Prepared for:

City of Hamilton

REPORT PREPARED FOR:

HIGHWAY 5 – GRINDSTONE CREEK BRIDGE UTILIITY RELOCATION CLASS ENVIRONMENTAL ASSESSMENT AND CONCEPTUAL DESIGN

A draft report submitted by:

Aquafor Beech Ltd.

October 6th,2016

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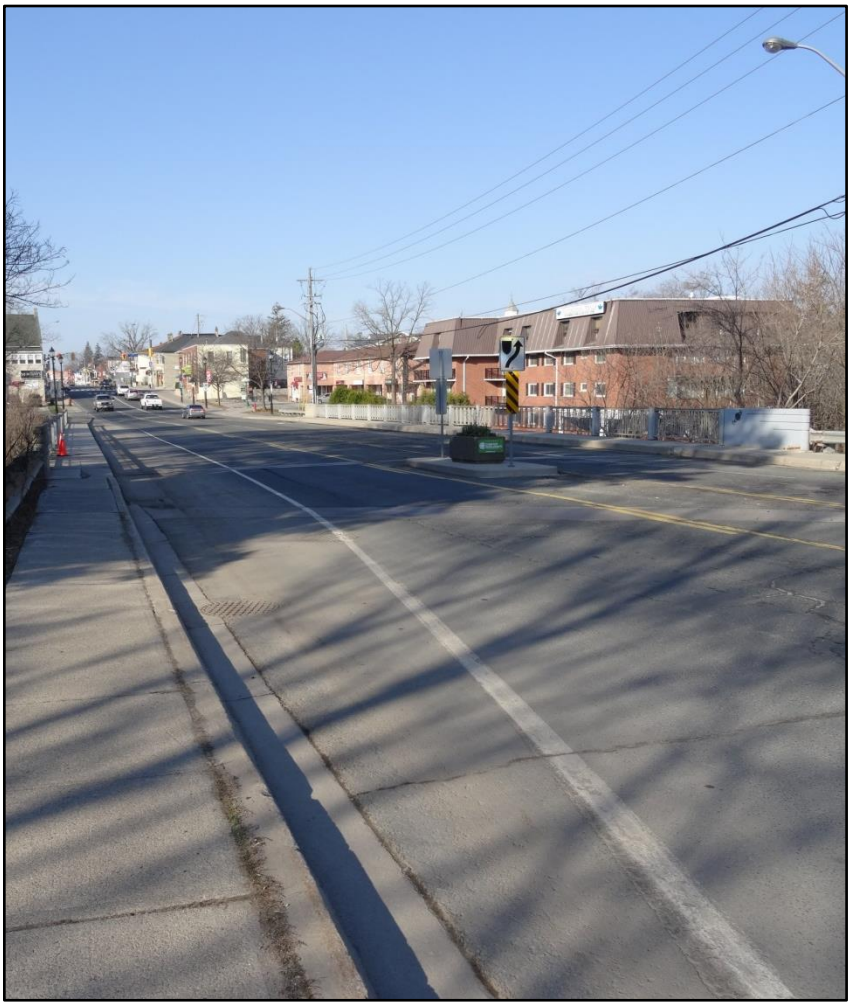


EXECUTIVE SUMMARY

INTRODUCTION

Aquafor Beech Limited has been retained by the City of Hamilton to undertake a Class Environmental Assessment (EA) for the Highway 5 Grindstone Creek Bridge Utility Relocation Study.

The Highway 5 Grindstone Creek Bridge in Waterdown, Hamilton (see **Figure ES-1**) was constructed in 1966 and is now reaching the end of its lifespan. The bridge is slated to be reconstructed or rehabilitated within the next 10 years. The existing bridge conveys a considerable amount of traffic and is an integral part of the local Waterdown transportation system. In an effort to reduce closure times of Highway 5 and thereby reduce inconvenience to local residents and businesses the City has initiated this study to look at the feasibility of relocating existing utilities which are part of the existing bridge prior to rehabilitation or reconstruction of the existing bridge.

STUDY PURPOSE

The study purpose has been defined as follows:

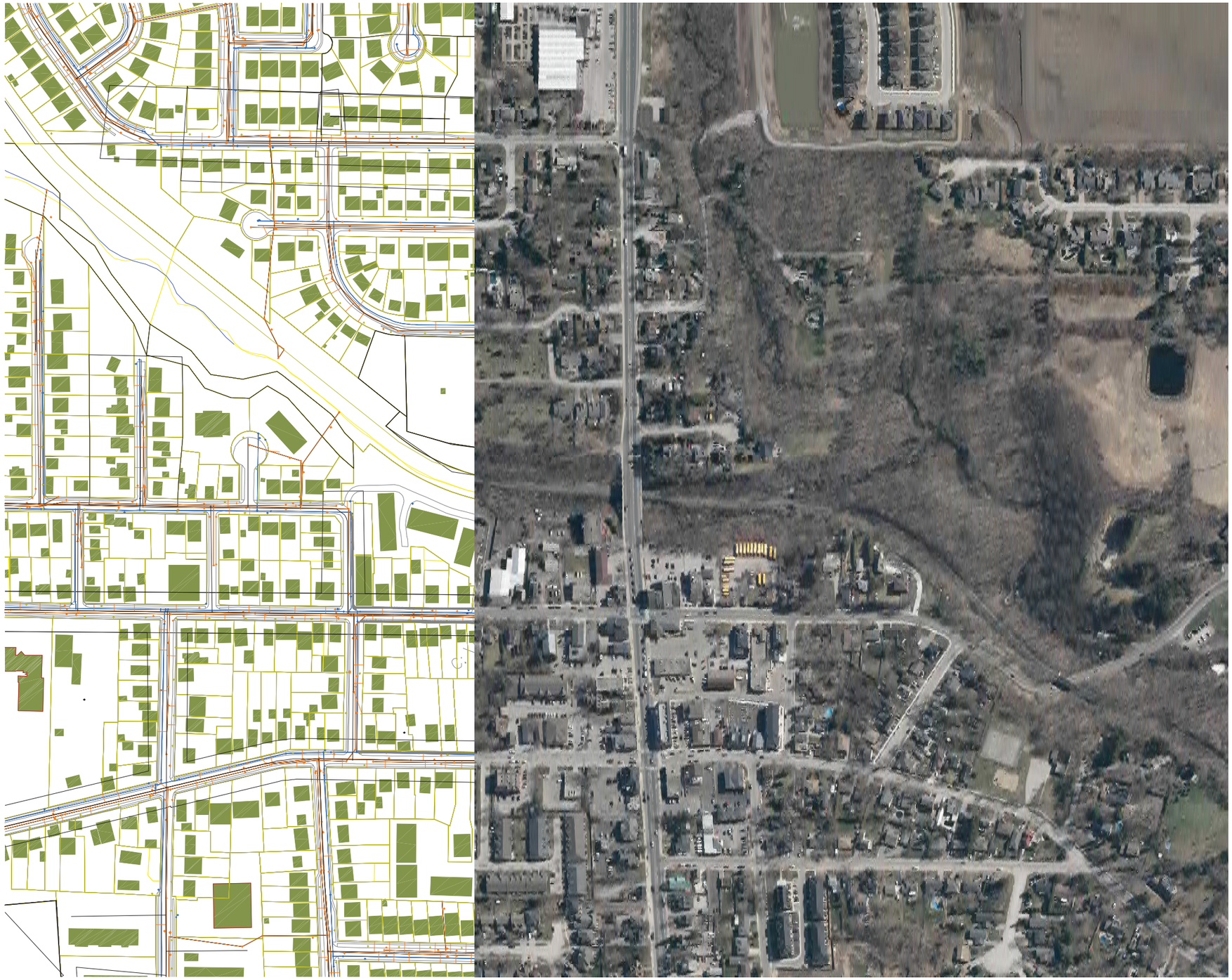
> To identify and evaluate the alternative solutions to permit the replacement and potential relocation of existing utilities (water, wastewater, hydro, telecommunications utilities, etc.) as part of future bridge rehabilitation works.

MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT (EA) PROCESS

The current study has been classified by the City as a Schedule óBô project and follows Phases 1 and 2 of the planning and design process with Phase 5 to follow at a subsequent stage. This report outlines Phases 1 and 2 of the EA process.

PHASE 1 ï PROBLEM AND OPPORTUNITY DEFINITION

Constructed in 1966, the Highway 5 Grindstone Creek bridge, which is located in Waterdown, is reaching the end of its lifespan. The City of Hamilton will initiate reconstruction or rehabilitation of the bridge within 10 years. Prior to the commencement of work, this Class EA will identify and evaluate the alternative solutions to permit the replacement and/or potential relocation of existing utilities (water, wastewater, hydro, telephone, gas etc.) as part of the future bridge rehabilitation works.



