

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

2nd Grant Call Briefing

20 Nov 2023

CoT V5 – Launch of 2nd Grant Call

- The 2nd grant call for Vertical 5 – City in Nature (under the Cities of Tomorrow R&D Programme) (CoT V5) has been launched as of **26 October 2023**.
- We invite interested researchers to submit suitable full proposals for potential funding support under **1 Call Topic**:
 - 1) Ecology and ecosystem services of blue-green infrastructure for urban climate and urban biodiversity
- 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.

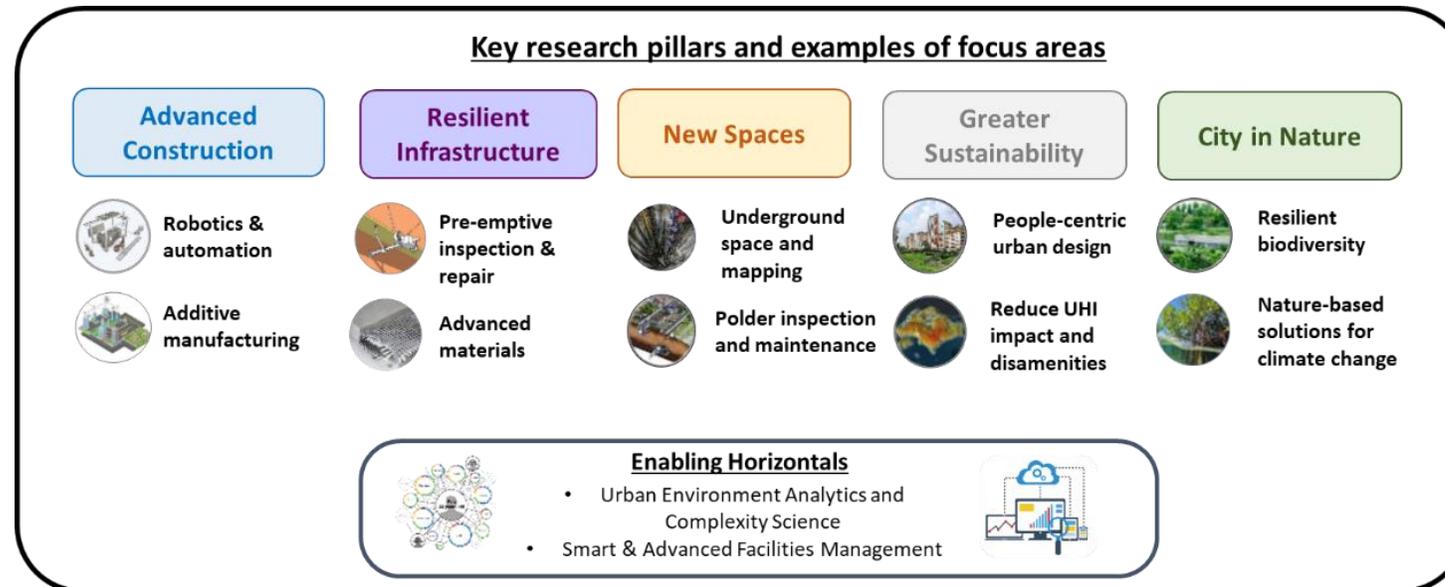
Schedule

- 2.00pm Overview of CoT V5 2nd 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
- 2.30pm Call Topic 6:
“Ecology and ecosystem services of blue-green infrastructure for urban climate and urban biodiversity”
- 2.45pm Q&A
- 3pm Refreshments & Networking

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

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 5th 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

Grant Call Eligibility

- All Singapore-based Institutions of Higher Learning (IHLs), 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 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.

