Summary

Water Resources East (WRE) is pleased to respond to the Environment Agency's Request for Quotation (SMF-01) to develop a proposal for a smart farming trial within the Cambridge region.

The total funding request is £29,764.67 (excl. VAT). This includes:

- Approximately £4,000 to pay for dedicated time for existing WRE team members, where this is not already funded by the Environment Agency.
- Approximately £14,000 for external consultancy and associate support for technical and logistical elements of the project.
- Approximately £5,500 to engage the expertise of [redacted] at Cranfield University and his post-doc research team.
- Approximately £6,250 to pay for the direct contribution of time from three established Water Abstractor Groups in the region. Two of which will host and co-facilitate a workshop each and support farmer engagement.

Our work will deliver three key outputs, with the first two directly informing the scope and development of the third - a proposal and terms of reference for a smart farming trial.

1. A review of the state of play of smart farming in the UK.
2. Development of an initial route map to a longer-term ambition for smart farming in the UK. This route map can form the framework around which trials and future projects collectively work toward.
3. A scoped and costed proposal for a smart farming trial. The trial will be defined such that it moves us forward in the route map toward the longer-term ambition for smart farming.

The success of the project and value of a future smart farming trial is dependent on having the right people involved, tapping into knowledge and experience, linking research, higher-level water resources planning and local practical activities and solutions.

We propose that we work towards the above deliverables through a series of structured workshops and meetings with well-captured outputs. These outputs, decisions, actions, recommendations etc, will be brought together into a coherent package and presented to the Environment Agency and key stakeholders at an online dissemination workshop at the end of the project.

Response to technical questions

E01 Understanding of the project

Regional groups have an important role to play in ensuring we are collectively looking at the longer-term, strategic work that will help to position abstractors and the environment for greater resilience in the future.

We understand that to date there has not been a thorough review of the state of play in smart farming in this country, or a clear articulation of the long-term vision or ambition for smart farming.

Without these it is hard to properly and systematically break down the barriers to wider adoption and make sure we invest in the right projects and trials to move things forward. A piecemeal approach risks:

- good practice not being shared, leading to slower progress;

- disconnected/incompatible datasets and systems;
- innovations that are incompatible with regulatory practices;
- preventing catchment-scale benefits being realised.

Recent work by Cranfield University in trial catchments within the WRE region, and work carried out by WRE as part of the Water for Tomorrow project, shows that, theoretically, improved capacity for sharing resources flexibly (in-year or in near real-time) can improve access to water and resilience. In reality, these arrangements need to be supported by data (and access to it), support from the regulators, and in some cases changes to the way licences are managed.

Working with our agricultural stakeholders, we already know that we need to build on work that the sector has led at farm level, but also innovative projects that look beyond a single farm boundary and into wider catchment benefits such as the ongoing work in the IDB Strine in Shropshire. In the Lark catchment, recent projects have explored resource sharing, but there is now a sense that attention needs to move into the detail of the data and management arrangements that will allow collaboration to happen in practice. In Norfolk, groups of abstractors are working with technology/instrumentation providers to improve monitoring of groundwater, while in Suffolk there are early discussions about how to improve monitoring and data access to support abstraction management in light of water quality and salinity challenges.

Discussion with our WRE Agriculture Group reveals that the real interest in smart farming now is not in how smart farming can be used at farm scale, but in the broader issues that will drive behaviour change, leading to wider adoption of smart farming approaches, especially where they work at catchment levels.

The biggest gains are likely to be obtained when we can monitor and manage in near real-time, linking water availability, actual abstraction, storage, crop and soil status and knowledge of upstream and downstream demands and constraints. These elements are dynamic, while the current licensing system is static and data availability and access is limited and slow.

We also need to be aware that greater use of higher frequency data such as smart metering could reveal deficiencies in current regulatory and farm/abstractor management practices. These issues need to be exposed and addressed if we are to move toward a smarter, more optimised system.

