APPENDIX 'B'

DRAFT Schedule B Municipal Class Environmental Assessment for
Pottersburg Creek Slope Stability South of Hamilton Road Bridge
City of London, Ontario

Executive Summary

Existing Environmental Conditions

Social Environment

This Environmental Assessment (EA) deals with an unstable slope located on the top of the east bank of Pottersburg Creek downstream of Hamilton Road within the City of London. The east bank is part of the Pottersburg Creek, a small tributary of the Thames River. The Pottersburg Creek subwatershed has a total drainage area of 4850 ha (48.5 km^2) of which 44% lie within the City of London limits (its lower portions).

The limits of the present study include river channel and its banks from Hamilton Road to approximately 80 m downstream.

Located immediately on top of the east bank of Pottersburg Creek downstream of Hamilton Road is a private subdivision that presently houses 185 residential townhouse units (1199 and 1203 Hamilton Road). Vital private underground services for portion of the residences in this area are located next to an access road on top of the compromised bank. The said access road is presently closed due to public safety concerns. Further deterioration of the compromised slope will adversely impact the continued safe operation of this infrastructure (should the slope give way the infrastructure will cease to function). Finding the solution for the continued safe operation of the existing servicing infrastructure is one of the goals of this EA.

Physical Environment

Geotechnical (slope stability)

Slope stability assessment undertaken as part of this EA has concluded that the existing slope on the east bank is unstable. The completed EA study identifies that a number of sections of the compromised bank have safety factors that are not adequate. The bank is considered unstable, and not fit for supporting vital underground services and residential structures.

Geotechnical analysis undertaken has concluded that the east bank needs to have a 2H:1V inclination (two horizontal units for every vertical unit) to be considered stable, or that an engineered retaining wall be installed to support the earth behind it.

Laboratory soil analysis (contamination of the soils)

Fill materials surrounding Pottersburg Creek have historically been contaminated with PCBs from industrial pollution. Since possible remediation work to stabilize the east bank may require excavation and removal of the overbank materials, soil samples within the EA work area were collected and analyzed for PCB contamination. A number of soil samples within the work area have identified elevated levels of PCB. The levels of PCBs are not high enough to be considered PCB waste but are above the allowed background levels for residential or community land uses.

Hydrology/Hydraulics (flows and water levels)
Detailed hydrologic and hydraulic analyses were carried out to establish the flow characteristics of the Pottersburg Creek subwatershed, and thus help understand erosive forces at the base of the steep slope within the study area. The hydrologic modeling represents the physical processes that transform rainfall (which falls over watershed lands) to river runoff (flow that eventually runs through the Pottersburg Creek main channel). The hydrologic model developed is used to establish peak flows for assessment of flooding and erosion. Hydraulic models were developed that quantified flood levels and erosion causing stream velocities within this reach of Pottersburg Creek.

Stream Morphology (long term creek behaviour)
A geomorphic investigation has been completed for the portion of the Pottersburg Creek within the work area. Geomorphology is the field of study that describes geometry of river channel and how it behaves over time. The geomorphic investigation has identified that the channel downstream of Hamilton Road has been artificially altered in the past. The banks on the east side consist of gabion baskets (stones enclosed with a wire mesh) that are nearly vertical. A natural meander bend exists just downstream of Hamilton Road that is directing flow towards the nearly vertical gabion basket banks causing undercutting (erosion from below).

Terrestrial Habitat (vegetation and wildlife)
Natural heritage assessment documenting the vegetation and wildlife communities was completed as part of this EA. Seven different vegetation communities of lowland forests were identified, as were two types of deciduous swamps. Significant flora species were not identified during the investigations. Wildlife observed within the stream corridor of the study area was also catalogued. No species of risk were identified within the study area.

Fisheries Habitat (in-stream aquatic conditions)
An in-stream aquatic assessment has been completed that documents characteristics of fish habitat within the study area. It was identified that the creek is a permanent fish habitat (foraging, refuge, overwintering, spawning) for both resident and transient fish species from the Thames River. The general habitat conditions observed are long shallow riffles and flats with short deep pools. Most of the fish habitat is provided by large gravel and cobble stones that line the channel bed, as well as limited woody debris and undercut banks adjacent to the gabion baskets. A number of fish species were observed, which include northern pike, smallmouth bass, white sucker, creek chub and cyprinid species (carp and minnows). No species at risk were identified within the study area.

