

Exploratory Cost Benefit Analysis

McKinley Beach Rezoning from Multifamily to Single Family on larger land footprint.

This analysis, and a bit more discussion, can be found at
<https://blogs.ubc.ca/ubcowatershed/2021/08/23/local-issues-mckinley-beach-rezoning/>

	Impacted Group	Zoning Amendment	Current Zoning
Benefits			
Total Housing Capitalized Value net Suite	Devel	839,005,000	570,500,000
Total Suite Capitalized Value	Public	86,400,000	86,400,000
Environmental PV value of ecosystem services	Public	822,591	47,349,063
Total Benefits		926,227,591	704,249,063
Costs			
Total Housing Build Cost net Suite	Devel	405,450,000	293,400,000
Total Suite Building Cost	Public	40,500,000	40,500,000
Housing PV social cost of carbon	Public	5,608,000	1,956,000
Transportation PV social cost of carbon	Public	5,597,009	3,530,140
Transportation PV cost of time	Public	134,081,611	88,947,814
Transportation PV cost of statistical lives lost	Public	27,341,712	17,244,936
Total Infrastructure Cost	Devel	32,808,399	0
Infrastructure Operating Cost	Public	?	?
Planning, marketing, administration, etc. costs	Devel	60,000,000	60,000,000
Total Costs		711,386,731	505,578,889
<u>Net Benefits before Transfers</u>			
Developer		340,746,601	217,100,000
Public		-125,905,742	-18,429,826
Net Benefit		214,840,859	198,670,174
Transfers from development to Kelowna		18,725,000	9,780,000
Transfers from Development to BC and Canada		112,707,560	72,562,000
Net Transfers to Kelowna, BC and Canada		131,432,560	82,342,000
Net Benefit to Developer		209,314,041	134,758,000
Net Benefit to Public		5,526,818	63,912,174
Changes			
Change in total net benefit			16,170,686
Additional benefit to Developer with zoning change			74,556,041
Additional benefit to Public with zoning change			-58,385,355

Numbers used to generate estimates of costs and benefits described in subsequent pages.

Based on numbers used, the rezoning has a net benefit that is about \$120 larger than developing the project as currently approved. Before considering transfers from the developer to different levels of government, the developer gains over \$250 million, and the public is worse off by about \$150 million. With about \$120 million in additional transfers to the public, the end result is that the developer gains about \$170 million, and the public loses about \$60 million.

The positive net benefit for the public hinges on the transfers from the developer through corporate taxes. If the profit generated by the rezoning is substantially less than estimated here, then those corporate taxes will be far lower, and both the net benefit of the project overall, and the relative benefit to the public will also be far lower.

Note that the taxes collected on the development profit ignore the fact that the investors in this project will likely invest elsewhere, also earning profits and paying taxes on that income. It is therefore an overstatement of the additional benefits captured by the public.

Project: McKinley Beach Rezoning
Counterfactual: McKinley Beach Built as Currently Approved

	Factors	Notes	Project	Counterfactual
Discount rate	0.05			
<u>Housing Impacts</u>				
SF homes, McKinley			415	0
MF homes, McKinley			400	815
Secondary suites, McKinley			300	0
Secondary suites, Kelowna not McKinley			1	0
SF homes, area excluding suite	2800			300
SF homes, suite area	900			
MF homes, area	1200			
SF build cost, per square foot (suite not fin.)	225	2		
MF build cost, per square foot	300			
Suite finish cost	150	3		
Build cost, SF homes, McKinley			261,450,000	0
Build cost, MF homes, McKinley			144,000,000	293,400,000
Build cost, suites, McKinley			40,500,000	0
Build cost, suites, Kelowna not McKinley			0	40,500,000
Total Build Cost			445,950,000	333,900,000

Cost of building with rezoning approved or following permissions currently in place.

1) - assuming that population growth in Kelowna doesn't change, and occupants of suites locate elsewhere in Kelowna.

2) - cost estimates from Altus: <https://creston.ca/DocumentCenter/View/1957/Altus-2018-Construction-Cost-Guide-web-1>, scaled upwards.

