

WELCOME TO PUBLIC INFORMATION CENTRE #2

PICKERING AND AJAX DYKES REHABILITATION

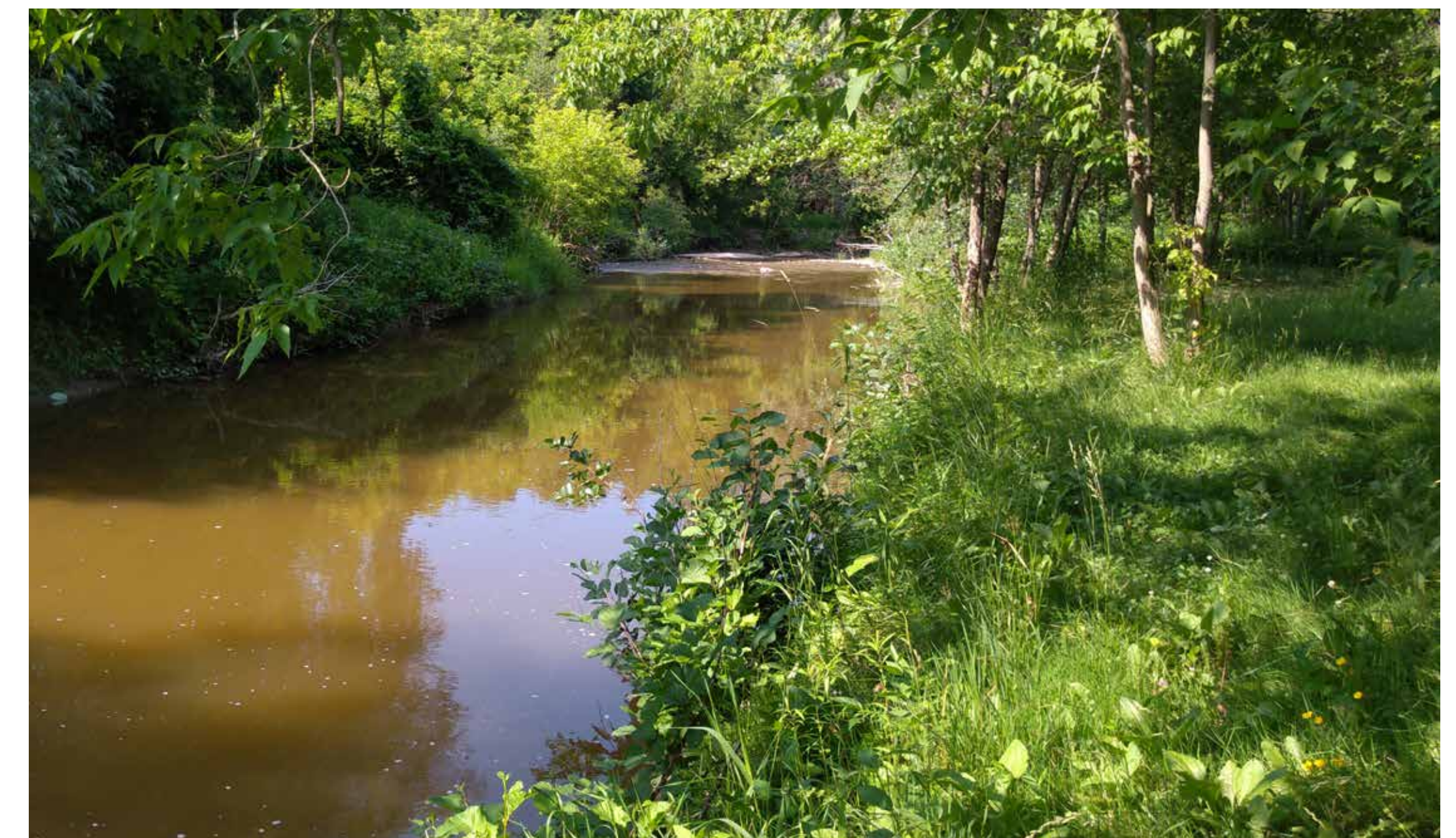
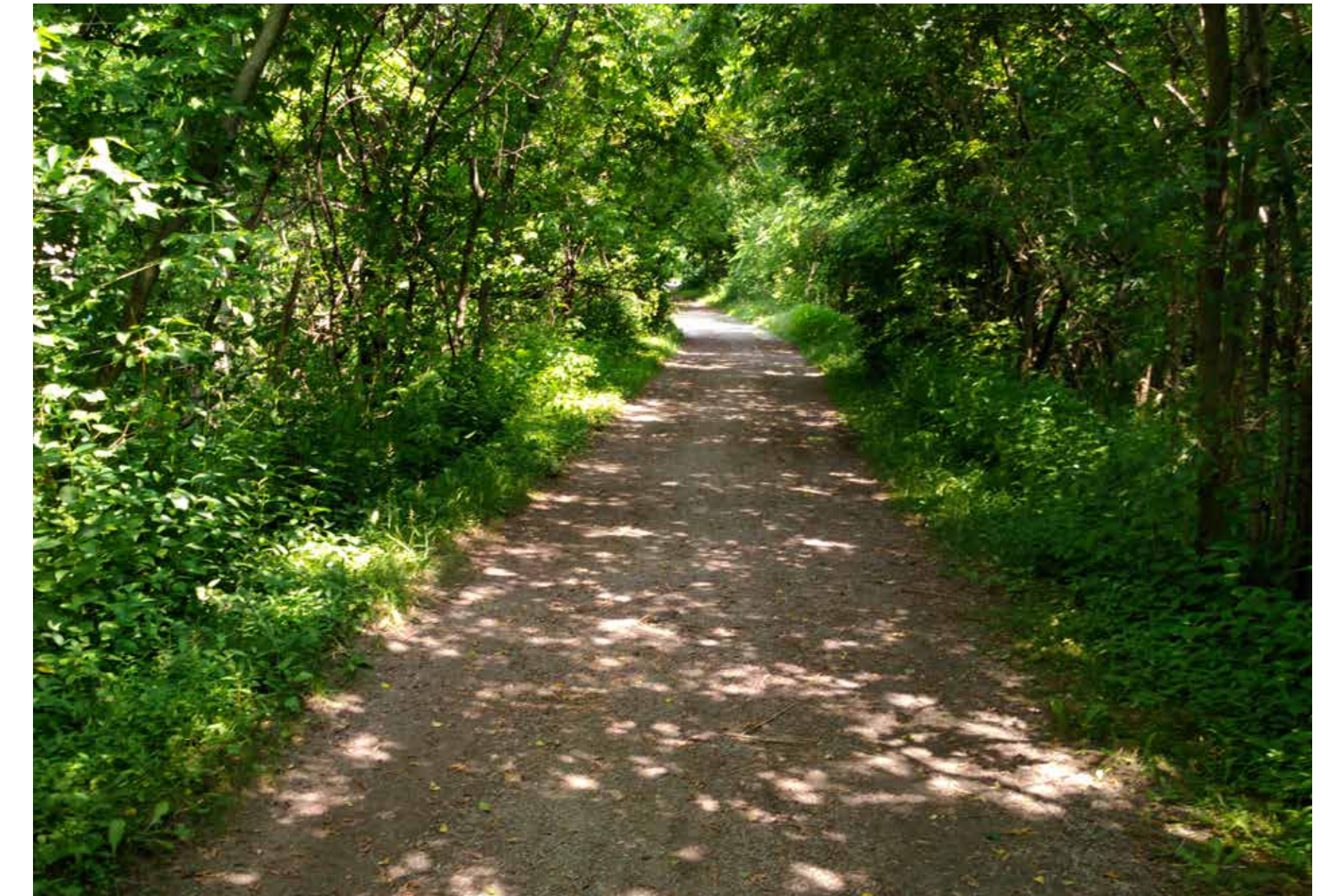
Class Environmental Assessment Project

Agenda

- Project Overview
- Alternative Design Concepts
- Evaluation of Design Concepts
- Recommended Preferred Design Concept
- Project Impacts and Mitigation
- Next Steps

Seeking your feedback on:

- Evaluation of Design Concepts
- Recommended Preferred Design Concepts
- Project Impacts and Mitigation
- Your input, issues and concerns



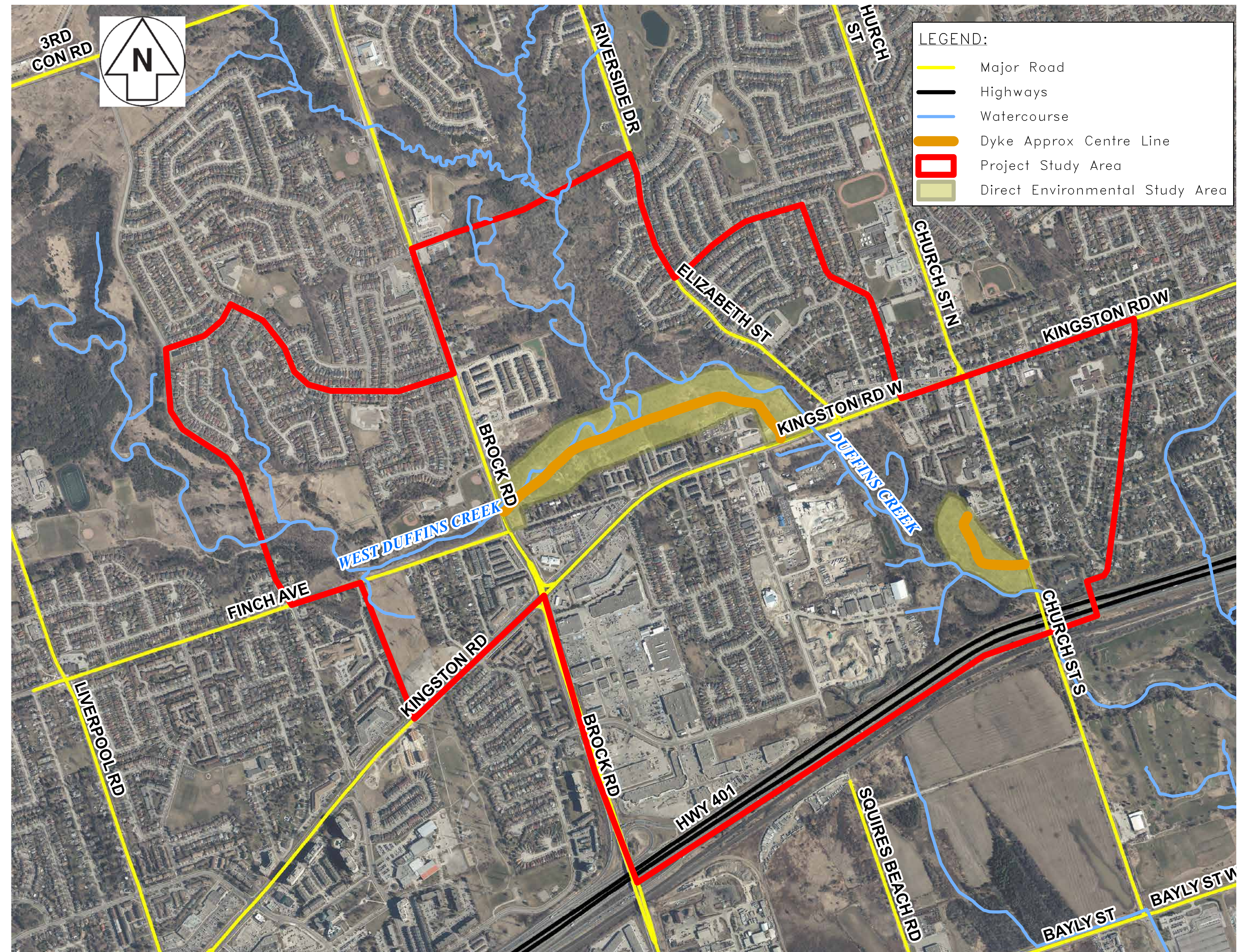
WHERE IS THE PROJECT?

DIRECT ENVIRONMENTAL STUDY AREA

Valley lands within the limits of the flood control structures (dykes) and the area primarily impacted by construction access and/or routes.

PROJECT STUDY AREA

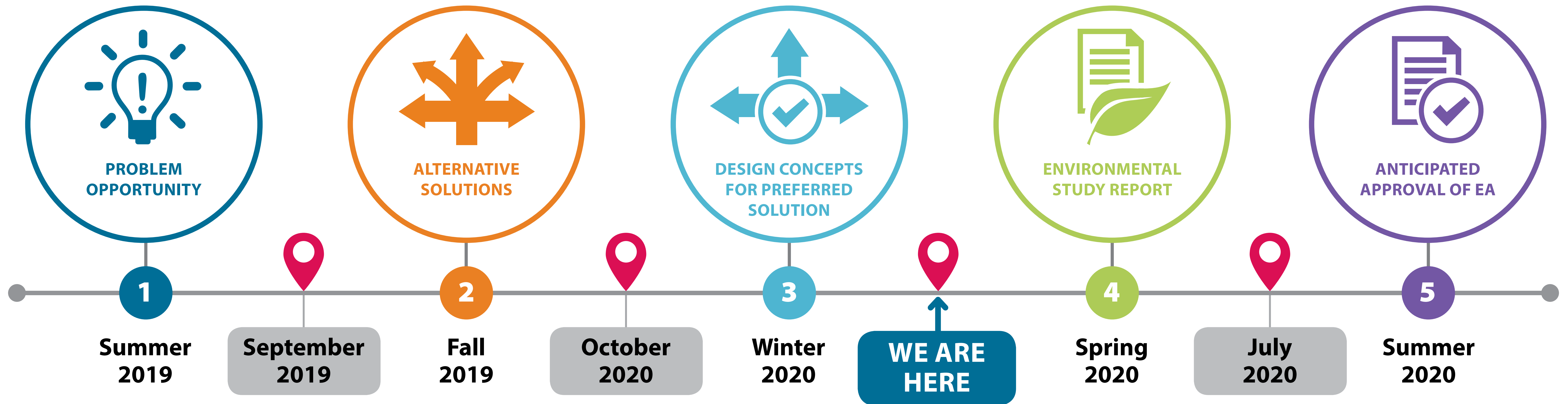
Valley lands and local communities surrounding the dykes that may be impacted by remedial works within the Direct Environmental Study Area.



THE CLASS ENVIRONMENTAL ASSESSMENT PROCESS


Conservation Ontario Class Environmental Assessment

 PUBLIC CONSULTATION



The Pickering and Ajax Dykes Rehabilitation Project is following the Class EA process for Remedial Flood and Erosion Control Projects outlined by Conservation Ontario.

The Class EA process has five phases that must be completed

There are many opportunities for the  **PUBLIC TO CONSULT** with the Study Team throughout the process

WHAT IS THE PROBLEM AND OPPORTUNITY?

