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Infrastructure development impacts on Agriculture Impact valuation and mitigation

BC Expropriation Fall Conference

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Types of projects considered

- Gas and oil pipeline projects
  - TransMountain Expansion Project
  - Spectra energy – integrity digs

- Highway expansion e.g.
  - Massey bridge project
  - Road widening Chilliwack

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Approach

- Avoidance of Impact
- Minimization of Impact
- Mitigation of Impact
- Compensation for Impact

Avoidance

- Drill rather than dig where required;
- Keep water supply and irrigation in-tact;
- Repair drainage;
- Assist in relocation;
- Biosecurity measures for livestock and nurseries;
- Work with Organic Certification bodies.

Example of drilling under vs. trenching

Minimize impact

- Landowner consultation and input;
  - Crop seasonality considerations, where possible;
  - Notification prior to construction to allow time to move sensitive materials
- Weed control and management;
- Erosion control;
- Prevent compaction with pads and/or working on dry soil
- Three lift soil excavation (where required);
- Special handling for Certified Organic Lands;
- Measures for sensitive livestock

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Do your home work

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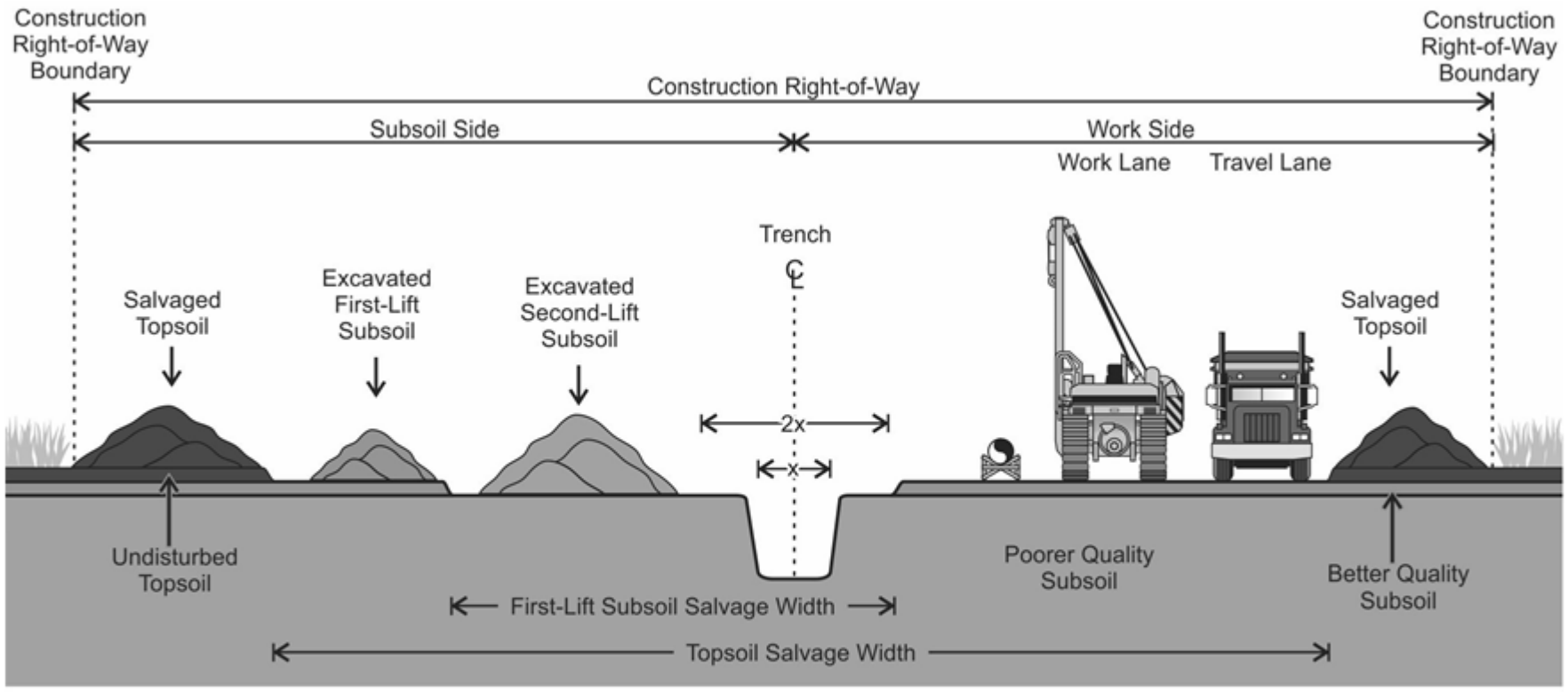
Minimize impact by proper soil handling



