NATIONAL ENVIRONMENT AGENCY, SINGAPORE
NEA SCHEME FOR TECHNOLOGY TRANSLATION (T^2)

REQUEST FOR PROPOSAL (RFP) ON A MONITORING SYSTEM FOR GRAVE AND MONUMENT WORK-RELATED ACTIVITIES AT CHOA CHU KANG CEMETERY

Research Area	A monitoring system for grave and monument work-related activities at NEA-managed Choa Chu Kang Cemetery, capable of filtering out routine vehicle and visitor movement across varied terrain.
Publication Date	16 November 2026 (Monday), 2.00 p.m.
Closing Date and Time	21 January 2027 (Thursday), 2.00 p.m.
Proposal Submission	Applications shall be made via: T2_Grant_Secretariat@nea.gov.sg by the closing date and time Note: Proposals submitted after the closing date and time will not be considered.
Instructions and Format of Submission	Please refer to the following website: NEA's webpage at https://www.nea.gov.sg/programmes-grants/grants-and-awards/a-monitoring-system-for-grave-and-monument-work-related-activities-at-choa-chu-kang-cemetery

REQUEST FOR PROPOSAL (RFP) ON A MONITORING SYSTEM FOR GRAVE AND MONUMENT WORK-RELATED ACTIVITIES AT CHOA CHU KANG CEMETERY

BACKGROUND

1. The National Environment Agency (NEA) is the lead agency responsible for planning and ensuring an adequate supply of after-death facilities in Singapore. With effect from 1 November 1998, burial period has been limited to 15 years, after which exhumation may take place should the sites be required for development. Progressive exhumation works at Choa Chu Kang Cemetery have been ongoing since 2004. Enhanced monitoring capabilities would allow ground officers to be alerted promptly, helping to prevent incidental damage to tombstones in the course of these operations.

2. While NEA officers currently conduct regular sector-by-sector inspections within the cemetery, the scale and pace of ongoing exhumation works calls for more robust and continuous monitoring capabilities to ensure effective ground coverage.

3. NEA seeks innovative technological solutions that monitor grave and monument work-related activities and provide early detection of unintended tombstone works that may result in tombstone damage. The proposed solution shall address the limitations of existing monitoring approaches, minimise false alarms, support efficient incident response, and be scalable for cemetery-wide adoption.

CHALLENGES

4. During government exhumation programmes, thousands of graves spread across large areas of more than 10 hectares may be affected. Private exhumations by Next-of-Kin (NOK) may occur concurrently, and their contractors may carry out works across different graves at varying times of the day. This makes it challenging to effectively monitor all exhumation activities at scale.

5. As the volume of exhumation work grows, so does the complexity of managing multiple contractors operating across the cemetery grounds. The risk of execution errors that may result in damage to graves not intended for exhumation is a key operational concern. Given the scale and operating environment, activities of concern may not always be readily detected in a timely manner, underscoring the need to strengthen monitoring capabilities for prompt detection and response.

6. Existing monitoring approaches have limitations in providing comprehensive coverage across cemetery grounds, particularly given the extensive area, varied terrain, vegetation, and environmental conditions. An operationally viable monitoring and early alert capability could enhance existing efforts by identifying activities of concern and providing timely alerts with location information to support operational response.

SCOPE OF RFP

7. This RFP is an open grant call for R&D proposals to develop an operationally viable, monitoring and early alert capability for detecting grave and monument work-related activities that may result in tombstone damage, including hacking, drilling and excavation in NEA-managed cemetery. The proposed solution shall support timely operational response, minimise false alarms from other possible activities in the surroundings (e.g. visitor and vehicle movements), and demonstrate readiness for ground deployment.

8. NEA does not prescribe any particular technology, technical approach, system architecture or analytical method. Applicants may propose a single technology or an appropriate combination of complementary technologies, provided that the proposed solution meets the required operational performance, safety, scalability and maintainability requirements.

9. The proposed solution shall meet the following desired outcomes and mandatory requirements:

a) Functionality

i) Be non-invasive and capable of detecting activities that may result in tombstone damage, including hacking, drilling and excavation. Distinguish activities of interest from other activities in the surrounding environment (e.g. visitor and vehicle movements), provide the location of detected activities, and minimise false alarms. Applicants shall describe the expected false alarm performance and the measures incorporated to minimise false alarms.
ii) Preserve the integrity of existing tombstones and graves during installation, operation, and maintenance.
iii) Incorporate appropriate sensing, data processing, and analytical capabilities to reliably detect activities associated with exhumation works, including hacking, drilling and excavation, and achieve a minimum event detection rate of 80%. Applicants shall propose the methodology of measurement and demonstrate how the proposed techniques enable the solution to meet these performance requirements.
iv) Alert users via one or more messaging applications upon detection of a suspected unauthorised activity. Each notification shall include the date, time, and location of the detected activity. For eventual operational deployment, the proposed solution shall be capable of providing such notification in a timely manner.
v) Operate fully off-grid at the trial site at Cemetery Block 3E, Chinese Cemetery Path 4, where there is no on-site power supply or street lighting. The nearest power source is the Choa Chu Kang Cemetery Office, approximately 1 km away.
vi) Operate reliably during both day and night, including under low-light conditions, and under the terrain, weather, and environmental conditions typically experienced in Singapore.

