
Expert guidance for environmental compensation (offsetting) is consistent with public preferences

– evidence from a choice experiment in Sweden

Scott Cole, WSP Advisory, Sweden (scott.cole@wsp.com)

Linus Hasselström, KTH Royal Institute of Technology, Sweden (plh@kth.se)

Guidance documents

Standard on Biodiversity Offsets



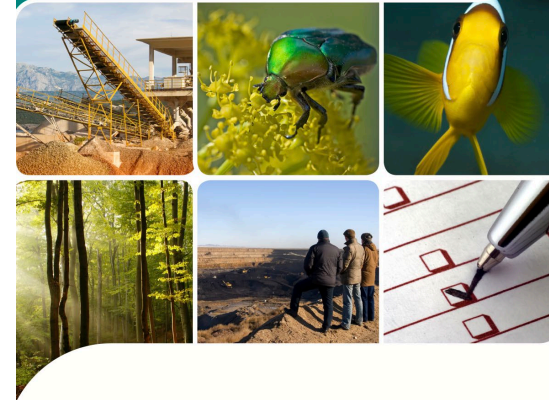
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Federal Register / Vol



Environmental compensation

Key conditions for increased and cost effective application



DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

15 CFR Part 990

[950718181-5276-02]

RIN 0648-AE13

Natural Resource Damage Assessments



AGENCY: National Oceanic and Atmospheric Administration (National Commerce).

ACTION: Final rule.

BALANSERINGSPRINCIPEN HELSINGBORG



Joshua Lipton
Ece Özdemiroğlu
David Chapman
Jennifer Peers *Editors*

Equivalency Methods for Environmental Liability

Assessing Damage and Compensation
Under the European Environmental
Liability Directive



Nordic Council
of Ministers

Planning biodiversity offsets

TWELVE OPERATIONALLY
IMPORTANT DECISIONS

Conservation Biology

Essay

No net loss for people and biodiversity

Victoria F. Griffiths¹,^{1*} Joseph W. Bull,^{2,3} Julia Baker,⁴ and E.J. Milner-Gulland¹

¹Department of Zoology, University of Oxford, New Radcliffe House, Radcliffe Observatory Quarter, Woodstock Road, Oxford OX2 6GG, U.K.

²Department of Food and Resource Economics & Center for Macroecology, Evolution and Climate, University of Copenhagen, Rolighedsvej 23, 1958, Copenhagen, Denmark

³Durrell Institute of Conservation and Ecology, School of Anthropology and Conservation, University of Kent, Canterbury, Kent, CT2 7NZ, U.K.

⁴Balfour Beatty, 5 Churchill Place, Canary Wharf, London E14 5HU, U.K.

Guidelines suggest

Size of offset site could be seen as a function of (among other factors) distance to the damaged site

Compensation should be "like for like". But differences could be adjusted by increasing size.

Proximity of offset is more important for recreational values than nature values.

Does the public agree?

On-line survey in Sweden

On-line survey focusing on respondents’:

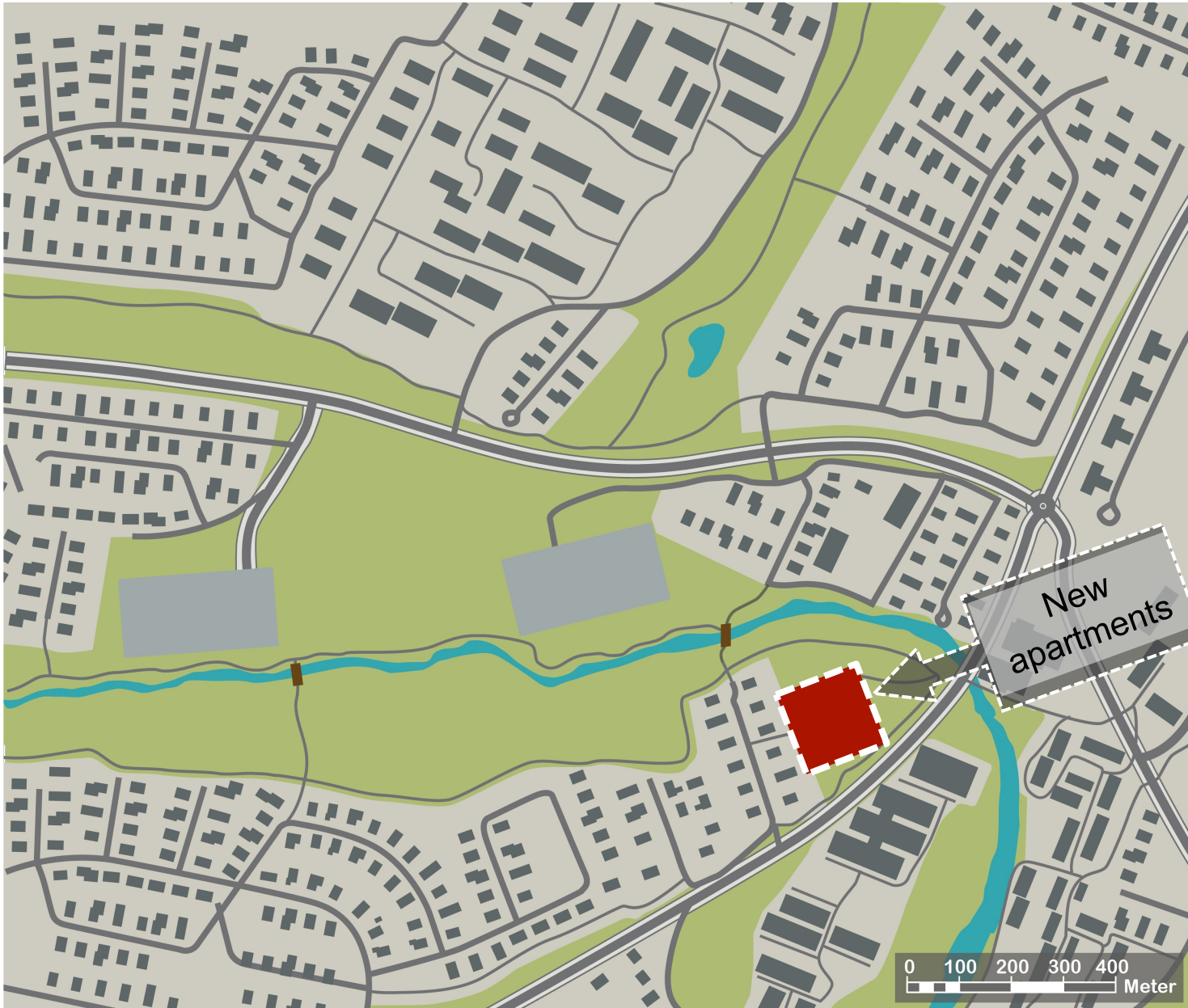
- Attitudes toward nature
- Experience of urban development
- Awareness/attitudes of compensation/offsetting
- Preferences regarding compensation design
- Sociodemographic info (age, income, etc)