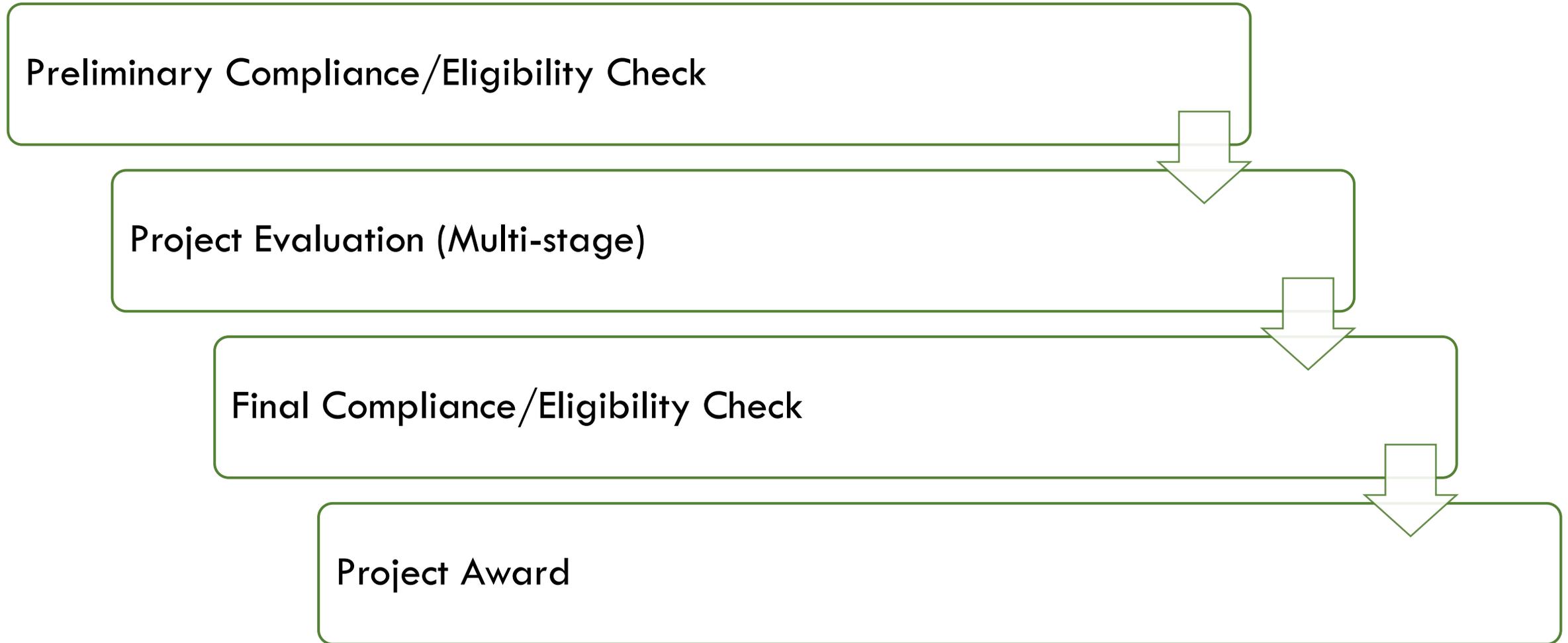
Additional notes on funded assets

- 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

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

Overview of Timeline

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

Grant Call Opens (for 8 weeks)	26 October 2023, 2.00pm
Physical Briefing & Networking for CoT V5 2 nd Grant Call	20 November 2023, 2.00pm
Grant Call Closes (Proposal Submission Deadline)	1 February 2024, 2.00pm

FOR SHORTLISTED APPLICANTS ONLY

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

FOR SUCCESSFUL AWARDEES ONLY

Approval and Letter of Award	July 2024 onwards*
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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 2nd 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 (**1 Feb 2024, 2.00pm**).
 - A copy of the application should also be sent via email to the CoT Directorate (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://researchgrant.gov.sg/Pages/TrainingGuides.aspx>)

Contact Information

- For **general information**, please refer to the Grant Call FAQs document in either:
 - [CoT V5 2nd 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. 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

Q&A on Grant Call Processes

Call Topic for CoT V5 2nd Grant Call

2nd Grant Call: Topic 6
CoT_V5_GC2023_06

R&D Theme 4 - Nature-based solutions for inland climate change adaptation

Call Topic: Ecology and ecosystem services of blue-green infrastructure for urban climate and urban biodiversity

Budget: S\$ 2 Mil

Duration of Project: 3 years

Lead Agency: NParks

Call Topic:

Ecology and ecosystem services of blue-green infrastructure for urban climate and urban biodiversity

Background

- Blue-green infrastructures (BGIs), such as swales, naturalised waterways, and wetlands, are examples of a nature-based solution to improve ecosystem service (ES) provision and climate resiliency.
- Ecosystem services (ESs) are the benefits (e.g., provision of food and clean water, control of flood and diseases, and recreation) that people obtain from ecological processes of natural ecosystems.
- Although BGIs in Singapore are usually planned and developed to maximise water related ESs, they can also provide many other important non-water related ESs, such as microclimate regulation, biodiversity conservation and enhancement, and socio-economic benefits.
- In recent years, more emphasis has been placed on improving Singapore's climate resilience . This urgency has led to the formation of the Singapore Green Plan 2030 and its five key pillars.
- As such, there are needs to understand quantitatively how BGIs can optimally provide multiple ESs and improve climate resiliency in Singapore with regards to its design, surrounding land cover and land use context, and stakeholder's requirements.

