

# **Cities of Tomorrow R&D Programme – Vertical 5 City in Nature (CoT V5)**

**3<sup>rd</sup> Grant Call Briefing**

**17 April 2024**

# CoT V5 – Launch of 3<sup>rd</sup> Grant Call

- The 3<sup>rd</sup> grant call for Vertical 5 – City in Nature (under the Cities of Tomorrow R&D Programme) (CoT V5) has been launched as of **28 March 2024**.
- We invite interested researchers to submit suitable full proposals for potential funding support under **1 Call Topic**:
  - 1) Physical & psycho-acoustic study of the potential for vegetation to mitigate traffic noise in high rise residential estates
- Interested parties are strongly encouraged to form research teams that collaborate across public research institutes and the private sector (including industry), and support translation of research outcomes to real-world applications.

# Schedule

10:00am Overview of CoT V5 3<sup>rd</sup> Grant Call – by **CoT Directorate**

- Overview of the Cities of Tomorrow R&D Programme – Vertical 5 City in Nature (CoT V5)
- Grant call eligibility & funding criteria
- Review process
- Instruction for submission of proposals
- Q&A on grant call processes

10:30am Call Topic 7:

“Physical & psycho-acoustic study of the potential for vegetation to mitigate traffic noise in high rise residential estates”

10:45am Q&A

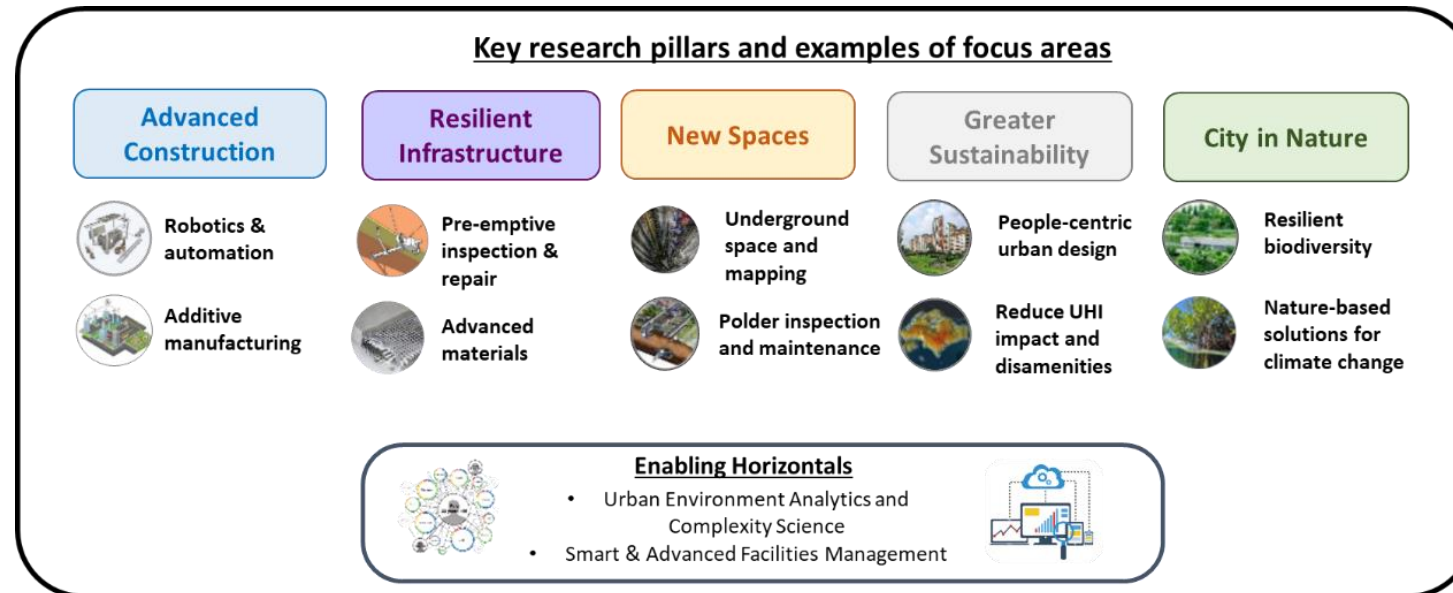
11:00am Refreshments & Networking

# **Overview of the Cities of Tomorrow R&D Programme – Vertical 5 City in Nature (CoT V5)**

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# Cities of Tomorrow R&D Programme