Completing these options will require making potential arrangements including consultation with approval agencies, potential construction of a utility bridge as well as land purchasing, prior to the formal rehabilitation or replacement of the existing Highway 5 bridge.

PHASE 2 - EVALUATION OF ALTERNATIVE SOLUTIONS

Definition of Existing Conditions

A variety of information was collected and reviewed in order to define existing conditions. In addition to collecting and reviewing existing information, fieldwork was undertaken in order to better define existing conditions.

A summary of the existing conditions is provided below.

Natural Environment

The study area is located in the Niagara Escarpment physiographic region of southern Ontario. The bridge is located over Grindstone Creek as well as a Canadian Pacific rail line.

An Ecological Characterization & Natural Heritage Assessment was completed by Dougan & Associates in 2015.

All vegetation community types found on the site are considered to be relatively common within the Southern Ontario landscape except for an area which includes the watercourse at the base and the valley slope up to a commercial parking lot. This area is classified as Fresh - Moist Black Walnut Lowland Deciduous Forest.

Eleven (11) species of birds were detected during the breeding bird surveys, with 7 species recorded on May 26 and 9 on June 5. Of the 11 species observed, 9 of them were likely breeding on-site or in the local area, with 2 of them ï Canada Goose and American Crow ï noted flying or foraging over the site only.

No amphibian breeding habitat is present within the study area. The reptile active hand searches detected the presence of two herpetofaunal species; Eastern Red-backed Salamander (Plethodon cinereus) and Eastern Gartersnake (Thamnophis sirtalis sirtalis). Both are considered to be locally abundant in Hamilton (Lamond & Duncan, 2003) and neither are listed as a federal or provincial Species at Risk (COSEWIC, 2015; OMNRF, 2015).

No rare or critical aquatic habitats were identified at the bridge location. Overall, the low habitat diversity, but high amount of instream cover, supports a low to medium diversity fish community of at least 7 species in the general vicinity of the bridge.

A Stage 1 archaeological assessment was undertaken by Historic Horizons Inc. in 2015. The Stage 1 report describes the study area as being within the historic urban core of the Town of Waterdown, on parts of Lots 6 & 7, Concession 3, East Flamborough Twp. Initially an agricultural settlement, urbanization began quickly in the early 19th Century, as Grindstone Creek was utilized to power a number of early mills and industries. A number of 19th century buildings remain in the study area, and a portion of the community of Waterdown, west of the creek, has been incorporated into a Heritage Conservation District. Archaeological potential in the area is related to its proximity to Grindstone Creek and the Niagara Escarpment, and its location in an early industrial settlement along an early roadway.

The Stage 1 report makes the following recommendation.

1) The study area is deemed to have intermittent archaeological potential in part of the creek ravine, around remaining 19th century buildings and under older parking areas. A Stage 2 archaeological assessment is recommended for these portions of the study area prior to any subsurface impacts.

Socio-Economic Environment

The area surrounding the existing Grindstone Creek crossing is predominately a mix of residential and commercial properties. To the northeast of the study area, residential development is the most common land use. To the southwest, the intersection of Mill St. South and Dundas Street East form the eastern boundary of the commercial hub for the community of Waterdown. This is also the boundary of the Waterdown Business Improvement Area.

Dundas Street East is a major East-West thoroughfare in this area of Hamilton. An active railway line (Canadian Pacific) runs along the Grindstone Creek valley system through the community of Waterdown. As noted previously, this rail line passes under the existing crossing.
The bridge also falls within the Niagara Escarpment Planning Area, which is under the jurisdiction of the Niagara Escarpment Commission (NEC).

Technical Environment

Figure ES-2 illustrates the existing utilities that are attached to the bridge or are in the vicinity of the existing bridge. As can be seen from the figure, there are a significant number of existing utilities either attached to, or adjacent to, the bridge. In summary the following utilities would need to be addressed as part of a relocation project.

A 500 mm diameter insulated sanitary sewer forcemain (see also **Photo ES.1**);

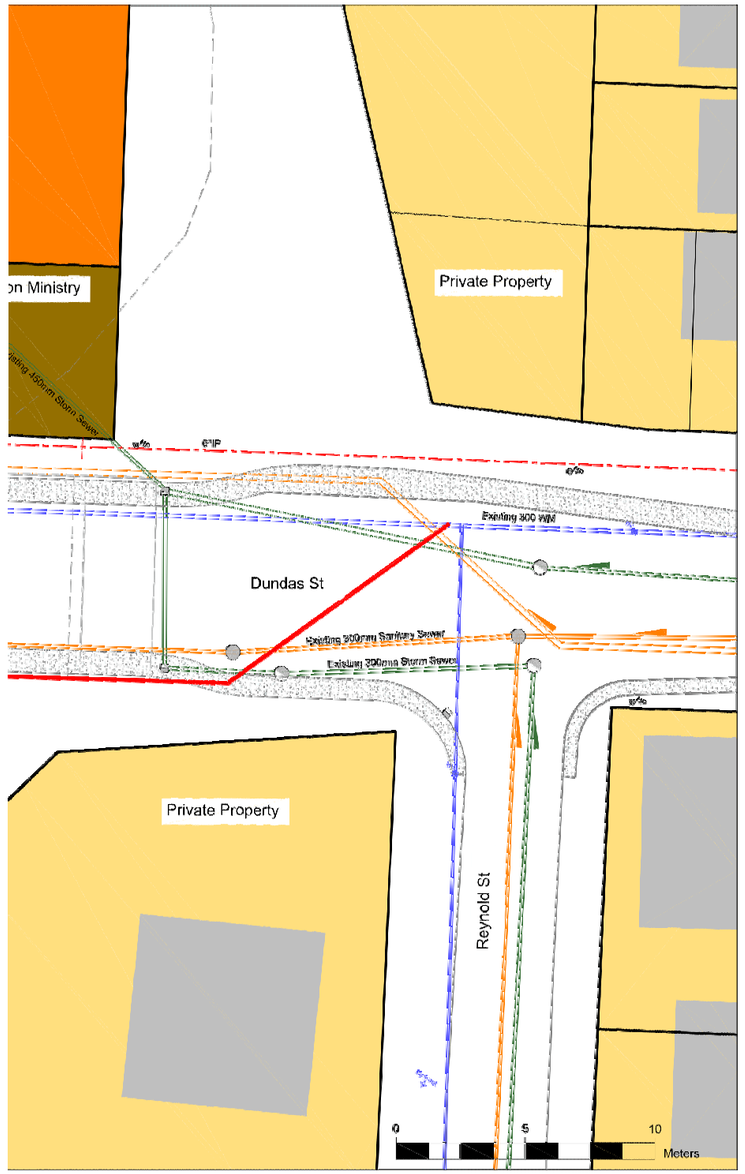


Figure ES-2

Hamilton

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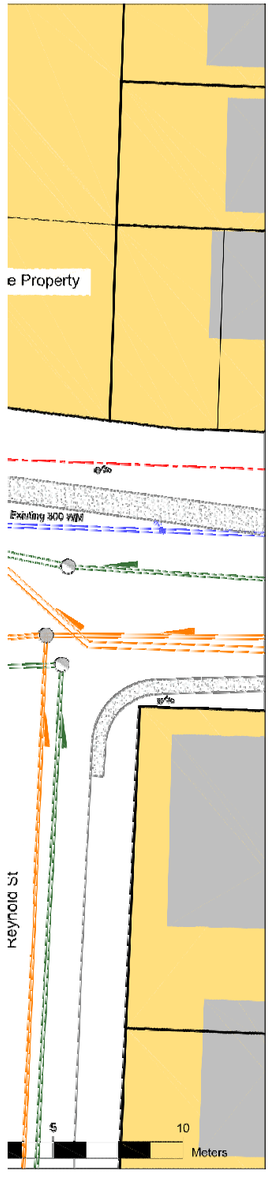

Figure ES-3

Hamilton

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The primary advantages (or opportunities) for this alternative include:

All works (rehabilitation of the existing bridge and relocation of the utilities) will be completed during one period thereby potentially facilitating a streamlined approval process.

The primary disadvantages (or constraints) for this alternative include:

Increased construction time during rehabilitation of the bridge, thereby resulting in significant impact to businesses, residents and commuters;
Long term operation and maintenance of existing utilities (i.e. existing watermain, sanitary sewer) is not optimal due to their respective locations under Grindstone Creek and within the existing bridge; and
A higher capital cost as a result of the lengthened construction process

The estimated capital cost for this alternative is $3.8 million.

