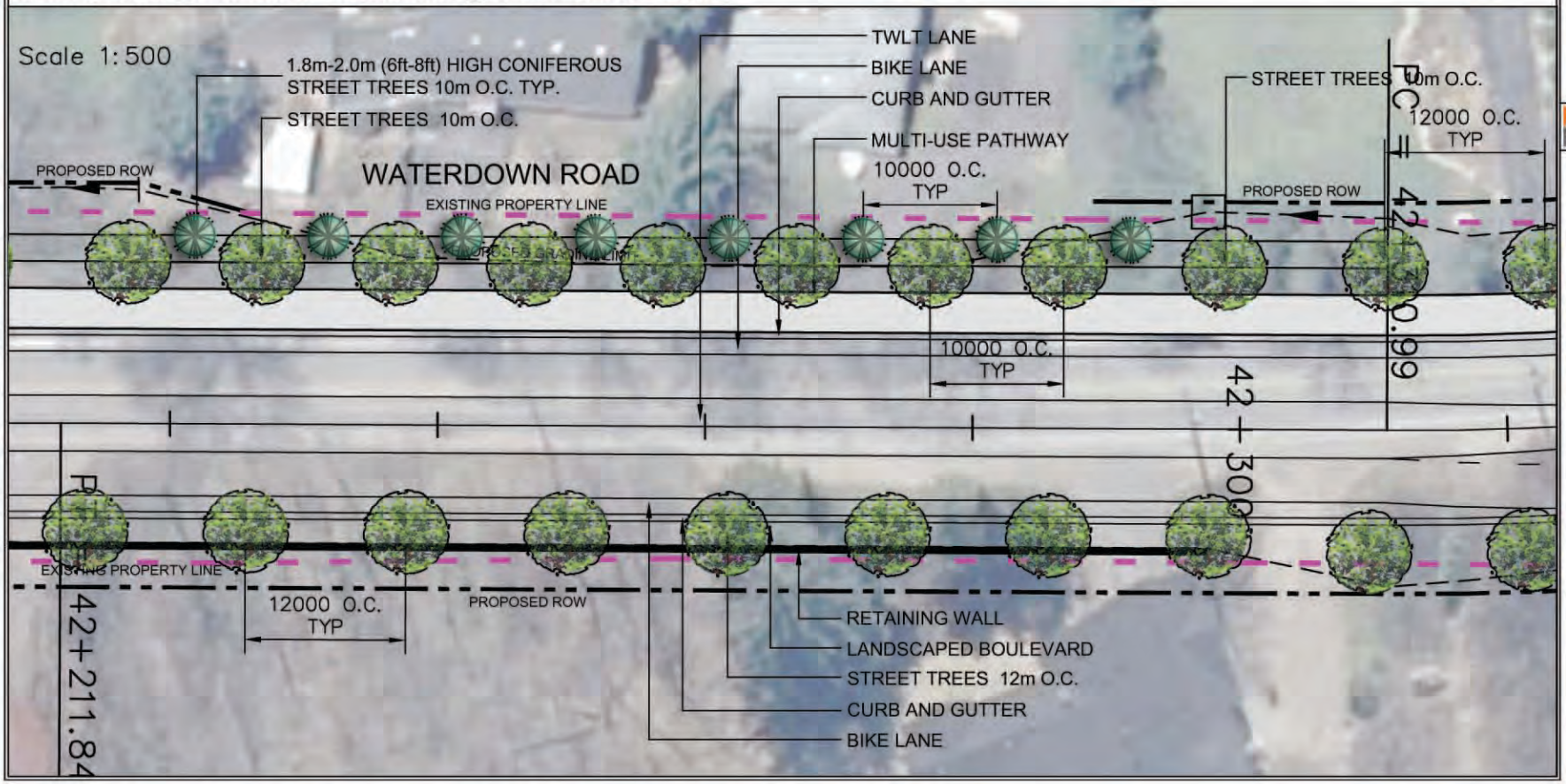
Figure 6–11



Section thru Waterdown Road looking North. Scale 1:300



Waterdown Road #1920 looking North.



WATERDOWN ROAD CORRIDOR CLASS EA

TYPICAL WATERDOWN ROAD NORTH OF HORNING ROAD

the mbtw group

Scale: As Noted

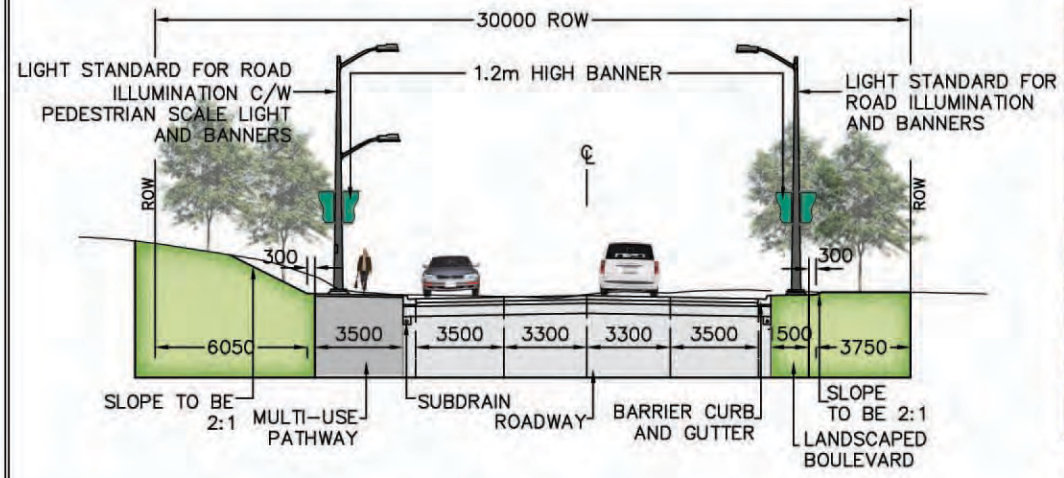
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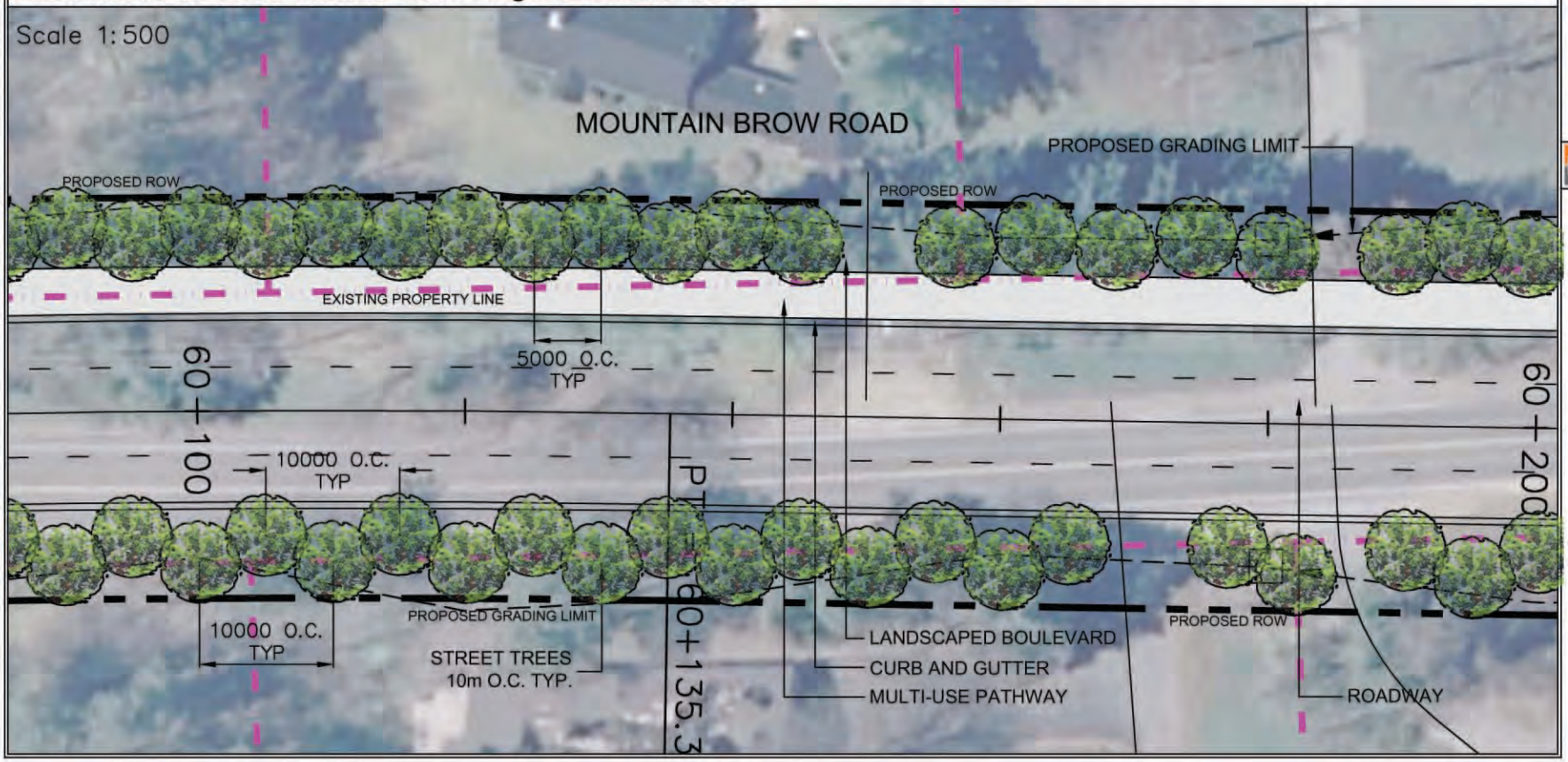
Figure 6–12



Section thru Mountain Brow Road looking East. Scale 1:300



Mountain brow Road at Waterdown Road looking East.



WATERDOWN ROAD CORRIDOR CLASS EA

TYPICAL MOUNTAIN BROW ROAD SECTION EAST OF WATERDOWN ROAD

the mbtw group

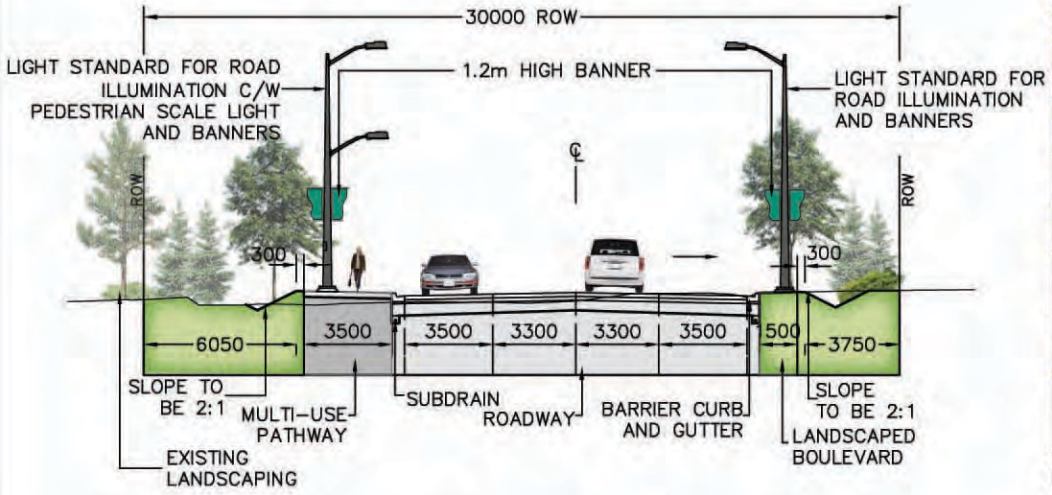
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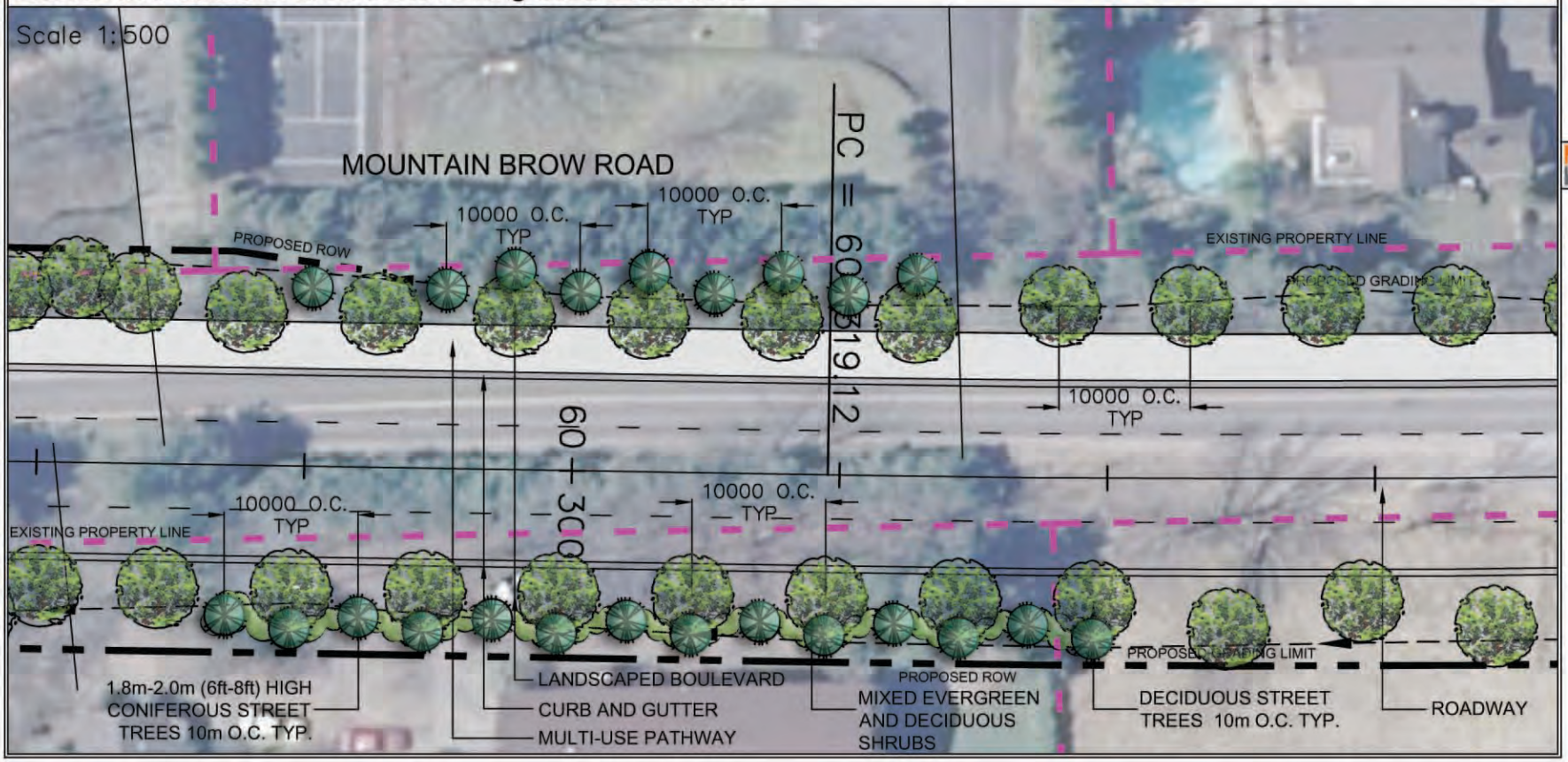
Figure 6–13



Section thru Mountain Brow Road looking East. Scale 1:300



Mountain Brow Road at Flanders Drive looking West.



WATERDOWN ROAD CORRIDOR CLASS EA

TYPICAL MOUNTAIN BROW ROAD SECTION WEST OF FLANDERS DRIVE

the mbtw group

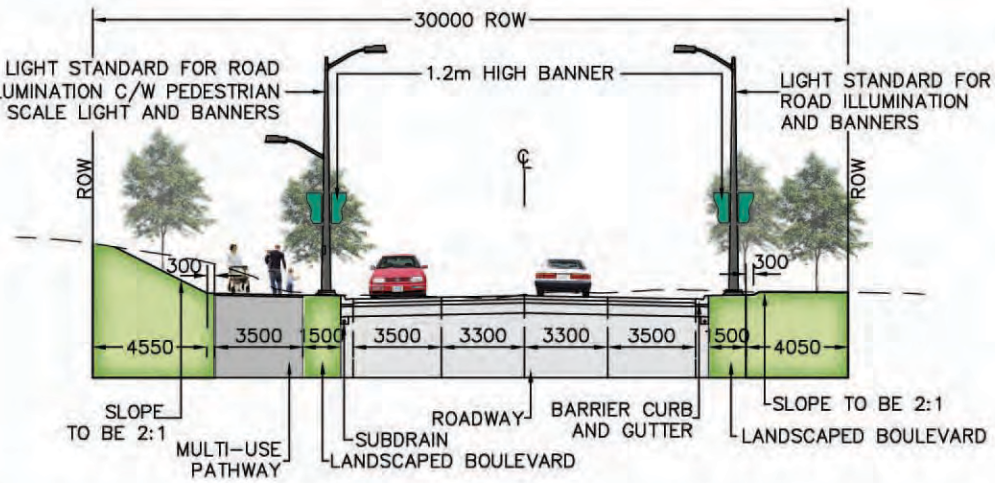
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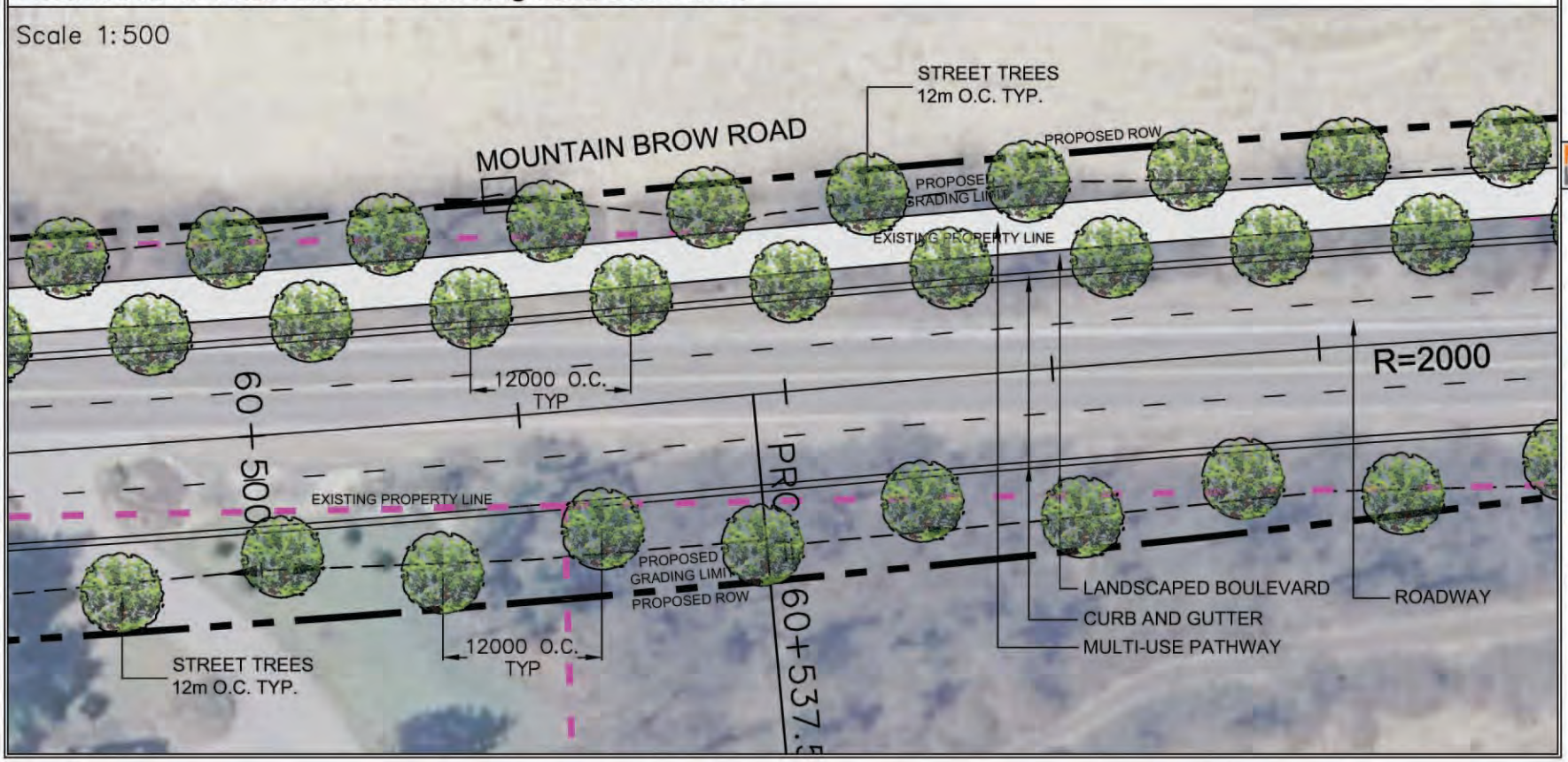
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Figure 6–14



Section thru Mountain Brow Road looking East. Scale 1:300



WATERDOWN ROAD CORRIDOR CLASS EA

TYPICAL MOUNTAIN BROW ROAD SECTION FROM FLANDERS DRIVE TO MID-BLOCK ROAD

the mbtw group

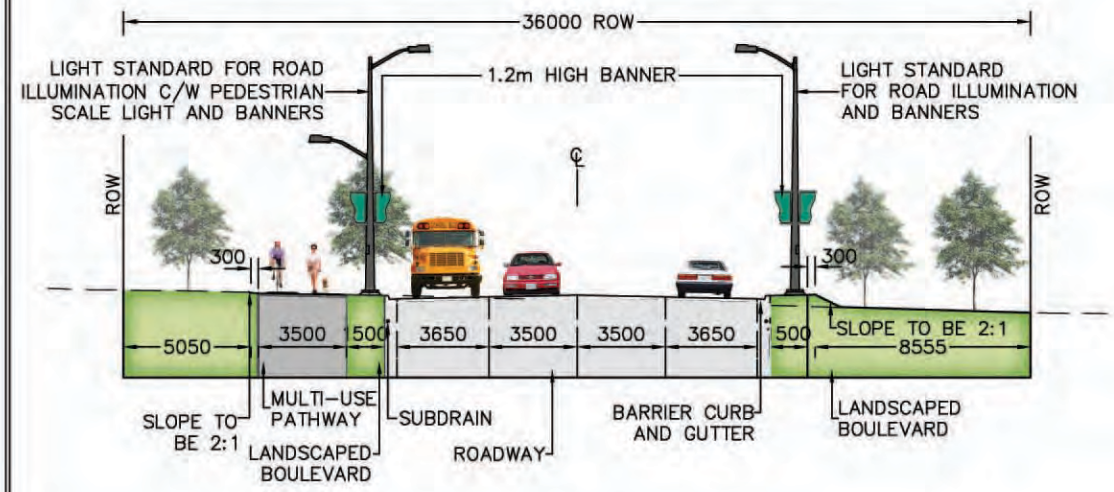
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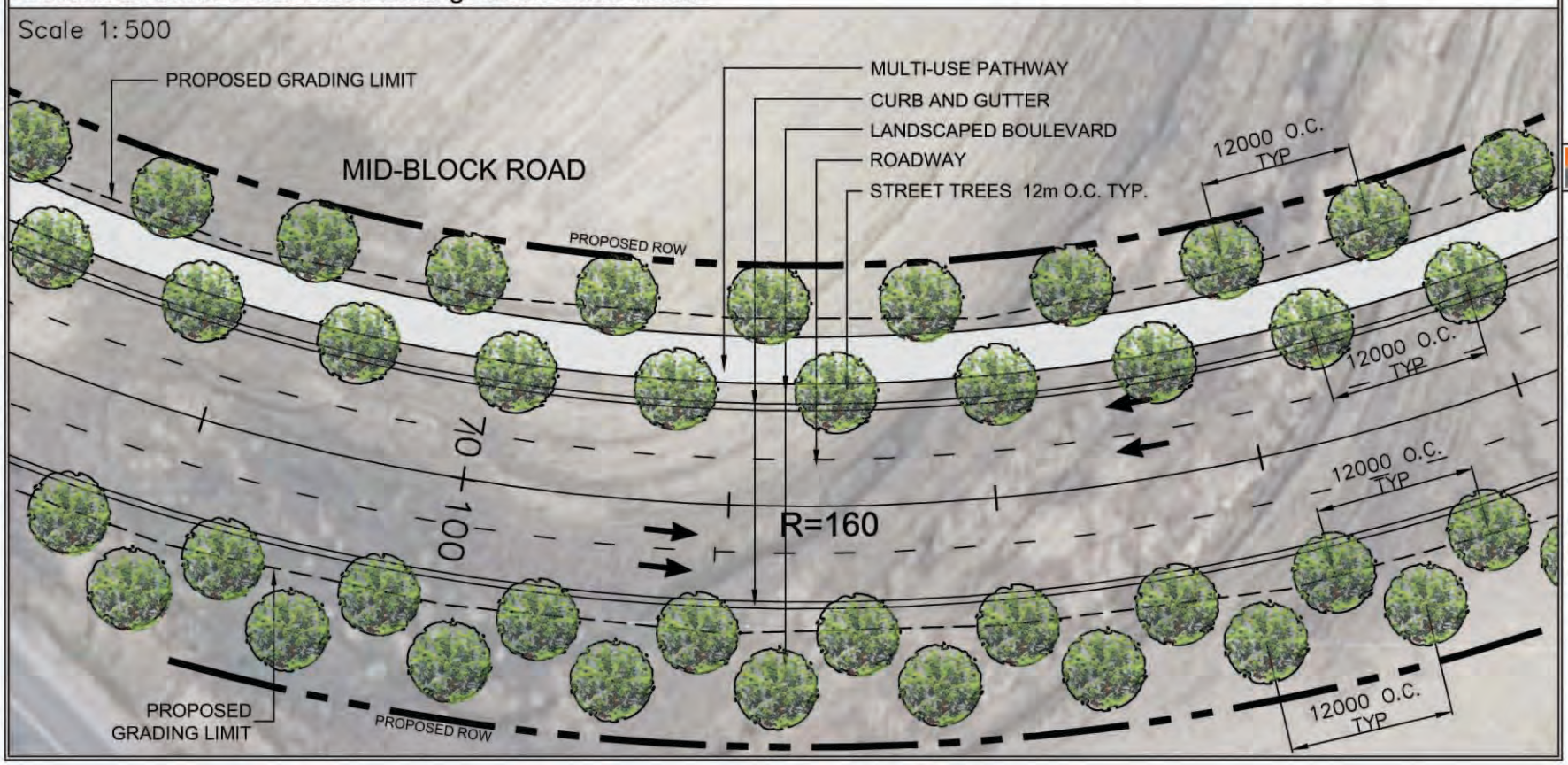
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Figure 6-15



Section thru Mid-Block Road looking North. Scale 1:300



WATERDOWN ROAD CORRIDOR CLASS EA

TYPICAL MID-BLOCK ROAD SECTION FROM MOUNTAIN BROW TO FIRST ROUNDABOUT

the mbtw group

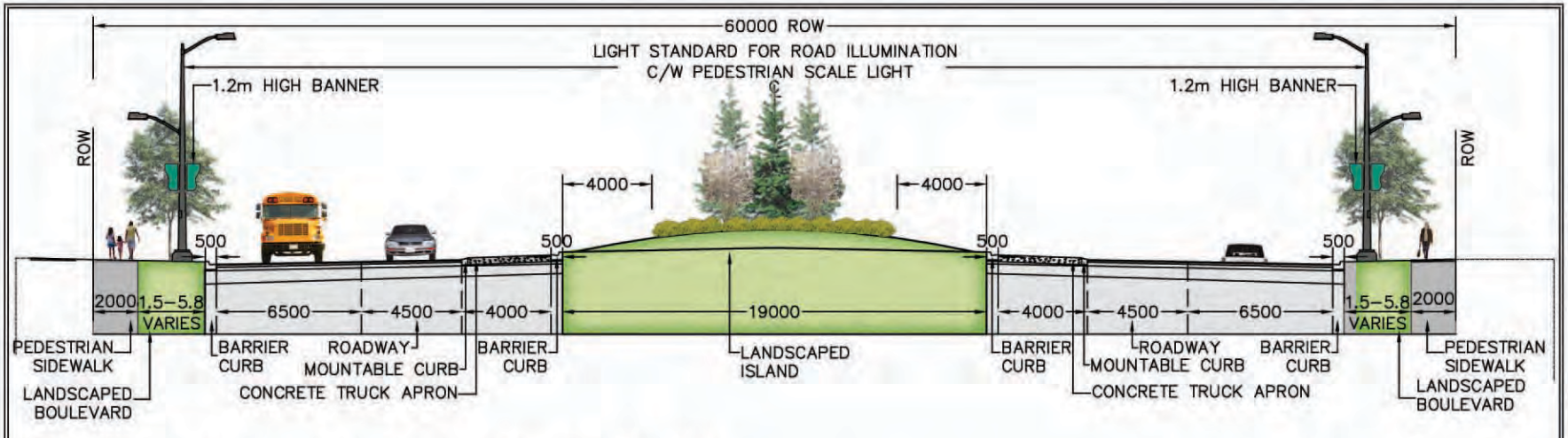
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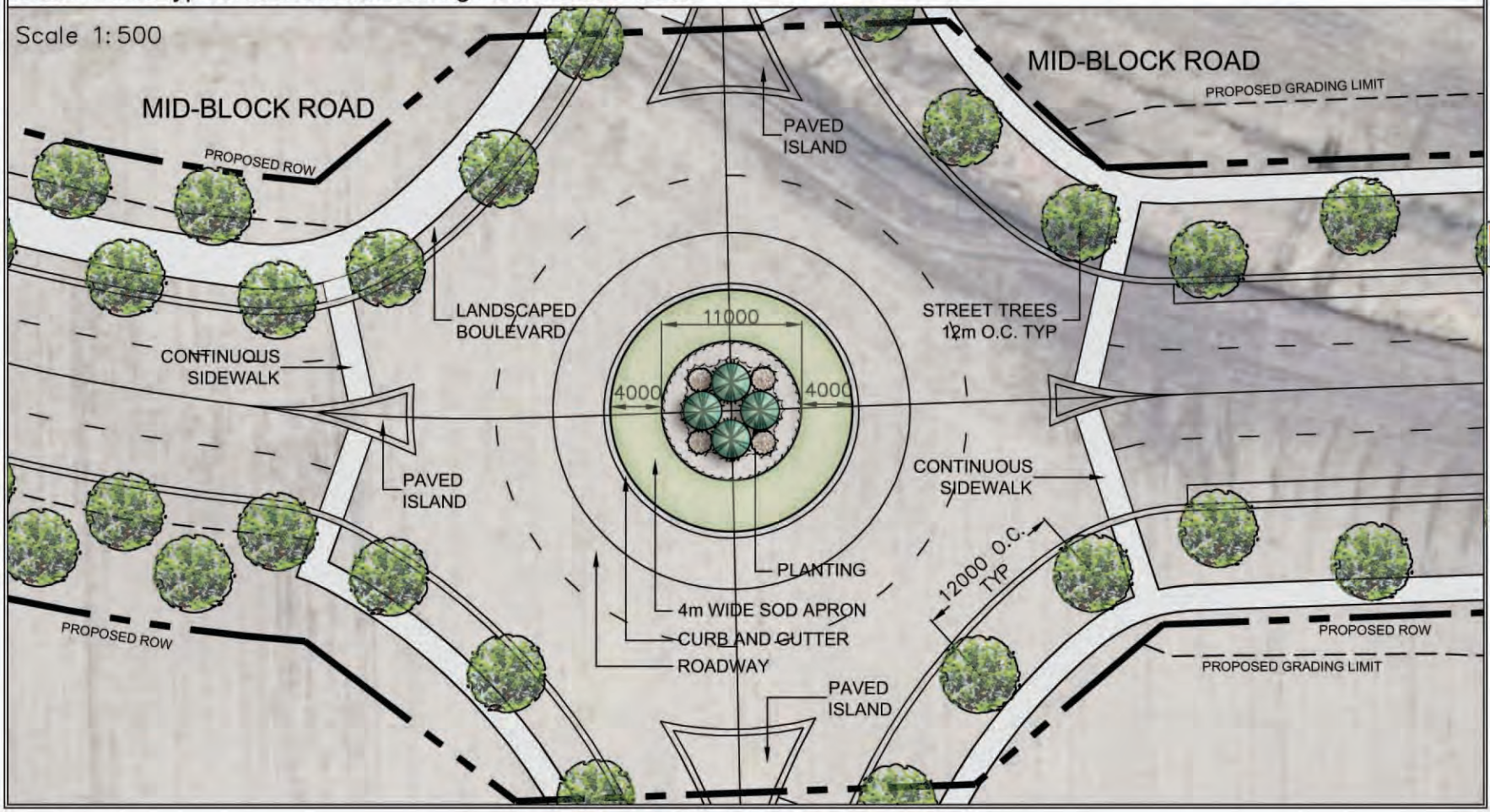
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Figure 6-16



Section thru typical roundabout looking North. Scale 1:300



WATERDOWN ROAD CORRIDOR CLASS EA

TYPICAL MID–BLOCK CONNECTION ROUNDABOUT SECTION

the mbtw group

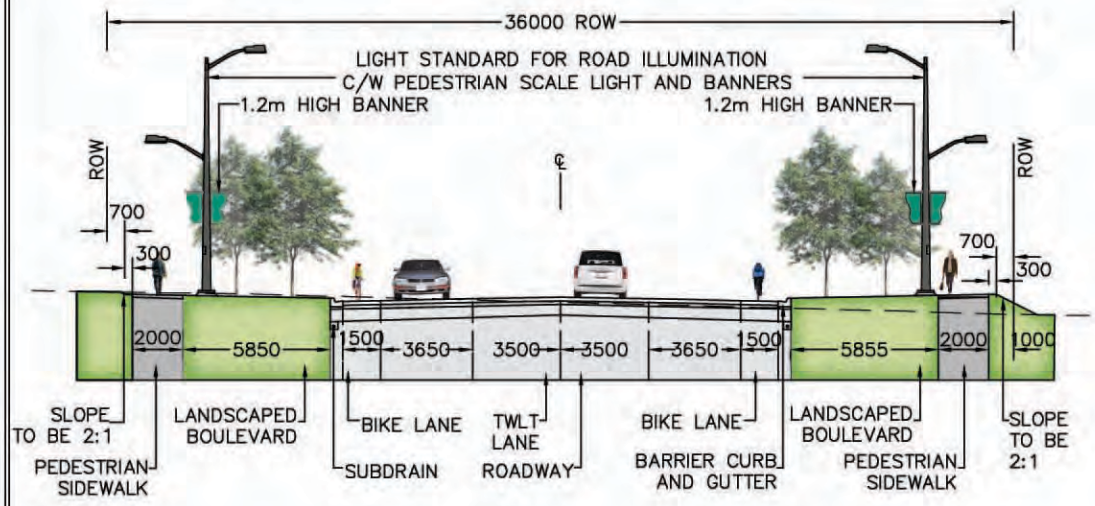
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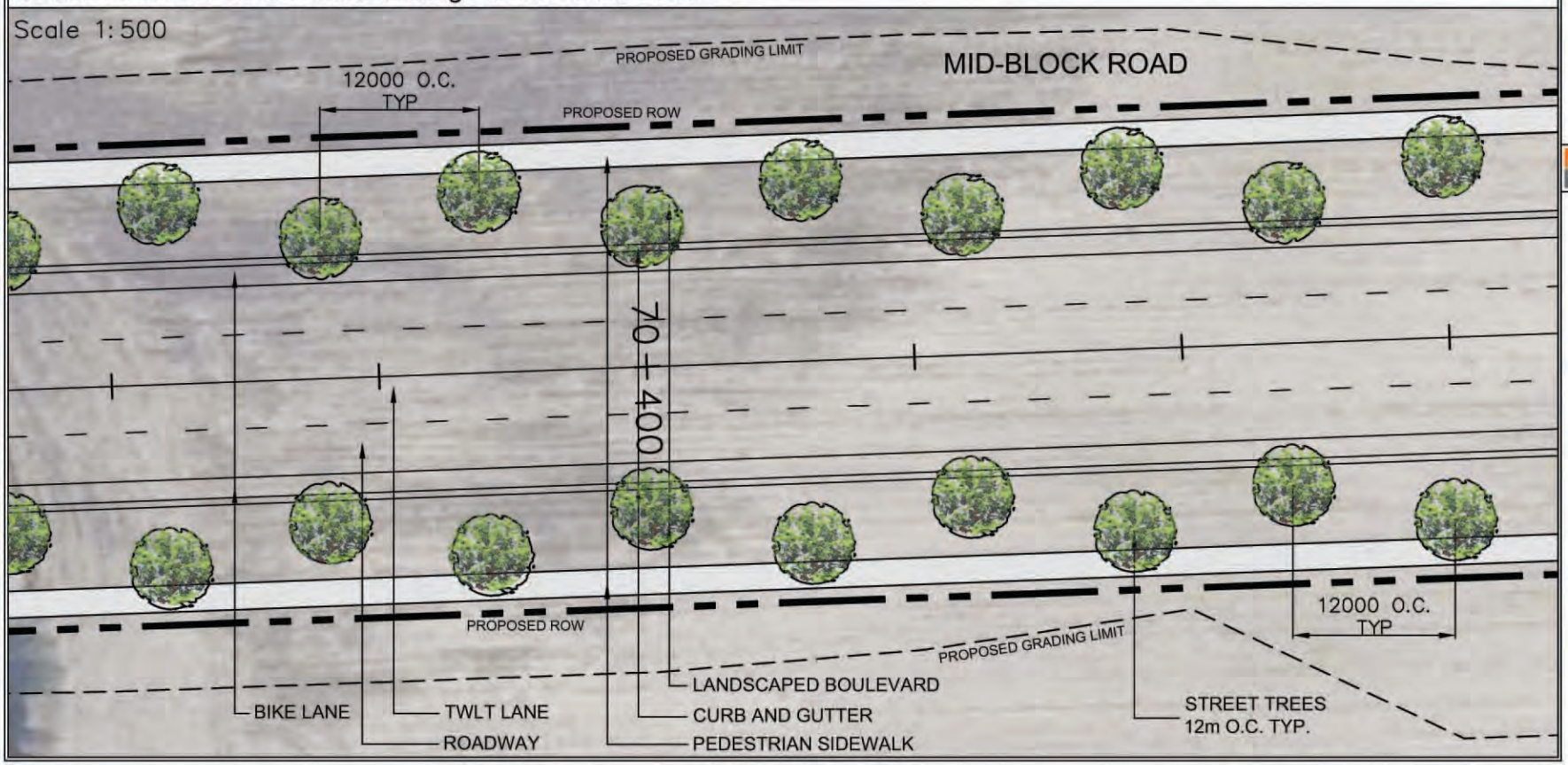
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Figure 6–17



Section thru Mid-Block Road looking North. Scale 1:300



WATERDOWN ROAD CORRIDOR CLASS EA

TYPICAL MID-BLOCK ROAD SECTION FROM FIRST ROUNDABOUT TO NORTH OF SECOND ROUNDABOUT

the mbtw group

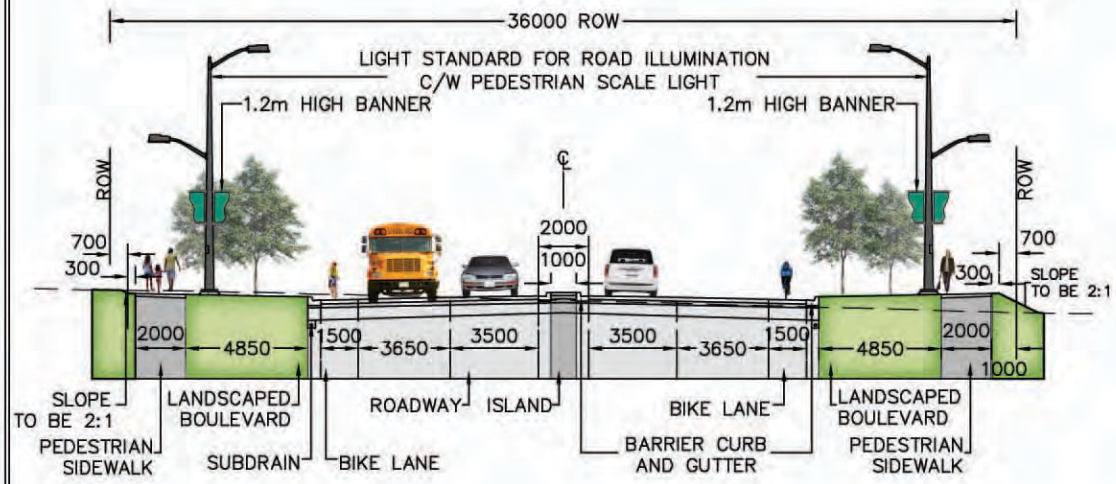
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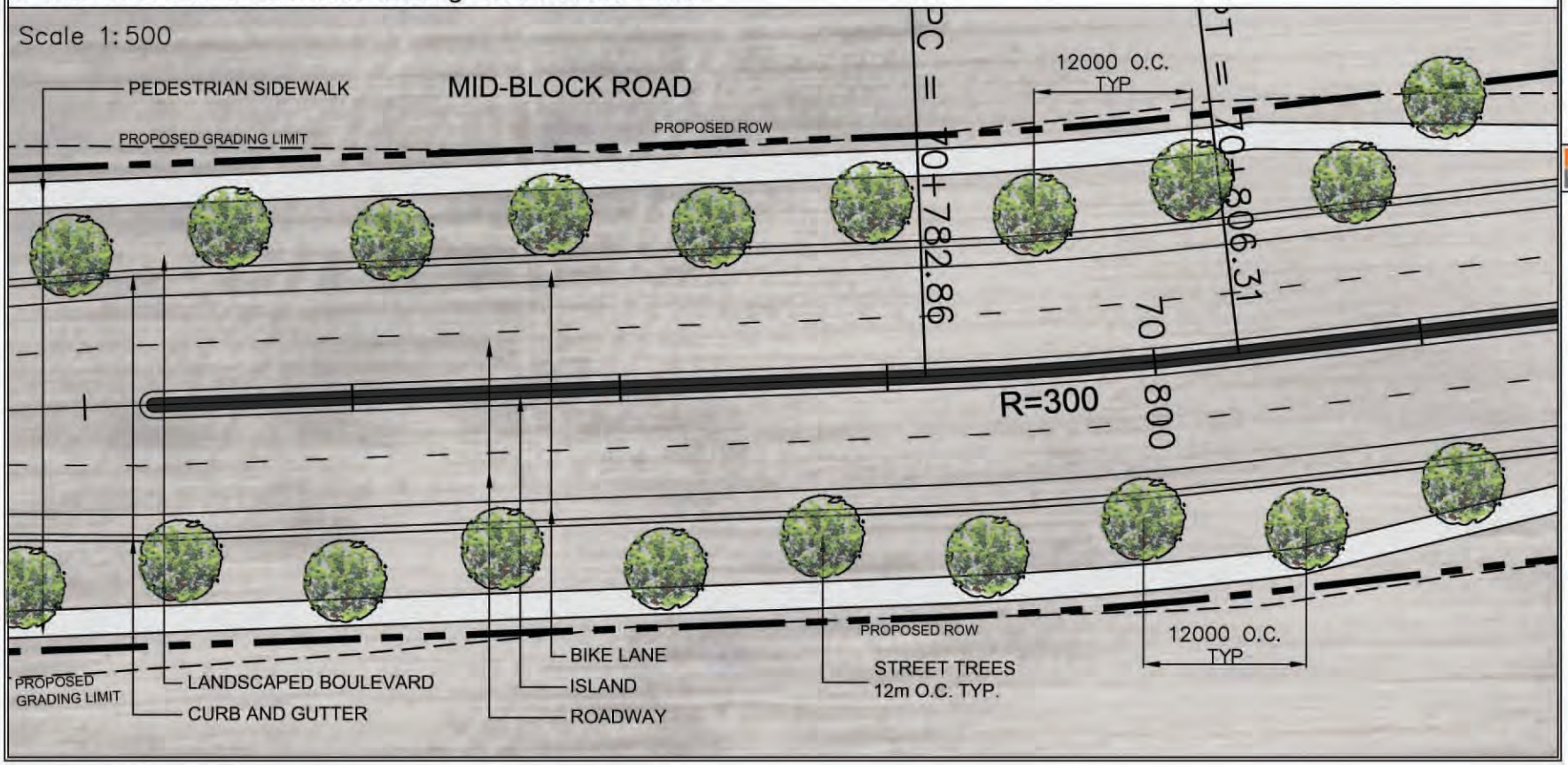
Halton Region

Hamilton Public Works

Figure 6-18



Section thru Mid-Block Road looking North. Scale 1:300



WATERDOWN ROAD CORRIDOR CLASS EA

TYPICAL MID-BLOCK ROAD URBAN SECTION FROM NORTH OF SECOND ROUNDABOUT TO DUNDAS STREET

the mbtw group

Scale: As Noted

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Figure 6-19

6.3.8 Geotechnical

The soil within the anticipated depth of excavation for general site grading and road pavement construction along most of the study corridor is expected to consist of the existing pavement structure and/or the silty clay/clayey silt till. It is expected that use of conventional construction procedures and equipment for excavation and site grading purposes will be suitable.

Excavation slopes should be cut at an inclination of 2 horizontal to 1 vertical (2H:1V). A 2 m wide berm with a reverse slope should be provided for earth cut slope greater than 6 m high for erosion and maintenance purposes. Fill slopes should also be inclined at 2H:1V and be provided with a 2 m wide berm with reverse slope if greater than 8 m in height (ref.: OPSD 202.010). An interceptor ditch should be provided at the top of the earth cut (ref.: OPSD 200.020). Stability of slope studies to locate the stable top of bank will be required in the design phase in the deep ravine areas along the road south of Flatt Road.

Reuse of the excavated granular material from the existing road pavement structures as well as the native silty clay/clayey silt till as bulk fill in other areas of the project is considered to be suitable; the excavated rock could also be used as bulk fill provided the maximum size is less than 150 mm. The predominant soil type likely to be exposed on earth cuts and fills is likely to comprise clayey silt/silty clay. The material is classed as moderately erodible (K factor of 0.4); hence conventional erosion protection systems on exposed slopes should be suitable. Based on the estimated strength and frost susceptibility of the anticipated subgrade and assuming adequate drainage, it is considered that the standard City of Hamilton pavement structure (***Table 6.15***) for a major arterial will be suitable. Conventional procedures are considered to be suitable for preparation of the subgrade as well as construction of the pavement structure and associated drainage.

Table 6-15: Pavement Structure

Pavement Component	Thickness (mm)
Top Course - Asphaltic Concrete HL-1	40
Binder Course - Asphaltic Concrete HL-8 (HS)	120
Granular A Base Course	150
Granular B Type II Sub-base Course	450*

* Can be reduced to 150 mm in rock cut areas since a variation in the composition and thickness of the existing pavement structure on both Waterdown Road and Mountain Brow Road may exist and continuous drainage of the granular base to the road side ditch through the road shoulders may be problematic. It is recommended that full depth reconstruction is carried out. It should not be necessary to excavate granular materials that may exist below the design depth of the new pavement structure.

RETAINING WALLS

At the site of the proposed retaining wall adjacent to Sassafras Woods, the earth slope on the east side of Waterdown Road at this location is

about 25 m high with an overall average inclination of about 1.7H:1V. It is vegetated with grass, shrubs and deciduous trees with a butt diameter of 100 to 200 mm, locally up to 600 mm. No evidence of instability was detected. Borehole 1 drilled near the north limit of the proposed retaining wall encountered fill and firm clay to a depth of 2.1 m overlying a 1.7 m thick deposit of hard clay till that is underlain by Queenston shale. It is considered that use of spread footings founded on the hard clay till about 2.1 m below grade is a feasible means of supporting the retaining wall; a factored bearing resistance at Ultimate Limit States (ULS) of 500 kPa is considered to be suitable for preliminary design.

For the proposed retaining wall on the east side of Waterdown Road, south of Mountain Brow Road, Borehole 5 drilled near the centre of the proposed retaining wall encountered pavement structure and fill to a depth of 1.4 m overlying a deposit of hard to very stiff clay till. It is considered that use of spread footings founded on the hard clay till about 1.5 m below grade is a feasible means of supporting the retaining wall; a factored bearing resistance at ULS of 400 kPa is considered to be suitable for preliminary design.

All works within Conservation Halton's jurisdiction will need to be constructed in accordance with their Regulation 162/06 (*Regulation of Development, Interference with Wetlands and Alteration to shorelines and Watercourses*).

6.3.9 Entrance Treatments

WATERDOWN ROAD

There are approximately 66 existing driveways along Waterdown Road. The existing road profile is being maintained throughout the corridor to the extent possible and it is expected that the proposals will not negatively impact the vast majority of the driveways. Driveways on the west side of the road will require an adjustment in their driveway grade due to the installation of the 4m multi-use pathway and the edge of pavement being located further back from its current location. The driveways of residents opposite the Eagle Heights development should experience a slight improvement due to the installation of a sidewalk and wide boulevard.

The driveway at #1390 Waterdown Road is in very close proximity to the road and it will be very difficult to provide an adequate driveway grade for this resident and to maintain the existing driveway in its current configuration (land is not available for alternative configurations). Similarly, the driveway at # 1917 Waterdown Road cannot be maintained due to the required grade (25%) and, in part, due to the proposed retaining wall causing a sight distance concern.

The driveway at #2000 Waterdown Road cannot be maintained in its current location due to steep grades and the presence of the proposed retaining wall. Initial discussions have been held with the affected owners regarding the possibility of relocating this driveway to an

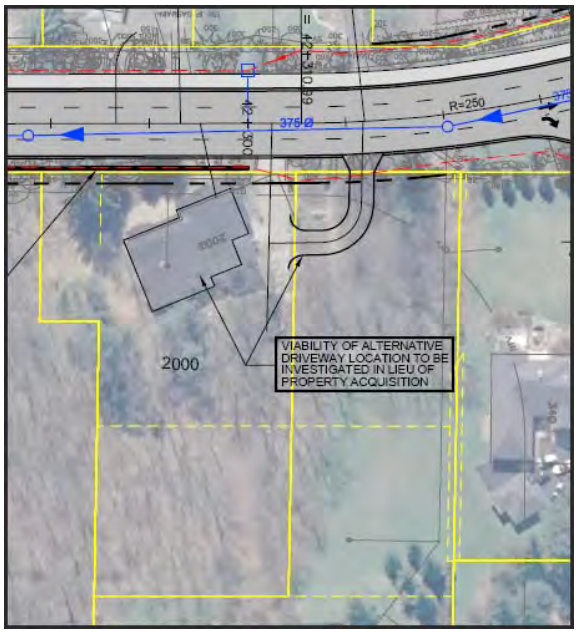


Exhibit 6-12: Alternative Driveway Location

adjacent lot immediately to the north. The feasibility of relocating the driveway needs to be further investigated and is subject to additional property acquisition and/or easement discussions between the City of Hamilton and the affected land owners. Refer to ***Exhibit 6-12*** for the alternative driveway location layout.