Alternative Solutions
In preparing the alternatives required to stabilize the jeopardized bank all feasible options have been considered. The following alternatives have been developed for consideration of this EA:

Option 1: Do nothing

The do-nothing alternative is not considered to be viable due to risks of public safety and environmental concerns associated with potential slope failure in the future. Environmental damage that would result should the compromised bank collapse has been identified as severe, especially in the case of servicing infrastructure ruptures into the creek. It is for this reason that the do-nothing option is not considered further.

Option 2: Buyout of residential properties

This alternative considers removal of existing gabion baskets and re-grading the slope of the east bank to a stable inclination. To facilitate removals and re-grading requires acquisition and demolishing of residential units adjacent to the slope (Figure ES-1). The access road running parallel to the creek would also have to be permanently closed. Erosion of the east bank would be allowed to continue, and the channel would be allowed to migrate eastward in response to geomorphic processes. The increased erosion is expected to impact fish habitat downstream due to increased sediment load. The advantage of this option is that re-vegetation of the slope would replace non-native vegetation that currently exists. Some improvements to stream function and fisheries would take place through addition of vegetation adjacent to the creek.

Option 3: Slope stabilization with new retaining walls

An engineered retaining wall represents an option that can stabilize the slope with nominal in-water disturbance without altering the alignment of the existing creek. In order to stabilize the slope, an extensive engineered retaining wall will be required for approximately 60 m +/- reach of the Pottersburg Creek downstream of the Hamilton Road (Figure ES-2). Due to existing site constraints (i.e., keeping the existing residences and infrastructure in place during construction works) this option requires either costly temporary supports or grouted anchors to be located underneath existing buildings. Costs and technical complexity are high for this option. Further complexity for the retaining walls option relates to routine future maintenance. It is anticipated that private property owners would own the wall and be responsible for its maintenance.

Option 4: Slope stabilization with channel re-alignment

One way to stabilize the existing slope is to permanently shift the creek westward onto the limits of the City property and re-grade portion of the east bank that is currently unstable (Figure ES-3). Shifting the creek a set amount and re-grading the east bank would ensure that a stable 2H:1V slope is achieved, thus ensuring public safety of the existing residential properties. Following the shift in the creek, existing servicing infrastructure on the east bank can remain in its current location, thus avoiding costly relocations. Since shifting the existing creek has a potential to interrupt terrestrial, fisheries and aquatic habitat, compensating measures will be required within the realigned channel limits. Furthermore, laboratory analyses of soil samples collected in an area where excavation will be required (to facilitate the shift in the creek) have

