

APPENDIX D

Table D1: WC-R1 to WC-R3 (Wilket Creek Park)

Category of Consideration	Criteria	Alternative 1 Do Nothing	Alternative 2 Local Improvements	Alternative 3 Channel Realignment
Natural	Geomorphic Form and Function	<ul style="list-style-type: none"> Channel will continue to actively adjust No change in cross-sectional area (i.e., no reduction in bankfull hydraulics and erosive forces). Bank erosion, channel widening, migration continues. Channel remains incised in locations. Debris jams can continue to occur regularly and cause major local geomorphic adjustments. 	<ul style="list-style-type: none"> Improvement in form and function at rehabilitated areas with changes in cross-sectional area and slope. Possible reduction in velocity, tractive force, and stream power at rehabilitated sections. Reduced depths in active channel means a decrease in tractive force on bed at design discharge (mitigate against incision) only at rehabilitated areas. Riffle-type features introduced to protect infrastructure will provide grade control and act to moderate energy at certain locations in the system. Potential negative transition effects between rehabilitated and natural zones. Debris jams can continue to occur regularly and cause major local geomorphic adjustments. 	<ul style="list-style-type: none"> Stable, self-sustaining planform and alternating pool-riffle profile created throughout the entire Park. Planform, cross-sectional shape, and profile would be developed in balance with the existing sediment and flow regime. Appropriate cross-section development will cause a reduction in velocity, tractive force, and stream power at all stages, resulting in reduced incision and rates of erosion. Pool-riffle sequences allow for natural energy dissipation. A more stable planform will result in less debris jams that could otherwise cause large geomorphic adjustments and migration. Will improve sediment transport through the system. Improved transition between different geomorphic features.
	Aquatic Habitat	<ul style="list-style-type: none"> No disruption to existing aquatic habitat due to construction activities. No improvement to aquatic habitat – active adjustment does not allow for in-channel habitat stability. Widening can result in impacts to water temperature and low-flow channels. Possible failure of the sanitary sewer system would hold severe impacts on water quality and aquatic species. 	<ul style="list-style-type: none"> Disruption to existing aquatic habitat due to construction activities. In rehabilitated areas, channel stability is improved and riffle features would incorporate an enhancement of substrate materials and provide geomorphic diversity. 	<ul style="list-style-type: none"> Disruption to existing aquatic habitat due to construction activities. The development of a stable planform allows for the establishment of stable habitat opportunities and will include a low-flow channel. The riffle features would be designed such that fish passage is promoted and will incorporate a variety of substrate materials, improve diversity, and create a net enhancement of aquatic habitat. Appropriate bank treatments and the removal of failed gabions/protection measures can be utilized to promote healthy communities.
	Terrestrial Systems	<ul style="list-style-type: none"> No disruption to existing terrestrial systems due to construction activities Stream banks remain consisting of natural material where not presently armoured. Widening of channel continues, eroding banks and reducing functional riparian habitat. Armoured banks provide few ecological benefits. 	<ul style="list-style-type: none"> Moderate disruption to terrestrial systems due to construction activities. Access to provide spot improvements may require the removal or established floodplain vegetation and potentially degrade existing habitat. Disruptions would be more local than if complete realignment is required. Established pathways exist within the Park provide good general access. 	<ul style="list-style-type: none"> Extensive disruption to terrestrial systems. Disruption would involve clearing floodplain and riparian vegetation (and related habitat) for the realigned channel path and construction road access for realignments that aren't situated along the existing path network. Any disturbed areas in the riparian zone and floodplain can be re-vegetated and restored with native plants that provide the maximum ecological benefit while also providing necessary strength to resist hydraulic forces.

Natural (cont'd)	Terrestrial Systems (cont'd)		<ul style="list-style-type: none"> Option to plant natural species which provide ecological benefits in addition to stability. 	<ul style="list-style-type: none"> Opportunity to develop wetland-type features in order to provide additional storage and ecological benefits. Bioengineering treatments and riparian plantings improve terrestrial habitat quality.
	Geotechnical	<ul style="list-style-type: none"> Existing geotechnical concerns of erosion scars, slumping, and failing valley walls would remain unaddressed and would continue to erode. Channel instability and migration could result in new valley wall contact points developing in the future. There are not any imminent risks to infrastructure due to geotechnical failure. 	<ul style="list-style-type: none"> Minor realignment of channel away from valley wall contact reduces slope failure due to fluvial erosion. Overall channel instability is not addressed under this alternative and further migration could result in new valley wall contact points developing in the future. There are not any imminent risks to infrastructure due to geotechnical failure. 	<ul style="list-style-type: none"> Major realignment of channel away from valley wall contact eliminates slope failure due to fluvial erosion. Overall stable planform will reduce the likelihood of valley wall contact in the future, when compared with the other alternatives.
Social	Property Impacts	<ul style="list-style-type: none"> Wilket Creek Park is a highly used recreational amenity that is located on public, City-owned park land. There could be a loss of land that is available for use if continued channel erosion, widening, and migration occurs. There is not currently any private property along the corridor that is at risk due to channel processes. 	<ul style="list-style-type: none"> Wilket Creek Park is a highly used recreational amenity that is located on public, City-owned land. There could be a loss of land that is available for use if continued channel erosion, widening, and migration occurs in locations where treatments aren't implemented. There is not currently any private property along the corridor that is at risk due to channel processes. 	<ul style="list-style-type: none"> City-owned park land is available for realignment purposes in the corridor. The creek is to be widened and the planform realigned such that there will be a net loss in the amount of park space. The realignment will not require the use of any private property.
	Aesthetics	<ul style="list-style-type: none"> Exposure and degradation of STS infrastructure, failed protection measures, fallen trees, and regular debris jams do not provide high aesthetic value. 	<ul style="list-style-type: none"> Aesthetic value under this alternative would improve as degraded infrastructure would be ameliorated. Spot treatments may not offer aesthetics of a more natural channel. Individuals may consider the creek more 'natural' without intervention. 	<ul style="list-style-type: none"> As this alternative provides the impression of channel stability and will be designed as much as possible to function and resemble a natural creek, the aesthetics could be considered high. The use of bioengineering and natural vegetation will be maximized. A number of locations will be required to be/ remain 'hardened' and to some may appear unnatural, lowering the aesthetic value.
	Public Perception	<ul style="list-style-type: none"> Recreational infrastructure in the Park such as the pathway and bridges will continue to experience degradation and possible failure due to erosion and channel adjustment. This can lead to the public perception of an unsafe environment, restrict accessibility, and could reduce use of the park. Contrarily, under this alternative there would be no disruption to use or areas restricted due to construction activities and some individuals may consider introduced protection measures unnatural. 	<ul style="list-style-type: none"> This can provide the perception of a safe environment and Park usage levels would remain similar or increase. Under this alternative there would be a disruption to use of the Park during periods of construction. 	<ul style="list-style-type: none"> This alternative provides the most benefit to park use as it ensures the safety of public amenities such as trails and bridges and reduces the amount of time that these amenities are not functional, outside of restrictions during construction.