It should also be noted that as part of the Environmental Assessment process the Do Nothing alternative is to be carried forward as a benchmark for evaluation purposes. For the purpose of this study Alternative #1 has been defined as the Do Nothing alternative.

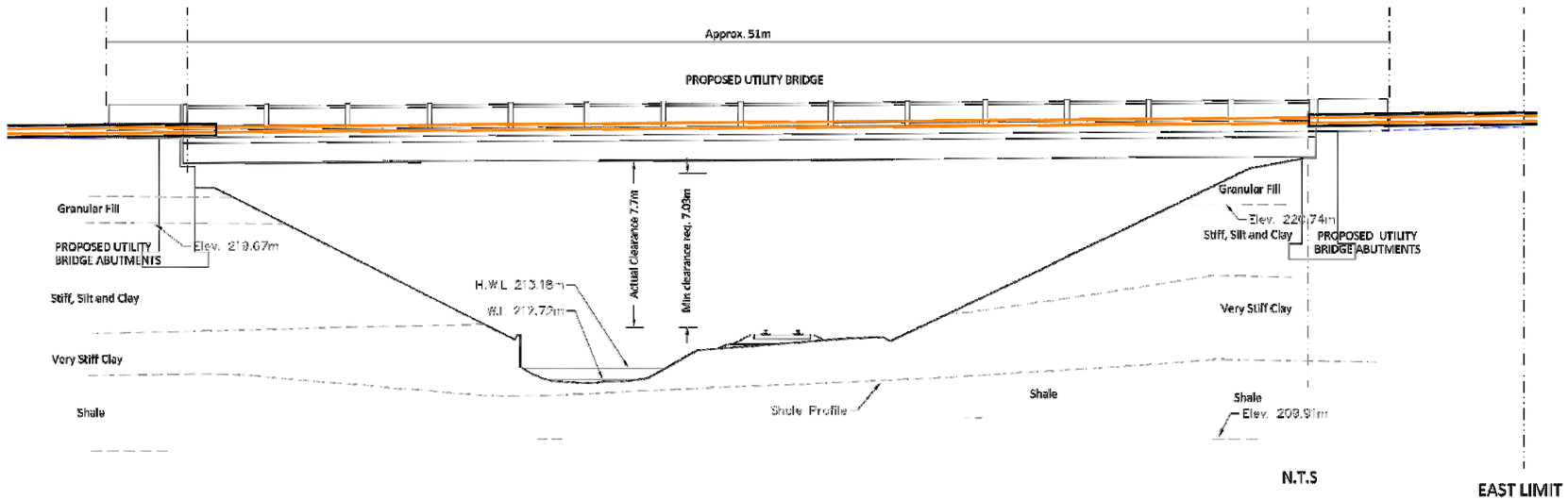
1.2 Alternative #2 ï Relocation of Existing Utilities

For this alternative, all utilities would be located to a separate utility bridge in advance of the bridge rehabilitation. Relocation of the utilities would allow for an expedited rehabilitation of the bridge.

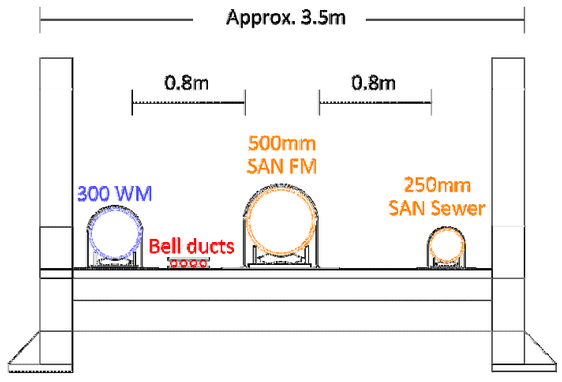
Figure ES-4 illustrates the proposed location and realignment of the existing utilities. All of the existing utilities which include the watermain, sanitary sewers (forcemain and gravity sewer), Bell telecommunications conduits and electrical duct would be located on the bridge. The storm sewer would likely be relocated so as not to be in conflict with the proposed utility bridge. The union gas main would remain as is, under the Grindstone Creek.

The primary advantages (or opportunities) for this alternative include:

Reduced bridge closure time during rehabilitation thereby minimizing impact to businesses, residents and commuters.
Ease of long term operation and maintenance of utilities as they are now easily accessible; and
The lowest capital cost of the three alternatives that are being considered.



ELEVATION



N.T.S

SECTION

ELEVATION

ONE CREEK UTILITY BRIDGE

F HAMILTON

Aquafor Beech Limited

Provision of clear and complete documentation of the planning process followed, to allow ñtraceabilityò of decision-making with respect to the project.

The accompanying flow chart (**Figure 1.2**) illustrates the process followed in the planning and design of projects covered by this Class Environmental Assessment. The five phases, as defined in the flow chart, are summarized in the document as follows:

Phase 1: Identify the problem or deficiency.

Phase 2: Identify alternative solutions to the problem, by taking into consideration the existing environment, and establish the preferred solution taking into account public and agency review and input. At this point, identify approval requirements (e.g., Ontario Water Resources Act, Lakes and Rivers Improvement Act, and Environmental Protection Act) and determine the appropriate schedule for the project and proceed through the appropriate phases (**Figure 1.2**).

Phase 3: Examine alternative methods of implementing the preferred solution, based upon the existing environment, public and government agency input, anticipated environmental effects, and methods of minimizing negative effects and maximizing positive effects.

Phase 4: Document, in an Environmental Study Report, a summary of the rationale and the planning, design, and consultation process of the project as established throughout the above phases, and make such documentation available for scrutiny by review agencies and the public.

Phase 5: Complete contract drawings and documents, and proceed to construction and operation; monitor construction for adherence to environmental provisions and commitments. Where special conditions dictate, also monitor the operation of the completed facilities.

Public and agency consultation is also an important and necessary component of the five phases.

The Municipal Engineers Associationôs Class EA document classifies projects as Schedule A, B or C depending on their level of environmental impact and public concern.

Schedule óAô projects are generally routine maintenance and upgrade projects; they do not have big environmental impacts or need public input. Schedule óAô projects are all so routine that they are generally pre-approved without any further public consultation.

Schedule óBô projects have more environmental impact and do have public implications. Examples would be stormwater ponds, river crossings, expansion of water or sewage plants beyond up to their rated capacity, new or expanded outfalls and intakes, and the like. Schedule óBô projects require completion of Phases 1 and 2 of the Class EA process.

Schedule óCô projects have the most major public and environmental impacts. Examples would be storage tanks and tunnels with disinfection, anything involving chemical treatment, or expansion beyond a water or sewage plantôs rated capacity. Schedule óCô projects require completion of Phases 1 through 4 of the Class EA process, before proceeding to Phase 5 implementation.