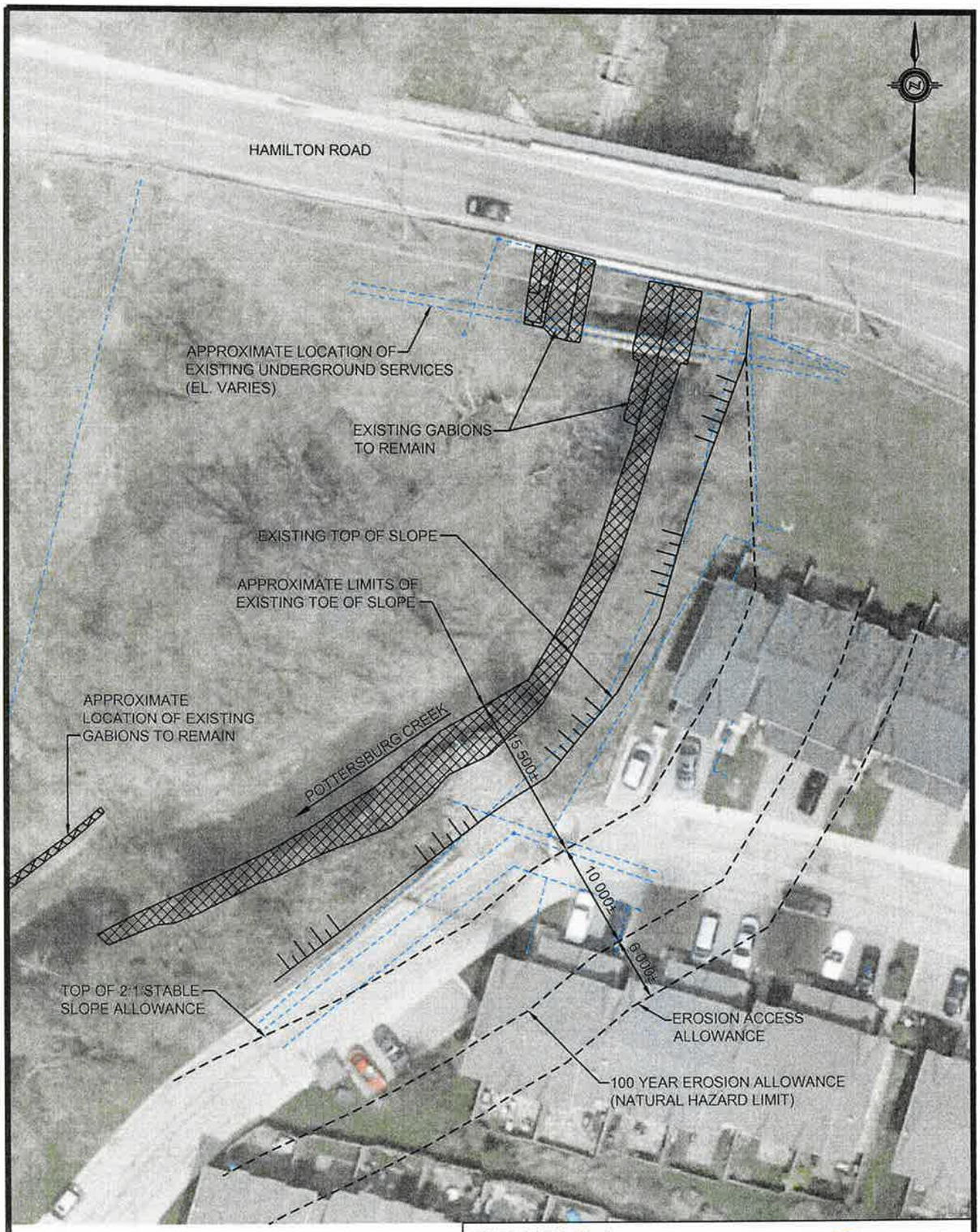

FIGURE ES-1

OPTION #2 - BUYOUT SITE PLAN

RIGGS ENGINEERING