Social (cont'd)	Cultural Heritage	<ul style="list-style-type: none"> This alternative may result in the disruption of historic artifacts due to natural channel adjustment but is considered less-impactful than disruption that could result from the intervention options. 	<ul style="list-style-type: none"> This alternative may result in the disruption of historic artifacts due to natural channel adjustment at locations where intervention is not applied. Where interventions are applied, earthworks may impact historic artifacts. 	<ul style="list-style-type: none"> This alternative will reduce the possibility of natural disruption of artifacts due to natural existing erosion. Extensive works throughout the corridor result in the largest possible impact to artifacts.
Technical	Risk Assessment	<ul style="list-style-type: none"> Significant risk to sanitary trunk sewer as channel continues to incise and migrate over the sewer. Risk to maintenance holes exposed/in close proximity to channel. Significant risk to paths along the channel due to continued erosion and widening. Significant risk to bridges that are undersized and continued degradation of structures. Debris jams at bridges continue. 	<ul style="list-style-type: none"> Exposed sewers and at-risk maintenance holes are protected. Bridges are replaced and sized appropriately. Pathways are protected. Underlying causes of channel instability would remain unaddressed in the unaltered portions and could require long-term maintenance costs as the creek adjusts. There is the potential that adjustments in the unaltered lengths could affect the stability of locations that have received local improvements. 	<ul style="list-style-type: none"> This alternative provides the opportunity to realign the channel, pathway, and pedestrian bridges in optimal configurations. Realignment of the channel such that its proximity to the STS line is reduced, as well as limit the number of crossings. The placement of riffles at STS crossings to provide cover and protect the pipe. The placement of bridges such that they cross the channel in appropriate creek locations and at appropriate skew. Establishment of a stable planform reduces risk of future problems developing.
	Access and Construction	<ul style="list-style-type: none"> None required 	<ul style="list-style-type: none"> Highly accessible as City-owned park land and existing path networks Spot treatments/ localized realignments generally require extensive works than complete realignment 	<ul style="list-style-type: none"> Construction accessibility is high as the land is city-owned and there is an existing path network for vehicles. The alternative is more extensive than Localized Treatments and additional temporary access roads may need to be built. For this alternative there are portions of the creek where the channel will not be moved from its current position and construction will be relatively straightforward with existing protection measures (e.g. armour stone) being maintained and improved if required. This alternative would prove to be the most difficult in terms of constructability for the portions which are to be moved.
	Immediate Cost	<ul style="list-style-type: none"> No Cost 	<ul style="list-style-type: none"> Moderate Cost: Extensive in-stream work is required, repair/replacement of bridge structures, however relatively minor floodplain work. 	<ul style="list-style-type: none"> High Cost: Extensive in-stream and floodplain work required, path realignment, replacement of bridge structures.
	Long-term Maintenance	<ul style="list-style-type: none"> High: No issues are addressed and exposed STS crossings remain a threat. 	<ul style="list-style-type: none"> Moderate: Treatments may require periodic maintenance or replacement. 	<ul style="list-style-type: none"> Low: Generally self-maintaining system established.

Table D2: WC-R4 (Edwards Gardens)

Category of Consideration	Criteria	Alternative 1 Do Nothing	Alternative 2 Local Improvements	Alternative 3 Channel Realignment
Natural	Geomorphic Form and Function	<ul style="list-style-type: none"> • No change in cross-sectional area or profile, geomorphic form and function unchanged. • In-stream structures act to trap sediment, creating a deficit downstream. • Hardened boundary and undersized bridge structures do not allow for natural adjustments to occur. 	<ul style="list-style-type: none"> • The modification/removal of the weirs would result in a moderate improvement of geomorphic form and function, primarily in the form of allowing sediment transport to occur and promoting connection with downstream reaches. 	<ul style="list-style-type: none"> • Stable, self-sustaining planform and alternating pool-riffle profile created throughout the section. • Planform, cross-sectional shape, and profile would be developed in balance with the existing sediment and flow regime. • Pool-riffle sequences allow for natural energy dissipation. • Will improve sediment transport through the system.
	Aquatic Habitat	<ul style="list-style-type: none"> • No disruption to existing aquatic habitat due to construction activities • No improvement to aquatic habitat. • Weir structures act as barriers to aquatic organism passage. 	<ul style="list-style-type: none"> • Disruption to existing aquatic habitat due to construction activities. • Weir replacement with riffle or rocky-ramp features can promote aquatic organism passage and provide habitat heterogeneity. 	<ul style="list-style-type: none"> • Disruption to existing aquatic habitat due to construction activities. • The development of a stable planform allows for the establishment of stable habitat opportunities and will include a low-flow channel. • The riffle features would be designed such that fish passage is promoted and will incorporate a variety of substrate materials, improve diversity, and create a net enhancement of aquatic habitat. • Appropriate bank treatments and the removal of failed gabions/protection measures can be utilized to promote healthy communities.
	Terrestrial Systems	<ul style="list-style-type: none"> • No disruption to existing terrestrial systems due to construction activities. • The property along the creek is generally manicured lawn and much of the banks are hardened, providing few positive riparian ecological benefits. 	<ul style="list-style-type: none"> • Moderate disruption to terrestrial systems due to construction activities. • Access to provide spot improvements may require the removal of established floodplain vegetation and potentially degrade existing habitat. • Disruptions would be more local than if complete realignment is required. Established paved pathways exist within the Gardens and allow for access. • Option to plant natural species which provide ecological benefits in addition to stability. 	<ul style="list-style-type: none"> • Extensive disruption to terrestrial systems. • Disruption would involve clearing floodplain and riparian vegetation (and related habitat) for the realigned channel path and construction road access for realignments that aren't situated along the existing path network. • Any disturbed areas in the riparian zone and floodplain can be re-vegetated and restored with native plants that provide the maximum ecological benefit while also providing necessary strength to resist hydraulic forces. • Bioengineering treatments and riparian plantings improve terrestrial habitat quality.
	Geotechnical	<ul style="list-style-type: none"> • No existing geotechnical issues. 	<ul style="list-style-type: none"> • No existing geotechnical issues. 	<ul style="list-style-type: none"> • No existing geotechnical issues.