b) Safety

i) Comply with all applicable safety standards and regulatory requirements relevant to the proposed technology.
ii) Ensure that the installation, operation, and maintenance of the proposed solution, including any ground works, embedded equipment, footings, supports, or associated infrastructure, do not create slip, trip, fall, or other safety hazards. All installations shall be securely positioned, protected, or concealed, as appropriate, and any disturbed ground surfaces shall be properly reinstated. The works shall not obstruct access or compromise the integrity of tombstones, graves, or the surrounding burial environment.

c) Project Deliverables

The key project deliverables during the development phase include:

i) Product Development

- Design and develop a scalable, durable, and reliable detection system suitable for field deployment, with ease of installation and minimal maintenance.

ii) Coverage Range of the System (Trial Site)

- The solution shall be tested and demonstrated at Cemetery Block 3E, Chinese Cemetery Path 4, which is representative of typical cemetery conditions. The trial site spans approximately 14,300m² with a perimeter of approximately 530m. The successful applicant(s) are not required to cover the entire cemetery block. The applicant(s) shall propose and justify the area needed for trial and inform NEA of the intended area before works commence. Please refer to **Appendix 1** for the site layout and further details.
- The Choa Chu Kang Cemetery Office is located approximately 1km from the trial site. Should the proposed solution require cabling or any other physical connection between the trial site and the Choa Chu Kang Cemetery Office, the proposed solution shall follow the route highlighted in yellow in **Appendix 1**, Figure 1, subject to NEA's approval.
- The proposed solution should be able to scale beyond the trial site and perform to specifications throughout the cemetery grounds. Applicant(s) shall describe and justify any additional system enhancements, infrastructure or deployment arrangements required for wider deployment.

iii) Validation Through Field Trials

- The successful applicant(s) shall be responsible for collecting all data necessary for the development and validation of the proposed solution, as no project data will be provided by NEA. NEA officers with relevant expertise and experience will provide the operational context and support throughout the project.
- Conduct field trials within the trial site to validate the proposed solution's performance. The solution shall achieve a minimum event detection rate of 80% for exhumation activities.
- Measure and report the alert latency between detection of a suspected unauthorised activity and issuance of the corresponding notification and demonstrate that the proposed solution can issue notifications in a timely manner, with appropriate validation to minimise false alarms.
- Demonstrate and report the false alarm performance of the proposed solution during field validation, including the proposed methodology for measuring false alarms.
- Where actual exhumation activities and relevant data are unavailable or insufficient for field validation, the successful applicant(s) shall, with NEA's approval, conduct simulated tests and collect the necessary data to validate the proposed solution.

iv) Backend System and Generation of Incident Reports

- Provide a backend system with a user interface that maintains an incident log and supports the automatic generation of incident reports based on detected events.
- Provide and manage the necessary data-hosting and storage arrangement as part of the proposed solution. NEA will not provide on-premises servers, storage devices or other equipment for the storage of event data.
- Retain relevant event data and incident records securely for at least the entire project duration.
- Allow authorised NEA users to access, retrieve and export relevant incident and event records in commonly used formats, including CSV or Excel-compatible formats.

- Describe the proposed data-hosting architecture, access arrangements, data-retention approach, backup and recovery measures, and any associated subscription or operational costs.

v) Data Protection
   - The system shall incorporate appropriate safeguards to prevent unauthorised access, modification or deletion of recorded data. Event data and records shall be securely stored and accessible only to authorised users.

vi) Documentation
   - Develop technical documentation, including user manuals and standard operating procedures.

vii) Decommissioning and Site Reinstatement
   - The proposed solution shall be deployed and operated in a manner that does not impede NEA's ongoing exhumation operations or the subsequent clearing and reinstatement of the site upon project completion.
   - The successful applicant(s) shall be responsible for removing temporary installations and reinstating any areas affected by testing and simulation activities, including the designated simulated test site where applicable, to a condition acceptable to NEA upon completion of the relevant works.

d) Operationalisation and Commercialisation

Applicants shall describe the proposed pathway for transitioning the solution from prototype to operational deployment and commercialisation. The proposal should include, but not be limited to the following information:

i) The proposed deployment model, including installation, commissioning, operation, maintenance and support arrangements.
ii) The expected operational readiness of the proposed solution upon project completion, with the solution aiming to achieve **Technology Readiness Level (TRL) 7–9**. Applicants shall state the target TRL and justify how the proposed development activities will achieve the intended level. Please refer to Appendix 2 for definitions of TRLs.
iii) Details of existing or proposed partnerships with service providers that will support deployment, commercialisation and scaling of the solution.
iv) Any software subscription or background intellectual property licensing fees required for deployment.