CLIENT CITY OF LONDON

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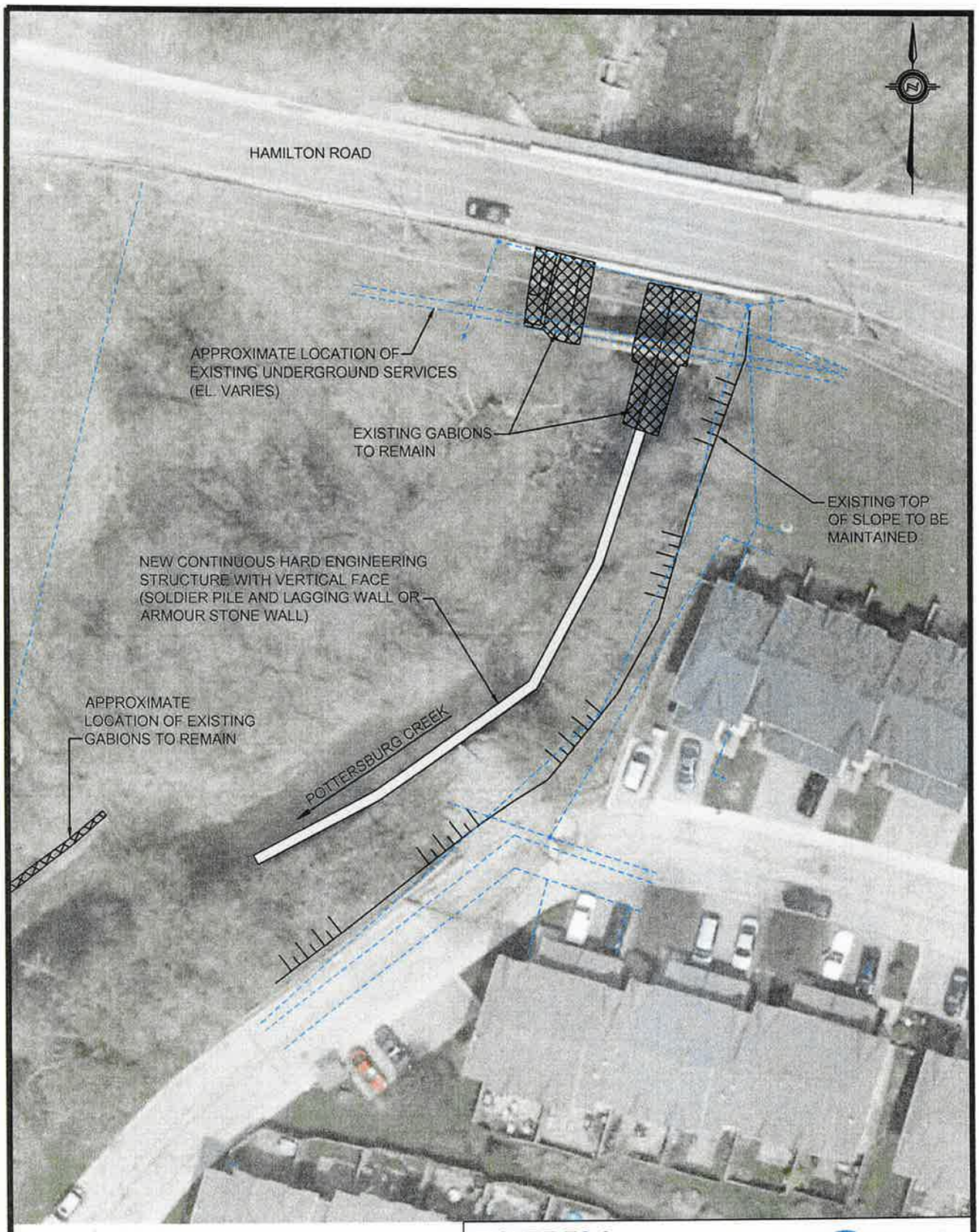