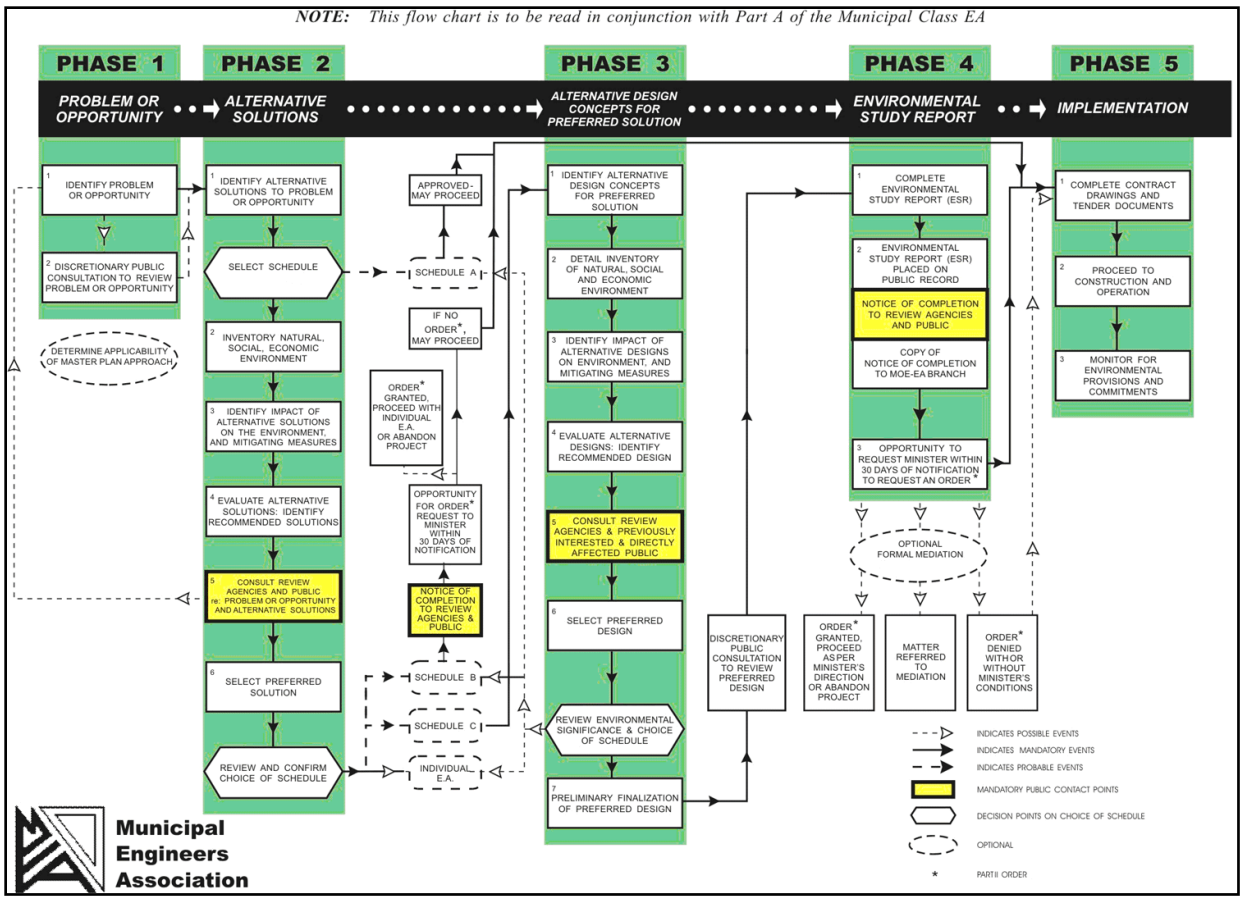


Figure 1.2: Municipal Class Environmental Assessment Planning and Design Process

The current study has been classified by the City as a Schedule B project and follows Phases 1 and 2 of the planning and design process with Phase 5 to follow at a subsequent stage. This report outlines Phases 1 and 2 of the EA process.

1.3 Study Area Characteristics

The primary study area is the Highway 5 Dundas street (Vinegar Hill) bridge spanning Grindstone Creek and the utilities that run beside, beneath, and within the bridge. The ultimate area has been expanded to ensure that all items relating to social, environmental, transportation, economic and other areas such as archaeology are addressed. The general study area is illustrated in **Figure 1.1**.

Land use in the proximity of the bridge includes both local businesses together with single family homes and a senior citizens complex.

The bridge itself is located over Grindstone Creek which forms part of the Conservation Halton watersheds. Furthermore, the bridge is located over a Canadian Pacific railway line.

1.4 Study Purpose and Primary Tasks

The study purpose has been defined as follows:

> To identify and evaluate the alternative solutions to permit the replacement and potential relocation of existing utilities (water, wastewater, hydro, telecommunications utilities, etc.) as part of future bridge rehabilitation works.

The primary tasks which were undertaken as part of this study and the associated chapters in which information is provided are summarized below:

Chapter 1 ï Define the study purpose
Chapter 2 ï Define the problems and opportunities associated with the study
Chapter 3 ï Establish existing environmental and social conditions
Chapter 4 ï Define the condition of the existing bridge
Chapter 5 ï Present and evaluate the alternative solutions
Chapter 6 ï Present and select the preferred alternative
Chapter 7 ï Provide estimated planning level costs
Chapter 8 ï Provide conclusions and recommendations

2 PROBLEM AND OPPORTUNITY IDENTIFICATION

2.1 General

Phase 1 of the municipal Class Environmental Assessment process involves identification of the problem to be resolved together with the opportunities to resolve the problem. Provided below is a summary of the problem(s) and opportunity(ies).

2.2 Identification of Problems and Opportunities

Constructed in 1966, the Highway 5 Grindstone Creek bridge, which is located in Waterdown, is reaching the end of its lifespan. The City of Hamilton will initiate reconstruction or rehabilitation of the bridge within 10 years. Prior to the commencement of work, this Class EA will identify and evaluate the alternative solutions to permit the replacement and/or potential relocation of existing utilities (water, wastewater, hydro, telephone, gas etc.) as part of the future bridge rehabilitation works.

Completing these options will require making potential arrangements including consultation with approval agencies, potential construction of a utility bridge as well as land purchasing, prior to the formal rehabilitation or replacement of the existing Highway 5 bridge.

3 EXISTING CONDITIONS

3.1 Study Area

The existing bridge is located on Highway 5 over Grindstone Creek. Adjacent streets include Reynold Street and William Street to the north as well as Mill Street and Main Street to the south.

3.2 Natural Environment

3.2.1 General

This section will describe the natural environment within and adjacent to the study area. The objective of the following sections is to describe the natural (as well as social and economic) environment from a study area perspective.

3.2.2 Geology, Physiography and Soils

The study area is located in the Niagara Escarpment physiographic region of southern Ontario. The Niagara Escarpment extends from the Niagara River to the northern tip of the Bruce Peninsula, continuing through the Manitoulin Islands (Chapman and Putman 1984: 114-122). Vertical cliffs along the brow outline most of the edge of the dolostone of the Lockport and Amabel Formations, and the slopes below are carved in red shale. Flanked by landscapes of glacial origin, the rock-hewn topography stands in striking contrast, and its steep-sided valleys are strongly suggestive of non-glacial regions. The highest section of the Niagara Escarpment is the Blue Mountain section, which stands over 300 metres above Georgian Bay. In this section the dolostone cap rock is exposed in cliffs 45 metres high, while huge stone blocks that have broke away from the wall have left deep crevasses in the area known as ñthe caves.ò Blue Mountain is located northwest of the study area and ñthe cavesò are located to the north.

Soils within the study area consist of Grimsby sandy loam and Oneida loam as well as stream course, ravine and escarpment (Dept. of Agriculture, 1967). The Grimsby soil series is of alluvial and lacustrine origin. These soils are prone to erosion on moderate to steep slopes. The area immediately west of the bridge crossing is characterized by Grimsby sandy loam. The Oneida soil series consist of well drained clay loam. The area immediately east of the bridge crossing is characterized by Oneida loam.

3.2.3 Terrestrial Communities

An Ecological Characterization & Natural Heritage Assessment was completed by Dougan & Associates in 2015 for the study area. A copy of the report can be found in Appendix B. The information contained in this section is a summary of the 2015 Dougan & Associates Report. For further details, the original report should be used as a comprehensive resource**. Figure 3.1**: illustrates the 120 m radius study area used for the Natural Heritage Assessment.

Figure 3.1: Study Area for the Ecological Characterization & Natural Heritage Assessment was completed by Dougan & Associates in 2015

The Hamilton Nature Counts Natural Areas Inventory (Dwyer, 2003a) provides a site summary for the Grindstone Creek Escarpment Valley (Flam-50); a natural area which begins at Highway 5 East (Mill Street) and extends southward along the steep-sided Grindstone Creek valley corridor. The flora of this area includes Carolinian and southern species. 47 species of local, provincial or national significance were recorded within this area including American Columbo (Frasera caroliniensis) and Red Mulberry (Morus rubra) (Dwyer, 2003a).

Natural Heritage Information Centre (NHIC)

Results of a NHIC query included 29 records in total, including 21 flora species, 4 fauna species and three natural area records. Natural area records for the general area include:

Niagara Escarpment Biosphere Reserve (International Biosphere Reserve)
Lake Meded Valley Wetland Complex (Provincially Significant Wetland)
Grindstone Creek (Earth Science ANSI, Provincial)

Vegetation Communities

Based on Ecological Land Classification (ELC) vegetation communities, the majority of the study area is mapped as anthropogenic, which includes roads, residential lots, commercial buildings and parking lots. All vegetation community types found on the site are considered to be relatively common within the Southern Ontario landscape except for an area which includes the watercourse at the base and the valley slope up to a commercial parking lot. This area is classified as Fresh - Moist Black Walnut Lowland Deciduous Forest.

109 vascular plant species were recorded for the study area. Of these, 102 were identified to species level including 52 (51%) native species and 50 (49%) introduced species. This is a relatively high proportion of introduced species, which may be attributed to the urban setting and high level of human disturbance in and surrounding the study area. No species of global, national or provincial significance were observed. Four species of local significance were recorded.