Exhibit 6-13: Flatt Road Intersection

MOUNTAIN BROW ROAD

There are approximately 12 existing driveways along Mountain Brow Road. Driveways on the north side of the road are generally expected to improve in grade as a result of the multi-use pathway installation and the edge of pavement being located further back from its current location. Driveways on the south side may experience a slight increase in steepness from their current condition. It is expected that all driveways will be regarded with a slope of less than 6%.

6.3.10 Intersection Treatments

WATERDOWN ROAD

Starting at the south project limits and travelling north, the following side roads intersect Waterdown Road:

- **Craven Avenue** – This side road is under the jurisdiction of the City of Burlington. It connects with Waterdown Road on the west side only, forming a 'T' type intersection. The intersection has been reconstructed as part of the City of Burlington/ MTO Highway 403/Waterdown Interchange project. The improvements proposed as part of this project will tie into the north leg of this intersection. Coordination with the City of Burlington will be required at the design phase as transitioning of the centre line may be required to ensure a proper tie-in.
- **Flatt Road** – This road is under the jurisdiction of the City of Burlington. It connects with Waterdown Road on the west side only. As mentioned in section 6.3.1, it is proposed to realign a portion of Flatt Road at the tie-in to Waterdown Road. The intersection is currently stop-controlled, with traffic on Flatt Road yielding to traffic on Waterdown Road. It is proposed to maintain the stop-control intersection arrangement. Construction along Flatt Road is to extend to the limit of re-alignment and will not impact the existing creek crossing west of Waterdown Road. An auxiliary northbound left-turn lane is proposed in anticipation of future development at this location. For the proposed layout at this intersection, please refer to ***Exhibit 6-13***.
- **Ireson Road** – This road is under the jurisdiction of the City of Burlington. It connects with Waterdown Road on the west side only, forming a 'T' type intersection. Ireson Road serves approximately 8 homes on the west side of Waterdown Road. The intersection is currently stop-controlled with vehicles on Ireson yielding to vehicles on Waterdown Road. It is proposed



Exhibit 6-14: Ireson Road Intersection

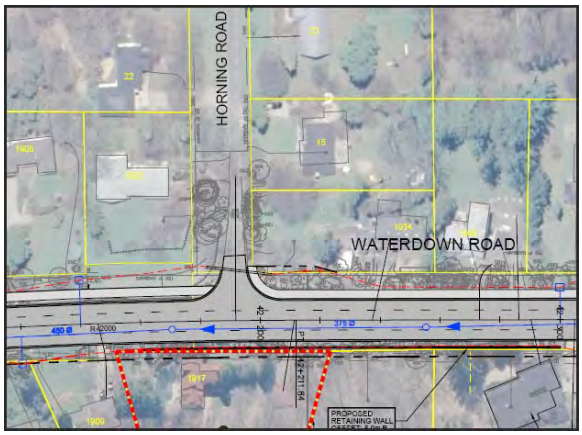


Exhibit 6-15: Horning Road Intersection

to maintain the stop-control intersection arrangement. For the proposed layout at this intersection, please refer to ***Exhibit 6-14***.

- **Old Waterdown Road** – This road is under the jurisdiction of the City of Burlington. It connects with Waterdown Road on the east side only, forming a 'T' type intersection. This two lane road meets Waterdown Road at approximately 100m north of Ireson Road. The intersection is currently stop-controlled with vehicles on Old Waterdown yielding to vehicles on Waterdown Road. It is proposed to maintain the stop-control intersection arrangement. For the proposed layout at this intersection, please refer to ***Exhibit 6-14.***
- **Horning Road** – This road is under the jurisdiction of the City of Burlington. It connects with Waterdown Road on the west side only, forming a 'T' type intersection. This existing road, located approximately 200 m south of Mountain Brow Road is currently stop-controlled with vehicles on Horning Road yielding to vehicles on Waterdown Road. It is proposed to maintain the stop-control intersection arrangement. For the proposed layout at this intersection, please refer to ***Exhibit 6-15***.
- **Mountain Brow Road** – This road is under the jurisdiction of the City of Hamilton. Although a full four-legged intersection is formed at the junction of these roads, it should be noted that the west leg of the intersection serves a small number of homes (approximately 8). At the north leg of the intersection, Waterdown Road turns into Mill Street, a two lane road that carries traffic to/from Dundas Street. The existing intersection is currently stop-controlled.

  It is proposed to signalize the intersection as part of this project. The south and east legs of the intersection will have four lanes, with the northbound right and westbound left lanes being forced exit lanes onto Mountain Brow Road and Waterdown Road, respectively. A channelized island is proposed for the northbound right turn lane. The layout of this intersection is depicted in ***Exhibit 6-16***.

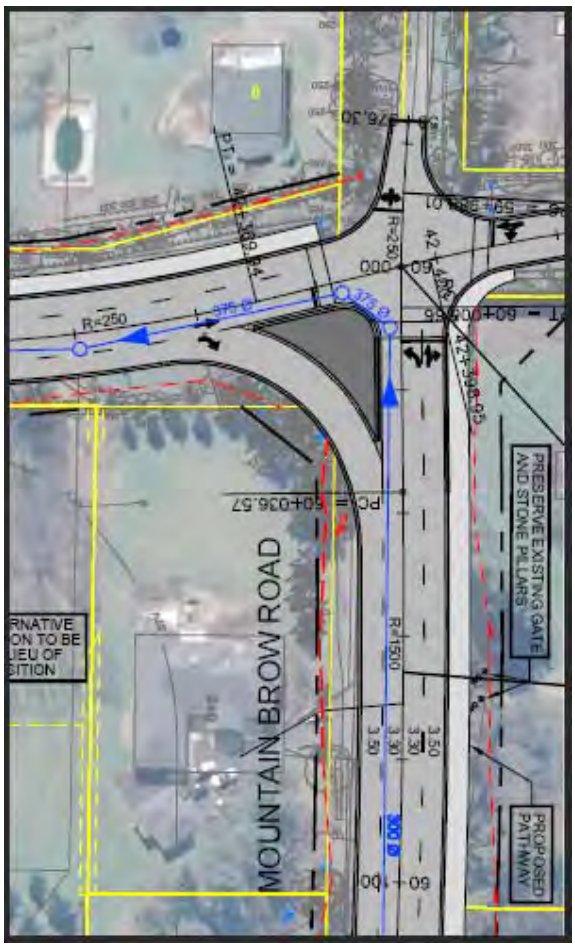


Exhibit 6-16: Mountain Brow Road Intersection

MOUNTAIN BROW ROAD

Continuing from the Waterdown Road intersection and travelling east, the following side roads intersect Mountain Brow Road:

- **Flanders Drive** – This side road is under the jurisdiction of the City of Hamilton. It connects with Mountain Brow Road at approximately 400 m east of Waterdown Road on the north side only, forming a 'T' type intersection. Flanders Drive presently serves a community of approximately 45 homes. The existing intersection is currently stop-controlled in all directions.

  As part of the proposed widening, the existing stop signs on Mountain Brow Road will be removed to improve the flow of

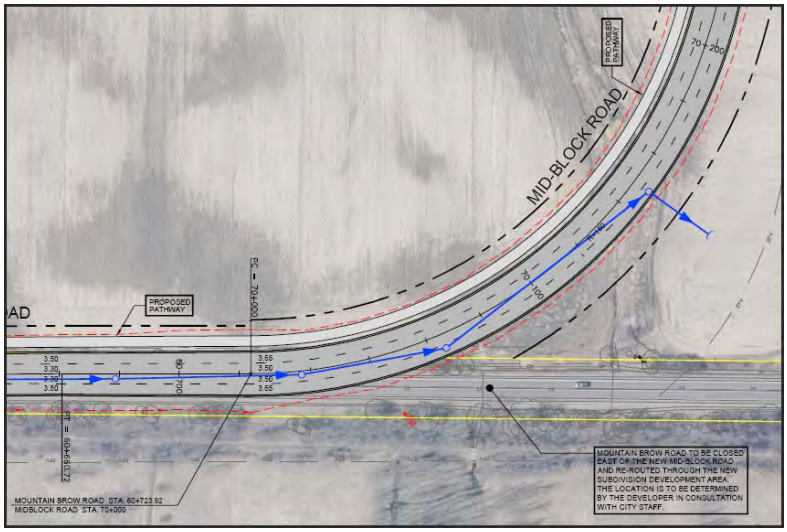


Exhibit 6-17: Flanders Drive Intersection

traffic on Mountain Brow Road. Vehicles on Flanders Drive will yield to vehicles on Mountain Brow Road. The layout of this intersection is depicted in ***Exhibit 6-17***.

- **Mid-Block Road** – The connectivity of Mountain Brow Road with the new Mid-Block Road was briefly discussed in Section 6.3.1 of this report. In order to improve the flow of traffic for vehicles wanting to access Dundas Street, a curved alignment of radius 160 m has been introduced at the junction of these two roads. As a result, Mountain Brow Road will be closed immediately east of the new curved alignment and will be re-routed through the Waterdown South development lands approximately 300m east of the closure. This layout is shown in ***Figure 6-20***.

Figure 6-20: Mid Block Treatment at Mountain Brow Road



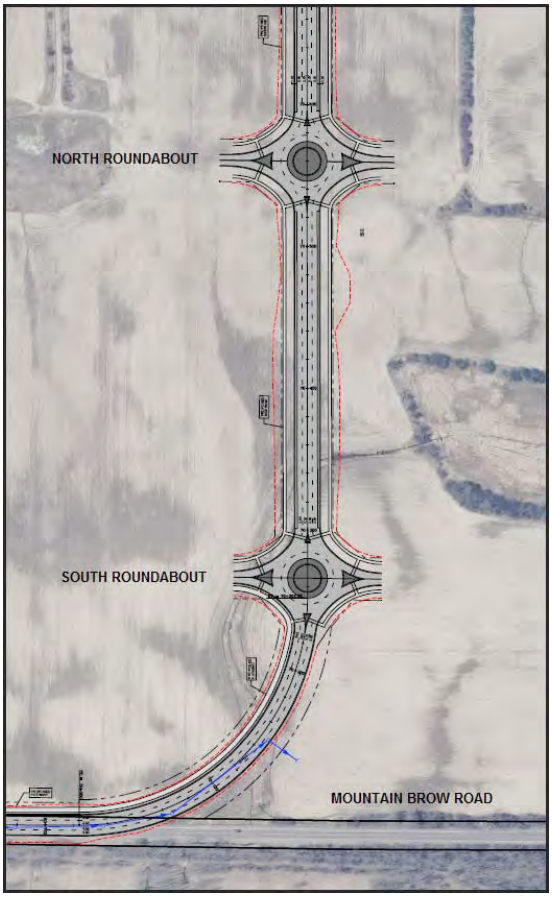


Exhibit 6-18: North and South Roundabouts

MID-BLOCK ROAD

Continuing from the Mountain Brow Road intersection and travelling north, the following roads will intersect the new Mid-Block Arterial Road. It should be noted that only Phase 1A of the Waterdown South development has been approved. The proposed layout, including intersecting roads, for the remainder of the development lands needs to be reviewed and approved by the City of Hamilton as part of the development process. As such, only major collector and arterials are discussed in this section:

- **South Collector Roundabout** – As part of the proposed development, a collector road is proposed to be located within the southern portion of the subdivision. This east-west collector road will be designed as a two-lane road and will intersect the Mid-Block Road at a two-lane roundabout. The exact location of the collector road needs to be finalized and is subject to the review and approvals of the development process. A layout of the proposed roundabout is shown in ***Exhibit 6-18.***

- **North Collector Roundabout** - As part of the Phase 1A approved development for Waterdown South, a collector road is proposed to be located within the northern portion of the subdivision. This east-west collector road will be designed as a two-lane road and will intersect the Mid-Block Road at a two-lane roundabout. A layout of the proposed roundabout is shown in ***Exhibit 6-18***.
- **Dundas Street** – Dundas Street is under the jurisdiction of the City of Hamilton. As part of the improvements, it is proposed to signalize this future intersection with Dundas Street. The new Mid-Block Road will tie into Dundas Street opposite Burke Street. Channelized islands will be installed to prevent northbound vehicles from continuing north along Burke Street. Vehicles travelling southbound on Burke will be allowed to continue south on the Mid-Block Road. For the proposed layout at this intersection, please refer to ***Exhibit 6-19***.

Existing Mountain Brow Road will be closed east of the curved road section. The location and details of this closure will be completed through the secondary plan process.



Exhibit 6-19: Dundas Street Intersection

6.3.11 Property Requirements

A basic right-of-way width of 30 m is proposed along Waterdown Road and Mountain Brow Road. A right-of-way width of 36 m is proposed along the new Mid-Block Road. Additional right-of-way may be required at some locations to accommodate grading. The extent of property requirements is shown on the Plates at the end of this chapter and is summarized in ***Table 6.16*** below. It is noted that these property requirements are preliminary and should be confirmed during detailed design.

Table 6-16: Property Requirements

Property Affected (Address and/or Location)			Additional Property Required	Comments
Waterdown Road - West Side				
1	# 1360 Waterdown Road	STA 40+090 to STA 40+128	0.0006 ha ±	- Residential property fronting onto Waterdown Road - Small parcel of land required at north end of property - Full access to property maintained.
2	# 1376 Waterdown Road	STA 40+128 to STA 40+220	0.040 ha ±	- Property is site of Waterdown reservoir - Property fronts onto Waterdown Road - Full access to property maintained
3	# 1390 Waterdown Road	STA 40+220 to STA 40+278	Full Buy-Out Proposed	- Residential property fronting onto Waterdown Road - Home in very close proximity to proposed roadway - Driveway access very difficult to maintain
4	Address # not applicable - (Eagle Heights Development)	STA 40+528 to STA 41+238	0.397 ha ±	- Property is part of the Eagle Heights development - Property fronts onto Waterdown Road
5	# 1682 Waterdown Road	STA 41+238 to STA 41+302	0.031 ha ±	- Property is privately owned - Undeveloped property fronting onto Waterdown Road

Property Affected (Address and/or Location)			Additional Property Required	Comments
				- No access exists onto Waterdown Road
6	# 1704 Waterdown Road	STA 41+302 to STA 41+345	0.009 ha ±	- Residential property fronting onto Waterdown Road - Full access to property maintained.
7	# 1764 Waterdown Road	STA 41+557 to STA 41+606	0.012 ha ±	- Residential property fronting onto Waterdown Road - Full access to property maintained
8	# 1772 Waterdown Road	STA 41+606 to STA 41+637	0.007 ha ±	- Residential property fronting onto Waterdown Road - Full access to property maintained
9	# 1802 Waterdown Road	STA 41+670 to STA 41+700	0.007 ha ±	- Residential property fronting onto Waterdown Road - Full access to property maintained
10	# 1810 Waterdown Road	STA 41+700 to STA 41+732	0.006 ha ±	- Residential property fronting onto Waterdown Road - Full access to property maintained
11	# 1822 Waterdown Road	STA 41+732 to STA 41+794	0.004 ha ±	- Residential property fronting onto Waterdown Road - Full access to property maintained
12	# 1826 Waterdown Road	STA 41+794 to STA 41+800	0.003 ha ±	- Residential property is privately owned - Only driveway fronts onto Waterdown Road - Full access to property maintained
13	# 1834 Waterdown Road	STA 41+800 to STA 41+854	0.010 ha ±	- Residential property fronting onto Waterdown Road - Full access to property maintained
14	Address # not applicable - (Hydro Corridor)	STA 41+854 to STA 41+906	0.004 ha ±	- Property is part of an Ontario Hydro Easement - No access to property exists from Waterdown Road
15	# 1908 Waterdown Road	STA 42+116 to STA 42+145	0.003 ha ±	- Residential property fronting onto Waterdown Road - Full access to property maintained
16	# 1934 Waterdown Road	STA 42+200 to STA 42+260	0.005 ha ±	- Residential property fronting onto Waterdown Road - Full access to property maintained
17	# 1956 Waterdown Road	STA 42+290 to STA 42+328	0.005 ha ±	- Residential property fronting onto Waterdown Road - Full access to property maintained
18	# 8 Mountain Brow Road West	STA 42+328 to STA 42+390	0.014 ha ±	- Residential corner property fronts onto Mountain Brow - No access exists onto Waterdown Road - Full access to property maintained from Mountain Brow
Waterdown Road - East Side				
19	Address # not applicable - (Sassafras Woods)	STA 40+000 to STA 40+245	0.058 ha ±	- Sassafras Woods conservation area - Property is privately owned - No access to property exists from Waterdown Road
20	Address # not applicable - (Hydro Corridor)	STA 40+245 to STA 40+355	0.092 ha ±	- Property is part of an Ontario Hydro Easement - No access to property exists from Waterdown Road - Property required for retaining wall construction
21	Address # not applicable - (Sassafras Woods)	STA 40+355 to STA 40+526	0.121 ha ±	- Sassafras Woods conservation area - Property is privately owned - No access to property exists from Waterdown Road
22	# 1717 Waterdown Road	STA 41+338 to STA 41+400	0.063 ha ±	- Residential property fronting onto Waterdown Road - Full access to property maintained
23	# 1729 Waterdown Road	STA 41+400 to STA 41+476	0.103 ha ±	- Residential property fronting onto Waterdown Road - Full access to property maintained
24	# 1749 Waterdown Road	STA 41+476 to STA 41+515	0.021 ha ±	- Residential property fronting onto Waterdown Road - Full access to property maintained
25	# 1751 Waterdown Road	STA 41+515 to STA 41+524	0.005 ha ±	- Residential property is privately owned - Only driveway fronts onto Waterdown Road - Full access to property maintained
26	# 1761 & #1761B Waterdown Road	STA 41+524 to STA 41+602	0.029 ha ±	- Residential properties fronting onto Waterdown Road - Full access to properties maintained
27	# 1771 Waterdown Road	STA 41+602 to STA 41+647	0.013 ha ±	- Residential property fronting onto Waterdown Road - Full access to property maintained

Property Affected (Address and/or Location)			Additional Property Required	Comments
28	# 1803 Waterdown Road	STA 41+647 to STA 41+712	0.021 ha ±	- Residential property fronting onto Waterdown Road - Full access to property maintained
29	# 1831 Waterdown Road	STA 41+712 to STA 41+814	0.022 ha ±	- Residential property fronting onto Waterdown Road - Full access to property maintained - Driveway is shared with #1833 Waterdown Road
30	# 1835 Waterdown Road	STA 41+814 to STA 41+858	0.015 ha ±	- Residential property fronting onto Waterdown Road - Full access to property maintained
31	Address # not applicable - (Hydro Corridor)	STA 41+858 to STA 41+905	0.059 ha ±	- Property is part of an Ontario Hydro Easement - No access to property exists from Waterdown Road
32	# 1850 Waterdown Road	STA 41+905 to STA 41+986	0.033 ha ±	- Residential property fronting onto Waterdown Road - Full access to property maintained
33	# 1879 Waterdown Road	STA 41+986 to STA 42+066	0.025 ha ±	- Residential property fronting onto Waterdown Road - Full access to property maintained
34	# 1903 Waterdown Road	STA 42+090 to STA 42+125	0.004 ha ±	- Residential property fronting onto Old Waterdown Road - No access to property exists from Waterdown Road
35	# 1909 Waterdown Road	STA 42+125 to STA 42+155	0.002 ha ±	- Residential property fronting onto Waterdown Road - Full access to property maintained
36	# 1917 Waterdown Road	STA 42+155 to STA 42+225	Full Buy-Out Proposed	- Residential property fronting onto Waterdown Road - Home in very close proximity to proposed works - Cannot maintain driveway grade through retaining walls
37	Address # not applicable - (Wooded Area)	STA 42+225 to STA 42+260	0.007 ha ±	- Wooded area forms part of Bruce trail complex - No access to property exists from Waterdown Road
38	# 2000 Waterdown Road	STA 42+260 to STA 42+312	0.009 ha ±	- Residential property fronting onto Waterdown Road - Home in very close proximity to proposed works and retaining walls. - Possible relocation of driveway onto adjacent property in the north to be further explored in detailed design. If unable to relocate, a full buy-out may be required
39	# 340 Mountain Brow Road	STA 42+312 to STA 42+345	0.004 ha ±	- Residential property has access from Mountain Brow Road but fronts onto Waterdown Road - No access to property exists from Waterdown Road
Mountain Brow Road - North Side				
40	# 265 Mill Street	STA 60+005 to STA 60+104	0.081 ha ±	- Residential corner property fronts onto Mountain Brow - Full access to property maintained - Property requirement includes sight triangle
41	# 339 Mountain Brow Road.	STA 60+104 to STA 60+155	0.035 ha ±	- Residential property fronting onto Mountain Brow Road - Full access to property maintained
42	# 345 Mountain Brow Road.	STA 60+155 to STA 60+201	0.025 ha ±	- Residential property fronting onto Mountain Brow Road - Full access to property maintained
43	# 351 Mountain Brow Road.	STA 60+201 to STA 60+272	0.022 ha ±	- Residential property fronting onto Mountain Brow Road - Full access to property maintained
44	# 357 Mountain Brow Road.	STA 60+272 to STA 60+340	0.002 ha ±	- Residential property fronting onto Mountain Brow Road - Small parcel required to transition road to the south - Full access to property maintained
45	Address # not applicable - (Waterdown South Development)	STA 60+453 to STA 60+724	0.169 ha ±	- Property is part of the Waterdown South development - Property fronts onto Mountain Brow Road
Mountain Brow Road - South Side				
46	# 340 Mountain	STA 60+022 to	0.024 ha ±	- Residential corner property fronts onto Mountain Brow

Property Affected (Address and/or Location)			Additional Property Required	Comments
	Brow Road. West	STA 60+102		- Full access to property maintained - Property requirement includes sight triangle
47	# 344 Mountain Brow Road.	STA 60+102 to STA 60+180	0.026 ha ±	- Residential property fronting onto Mountain Brow Road - Full access to property maintained - Driveway is shared with # 342 and # 348 Mountain Brow Road
48	# 346 Mountain Brow Road.	STA 60+180 to STA 60+211	0.016 ha ±	- Residential property is privately owned - Only driveway access fronts onto Mountain Brow Road - Full access to property maintained
49	# 352 Mountain Brow Road.	STA 60+211 to STA 60+334	0.098 ha ±	- Residential property fronting onto Mountain Brow Road - Building at east property limit in very close proximity to proposed right-of-way - Full access to property maintained
50	Address # not applicable - (Wooded Area)	STA 60+334 to STA 60+475	0.147 ha ±	- Wooded area forms part of Bruce trail complex - No access to property exists from Waterdown Road
51	# 376 Mountain Brow Road.	STA 60+475 to STA 60+520	0.036 ha ±	- Residential property fronting onto Mountain Brow Road - Full access to property maintained
52	Address # not applicable - (Wooded Area)	STA 60+520 to STA 60+600	0.028 ha ±	- Wooded area forms part of Bruce trail complex - No access to property exists from Waterdown Road - Parcel required to transition road to the north

It should be noted that the new 36 m right-of-way required for the Mid-Block arterial road will be established through the development process. At the proposed roundabout locations, some additional property will be required. The amount of additional property required (beyond the 36 m right-of-way) for installation of the roundabouts is approximately 0.120 ha ± per roundabout.

6.3.12 Construction Staging and Phasing

It is recommended that, as a first stage, the widened road be operated as a 3-lane roadway. The three-lane cross-section would be in place until traffic generated by future development fills the surplus capacity of a single lane per direction, at which point the roadway would be restriped to a basic four-lane cross-section. Refer to ***Figure 6-21*** and ***Figure 6-22*** below.

To determine the cost-effectiveness of this phased approach, the development level producing a traffic volume on Waterdown Road requiring four-lane widening was estimated and then converted into years of development. Current one-way peak hour volumes along Waterdown Road are as high as approximately 500 vehicles per hour (2006). With Dundas Street connected to Mountain Brow Road and improvements completed at the south end as part of the re-construction of the Waterdown/403 interchange, and with a two-way left turn lane constructed throughout the corridor, it is estimated that the capacity throughout the corridor could be increased to as much as 1,000 vehicles per hour (vph) per lane, resulting in initial excess capacity of approximately 500 vph.

Figure 6-21: Ultimate 4-lane Waterdown Road Cross-Section

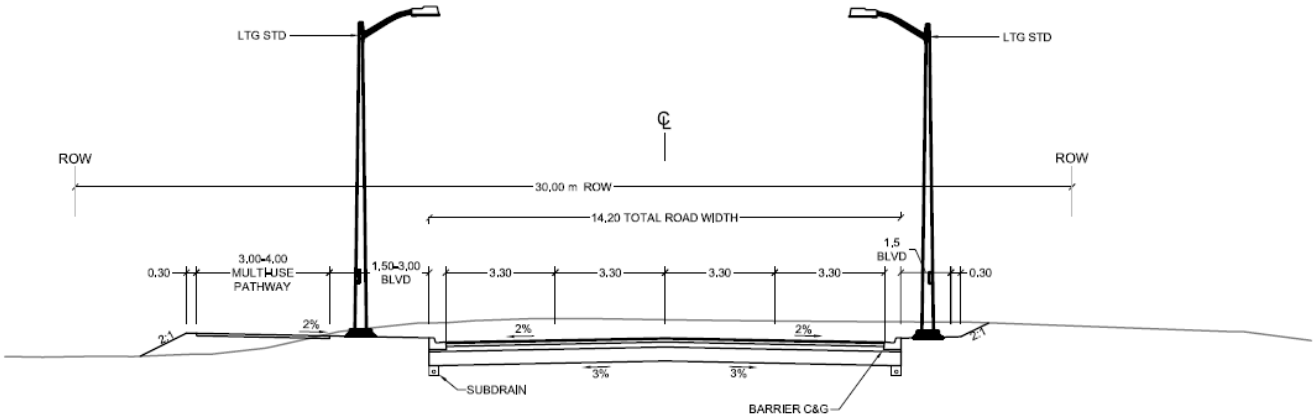
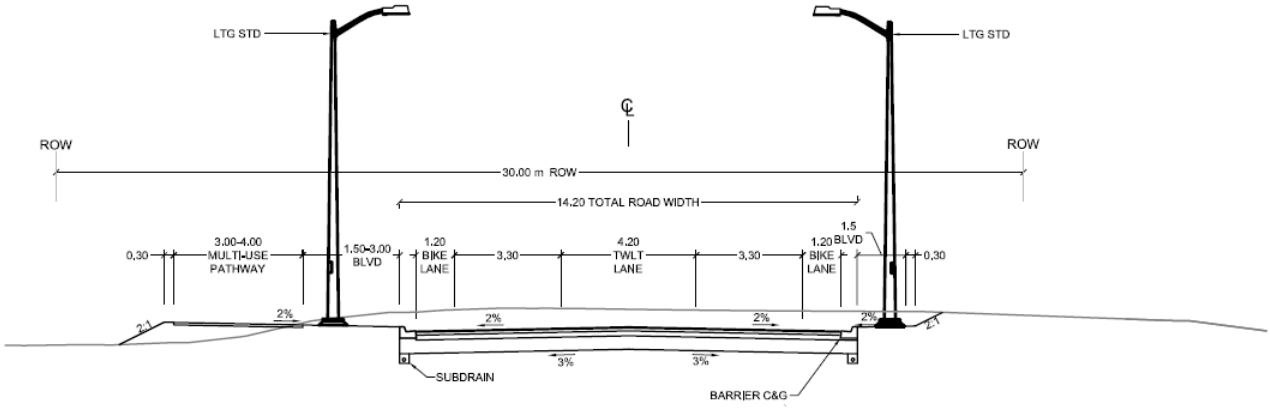


Figure 6-22: Interim 3-Lane Waterdown Road Cross-Section



After additional traffic attracted to the new interchange ramps at Highway 403, it is estimated that approximately 350 vph of peak-direction capacity will be available to accommodate additional development in Waterdown South and Upcountry Estates, corresponding to approximately 1,150 units (of which 500 units have already been approved for construction). If development proceeds at an average rate of 250 units per year (based on reaching full build-out by 2021), the Waterdown Road 3-lane treatment will reach capacity after approximately 5 years.

It is noted that there is some flexibility in the determination of a three lane road's capacity, which could extend the service life of this interim treatment beyond the five year horizon. While a design capacity of 1,000 vehicles per hour per lane has been used in the calculation, elsewhere in Hamilton (e.g. the Beckett Drive escarpment crossing) suggests that up to 1,200 vehicles per hour can be achieved in the upbound direction, albeit at a poorer level of service, if capacity on the escarpment crossing is not limited by upstream and downstream

bottlenecks (such as intersections). This additional 200 vehicles per hour of capacity would correspond to approximately 650 residential units, or two to three years of additional use of the three-lane roadway if development proceeds at 250 units per year. This would defer the need for four lanes to seven to eight years, or longer if development proceeds at a slower pace. Given that approvals, design, property acquisition and construction will take a minimum of three years, the projected life of the three-lane road could be as high as 5 years.

Converting the initial three-lane stage to the ultimate four-lane treatment will involve basic pavement marking modifications with some minor median treatment conversion. It is estimated that this conversion will cost approximately $200,000. A full work-up of the three-lane stage is contained in the plates at the end of this section.

6.4 Description of Potential Impacts, Proposed Mitigation and Commitments

The proposed improvements to Waterdown Rd and Mountain Brow Rd have the potential to result in impacts to the environment, including the natural and social environment. Further, considerable public concern has been raised by the residents of Waterdown Road regarding the proposed widening of the roads including:

- Loss of property and compensation
- Safety concerns
- Loss of trees
- Disturbance effects (e.g. noise and air quality)
- Loss of rural character of the area
- Changes to road access
- Potential for Waterdown Road to become a truck route

Attempts have been made to address these issues and reduce the potential for effects to the natural and social environment through the design of the road facility and the incorporation of many mitigation measures. This section of the ESR describes potential impacts of the preferred road design and the Project Partner's commitment to mitigation. ***Table 6.17, Waterdown Road Corridor Net Effects Assessment*** on the following pages, provides the reader with an overview and summary of the potential impacts and mitigation. This is followed by more detailed discussion.

Table 6.17 - Waterdown Road Corridor Phase 3 Class EA Net Effects Assessment

Criteria Group	Criteria	Indicators	Description of Effect	Mitigation	Net Effect
Social Environment	Potential for impact on residents	Potential for displacement of residents/ residences	It is expected that 2 or 3 residences will be displaced. This will depend on the final design of the roadway.	Residents will be compensated for their homes based on fair market value. Residents will be offered the option of an independent valuation of their property worth.	Due to the financial compensation packages that will be offered to the affected residents, no negative net financial effects will result.
		Amount of residential property removed (ha)	Based on the preliminary design, about 40 residential properties along Waterdown Road and Mountain Brow Road will be impacted. The maximum amount of property required from a residential property is .06 ha and most are in the order of 0.01 ha.	Residents will be offered fair market value for the loss of property.	Due to the relatively small amount of property required per property, and that land owners will be compensated for their property loss, the net resulting effects are minimal.
		Change in access to residential property	Approximately 4 residents on the west side of the roadway will now have a steeper driveway access to Waterdown Road under the proposed road design. This could create some concerns for residents regarding access/safety	The road will be designed to ensure that residents have vehicular access to their properties and enter safely onto Waterdown Road. Discussions with landowners will occur during the detailed design stage to ensure that any concerns are addressed.	Net effects regarding property access are expected to be minimal.
		Potential for change in air quality	Air quality levels were modeled and compared for the future “build” and “no build” scenarios. For residents along Waterdown Road and Mountain Brow Road., the change in air emissions would be negligible and are within applicable guidelines and standards.	No specific air quality mitigation measures are proposed.	No net adverse effects are expected
		Potential for change in noise levels	Noise levels were modeled and compared for the future “build” and “no build” scenarios. Residents along Waterdown Road will experience an imperceptible increase or a decrease in noise levels. Residents along Mountain Brow Road will experience an increase in noise levels that would range from imperceptible to noticeable as one moves west to east. Increases are predicted to be below 5 dBA, and as such, are not considered to be significant. Future receptors along the proposed mid-block connector road could experience noise levels that exceed 60 dBA. Some short term noise effects are expected during the construction period of the project.	No mitigation is proposed nor is required along Waterdown Road and Mountain Brow Road. Noise mitigation to reduce sound levels for future residents may be required along the new mid-block connector road as levels could exceed 60 dBA. This requirement will be incorporated into the planning approvals (i.e. draft plan). Standard construction mitigation measures are to be implemented to minimize noise levels during construction (e.g. keep equipment in good working conditions, meet applicable noise by-laws)	No net noise effects to residents.
		Potential for light pollution	The existing level of illumination along the corridor is below what would be required for an urban arterial	No specific mitigation measures are expected to be required. Additional assessment of	No net adverse lighting effects are expected

Table 6.17 - Waterdown Road Corridor Phase 3 Class EA Net Effects Assessment

Criteria Group	Criteria	Indicators	Description of Effect	Mitigation	Net Effect
			road. The street lighting plan will be developed as part of the road detailed design work. Separate illumination is being proposed for the west side multi-use pathway. No to minimal effects are expected.	possible light spillover effects on Sassafras Woods to be assessed in a subsequent study.	
		Potential for impact to wells and septic tanks	Residents along the corridor are served by a piped municipal water supply. MOE records for up to 21 wells within the vicinity of the road corridor were obtained. The majority of the wells are deep bedrock wells. Depending on the depth of excavations, there is the potential to encounter groundwater. Due to the character of the wells and their location relative to the road, impacts on wells are not expected from road development. Impacts to septic systems will be identified during the detailed design stage.	During detailed road design work, additional geotechnical work would be completed to identify areas where groundwater could be encountered during construction. If these areas exist, specific construction techniques would be utilized which may include temporary pumping of ground water from the excavated areas. If septic systems are affected by road development, these systems would need to be relocated/replaced to ensure that a system to manage sewage is maintained for each residence.	No net adverse effects to wells and ground water are expected. If required, appropriate mitigation measures would be put in place to ensure that there are no adverse net effects to septic systems.
		Potential for traffic infiltration to existing residential areas and resulting effects	Concern was expressed by existing residents in the community north of Dundas Street opposite to the proposed new intersection for the “mid-block” road to connect Dundas Street with Mountain Brow Road.	The Mid-Block Road/Dundas Street intersection has been designed to prohibit vehicles from continuing north into this existing community. Vehicles will be forced to travel either east or west along Dundas Street	As a result of the proposed intersection design, minimal to no infiltration effects are expected in existing residential areas.
	Potential for community character impacts/ change in views	Potential change to community character and views in the area	The existing Waterdown Road has retained a rural character despite proximity to Burlington. The widened road will change the character of the area.	The proposed widened road has been designed to maintain this character as much as possible. The proposed road design includes an off-road multi-use pathway, landscaping plan and narrower lanes.	Despite the proposed design for the new road facility, some change to the character of the area will result. It is anticipated that the overall effect will be minimal as a result of the proposed mitigation.
	Potential for impact on community/ recreation features	Removal of community/recreation property	None	No mitigation required	No net negative effects
		Disruption to use of community/recreation property	The Bruce Trail facility is in proximity to the road corridor. This includes an entrance along Waterdown Road and two crossings along Mountain Brow Road.	A median refuge will be provided on Mountain Brow Road to allow for the crossing of the road by trail users.	Minimal negative effects expected
	Potential for effects	Potential for removal of	Based on the Archaeological Stage 1 Report that was	A Stage 2 Archaeological Assessment is to be	The Stage 2 assessment will confirm

Table 6.17 - Waterdown Road Corridor Phase 3 Class EA Net Effects Assessment

Criteria Group	Criteria	Indicators	Description of Effect	Mitigation	Net Effect
	on historical features	heritage/archaeological features	completed, there is potential for archaeological resources along the corridor. Stage 2 investigations are recommended to confirm the potential for resources. A built heritage resources assessment was undertaken. A total of 13 built heritage resources, including 4 designated buildings, were identified in the study area. Six built heritage resources are located within 25 m of the roadway. While there will be no direct impact on heritage buildings, the City will need to acquire one heritage property as driveway access to the property will no longer be possible.	undertaken to confirm resources/ mitigation requirements. The City is to explore options regarding the preservation of this heritage building and providing access to it.	the potential for effects on archaeological resources. No net effects to built heritage resources are expected.
Natural Environment	Potential for impact on terrestrial features	Amount, nature and significance of natural habitat removed	A small section of Sassafras-Waterdown Woods ANSI-ESA, located on the east side of Waterdown Road south of Flatt Road will be removed (about 0.26 ha). Further a small section of the Waterdown Escarpment Woods ESA (0.02 ha) south of Mountain Brow Road will be removed. Potential for effects on nesting birds. OMNR has identified Jefferson salamander habitat in the Sassafras-Waterdown Woods ANSI/ESA boundaries. The edge disturbance from road improvements is not expected to have a deleterious effect on the core Jefferson salamander habitat. As such, no specific mitigation is deemed necessary.	The road has been positioned and designed so that most of the widening is to the west to minimize effects to Sassafras Woods. Additional work is recommended during detailed design to further assess shifting the road's impact footprint further to the west by adjusting the design elements such as sidewalk, boulevard and lane widths/requirements. Compensatory tree planting (at a 3:1 replacement ratio) will be undertaken as per the landscape plan to minimize the effects from tree loss. The plantings are to occur on public lands. The location of the plantings is to be confirmed with Halton Conservation during the detail design phase. An Edge Management Plan would detail this. Vegetation clearing should be undertaken outside of the breeding bird window of April 15 to August 15. If this is not possible, nest surveys would need to be done to confirm the absence of nesting birds prior to vegetation clearing.	As a result of the compensatory tree plantings that will be undertaken, net negative effects to natural habitat will be minimal. Observance of the breeding bird window will avoid effects to breeding birds.
		Number of significant trees along existing	The widened road will result in the loss of about 475	Compensatory tree planting will be undertaken	As a result of the compensatory tree

Table 6.17 - Waterdown Road Corridor Phase 3 Class EA Net Effects Assessment

Criteria Group	Criteria	Indicators	Description of Effect	Mitigation	Net Effect
		roadway removed	"street trees".	along the Waterdown Road corridor as per the landscape plan to minimize the effects from tree loss. About 875 new trees will be planted.	planting that will be undertaken, net negative effects of tree loss will be minimal.
		Potential for effects to adjacent habitat	The most significant habitat adjacent to the road is the Sassafras-Waterdown Woods ANSI-ESA located to the south of Mountain Brow Road and east of Waterdown Road. Encroachment into the ESA-ANSI could increase the vulnerability of a portion of this feature to the colonization of invasive exotic flora. Other potential effects include noise disturbance from road traffic and potential for light pollution.	An Edge Management Plan (EMP) will be prepared (supported by additional botanical surveys)and will detail the control of invasive and exotic pioneer plant species and propose restoration activities along the western boundary of the ANSI/ESA lands in a cultural meadow area that is located south of the project encroachment area. The design of the street lighting will take into account the potential for light pollution into natural areas. A slope stability study will be undertaken to locate the stable top of bank and to determine whether further reduction to the road footprint, in the area of Waterdown Road south of Flatt Road, can be made. The road has been positioned and designed so that most of the widening is to the west to minimize effects to Sassafras Woods. Additional work is recommended during detailed design to further assess shifting the road's impact footprint further to the west by adjusting the design elements such as sidewalk, boulevard and lane widths/requirements.	With the implementation of an EMP and consideration of light pollution in street lighting design, net effects should be minimal.
		Fragmentation of natural areas	Minimal fragmentation of natural areas as the project largely involves the widening of an existing road. The new section of road (mid-block connector) passes through agricultural land that is to be developed.	No specific mitigation recommended	No net fragmentation effects
		Effect on terrestrial corridor connectivity / linkages	Minimal effects on habitat connectivity/ linkages as the project largely involves the widening of an existing road. The new section of road (mid-block connector)	No specific mitigation recommended	No net fragmentation effects

Table 6.17 - Waterdown Road Corridor Phase 3 Class EA Net Effects Assessment

Criteria Group	Criteria	Indicators	Description of Effect	Mitigation	Net Effect
			passes through agricultural land that is to be developed. No specific terrestrial movement corridors were identified.		
	Potential for Impact on aquatic features	Amount and quality of aquatic habitat altered/disturbed/removed	There is one watercourse crossing along Waterdown Road- Southern Branch of Grindstone Creek. This reach of the creek is intermittent. The existing culvert will need to be lengthened to accommodate the road widening. This could negatively affect existing fish habitat by removing or temporarily disturbing habitat that exists. There are also 2 crossings of the Grindstone Creek (North Branch and South Branch) within the Waterdown South development lands.	Mitigation measures are to be implemented during and after construction to mitigate the indirect impacts of construction activities and sediment and erosion loading into the Grindstone Creek system. The mitigation plan for the crossings within the Waterdown South development lands is to be developed by the land developer as part of the plan of subdivision approval process that will be undertaken.	With the implementation of appropriate mitigation measures, net negative effects to fisheries and fish habitat will be minimal. DFO will be consulted with during detailed design regarding the need for approval under the *Fisheries Act*.
Economic Environment	Potential for impact on business enterprises	Area of commercial properties required (ha)	None present	No mitigation required	No net effects
		Potential for change (disruption or enhancement) to business operations	None present	No mitigation required	No net effects
	Potential for impact on future land use	Compatibility with future land use plans	0.39 ha will be required from the western edge of the Eagle Heights development area.	The owner of this property will be compensated for the loss of property. Substantial effects to this future development are not expected from this road project.	No net effects
	Potential for impact on agricultural land	Area of designated agricultural land removed (ha)	No land designated for agriculture is affected	No mitigation required	No net effects
Transportation	Change in traffic operations, delay and capacity	Potential to increase level of traffic service	The 4-lane road design as proposed will address future (2021) traffic service level requirements.	No mitigation required	No net effects
		Ability to accommodate local and through traffic	All road segments can accommodate local and through traffic	No mitigation required	No net effects

Table 6.17 - Waterdown Road Corridor Phase 3 Class EA Net Effects Assessment

Criteria Group	Criteria	Indicators	Description of Effect	Mitigation	Net Effect
	Potential for change to traffic and public safety levels	Potential to improve roadway operations, geometry and sightlines	The proposed design will improve road geometry and sightlines. The design includes raised curbs adjacent to the narrow lanes, making the road less forgiving to minor driver errors and during winter driving conditions. Cyclists using the pathway need to pay special attention to the large number of driveways, as well as pedestrians.	No mitigation required	No net effects
	Opportunity to support transit use, pedestrians and cycling	Extent that alternative supports/promotes transit use, pedestrians and cycling	The 4-lane design supports transit along the corridor. A multi-use pathway on the west side only will require residents on the east side to cross the road in order to use that facility. Recreation cycling is supported by the off-road multi-use pathway.	No mitigation required	No net effects

6.4.1 Natural Environment

The Waterdown Road Corridor improvements have the potential to impact natural heritage features. This may result in direct and indirect impacts to Species at Risk (SAR), Provincially Significant Wetlands (PSWs), Environmentally Sensitive (Significant) Areas (ESAs) and Areas of Natural or Scientific Interest (ANSIs). The improvements may encroach into and/or be aligned in close proximity to the following significant natural areas (refer to ***Figure 4.1***):

- Grindstone (Creek) Valley ESA; and
- Provincial Life Science ANSI – Sassafras-Waterdown Woods (In Halton Region identified as the "Sassafras Woods ESA" (also a "Carolinian Canada Site") and the "Waterdown Escarpment Woods and Extension ESA"; and in the Region of Hamilton-Wentworth identified as "Waterdown Woods ESA".).

Further, the Waterdown Road Corridor route involves three watercourse crossings, two of which are in the Waterdown South development and will be addressed by others. The sensitivity of the aquatic habitat ranges from low to high. The potential for impact to the above noted natural heritage features necessitates mitigation measures that reduce or eliminate these impacts as directed by the following legislation and regulations: the *Ontario EA Act*, the *Lakes and Rivers Improvement Act, Conservation Authorities Act*, , *Fish and Wildlife Conservation Act, Endangered Species Act,* federal *Fisheries Act*, federal *Migratory Bird Convention Act* and as directed by the Province of Ontario under *Section 2.1 Natural Heritage* of the 2005 Provincial Policy Statement, which states:

> ***"2.1.1*** *Natural features and areas shall be protected for the long term.*
>
> ***2.1.2*** *The diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems, should be maintained, restored or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and ground water features.*
>
> ***2.1.3*** *Development and site alteration shall not be permitted in:*
>
> *a. significant habitat of endangered species and threatened species;*
> *b. significant wetlands in Ecoregions 5E, 6E and 7E; and*
>
> ***2.1.4*** *Development and site alteration shall not be permitted in:*
>
> *a. significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E and 7E;*
> *b. significant woodlands south and east of the Canadian Shield ;*
> *c. significant valleylands south and east of the Canadian Shield;*
> *d. significant wildlife habitat; and*

e. significant areas of natural and scientific interest unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.

***2.1.5** Development and site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements.*

***2.1.6** Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.3, 2.1.4 and 2.1.5 unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions."*

Terrestrial Impacts and Mitigation

The following describes potential project impacts and mitigation strategies for terrestrial natural heritage features. Issues concerning hazard lands (i.e. escarpment and karst topography) will be addressed as part of future detailed design work for the project.

A. Sassafras-Waterdown Woods Area of Natural or Scientific Interest (Waterdown Road)

The Sassafras-Waterdown Woods ESA and provincial Life Science Area of Natural and Scientific Interest (ANSI) are located in the natural area south of Mountain Brow Road and east of Waterdown Road. Halton Conservation has identified that this area is also largely coincident with the "Waterdown Woods Resource Management Area". The provincial ANSI is comprised of two former regional ANSIs; the Sassafras Woods ANSI and the Waterdown Escarpment Woods ANSI. This ANSI/ESA has distinctive escarpment plain, slope topographies and vegetation communities as well as a unique Carolinian upland forest community with many rare species (Eagles & Beechey, 1985).

Road widening along the south side of Mountain Brow Road and the east side of Waterdown Road has the potential to impact the Sassafras-Waterdown Woods ANSI/ESA through:

1. Removal of street trees;
2. Edge disturbance (vegetation removal) and the introduction of invasive non-indigenous plant species;
3. Potential impacts to Jefferson salamander (*Ambystoma jeffersonianum*) habitat; and
4. Increased use of an existing road.

1. Removal of street trees.

The direct impact of removing street trees was assessed and it was determined that approximately 75 street trees would be removed along the shoulder/ledge that is adjacent to Sassafras Woods and about 50 street trees would be removed south of Mountain Brow

Road (northern limit of the Waterdown Escarpment Woods). Due to social impacts (i.e. property acquisition) and other constraints (i.e. hydro tower) on the west side of Waterdown Road, the removal of these trees is unavoidable. It is recommended that a compensatory tree replacement plan based on the number of trees removed be implemented at a rate of 3:1 and the trees should be of a similar species to the type that was lost (See Section 4.3.2 and Appendix J). It is also recommended that if non-native trees are removed, that they be replaced with similar native trees.

2. Edge Disturbance (vegetation removal) and the Introduction of Invasive Exotic Plant Species

   The direct impact of removing edge vegetation and disturbing habitat at the ANSI/ESA's edge was largely avoided through concentrating road widening on the west side of Waterdown Road and the north side of Mountain Brow Road. Due to social impacts (i.e. property acquisition) and other constraints (i.e. hydro tower) on the west side of Waterdown Road, encroachment into a limited section of the western edge of the Sassafras-Waterdown Woods ANSI/ESA was unavoidable. Encroachment effects include the removal of 0.26 ha of vegetation and disturbance along the slope on the western edge of the ANSI/ESA feature from the Waterdown Road widening and 0.02 ha of vegetation and disturbance from the widening of Mountain Brow Road (south side). While this is not expected to impact provincially significant or regionally rare flora, it could increase the vulnerability of a portion of this feature to the colonization of invasive exotic flora.

   An Edge Management Plan (EMP) will be prepared in the design phase that details how invasive and exotic pioneer plant species will be controlled and the restoration activities to be taken along the western boundary of the ANSI/ESA lands. It is recommended that a minimum compensatory tree replacement plan based on the area of the natural community removed be implemented at a rate of 3:1 and should be of a similar habitat type to the type that was lost. The EMP should be generated in consultation with the MNR and/or Conservation Halton.

3. Potential Impacts to Jefferson Salamander Habitat

   The MNR has identified Jefferson salamander habitat in the naturally vegetated lands including forests, field and meadow areas south of Mountain Brow Road. Much of this habitat is contained within Sassafras-Waterdown Woods ANSI/ESA boundaries and falls under the regulations of the *Endangered Species Act (2007).* This species requires intact deciduous forest with undisturbed forest floor and breeding ponds that are permanent and unpolluted (ROM 2008). The MNR has not indicated the exact location of Jefferson salamander habitat in the Sassafras-Waterdown Woods ANSI/ESA to date.

The ANSI/ESA edge disturbance associated with road expansion along the Waterdown Road Corridor is not expected to have a deleterious effect on the core Jefferson salamander habitat. Potential impacts will be restricted to a 0.26 ha forest edge disturbance zone along Waterdown Road and 0.02 ha along Mountain Brow Road. These effects will not impact core breeding and terrestrial habitat used by this amphibian species (i.e. breeding ponds, undisturbed interior woodland and meadows, etc.). As such, no specific mitigation is deemed necessary. To date, the MNR has not confirmed if mitigation will be required for vegetation removal along the western edge of the Sassafras-Waterdown Woods ANSI/ESA.

B. General Breeding Bird Mitigation Measures

The removal of the small area of natural vegetation/trees has the potential to impact breeding birds. The Migratory Birds Regulation under Section 6 of the *Migratory Birds Convention Act* (MBCA) prohibits the disturbance, destruction or removal of a nest, egg or nest shelter of a migratory bird. The *Ontario Fish and Wildlife Conservation Act* (OFWCA) prohibits the destruction or taking of nests or eggs of wild birds, except for American crows, brown-headed cowbirds, common grackles, house sparrows, red-winged blackbirds or starlings. The Act also prohibits the capturing, killing or harassment of endangered species.

To mitigate contravening the MBCA or the OFWCA, vegetation clearing should not occur between April 15th and August 15th to avoid disturbing breeding or nesting birds. If vegetation clearing and/or general construction must occur during this time period, a qualified avian biologist is to develop a nesting survey protocol for the disturbance areas. Under this protocol, areas proposed for clearing should be searched a minimum of 3 days in advance of the clearing activity. If breeding bird activity is observed within the construction area, specific mitigation measures, such as prohibition of clearing and/or construction until after the nesting period or establishment of appropriate buffers around active nests, will be implemented to avoid direct impacts on breeding birds and/or their habitats.