FIGURE ES-2

OPTION #3 - NEW WALL SITE PLAN

RIGGS ENGINEERING

CLIENT CITY OF LONDON

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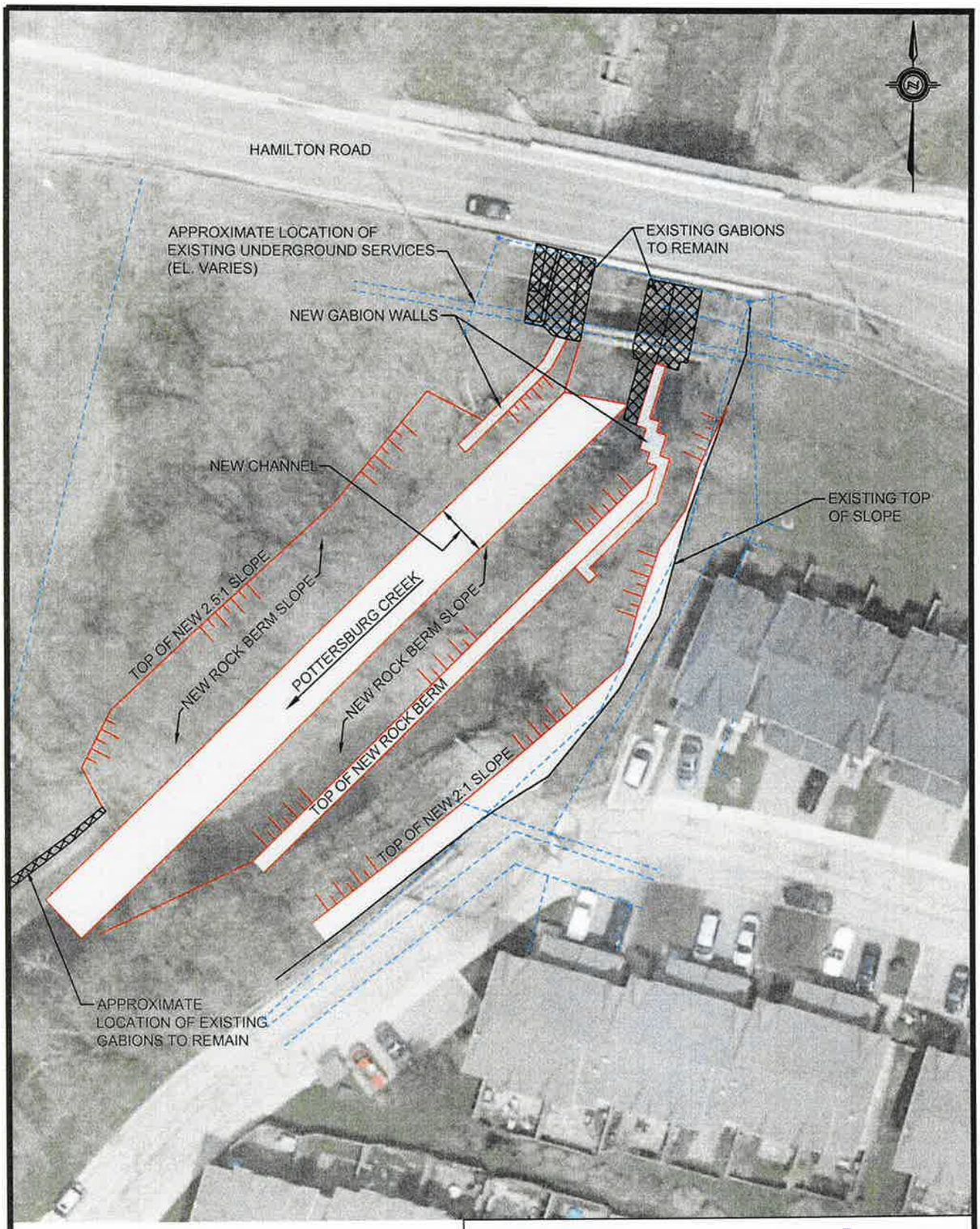

FIGURE ES-3

OPTION #4 - REALIGNMENT SITE PLAN

RIGGS ENGINEERING

CLIENT CITY OF LONDON

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Impact Assessment

An impact assessment analysis has been undertaken to identify potential effects (positive and negative) related to the proposed stabilization works. A summary of each is provided below.

Option 1: Do nothing

Due to public safety concerns and severe environmental effects associated with this option, the do nothing option is not considered viable. It is thus excluded from further consideration.

Option 2: Buyout of residential properties

This option requires acquisition of five residential units and relocation of key servicing infrastructure. An advantage of this option is non-native vegetation could be removed from the re-graded slope and replaced with native plant, shrubs, and tree species. From the geotechnical (slope stability) perspective, this option is considered satisfactory because the critical services and residential buildings are removed from hazard lands. Some adverse environmental impacts are associated with this option since erosion will be allowed to occur and will increase sediment entering the watercourse. The addition of extra sediment to the creek adversely impacts the aquatic environment. From a geomorphic perspective a key advantage offered by this option is that the creek will be able to freely and naturally adjust and function without any direct or further alterations.

