University of Stirling

Cottrell Building

Stirling

FK9 4LA

Attn: [redacted]

Date: 20/11/18

Our ref: FS301079

Dear Sirs,

Award of contract for the supply of FS301079 – The Screening Permits for Ingestion Pathway Radiological Assessment

Following your tender/ proposal for the supply of **FS301079 – The Screening Permits for Ingestion Pathway Radiological Assessment** to Food Standards Agency, we are pleased to award this contract to you.

This letter (Award Letter) and its Annexes set out the terms of the contract between Food Standards Agency as the Customer and University of Stirling as the Supplier for the provision of the Services. Unless the context otherwise requires, capitalised expressions used in this Award Letter have the same meanings as in the terms and conditions of contract set out in Annex 1 to this Award Letter (the "**Conditions**"). In the event of any conflict between this Award Letter and the Conditions, this Award Letter shall prevail. Please do not attach any Supplier terms and conditions to this Award Letter as they will not be accepted by the Customer and may delay the conclusion of the Agreement.

For the purposes of the Agreement, the Customer and the Supplier agree as follows:

1) The Services shall be performed at the Suppliers premises.

2) The specification of the Services to be supplied is as set out in Annex 2.

3) The Technical Proposal for the Services to be supplied is as set out in Annex 3.

4) The Financial Proposal (Cost) of the Services to be supplied is as set out in Annex 4.

5) The Term shall commence on 1st November 2018 and the Expiry Date shall be 31st March 2019.

6) The address for notices of the Parties are:

Customer	**Supplier**
Food Standards Agency. Foss House, Peasholme Green, York	University of Stirling. Cottrell Building, Stirling.

7) The following persons are Key Personnel for the purposes of the Agreement:

Name	**Title**
[redacted]	University of Stirling
[redacted]	Project Officer – Food Standards Agency

8) For the purposes of the Agreement the [Staff Vetting Procedures/data security requirements/equality and diversity policy/ environmental policy are at: https://www.food.gov.uk/

9) The Customer may require the Supplier to ensure that any person employed in the provision of the Services has undertaken a Disclosure and Barring Service check. The Supplier shall ensure that no person who discloses that he/she has a conviction that is relevant to the nature of the Services, relevant to the work of the Customer, or is of a type otherwise advised by the Customer (each such conviction a "**Relevant Conviction**"), or is found by the Supplier to have a Relevant Conviction (whether as a result of a police check, a Disclosure and Barring Service check or otherwise) is employed or engaged in the provision of any part of the Services.

Payment

All invoices must be sent, quoting a valid purchase order number (PO Number), to: accounts-payable.def@sscl.gse.gov.uk. Within [10] working days of receipt of your countersigned copy of this letter, we will send you a unique PO Number. You must be in receipt of a valid PO Number before submitting an invoice.

To avoid delay in payment it is important that the invoice is compliant and that it includes a valid PO Number, PO Number item number (if applicable) and the details (name and telephone number) of your Customer contact (i.e. Contract Manager). Non-compliant invoices will be sent back to you, which may lead to a delay in payment. If you have a query regarding an outstanding payment please contact our Accounts Payable section either by email to accounts-payable.def@sscl.gse.gov.uk.

Liaison

For general liaison your contact will continue to be [redacted].

We thank you for your co-operation to date and look forward to forging a successful working relationship resulting in a smooth and successful delivery of the Services. Please confirm your acceptance of the award of this contract by signing and returning the enclosed copy of this letter to me at the above address **within 7** days from the date of this letter. No other form of acknowledgement will be accepted. Please remember to quote the reference number above in any future communications relating to this contract.

Yours faithfully,

[redacted]

Procurement Category Manager

Signed for and on behalf of Food Standards Agency

Name: [redacted]
Job Title: Procurement Category Manager

Signature:

Date: 17/12/18

We accept the terms set out in this letter and its **Annexes**, including the Conditions.

Signed for and on behalf of University of Stirling

Name: [redacted]

Job Title: Head of Research Funding and Performance

Signature: Date: 30th November 2018

Annex 1 - Terms and Conditions of Contract for Services

1 Interpretation

1.1 In these terms and conditions:

"Agreement"	means the contract between (i) the Customer acting as part of the Crown and (ii) the Supplier constituted by the Supplier's countersignature of the Award Letter and includes the Award Letter and Annexes;
"Award Letter"	means the letter from the Customer to the Supplier printed above these terms and conditions;
"Central Government Body"	means a body listed in one of the following sub-categories of the Central Government classification of the Public Sector Classification Guide, as published and amended from time to time by the Office for National Statistics: (a) Government Department; (b) Non-Departmental Public Body or Assembly Sponsored Public Body (advisory, executive, or tribunal); (c) Non-Ministerial Department; or (d) Executive Agency;
"Charges"	means the charges for the Services as specified in the Award Letter;
"Confidential Information"	means all information, whether written or oral (however recorded), provided by the disclosing Party to the receiving Party and which (i) is known by the receiving Party to be confidential; (ii) is marked as or stated to be confidential; or (iii) ought reasonably to be considered by the receiving Party to be confidential;
"Supplier Personnel"	means all directors, officers, employees, agents, consultants and Suppliers of the Supplier and/or of any Sub-Supplier engaged in the performance of its obligations under this Agreement;
"Controller, Processor, Data Subject, Personal Data, Personal Data Breach, Data Protection Officer"	take the meaning given in the GDPR;
"Customer"	means the person named as Customer in the Award Letter;
"DPA"	means the Data Protection Act 1998;
"DPA 2018"	means Data Protection Act 2018
"Data Loss Event"	means any event that results, or may result, in unauthorised access to Personal Data held by the Processor under this Agreement, and/or actual or potential loss and/or destruction of Personal Data in breach of this Agreement, including any

"Data Protection Personal Data Breach;	
"Data Protection Impact Assessment"	means an assessment by the Controller of the impact of the envisaged processing on the protection of Personal Data;
"Data Protection Legislation"	means (i) the GDPR, the LED and any applicable national implementing Laws as amended from time to time (ii) the DPA 2018 to the extent that it relates to processing of personal data and privacy; (iiii) all applicable Law about the processing of personal data and privacy;
"Data Subject Access Request"	means a request made by, or on behalf of, a Data Subject in accordance with rights granted pursuant to the Data Protection Legislation to access their Personal Data;
"Expiry Date"	means the date for expiry of the Agreement as set out in the Award Letter;
"FOIA"	means the Freedom of Information Act 2000;
"GDPR"	means the General Data Protection Regulation (Regulation (EU) 2016/679);
"Information"	has the meaning given under section 84 of the FOIA;
"Joint Controllers"	where two or more Controllers jointly determine the purposes and means of processing
"Key Personnel"	means any persons specified as such in the Award Letter or otherwise notified as such by the Customer to the Supplier in writing;
"Law"	means any law, subordinate legislation within the meaning of Section 21(1) of the Interpretation Act 1978, bye-law, enforceable right within the meaning of Section 2 of the European Communities Act 1972, regulation, order, regulatory policy, mandatory guidance or code of practice, judgment of a relevant court of law, or directives or requirements with which the Supplier is bound to comply;
"LED"	means Law Enforcement Directive (Directive (EU) 2016/680);
"Party"	means a Party to this Agreement;
"Personal Data"	means personal data (as defined in the DPA) which is processed by the Supplier or any Staff on behalf of the Customer pursuant to or in connection with this Agreement;
Processor Personnel:	means all directors, officers, employees, agents, consultants and contractors of the Processor and/or of any Sub-Processor engaged in the performance of its obligations under this Agreement
"Protective Measures"	means appropriate technical and organisational measures which may include: pseudonymising and encrypting Personal Data, ensuring confidentiality, integrity, availability and resilience of systems and services, ensuring that availability of and access to Personal Data can be restored in a timely manner after an incident, and regularly assessing and evaluating the effectiveness of the such measures adopted by it including those outlined in Schedule A;
"Purchase Order Number"	means the Customer's unique number relating to the supply of the Services;
"Request for Information"	has the meaning set out in the FOIA or the Environmental Information Regulations 2004 as relevant (where the meaning set out for the term "request" shall apply);
"Services"	means the services to be supplied by the Supplier to the Customer under the

	Agreement;
"Specification"	means the specification for the Services (including as to quantity, description and quality) as specified in the Award Letter;
"Staff"	means all directors, officers, employees, agents, consultants and Suppliers of the Supplier and/or of any sub-Supplier of the Supplier engaged in the performance of the Supplier's obligations under the Agreement;
"Staff Vetting Procedures"	means vetting procedures that accord with good industry practice or, where requested by the Customer, the Customer's procedures for the vetting of personnel as provided to the Supplier from time to time;
"Sub-processor"	means any third Party appointed to process Personal Data on behalf of the Processor related to this Agreement;
"Supplier"	means the person named as Supplier in the Award Letter;
"Term"	means the period from the start date of the Agreement set out in the Award Letter to the Expiry Date as such period may be extended in accordance with clause 4.2 or terminated in accordance with the terms and conditions of the Agreement;
"VAT"	means value added tax in accordance with the provisions of the Value Added Tax Act 1994; and
"Working Day"	means a day (other than a Saturday or Sunday) on which banks are open for business in the City of London.