Social	Property Impacts	<ul style="list-style-type: none"> Edwards Gardens is a highly used recreational amenity that is located on public, City-owned park land. This alternative would not result in impacts to the property. 	<ul style="list-style-type: none"> Edwards Gardens is a highly used recreational amenity that is located on public, City-owned park land. This alternative would impact have minor property impacts, primarily due to construction activities. 	<ul style="list-style-type: none"> City-owned park land is available for realignment purposes in the corridor. The creek is to be widened and the planform realigned such that there will be a net loss in the amount of park space. The realignment will not require the use of any private property.
	Aesthetics	<ul style="list-style-type: none"> Although the creek is highly altered, the present form provides high aesthetic value to users. 	<ul style="list-style-type: none"> Aesthetic value under this alternative would improve as degraded historic erosion protection would be ameliorated. 	<ul style="list-style-type: none"> As this alternative provides the impression of channel stability and will be designed as much as possible to function and resemble a natural creek, the aesthetics could be considered high. The use of bioengineering and natural vegetation will be maximized, but a number of locations will be required to be 'hardened' and to some may appear unnatural, lowering the aesthetic value.
	Public Perception	<ul style="list-style-type: none"> Edwards Gardens is a well-used, accessible park located on public land - this alternative would ensure that all current recreational functions are maintained and usage is unaffected without any disruptions due to construction. 	<ul style="list-style-type: none"> Park use, outside of the construction phase, would generally be unaffected. 	<ul style="list-style-type: none"> Park use would be changed due to reconfiguration of amenities and would be disrupted for an extended period due to construction activities.
Social (cont'd)	Cultural Heritage	<ul style="list-style-type: none"> Prior construction activity has likely already disturbed much of the area in and along the creek in this section. This alternative has no works associated and there is no potential for any further impact to historic artifacts due to earth works. 	<ul style="list-style-type: none"> Where local improvements are applied, earthworks may impact historic artifacts. 	<ul style="list-style-type: none"> Extensive works throughout the corridor result in the largest possible impact to artifacts.
Technical	Risk Assessment	<ul style="list-style-type: none"> No infrastructure at high-risk of failure. Where the STS crosses under the creek at the downstream end of the reach, the creek is lined with riprap and it has not been identified as an area of concern for sewer exposure. 	<ul style="list-style-type: none"> No infrastructure at high-risk of failure and there would be no change in risk with Local Improvements. 	<ul style="list-style-type: none"> No infrastructure at high-risk of failure and there would be no change in risk with Complete Realignment.
	Access and Construction	<ul style="list-style-type: none"> None required 	<ul style="list-style-type: none"> Highly accessible as City owned park land and existing path networks. Spot treatments/ localized realignments generally require less extensive works than complete realignment. 	<ul style="list-style-type: none"> Construction accessibility is high as the land is city-owned and there is an existing path network for vehicles. Additional temporary access roads may need to be built. For this alternative there are portions of the creek where the channel will not be moved and construction will consist of improvement. This alternative would prove to be the most difficult in terms of constructability for the portions which are to be moved.

Technical (cont'd)	Immediate Cost	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • Moderate: Extensive in-stream work required with the repair/replacement of bridge structures. 	<ul style="list-style-type: none"> • High: Extensive in-stream and floodplain work required, path realignment, replacement of bridge structures.
	Long-term Maintenance	<ul style="list-style-type: none"> • Moderate maintenance required for upkeep of park amenities. 	<ul style="list-style-type: none"> • Moderate: Treatments may require periodic maintenance or replacement and park upkeep required. 	<ul style="list-style-type: none"> • Low: Some treatments may require periodic maintenance or replacement.

Table D3: WC-R5

Category of Consideration	Criteria	Alternative 1 Do Nothing	Alternative 2 Local Improvements	Alternative 3 Channel Realignment
Natural	Geomorphic Form and Function	<ul style="list-style-type: none"> Channel will continue to actively adjust No change in cross-sectional area (i.e., no reduction in bankfull hydraulics and erosive forces). Bank erosion, channel widening, migration continues. Channel remains incised in locations. Debris jams can continue to occur regularly and cause major local geomorphic adjustments. 	<ul style="list-style-type: none"> Improvement in form and function at rehabilitated areas with changes in cross-sectional area and slope. Possible reduction in velocity, tractive force, and stream power at rehabilitated sections. Reduced depths in active channel means a decrease in tractive force on bed at design discharge (mitigate against incision) only at rehabilitated areas. Riffle-type features introduced to protect infrastructure will provide grade control and act to moderate energy at certain locations in the system. Potential negative transition effects between rehabilitated and natural zones. Debris jams can continue to occur regularly and cause major local geomorphic adjustments. 	<ul style="list-style-type: none"> Stable, self-sustaining planform and alternating pool-riffle profile created throughout the entire Park. Planform, cross-sectional shape, and profile would be developed in balance with the existing sediment and flow regime. Appropriate cross-section development will cause a reduction in velocity, tractive force, and stream power at all stages, resulting in reduced incision and rates of erosion. Pool-riffle sequences allow for natural energy dissipation. A more stable planform will result in less debris jams that could otherwise cause large geomorphic adjustments and migration. Will improve sediment transport through the system. Improved transition between different geomorphic features.
	Aquatic Habitat	<ul style="list-style-type: none"> No disruption to existing aquatic habitat due to construction activities. No improvement to aquatic habitat – active adjustment does not allow for in-channel habitat stability. Widening can result in impacts to water temperature and low-flow channels. Possible failure of the sanitary sewer system would hold severe impacts on water quality and aquatic species. 	<ul style="list-style-type: none"> Disruption to existing aquatic habitat due to construction activities. In rehabilitated areas, channel stability is improved and riffle features would incorporate an enhancement of substrate materials and provide geomorphic diversity. 	<ul style="list-style-type: none"> Disruption to existing aquatic habitat due to construction activities. The development of a stable planform allows for the establishment of stable habitat opportunities and will include a low-flow channel. The riffle features would be designed such that fish passage is promoted and will incorporate a variety of substrate materials, improve diversity, and create a net enhancement of aquatic habitat. Appropriate bank treatments can be utilized to promote healthy communities.
	Terrestrial Systems	<ul style="list-style-type: none"> No disruption to existing terrestrial systems due to construction activities Stream banks remain consisting of natural material where not presently armoured. Widening of channel continues, eroding banks and reducing functional riparian habitat. Armoured banks provide few ecological benefits. 	<ul style="list-style-type: none"> Extensive disruption to terrestrial systems due to construction activities, including the establishment of access routes. Access to provide spot improvements may require the removal or established floodplain vegetation and potentially degrade existing habitat. Option to plant natural species which provide ecological benefits in addition to stability. 	<ul style="list-style-type: none"> Extensive disruption to terrestrial systems. Disruption would involve clearing floodplain and riparian vegetation (and related habitat) for the realigned channel path and construction road access. Any disturbed areas in the riparian zone and floodplain can be re-vegetated and restored with native plants that provide the maximum ecological benefit while also providing necessary strength to resist hydraulic forces. Opportunity to develop wetland-type features