- Launched in 2017, the Cities of Tomorrow (CoT) R&D programme is MND's flagship R&D programme under the Urban Solutions and Sustainability (USS) domain
- The vision of CoT is to establish Singapore as a highly liveable, sustainable and resilient city of the future, and as a vibrant urban solutions hub
- In RIE2025, CoT comprises 5 key verticals and 2 enabling horizontals, including the new Vertical 5 on City in Nature



# Vertical 5 – City in Nature (*under Cities of Tomorrow R&D programme*)

- New NRF-funded Funding Initiative (FI), and 5<sup>th</sup> research vertical under CoT R&D Programme, totaling \$17.9M to support a 5-year programme under the USS domain under RIE2025
  - Led by NParks as Implementing Agency
- Multi-stakeholder research programme which seeks to provide scientific foundation to support Singapore's transformation into a City in Nature
- Aims to enhance:
  - Climate resilience – by improving ecosystem capacity to adapt and respond to disturbances brought about by climate change (e.g., higher temperatures, inland flooding due to extreme rainfall events) using nature-based solutions
  - Ecological resilience – by adopting an evidence-based approach to plan, design and monitor biodiversity conservation outcomes more effectively
  - Social resilience – by gaining a better understanding of how dimensions and detailing of landscape elements affect mental and physical health, which allows more effective planning and design of public spaces towards enhanced health outcomes and social cohesion

# Vertical 5 – City in Nature (under Cities of Tomorrow R&D programme)

- 4 research themes, in support of the FI's overall outcomes of enhancing climate, ecological and social resilience:

## **1 Safe, productive, and multifunctional urban greenery**

*To develop new solutions to improve urban greenery operations and management, and its integration with the built environment*

## **2 Biodiversity monitoring to improve adaptive management of urban biodiversity**

*To develop tools and techniques to improve the efficiency of biodiversity monitoring*

## **3 Managing human-nature relationships**

*To improve our understanding of human-nature relationships, so as to inform policies and solutions that further enhance the physical and mental well-being benefits of urban nature*

## **4 Nature-based solutions for inland climate change adaptation**

*To inform the planning and design of blue-green infrastructure for the provision of climate-related ecosystem services*

# **Grant Call Eligibility & Funding Criteria**

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# Grant Call Eligibility

- All Singapore-based public research institutes (RIs) (e.g., Institutions of Higher Learning (IHLs) and A\*STAR RIs), companies, company-affiliated research laboratories or institutions and not-for-profit entities are eligible to participate in the call.
- The Lead PI who leads the Research must be based in Singapore. Collaboration with Singapore-based and foreign organisations and experts, in the capacity of Co-Investigator (Co-I) or as Collaborator, is allowed.
- All funding awarded must be used to carry out the research work in Singapore, unless expressly approved by the grantor.
- Grant applicants are strongly encouraged to collaborate with industry partners to develop innovative solutions that can address the call objectives and demonstrate strong potential for real-world application within and beyond Singapore.
- R&D proposals already funded by other government agencies will not be considered. R&D proposals with similar scope, which are currently under evaluation by other funding initiatives, will not be considered until the results from the other funding initiatives are finalised. Lead PIs, Co-Is, and Collaborators will need to declare other funding sources as well as participation in other funding initiatives during application.

## **Additional notes for private sector entities**

- Funding for private sector entities would be conditional on collaboration with a public research performer for:
  - Research projects with a total project budget more than S\$500,000;
  - Test-bedding/demonstration/scale-up projects with a total project budget more than S\$2.0mil.
- For projects funding non-Singaporean entities (i.e., companies registered in Singapore with less than 30% local shareholding, determined by the ultimate individual ownership), a Singapore Technology Licensing Office (STLO) must be appointed regardless of the involvement of public research performer.

# Funding Criteria

## **Direct Costs\***

- Supportable direct costs are incremental cost required to execute the programme; can be classified into the following cost categories:-
  - Expenditure on manpower (EOM);
  - Equipment;
  - Other Operating Expenses (OOE); and
  - Overseas Travel

## **Indirect Costs (i.e. “overheads”)**

- Costs that are incurred for common or joint objectives and therefore cannot be identified readily and specifically with a particular sponsored research project, but;
- Contribute to the ability of the Institutions to support such research projects (e.g., providing research space, research administration and utilities), and not through the actual performance of activities under the sponsored projects.