1.2 In these terms and conditions, unless the context otherwise requires:

1.2.1 references to numbered clauses are references to the relevant clause in these terms and conditions;

1.2.2 any obligation on any Party not to do or omit to do anything shall include an obligation not to allow that thing to be done or omitted to be done;

1.2.3 the headings to the clauses of these terms and conditions are for information only and do not affect the interpretation of the Agreement;

1.2.4 any reference to an enactment includes reference to that enactment as amended or replaced from time to time and to any subordinate legislation or byelaw made under that enactment; and

1.2.5 the word 'including' shall be understood as meaning 'including without limitation'.

2 Basis of Agreement

2.1 The Award Letter constitutes an offer by the Customer to purchase the Services subject to and in accordance with the terms and conditions of the Agreement.

2.2 The offer comprised in the Award Letter shall be deemed to be accepted by the Supplier on receipt by the Customer of a copy of the Award Letter countersigned by the Supplier within [**7**] days of the date of the Award Letter.

3 Supply of Services

3.1 In consideration of the Customer's agreement to pay the Charges, the Supplier shall supply the Services to the Customer for the Term subject to and in accordance with the terms and conditions of the Agreement.

3.2 In supplying the Services, the Supplier shall:

3.2.1 co-operate with the Customer in all matters relating to the Services and comply with all the Customer's instructions;

3.2.2 perform the Services with all reasonable care, skill and diligence in accordance with good industry

practice in the Supplier's industry, profession or trade;

3.2.3 use Staff who are suitably skilled and experienced to perform tasks assigned to them, and in sufficient number to ensure that the Supplier's obligations are fulfilled in accordance with the Agreement;

3.2.4 ensure that the Services shall conform with all descriptions and specifications set out in the Specification;

3.2.5 comply with all applicable laws; and

3.2.6 provide all equipment, tools and vehicles and other items as are required to provide the Services.

3.3 The Customer may by written notice to the Supplier at any time request a variation to the scope of the Services. In the event that the Supplier agrees to any variation to the scope of the Services, the Charges shall be subject to fair and reasonable adjustment to be agreed in writing between the Customer and the Supplier.

4 Term

4.1 The Agreement shall take effect on the date specified in Award Letter and shall expire on the Expiry Date, unless it is otherwise extended in accordance with clause 4.2 or terminated in accordance with the terms and conditions of the Agreement.

4.2 The Customer may extend the Agreement for a period of up to 6 months by giving not less than 10 Working Days' notice in writing to the Supplier prior to the Expiry Date. The terms and conditions of the Agreement shall apply throughout any such extended period.

5 Charges, Payment and Recovery of Sums Due

5.1 The Charges for the Services shall be as set out in the Award Letter and shall be the full and exclusive remuneration of the Supplier in respect of the supply of the Services. Unless otherwise agreed in writing by the Customer, the Charges shall include every cost and expense of the Supplier directly or indirectly incurred in connection with the performance of the Services.

5.2 All amounts stated are exclusive of VAT which shall be charged at the prevailing rate. The Customer shall, following the receipt of a valid VAT invoice, pay to the Supplier a sum equal to the VAT chargeable in respect of the Services.

5.3 The Supplier shall invoice the Customer as specified in the Agreement. Each invoice shall include such supporting information required by the Customer to verify the accuracy of the invoice, including the relevant Purchase Order Number and a breakdown of the Services supplied in the invoice period.

5.4 In consideration of the supply of the Services by the Supplier, the Customer shall pay the Supplier the invoiced amounts no later than 30 days after verifying that the invoice is valid and undisputed and includes a valid Purchase Order Number. The Customer may, without prejudice to any other rights and remedies under the Agreement, withhold or reduce payments in the event of unsatisfactory performance.

5.5 If the Customer fails to consider and verify an invoice in a timely fashion the invoice shall be regarded as valid and undisputed for the purpose of paragraph 5.4 after a reasonable time has passed.

5.6 If there is a dispute between the Parties as to the amount invoiced, the Customer shall pay the undisputed amount. The Supplier shall not suspend the supply of the Services unless the Supplier is entitled to terminate the Agreement for a failure to pay undisputed sums in accordance with clause 16.4. Any disputed amounts shall be resolved through the dispute resolution procedure detailed in clause 19.

5.7 If a payment of an undisputed amount is not made by the Customer by the due date, then the Customer shall pay the Supplier interest at the interest rate specified in the Late Payment of Commercial Debts (Interest) Act 1998.

5.8 Where the Supplier enters into a sub-contract, the Supplier shall include in that sub-contract:

5.8.1 provisions having the same effects as clauses 5.3 to 5.7 of this Agreement; and

5.8.2 a provision requiring the counterparty to that sub-contract to include in any sub-contract which it awards provisions having the same effect as 5.3 to 5.8 of this Agreement.

5.8.3 In this clause 5.8, "sub-contract" means a contract between two or more suppliers, at any stage of remoteness from the Authority in a subcontracting chain, made wholly or substantially for the purpose of performing (or contributing to the performance of) the whole or any part of this Agreement.

5.9 If any sum of money is recoverable from or payable by the Supplier under the Agreement (including any sum which the Supplier is liable to pay to the Customer in respect of any breach of the Agreement), that sum may be deducted unilaterally by the Customer from any sum then due, or which may come due, to the Supplier under the Agreement or under any other agreement or contract with the Customer. The Supplier shall not be entitled to assert any credit, set-off or counterclaim against the Customer in order to justify withholding payment of any such amount in whole or in part.

6 Premises and equipment

6.1 If necessary, the Customer shall provide the Supplier with reasonable access at reasonable times to its premises for the purpose of supplying the Services. All equipment, tools and vehicles brought onto the Customer's premises by the Supplier or the Staff shall be at the Supplier's risk.

6.2 If the Supplier supplies all or any of the Services at or from the Customer's premises, on completion of the Services or termination or expiry of the Agreement (whichever is the earlier) the Supplier shall vacate the Customer's premises, remove the Supplier's plant, equipment and unused materials and all rubbish arising out of the provision of the Services and leave the Customer's premises in a clean, safe and tidy condition. The Supplier shall be solely responsible for making good any damage to the Customer's premises or any objects contained on the Customer's premises which is caused by the Supplier or any Staff, other than fair wear and tear.

6.3 If the Supplier supplies all or any of the Services at or from its premises or the premises of a third party, the Customer may, during normal business hours and on reasonable notice, inspect and examine the manner in which the relevant Services are supplied at or from the relevant premises.

6.4 The Customer shall be responsible for maintaining the security of its premises in accordance with its standard security requirements. While on the Customer's premises the Supplier shall, and shall procure that all Staff shall, comply with all the Customer's security requirements.

6.5 Where all or any of the Services are supplied from the Supplier's premises, the Supplier shall, at its own cost, comply with all security requirements specified by the Customer in writing.

6.6 Without prejudice to clause 3.2.6, any equipment provided by the Customer for the purposes of the Agreement shall remain the property of the Customer and shall be used by the Supplier and the Staff only for the purpose of carrying out the Agreement. Such equipment shall be returned promptly to the Customer on expiry or termination of the Agreement.

6.7 The Supplier shall reimburse the Customer for any loss or damage to the equipment (other than deterioration resulting from normal and proper use) caused by the Supplier or any Staff. Equipment supplied by the Customer shall be deemed to be in a good condition when received by the Supplier or relevant Staff unless the Customer is notified otherwise in writing within 5 Working Days.

7 Staff and Key Personnel

7.1 If the Customer reasonably believes that any of the Staff are unsuitable to undertake work in respect of the Agreement, it may, by giving written notice to the Supplier:

7.1.1 refuse admission to the relevant person(s) to the Customer's premises;

7.1.2 direct the Supplier to end the involvement in the provision of the Services of the relevant person(s); and/or

7.1.3 require that the Supplier replace any person removed under this clause with another suitably qualified person and procure that any security pass issued by the Customer to the person removed is surrendered,

and the Supplier shall comply with any such notice.

7.2 The Supplier shall:

7.2.1 ensure that all Staff are vetted in accordance with the Staff Vetting Procedures;

7.2.2 if requested, provide the Customer with a list of the names and addresses (and any other relevant information) of all persons who may require admission to the Customer's premises in connection with the Agreement; and

7.2.3 procure that all Staff comply with any rules, regulations and requirements reasonably specified by the Customer.

7.3 Any Key Personnel shall not be released from supplying the Services without the agreement of the Customer, except by reason of long-term sickness, maternity leave, paternity leave, termination of employment or other extenuating circumstances.

7.4 Any replacements to the Key Personnel shall be subject to the prior written agreement of the Customer (not to be unreasonably withheld). Such replacements shall be of at least equal status or of equivalent experience and skills to the Key Personnel being replaced and be suitable for the responsibilities of that person in relation to the Services.

8 Assignment and sub-contracting

8.1 The Supplier shall not without the written consent of the Customer assign, sub-contract, novate or in any way dispose of the benefit and/ or the burden of the Agreement or any part of the Agreement. The Customer may, in the granting of such consent, provide for additional terms and conditions relating to such assignment, sub-contract, novation or disposal. The Supplier shall be responsible for the acts and omissions of its sub-Suppliers as though those acts and omissions were its own.

8.2 Where the Customer has consented to the placing of sub-contracts, the Supplier shall, at the request of the Customer, send copies of each sub-contract, to the Customer as soon as is reasonably practicable.

