

Fall 2023

KINGSWAY BIKE LANES



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OVERVIEW

OVERVIEW

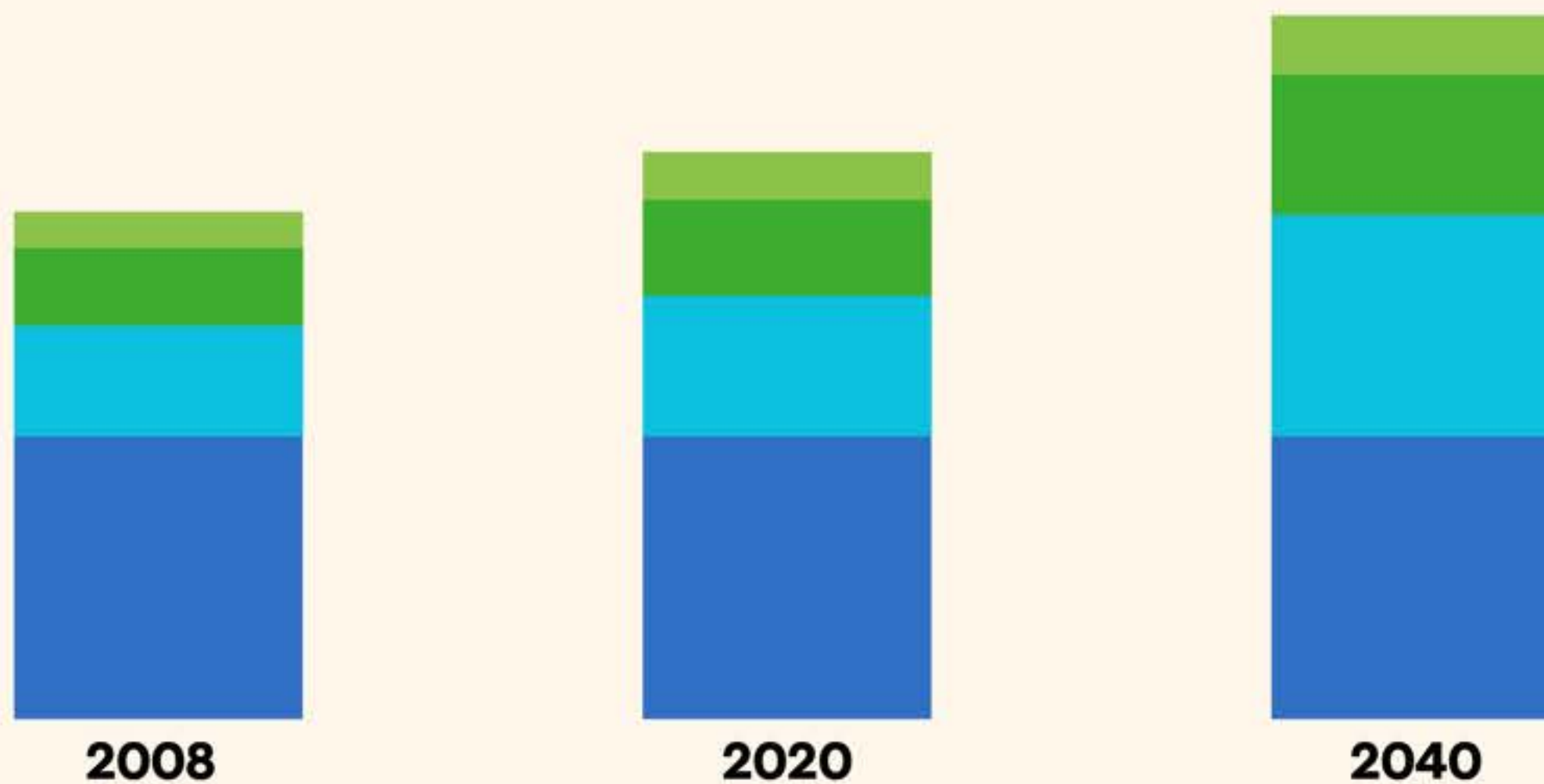
OUR PROCESS

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The Future of Transportation

<https://vancouver.ca/files/cov/transportation-2040-plan.pdf>

Vancouver 2040 Transportation Plan



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Benefits of Cycling



Image: https://www.regina.ca/.galleries/Photo-Galleries/Bi-directional-Bike-Lane.jpeg?__scale=w:1280,h:720,t:2

OVERVIEW

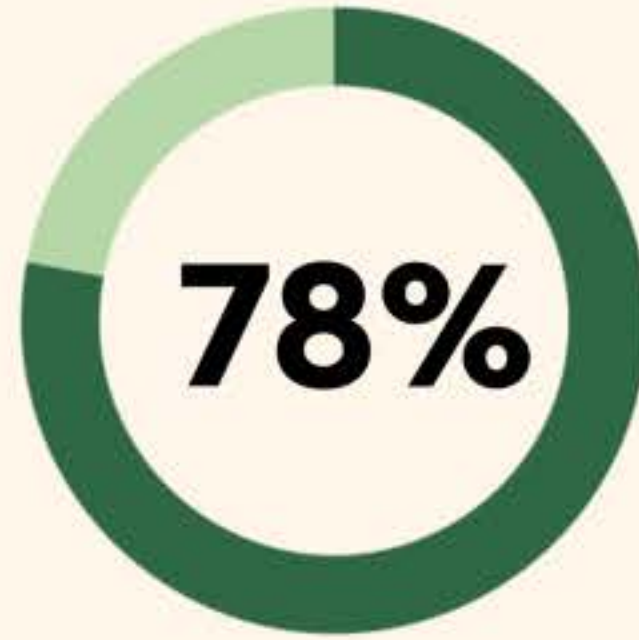
OUR PROCESS

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Why Protected Bike Lanes?



Increased cyclists
feeling of safety



Think sufficient space
should be left between
drivers and cyclists
when sharing a road.