With the above in mind, we have proposed an approach to this project that seeks to co-define the challenge and long-term ambition, exploring the barriers and opportunities from a broader perspective, considering also how new technology or new systems can be used with the existing farm asset base, and then scoping a trial that directly seeks to address or test key priorities identified.

E02 Approach and methodology

We will deliver three key outputs, with the first two directly informing the scope and development of the third - a proposal for a smart farming trial.

1. A review of the state of play of smart farming in the UK.
2. Development of an initial route map to a longer-term ambition for smart farming in the UK.
3. A scoped and costed (desk-based approach) proposal for a smart farming trial.

Our approach involves the co-creation of these deliverables through a series of structured workshops and meetings with well-captured outputs. These outputs, decisions, actions, recommendations, route maps etc will then be brought together into a coherent package along with the scoped and costed smart farming trial.

The success of the project and uptake of actions is dependent on having the right people involved, tapping into knowledge and experience, linking research, higher-level water resources planning and local practical activities and solutions.

Project deliverables:

1. A review of the state of play of smart farming in the UK

A clear definition of smart farming, the status of smart farming in the UK, an overview of key learning from international practice, and a summary and basic SWOT-style analysis of past and ongoing UK trials/case studies. This will bring the project steering group and key stakeholders up to a common level of understanding and reveal where there are gaps or further challenges to be addressed through further smart farming trials and associated developments. In turn this will support the development of an initial route map to a longer-term ambition for smart farming in the UK.

2. A route map to a longer-term ambition for smart farming in the UK

A co-defined long-term ambition statement or vision for smart farming in this country. Articulating what smart farming looks like in the long-term and the key opportunities and benefits to be gained from widespread uptake of smart farming and its integration into catchment management and regulation. Once defined, the key barriers to achieving this ambition will be explored alongside potential resolutions to them, and actions needed to fill gaps hindering progress. This will lead to the development of a schematic route map toward the long-term vision. Examples of route maps can be seen in recent UKWIR projects and the ongoing EA project exploring barriers to collaboration between the energy and water sectors

This route map will form the framework around which trials and future projects collectively work toward. The route map and identification of priority actions will also help the steering group (and later funding organisations) to make an informed and more transparent decision on where to invest in a trial. This is a preferred outcome to simply investing in trials on an ad hoc basis, or simply relying on the emergence of willing participants. This approach allows us to actively search for participants and projects where they maximise opportunities to move forward through the actions set out in the route map.

3. A scoped and costed proposal for a smart farming trial

The key deliverable from this project. An outline costing and preliminary design of a smart farming trial will be carried out by a specialist consultancy informed and steered by the project team. The trial's design will be based on a desktop approach, supported by local knowledge from the project team and stakeholders where possible.

Trial costs will be developed to a pre-feasibility stage, involving expert judgement, typical costs for software/applications, approximate unit costs for instrumentation etc. An uncertainty range will be provided.

Trial timelines will be informed by expert judgement and knowledge of similar schemes, supported by local stakeholders and the project steering group's knowledge of key drivers and wider opportunities.

Planning, access, and legal factors will be dealt with only at a high-level, involving an initial identification of potential issues to resolve at a more detailed stage.

Farmers within the preferred trial area will be contacted by the project team, seeking input and in-principle agreement to be involved.

An outline cost and programme for taking the trial's design and costing to full feasibility/implementation-ready scheme will be provided.

Note the role of the most established WAGs on this project does not mean that candidate trials and the selected trial for scoping will only be located within their areas. The project team and stakeholders will be encouraged to identify trials beyond their local interests, especially recognising that this may encourage the establishment of new WAGs.

Direct and indirect links to the Cambridge water resources and growth challenge will be explicitly considered for each candidate trial. The project steering group will determine which candidate trial goes forward for scoping and costing on this basis, in addition to other factors that will be revealed during the course of the project.