Profile View
(Not to Scale)

Representation Only

What you don’t want to happen

Working in wet conditions

Results in soil compaction and crop loss

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Minimize impact by use of rig mats

After construction

- Restore and reseed;
- Re-establish perennials such as berries;
- Rebuild infrastructure, gates/fences and water and drain lines;
- Remove access roads;
- Restore damage related to construction.
- Monitor weeds and crop growth.

Primary Compensation Variables

- Type of crop
- Time of year for construction can have significant impact
- Area of damage
- Length of time (years) to full soil remediation
- Recent average farm-gate prices
- Farm-specific yields, or those attainable under average management
- Crop replant/restoration costs
- Use of a discount rate
- NPV of lost net income, to ensure farmer has no net loss

Blueberry example

- Compensation based on:
  - Acreage affected;
  - Type of berry, variety;
  - Age of stand
  - Irrigation system and infrastructure;
  - Health of plantation at review;
  - Harvesting pattern and crop layout;
  - Harvesting method;
  - Replant costs;
  - Expected average market price over time.


Township line Rd
T 2551
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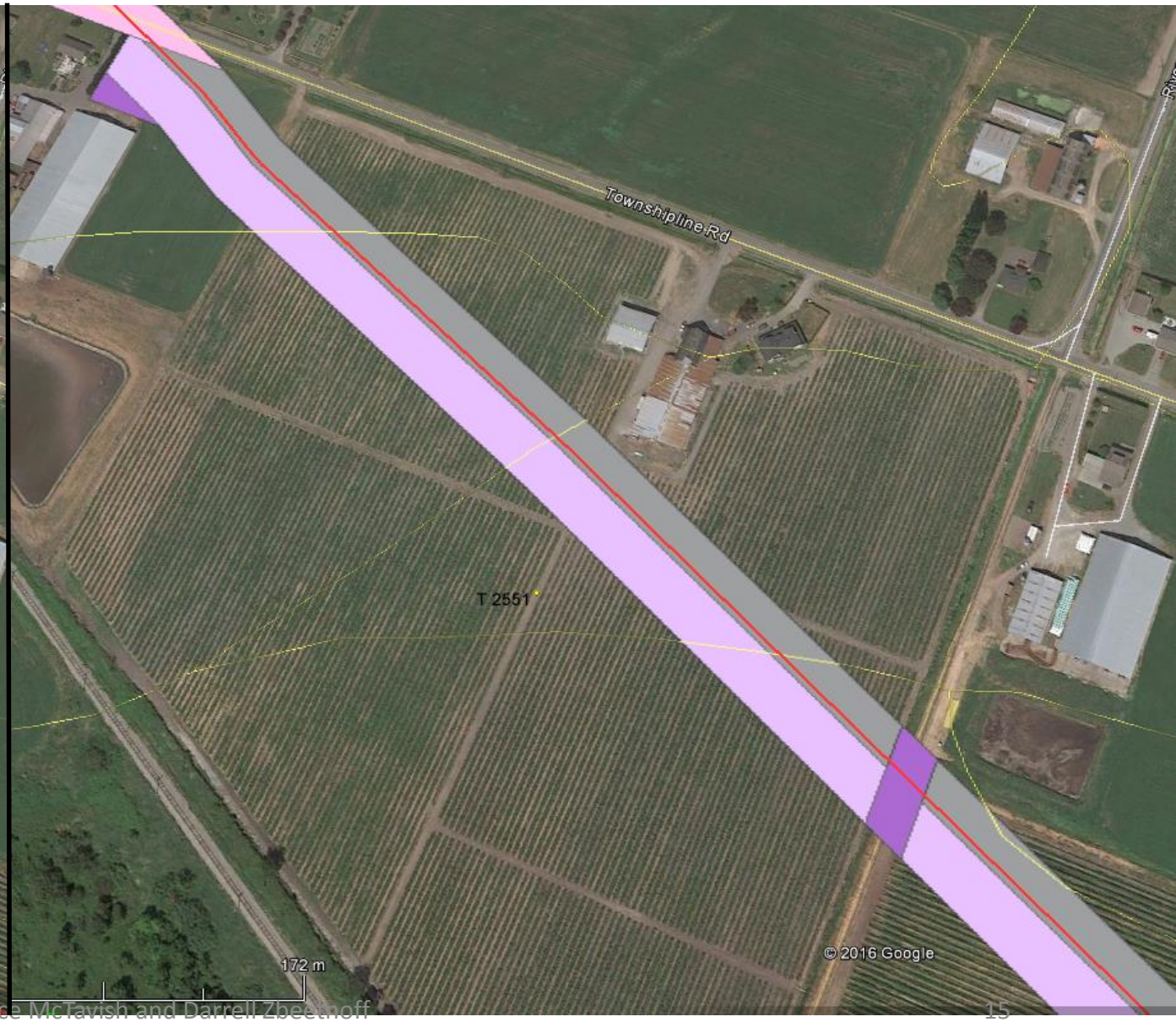
172 m