PROPOSAL REQUIREMENTS AND SUBMISSION

10. All proposals shall be submitted through email to T2_Grant_Secretariat@nea.gov.sg before the closing date and time, by filling in **Annex A (Research Proposal Template)**. Applicants are to refer to https://www.nea.gov.sg/programmes-grants/grants-and-awards/a-monitoring-system-for-grave-and-monument-work-related-activities-at-choa-chu-kang-cemetery for detailed submission instructions and templates for submission of the proposal. Each email is subject to a size limit of 15 MB. Please send separate emails if the email exceeds the size limit.

11. Each proposal shall address all desired outcomes and phases of work set out in this RFP. The successful applicant(s) shall retain ownership of the solution, subject to the Intellectual Property Rights provisions of this RFP. The solution shall subsequently be offered to NEA as a service by the service provider for eventual deployment.

12. The Proposal shall include but shall not be limited to the following information:

a) Describe the proposed solution and methodology, including how the proposal addresses all desired outcomes, the advantages of the proposed solution over existing approaches.

b) Provide a detailed project work plan covering the major milestones, completion criteria, success metrics, and periodic review sessions with NEA and relevant stakeholders.

c) Provide a field-validation plan setting out the simulated test scenarios, ground-truth arrangements, methodology for measuring event detection and false alarm performance, trial conditions, and proposed acceptance criteria.

d) Provide the estimated whole-of-life costs, including installation, operation, maintenance, replacement, software subscriptions, and any licensing fees or royalties required for deployment and continued use.

e) Describe the research team composition, individual capabilities, and the relevance of the project team members' expertise and experience to the project, including experience with field trials and real-world deployment.

f) Indicate all in-kind services, funding, and tangible contributions to be provided by the applicants, industry partners, or other collaborators. In-kind contributions may include labour, materials, facilities, and other services, such as the provision of facilities and space. Applicants are encouraged to demonstrate the level of institutional support and multidisciplinary expertise available to the project.

g) Identify the key technical, operational, implementation and schedule risks, together with the proposed mitigation and contingency measures.

13. Together with **Annex A (Research Proposal Template)**, filled-in copies of **Annex B (CV template)** should be submitted for each principal investigator, co-principal investigator, applicant, co-applicant, or project team member.

14. Requests for data from Public Sector Agencies are to be submitted within the proposal **(Annex A: Research Proposal Template Part E – Data Requirements).**

PROJECT DURATION AND SCHEDULE

15. The proposed solution shall be developed over a period of up to 18 months from award to the completion of the project. Projects that can be completed within a shorter timeframe are strongly encouraged.

16. The proposed project schedule shall include major milestones and phases **(Annex A: Research Proposal Template Part B – Proposed Solution – B3 Project Schedule, Phasing Plans and Cash-Flow Projections).** The Proposal shall also explain how the achievement of the major milestones and phases are to be evaluated and determined.

ELIGIBILITY AND FUNDING SUPPORT

17. This RFP is extended to all Institutes of Higher Learning (IHLs) and Research Institutes, and private sector entities, based in Singapore. The RFP is to support R&D work carried out in Singapore.

18. The funding support for successful applicant(s) is indicated below:

S/N	Type	Max Direct Costs (DC) support
1	Public Sector Entities	100%
2	Small and Medium Enterprises (SMEs)	50%
3	Non-SMEs	30%

19. More details on funding of private sector entities for research projects can be found in **Annex C (Guidelines on Funding Private Sector Entities)**.

20. Indirect costs will not be supported for all private sector entities (i.e. 0% of indirect costs will be provided). Indirect costs shall be funded at up to 30% of qualifying direct research costs for public sector entities. The definition of indirect costs is given in **Appendix A.2 of Annex A (Research Proposal Template)**.

21. Private sector applicants are required to fill in **Annex A (Research Proposal Template Part F – Declaration – F2 Additional Declaration [For Private Sector Applicant(s)])**, as part of the proposal application.

22. Grant disbursement is made on a reimbursement basis upon achievement of agreed project milestones and deliverables, supported by documents as proof of the actual expenditure incurred and an externally audited statement of account.

23. GST incurred by successful applicant(s) should not be supported by the grant except for cases such as non-GST registered organisations or where the organisation is unable to claim input GST incurred from IRAS (e.g. Institutes of Higher Learning).