The project steering group, consisting of WRE's Project Manager, members of WRE's Agriculture Group and key nominated specialists from within the Environment Agency, will be responsible for:

- Ensuring the project meets the collective aims.
- Supporting stakeholder mapping and liaising within their own networks to ensure the right people are invited to take part in meetings and workshops.
- Providing data and supporting data gathering.
- Working with the WRE team to shape online and in-person workshop content.
- Selecting the preferred smart farming trial area to be more fully scoped and costed from amongst the candidates identified through the project.
- Reviewing draft deliverables.

WRE will work with three key partner groups as sub-contractors. The respective roles of each are set out under question E04. Note that partners and any third parties working with or for Water Resources East, and who have or may have access to personal data, will be expected to have read, understood and to comply with our Data Protection policy. A copy of our policy is provided along with our proposal.

We understand that there are hopes to broaden the work in the Strine in the new year subject to further funding from DSIT, so it will be important to liaise with key stakeholders from that project to avoid duplication and maximise learning.

Key assumptions

Given the limited time available for the project overall, and the stretched diaries of key project stakeholders, including those within the EA, we propose:

- Draft deliverables are shared with the EA project manager and steering group for review, giving 1 week in each case for comments.
- Concise, clearly structured meeting and workshop outputs and summaries (attendees, key points, actions) will be provided to the project steering group.
- The smart farming trial terms of reference will be provided in the form of a concise technical report.
- The default format for other deliverables (unless agreed with the project steering group) will be PowerPoint slide packs in order to reduce review time and facilitate subsequent dissemination of outputs.
- Products/reports developed can be published on WRE's website (with sensitive information redacted).

E03 Project management and programme

We recognise that this project has a limited timeframe in which to complete. For this reason, we have developed the proposed programme to maximise the opportunity for quality input from key stakeholders and project partners.

We will require direct input and engagement from a range of Environment Agency staff. These individuals should be identified at the earliest opportunity as we recommend that one or two of these individuals form part of the project steering group.

The project is set out to be delivered via a series of structured online and in-person workshops, supported by the project team and steering group reviewing outputs and making decisions at key points in the programme.

The stages of the project are briefly described below, supported by a project Gantt chart on the following page.

Stage 1a: Project inception and begin stakeholder engagement, informally exploring potential areas for smart farming trials that may become candidates for scoping/costing. Identification and review of past and ongoing smart farming trials. – **EA core project team attendance at inception, and to flag any useful case studies known to the EA.**

Stage 1b: Begin data gathering for areas more likely to feature as candidate trials. This will include existing EA hydrometric (and potentially water quality) monitoring networks, water company and Rivers Trust/Citizen Science monitoring, as well as early sight of farmer-owned instrumentation in these areas. – **EA support needed in data collation (national or local monitoring and hydrometry staff).**

Stage 2a: Evidence and case study review of state of play of smart farming in the UK.

Stage 2b: Online workshop 1. Primary aim – co-create route map toward a long-term ambition for smart farming. Exploring goals, drivers, opportunities, barriers and gaps. Draft state of play presented at this workshop to drive discussion. Full list of stakeholders invited to this workshop (see project org chart under question E04). **– EA attendance from across a range of specialisms.**

Stage 3: Route map refined by project team, ready to be used in draft format at WAG-hosted workshops. – **EA project steering group members to review.**

Stage 4a: In-person WAG-hosted workshops 1 and 2. Primary aim to review route map with wider group of farmers. Attendees will identify and conceptualise candidate trial areas that address priority actions within the route map. Technology/instrumentation consultant to attend. – **EA attendance required, to include national or local specialists with supporting knowledge to conceptualise and define candidate trials.**

Stage 4b: Project team engage with farmers within more promising candidate trial areas to seek further input and in-principle agreement for involvement. Note that this approach to capturing candidate trial areas before selecting a preferred trial to fully scope means that the project will deliver one preferred scoped trial, but also a set of additional trials that could be developed further depending on funding and drivers, and may also encourage the development of new abstractor groups, collaborations or Local Resource Options.

