1. Green Strategy and Measures to Reduce Noise Pollution

Based on the findings of the research project "*HOlistic and Sustainable* Abatement of Noise by optimized *combinations of Natural and Artificial means (HOSANNA) (Nilson et al. 2013 – Summary in annex 3), discuss in group the* advantages/disadvantages of the following measures to reduce noise pollution on the Place Cosanday (e.g. effect on noise mitigation, connection with existing green and blue infrastructures, compatibility with the uses of the site, implementation issues and challenges, cost/effectiveness, etc.):

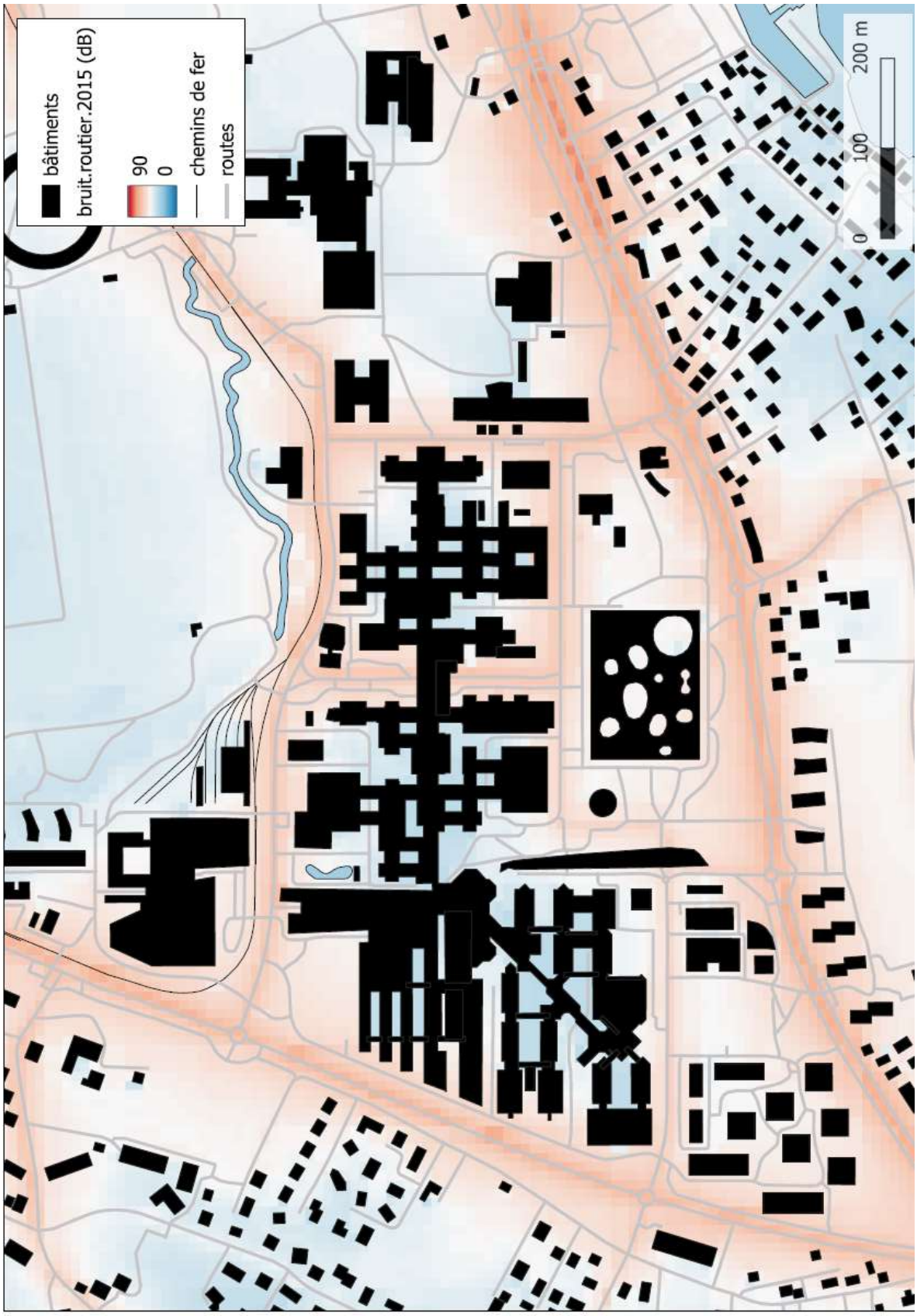
1. Soil and plant systems in noise barriers (p. 11)
2. Low-height noise barriers (p12
3. Earth berms (p. 15)
4. Multiple rows of trees in open fields (p. 17)
5. Shrubs, bushes, and hedges (p. 20)
6. Vegetated facades in urban squares (29), courtyard facades/openings to courtyards (p.30)

Synthesise the results of your discussion in the documents [2025.05.02_ENV-462_Noise&Health_Sub-Project_RENDU].