Aquatic Impacts and Mitigation

The road corridor crosses the Grindstone Creek-Northeast Branch and the Grindstone Creek Southern Branch (2 crossings) (See previous Figure 4.4). The proposed construction of a section of new road (between Dundas St and Mountain Brow Road) and widening of the existing road will require some localized encroachment onto aquatic habitat. This ESR considers the effects to the one crossing along Waterdown Road (crossing #3). The effects (and permitting) associated with the other two crossings will be dealt with by the developer of the South Waterdown development lands. It is noted that all affected watercourses have undergone some level of disturbance in the past as a result of the surrounding land use and ongoing land development

activities. There exists the potential for indirect impacts (e.g. disturbance during fish reproductive periods) on the aquatic habitat, if appropriate mitigation measures are not implemented and maintained during construction.

Potential Disturbance to Fisheries and Aquatic Habitat

Waterdown Road crosses the Southern Branch of Grindstone Creek. There is an existing pipe arch culvert (1490 mm x 910 mm) at this location. This is a headwater area for the southern branch, which has intermittent flow and dries out seasonally in the area immediately downstream of the culvert.

New culverts can negatively affect existing fish habitat by removing or temporarily disturbing habitat that exists under the physical footprint of the new structure (e.g., culvert bottom). Improperly installed and lengthy culverts can restrict or prevent fish passage by causing flows that are too strong for fish to negotiate or create a perched situation (when the outlet is "perched" above the normal water level). The culvert extension will also involve enclosing short additional reaches of the channel, which will result in some localized alteration of habitat conditions. The affected watercourse has intermittent flow although further downstream the watercourse has a more defined channel classified as Type 3 direct fish habitat during active flow periods.

Culverts should be installed along a straight section of the channel and embedded sufficiently so that water can flow through the inlet and outlet naturally and allow fish to successfully negotiate the structure. If that is not possible, additional channel realignments or slight design modifications may be required to allow flows to convey through new structures gradually and smoothly.

With proper mitigation measures in place during and after construction, the proposed works will mitigate the indirect impacts of construction activities and sediment and erosion loading into the Grindstone Creek system.

In order to minimize potential impacts on the aquatic habitat and fish populations, all work should take place outside of the appropriate fisheries windows (typically March 15 to July 15). The exact time of this window for this crossing should be determined with the Conservation Authority.

Additional Natural Environment Measures

In addition to the mitigation strategies detailed above, the following measures are recommended based on correspondence with stakeholders including the Conservation Authority:

- Use of a certified environmental inspector during any construction affecting area watercourses
- It is recommended that the detailed design team utilizes a karst specialist to ensure that requirements of Conservation Halton

are met with regard to any areas where karst topography is encountered.
- It is noted that watercourse crossings will require a Permit from Conservation Halton pursuant to Ontario Regulation 162/06.
- Additional botanical surveys will be required and Edge Management Plans competed along the south part of Waterdown Road and on Mountain Brow Road in the vicinity of Flanders Drive.

6.4.2 Social Environment

The potential for social impacts from the road include both direct loss to property from the physical widening of the road right-of-way and from potential disturbance effects as a result of changes in traffic volumes. **Table 6.13** includes a summary of both of these effects.

Direct Loss of Property

Regarding the potential for property effects it is expected that 2 to 3 residences will be directly impacted that would require the occupants of these dwellings to relocate. The final number of directly impacted residences will be confirmed during the detailed design stage and through discussions with these property owners. While the buildings would not by physically affected, access to these properties would no longer be possible or would be very difficult to re-establish. The impacted residents will be financially compensated for their property at fair market value.

Frontage property would be required from about 40 residences. The amount of property required from any one residence will be relatively minor with most in the order of 0.1 ha. Again, the owners of these properties will be financially compensated for their loss. This compensation would also include the loss of other related assets including for example fences, gates and trees.

Change in Character

Despite the study area's proximity to the urban part of the City of Burlington, the community along Waterdown Road and Mountain Brow Road has retained a rural character. To minimize the impact on the corridor the road design and landscape plan has been developed to retain this character as much as possible. As requested by Burlington Council, a "Parkway" like design has been developed which includes narrower lanes, specific landscaping and streetscaping elements and the development of an off-road multi-use pathway. Further, as an interim measure (for approximately 5 years), the road would be operated as a three lane roadway which would also allow for on-road bicycle lanes (See **Figure 6-7**). While there will be some change to the rural character of this area, the intent of the design as proposed is to mitigate these effects.

A concern expressed by the public and through the NAC meetings was the potential for the improvements and the establishment of a direct, new road connection to Dundas Street, to result in an increase in the use of the corridor by truck traffic. Recent improvements to the Highway 6 corridor south from Dundas Street should result in an improved route for trucks in this area. The design recommendations include the use of narrow lanes, curb and gutter, extensive landscaping, use of two roundabouts and a reduced design speed (50 km/h). It was thought by the project team that, in combination, these design features, will result in a corridor that will not be as attractive to truck traffic as a conventional road and increases in truck traffic were not identified as an impact.

Disturbance Effects

Disturbance effects to residents will occur during both the construction and operation periods. Appropriate construction practices will be applied to minimize noise and air quality effects during the construction period. Construction practices will also ensure the safety of residents and other users of Waterdown Rd and Mountain Brow Road

Future land development activity in the Waterdown area (Hamilton) will result in increased road traffic along Waterdown Road which could lead to some increases in disturbances to residents. It is noted that road traffic volume increases will occur along Waterdown Road whether the road improvements are made or not. To better understand the nature of these effects, noise and air quality modeling exercises were undertaken as described below:

Noise

An acoustic impact assessment study was carried out by Dillon as part of this project. The study used existing and projected future (2021) traffic information as well as the Ontario Ministry of Environment predictive road traffic noise model ORNAMENT/ STAMSON to predict the acoustical impact of the proposed roadway improvements. The details of the noise assessment are presented in Appendix E.

Twenty-one noise sensitive residential receptors plus two sensitive conservation area receptors were selected for this assessment and are identified in ***Figure 6-23.*** The residential receptors were chosen for their potential to be impacted by road traffic noise sources based on their relative location (proximity) to the roads and the configuration of the roadways. There is a sensitive ecological zone east of Waterdown Road between the Highway 403 and Flatt Road. Two conservation area receptors were selected to assess the potential impact of the road redevelopment on this potentially noise-sensitive eco-zone.

In order to study the noise impact of the proposed road corridor improvements, the impact at the identified receptor locations for the predicted future traffic volumes (under the mature state of development scenario) was compared against a future scenario with no road improvements. An assessment of the current noise impact at the same

receptors due to existing traffic volumes was also performed to establish a baseline.

For the future "build scenario", there is predicted to be an increase (over the future "no build scenario") in the sound levels for receptors W03 and W04, and W07 to W13 along Waterdown Road, and W14 and W17 along Mountain Brow Road. The increase in sound levels ranged from 0.2 dBA to 4.5 dBA during daytime; and from 0.1 dBA to 4.4 dBA during night-time. The majority of expected increases in noise predicted for the receptors were insignificant as they were below the 3 dBA threshold for which the human ear can perceive a difference.

For existing receptors WC1, WC2, W01, W02 and W06 along Waterdown Road, there is predicted to be a decrease in predicted sound levels in comparison to the "no-build scenario". The change was considered to be noticeable (for both daytime and night-time) at WC1 as the decrease in noise was more than 3 dBA. At the other receptors the predicted decreases were insignificant. Elsewhere along Waterdown Road the ambient sound levels should not be perceived to be significantly different from sound levels prior to the redevelopment project.

Receptors along Mill Street South W15 and W16 are predicted to have a lower noise impact (as a result of lower volumes) compared to Scenario 2's future no-build situation. However, the improvement was considered insignificant as decreases were 1 dBA or less. Similarly, there is predicted to be an insignificant improvement at W18 on Dundas Street East.

The receptors W14 and W17 along Mountain Brow Road are predicted to have an increase in sound levels over the "future no-build" scenario. The impact at W14 was estimated to be insignificant. However, at W17 it was considered to be noticeable (increase of over 4 dBA for both daytime and night-time). Due to the increased volumes predicted for Mountain Brow Road, there is a potential for residences to experience noticeable increases in traffic generated sound levels. However the predicted increase in noise levels is low (i.e., less than 5 dBA), and below the value where mitigation will be required.

For future receptors along the Mid-block Road, the predicted noise levels could exceed 60 dBA and thus noise barriers may be warranted. This would require further assessment to confirm the need/form of noise barriers.

In summary, there is predicted to be no significant noise increases to existing residents in the study area and as such, no noise specific mitigation is warranted during the operations period. There may be the need for noise barriers to mitigate noise effects to future residents in the Waterdown South development area.

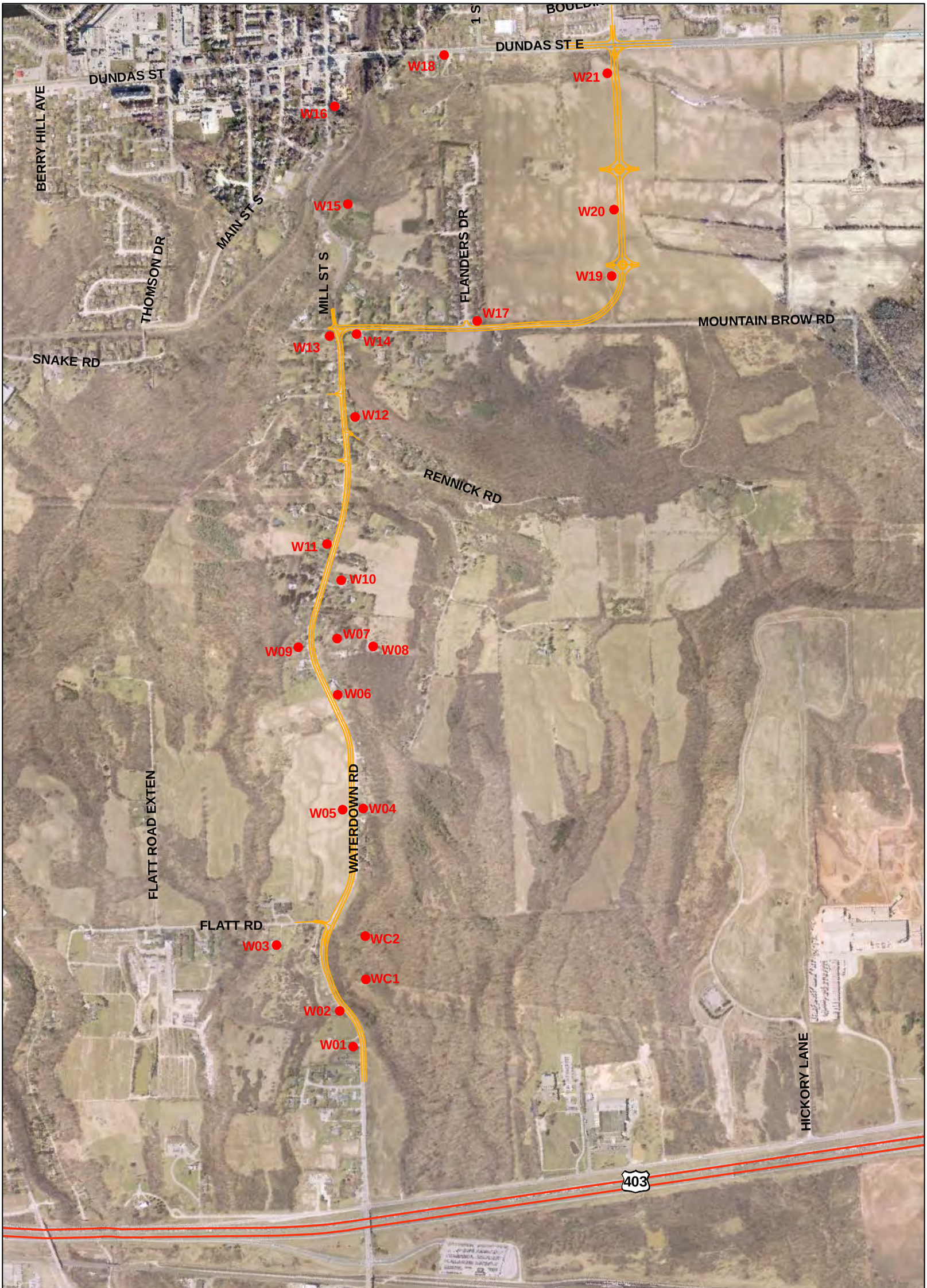


Figure 6.23 - Noise Receptor Locations

Legend

- Receptor Locations
- Proposed Waterdown Corridor Alignment Options

Waterdown Road Class Environmental Assessment

1 : 10,500

0 200 400 600

Air Quality

The objective of the air quality assessment was to consider vehicular emission impacts on current and future ambient air quality in the vicinity of the roads to be improved. The following are the key conventional air contaminants pollutants associated with vehicular traffic and which were assessed in this study.

- Carbon monoxide (CO);
- Oxides of nitrogen (NOx); and
- Respirable particulate matter ($PM_{2.5}$).

The gaseous emissions (i.e. CO and NOx) are associated with tailpipe emissions only whereas particulate matter ($PM_{2.5}$) emissions are associated with re-suspension of road dust, vehicular braking and tailpipe emissions.

The 21 residential noise sensitive receptors identified in the previous section were also used in the air quality study as sensitive receptors. As with the noise assessment, the future "no-build scenario" was assessed and compared to the future "build scenario". A detailed description of the results of the air quality modelling is presented in the Air Quality Report contained in ***Appendix D***.

The maximum concentrations predicted for the identified receptors for the future "build scenario" were approximately 2 ppm for CO, 48 ppb for NOx, and 1 $\mu g/m^3$ for $PM_{2.5}$. The maxima for all the contaminants occurred near the intersection of Mill Street South and Dundas Street East, outside of the direct study area. As shown in ***Table 6.18***, the cumulative maximum concentrations for all contaminants modelled for this assessment were below the respective air quality standards. Therefore, the predicted cumulative concentrations of the air contaminants at the receptors selected for the purposes of this assessment were all below the respective MOE and CCME CWS standards for all parameters.

Table 6-18: Total Concentration versus Existing Standards – Future "Build Scenario"

Contaminant	Highest Predicted Concentration	Ambient (Background) Concentration	Total (Cumulative) Concentration	Existing Standard	% of Standard
CO (ppm)	1.9	0.5	2	30	7
NOx (ppb)	48	49	97	200	49
$PM_{2.5}$ ($\mu g/m^3$)	1.2	20	21	30	70

For all three contaminants of NOx, CO, and $PM_{2.5}$ the maximum concentration is predicted to be higher for the future "build scenario" than for the future "no-build scenario". However, the increases were

negligible for CO and $PM_{2.5}$ as they were less than 1 ppm and 1 $\mu g/m^3$, respectively. NOx changes are described as follows:

- For the Waterdown Road segment, the predicted increase in NOx concentrations is 9 ppb or less under the future "build scenario" when compared to the future "no-build scenario";
- Changes in NOx concentrations for the Mill Street South receptors are not significant; and
- Along Mountain Brow Road, NOx concentrations are predicted to be greater (up to approximately 6 ppb) under the future "build scenario" than under the future "no build" scenario.

The overall impact of the road project on the ambient NOx concentrations is considered to be low, and negligible for CO and $PM_{2.5}$. For both NOx and CO, the cumulative concentrations (ambient plus vehicular) were significantly lower (less than 50%) than the Ontario Ministry of the Environment's 1-hour standard. In the case of $PM_{2.5}$, the concentration resulting from vehicular traffic was significantly lower than the existing ambient background concentrations (approximately 6% of the background) and the calculated cumulative concentration was approximately at 70% of the CWS. Based on the air quality modeling work, no air quality specific mitigation is warranted.

Other Effects

Other effects considered in the design of the facility include: Potential for Light Pollution: Potential for Impacts to Wells and Septic Tanks and Potential for Traffic Infiltration. The potential for these effects are described in ***Table 6.17***.

6.4.3 Economic Environment

As there are no businesses along the road corridor, the only issue of concern relating to the economic environment is in regards to the potential for impact on future development lands. Along Waterdown Rd, there is the requirement for about 0.39 ha of land along the eastern edge of the Eagle Heights development. Based on some preliminary discussions with the owner of this property, it is expected that this property requirement would not have a significant impact on the future development plans for these lands.

6.4.4 Transportation

The recommended facilities will address the traffic service level requirements for year 2021 (assumed full build-out of new residential areas) for both local and through traffic. No road operation or safety concerns have been identified. Extensive lengths of multi-use pathways, bicycle allowances and sidewalks have been incorporated into the recommendations to address north/south pedestrian and cycling needs in the corridor and to connect to adjacent facilities.

6.5 Estimated Construction Costs

A preliminary cost estimate has been prepared for the reconstruction of Waterdown Road and Mountain Brow Road; and for the construction of the new Mid-Block Road. This estimate presented below is based on present day costs and excludes GST.

Table 6-19: Preliminary Construction Cost Estimate

Waterdown Road	SECTION	Section Total
	ROADWORKS	$5,539,400
	STRUCTURES	$546,000
	LANDSCAPING	$1,162,900
	ELECTRICAL	$692,000
	PROPERTY	$3,380,000
	PATHWAY/MITIGATION	$519,700
	UTILITIES	$423,000
	CONTINGENCY	$888,300
	ENGINEERING	$888,300
	Subtotal	**$14,039,600.00**
Mountain Brow Road		
	ROADWORKS	$1,784,200
	STRUCTURES	$0
	LANDSCAPING	$282,300
	ELECTRICAL	$149,600
	PROPERTY	$676,500
	PATHWAY/MITIGATION	$141,000
	UTILITIES	$117,900
	CONTINGENCY	$247,500
	ENGINEERING	$247,500
	Subtotal	**$3,646,500.00**
Mid-Block Road		
	ROADWORKS	$2,228,600
	STRUCTURES	$1,440,000
	LANDSCAPING	$480,400
	ELECTRICAL	$188,400
	PROPERTY	$0
	SIDEWALK/MITIGATION	$236,200
	UTILITIES	$228,700
	CONTINGENCY	$480,300
	ENGINEERING	$480,300
	Subtotal	**$5,762,900.00**
	TOTAL	**$23,449,000.00**

6.6 Commitments to Future Work

It is recommended that additional studies be carried out during the design phase to finalize the required mitigation measures. These are recommended and include the development of Edge Management Plans

along the Sassafras Woods and Waterdown Escarpment Woods Environmentally Sensitive Areas (ESAs), completion of additional botanical surveys to support the Edge Management Plans, completion of Slope Stability Studies to identify the stable top of bank along the west side of the Sassafras Woods ESA and the completion (where required, due to the need for channel works) of fluvial geomorphology assessments. ***Table 6-20, Commitments to Future Work***, below, details City of Hamilton and City of Burlington commitments to further studies/work as this project advances toward and into the detail design stage. Commitments for mitigation measures to address potential impacts were discussed earlier in this section of the report.

Table 6-20: Commitments to Future Work

Item	Future Work/Specifics	Details
1. 2000 Waterdown Road	Establish alternative access or purchase this property	Discussions started. Included dealing with property owner to the east for easement for new driveway.
2. Completion of Edge Management Plans	Locations: • Sassafras Woods • Waterdown Woods ESA	To be completed in discussions with Conservation Halton
3. Vegetation Compensation Plans	Locations: • Sassafras Woods • Waterdown Woods ESA	3:1 replacement ratio to be located off-site on public lands (locations to be confirmed in discussions with Conservation Halton)
4. Light pollution study	Location: • Sassafras Woods	Requirement of Conservation Halton
5. Alignment Revision Study	Location: • South end – south from Flatt Road (adjacent to Sassafras Woods)	• Minimize direct impact to Sassafras Woods by assessing reducing the west side multi-use pathway width to a minimum (similar to the section to the south), possibly eliminating the boulevard and further reducing the lane widths in this section. • With a footprint reduction the road can be shifted to the west (while keeping the new west side grading limit) and most of Sassafras Woods direct impact could be eliminated. • This work should be carried out in consultation with Conservation Halton.
6. Wildlife Crossing Assessment	Locations: • Three locations have been suggested by Conservation Halton (2 south of Mountain Brow, one at the hydro corridor south of Flatt Road)	• Conservation Halton continues to request the installation of wildlife crossings at three locations in the corridor. • An assessment completed during Class EA indicated that the crossings are not recommended as specific movement corridors were not identified in the natural environment study and opportunities for installing crossing facilities at the three potential locations were problematic due to the road grades (all in cut) and conflict with the road's new storm sewer. • This issue remains unresolved and further talks with Conservation Halton will be required during the design of Waterdown Road.
7. Eagle Heights Development	Continue discussions with the developer.	Resolve common design elements/requirements including: • Finalize grading interface • Finalize property/easement requirements • Finalize road drainage outlet in this area and the possibility of shared SWM facilities
8. 265 Mill Street	Finalize driveway and gate treatment/location on Mountain Brow Road	This property has access off Mountain Brow Road. Discussions with the owner should continue related to finalizing the location and treatment details for the new driveway and entrance gate.
9. Geotechnical	Groundwater impacts	Additional geotechnical work may be needed in relation to structures/sewers to assess possible groundwater impacts and follow-up requirements.

Item	Future Work/Specifics	Details
10. Septic systems	Relocation requirements	Impacts to septic systems to be identified and mitigation developed (limited relocation options due to rock)
11. Stage 2 Archaeological Studies	Required throughout the Waterdown Road and Mountain Brow Road corridors	Recommended in Stage 1 study
12. Heritage Building (1917 Waterdown)	This property will require acquisition as a result of the widening recommendations.	Treatment issues to be resolved after purchase include: • Access and proximity issues • Use/preservation of the building • Bruce Trail potential (the Waterdown Road Bruce Trail crossing is adjacent to this property)
13. Karst Specialist Services	Address the potential for encountering/impacting karst formations – additional geotechnical work will be required.	Requested by Conservation Halton
14. Slope Stability Assessment	Complete slope stability assessment work at the south end of the project adjacent to Sassafras Woods	Related to the alignment revision work outlined above (see Item 5) Conservation Halton has requested additional Sassafras Woods slope stability work including additional field work (boreholes, monitoring, etc.) and the completion of a detailed slope stability assessment. This work should be carried out in consultation with Conservation Halton.
15. Species at Risk Assessment (SAR)	Follow-up work will be required related to additional field sampling/observation for species at risk	• The development of mitigation measures for marsh, field and woodland bird species will be dependent on additional breeding bird surveys if construction is to take place between May 15 and August 1. • Additional woodland vole survey will be required to maximize opportunities for observation • A work plan should be submitted outlining the proposed timing and methodology for the above work.

7. PUBLIC CONSULTATION AND COMMUNICATIONS

This chapter:

- Summarizes the Phase 2 consultation activities and inputs;
- Outlines the objectives to be achieved, and the mechanisms utilized for public consultation and communications during Phase 3 and 4 of the Waterdown Road Class EA;
- Describes the public consultation and communications program that was conducted during Phase 3 and 4;
- Summarizes the outcomes of the consultation program, the comments received from the public and agencies with the provided responses; and,
- Evaluates the effectiveness of the program.

Public consultation and communications was an important part of the work undertaken in the Waterdown Road Corridor Class Environmental Assessment (Class EA). The consultation program allowed for local knowledge, interests and concerns of the public and stakeholders to be understood and taken into account.

7.1 Summary of Phase 2 Consultation and Communications Program

An extensive public and agency consultation program was undertaken as part of the Waterdown Aldershot Transportation Master Plan (WATMP) process (Phase 1 and 2 of the Class EA). The connected consultation process exceeded the minimum requirements of the Class EA Process. The WATMP consultation activities included multiple public notices, Public Information Centre events (5), Stakeholder Advisory Committee meetings (5), agency meetings, presentation to Councils, issuing of interim study reports for public review, information postings on the project website, and responding to project related comments, issues and concerns.



Exhibit 7-1: NAC Meeting

The Phase 2 consultation work focused consultation and communications activities around four study stages:

1. Confirm Approach to the Study;
2. Review and Confirm Issues, Alternatives and Criteria;
3. Develop and Seek Feedback on Alternatives; and
4. Develop and Review Draft Transportation Master Plan (two drafts – 2006, and 2007)

The consultation activities that were undertaken and the inputs received are documented in Section 7.0 of the WATMP Report (see ***Appendix O***). ***Table 7.***1 presents a summary of the issues and concerns regarding the identification of a widened Waterdown Road as the preferred alternative that were identified through the Phase 2 consultation process.

Table 7.1 – Summary of Issues and Concerns Regarding Waterdown Road Widening – Phase II

General	• Majority of participants attending meetings were from the Waterdown Road area. • Majority of meeting participants from both of the meetings are opposed to the North-South option to widen Waterdown Road. • Some participants felt that the road widening appears to solve the problem, is cost effective, and provides for the least impact on residents. • Some participants did not receive notification of the meetings.
Key Issues and Concerns	• The proposed widening of Waterdown Road is creating a great deal of anxiety and opposition in the community. • There is a need for creative solutions to the problem. • Many people support the North-South option of widening King Road to four lanes, using creative designs, despite the environmental impacts. • Most people indicated that the development of Waterdown Road/Mountain Brow Road is not an acceptable option since there is greater social impact than the King Road option. Concern that impact on people is preferred over impact on environment, flora and fauna. • Some people supported the Waterdown Road option, and indicated that the option to widen King Road has too many environmental impacts. • Social impact – anxiety and concern expressed about acquisitions along Waterdown Road as details about the specific alignments are not yet available. • Basis for the assessment – Concern expressed that documentation was not available on how the screening and evaluation process was conducted. Report needs to be reviewed and discussed by the public before decisions are made. • The plan for public transit needs to be significantly strengthened. Residents use cars to get to and from Waterdown. Need to integrate the need for better public transportation in a much stronger way – not just the GO train. • Road safety – Enforce reasonable speed limits on busy roads; prevent winter accidents by designing the road appropriately. • Safety of hikers and cyclists on the Bruce Trail needs to be a priority. • Traffic could reach capacity on King Road even if Waterdown Road is expanded. • Connect N/S and E/W routes; this will reduce traffic congestion on Highway 5 and 6. • Development is not welcome in Waterdown, concerns surrounding OPA28. Politicians encouraged to lobby for the revocation of OPA28. • Protect environmentally sensitive areas and wildlife. Many participants support the decision to protect “23 acres”. • Concerns that truck traffic will increase and continue to move through residential areas. • Need to continue to involve local residents in the planning process, it was suggested that another round of public meetings are held prior to final study recommendations being made. • Concern about the health and safety of the children, schools need to be built to accommodate for growth. • Participants would like to receive more information about the project.

City of Burlington Review of WATMP Recommendations

In responding to the WATMP recommendations, at its May 1st, 2006 meeting of Council, Burlington Council directed staff and the Project Team to review a 3-lane Waterdown Road/Improved 2-lane King Road option. The option was in response to concerns of the public regarding the WATMP recommendation to widen Waterdown Road to 4 lanes. Further, Burlington staff raised concerns regarding the condition of King Road in light of the likelihood of higher traffic volumes along it from planned future development in the area (OPA 28). A consultant was retained by the City of Burlington to provide an independent review of the existing King Road alignment and develop a functional plan for an improved 2-lane King Road option.

An evaluation of the 3-lane Waterdown Road/Improved 2-lane King Road option and the recommended 4-lane Waterdown Road option was conducted by Dillon Consulting based on the evaluation criteria, weighting, and process used in the Phase 2 Waterdown-Aldershot Transportation Master Plan. The evaluation of the 4-lane Waterdown Road option included the estimated cost to reconstruct King Road to improve the condition of pavement surface. The evaluation results based on the previously used criteria group weights indicated that the 4-lane Waterdown Road option is preferred.

In July 2007, the City of Burlington received the draft Phase 2 Report and, subject to a number of conditions, authorized staff to proceed with Phase 3 and 4 of the Class EA process. Included in the resolution was the need to consider an interim 3-lane option along Waterdown Road until traffic volumes warranted the fourth lane and to undertake additional studies in the King Road corridor to assess feasible treatment options.

The resolution from the City of Burlington can be found in ***Appendix A***.

7.2 Phase 3-4 Consultation Approach

In developing the public consultation and communications program for the Waterdown Road Corridor Class EA, the Project Partners (City of Hamilton, City of Burlington, and Halton Region) retained Lura Consulting, a neutral third-party expert in public consultation and communications, to assist in providing facilitation, managing stakeholder communications, and providing meeting organizational and reporting services.

7.2.1 Approach to developing the Public Consultation and Communications Program

The Consultation and communications program for the Class EA built on the program that was developed and implemented for the Waterdown-Aldershot Transportation Master Plan (WATMP).

The Consultation and Communications approaches were informed by input received from members of the public as a result of the WATMP consultations. Recommendations contained in the WATMP included:

- Improving communications through the initiation of a One-Window communications centre;
- Establishing a Waterdown Road Neighbourhood Advisory Committee, in accordance with the requirements set out by the City of Burlington in the July 2007 resolution;
- Ensuring that correspondence from members of the public is responded to within a specified time period (e.g. 10 business days);
- Providing adequate resources to enable meetings with affected members of the public when required;
- Considering a newsletter/flyer to provide frequent updates to affected members of the public as new information becomes available. Include information on timing of decisions, and mechanisms for participation;
- Consider holding community-neighbourhood meetings to discuss study findings as the project progresses; and,
- Continue to convene PICs before significant decisions are made.

Prior to the initiation of the Phase 3-4 Class EA process, the project team developed a draft Path Forward Report (see ***Appendix A***) that outlined the approach to be followed for the Phase 3-4 Class EA and consultation and communications process. The approach was built on the goals and principles of the WATMP consultation process.

7.2.2 Strategies for Public Consultation and Communications Activities

The following strategies were deployed in communicating and consulting with the public:

- Get and keep people engaged;
- Correctly identify target stakeholder groups;
- Have contact early and often;
- Provide clear, concise, relevant information – as early as possible;
- Demonstrate how ideas from previous consultations have been/will be considered;
- Time and focus public engagement and consultation activities to match decision milestones in the Environmental Assessment
- Manage meetings for maximum effectiveness;

- Provide several mechanisms to provide information and collect feedback (meetings, web-site, internet, email, fax, mail, phone, personal contact); and,
- Demonstrate how feedback will be/was considered.

7.2.3 Key Study Messages

At the outset of the Class EA process, a number of key messages were identified to guide the process. These key messages are identified below and separated into 'process' messages, and 'content' messages.

Process Messages

- The study is a joint project being led by the City of Hamilton, the City of Burlington and Halton Region.
- The study is following the Municipal Engineers' Association Class Environmental Assessment Process.
- The study is guided by the Project Partners.
- Stakeholder agencies are engaged both individually and through project meetings;
- Public consultation is an essential component of the project. This will be achieved through the establishment of a Neighbourhood Advisory Committee (NAC), Public Information Centres (PICs), individual meetings and communications.

Content Messages

- Although, initially adopted by Town of Flamborough Council in May 1992, a revised version of OPA 28 and related Memorandum of Agreement was ultimately approved by Cabinet in June 2002 by Order in Council 1262/2002, in response to a series of appeals and required the completion of an Environmental Assessment Master Transportation Study.
- Development plans have been proposed to the City of Hamilton, however, these cannot be implemented until transportation alternatives are identified and a Transportation Master Plan is completed.
- The approved development includes approximately 6,500 new residential units and limited commercial/retail. The residential development will support an additional estimated population of approximately 20,000 people, with about half of the units planned for north of Dundas Street and the other half south of Dundas Street.
- As confirmed in the WATMP transportation infrastructure is required to support the new development, particularly to move people east, west, and south to places of employment.
- The Class EA will look at alternatives for the north-south corridor, including improving existing infrastructure (roads and bridges) and constructing new infrastructure, and provision and improvement of cycling and pedestrian infrastructure.
- A second Environmental Assessment is being undertaken for the New East West Road Corridor. The two studies take place in parallel to one another.

7.3 Phase 3-4 Public Consultation and Communications Activities

Under the Municipal Engineer's Association Class EA process, for Phase 3 and 4, there are two mandatory points of public contact including:

1. During Phase 3, the public is invited to provide input into the alternatives and mitigation measures; and,
2. At project completion, a notice of project completion is to be issued, again, inviting comment on the recommended solution.

The Project Partners designed the public consultation process to exceed the minimum public notice and consultation requirements of the Class EA process. The consultation process included:

- Pre-consultation stakeholder identification and discussions;
- A final Stakeholder Advisory Committee meeting to wrap up the WATMP (Phase 2) and obtain input on the Class EA Phase 3 and 4 process;
- Release of the Path Forward Report;
- E-mail, print and mail notices to attend three Public Information Centres (PICs);
- Three rounds of Public Information Centres (PICs); (the first one to present the WATMP's conclusions, and the proposed Study Plan and Public Consultation and Communications process; the second one to present the alternatives, and the third one to present the preferred alternative or undertaking);
- An additional PIC was held in Burlington to review the road concept drawings with the residents along Waterdown Road
- Development of a Terms of Reference, recruitment and formation of the North-South Neighbourhood Advisory Committee (NAC), and holding five meetings (please see attached Terms of Reference and Recruitment procedure in Appendix A);
- A One-Window Communications Portal for stakeholders and the public;
- Issuing of interim study reports for public review;
- One-on-one meetings with affected property owners;
- Newsletters; and
- Responding to public inquiries throughout the study process.

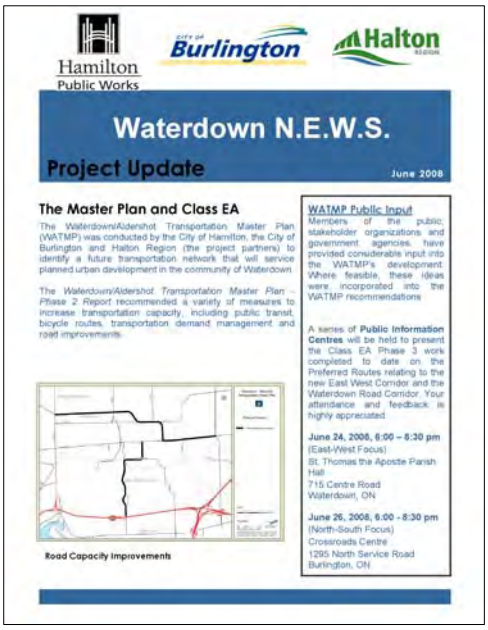

Hamilton Public Works
Burlington
Halton
Waterdown N.E.W.S.
Project Update
June 2008
The Master Plan and Class EA
The Waterdown/Aldershot Transportation Master Plan (WATMP) was conducted by the City of Hamilton, the City of Burlington and Halton Region (the project partners) to identify a future transportation network that will service planned urban development in the community of Waterdown.
The Waterdown/Aldershot Transportation Master Plan – Phase 2 Report recommended a variety of measures to increase transportation capacity, including public transit, bicycle routes, transportation demand management and road improvements.
WATMP Public Input
Members of the public, stakeholder organizations and government agencies have provided considerable input into the WATMP's development. Where feasible, these ideas were incorporated into the WATMP recommendations.
A series of Public Information Centres will be held to present the Class EA Phase 3 work completed to date on the Preferred Routes relating to the new East West Corridor and the Waterdown Road Corridor. Your attendance and feedback is highly appreciated.
June 24, 2008, 6:00 – 8:30 pm
(East-West Focus)
St. Thomas the Apostle Parish Hall
715 Centre Road
Waterdown, ON
June 26, 2008, 6:00 - 8:30 pm
(North-South Focus)
Crossroads Centre
1295 North Service Road
Burlington, ON
Road Capacity Improvements

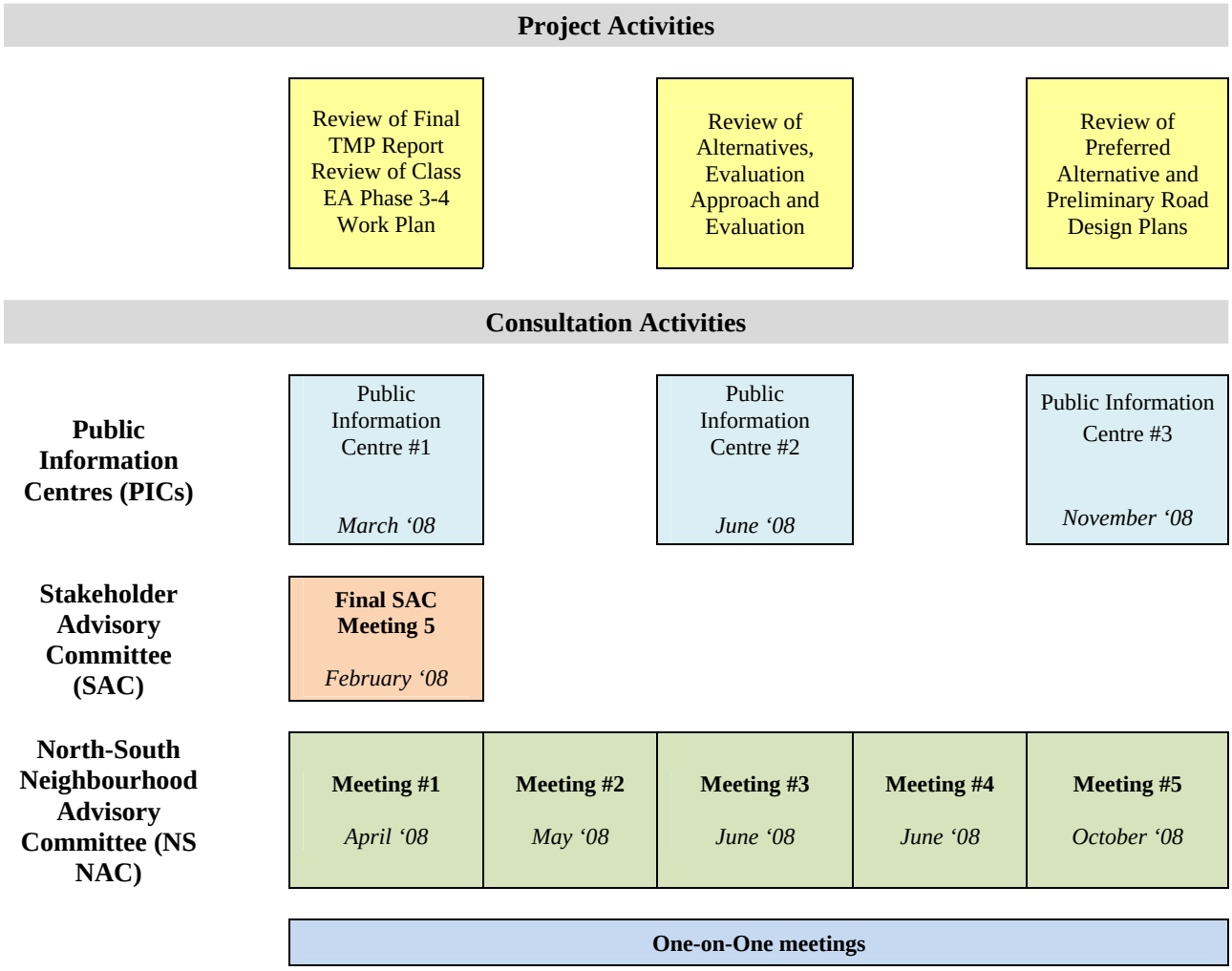
Exhibit 7-2: Example Project Newsletter

The WATMP recommendation to widen Waterdown Road generated significant concern for many residents along Waterdown Road. These concerns are documented in the February 2008 WATMP Report. In the initial phases of the consultation program for Phases 3 and 4, there was still considerable discussion regarding the WATMP recommendations despite Burlington Council's resolution to proceed with the Phase 3-4 work.

In addition to the formal consultations that were held, there were ongoing opportunities throughout the process for members of the public and stakeholders to receive information about the project (via the project website and other communications materials, as developed), and also to

provide feedback to the Project Partners (e.g. through phone, fax, email, mail, and the project website). ***Figure 7.1*** depicts the work plan in relation to the public consultation. It demonstrates the integration between the two activity streams.

Figure 7.1 – Work Plan Overview (Phase 3 and 4)



Note that an additional public meeting was held for Waterdown Road residents to view the recommended road design concept plans (March 2010);

For detailed information on the issues raised by the public and stakeholders and responses provided (by the Project Team) refer to ***Appendix P***. Minutes from Public Information Centres (PICs) and North-South Neighbourhood Advisory Committee (NS NAC) meetings, and submissions from members of the public are provided in ***Appendix A***. Comments from government agencies and other stakeholder groups can be found in ***Appendix B.*** Refer to ***Appendix O*** for complete information regarding the public program carried out during Phase 2.

7.3.1 Communications Activities

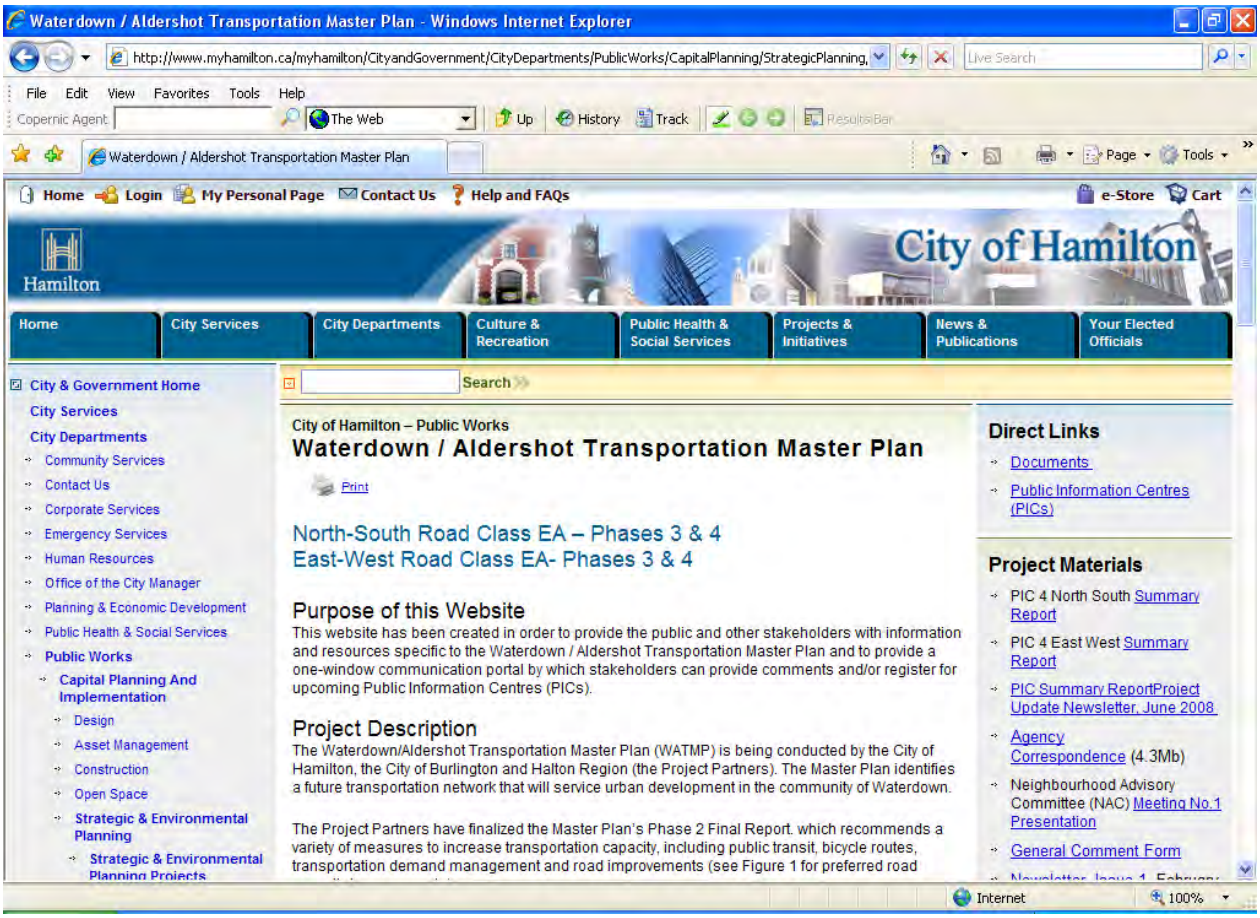
An effective communications program creates awareness of a project and opportunities for involvement and participation. It should also provide information in a clear, concise way that enables the public and stakeholders to understand the issues that need to be addressed, and the different considerations that influence the decision-making process. The following communications activities were undertaken throughout Phase 3 and 4:

Study Web Page

A study web page was developed in the project initiation phase of the study. The purpose of the web page was to provide the public-at-large with the most up-to-date information available on the study progress, and act as a medium for the exchange of information (i.e., the ability to download reports, presentation materials, etc.). The web page was located at:

www.hamilton.ca/WaterdownTMP

Figure 7.2 – Project Web Page



E-Mail, Verbal and Written Communications

Throughout the study, members of the Project Team were available to receive information, obtain input and ensure that responses were provided through the One-Window Communications Portal established by the Neutral Community Facilitator's Office:

Neutral Community Facilitator's Office
36 Hunter Street East, 6th Floor
Hamilton, ON L8N 3W8
Tel. (905) 818-8464
Fax (905) 528-4179
Email: info@waterdown-aldershot.ca

Consultation Communications

At various stages throughout the study, communications materials were developed to assist consultation activities, including:

- Path Forward Report;
- Presentations at Neighbourhood Advisory Committee (NAC) meetings;
- Display boards at Public Information Centres (PICs);
- Pre-meeting notification/invitations (through ads and e-mail communications to the study mailing area and mailing list); and
- Project website updates.
- Newsletters
    - Waterdown/Aldershot Transportation Master Plan Update – February 2008
    - Waterdown/Aldershot Public Information Centre – March 2008
    - Notice of Public Information Centre #1 – June 26, 2008
    - Notice of Public Information Centre #2 – November 6, 2008

Path Forward Report

At the onset of Phase 3, a ***Path Forward Report*** was developed as a basis for consultation with the community. The report set out the results of the Transportation Master Plan, the current status and the proposed path forward to be followed in the Phase 3-4 Class EA. The purpose of the report was to assist all stakeholders, including landowners, businesses, review agencies, the public, and other interested parties, to understand the background of the study, provide input on the Class EA process and consultation and communications process, and to facilitate input. The Path Forward Report is contained in ***Appendix A***.

7.3.2 Consultation Activities

Public Information Centres (PICs)

Public Information Centre #1

The first Public Information Centre for the Waterdown Road Class Environmental Assessment took place on March 5, 2008 in Burlington, and was intended as an information centre to update the community on progress that had occurred during the 2-year hiatus since the last public meeting, and to obtain public input on the next steps. It also served as an opportunity to solicit applications for the North-South Neighbourhood Advisory Committee. The following display panels were provided:

- Project History Overview;
- Transportation Master Plan (TMP) Report Recommendations;
- Recommended Road Improvements;
- Waterdown Transit Update;
- Endorsement of Recommendations;
- Burlington Council Resolution;
- Changes to the final TMP Report;
- Consultation Program – Phase 2;
- Stakeholder Concerns:
- Steps Ahead for Phase 3 & 4;
- Phase 3 Issues to Address;
- Waterdown Road - Phase 3;
- New East-West Road - Phase 3;
- Planned Consultation Program;
- Phase 3 & 4 Study Schedule; and
- "Your Comments".



Exhibit 7-3: PIC #1 Discussions

The purpose of the PIC was to present the final *Phase 2 Report (Transportation Master Plan)*; and, to discuss the proposed technical work program and public consultation and outreach plan for Phase 3 (contained in a *Path Forward Report*). The PIC also included an opportunity for attendees to apply for membership on the North-South Neighbourhood Advisory Committee (NS NAC) that was being developed for the Waterdown Road Phases 3 & 4 Class EA work. A summary of the meeting and the input that was received is provided in ***Appendix A***.

Public Information Centre #2

The second Public Information Centre took place on June 26, 2008 at the Crossroads Centre in Burlington. This PIC covered the following information:

- Waterdown / Aldershot Transportation Master Plan (WATMP) Report Recommendations;
- Recommended Road Improvements;
- Class EA Phase 3 & 4 Process;
- Phase 3 Issues to be Addressed;
- Consultation Program;

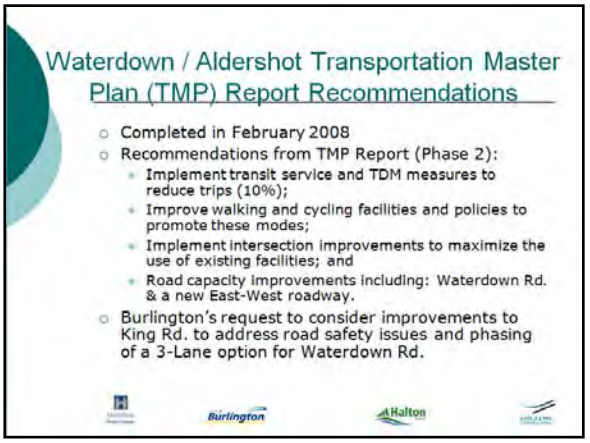


Exhibit 7-4: PIC #2 Display of TMP Report Recommendations

- Neighbourhood Advisory Committee (NAC) Role to Date;
- Phase 3 Evaluation Criteria;
- Waterdown Road Alternatives;
- Mid Block Alternatives Evaluation;
- Waterdown/Mountain Brow Intersection Alternatives Evaluation;
- Properties with Grading Impacts;
- New Road Connection at Dundas Street;
- Rationale for the Link Location;
- Area Travel Patterns;
- King Road Technical Feasibility Study;
- Phase 3 & 4 Study Schedule; and
- Next Steps.



Exhibit 7-5: PIC #2 Welcome Board

The purpose of the PIC was to provide an overview of the preliminary results of the evaluation of alternatives, mitigation options and issues identified; and to obtain feedback from the public. A summary of the meeting and the input that was received is provided in ***Appendix A***.

Public Information Centre #3

The third Public Information Centre took place on November 6, 2008 at the Crossroads Centre in Burlington. This PIC covered the following information:

- Phase 2;
- TMP Recommended Road Improvements;
- Phase 2 Burlington Council Resolution;
- Class EA Phase 3 & 4 Process;
- Public and Agency Consultation;
- Alternative Design Alignments: Evaluation;
- Evaluation Criteria;
- Dundas Street Connector Road Alternatives;
- Evaluation of Connector Road Alternatives;
- Mountain Brow Road Alignment;
- Waterdown Road Mid Block (north of Flatt Road) Alternatives Evaluation;
- King Road Technical Feasibility Study;
- Phase 2 Assessment of King Road;
- King Road Study Area;
- King Road Reconstruction Option;
- King Road Assessment Summary;
- Waterdown Road Corridor – Impacts and Mitigation;
- Truck Issue;
- Overview of Preliminary Design;
- Preliminary Design Plans; and
- Project Schedule.