THE PROBLEM

- **The dykes are at risk of failure**
 - The dykes do not meet the current engineering design standards
 - Significant erosion of the creek banks in areas adjacent to the Pickering Dyke
 - Other issues
 - *Tree growth and root systems compromising integrity*
 - *Narrow crest width limits access for maintenance*



THE OPPORTUNITY

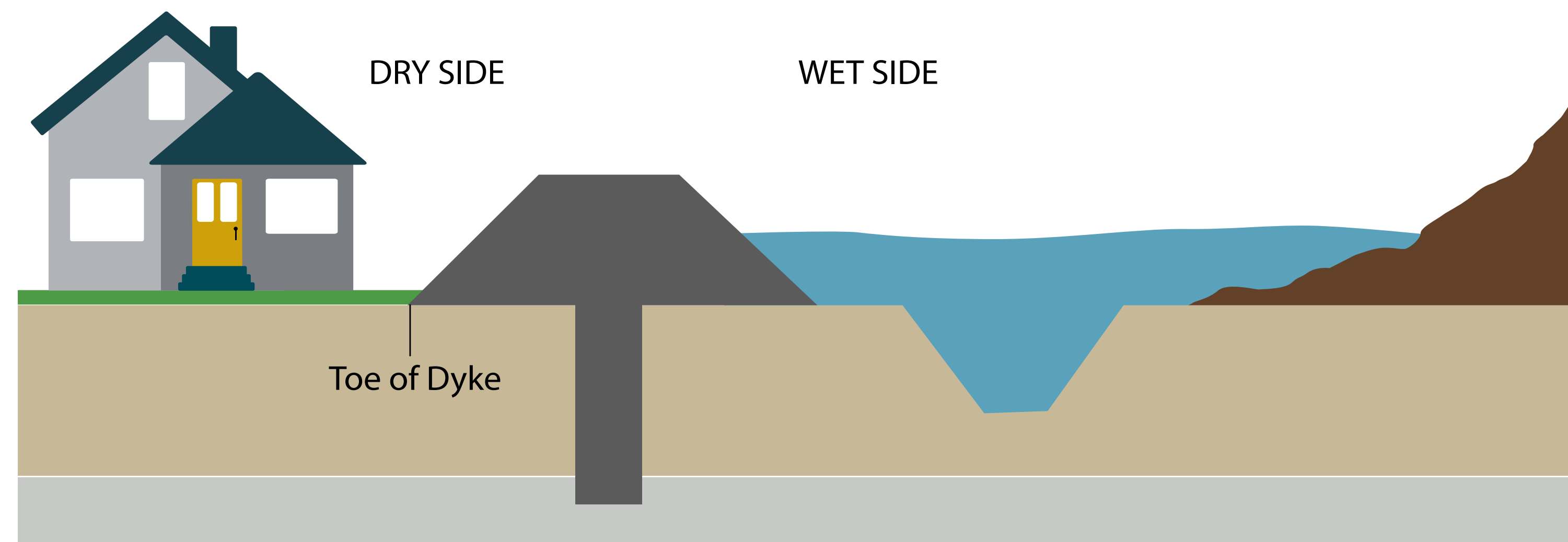
- **Meet current design standards**
 - Ensure performance of flood protection at the current crest levels at minimum.
 - *Pickering Dyke: 100-year storm flood event*
 - *Ajax Dyke: 50-year storm flood event*
- **Protect the dykes against channel bank erosion**
- **Enhance the natural environment**
- **Allow for future improvements**
 - Flexibility to increase level of flood protection in the future

HISTORY OF FLOODING

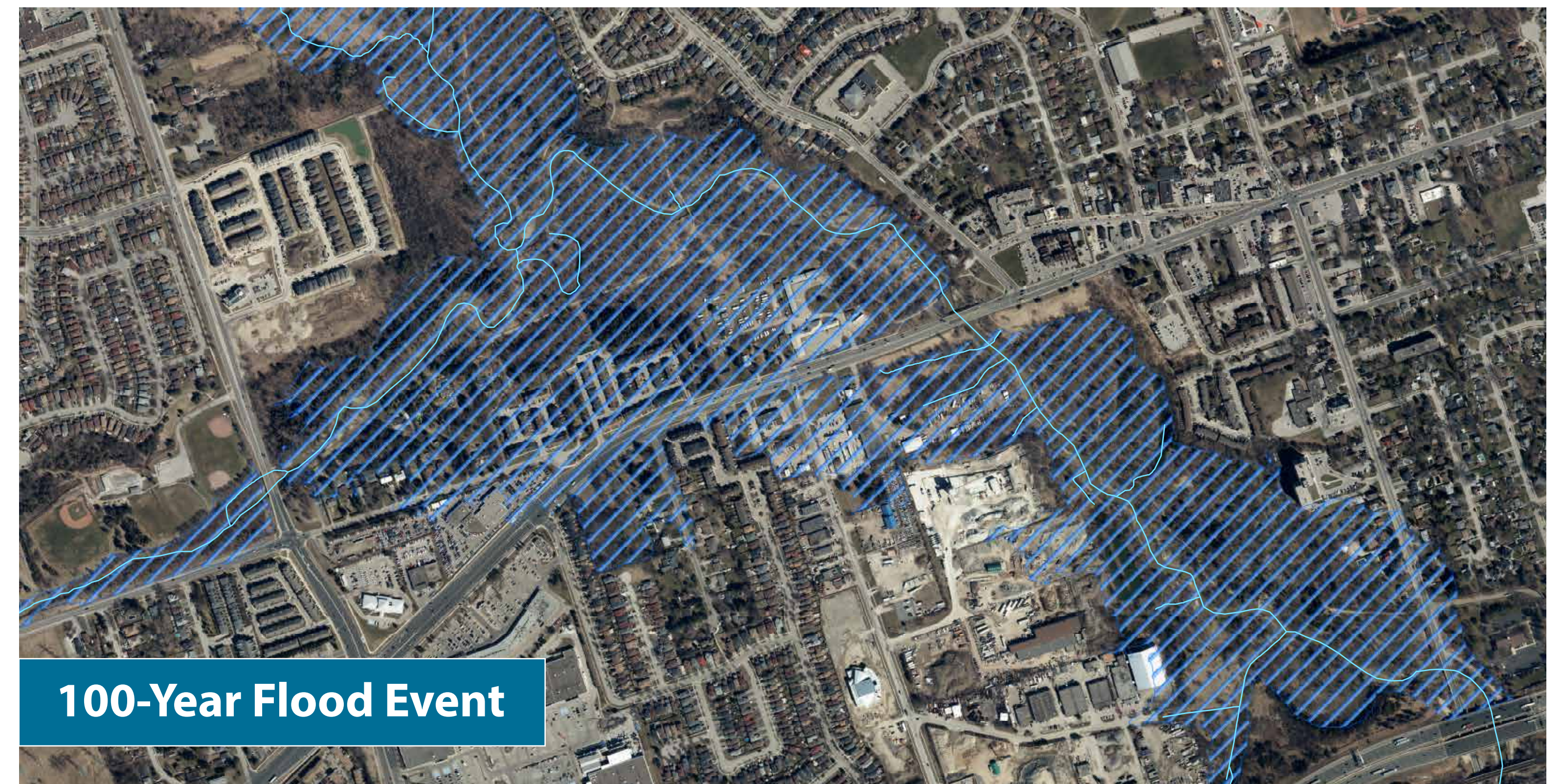
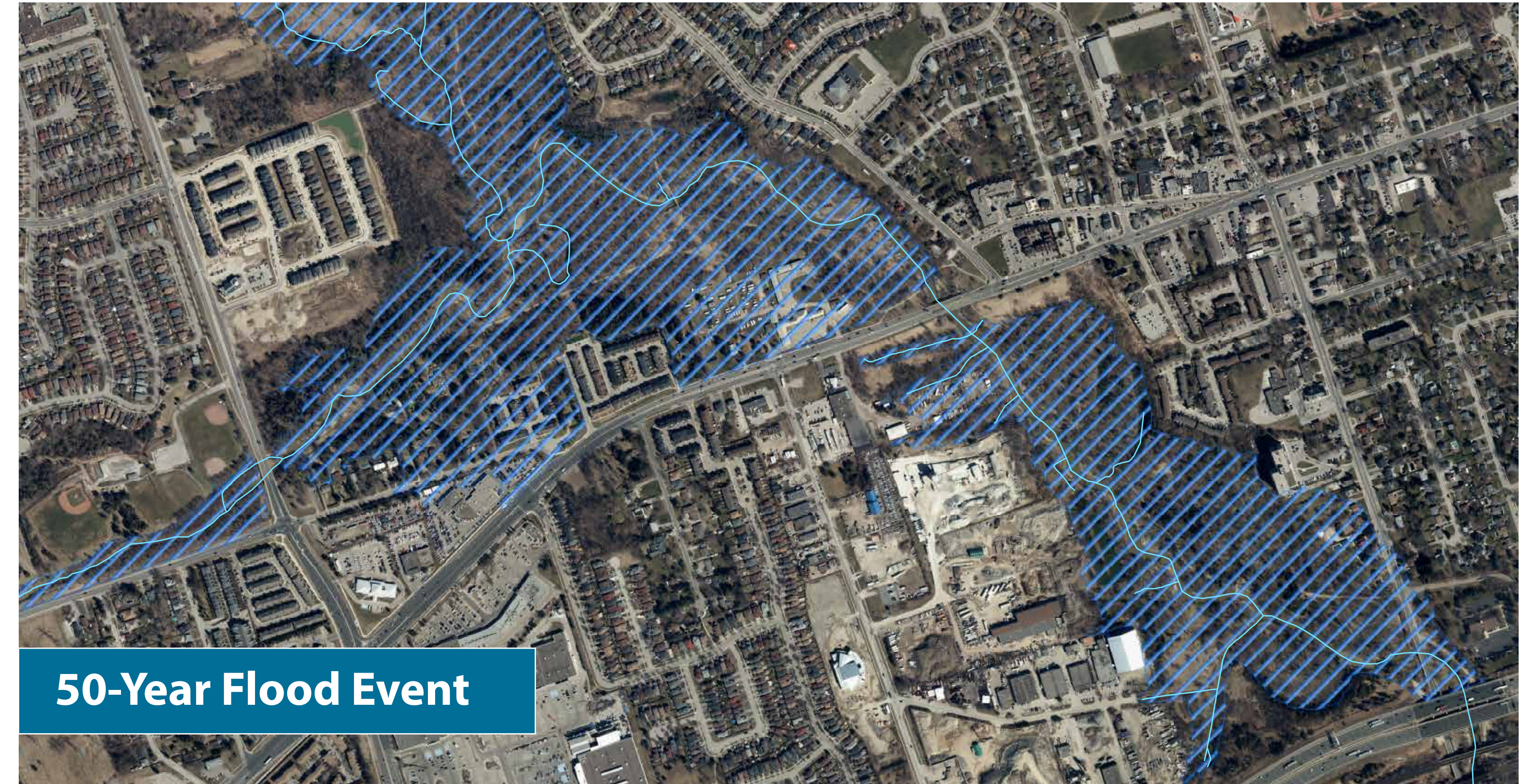
- Before the dykes were constructed the adjacent residential areas flooded frequently
- **1980's (approximately) Special Policy Area (SPA) Designation** for Village East and Notion Road/Pickering Village communities
- **1984-1985 Pickering and Ajax Dykes constructed** Designed to provide flood protection for the communities up to the 500-year storm flood

WHAT IS A DYKE?

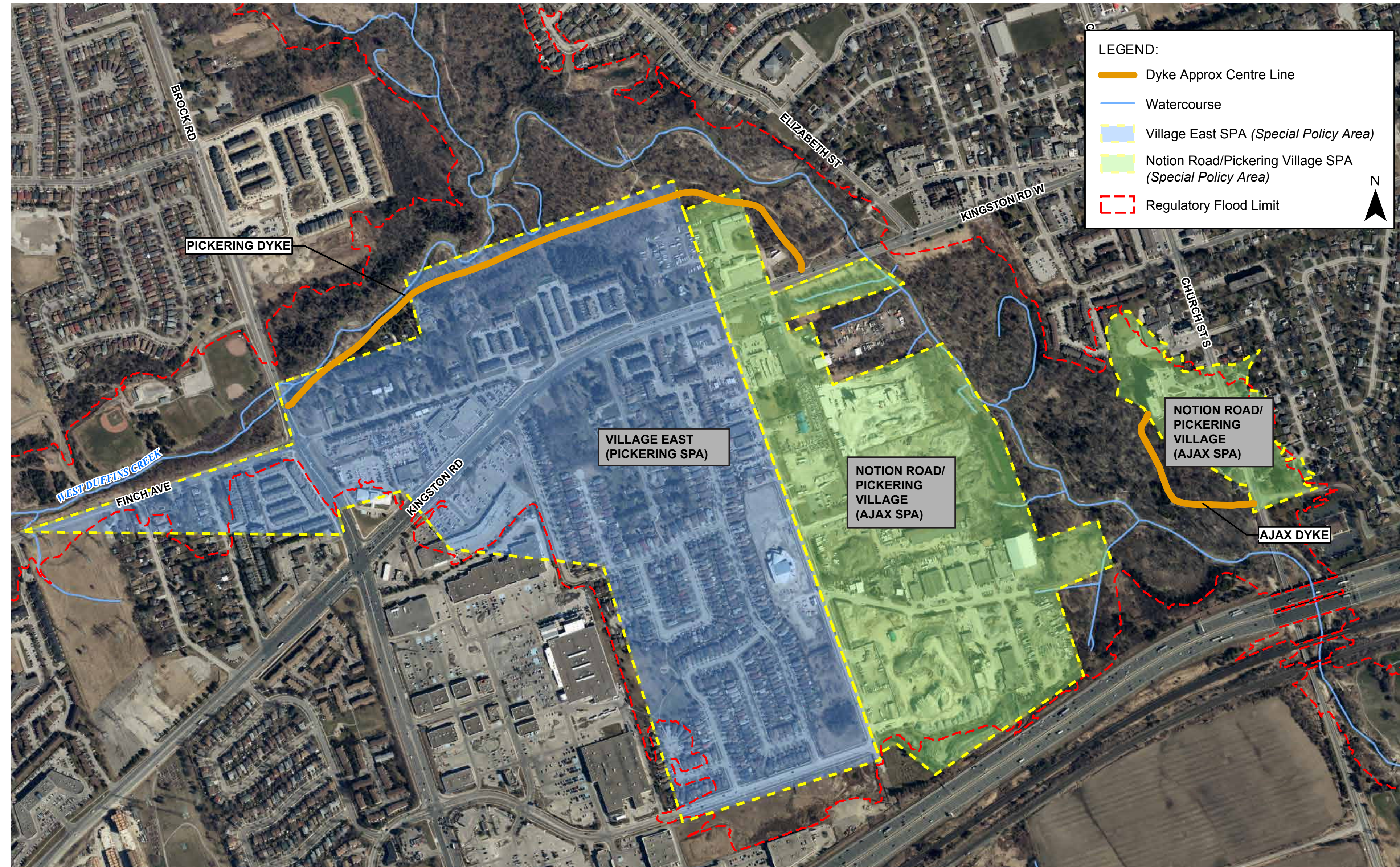
A flood control dyke is a long wall or embankment built to prevent flooding from a river course.



POTENTIAL FLOOD EXTENT WITHOUT DYKES



FLOOD RISK 101



WHAT IS A FLOODPLAIN?

A floodplain is the area beside a watercourse that would be covered in water by a flood event.

WHAT IS A SPECIAL POLICY AREA (SPA)?

A Special Policy Area is a land use planning designation that acknowledges that there is already development in a flood vulnerable area and that only limited changes can be made to the development in the flood plain.