Township line Rd
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Year	Net Revenue without project (less harvest costs) (A)	Gross Margin without project (B)	Net Revenue with project (C)	Net Revenue Difference (D)	NPV of Difference (2015$) (E)
	Per acre				
2017	$3,312 (1)		0	$3,312	$3,092
2018		$1,242	0	$1,242	$1,159
2019		$1,242	0	$1,242	$1,120
2020		$1,242	-$3,058	$4,300	$3,747
2021		$1,242	-$3,663	$4,905	$4,130
2022		$1,242	-$1,009	$2,251	$1,831
2023		$1,242	$927	$315	$248
2024		$1,242	$1,292	$365	$277
2025		$1,242	$1,242	$0	$0
				NPV	$15,604

Notes: (1) Assuming that the pipeline construction prevents a harvest in 2017, the revenue loss is projected revenue ($10,375) less harvesting/marketing costs not incurred ($7,063) = $3,312; (2) From Table 2

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Replant costs

Year	Direct Expenses Replant (nominal$)	PV (2015$)
	Per acre	
2018	7,222	$6,514
2019	3,153	$2,748
2020	1,100	$926
Total 2015$		$10,188

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Example of all costs rolled up

Damage Component	ROW (1.90 ac)	TWS (2.57 ac)	Turning Area (2.86 ac)	Total
	Net Present Value 2015$ (@ 3.5% discount rate)			
Net Revenue Loss – construction year (2017)	$3,092 x 1.90 ac = $5,875	$3,092 x 2.57 ac = $7,946	$3,092 x 2.86 ac = $8,843	$3,092 x 7.33 ac = $22,664
Net revenue loss until re-established crop attains maturity (2018 to 2026)	$12,513 x 1.90 ac = $23,775	$12,513 x 2.57 ac = $32,158	$12,513 x 2.86 ac = $35,787	$12,513 x 7.33 ac = $91,720
Crop-re-establishment costs (2018-2019)	$10,188 x 1.90 ac = $19,357	$10,188 x 2.57 ac = $26,183	$10,188 x 2.86 ac =$29,138	$10,188 x 7.33 ac = $74,678
Total for the T2551	$49,007	$66,288	$73,768	$189,063