Natural (cont'd)	Terrestrial Systems (cont'd)			<p>in order to provide additional storage and ecological benefits.</p> <ul style="list-style-type: none"> Bioengineering treatments and riparian plantings improve terrestrial habitat quality.
	Geotechnical	<ul style="list-style-type: none"> Existing geotechnical concerns of erosion scars, slumping, and failing valley walls would remain unaddressed and would continue to erode. Channel instability and migration could result in new valley wall contact points developing in the future. 	<ul style="list-style-type: none"> Minor realignment of channel away from valley wall contact reduces slope failure due to fluvial erosion. Overall channel instability is not addressed under this alternative and further migration could result in new valley wall contact points developing in the future. 	<ul style="list-style-type: none"> Major realignment of channel away from valley wall contact eliminates slope failure due to fluvial erosion. Overall stable planform will reduce the likelihood of valley wall contact in the future, when compared with the other alternatives.
Social	Property Impacts	<ul style="list-style-type: none"> This section runs through private property. There could be a loss of land that is available for use if continued channel erosion, widening, and migration occurs. 	<ul style="list-style-type: none"> This section runs through, and will require the use of, private property. There could be a loss of land if continued channel erosion, widening, and migration occurs in locations where treatments aren't implemented. 	<ul style="list-style-type: none"> This section runs through, and will require the use of, private property. There could be a loss of land required for planform realignment and a wider cross section.
	Aesthetics	<ul style="list-style-type: none"> Exposure and degradation of STS infrastructure, failed protection measures, fallen trees, and regular debris jams do not provide high aesthetic value. Some property owners have invested in landscaping and erosion protection measures that provide high value. 	<ul style="list-style-type: none"> Aesthetic value under this alternative would improve as degraded infrastructure would be ameliorated. Spot treatments may not offer aesthetics of a more natural channel. Individuals may consider the creek more 'natural' without intervention. 	<ul style="list-style-type: none"> Will address unsightly sewer exposures and will be designed as much as possible to function and resemble a natural creek, the aesthetics could be considered high. A number of locations will be required to be 'hardened' and to some may appear unnatural, lowering the aesthetic value.
	Public Perception	<ul style="list-style-type: none"> There may be a perception of high risk (low value) due to the possibility of a sewer failure and continued erosion and the possible impacts on property. Positive value that under this alternative there will be no impact to their property due to construction activities, and will not lose any existing land due to anthropogenic planform realignment. 	<ul style="list-style-type: none"> This can provide the perception of safety due to addressing risk to STS. Perception that large disturbances will occur to owner's property particularly from construction activities and a decrease in privacy may result. 	<ul style="list-style-type: none"> This alternative provides the most benefit to park use as it ensures the safety of public amenities such as trails and bridges and reduces the amount of time that these amenities are not functional, outside of restrictions during construction.
	Cultural Heritage	<ul style="list-style-type: none"> This alternative may result in the disruption of historic artifacts due to natural channel adjustment but is considered less-impactful than disruption that could result from the intervention options. 	<ul style="list-style-type: none"> This alternative may result in the disruption of historic artifacts due to natural channel adjustment at locations where intervention is not applied. Where interventions are applied, earthworks may impact historic artifacts. Access routes could also potentially impact artifacts. 	<ul style="list-style-type: none"> This alternative will reduce the possibility of natural disruption of artifacts due to natural existing erosion. Extensive construction throughout the corridor result in the largest possible impact to artifacts due to earth works.

Technical	Risk Assessment	<ul style="list-style-type: none"> • Significant risk to sanitary trunk sewer as channel continues to incise and migrate over the sewer. • Risk to maintenance holes exposed/in close proximity to channel • Significant risk to paths along the channel due to continued erosion and widening • Significant risk to bridges that are undersized and continued degradation of structures. Debris jams at bridges continue. 	<ul style="list-style-type: none"> • Exposed sewers and at-risk maintenance holes are protected. • Underlying causes of channel instability would remain unaddressed in the unaltered portions and could require long-term maintenance costs as the creek adjusts. • There is the potential that adjustments in the unaltered lengths could affect the stability of locations that have received local improvements. 	<ul style="list-style-type: none"> • This alternative provides the opportunity to realign the channel such that its proximity to the STS line is reduced, as well as limit the number of crossings. • The placement of riffles at STS crossings to provide cover and protect the pipe. • Establishment of a stable planform reduces risk of future problems developing.
	Access and Construction	<ul style="list-style-type: none"> • None required 	<ul style="list-style-type: none"> • Low accessibility due to valley setting and private property. • Spot treatments/ localized realignments generally require less extensive works than complete realignment. • Public cooperation required. 	<ul style="list-style-type: none"> • Low accessibility due to valley setting and private property. • Construction works are most extensive. • Public cooperation required.
	Immediate Cost	<ul style="list-style-type: none"> • No Cost 	<ul style="list-style-type: none"> • Moderate Cost: Extensive in-stream work is required and access routes must be developed. 	<ul style="list-style-type: none"> • High Cost: Extensive in-stream and floodplain work required, access routes must be developed.
	Long-term Maintenance	<ul style="list-style-type: none"> • High: No issues are addressed, risk to exposed STS crossings and private property remains high. 	<ul style="list-style-type: none"> • Moderate: Treatments may require periodic maintenance or replacement to address future risks that develop. 	<ul style="list-style-type: none"> • Low: Generally self-maintaining system established.