Exhibit 7-6: PIC #3 Discussions

The purpose of the PIC was to provide an overview of the preferred road alignments, streetscape designs, mitigation options and issues identified;

and to obtain feedback from the public. A summary of the meeting and the input that was received is provided in ***Appendix A***.

Neighbourhood Advisory Committee

The Waterdown Road Class EA North-South Neighbourhood Advisory Committee (NS NAC) was formed to obtain input from members of the public and community stakeholders on the conduct of the Waterdown Road Class EA process. Its mandate was to provide a forum for in-depth discussion of project issues with a representative group of interested citizens and stakeholders. In particular its role was to:

- Provide a balanced, inclusive discussion and advisory forum for community members and stakeholders;
- Review and provide comments on the alternative design concepts, evaluation criteria and preferred design;
- Provide a forum for the discussion of issues, opportunities and solutions; and,
- Provide other relevant information that the Project Team refers to the Neighbourhood Advisory Committee for feedback.



Exhibit 7-7: NAC Discussion of Alternatives

The Neighbourhood Advisory Committee reported through the Project Team to the City of Hamilton, City of Burlington and the Halton Region (the Project Partners). The NS NAC held five meetings in total during the study period. Table 7.2 summarizes the schedule and discussion topics.

Table 7.2 – North-South NAC Meeting Schedule

NS NAC Meeting	Meeting Topics
Meeting #1 April 22, 2008	▪ NAC Terms of Reference ▪ Phase 3 and 4 Work Plan ▪ Alternative Design Concepts – Assessing Alternatives and Criteria ▪ Consultation with Property Owners
Meeting #2 May 14, 2008	▪ Alternatives Evaluation Methodology ▪ Issue Areas
Meeting #3 June 2, 2008	▪ Evaluation Criteria ▪ Issues / Opportunities for Alternative Alignments
Meeting #4 June 11, 2008	▪ Preliminary Evaluation of Alternatives ▪ Mitigation Options ▪ Update on King Road ▪ Option 4 vs. 5 Re-evaluation
Meeting #5 October 30, 2008	▪ Review of Draft Plans ▪ Mitigation Options/ Measures ▪ Streetscape / Design Issues

Membership

To ensure a balanced representation, the Neighbourhood Advisory Committee was comprised of representatives from:

- Local Residents – including 3 residents from Waterdown Road;
- Environmental Organizations;
- Community Organizations;
- Development Community Representatives; and
- Councillor Rick Craven, City of Burlington.

NAC Terms of Reference

A draft NAC Terms of Reference (ToR) was prepared which outlined the guidelines and purpose of the North-South Neighbourhood Advisory Committee (NS NAC). The ToR presented the operational basis for the meetings that would take place over Phases 3 and 4. The NS NAC had a chance to review and amend their ToR at their first meeting. The NS NAC's Terms of Reference and Meeting Minutes are presented in ***Appendix A***.

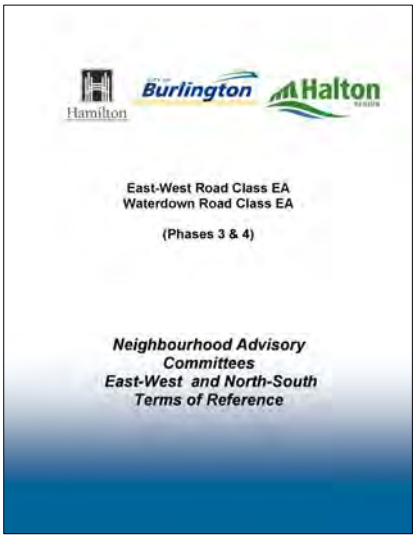


Exhibit 7-8: NAC Terms of Reference

Resident One-on-One Meetings

Individual meetings were held with twelve land owners that would be directly affected by the road widening. These meetings were largely conducted in the residents' homes. The purpose of these meetings was to inform the landowners of the potential property requirements, identify their concerns, explain the compensation process and where available, discuss design modifications/mitigation measures to reduce the effects. As a result of these meetings, modifications to the design proposals were explored.

Land Developer Discussions

Discussions and meetings were held with the owners of the Waterdown South Development and the Eagles Heights Development. The focus of the discussions with the Waterdown South Development was in regards to the alignment of the Mid-Block connector road and its design including the need for a centre median, intersection location and design and the number of required lanes. Minutes from these meetings are contained in ***Appendix B***.

Discussions and meetings with the owner of the Eagle Heights development focussed on the proposed realignment of Waterdown Road through this land parcel. Through these meetings the Project Partners were able to develop an understanding of the impacts that the realignment would have on this development parcel which was taken into account in the re-evaluation of the alignment alternatives though this area. Meeting minutes with this landowner are contained in ***Appendix B***.

7.4 Technical Advisory Committee Inputs

To provide technical input to the study process a Technical Advisory Committee (TAC) was assembled that included representatives from the following agencies (in addition to the Project Partners):

- Conservation Halton
- Ministry of Environment
- Ministry of Transportation
- Niagara Escarpment Commission

The TAC held meetings on: May 12, 2008, July 12, 2008, August 12, 2008, and September 17, 2008. Additional discussion and correspondence was held with some agencies to address specific issues. Minutes of the TAC meetings and comments received from the agencies are contained in ***Appendix B***.

Key issues discussed with the TAC as they relate to the Waterdown Road project included:

- Natural heritage field surveys;
- Evaluation criteria;
- Integration of the Waterdown Road study with the Hwy 403 interchange work;
- Impacts to the Grindstone Creek crossing south of Dundas Street;
- Erosion mitigation;
- Impacts on the creek channel in the Waterdown South development area;
- Review of the proposed designs for road widening; and
- Impacts on Sassafras Woods on the east side of Waterdown Road – reviewing the use of retaining walls to minimize effects

Detailed comments were provided by Conservation Halton on the Alternatives Evaluation Framework and the Natural Environment Conditions Report. These comments and the Project Partners responses to them are contained in ***Appendix B***.

7.5 Burlington and Hamilton Council Consultation

The Waterdown Road Corridor Class EA Environmental Study Report was endorsed by Hamilton City Council and Burlington's Community Services Committee of Council on February 10, 2010.

7.6 First Nations Consultation

Provincial and federal agencies that were consulted with regarding First Nation consultation included:

- The Department of Indian and Northern Affairs;
- Ontario Secretariat of Aboriginal Affairs (OSAA); and
- Ministry of Attorney General.

INAC responded in letters dated March 21, July 10 and Nov 14, 2008 and indicated that they are not aware of any claims litigation or comprehensive claims in the project area.

The following First Nation communities and organizations were sent a letter in early June 2008 to invite them to PIC #1 and to confirm their interest in the results of the WATMP Phase 2 work and involvement in the Phase 3 and 4 work:

- Six Nations of the Grand Council;
- Mississaugas of the New Credit;
- Huron-Wendat First Nation;
- The Métis Nation of Ontario;
- The Chiefs of Ontario;
- Assembly of First Nations; and
- The Association of Iroquois and Allied Indians (AIAI).

The Six Nations of the Grand River First Nations responded with a letter on September 29, 2008 indicating that they would like to be forwarded the Archaeological Assessment.

A meeting was held with Mississaugas of the New Credit First Nations on January 23, 2009. During the meeting, Dillon presented the project background and the current proposed design concept and accepted feedback from Chief Bryan LaForme. The presentation and meeting minutes can be found in ***Appendix B***.

A letter (May 29, 2008) was received from the Huron-Wendat First Nation indicating that they are not able to comment on specific projects due to a lack of financial support by the Province of Ontario.

The Assembly of First Nations submitted a letter on July 17, 2008 that provided some general advice regarding First Nation consultation. No specific comments to the project were made.

The AIAI submitted a letter on June 24, 2008 that provided some general advice regarding First Nation consultation. No specific comments to the project were made.

The above identified First Nation communities will receive notice of the ESR completion for review and comments. Further, offers to meet with these communities will be made.

7.7 Community Issues and Results of the Consultation and Communications Program

This section summarizes the input that was received by the local community and how these issues were responded to and considered in

the preparation of the Class EA. This input was obtained through a variety of means as indicated in the previous section The issues and comments were documented in a data base as they were received. The full documentation of comments/questions received from the public and the Project Team responses are contained in ***Appendix P***. Not included is the input received from the owners of land development parcels affected by the project. This input is documented separately in the form of meeting minutes. ***Table 7.5*** (located at the end of this chapter) presents a summary of the public input received and the responses that were provided. While attempts were made to respond to the issues in a timely manner, this was not always possible due to either the volume of comments that were received during certain periods of the study, the number of reviewers that many of the responses required and/or because the information that was being requested was not yet available. The residents did at times voice frustrations that their questions were not being responded to in a timely manner. Attempts were made by the project team to address concerns as quickly as was possible but time lags in many of the responses did occur. In all cases however, response were provided to all questions and concerns that were received from the public throughout the course of Phases 3 and 4.

The types of issues raised and comments made by the public can be summarized as follows:

- Specific comments relating to the road design such as: speed limits, road lane widths, bicycle lanes, intersection design, property requirements, property access, questioning of need to accommodate truck traffic, etc.;
- Issues relating to impacts on the natural environment that included street trees along the roadway and effects on ESA lands including Sassafras Woods and the Grindstone Creek Crossing (just south of Dundas St.);
- Comments on the EA study process and consultation methods, timing, advertisements, etc.;
- Frequent requests to receive and review the interim reporting;
- Safety concerns of residents resulting from expected increases in traffic volume along Waterdown Road;
- Issues relating to compensation for property taking and impacts on land value;
- Concerns relating to traffic infiltration via Boulding Avenue as a result of the intersection location on Dundas Street for the new mid-block connector road;
- Concerns regarding impacts on residences well water supplies and septic systems;
- Changes to drainage patterns in the study area and result impacts on residential property;
- Questions regarding impacts on public health (due to potential noise and air quality effects); and
- Comments regarding King Road and the need to keep it open as a viable alternative route.

Table 7.3 presents a summary of the comments and suggestions received from the NAC.

Table 7-3: Summary of NAC Comments/Suggestions

Topic	Comments / Suggestions
General	▪ The Project Team should consider creating a connection between the North-South route and the new East-West Road. ▪ The need to implement the City of Burlington's resolution ▪ Recommendation that truck traffic be prohibited from the roadway (in both Burlington and Hamilton)
Evaluation Criteria Ranking	▪ Overall the social and natural environments are very important criteria. ▪ Cost is a very relevant criterion. ▪ Safety was also identified as an important criterion.
Waterdown Road	▪ The Project Team should consider the longer-term needs of the local community, beyond the OPA 28, and consider the amount of road that would be required based on future development. ▪ Concerns about impacts on septic systems in front yards along Waterdown Road. ▪ Concerns about speed limits on Waterdown Road, suggestion for reduced speed limit of 50 km/h. ▪ Suggested lane width reduction from 3.3 m to 3.0 m. ▪ Many NS NAC members supported a roundabout at Waterdown Road and Mountain Brow Road.
King Road	▪ NS NAC members would like to see King Road left open and in good, safe condition.
Natural Environment	▪ NS NAC members advocated for the preservation of the continuity of the Waterdown North Wetland Trail. ▪ Concerns about the Bruce Trail crossing, and possible impacts to the local Environmentally Sensitive Area (ESA). ▪ Suggestion for a possible Bruce Trail crossing on Waterdown Road south of Mountain Brow Road. ▪ Suggestion for a pedestrian island at the Bruce Trail crossings of Mountain Brow Road east of Flanders Drive. ▪ Concerns about road salt contamination of local creeks and streams. ▪ Concerns about noise, light and air pollution. ▪ Suggested compensated for removal of local trees.
Social Concerns	▪ NS NAC members were concerned about property acquisition and expropriation of homes along Waterdown Road and the North-South route. ▪ The need for compensation for home-owners directly impacted.

Extensive input was also received as a result of the one-on-one property owner meetings. A summary of the input received from those meetings is summarized in ***Table 7.4***.

Table 7.4 - Summary of Comments/Concerns from One-one-One Meetings

- Concerned about controlling traffic speed along Mountain Brow Road; currently vehicles drive speeds upwards of 80-90 km/h. Resident is opposed to a stop sign at Flanders Dr.
- Resident on Flanders Drive is in favour of closing Flanders Drive at Mountain Brow Road when the Waterdown South subdivision is built.
- Annoyed with length of study.
- Concerned that residential property value will decrease after Mountain Brow Road is widened.
- Regular cyclists are in favour of on-road shared bike lanes.
- Concerned about noise and light pollution when tree frontage is removed.
- Vehicles travelling west on Mountain Brow Road at high speeds lose contact with the road at the intersection with Waterdown Road. The grade at the intersection should be flattened out to eliminate this problem.
- Concerned about sightlines from Mill Street at the intersection of Waterdown Road and Mountain

Brow Road. Residents encouraged the idea of a stop at that location (i.e. lights or signage).

- Concerned about putting a much needed addition onto their house for fear that their property will be purchased.
- Considering building a berm on their property between their house and the road to decrease noise.
- Concerned about having to relocate their entry gates.
- Observed daily traffic backups going south toward Hwy 403.
- Resident feels that sidewalk on Mountain Brow Road will not be used.
- Concerned about proximity of proposed road to home.
- Numerous drivers have hit the guide rail adjacent to Sassafras Woods while speeding around the curve.
- Residents feel unsafe backing out onto the road from their driveways.
- Concerned about the number of mature trees on their property that will have to be removed according to the current plan.
- Concerned about increased truck traffic on Waterdown Road, south toward Highway 403.
- A previously proposed design showed grading over their home and for that reason, the home could not be sold.
- Several residents questioned why a sanitary sewer isn't being installed at the same time as the road widening.
- Concerned about enjoyment factor of their property while the road is being re-constructed.
- Concerned about extent of impacts to their property; what restrictions are currently in place for additions to their home?
- Plans to sell home after road is built.
- Resident feels that narrower lanes would reduce property impacts and act as a traffic calming measure.
- Residents on Mountain Brow Road pick up mail from a bulk mail box located south of Flanders Drive.
- Previously, significant flooding has occurred at the north end of Waterdown Road which caused damage to the property.
- Resident feels that the impacts to their property warrant purchase by the City.

The following summarizes how the input received was considered and influenced the decision process and recommended road improvement design:

- Significant public concern was expressed regarding the potential for traffic infiltration into the residential area (via Burke St. /Boulding Avenue) north of the proposed Mid-Block Rd/Dundas Street intersection location. In response to these concerns, an intersection design is recommended to prohibit northbound traffic from traveling north through this intersection – vehicles will be forced to turn right or left;
- Considerable discussion was held with the owner of the Waterdown South Development to be located between Dundas Street and Mountain Brow Road. These discussions were focused on the design of the Mid-Block Road and addressing issues relating to: Grindstone Creek crossing location/design, the number of road lanes required, use/location of road medians, viability and location of proposed roundabouts/intersections, and the alignment of the road in context of the swale at the south end of the development parcel. Based on these discussions and the inputs received,

considerable change was made to the initially proposed draft road design for the Mid-Block Road.

- Due to public concern regarding the change to the rural character of Waterdown Road the normal design speed for this class of road was reduced from 70 km/h to 60 km/h which will result in a reduced posted speed along the road of 50 km/h.
- Due to the expressed concerns of residents along Mountain Brow Rd in the vicinity of the Flanders Drive Intersection, the road alignment was shifted slightly to the south in this area to avoid the requirement to purchase property at this location. Further, sidewalks have only been proposed on the north side of the roadway to further minimize road footprint impacts.
- Based on comments received by residents and the Bruce Trail Association, an island refuge type crossing features is proposed along Mountain Brow Road and Waterdown Road to allow the safe crossing of the widened roadways by trail users.
- Consideration was given to the use of roundabouts at key intersection locations. Public comment was received regarding a proposed roundabout at the Waterdown Rd/Mountain Brow Rd intersection. These comments were considered in the decision to implement a 4-way intersection design instead of a roundabout (that would have resulted in much greater property impacts due to its size). This intersection provides a continuous right turning movement for northbound traffic.
- The design of Waterdown Road was influenced by comments received by several interests including Burlington City Council and several individual property owners. As a result of Burlington Council input, an off-road multi-use pathway design was considered and compared against an on-road bicycle lane design. The off-road pathway design was selected as preferred. Further, based on Council input, a 3-lane interim road design has been developed for Waterdown Road. Extensive streetscaping proposals have been incorporated into the recommended design to address Burlington Councils request for a “parkway” treatment along the road. This includes significant street tree planting, median treatments, pedestrian lighting and the recommendations for the consideration of banners, hanging planters, burying of hydro service lines and decorative treatments at the proposed roundabouts. As well, based on meetings with individual landowners, modifications were made to the alignment/use of retaining walls to minimize impacts on property, trees and property access. Alternative property access points in one case are also being explored.
- Comments were received from the public regarding lane widths and the desire to decrease them from the proposed 3.3 m to 3.0 m. While this was considered, Burlington is concerned that the narrowing of the lane widths could be problematic for some vehicles (e.g. buses) and could result in safety concerns. A 3.3 m lane is Burlington’s standard, minimum lane width.
- Requests were made to consider the need for wildlife crossings along Waterdown Road. Three areas where wildlife crossings are noted to occur are: just south of the Mountain Brow intersection, the northern hydro corridor crossing and at the

hydro corridor crossing south of Flatt Road. In reviewing these locations, it was determined that the road profile would not allow the implementation of a grade separated crossing without incurring significant footprint impacts and costs. As such, wildlife crossings were not considered further.

- Discussions were held with the owner of the Eagles Heights development lands located on the west side of Waterdown Road, north of Flatt Road. An alternate alignment was initially proposed to run through these lands to allow a straightening of the roadway. Upon subsequent discussion with the owner of these lands, it was determined that this realignment would have substantial impact on this development parcel and result in substantial cost to the Project Partners. This information was then taken into account and the alignment alternatives re-evaluated. The preferred alignment was determined to widen the road to the west of the current roadway that would reduce the effect on these development lands while at the same time avoid impacting the residents on the east of the road.
- To address concerns relating to the possible encroachment of the widened road onto the ESA lands south and in the vicinity of Flatt Road, the widened road was directed to the west side as much as possible.
- In response to concerns relating to tree removal as a result of road widening, an extensive landscape/streetscaping and tree planting plan was developed and included in this ESR. In total, approximately 475 existing street tree will require removal as a result of the road widening and approximately 875 new street trees will be planted.

A meeting was held at the Aldershot Pool community room, 50 Fairwood Place in Burlington on March 10, 2010. Meeting notices were sent to residents along the Waterdown Road corridor from north of the North Service Road to Mountain Brow Road. Approximately 50 people attended the meeting. A short presentation was made regarding the project, the key recommendations and next steps. After the presentation, a large scale display of the recommended concept was used to illustrate specific impact to properties and to discuss mitigation and design elements with affected property owners. The table below contains a summary of the comments received and the Project Team's responses. Three types of comments were received:

A. Main comments received from the attendees at the meeting
B. Comments written on the display roll plan of the recommended concept
C. Comments received after the meeting

Table 7.5 – Summary of Waterdown Road Residents Meeting (March 2010)

ID#	Comment	Response
A. Main comments received from the attendees:		
1	Suggested rumble strips in the two way left turn lanes where planter boxes not installed	These will be considered in the design phase.
2	Noise report was requested with respect to time of	A copy of the Noise Assessment Report was

	day/day of week that study was conducted (copies of this report was distributed to those who asked to review it)	provided
3	Suggested side walk on west side of Waterdown Road instead of Multi-Use Path (MUP)	A multi-use pathway was recommended to provide sufficient width for pedestrians and cyclists. A reduced width will be considered in the design phase.
4	Suggested constant 3 metre multi-use pathway vs. the 3 – 4 metre that was proposed	A reduced width will be considered in the design phase.
5	Concerns re: Paletta development and possible retail plaza on corner of Flatt Rd and Waterdown	Comment noted. No development application has been submitted to the City for a retail plaza.
6	Concerned for safety of Mountain Brow (& the Hollow) signalized intersection – steep grade – safety/collision issues	Comment noted. The road grade on Mountain Brow Road approaching the Waterdown Road intersection will be flattened significantly with the recommended concept.
7	Concerned that lowering the posted speed limit will not deter public from driving well above the limit	Comment noted.
8	Request for load bearing weight on Waterdown Road – will Waterdown Rd become a designated truck route	The Waterdown Road pavement will be constructed to accommodate truck traffic, as is normal design practice. There are no plans to designate this road as a truck route.
9	Will there be crosswalks designed with Paletta development	No cross walks are recommended in the current concept.
10	Niagara Escarpment Commission – concerns with drainage surface water overflowing Dundas/Mountain Brow Road	The Waterdown South development will include the provision of major stormwater management facilities. A drainage ditch running along the north side of Mountain Brow Road has been recommended for the storage of excess surface storm flows.
11	Concerns for well water impact on residents	The impacts to active wells will be assessed in the design phase.
12	Resident requested consideration for installation of "u-shaped" driveway (impact of 2 access points on Waterdown)	Final driveway treatments will be assessed in the design phase.
13	Concern for septic system impact on residents	The impacts to septic systems will be assessed in the design phase.
B. Comments Written on Display Plan		
14	3-Lane Configuration: Concern that the 3rd lane will often be used as a passing lane. This currently exists in the 2-lane configuration. Consider rumble strips placed periodically or strategically to discourage passing in the middle 3rd lane.	This will be considered in the design phase.
15	Consider a landscaped island and crossing (at the hydro corridor south of Old Waterdown Road)	Comment noted. The provision of an island at this location will be assessed in the design phase.
16	Possible layover for mail boxes. For access from west side consider as island (at the Old Waterdown Road intersection).	Comments noted. This will be assessed in the design phase.
17	Include safety measures for crossing Old Waterdown Road.	Comment noted. This will be assessed in the design phase.
18	Consider a retaining wall (rock) to minimize grading impact. Catchbasin required at low spot. (west side of road immediately south of Horner).	Minimizing frontage impact to this property will be assessed in the design phase.
19	Several mature trees and bushes proposed to be cut	Request noted. This will be assessed in the design

	down and replaced with 2 new rows of trees. Request is made to increase foliage for visible and audio barriers given the proximity of the house to the road (west side of road between Horner and Mountain Brow Road).	phase as part of the development of a final landscape plan for the corridor.
20	Concern regarding removal of trees. Current trees provide privacy for pool (property on south west corner of Waterdown Road/Mountain Brow Road intersection).	Comment noted. Additional screening will be assessed in the design phase as part of the development of a final landscape plan for the corridor.
21	Impact on resident's driveway (property on south west corner of Waterdown Road/Mountain Brow Road intersection).	Final driveway treatments will be resolved in the design phase.
22	Consider protection from the lights at the corner (property on south west corner of Waterdown Road/Mountain Brow Road intersection).	Light spillover impacts will be considered during the design of the road's lighting system.
23	Possible location for retaining/sound proofing wall (property on south west corner of Waterdown Road/Mountain Brow Road intersection).	Request noted. The provision of this will be assessed in the design phase.
24	Consider to reduce multi-use path from 4m to 2.5m max. This is to reduce the impact and lower costs. Provide additional efforts to reduce noise levels.	Comment acknowledged. This will be considered in the design phase.
C. Additional comments from two residents received after the meeting		
25	Enquiring as to the reasoning behind the decision to shift the centre line of the roadway to the west in their section of Waterdown Road. They fear that they will be losing 2 60 year-old trees and major repair work to landscaping. They request that consideration be made to move this section to the east where they claim there would be less impact.	The recommended alignment of the proposed road was selected to minimize the overall impacts on both sides of the road. Slight shifts to the proposed alignment are possible and these will be assessed further in the design phase.
26	I am quite disappointed that no serious consideration was given to relocating this arterial road to a new right-of-way west of the current road. A new right-of-way through the undeveloped lands would have addressed most of the concerns of the residents; noise, speed, traffic congestion, etc. Then the old road could have been left as a quiet residential street and the new road a beautiful, limited access parkway leading to Burlington. Somebody dropped the ball on this option. This was the option taken in Waterdown on the east-west section and proves to be a lot less expensive. I would like to know what consideration was given to using an alternative route.	A detailed assessment and evaluation of a westerly alternative was completed during the study. It was not recommended due to impacts to the proposed subdivision, natural environmental impacts and cost. The proposed road has been shifted significantly to the west in this location such that the future proposed sidewalk's edge is where the present road edge is located.
27	In spite of the comments you heard, I for one appreciate the need for multiuse pathways. I would not want my children riding their bicycles on the new Waterdown Road. Cars, bicycles and children do not mix. If you had taken my point above the pathway would not be as necessary for a large portion of it as the old road would now be a quiet residential street. You might want to reduce the width of the pathway and paint a stripe down	Comments noted. The treatment of the proposed multi-use pathway will be finalized in the design phase.

	the centre to gain a few points with the locals.	
28	The intersection of Waterdown Road and Flatt Road needs a turning lane for BOTH north bound and south bound traffic. I have used this area for the past 27 years and have witnessed several accidents including one I was in. I would ask that you do a traffic safety study of this intersection.	Comments noted. The final intersection treatment will be developed in the design phase.
29	The new traffic signals at the North Service Road are way over designed for the limited traffic the intersection currently sees. Waiting times seems interminable. In this day and age you need to have lights that are far more flexible and based on traffic rather than some time clock. The City has an anti-idling by-law which starts $150 fines at idling for 1 minute. This light can easily make you sit for in excess of 1 minute and it is most aggravating when there is no traffic. There are many times when I think a simple 4 way stop would handle the flow far more efficiently. The intersection at Plains Rd sees far more traffic and moves it must faster.	Comments noted. This intersection is located south of this project's study limit. Comments will be passed on to the appropriate City department.
30	I noticed that the road through the "South Waterdown" section has two roundabouts for access to the new developments. Perhaps similar consideration sound be given for access to the Paletta development off Waterdown Road This would also help to provide some traffic calming.	A roundabout was developed in this location but the size of the required size of created too much property and environmental impact compared to the recommended intersection layout.
31	Tree planting was shown on the boulevards. There is a major power line (fairly new) on the east side of the road that will limit tree planting. This line will likely need to be relocated in several areas. Trees and power lines do not mix. Again to my point above, much of this would be unnecessary if you located on a new ROW.	The east side hydro line will likely have to be relocated throughout the corridor. This will be a consideration when finalizing the landscape treatment plan.

7.8 Evaluation of Consultation and Communications Program

Monitoring and evaluation of the public consultation and communications program implementation is an important responsibility that was implemented on an ongoing basis throughout the project. Typical tools used by the Project Team to facilitate the assessment of the success in meeting the objectives the program included:

- Ongoing documentation of process-related feedback and suggestions received throughout the process;
- Regular check-in with the Project Partners
- Regular reports to the Project Partners of the status of the issues and responses

The following section provides a summary of how effective the consultation and communications plan was in achieving specific objectives.

Get and keep people engaged: The study had numerous opportunities for public input, with three formal opportunities for public meetings, and five North-South NAC meetings. The Project Team adapted to requests from NAC members for additional meetings.

Correctly identify local neighbourhood stakeholders: Local neighbourhood stakeholders were identified at the onset of Phase 3, and the North-South NAC was established. During Phase 3 and 4, everyone who wished to be involved in the process had access to it.

Have contact early and often: Communications occurred during Phase 3 and 4 on a scheduled basis according to the study work plan. The volume of input from members of the public was significant. Members of the public identified a number of issues and suggestions that were considered by the Project Team on a continual basis. The Project Team had anticipated this, and as a result, had established the one-window communications system. However, in some cases, the technical schedule did not permit materials to be provided ahead of meetings. In these cases, members of the public were provided with adequate time after the materials were introduced to provide their comments. In this project, the Project Team made it clear that they were open and receptive to comments throughout the process.

Provide clear, concise, relevant information – as early as possible: Due to the nature of this project, and the need to incorporate input from the public, the Project Partners, and other stakeholders from earlier stages, information presented at the PICs and to the NAC was completed just prior to consultation events. Information was clear and relevant, which enabled members of the public to provide constructive input and advice to the Project Team.

Demonstrate how ideas from previous consultations have been/will be considered: At each NAC meeting and public event, the Project Team presented the input from previous stages, and how it had been addressed and/or incorporated.

Time and focus public engagement and consultation activities to match decision milestones in the Waterdown Road Class EA work plan: Input was received and considered on an ongoing basis throughout the study. Discussions at formal meetings were focused on the relevant stage of the study plan, and community requirements. Suggestions from members of the public were considered and incorporated into the study where possible and appropriate.

Manage meetings for maximum effectiveness: The drop-in-centre format for Phase 3 and 4 Public Information Centres (PICs) was an effective way of receiving input and allowed for one-on-one discussions with project team members. In addition, members of the public who did not wish to speak to a member of the Project Team were able to provide

comments through written comment forms and workbooks. The Project Team received advice from some members of the public that future PICs should take the form of a formal presentation followed by a question and answer period.

The Neighbourhood Advisory Committee discussions were facilitated in a number of formats. These included: presentations and questions/answers; working sessions in small groups; and hands-on commentary on display boards and maps. NAC members reviewed and approved minutes from their previous discussions.

Provide several mechanisms to provide information and collect feedback (web-site, internet, email, fax, mail, phone, personal contact): Numerous mechanisms were provided and proved successful. Delays in responding to some issues were experienced during the second half of Phase 3 and Phase 4 due to the large quantity and detail of comments that came from the public. Many responses required input from multiple Project Team members and specialist disciplines and response reviews from all Project Partners were required before issuing. These factors contributed to delays in responding to some of the comments.

Demonstrate how feedback will be/was considered: Members of the Project Team worked closely with the public throughout the study, and communications tools were available on an ongoing basis. ***Table 7.6*** provides a summary of the public comments and Project Team responses. The complete, detailed comment/response table documents all One-Window comments received and the responses that were sent out in reply, and is included in ***Appendix P.*** Names and personal information has been removed from these tables. The previous section illustrates how some of the key input received was considered and influenced the decision process and recommended road improvement design.

Table 7.6: Summary of Issues and Concerns Raised by the Public During Phase 3 and 4			
TOPIC	**QUESTION/CONCERN**	**RESPONSE**	**REFERENCE**
PART A: WATERDOWN ROAD CORRIDOR			
Section 1: WATERDOWN ROAD CORRIDOR PROJECT ANALYSIS SECTIONS			
W1- Waterdown Southern Section			
	Concerned about increased traffic on Craven Avenue and safety when coming from Burlington.	Comment was recorded.	ID# 197
	Concerned about the safety of Waterdown Road merging from four lanes into two lanes.	Comment was recorded.	ID# 197
	Concerned about Craven Avenue access and future subdivisions.	Access will be maintained to Craven Avenue. The needs of future development in the area will be considered in finalizing the road layout.	NAC Waterdown Issue Table – June 2, 2008
	Concerned about water reservoir and hydro tower closeness to road.	The potential for impacts to these facilities will be assessed. Access requirements will be reviewed and provided for.	NAC Waterdown Issue Table – June 2, 2008
	Concerned about intersection at Flatt Road over future increase in development.	• The intersection layout and turning lanes will be developed with consideration for future traffic and minimizing impacts to property. • The possibility of traffic signals or a roundabout were considered for the Waterdown Road /Flatt Road intersection.	NAC Waterdown Issue Table – June 2, 2008, ID# 262
	Concerned about infill materials at narrow road getting into the ravine.	Infill placement into the ravine will be minimized as much as possible.	NAC Waterdown Issue Table – June 2, 2008
	Concerned about existing wildlife crossings at hydro crossing locations.	Provisions for wildlife crossings will be considered, where possible. This typically requires raising the road bed profile which could result in greater property impacts.	NAC Waterdown Issue Table – June 2, 2008
	Concerned about septic systems in front yards (sewers and well water).	Information on septic systems and wells will be collected. Impacts to these facilities will be avoided where possible. Relocation may be required if impacts cannot be avoided. To be assessed in detail in the next phase of the study.	NAC Waterdown Issue Table – June 2, 2008
	Concerned about noise, light and air pollution.	Potential noise and air pollution impacts will be assessed in this study. New roadway lighting will consider spill over effects onto private properties.	NAC Waterdown Issue Table – June 2, 2008
	Issue of conventional intersection versus roundabout versus continuous flow at the Waterdown/Mountain Brow intersection and at the Mountain Brow/New Connector Road intersection.	Both roundabouts and conventional intersections will be assessed. Providing continuous flow lanes at intersections (i.e. channelized right turn lane) may be possible and will be considered.	NAC Waterdown Issue Table – June 2, 2008
	Concerned about speed limits.	A posted speed of 60 km/h would be more appropriate for this class of road. This will be reviewed as part of the road design work.	NAC Waterdown Issue Table – June 2, 2008
	Concerned about future increase in traffic volumes at 403 interchange.	Potential increases in traffic at the 403 interchange were considered in developing the recommended lane and intersection layouts.	NAC Waterdown Issue Table – June 2, 2008
	Concerned there are no answers regarding the additional land requirements at Waterdown Road south of Flatt Road.	Comment was recorded.	Comment from June 26 workbook
	Concerned about safety since property may be too close to the road on a hill curb.	Comment was recorded.	Comment from June 26 workbook
	Suggestion to extend Waterdown Road widening further south to facilitate better movement of travelers from Aldershot GO Station.	Suggestion was recorded.	ID# 189
	Suggestion to reduce lane width from 3.3 to 3.0 metres.	Lane widths of 3.0 metres are not recommended due to safety concerns related to potential vehicle encroachment onto adjacent lanes and road curbs. Burlington's standard minimum lane width for arterial roads is 3.3 metres.	NAC Waterdown Issue Table – June 2, 2008
W2- Waterdown Mid Section			

Table 7.6: Summary of Issues and Concerns Raised by the Public During Phase 3 and 4			
TOPIC	**QUESTION/CONCERN**	**RESPONSE**	**REFERENCE**
	Concerned about the proposed road being directly on top of an environmental feature.	Encroachment onto environmental features will be minimized. It is expected that the road can be widened to the west in this area.	NAC Waterdown Issue Table – June 2, 2008
	Concerned about intersection at Flatt Road over future increase in development.	The intersection layout and turning lanes will be developed with consideration for future traffic and minimizing impacts to property.	NAC Waterdown Issue Table – June 2, 2008
	Concerned about storm drainage and flooding (especially Old Waterdown area).	A detailed drainage study is underway as part of this project. The need for new storm sewers will be assessed.	NAC Waterdown Issue Table – June 2, 2008
	Alternate alignment is crucial.	Comment was acknowledged.	NAC Waterdown Issue Table – June 2, 2008
	Concerned about access from Waterdown Road alignment onto alternative Waterdown Road re-alignment.	Access to residents currently along Waterdown Road would be maintained off of the realigned Waterdown Road (if this was selected)	NAC Waterdown Issue Table – June 2, 2008
	Questions regarding who will pay for the sewer to be hooked up to residences.	There are no current plans to install a sanitary sewer to service existing residents along Waterdown Road as part of the road upgrade.	NAC Waterdown Issue Table – June 2, 2008
	Suggestion to develop lands to the west of Waterdown.	Consideration of the development lands to the west of Waterdown will be included in the evaluation of alternatives through the area and development of the recommended road design.	NAC Waterdown Issue Table – June 2, 2008
	Suggestion that there is potential for stores on east side of alternative alignment.	Potential changes to the development plan as a result of the new alignment would be considered.	NAC Waterdown Issue Table – June 2, 2008
	Support for this road as it protects existing houses.	Comment was recorded.	Comment from June 26 workbook
W3- Waterdown Northern Section			
	Concerned that there is clear impacts on two houses in the area.	Impacts on residences are a key consideration in the Phase 3 work. Discussions with landowners are occurring.	NAC Waterdown Issue Table – June 2, 2008
	Concerned about the developer owned properties behind residences from Flatt Rodd to Horning Avenue on the west side of Waterdown Road and between Horning Road and Mountain Brow Road.	We are aware of the development plans in the area. These are being considered as part of the study.	NAC Waterdown Issue Table – June 2, 2008
	Concern regarding safety and property value around X Waterdown Road between Flatt Road and Mountain Brow.	The Project Team is reviewing an alternative alignment to the west of the section of Waterdown Road that involves cutting through the vacant lands (which are proposed for future development. The Project Team will provide an update, in the form of a newsletter, as soon as it becomes available.	ID# 228
	Concerned about potential wildlife crossing north of the Waterdown Road development, through the hydro corridor.	Provisions for wildlife crossings will be considered where possible. This typically requires raising the road bed profile which could result in greater property impacts.	NAC Waterdown Issue Table – June 2, 2008
	Concerned about impacts on septic systems and wells existing in residences.	Information on septic systems and wells will be collected. Impacts to these facilities will be avoided where possible. Relocation may be required if impacts cannot be avoided. To be assessed in detail in the next phase of the study.	NAC Waterdown Issue Table – June 2, 2008
	Concerned about water flooding at Old Waterdown Road.	A detailed drainage study is underway as part of this project. The provision of new storm sewers will be assessed.	NAC Waterdown Issue Table – June 2, 2008
	Concerned about potential problems with retaining walls such as noise reverberation, impacts to major wildlife structure and suggestion that earth berms could be installed instead.	Retaining walls are effective in reducing the foot print of the roadway. Use of earth berms would take up considerably more land and result in additional property impacts. The potential for effects on wildlife movement will be considered in the design of retaining walls.	NAC Waterdown Issue Table – June 2, 2008

Table 7.6: Summary of Issues and Concerns Raised by the Public During Phase 3 and 4			
TOPIC	**QUESTION/CONCERN**	**RESPONSE**	**REFERENCE**
	Suggestion for traffic light at the intersection of (Old) Mountain Brow Road and Waterdown Road.	Our traffic analysis indicated that this intersection should operate effectively in the future. Four-way stops, traffic signals or providing a roundabout are not warranted at this location (ID# 231).	Comment from June 26 workbook, ID# 231
	Suggestion that in the future the Bruce Trail will cross Waterdown Road in this section of the road at this point.	Suggestion was recorded.	Comment from June 26 workbook
	Suggestion to remove bike lanes from the cross section and putting an off-road bike path along Horning Avenue in order to reduce widening and property taken along Waterdown Road.	Removing bike lanes from Waterdown Road in this section could reduce the width of the road and minimize property impacts. Opportunities for an off road pathway will be considered.	NAC Waterdown Issue Table – June 2, 2008
	Suggestion to post 50km/h.	A posted speed of 60 km/h would be more appropriate for this class of road. This will be reviewed as part of the road design work.	NAC Waterdown Issue Table – June 2, 2008
	Calming could be implanted by installing roundabouts at Old Waterdown Road and Horning Avenue.	• Roundabouts may not be appropriate at these minor intersections as they are too close together, would create considerable congestion on Waterdown Road and would require more land, creating additional property impacts. • We are recommending a lower speed be posted along Waterdown Road which will make it easier to turn into traffic from side roads (ID# 231).	NAC Waterdown Issue Table – June 2, 2008, ID# 231
	Suggestion regarding the placement of a new road through the field, from Flatt Road north leaving a “sub road” similar to that at # 5 Highway and # 25 Highway.	The Project Team is proposing and reviewing an alternative alignment to the west of the section of Waterdown Road that involves cutting through the vacant lands. Discussion with the owner of these lands is underway and as such it has not yet been determined if the alignment that is being recommended by the Project Partners will be acceptable.	ID# 228
	Shown interest in seeing the Utility Plan for the area.	Comment was recorded.	Comment from June 26 workbook
	Shown interest in the Road Design (three- or four-lane)	Comment was recorded.	Comment from June 26 workbook
	Residents request to be compensated for removal of trees.	Tree loss would be considered as part of property loss valuation. Landscaping proposals will be developed as part of the study.	NAC Waterdown Issue Table – June 2, 2008
W4- Waterdown/Mountain Brow Intersection			
	Concerned about conventional intersection versus roundabout versus continuous flow (Concern recorded twice).	• Both roundabouts and conventional intersections will be assessed. • Providing continuous flow lanes at intersections (i.e. channelized right turn lane) may be possible but will involve additional property.	NAC Waterdown Issue Table – June 2, 2008
	Concerned about loss of property at intersection of Waterdown Road and Mountain Brow Road	• Intersection and road location options are being developed to address potential impacts to this property. • Details will be available in the Environmental Study Report. (ID# 324).	NAC Waterdown Issue Table – June 2, 2008, ID# 324
	Concerned for residences at the intersection with respect to headlights and pollution.	Comments noted.	NAC Waterdown Issue Table – June 2, 2008
	Concerned that traffic will continue to use Mill Road and that there is no need for four lanes on Waterdown Rd, Mountain Brow Road, and the mid-block road.	Traffic will continue to use Mill Road after the improvements have been completed. There may be a need to restrict use during certain times of day to encourage use of the new roadway. An interim three-lane option is being investigated for Waterdown Road. Currently, four lanes are proposed for Mountain Brow Road and the mid-block road.	NAC Waterdown Issue Table – June 2, 2008
	Suggestion for a possible Bruce Trail crossing on Waterdown Road south of Mountain Brow in the future.	We are aware of this possible future Bruce Trail crossing. This will be considered in our development of road and pathway options.	NAC Waterdown Issue Table – June 2, 2008
	Suggestion to keep Mill Street open in both directions.	There are no plans to restrict Mill Street to one-way traffic.	NAC Waterdown Issue Table – June 2, 2008
	Suggestion to see what the issues may be in the fill area.	The cross section designs of the fill areas will be available for review and comment. This will allow for an examination of grading issues.	NAC Waterdown Issue Table – June 2, 2008

Table 7.6: Summary of Issues and Concerns Raised by the Public During Phase 3 and 4			
TOPIC	**QUESTION/CONCERN**	**RESPONSE**	**REFERENCE**
	Suggestion that signal lights at the intersection may not be necessary.	Suggestion was recorded.	Comment from June 26 workbook
	Suggestion that a smaller traffic circle than proposed would be better and would have less impacts on the natural landscape.	Suggestion was recorded three times.	Comment from June 26 workbook
	2/3 of NAC members support roundabout.	Comment was acknowledged.	NAC Waterdown Issue Table – June 2, 2008
	1/3 of NAC members would like to see the study results for all options.	The evaluation of intersection options will be reviewed with the NAC before finalizing.	NAC Waterdown Issue Table – June 2, 2008
W5- Mountain Brow Rd			
	Issues of grading, sidewalks and driveways.	Comments were noted.	NAC Waterdown Issue Table – June 2, 2008
	Roundabout concerns for intersection with Mid-Block and Mountain Brow Road.	Comment noted.	NAC Waterdown Issue Table – June 2, 2008
	Concerned about mailboxes issues.	Potential impacts to mailboxes will be assessed.	NAC Waterdown Issue Table – June 2, 2008
	Concerned about noise pollution.	A noise impact study will be completed as part of the study.	NAC Waterdown Issue Table – June 2, 2008
	Concerned about possible impact to residence on the north side of Mountain Brow and east of Flanders.	Alignment options to reduce these effects are being considered.	NAC Waterdown Issue Table – June 2, 2008
	Concerned about sightline issues for traffic exiting/entering Flanders.	The sightline issue will be investigated during development of the design concepts. Traffic control options at this intersection will be developed.	NAC Waterdown Issue Table – June 2, 2008
	Concerned about well water and storm water issues in this area.	The assessment of area wells and drainage conditions is underway.	NAC Waterdown Issue Table – June 2, 2008
	Concerned about flooding/drainage issues behind properties on the east side of Flanders.	Concern was acknowledged.	NAC Waterdown Issue Table – June 2, 2008
	Concerned about wildlife crossing at Grindstone Creek crossing south of intersection with Dundas Street.	Treatment of this crossing will be assessed including the possibility of accommodating wildlife.	NAC Waterdown Issue Table – June 2, 2008
	Suggestion to shift road to the opposite field.	An alignment option shifting the road to the south is being developed and will be considered.	NAC Waterdown Issue Table – June 2, 2008
	Suggestion for an island at Bruce Trail crossings of Mountain Brow east of Flanders.	Means to accommodate the Bruce Trail crossing will be investigated. Providing a median island at this location will be assessed.	NAC Waterdown Issue Table – June 2, 2008
	Suggestion to move the alignment to the east to avoid the ESA.	The proposed alignment is just east of the ESA but would need to cross the creek. Mitigation to minimize the effects on the ESA/Creek will be explored with the Conservation Authority.	NAC Waterdown Issue Table – June 2, 2008
	Suggestion to move road alignment to the east to connect directly to Dundas and Evans for improved traffic flow.	Although many people have suggested the need for a full by-pass route, traffic modeling shows that this is not required. The two roads systems are essentially independent of each other and serve different users.	ID# 240
	Dundas Street should not have “No Hiking Trail” to stress the ESA.	Clarification requested by the Project Team regarding the comment provided.	NAC Waterdown Issue Table – June 2, 2008
	Suggestion for Dundas Street to function as a higher order inter-regional transit corridor. (As identified in Metrolinx's Draft Regional Transportation Plan as a corridor for Rapid Transit improvements).	Dundas Street falls under the jurisdiction of the Region of Halton. It is the City of Hamilton’s understanding that the Region of Halton, in regards to this project, is releasing a Terms of Reference early in the new year.	ID# 335
	Suggestion to potentially reduce lane sizes.	Lane width reductions on Mountain Brow Road will be discussed with the City of Hamilton.	NAC Waterdown Issue Table – June 2, 2008

Table 7.6: Summary of Issues and Concerns Raised by the Public During Phase 3 and 4			
TOPIC	**QUESTION/CONCERN**	**RESPONSE**	**REFERENCE**
	NAC suggested to make Mountain Brow Road a phased 3-4 lane road to match Waterdown Road.	This will be discussed with the City of Hamilton for consideration.	NAC Waterdown Issue Table – June 2, 2008
	Suggestion to remove sidewalks in road design to have less impacts on residential properties and shift the road South and/or become a more pronounced curb to avoid property impacts.	Issue was reviewed with Dillon Consulting.	ID# 167
	Suggestion to install flashing stop sign at Flanders and Mountain Brow Road.	None provided.	ID# 157
	Suggestion that Flanders and Mountain Brow intersection be the point of crossing for the Bruce Trail (Suggestion recorded twice).	• The location of the Bruce Trail crossing of Mountain Brow is being reviewed as part of the Class EA Phase 3 road design work. Location/design for the crossing will be presented to the public in September for comment (ID# 157) • Comment was recorded	ID# 157, Comment from June 26 workbook
	Suggestion to use calming measure to slow down traffic.	Suggestion was recorded	Comment from June 26 workbook
	Importance to keep the existing trees on both sides of the road.	Some existing trees will be directly impacted with the roadway alternatives. Landscaping recommendations will be included.	NAC Waterdown Issue Table – June 2, 2008
	Residents would like clarity on whether houses will be expropriated.	The acquiring of residences/property will be undertaken initially through a negotiated process with the landowner. Land would only be expropriated if an agreement could not be reached.	NAC Waterdown Issue Table – June 2, 2008
	Strong NAC support for a roundabout at Flanders.	A roundabout may not be appropriate at this location as it would require more land and create additional property impacts. This will be investigated further.	NAC Waterdown Issue Table – June 2, 2008
	NAC would like to see King Road left open and in good, safe condition.	A Feasibility Study is being carried out to investigate options for King Road improvements.	NAC Waterdown Issue Table – June 2, 2008
	Development should not occur in the field North-East of the Mid-Block Road due to flooding and pollution of sub-watershed.	Development of lands in the area is not the subject of this study.	NAC Waterdown Issue Table – June 2, 2008
	Karst, sub-watershed, and ESA all sit over the resident's drinking water and into Smokey Hollow.	Comments noted. These issues will be considered as they relate to the road improvements.	NAC Waterdown Issue Table – June 2, 2008
	The buffer should be larger, even around potential storm pond in the North-West corner of Mid-Block and Dundas intersection.	Mitigation to minimize the effects on the ESA/Creek will be explored with the Conservation Authority.	NAC Waterdown Issue Table – June 2, 2008
	Request to investigate if the gates at Fraleigh property are a cultural feature.	This will be investigated by the Project Team's cultural heritage consultant.	NAC Waterdown Issue Table – June 2, 2008
	Dundas Street should not have "No Hiking Trail" to stress the ESA	Clarification of the comment required by the Project Team.	NAC Waterdown Issue Table – June 2, 2008
	Requested the elevation of the proposed road to correct water drainage.	• Informed that plans are being developed showing alternatives ways of widening Mountain Brow Road • To be contacted by Project Team when preliminary plans are available	ID# 86
W6- Mountain Brow Rd/ Mid Block Road Intersection alternatives			
	Concerned about impacts on Ontario Realty Corporation property.	• There could be the need for lands contained within these power transmission corridors as Waterdown Road crosses two power transmission line corridors that are under the mandate of the Ontario Realty Corporation (ORC). Once it has been confirmed, the Project Team will advise of the land requirement and discuss the process to facilitate this.	ID# 269
	Suggestion for safe crossing for Bruce Trail hikers.	Suggestion was recorded.	Comment from June 26 workbook
	Requested information on W6 Mountain Brow Road / Mid Block Road Intersection Alternatives.	A conventional intersection is being recommended as it has less property impact than a roundabout intersection.	ID# 140