Of cycling
accidents involve
cars

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SUSTAINABILITY

 **Motor Vehicle**

 **Biking**



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MAIN STAKEHOLDERS



CYCLISTS

**THE CITY OF
VANCOUVER**



**PEDESTRIANS /
CAR COMMUTERS**



**LOCAL
BUSINESSES**

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LEGITIMACY



**Local
Businesses**

**City of
Vancouver
Cyclists**

**Emergency
Services**

**Pedestrians
Car Commuters**

POWER



URGENCY



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Stakeholder Needs



Safety



Well-being



Reduced
traffic



More
customers

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Businesses and Bike Lanes



Positive Impact On Businesses



Better Customer Access



Enhanced Commercial Activity



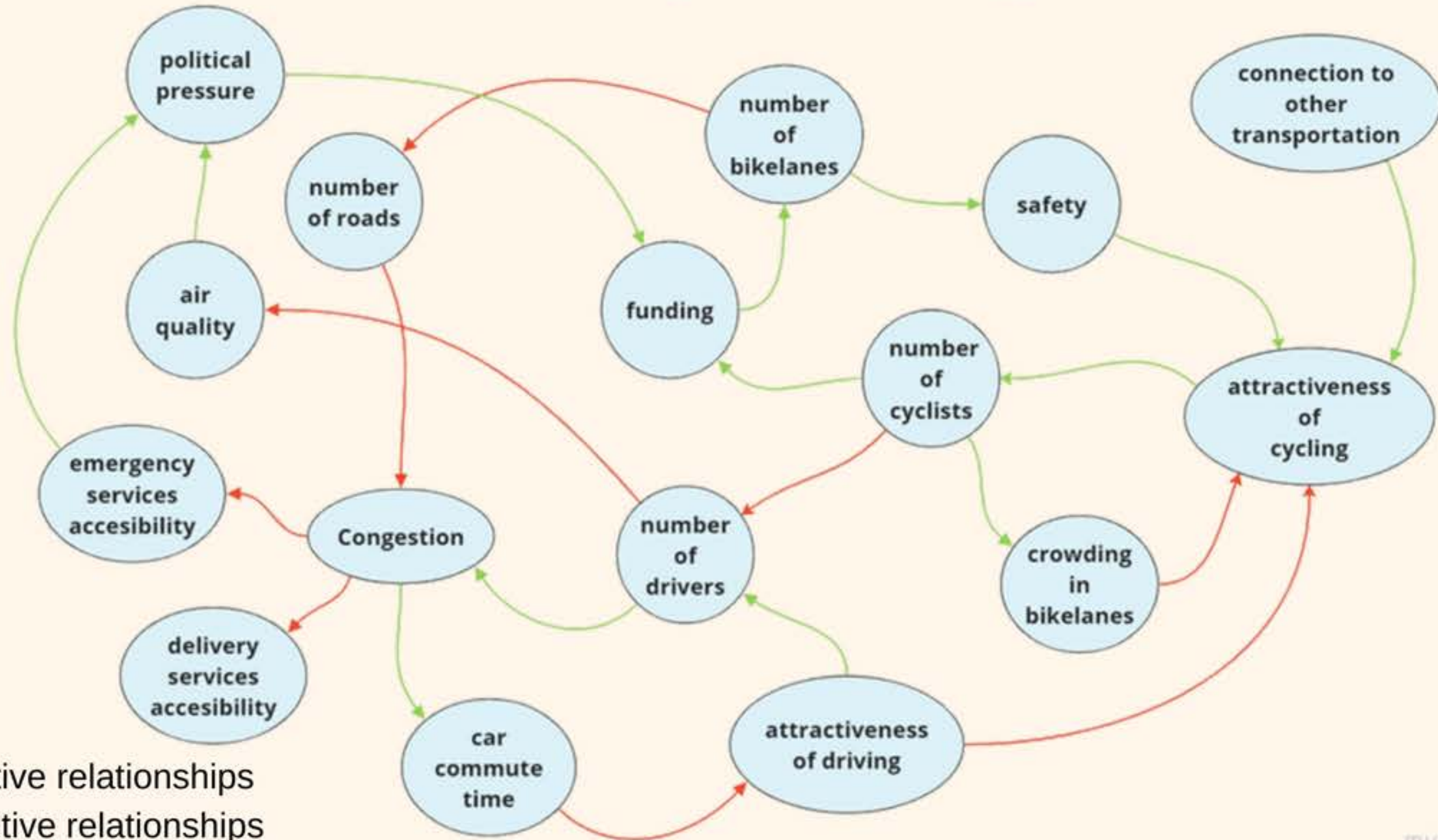
Aligned With Customer Interests

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Causal Loop Diagram



Red indicated negative relationships
Green indicates positive relationships

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OUR PROCESS

OVERVIEW

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Determining WDM Criteria Using Stakeholders

**Environmental
Benefits-**
All

**Economical
Benefits-**
All

Accessibility-
Cyclists

Safety-
Cyclists

**Easy
Implementation-**
Government

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WDM Weights



Weighted Decision Matrix

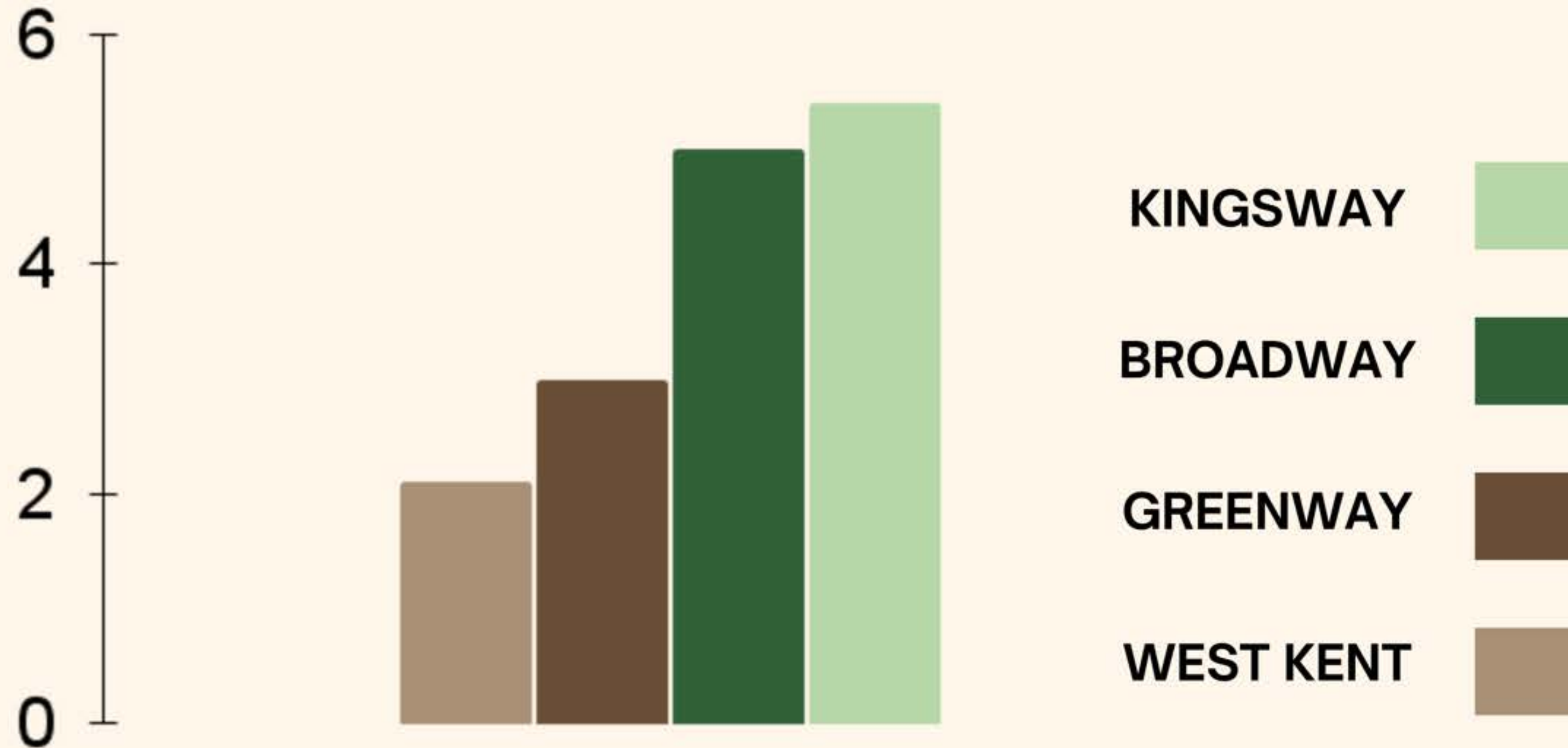
	WEST KENT	GREENWAY	BROADWAY	KINGSWAY
SAFETY				
ECONOMY				
ENVIRONMENT				
ACCESSIBILITY				
IMPLEMENTATION				