Table D4: WC-R6

Category of Consideration	Criteria	Alternative 1 Do Nothing	Alternative 2 Local Improvements	Alternative 3 Channel Realignment
Natural	Geomorphic Form and Function	<ul style="list-style-type: none"> Channel will continue to actively adjust. No change in cross-sectional area (i.e., no reduction in bankfull hydraulics and erosive forces). Bank erosion, channel widening, migration continues. Channel remains incised in locations. Debris jams can continue to occur regularly and cause major local geomorphic adjustments. There are three private pedestrian bridges throughout the reach which can act to constrict the flow and potentially increase the frequency of debris jams. 	<ul style="list-style-type: none"> Improvement in form and function at rehabilitated areas with changes in cross-sectional area and slope. Possible reduction in velocity, tractive force, and stream power at rehabilitated sections. Reduced depths in active channel means a decrease in tractive force on bed at design discharge (mitigate against incision) only at rehabilitated areas. Potential negative transition effects between rehabilitated and natural zones. Debris jams can continue to occur regularly and cause major local geomorphic adjustments. 	<ul style="list-style-type: none"> Stable, self-sustaining planform and alternating pool-riffle profile created throughout the entire Park. Planform, cross-sectional shape, and profile would be developed in balance with the existing sediment and flow regime. Appropriate cross-section development will cause a reduction in velocity, tractive force, and stream power at all stages, resulting in reduced incision and rates of erosion. Pool-riffle sequences allow for natural energy dissipation. A more stable planform will result in less debris jams that could otherwise cause large geomorphic adjustments and migration. Will improve sediment transport through the system. Improved transition between different geomorphic features.
	Aquatic Habitat	<ul style="list-style-type: none"> No disruption to existing aquatic habitat due to construction activities. No improvement to aquatic habitat – active adjustment does not allow for in-channel habitat stability. Widening can result in impacts to water temperature and low-flow channels. 	<ul style="list-style-type: none"> Disruption to existing aquatic habitat due to construction activities. In rehabilitated areas, channel stability is improved and would incorporate an enhancement of substrate materials and provide geomorphic diversity. 	<ul style="list-style-type: none"> Disruption to existing aquatic habitat due to construction activities. The development of a stable planform allows for the establishment of stable habitat opportunities and will include a low-flow channel. The riffle features would be designed such that fish passage is promoted and will incorporate a variety of substrate materials, improve diversity, and create a net enhancement of aquatic habitat. Appropriate bank treatments can be utilized to promote healthy communities.
	Terrestrial Systems	<ul style="list-style-type: none"> No disruption to existing terrestrial systems due to construction activities Stream banks remain consisting of natural material where not presently armoured. Widening of channel continues, eroding banks and reducing functional riparian habitat. There is manicured lawns and hard erosion protection measures along the banks at a number of properties and do 	<ul style="list-style-type: none"> Disruption to terrestrial systems due to construction activities, including the establishment of access routes. Access to provide spot improvements may require the removal or established floodplain vegetation and potentially degrade existing habitat. Option to plant natural species which provide ecological benefits in addition to stability. 	<ul style="list-style-type: none"> Extensive disruption to terrestrial systems. Disruption would involve clearing floodplain and riparian vegetation (and related habitat) for the realigned channel path and construction road access. Any disturbed areas in the riparian zone and floodplain can be re-vegetated and restored with native plants that provide the maximum ecological benefit while also providing necessary strength to resist hydraulic forces. Bioengineering treatments and riparian

Natural (cont'd)	Terrestrial Systems (cont'd)	not provide high ecological value.		plantings improve terrestrial habitat quality.
	Geotechnical	<ul style="list-style-type: none"> No major geotechnical issues identified but with continued erosion and planform adjustment may result in future valley wall contacts. 	<ul style="list-style-type: none"> No major geotechnical issues identified but with continued erosion and planform adjustment may result in future valley wall contacts. 	<ul style="list-style-type: none"> No major geotechnical issues identified and with a stable planform will reduce the likelihood of valley wall contact in the future, when compared with the other alternatives.
Social	Property Impacts	<ul style="list-style-type: none"> This section runs through private property. There could be a loss of land that is available for use if continued channel erosion, widening, and migration occurs. 	<ul style="list-style-type: none"> This section runs through, and will require the use of, private property. There could be a loss of land if continued channel erosion, widening, and migration occurs in locations where treatments aren't implemented. 	<ul style="list-style-type: none"> This section runs through, and will require the use of, private property. There could be a loss of land required for planform realignment and a wider cross section.
	Aesthetics	<ul style="list-style-type: none"> Failed protection measures, fallen trees, and regular debris jams do not provide high aesthetic value. Some property owners have invested in landscaping and erosion protection measures that provide high value. 	<ul style="list-style-type: none"> Aesthetic value under this alternative would improve as bank treatments that provide natural function and stability will be an improvement on some of the haphazard measures currently in place. Spot treatments may not offer aesthetics of a more natural channel. Some individuals may consider the creek more 'natural' without intervention. 	<ul style="list-style-type: none"> Compared to the haphazard erosion protection measures which are currently in place, this alternative could be considered to have high aesthetic value. If it is required that bridge structures are removed or replaced, it may lower the aesthetic value for some property owners.
	Public Perception	<ul style="list-style-type: none"> As there aren't any large threats to private property, owners would likely value privacy and no disturbance to their lands with this alternative. Possible loss of land along some backyards would result in a low perception of this alternative. 	<ul style="list-style-type: none"> Perception that large disturbances will occur to owner's property particularly from construction activities and a decrease in privacy may result. Public may perceive improvements to bank stability as increasing value of property. 	<ul style="list-style-type: none"> Providing high value is stream stability and protection of property along the stream corridor. Low value in terms of perception is disruption of privacy and disturbance to property due to construction.
	Cultural Heritage	<ul style="list-style-type: none"> This alternative may result in the disruption of historic artifacts due to natural channel adjustment but is considered less-impactful than disruption that could result from the intervention options. 	<ul style="list-style-type: none"> This alternative may result in the disruption of historic artifacts due to natural channel adjustment at locations where intervention is not applied. Where interventions are applied, earthworks may impact historic artifacts. Access routes could also potentially impact artifacts. 	<ul style="list-style-type: none"> This alternative will reduce the possibility of natural disruption of artifacts due to natural existing erosion. Extensive construction throughout the corridor result in the largest possible impact to artifacts due to earth works.
Technical	Risk Assessment	<ul style="list-style-type: none"> The STS and a contributing sewer line each cross under the creek at the downstream extent of the reach, however the sewers are not currently exposed and have not been identified as imminent risks for failure. Does not address erosion and future risk development. 	<ul style="list-style-type: none"> The STS and a contributing sewer line each cross under the creek at the downstream extent of the reach, however the sewers are not currently exposed and have not been identified as imminent risks for failure. Underlying causes of channel instability would remain unaddressed in the unaltered portions and risks could develop. There is the potential that adjustments in the unaltered lengths could affect the stability of locations that have received local improvements. 	<ul style="list-style-type: none"> No existing high-risk locations. This alternative provides the opportunity to realign the channel such that its proximity to the STS line is reduced, as well a limit the number of crossings. The placement of riffles at STS crossings to provide cover and protect the pipe. Establishment of a stable planform reduces risk of future problems developing.