Stage 5a: Project steering group select preferred trial area to go forward for scoping and costing, and arrange online workshop with stakeholders relevant to that trial. **– EA project steering group members to support selection of trial.**

Stage 5b: Online workshop 2: Primary aim to fully conceptualise trial and terms of reference and provide technology/instrumentation consultant with sufficient steer to carry out the desk-based

trial design and costing. – **EA attendance required, to include national or local specialists with supporting knowledge to properly conceptualise preferred trial.**

Stage 6: Draft deliverables submitted to project steering group and Environment Agency for review. Including final draft of route map (having been refined following workshops) and technical report detailing terms of reference, design and costs for preferred smart farming trial. – **EA project team to review deliverables.**

Stage 7: Online dissemination workshop. – **EA project team attendance required. Others welcome.**

All deliverables developed by contractors will be reviewed by WRE's Project Manager before being sent to the Environment Agency or steering group for further comment and review. WRE's Project Director is accountable for the successful delivery of this project, and will provide final WRE sign-off of final outputs ready to be shared with the Environment Agency.

Collaborative, stakeholder-dependent projects such as this require significant resource to deliver successfully. To ensure that this project has sufficient team resource to run, WRE will engage the services of an Associate to act as Project Coordinator. This person will work directly with the WRE team, supporting the development of materials and content for workshops, and jointly facilitating them as well as supporting engagement with key stakeholders. This person will also work closely with the WRE team to input to and coordinate the delivery of key project deliverables.

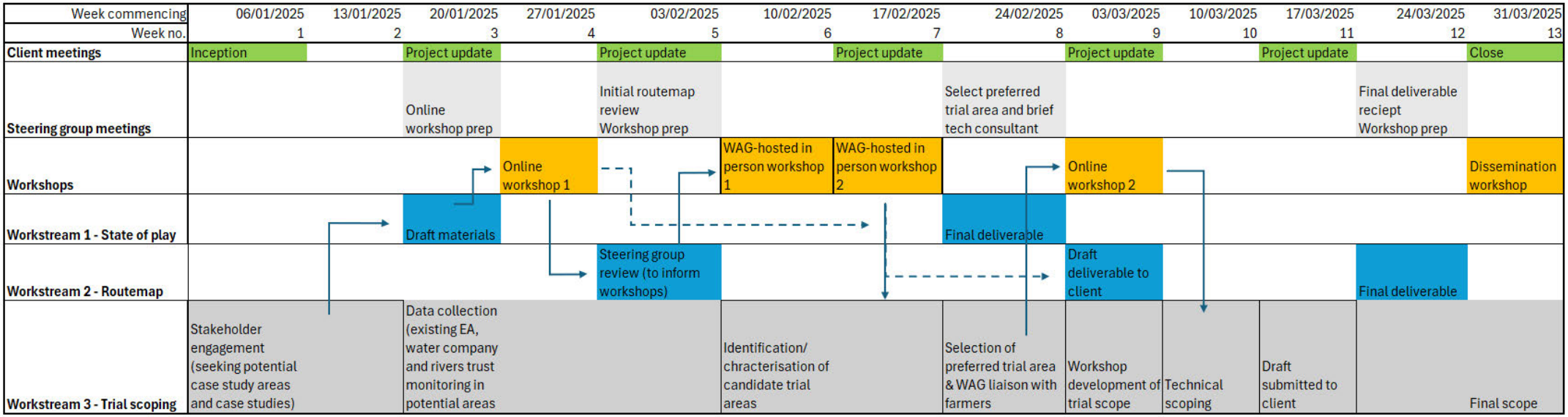

Figure 1: Project programme. Meetings and workshop dates are indicative and depend on availability of key stakeholders.

E04 Team, experience and Technical Skill of those involved in the project

The structure of the proposed project team including sub-contractors is presented below. The diagram also presents the proposed project steering group and a list of key stakeholder organisations we will need to work with. We will seek representatives from these organisations for our online and in-person workshops.