Table 7.6: Summary of Issues and Concerns Raised by the Public During Phase 3 and 4			
TOPIC	**QUESTION/CONCERN**	**RESPONSE**	**REFERENCE**
W7- Mid Block Road			
	Concerned that Boulding Avenue will be used as a bypass to Dundas Street and the associated safety and property value concerns.	• The potential for increased use of Boulding Avenue to access Dundas Street from Parkside Drive is being examined as part of the road design work to minimize effects to residents in that subdivision. • The new intersection opposite Burke Street is being designed to prohibit the through movement of vehicles from the new North-South roadway and Burke Street.	ID# 134, 230
	Concerned that left turn off Dundas Street south is already congested.	Concern was recorded.	Comment from June 26 workbook
	Concerned about impacts to Mountain Brow Road natural features and homes.	Alignment options are being developed to address potential impacts. It may not be possible to avoid all impacts.	NAC Waterdown Issue Table – June 2, 2008
	Concern of impacts on Karst, low overburden, ESA all sit over our drinking water. Flow over Smokey Hallow and through Royal Botanical Gardens and Lake Ontario.	Comments noted.	NAC Waterdown Issue Table – June 2, 2008
	Concerns over flooding on lower George Street, well water, pond levels and Flanders Drive.	Comments noted.	NAC Waterdown Issue Table – June 2, 2008
	Concerned about intersection at the mid-block road and Dundas Street and possibility that traffic will be impeded through Burke Street.	Comment noted. The issue of the potential for traffic infiltration onto Burke Street will be addressed. Intersection design features and signage are measures that could be considered to address these concerns.	NAC Waterdown Issue Table – June 2, 2008
	Suggestion for garbage barriers at the bridge and protection from salt, sand, erosion for Grindstone Creek.	The impacts of new road runoff will be assessed as part of the project's drainage study. Measures to address erosion and potential water quality impacts will be included.	NAC Waterdown Issue Table – June 2, 2008
	Suggestion that there should be no development on the north-west corner of W7 as this field is on the flood plain.	The appropriateness of development in specific areas is being addressed as part of the Secondary Plan Study.	NAC Waterdown Issue Table – June 2, 2008
	Suggestion for route to be moved east so it does not cut through the ESA.	The appropriateness of development in specific areas is being addressed as part of the Secondary Plan Study.	NAC Waterdown Issue Table – June 2, 2008
	Suggestion for large buffers around ESA, Grindstone Creek, freshwater springs and proposed storm water management pond in the north-west corner.	Comment noted.	NAC Waterdown Issue Table – June 2, 2008
	NAC suggested that other parallel roadways could handle the increase in traffic and questioned the need for 4 lanes on the mid-block road.	The TMP work identified the need for 2 additional lanes to connect with Dundas Street. The planned collector roads in the South Waterdown development lands would not be able to accommodate the projected traffic volumes.	NAC Waterdown Issue Table – June 2, 2008
	Suggestion that the Project Team should emphasize and facilitate turns for cars and not for trucks.	Suggestion was recorded.	Comment from June 26 workbook
	Suggestion to align North-South line so that it intersects with the East-West corridor at Highway #5.	Suggestion was recorded.	ID# 137
	The NAC would like to see hard data in "plain English" on animal, bird, amphibian studies, sub-watershed, karsts and natural springs.	Project documentation is currently being prepared. The data collected regarding the natural environment will be available for review by the NAC and the general public.	NAC Waterdown Issue Table – June 2, 2008
	There is no need for a 36 meters right-of-way on the Mid-Block section considering all other available roadways.	Alternative road standards, lanes widths and right-of-way are all still under consideration.	NAC Waterdown Issue Table – June 2, 2008
	The intersection at Waterdown Road and Mountain Brow Road should not have a roundabout.	Comment noted.	NAC Waterdown Issue Table – June 2, 2008
	W7 at Dundas Street should have no hiking trail running parallel to Dundas Street due to impacts to nature and wildlife corridor. Any trail should cross at W7 to sidewalks on Dundas Street.	Comment noted. Consolidation and/or adjustment of hiking trails and pedestrian access in this area will be assessed in discussion with the City's Culture and Recreation Department.	NAC Waterdown Issue Table – June 2, 2008
	Questioned the need for a traffic signal at this section of the road.	Concern was recorded.	Comment from June 26 workbook
	Questioned the peak/hour traffic volumes and the grade of the alignment over Grindstone Creek.	In progress	ID# 344

Table 7.6: Summary of Issues and Concerns Raised by the Public During Phase 3 and 4			
TOPIC	**QUESTION/CONCERN**	**RESPONSE**	**REFERENCE**
King Road			
	Concerned that North Service Road is congested in the evening and that it is sometimes the only way up.	Concern was recorded.	Comment from June 26 workbook
	King road is substandard width but there are no issues with it as cars can still travel safely on it.	Comment was recorded.	Comment from June 26 workbook
	Suggestion that this road must be left open in both directions.	Suggestion was recorded.	Comment from June 26 workbook
	Questioned whether there will be a connection between King Road and Dundas Street and suggestion made to tunnel under the escarpment to achieve this link.	At this time the Project Team is not proposing that King Road be extended to Dundas Street, although the internal road network of the Waterdown South development may allow for better connections between Mountain Brow and Dundas Street.	ID# 247
Section 2:SOCIAL CONCERNS			
	Concerned about health of homeowners due to stress caused by uncertainty of property acquirement and length of time taken by Project Team to meet with residents.	Property requirement will be an outcome of the Phases 3&4 Study. More details cannot be provided at this time but the study should be completed within 12 months.	ID# 10
Section 3: PROCESS ISSUES			
TECHNICAL			
Housing developments	Questioned timeframe construction of Waterdown South housing development.	Approval not yet granted to “Waterdown Bay” application. Information contacts were provided and information about Secondary Plan for Waterdown South and PICs.	ID# 2
	Questioned the Waterdown Bay OMB Hearing and the proposed driveway access to George Street properties.	The proposal was explained by the Project Team and resident was advised that there had been no decision of the OMB and that it was still currently ongoing. The Hearing ended on July 24 and no decision was rendered by the OMB.	ID# 182
	Requested contact information of OMB attendants.	Contacted by City of Hamilton.	ID# 182
Property impacts	Questioned intersection design and road width due to property concerns at corner of Mill Street and Mountain Brow Road.	The EA process was explained. Phase 3 will address intersection and road width design.	ID# 3
	Questioned if the City will replace the removed or killed trees bordering residential properties during construction.	These are issues that the City of Burlington can respond to during Phases 3&4 of the study.	ID# 21
	Questioned if the City will provide funds for the relocation of a residential driveway, given that the proposed “roundabout” cuts through the driveway.	These are issues that the City of Burlington can respond to during Phases 3&4 of the study.	ID# 21
	Questioned if the City will be surveying the property and clearly marking the boundaries so owners can carry out landscaping in advance of the construction.	A topographic survey will be undertaken as part of the Phases 3&4 study but property markings will likely not be installed.	ID# 21
	Questioned if the City will be assisting with landscaping along the edge of the new road to provide screening as it currently exists.	These are issues that the City of Burlington can respond to during Phases 3&4 of the study.	ID# 21
Pre-screening method	Questioned how the "pre-screening" of the idea of *"Improving King Road on its own (with no improvement to Waterdown Road)",* was done that made the Project Team come to the conclusion that *"on its own it did not solve the road capacity problem.*	• The rationale for the screening of the “King Road on its own” (either two-or four-lanes) solution is presented in the Phase 2 TMP report (pages 48 and 49). • Dillon modeled an improved King Road, it proved that King Road did not provide the needed capacity and thus was pre-screened out of the process	ID# 62, 102, 118
	Questioned how the "pre-screening" of the idea of *"the potential widening of King Road to 4 lanes"* was done that made the Project Team come to the conclusion that again it would not solve the road capacity problem.	• The rationale for the screening of the “King Road on its own” (either two-or four-lanes) solution is presented in the Phase 2 TMP report (pages 48 and 49). • Adding more capacity to the King Road corridor resulted in a road that was well under utilized.	ID# 62, 102, 118
Road Widening	Questioned if Mountain Brow Road will be widened for certain and when construction is expected to begin.	• A final decision has not been made, however it is proposed. • Construction would likely start in 2010 at the earliest	ID# 97
	Questioned if the four-lane design has been accepted.	Four-lane design has been accepted. Council requested a gradual three- to four-lane option to be part of Phases 3&4 study	ID# 21

Table 7.6: Summary of Issues and Concerns Raised by the Public During Phase 3 and 4			
TOPIC	**QUESTION/CONCERN**	**RESPONSE**	**REFERENCE**
	Questioned if council have to vote again to approve four lanes instead of three.	The recommendations of the next round of the study will be presented to Council (Hamilton, Burlington, and Halton Region) at set stages in the study schedule for approval.	ID# 21
	Questioned why the Project Team refers to Waterdown Road as a four-lane road when it was to be three lanes with potentially four in the future.	The technical aspects of the four-lane option are currently being finalized along Waterdown Road. Once the preferred four-lane concept has been finalized the Project Team will develop and evaluate providing a three-lane option as the first stage in implementing the four-lane concept.	ID# 372
	Questioned how the Waterdown Road widening would function (if at all) with the new Highway interchange that has been proposed off the 403.	• The Waterdown Road interchange is a City of Burlington project. • The Waterdown Road and the Highway 403 interchange is being built to tie into a future four-lane Waterdown Road. Waterdown Road through the new Highway interchange will have four lanes plus turn lanes.	ID# 335
	Questioned the stage of the process for the Waterdown Road widening.	The Environmental Study Report (ESR) for the Waterdown Road Class EA is expected to be prepared in draft form in late Spring 2009. Up-to-date information and progress on the Waterdown-Aldershot Transportation Master Plan including announcements of any upcoming activity is available at www.hamilton.ca/WaterdownTMP.	ID# 398
Bike Lanes	Questioned whether bike lanes were being considered for the new Waterdown Road.	• The possibility to include bike lanes will be examined in Phase 3 of the EA work (either on or off road). The Project Team to discuss with the community its integration, impacts and mitigative measures (ID# 4). • Project Team is proposing sidewalks along both sides of Waterdown Road. The viability of also placing a multi-use pathway along the west side of the road is being assessed. (ID# 244).	ID# 4, 244
	Reasons given that bike lanes are not necessary on Waterdown Road.	Comments will be taken into consideration by the Project Team.	ID# 6,7
Intersection Design	Questioned if the roundabout shown in the sample road design are decided on or are other forms of intersections being considered.	• It was provided as an example, but will be determined in Phases 3&4 of the Study. • Resident was advised to participate in public consultation process to help in determining the recommended intersection configuration.	ID# 21
Septic lines impacts	Questioned if the option of hook up to a sewer line was part of the construction, since there are concerns that the septic bed will be affected by construction.	This will be determined as part of the Phases 3&4 study.	ID# 21
	Questioned if the homes would be switched from a septic system to a sewer system.	Most of the homes in this area are on septic tanks. There are currently no plans to construct a sanitary sewer as part of the road project.	ID# 324
Truck Route	Questioned if the road will be designated as a no truck route.	This will be determined as part of the Phases 3&4 study.	ID# 21
	Suggestion to consider using the existing railroad track for a rapid transportation system along with the tunnel under the King Road Escarpment.	The use of the existing rail tracks that run through the area are not a technically feasible option along with the exorbitant costs associated with this proposal.	ID# 98
	Requested the estimated cost of the tunnel under the King Road proposal compared to the Waterdown Road proposal and information on who/how it was decided that it was not technically feasible option.	The Niagara Escarpment Commission has policies restricting the alteration of the escarpment. Please refer to the preliminary construction costs outlined in the Environmental Study Report (ESR) which will be placed on public record for a 30 day review period.	ID# 210
Noise Impacts	Request for a North-South Noise Assessment Report.	In progress.	ID# 397
Section 4: ECONOMIC			
Property value Impacts	Questioned about impacts on property values and/or expropriation plans.	• The acquisition of some homes along Waterdown Road is being considered along with possible property parcel acquisition. Landscaping plans for some properties is being evaluated. • Real estate values are essentially market driven.	ID# 97
Section 5: GENERAL			
	Concerned about North Service Road and Highway 403 EA.	Concerns raised are outside of the City of Hamilton's jurisdiction. Appropriate contact was provided.	ID# 331
	Suggestion to turn the East-West route about a quarter mile before it reaches Mountain Brow and tying in to the boulevard.	Suggestion was recorded.	ID# 137

Table 7.6: Summary of Issues and Concerns Raised by the Public During Phase 3 and 4			
TOPIC	**QUESTION/CONCERN**	**RESPONSE**	**REFERENCE**
	Requested a diagram or map to show Waterdown Road widening.	The visual representation of Waterdown Road will be an outcome of the Phases 3&4 study.	ID# 15
OMB Application	Questioned how to fill in an appeal to the OMB about the widening of Waterdown Road.	Since this is not a Planning Act application there are no provisions under the Planning Act to appeal the widening of Waterdown Road. Please see Item 1 for appeal provisions under the Municipal Class Environmental Assessment.	ID# 77
Petition ignored	Questioned why the City of Hamilton has ignored a Petitioners proposal (41 names).	Staff appreciates the contribution to this process and will take the information in question under advisement as Phases 3&4 of the Environmental Assessment process are carried out.	ID# 98
Section 6: PROCESS ISSUES			
ENVIRONMENTAL ASSESSMENT			
Approach used	Questioned which approach the proponent is following on the Waterdown Aldershot Master Transportation Plan.	• Approach #2 best describes the approach taken by the partners. • The Ministry of the Environment is aware of the City's approach to this Class EA process and has been kept informed throughout the process.	ID# 54, 56
	Questioned who is in control of the project, the City of Hamilton or do the developers.	The Waterdown/Aldershot Transportation Master Plan and Environmental Assessment study is being undertaken by the City of Hamilton, the City of Burlington and Halton Region (the Project Partners).	ID# 339
Bump up request	Questioned the official Project Team response to a bump-up request of this project to an individual EA.	The Project Team is pursuing the Schedule C EA process. When the Project Partners file a Notice of Completion there will be a 30 day comment period at which point you may make a written submission to the Minister of Environment asking that an individual Environmental Assessment be prepared for the proposed projects. The Project Partners are following the Schedule C Class EA process, and do not intend to elevate the work to an Individual EA.	ID# 57
	Informed that a bump up request was sent to the Minister of the Environment.	Thank you for sending the Neutral Community Facilitator's Office a copy of the request to the Minister of the Environment and keeping the Project Team informed.	ID# 65
	Requested that the Project Team bump up from a Schedule C project to an Individual Environmental Assessment as a Part II order.	The Project Partners are following the Schedule C Class EA process, and do not intend to elevate the work to an Individual EA. When the Project Partners file a Notice of Completion there will be a 30 day comment period at which point you may make a written submission to the Minister of Environment asking that an individual Environmental Assessment be prepared for the proposed projects.	ID# 204
Phase schedule	Requested Phases 3&4 schedule and Gantt Chart.	Please find attached the Phases 3&4 Study schedule and the Gantt Chart.	ID# 66
Environmental Study Report and mitigation	Requested details about environmental study reports and environmental mitigation measures at the sub-watershed level.	• The Environmental Study Report (ESR) will document the natural environment data/information that has been collected through reviews of background information, discussions with agencies and field survey results. • Mitigation measures will be proposed to address the issues raised including ways to protect the stream, ESAs and wildlife from road encroachment.	ID# 256
Environmental Study Report	Questioned if the ESR will contain all the alternative routes presented throughout the process or only the final preferred/proposed route.	It will contain a summary of the alternatives considered in Phase 2, a full description of the alternatives considered in Phase 3, and the full Phase 2 Final Report contained in the appendix.	ID# 318
	Questioned when the ESR report will be issued.	The City of Hamilton is planning to release the ESR in early summer 2009.	ID# 373
	Expressed frustration against the Project and/or Project Team.	No response required.	ID# 396

Table 7.6: Summary of Issues and Concerns Raised by the Public During Phase 3 and 4

TOPIC	QUESTION/CONCERN	RESPONSE	REFERENCE
NATURAL ENVIRONMENT			
Flying squirrels	Requested information on pictures of flying squirrels sent to the Project Team.	• Southern flying squirrel is listed as Special Concern by the Committee on Status of Species at Risk in Ontario. • Advised about impacts and mitigations measures.	ID# 150
Drainage	Concerned that the Project Team is not dealing with the Study Area drainage issue appropriately and possible fungus development may result.	Concern was recorded and is to be considered by the Project Team.	ID# 195
	Concerned about hilltop route location regarding drainage and safety concern about using an open drainage system (ditch).	• Soil conditions are being confirmed through geotechnical analysis. • We are consulting with the Hamilton Conservation Authority regarding storm water/drainage issues as they relate to the proposed road.	ID# 238
Pests	Concerned of pest attacking ash trees.	Concern was recorded.	ID# 195
PUBLIC CONSULTATION			
Stakeholder Advisory Committee (SAC)	Concerned the SAC does not reflect the views of the local residents due to a low representation of residents in the committee.	• The Project Team solicited input from the SAC member and other public participants on the Evaluation criteria. • Selection process for the Neighbourhood Advisory Committee (NAC) was explained.	ID# 9
SAC Meeting	Questioned date of last SAC meeting.	The date of February 28, 2008 was confirmed.	ID# 8, 29
	Questioned if an email was sent to SAC members regarding the last SAC meeting on February 28, 2008.	An email has been sent and follow-up phone calls are taking place this week.	ID# 8
	Requested a copy of all SAC members' names including who they represent.	Sent from the Project Team.	ID# 52
	Requested a copy of Dillon's presentation for the February 28, 2008 SAC meeting.	PowerPoint presentation was emailed out to SAC member and interested participants on March 4, 2008.	ID# 52
Member delegation	Members of Parkside Drive were given the opportunity to appear as a delegation at the last SAC meeting.	Offer was accepted by the Parkside Drive Residents. A quick summary of the Parkside Drive East Citizens Group will be provided.	ID# 18, 37
Bike lanes	Bike lane response to be shared with original SAC members.	The response relating to bike lanes to be circulated and distributed and discussed at SAC meeting.	ID# 5, 8
	Request that accommodations be made for the implementation of bicycle lanes in the overall plan.	The final recommended preferred option will be provided in the Environmental Study Report released in the summer of 2009.	ID# 333, 347
	Suggestion for wider lanes to help cars become accustomed to sharing the road safely with bicycle riders.	• Accommodating future capacity of vehicular and alternate forms of transportation along these proposed corridors is a key variable that requires careful study and The Project Team has been consulting with several parties. • Detailed breakdown of pedestrian and cycling facilities for both corridors of the draft Preferred option was provided.	ID# 333, 335
One-on-One Session	Concerned that the City will not answer "key" directly affected landowners in a timely fashion.	There will be opportunities to discuss specific concerns through the Public Consultation sessions. If needed, one-on-one sessions can be scheduled.	ID# 22
	Requested to have a one-on-one session with the Project Team.	Meetings that have/need to happen with residents and Dillon Consulting.	ID# 88, 109, 111, 127, 160, 172, 181, 264, 292, 303, 319, 325
	Requested to see further details with respect to road widening to be taken from the resident property.	• Dillon Consulting will be making adjustments to the proposed East-West road alignment based on public and agency comments. We will provide an updated plan to interested residents in late February or early March 2009 • Detailed plans for Parkside Drive will be made available as part of the Environmental Study Report (ESR) in summer 2009 (ID#388)	ID# 295, 296, 298, 310, 388
	Questioned when homeowner will be notified about one-to-one meetings.	Contacted by Dillon Consulting.	ID# 127
PIC - Format	Questioned about the PIC format.	Not provided. No questions at the PIC.	ID# 192

Table 7.6: Summary of Issues and Concerns Raised by the Public During Phase 3 and 4			
TOPIC	**QUESTION/CONCERN**	**RESPONSE**	**REFERENCE**
	Questioned why the PICs were changed from presentation to drop-in format.	These discretionary PICs were considered necessary and the open house format would allow people to seek information at own pace and speak with project partners one-on-one.	ID# 44
PIC – Process	Questioned the PIC/public consultation process.	PICs or Public Information Centres are held to provide the public with project information and updates and to provide an opportunity for community feedback.	ID# 273
PIC - Notice	Questioned why the format of PICs was not announced sooner.	• The notice was placed in the Hamilton Spectator, Burlington Post, and Flamborough Review for two consecutive weeks. • The notice was also mailed out to stakeholders, public, and agencies.	ID# 44
Future PIC - Meeting	Questioned when the next public information meeting is on the proposed widening of Waterdown Road.	The Environmental Study Report (ESR) for the Waterdown Road Class EA is expected to be prepared in draft form in late Spring 2009. Up-to-date information and progress on the Waterdown-Aldershot Transportation Master Plan including announcements of any upcoming activity is available at www.hamilton.ca/WaterdownTMP.	ID# 398
	Criticism that residents do not have meaningful input in the process and that the Project Team is trying to convince the public of their already made decision as the best option.	Comment was recorded.	ID# 309
	Suggestion that someone from the Development department should be present at the PICs.	The Project Team will request that for future Public Information Sessions (PICs) staff from the Development department be present. As there are no more scheduled PICs, the suggestion will be incorporated into the Environmental Study Report.	ID# 339
	Requested a copy of maps, presentation/display materials as presented at the PIC.	Materials were sent and the project website address was provided.	ID# 61, 70 , 84 , 86, 95 , 151, 153, 160, 161 , 162 , 163 , 164 , 169 , 174 , 175 , 176, 177, 178, 183 , 201, 260, 277, 302, 304. 305, 306, 307, 308. 310, 312, 313, 314, 315, 316, 317, 319. 326, 328 345
	Requested larger version of the maps found in Public Notices.	Maps were sent by NCFO.	ID# 24, 26, 27, 28, 31, 38, 91, 187 , 190 , 194, 237, 245
	Requested the materials from PICs to be posted on the website.	Materials were posted on the website.	ID# 173
	Requested the North-South PIC summary and detailed map of Flanders and Mountain Brow intersection.	Materials were sent via email.	ID# 181
	Criticism of maps which have no scale/distances and are therefore useless.	Distances were clarified (ID# 224). ID# 225: Response is missing.	ID# 224, 225
	Criticism of map on PIC notice is inaccurate/old/false.	• The “Notice Map” provides general information about the location of the project and can be considered as a project logo until the Preferred Option is confirmed. • We provide the detailed map boards at NACs and PICs where project options are discussed.	ID# 265
	Questioned if the gas lines in the PIC maps are existing lines or proposed.	The utility lines shown on the base plan came from various sources and some locations (such as the gas line on this property) appear to be incorrect and are currently under review.	ID# 324
	Suggested better signage directing traffic from street into meeting place.	Thank you for your advice relation directional signage and communications materials.	ID# 77
Consultation Material	Requested the location of the Path Forward Report on the website	Referred to the Path forward report.	ID# 51
Lura Role	Questioned why the City needed an outside agency such as Lura Consulting to control the communications between the public and the Project Team of Waterdown Aldershot Master Transportation Plan.	• Neutral Community Facilitator's role is to assist both members of the public and the Project Team in clarifying and responding to inquiries and input on a timely basis. (ID# 53) • Lura Consulting is providing this service in response to concerns raised in Phase 2 that responses were not being received in a timely manner. (ID# 53)	ID# 53 , 253

Table 7.6: Summary of Issues and Concerns Raised by the Public During Phase 3 and 4

TOPIC	QUESTION/CONCERN	RESPONSE	REFERENCE
Meeting with NCFO	Requested to communicate with NCFO concerning WATMP.	Time was set to meet/discuss with someone from the NCFO.	ID# 90 , 94 , 115 , 117 , 145, 147 , 191
	Requested to communicate with NCFO concerning communication issue.	Time was set to meet/discuss with someone from the NCFO.	ID# 55
Meeting with Dillon	Requested another setting to discuss matters with Dillon besides the PIC.	Time was set to discuss with someone for the NCFO.	ID# 138
	Requested follow-up discussion with Dillon once road plan is complete.	The plans have been circulated to all City departments and comments have been received. The plans are in the process of being finalized and a copy of the revised plan will be provided to you when completed, likely in late February or March.	ID# 227
	Request that NCFO provide a list of outstanding issues with their submission dates.	• The NCFO compiles a report on both a weekly and monthly basis for the Project's Team's review. • A copy of the June/July NCFO Report was attached in the response.	ID# 200
	Agency requested if a memo would be necessary for the PIC.	Time was set to discuss with NCFO.	ID# 148
	Concerned that emails and questions are not fully answered through NCFO and/or responses are not made within 10 days as promised.	The information requested is taking longer than the anticipated 10 days times due gathering and compiling of information from different City staffs and Consultants. Response was sent.	ID# 80, 81, 102, 199, 200, 221, & 225, 336, 357, 364, 367
	Expressed frustration in response delay.	Response was sent.	ID# 399
	Concerned that Project Team does not consider information, errors and suggestions presented by NAC members and the public. Criticism of/lack of faith in public consultation process.	• See PDF "Letter to NAC – Oct 08" sent Oct 27, 2008. • All resident concerns will be clearly documented in the Environmental Study Report (ESR).	ID# 156, 239, 241, 242, 243, 246, 248, 253, 284
	Concerned that he has not received any written acknowledgement of his correspondence from Lura Consulting nor the Project Team for a while.	Acknowledgment/Response was sent by NCFO.	ID# 288, 336
Transparency	Commented about lack of transparency in the process.	Informed that NCFO Review of MTO Highway 6/Parkside Drive Issue was sent May 26.	ID#114, 129 , 291
	Concerned that the communications from the Project Team fail to be consistent from the start of this process such as issue with City sewers connections where City had two opposite answers.	NCFO promised to contact the City relating to the connection of City sewers to residences with septic systems to obtain clarification.	ID# 200
	Complaint regarding mistreatment of those showing interest in public forums. Criticism of the City of Hamilton and those hired to "push" the road through at any cost.	See PDF "Letter to NAC – Oct 08" sent Oct 27, 2008.	ID# 217
	Concerns that the Project Team is making statements before reports are complete and thus misleading the public and NAC members.	Typically, these reports are not released to the public prior to the ESR, due to the technical difficulty of understanding the documents In accordance with the current practice for similar projects, the reports are based on empirically gathered information, have been drafted and are therefore provisionally justifiable.	ID# 358
	Complaint of the Project Team's statement that some reports are not released to the public prior to the ESR, due to the technical difficulty of understanding the documents.	The comment was forwarded to the Project Team for their information.	ID# 378
	Questions about the discrepancies in cost calculations between the Waterdown-Aldershot Master Transportation Plan and the Hamilton Master Transportation Plan. It appears that not all of the pre-estimated costs in the Hamilton Master Transportation Plan were included.	The costs used in the *Waterdown / Aldershot Transportation Master Plan, Phase 2 Final Report* (February 2008) are estimates based on conceptual alignments, primarily for the purpose of comparing alternative solutions. These estimates were appropriately reflected in the *Hamilton Transportation Master Plan, Class Environmental Assessment Report* (May 2000) based on the best information available at the time of completion. Further cost comparisons will be undertaken as alternative designs are developed in Phases 3&4.	ID# 82
	Request that NCFO update the NAC and the public of the Truck Route designation. Importance of keeping the public updated on all issues. (ID# 236)	An update was provided at the NAC meetings in Oct 2008.	ID# 232, 235, 236

Table 7.6: Summary of Issues and Concerns Raised by the Public During Phase 3 and 4

TOPIC	QUESTION/CONCERN	RESPONSE	REFERENCE
NAC Selection	Questioned how the NAC is being selected.	The Draft NAC Recruitment Strategy was sent for a response.	ID# 10
NAC Application	Questioned how to move forward with applying to be on this committee, either as an individual resident and/or as a representative from a group.	Advised that Draft NAC Recruitment Strategy and the NAC Application Form are available online on the Waterdown/Aldershot Transportation Master Plan website.	ID# 22
	Questioned when the applications are due for being chosen for the NAC, and when will the decisions be made about who is on the NAC.	Application forms for the two NACs are due March 14, 2008. All successful and unsuccessful candidates will be contacted by April 4, 2008.	ID# 23
	Questioned the qualifications required to be a committee member.	The Draft NAC Recruitment Strategy and an application form were sent for a response.	ID# 47, 50
	Questioned if it was possible to apply to become a NAC member if living outside the study area.	Please send your application and we will let you know if you are eligible.	ID# 69
	Questioned if the NCFO had received his application.	Person was advised that the application was received via fax.	ID# 67, 73
	Requested a deadline extension to submit a NAC application.	Petition was granted by NCFO.	ID# 72
NAC Meeting	Questioned if NAC meetings are open to the public.	Resident advised that he/she would be welcome to observe the Neighbourhood Advisory scheduled for Sept 9.	ID# 92
	Notified NCFO of a date/day error for the East-West NAC meeting.	He was given the accurate date and day of the meeting.	ID# 96 , 134
	Attendance/Absence confirmation.	None required.	ID# 110 , 136, 137
	Requested the location and date for the NAC meeting.	Location/Date was given.	ID# 116 , 135 , 196 , 233, 254, 255
	Questioned why he/she had not received the NAC meeting notification.	Advised it was an oversight on NCFO, the contact information was updated.	ID# 120 , 121 , 126
Evaluation Criteria	Questioned why there was a new criteria added to the original evaluation criteria methodology named “Technical”.	The technical criteria group was removed from the evaluation table. However, the potential for site contamination is an important consideration and could affect the overall cost to develop Option 5. The potential for additional costs as a result of soil contamination has been referenced under the “Cost” criteria group.	ID# 123
	Questioned why Project Team is using a simplistic rating scale to weight the new evaluation criteria.	Criteria rankings using a scale of “high, medium and low” importance (and not weightings) will be sufficient for the purposes of the evaluation to differentiate among the alternatives. We will review this approach as the Phase 3 work progresses and continue to welcome your comments on this.	ID# 123
	Commented that process feels rushed and that more time is needed for the City to present findings.	While we appreciate the view that Phase 3 work is progressing at too fast of a pace, there are many potentially affected landowners who are requesting a timely conclusion to the project so that they can make future plans regarding their property, particularly since this study has been ongoing since 2004.	ID# 123
	Concerned that not enough time was provided at a NAC meeting to provide proper input into road design criteria and alternatives evaluation methodology.	• Unfortunately as there are many items that need to be covered at each NAC meeting it is not possible to devote an entire evening on a single task. • The Project Team has been open to receiving comments on the criteria groups ranks through submissions by members of the NAC and the public.	ID# 124 , 134
	NAC members ranked both social and natural environment criteria as high.	The criteria rankings as presented to the NAC in June 08 based on the input received from NAC identified the Social criteria to range in importance from high to medium and the Natural Environment criteria to range in importance from high-medium to medium. As such, the social criteria were considered to be only slightly more important than the natural environment criteria.	ID# 157
	Detailed comments on criteria evaluation and alternatives routes and alignments.	Detailed responses to each comment mentioned.	ID# 283, 284
	Requested a copy of NAC materials (presentations, minutes, workbook, and/or Evaluation tables).	Materials sent by NCFO.	ID# 95 , 112, 131 , 131 , 200, 257, 259, 261, 267

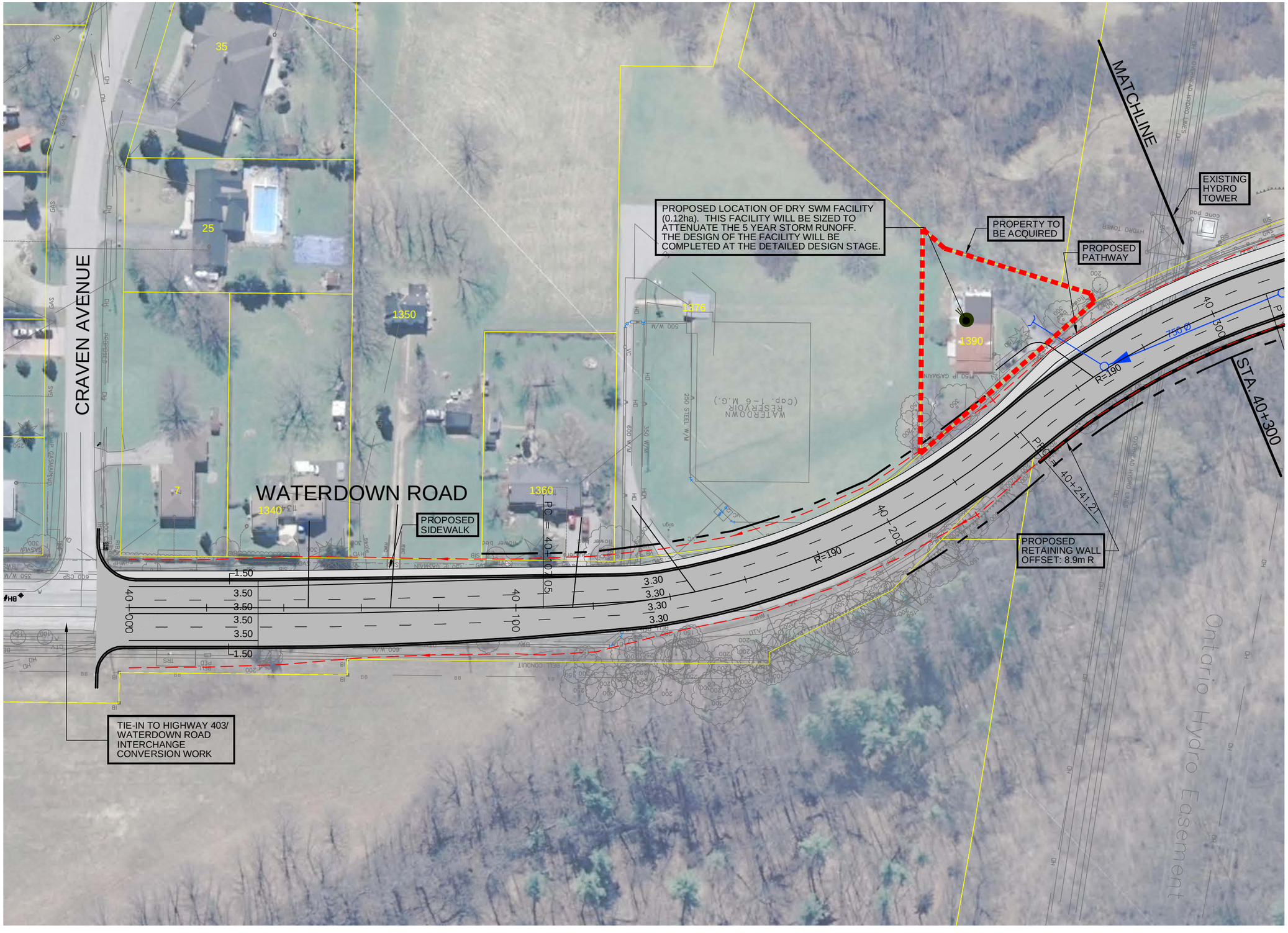
Table 7.6: Summary of Issues and Concerns Raised by the Public During Phase 3 and 4			
TOPIC	**QUESTION/CONCERN**	**RESPONSE**	**REFERENCE**
	Requested that the June 12 Meeting minutes incorporate that the Project Team stated that residence who had septic systems and live on the new proposed roads would be connected to City sewers.	• Discussion may have been "off-the-record" rather than brought up in the formal session. Further review of the meeting record indicates that no such comment was made at the meeting. • The possibility for a connection to city sewers is outside the Terms of Reference (ToR) for the Waterdown Road Class EA and the East-West Road Class EA. You may wish to contact the City of Burlington directly about this matter.	ID# 209
	Requested that attached petition be added to the agenda for the Oct. 28 meeting. Petition regarding concerns and suggestions regarding Highway 5/Dundas Street road widening between Evans Road and Kerns.	Request granted, confirmation sent by NCFO.	ID# 220, 251
	Request for confirmation that the final version of minutes for meeting #4 was sent out by email.	Advised that the NCFO sends out draft versions of meeting minutes, seeking comments from NAC members, and following member acceptance of the minutes they are finalized.	ID# 219
NAC Membership	Request to be removed from the NAC.	Removed by NCFO.	ID# 155
	Requested an update on the preferred alignment at Flanders Drive and that the plans be reviewed by the road safety and traffic engineering department of the City of Hamilton.	The plans have been circulated to all City departments and comments have been received. The plans are in the process of being finalized and a copy of the revised plan will be provided likely in late February or March.	ID# 346
	Request for related materials from Dillon and others (e.g. truck route study material, the Natural Environment Inventory Report and the Geotechnical Report, the Waterdown Area Traffic Monitoring Update and Waterdown Aldershot Master Transportation Plan Phase 1 report.	Materials sent by NCFO.	ID#238, 256, 258, 266, 268, 270, 329, 332, 373, 374, 375, 376, 377, 383
	Request for 90 days to review report before Notice of Completion (NOC) is submitted to MOE.	Relating to your request for a 90-day review period of the draft ESR (we assume that you are referring to the draft ESR that goes before Council for their approval), we have requested a response from the Project Partners.	ID# 381
	Request for 60 days to review the Final Noise Report.	Noise report was sent.	ID# 390
	Request for the technical information that the Project Team has used to make their recommendations for their road alignment.	Requested reports sent.	ID# 329
	Request for MOE meetings minutes.	There were no minutes taken at the discussions with the MOE.	ID# 87, 114
	Requested a legible map which shows the properties affected by the project.	Map was sent by the City of Hamilton.	ID# 186
TECHNICAL			
Water Tower	Questioned progress of the water tower.	• To be constructed in conjunction with subdivision. Estimated timeframe is February to September 2009. • Since the plan was appealed the water tower is unable to be built until the appeal is resolved. No building permits can be issued until the water tower has been constructed and is operational. • The OMB has now issued a decision, and the entire Waterdown North Secondary Plan is now in effect. No building permits can be issued until the water tower has been constructed and is operational. Please visit the project website www.hamilton.ca/waterdownnorth for details.	ID# 1, 92, 299
	Concerned about impacts on the water table.	Detailed drainage studies have been completed during the study that assessed the impacts on surface drainage. The new road will not block any surface water flows as culverts will be placed under the new road to allow for water movement.	ID# 300
TMP schedule	Questioned the schedule for the Transportation Master Plan (TMP) and phases timing.	• The Transportation Master Plan (TMP) is now complete. As Phase 2 of the Waterdown/Aldershot Transportation Master Plan is now complete, the Study will proceed to Phases 3&4 to examine two distinct roadway projects. The North-South Road (Waterdown Road) Class Environmental Assessment project and the East-West Road Class Environmental Assessment project. • This work is commencing in March and will continue for about 1 year.	ID# 42

Table 7.6: Summary of Issues and Concerns Raised by the Public During Phase 3 and 4			
TOPIC	**QUESTION/CONCERN**	**RESPONSE**	**REFERENCE**
	Questioned the completion of the Transportation Master Plan.	A draft schedule was sent.	ID# 42
	Concerned that TMP process and outcome are seriously flawed as the Project Team did not have regard for fundamental materials that should have been considered.	Meeting with Dillon and concerned stakeholders was held December 18, 2008 to discuss these issues.	ID# 325
	Questioned when construction will begin.	• The timing of construction is dependent on: EA process completion, Receipt of endorsement and approval from the Hamilton, Burlington and Halton Region Councils and MOE receipt of a bump up request on the Environmental Study Reports • We do not foresee construction starting any earlier than 2011	ID# 42
	Questioned the status of the overall Study Work Program and where the Project Team is in the process.	The Pathforward report was sent via email which outlines the current status of the process. He was also given the website.	ID# 103
	Questioned the approximate timing of implementation.	The Project Team plans to complete Phases 3&4 of the Municipal Class Environmental Assessment for New East-West Corridor and Waterdown Road Corridor in the summer of 2009.	ID# 330
	Questioned if the City of Hamilton has prepared a draft development phasing plan for the new roads.	No. The City of Hamilton has not yet prepared the draft Development Phasing Plan for the new roads. Guidelines for the Implementation and Phasing Plan will be part of the Environmental Study Reports to be prepared for the project.	ID# 330
	Question how much/if any new development will be allowed to proceed ahead of or concurrent to construction of the North-South and East-West corridors.	There is no answer for this at the moment. The Implementation and Phasing Plan will determine this. Also, the City of Hamilton is preparing a Traffic Allocation Study which will further address this issue.	ID# 330
	Suggestion for a link between the North-South road and new East-West road.	We have received many comments regarding the connection (or lack of) between the new east-west road and the new/improved Waterdown Road. Although many people have suggested the need for a full by-pass route, the traffic modeling shows that this is not in fact required. The two roads systems are essentially independent of each other and serve different users.	ID# 240, 278
Contact Information	Requested a contact name from Dillon Consulting.	The contact information for Dillon Consulting was sent via email.	ID# 61 , 111
	Requested NCFO contact information.	The contact information was provided by NCFO	ID# 275, 276
Housing development	Questioned the timing of the build-out for the 6500 residential units referred in the staging plan for the TMP.	The timing of the build-out is subject to the developers' plans along with the completion of the additional municipal projects such as secondary and servicing plans and approval and construction of the road improvements.	ID# 78
	Comments on the preferred road alignment sections for the new East-West road (N1-N7) and Waterdown Road widening (W1-W7).	No response required.	ID# 211
PHASE 2 Report			
Cost Breakdown	Requested copies of the detailed costs breakdowns for each of the Projects referred to in Appendix D of Phase 2 Report.	The cost breakdown will be approved in the provided on the project website as an "amended Appendix D" by March 28.	ID# 12, 20, 43, 46
Agency Communication	Requested the letters and documents of communication from the various agencies that were contacted by either Dillon or the Project Team for their input in this project.	•All correspondence is not typically included during the course of an EA, however the Project Team will assemble key correspondence to be posted on the website by March. • An updated Agency Correspondences were posted at www.hamilton.ca/WaterdownTMP	ID# 12, 43, 46, 142
Black-lined version	Requested a copy of the black-lined version of the Final Phase 2 Report prepared by Dillon Consulting. (Draft Phase 2 Report with sections indicating additions to and deletions from the draft Phase 2 Report.)	•A black-lined version of the Final Phase 2 Report is currently being reviewed, and will be available shortly. •A copy was sent Sep 22, 2008 by the NCFO. (ID# 108)	ID# 52 , 108
	Questioned if the information, text and maps, presented in the phase 2 report are a ‘done deal’.	The recommendations of the Phase 2 report have been accepted by Hamilton Council. There is still the need to undertake the Class EA Phase 3 work and prepare the Environmental Study Report (ESR), both to be approved by Hamilton Council and the Ministry of the Environment. As such, the road recommendations are not yet finalized.	ID# 49

Table 7.6: Summary of Issues and Concerns Raised by the Public During Phase 3 and 4			
TOPIC	**QUESTION/CONCERN**	**RESPONSE**	**REFERENCE**
MISCELLANEOUS			
Mailing list	Additions, updates and removals to the project mailing list.	Added, corrected, and/or removed from mailing list.	ID# 11, 16, 36, 39, 101, 144, 154, 158, 165 , 188, 207, 222, 223, 234, 272, 320
Technology	Questioned delivery status notification messages and/or email recall.	•Informed that blackberry device was out of range and unable to receive emails but the office still received all messages (ID# 19) •Explanation in person for email recall (ID# 263)	ID# 19, 263
Website	Questioned project website location to obtain information.	Website link sent by NCFO.	ID# 31, 159 , 165
	Requested the resident contact information be removed from the project website.	Contact information was removed Jan 30, 2009.	ID# 366
Communications	Request for City of Hamilton contact information.	Contact information provided.	ID# 226, 352
Accessibility	Questioned if the Crossroads Centre is accessible by public transit.	He was sent the Burlington Transit map and given the bus route numbers.	ID# 40
Agency	Agency concerned that it was not invited to some Project Team meetings and that it did not received documents for review	We are aware that Conservation Halton and Hamilton Conservation Authority are part of the WATMP EA Study team. A copy of the final report will be sent out shortly.	ID# 60
Terms of Reference (ToR)	Requested the location of the Phase 1 Terms of Reference for the WAMTP.	• A Terms of Reference was not prepared for the Phase 1 "EA Transportation Network Study", as it is not required under current legislation. • The Municipal Engineers Association Class Environmental Assessment Class EA for municipal projects is equivalent to a Terms of Reference, since it provides the scope and level of detail for Class EA studies.	ID# 64 , 102
Letter from NEC	Requested a copy of the letter from the NEC sent to the City of Burlington, regarding “refusing to use King Road as the expressway to go from Burlington to Waterdown”.	It was indicated that we would locate the letter and fax it to him within 10 business days.	ID# 79
	Resident expressed his frustration in dealing with City staff on this project to Mayor Eisenberger.	The e-mail to Mayor Fred Eisenberger will be documented for the record.	ID# 384, 385, 387

WATERDOWN ROAD

PREFERRED DESIGN CONCEPT
PLANS AND PROFILES



LEGEND

- PROPOSED ROW
- PROPOSED GRADING LIMIT
- 750 Ø — PROPOSED STORM SEWER
- PROPOSED MANHOLE
- PROPOSED DITCH INLET
- PROPOSED CULVERT
- PROPOSED CURB & GUTTER
- NEW ROAD SURFACE
- EXISTING PROPERTY

PRELIMINARY

0 10 20 30 40 50m

Hamilton Public Works | Burlington | Halton

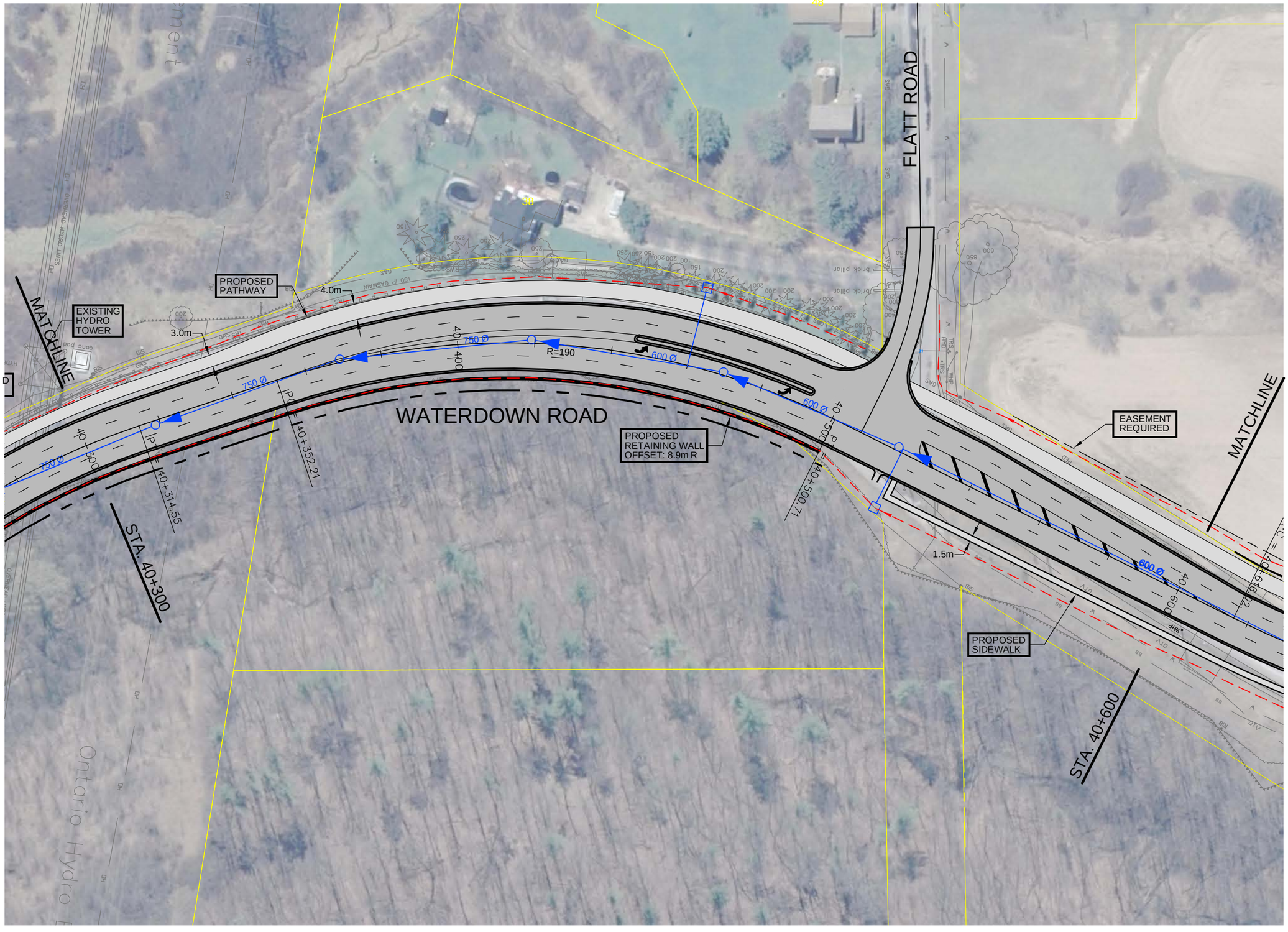
PREFERRED ULTIMATE DESIGN CONCEPT

STA. 40+000 to STA. 40+300

DILLON CONSULTING

CHECKED BY: ---	WATERDOWN ROAD CLASS ENVIRONMENTAL ASSESSMENT
DESIGN BY: ---	
DRAWN BY: ---	
SCALE: AS SHOWN	WATERDOWN-PLATE 1
DATE: JUNE 25, 2008	

Plotted: Jul 29, 2009 - 4:48pm File: G:\CAD\080020 Waterdown E-W Roads\LDD Waterdown\dwg\080020--waterdown--Plan--1--500--Opt--10.dwg Layout: Final Waterdown--PlanProfile



LEGEND

- PROPOSED ROW
- PROPOSED GRADING LIMIT
- 750 Ø — PROPOSED STORM SEWER
- PROPOSED MANHOLE
- PROPOSED DITCH INLET
- PROPOSED CULVERT
- PROPOSED CURB & GUTTER
- NEW ROAD SURFACE
- EXISTING PROPERTY

PRELIMINARY

0 10 20 30 40 50m

Hamilton Public Works | City of Burlington | Halton Region

PREFERRED ULTIMATE DESIGN CONCEPT

STA. 40+300 to STA. 40+600

DILLON CONSULTING

CHECKED BY: ---	WATERDOWN ROAD CLASS ENVIRONMENTAL ASSESSMENT
DESIGN BY: ---	
DRAWN BY: ---	WATERDOWN- PLATE 2
SCALE: AS SHOWN	
DATE: JUNE 25, 2008	

Plotted: Jul 29, 2009 - 2:18pm File: G:\CAD\08W220 Waterdown E-W Roads\LDD Waterdown\dwg\W08D2D-waterdown-Plan-1-200-Opt-10.dwg Layout: Final Waterdown-PlanProfile

EASEMENT REQUIRED

MATCHLINE

PROPOSED PATHWAY

WATERDOWN ROAD

EASEMENT REQUIRED

MATCHLINE

STA. 40+600

PROPOSED SIDEWALK

PC = 40+616.23

PT = 40+728.98

R=250

600 Ø

525 Ø

525 Ø

525 Ø

40+700

40+800

40+900

STA. 40+900

1545

1553

1565

1573

1581

1589

1597

1605

LEGEND

- PROPOSED ROW
- PROPOSED GRADING LIMIT
- 750 Ø PROPOSED STORM SEWER
- PROPOSED MANHOLE
- PROPOSED DITCH INLET
- PROPOSED CULVERT
- PROPOSED CURB & GUTTER
- NEW ROAD SURFACE
- EXISTING PROPERTY