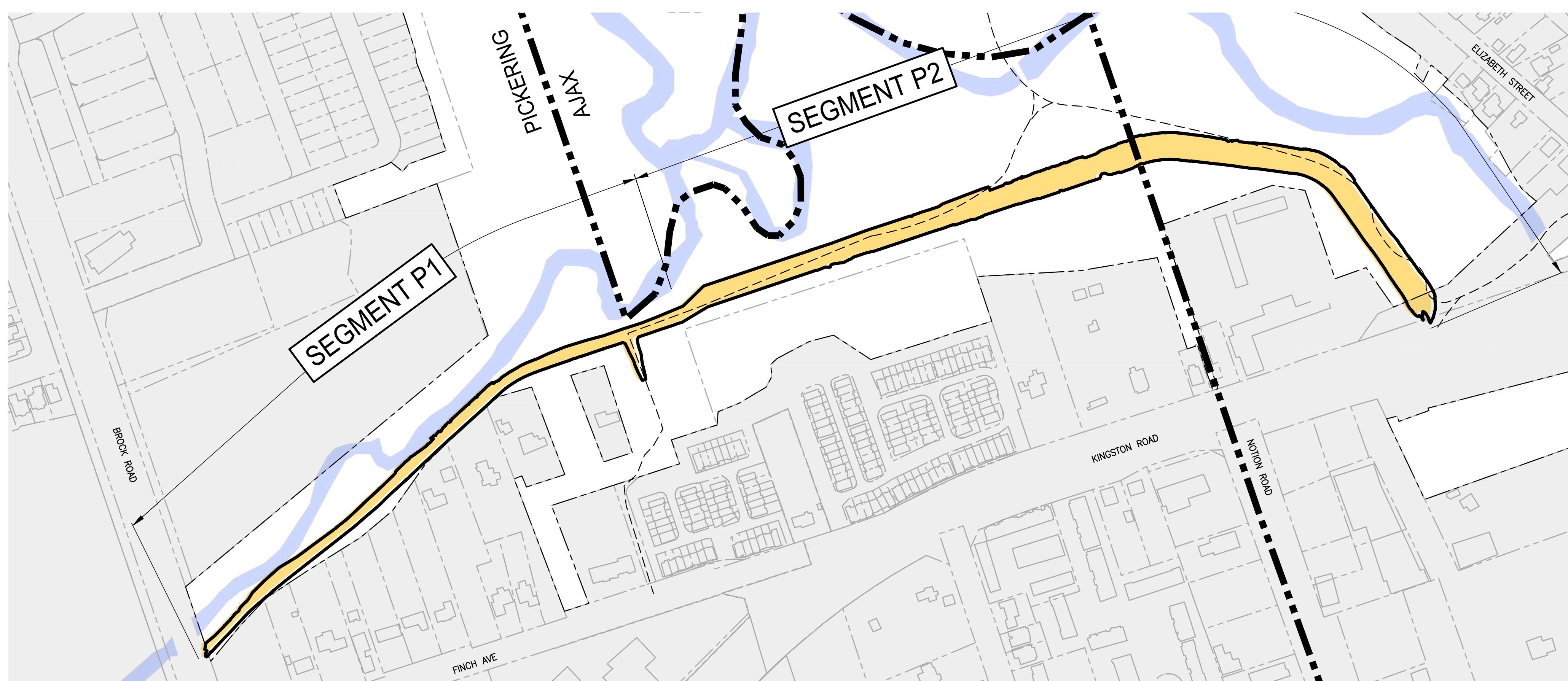
WHAT IS THE REGULATORY FLOOD?

The Regulatory flood is the extent of flooding that would occur if a storm the size of Hurricane Hazel (the largest storm on record in southern Ontario) falls over an area.

DYKE SEGMENTS

- The dykes were divided into segments based on unique characteristics of the dyke and surrounding area
- Segmentation allows for a solution unique to each segment

PICKERING DYKE



SEGMENT PICKERING 1 (P1)

Previously Segment 1 and 2

Preferred Alternative Solution: 'Hard' Engineering Solution to a 100 year level flood protection

Design Concepts

- H1 – MSE Wall + Sheetpile
- H2 – Modified Embankment + Sheetpile
- H3 – Sheetpile Only
- H4 – Modified Embankment + Concrete Wall

SEGMENT PICKERING 2 (P2)

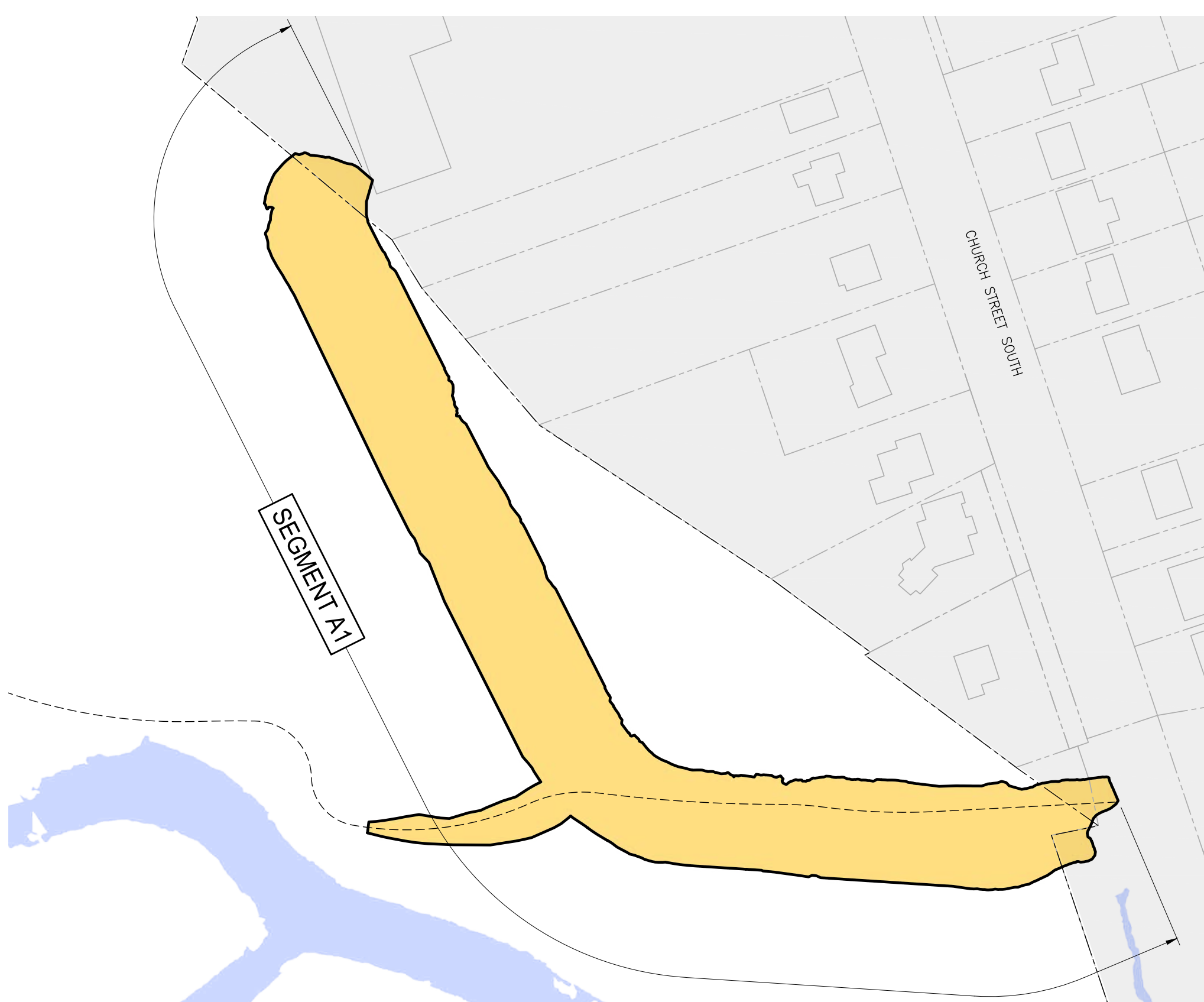
Previously Segments 3, 4 and 5.

Preferred Alternative Solution: 'Soft' Engineering Solution to a 100 year level flood protection

Design Concepts

- S1 – Modified Embankment + Filter
- S2 – Modified Embankment + Seepage Cutoff + Filter where needed

AJAX DYKE



SEGMENT AJAX 1 (A1)

Previously Segment 6.

Preferred Alternative Solution: 'Soft' Engineering Solution to a 100 year level flood protection

Design Concepts

- S1 – Modified Embankment + Filter
- S2 – Modified Embankment + Seepage Cutoff + Filter where needed

SUMMARY EVALUATION OF ALTERNATIVE DESIGN CONCEPTS

SEGMENT P1 – PICKERING DYKE

| EVALUATION CRITERIA | CONCEPT H1: MSE WALL + SHEETPILE | CONCEPT H2: MODIFIED DRY-SIDE EMBANKMENT + SHEETPILE | CONCEPT H3: STRUCTURAL SHEETPILE IN EXISTING | CONCEPT H4: MODIFIED DRY-SIDE EMBANKMENT + CONCRETE WALL |
|--|---|--|---|--|
| SOCIAL ENVIRONMENT | | | | |
| Removal or disturbance to private and public property not owned by TRCA | <ul style="list-style-type: none"> • Smallest disturbance and impacts to private properties • Dyke and drainage swale contained on TRCA property • Temporary construction access could require up to 5m at the rear of private properties | <ul style="list-style-type: none"> • Moderate disturbance and impacts to private properties • Dyke contained on TRCA property while drainage swale could require up to 1.5m at the rear of private properties • Temporary construction access could require up to an additional 5m at the rear of private properties | <ul style="list-style-type: none"> • Largest disturbance and impacts to private properties • Dyke contained on TRCA property while drainage swale could require up to 1.5m at the rear of private properties • Temporary construction access could require up to 20m at the rear of private properties • Potential for additional impacts if tie-backs are required | <ul style="list-style-type: none"> • Moderate disturbance and impacts to private properties • Dyke contained on TRCA property while drainage swale could require up to 1.5m at the rear of private properties • Temporary construction access could require up to an additional 5m at the rear of private properties |
| Effects on public recreational spaces | <ul style="list-style-type: none"> • Largest temporary and long-term impacts • Municipal trail from Bluebird Cres to the dyke would be temporarily closed for use as construction access • Fence / barrier required along top of MSE wall per local building codes • Pedestrian access to cross dyke would be impeded by wall • Opportunity to improve public realm at top of dyke | <ul style="list-style-type: none"> • Minor temporary impacts • Municipal trail from Bluebird Cres to the dyke would be temporarily closed for use as construction access • Dyke slope allows pedestrians to cross the dyke as existing • Fall barrier may be needed in some areas with steeper slopes as required • Opportunity to improve public realm | <ul style="list-style-type: none"> • Minor temporary impacts • Municipal trail from Bluebird Cres to the dyke would be temporarily closed for use as construction access • Dyke slope allows pedestrians to cross the dyke as existing • Fall barrier may be needed in some areas with steeper slopes as required • Less opportunity to improve public realm | <ul style="list-style-type: none"> • Minor temporary impacts • Municipal trail from Bluebird Cres to the dyke would be temporarily closed for use as construction access • Dyke slope allows pedestrians to cross the dyke as existing • Fall barrier may be needed in some areas with steeper slopes as required • Opportunity to improve public realm |
| Disruption caused by construction activities | <ul style="list-style-type: none"> • Moderate construction duration • Typical temporary construction impacts (dust, noise, vibration, etc.) | <ul style="list-style-type: none"> • Shortest construction duration • Typical temporary construction impacts (dust, noise, vibration, etc.) | <ul style="list-style-type: none"> • Moderate construction duration with potential for extended duration should the use of tie-backs be required • Significant temporary construction impacts due to larger equipment | <ul style="list-style-type: none"> • Longest construction duration • Significant temporary construction impacts due to significant excavation and concrete work |
| Effects to servicing, utilities and infrastructure | <ul style="list-style-type: none"> • No public utilities in the P1 segment • Potential private utilities can be accommodated during construction | <ul style="list-style-type: none"> • No public utilities in the P1 segment • Potential private utilities can be accommodated during construction | <ul style="list-style-type: none"> • No public utilities in the P1 segment • Potential private utilities can be accommodated during construction | <ul style="list-style-type: none"> • No public utilities in the P1 segment • Potential private utilities can be accommodated during construction |
| Removal or disturbance of potential archaeological resources | <ul style="list-style-type: none"> • Smallest excavation footprint • Smallest chance of disturbing potential archaeological resources | <ul style="list-style-type: none"> • Small excavation footprint • Small chance of disturbing potential archeological resources | <ul style="list-style-type: none"> • Small excavation footprint • Small chance of disturbing potential archeological resources with increased potential should the use of tie-backs be required | <ul style="list-style-type: none"> • Largest excavation footprint • Largest chance of disturbing potential archeological resources |
| Aesthetics | <ul style="list-style-type: none"> • Low aesthetic value due to wall and fence • Natural appearance with native grasses on wet side | <ul style="list-style-type: none"> • High aesthetic value: natural appearance with native grasses | <ul style="list-style-type: none"> • Highest aesthetic value: natural appearance with native grasses, and greatest opportunity for trees and shrubs | <ul style="list-style-type: none"> • Low aesthetic value: natural appearance with native grasses on dry side but with concrete wall on wet side |
| SUMMARY | MODERATELY PREFERRED | MOST PREFERRED | LEAST PREFERRED | LEAST PREFERRED |
| COST | | | | |
| Capital cost | • \$ 7.2 Million | • \$ 7.0 Million | • \$ 11.1 Million | • \$ 10.7 Million |
| Operations and maintenance cost | • Low maintenance cost | • Low maintenance cost | <ul style="list-style-type: none"> • Moderate maintenance cost • Smallest area to mow (crest only) however, more effort and cost to repair regular nuisance failures | • Low maintenance cost |
| SUMMARY | MODERATELY PREFERRED | MOST PREFERRED | LEAST PREFERRED | LEAST PREFERRED |

SUMMARY EVALUATION OF ALTERNATIVE DESIGN CONCEPTS

SEGMENT P1 – PICKERING DYKE

| EVALUATION CRITERIA | CONCEPT H1: MSE WALL + SHEETPILE | CONCEPT H2: MODIFIED DRY-SIDE EMBANKMENT + SHEETPILE | CONCEPT H3: STRUCTURAL SHEETPILE IN EXISTING | CONCEPT H4: MODIFIED DRY-SIDE EMBANKMENT + CONCRETE WALL |
|--|--|--|---|--|
| NATURAL ENVIRONMENT | | | | |
| Removal, disturbance or enhancement of terrestrial habitat | <ul style="list-style-type: none"> Requires removal of trees Moderate temporary disturbance during construction Moderate permanent disturbance. Dyke footprint similar to existing | <ul style="list-style-type: none"> Requires removal of trees Moderate temporary disturbance during construction Moderate permanent disturbance. Dyke footprint slightly larger than existing | <ul style="list-style-type: none"> Requires removal of trees Largest temporary disturbance during construction Smallest permanent disturbance Potential additional areas of disturbance should tie-backs be required | <ul style="list-style-type: none"> Requires removal of trees Large temporary disturbance during construction Moderate permanent disturbance. Dyke footprint similar to existing |
| Removal, disturbance or enhancement of aquatic habitat | <ul style="list-style-type: none"> Moderate disturbance to aquatic habitat due to installation of erosion controls Significant temporary impact during construction if channel is used for access Permanent reduction of instream erosion | <ul style="list-style-type: none"> Moderate disturbance to aquatic habitat due to installation of erosion controls Significant temporary impact during construction if channel is used for access Permanent reduction of instream erosion | <ul style="list-style-type: none"> Smallest disturbance to aquatic habitat as erosion controls are limited Potential for large long-term impacts if channel bank erodes Largest short-term disturbance should tie-backs be required | <ul style="list-style-type: none"> Largest disturbance to aquatic habitat due to significant excavation Permanent reduction of instream erosion |
| SUMMARY | MOST PREFERRED | MOST PREFERRED | LEAST PREFERRED | LEAST PREFERRED |
| TECHNICAL ENVIRONMENT | | | | |
| Allowance for future enhancement to a higher level of flood protection | <ul style="list-style-type: none"> Moderate effort to raise / enhance the dyke in the future Potential to raise MSE wall and extend sheetpile | <ul style="list-style-type: none"> Least effort to raise / enhance the dyke in the future Larger footprint required, which may require private properties | <ul style="list-style-type: none"> Moderate effort to raise / enhance the dyke in the future Potential increased maintenance needs and difficulty in maintenance | <ul style="list-style-type: none"> Moderate effort to raise / enhance the dyke in the future Larger footprint required, which may require private property |
| Construction complexity and constraints | <ul style="list-style-type: none"> Moderate construction constraints and complexities Additional construction complexities due to the installation of sheetpile and MSE wall using small equipment within limited space | <ul style="list-style-type: none"> Least construction constraints and complexities Additional construction complexities due to the installation of sheetpile using small equipment within limited space | <ul style="list-style-type: none"> Significant construction constraints and complexities due to large construction equipment operating within limited space Potential increase to construction constraints and complexity if tie-backs are required | <ul style="list-style-type: none"> Significant construction constraints and complexities due to excavation and concrete work in close proximity to the creek |
| Service life | <ul style="list-style-type: none"> Minimum 50 year design life, with regular maintenance and monitoring Additional erosion mitigation measures may be required long-term | <ul style="list-style-type: none"> Minimum 50 year design life, with regular maintenance and monitoring Additional erosion mitigation measures may be required long-term | <ul style="list-style-type: none"> Minimum 50 year design life, with regular maintenance and monitoring Additional erosion mitigation measures may be required long-term | <ul style="list-style-type: none"> Minimum 50 year design life, with regular maintenance and monitoring Additional erosion mitigation measures may be required long-term |
| Maintenance requirements | <ul style="list-style-type: none"> Typical, low complexity, maintenance works required on a regular basis (ie. mowing and culvert cleaning) Potential, more complex, maintenance of MSE wall, fence / barrier and bank erosion protection | <ul style="list-style-type: none"> Typical, low complexity, maintenance works required on a regular basis (ie. mowing and culvert cleaning) Potential maintenance of bank erosion protection | <ul style="list-style-type: none"> Typical, low complexity, maintenance works required on a regular basis (ie. mowing and culvert cleaning) Potential maintenance of bank erosion protection and repair of damage from slope failures and tree failures | <ul style="list-style-type: none"> Typical, low complexity, maintenance works required on a regular basis (ie. mowing and culvert cleaning) Potential, complex, maintenance of concrete wall and bank erosion protection |
| SUMMARY | MOST PREFERRED | MOST PREFERRED | MODERATELY PREFERRED | LEAST PREFERRED |
| OVERALL | MODERATELY PREFERRED | MOST PREFERRED | LEAST PREFERRED | LEAST PREFERRED |