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Safety Scores

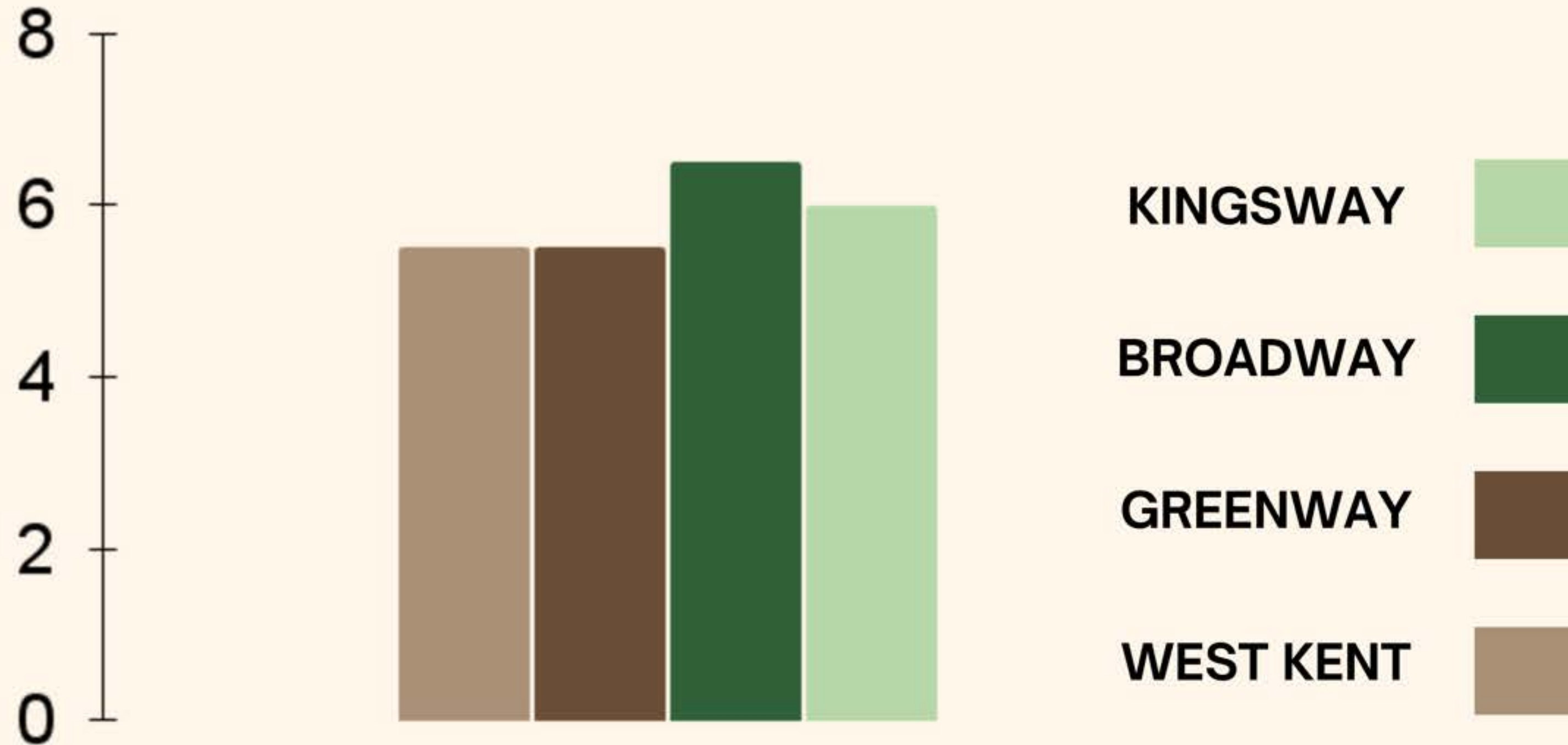


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Economy Scores

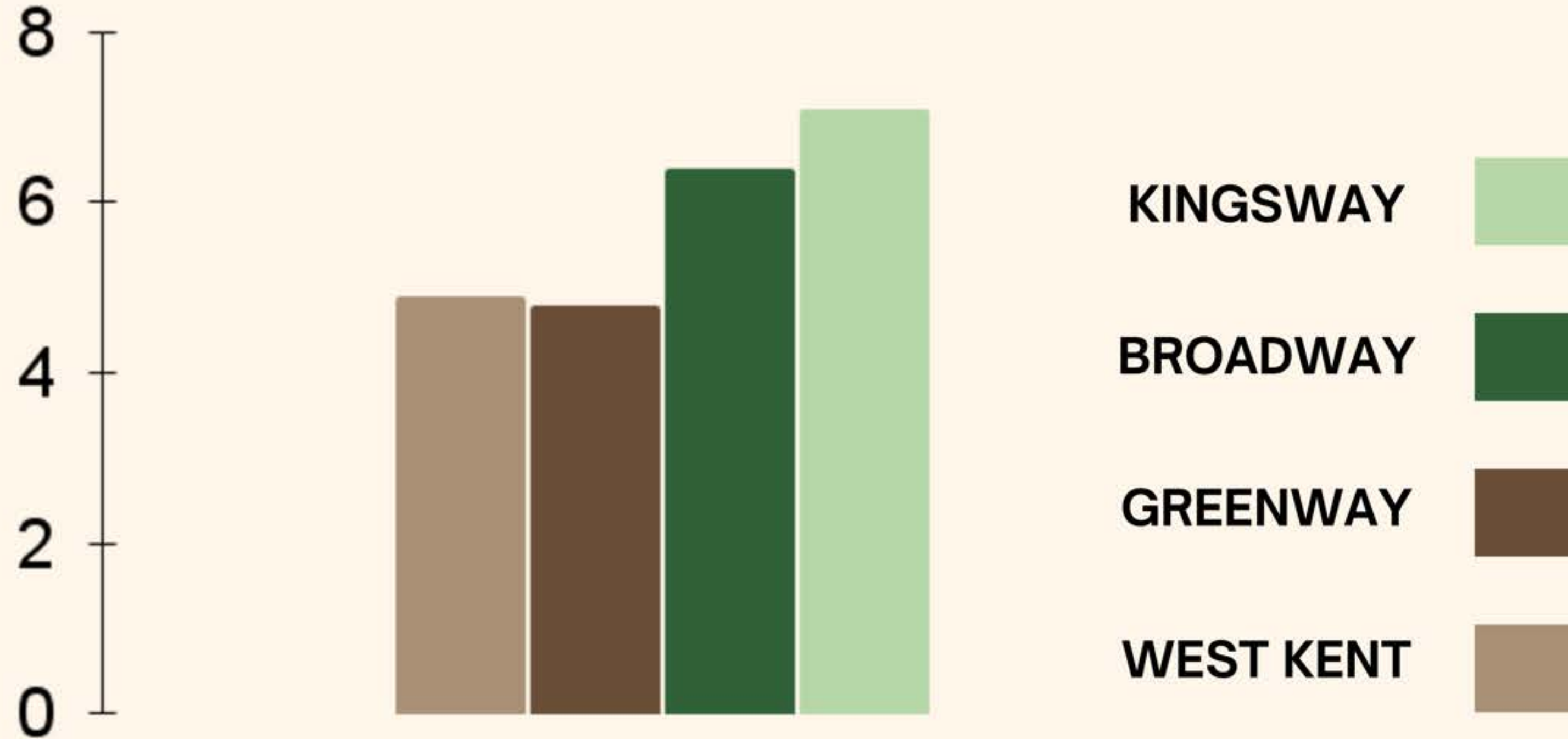


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Environment Scores

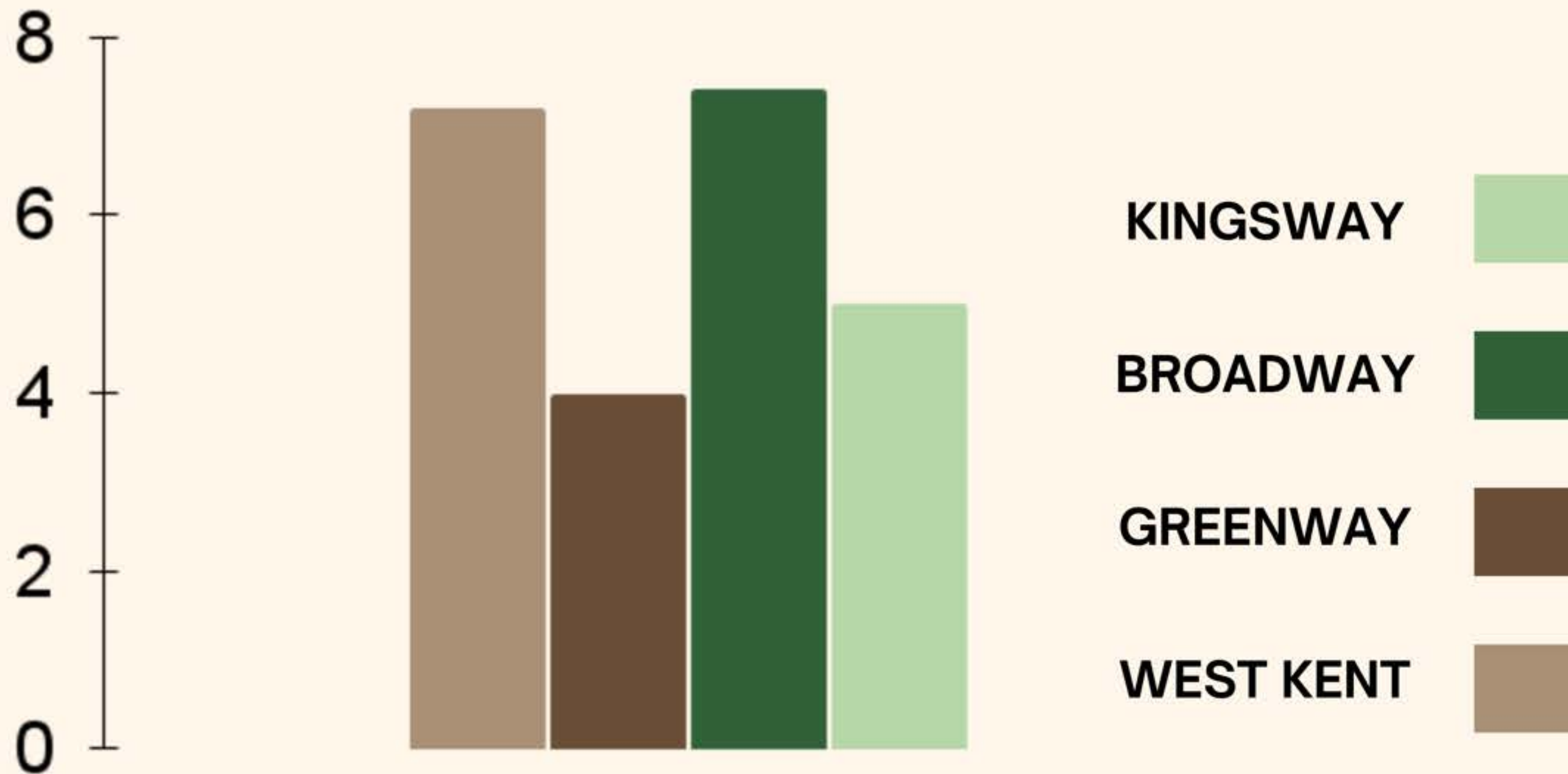


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Implementation Scores

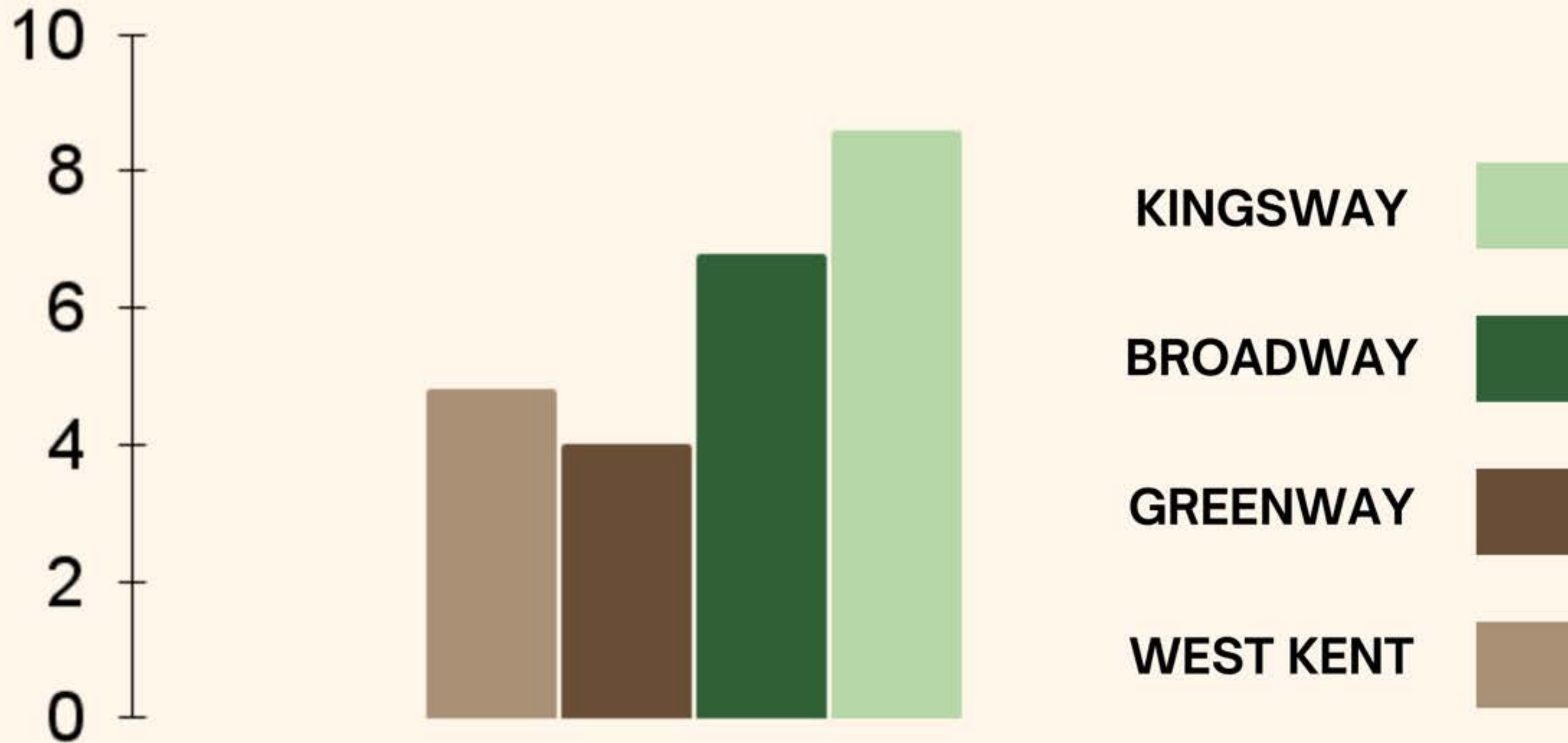


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Accessibility Scores

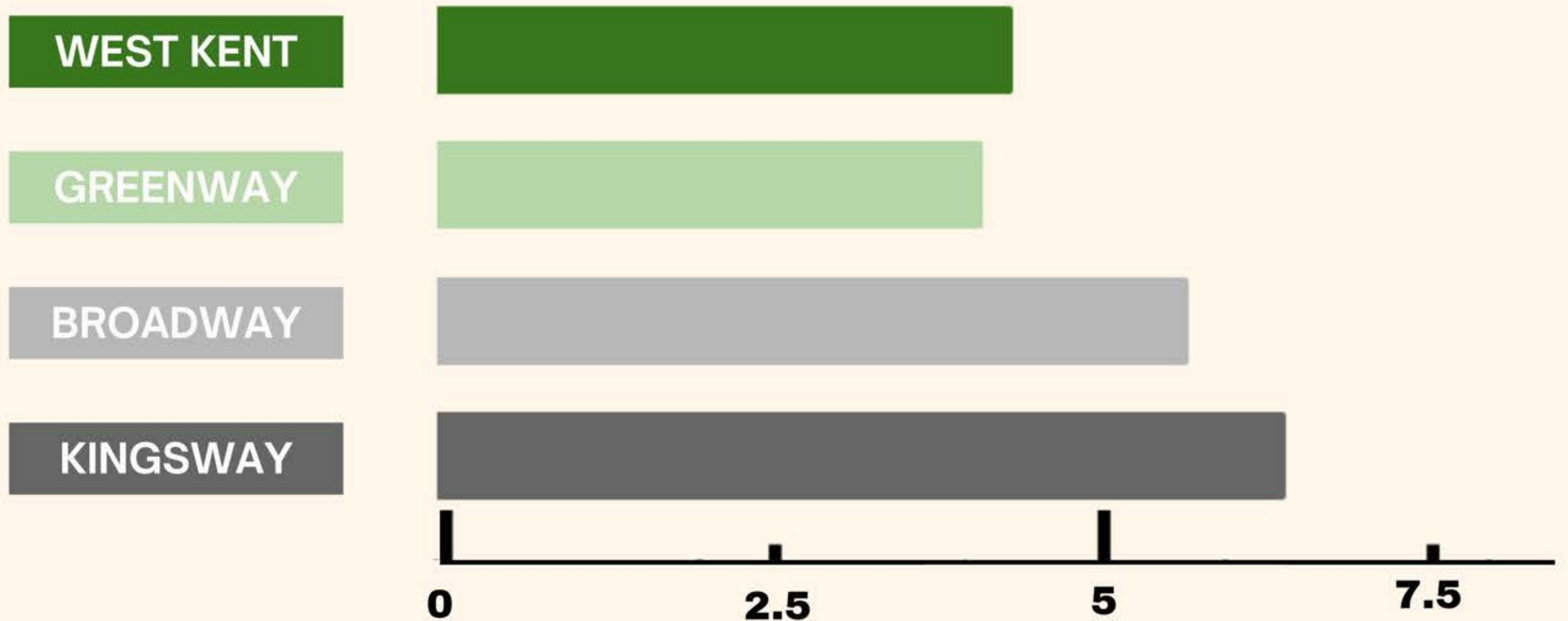