Figure 1 – EPFL Learning Centre's Esplanade (project perimeter)

2. Annexes

1.1. Noise Cadaster EPFL (2015)



1.2. Noise Cadaster EPFL (2015) – Study Areay

1.3. Novel Solutions for Quieter and Greener Cities - Summary of Noise Reduction Methods (Nillson et al. 2013, p. 46-47)

CATEGORY	MITIGATION METHOD	PROTECTED AREA	NOISE REDUCTION*	COSTS AND BENEFITS
Innovative barriers	Low-height barrier (maximum 1 m high)	Pavements and cycle paths, for a receiver at least 1 m from the barrier; dwellings and open spaces, such as parks, in the barrier's shadow zone	3–12 dB(A) for an urban road and 9–15 dB(A) for a tramway at a distance of 2–50 m	+Improves appearance +Contributes to pedestrian and cyclist security – May take up some space
	Light vegetated barrier along bridges (maximum 1 m high)	Pavements, cycle paths, and open spaces below urban roads and tramways; dwellings at the same level or below	Up to 5 dB(A) below a road traffic bridge, up to 15 dB(A) below a tramway bridge	+Improves appearance +Contributes to biodiversity
	Graded index sonic crystal barrier (maximum 1 m high)	Large open spaces behind the barrier, e.g. parking lots or parks	4 dB(A) at a distance of 15 m from the barrier (for light vehicles only)	+Sculptural design +High attenuation at certain frequencies, despite pervious structure – Non-uniform attenuation across frequencies
	Vegetated barrier caps (maximum cap size 1.20 m, minimum barrier height 4 m)	Parks, playgrounds, gardens, pedestrian/cycle paths along motorways, for receivers in the barrier's shadow zone	6–14 dB(A) at a distance of 1–20 m, compared with a straight rigid uncapped barrier	+Improves appearance +Contributes to biodiversity – May need strong barrier foundations
	Earth berms with strongly non-flat surfaces	Open spaces and houses along motorways and railways	Up to 5 dB(A) compared with a smooth trapezoidal berm at a distance of 1–50 m	+Improves appearance +Less graffiti than for a barrier +Contributes to biodiversity – Takes up more space than a barrier
Trees, shrubs, and bushes	Trees in street canyons and courtyards	Walkways and facades inside streets and courtyards	No more than 2 dB(A) for close positioning of trees in the street	+Fully green solution (e.g., CO_2 uptake, increases biodiversity) +Improves appearance
	Tree belts (multiple rows of trees)	Open spaces near urban roads and highways; borders of parks near urban roads	Up to 6 dB(A) at a distance of 50 m for a 15-m-deep tree belt; up to 10 dB(A) for a 30-m-deep belt	+Fully green solution (e.g., CO_2 uptake, increases biodiversity) +Improves appearance +Air pollution reduction – Takes many years to exert its maximum noise-reducing effect – Species allowing dense planting should be selected
	Trees behind barriers	Areas behind noise barriers in downwind sound propagation	Up to 5 dB(A) at a distance of 100 m in strong downwinds near highways	+Strongly reduces negative visual impact of noise walls – Need for dense canopies to maximize effects – Complex, distance-dependent effect – Negative effects could appear at some distance

CATEGORY	MITIGATION METHOD	PROTECTED AREA	NOISE REDUCTION*	COSTS AND BENEFITS
Ground treatments	Roughness element configurations on hard ground	Pavements and open spaces near urban roads, railways, and tramways	Up to 3 dB(A) at a distance of 10 m; up to 12 dB(A) at a distance of 50 m	+Visually nonintrusive +Allows access –Takes up more space than a barrier
	Soft strips and patches	Hard shoulders and open spaces such as car parks	3–9 dB(A) at a distance of 50 m	+Improves appearance
	Ground and groundcover	Rural open spaces along motorways	Up to 9 dB(A) at a distance of 50 m	+Improves appearance +Increases green space
	Crops	Rural open spaces along motorways	Up to 5 dB(A)	+Contributes to food security –Seasonal effect
	Buried resonators	Hard shoulders and roads	Up to 3 dB(A) at a distance of 7.5 m	+May be used to improve the effect of porous asphalt
Vegetated facades and roofs	Vegetated roadside facades	Vegetated roadside facades	2–3 dB(A) at a height of 1.5–4 m on the facade	+Improves appearance +Reduces air pollution
	Vegetated facades in urban squares	Building facades inside squares	3 dB(A) at a height of 1.5 m throughout the square	+Improves appearance +Improves thermal insulation of buildings –May make squares appear darker due to reduced light reflectance –High costs of installation and maintenance –Short life-cycle: 10 yr
	Vegetated courtyard facades	Building facades inside courtyards	4 dB(A) at a height of 1.5 m throughout the courtyard and on facades along the whole height of the building	+Improves appearance +Reduces air pollution +Improves thermal insulation of buildings –May make courtyards appear darker due to reduced light reflectance –High costs of installation and maintenance –Short life-cycle: 10 yr
	Vegetated courtyard openings	3-m-high opening running from front to back through the building	4.5 dB(A) at a height of 1.5 m throughout the courtyard and on facades along the whole height of the building	+ Improves appearance +Improves thermal insulation of facades –May make courtyard openings appear darker due to reduced light reflectance –High costs of installation and maintenance –Short life-cycle: 10 yr
	Vegetated roofs	Semi-extensive installation (10 cm thick substrate) on the roofs surrounding the courtyard	2.5 dB(A) for flat roofs and 8 dB(A) for angled roofs at a height of 1.5 m throughout the courtyard and on facades along the whole height of the building	+Improves appearance +Reduces heat loss and incoming heat flux into the building +Ameliorates storm water runoff +Low costs of installation and maintenance +Long life-cycle: 50 yr
	Roof barrier	0.64 × 0.96 m (width × height) barrier at edges of the building surrounding the courtyard	3 dB(A) when barriers are placed along both sides of the central building at a height of 1.5 m throughout the courtyard and on facades along the whole height of the building	+Improves appearance +Improves roof safety

**) Unless otherwise indicated, the quoted noise reduction values are predicted for a receiver 1.5 m above ground at the specified distance from the roadside of a two-lane urban road, with 95% light and 5% heavy vehicles travelling at a speed of 50 km/h. The stated ground treatment reductions are with respect to continuous acoustically hard ground.*