Technical (cont'd)	Access and Construction	<ul style="list-style-type: none"> • None required 	<ul style="list-style-type: none"> • Low accessibility due to valley setting and private property. • Spot treatments/ localized realignments generally require less extensive works than complete realignment. • Public cooperation required. 	<ul style="list-style-type: none"> • Low accessibility due to valley setting and private property. • Construction works are most extensive. • Public cooperation required.
	Immediate Cost	<ul style="list-style-type: none"> • No Cost 	<ul style="list-style-type: none"> • Moderate Cost: Extensive in-stream work is required and access routes must be developed. 	<ul style="list-style-type: none"> • High Cost: Extensive in-stream and floodplain work required, access routes must be developed.
	Long-term Maintenance	<ul style="list-style-type: none"> • Moderate: The repair or replacement of private infrastructure (bridges) or private erosion protection measures. 	<ul style="list-style-type: none"> • Moderate: Treatments may require periodic maintenance or replacement to address future risks that develop. 	<ul style="list-style-type: none"> • Low: Generally self-maintaining system established.

Table D5: WC-R7

Category of Consideration	Criteria	Alternative 1 Do Nothing	Alternative 2 Local Improvements	Alternative 3 Channel Realignment
Natural	Geomorphic Form and Function	<ul style="list-style-type: none"> Channel will continue to actively adjust, particularly widening and planform migration. No change in cross-sectional area (i.e., no reduction in bankfull hydraulics and erosive forces). Debris jams can continue to occur regularly and cause major local geomorphic adjustments. 	<ul style="list-style-type: none"> Improvement in form and function at rehabilitated areas with changes in cross-sectional area and slope. Possible reduction in velocity, tractive force, and stream power at rehabilitated sections. Reduced depths in active channel means a decrease in tractive force on bed at design discharge (mitigate against incision) only at rehabilitated areas. Potential negative transition effects between rehabilitated and natural zones. Debris jams can continue to occur regularly and cause major local geomorphic adjustments. 	<p>3A</p> <ul style="list-style-type: none"> Stable, self-sustaining planform and alternating pool-riffle profile created throughout the entire reach. Planform, cross-sectional shape, and profile would be developed in balance with the existing sediment and flow regime. Appropriate cross-section development will cause a reduction in velocity, tractive force, and stream power at all stages, resulting in reduced incision and rates of erosion. Pool-riffle sequences allow for natural energy dissipation. A more stable planform will result in less debris jams that could otherwise cause large geomorphic adjustments and migration. Will improve sediment transport through the system. Improved transition between different geomorphic features.
				<p>3B</p> <ul style="list-style-type: none"> Straightened nature of proposed planform is not a typical stable planform for this region. Cross-sectional shape, and profile would be developed in balance with the existing sediment and flow regime. Pool-riffle sequences allow for natural energy dissipation. A more stable planform will result in less debris jams that could otherwise cause large geomorphic adjustments and migration.

Natural (cont'd)	Aquatic Habitat	<ul style="list-style-type: none"> No disruption to existing aquatic habitat due to construction activities. No improvement to aquatic habitat – active adjustment does not allow for in-channel habitat stability. Widening can result in impacts to water temperature and low-flow channels. Possible failure of the sanitary sewer system would hold severe impacts on water quality and aquatic species. 	<ul style="list-style-type: none"> Disruption to existing aquatic habitat due to construction activities. In rehabilitated areas, channel stability is improved. If sewers exposed, riffle features would be placed over and incorporate an enhancement of substrate materials, providing geomorphic diversity. 	<p>3A and 3B</p> <ul style="list-style-type: none"> Disruption to existing aquatic habitat due to construction activities. The development of a stable planform allows for the establishment of stable habitat opportunities and will include a low-flow channel. The riffle features would be designed such that fish passage is promoted and will incorporate a variety of substrate materials, improve diversity, and create a net enhancement of aquatic habitat. Appropriate bank treatments and the removal of failed gabions/protection measures can be utilized to promote healthy communities. Straightened nature of 3B less conducive to the development of habitat.
	Terrestrial Systems	<ul style="list-style-type: none"> No disruption to existing terrestrial systems due to construction activities. Forest and canopy highly valued in this section. Widening of channel continues, eroding banks and reducing functional riparian habitat. 	<ul style="list-style-type: none"> Moderate disruption to terrestrial systems due to construction activities. Access to provide spot improvements may require the removal or established floodplain vegetation and potentially degrade existing habitat. Disruptions would be more local than if complete realignment is required. Established pathways exist within the Park provide good general access. Option to plant natural species which provide ecological benefits in addition to stability. 	<p>3A and 3B</p> <ul style="list-style-type: none"> Extensive disruption to terrestrial systems, more so for option 3B. Disruption would involve clearing floodplain and riparian vegetation (and related habitat) for the realigned channel path and construction road access for realignments that aren't situated along the existing path network. Any disturbed areas in the riparian zone and floodplain can be re-vegetated and restored with native plants that provide the maximum ecological benefit while also providing necessary strength to resist hydraulic forces. Opportunity to develop wetland-type features in order to provide additional storage and ecological benefits. Bioengineering treatments and riparian plantings improve terrestrial habitat quality