Breeding Birds

Eleven (11) species of birds were detected during the breeding bird surveys, with 7 species recorded on May 26 and 9 on June 5. Of the 11 species observed, 9 of them were likely breeding on-site or in the local area, with 2 of them ï Canada Goose and American Crow ï noted flying or foraging over the site only. Two (2) of the species potentially breeding on the site are considered non-native (introduced): European Starling and House Sparrow. None of the 11 species are considered Species at Risk (SAR), either federally (Committee on the Status of Endangered Wildlife in Canada (COSEWIC), 2014) or provincially (Ontario Ministry of Natural Resources and Forestry (OMNRF), 2015). At a provincial level, all of the observed native breeding species have been assigned an S-rank of either S4 or S5 by the Natural Heritage Information Centre (NHIC, 2015b), which indicates that their provincial populations are ñapparently secureò or ñsecureò, respectively (NHIC, 2015a). At a local level, all of the potentially breeding species are considered common to abundant and widespread in the City of Hamilton (Curry, 2003). Also, none of the species recorded are considered area sensitive by the Ontario Ministry of Natural Resources and Forestry (OMNR, 2000), indicating that they do not require large areas of suitable habitat for their long-term survival and are therefore less sensitive to development.

Amphibians

Bridge 451 crosses the fast-flowing Grindstone Creek within a highly developed urban area. No amphibian breeding habitat is present within the study area, however during the June 15 survey, approximately 12 Gray Treefrogs (Hyla versicolor) were heard calling approximately 400 m north-east of the bridge.

Reptiles

The reptile active hand searches detected the presence of two herpetofaunal species; Eastern Red-backed Salamander (Plethodon cinereus) and Eastern Gartersnake (Thamnophis sirtalis sirtalis). Both are considered to be locally abundant in Hamilton (Lamond & Duncan, 2003) and neither are listed as a federal or provincial Species at Risk (COSEWIC, 2015; OMNRF, 2015).

Odonates

Three species of damselflies and dragonflies were documented during the July 15, 2015 field survey. This included 10 Ebony Jewelwing (Calopteryx maculata), 2 female Common Whitetail (Plathemis lydia), and 1 male White-faced Meadowhawk (Sympetrum obtrusum). One additional unidentified Meadowhawk species (Sympetrum sp.) was observed. All three of the identified species have a provincial conservation rank of S5, or ñsecureò (NHIC, 2015b). Similarly, all three are considered ñcommonò in Halton Region (Rothfels, 2006).

3.2.4 Aquatic Communities

No rare or critical aquatic habitats were identified at the bridge location, and the type of habitat in the immediate vicinity of bridge 451 occurs upstream and downstream of the bridge in the reach examined. Overall, the low habitat diversity, but high amount of instream cover, supports a low to medium diversity fish community of at least 7 species in the general vicinity of bridge 451.

Of the fish that are, or have been, known to occur in the vicinity of Bridge 451, none are listed under the Federal Species at Risk Act (SARA, 2002) or are considered to be at risk under the Ontario Endangered Species Act (ESA, 2007). However, a couple of fishes (Brassy Minnow and Pearl Dace) are considered uncommon in Hamilton, and one (Finescale Dace) is considered rare in Hamilton (Hamilton Conservation Authority, 2014). All three of these prefer coolwater habitats with gentle or no flow, and Brassy Minnow and Finescale Dace also prefer boggy conditions with soft detritus substrate and aquatic vegetation (Scott and Crossman 1973). These habitat conditions do not exist in the vicinity of Bridge 451, and consequently these fish have not been collected in close proximity to the bridge. The habitat beneath and surrounding Bridge 451 may provide spawning habitat for the common species found there, such as White Sucker, Creek Chub, Longnose Dace and Blacknose Dace, but these same types of habitat occur in ample amounts upstream and downstream of the bridge location and are not considered limiting.

3.2.5 Archaeological and Cultural Heritage Assessments

A Stage 1 Archaeological assessment was undertaken by Historic Horizons Inc. in 2015. A copy of the report can be found in Appendix C. The Stage 1 report describes the study area as being within the historic urban core of the Town of Waterdown, on parts of Lots 6 & 7, Concession 3, East Flamborough Twp. Initially agricultural settlement, urbanization began quickly in the early 19th Century, as Grindstone Creek was utilized to power a number of early mills and industries. A number of 19th century buildings remain in the study area, and a portion of the community of Waterdown, west of the creek, has been incorporated into a Heritage Conservation District. Archaeological potential in the area is related to its proximity to Grindstone Creek and the Niagara Escarpment, and its location in an early industrial settlement along an early roadway.

The Stage 1 report makes the following recommendations:

2) The study area is deemed to have intermittent archaeological potential in part of the creek ravine, around remaining 19th century buildings and under older parking areas. These areas are identified via the accompanying figure (Figure 17 from the 2015 Stage 1 Archaeological Assessment, reproduced as **Figure 3.2** below) in green shading. Stage 2 archaeological assessment is recommended for these portions of the study area prior to any subsurface impacts.

3) The Union Cemetery lies within the study area (approximately 65 m upstream of the crossing). No construction activity must be allowed to impact any portion of the cemetery.

3.3 Socio-Economic Environment

The area surrounding the existing Grindstone Creek crossing is predominately a mix of residential and commercial properties. To the northeast of the study area, residential development is the most common land use. To the southwest, the intersection of Mill St. South and Dundas Street East form the eastern boundary of the commercial hub for the community of Waterdown. This is also the boundary of the Waterdown Business Improvement Area.

3.3.1 Land Use

According to the City of Hamiltonôs zoning mapping, the land use in the vicinity of the existing crossing includes:

Business District Zone (BD) to the southwest of the crossing
Public Use Zone (P4) to the north in the cemetery lands
Core Area Residential (R5) to the northeast of the crossing
Parkway Belt Open Space Zone (01-1) in the valley lands

3.3.2 Proposed Land Use

Based on the Hamilton Official Plan, no significant land use change by the City is proposed within the study area. There is significant growth area to the south of the study area downstream of Dundas Street East.

3.3.3 Transportation

Dundas Street East is a major East-West thoroughfare in this area of Hamilton. An active railway line (Canadian Pacific) runs along the Grindstone Creek valley system through the community of Waterdown. This rail line passes under the existing crossing.
A by-pass road (North Waterdown Drive) is also proposed to alleviate traffic congestion within the area.