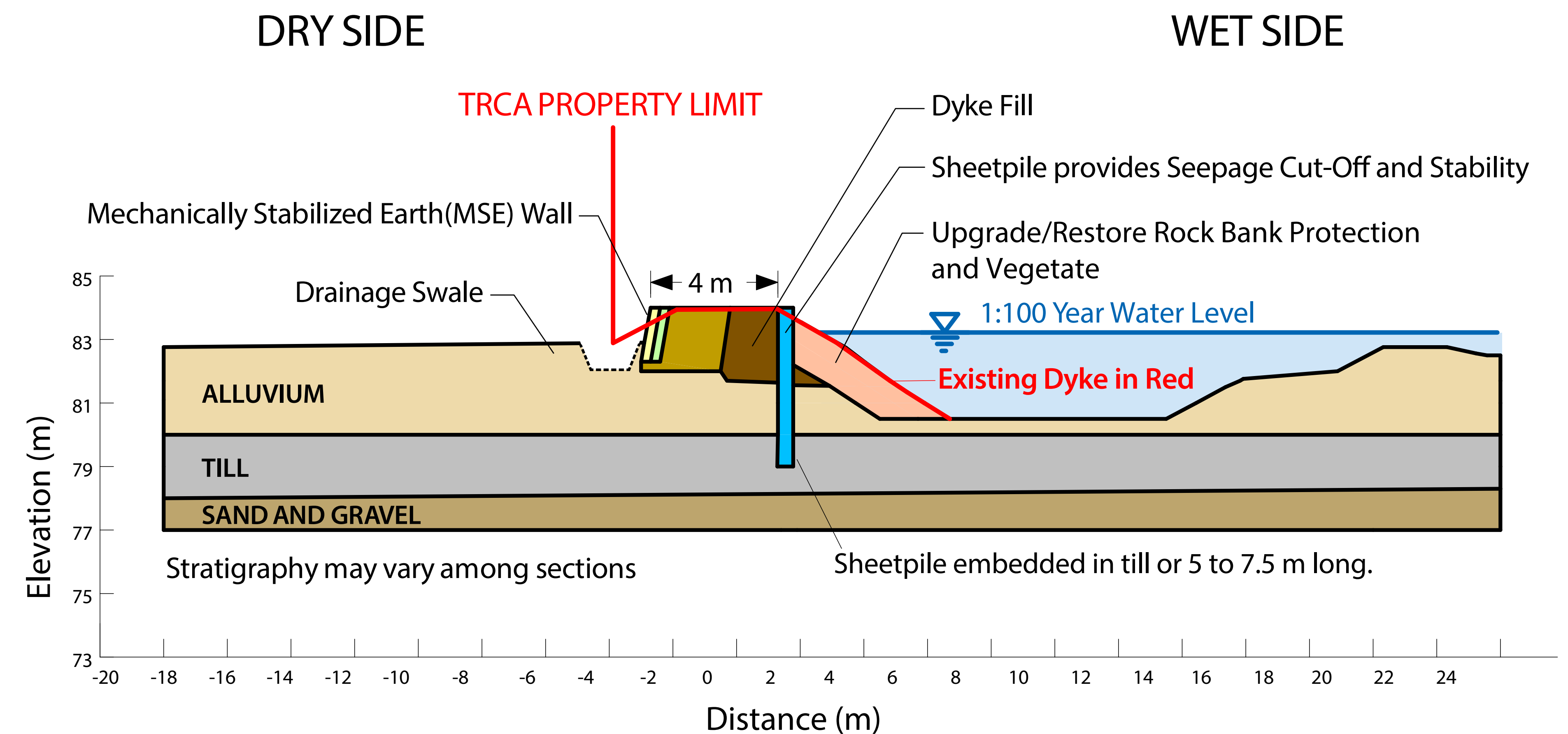
DESIGN CONCEPT H1: MSE WALL + SHEETPILE

ADVANTAGES

- Moderate capital cost (\$7.2 million)
- Smallest footprint and disturbance area
- Smallest impact to private properties (no permanent impact, up to 5 m temporary impact for construction)
- Can be raised in the future without permanently impacting private properties

DISADVANTAGES

- Lowest aesthetics: not a natural appearance and requires a fence at top for public safety
- Dyke difficult to cross. Higher complexity for maintaining pedestrian access to creek.
- Slightly more complex construction than typical embankment
- Moderate construction duration



DESIGN CONCEPTS

PICKERING DYKE (P1)

DESIGN CONCEPT H2: MODIFIED DRY-SIDE EMBANKMENT + SHEETPILE

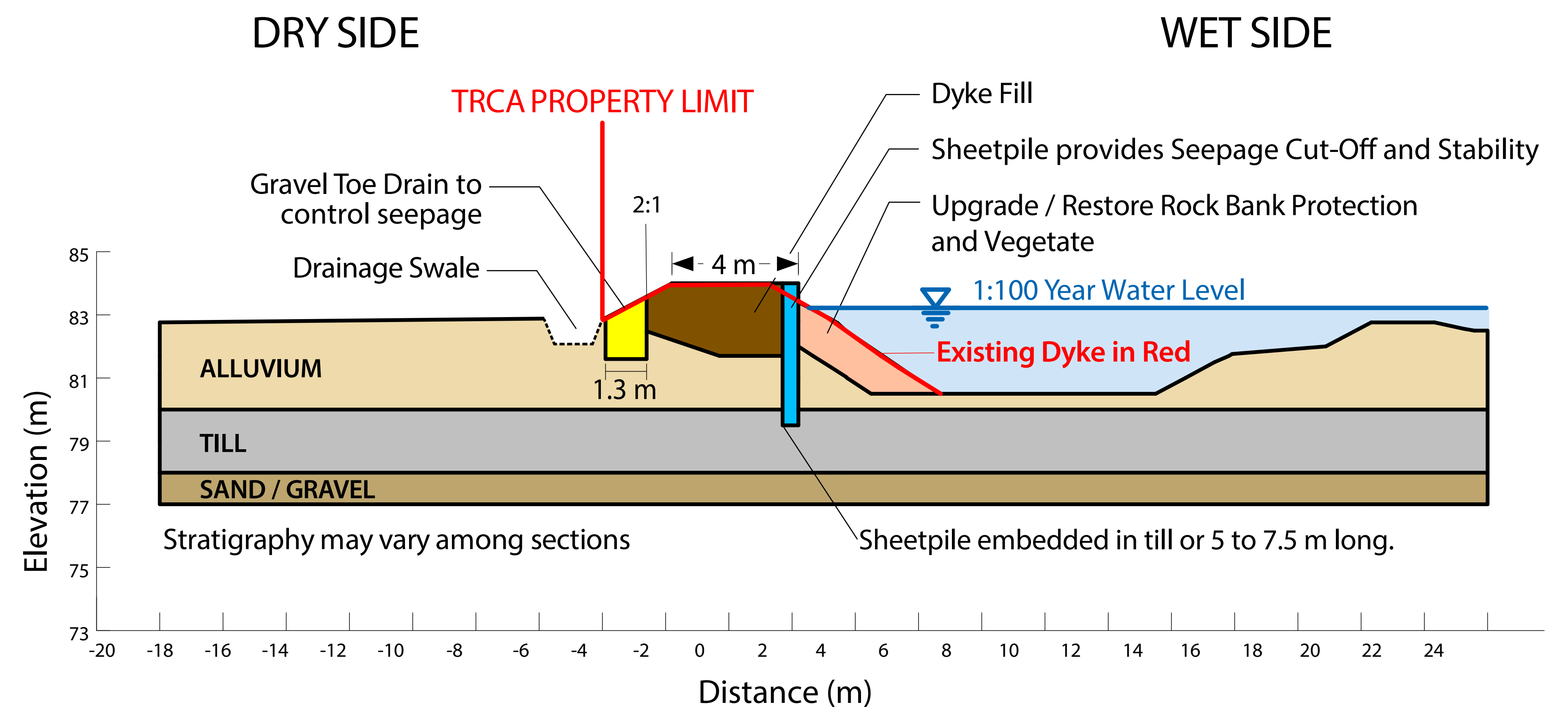
RECOMMENDED
PREFERRED CONCEPT
FOR DYKE SEGMENT P1

ADVANTAGES

- Lowest capital cost (\$7 million)
- Lowest construction complexity and time
- Easiest pedestrian access to creek
- Preferred aesthetic: natural appearance

DISADVANTAGES

- Moderate footprint (larger than existing) and disturbance area
- Impacts to private properties (up to 1.5 m permanent impact for drainage, plus 5 m temporary impact for construction)



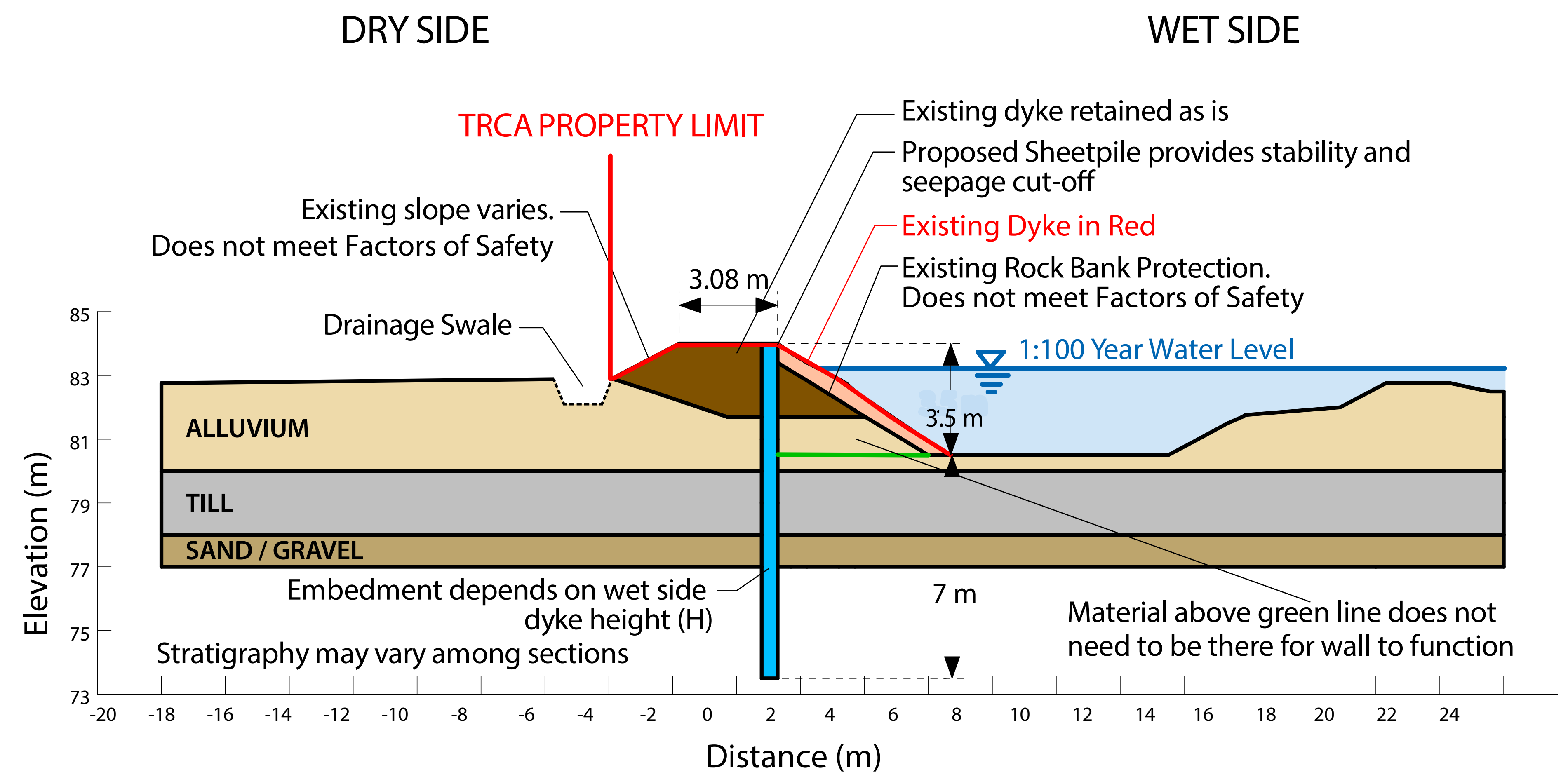
DESIGN CONCEPT H3: DEEP STRUCTURAL SHEETPILE

ADVANTAGES

- Greatest aesthetics: most natural appearance
- Smallest permanent disturbance area
- Lowest immediate aquatic impacts

DISADVANTAGES

- Highest capital cost (\$11.1 million)
- Largest construction impact and largest equipment required
- Slopes do not meet standards and could fail, causing environmental impacts and requiring expensive repairs
- Narrower crest width limits maintenance access
- More susceptible to construction complications which could increase impacts