Call Topic:

Ecology and ecosystem services of blue-green infrastructure for urban climate and urban biodiversity

Objectives

1. Quantify the relationship between the level of ES provision and the quantity of design features in a BGI by conducting literature review and meta-analyses, and field data collection.
 - Literature review and meta-analyses should be compiled from published scientific papers and grey literature.
2. Develop two suites of models that factors in the interaction between important ESs and different BGI typologies (Table 1) and design variants (Table 2) that can be used during the planning and design phase.
 - ES Provision models should extrapolate the findings from objective 1 to predict the level of ES provision based on a given configuration and quantity of design features in a BGI.
 - ES Valuation models should use the output from the ES Provision models to estimate an overall economic value of the corresponding BGI design.

Call Topic:

Ecology and ecosystem services of blue-green infrastructure for urban climate and urban biodiversity

Objectives (Table 1, Blue-green infrastructure (BGI) typologies and ecosystem services that minimally should be studied)	BGI Typologies	Ecosystem Services
	<ol style="list-style-type: none">1. Canal + PCN/planting verge<ul style="list-style-type: none">• Concretized• Semi-naturalised• Naturalised2. Wetlands/Marshlands + Park3. Ponds/lakes + Park	<ol style="list-style-type: none">1. Stormwater management<ul style="list-style-type: none">• Discharge capacity• Water quality and nutrient removal*2. Microclimate regulation<ul style="list-style-type: none">• UHI mitigation• Thermal comfort3. Socioeconomic benefits<ul style="list-style-type: none">• Recreational activities• Mental and physical benefits• Visitor frequency4. Biodiversity<ul style="list-style-type: none">• Urban freshwater biodiversity

Call Topic:

Ecology and ecosystem services of blue-green infrastructure for urban climate and urban biodiversity

Objectives
(Table 2,
Example BGI
design features
for project
considerations.)

1. Area of water structures
2. Degree of vegetation along banks of water structures
3. Roughness coefficient of structures
4. Total area of greenery
5. Total area of grey infrastructure
6. Percentage of green areas covered by trees.
7. Degree of shading by surrounding structures
8. Extent of green walls
9. Total leaf area index
10. Area of rain gardens
11. Area of bioretention swales
12. Area for recreational activities

Call Topic:

Ecology and ecosystem services of blue-green infrastructure for urban climate and urban biodiversity

Objectives

3. Develop an easy to use and iterative multi-criteria decision-making framework and tool (including the use of a multi-criteria decision analysis) to provide site-specific optimal design recommendations based on local context (including landuse parameters such as residential, or industrial) for future BGIs in Singapore. The framework and tool should:
 - consolidate the outputs from the ES models described in 2.1(b), and feedbacks from local stakeholders and community.
 - place greater emphasis on evidence-based justifications and minimize the influences of subjective judgement.
 - generate and/or allow the input of weightages of the various ESs and provide recommendations on the ESs to prioritize and the planning parameters and design features that could be incorporated in the BGI on a site-specific basis depending on the local context.
 - inform and provide design recommendations at the precinct/ micro-scale (~500 m, Figure 1)
4. Demonstrate the relevance and potential of applying the suite of ES models and multi-criteria decision-making framework and tools in at least two sites in Singapore.
 - Research team to propose the sites at the precinct/ microscale.
 - Research team is not expected to implement the BGIs itself.
 - Research team should quantify the time and effort saved when applying the ES models and decision-making framework and tool when planning and designing BGIs.

Call Topic:

Ecology and ecosystem services of blue-green infrastructure for urban climate and urban biodiversity

Objectives
(Figure 1, Illustration of the precinct/micro-scale. Each red circle is 500 m in diameter.)



Call Topic:

Ecology and ecosystem services of blue-green infrastructure for urban climate and urban biodiversity

Technical Deliverables

1. Literature review of ESs provision by BGIs that are relevant and can be implemented in Singapore.
2. Meta-analyses of that literature review quantifying the relationship between the levels of ES provision and the quantity of corresponding BGI design features; including metadata for ease of adoption into other projects.
3. Field assessment and data of ESs provision by BGIs in Singapore.
4. A suite of ecosystem service provision models that extrapolate the findings from the meta-analyses, literature review, and analysis of data to predict the level of provision of ESs in a BGI based on the quantity and configuration of design features present.
 - The models should be tested and validated on 5 to 10 existing BGIs in Singapore to improve their accuracy ($\geq 80\%$).
5. A suite of ecosystem service valuation models that estimate the Singapore-relevant economic values of the BGI based on the output of the ES provision models. The valuation should enable comparisons between BGI designs.