8.3 The Customer may assign, novate, or otherwise dispose of its rights and obligations under the Agreement without the consent of the Supplier provided that such assignment, novation or disposal shall not increase the burden of the Supplier's obligations under the Agreement.

9 Intellectual Property Rights

9.1 All intellectual property rights in any materials provided by the Customer to the Supplier for the purposes of this Agreement shall remain the property of the Customer but the Customer hereby grants the Supplier a royalty-free, non-exclusive and non-transferable licence to use such materials as required until termination or expiry of the Agreement for the sole purpose of enabling the Supplier to perform its obligations under the Agreement.

9.2 All intellectual property rights in any materials created or developed by the Supplier pursuant to the Agreement or arising as a result of the provision of the Services shall vest in the Supplier. If, and to the extent, that any intellectual property rights in such materials vest in the Customer by operation of law, the Customer hereby assigns to the Supplier by way of a present assignment of future rights that shall take place immediately on the coming into existence of any such intellectual property rights all its intellectual property rights in such materials (with full title guarantee and free from all third party rights).

9.3 The Supplier hereby grants the Customer:

9.3.1 a perpetual, royalty-free, irrevocable, non-exclusive licence (with a right to sub-license) to use all intellectual property rights in the materials created or developed pursuant to the Agreement and any intellectual property rights arising as a result of the provision of the Services; and

9.3.2 a perpetual, royalty-free, irrevocable and non-exclusive licence (with a right to sub-license) to use:

(a) any intellectual property rights vested in or licensed to the Supplier on the date of the Agreement; and

(b) any intellectual property rights created during the Term but which are neither created or developed pursuant to the Agreement nor arise as a result of the provision of the Services,

including any modifications to or derivative versions of any such intellectual property rights, which the Customer reasonably requires in order to exercise its rights and take the benefit of the Agreement including the Services provided.

9.4 The Supplier shall indemnify, and keep indemnified, the Customer in full against all costs, expenses, damages and losses (whether direct or indirect), including any interest, penalties, and reasonable legal and other professional fees awarded against or incurred or paid by the Customer as a result of or in connection with any claim made against the Customer for actual or alleged infringement of a third party's intellectual property arising out of, or in connection with, the supply or use of the Services, to the extent that the claim is attributable to the acts or omission of the Supplier or any Staff.

10 Governance and Records

10.1 The Supplier shall:

10.1.1 attend progress meetings with the Customer at the frequency and times specified by the Customer and shall ensure that its representatives are suitably qualified to attend such meetings; and

10.1.2 submit progress reports to the Customer at the times and in the format specified by the Customer.

10.2 The Supplier shall keep and maintain until 6 years after the end of the Agreement, or as long a period as may be agreed between the Parties, full and accurate records of the Agreement including the Services supplied under it and all payments made by the Customer. The Supplier shall on request afford the Customer or the Customer's representatives such access to those records as may be reasonably requested by the Customer in connection with the Agreement.

11 Confidentiality, Transparency and Publicity

11.1 Subject to clause 11.2, each Party shall:

11.1.1 treat all Confidential Information it receives as confidential, safeguard it accordingly and not disclose it to any other person without the prior written permission of the disclosing Party; and

11.1.2 not use or exploit the disclosing Party's Confidential Information in any way except for the purposes anticipated under the Agreement.

11.2 Notwithstanding clause 11.1, a Party may disclose Confidential Information which it receives from the other Party:

11.2.1 where disclosure is required by applicable law or by a court of competent jurisdiction;

11.2.2 to its auditors or for the purposes of regulatory requirements;

11.2.3 on a confidential basis, to its professional advisers;

11.2.4 to the Serious Fraud Office where the Party has reasonable grounds to believe that the other Party is involved in activity that may constitute a criminal offence under the Bribery Act 2010;

11.2.5 where the receiving Party is the Supplier, to the Staff on a need to know basis to enable performance of the Supplier's obligations under the Agreement provided that the Supplier shall procure that any Staff to whom it discloses Confidential Information pursuant to this clause 11.2.5 shall observe the Supplier's confidentiality obligations under the Agreement; and

11.2.6 where the receiving Party is the Customer:

(a) on a confidential basis to the employees, agents, consultants and Suppliers of the Customer;

(b) on a confidential basis to any other Central Government Body, any successor body to a Central Government Body or any company to which the Customer transfers or proposes to transfer all or any part of its business;

(c) to the extent that the Customer (acting reasonably) deems disclosure necessary or appropriate in the course of carrying out its public functions; or

(d) in accordance with clause 12.

and for the purposes of the foregoing, references to disclosure on a confidential basis shall mean disclosure subject to a confidentiality agreement or arrangement containing terms no less stringent than those placed on the Customer under this clause 11.

11.3 The Parties acknowledge that, except for any information which is exempt from disclosure in accordance with the provisions of the FOIA, the content of the Agreement is not Confidential Information and the Supplier hereby gives its consent for the Customer to publish this Agreement in its entirety to the general public (but with any information that is exempt from disclosure in accordance with the FOIA redacted) including any changes to the Agreement agreed from time to time. The Customer may consult with the Supplier to inform its decision regarding any redactions but shall have the final decision in its absolute discretion whether any of the content of the Agreement is exempt from disclosure in accordance with the provisions of the FOIA.

11.4 The Supplier shall not, and shall take reasonable steps to ensure that the Staff shall not, make any press announcement or publicise the Agreement or any part of the Agreement in any way, except with the prior written consent of the Customer.

12 Freedom of Information

12.1 The Supplier acknowledges that the Customer is subject to the requirements of the FOIA and the Environmental Information Regulations 2004 and shall:

12.1.1 provide all necessary assistance and cooperation as reasonably requested by the Customer to enable the Customer to comply with its obligations under the FOIA and the Environmental Information Regulations 2004;

12.1.2 transfer to the Customer all Requests for Information relating to this Agreement that it receives as soon as practicable and in any event within 2 Working Days of receipt;

12.1.3 provide the Customer with a copy of all Information belonging to the Customer requested in the Request for Information which is in its possession or control in the form that the Customer requires within 5 Working Days (or such other period as the Customer may reasonably specify) of the Customer's request for such Information; and

12.1.4 not respond directly to a Request for Information unless authorised in writing to do so by the Customer.

12.2 The Supplier acknowledges that the Customer may be required under the FOIA and the Environmental Information Regulations 2004 to disclose Information concerning the Supplier or the Services (including commercially sensitive information) without consulting or obtaining consent from the Supplier. In these circumstances the Customer shall, in accordance with any relevant guidance issued under the FOIA, take reasonable steps, where appropriate, to give the Supplier advance notice, or failing that, to draw the disclosure to the Supplier's attention after any such disclosure.

12.3 Notwithstanding any other provision in the Agreement, the Customer shall be responsible for determining in its absolute discretion whether any Information relating to the Supplier or the Services is exempt from disclosure in accordance with the FOIA and/or the Environmental Information Regulations 2004.

13 Data Protection

13.1 The Parties acknowledge that for the purposes of the Data Protection Legislation, the Customer is the Controller and the Contractor is the Processor unless otherwise specified in Schedule A. The only processing that the Processor is authorised to do is listed in Schedule A by the Controller and may not be determined by the Processor.

13.2 The Processor shall notify the Controller immediately if it considers that any of the Controller's instructions infringe the Data Protection Legislation.

13.3 The Processor shall provide all reasonable assistance to the Controller in the preparation of any Data Protection Impact Assessment prior to commencing any processing. Such assistance may, at the discretion of the Controller, include:

(a) a systematic description of the envisaged processing operations and the purpose of the processing;

(b) an assessment of the necessity and proportionality of the processing operations in relation to the Services;

(c) an assessment of the risks to the rights and freedoms of Data Subjects; and

(d) the measures envisaged to address the risks, including safeguards, security measures and mechanisms to ensure the protection of Personal Data.

13.4 The Processor shall, in relation to any Personal Data processed in connection with its obligations under this Agreement:

(a) process that Personal Data only in accordance with Schedule A, unless the Processor is required to do otherwise by Law. If it is so required the Processor shall promptly notify the Controller before processing the Personal Data unless prohibited by Law;

(b) ensure that it has in place Protective Measures, which are appropriate to protect against a Data Loss Event, which the Controller may reasonably reject (but failure to reject shall not amount to approval by the Controller of the adequacy of the Protective Measures), having taken account of the:

(i) nature of the data to be protected;

(ii) harm that might result from a Data Loss Event;

(iii) state of technological development; and

(iv) cost of implementing any measures;

(c) ensure that:

(i) the Processor Personnel do not process Personal Data except in accordance with this Agreement (and in particular Schedule A);

(ii) it takes all reasonable steps to ensure the reliability and integrity of any Processor Personnel who have access to the Personal Data and ensure that they:

(A) are aware of and comply with the Processor's duties under this clause;

(B) are subject to appropriate confidentiality undertakings with the Processor or any Sub-processor;

(C) are informed of the confidential nature of the Personal Data and do not publish, disclose or divulge any of the Personal Data to any third Party unless directed in writing to do so by the Controller or as otherwise permitted by this Agreement; and

(D) have undergone adequate training in the use, care, protection and handling of Personal Data; and

(d) not transfer Personal Data outside of the EU unless the prior written consent of the Controller has been obtained and the following conditions are fulfilled:

(i) the Controller or the Processor has provided appropriate safeguards in relation to the transfer (whether in accordance with GDPR Article 46 or LED Article 37) as determined by the Controller;

(ii) the Data Subject has enforceable rights and effective legal remedies;

(iii) the Processor complies with its obligations under the Data Protection Legislation by providing an adequate level of protection to any Personal Data that is transferred (or, if it is not so bound, uses its best endeavours to assist the Controller in meeting its obligations); and

(iv) the Processor complies with any reasonable instructions notified to it in advance by the Controller with respect to the processing of the Personal Data;

(e) at the written direction of the Controller, delete or return Personal Data (and any copies of it) to the Controller on termination of the Agreement unless the Processor is required by Law to retain the Personal Data.