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WDM Data



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THE FUTURE OF KINGSWAY

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“Seriously it’s a no brainer.
It’s a direct route through
the city.”
-Citizen

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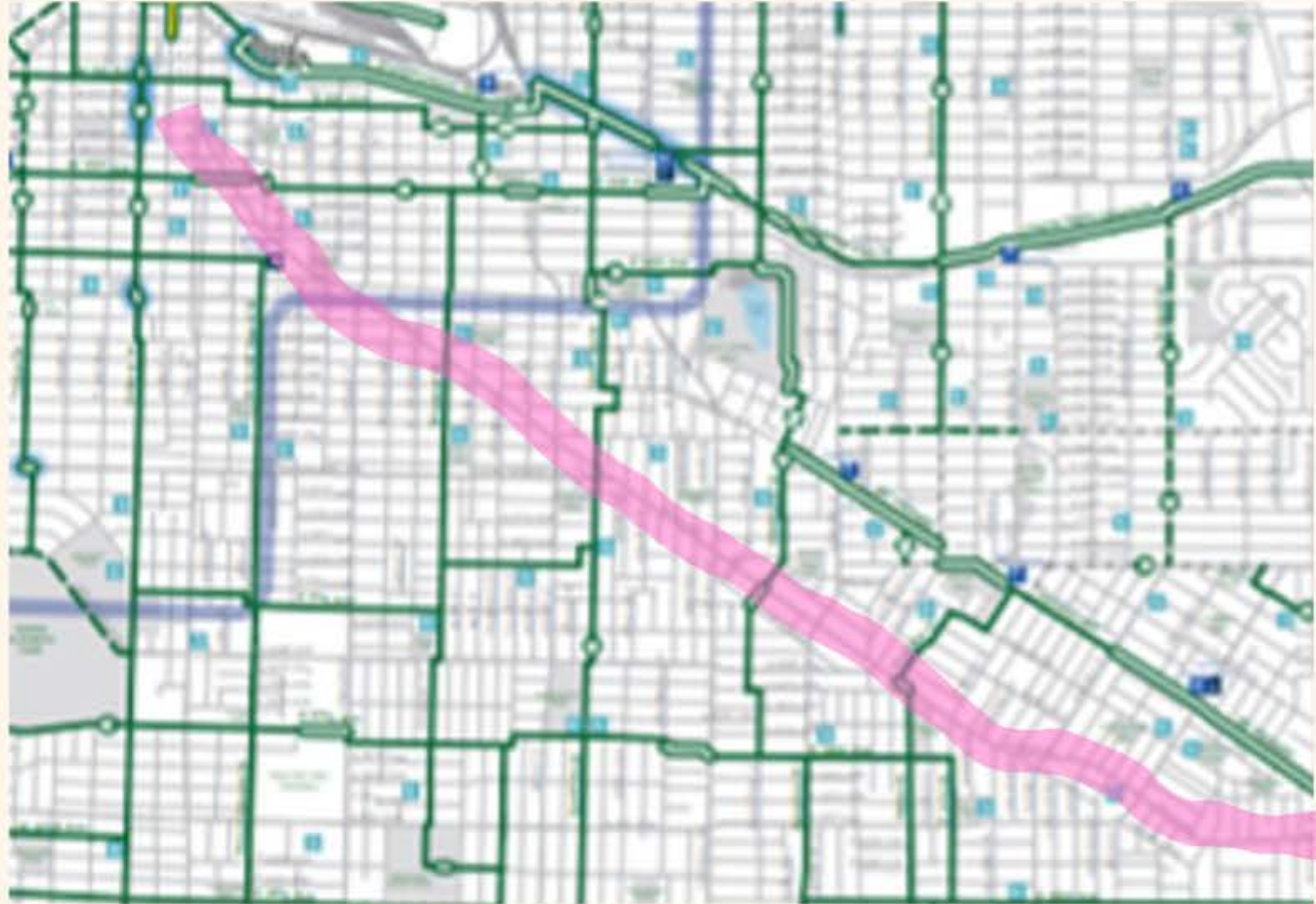
“It would be awesome to have a protected bike lane on Kingsway. Fastest and flattest route across town and tons of businesses along it”
-Citizen

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More direct than current East-West and North-South routes.