*Skåne County, Sweden.
May 2020.
Sample size N=1,005*



The hypothetical environmental damage → New apartments remove green space

Negative effects
on both:
Nature values
&
Recreation values

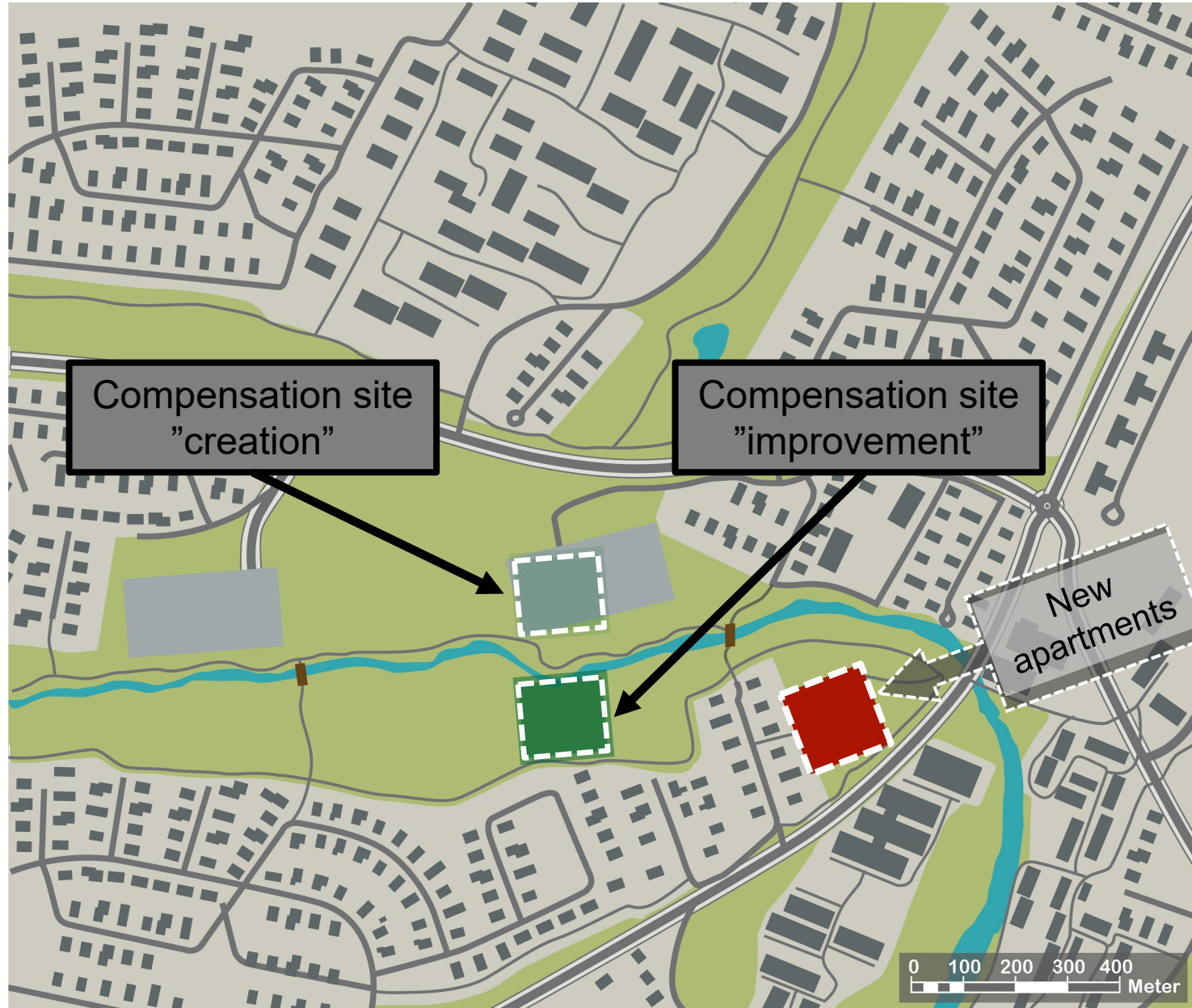


The proposed compensation/offset

Compensation design variable #1 → Land use at compensation location (LOC)

Either:

- 0. "Gray"
- 1. "Green"



The proposed compensation/offset

Compensation design variable #2 → Area of compensation site (SIZE)

Either:

- 0. Same size as damage
- 1. Twice the size as damage



The proposed compensation/offset

Compensation design variable #3 → Distance to compensation site (DIST)

Either:

- 0. 300 meters
- 1. 900 meters

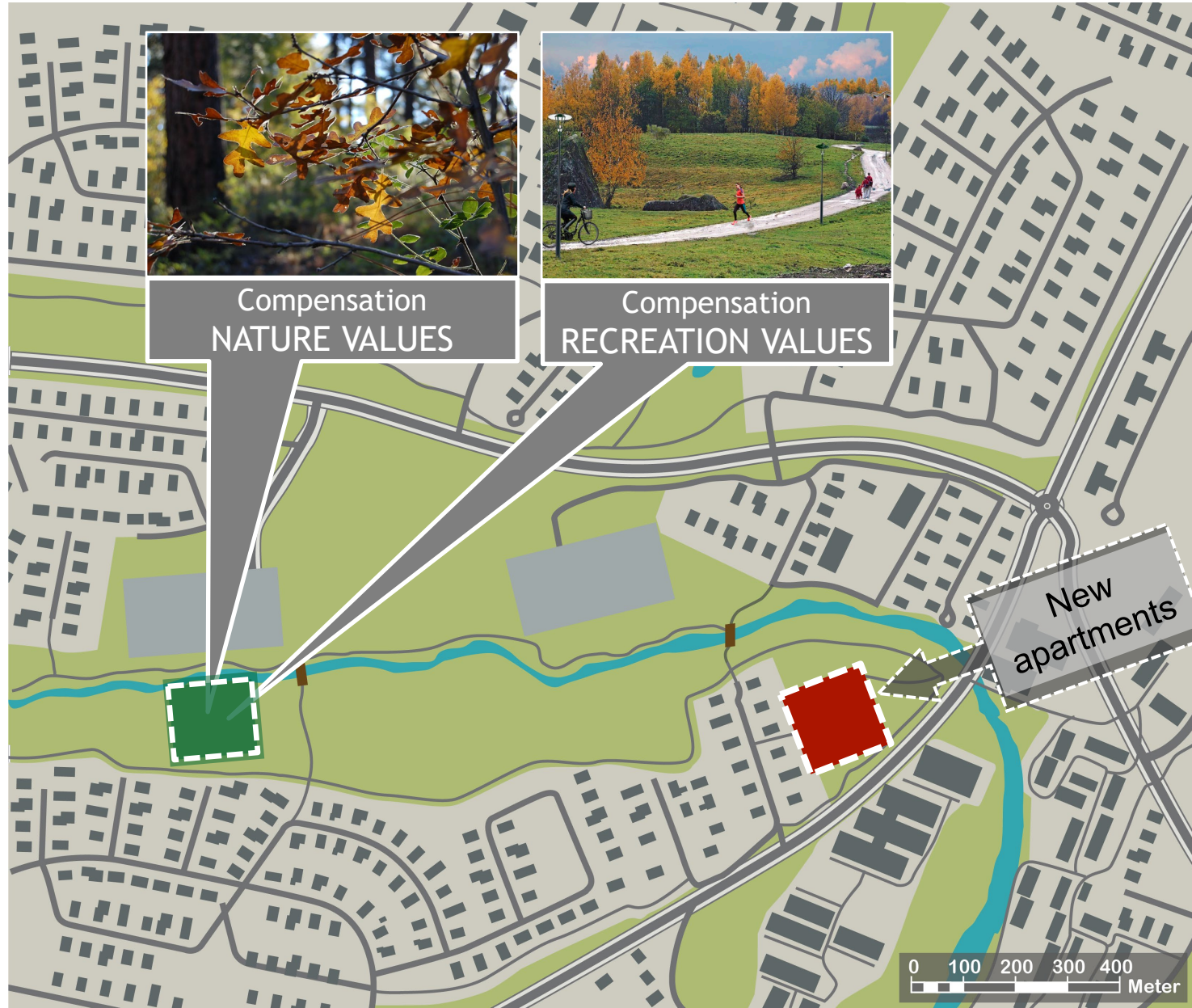


The proposed compensation/offset

Compensation design variable #4 → Compensation focus (COMP)

Either:

- 0. Only Nature Values
- 1. Only Recreation Values
- 2. Both values



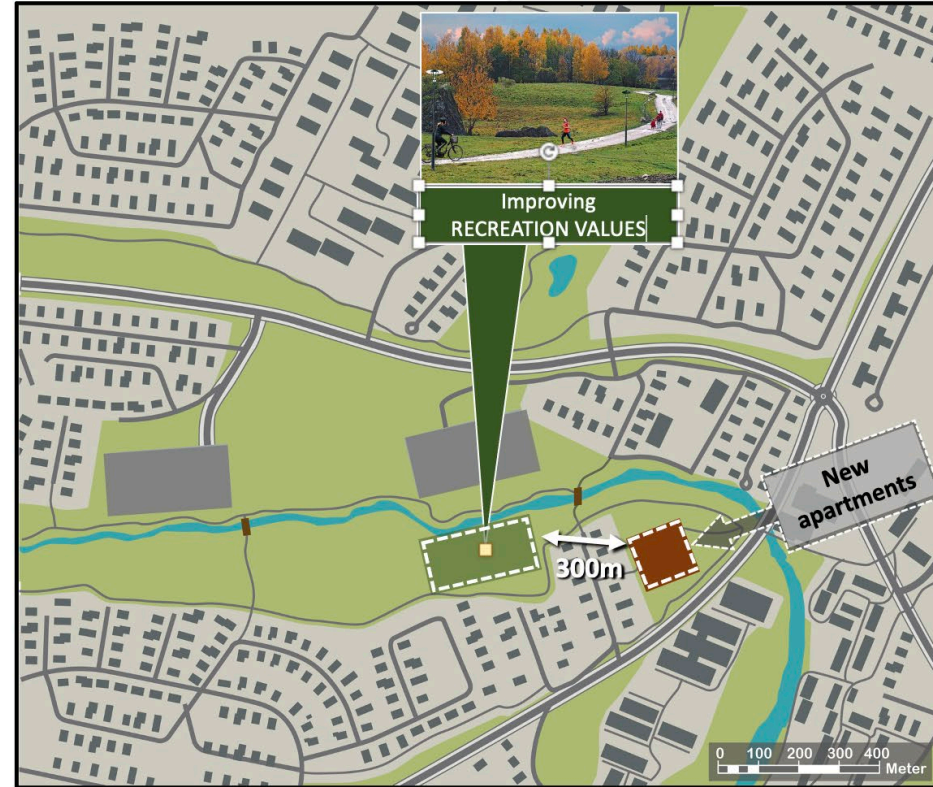
Choice Experiment

Which alternative do you prefer? A or B?

Alternative A



Alternative B



**Difference between
Compensation alternatives:**

- ✓ Nature values / Recreation values
- ✓ Creating (gray industrial site) / Improving (green space)
- ✓ Distance
- ✓ Size

We estimated two models...

Simple model

$$\text{Choice (A/B)} = \beta_0 + \beta_1 * \text{LOC} + \beta_2 * \text{SIZE} + \beta_3 * \text{DIST} + \beta_4 * \text{COMP} + \varepsilon$$

Complex model

$$\text{Choice (A/B)} = \beta_0 + \beta_1 * \text{LOC} + \beta_2 * \text{SIZE} + \beta_3 * \text{DIST} + \beta_4 * \text{COMP} +$$

$$\beta_5 * \text{SIZE} * \text{DIST} + \beta_6 * \text{SIZE} * \text{COMP} + \beta_7 * \text{DIST} * \text{COMP} + \beta_8 * \text{LOC} * \text{COMP} + \varepsilon$$

Simple model

How do changes in the **compensation variable** affect the likelihood of choosing a compensation alternative?

These "**marginal effects**" are best shown visually ...