*\* Please refer to the Annex D of the Grant Call info sheet for the list of non-fundable direct costs of research.*

# Funding Criteria

## Singapore-based IHLs/public research institutes

- Lead PI or Co-I will qualify for:
  - **[Direct costs] 100%** of the approved qualifying direct costs of a project;
  - **[Indirect costs] 30%** of the total qualifying approved direct costs of a project.

## Singapore-based private sector entities (incl. not-for-profit organisations)

- Lead PI or Co-I will qualify for:
  - **[Direct costs] Up to 70%** of the approved qualifying direct costs of a project
    - 30% for all non-Singaporean entities (incl. non-Singaporean not-for-profits);
    - 50% for Singapore Large Local Enterprises (LLEs);
    - 70% for Singapore Small Medium Enterprises (SMEs), start-ups and not-for-profits.

## Overseas organisations

- **Not** permitted to receive, directly or indirectly, any part of the funding, whether in cash or in the form of assets acquired using the funding or otherwise unless expressly approved by the grantor.
  - Exception: **Travel expenses** for Visiting Professors/Experts (e.g., overseas-based Co-Is and Collaborators) **to come over to Singapore**, which should be identified and budgeted for upfront in the Other Operating Expenses vote to be incurred by the Host Institution.

## **Additional notes on Collaborators**

- Collaborators are **not** permitted to receive, directly or indirectly, any part of the funding, whether in cash or in the form of assets acquired using the funding or otherwise unless expressly approved by the grantor.

## **Additional notes on funded assets**

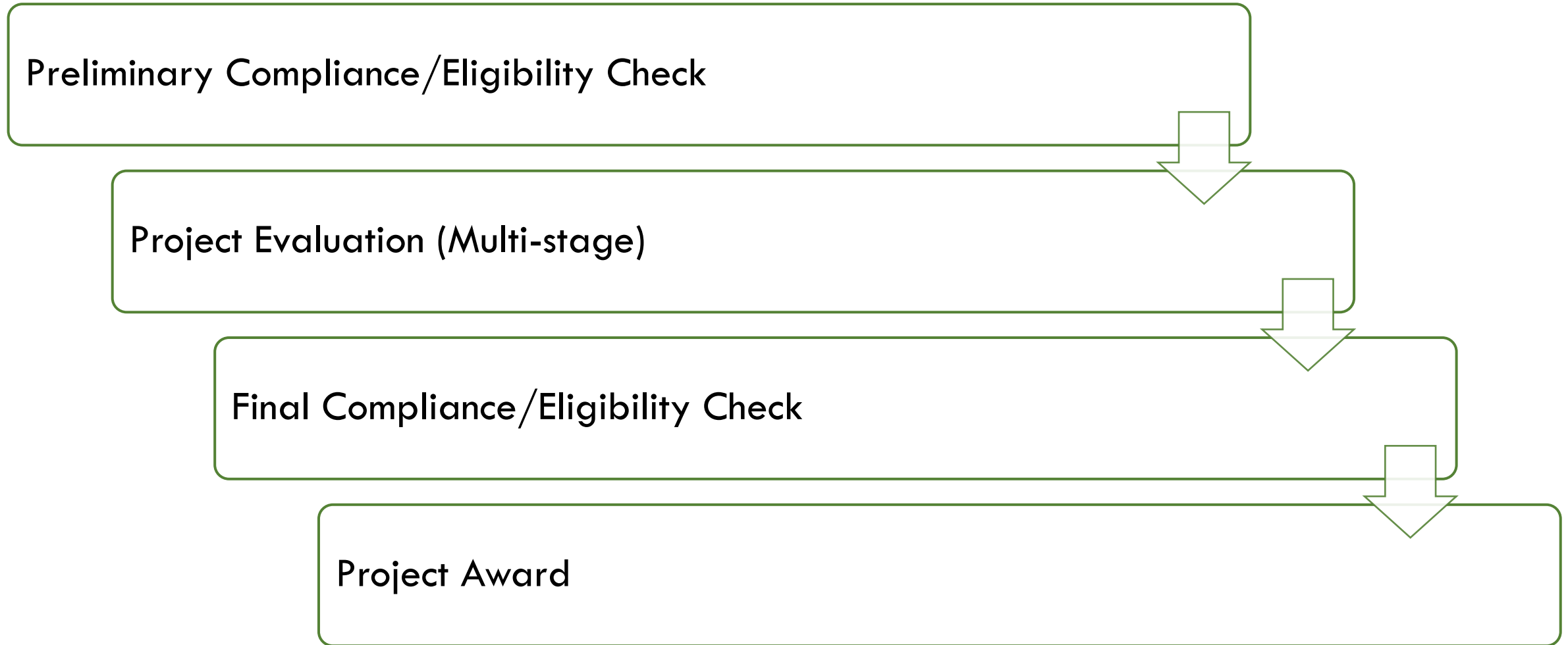
- All assets acquired using the funding must be located in Singapore and maintained within the control of the grantees.