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KINGSWAY TODAY

“I used to bike commute downtown from New West. On the days I was brave I would take Kingsway.

It was the quickest, most efficient route and it wasn't even close.”

-Citizen



“I used to commute from main and Broadway to Metrotown on Kingsway. It was a good 15 min faster than taking bike routes.

I thank my lucky stars that I never got doored tho. Biking home at 5 was always a roll of the dice”

-Citizen

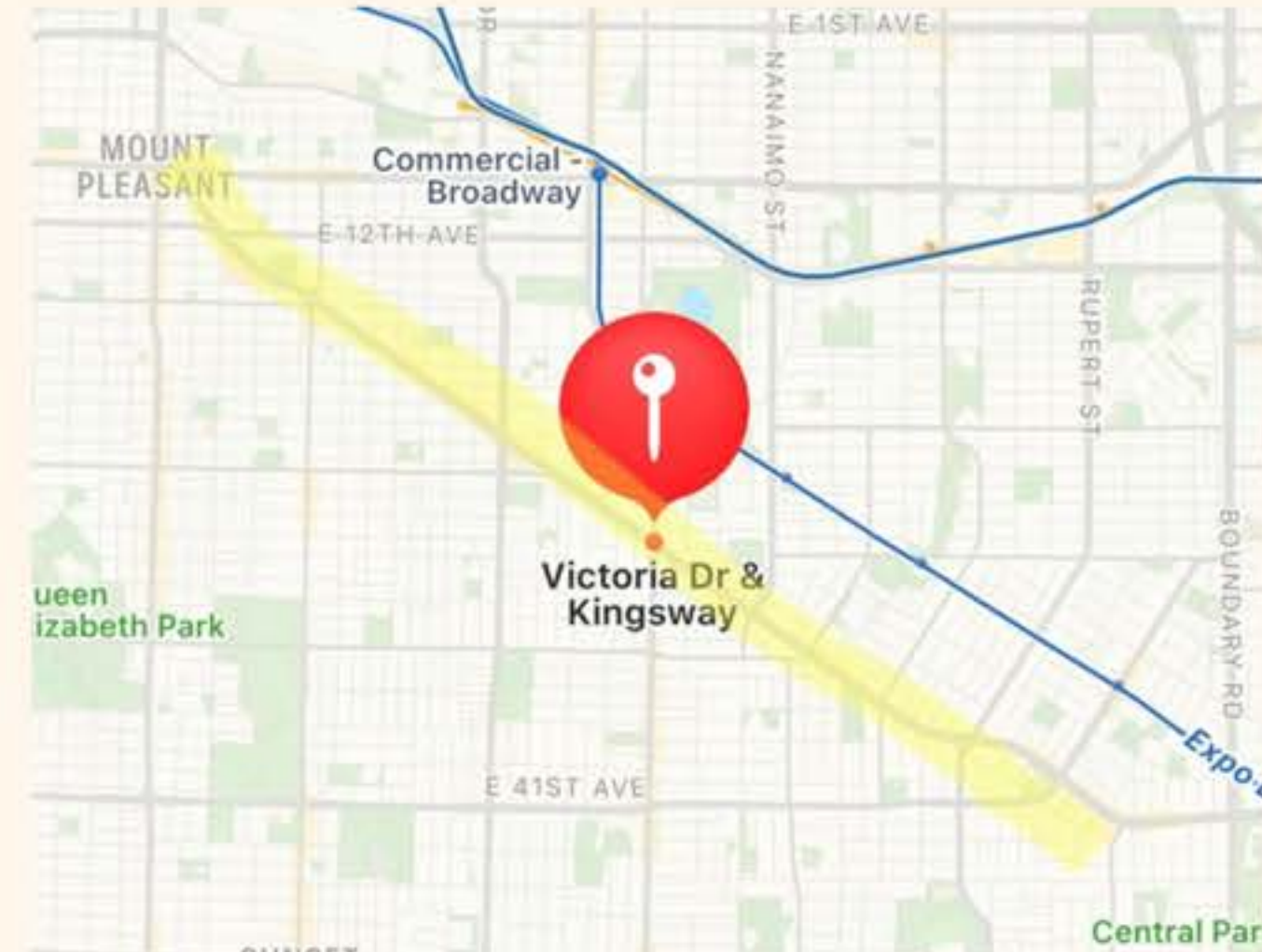
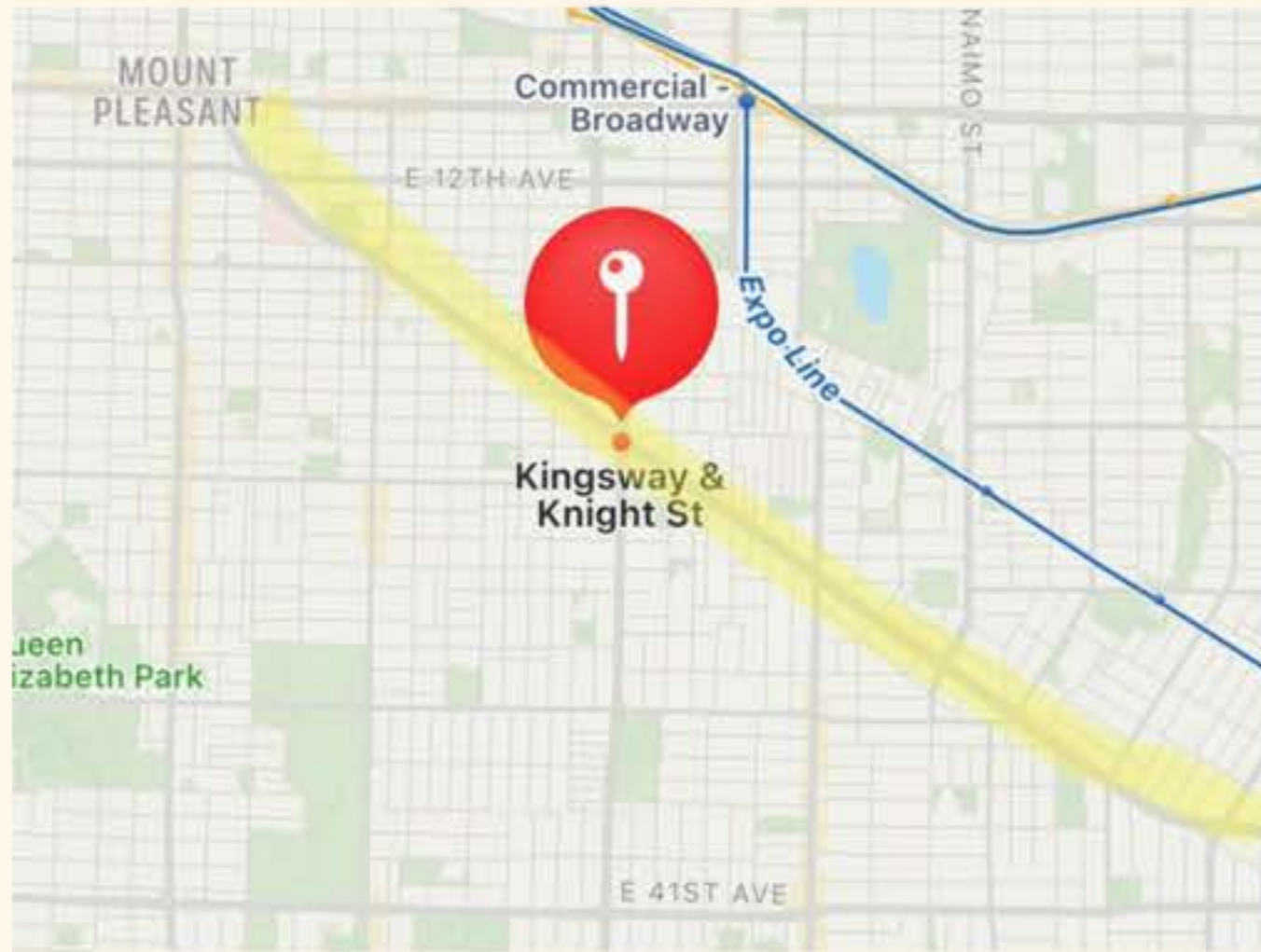
OVERVIEW

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KINGSWAY TODAY

Included in Vancouver's 10 most dangerous intersections excluding on-ramps.*

Kingsway & Knight Street (249 collisions) Kingsway & Victoria Drive (247 collisions)



*According to Insurance Corporation of British Columbia (ICBC) data between 2019 to 2021.