PRELIMINARY

0 10 20 30 40 50m

Hamilton Public Works

City of Burlington

Halton Region

PREFERRED ULTIMATE DESIGN CONCEPT

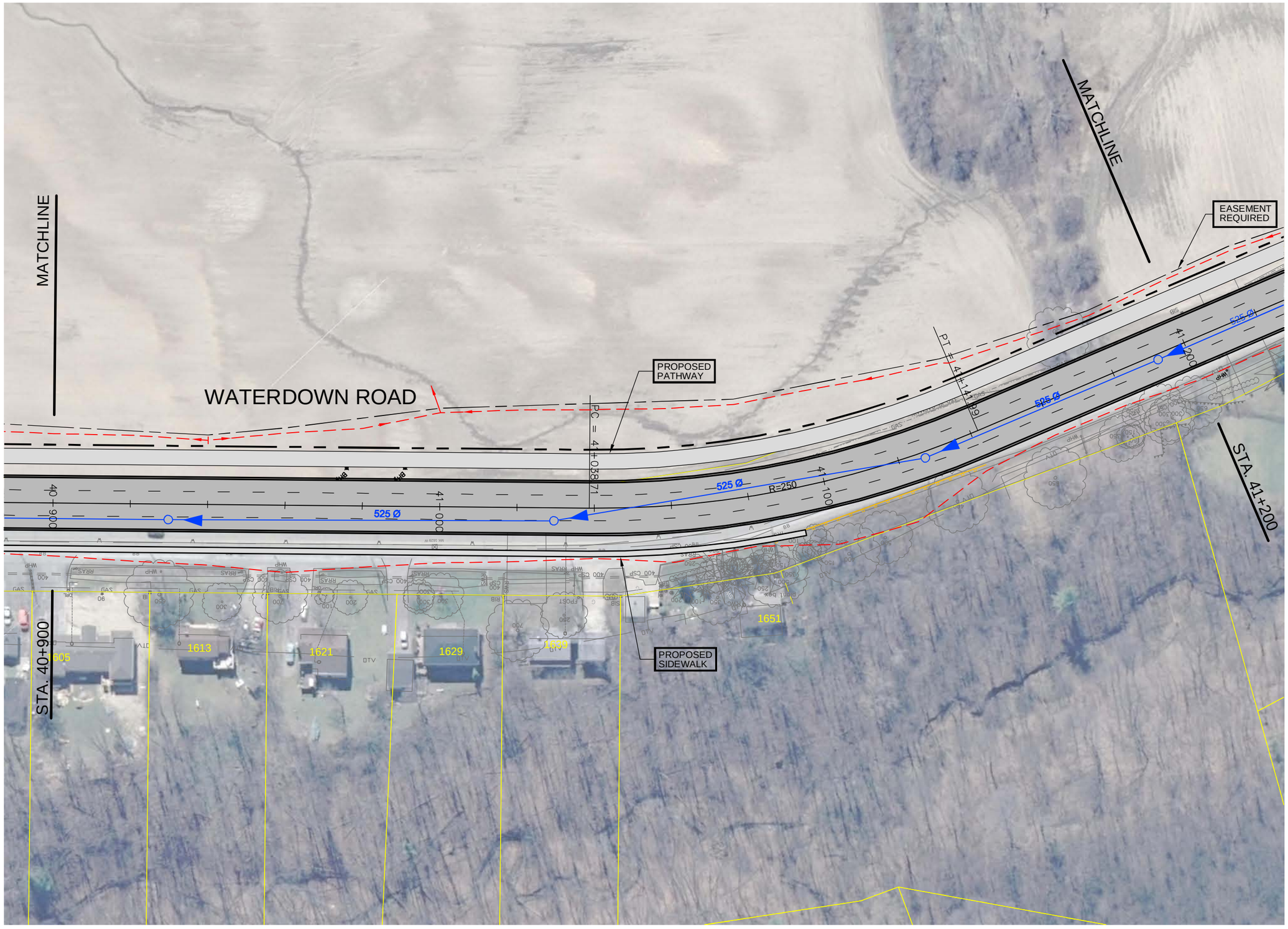
STA. 40+600 to STA. 40+900

DILLON CONSULTING

WATERDOWN ROAD CLASS ENVIRONMENTAL ASSESSMENT

CHECKED BY: ---	
DESIGN BY: ---	
DRAWN BY: ---	
SCALE: AS SHOWN	WATERDOWN- PLATE 3
DATE: JUNE 25, 2008	
PROJECT No. 08-8000	

Plotted: Jul 25, 2009 - 2:23pm File: G:\CAD\08920 Waterdown E-W Roads\LDO_Waterdown\dwg\08920--waterdown--Plan-1-500--Opt--10.dwg Layout: Final Waterdown--PlanProfile



LEGEND

- PROPOSED ROW
- PROPOSED GRADING LIMIT
- 750 Ø — PROPOSED STORM SEWER
- PROPOSED MANHOLE
- PROPOSED DITCH INLET
- PROPOSED CULVERT
- PROPOSED CURB & GUTTER
- NEW ROAD SURFACE
- EXISTING PROPERTY

PRELIMINARY

0 10 20 30 40 50m

Hamilton Public Works | Burlington | Halton Region

PREFERRED ULTIMATE DESIGN CONCEPT

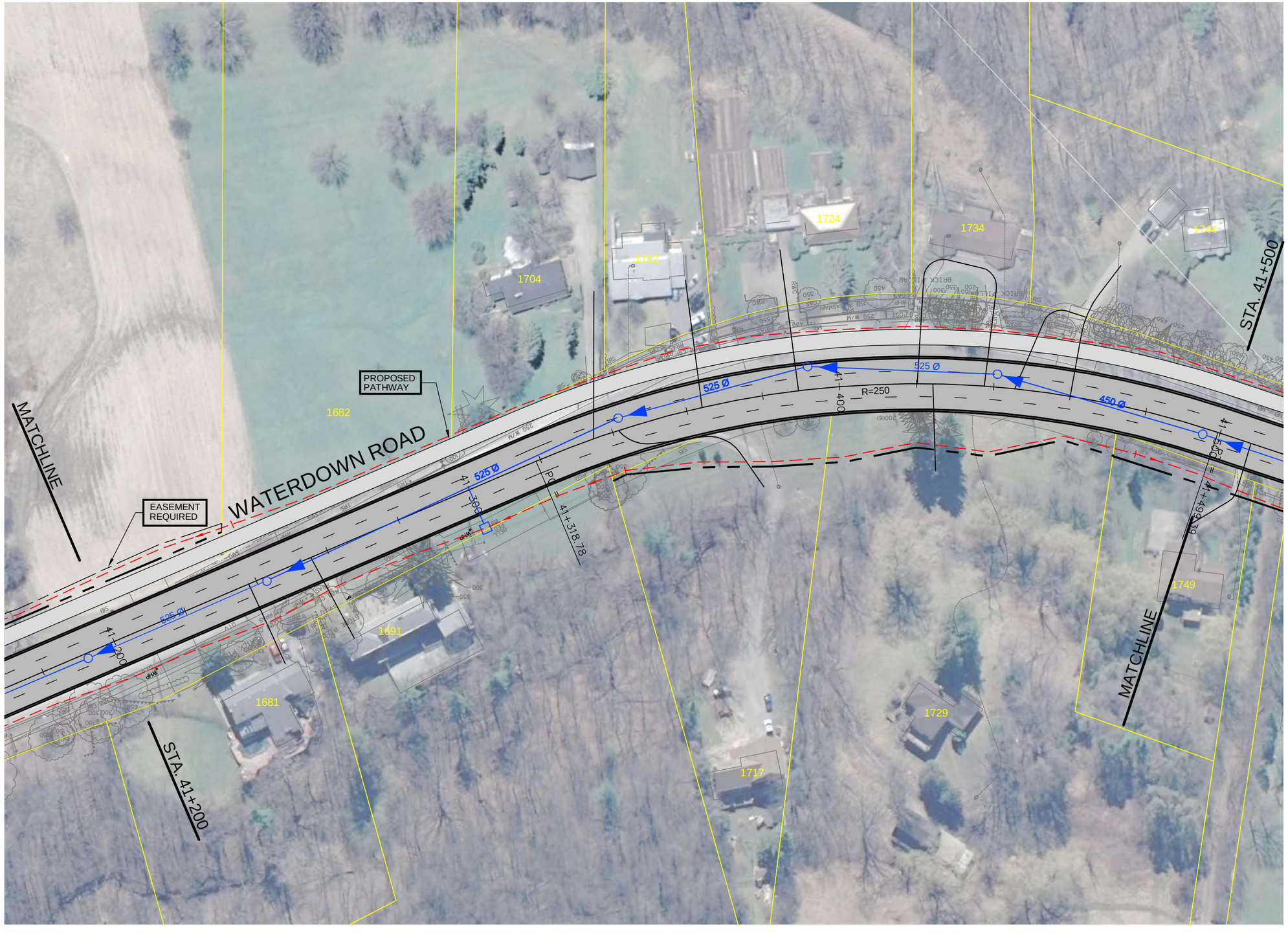
STA. 40+900 to STA. 41+200

DILLON CONSULTING

WATERDOWN ROAD CLASS ENVIRONMENTAL ASSESSMENT

CHECKED BY: ---	
DESIGN BY: ---	
DRAWN BY: ---	
SCALE: AS SHOWN	
DATE: JUNE 25, 2008	
PROJECT No. 08-8000	WATERDOWN- PLATE 4

Plotted: Jul 29, 2009 – 2:26pm File: G:\CAD\080020 Waterdown E-W Roads\LDD Waterdown\Dwg\080020--waterdown-Plan-1-500--Opt-10.dwg Layout: Final Waterdown-PlanProfile



LEGEND

- PROPOSED ROW
- PROPOSED GRADING LIMIT
- 750 Ø — PROPOSED STORM SEWER
- PROPOSED MANHOLE
- PROPOSED DITCH INLET
- PROPOSED CULVERT
- PROPOSED CURB & GUTTER
- NEW ROAD SURFACE
- EXISTING PROPERTY

PRELIMINARY

0 10 20 30 40 50m

Hamilton Public Works | City of Burlington | Halton Region

PREFERRED ULTIMATE DESIGN CONCEPT

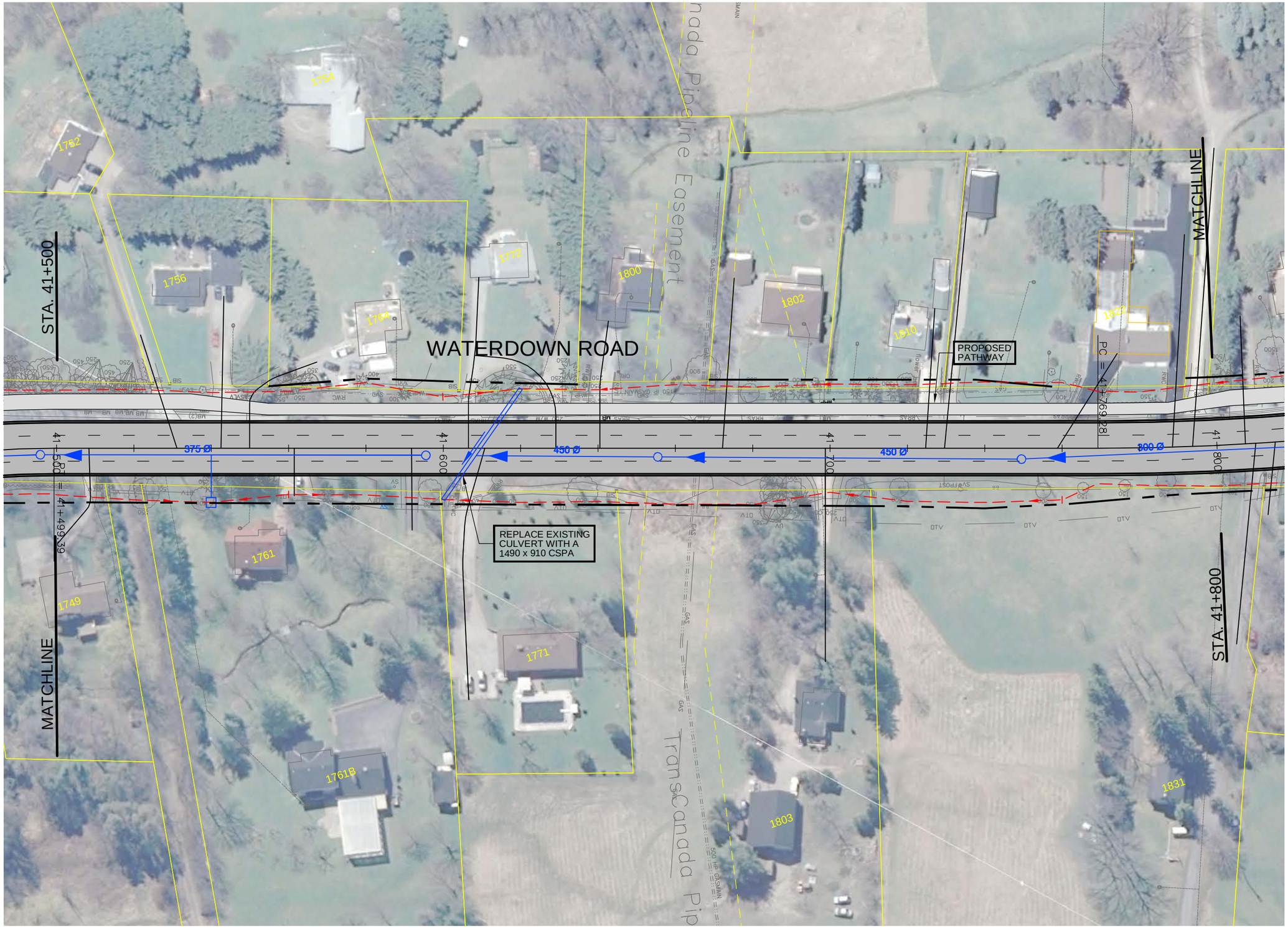
STA. 41+200 to STA. 41+500

DILLON CONSULTING

WATERDOWN ROAD CLASS ENVIRONMENTAL ASSESSMENT

CHECKED BY:—	
DESIGN BY:—	
DRAWN BY:—	
SCALE: AS SHOWN	
DATE: SEPTEMBER 16, 2008	WATERDOWN- PLATE 5
PROJECT No. 08-9020	

Plotted: Jul 31, 2009 – 9:53am File: G:\CAD\08020 Waterdown E-W Roads\LDD Waterdown\dwg\08020-waterdown-Plan-1-500-Opt-10.dwg Layout: Final Waterdown-PlanProfile



LEGEND

- PROPOSED ROW
- PROPOSED GRADING LIMIT
- 750 Ø PROPOSED STORM SEWER
- PROPOSED MANHOLE
- PROPOSED DITCH INLET
- PROPOSED CULVERT
- PROPOSED CURB & GUTTER
- NEW ROAD SURFACE
- EXISTING PROPERTY

PRELIMINARY

0 10 20 30 40 50m

Hamilton Public Works | Burlington | Halton Region

PREFERRED ULTIMATE DESIGN CONCEPT

STA. 41+500 to STA. 41+800

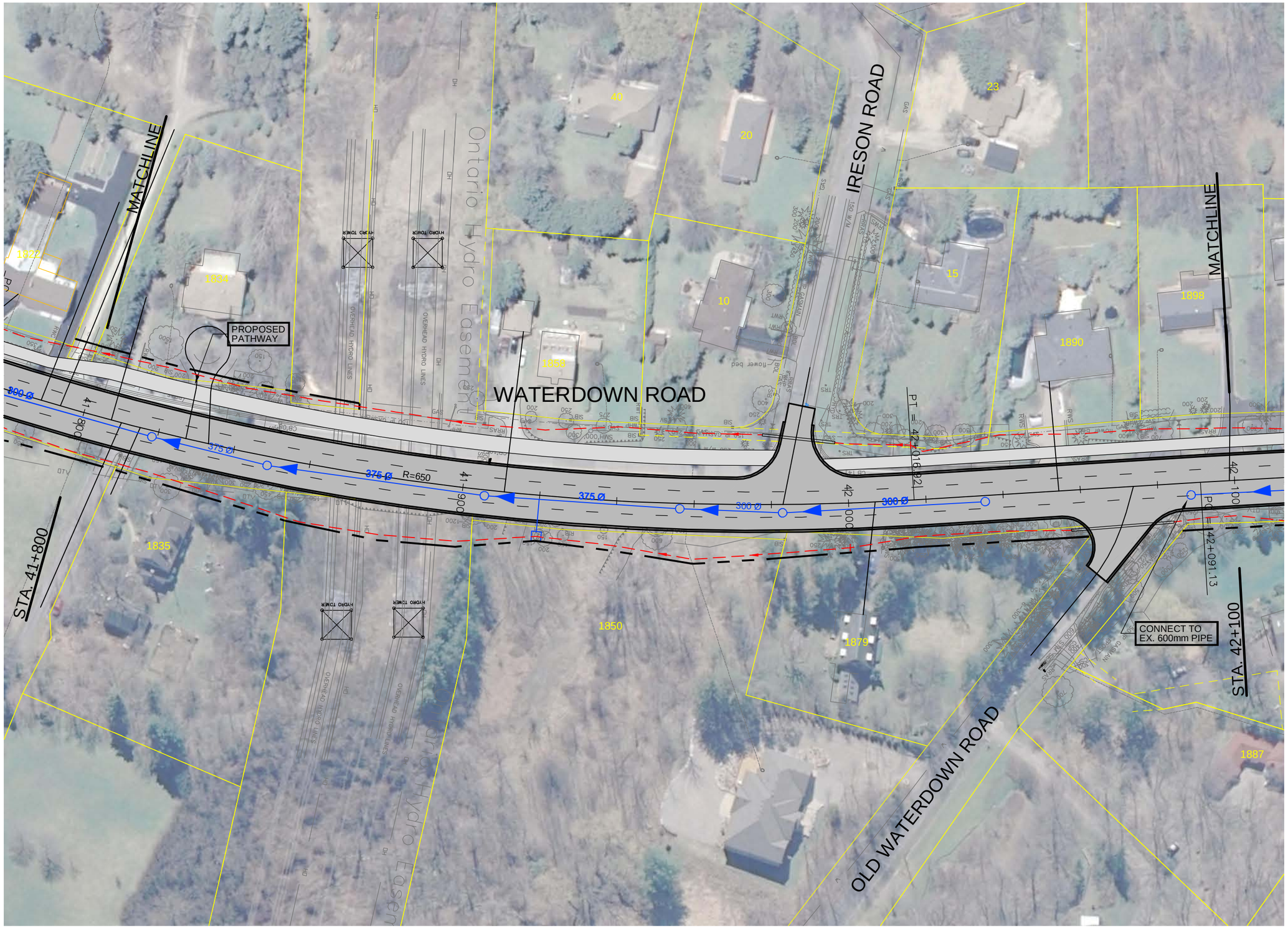
DILLON CONSULTING

WATERDOWN ROAD CLASS ENVIRONMENTAL ASSESSMENT

CHECKED BY: ---	
DESIGN BY: ---	
DRAWN BY: ---	
SCALE: AS SHOWN	
DATE: JUNE 25, 2008	
PROJECT No. 08-8000	

WATERDOWN- PLATE 6

Plotted: Jul 29, 2009 - 2:30pm File: C:\DATA\089020 Waterdown E-W Roads\LDD Waterdown\Reg\089020-waterdown-Plan-1-500-Opt-10.dwg Layout: Final Waterdown-PlanProfile



LEGEND

- PROPOSED ROW
- PROPOSED GRADING LIMIT
- 750 Ø PROPOSED STORM SEWER
- PROPOSED MANHOLE
- PROPOSED DITCH INLET
- PROPOSED CULVERT
- PROPOSED CURB & GUTTER
- NEW ROAD SURFACE
- EXISTING PROPERTY

PRELIMINARY

0 10 20 30 40 50m

Hamilton Public Works | City of Burlington | Halton Region

PREFERRED ULTIMATE DESIGN CONCEPT

STA. 41+800 to STA. 42+100

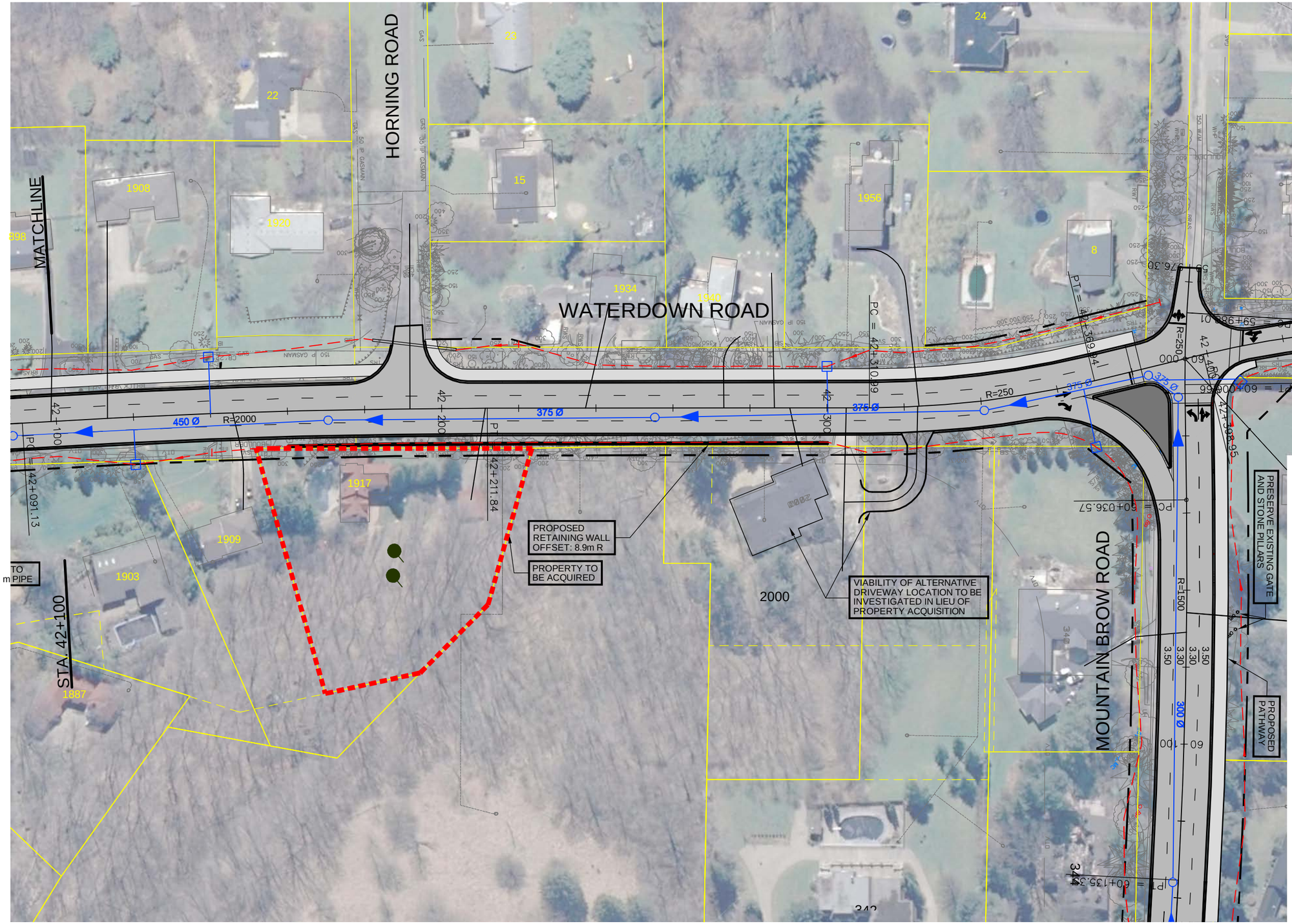
DILLON CONSULTING

WATERDOWN ROAD CLASS ENVIRONMENTAL ASSESSMENT

CHECKED BY: —	
DESIGN BY: —	
DRAWN BY: —	
SCALE: AS SHOWN	
DATE: JUNE 25, 2008	
PROJECT No. 08-9020	

WATERDOWN- PLATE 7

Plotted: Jul 29, 2009 – 2:34pm File: G:\CAD\08\9020 Waterdown E-W Roads\LDD Waterdown\dwg\089020--waterdown--Plan-1--500--Opt--10.dwg Layout: Final Waterdown--PlanProfile



LEGEND

- PROPOSED ROW
- PROPOSED GRADING LIMIT
- 750 Ø PROPOSED STORM SEWER
- PROPOSED MANHOLE
- PROPOSED DITCH INLET
- PROPOSED CULVERT
- PROPOSED CURB & GUTTER
- NEW ROAD SURFACE
- EXISTING PROPERTY

PRELIMINARY

0 10 20 30 40 50m

Hamilton Public Works | Burlington | Halton Region

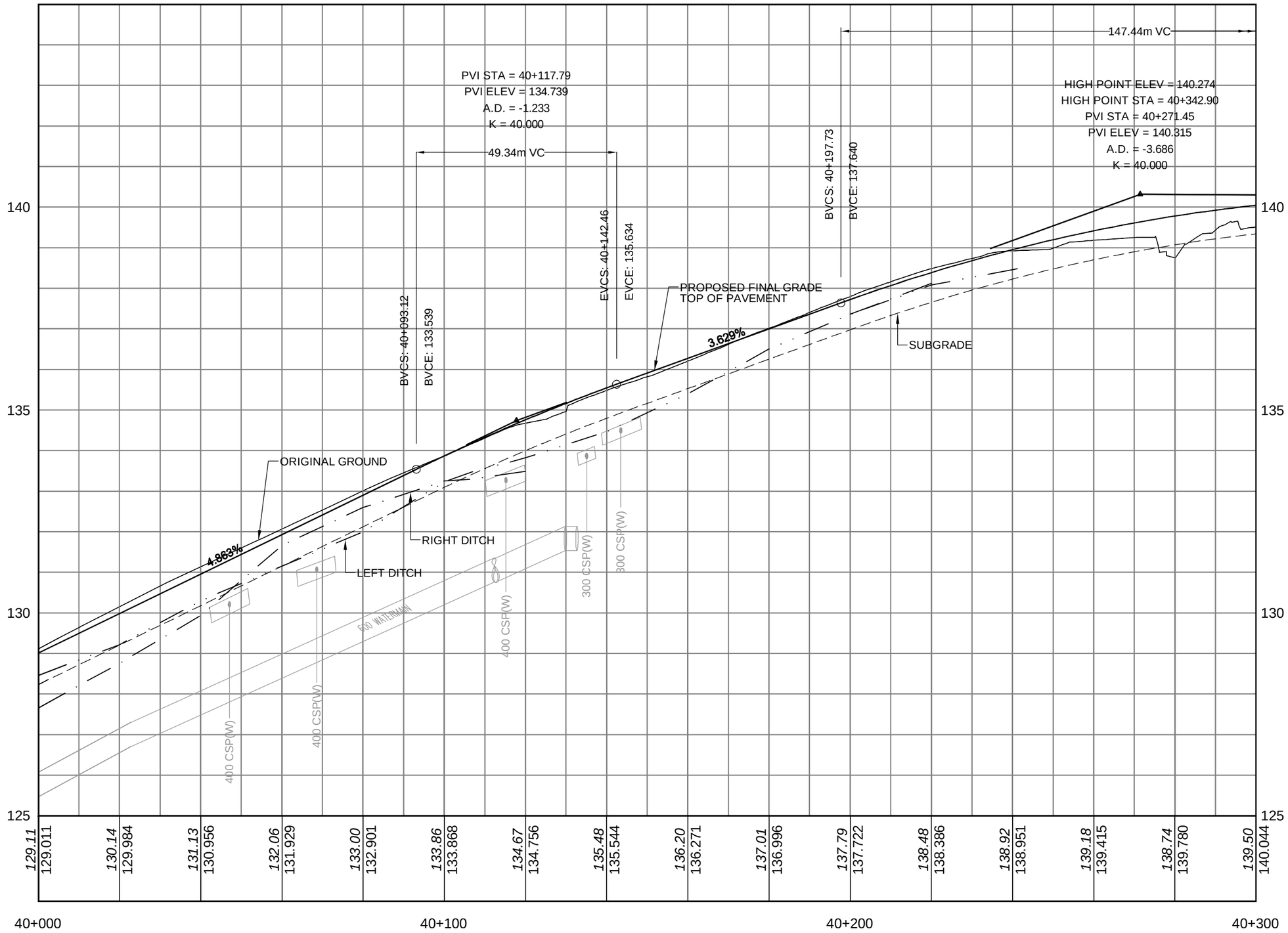
PREFERRED ULTIMATE DESIGN CONCEPT

STA. 42+100 to STA. 42+456.63

DILLON CONSULTING

CHECKED BY: ---	WATERDOWN ROAD CLASS ENVIRONMENTAL ASSESSMENT
DESIGN BY: ---	
DRAWN BY: ---	WATERDOWN- PLATE 8
SCALE: AS SHOWN	
DATE: JUNE 25, 2008	
PROJECT No. 08-9020	

Plotted: Jul 31, 2009 - 10:54am File: G:\CAD\08920D Waterdown E-W Roads\LDG Waterdown\dwg\08920D-waterdown-Plan-1-500-Opt-1D.dwg Layout: Final Waterdown-PlanProfile



PRELIMINARY

0 10 20 30 40 50m
HORIZONTAL

0 1 2 3 4 5m
VERTICAL

Hamilton Public Works | Burlington | Halton Region

PREFERRED ULTIMATE DESIGN CONCEPT

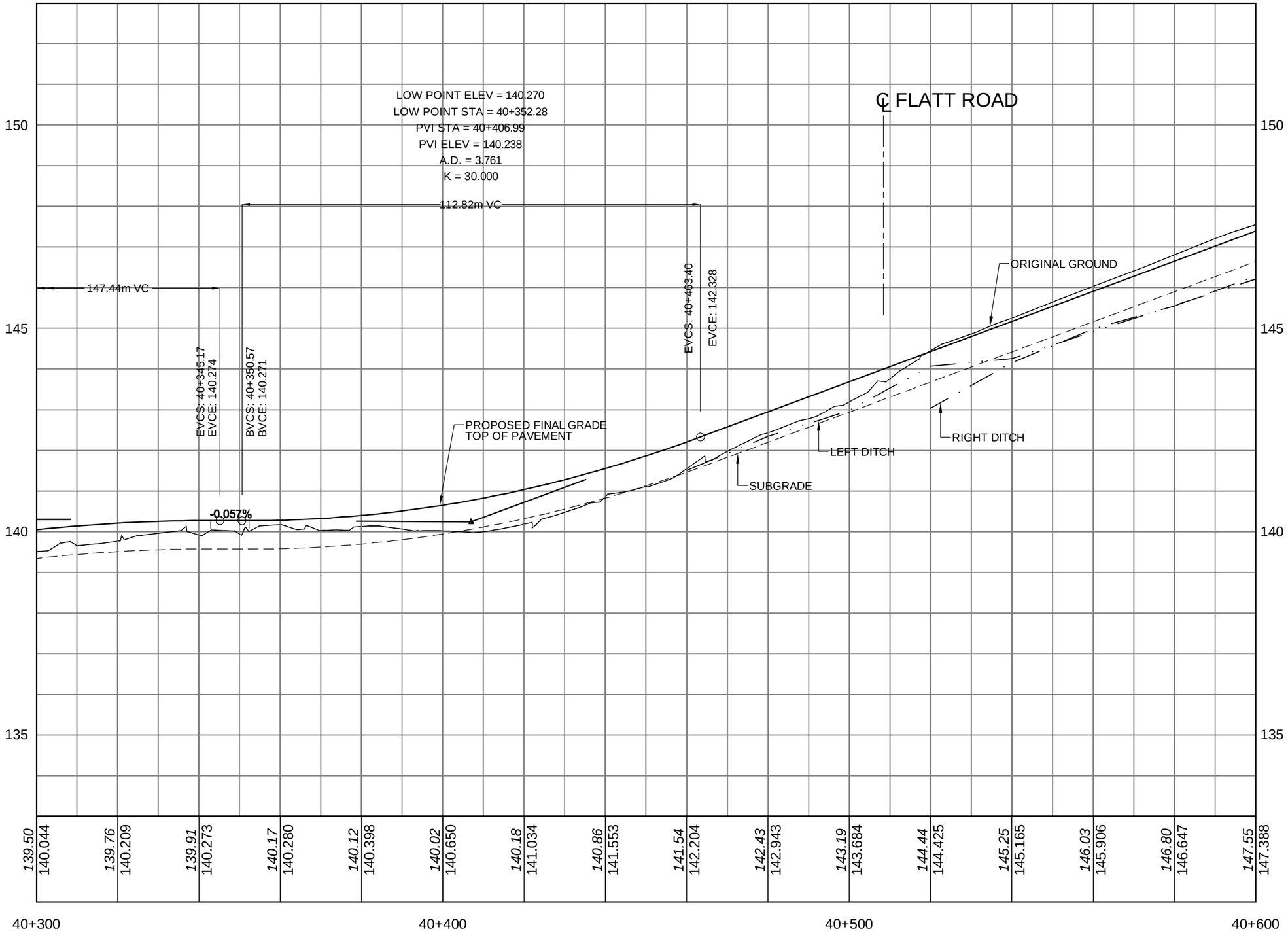
STA. 40+000 to STA. 40+300

DILLON CONSULTING

WATERDOWN ROAD CLASS ENVIRONMENTAL ASSESSMENT

CHECKED BY: JDM	
DESIGN BY: JDM	
DRAWN BY: GCC	
SCALE: AS SHOWN	WATERDOWN-PLATE 9
DATE: JUNE 25, 2008	
PROJECT No. 08-9020	

Plotted: Jul 29, 2009 - 2:46pm File: G:\CAD\08920D Waterdown E-W Roads\LDD Waterdown\Vert\08920D-waterdown-Plan-1-600-Opt-10.dwg Layout: Final Waterdown-PlanProfile



PRELIMINARY

0 10 20 30 40 50m
HORIZONTAL

0 1 2 3 4 5m
VERTICAL

Hamilton Public Works | Burlington | Halton Region

PREFERRED ULTIMATE DESIGN CONCEPT

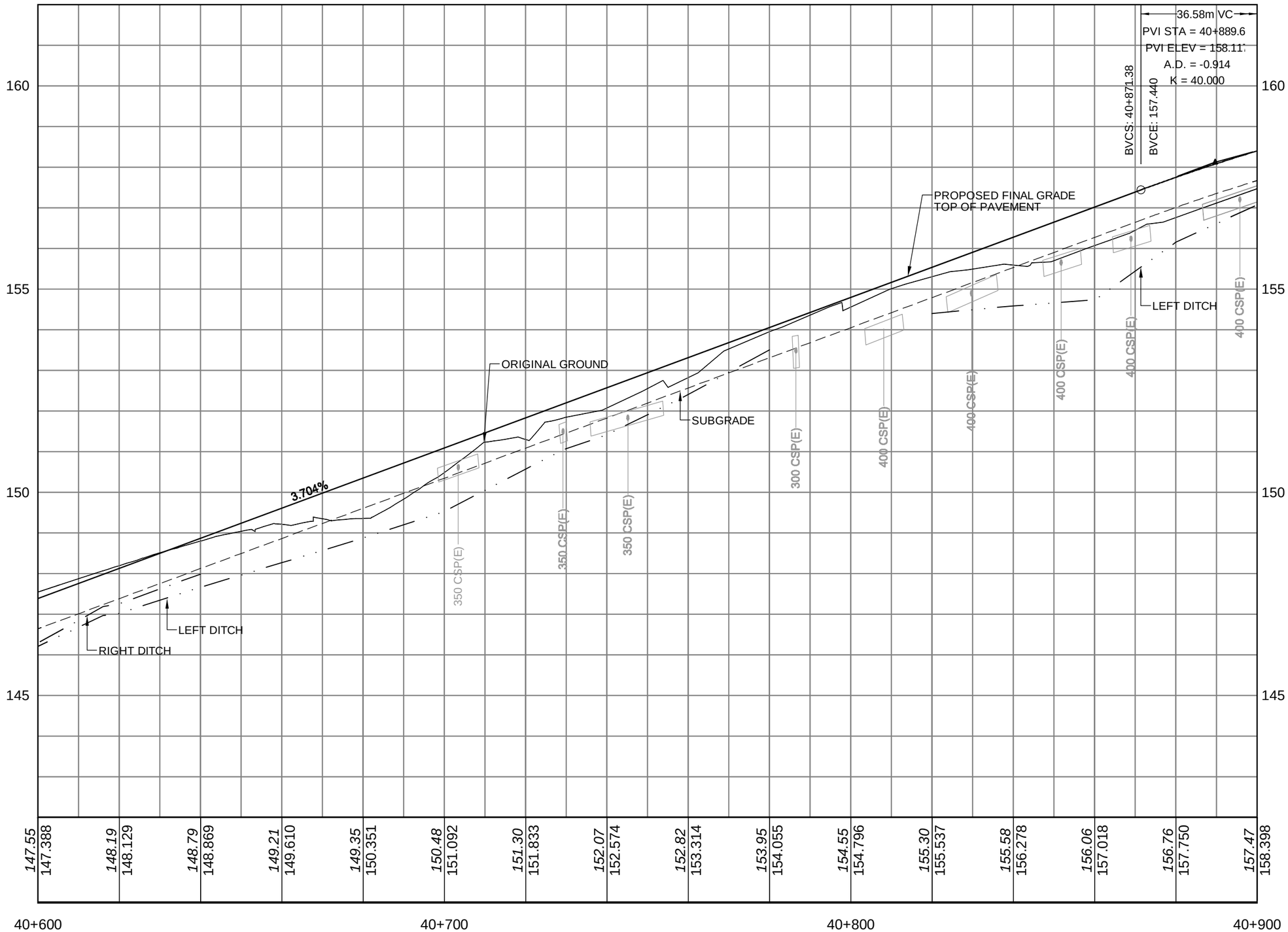
STA. 40+300 to STA. 40+600

DILLON CONSULTING

WATERDOWN ROAD
CLASS ENVIRONMENTAL ASSESSMENT

CHECKED BY: JDM	
DESIGN BY: JDM	
DRAWN BY: GCC	
SCALE: AS SHOWN	WATERDOWN-PLATE 10
DATE: JUNE 25, 2008	
PROJECT No. 08-9020	

Plotted: Jul 29, 2009 - 2:49pm File: G:\JOB\08\9020 Waterdown E-W Roads\100 Waterdown\Acad\08902D--waterdown--Plan--1--500--0pt--10.dwg Layout: Final Waterdown--PlanProfile



PRELIMINARY

0 10 20 30 40 50m
HORIZONTAL

0 1 2 3 4 5m
VERTICAL

Hamilton Public Works | Burlington | Halton Region

PREFERRED ULTIMATE DESIGN CONCEPT

STA. 40+600 to STA. 40+900

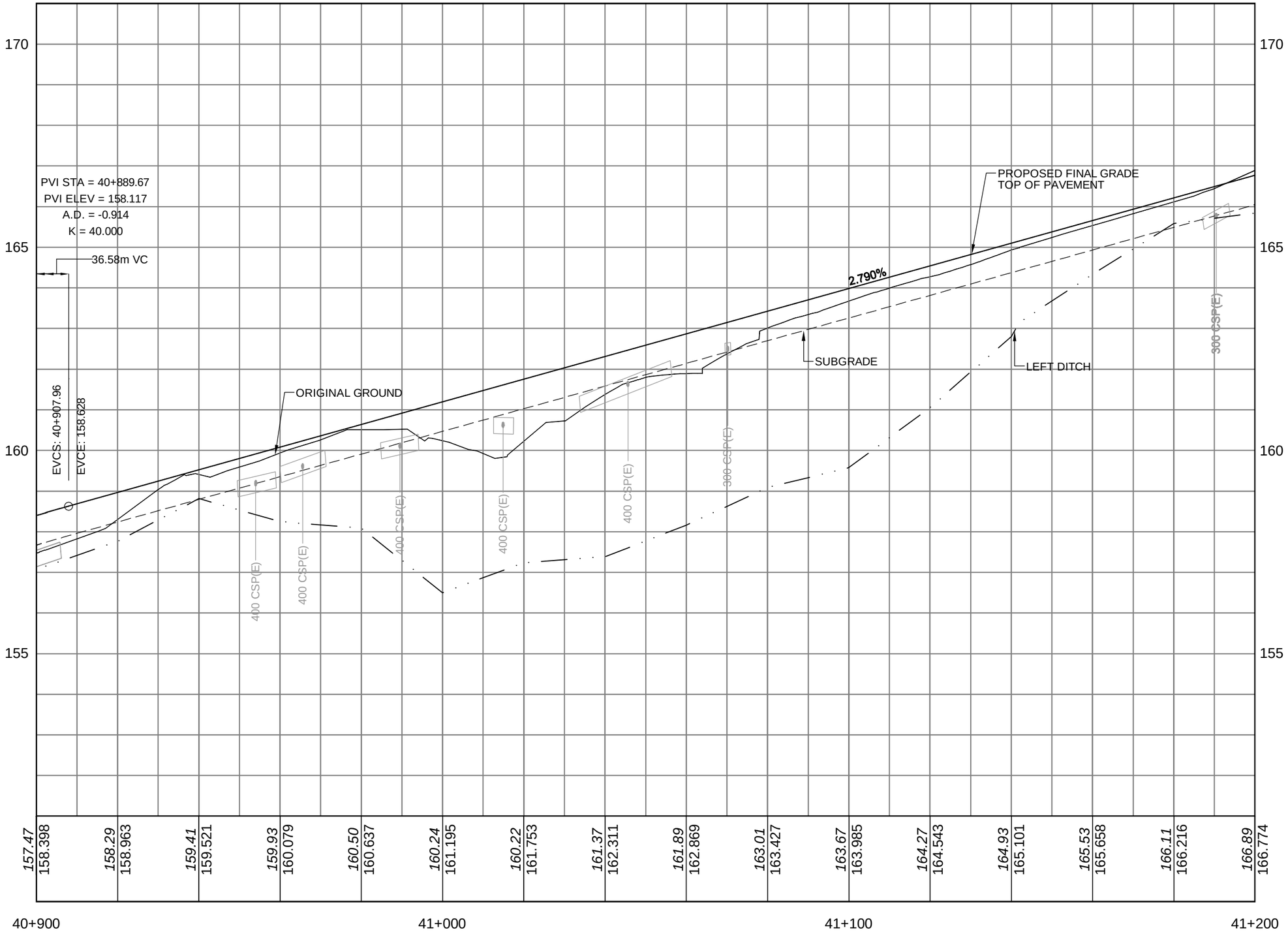
DILLON CONSULTING

CHECKED BY: JDM	
DESIGN BY: JDM	
DRAWN BY: GCC	
SCALE: AS SHOWN	
DATE: JUNE 25, 2008	

WATERDOWN ROAD CLASS ENVIRONMENTAL ASSESSMENT

WATERDOWN-PLATE 11

Plotted: Jul 29, 2009 - 2:54pm File: G:\Jobs\089020 Waterdown E-W Roads\LDD Waterdown\dwg\089020-waterdown-Plan-1-500-Opt-10.dwg Layout: Final Waterdown-PlanProfile



PRELIMINARY

0 10 20 30 40 50m
HORIZONTAL

0 1 2 3 4 5m
VERTICAL

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PREFERRED ULTIMATE DESIGN CONCEPT

STA. 40+900 to STA. 41+200

DILLON CONSULTING

WATERDOWN ROAD CLASS ENVIRONMENTAL ASSESSMENT

CHECKED BY: JDM	
DESIGN BY: JDM	
DRAWN BY: GCC	
SCALE: AS SHOWN	WATERDOWN-PLATE 12
DATE: JUNE 25, 2008	
PROJECT No. 08-8020	

Plotted: Jul 29, 2009 - 2:58pm File: G:\CAD\08020 Waterdown, E-W Roads\LDD Waterdown\dwg\08020-waterdown-Plan-1-500-Opt-10.dwg Layout: Final Waterdown-PlanProfile

PVI STA = 41+335.71
PVI ELEV = 170.560
A.D. = -1.683
K = 40.000

67.31m VC

BVCS: 41+302.06
BVCE: 169.621
EVCS: 41+369.36
EVCE: 170.933

PROPOSED FINAL GRADE
TOP OF PAVEMENT

1.107%

ORIGINAL GROUND

SUBGRADE

LEFT DITCH

RIGHT DITCH

200 CSP(E)
400 CSP(E)
400 CSP(E)
400 CSP(W)
400 CSP(W)
400 CSP(W)
400 CSP(W)
400 CSP(W)

175
170
165
160

166.89	166.774	167.82	167.332	168.62	167.890	169.11	168.448	169.59	169.006	170.05	169.564	170.33	170.082	170.44	170.500	170.35	170.818	170.03	171.050	170.17	171.272	170.75	171.493	170.35	171.714	171.33	171.936	172.15	172.157	172.42	172.379

41+200 41+300 41+400 41+500

PRELIMINARY

0 10 20 30 40 50m
HORIZONTAL

0 1 2 3 4 5m
VERTICAL

Hamilton Public Works | Burlington | Halton Region

PREFERRED ULTIMATE DESIGN CONCEPT

STA. 41+200 to STA. 41+500

DILLON CONSULTING

WATERDOWN ROAD
CLASS ENVIRONMENTAL ASSESSMENT

CHECKED BY: JDM
DESIGN BY: JDM
DRAWN BY: GCC
SCALE: AS SHOWN
DATE: JUNE 25, 2008
PROJECT No. 06-8090

WATERDOWN-PLATE 13

Plotted: Jul 29, 2009 - 2:04pm File: G:\CAD\068020 Waterdown E-W Roads\LDO Waterdown\dwg\068020--waterdown-Plan-1-500-Opt-10.dwg Layout: Final Waterdown-PlanProfile

PVI STA = 41+642.96
PVI ELEV = 173.961
A.D. = 5.893
K = 28.000

165.01m VC

BVCS: 41+560.45
BVCE: 173.048

EVCS: 41+725.46
EVCE: 179.736

ORIGINAL GROUND

SUBGRADE

PROPOSED FINAL GRADE
TOP OF PAVEMENT

LEFT DITCH

RIGHT DITCH

0 CSP(W)

300 CSP(W)

400 CSP(W)

0 CSP(E)
(Road Crossing)

400 CSP(W)

400 CSP(W)

HP GASMAIN
500 TRANSCANADA

250 CSP(E)

300 STM SEWER @ 5.00%

300 STM SEWER @ 5.00%

185
180
175
170

172.42	172.63	172.86	173.06	173.30	173.54	174.01	174.73	175.48	176.48	177.74	179.04	180.39	181.93	183.59	185.10
172.379	172.600	172.821	173.043	173.332	173.765	174.340	175.058	175.919	176.923	178.070	179.359	180.754	182.154	183.554	184.954

41+500 41+600 41+700 41+800

PRELIMINARY

0 10 20 30 40 50m
HORIZONTAL

0 1 2 3 4 5m
VERTICAL

Hamilton Public Works | Burlington | Halton Region

PREFERRED ULTIMATE
DESIGN CONCEPT

STA. 41+500 to STA. 41+800

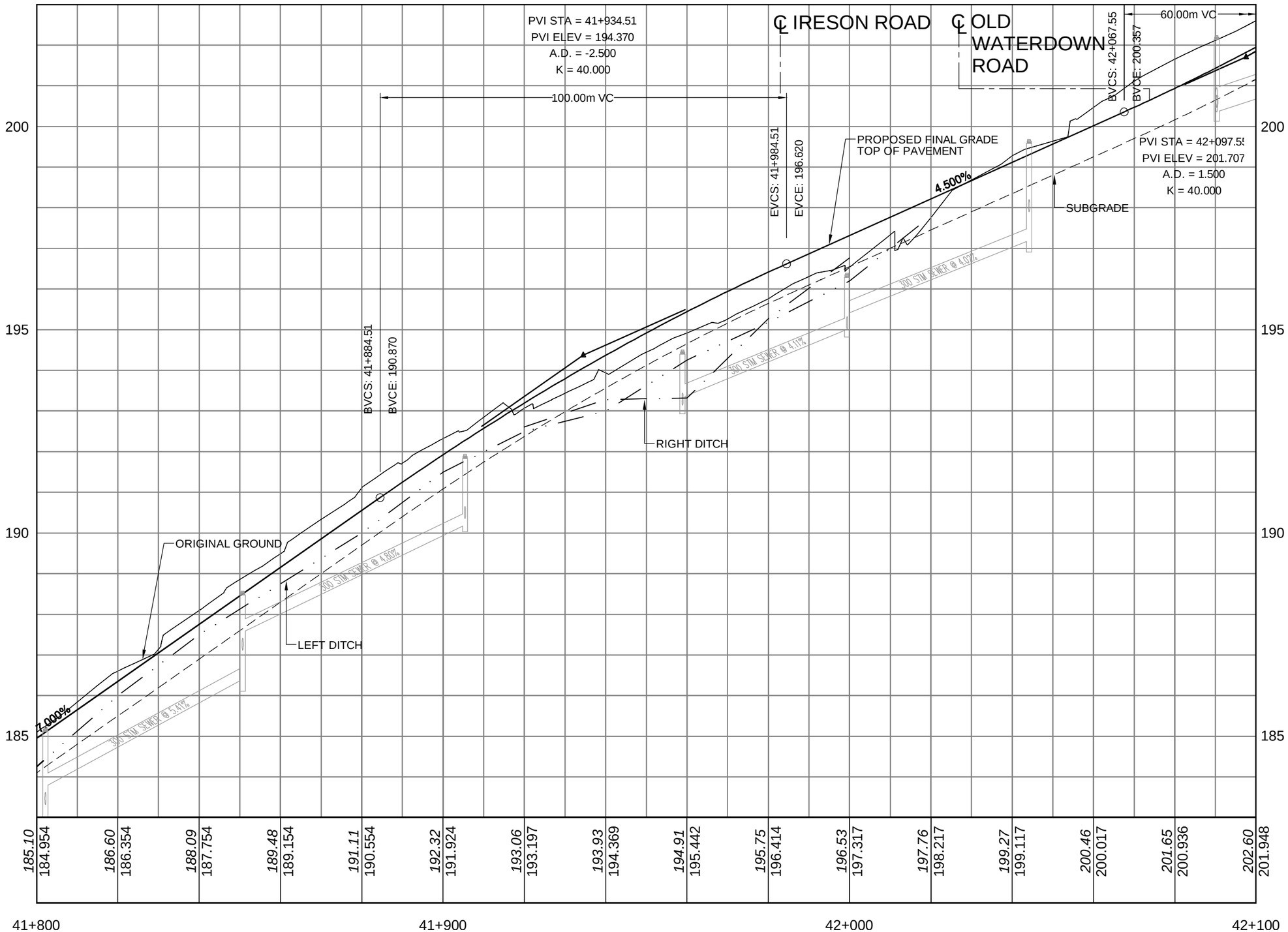
DILLON CONSULTING

WATERDOWN ROAD
CLASS ENVIRONMENTAL ASSESSMENT

CHECKED BY: JDM
DESIGN BY: JDM
DRAWN BY: GCC
SCALE: AS SHOWN
DATE: JUNE 25, 2008

WATERDOWN-PLATE 14

Plotted: Jul 29, 2008 – 3:02pm File: G:\CAD\088020 Waterdown E-W Roads\L00 Waterdown\Dwg\088020-waterdown-Plan-1-500-dpt-10.dwg Layout: Prof Waterdown-ProfProfile



PRELIMINARY

0 10 20 30 40 50m
HORIZONTAL

0 1 2 3 4 5m
VERTICAL

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PREFERRED ULTIMATE DESIGN CONCEPT