*Please refer to the Grant Call info sheet for detailed information on the guidelines for the grant call.*

# Review Process

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# Review Process – at a glance



# Evaluation of Proposals

Evaluation of proposals will include:

## **1. Technical Peer Review**

Proposals will be subject to a round of technical peer review by domain experts\* with relevant expertise, to ensure excellent science in proposals.

## **2. Project Evaluation Panel**

Shortlisted applicants will be invited to present their proposals to a Project Evaluation Panel, consisting of relevant agency representatives, the Programme Director, and other external experts (where relevant).

Successful applicants will be informed by the CoT Directorate on the award of the grant. The CoT Directorate's decision on project and funding support will be final.

*\* Research teams applying for the grant call are invited to recommend potential suitable peer reviewers for the CoT Evaluation Committee's consideration, as part of the proposal submission process. The final decision on the peer reviewers will be decided by the Evaluation Committee.*



# Evaluation Criteria

## Criteria

### Potential Contribution to CoT Objectives

- Relevance of proposed research in contributing to objectives/targets stated for the CoT Call Topic.

### Potential for Breakthrough and Innovation

- Quality and significance of proposed research, including value for money, and the potential for breakthrough/innovation to advance knowledge and understanding within its own field or across different fields.

### Potential for Application and Deployment in Singapore and Commercialisation/Export

- Potential for application of research outcomes in Singapore by a public agency and potential for solutions to be replicated in Singapore beyond a single site/project.
- Feasibility for commercialisation/ export in areas where Singapore has a competitive advantage.

### Execution Strength and Technical Competency of Research Team

- Quality of plans for execution and delivery of the research programme and goals, including the appropriateness of the proposed milestones and deliverables (specific to evaluation of full proposal applications)
- Quality, significance, and relevance of the recent research record of the Lead PI and Co-Is and the strength of the applicant group, including likely synergy in delivering research and potential for international leadership.

# **Instructions for Submissions of Proposals**

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# Overview of Timeline

## FOR APPLICANTS & INTERESTED PARTIES (SGT, UTC +08:00)

Grant Call Opens (for 12 weeks)	28 March 2024, 2.00pm
Physical Briefing & Networking for CoT V5 3 <sup>rd</sup> Grant Call	17 April 2024, 10.00am
Grant Call Closes (Proposal Submission Deadline)	20 June 2024, 2.00pm

## FOR SHORTLISTED APPLICANTS ONLY

Notification of shortlisted applicants	August 2024*
Presentation to Project Evaluation Panel (2 or 3 days)	September 2024*

## FOR SUCCESSFUL AWARDEES ONLY

Approval and Letter of Award	Q4 2024*
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*\* Timings are indicative; shortlisted/successful applicants will be notified accordingly.*

# Grant Call Details

## Grant call information and relevant documents at:

- [CoT V5 3<sup>rd</sup> Grant Call website](#)
- [IGMS](#)

## Application only through IGMS:

- See section on “Application Guidelines”. All funded proposals should follow the prevailing Research Grant Terms and Conditions and NR Fund Guide.
- The application will only be considered valid if the submission of the full proposal is completed in IGMS, including endorsement by the Director of Research (also in IGMS) by the proposal submission deadline (**20 June 2024, 2.00pm**).
  - A copy of the application should also be sent via email to the CoT Directorate ([CoTV5@nparks.gov.sg](mailto:CoTV5@nparks.gov.sg)) after this.
- E-mail or walk-in applications will not be accepted.
- Late submissions will not be considered. Incomplete submissions may also be rejected. Applicants are advised not to submit their application at the last minute in case of technical errors with the IGMS website.
- The following slides outline steps for “Using IGMS” and “Full Proposal Submission”.

# Application Guidelines

Please choose one of the options below. It will direct you to the login type based on your choice.