13.5 Subject to clause 1.6, the Processor shall notify the Controller immediately if it:

(a) receives a Data Subject Request (or purported Data Subject Request);

(b) receives a request to rectify, block or erase any Personal Data;

(c) receives any other request, complaint or communication relating to either Party's obligations under the Data Protection Legislation;

(d) receives any communication from the Information Commissioner or any other regulatory authority in connection with Personal Data processed under this Agreement;

(e) receives a request from any third Party for disclosure of Personal Data where compliance with such request is required or purported to be required by Law; or

(f) becomes aware of a Data Loss Event.

13.6 The Processor's obligation to notify under clause 1.5 shall include the provision of further information to the Controller in phases, as details become available.

13.7 Taking into account the nature of the processing, the Processor shall provide the Controller with full assistance in relation to either Party's obligations under Data Protection Legislation and any complaint, communication or request made under clause 1.5 (and insofar as possible within the timescales reasonably required by the Controller) including by promptly providing:

(a) the Controller with full details and copies of the complaint, communication or request;

(b) such assistance as is reasonably requested by the Controller to enable the Controller to comply with a Data Subject Request within the relevant timescales set out in the Data Protection Legislation;

(c) the Controller, at its request, with any Personal Data it holds in relation to a Data Subject;

(d) assistance as requested by the Controller following any Data Loss Event;

(e) assistance as requested by the Controller with respect to any request from the Information Commissioner's Office, or any consultation by the Controller with the Information Commissioner's Office.

13.8 The Processor shall maintain complete and accurate records and information to demonstrate its compliance with this clause. This requirement does not apply where the Processor employs fewer than 250 staff, unless:

(a) the Controller determines that the processing is not occasional;

(b) the Controller determines the processing includes special categories of data as referred to in Article 9(1) of the GDPR or Personal Data relating to criminal convictions and offences referred to in Article 10 of the GDPR; or

(c) the Controller determines that the processing is likely to result in a risk to the rights and freedoms of Data Subjects.

13.9 The Processor shall allow for audits of its Data Processing activity by the Controller or the Controller's designated auditor.

13.10 Each Party shall designate its own data protection officer if required by the Data Protection Legislation.

13.11 Before allowing any Sub-processor to process any Personal Data related to this Agreement, the Processor must:

(a) notify the Controller in writing of the intended Sub-processor and processing;

(b) obtain the written consent of the Controller;

(c) enter into a written agreement with the Sub-processor which give effect to the terms set out in this clause [X] such that they apply to the Sub-processor; and

(d) provide the Controller with such information regarding the Sub-processor as the Controller may reasonably require.

13.12 The Processor shall remain fully liable for all acts or omissions of any of its Sub-processors.

13.13 The Controller may, at any time on not less than 30 Working Days' notice, revise this clause by replacing it with any applicable controller to processor standard clauses or similar terms forming part of an applicable certification scheme (which shall apply when incorporated by attachment to this Agreement).

13.14 The Parties agree to take account of any guidance issued by the Information Commissioner's Office. The Controller may on not less than 30 Working Days' notice to the Processor amend this agreement to ensure that it complies with any guidance issued by the Information Commissioner's Office.

13.15 Where the Parties include two or more Joint Controllers as identified in Schedule [X] in accordance with GDPR Article 26, those Parties shall enter into a Joint Controller Agreement based on the terms outlined in Schedule [Y] in replacement of Clauses 1.1-1.14 for the Personal Data under Joint Control.

14 Liability

14.1 The Supplier shall not be responsible for any injury, loss, damage, cost or expense suffered by the Customer if and to the extent that it is caused by the negligence or wilful misconduct of the Customer or by breach by the Customer of its obligations under the Agreement.

14.2 Subject always to clauses 14.3 and 14.4:

14.2.1 the aggregate liability of the Supplier in respect of all defaults, claims, losses or damages howsoever caused, whether arising from breach of the Agreement, the supply or failure to supply of the Services, misrepresentation (whether tortuous or statutory), tort (including negligence), breach of statutory duty or otherwise shall in no event exceed a sum equal to 125% of the Charges paid or payable to the Supplier; and

14.2.2 except in the case of claims arising under clauses 9.4 and 18.3, in no event shall the Supplier be liable to the Customer for any:

(a) loss of profits;

(b) loss of business;

(c) loss of revenue;

(d) loss of or damage to goodwill;

(e) loss of savings (whether anticipated or otherwise); and/or

(f) any indirect, special or consequential loss or damage.

14.3 Nothing in the Agreement shall be construed to limit or exclude either Party's liability for:

14.3.1 death or personal injury caused by its negligence or that of its Staff;

14.3.2 fraud or fraudulent misrepresentation by it or that of its Staff; or

14.3.3 any other matter which, by law, may not be excluded or limited.

14.4 The Supplier’s liability under the indemnity in clause 9.4 and 18.3 shall be unlimited.

15 Force Majeure

Neither Party shall have any liability under or be deemed to be in breach of the Agreement for any delays or failures in performance of the Agreement which result from circumstances beyond the reasonable control of the Party affected. Each Party shall promptly notify the other Party in writing when such circumstances cause a delay or failure in performance and when they cease to do so. If such circumstances continue for a continuous period of more than two months, either Party may terminate the Agreement by written notice to the other Party.

16 Termination

16.1 The Customer may terminate the Agreement at any time by notice in writing to the Supplier to take effect on any date falling at least 1 month (or, if the Agreement is less than 3 months in duration, at least 10 Working Days) later than the date of service of the relevant notice.

16.2 Without prejudice to any other right or remedy it might have, the Customer may terminate the Agreement by written notice to the Supplier with immediate effect if the Supplier:

16.2.1 (without prejudice to clause 16.2.5), is in material breach of any obligation under the Agreement which is not capable of remedy;

16.2.2 repeatedly breaches any of the terms and conditions of the Agreement in such a manner as to reasonably justify the opinion that its conduct is inconsistent with it having the intention or ability to give effect to the terms and conditions of the Agreement;

16.2.3 is in material breach of any obligation which is capable of remedy, and that breach is not remedied within 30 days of the Supplier receiving notice specifying the breach and requiring it to be remedied;

16.2.4 undergoes a change of control within the meaning of section 416 of the Income and Corporation Taxes Act 1988;

16.2.5 breaches any of the provisions of clauses 7.2, 11, 12, **Error! Reference source not found.** and 17;

16.2.6 becomes insolvent, or if an order is made or a resolution is passed for the winding up of the Supplier (other than voluntarily for the purpose of solvent amalgamation or reconstruction), or if an administrator or administrative receiver is appointed in respect of the whole or any part of the Supplier's assets or business, or if the Supplier makes any composition with its creditors or takes or suffers any similar or analogous action (to any of the actions detailed in this clause 16.2.6) in consequence of debt in any jurisdiction; or

16.2.7 fails to comply with legal obligations in the fields of environmental, social or labour law.

16.3 The Supplier shall notify the Customer as soon as practicable of any change of control as referred to in clause 16.2.4 or any potential such change of control.

16.4 The Supplier may terminate the Agreement by written notice to the Customer if the Customer has not paid any undisputed amounts within 90 days of them falling due.

16.5 Termination or expiry of the Agreement shall be without prejudice to the rights of either Party accrued prior to termination or expiry and shall not affect the continuing rights of the Parties under this clause and clauses 2, 3.2, 6.1, 6.2, 6.6, 6.7, 7, 9, 10.2, 11, 12, **Error! Reference source not found.**, 0, 16.6, 17.4, 18.3, 19 and 20.7 or any other provision of the Agreement that either expressly or by implication has effect after termination.

16.6 Upon termination or expiry of the Agreement, the Supplier shall:

16.6.1 give all reasonable assistance to the Customer and any incoming supplier of the Services; and

16.6.2 return all requested documents, information and data to the Customer as soon as reasonably practicable.

17 Compliance

17.1 The Supplier shall promptly notify the Customer of any health and safety hazards which may arise in connection with the performance of its obligations under the Agreement. The Customer shall promptly notify the Supplier of any health and safety hazards which may exist or arise at the Customer's premises and which may affect the Supplier in the performance of its obligations under the Agreement.

17.2 The Supplier shall:

17.2.1 comply with all the Customer's health and safety measures while on the Customer's premises; and

17.2.2 notify the Customer immediately in the event of any incident occurring in the performance of its obligations under the Agreement on the Customer's premises where that incident causes any personal injury or damage to property which could give rise to personal injury.

17.3 The Supplier shall:

17.3.1 perform its obligations under the Agreement in accordance with all applicable equality Law and the Customer's equality and diversity policy as provided to the Supplier from time to time; and

17.3.2 take all reasonable steps to secure the observance of clause 17.3.1 by all Staff.