3) - build costs may be higher in Kelowna, if suites in older homes requiring more complicated work. Also more costly if in Kelowna MF if build to provide same housing as secondary suites would.

Suite net monthly rental	1200	4		
PV suite income annuity	288000			
McKinley SF price	1500000	5		
McKinley SF price net suite profit	1347000	6		
McKinley MF price	700000	7		
Market value, SF homes net suite McKinley			559,005,000	0
Market value, MF homes, McKinley			280,000,000	570,500,000
PV of suite income, McKinley			86,400,000	0
PV of suite income, Kelowna not McKinley			0	86,400,000
Total Housing Capitalized Value			925,405,000	656,900,000

Income associated with selling new homes and having secondary suites in many of these homes.

- 4) - net rental income may be higher for suites in Kelowna, where tenants don't need a vehicle to access jobs and services
- 5) - estimated using properties in Wilden. May be lower, as commute is further.
- 6) - Deducting present value of suite income, less cost of finishing suite. Price for all homes, as price land sells for is its 'highest and best use'. Principle used by BC Assessment and appraisers.
- 7) - based on listed properties currently in McKinley.

SF homes, GHG per square foot	4	8		
MF homes, GHG per square foot	2	9		
GHG emissions SF McKinley			4,648,000	0
GHG emissions MF McKinley			960,000	1,956,000
Housing annual social cost of carbon			280,400	97,800
Housing PV social cost of carbon			5,608,000	1,956,000

GHG emission estimates. Note that while these homes could be heated by electricity that in BC is largely generated by hydro, BC power is exported, and displaces fossil fuel generated electricity elsewhere. Building these larger homes will likely contribute to extending the length of time we continue using fossil fuels either directly for heating, or indirectly for generating electricity.

The social cost of carbon is an estimate of the economic impact of an extra tonne of emissions. It has been estimated at over \$100 per tonne. I am including \$50, which is consistent with BC's carbon tax.

8) - <https://www.pnas.org/content/117/32/19122>

9) - PV assumed to be an annuity, which is value divided by discount rate. Could make things more complicated by assuming a project time length.

Infrastructure Construction

Infrastructure cost per foot	1000	10		
Infrastructure length (ft) for SF homes			32,808	0
Total Infrastructure Cost			32,808,399	0

Cost of constructing roads, installing utilities, etc., needed to enable construction and sale of residential units.

10) - <https://www.swiftestimator.com/SE7Help/CE/help/Miscellaneous/Section66Costs.htm> - \$200 per foot of street approximate from source. Have multiplied up for hillside, CDN, etc.

Transportation

Average vehicle litre / 100 km	8.7	11		
GHG kg per litre	2.4	12		
Social cost of carbon (BC carbon tax)	50	13		
Mortality per billion vehicle km	5.1	14		
Value of statistical life	10000000	15		
Kelowna congestion hours / 1M vehicle km	100	16		
Value of hour traveling	10	17		

Average travel speed McKinley to Kelowna	40		
Average travel speed Kelowna not McKinley	30		
Trips per SF household per day	6		
Trips per MF household per day	3		
Trips per suite per day	3		
Trip length McKinley to downtown	16		
Trip length Kelowna not McKinley to dt	8	18	
Total annual trips SF origin		908,850	0
Total annual trips MF origin		438,000	892,425
Total annual trips suite origin McKinley		328,500	0
Total annual trips suite origin Kelowna not McKinley		0	328,500
Total annual km SF origin McKinley		14,541,600	0
Total annual km MF origin McKinley		7,008,000	14,278,800
Total annual km suite origin McKinley		5,256,000	0
Total annual km suite origin Kelowna not McKinley		0	2,628,000
Total GHG produced		5,597	3,530
Transportation annual social cost of carbon		279,850	176,507
Transportation PV social cost of carbon		5,597,009	3,530,140
Total annual travel time SF origin McKinley		363,540	0
Total annual travel time MF origin McKinley		175,200	356,970
Total annual travel time suite origin McKinley		131,400	0
Total annual travel time suite origin Kelowna not McKinley		0	87,600
Total annual travel time cost		6,701,400	4,445,700
Total congestion time		2,681	1,691
Transportation annual cost of time		6,704,081	4,447,391
Transportation PV cost of time		134,081,611	88,947,814
Total expected fatalities per year		0	0
Transportation annual cost of statistical lives lost		1,367,086	862,247
Transportation PV cost of statistical lives lost		27,341,712	17,244,936

Totalling transportation cost impacts, in terms of GHG emissions, travel time, and accident risk.