## Host Institution Users

- Principal Investigator
- HI Administrator
- Office of Research/ Director of Research
- HI Finance/ HI Human Resource
- Data Administrator/ HI Audit



## Individual Users

- Singapore-based Applicants
- Overseas-based Applicants  
Eg. NRF Fellowship Applicants



## Reviewers

- Singapore-based Reviewers
- Overseas-based Reviewers

## Using IGMS:

### Key details for first time users

- Under the landing page, select the “**Host Institution Users**” option. This option will lead you to “Login with Singpass (Logging in as Business User)”. Login or register using your Singpass.
- **Authorise ORCID ID** before any grant application.
- Fill up mandatory fields.
- Update user profile.

# Application Guidelines

## **Full Proposal Submission:**

- Login to the system using the "Host Institution Users" option and subsequently, via "Login with Singpass (Logging in as Business User)".
- Click on grant call topic of interest under "Open Opportunities" and click "Apply".

## **For detailed steps, please refer to:**

- [Quick guide for Potential Applicants](#); and
- [Help guide for Potential Applicants](#)

(also available on the IGMS "Training Guides"

page: <https://www.researchgrant.gov.sg/Pages/TrainingGuides.aspx>)

# Contact Information

- For **general information**, please refer to the Grant Call FAQs document in either:
  - [CoT V5 3<sup>rd</sup> Grant Call website](#)
  - Under “Related Documents” under the grant call topic of interest on [IGMS](#)
- For transparency, no verbal enquiries will be entertained. However, if you require clarification, please email the CoT Directorate at [CoTV5@nparks.gov.sg](mailto:CoTV5@nparks.gov.sg). Answers to all received queries will also be reflected in the Grant Call FAQs document (see above), which will be updated periodically to ensure that all applicants have equal access to additional information.
- For any queries on the **use of IGMS**, please contact the IGMS helpdesk.  
Tel No: (65) 6556 8807 or (65) 6556 6971  
E-mail: [helpdesk@researchgrant.gov.sg](mailto:helpdesk@researchgrant.gov.sg)

# **Q&A on Grant Call Processes**

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# **Call Topic for CoT V5 3<sup>rd</sup> Grant Call**

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**3<sup>rd</sup> Grant Call: Topic 7**  
**CoT\_V5\_GC2024\_07**

**R&D Theme 1 - Safe, productive and multi-functional greenery**

**Call Topic: Physical & psycho-acoustic study of the potential for vegetation to mitigate traffic noise in high-rise residential estates**

**Budget:** S\$ 0.7 Mil

**Duration of Project:** 2.5 years

**Lead Agency:** NParks

**Member Agencies:** HDB & LTA

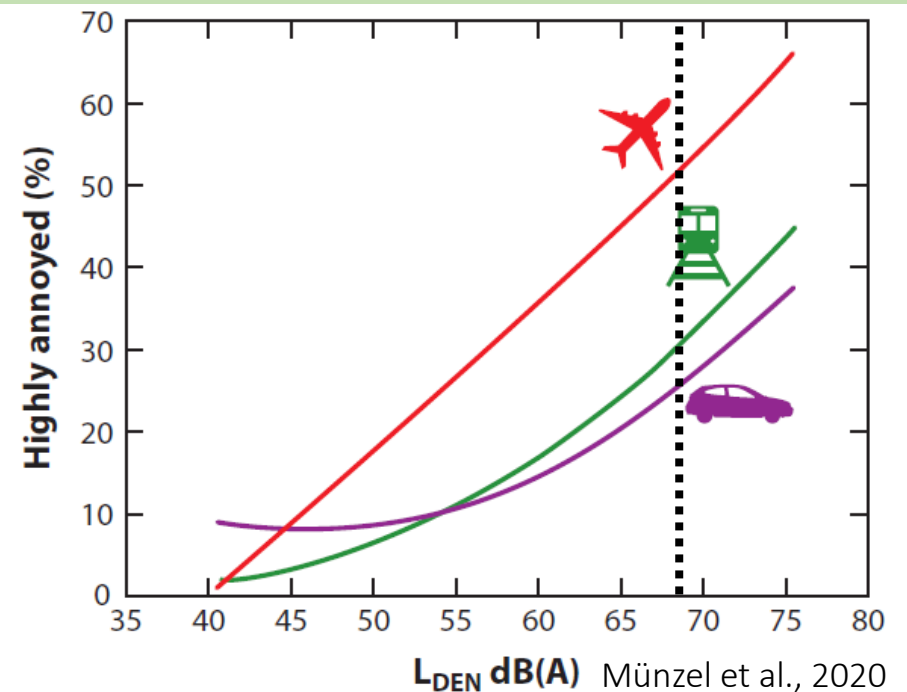
# Call Topic: Physical & psycho-acoustic study of the potential for vegetation to mitigate traffic noise in high-rise residential estates