17.4 The Supplier shall supply the Services in accordance with the Customer's environmental policy as provided to the Supplier from time to time.

17.5 The Supplier shall comply with, and shall ensure that its Staff shall comply with, the provisions of:

17.5.1 the Official Secrets Acts 1911 to 1989; and

17.5.2 section 182 of the Finance Act 1989.

18 Prevention of Fraud and Corruption

18.1 The Supplier shall not offer, give, or agree to give anything, to any person an inducement or reward for doing, refraining from doing, or for having done or refrained from doing, any act in relation to the obtaining or execution of the Agreement or for showing or refraining from showing favour or disfavour to any person in relation to the Agreement.

18.2 The Supplier shall take all reasonable steps, in accordance with good industry practice, to prevent fraud by the Staff and the Supplier (including its shareholders, members and directors) in connection with the Agreement and shall notify the Customer immediately if it has reason to suspect that any fraud has occurred or is occurring or is likely to occur.

18.3 If the Supplier or the Staff engages in conduct prohibited by clause 18.1 or commits fraud in relation to the Agreement or any other contract with the Crown (including the Customer) the Customer may:

18.3.1 terminate the Agreement and recover from the Supplier the amount of any loss suffered by the Customer resulting from the termination, including the cost reasonably incurred by the Customer of making other arrangements for the supply of the Services and any additional expenditure incurred by the Customer throughout the remainder of the Agreement; or

18.3.2 recover in full from the Supplier any other loss sustained by the Customer in consequence of any breach of this clause.

19 Dispute Resolution

19.1 The Parties shall attempt in good faith to negotiate a settlement to any dispute between them arising out of or in connection with the Agreement and such efforts shall involve the escalation of the dispute to an appropriately senior representative of each Party.

19.2 If the dispute cannot be resolved by the Parties within one month of being escalated as referred to in clause 19.1, the dispute may by agreement between the Parties be referred to a neutral adviser or mediator (the "**Mediator**") chosen by agreement between the Parties. All negotiations connected with the dispute shall be conducted in confidence and without prejudice to the rights of the Parties in any further proceedings.

19.3 If the Parties fail to appoint a Mediator within one month, or fail to enter into a written agreement resolving the dispute within one month of the Mediator being appointed, either Party may exercise any remedy it has under applicable law.

20 General

20.1 Each of the Parties represents and warrants to the other that it has full capacity and authority, and all necessary consents, licences and permissions to enter into and perform its obligations under the Agreement, and that the Agreement is executed by its duly authorised representative.

20.2 A person who is not a party to the Agreement shall have no right to enforce any of its provisions which, expressly or by implication, confer a benefit on him, without the prior written agreement of the Parties.

20.3 The Agreement cannot be varied except in writing signed by a duly authorised representative of both the Parties.

20.4 The Agreement contains the whole agreement between the Parties and supersedes and replaces any prior written or oral agreements, representations or understandings between them. The Parties confirm that they have not entered into the Agreement on the basis of any representation that is not expressly incorporated into the Agreement. Nothing in this clause shall exclude liability for fraud or fraudulent misrepresentation.

20.5 Any waiver or relaxation either partly, or wholly of any of the terms and conditions of the Agreement shall be

valid only if it is communicated to the other Party in writing and expressly stated to be a waiver. A waiver of any right or remedy arising from a breach of contract shall not constitute a waiver of any right or remedy arising from any other breach of the Agreement.

20.6 The Agreement shall not constitute or imply any partnership, joint venture, agency, fiduciary relationship or other relationship between the Parties other than the contractual relationship expressly provided for in the Agreement. Neither Party shall have, nor represent that it has, any authority to make any commitments on the other Party's behalf.

20.7 Except as otherwise expressly provided by the Agreement, all remedies available to either Party for breach of the Agreement (whether under the Agreement, statute or common law) are cumulative and may be exercised concurrently or separately, and the exercise of one remedy shall not be deemed an election of such remedy to the exclusion of other remedies.

20.8 If any provision of the Agreement is prohibited by law or judged by a court to be unlawful, void or unenforceable, the provision shall, to the extent required, be severed from the Agreement and rendered ineffective as far as possible without modifying the remaining provisions of the Agreement, and shall not in any way affect any other circumstances of or the validity or enforcement of the Agreement.

21 Notices

21.1 Any notice to be given under the Agreement shall be in writing and may be served by personal delivery, first class recorded or, subject to clause 21.3, e-mail to the address of the relevant Party set out in the Award Letter, or such other address as that Party may from time to time notify to the other Party in accordance with this clause:

21.2 Notices served as above shall be deemed served on the Working Day of delivery provided delivery is before 5.00pm on a Working Day. Otherwise delivery shall be deemed to occur on the next Working Day. An email shall be deemed delivered when sent unless an error message is received.

21.3 Notices under clauses 15 (Force Majeure) and 16 (Termination) may be served by email only if the original notice is then sent to the recipient by personal delivery or recorded delivery in the manner set out in clause 21.1.

22 Governing Law and Jurisdiction

The validity, construction and performance of the Agreement, and all contractual and non contractual matters arising out of it, shall be governed by English law and shall be subject to the exclusive jurisdiction of the English courts to which the Parties submit.

Schedule A: Schedule of Processing, Personal Data and Data Subjects

No personal data to be processed as part of this contract

Annex 2 - Specification

Specification Reference
FS301079
Specification Title
The Screening Permits for Ingestion Pathway Radiological Assessment Impacts Tool
Contract Duration
5 months, to be delivered by 31st March 2019

THE SPECIFICATION, INCLUDING PROJECT TIMETABLE AND EVALUATION OF TENDERS

GENERAL INTRODUCTION

The Food Standards Agency is a non-ministerial government department governed by a Board appointed to act in the public interest, with the task of protecting consumers in relation to food. It is a UK-wide body with offices in London, Cardiff, Belfast and York.

The Agency is committed to openness, transparency and equality of treatment to all suppliers. As well as these principles, for science projects the final project report will be published on the Food Standards Agency website (www.food.gov.uk). For science projects we will encourage contractors to publish their work in peer reviewed scientific publications wherever possible. Also, in line with the Government's Transparency Agenda which aims to encourage more open access to data held by government, the Agency is developing a policy on the release of underpinning data from all of its science- and evidence-gathering projects. Underpinning data should also be published in an open, accessible, and re-usable format, such that the data can be made available to future researchers and the maximum benefit is derived from it. The Agency has established the key principles for release of underpinning data that will be applied to all new science- and evidence-gathering projects which we would expect contractors to comply with. These can be found at http://www.food.gov.uk/about-us/data-and-policies/underpinning-data

The main objective of the FSA in carrying out its functions is to protect public health from risks which may arise in connection with the consumption of food (including risks caused by the way in which it is produced or supplied) and otherwise to protect the interests of consumers in relation to food. This project aims to predict the effects on the food chain from radiological discharges to the environment.

A. THE SPECIFICATION

The Screening Permits for Ingestion Pathway Radiological Assessment Impacts Tool (SPIRIT) is a tool for assessing radiological dose to members of the public (and other receptors) from permitted discharges of radioactive waste.

It is used by FSA staff to determine the possible implementation of environmental permits regarding food safety. Permits authorise the release of radionuclides from institutes such as hospitals, research establishments and from the operation of and waste disposal from nuclear power plants. SPIRIT is a spreadsheet-based application in use since the agency was formed in 2000. Following recent IAEA publications of technical information on radionuclide behaviour, together with developments in environmental dispersion models on which many of the underlying calculations are based, SPIRIT needs to be reviewed and updated or replaced. Historical records of the environmental dispersion models used are unclear. A specialist contractor will therefore be engaged to identify source data/equations and the environmental dispersion models needed to complete this work and produces a working spread sheet or programme to do the assessments. All suggested sources of data/equations will need to be scientifically justified and approved by the scientific community.

The current assessment sheet needs to be updated to incorporate changes introduced in documents which succeeded the tool:

- IAEA Tec Rep 364

https://www-pub.iaea.org/mtcd/publications/pdf/trs472_web.pdf

- EC Radiation Protection 72 Methodology for assessing the radiological consequences of routine releases of radionuclides to the environment. EC Report No. EUR 15760 EN, 1995. ISSN 1018-5593.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/434637/HPA-RPD-058_June_2015.pdf

- UK Clearance Levels Report.

- Coughtrey P.J., Jackson D., Thorne M.C., Radionuclide Distribution and Transport in Terrestrial and Aquatic Ecosystems, vol.6, A.A.Balkema (Rotterdam) (Book publication).

The FSA will provide a copy of the old assessment sheet to the contractor as an example.

The contractor will devise an assessment method which will consider and improve the current method used. A brief description is below:

Dose calculation (scoping pathway approach)

The present approach calculates the dose to the representative person e.g. sewer worker, sewage plant worker, or farmer. The present sheet's possible pathways include dose from inhalation of soil, and from external exposure to soil from fish consumption.

Contribution to sewer worker dose:

When calculating the contribution to sewer workers dose from radionuclide concentrations in crude effluent, consideration is made of concentrations in sediment, dose in sewer pipe from external radiation

("line strength in sewer"), dose in sewer pipe from ingestion of sludge and dose in sewer pipe from inhalation of tritiated H2O.