24. All other terms and conditions governing the grant will be communicated to and mutually agreed upon with successful applicant(s) prior to the award of the grant.

INTELLECTUAL PROPERTY RIGHTS

25. The Project Intellectual Property (IP) shall, in the first instance, be owned by the successful applicant(s). This is without prejudice to any agreement that the successful applicant(s) may enter into with the Investigators or Project Personnel on ownership and exploitation of Project IP.

26. The NEA shall reserve royalty-free, irrevocable, worldwide, perpetual and non-exclusive right to use any Project IP for their statutory functions, non-commercial and/or Research & Development (R&D) purposes, including continuing the R&D with any third party, and making and having made products based on the Project IP to fulfil statutory functions. Notwithstanding the foregoing, the successful applicant(s) may seek a waiver of this Clause from NEA, if such waiver would support the effective commercialisation of the Project IP by a third party pursuant to the National IP Protocol for Publicly Funded R&D. Any waiver would be at NEA's absolute discretion.

RESEARCH COLLABORATION AGREEMENTS

27. The successful applicant(s) may undertake work on the research in collaboration with a collaborator. Where and when this occurs, the successful applicant is responsible for putting in place research collaboration agreements that are undertaken by the successful applicant.

EVALUATION CRITERIA

28. Proposals will be evaluated against the following criteria:

S/N	Weightage (%)	Evaluation Criterion
1	25	Operational effectiveness of solution
2	20	Cost-effectiveness of solution
3	15	Potential for operationalisation/commercialisation
4	25	Capacity & expertise to execute the project
5	15	Technological competency and manpower capability building
	Total (100%)	

CONTACT

29. Please contact the Secretariat at T2_Grant_Secretariat@nea.gov.sg, should you have any queries. Applicants should refer to the Instructions and Templates for Applicants on https://www.nea.gov.sg/programmes-grants/grants-and-awards/a-monitoring-system-for-grave-and-monument-work-related-activities-at-choa-chu-kang-cemetery as the primary source of information.

30. Successful applicant(s) will be notified in writing.

Appendix 1: Choa Chu Kang Cemetery Block Map (Block 3E)



Figure 1. Choa Chu Kang Cemetery Block 3E and Designated Route to Choa Chu Kang Cemetery Office

(The yellow route indicates the permissible alignment for any physical connection between Block 3E and the Choa Chu Kang Cemetery Office, approximately 1 km away)



Figure 2. Existing Site Conditions in CCK Chinese Cemetery Block 3E

(The photographs are provided for reference to illustrate the general site conditions, including the terrain, vegetation, accessibility and surrounding environment at the trial site.)

Appendix 2: Definition of Technology Readiness Levels (TRL)

TRL 1	**Basic principles observed and reported** Lowest level of technology readiness. Scientific research begins to be translated into applied research and development. Formulation of basic theories / principles which have the potential to be further developed into applied research. The project may be limited to literature review and fundamental investigations and paper studies.
TRL 2	**Technology concept and/or application formulated** Once basic principles are observed, practical applications can be formulated. Conceptual development of application and technology. The project may involve analytic studies such as numerical simulations and experimentation to support the basic theories.
TRL 3	**Analytical and experimental critical function and/or characteristic proof of concept** Active research and development is initiated. Proof of concept established through laboratory studies which aim to validate analytical predictions of separate components of the technology. Examples include components that are not yet integrated or representative.
TRL 4	**Component and/or breadboard validation in laboratory environment** Design, development and lab testing of technological components are performed. Lab-scale tests on the prototype where separate components of the technology have been integrated to establish that they will work together. This is a relatively “low fidelity” prototype in comparison with the eventual system.
TRL 5	**Component and/or breadboard validation in relevant environment** The basic technological components are integrated together with realistic supporting elements to be tested in a simulated environment. Bench-scale tests in a simulated environment (e.g., laboratories or other environment under controlled conditions) for optimisation/performance enhancement of the technology/prototype. This is a “high fidelity” prototype compared to the eventual system.
TRL 6	**System/subsystem model or prototype demonstration in a relevant environment** The prototype, which is well beyond that of level 5, is tested in a relevant environment. Pilot-scale tests of the system or process demonstration in a relevant operational environment and the prototype system verified.
TRL 7	**System prototype demonstration in an operational environment** Prototype is near, or at, planned operational system level. Demo-scale tests in the actual operational environment. The final design is virtually complete. The goal of this stage is to remove engineering and manufacturing risk.
TRL 8	**Actual system completed and qualified through test and demonstration** Technology has been proven to work in its final form under the expected conditions. Successful implementation of demo-scale tests where true system development is achieved. In most of the cases, this level represents the end of true system development.
TRL 9	**Actual system proven through successful mission operations** The technology in its final form is ready for commercial deployment.