## Background

### Problem statement

- Noise exposure is responsible for a wide range of negative public health issues, especially heart disease, stroke and diabetes (Münzel et al., 2020).
- NEA and LTA receive about 2,000 road traffic noise feedback cases annually from residential developments facing train tracks, expressways and/or major arterial roads.
- Locally, traffic noise associated with the opening of a new bus route has been shown to increase noise complaints<sup>1</sup> (Fan et al. 2021).

<sup>1</sup> Living closer to the bus route (for every 100m) increases noise complaints by est. 10% points; Effect is more severe on medium levels (5<sup>th</sup> - 8<sup>th</sup> floors) and near bus stops (within 100m).



..... Singapore (Diong et al., 2021)

# Call Topic:

## Physical & psycho-acoustic study of the potential for vegetation to mitigate traffic noise in high-rise residential estates

### Background (cont'd)

### Problem statement

- **CURRENT NOISE REGULATION STANDARDS:** In Singapore, the regulatory standard for environmental noise reaching building facades in residential estates or other noise sensitive developments<sup>1</sup> is 67 dB(A) Leq 1hr<sup>2</sup>.
- **LIMITATIONS:** Physical infrastructure<sup>3</sup> such as conventional noise barriers are effective, but there are limitations to scaling up their use, including cost, practicality and aesthetics.
- **EXISTING & PERVASIVE:** Urban vegetation is already well-established in Singapore. Optimising vegetation for noise mitigation (actual or perceived) could be an effective noise mitigation measure, on top of existing benefits such as visual screening, heat mitigation and biodiversity conservation.



Conventional noise barrier



Urban vegetation

<sup>1</sup> Noise sensitive developments include residential developments, hospitals, nursing homes, boarding houses/hostels

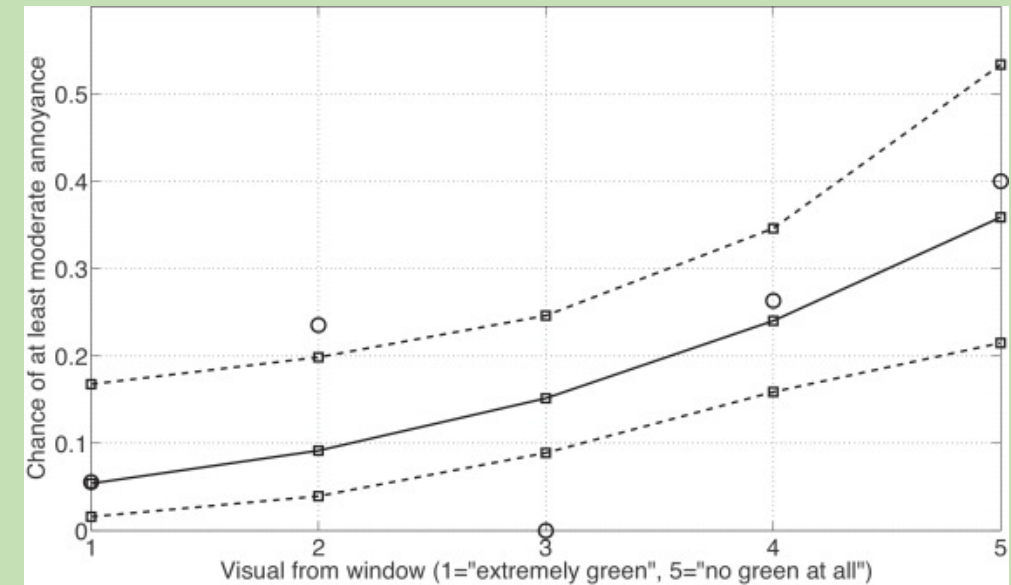
<sup>2</sup> Technical guideline for land traffic noise impact assessment (2023)

<sup>3</sup> Other measures include road re-surfacing, novel window designs, active noise-cancelling systems, novel building materials