Development of computation models blueberries

Blueberry Compensation Assumptions and Calculations

Assumptions	Input Variables	Select Here	
A	Location	Lower Fraser Valley	
B	Prodution Method	Conventional	
C	Crop Age (in 2015)	5	
D	Level of Management	Good	
E	Irrigation	Yes	
F	% of Direct Costs Expended (Construct. Yr)	50%	
G	% of Gross Revenues Captured (Construct. Yr)	0%	
H	Discount Rate	3.50%	% of Sales
I	Farm Direct Price ($/lb)	$2.50	0%
J	Farm Gate Fresh Wholesale Price ($/lb)	$1.20	35%
K	Farm Gate Processed Price ($/lb)	$0.80	65%
L	Percent Machine Harvested	100%	OK
M	Percent Hand Harvested	0%	OK

Other costs not represented here:

Business effect of loss of blueberry supply
Inconvenience to operator
Ongoing fixed costs
Extra operations required

This Scenario: **Per Acre**

Summary

Yield at Maturity	14,000	Lbs/Acre
Weighted Average Price	$0.94	Per lb
Gross Revenues at Maturity	$13,160	
Direct Costs at Maturity	$10,200	
Gross Margin at Maturity	$2,960	
NPV Losses from Project	$25,098	

Tract 2647
Tract 2644
Tract 2622
Tract 2558.01
Tract 2551
Tract 2549
Tract 2542
Tract 2539
Tract 2538

Per Acre Blueberry Budget

Per Acre Compensation Budget

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Output

Type of Loss	$/Acre (2015$)	ROW	TWS	#Acres Turning Area	Other	Total Acres
		2.34	3.73	0.00	0.00	6.07
				2015$		
Suspended Harvest/Construct Yr	$4,458	$10,431	$16,627	$0	$0	$27,057
Crop Loss until Re-established	$20,641	$48,299	$76,990	$0	$0	$125,289
Re-establishment Cost	$10,188	$23,839	$38,000	$0	$0	$61,839
	Total	$72,139	$114,990	$0	$0	$187,129

Return to Assumptions

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Forage

Assumptions		
A	Location	Lower Fraser Valley
B	Forage Type	Tame/seeded hay or forage
C	Level of Management	Good
D	Irrigation	Yes
E	% of Direct Costs Expended in Construction Year	100%
F	% of Gross Revenues Captured in Construction Y	50%
G	Discount Rate	3.50%
H	AUM value	$22.50
I	Hay Value (per Ton 85% Dry Matter)	$205

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Compensation Estimate

Year	Year from 2015	Rehabilitation Scenario	Expected Revenues (no project)	Realized Revenues	Direct Expenses (spent)	AUMs/ac (remediat)	Revenues (remediat)	Direct exp (remediat)	Gross Margin (remediat)	Net Revenue Loss Due to Project	Present Value (2015$)	Impact of Soil disturb on Yield
2015	0	Current Production										
2016	1	Current Producton										
2017	2	Current production> construction	$1,230.00	$615.00	$600.00	$0.00	$0.00	$0.00	$0.00	$615.00	$574.11	100%
2018	3	Soil reclamation				$0.00	$0.00	$0.00	$0.00	$630.00	$568.22	100%
2019	4	Depressed carrying capacity				$3.00	$615.00	$600.00	$15.00	$615.00	$535.94	50%
2020	5	Depressed carrying capacity				$4.20	$861.00	$600.00	$261.00	$369.00	$310.69	30%
2021	6	Full carrying capacity				$6.00	$1,230.00	$600.00	$630.00	$0.00	$0.00	0%
										Total	$1,988.96	

Summary of compensation

- Remember
  - every farmer has better than average production
  - and lowest cost of production

- Ask for records
- Consult with experts
- Be fair