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OUR PROCESS

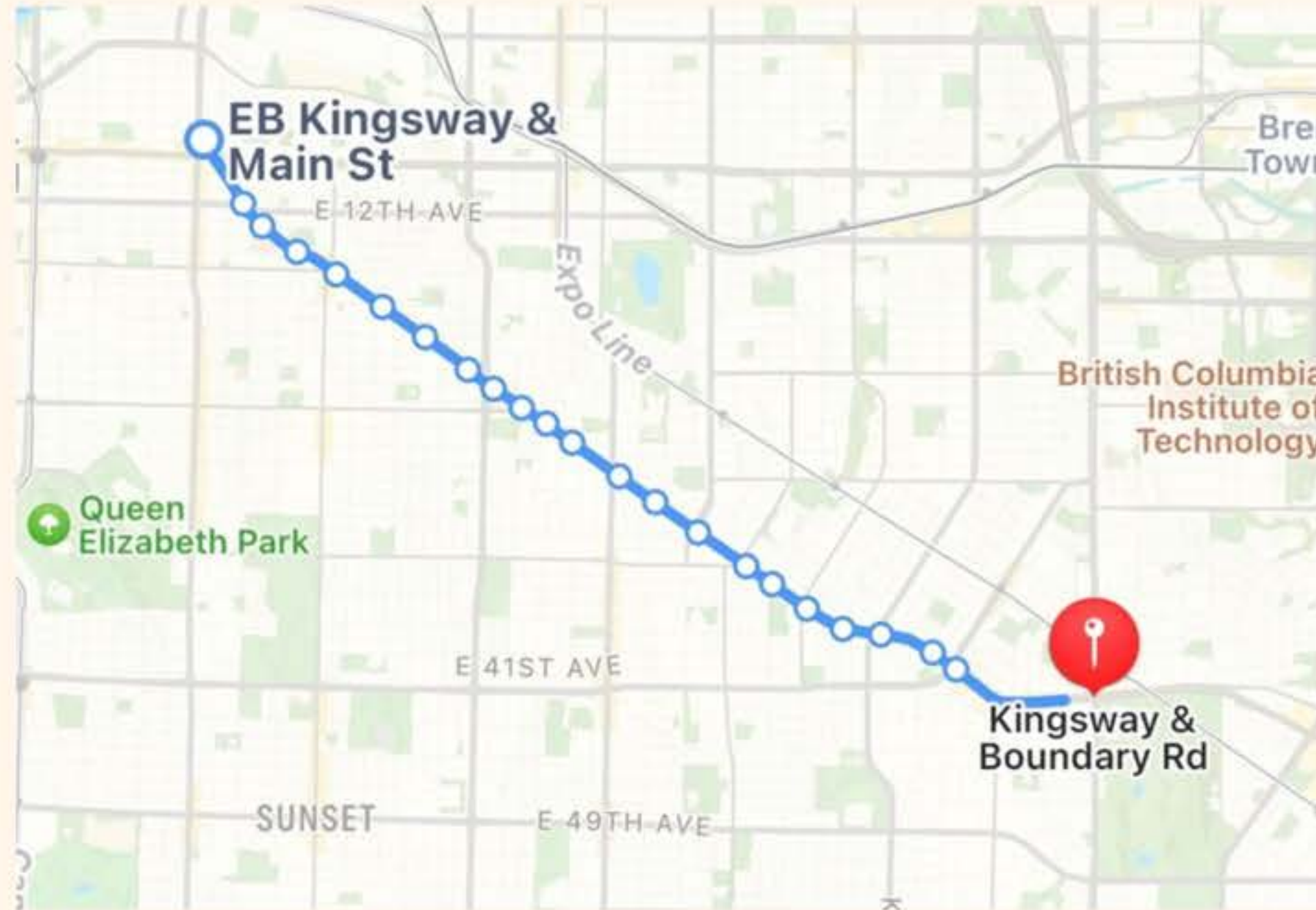
OUR CHOICE



July 2023

https://packaged-media.redd.it/32nh6si3k7db1/pb/m2-res_1080p.mp4?m=DASHPlaylist.mpd&v=1&e=1699495200&s=1b5ef69fe1a23a0b88b867277f714053b5c0bec3#t=0

The typical commuter spends an average of 43.6 minutes travelling one way to work by public transit.



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It takes an average of 30 minutes to commute from Kingsway and Main street to Kingsway and Boundary Road.



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A direct commute between Vancouver and Burnaby.

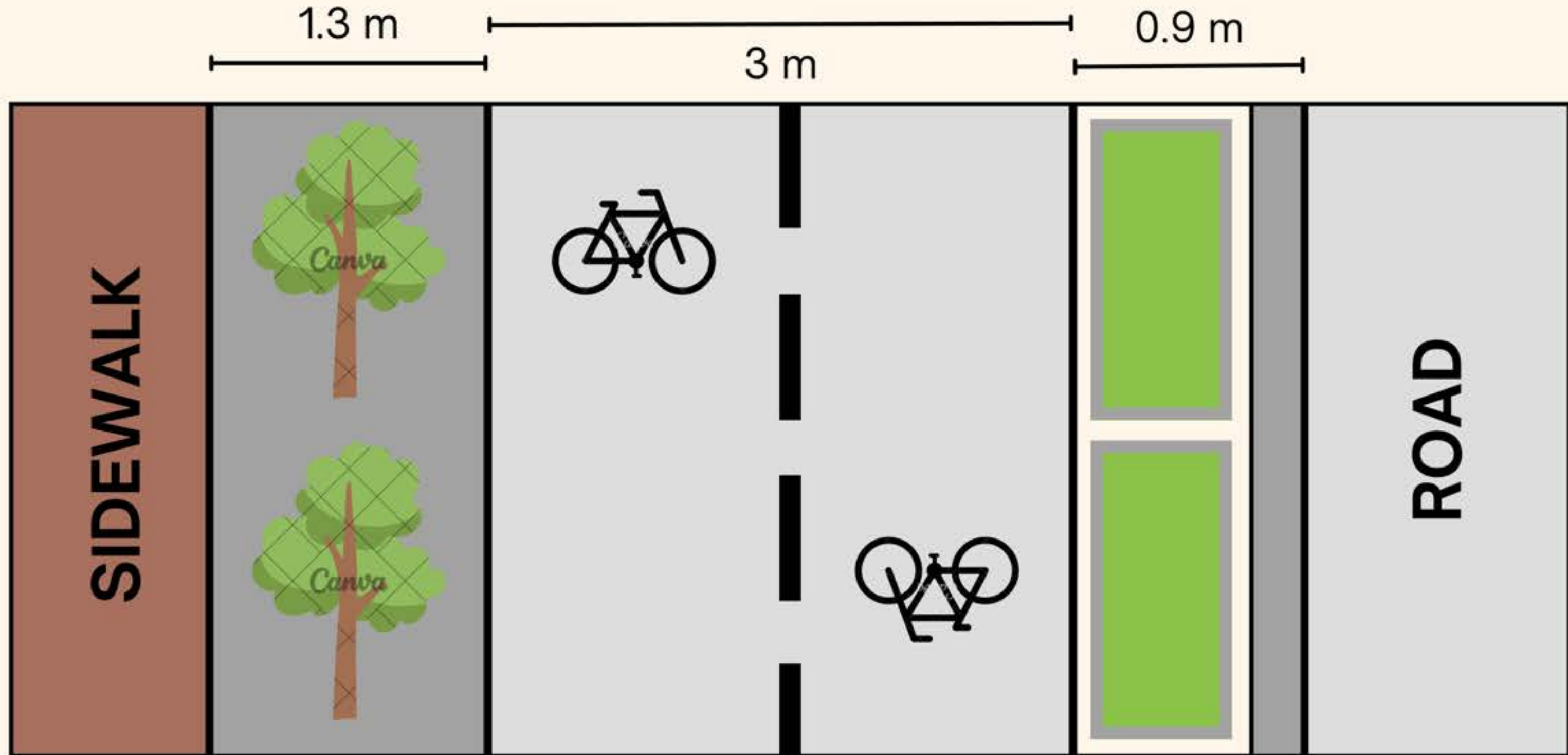


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VISUAL REPRESENTATION



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Kingsway Redesign



<https://www.bikesanantonio.org/request-bike-lanes-broadway/>

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COST PER KM

\$1,371,728

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How Was It Calculated?