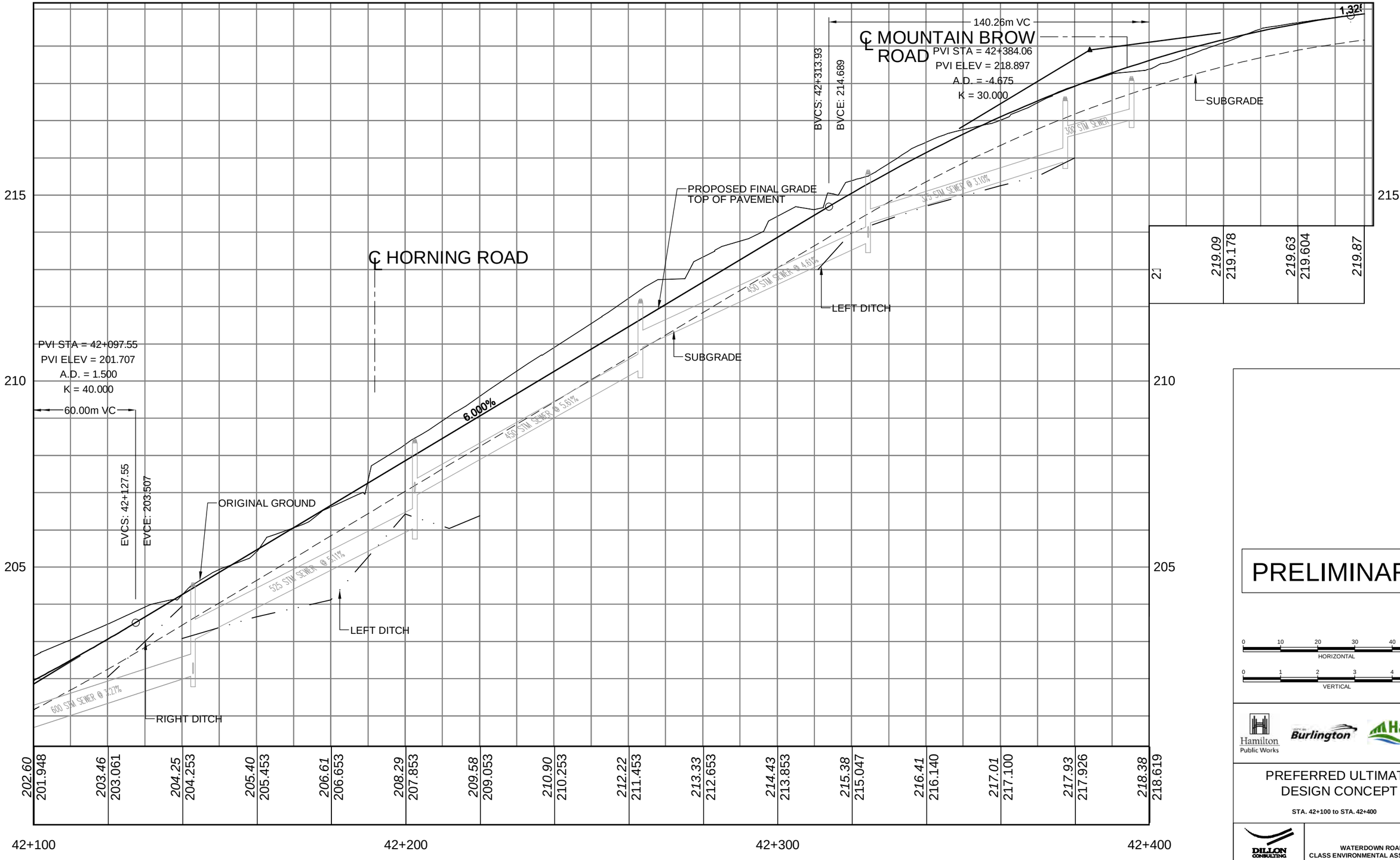
STA. 41+800 to STA. 42+100

DILLON CONSULTING

WATERDOWN ROAD
CLASS ENVIRONMENTAL ASSESSMENT

CHECKED BY: JDM	
DESIGN BY: JDM	
DRAWN BY: GCC	
SCALE: AS SHOWN	WATERDOWN-PLATE 15
DATE: JUNE 25, 2008	

Plotted: Jul 29, 2009 - 3:05pm File: G:\CAD\08H020 Waterdown E-W Roads\LDD Waterdown\Dwg\08H020-waterdown-Plan-1-500-Opt-10.dwg Layout: Final Waterdown-PlanProfile



PRELIMINARY

0 10 20 30 40 50m
HORIZONTAL

0 1 2 3 4 5m
VERTICAL

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PREFERRED ULTIMATE DESIGN CONCEPT

STA. 42+100 to STA. 42+400

DILLON CONSULTING

CHECKED BY: JDM	
DESIGN BY: JDM	
DRAWN BY: GCC	
SCALE: AS SHOWN	
DATE: JUNE 25, 2008	

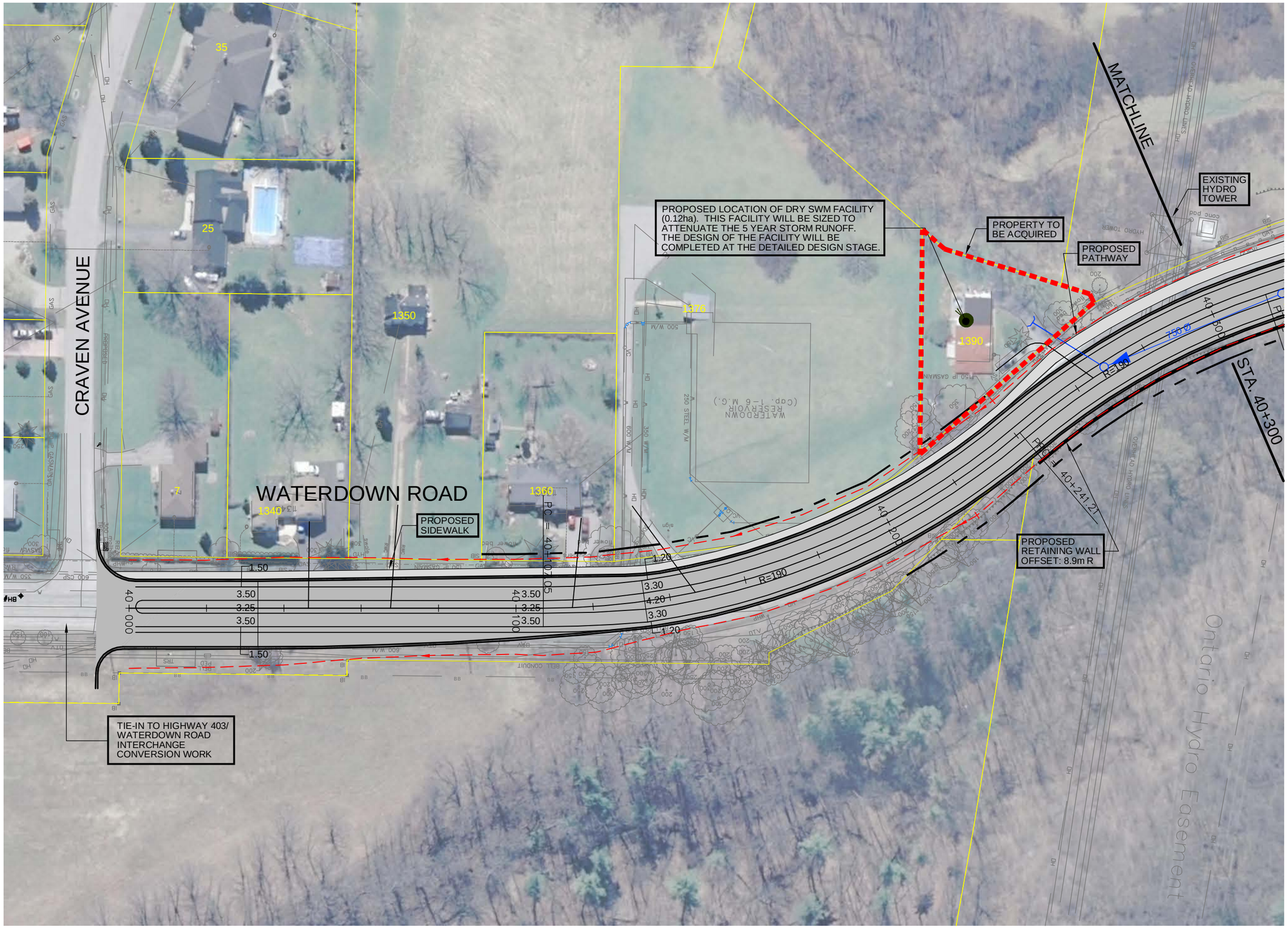
WATERDOWN ROAD
CLASS ENVIRONMENTAL ASSESSMENT

WATERDOWN-PLATE 16

Plotted: Jul 29, 2009 - 3:09pm File: G:\CAD\08025 Waterdown E-W Roads\LDD Waterdown\Dwg\08025D-waterdown-Plan-1-300-Opt-1Q.dwg Layout: Final Waterdown-PlanProfile

WATERDOWN ROAD

INTERIM DESIGN CONCEPT PLANS



LEGEND

- PROPOSED ROW
- PROPOSED GRADING LIMIT
- 750 Ø PROPOSED STORM SEWER
- PROPOSED MANHOLE
- PROPOSED DITCH INLET
- PROPOSED CULVERT
- PROPOSED CURB & GUTTER
- NEW ROAD SURFACE
- EXISTING PROPERTY

PRELIMINARY

0 10 20 30 40 50m

Hamilton Public Works | Burlington | Halton Region

PREFERRED INTERIM DESIGN CONCEPT

STA. 40+000 to STA. 40+300

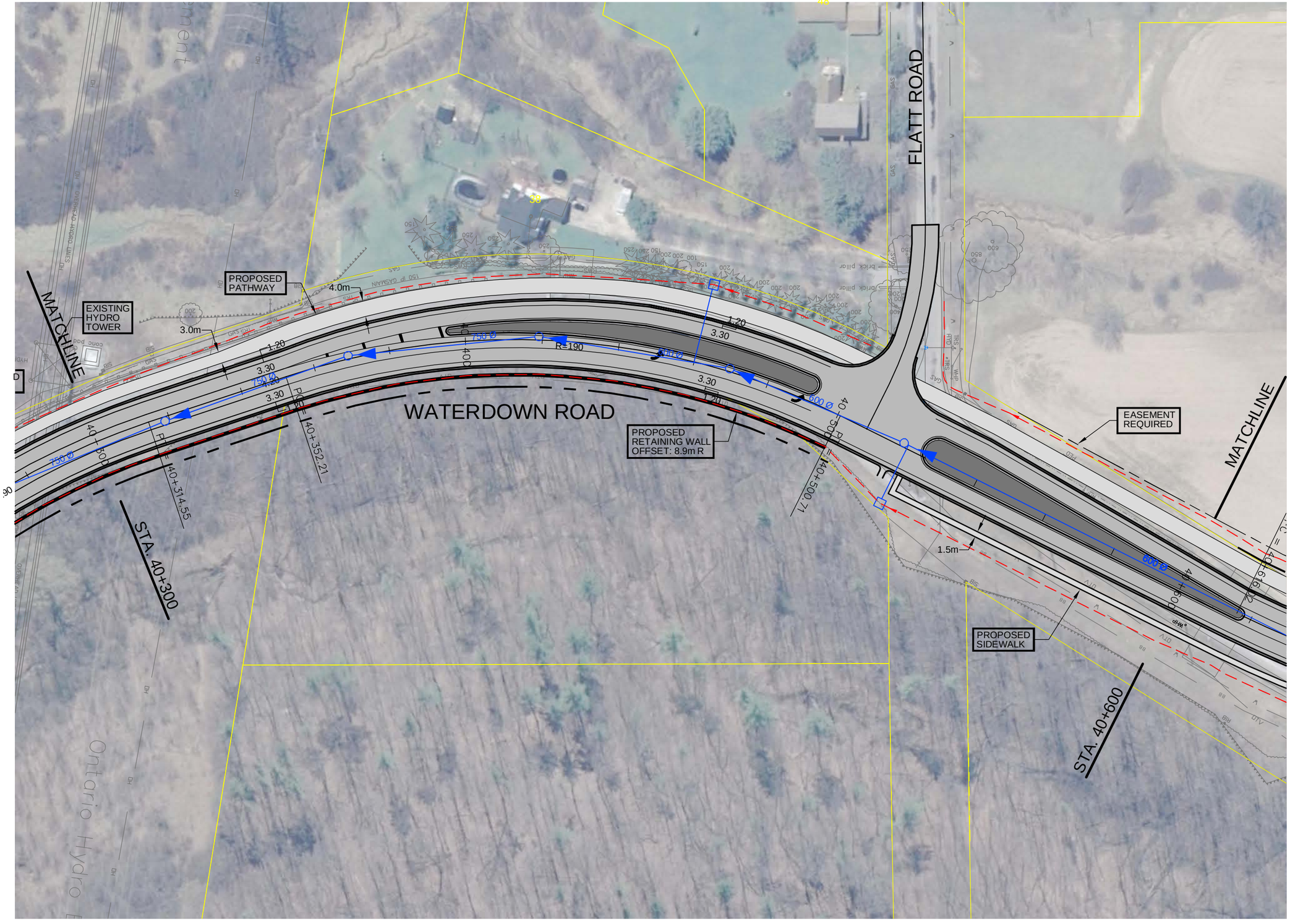
DILLON CONSULTING

CHECKED BY: ---	
DESIGN BY: ---	
DRAWN BY: ---	
SCALE: AS SHOWN	
DATE: JUNE 25, 2008	

WATERDOWN ROAD CLASS ENVIRONMENTAL ASSESSMENT

WATERDOWN-PLATE 17

Plotted: Jul 29, 2009 - 4:44pm File: G:\CAD\08920 Waterdown E-W Roads\LDD Waterdown\dwg\08920--waterdown--Plan--1-500--Opt--10.dwg Layout: Final Waterdown--PlanProfile



LEGEND

- PROPOSED ROW
- PROPOSED GRADING LIMIT
- 750 Ø — PROPOSED STORM SEWER
- PROPOSED MANHOLE
- PROPOSED DITCH INLET
- PROPOSED CULVERT
- PROPOSED CURB & GUTTER
- NEW ROAD SURFACE
- EXISTING PROPERTY

PRELIMINARY

0 10 20 30 40 50m

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PREFERRED INTERIM DESIGN CONCEPT

STA. 40+300 to STA. 40+600

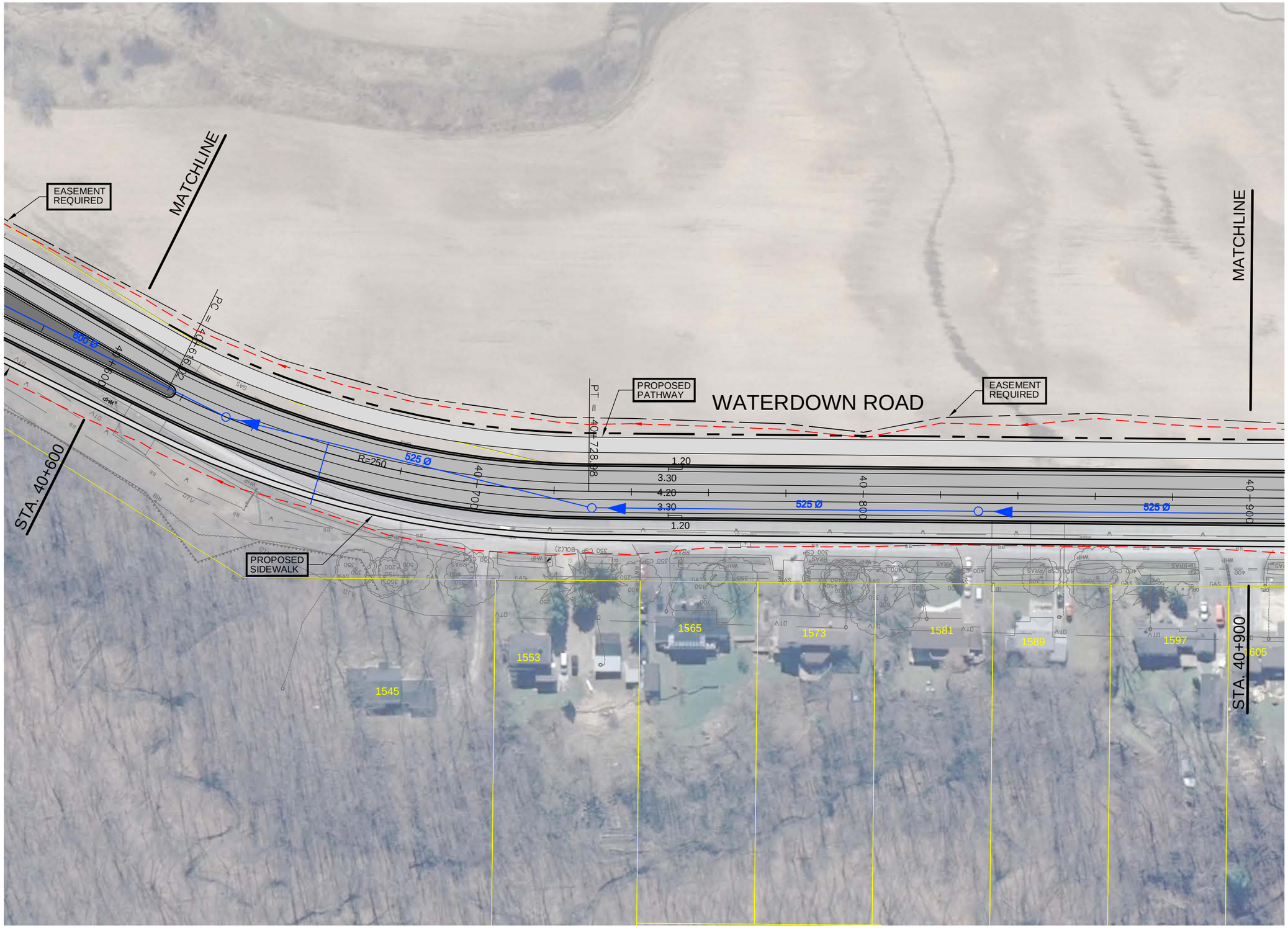
DILLON CONSULTING

CHECKED BY: --	
DESIGN BY: --	
DRAWN BY: --	
SCALE: AS SHOWN	
DATE: JUNE 25, 2008	

WATERDOWN ROAD CLASS ENVIRONMENTAL ASSESSMENT

WATERDOWN- PLATE 18

Plotted: Jul 29, 2009 - 11:51am File: G:\CAD\GB0020 Waterdown E-W Roads\LDD Waterdown\Dwg\GB0020--waterdown--Plan--1--500--Opt-10.dwg Layout: Final Waterdown--PlanProfile



LEGEND

- PROPOSED ROW
- PROPOSED GRADING LIMIT
- 750 Ø PROPOSED STORM SEWER
- PROPOSED MANHOLE
- PROPOSED DITCH INLET
- PROPOSED CULVERT
- PROPOSED CURB & GUTTER
- NEW ROAD SURFACE
- EXISTING PROPERTY

PRELIMINARY

0 10 20 30 40 50m

Hamilton Public Works | Burlington | Halton Region

PREFERRED INTERIM DESIGN CONCEPT

STA. 40+600 to STA. 40+900

DILLON CONSULTING

WATERDOWN ROAD CLASS ENVIRONMENTAL ASSESSMENT

CHECKED BY: ---	
DESIGN BY: ---	
DRAWN BY: ---	
SCALE: AS SHOWN	
DATE: JUNE 25, 2008	
PROJECT No. 08-9020	WATERDOWN- PLATE 19

Plotted: Jul 29, 2009 - 11:56am File: G:\CAD\08\9020 Waterdown, E-W Roads\LDD Waterdown\dwg\08\9020--waterdown-Plan--1-500--Opt--10.dwg Layout: Final Waterdown-PlanProfile

MATCHLINE

WATERDOWN ROAD

PROPOSED PATHWAY

EASEMENT REQUIRED

MATCHLINE

STA. 41+200

PROPOSED SIDEWALK

STA. 40+900

PC = 41+080.71

PT = 41+119.29

525 Ø

R=250

750 Ø

605

1613

1621

1629

1639

1651

LEGEND

- PROPOSED ROW
- PROPOSED GRADING LIMIT
- 750 Ø PROPOSED STORM SEWER
- PROPOSED MANHOLE
- PROPOSED DITCH INLET
- PROPOSED CULVERT
- PROPOSED CURB & GUTTER
- NEW ROAD SURFACE
- EXISTING PROPERTY

PRELIMINARY

0 10 20 30 40 50m

Hamilton Public Works | City of Burlington | Halton Region

PREFERRED INTERIM DESIGN CONCEPT

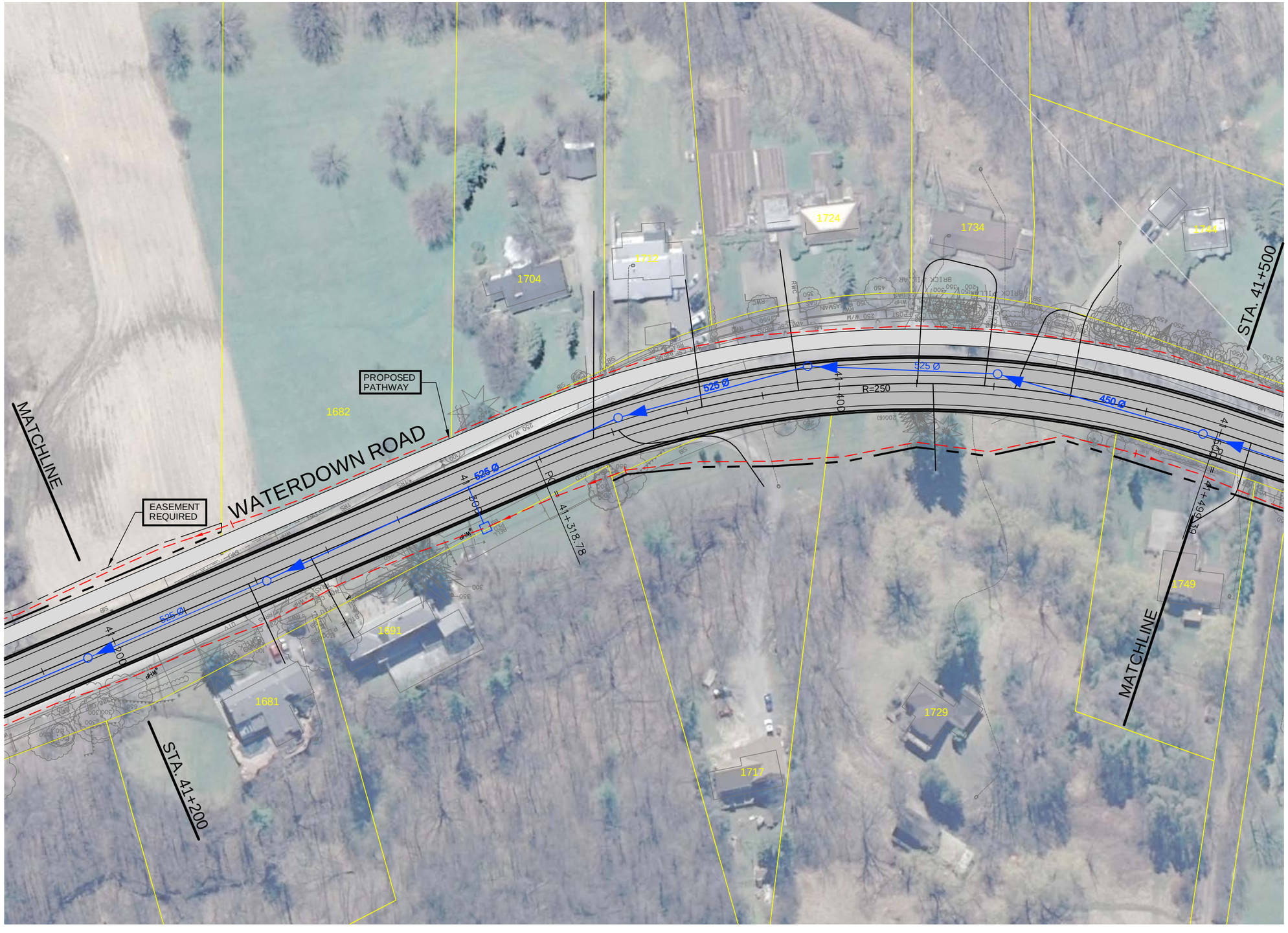
STA. 40+900 to STA. 41+200

DILLON CONSULTING

WATERDOWN ROAD CLASS ENVIRONMENTAL ASSESSMENT

CHECKED BY: ---	
DESIGN BY: ---	
DRAWN BY: ---	
SCALE: AS SHOWN	
DATE: JUNE 25, 2008	
PROJECT No. 08-9020	WATERDOWN- PLATE 20

Plotted: Jul 29, 2009 - 1:54pm File: G:\CAD\08\9020 Waterdown E-W Roads\LDD Waterdown\dwg\08920--waterdown-Plan--1--500--0pt--10.dwg Layout: Final Waterdown--Plan/Profile



LEGEND

- PROPOSED ROW
- PROPOSED GRADING LIMIT
- 750 Ø — PROPOSED STORM SEWER
- PROPOSED MANHOLE
- PROPOSED DITCH INLET
- PROPOSED CULVERT
- PROPOSED CURB & GUTTER
- NEW ROAD SURFACE
- EXISTING PROPERTY

PRELIMINARY

0 10 20 30 40 50m

Hamilton Public Works | City of Burlington | Halton Region

PREFERRED INTERIM DESIGN CONCEPT

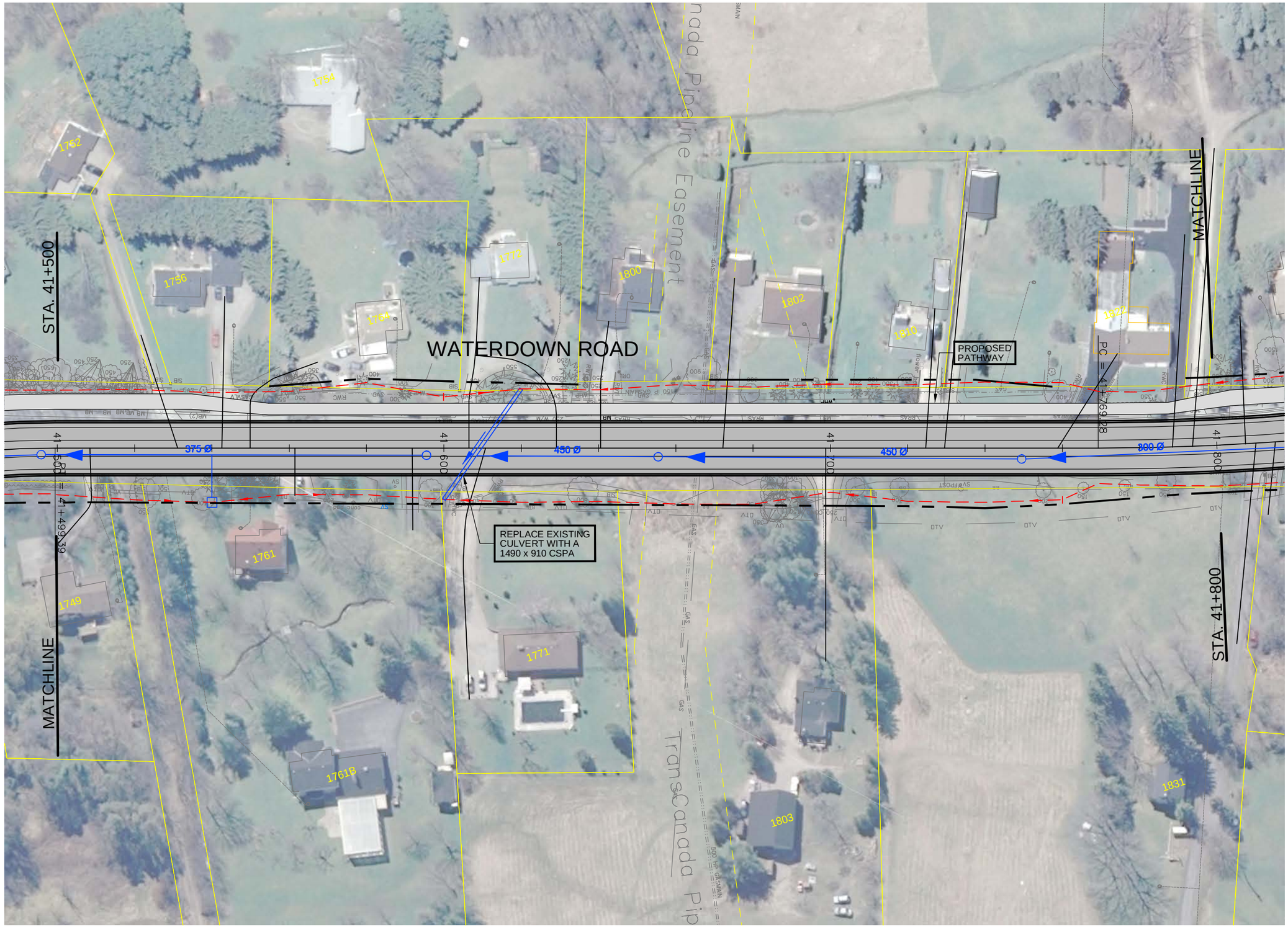
STA. 41+200 to STA. 41+500

DILLON CONSULTING

WATERDOWN ROAD CLASS ENVIRONMENTAL ASSESSMENT

CHECKED BY: ---	
DESIGN BY: ---	
DRAWN BY: ---	
SCALE: AS SHOWN	WATERDOWN- PLATE 21
DATE: SEPTEMBER 16, 2008	
PROJECT No. 08-9020	

Plotted: Jul 31, 2009 – 9:47am File: G:\CAD\08\9020- Waterdown E-W Roads\LDD Waterdown\dwg\089020-waterdown-Plan-1-200-dpl-10.dwg Layout: Final Waterdown-PlanProfile



LEGEND

- PROPOSED ROW
- PROPOSED GRADING LIMIT
- 750 Ø — PROPOSED STORM SEWER
- PROPOSED MANHOLE
- PROPOSED DITCH INLET
- PROPOSED CULVERT
- PROPOSED CURB & GUTTER
- NEW ROAD SURFACE
- EXISTING PROPERTY

PRELIMINARY

0 10 20 30 40 50m

Hamilton Public Works | Burlington | Halton Region

PREFERRED INTERIM DESIGN CONCEPT

STA. 41+500 to STA. 41+800

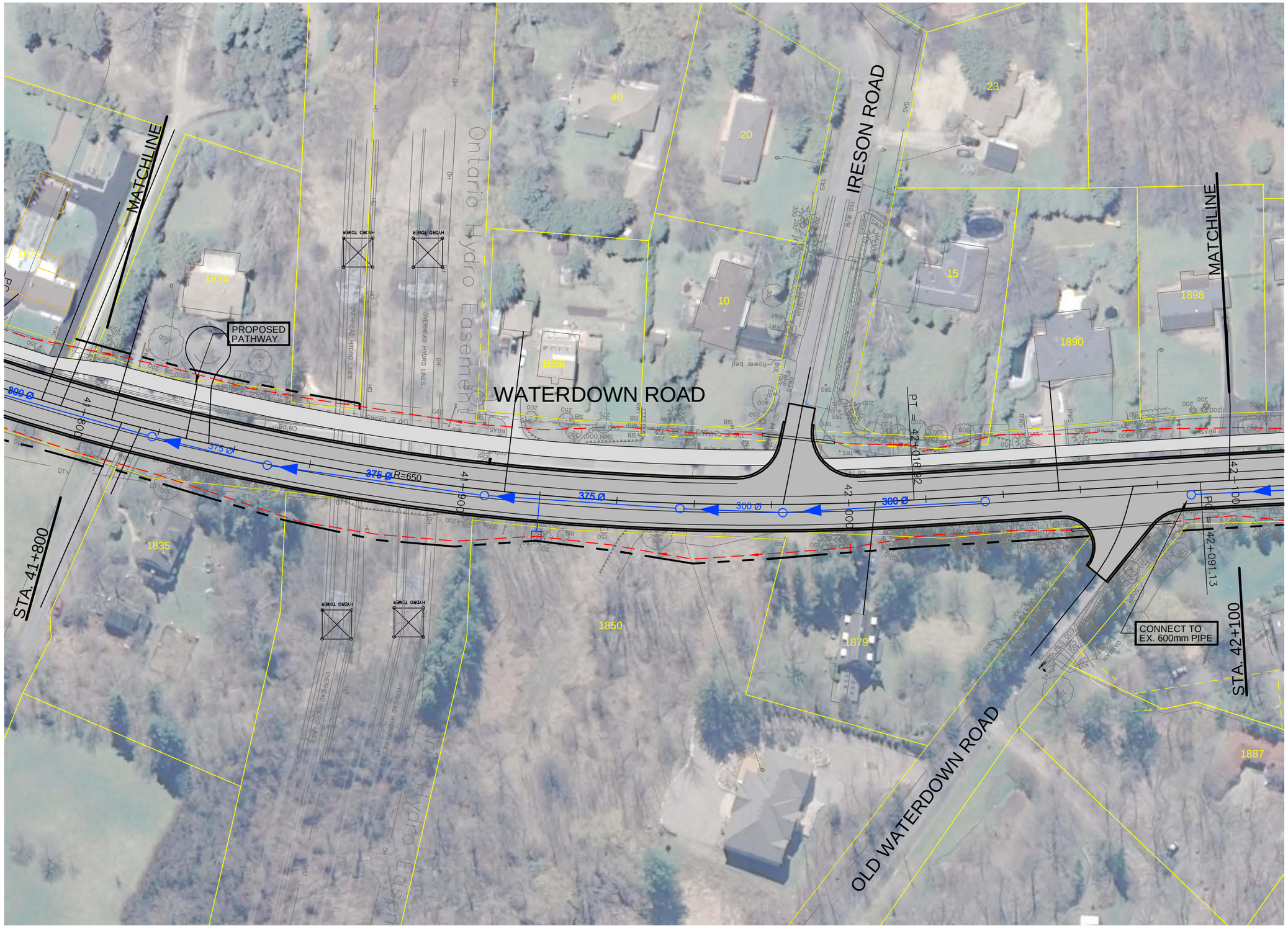
DILLON CONSULTING

WATERDOWN ROAD CLASS ENVIRONMENTAL ASSESSMENT

CHECKED BY: ---	
DESIGN BY: ---	
DRAWN BY: ---	
SCALE: AS SHOWN	
DATE: JUNE 25, 2008	
PROJECT No. 08-9020	

WATERDOWN- PLATE 22

Plotted: Jul 29, 2009 – 2:04pm File: G:\CAD\08\9020 Waterdown, E-W Roads\LDS Waterdown\dwg\08902b-waterdown--Plan-1-500--Opt-10.dwg Layout: Final Waterdown--PlanProfile



LEGEND

- PROPOSED ROW
- PROPOSED GRADING LIMIT
- 750 Ø — PROPOSED STORM SEWER
- PROPOSED MANHOLE
- PROPOSED DITCH INLET
- PROPOSED CULVERT
- PROPOSED CURB & GUTTER
- NEW ROAD SURFACE
- EXISTING PROPERTY

PRELIMINARY

0 10 20 30 40 50m

Hamilton Public Works | Burlington | Halton Region

PREFERRED INTERIM DESIGN CONCEPT

STA. 41+800 to STA. 42+100

DILLON CONSULTING

WATERDOWN ROAD CLASS ENVIRONMENTAL ASSESSMENT

CHECKED BY: ---	
DESIGN BY: ---	
DRAWN BY: ---	
SCALE: AS SHOWN	
DATE: JUNE 25, 2008	
PROJECT No. 08-8020	WATERDOWN- PLATE 23

Plotted: Jul 29, 2009 - 2:08pm File: G:\CAD\08020 Waterdown E-W Roads\L00 Waterdown\Key\08020--waterdown--Plan--1-500--Opt--10.dwg Layout: Final Waterdown--PlanProfile

HORNING ROAD

MATCHLINE

WATERDOWN ROAD

MILL STREET

MOUNTAIN BROW ROAD

BRUCE TRAIL CROSSING PEDESTRIAN REFUGE TREATMENT

PROPOSED RETAINING WALL OFFSET: 8.9m R

PROPERTY TO BE ACQUIRED

VIABILITY OF ALTERNATIVE DRIVEWAY LOCATION TO BE INVESTIGATED IN LIEU OF PROPERTY ACQUISITION

PRESERVE EXISTING GATE AND STONE PILLARS

PROPOSED PATHWAY

STA 42+100

PC = 42+091.13

PT = 42+211.84

PC = 42+310.99

PT = 42+369.84

PC = 59+976.30

PT = 60+036.57

PC = 60+098.66

PT = 60+135.34

PC = 59+926.01

PT = 42+457.85

R=2000

R=250

R=1500

450 Ø

375 Ø

300 Ø

750 Ø

1.20

3.30

4.20

3.50

42+100

42+200

42+300

42+400

60+000

60+100

22

23

24

15

1908

1920

1934

1940

1956

8

319

323

1917

1909

1903

1887

2000

342

LEGEND

- PROPOSED ROW
- PROPOSED GRADING LIMIT
- 750 Ø PROPOSED STORM SEWER
- PROPOSED MANHOLE
- PROPOSED DITCH INLET
- PROPOSED CULVERT
- PROPOSED CURB & GUTTER
- NEW ROAD SURFACE
- EXISTING PROPERTY

PRELIMINARY

0 10 20 30 40 50m

Hamilton Public Works

City of Burlington

Halton Region

PREFERRED INTERIM DESIGN CONCEPT

STA. 42+100 to STA. 42+456.63

DILLON CONSULTING

WATERDOWN ROAD CLASS ENVIRONMENTAL ASSESSMENT

CHECKED BY: ---	
DESIGN BY: ---	
DRAWN BY: ---	
SCALE: AS SHOWN	WATERDOWN- PLATE 24
DATE: JUNE 25, 2008	
PROJECT No. 08-9020	

Plotted: Jul 31, 2009 – 11:08am File: G:\CAD\08020 Waterdown E-W Roads\LDD Waterdown\Dwg\08020-waterdown-Plan-1-500-Opt-10.dwg Layout: Final Waterdown-PlanProfile

MOUNTAIN BROW ROAD

PREFERRED DESIGN CONCEPT
PLANS AND PROFILES

265

339

MOUNTAIN BROW ROAD

351

MATCHLINE

42+457.85

PT = 42+450.57

WATERDOWN ROAD STA: 42+394.10
MOUNTAIN BROW ROAD STA: 60+000

PRESERVE EXISTING GATE AND STONE PILLARS

PROPOSED PATHWAY

PT = 42+398.10

42+392.95

42+400

R=250

R=1500

3.50
3.30
3.30
3.50

300 Ø

375 Ø

PC = 60+036.57

PT = 60+135.34

344

352

PT = 42+369.24

R=250

PC = 42+310.99

375 Ø

42+300

VIABILITY OF ALTERNATIVE DRIVEWAY LOCATION TO BE INVESTIGATED IN LIEU OF PROPERTY ACQUISITION

342

346

2000

STA. 60+300

LEGEND

- PROPOSED ROW
- PROPOSED GRADING LIMIT
- 750 Ø PROPOSED STORM SEWER
- PROPOSED MANHOLE
- PROPOSED DITCH INLET
- PROPOSED CULVERT
- PROPOSED CURB & GUTTER
- NEW ROAD SURFACE
- EXISTING PROPERTY

PRELIMINARY

0 10 20 30 40 50m

Hamilton Public Works

Halton Region

PREFERRED
DESIGN CONCEPT

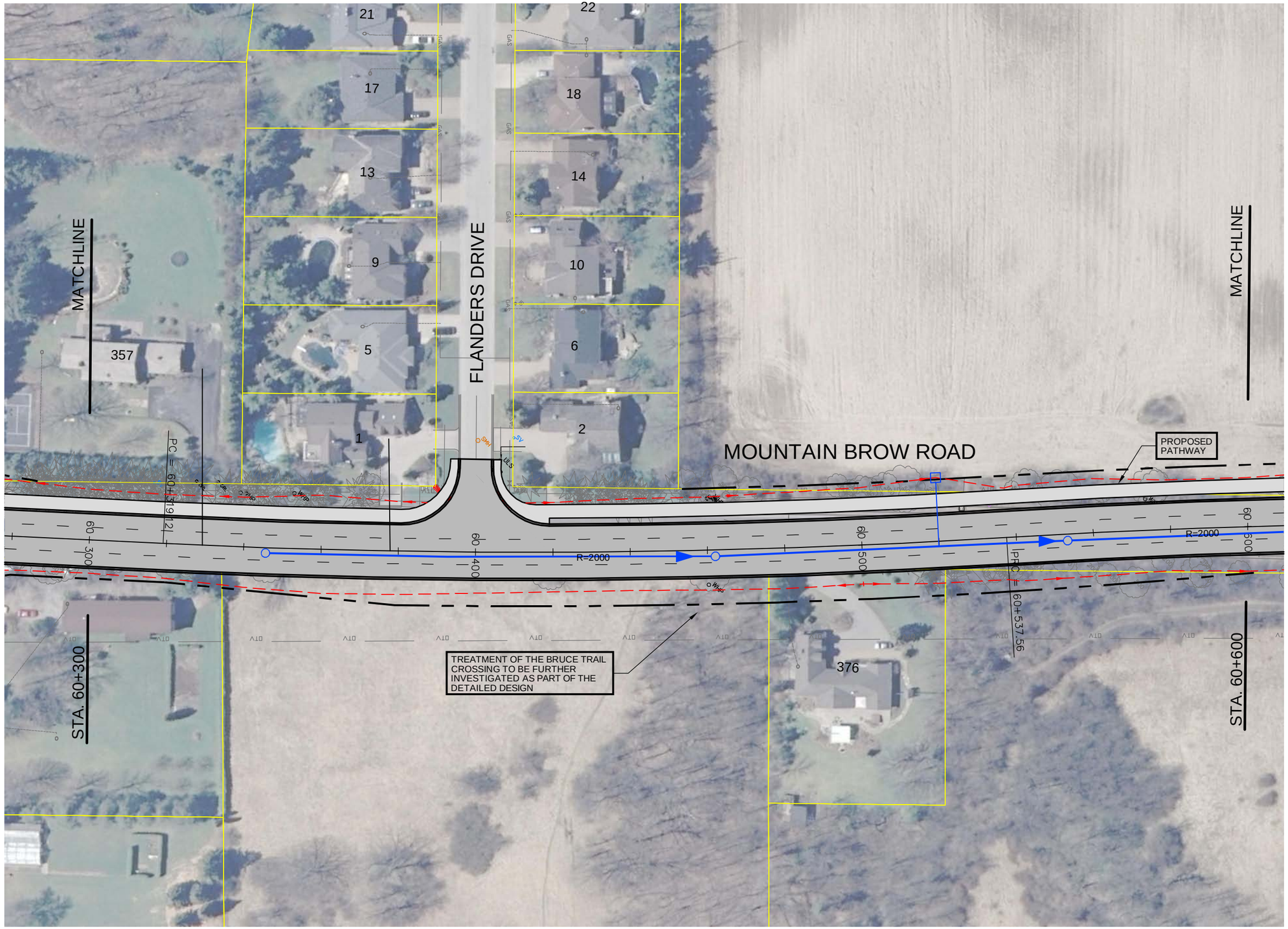
STA. 59+976.30 to STA. 60+300

DILLON CONSULTING

WATERDOWN ROAD
CLASS ENVIRONMENTAL ASSESSMENT

CHECKED BY: ---	
DESIGN BY: ---	
DRAWN BY: ---	
SCALE: 1:500	MOUNTAIN BROW-PLATE 1
DATE: JUNE 25,2008	
PROJECT No. 08-8020	

Plotted: Jul 31, 2009 - 11:13am File: G:\CAD\08\8020 Waterdown E-W Roads\LDD Waterdown\Dwg\08020-waterdown-Plan-1-500-Opt-10.dwg Layout: Final Waterdown-PlanProfile



LEGEND

- PROPOSED ROW
- PROPOSED GRADING LIMIT
- 750 Ø PROPOSED STORM SEWER
- PROPOSED MANHOLE
- PROPOSED DITCH INLET
- PROPOSED CULVERT
- PROPOSED CURB & GUTTER
- NEW ROAD SURFACE
- EXISTING PROPERTY

PRELIMINARY

0 10 20 30 40 50m

Hamilton Public Works

Halton Region

PREFERRED DESIGN CONCEPT

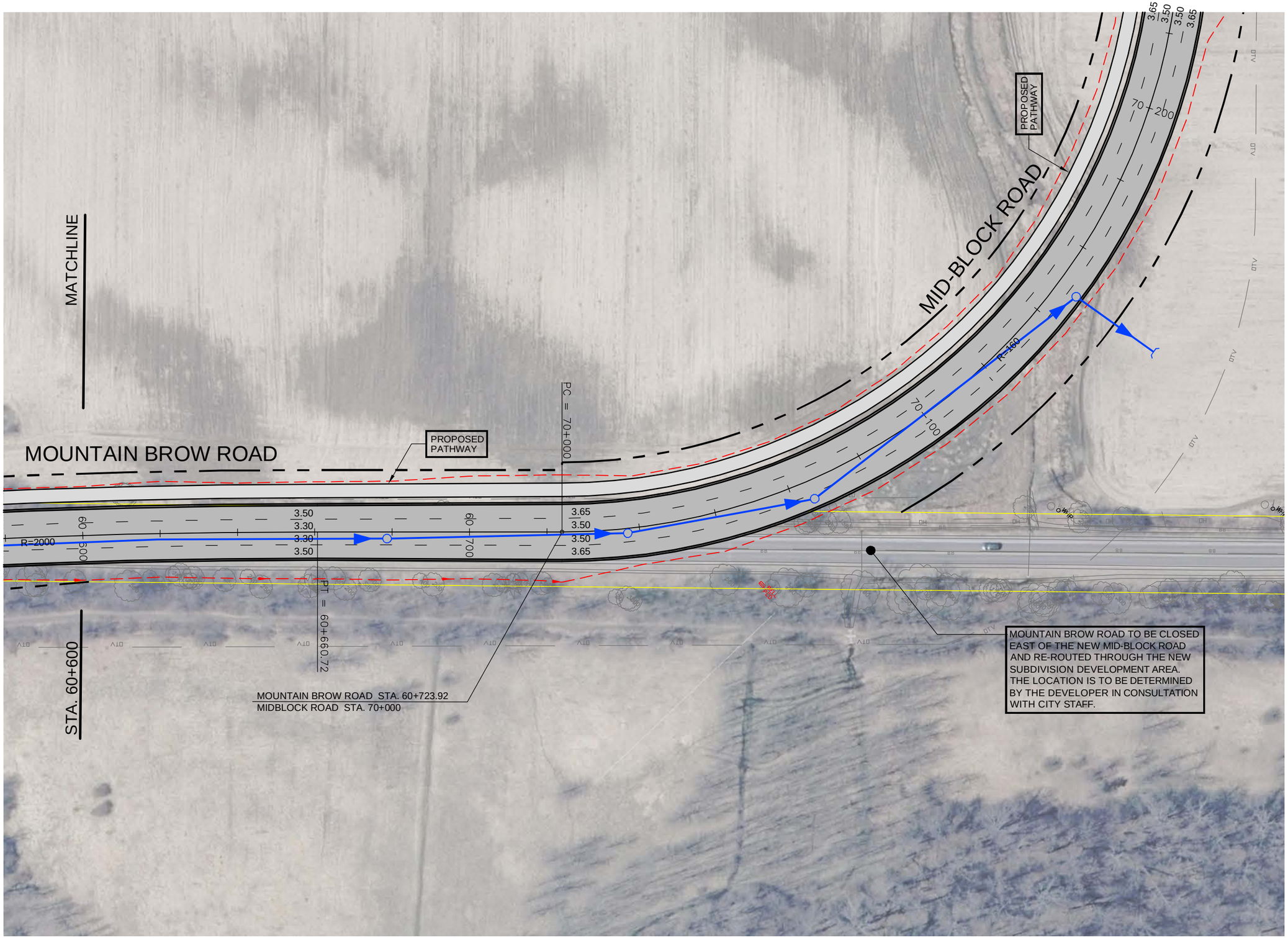
STA. 60+300 to STA. 60+600

DILLON CONSULTING

WATERDOWN ROAD CLASS ENVIRONMENTAL ASSESSMENT

CHECKED BY: --	
DESIGN BY: --	
DRAWN BY: --	
SCALE: 1:500	MOUNTAIN BROW-PLATE 2
DATE: JUNE 25, 2008	
PROJECT No. 08-9020	

Plotted: Aug 05, 2008 - 3:16pm File: G:\CAD\08\9020 Waterdown E-W Roads\LDD Waterdown\Dwg\08%20--waterdown--Plan--1-500--Opt-10.dwg Layout: Final Waterdown--PlanProfile



LEGEND

- PROPOSED ROW
- PROPOSED GRADING LIMIT
- 750 Ø PROPOSED STORM SEWER
- PROPOSED MANHOLE
- PROPOSED DITCH INLET
- PROPOSED CULVERT
- PROPOSED CURB & GUTTER
- NEW ROAD SURFACE
- EXISTING PROPERTY