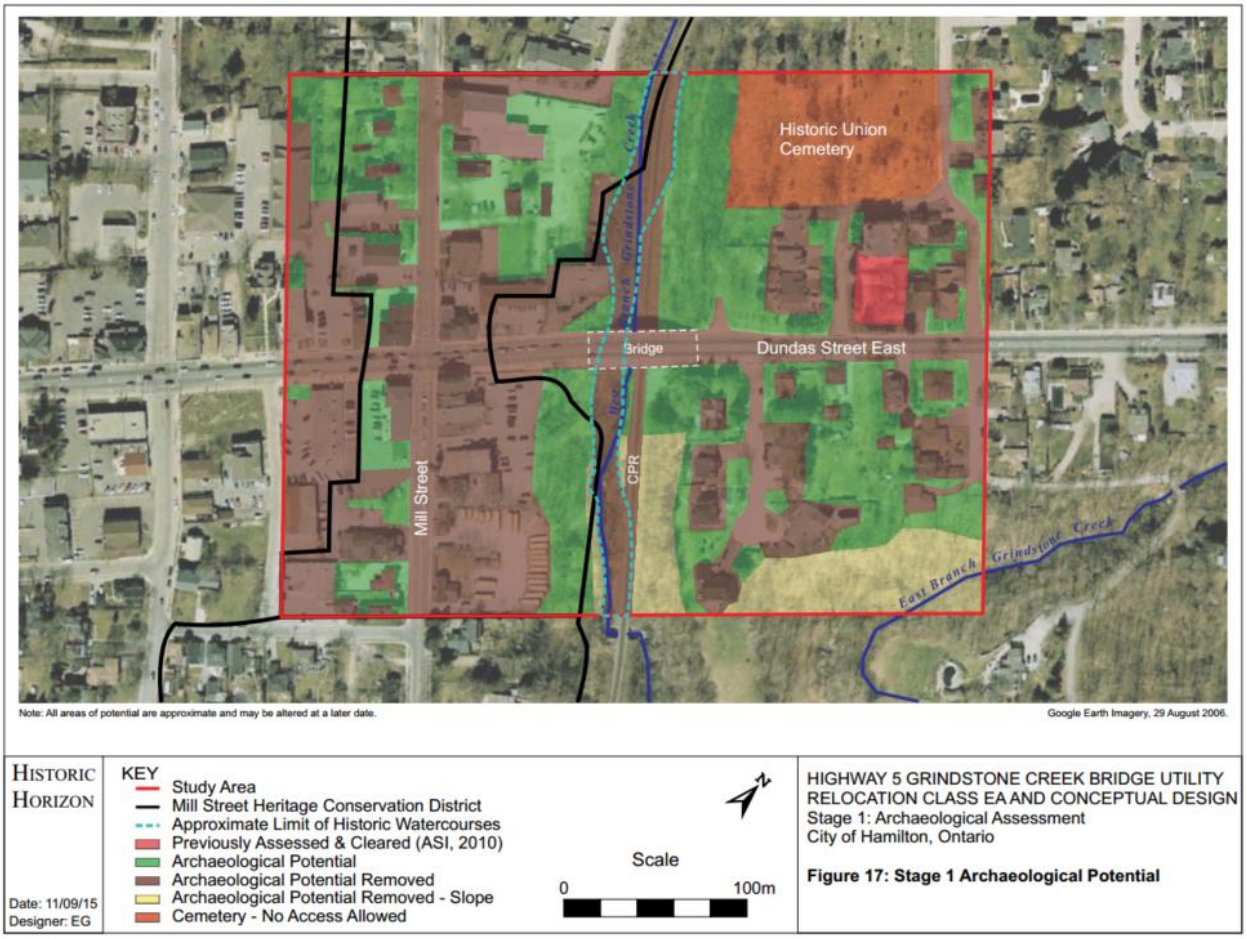


Figure 3.2: Stage 1 Archeological Potential Mapping (Source: Historic Horizons Inc., 2015)

3.3.4 Planning Policy

Niagara Escarpment Plan (Updated 2012): The Grindstone Creek crossing falls within the Niagara Escarpment Planning Area, which is under the jurisdiction of the Niagara Escarpment Commission (NEC). The Niagara Escarpment Planning Area utilizes designations which apply to the study area and are shown below in **Figure 3.3**. They include:

Escarpment Protection Area (orange)
Escarpment Natural Area (green)
Urban Area (pink)

Figure 3.3: NEPA Mapping (Source: MNRFôs Natural Heritage Information Centre (NHIC) online mapping tool ñMake a Map: Natural Heritage Areasò. Accessed June 21 2016)

The valley lands within the project area are defined as having an **Escarpment Natural Area** land use designation. The objectives of the Niagara Escarpment Commission in creating this land use designation are:

1. To maintain the most natural Escarpment features, stream valleys, wetlands and related significant natural areas and associated cultural heritage features.
2. To encourage compatible recreation, conservation and educational activities.
3. To maintain and enhance the landscape quality of Escarpment features.

There are 25 permitted uses of lands that are designed Escarpment Natural Area listed in the Niagara Escarpment Plan. One of these land uses is ñEssential transportation and utility facilitiesò.

On both sides of Grindstone Creek, the area outside of the valley is defined as having an **Urban Area** land use designation. The objective of the Niagara Escarpment Commission in creating this land use designation is to ñminimize the impact and further encroachment of urban growth on the Escarpment environmentò. Changes to permitted uses, expansions and alterations of existing uses or the creation of new lots within the Urban Area designation will not require an amendment to the Niagara Escarpment Plan.

Approximately 400 m to the west of the existing crossing, there is an area adjacent to Flanders Drive that is classified as having an **Escarpment Protection Area** land use designation. Per the 2015 Niagara Escarpment Plan, Escarpment Protection Areas are important because of their visual prominence and their environmental significance. They are often more visually prominent than Escarpment Natural Areas. Included in this designation are Escarpment features that have been significantly modified by land use activities such as agriculture or residential development, land needed to buffer prominent Escarpment Natural Areas, and natural areas of regional significance. The objectives of the Niagara Escarpment Commission in creating this land use designation are:

1. To maintain and enhance the open landscape character of Escarpment features.
2. To provide a buffer to prominent Escarpment features.
3. To maintain natural areas of regional significance and cultural heritage features.
4. To encourage agriculture, forestry and recreation.

Within the Niagara Escarpment Plan there is a list of 37 permitted uses of land designated as Escarpment Protection Area. Transportation and utility facilities are permitted; however only linear facilities are permitted in prime agricultural areas and specialty crop areas.

3.3.5 Natural Hazards

Figure 3.4 illustrates the flood line and CA Generic Regulated Area adjacent to Grindstone Bridge. As noted within the figure, the flood lines are contained well within the valley. The generic regulated area, which represents an extent based on the worst of the flood line, stable top of bank, meander belt or wetland together with associated setbacks extends well onto the tableland.

GRINDSTONE CREEK UTILITY BRIDGE

CITY OF HAMILTON

Floodplain

CA Generic Regulated Areas

FIGURE 3.4 Conservation Halton Floodlines and Generic Regulated Areas

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4 EXISTING CONDITIONS

4.1 General

This section provides an overview as to the existing conditions of the existing bridge together with the utilities that are located on the bridge. In defining the existing systems, a variety of information was collected and reviewed. This information included plan and profile drawings which describe the existing infrastructure, relevant background reports from the city and outside agencies as well as field visits to confirm specific items.

4.2 Grindstone Creek Bridge

The Highway 5 Grindstone Creek bridge was constructed in 1966 and is reaching the end of its lifespan. The City has proposed to rehabilitate or reconstruct the existing bridge within the next 10 years.

Two reports relating to the existing bridge as well as alternatives to rehabilitate the bridge were prepared by the MMM Group.

The first report, entitled óStructural Alternatives Assessment Reportô was completed in September 2014. This objective of this report was to undertake an investigation and preliminary design of the bridge.

The report provides some history with respect to previous investigations. It is noted that, in 1989, a condition survey was undertaken. The survey identified severe levels of corrosion potential in the deck. Based on these findings a series of rehabilitation measures were undertaken.

MMM also conducted a limited condition survey of the structure in May 2014. The Structural Alternatives Report described the rehabilitation alternatives to be considered together with preliminary cost estimates and a recommended course of action.

The second report, entitled óPreliminary Structural Design Reportô discussed three bridge replacement alternatives and recommended a preferred option. Original drawings of the bridge were also presented (see **Figure 4.1**). The existing bridge, constructed in 1966 is a three span, cast in place continuous concrete T-beam structure with an asphalt wearing surface, reinforced abutments and piers. The bridge is approximately 50 m in length and 20 m in width.

The preferred option includes replacement of the bridge. The proposed cross section (see **Figure 4.2**) will consist of a 4.5 m wide lane/shared bike lane and 2.0 m sidewalk in each direction with one 3.5 m wide median left turn lane. The bridge will consist of a single span slab on steel girder superstructure composed of 1810 mm deep steel plate girders with a 225 mm thick reinforced concrete deck slab. The estimated cost to replace the bridge is approximately $3,000,000. The

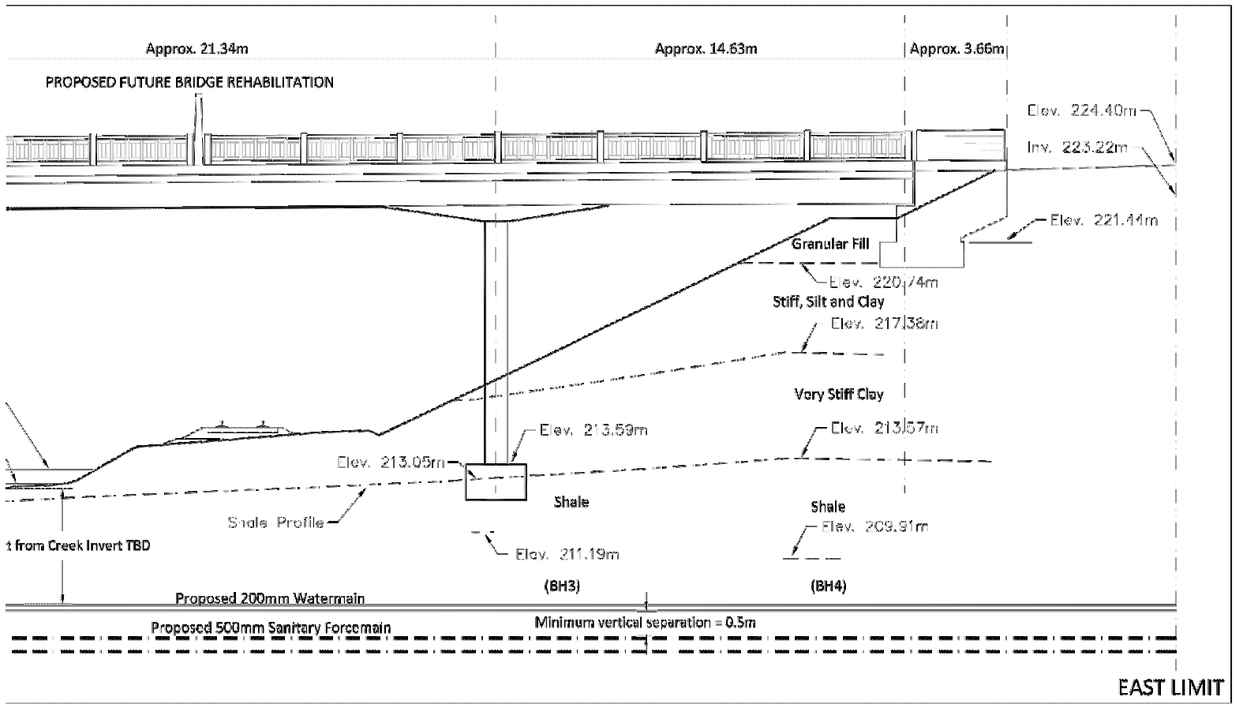

Figure 4.1

1. From Preliminary Structural Design Report - MMM - May 2015

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report also notes that it is understood that the City will reconstruct a new utility bridge adjacent to the existing bridge in advance of the replacement contract to relocate all of the existing utilities off of the existing bridge.