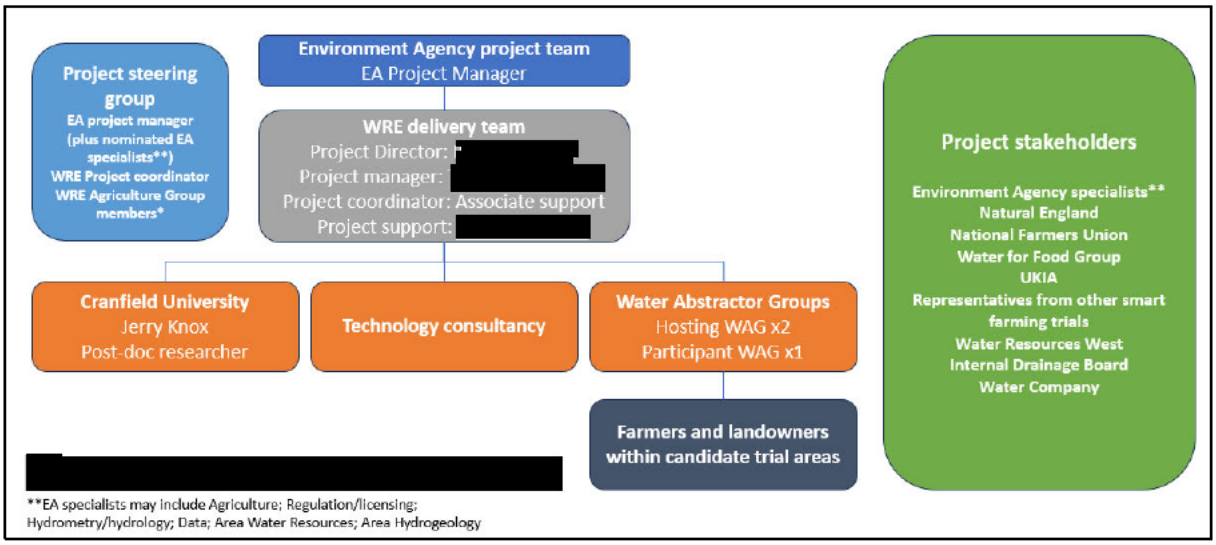

Figure 2: Project organisation chart

As per the requirements set out in the RFQ, WRE's Project Manager will meet with the Environment Agency project manager every other week for a short meeting to review progress, with an email summary submitted weekly.

For clarity, the roles of each of the sub-contractor groups is set out in the table below.

If this project is awarded to us, we will immediately move to formally engage Cranfield University and secure resources from the three WAGs.

Note that at the time of submission, we are yet to formally agree a scope and contract with a technology/instrumentation consultant. We will carry out a rapid, light touch procurement exercise for this, which will pass through WRE's contracting governance.

Organisation	**Role**
Cranfield University	Carry out initial desk-study review of past and ongoing smart farming trials in the UK and explore learning from international case studies ahead of the first online workshop. Provide expert contributions to online and in-person meetings. Review and help to shape final deliverables.
Technology/ instrumentation consultancy	Responsible for desk-based design and costing for smart farming trial (as agreed by project steering group and informed through stakeholder engagement).
Water Abstractor Groups (WAGs)	We will work with representatives from the three established WAGs in our region. Two of which will act as "hosting WAGs", directly hosting and co-facilitating an in-person workshop each. The WAGs will work with WRE's project manager and coordinator to support stakeholder identification and farmer liaison to gain buy in for a trial. The WAGs will be responsible for identifying candidate smart farming trial areas

	through engagement with their networks and by drawing them out during workshops. The WAGs will also provide expert contributions to online and in-person meetings, and review and help to shape final deliverables, ensuring that they meet the sector's needs.

Most of the project team and sub-contractor organisations are known to the Environment Agency's project team, along with their experience in working in this field. But for completeness, a short CV for [redacted] is provided as an appendix to this document.

Appendix 1 – Short CV: [redacted]

[redacted]