# Call Topic: Physical & psycho-acoustic study of the potential for vegetation to mitigate traffic noise in high-rise residential estates

## Objectives

- To quantify the effectiveness of urban vegetation and landscapes for reducing physical traffic noise levels (in dBA), for high-rise residents, in comparison to synthetic noise barriers.
- To quantify the psycho-acoustic effectiveness of urban vegetation and landscapes for reducing perceived traffic noise levels, for high-rise residents, in comparison to synthetic noise barriers, and the actual physical traffic noise level reduction of urban vegetation and landscapes.
- To analyse the contributions of relevant urban vegetation and landscape metrics to noise mitigation, both physically and psychologically.
- To develop guidelines with landscape design recommendations for traffic noise mitigation suitable for high-rise residential planning.



Renterghem and Botteldooren (2016)

*Projects are also encouraged to further build upon the above-mentioned objectives, and/or propose additional research objectives.*

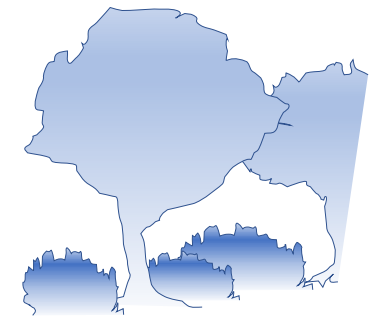
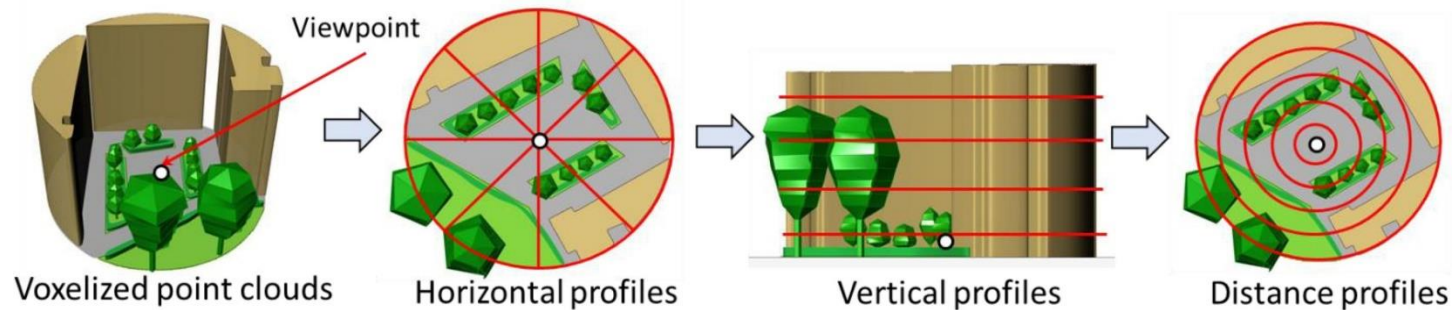
# Call Topic: Physical & psycho-acoustic study of the potential for vegetation to mitigate traffic noise in high-rise residential estates

## Technical Deliverables

- (a) Field-validated baseline information on physical and psycho-acoustic performance of various vegetation and landscape metrics (separately and in combination with synthetic measures) for traffic noise mitigation.
- (b) Identification of relevant vegetation and landscape metrics and environmental factors affecting traffic noise mitigation.
- (c) Landscape guidelines for traffic noise mitigation relevant to high-rise residential contexts<sup>1</sup>.

<sup>1</sup>Agencies (including URA, HDB and NEA) to be consulted to scope dissemination pathways for the guidelines

Projects are encouraged to further build upon the above-mentioned deliverables, and/or propose additional deliverables.



*Landscape guidelines*

Qi et al. (2022) Example approaches to vegetation metrics



# Call Topic: Physical & psycho-acoustic study of the potential for vegetation to mitigate traffic noise in high-rise residential estates

## Impact Outcomes

*In relation to the overall aims and key research themes of CoT V5, this project should look towards contributing to the following impact outcomes:*

(a) In the medium term (post-2025):

- Demonstrate roadside traffic noise mitigation potential of urban vegetation and landscapes by an estimated 5dB(A) Leq<sup>1</sup> or more equivalent reduction at pilot sites, in comparison to the actual physical noise reduction by roadside greenery and that of synthetic noise barriers.

(b) In the long term (post-2030):

- Apply landscape guidelines for noise mitigation to achieve the above reduction along 50km<sup>2</sup> of noise-sensitive sites.