Option 3: Slope stabilization with new retaining walls

The major advantage of the retaining wall option is that acquisition of private property and costly relocation of servicing infrastructure are not required. Stabilizing the slope with a retaining wall implies that existing residences and servicing infrastructure can remain at their current location. A complexity of the new wall option requires construction of temporary supports or installation of grouted anchors (to be located under existing structures), both costly and technically difficult to implement. Adverse environmental impacts are identified with this option since modifications to the banks are being proposed. Riparian cover and the associated ecological functions (e.g. shading, nesting habitat, forage for wildlife) would be reduced. Planting of native vegetation could offset the some of the identified disruption to terrestrial and wildlife habitat. Additional channel work on the west side may be required to offset loss of stream function, or that new in-stream structures be considered.

Option 4: Slope stabilization with channel re-alignment

Major benefits to the channel re-alignment option lie in the fact that slope of the east bank can be stabilized by keeping existing servicing infrastructure and residential units in its current location. The stabilization is achieved by shifting the existing channel westward, and re-grading the slope of the east bank to a stable 2H:1V inclination. Bed and banks of the proposed works would have to be lined with stone or other appropriate erosion resistant material. From the geotechnical perspective, re-grading of the slope to the 2H:1V inclination (with appropriate erosion protection at the toe) represents an acceptable solution. Hydraulic assessment carried

out shows that flooding and erosion characteristics of the re-aligned channel are identical to existing conditions outside of the proposed work area. Temporary environmental adverse impacts during construction will occur (loss of vegetation and wildlife habitat, loss of shading to the creek, major disruption to the aquatic habitat). The short-term adverse impacts would however be offset by vegetating upper portions of the restored slopes with native vegetation, as well as including planting offsite to compensate for armouring of the lower banks. This planting will remove non-native vegetation from the slope and be replaced with appropriately selected native species and thereby maintain natural wildlife habitat. The proposed design has the ability to incorporate in-stream aquatic habitat features that will lead to improved conditions when compared to present conditions.

Evaluation of Alternative Solutions

The alternative solutions developed in this EA were subjected to an evaluation matrix based on the following set of criteria:

1. Land acquisition (whether additional land will have to be acquired in order for stabilization works to be completed),
2. Erosion (will erosion be worse, better, or the same as a result of the implementation of an option),
3. Flooding (will flooding be worse, better or the same following of implementation of an option),
4. Stream morphology (will long-term stream health be improved, degraded, or be identical to current condition after implementation of an option),
5. Aquatic habitat (will fish habitat be improved, degraded, or remain identical to current condition following implementation of an option)
6. Terrestrial habitat (will vegetation and wildlife habitat be improved, degraded, or be identical to current condition following implementation of an option),
7. Technical complexity (how will difficult will it be to achieve regulatory approvals of final design associated with each option),
8. Social implications (how will each option be perceived by those living adjacent to the creek corridor), and
9. Costs (estimates of the total costs associated with each option, includes construction and consultant fees).

Each of the three options presented have been evaluated based on the criteria presented above. The results of our evaluations are presented in Table ES-1. The colour coding in Table ES-1 is analogous to traffic lights, where red is associated with adverse, orange with intermediate and green as favourable. Neutral or no change results are labeled with white.

Table ES-1: Ranking of alternatives summary

Criteria/Option	Option 1 Do Nothing	Option 2 Buyout	Option 3 New Wall	Option 4 Re-alignment
Land acquisition	None	Yes	None	None
Erosion	Worse	Permitted	None	None
Flooding	Worse	No change	No change	No change
Stream morphology	No change	Improved	Marginal	Improved
Aquatic habitat	Worse	No change	Worse	Improved
Terrestrial habitat	Worse	Improved	Reduced	Improved
Technical complexity	None	Medium	High	High
Social Implications	Negative	Intermediate	Intermediate	Positive
Costs	None	High	Very High	Moderate
Level of Preference	N/A	Medium/High	Low	High

Costs associated with Option 2 are estimated as $1,374,300, while costs of Option 4 are estimated as $1,140,580. The costs presented include engineering fees and contingency estimates.

Given such close overall ranking results, it is recommended that both Option 2 and Option 4 be considered as preferred alternatives. From the environmental assessment point of view, both options are considered viable (despite the slightly higher costs of Option 2). Flexibility in selecting either of the two options is left for the property owners since they will be funding the repair works.