- Cost estimate of the protected cycle track currently on Dunsmuir street
- 75% of cyclists - 'very comfortable' when buffer spaces are with planters²¹

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Included in Cost



Concrete median, modular planters, pavement markings, conflict paint at intersections, signage, bicycle parking

Images: <https://www.kimley-horn.com/wp-content/uploads/2020/06/N-Fremont-Street-Bike-Lane-7.jpg>, <https://www.swrl.com/images/planters/bike/02.jpg>, <https://www.mississauga.ca/wp-content/uploads/2022/12/Stavebank-Bike-Parking-Corral.jpg>

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ANNUAL OPERATING COST PER KM

\$12,900*

*Estimated using Richmond hill's Pedestrian and cycling master plan study (2010)

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COST PER CYCLIST

\$22.12 PER KM

Assuming there are 2000 bikers per day

*https://opendata.vancouver.ca/explore/dataset/bikeways/information/?disjunctive.bike_route_name&disjunctive.bikeway_type&disjunctive.subtype&disjunctive.year_of_construction

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ENVIRONMENTAL BENEFITS

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Significant Benefits



Reduced Greenhouse
Gas Emissions



Lower Air Pollutants



Reduced Traffic
Congestion



More Energy
Efficient

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CO2 EMISSIONS SAVED PER KM

100 GRAMS*

*<https://www.canada.ca/en/environment-climate-change/services/canadian-environmental-protection-act-registry/greenhouse-gas-emissions-performance-2019.html>

OVERVIEW

OUR PROCESS

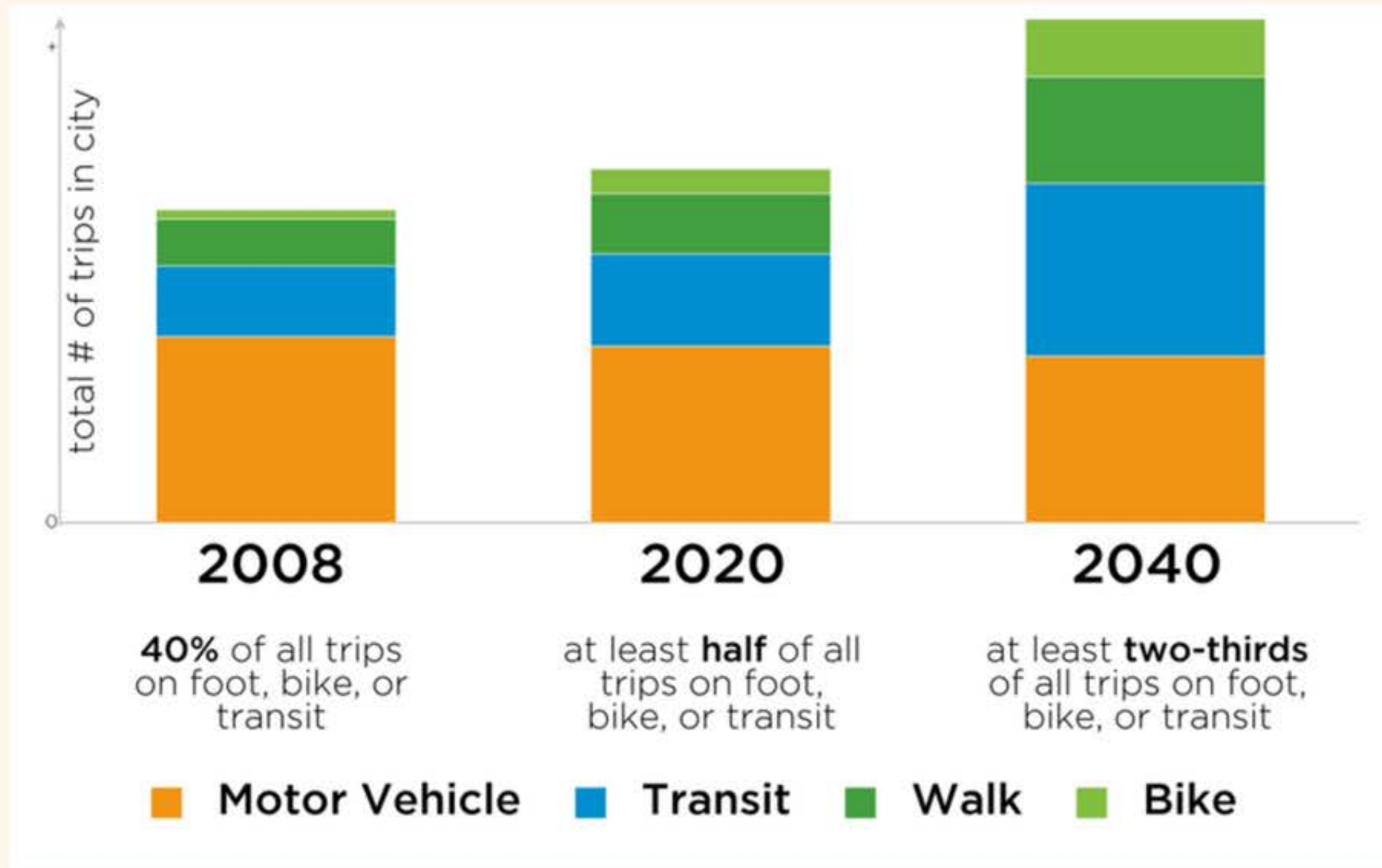
OUR CHOICE

THANK YOU

APPENDIX

Vancouver 2040 Transportation Plan

<https://vancouver.ca/streets-transportation/transportation-2040.aspx>



FULL WDM

SAFETY (NEED FOR BIKE LANE)									
Criteria		West kent ave		Greenway project		Broadway		Kingsway	
Number of intersections per kilometer	20	7.5	1.5	5	1	5	1	5	1
Speed limit of roads	40	8	3.2	8	3.2	5	2	5	2
Number of car accidents	40	8	3.2	7	2.8	5	2	4	1.6
Final weigthed score		7.9		7		5		4.6	
Need		2.1		3		5		5.4	

FULL WDM

ENVIRONMENT									
Criteria	Weight	West kent ave		Greenway project		Broadway		Kingsway	
Reduction of traffic	70	4	2.8	3	2.1	7	4.9	8	5.6
Green ways = more flora and fauna	30	7	2.1	9	2.7	5	1.5	5	1.5
Final weigthed score		4.9		4.8		6.4		7.1	

FULL WDM

IMPLEMENTATION									
Criteria	Weight	West kent ave		Greenway project		Broadway		Kingsway	
Width of roads	40	6	2.4	4	1.6	8	3.2	8	3.2
Length of road	60	8	4.8	4	2.4	7	4.2	3	1.8
Final weigthed score		7.2		4		7.4		5	

FULL WDM

ECONOMY									
Criteria	Weight	West kent ave		Greenway project		Broadway		Kingsway	
Number of shops on the road	50	4	2	3	1.5	8	4	9	4.5
Cost of contruction	50	7	3.5	8	4	5	2.5	3	1.5
Final weighted score		5.5		5.5		6.5		6	

FULL WDM

ACCESSIBILITY									
Criteria	Weight	West kent ave		Greenway project		Broadway		Kingsway	
Proximity to transit hubs	40	6	2.4	4	1.6	8	3.2	8	3.2
Number of users impacted/ density of neighbourhoods	60	4	2.4	4	2.4	6	3.6	9	5.4
Final weighted score		4.8		4		6.8		8.6	

FULL WDM

TOTAL									
Criteria	Weight	West kent ave		Greenway project		Broadway		Kingsway	
Safety	30	2.1	0.63	3	0.9	5	1.5	5.4	1.62
Economy	20	5.5	1.1	5.5	1.1	5	1	6	1.2
Environment	20	4.9	0.98	4.8	0.96	6.4	1.28	7.1	1.42
Accesibility	20	4.8	0.96	4	0.8	6	1.2	8.6	1.72
Implementation	10	7.2	0.72	4	0.4	7.4	0.74	5	0.5
Final weigthted score		4.39		4.16		5.72		6.46	

STAKEHOLDERS

Stakeholder	Stakeholder Needs -Highest Priorities	Stakeholder Needs – Lower-Level Priorities	Power (high, medium, low)	Legitimacy (high, medium, low)	Urgency (high, medium, low)	Expected Stakeholder Class (Primary, Secondary, Tertiary)
Cyclists "Road Warriors" (Susan)	<ul style="list-style-type: none"> - Bikes lanes that don't increase commute time - wide bike lanes with more room alternate bike routes to decrease traffic	<ul style="list-style-type: none"> - storage 	medium	low	high	secondary
Non-Cycling Homeowners (Mohamed)	<ul style="list-style-type: none"> - Use bikes on major road result in traffic congestion to drivers and pollution to environment - Tax money should spend on health care not this project. 	<ul style="list-style-type: none"> - health care 	medium	low	low	secondary
Emergency Services - a planner for the Vancouver fire department(Laura)	<ul style="list-style-type: none"> - Make space for emergency vehicles - that emergency vehicle routes are a high priority - ensure that cycle lanes are not limiting emergency vehicle access to a region 	<ul style="list-style-type: none"> - None 	Medium	High	High	Primary