4.3 Grindstone Creek Bridge ï Existing Utilities

Figure 4.3 illustrates the existing utilities that are attached to the bridge or are in the vicinity of the existing bridge. As can be seen from the figure, there are a significant number of existing utilities either attached to, or adjacent to, the bridge. In summary the following utilities would need to be addressed as part of a relocation project.

A 500 mm diameter insulated sanitary sewer forcemain (see also **Photo 4.1**);

A 200 mm diameter insulated ductile iron pipe watermain which is tunneled under Grindstone Creek;

A 250 mm sanitary sewer which is embedded within the existing bridge structure;

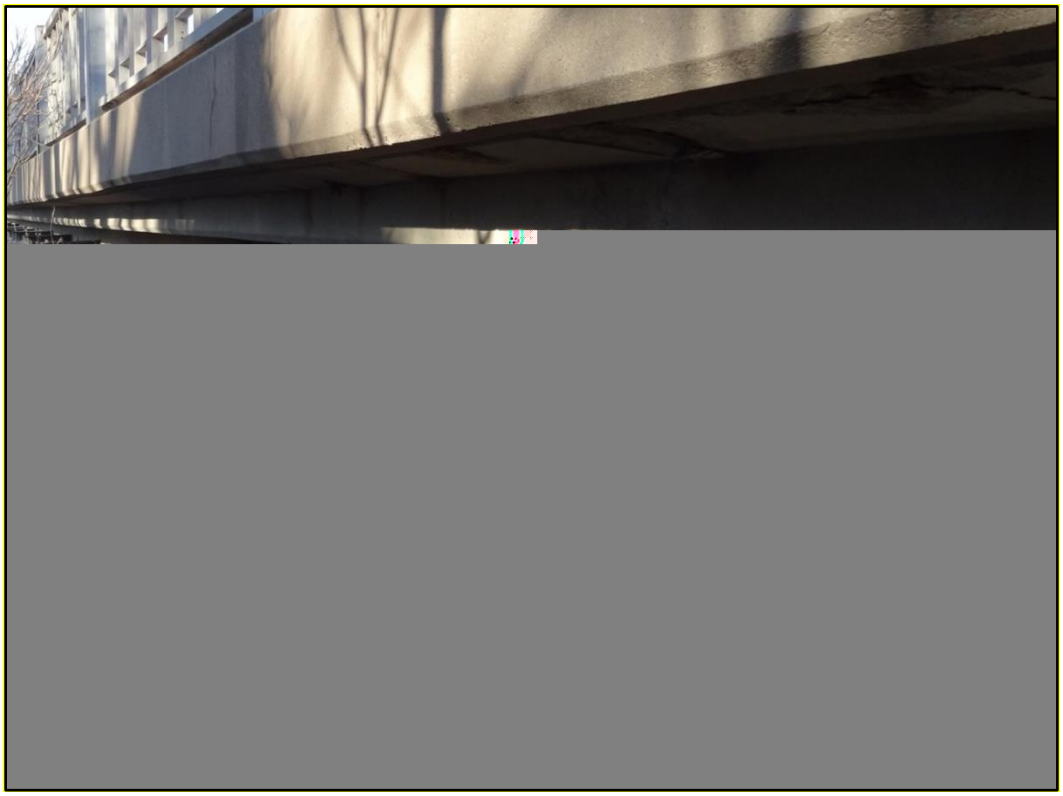
Bell communications infrastructure including 8 embedded 108 mm diameter Bell ducts in the north sidewalk, an 89 mm Bell duct supported on the exterior girder (see **Photo 4.2**);

One 76 mm diameter electrical duct in each sidewalk; and

A union gas line located under Grindstone Creek

Photo 4.1 ï A 500 mm Diameter Insulated Sanitary Sewer Forcemain

Photo 4.2 ï Bell Communications Infrastructure



A sanitary sewage pumping station is also located approximately 300 m upstream (easterly). The water main is one of four feeds providing water to the Waterdown area.
In addition, CP Rail has significant infrastructure in the area including a rail line that runs under the bridge as well as associated including CP communications lines and Fiber-optics located approximately 1.8 m from the edge of the railway tie/rail.
Also shown on the map is the primary ownership of lands within the area.

4.4 Overview of Public Information Centre No.1

The Notice of Study Commencement was published in the October 29 edition of the Flamborough Review. A copy of the notice and a comment sheet was mailed out to all relevant government agencies, local interest groups, Aboriginal contacts, and persons requesting to be a part of the study.

The first Public Information Centre was held on November 5, 2015 at the Knox Prsbyterian Church from 6:00 p.m. to 8:00 p.m. The purpose of this open house was to present an overview of the study, to present some of the initial findings, to solicit feedback from the public, and to outline the next steps in the process. The open house consisted of display boards outlining the study purpose and background, as well as next steps. A copy of display panels was presented and is attached in Appendix D.

It should also be noted that as part of the Environmental Assessment process the Do Nothing alternative is to be carried forward as a benchmark for evaluation purposes. For the purpose of this study Alternative #1 has been defined as the Do Nothing alternative.

5.2.2 Alternative #2ï Relocation of Existing Utilities

For this alternative, all utilities would be located to a separate utility bridge in advance of the bridge rehabilitation. Relocation of the utilities would allow for an expedited rehabilitation of the bridge.

Figure 5.2 illustrates the proposed location and realignment of the existing utilities. All of the existing utilities which include the watermain, sanitary sewers (forcemain and gravity sewer), Bell telecommunications conduits and electrical duct would be located on the bridge. The storm sewer would likely be relocated so as not to be in conflict with the proposed utility bridge. The union gas main would remain as is, under the Grindstone Creek.

The primary advantages (or opportunities) for this alternative include:

Reduced bridge closure time during rehabilitation thereby minimizing impact to businesses, residents and commuters.
Ease of long term operation and maintenance of utilities as they are now easily accessible; and
The lowest capital cost of the three alternatives that are being considered.

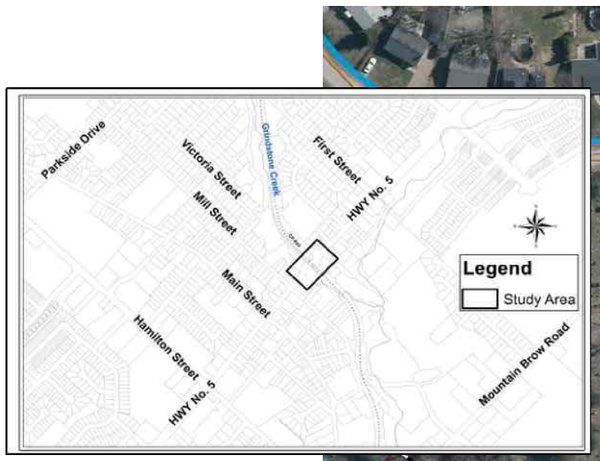
The primary disadvantages (or constraints) for this alternative include:

Short term partial closures of Grindstone Creek bridge during construction of the utility bridge; and
Requirements for approval from Conservation Halton, Bell utilities and Canadian Pacific Railway

The estimated capital cost for this alternative is $2.5 million.

5.2.3 Alternative #3 ï Relocation of Some of Existing Utilities

For this alternative, the existing sanitary forcemain and watermain would be relocated subsurface (under Grindstone Creek) in advance of the bridge rehabilitation. Relocation of the other utilities (bell and gravity fed sanitary sewer) would be placed on the utility bridge thus allowing for a somewhat expedited rehabilitation/replacement of the bridge.