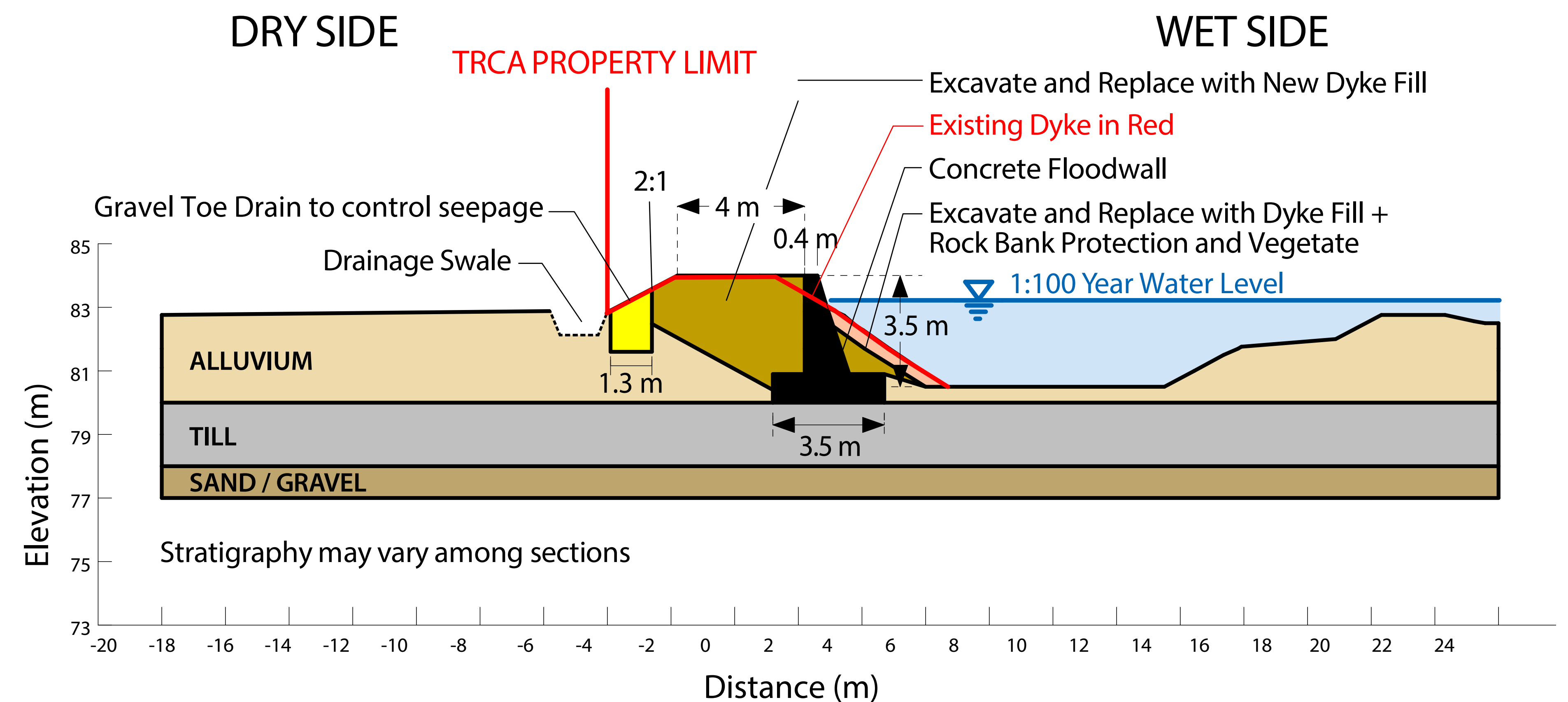
DESIGN CONCEPT H4: MODIFIED DRY-SIDE EMBANKMENT + CONCRETE WALL

ADVANTAGES

- No notable advantages over other options

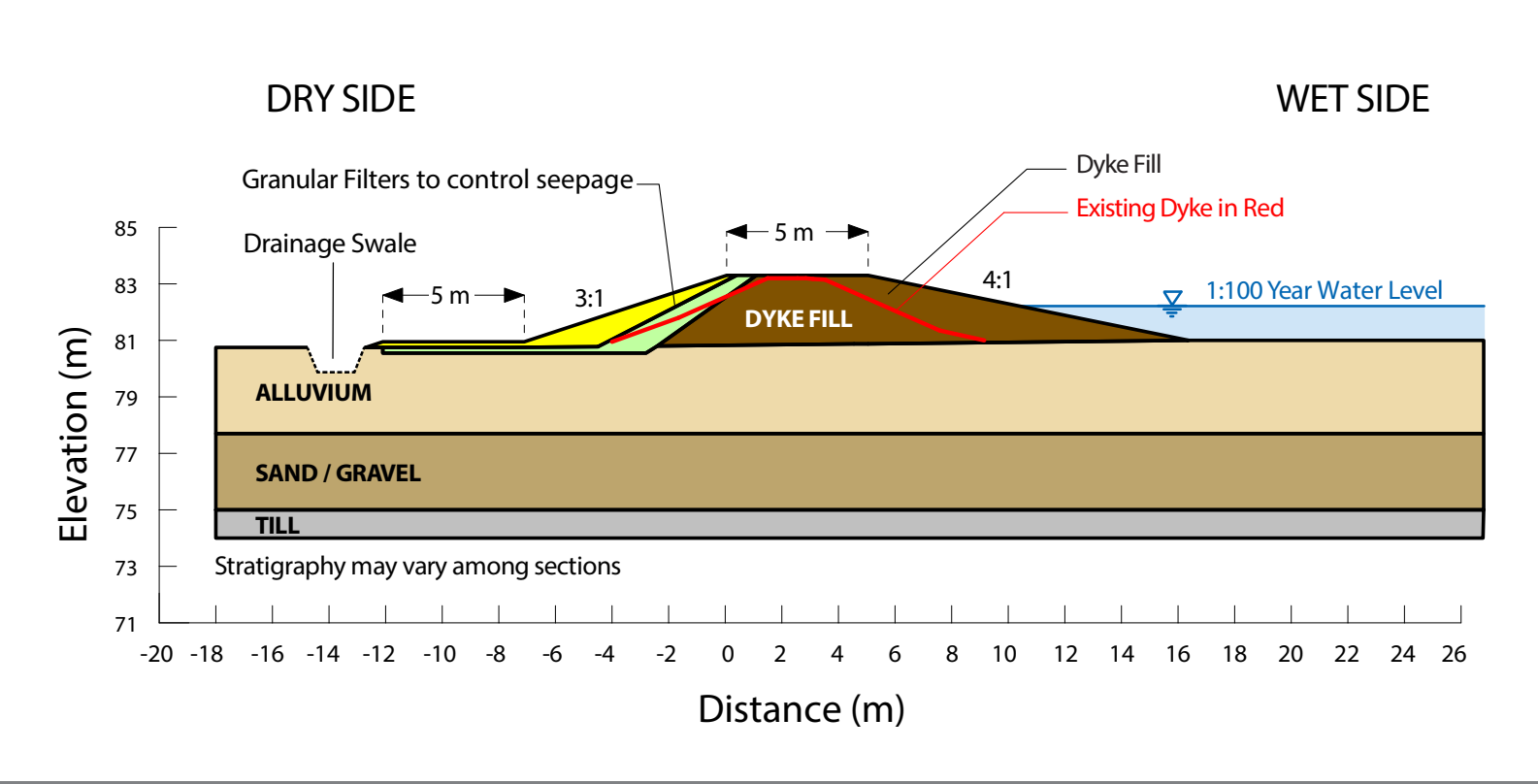
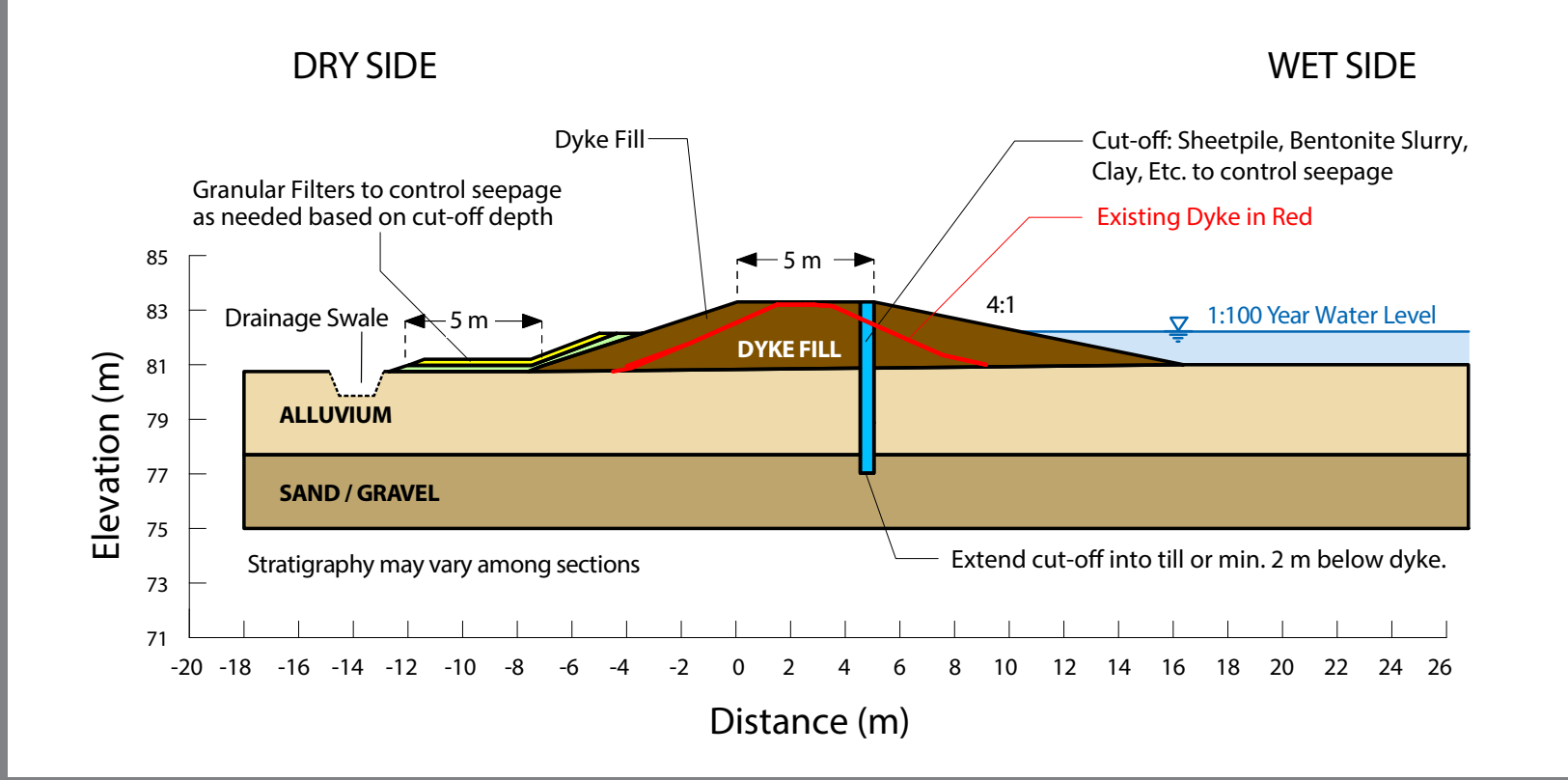
DISADVANTAGES

- High capital cost (\$10.7 million)
- Large construction disturbance including creek
- Difficult construction and future repairs
- Longest construction duration
- Impacts to private properties



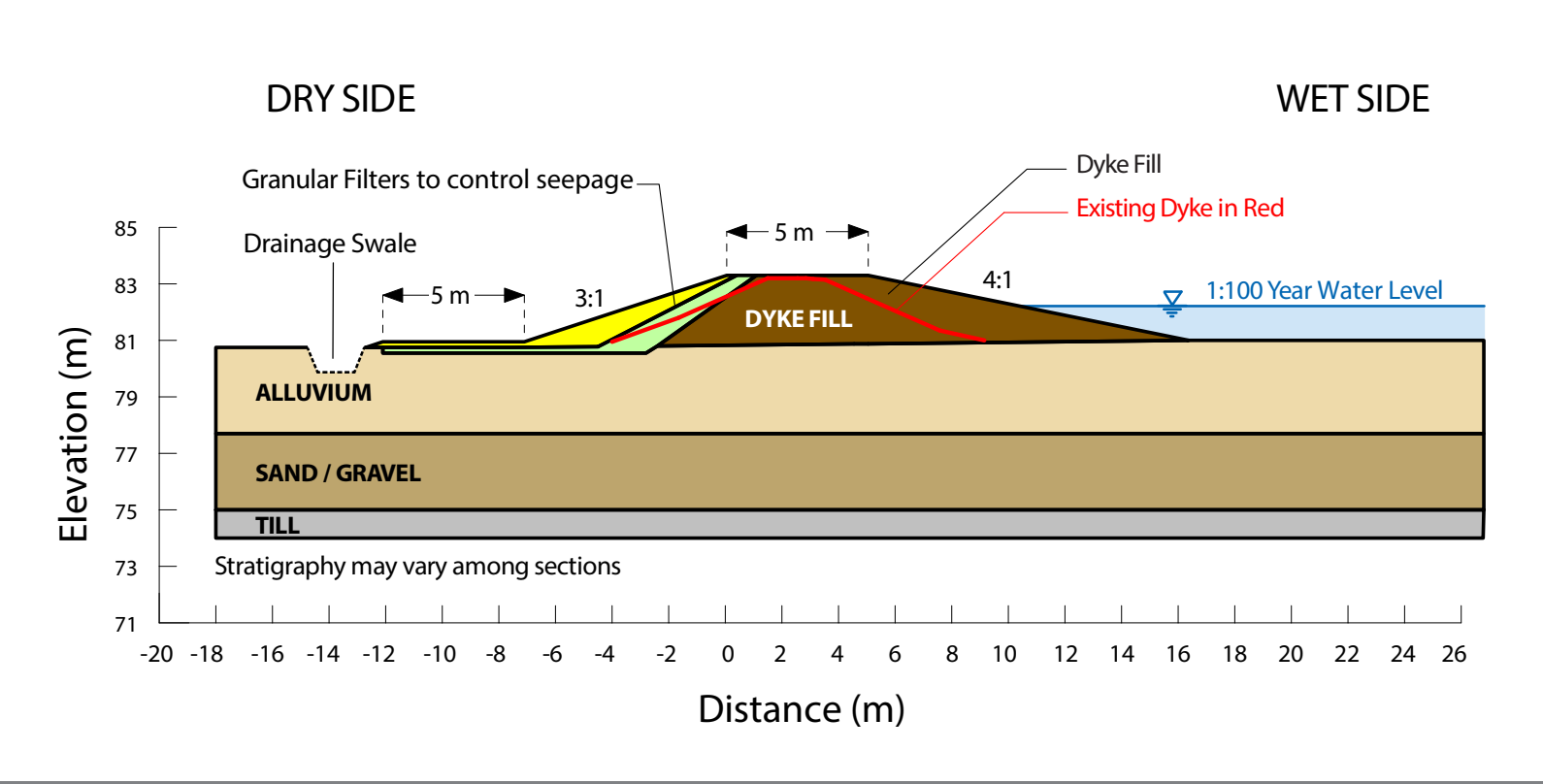
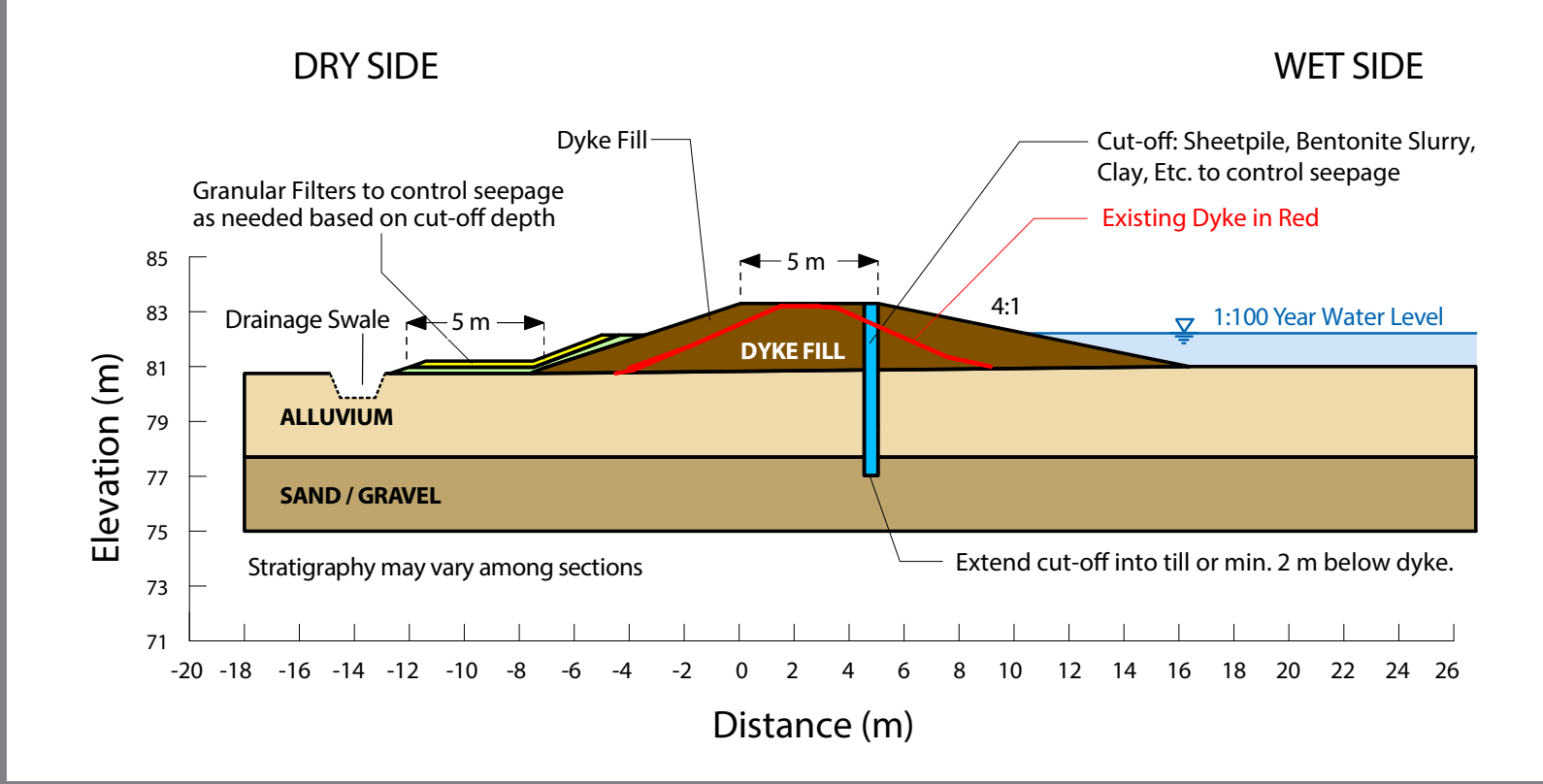
SUMMARY EVALUATION OF ALTERNATIVE DESIGN CONCEPTS