PRELIMINARY

0 10 20 30 40 50m

Hamilton Public Works

Halton Region

PREFERRED DESIGN CONCEPT

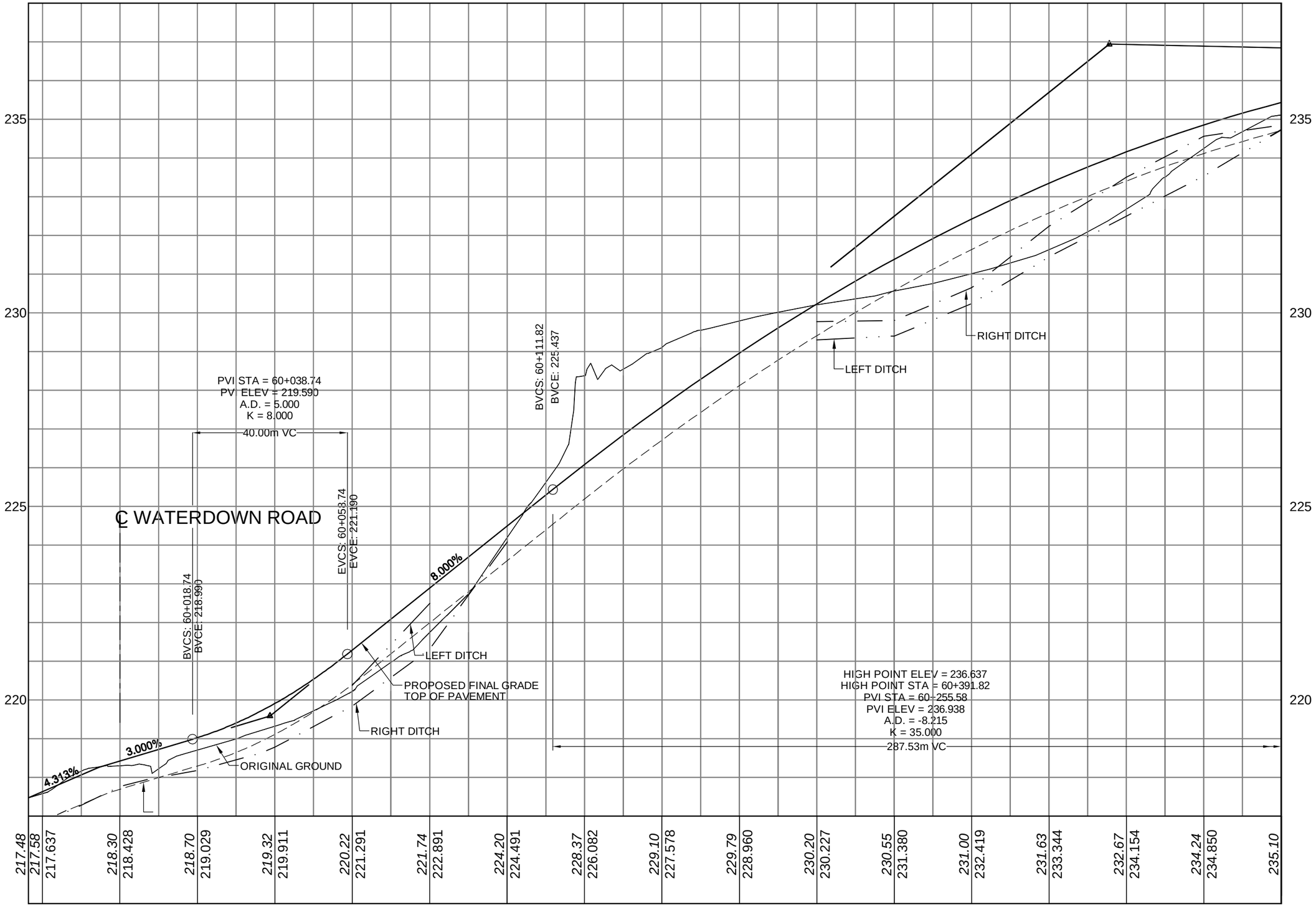
STA. 60+600 to STA. 60+783.91

DILLON CONSULTING

WATERDOWN ROAD CLASS ENVIRONMENTAL ASSESSMENT

CHECKED BY: ---	
DESIGN BY: ---	
DRAWN BY: ---	
SCALE: 1:500	MOUNTAIN BROW-PLATE 3
DATE: JUNE 25, 2008	
REVISED: No. 00 0000	

Plotted: Jul 29, 2009 - 3:26pm File: G:\CAD\089020 Waterdown E-W Roads\LDD Waterdown\dwg\089020--waterdown--Plan--1--500--Opt--10.dwg Layout: Final Waterdown--PlanProfile



PRELIMINARY

0 10 20 30 40 50m
HORIZONTAL
0 1 2 3 4 5m
VERTICAL

Hamilton Public Works

Halton Region

PREFERRED
DESIGN CONCEPT

STA. 59+976.30 to STA. 60+300

DILLON CONSULTING

WATERDOWN ROAD
CLASS ENVIRONMENTAL ASSESSMENT

CHECKED BY: JDM	
DESIGN BY: JDM	
DRAWN BY: GCC	
SCALE: AS SHOWN	
DATE: JUNE 25, 2008	
PROJECT No. 08-8020	

MOUNTAIN BROW-PLATE 4

Plotted: Jul 29, 2009 - 3:39pm File: G:\CAD\08-8020 Waterdown, E+W Roads\LDD Waterdown\dwg\08-8020-waterdown-Plan-1-500-Opt-10.dwg Layout: Final Waterdown-PlanProfile

250
245
240
235
230

287.53m VC

EVCS: 60+399.35
EVCE: 236.628

℄ FLANDERS ROAD

PVI STA = 60+548.03
PVI ELEV = 236.308
A.D. = -2.285
K = 20.000

45.69m VC

50.00m VC

BVCS: 60+525.18
BVCE: 236.358

EVCS: 60+570.87
EVCE: 235.737

BVCS: 60+589.68
BVCE: 235.267

-0.215%

-2.500%

ORIGINAL GROUND

SUBGRADE

LEFT DITCH

LEFT DITCH

PROPOSED FINAL GRADE
TOP OF PAVEMENT

RIGHT DITCH

235.10	235.45	235.60	235.88	236.11	236.22	236.23	236.45	236.57	236.31	236.05	236.25	236.30	236.00	235.51	234.99
235.432	235.900	236.253	236.492	236.617	236.627	236.584	236.541	236.498	236.455	236.412	236.369	236.271	235.979	235.509	235.030

60+300 60+400 60+500 60+600

PRELIMINARY

0 10 20 30 40 50m
HORIZONTAL

0 1 2 3 4 5m
VERTICAL

Hamilton Public Works

Halton Region

PREFERRED
DESIGN CONCEPT

STA. 60+300 to STA. 60+600

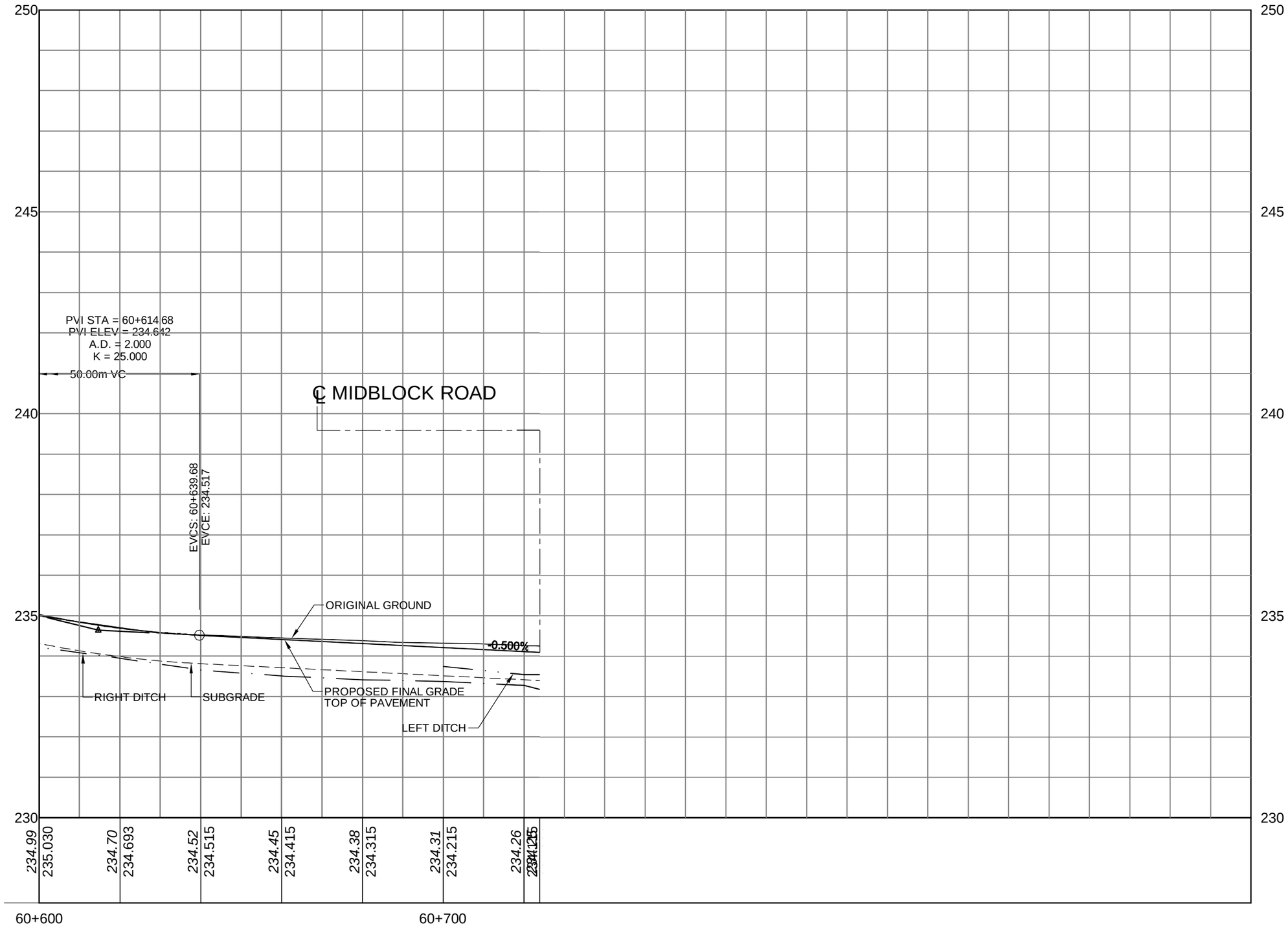
DILLON CONSULTING

WATERDOWN ROAD
CLASS ENVIRONMENTAL ASSESSMENT

CHECKED BY: JDM
DESIGN BY: JDM
DRAWN BY: GCC
SCALE: AS SHOWN
DATE: JUNE 25, 2008
PROJECT No. 08-8020

MOUNTAIN BROW-PLATE 5

Plotted: Jul 29, 2009 – 3:33pm File: C:\CAD\08020 Waterdown E-W Roads\LDD Waterdown\dwg\08020-waterdown-Plan-1-500--Opt--10.dwg Layout: Final Waterdown-PlanProfile



PRELIMINARY

0 10 20 30 40 50m
HORIZONTAL

0 1 2 3 4 5m
VERTICAL

Hamilton Public Works

Halton Region

PREFERRED
DESIGN CONCEPT

STA. 60+600 to STA. 60+783.91

DILLON CONSULTING

CHECKED BY: JDM	
DESIGN BY: JDM	
DRAWN BY: GCC	
SCALE: AS SHOWN	
DATE: JUNE 25, 2008	

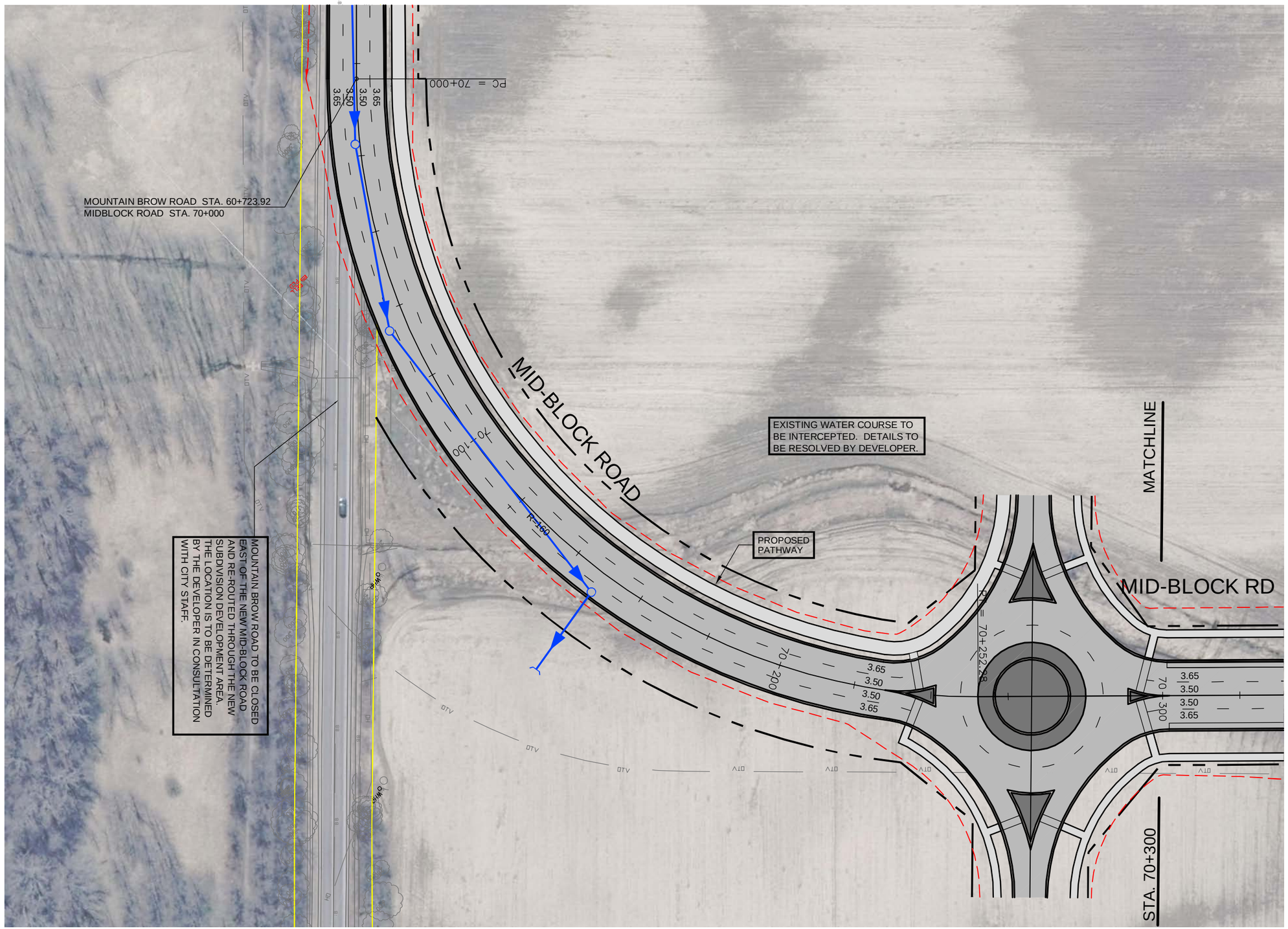
WATERDOWN ROAD
CLASS ENVIRONMENTAL ASSESSMENT

MOUNTAIN BROW-PLATE 6

Plotted: Jul 29, 2009 – 3:36pm File: G:\JOB\089020 Waterdown E-W Roads\LDD Waterdown\dwg\089020-waterdown-Plan-1-500-0pt-10.dwg Layout: Final Waterdown-PlanProfile

MID-BLOCK ROAD

PREFERRED DESIGN CONCEPT
PLANS AND PROFILES



LEGEND

- PROPOSED ROW
- PROPOSED GRADING LIMIT
- 750 Ø PROPOSED STORM SEWER
- PROPOSED MANHOLE
- PROPOSED DITCH INLET
- PROPOSED CULVERT
- PROPOSED CURB & GUTTER
- NEW ROAD SURFACE
- EXISTING PROPERTY

PRELIMINARY

0 10 20 30 40 50m

Hamilton Public Works

Halton Region

PREFERRED DESIGN CONCEPT

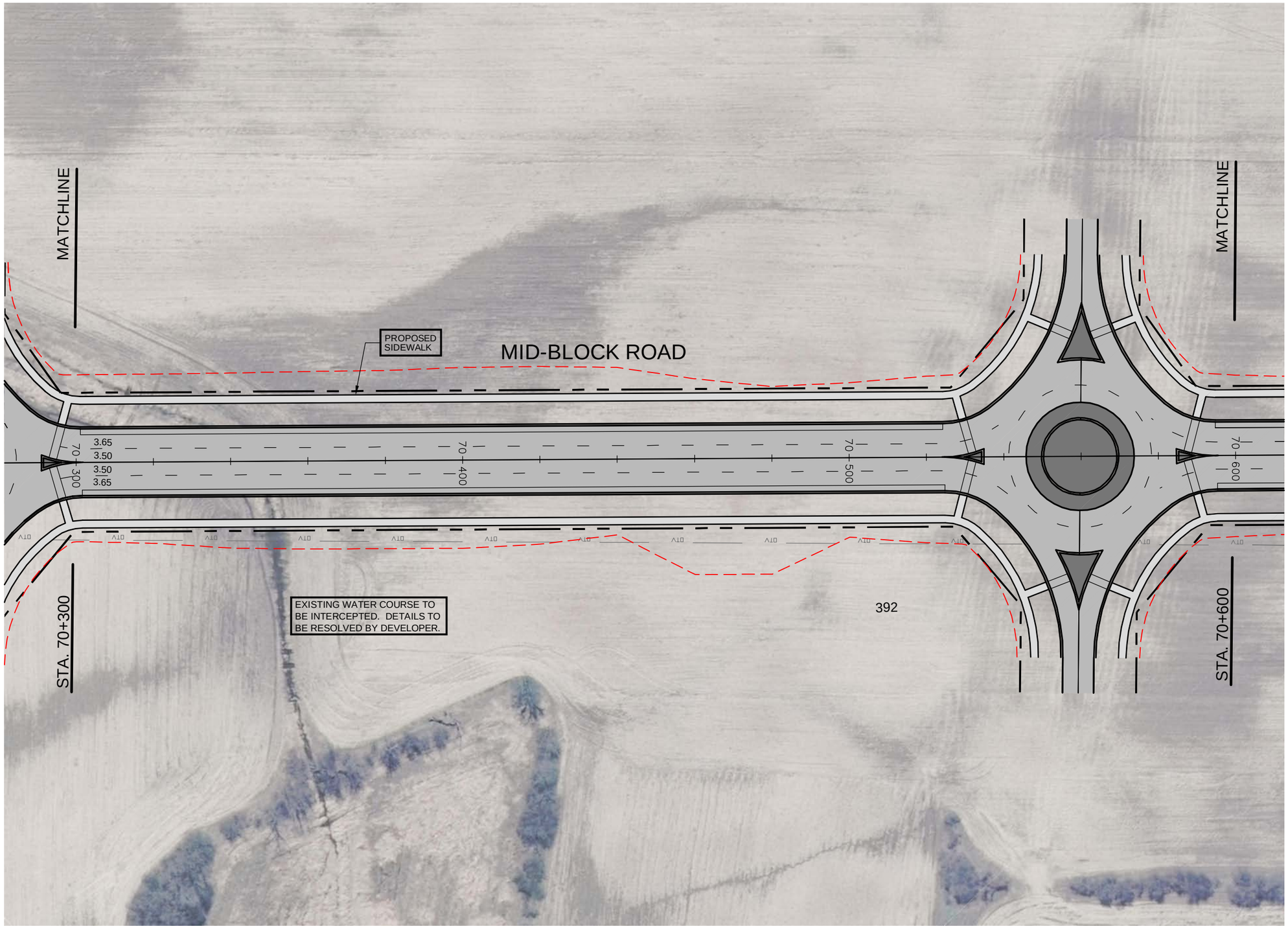
STA. 70+000 to STA. 70+300

DILLON CONSULTING

WATERDOWN ROAD CLASS ENVIRONMENTAL ASSESSMENT

CHECKED BY: —	
DESIGN BY: —	
DRAWN BY: —	
SCALE: 1:500	MID-BLOCK - PLATE 1
DATE: JUNE 25, 2008	
PROJECT No. 08-9020	

Plotted: Aug 04, 2009 - 9:19am File: G:\CAD\08020 Waterdown E-W Roads\LDD Waterdown\Dwg\08020-waterdown-Plan-1-1-500-Opt-10.dwg Layout: Final Waterdown-PlanProfile



LEGEND

- PROPOSED ROW
- PROPOSED GRADING LIMIT
- 750 Ø PROPOSED STORM SEWER
- PROPOSED MANHOLE
- PROPOSED DITCH INLET
- PROPOSED CULVERT
- PROPOSED CURB & GUTTER
- NEW ROAD SURFACE
- EXISTING PROPERTY

PRELIMINARY

0 10 20 30 40 50m

Hamilton Public Works

Halton Region

PREFERRED DESIGN CONCEPT

STA. 70+300 to STA. 70+600

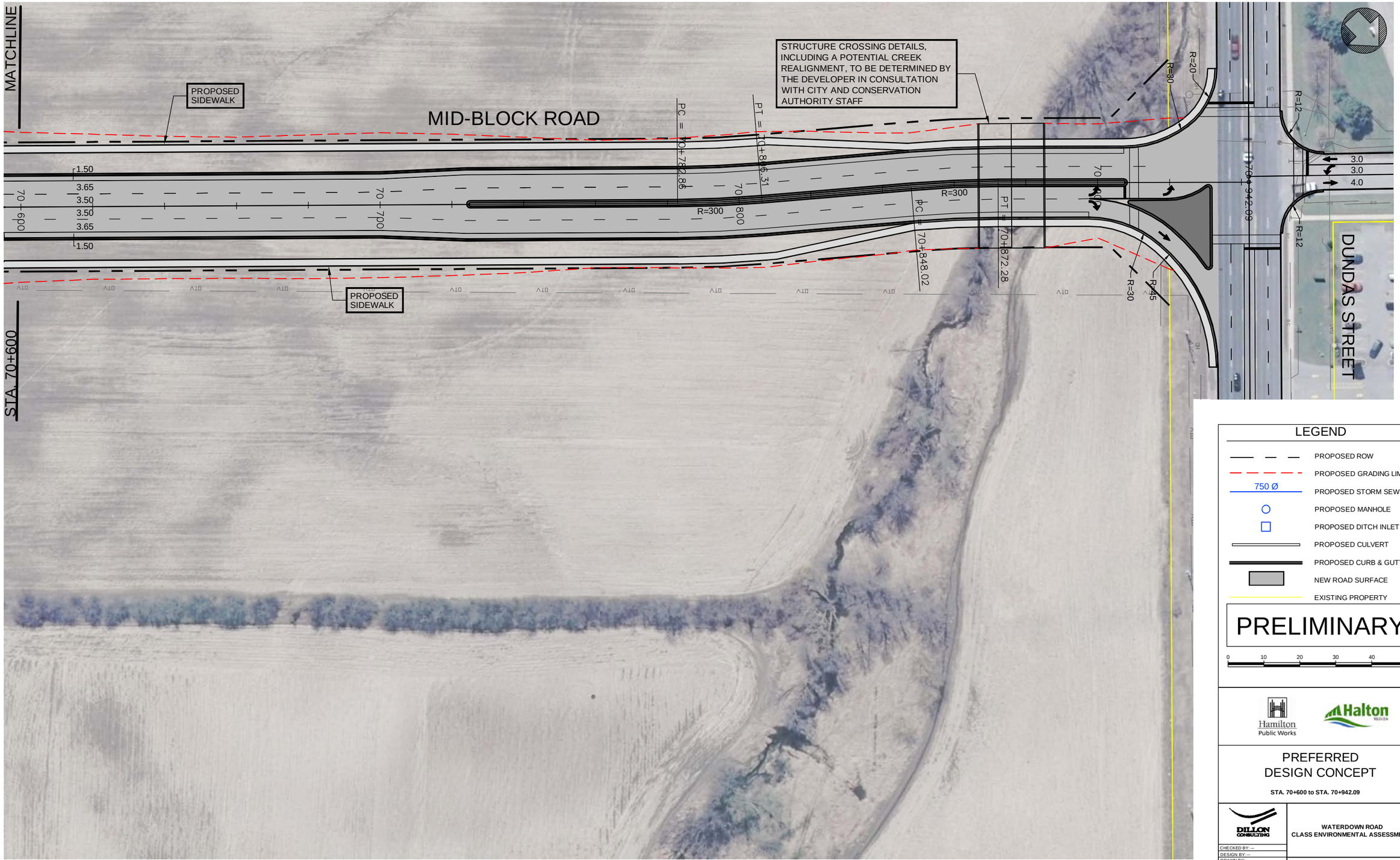
DILLON CONSULTING

CHECKED BY: --	
DESIGN BY: --	
DRAWN BY: --	
SCALE: 1:500	
DATE: JUNE 25, 2008	
PROJECT No. 08-9020	

WATERDOWN ROAD CLASS ENVIRONMENTAL ASSESSMENT

MID-BLOCK - PLATE 2

Plotted: Aug 04, 2009 - 9:22am File: G:\CAD\08\9020 Waterdown E-W Route\LDD Waterdown\Dwg\08902D-waterdown-Plan-1-500-Opt-10.dwg Layout: Final Waterdown-PlanProfile



LEGEND

- PROPOSED ROW
- PROPOSED GRADING LIMIT
- 750 Ø PROPOSED STORM SEWER
- PROPOSED MANHOLE
- PROPOSED DITCH INLET
- PROPOSED CULVERT
- PROPOSED CURB & GUTTER
- NEW ROAD SURFACE
- EXISTING PROPERTY

PRELIMINARY

0 10 20 30 40 50m

Hamilton Public Works

Halton Region

PREFERRED DESIGN CONCEPT

STA. 70+600 to STA. 70+942.09

DILLON CONSULTING

WATERDOWN ROAD CLASS ENVIRONMENTAL ASSESSMENT

CHECKED BY: --	
DESIGN BY: --	
DRAWN BY: --	
SCALE: 1:500	MID-BLOCK - PLATE 3
DATE: JUNE 25, 2008	
PROJECT No. 08-9020	

Plotted: Aug 04, 2008 - 9:24am File: G:\CAD\08-9020 Waterdown E-W Roads\LDD Waterdown\Varq\08-9020-waterdown-Plan-1-500-Opt-10.dwg Layout: Final Waterdown-PlanProfile

℄ MOUNTAIN BROW ROAD

LOW POINT ELEV = 233.648
LOW POINT STA = 70+095.81
PVI STA = 70+127.06
PVI ELEV = 233.460
A.D. = 3.500
K = 25.000
87.50m VC

PVI STA = 70+261.70
PVI ELEV = 237.500
A.D. = -2.500
K = 36.000
90.00m VC

BVCS: 70+083.31
BVCE: 233.679

EVCS: 70+170.81
EVCE: 234.773

BVCS: 70+216.70
BVCE: 236.150

ORIGINAL GROUND

PROPOSED FINAL GRADE
TOP OF PAVEMENT

-0.500%

3.000%

SUBGRADE

250
245
240
235
230

234.25	233.57	234.20	234.02	233.71	233.81	233.84	233.87	234.07	234.53	235.21	235.75	236.23	236.51	235.87	235.32
234.096	233.996	233.896	233.796	233.696	233.651	233.765	234.039	234.472	235.049	235.649	236.247	236.773	237.188	237.492	

70+000 70+100 70+200 70+300

PRELIMINARY

0 10 20 30 40 50m
HORIZONTAL

0 1 2 3 4 5m
VERTICAL

Hamilton Public Works

Halton Region

PREFERRED
DESIGN CONCEPT

STA. 70+000 to STA. 70+300

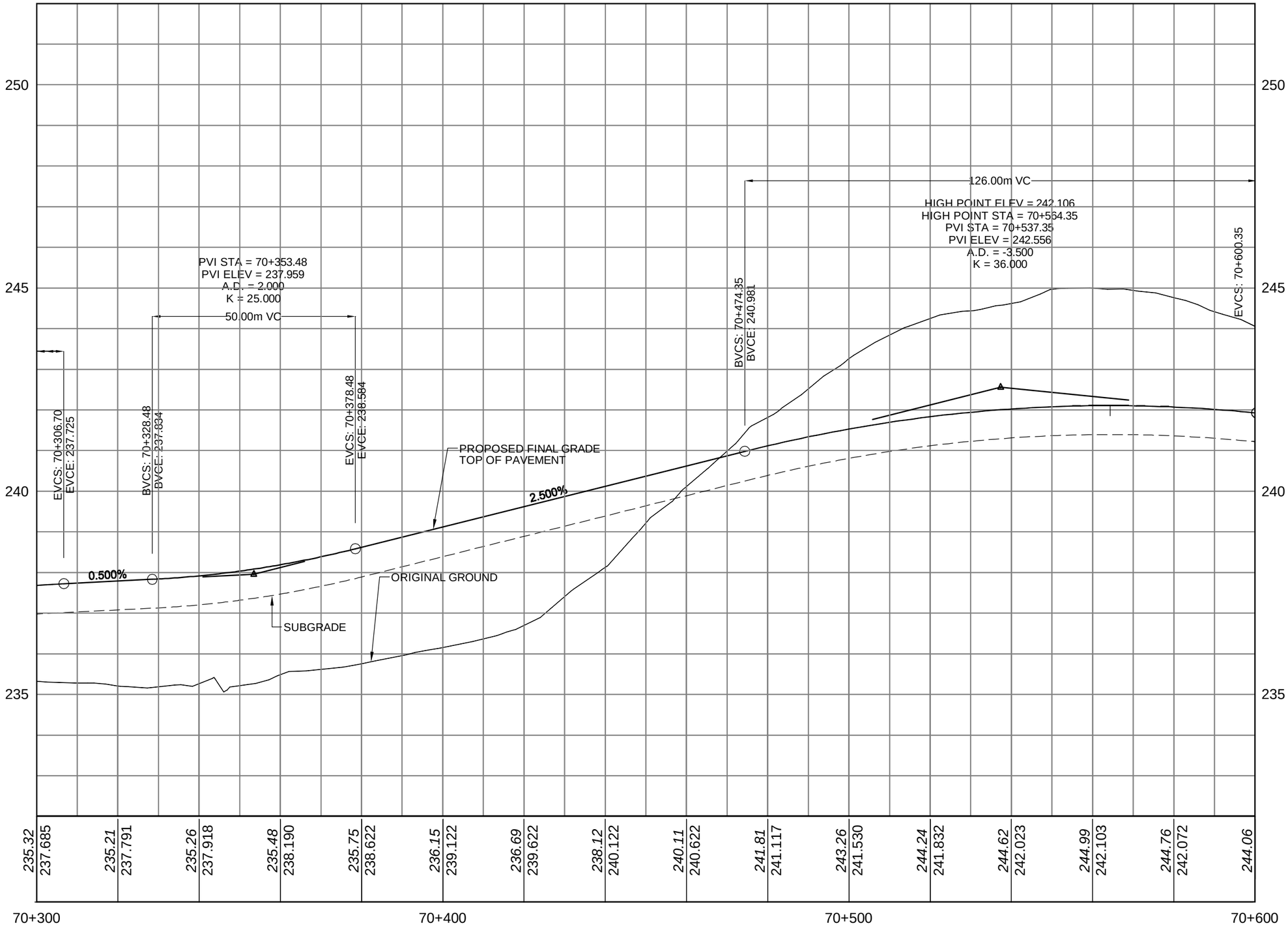
DILLON CONSULTING

WATERDOWN ROAD
CLASS ENVIRONMENTAL ASSESSMENT

CHECKED BY: JDM
DESIGN BY: JDM
DRAWN BY: GCC
SCALE: AS SHOWN
DATE: JUNE 25, 2008

MID-BLOCK - PLATE 4

Plotted: Jul 29, 2009 - 4:29pm File: G:\JOB\08920 Waterdown E-W Road\LDD Waterdown\dwg\08920--waterdown--Plan+1-500--Opt--10.dwg Layout: Final Waterdown--PlanProfile



PRELIMINARY

0 10 20 30 40 50m
HORIZONTAL

0 1 2 3 4 5m
VERTICAL

Hamilton Public Works

Halton Region

PREFERRED DESIGN CONCEPT

STA. 70+300 to STA. 70+600

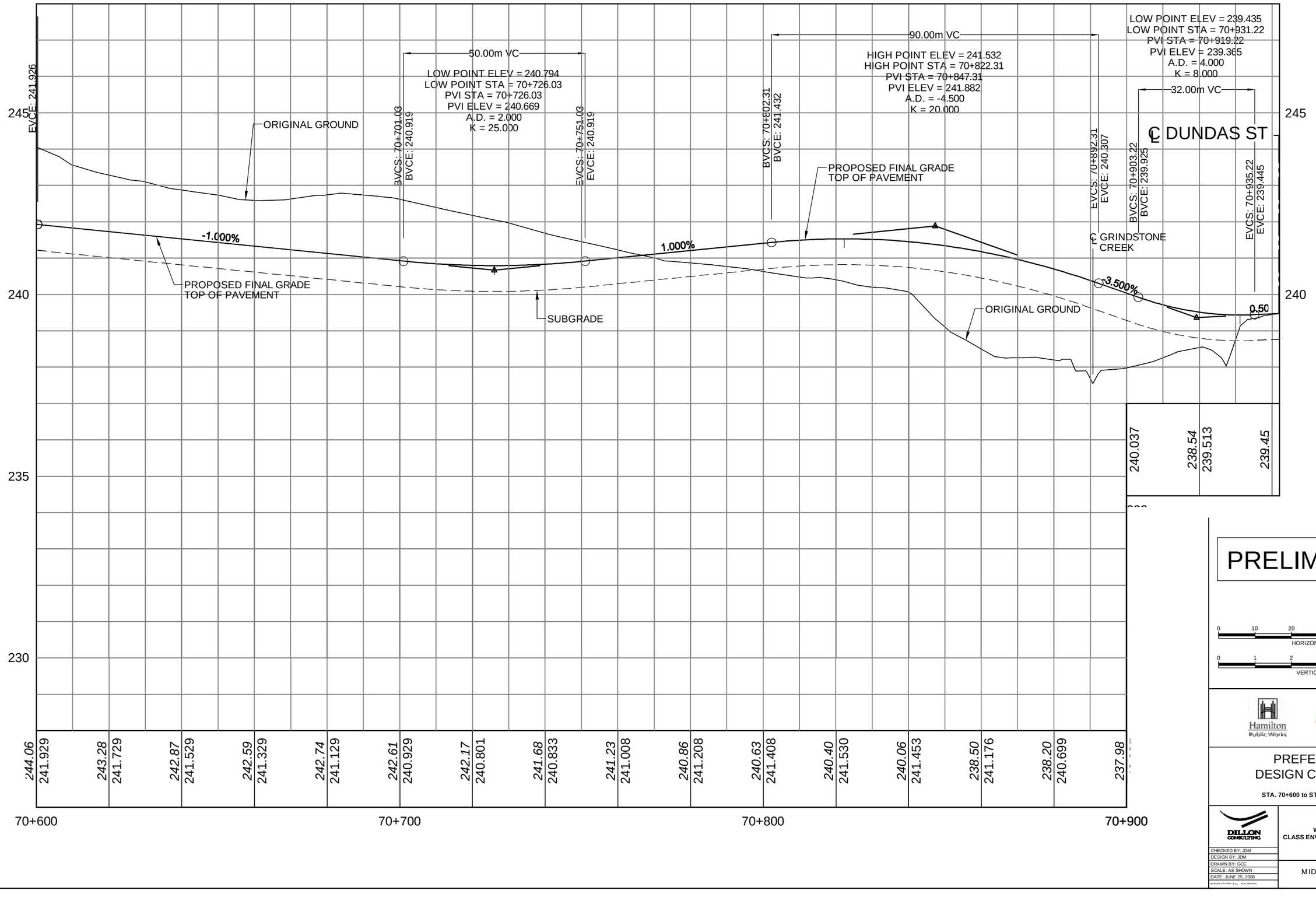
DILLON CONSULTING

CHECKED BY: JDM	
DESIGN BY: JDM	
DRAWN BY: GCC	
SCALE: AS SHOWN	
DATE: JUNE 25, 2008	

WATERDOWN ROAD
CLASS ENVIRONMENTAL ASSESSMENT

MID-BLOCK - PLATE 5

Plotted: Jul 29, 2009 - 4:25pm File: G:\CAD\089020 Waterdown E-W Roads\LDD Waterdown\Jim\089020--waterdown-Pcon-1-500-Opt-10.dwg Layout: Final Waterdown--PlanProfile



PRELIMINARY

0 10 20 30 40 50m
HORIZONTAL

0 1 2 3 4 5m
VERTICAL

Hamilton Public Works

Halton Region

PREFERRED
DESIGN CONCEPT

STA. 70+600 to STA. 70+942.09

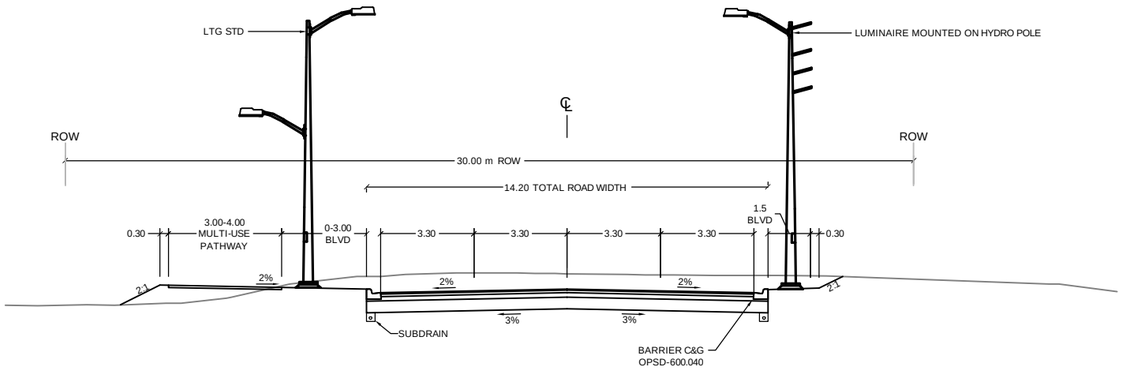
DILLON CONSULTING

WATERDOWN ROAD
CLASS ENVIRONMENTAL ASSESSMENT

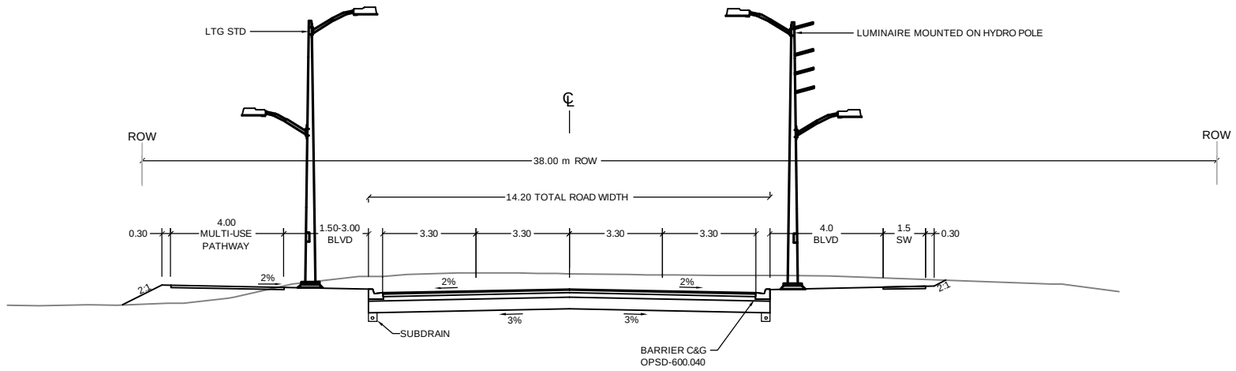
CHECKED BY: JDM
DESIGN BY: JDM
DRAWN BY: GCC
SCALE: AS SHOWN
DATE: JUNE 25, 2008

MID-BLOCK - PLATE 6

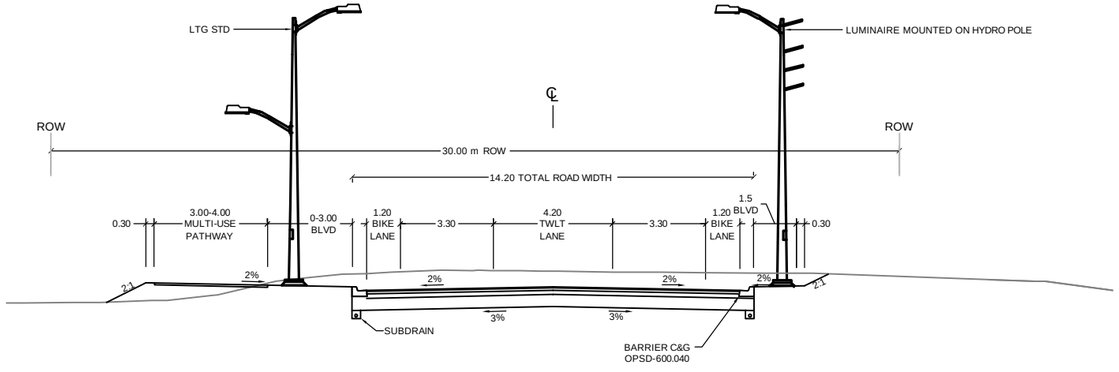
Plotted: Jul 29, 2009 – 4:29pm File: G:\CAD\089020 Waterdown E-W Roads\LDD_Waterdown\dwg\089020--waterdown--Plan-1--500--Opt--10.dwg Layout: Final Waterdown--PlanProfile



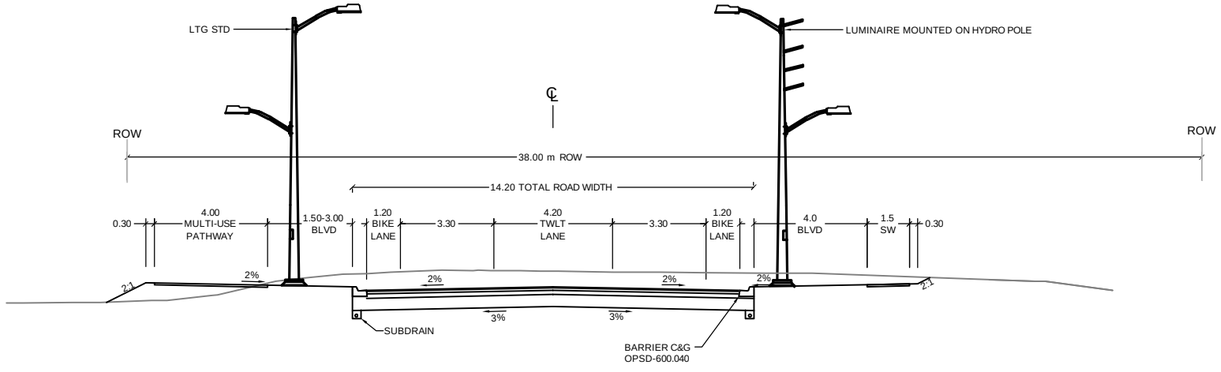
ULTIMATE 4–LANE CROSS SECTION



ULTIMATE 4–LANE CROSS SECTION AT EAGLE HEIGHTS



INTERIM 3–LANE OPTION ON 4–LANE PLATFORM



INTERIM 3–LANE OPTION ON 4–LANE PLATFORM AT EAGLE HEIGHTS

PRELIMINARY

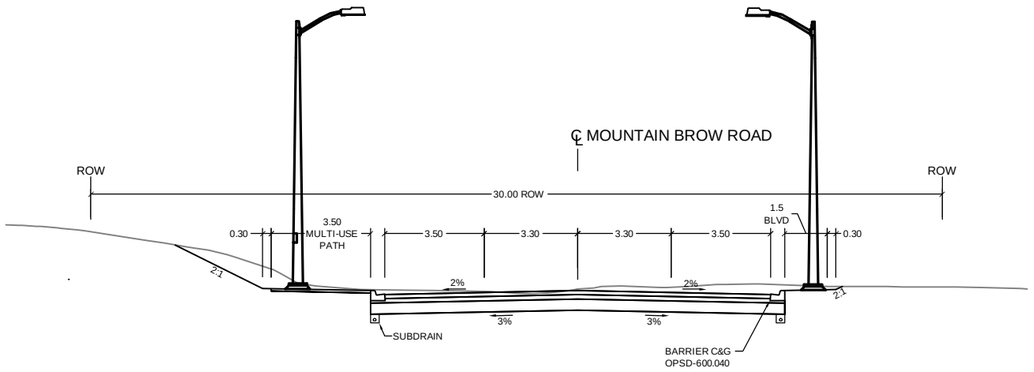
Hamilton Public Works | City of Burlington | Halton Region

PREFERRED DESIGN TYPICALS

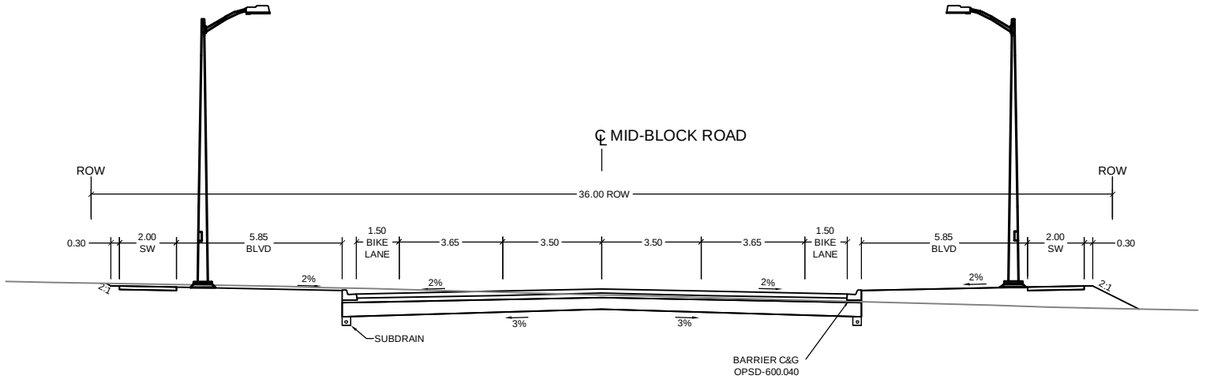
DILLON CONSULTING

WATERDOWN ROAD
CLASS ENVIRONMENTAL ASSESSMENT

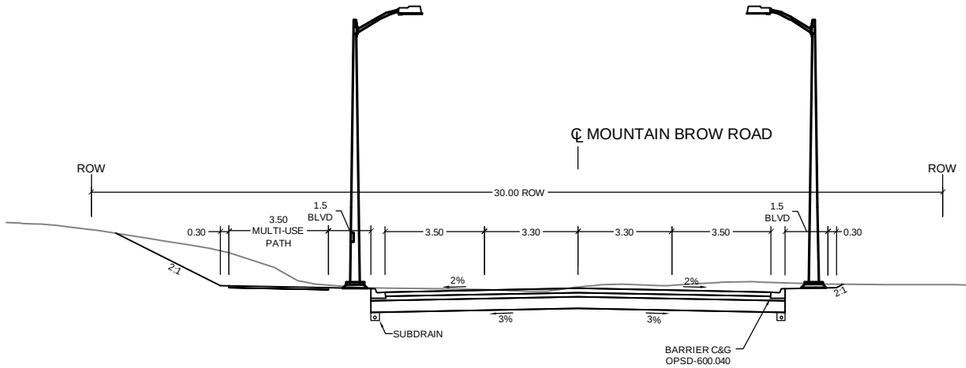
CHECKED BY: PAM	
DESIGN BY: JDM	
DRAWN BY: JDM / GCC	
SCALE: AS SHOWN	WATERDOWN ROAD TYPICAL SECTIONS - 1
DATE: OCTOBER 2008	
PROJECT No. 08-9020	



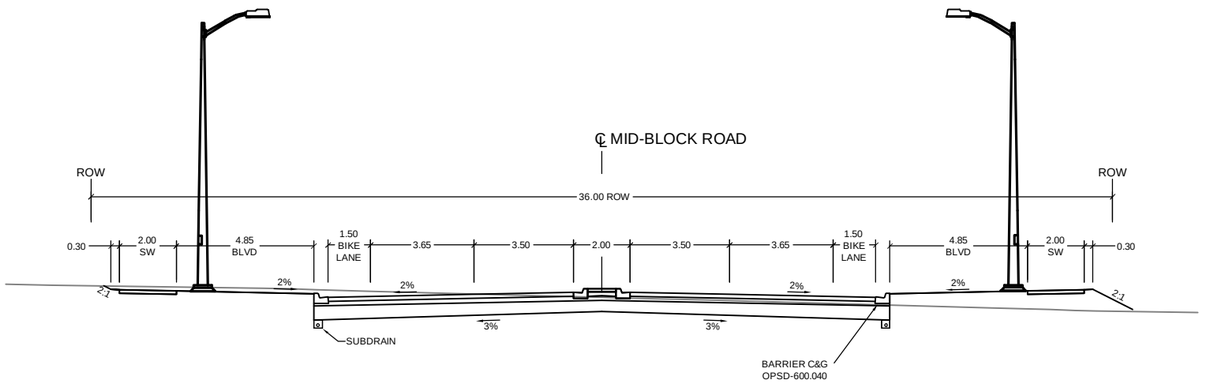
TYPICAL MOUNTAIN BROW ROAD URBAN SECTION
FROM WATERDOWN ROAD TO FLANDERS DRIVE



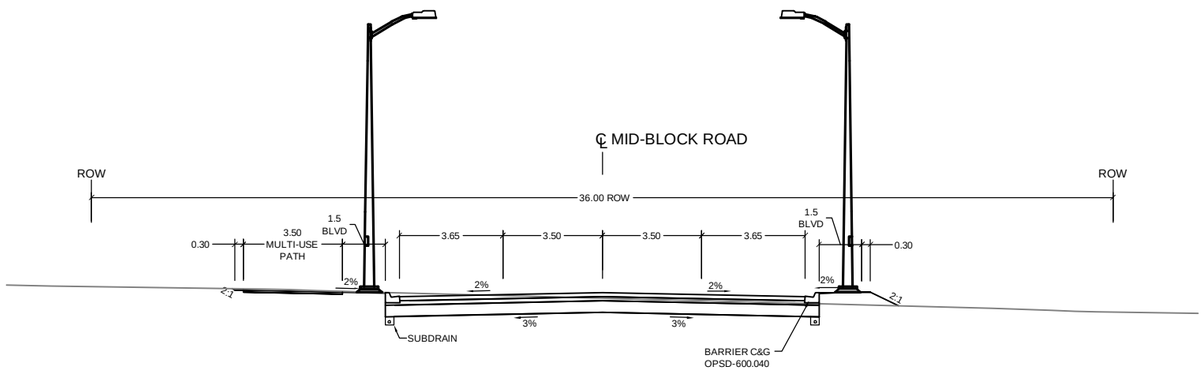
TYPICAL MID-BLOCK ROAD URBAN SECTION
FROM FIRST ROUNDABOUT TO NORTH OF SECOND ROUNDABOUT



TYPICAL MOUNTAIN BROW ROAD URBAN SECTION
FROM FLANDERS DRIVE TO MID-BLOCK ROAD



TYPICAL MID-BLOCK ROAD URBAN SECTION
FROM NORTH OF SECOND ROUNDABOUT TO DUNDAS STREET



TYPICAL MID-BLOCK ROAD URBAN SECTION
FROM MOUNTAIN BROW ROAD TO FIRST ROUNDABOUT

PRELIMINARY

Hamilton Public Works

Halton Region

PREFERRED DESIGN TYPICALS

DILLON CONSULTING

WATERDOWN ROAD
CLASS ENVIRONMENTAL ASSESSMENT

CHECKED BY: PAM
DESIGN BY: JDM
DRAWN BY: JDM / AMS
SCALE: AS SHOWN
DATE: OCTOBER 2008

MOUNTAIN BROW ROAD
& MID-BLOCK ROAD
TYPICAL SECTIONS - 2