<p>Natural (cont'd)</p>	<p>Geotechnical</p>	<ul style="list-style-type: none"> No existing geotechnical issues. The energy from a stormwater outfall along the right valley wall upstream of the highly sinuous section has created a large gully which is eroding and causing major tree fall and potential slope stability issues. This would continue to occur under this alternative and delivers debris into the main channel. Under this alternative, there is potential that future valley wall contact points along the Wilket Creek corridor would be created due to the existing high level of adjustment and migration. 	<ul style="list-style-type: none"> No existing geotechnical issues. The energy from a stormwater outfall along the right valley wall upstream of the highly sinuous section has created a large gully which is eroding and causing major tree fall and potential slope stability issues. Local improvements can include stabilization in order to properly dissipate energy. Under this alternative, there is potential that future valley wall contact points along the Wilket Creek corridor would be created due to the existing high level of adjustment and migration. 	<ul style="list-style-type: none"> No existing geotechnical issues. The energy from a stormwater outfall along the right valley wall upstream of the highly sinuous section has created a large gully which is eroding and causing major tree fall and potential slope stability issues. Local improvements can include stabilization in order to properly dissipate energy. Stable planform will reduce the likelihood of valley wall contact in the future, when compared with the other alternatives.
<p>Social</p>	<p>Property Impacts</p>	<ul style="list-style-type: none"> The reach runs through public, City-owned park land. There could be a loss of land that is available for use if continued channel erosion, widening, and migration occurs. Downstream issues related to in-stream debris will continue for private properties downstream. 	<ul style="list-style-type: none"> The reach runs through public, City-owned park land. Property loss and impacts to existing unpaved recreational trails due to erosion and migration could be mitigated under this alternative. There would be moderate disruption due to construction due to this alternative. 	<ul style="list-style-type: none"> City-owned park land is available for realignment purposes in the corridor. The creek is to be widened and the planform realigned such that there will be a net loss in the amount of park space.
	<p>Aesthetics</p>	<ul style="list-style-type: none"> Aesthetics in this section would remain generally unchanged outside of natural erosion which is occurring. There is high value placed on the natural state of the existing channel and the forest and canopy in this reach. 	<ul style="list-style-type: none"> Aesthetics in this section would be improved in areas where debris jams would occur less frequently. Anthropogenic alterations of the natural system may provide low aesthetic value to some individuals. 	<ul style="list-style-type: none"> As this alternative provides the impression of channel stability and will be designed as much as possible to function and resemble a natural creek, the aesthetics could be considered high. Anthropogenic alterations of the natural system may provide low aesthetic value to some individuals. Any loss of vegetation in this section would provide low aesthetic value, particularly large trees and canopy.
	<p>Public Perception</p>	<ul style="list-style-type: none"> There are those who value highly the forest and natural state of the creek along this reach, and would give high value to not disturbing the section with construction activities. Contrarily, others consider large debris jams as the primary cause of major issues downstream and/or are concerned that continued erosion will result in impairments to park use. Additionally, there is a perception of low value under this alternative due to the possibility of a sewer failure in the future. 	<ul style="list-style-type: none"> This alternative may provide balance between conserving the forested area and natural function of the creek as much as possible while also addressing the high degree of adjustment and potential risk to infrastructure. Disruption to trail use due to construction. 	<ul style="list-style-type: none"> Public perception for A is considered moderate as it generally follows the existing path of the creek while also addressing the high degree of adjustment and potential risk to infrastructure and paths. The un-natural planform of B, along with the disruption of a great amount of the existing forested area creates low public perception for B.

Social (cont'd)	Cultural Heritage	<ul style="list-style-type: none"> This alternative may result in the disruption of historic artifacts due to natural channel adjustment but is considered less-impactful than disruption that could result from the intervention options. 	<ul style="list-style-type: none"> This alternative may result in the disruption of historic artifacts due to natural channel adjustment at locations where intervention is not applied. Where interventions are applied, earthworks may impact historic artifacts. 	<ul style="list-style-type: none"> This alternative will reduce the possibility of natural disruption of artifacts due to natural existing erosion.
Technical	Risk Assessment	<ul style="list-style-type: none"> High risk to maintenance hole as channel continues to migrate and banks erode. The sewer pipelines are not currently exposed along the channel bed, however, the significant erosion and adjustment in the reach could potentially lead to exposure. 	<ul style="list-style-type: none"> High risk to maintenance hole as channel continues to migrate and banks erode. The sewer pipelines are not currently exposed along the channel bed, however, the significant erosion and adjustment in the reach could potentially lead to exposure. Underlying causes of channel instability would remain unaddressed in the unaltered portions and could require long-term maintenance costs as the creek adjusts. There is the potential that adjustments in the unaltered lengths could affect the stability of locations that have received local improvements. 	Both A and B provide high value in terms of Risk Assessment as they address any existing risks and mitigate the likelihood of risks developing in the future.
	Access and Construction	<ul style="list-style-type: none"> None required 	<ul style="list-style-type: none"> Accessibility moderate as land is a City-owned park Trails unpaved and require clearing for works. Spot treatments/ localized realignments generally require extensive works than complete realignment. 	<ul style="list-style-type: none"> Construction accessibility is high as the land is city-owned and there is an existing path network for vehicles. The alternative is more extensive than Localized Treatments and additional temporary access roads may need to be built.
	Immediate Cost	<ul style="list-style-type: none"> No Cost 	<ul style="list-style-type: none"> Moderate Cost 	<ul style="list-style-type: none"> High Cost: Extensive in-stream and floodplain work required.
	Long-term Maintenance	<ul style="list-style-type: none"> High: No issues are addressed and in-stream debris jams require removal. 	<ul style="list-style-type: none"> Moderate: Treatments may require periodic maintenance or replacement. Long-term maintenance related to debris-jam removal would be required. 	<ul style="list-style-type: none"> Low: Generally self-maintaining system established and in-stream debris issues addressed.