11) - <https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/market-snapshots/2019/market-snapshot-how-does-canada-rank-in-terms-vehicle-fuel-economy.html>

12) - https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/oeef/pdf/transportation/fuel-efficient-technologies/autosmart_factsheet_9_e.pdf

13) - estimates of the social cost of carbon are higher, but this is what we as a province are accepting right now.

14) - https://en.wikipedia.org/wiki/List_of_countries_by_traffic-related_death_rate

15) - based on choices people make that affect their probability of death.

16) - adding traffic to the entire Kelowna network will slow things down. If anything, widening Glenmore will encourage more trips out of McKinley, and more congestion in the network overall.

17) - typically fraction of wage (e.g. 1/2).

18) - a circle this radius from downtown Kelowna includes much of the city, so this may be long for the average trip length for people with suites in Kelowna not McKinley

Infrastructure Operation and Maintenance Costs

This is an area where I would expect city staff to have a good idea of the asset management related cost of more road, more utilities (pipes, etc.) that need to be managed (snow removal, garbage pickup, policing, etc.) and maintained. With more total length of roads, this will invariably be a larger cost than if the currently approved development plan is followed.

Ecosystem services

Acres of high quality natural habitat		0	403
Acres of low quality natural habitat		359	200
Value of high quality habitat / acre / year	\$ 5,817.72	19	
Value of low quality habitat / acre / year	\$ 114.57		
Environmental annual value of ecosystem services		41,130	2,367,453
Environmental PV value of ecosystem services		822,591	47,349,063

Ecosystem services are services provided by the environment for free, that are easy to ignore. There has been considerable research over the years to attempt to attach a value, so that we have a better sense of what we lose if we destroy ecosystems that are providing services. In this case, much of the proposed park is degraded from an environmental view, and I attach a value estimated for the services provided by agricultural land. For the forested land, I attach a value based on suburban forest. See the reference for more detail.

19) - <https://alus.ca/wp-content/uploads/2016/08/estimation-of-ecosystem.pdf>

Distribution of Impacts

Developer revenues from sales	20	839,005,000	570,500,000
Developer build costs		405,450,000	293,400,000
Developer infrastructure cost		32,808,399	0
<u>Developer revenue over direct construction costs</u>		<u>400,746,601</u>	<u>277,100,000</u>
Developer planning costs		10,000,000	10,000,000
Developer real estate agency costs		20,000,000	20,000,000
Sales value of land if not developed	21	30,000,000	30,000,000
<u>Total Developer Business Costs</u>		<u>60,000,000</u>	<u>60,000,000</u>
Developer profit before transfers		340,746,601	217,100,000
Per Unit DCC on SF		\$15,000.00	
Per Unit DCC on MF		\$12,000.00	
Corporate tax rate		0.35	
Gift of park		11,000,000	
Contribution to Glenmore widening		1,500,000	
Total DCC paid		6,225,000	9,780,000

Net transfer from development to city	18,725,000	9,780,000
Profit after DCC paid	322,021,601	207,320,000
Corporate taxes paid	112,707,560	72,562,000
Profit after DCC and corporate taxes	209,314,041	134,758,000
Changes		
Additional Investment		144,858,399
Additional Profit		74,556,041
Return on Investment		51%

One important question is whether the net benefits of the project are positive. Another is how those benefits are distributed. The net increase in transfers to the city are far less than the additional costs born by people in Kelowna. The investors will pay taxes on the profit earned from this project. This additional tax revenue is likely an overstatement, as the investors will invest that which would be added to the current project elsewhere, earning profits and paying taxes.

20 - present value of profit from suite not included.

21 - extrapolated from 11m for 'gift' of land.