SEGMENT P2 – PICKERING DYKE

| EVALUATION CRITERIA | CONCEPT S1: MODIFIED EMBANKMENTS + FILTER | CONCEPT S2: MODIFIED EMBANKMENTS + SEEPAGE CUT-OFF + (where needed) FILTER |
|---|--|--|
| |  |  |
| SOCIAL ENVIRONMENT | | |
| Removal or disturbance to private and public property not owned by TRCA | <ul style="list-style-type: none"> No direct disturbance to private property All components of this design are contained on TRCA property Construction can be facilitated on TRCA and other public property | <ul style="list-style-type: none"> No direct disturbance to private property All components of this design are contained on TRCA property Construction can be facilitated on TRCA and other public property |
| Effects on public recreational spaces | <ul style="list-style-type: none"> Temporary removal of the TransCanada trail and municipal recreational trail during construction Easier pedestrian access over dyke due to gentler side slopes Opportunity to improve public realm / open space areas | <ul style="list-style-type: none"> Temporary removal of the TransCanada trail and municipal recreational trail during construction Easier pedestrian access over dyke due to gentler side slopes Opportunity to improve public realm / open space areas |
| Disruption caused by construction activities | <ul style="list-style-type: none"> Shortest construction duration Typical temporary construction impacts (dust, noise, vibration, etc.) | <ul style="list-style-type: none"> Longest construction duration Typical temporary construction impacts (dust, noise, vibration, etc.), with potential for additional impacts if sheetpile is selected as preferred cut-off material |
| Effects to servicing, utilities and infrastructure | <ul style="list-style-type: none"> Least impact to existing servicing and utilities Pipes will remain covered during construction Requires coordination with multiple utility owners | <ul style="list-style-type: none"> Most impact to existing servicing and utilities due to interaction of seepage cut-off with pipes Pipes will need to be exposed during construction Requires coordination with multiple utility owners |
| Removal or disturbance of potential archaeological resources | <ul style="list-style-type: none"> Largest excavation footprint Highest chance of disturbing potential archaeological resources | <ul style="list-style-type: none"> Smallest excavation footprint Lowest chance of disturbing potential archaeological resources |
| Aesthetics | <ul style="list-style-type: none"> High aesthetics value: natural appearance with native grasses | <ul style="list-style-type: none"> High aesthetics value: natural appearance with native grasses |
| SUMMARY | MOST PREFERRED | MODERATELY PREFERRED |
| NATURAL ENVIRONMENT | | |
| Removal, disturbance, or enhancement of terrestrial habitat | <ul style="list-style-type: none"> Requires removal of trees Moderate temporary disturbance during construction Largest permanent disturbance, however only moderately larger than S2 | <ul style="list-style-type: none"> Requires removal of trees Moderate temporary disturbance during construction Smallest permanent disturbance, however only moderately smaller than S1 |
| Removal, disturbance, or enhancement of aquatic habitat | <ul style="list-style-type: none"> No permanent disturbance to aquatic habitat Potential for temporary disturbance during installation of drainage pipe | <ul style="list-style-type: none"> No permanent disturbance to aquatic habitat Potential for temporary disturbance during installation of drainage pipe |
| SUMMARY | MODERATELY PREFERRED | MOST PREFERRED |
| TECHNICAL ENVIRONMENT | | |
| Allowance for future enhancement to a higher level of flood protection | <ul style="list-style-type: none"> Dyke can easily be built upon to raise / enhance in the future | <ul style="list-style-type: none"> Dyke can be built upon to raise / enhance in the future More complex to raise dyke as the seepage cut-off must also be raised |
| Construction complexity and constraints | <ul style="list-style-type: none"> Typical earthworks construction practices, equipment and constraints Low complexity | <ul style="list-style-type: none"> Typical earthworks construction practices and equipment Moderate complexity and additional constraints due to seepage cut-off |
| Service life | <ul style="list-style-type: none"> Minimum 50 year design life, with regular maintenance | <ul style="list-style-type: none"> Minimum 50 year design life, with regular maintenance |
| Maintenance requirements | <ul style="list-style-type: none"> Typical, low complexity, maintenance works required on a regular basis (ie. mowing and culvert cleaning) | <ul style="list-style-type: none"> Typical, low complexity, maintenance works required on a regular basis (ie. mowing and culvert cleaning) |
| SUMMARY | MOST PREFERRED | MODERATELY PREFERRED |
| COST | | |
| Capital cost | <ul style="list-style-type: none"> \$ 3.0 Million | <ul style="list-style-type: none"> \$ 9.1 Million |
| Cost of flood damages | <ul style="list-style-type: none"> Low maintenance cost Largest area to mow, however only moderately larger than S2 | <ul style="list-style-type: none"> Low maintenance cost Smaller area to mow, however only moderately smaller than S1 |
| SUMMARY | MOST PREFERRED | LEAST PREFERRED |
| OVERALL | MOST PREFERRED | LEAST PREFERRED |

SUMMARY EVALUATION OF ALTERNATIVE DESIGN CONCEPTS

SEGMENT A1 – AJAX DYKE

| EVALUATION CRITERIA | CONCEPT S1: MODIFIED EMBANKMENTS + FILTER | CONCEPT S2: MODIFIED EMBANKMENTS + SEEPAGE CUT-OFF + (where needed) FILTER |
|---|--|---|
| |  |  |
| SOCIAL ENVIRONMENT | | |
| Removal or disturbance to private and public property not owned by TRCA | <ul style="list-style-type: none"> A small portion of the dyke will be located on private lands Potential temporary impacts to four properties for construction access Both concepts have equivalent impacts | <ul style="list-style-type: none"> A small portion of the dyke will be located on private lands Potential temporary impacts to four properties for construction access Both concepts have equivalent impacts |
| Effects on public recreational spaces | <ul style="list-style-type: none"> Temporary removal of the TransCanada trail during construction Easier pedestrian access over dyke due to gentler side slopes Opportunity to improve public realm / open space areas | <ul style="list-style-type: none"> Temporary removal of the TransCanada trail during construction Easier pedestrian access over dyke due to gentler side slopes Opportunity to improve public realm / open space area |
| Disruption caused by construction activities | <ul style="list-style-type: none"> Shortest construction duration Typical temporary construction impacts (dust, noise, vibration, etc.) | <ul style="list-style-type: none"> Longest construction duration Typical temporary construction impacts (dust, noise, vibration, etc.), with potential for additional impacts if sheetpile is selected as preferred cut-off material |
| Effects to servicing, utilities and infrastructure | <ul style="list-style-type: none"> Least impact to existing servicing and utilities Pipes will remain covered during construction Requires coordination with multiple utility owners | <ul style="list-style-type: none"> Most impact to existing servicing and utilities due to interaction of seepage cut-off with pipes Pipes will need to be exposed during construction Requires coordination with multiple utility owners |
| Removal or disturbance of potential archaeological resources | <ul style="list-style-type: none"> Large excavation footprint into undisturbed soils Chance of disturbing potential archaeological resources | <ul style="list-style-type: none"> Large excavation footprint into undisturbed soils Chance of disturbing potential archaeological resources |
| Aesthetics | <ul style="list-style-type: none"> High aesthetics value: natural appearance with native grasses | <ul style="list-style-type: none"> High aesthetics value: natural appearance with native grasses |
| SUMMARY | MOST PREFERRED | MODERATELY PREFERRED |
| NATURAL ENVIRONMENT | | |
| Removal, disturbance, or enhancement of terrestrial habitat | <ul style="list-style-type: none"> Requires removal of trees Moderate temporary disturbance during construction Large permanent disturbance (double the existing dyke footprint) Both concepts have equivalent impacts | <ul style="list-style-type: none"> Requires removal of trees Moderate temporary disturbance during construction Large permanent disturbance (double the existing dyke footprint) Both concepts have equivalent impacts |
| Removal, disturbance, or enhancement of aquatic habitat | <ul style="list-style-type: none"> No disturbance to aquatic habitat | <ul style="list-style-type: none"> No disturbance to aquatic habitat |
| SUMMARY | MOST PREFERRED | MOST PREFERRED |
| TECHNICAL ENVIRONMENT | | |
| Allowance for future enhancement to a higher level of flood protection | <ul style="list-style-type: none"> Dyke can easily be built upon to raise / enhance in the future | <ul style="list-style-type: none"> Dyke can be built upon to raise / enhance in the future More complex to raise dyke as the seepage cut-off must also be raised |
| Construction complexity and constraints | <ul style="list-style-type: none"> Typical earthworks construction practices, equipment and constraints Low complexity | <ul style="list-style-type: none"> Typical earthworks construction practices and equipment Moderate complexity and additional constraints due to seepage cut-off |
| Service life | <ul style="list-style-type: none"> Minimum 50 year design life, with regular maintenance | <ul style="list-style-type: none"> Minimum 50 year design life, with regular maintenance |
| Maintenance requirements | <ul style="list-style-type: none"> Typical, low complexity, maintenance works required on a regular basis (ie. mowing and culvert cleaning) | <ul style="list-style-type: none"> Typical, low complexity, maintenance works required on a regular basis (ie. mowing and culvert cleaning) |
| SUMMARY | MOST PREFERRED | MODERATELY PREFERRED |
| COST | | |
| Capital cost | <ul style="list-style-type: none"> \$ 2.6 Million | <ul style="list-style-type: none"> \$ 4.7 Million |
| Cost of flood damages | <ul style="list-style-type: none"> Low maintenance cost Largest area to mow | <ul style="list-style-type: none"> Low maintenance cost Large area to mow |
| SUMMARY | MOST PREFERRED | LEAST PREFERRED |
| OVERALL | MOST PREFERRED | LEAST PREFERRED |

DESIGN CONCEPT S1: MODIFIED EMBANKMENTS + FILTER

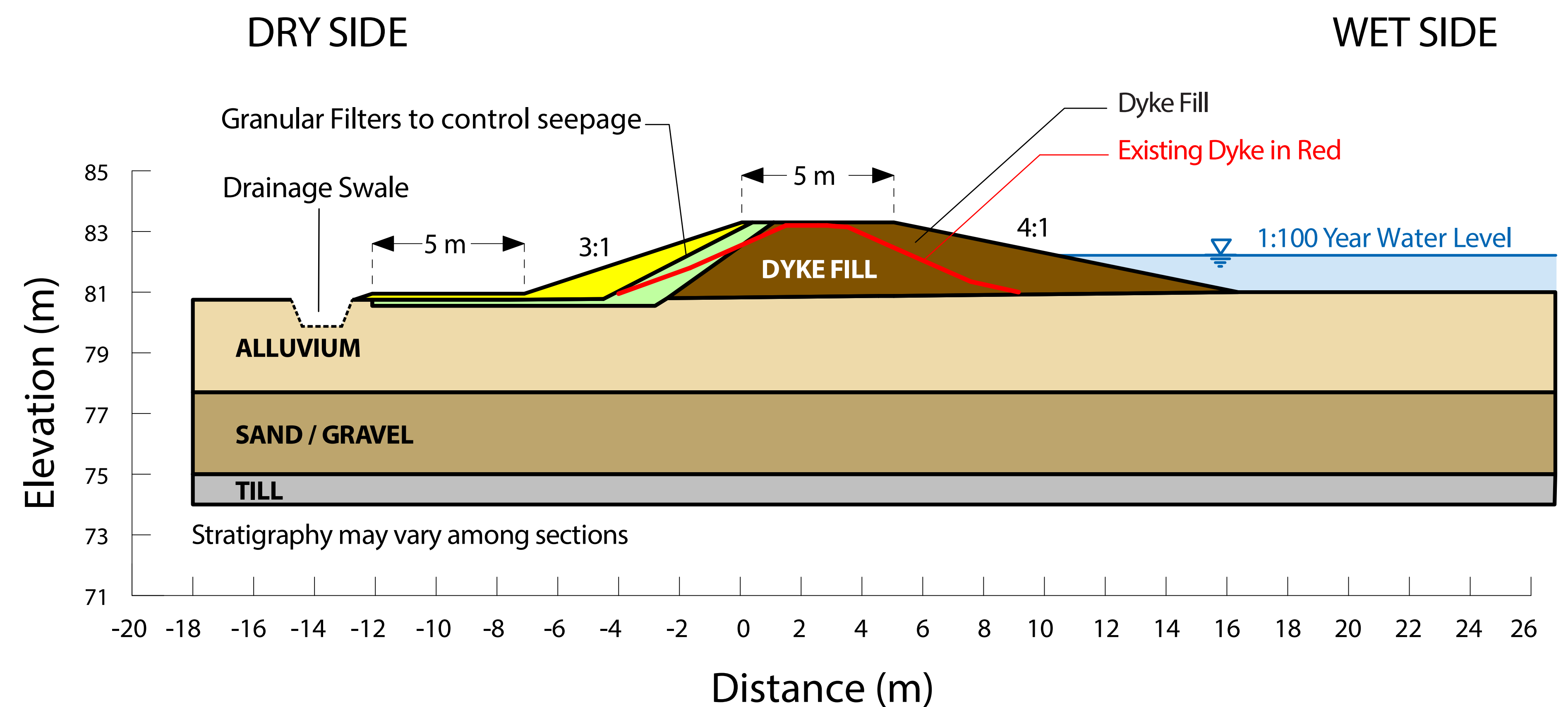
RECOMMENDED PREFERRED
CONCEPT FOR DYKE
SEGMENTS P2 & A1

ADVANTAGES

- Lowest capital cost (P2 \$3 million and A1 \$2.6 million)
- Easier and faster construction with fewer impacts
- No interaction with buried utilities, minimal impact
- Easier to raise in the future