These parameters as well as other factors relevant for SPIRIT.

Sewage plant workers' dose:

Calculation of the contribution to sewage plant workers dose from radionuclide concentration flowing into sewage plant includes concentration in sludge, dose at sewage plant from external radiation dose at sewage plant from ingestion of sludge dose at sewage plant from inhalation of sediment

1 BACKGROUND AND OVERALL OBJECTIVE

1.1 Background

UK environment agencies regulate the discharge of radioactive waste to the environment using permits issued under the Environmental Permitting Regulations (EPR-16). Organisations making discharge of radioactive waste must apply to the environment agencies for a permit. As part of the permit application, the applicant is required to make a radiological assessment of the impact of the discharges to human and ecosystem receptors. As part of the permit determination, environment agencies' officers will review, and in some cases further assess, to confirm the findings of the radiological assessment and under the working level agreements will ask the FSA to carry out a food chain assessment.

The environment agencies work to ensure that the permit determination process - including assessments of the radiological impacts of discharges - is efficient. The radiological assessment process is focused on the outcome of doses to the public with the recognition that radiological assessment can become complex, where there are multiple pathways and several fates for disposed radionuclides. There is a need to maintain a consistent method to allow an initial radiological assessment that is sufficiently comprehensive (addressing all the main pathways), robust, efficient and consistent. The Guidance document [Ref 1] recommends a staged process for radiological assessment with a conservative initial assessment as a first step. Where the resulting dose is sufficiently low that no further assessment is required, it is considered a sufficient approach from which to input into the permitting process or other assessment. For those situations where a conservative assessment identifies discharges that may lead to doses in excess of 0.2 mSv a year [Ref 1], a further dose assessment exercise may be required (to identify sites where discharges potentially present a greater risk). This further assessment would ensure that the detriment related to the proposed permitted discharge was assessed robustly and that the permit decision was not based on an excessively conservative assessment.

1.2 Overall Objective

The ultimate purpose of this project is to provide an up to date methodology and screening tool for radiological dose assessment. This updated version will be used in the permit determination process, in accordance with the latest science and the Guidance document: Assessment of prospective public doses from authorised discharges [Ref 1]. This will enable consistent and efficient assessments of the radiological impact of discharges permitted under EPR-16 to be made by applicants for a permit and by FSA staff.

Since 2000 the FSA has been using an Excel based spreadsheet tool to conduct the initial assessments of radiation dose for permitted discharges. The present assessment method includes a range of generic scenarios that are representative of the fates of discharged radionuclides

The objective is to produce an updated version of the SPIRIT incorporating the new dose-per-unit-release data from environmental dispersions assessment models, updates from recently published environmental transfer data and with some improved functionality to take account of current concerns such as discharges of NORM from the oil and gas industry and the use of additional radionuclides in novel medical applications.

This new assessment sheet will be the intellectual property of the FSA who may share it with the public or other government agency as it sees fit.

2 SPECIFIC OBJECTIVES

There are four main objectives to this project which aims to produce an updated version of non-nuclear site assessment for use by the FSA staff and others.

1. To conduct a review of the existing assessment sheet functionality and specification to understand what needs to be altered, updated or added in terms of radionuclides, scenarios, pathways and parameters. This will set the framework for the required updates to SPIRIT given the existing position and required additions and suggest developments in science.

2. To update/ develop a new assessment sheet taking account of updated data sources, new values, improvements in scientific understanding of the existing scenarios and adding some additional functionality.

3. To conduct a rigorous comparison of the old assessment sheet

4. Some intercomparing with the EA sheets as part of this dose assessment calculation with the new SPIRIT will need to be compared with the old (present) version, once the tool is complete and differences documented and explained (see Tasks 8 and 10).

5. To establish training and documentation of use of the spreadsheet using the examples from the dose assessment comparisons

3 TARGET AUDIENCE

The audience for this work will be risk managers and policy officers within the FSA. The updated version will be used in the assessment of permit applications, in alterations to permits and may also be used in radiological assessments for the Generic Design Assessment for new nuclear power plants as a first-tier screening method to help target a more in-depth assessment. Other situations requiring screening radiological assessments would also be possible. Other interested organisations will be those regulated under EPR 2016; PHE, NRW, SEPA and EA.

Organisations applying for permits may request use of the tool to conduct their assessments. It would comply and be consistent with current best practice to allow shared use.

4 PROGRAMME OF WORK

4.1 Main Tasks

The project comprises the following 7 tasks.

Task 1 - Review of scenarios and pathways

To undertake a full review of the pathways and scenarios used in the current version to assess nuclear sites. This current assessment sheet and the underpinning spreadsheets will be provided by the FSA manager at the start of the project. While existing scenarios may all still be required, refinements to the conceptual model would be beneficial for some and additional scenarios may need to be added e.g. for NORM discharges for onshore and offshore oil and gas. The review should suggest improvements and extensions to the existing assessment sheet both from suggestions of current users and from this review of scientific developments.

This review will consider developments in the use and disposal of radionuclides to ensure that those most appropriate are included (see Task 2). Disposals are made into the marine, river (either directly or via a sewage treatment works) and atmospheric environments, and the manner of the disposals and discharges should be considered for each.

Consideration needs to be given to any changes to legislation or best practice involving sewage treatment that may affect the fate of radionuclides. This should include options for sewage sludge treatment and disposal, in particular options for disposal that may affect the food chain (e.g. land spreading), and whether flooding events may give rise to exposures from sewage that require assessment.

Scenarios such as disposal to slow moving water bodies such as canals and exposure upstream of sewage treatment plants have been investigated by recent EA work and these should be reviewed and considered for inclusion in the tool as they will affect the food chain dose pathways that are to be assessed.

Some receiving environments have undergone change (in particular environments impacted by discharges via the sewer system). There will therefore be a requirement to determine if the modelling approach to the sewer treatment and disposal system for radionuclides, and the food chain pathways arising from sewage treatment and from irrigation of land are still valid or need to be developed further. There are reports available from the Environment Agency on outcomes of interim work including the sewer inter-comparison work reported by the National Dose Assessment Working Group (NDAWG), and various reports from MSc projects on this subject, which have already considered some aspects of radionuclide dose assessment following sewage disposal.

Onshore disposals of NORM in waste waters to sewer currently in the same way as any other discharge to sewer from other permitted sources.

Identification of parameter updates such as IAEA reference sources, dissociation constant (Kd) values and dispersion parameters should be made (see also Task 4). All proposed changes to improve the existing sheet will require justification.

Task 2 - Review of radionuclides

To undertake a review of the radionuclides that need to be included in SPRIRT and which therefore need to be modelled with FSA predictive models. This review will consider developments in the use (e.g. novel radionuclides used in hospitals and PET facilities) and disposal (e.g. sewage flow and treatment, anaerobic digesters) of radionuclides to ensure that the most appropriate radionuclides are included. This review should include NORM radionuclides for off-shore and on-shore oil and gas industry waste disposal assessments. The use of surrogate radionuclides where no pathway or dose information is available for a given radionuclide are suggested and the justifications for the use of such surrogates in the assessments should be recorded. Table 1 lists the current radionuclides with others as potential substitutions.

Task 3 - comparison with previous assessment method

It may be necessary to choose a subset of radionuclides for test in comparison with the previous method from the full number available (see table 1). The justification for the choice of test radionuclides should be provided ensuring that suitable radionuclides are chosen to cover releases to air, water and farmland via sewage and to accommodate a range of environmental behaviours.

The output of these runs should be provided as electronic and hard copy output, with all input parameters described in full. Where updated information suggests that input parameters should be altered from those used in the original assessments, then these should be justified and reported in full. As a guide, it is expected that the output of the comparison model runs should be presented as in the results tables of the original spread sheet.

It is expected that this task will involve liaison with FSA Contractors who have developed the FSA assessment models - and an examination of the published manuals - to understand how the updated model may vary from the previous version and how this may impact the re-run dose assessment calculation outputs for different scenarios.

The current spreadsheet scenarios are: -

- Release to air
- Release to sewer
- Releases to rivers,
- Release to estuary/coastal waters.

The effect of these releases will need to be considered to calculate the dose.

Also, some comparison with the EA IRAT will need to be carry out so reason for different results can be explained

Dose calculation scoping pathway approach

The present approach calculates the dose to the representative person e.g. sewer worker, sewage plant worker, or farmer. The present sheet's possible pathways include dose from inhalation of soil and from external exposure to soil from fish consumption.

But other scenarios may be included following the review of Task 1, including offshore disposal and disposal to slow moving water bodies such as lakes or canals

- Release to air – Dose per unit release for residents.
- Release to sewer – Maximum dose per unit release for sewage treatment workers (STW), farming family using sludge for land conditioning, children using water bodies close to the STW, anglers and irrigated food consumers. If release from sewage works is direct to estuary or coastal waters, then fisherman will also be included in this group.
- Releases direct to rivers, streams etc - Maximum dose per unit release for anglers and irrigated food consumers.

- Release direct to estuary/coastal waters – Fisherman.