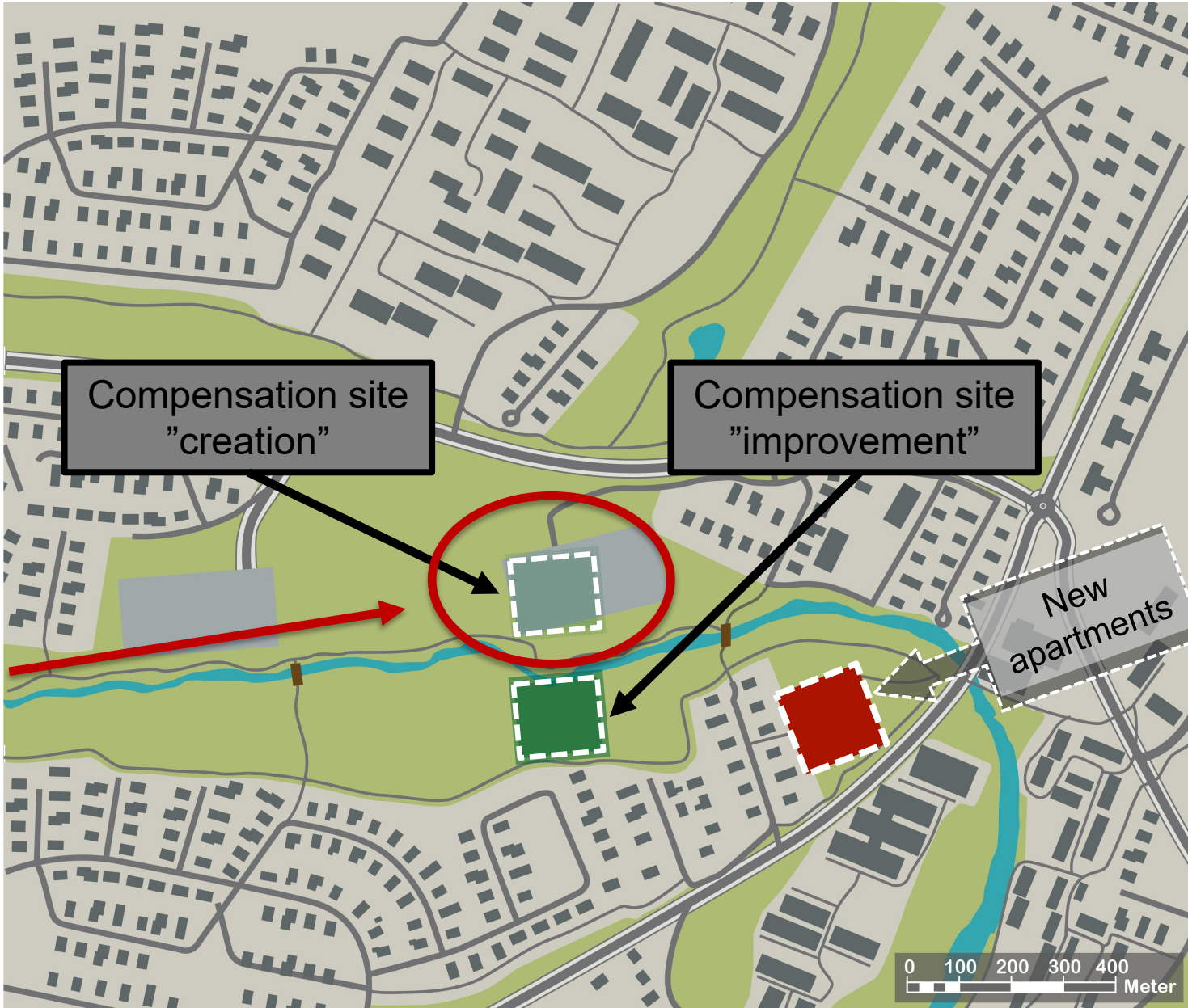
NOTE: all marginal effects are statistically significant at $<.0001$ level.

MARGINAL EFFECTS

Land use at compensation location (LOC)

Either:

- 0. "Gray"
- 1. "Green"



A gray compensation site is 4.7% more likely to be chosen (than a green site)

(all else equal)

MARGINAL EFFECTS

Area of compensation site (SIZE)

Either:

- 0. Same size as damage
- 1. Twice the size as damage

A bigger site is 23% more likely to be chosen

(all else equal)



MARGINAL EFFECTS

Distance to compensation site (DIST)

Either:

- 0. 300 meters
- 1. 900 meters



A closer site is 9.4% more likely to be chosen

(all else equal)