DISADVANTAGES

- Largest footprint and construction area
- More area to maintain



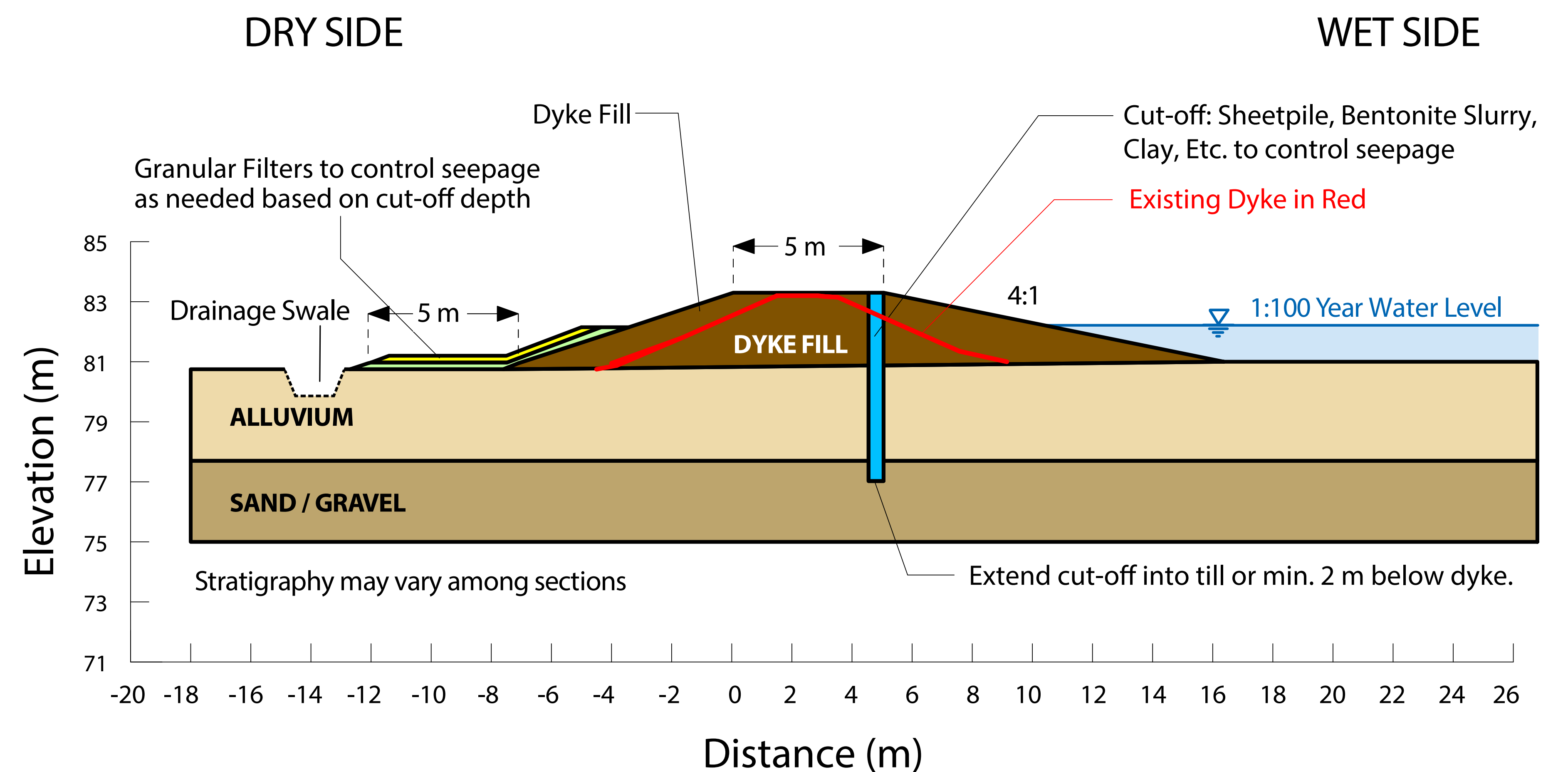
DESIGN CONCEPT S2: MODIFIED EMBANKMENTS + SEEPAGE CUT-OFF + FILTER WHERE NEEDED

ADVANTAGES

- Smaller footprint and construction area than S1 where the filter is not needed
- Less area to maintain where the filter is not needed

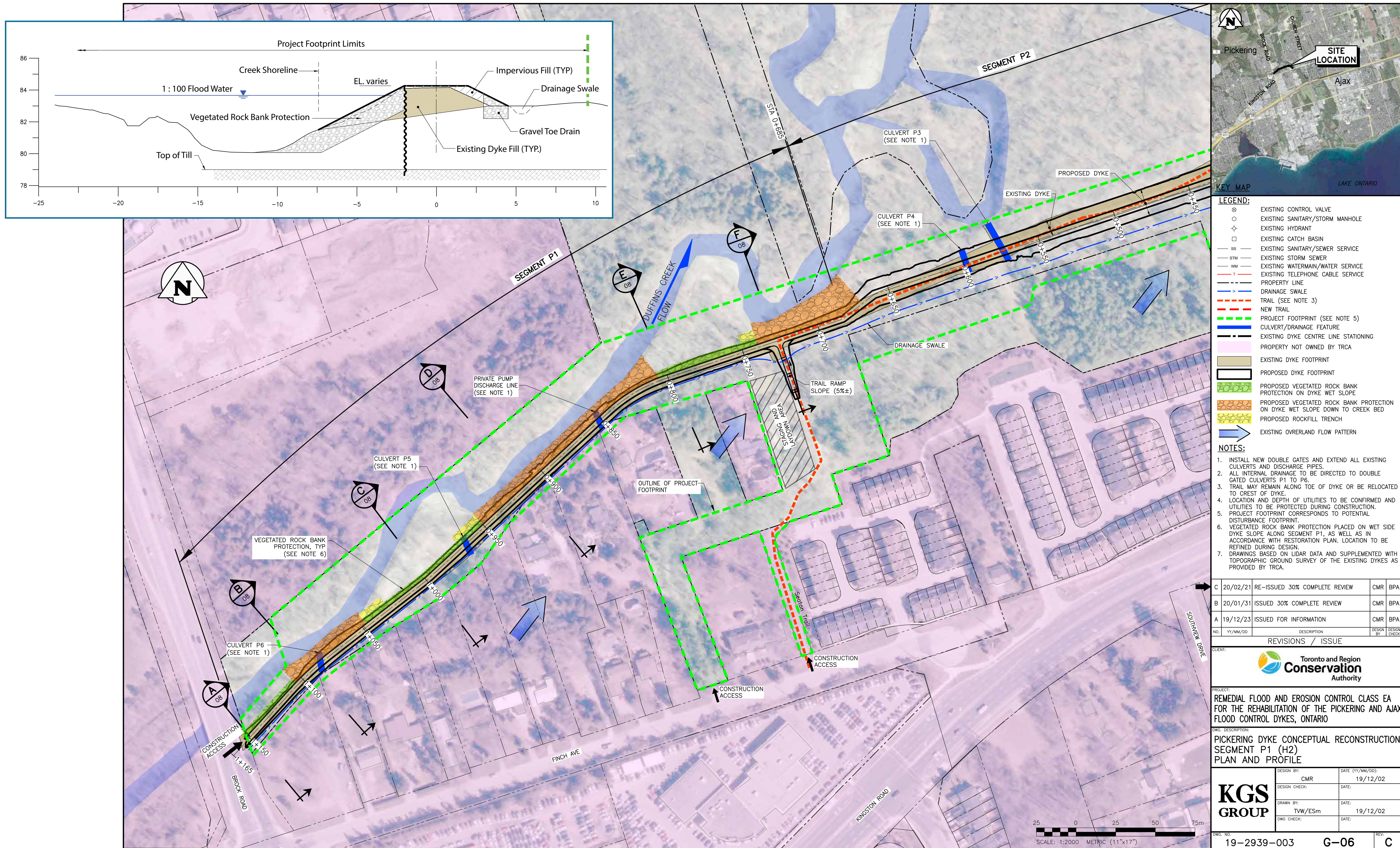
DISADVANTAGES

- Highest capital cost (P2 \$9.1 million and A1 \$4.7 million)
- More complex construction, longer duration and more noise impacts
- Greatest impact & interaction with buried utilities
- More complex and expensive to raise in the future



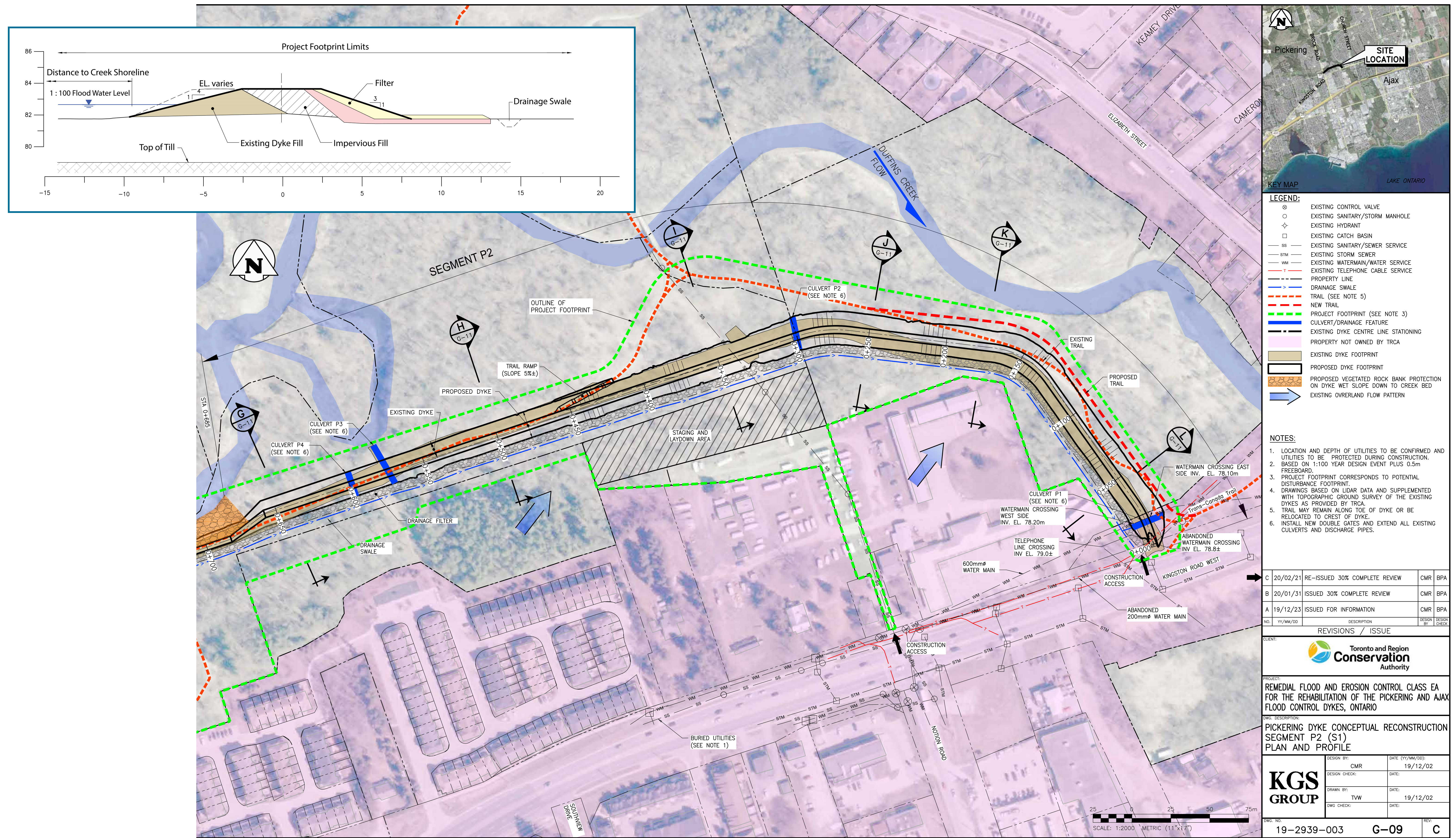
RECOMMENDED PREFERRED DESIGN CONCEPT

PICKERING DYKE SEGMENT P1 - DESIGN CONCEPT H2: Modified Dry-side Embankment + Sheetpile



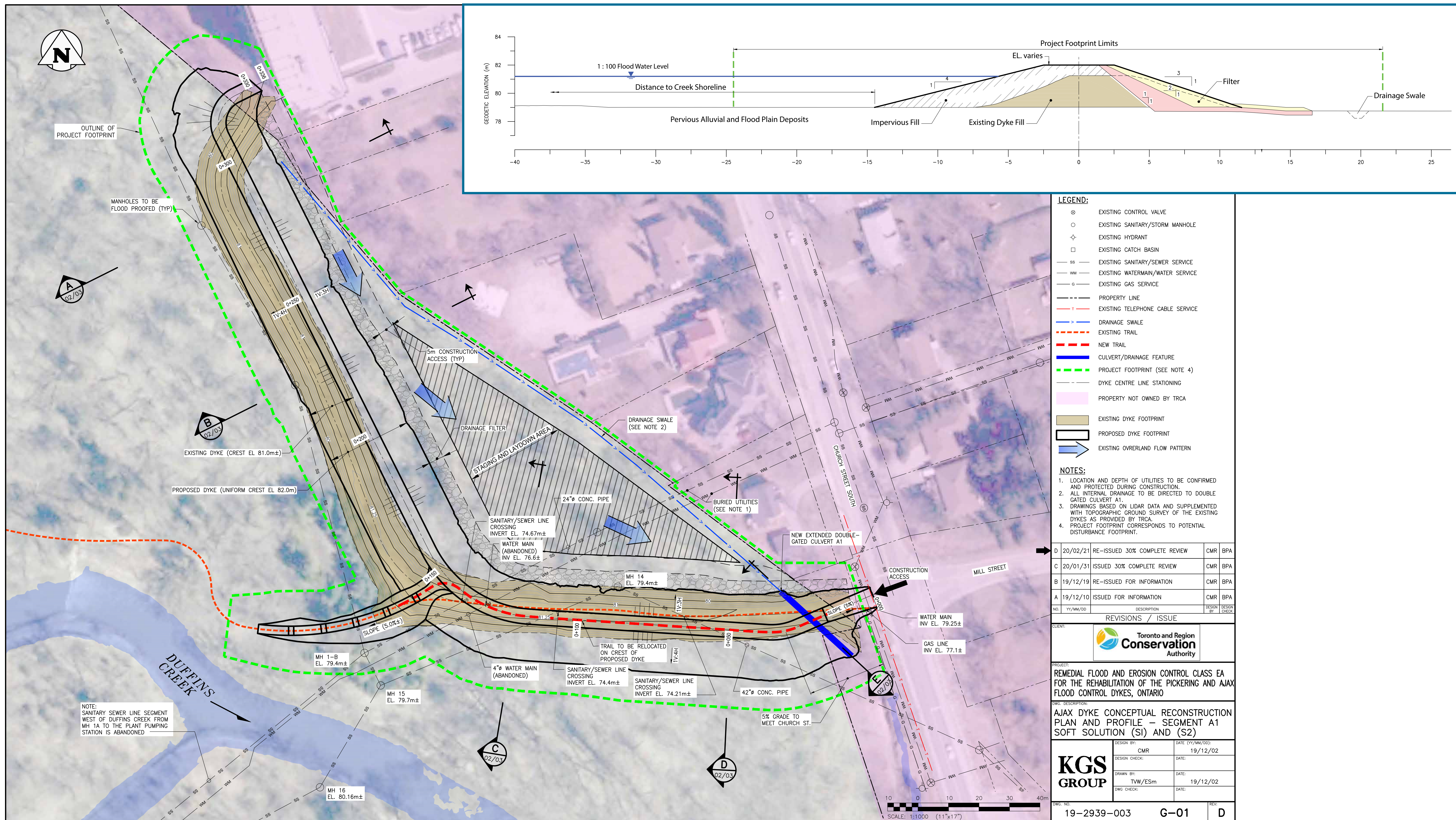
RECOMMENDED PREFERRED DESIGN CONCEPT

PICKERING DYKE SEGMENT P2 - DESIGN CONCEPT S1: Modified Embankments + Filter



RECOMMENDED PREFERRED DESIGN CONCEPT

AJAX DYKE SEGMENT A1 - DESIGN CONCEPT S1: Modified Embankments + Filter



DETAILED ANALYSIS OF ENVIRONMENTAL EFFECTS

BIOLOGICAL ENVIRONMENT

Effects

- Disturbance of wildlife habitat during construction and temporary avoidance of the area by wildlife
- Removal of approximately 2.7 ha of forest/woodland and thicket for rehabilitation of the Pickering Dyke
- Removal of approximately 1.4 ha forest/woodland for the rehabilitation of the Ajax Dyke
- Butternut Tree and Redside Dace habitat within the project impact area
- Potential negative impacts to fish habitat along Segment 1 of the Pickering Dyke during construction (due to in-water works) and long-term due to rock bank protection