Task 4 - Model parameterisation

To review the scientific data that has been used to underpin the expected behaviour of radionuclides in the modelling of the environments that they are discharged into and transfer through (also known as model parameterisation). This will include data describing radionuclide behaviour in:

i) Sewer transport systems (some interim work on this area has been funded by the EA and is available in MSc reports and the NDAWG sewer model comparison.

ii) Treatment at sewage works, including partitioning and removal efficiencies (An Environment Agency report of a laboratory study is available and will be provided).

iii) The environment, including: sediment dissociation constants (Kds) for the marine and freshwater environments; concentration factors (cfs) for foods in the marine and freshwater environments; transfer factors (tfs) in the terrestrial foodchain (following either atmospheric deposition, sludge application to land, or irrigation).

iv) External dose factors for nuclides for differing environments.

The final data selection should draw on the latest published science – in particular where the data has been collated and reviewed into a consensus set (e.g. IAEA publications).

A proposal for the datasets to be used will be based on this review, this should then be compared with the previous data sets used in the old assessment sheet, highlighting any significant changes and reporting the justification and reference for such changes.

Task 5 – SPIRIT design

To create the design and layout of the new assessment covering all the proposed dose assessment scenarios. The starting point should be to consider the functionality of the current sheet, but with consideration of the updates required. Flexibility should be included in the structure to allow inclusion of the impact from other pathways and to allow for future extensions to this capability. The capability to undertake assessments of multiple sources to a single receptor would be an important improvement, allowing the combined radiological effect of two or more sources to be considered in one calculational run. Unnecessary changes should be avoided and the best elements retained, taking into account simplicity, robustness, transparency, ability to update, extend FSA staff or contractors. Improvements in functionality options should be identified (the user interface) considering existing user feedback. A proposal for the future structure and layout at the end of the project should be listed.

Task 6 - Review of outcomes

A review of the proposed updates to the new assessment sheet with FSA staff who use the tool as part of their permitting work. This is to ensure that the proposed updates meet their needs prior to undertaking the full update to the new assessment sheet data and functionality. It may be appropriate to run an internal workshop or presentation with all the proposed updates outlined and discussed with FSA staff or potentially once an initial draft version of the new spread sheet has been developed. The intention is to ensure that all required updates and improvements are incorporated before time is spent on producing a finished version of the tool.

Task 7 - New assessment spreadsheets

To create a new assessment spreadsheet, most likely following the existing Excel based format. The FSA project staff will provide the existing calculation sheets on commencement of the project. The work completed previous Tasks will provide the updated input data, the list of radionuclides required, new functionality such as assessment for off-shore oil and gas permitting, and considering the user interface. Comments and issues noted in Task 8 should be addressed. Functionality testing of the new assessment sheet should be undertaken.

4.2 Meetings - Undertaking the work project.

The contractor can expect assistance from FSA assessment officer to understand the project requirements and access existing resources and information. The contractor will need to provide the name of a project manager who will take responsibility for co-ordinating requests and consultation with FSA.

Meetings are to be half days (i.e. 4 hours) and held in either the contractor's offices or the FSA or by teleconference.

4.3 Skillsets required

It is important that the contractor has expertise in radiological assessment. A good track record is required in the systematic comparison of model scenarios, inputs and outputs for different radioactivity sources, pathways and receptors. The contractor will need to have the ability to operate and understand dose assessment modelling software. The results and output of the modelling will need to be summarised in concise and clear reports, which may form the basis of future standard scenarios for assessment purposes.

Good co-ordination and liaison skills are required to project manage the work in co-operation with the FSA technical specialists and project board.

5 OUTPUTS AND DELIVERY DATES

This will be agreed with the project officer once the contact has been awarded.

6 DELIVERABLES

During the course of the project, the contractor will provide the Agency's Project Manager with scheduled progress reports:

- progress and difficulties encountered with the project;
- any proposed changes to the project;
- time spent on the project;
- details of the financial spend/invoices during the period covered;
- regular updates to workflow charts for planning and tracking purposes.

The project deliverables are expected to be:

1) A new spreadsheet assessment model in Microsoft Excel format and both a User Guide (Report Part 1) and a Guide to the Methodology (Report Part 2) reported in a similar format to the existing versions. The model is to include the radionuclides listed in Table 1.

2) A training and familiarisation seminar (½ day to 1 day)

3) The FSA will own the intellectual property right to the spreadsheet and have the right to provide this this spreadsheet to whom they see fit

7. REFERENCES

Ref 1: Environment Agency; Scottish Environment Protection Agency; Northern Ireland Environment Agency; Health Protection Agency; Food Standards Agency (2012). Principles for the Assessment of Prospective Public Doses arising from Authorised Discharges of Radioactive Waste to the Environment. https://www.gov.uk/government/publications/assessment-of-prospective-public-doses-from-authorised-discharges

Ref 2: Environment Agency (2006a). Initial radiological assessment methodology – part 1 user report. Science report SC030162/SR1 May 2006. https://www.gov.uk/government/publications/initial-radiological-assessment-methodology [Document appears to be missing from this page – it will be provided as a .pdf with the tender documents.]

Ref 3: Environment Agency (2006b). Initial radiological assessment methodology – part 2 methods and input data. Science report SC030162/SR2 May 2006. https://www.gov.uk/government/publications/initial-radiological-assessment-methodology

Ref 4: HPA-RPD-058 - The Methodology for Assessing the Radiological Consequences of Routine Releases of Radionuclides to the Environment Used in PC-CREAM 08 Parts 1 to 4.

http://webarchive.nationalarchives.gov.uk/20140714084352/http://www.hpa.org.uk/webw/HPAweb&HPAwebStandard/HPAweb_C/1257260349678?p=1197637096018

Ref 5: Environment Agency (2006c). Radiological Assessment British Energy Hinkley Point B. Authorisation Review 2005/6. National Monitoring and Assessment Technical Report, March 2006. [Provided as a .pdf with the tender document.]

See Table 1 – Radionuclides included in the current sheet

Am-241, Br-76,Br-82,C-14,Ca-45,Ce-141,Cl-36,Co-57,Co-58,Co-60,Cr-51,Cs-137,F-18,Fe-59,Ga-67,H-3 (tritium),I-123,I-125,I-131,In-111,In-113m,Mn-56,Na-22,Na-24, P-32,P-33,Pb-210,Po-210,Pu-238,Pu-239+240,Ra-226,Rb-86,Re-186,S-35,Sm-153,Se-75,Sn-117m,Sr-89,Sr-90,Tc-99,Tc-99m,Th-234,Tl-201,U-234,U-235,U-238,Y-90,Zn-65.

See Table 2 – Other radionuclides suggested for potential inclusion or for choice of appropriate surrogate

As medical science improves, new nuclides will also need to be added such as Gallium 68, Rhenium 188, Thorium 227, Germanium 68, Iron-55, Thorium 230, Thorium 232, Rubidium 81/Krypton 81Rubidium 82, Rb86, Re 186 and Sn 117m.

If the project includes any mathematical modelling, the quality assurance considerations need to include how the work will meet the standards in the Aqua Book:

https://www.gov.uk/government/publications/the-aqua-book-guidance-on-producing-quality-analysis-for-government

Will the 'Joint Code of Practice for Research' apply to your project?

https://www.gov.uk/government/publications/joint-code-of-practice-for-research-jcopr

Annex 3 – Suppliers Technical Proposal

LEAD APPLICANT'S DETAILS							
Surname	[redacted]	First Name	[redacted]	Initial	[redacted]	Title	[redacted]
Organisation	University of Stirling	Department	Biological and Environmental Sciences				
Street Address	Cottrell building						
Town/City	Stirling	Country	Scotland	Postcode	FK9 4LA		
Telephone No	[redacted]	E-mail Address	[redacted]				

Is your organisation is a **small and medium enterprise**. (EU recommendation 2003/361/EC refers http://www.hmrc.gov.uk/manuals/cirdmanual/cird92800.htm)	No			

TENDER SUMMARY

TENDER TITLE

The Screening Permits for Ingestion Pathway Radiological Assessment Impacts Tool

TENDER REFERENCE	**FS301079**		
PROPOSED START DATE	[15/10/2018]	**PROPOSED END DATE**	[31/03/2019]

1: TENDER SUMMARY AND OBJECTIVES

A. TENDER SUMMARY

Please give a brief summary of the proposed work in no more than 400 words.

The University of Stirling welcomes the opportunity to tender for research to update and improve the Food Standards Agency (FSA) SPIRIT dose assessment tool, which we understand is used to support radiological dose assessments. All work to update SPIRIT will be structured around specific tasks and our proposal outlines our approach to dealing with each task. We understand that the revised version of SPIRIT will be used to support radiological dose assessments and as such will need to be robust, fit for purpose and quality-assured through rigorous testing and intercomparisons with the old SPIRIT tool and any equivalent tools available from other regulatory organisations. Our proposal outlines how we will meet these key requirements.

Our team has extensive experience in designing and developing dose assessment tools for SEPA [redacted]

[redacted]

We have the relevant expertise and experience to support the Food Standards Agency in the redevelopment of SPIRIT and this will be achieved by completing the following tasks:

1 – Review and identify scenarios and pathways of potential exposure to ionising radiation.

2 – Review of the radionuclides that may be released to the environment and require assessment.

3 – Compare the proposed developments with previous assessment methods during a comprehensive intercomparison of the proposed SPIRIT II with other tools.

4 – Ensure that SPIRIT II is parameterised using the latest published science (e.g. IAEA publications).

5 & 7 – Design and build SPIRIT II, working with staff to ensure that the model interface is fit for purpose, practicable, useful and that the new functionality addresses the Agency's needs.