Potential for greenery intensification  
to reduce perceived noise

<sup>1</sup> The target of 5dB is assessed to be a reasonable benchmark, based on the performance of existing conventional noise barriers.

<sup>2</sup> The target of 50km is based on priority areas for noise mitigation (residential, hospital and old-age homes abutting existing expressways).

# Call Topic: Physical & psycho-acoustic study of the potential for vegetation to mitigate traffic noise in high-rise residential estates

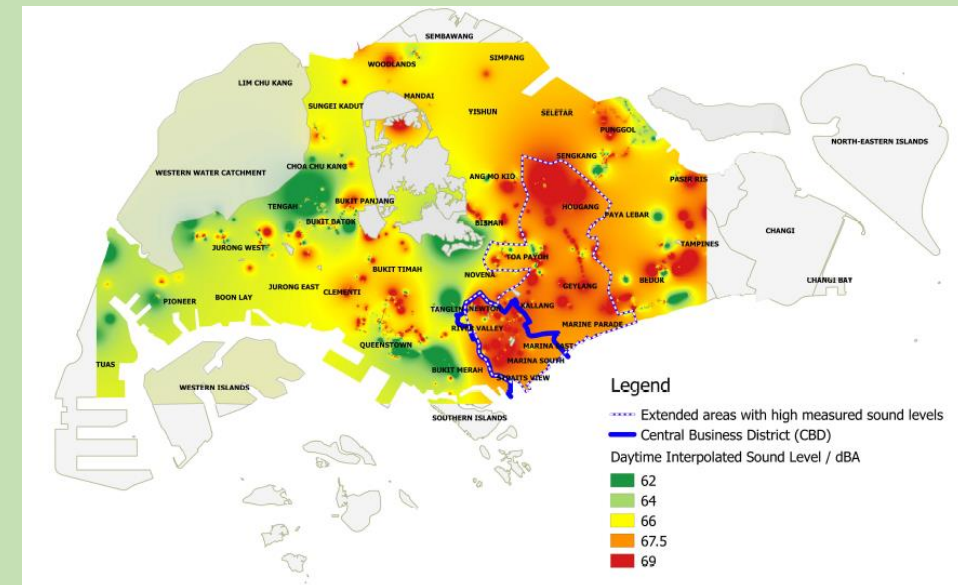
## Impact Outcomes (cont'd)

*In relation to the overall aims and key research themes of CoT V5, this project should look towards contributing to the following impact outcomes:*

### Translation

Implementation of the guidelines developed through this project can potentially be prioritised for three categories of residential developments:

- Existing residential noise-sensitive developments, in proximity to existing traffic noise hotspots (to be identified in consultation with LTA and HDB)
- Existing residential developments, in proximity to new/expanded traffic-related infrastructure (to be identified in consultation with LTA and HDB)
- New residential developments (yet to be launched), in proximity to existing traffic noise hotspots (to be identified in consultation with LTA and HDB)



Diong et al. (2021)



# Call Topic:

## Physical & psycho-acoustic study of the potential for vegetation to mitigate traffic noise in high-rise residential estates

Role	Agency
Lead	National Parks Board (NParks)
Member	Housing & Development Board (HDB)
Member	Land Transport Authority (LTA)

# Call Topic:

## Physical & psycho-acoustic study of the potential for vegetation to mitigate traffic noise in high-rise residential estates

### References

Diong HT, Neitzel R and Martin WH (2021) Spatial evaluation of environmental noise with the use of participatory sensing system in Singapore. *Noise Mapping* 8: 236-248.

Fan Y, Teo HP and Wan WX (2021) Public transport, noise complaints, and housing: Evidence from sentiment analysis in Singapore. *Journal of Regional Science* 61:570-596

Münzel T, Swenja K-S, Oelze M, Gori T, Schmidt FP, Steven S, Hahad O, Rössli M, Wunderli J-M, Daiber A, Sørensen M (2020) Adverse cardiovascular effects of traffic noise with a focus on nighttime noise and the new WHO noise guidelines. *Annual Review of Public Health* 41: 309-28

Qi J, Lin ES, Tan PY, Zhang X, Ho R, Sia A, Olszewska-Guizzo A, Waykool R (2023) Representing the landscape visual quality of residential green spaces in Singapore with 3D spatial metrics. *Urban Forestry & Urban Greening* 90: 128132