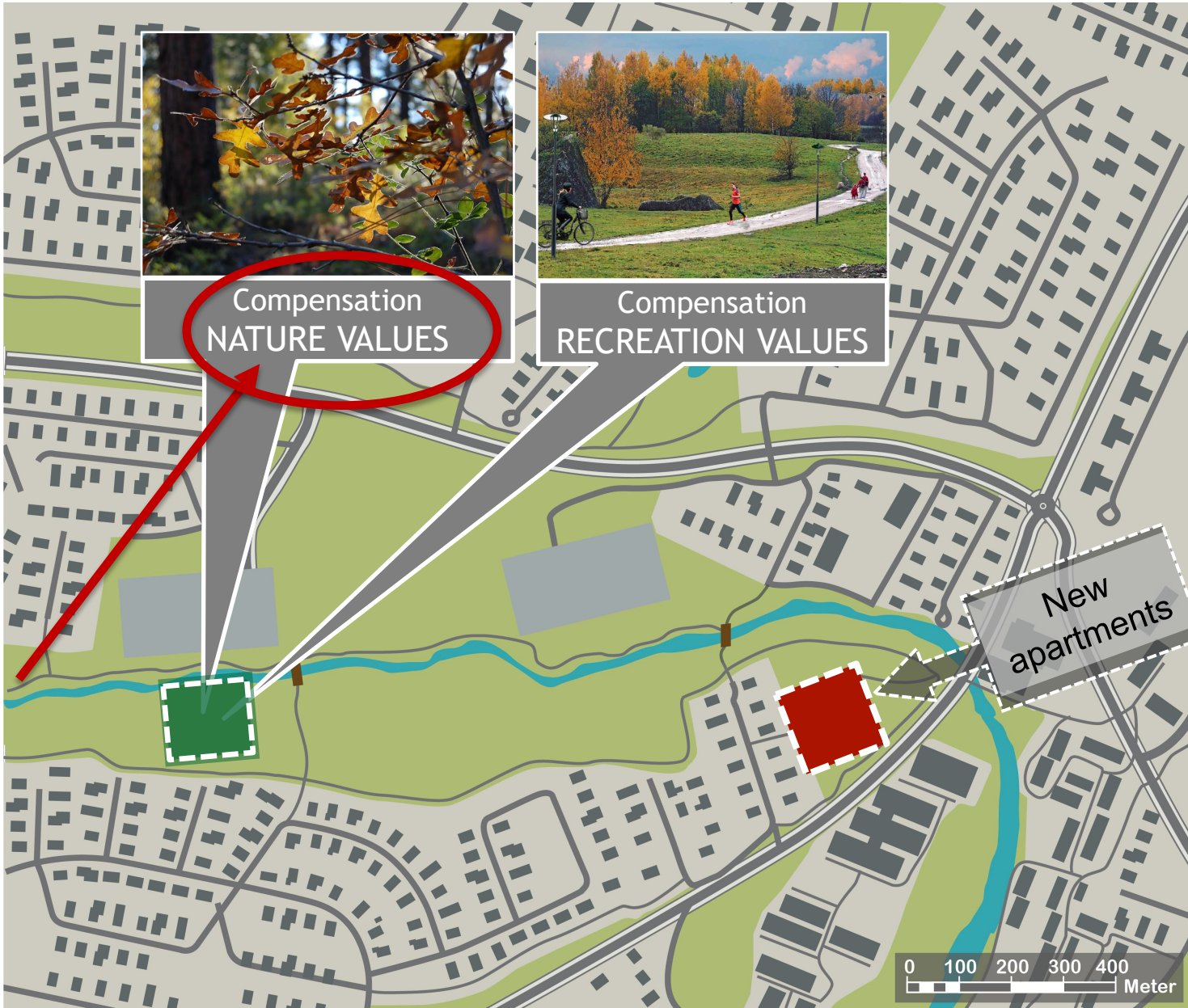
MARGINAL EFFECTS

Compensation focus (COMP1)

Either:

- 0. Only Nature Values
- 1. Only Recreation Values
- 2. Both values

5% more likely to choose compensation for nature values (if forced choice)
(all else equal)



MARGINAL EFFECTS

Compensation focus (COMP2)

Either:

- 0. Only Nature Values
- 1. Only Recreation Values
- 2. Both values

21% more likely to choose compensation for "both values"

(all else equal)



Complex model

Does one compensation variable “**condition**” the **effect** of another?
If it does, **how big is that effect?** (interaction effects)

Interaction that we tested	Interaction Effect present?	Effect



All interaction effects statistically significant at .02 level or lower.

Guidelines suggest

Size of compensation site could be seen as a function of (among other factors) distance to the damaged site

- PUBLIC AGREES! willing to trade "further away" for "bigger" ($DIST*SIZE$)

Compensation should be "like for like". But differences could be adjusted by increasing size.

- PUBLIC AGREES! (partially). If compensation ONLY provides for nature values, they require "bigger size" as additional compensation ($SIZE*COMP1$)

Proximity of compensation is more important for recreational values than nature values.

- PUBLIC AGREES! "Further away is OK" when compensating for nature (but not when compensating for recreation) ($DIST*COMP1$)

(as far as we know, no explicit guidance on the use of "gray" vs "green" compensation sites?)

**”We should compensate
when urban development
removes green space”**

86%

(agree or partially agree)

... But what about other activities that remove green space?

Should compensation be required for loss of green space caused by the following:??*