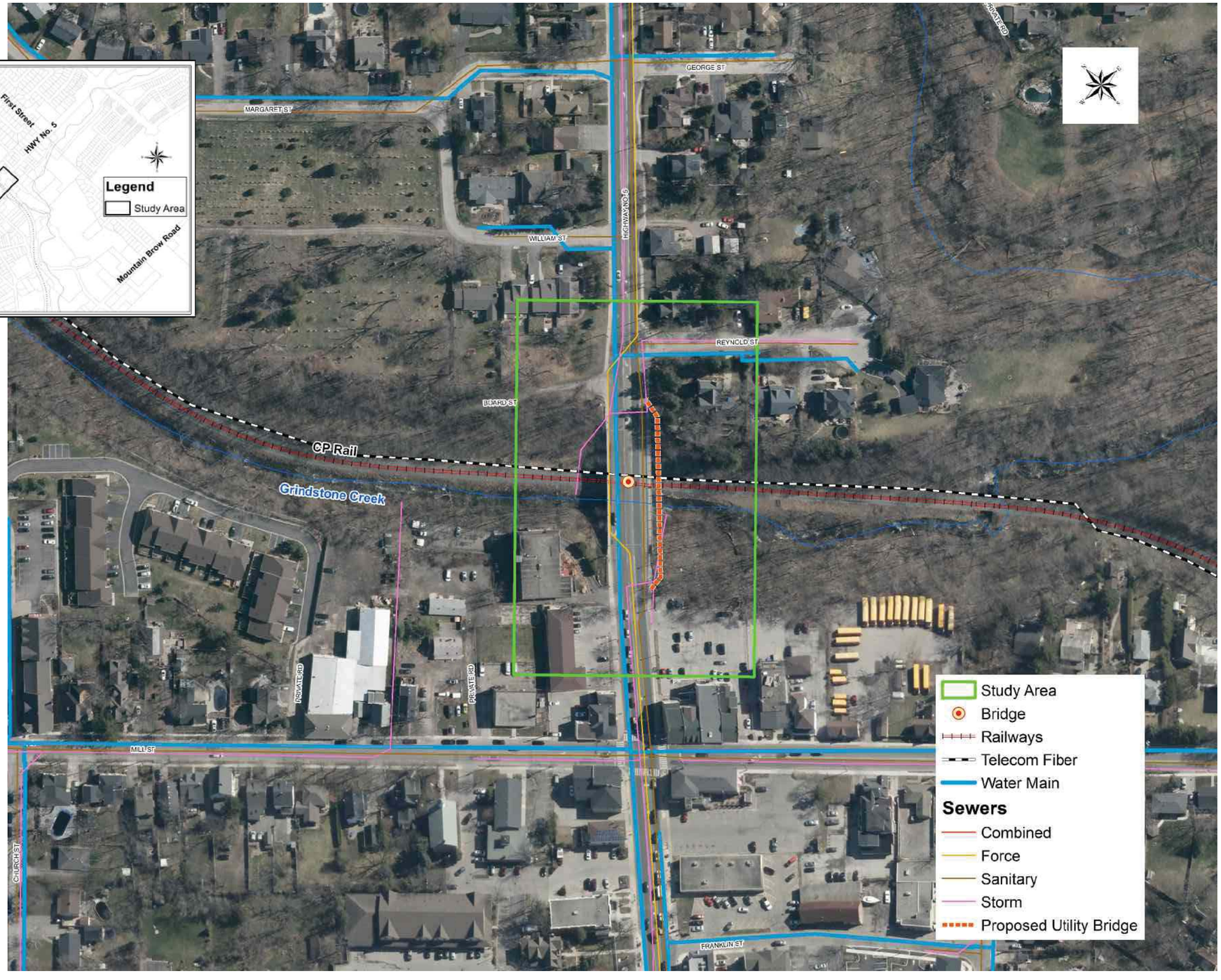


Figure 5.2

GRINDSTONE CREEK BRIDGE
Alternative #2 - Relocation of Existing Utilities

Hamilton

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Figure 5.3 illustrates the proposed location and realignment of the existing utilities. As noted above the watermain would remain in place while the sanitary forcemain, which is presently attached to the existing bridge, would be tunneled under Grindstone Creek. The gravity fed sanitary sewer, Bell and electrical conduits would be placed on the utility bridge.

The primary advantages (or opportunities) for this alternative include:

Somewhat reduced bridge closure time during rehabilitation thereby minimizing impact to businesses, residents and commuters; and
Ease of long term operation and maintenance of some utilities as they are now easily accessible;

The primary disadvantages (or constraints) for this alternative include:

Short term partial closures of Grindstone Creek bridge during construction of the utility bridge;
Higher capital cost associated with tunnelling of the sanitary forcemain;
Requirements for approval from Conservation Halton, Bell utilities and Canadian pacific Railway; and
Potential requirement of temporary or permanent acquisition of property to construct and maintain the sanitary forcemain

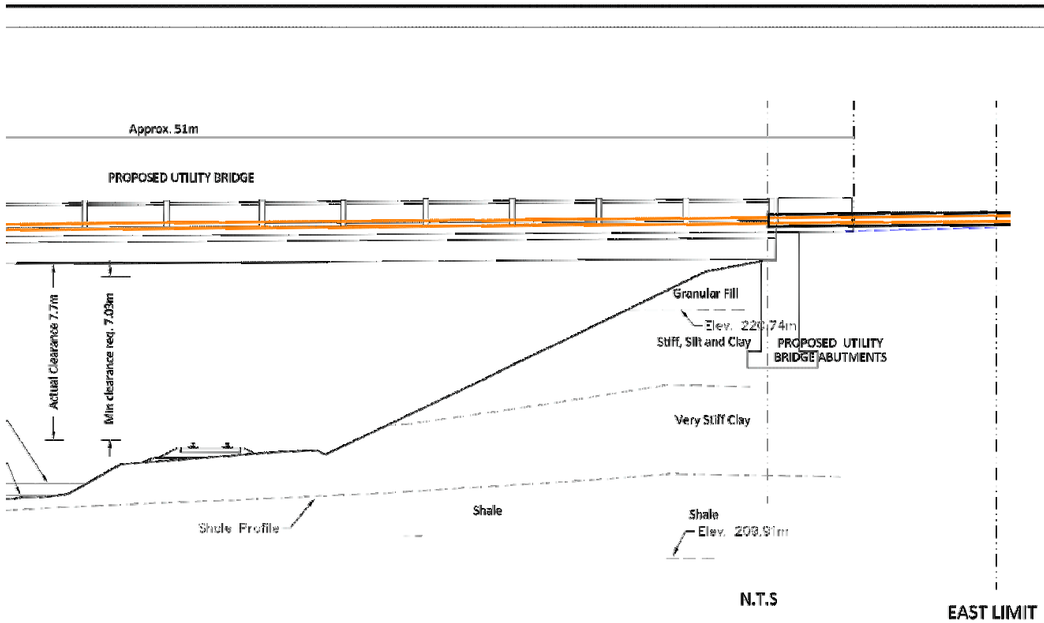
The estimated capital cost for this alternative is $3.8 million.

5.3 Evaluation Criteria

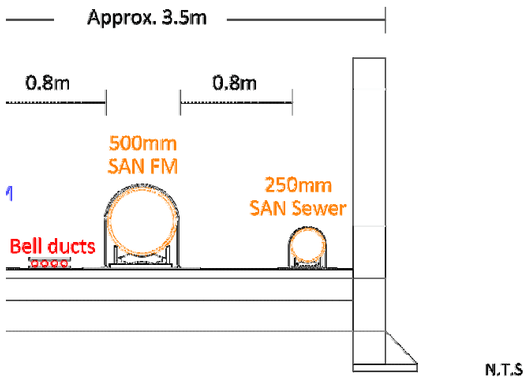
As part of the Municipal Class Environmental process, each alternative must be evaluated based on a set of Physical/Natural Environment, Social/Cultural and Economic criteria. Two additional categories, Legal/Jurisdictional and Technical, were also included as part of this assessment. The set of criteria was developed by Aquafor Beech Limited and reviewed by the City.

A score was then established through a multidisciplinary evaluation process for each alternative design for each of the criteria which were established. The score for each option ranged from least preferred (designated by ○) to most preferred (designated by ●).

A score (or assessment) of ○ indicated that the alternative scored the lowest in relation to the criteria. Alternatively, an assessment of ● indicated that the option scored the highest in satisfying the respective criteria. Three intermediate assessments (◔ ◑ ◕) were also used to evaluate the alternatives.



ELEVATION



SECTION

Aquafor Beech Limited

Figure 7.2