General Pedestrian (Krishna)	<ul style="list-style-type: none"> - Safety for pedestrians - Directional boards in the bike lanes - separating the cyclists from the pedestrians 	<ul style="list-style-type: none"> - None 	low	low	low	Tertiary
University student (Bethany)	<ul style="list-style-type: none"> - safety - proximity/accessibility to public transport 	<ul style="list-style-type: none"> - aesthetics - bike parking booths 	low	low	low	Tertiary
Owner of a bike rental company (Eugene)	<ul style="list-style-type: none"> - Profit - Easy accessibility for the bikers to our rental shops. - Scooters should not be allowed on bike lanes- hurts business - Clean and green bike lanes 	<ul style="list-style-type: none"> - safety 	low	low	low	Tertiary
Car commuters- Local Commuter David	<ul style="list-style-type: none"> - 1. Child Safety: Ensure safe commuting for David's children. - 2. Accessibility: Improve access to nearby shops and services. - 3. Traffic Safety: Address road safety for David's car commute. - 4. Cycling Safety: Address concerns about cycling safety. - 5. Efficient Infrastructure: Ensure efficient use of public investments in cycle lanes. 	<ul style="list-style-type: none"> - 1. Promote Bicycling: Encourage bicycle use for daily errands and commutes. - 2. Child Bike Use: Discuss allowing children to bike on city streets. - 3. Environmental Concerns: Address David's environmental concerns. - 4. Commuting Time: Reduce David's 15-minute car commute. - 5. Urban Planning: Handle broader urban planning matters. 	medium	high	medium	secondary
Car rent companies- that incorporated cycling Regular commuter Dadigam	<ul style="list-style-type: none"> - The route should have full clearance to decrease the time of commute by cycle 	<ul style="list-style-type: none"> - speed 	low	high	High	secondary

Sustainability of Bike Lanes

Design Principles for Bike Lanes: The World Resources Institute (WRI) has published a guide on bike lane design principles which are grounded in years of cycling and road safety experience. This guide is aimed at helping city leaders create safer and more effective bike lanes.

Impact on Accessibility: A study in Canada found that the implementation of bike lanes during the COVID-19 pandemic increased cyclists' road access to stores, jobs, and parks by significant percentages, thereby enhancing urban accessibility.

Health and Safety Benefits: Protected bike lanes not only save the lives of cyclists but also promote healthier lifestyles by encouraging more people to cycle instead of using cars. This also leads to a decrease in the number of sedentary individuals, which in turn, can have a positive impact on public health.

Environmental Benefits: Cycling, facilitated by bike lanes, supports healthy and non-air-polluting lifestyles. The shift from individual motorized transport to cycling is known to improve air quality and road safety. The physical activity associated with cycling can reduce the risk of heart diseases and mitigate other negative impacts of sedentary lifestyles.

Carbon Emission Reduction: Bike lanes promote sustainability by reducing carbon emissions and advocating for a more eco-friendly mode of transportation. However, the implementation of bike lanes can present challenges like the need for infrastructure changes and potential conflicts with other modes of transportation

Carbon Emissions

Carbon Emissions per Kilometer: On average, a typical car in the US emits around 300 grams of CO₂ equivalent (gCO₂e) per kilometer, while more fuel-efficient cars like the Toyota Prius emit about 150 gCO₂e per kilometer. In contrast, the carbon footprint of cycling one kilometer ranges between 16 to 50 grams CO₂ equivalent depending on the efficiency of cycling and dietary choices of the cyclist

Emissions Comparison: A study highlighted that emissions from cycling are over 10 times lower than those from a passenger car, even when taking into account the additional dietary intake of a cyclist compared to a motorized transport user [oai_citation:3, New study compares bicycling's CO₂ emissions to other

Carbon Footprint Reduction: Individuals who switch from car to bike for just one day a week can reduce their carbon footprint by 3.2kg of CO₂, which is equivalent to the emissions from driving a car for 10km

These comparisons illustrate the significant sustainability advantage of bike lanes and cycling over driving, particularly in terms of carbon emissions reduction. By facilitating cycling, bike lanes help in reducing the carbon footprint, thus contributing towards environmental sustainability.

CO2 Emmissions

In Canada, the average CO2 emissions for new passenger automobiles were reported at 194 grams per mile (or approximately 120.7 grams per kilometer, using the conversion 1 mile = 1.60934 kilometers) as of the 2019 model year. This represents a 23.9% reduction from the previous value of 255 grams per mile. Similarly, light trucks saw a decrease in emissions from 349 grams per mile to 290 grams per mile, a 16.9% reduction.

Converting these figures to per kilometer values gives an approximate emission of 120.7 grams CO2e per km for passenger automobiles and 180.3 grams CO2e per km for light trucks. Keep in mind that these are average values and actual emissions can vary depending on the specific vehicle and its fuel efficiency.

Impact on Businesses

Positive Sales Impact:

- Studies have highlighted that bike lanes typically have little to no negative impact on business sales and can, in many cases, increase spending at local businesses. The fear of losing customers due to reduced parking is often unfounded since the data shows that overall, bike lanes tend to have a neutral or even positive effect on business sales .

Customer Access and Preferences:

- Surveys conducted by the Cambridge Community Development Department revealed that less than a third of customers travel to business districts by car, with the majority arriving by foot, bike, or transit. This indicates that bike lanes, which facilitate bicycle and pedestrian traffic, align with the primary modes of transport used to access these areas .

Customer vs. Business Owner Perceptions:

- There is a noted difference between the preferences of customers and the perceptions of business owners. While business owners often prioritize parking, customers tend to value a better mix of retail, more affordable shopping options, special events, and improved street safety infrastructure, including bike lanes. This suggests that enhancing cycling infrastructure could be more in line with what customers are seeking .

Case Studies on Economic Impact:

- A specific case study in Toronto, Canada, after the installation of a bike lane on Bloor Street West, showed increased cyclist volumes and improved safety perceptions among cyclists and drivers. Importantly, surveys indicated an increase in the number of visitors, visit frequency, and monthly spending by visitors both on Bloor Street with the new bike lane and on Danforth Avenue, which served as a control area without bike lanes. This suggests that the presence of bike lanes did not detract from commercial activity and may have enhanced it .

Environmental Benefits

Traffic Flow and Accessibility: Kingsway is a significant arterial route that cuts diagonally through Vancouver's grid system. Implementing a bike lane here could potentially alleviate traffic congestion and improve accessibility to different parts of the city for cyclists

Potential Emission Reduction: By facilitating cycling along a major arterial like Kingsway, there's a potential to significantly reduce vehicle emissions. Every kilometer cycled instead of driven saves about 250 grams of CO₂, considering the average emissions from cars

Investment in Sustainable Transportation: TransLink's investment in bus-priority lanes and intersection improvements on Kingsway indicates a commitment to enhancing sustainable transportation along this route. This investment can be complemented by a bike lane, which would further the agenda of reducing car-dependency and promoting cleaner modes of transportation

COST CALCULATIONS

Cost of infrastructure

Cost/meter of the Dunsmuir protected bike lane : \$1132

Estimated cost per kilometer:
\$1,132,000 (2017 data)

Estimated cost per kilometer in 2023
(after inflation): **\$1,371,727.83**

Operating/Maintenance Cost

Estimated annual maintenance
cost/kilometer: \$10,000 (2013 data)

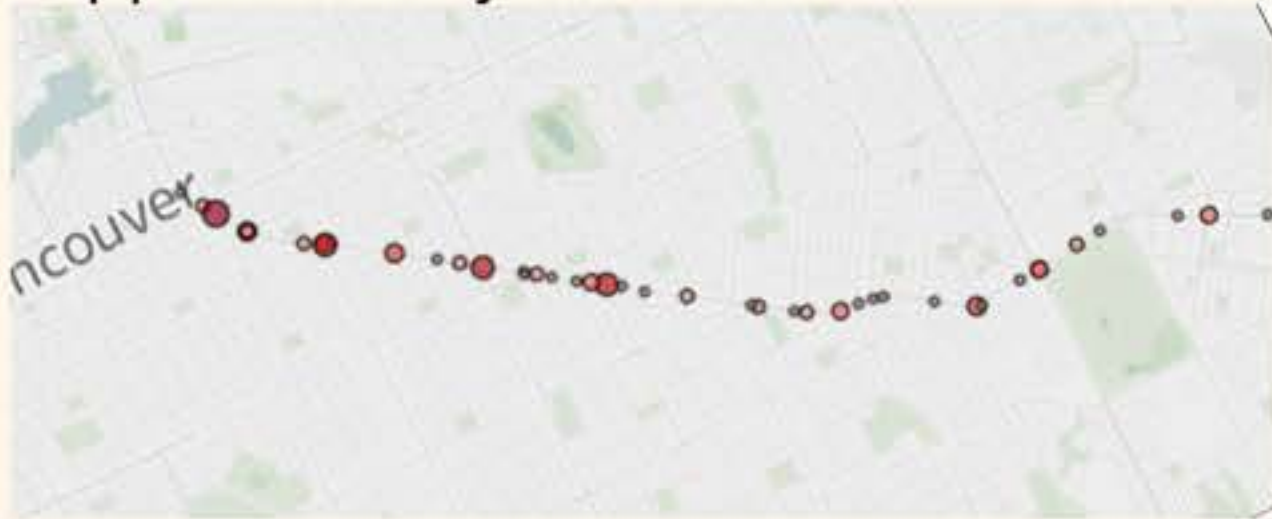
Annual maintenance cost/kilometer in
2023: **\$12,854.83**

COLLISION DATA

How many crashes involving cyclists were along the stretch of road in the last 5 years

Kingsway

approximately 70 crashes



Kent

approximately 9 crashes



Broadway

approximately 50 crashes



Greenway

approximately 11 crashes



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