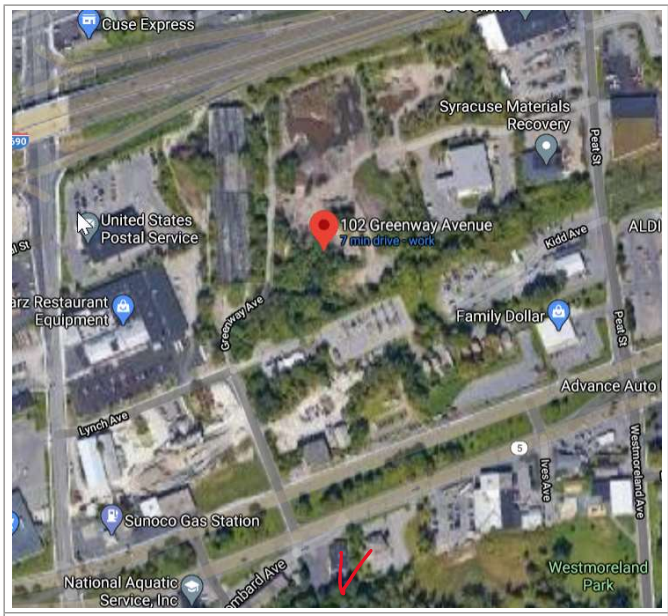
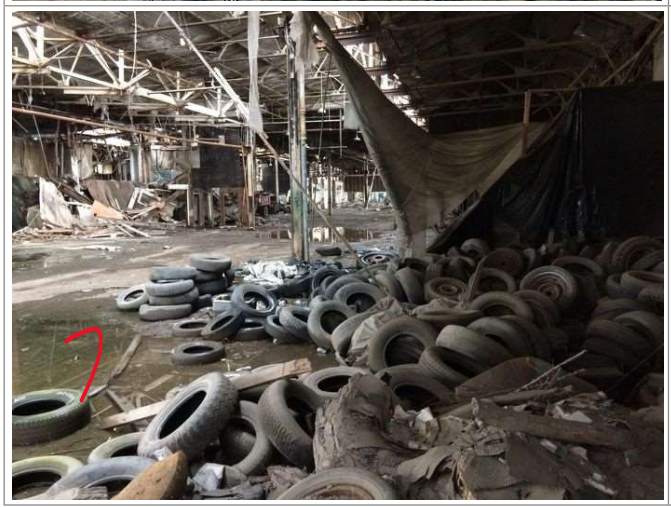
Application: Brownfield Cleanup

Brownfields: shut down or abandoned industrial areas

Example: Winkelman property in Syracuse

Between 690 and Erie near Teall





Photos: syracuse.com. Map and street view: maps.google.com

- Abandoned in the 1980s
- PCBs were present but have been removed; now tires, asbestos
- Outstanding tax bill: $2.6 million

Brownfield problems in general:

1. Lost tax revenue on parcel

2. Negative externalities:
   - Lower property values for neighbors
   - Lower tax revenue on nearby parcels
   - Unsafe structures and debris
   - Higher crime

Cities would like brownfields redeveloped

But, risky for developers:
- Potentially contaminated
- Could be liable for cleanup or damages
- May prefer nearby greenfield sites

Stylized example:

Site data:

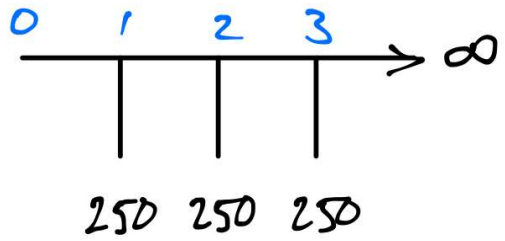
Site condition:	Clean (C) or dirty (D)
Probabilities:	$\rho_C = 60\%, \rho_D = 40\%$
Site value if clean (C):	\$1 million
Externalities while vacant:	\$250k/year

Risk to developer:

If site is dirty (D):	20% chance of losing a liability lawsuit (L)
Cost if liable (L):	\$50 million

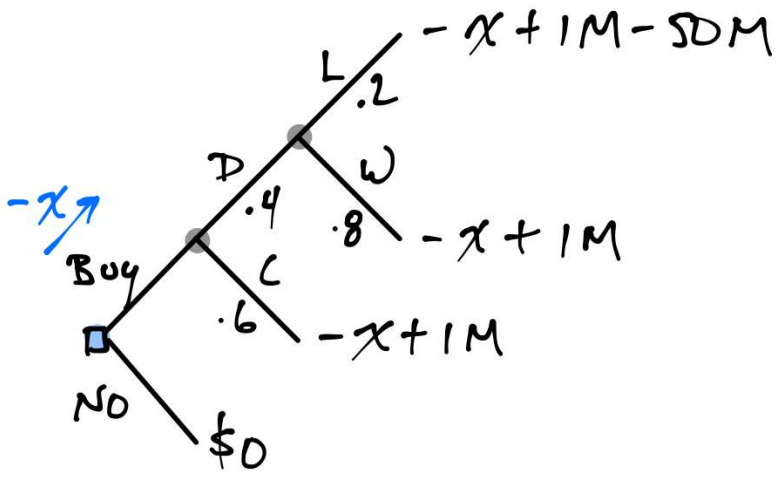
Interest rate: 5%

City sees the externalities:



$$PV_{ext} = \frac{\$250k}{0.05} = \$5\ M$$

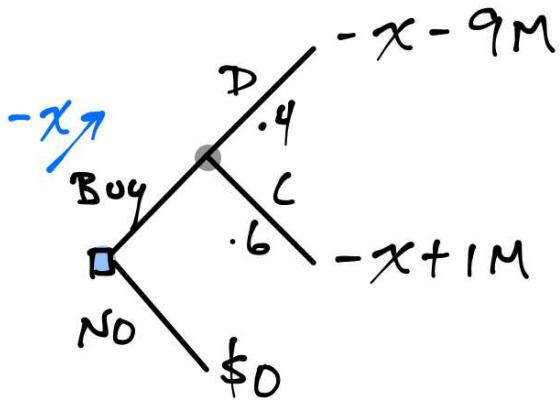
Developer's WTP for the property?



Taking the right-most EV:

$$EV = 0.2^*(-X - 49M) + 0.8(-X + 1M)$$

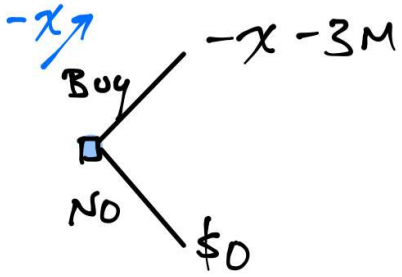
$$EV = -X - 9M \qquad \text{(EV of owning the site if it's dirty)}$$



Taking the right-most EV:

$$EV = 0.4 * (-X - 9M) + 0.6 * (-X + 1M)$$

$$EV = -X - 3M \qquad \text{(EV of buying site before state is known)}$$

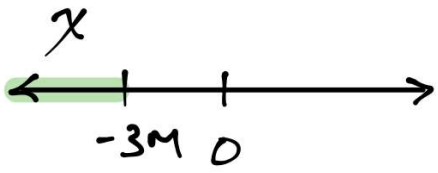


Maximum value of X for buying the site:

$$-X - 3M = 0$$

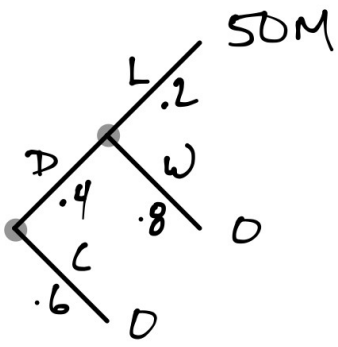
$$X = -3M$$

Only develop if paid at least $3M to take the site



What would an insurance policy cost?

EV of claim?



Right node:

$$EV = 0.2 * 50M + 0.8 * 0 = 10M$$

Working back to the root node:

$$EV = 0.4 * (10M) + 0.6 * 0 = 4M$$

Premium = $4M

Alternative version of developer's view using insurance:

Property value: $\$1M$

Insurance bill: $\$4M$

Net value: $\$1M - \$4M = -\$3M$

But, it's efficient to develop:

PV cost of externalities: $5M
Net cost of development: $3M

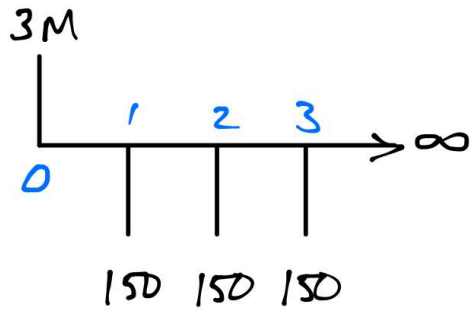
$2M potential gain

Possible option: city provides insurance

Steps city would take:

1. Sell property for $1M
2. Borrow $3M via consols paying $150k/year
3. Buy insurance policy for $4M
4. Raise future taxes to pay for $150k/year interest

Cash flow for consols



$$NPV = \$3M - \frac{\$150k}{0.05} = \$0$$

Arrangement is a Pareto improvement to future residents:

Annual benefit from reduced externalities:	+$250k
Annual additional taxes:	-$150k
Annual net gain:	+$100k

PV of gain:

$$PV = \frac{\$100k}{0.05} = \$2M$$