Mitigation Measures

- All temporarily disturbed areas will be restored and planted with native vegetation
- A tree compensation plan will be developed during detailed design
- Guidelines to reduce risk to migratory birds as per the Migratory Bird Act will be followed including removal of trees outside of the nesting window
- Species at Risk surveys during detailed design and mitigation in consultation with the Ministry of the Environment, Conservation and Parks
- Construction fencing and avoiding construction activities within the buffer area for Butternut Tree.
- Evaluation of harmful effect to fish habitat during detailed design and mitigated e.g. adhere to timing windows, rock bank protection optimized for both erosion protection and fish habitat
- Adherence to Best Management Practices for in-water works
- Creek features restored to pre-construction condition or better

Net Effects Biological Environment

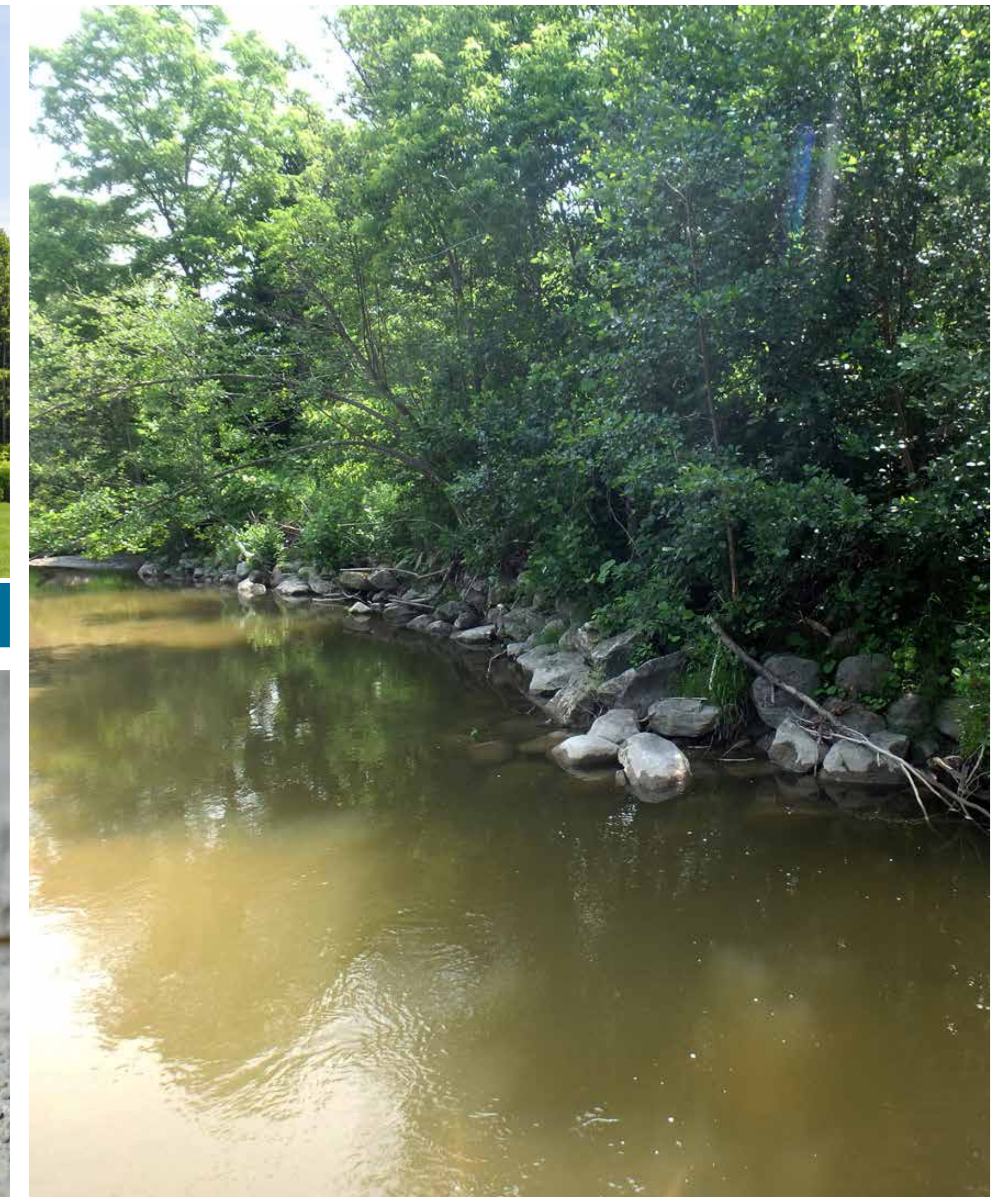
- Permanent removal of approximately 2.7 ha of terrestrial habitat to be compensated off-site.
- Re-established vegetation will be comprised of targeted native species and will contribute to a healthier ecosystem.
- Permanent vegetation removals are linear and narrow in comparison to valley scale so not expected to be detrimental to the overall terrestrial habitat value.



Butternut tree



Baby Snapping Turtle



Creek bank erosion repair.

DETAILED ANALYSIS OF ENVIRONMENTAL EFFECTS

ENGINEERING/TECHNICAL ENVIRONMENT

Effects

- Flood protection afforded by the dykes will be compromised / reduced during construction, as portions of the dyke are being rebuilt / rehabilitated
- Long term improvements to dyke stability, creek bank stability, and reduction of creek bank erosion
- Long term improvement to dyke access for maintenance
- No impact to Special Policy Area designation
- Improvements to extreme storm event flood conditions. Up to 100-year storm event is contained within valley (restricted by dykes)

Mitigation Measures

- Dyke construction works to be completed outside of spring freshet period during less flood prone seasons
- A risk management plan, to minimize risk and restore flood protection during construction in short notice, will be required from the contractor

Net Effects Engineering/Technical Environment

- Positive effects on long term flood protection, dyke and bank stability, and channel erosion
- Improved ability to maintain the flood protection infrastructure
- Minimized risk of flooding during construction. Risk expected to be similar or better than existing (due to current potential for dyke failure)

SOCIOECONOMIC ENVIRONMENT

Effects

- Potential impact to private property for access during construction and potentially long term
- Improved riverine flood protection for properties within the Special Policy Areas
- Potential impacts to local traffic during construction due to material hauling activities (e.g. Kingston Road West, Brock Road and Church Street South)
- Access to creek temporarily restricted during construction
- Potential impact to underground utilities due to construction
- Potential construction timing conflict with the Durham Bus Rapid Transit project

Mitigation Measures

- Further refinement of dyke rehabilitation design during detailed design stage to focus on reducing dyke footprint and construction access requirements
- A traffic management plan and communication strategy will be developed for construction
- Synergies with utilities upgrades to be explored during subsequent project design and planning stages. Coordinate with utilities on timing of upgrades
- Coordinate with other projects to reduce/avoid construction conflicts

Net Effects Socioeconomic Environment

- Minimized impacts to private properties
- Improved riverine flood protection for properties within the Special Policy Areas
- Minimized impacts to traffic in the Direct and Project Study Area during construction
- Temporary restrictions to pedestrian routes through Direct Study Area during construction

This panel provides a summary of the evaluation highlighting the environment factors that we expect the public to be most interested in based on previous consultations. The full evaluation will be available for public review as part of the complete Environmental Study Report.

DETAILED ANALYSIS OF ENVIRONMENTAL EFFECTS

CULTURAL ENVIRONMENT

Effects

- Temporary removal/closure of trails will impact accessibility within the parklands in the Direct Project Area during construction
- There will be a permanent aesthetic change as there will not be trees within the dyke footprint
- Possibility of incorporating some vertical structural components into dyke where public space is most restricted to avoid property impacts. Fencing / fall barrier could be necessary in those areas for public safety
- In most areas pedestrian accessibility to cross dykes will be improved with more gradual side slopes and clear passage
- Chance of impacting potential archaeological resources (per Stage 1 assessment)

Mitigation Measures

- Trail will be reconstructed to present conditions or better
- Reconstructed trails can be located differently to improve vistas / public realm
- Appropriate public notification of construction works and temporary trail closure
- Pedestrian barriers into work areas and other safety measures to be implemented during construction to ensure public safety
- If possible, trail closures will be scheduled during periods of lower use and provide accessibility during weeknights and weekends. Safety considerations provided
- Restoration of dykes will favour natural look, with grassy dyke slopes
- Stage 2 Archaeological Assessment will be carried out prior to construction to confirm presence of archaeological resources

Net Effects Cultural Environment

- Temporary and minimized impacts to access and enjoyment of recreation areas during construction
- Dyke appearance will be different than present but will maintain natural appearance in general
- In most areas pedestrian accessibility to cross dykes will be improved with more gradual side slopes and clear passage

PHYSICAL ENVIRONMENT

Effects

- Potential noise, dust and vibration impacts to adjacent properties during construction
- Potential spills during construction could affect soil and surface water quality
- Contaminated soils have not been identified on site but they could exist in area of excavations
- Changes to high water flow regimes. Up to 100-year storm event is contained within valley (restricted by dykes)
- Improvements to surface water drainage on dry side through formalized drainage swales discharging to culverts in dykes
- Potential, but not expected, localized effects to groundwater flow patterns

Mitigation Measures

- Construction best management practices will be used to minimize noise, dust, vibration, and effectively implement spill control, sediment control, and soil management. This will include implementation of construction management and contingency plans.
- Application of TRCA Erosion and Sediment Control Guidelines
- Works restricted by Noise By-Law
- Groundwater study recommended to determine if there is impact

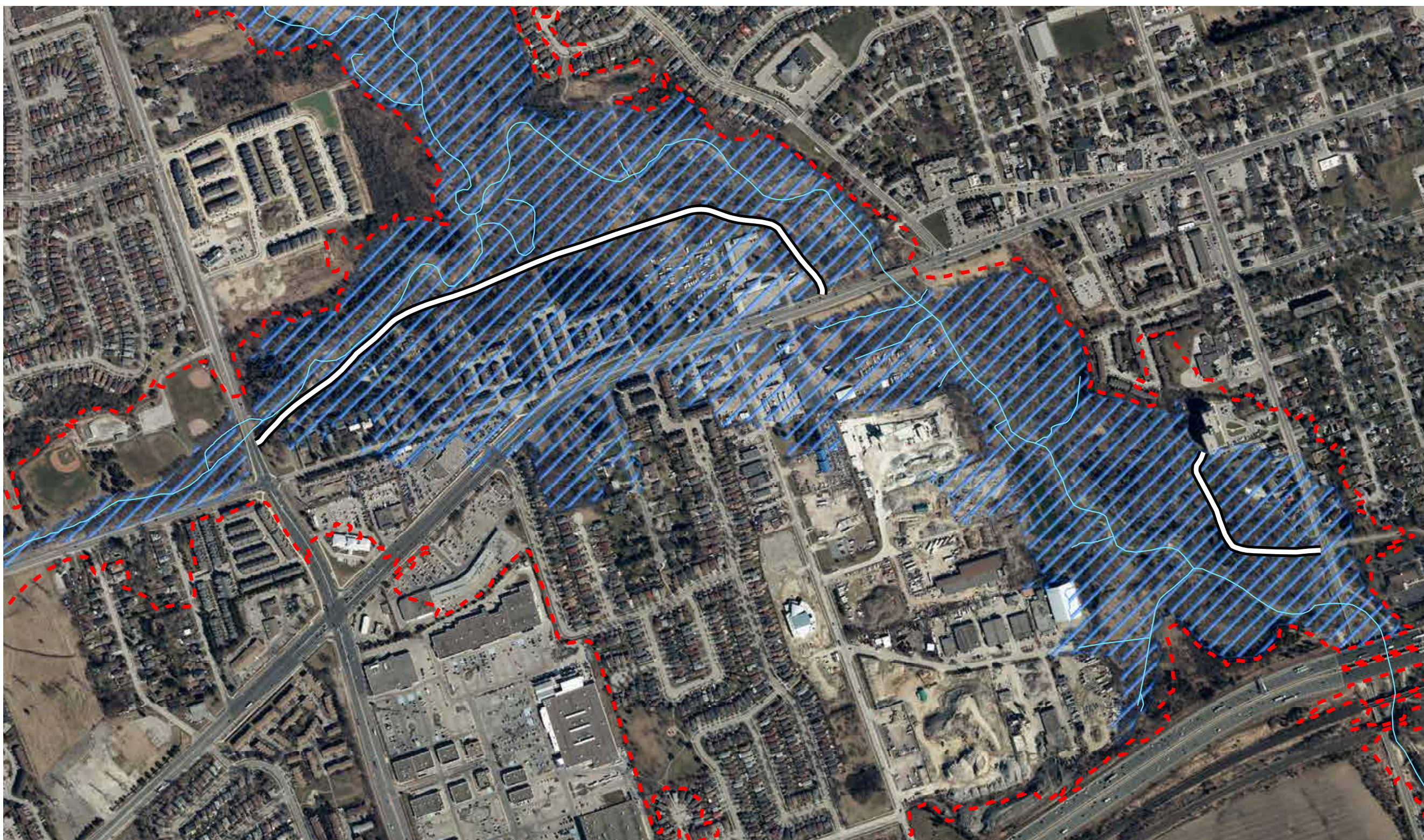
Net Effects Physical Environment

- Nuisance effects from construction activities will be lessened to the extent possible
- Risk of spills, sedimentation and spreading contaminated soils effectively controlled

This panel provides a summary of the evaluation highlighting the environment factors that we expect the public to be most interested in based on previous consultations. The full evaluation will be available for public review as part of the complete Environmental Study Report.

CHANGES TO FLOOD CONDITIONS

100-YEAR FLOOD EVENT



Potential extent of flooding without dykes (ie. a dyke failure)

Without the dykes approximately 60 buildings would be flooded during a 100-Year Flood Event.

The majority of the flooded buildings are residential.

Additionally, Finch Avenue, Kingston Road and Church Street South would be flooded during a 100-Year Flood Event.



Extent of flooding with current dyke heights

Rehabilitating the dykes to their current height would provide 100-Year Flood Event protection for the Pickering Special Policy Area community.

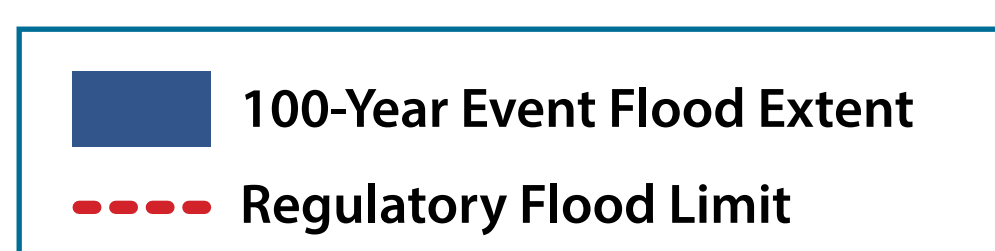
However, 10 buildings (all residential) in the Ajax Special Policy Area community would still be flooded.



Extent of flooding with proposed dykes

The proposed dyke rehabilitation provides 100-Year Flood Event protection for both the Pickering and Ajax Special Policy Area communities.

Note: The proposed dyke rehabilitation does not effect the Regulatory Flood Limit.



NEXT STEPS AND THANK YOU

Next Stage of the Environmental Assessment will include the following:

- Refinement of design concepts, evaluation and impacts assessment based on feedback received
- Confirmation of selection of the Preferred Design Concept
- Preparation of Environmental Monitoring Plan
- On-going consultation with agencies, landowners and other stakeholders
- Completion of Environmental Study Report
- Project Filing with Ministry of the Environment, Conservation and Parks (MECP)
- The complete Environmental Study Report will be available for public review for a 30-day period following the Notice of Filing. This is tentatively scheduled for July 2020.

We appreciate the time you have taken to learn more about the Pickering and Ajax Dykes Rehabilitation EA. Your input is important for the success of the EA process. Please provide your input.

HOW TO STAY CONNECTED:

- Send us your comments or questions. Email us at PADR@trca.ca

Join our mailing list – leave us your email or mailing address if you would like to be kept up to date as the study progresses

Contact the Project Team with any additional comments or questions at any time:

PADR EA Project Coordinator

Email: PADR@trca.ca

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