Call Topic:

Ecology and ecosystem services of blue-green infrastructure for urban climate and urban biodiversity

Technical Deliverables

6. Easy to use and iterative multi-criteria decision analysis framework and tool(s) that consolidates the outputs of the models and other criteria (such as stakeholder input) to provide the recommendations for the optimal design of the BGI. Details are in objective 3.
7. Proof-of-concept on adapting the suite of ES models and MCDA framework and tool in at least two sites in Singapore to demonstrate its functionality and usability (e.g., time and effort saved) to the planning and design of BGIs.
8. Technical reports detailing the development and validation of the ES provision models, the field assessment and development of the MCDA framework and tools, and their demonstrations in the two sites.
9. User guidelines on how to use the models, framework and tools that could complement the existing design and planning process of BGIs in Singapore.
10. Design guidelines to recommend design and planning parameters for BGI implementation in tropical cities.
 - Research team is encouraged to recommend how BGIs can be used for a city to meet the aims of City in Nature/Regenerative City/Climate Resilient City in view of on-going urban development.

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

Call Topic:

Ecology and ecosystem services of blue-green infrastructure for urban climate and urban biodiversity

Impact Outcomes and Pathway to Impact

- Provide models and framework for planning agencies (e.g., URA, PUB, JTC, NParks etc.) to better develop strategies for the implementation of BGIs as nature-based solutions in Singapore through the improved delivery of ESs, as well as the quantification of ES supply (i.e., from proposed BGI designs) and demand (i.e., from stakeholders and communities).
- Potential to export and adapt the models, tools, and framework to other densely built and/or tropical cities.

Agencies Involved:

Ecology and ecosystem services of blue-green infrastructure for urban climate and urban biodiversity

Role	Agency
Lead	National Parks Board
Member	Public Utilities Board Urban Redevelopment Authority JTC Corporation Centre for Liveable Cities

Q&A:

Ecology and ecosystem services of blue-green infrastructure for urban climate and urban biodiversity

Are there any specific sites of interests that applicants should target?	Research proposals should suggest at least two appropriate sites with justifications that are suitable for demonstrating the functionality and usability of the ES models and MCDA framework and tools for planning and designing BGI.
Do reservoirs qualify as blue-green infrastructures (BGIs) within the context of the Call Topic?	Reservoirs can be considered as BGI depending on the framing of the proposal. Please refer to Table 1 on the minimum set of BGI typologies to examine, and para 2.1c on the scale to which the deliverables should minimally address, in Annex C of the Grant Call Information Sheet.
Is a multi-institution project team preferable over a single institution team under CoT V5?	Researchers may form multi-institution or single institution project teams. Each proposal will be assessed accordingly through the evaluation criteria, which considers the execution strength and technical competency of the project team.
What are the areas of expertise required in a project team for this Call Topic?	The project team should have multidisciplinary expertise in topics such as hydrology, ecosystem services, biodiversity, decisions science, and landscape architecture in order to sufficiently address the Call Topic's research objectives.

Q&A:

Ecology and ecosystem services of blue-green infrastructure for urban climate and urban biodiversity

Q&A

Further clarifications before the project award should surround the stated Call Topic requirements. All clarifications and queries should be submitted directly to the CoT Directorate at **CoTV5@nparks.gov.sg** during the open grant call process, i.e., research teams should not contact agencies directly.

CoT Directorate will respond to the clarifications and queries, by periodically updating the Grant Call FAQs document with the relevant answers, on the CoT V5 2nd Grant Call website and IGMS website to ensure equal accessibility to all additional information. Please refer to these websites for the latest version of the FAQs. Agencies involved will work with research teams to provide further technical advice and discuss potential study sites during the proposal scrubbing stage.



CoT V5 2nd Grant Call website

<https://www.nparks.gov.sg/cuge/programmes-schemes/research-programmes/cot-v5-2nd-grant-call>



IGMS website

<https://researchgrant.gov.sg/pages/index.aspx>

Q&A

Thank You

For further enquiries, please contact: CoTV5@nparks.gov.sg