Table D6: WC-R8 and WC-R9

Category of Consideration	Criteria	Alternative 1 Do Nothing	Alternative 2 Local Improvements	Alternative 3 Channel Realignment
Natural	Geomorphic Form and Function	<ul style="list-style-type: none"> • No change in cross-sectional area or profile, geomorphic form and function unchanged. • In-stream structures act to trap sediment, creating a deficit downstream. • Hardened boundary and undersized bridge structures do not allow for natural adjustments to occur. 	<ul style="list-style-type: none"> • The modification/removal of the weirs would result in a moderate improvement of geomorphic form and function, primarily in the form of allowing sediment transport to occur and promoting connection with downstream reaches. • In areas where bioengineering treatments replace existing hard protection measures, the banks will have increased natural function. 	<ul style="list-style-type: none"> • Stable, self-sustaining planform and alternating pool-riffle profile created throughout the section. • Planform, cross-sectional shape, and profile would be developed in balance with the existing sediment and flow regime. • Pool-riffle sequences allow for natural energy dissipation. • Will improve sediment transport through the system.
	Aquatic Habitat	<ul style="list-style-type: none"> • No disruption to existing aquatic habitat due to construction activities • No improvement to aquatic habitat. • Weir structures act as barriers to aquatic organism passage. 	<ul style="list-style-type: none"> • Disruption to existing aquatic habitat due to construction activities. • Weir replacement with riffle or rocky-ramp features can promote aquatic organism passage and provide habitat heterogeneity. 	<ul style="list-style-type: none"> • Disruption to existing aquatic habitat due to construction activities. • The development of a stable planform allows for the establishment of stable habitat opportunities and will include a low-flow channel. • The riffle features would be designed such that fish passage is promoted and will incorporate a variety of substrate materials, improve diversity, and create a net enhancement of aquatic habitat. • Appropriate bank treatments and the removal of failed gabions/protection measures can be utilized to promote healthy communities.
	Terrestrial Systems	<ul style="list-style-type: none"> • No disruption to existing terrestrial systems due to construction activities. • The property along the creek is generally manicured lawn and much of the banks are hardened, providing few positive riparian ecological benefits. 	<ul style="list-style-type: none"> • Moderate disruption to terrestrial systems due to construction activities. • Access to provide spot improvements may require the removal or established floodplain vegetation and potentially degrade existing habitat. • Disruptions would be more local than if complete realignment is required. Established paved pathways exist and allow for access. • Option to plant natural species which provide ecological benefits in addition to stability. 	<ul style="list-style-type: none"> • Extensive disruption to terrestrial systems. • Disruption would involve clearing floodplain and riparian vegetation (and related habitat) for the realigned channel path and construction road access for realignments that aren't situated along the existing path network. • Any disturbed areas in the riparian zone and floodplain can be re-vegetated and restored with native plants that provide the maximum ecological benefit while also providing necessary strength to resist hydraulic forces. • Bioengineering treatments and riparian plantings improve terrestrial habitat quality.
	Geotechnical	<ul style="list-style-type: none"> • No existing geotechnical issues. 	<ul style="list-style-type: none"> • No existing geotechnical issues. 	<ul style="list-style-type: none"> • No existing geotechnical issues

Social	Property Impacts	<ul style="list-style-type: none"> Windfields Park is a highly used recreational amenity that is located on public, City-owned park land. This alternative would result in minor losses to useable property due to erosion along pathways. No impacts related to construction. 	<ul style="list-style-type: none"> This alternative would impact have minor property impacts, primarily due to construction activities. 	<ul style="list-style-type: none"> City-owned park land is available for realignment purposes in the corridor. The creek is to be widened and the planform realigned such that there will be a net loss in the amount of park space.
	Aesthetics	<ul style="list-style-type: none"> Existing aesthetics are considered low due to the presence of degraded infrastructure and armoured banks. 	<ul style="list-style-type: none"> Aesthetic value under this alternative would improve as degraded historic erosion protection and infrastructure would be ameliorated. 	<ul style="list-style-type: none"> As this alternative provides the impression of channel stability and will be designed as much as possible to function and resemble a natural creek, the aesthetics could be considered high.
	Public Perception	<ul style="list-style-type: none"> This alternative would ensure that most current recreational functions are maintained and usage is unaffected, however there is a risk to safety where the path is eroding. 	<ul style="list-style-type: none"> As Local Improvements would address the primary issues with the section while maintaining park functions and usage, it receives high value. 	<ul style="list-style-type: none"> Park use would be changed due to reconfiguration of amenities and would be disrupted for an extended period due to construction activities.
	Cultural Heritage	<ul style="list-style-type: none"> This alternative has no works associated and there is no potential for any further impact to historic artifacts due to earth works. 	<ul style="list-style-type: none"> Where local improvements are applied, earthworks may impact historic artifacts. 	<ul style="list-style-type: none"> Extensive works throughout the corridor result in the largest possible impact to artifacts.
Technical	Risk Assessment	<ul style="list-style-type: none"> Pathway at risk due to erosion. No infrastructure at high-risk of failure. Where the STS crosses under the creek but it has not been identified as an area of concern for sewer exposure. 	<ul style="list-style-type: none"> Pathway at risk due to erosion would be addressed. No infrastructure at high-risk of failure. Where the STS crosses under the creek but it has not been identified as an area of concern for sewer exposure. 	<ul style="list-style-type: none"> All existing risks addressed and the development of future risks is mitigated due to the development of a stable planform.
	Access and Construction	<ul style="list-style-type: none"> None required 	<ul style="list-style-type: none"> Highly accessible as City owned park land and existing path networks. Spot treatments/ localized realignments generally require less extensive works than complete realignment. 	<ul style="list-style-type: none"> Construction accessibility is high as the land is city-owned and there is an existing path network for vehicles. The alternative is more extensive than Localized Treatments and additional temporary access roads may need to be built. For this alternative there are portions of the creek where the channel will not be moved from its current position and construction will be relatively straightforward with existing protection measures (e.g. armour stone) being maintained and improved if required. This alternative would prove to be the most difficult in terms of constructability for the portions which are to be moved.
	Immediate Cost	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Moderate: Extensive in-stream work required with the repair/replacement of weir structure. 	<ul style="list-style-type: none"> High: Extensive in-stream and floodplain work required, path realignment, replacement of bridge structures.
	Long-term Maintenance	<ul style="list-style-type: none"> Moderate maintenance required for upkeep of park amenities. 	<ul style="list-style-type: none"> Moderate: Treatments may require periodic maintenance or replacement and park upkeep required. 	<ul style="list-style-type: none"> Moderate: Self-maintaining system established but park upkeep required.