6 – Work with FSA staff to ensure that all planned changes are discussed and approved before being implemented.

8 – Provide comprehensive documentation including a user guide and outline of the methodology.

B. OBJECTIVES AND RELEVANCE OF THE PROPOSED WORK TO THE FSA TENDER REQUIREMENT

OBJECTIVES

Please detail how your proposed work can assist the agency in meeting it stated objectives and policy needs.. Please number the objectives and add a short description. Please add more lines as necessary.

OBJECTIVE NUMBER	OBJECTIVE DESCRIPTION
1	Review and identify scenarios and pathways - Requirements determined by new legislation and technical reports will be used to ensure that SPIRIT II will meet the current and near future challenges facing radiological dose assessments. This will contribute to FSA tender specific objective 1.
2	Review radionuclides - Based on the FSA identified needs and the desire for an adaptable tool, specific radionuclides for inclusion in SPIRIT II and surrogate radionuclides will be identified based on a robust science case linked to objective number 1 as the review of scenarios and pathways may also identify new radionuclides that need to be considered. A review and horizon scanning exercise will be undertaken here to consider what radionuclides may come into prominent use in the near future (for example through cancer treatments). This will contribute to FSA tender specific objective 2.
3	Update model parameters - Published science (e.g. IAEA publications) will be used to update SPIRIT II in light of the most recent scientific evaluations using for example compilations of parameters for transfer of radionuclides from food stuffs. This will include not only those radionuclides within SPIRT but also those identified in objective 2 above. This will contribute to FSA tender specific objectives 1 and 2.
4	Engage with FSA staff - to determine what functionality and user interface - to ensure that any amendments to SPIRIT - are required, agreed and fit for purpose based on the planned use of SPIRIT II. Furthermore this will be extended to include the plans for the user guide and supporting documentation to ensure that all details on the proposed changes to SPIRIT are fully documented and captured. This will contribute to FSA tender specific objectives 1, 2 and 5.

5	Design SPIRIT II - Once an understanding of the changes has been developed the implications for SPIRIT design will be considered and modifications or a new design will be produced. This will contribute to FSA tender specific objectives 2 and 5.
6	Compare SPIRIT II with previous assessment method and other assessment tools – All changes to SPIRIT will be logged, and the implications of the modifications to SPIRIT recorded and described. How SPIRIT II performs in relation to other dose assessment tools will also be captured and used as part of the quality assurance processes associated with this project. This will contribute to FSA tender specific objective 4 but also through demonstration show that the functionality meets the FSA requirements (specific objective 2).
7	Deliver SPIRIT II and associated documentation – A two part report consisting of a user guide and a guide to the methodology along with a copy of the SPIRIT II spreadsheet tool will be delivered to the FSA project manager. This will contribute to FSA tender specific objective 5. Appropriate project management will be put in place to ensure that the deliverables are provided in accordance with FSA requirements. Regular communication between the project team manager and the FSA project manager will ensure that progress is on track and any issues raised and dealt with.

2: DESCRIPTION OF APPROACH/SCOPE OF WORK

A. APPROACH/SCOPE OF WORK

Please describe how you will meet our specification and summarise how you will deliver your solution. You must explain the approach for the proposed work. Describe and justify the approach, methodology and study design, where applicable, that will be used to address the specific requirements and realise the objectives outlined above. Where relevant (e.g. for an analytical survey), please also provide details of the sampling plan

We have split the required research into seven work packages within the proposal. If the tender is successful, each work package will have an internal kick off meeting where tasks will be allocated and any issues can be identified and discussed. Work package progress will be monitored and meetings held as needed to allow findings and progress on SPIRIT II to be discussed. Completion of each work package has been marked as a delivery milestone within the proposal. The following describes each of the seven work packages in detail.

Work Package 1 – Review and identify scenarios and pathways

Identify old SPIRIT scenarios and pathways and compare them to those deemed necessary by new legislation and technical reports. Changes will be reported with justification based on best practice and will have a science case supporting them.

i. **Review of scenarios:** For the development of SPIRIT II, we will undertake a thorough review of all components of the old SPIRIT. We will review the existing scenarios with the objective to maintaining them in the tool to identify areas where the assessment for these scenarios can be improved and where any scenarios may be missing using guidance in the literature since 2000. For example, using the NDAWG guidance note 1. Based on this review, we will suggest potential new scenarios to the FSA for possible inclusion in the new SPIRIT (for example, scenarios around offshore and onshore NORM disposal that may lead to contaminated foodstuffs). This will include such things as disposals of radionuclides to landfills and then any resultant exposure through leachates from such sites and, given the increasing interest in mining old landfill sites for recyclable materials (e.g. high value metals from mobile phones), exposure scenarios such as those from digging through the landfill materials and especially in light of novel radionuclide use in the medical sector. [redacted] The key point here is to assess whether SPIRIT can demonstrate whether an assessment needs further consideration i.e. is the model fit for purpose?

i. **Review of pathways:** To review all relevant pathways we will look at:

- Internal terrestrial, which includes the consumption of locally produced meat, fruit and vegetables.

- External terrestrial, which determines the external doses from exposure to radionuclides present in the terrestrial environment as a consequence of deposition from atmospheric discharges and direct exposure through shine from on-site activities with radioactive materials.
- Internal aquatic, which includes ingestion of fish, crustacea, molluscs and inadvertent consumption of seawater.
- External aquatic, which estimates the dose from external exposure through aquatic activities (e.g. from radionuclides present in the aquatic environment (in water and sediments in saltmarshes or intertidal areas)).
- We will also compare the SPIRIT pathways and any identified additional pathways to potentially be added to SPIRIT II to National Dose Assessment Working Group (NDAWG) guidance e.g. notes 1, 3 and exposure pathways checklist.

Following this review, we will produce a proposed list of scenarios and pathways for inclusion in the SPIRIT II and whether they are adequately covered by the approach adopted in SPIRIT. We will provide justification and a science-based case to support any recommended changes. Please see below where we discuss an idea related to an optional workshop that could facilitate the process of gathering information on the scenarios, pathways and radionuclides and the initial sorting of these for consideration by the FSA.

Work Package 2 – Review radionuclides. In the tender specification, tables 1 and 2 listed the radionuclides that are currently in SPIRIT and a list of those radionuclides that should be included in SPIRIT II. We have noted these and will review how these are/can be handled within SPIRIT/SPIRIT II. As appropriate, we will make recommendations for the use of surrogate radionuclides to enable the assessment of dose to be made. This will consider such things as the potential radiological impact of the radionuclide of interest, whether suitable parameters are in existence already, what research would be needed to gather the parameters and whether this research might become available during the course of this project. The radiological significance of the radionuclides will be compared to any recommended surrogates for use in the assessments. An**y changes will be supported by a justified science case and will be agreed with the FSA project manager before moving to the next work package**. Specifically we will:

- **List of radionuclides for SPIRIT:** We will conduct a thorough revision of all radionuclides presented in *FS301079 - Specification for Radiological assessment impact tool* tables 1 and 2 for the new version of SPIRIT and inspect them in the light of any new legislation and scientific developments (e.g. new medical uses), to identify and update the list of radionuclides. In addition, we will submit to the FSA a finalised list of radionuclides with potential new inclusions of novel radionuclides that may be disposed to sewage as well as any specific NORM related radionuclides from the oil and gas industry that are not in the current SPIRIT tool. These will be checked against the list of proposed new radionuclides in Table 2 of the tender document already provided. Each proposed radionuclide will then be reviewed to check the dose coefficients, transfer data and any dose per unit release values that are needed to scale the radionuclide releases within SPIRIT or SPIRIT II.
- Should we identify that any new parameters are required (e.g. transfer data to different foodstuffs, new dose coefficients from ICRP, or other dose per unit release values for use directly in SPIRIT II), the existing and new radionuclides will be modelled with tools such as PC-CREAM 08 or PRISM while ensuring that all the inputs to these tools are updated to the latest international compilations of parameters (e.g. IAEA publications 472 and 479). These will be logged for discussion with FSA. When FSA require the radionuclides to be modified in the ways described, work package 3 will take this forward and all details will be recorded, justified, and the approach to change any SPIRIT parameters logged. Full Quality Assurance of the model parameters will be reported and new tables of parameter data will be produced as part of work package 3.
- We have been involved in determining surrogate radionuclides for use in the default parameters in tools such as the ERICA Tool for wildlife dose assessment by using information on the chemical behaviour and fate of radionuclides with similar biogeochemistry, or similar taxonomic groupings for wildlife, or based on the relative radiotoxicity (and in some cases for example U isotopes their chemical toxicity) and so have a track record of determining and justifying appropriate surrogate or analogue choices for dose assessments.
- **Produce a list of parameters for each radionuclide:** For each radionuclide we will provide a comprehensive list of parameter values and updated where significantly changed values now exist in the literature (e.g. IAEA Technical Report Series 472). We will agree on the definition of significant with the FSA before implementing it (for example, it may be defined as where a parameter change leads to an increase in the dose contribution greater than 10% from that radionuclide). For each radionuclide where parameter values cannot be identified we will use analogue radionuclide approach to provide the parameter values for inclusion in the modified SPIRIT. All choices and the rationale behind them will be clearly documented and reported to the FSA.

iii. An example of a radionuclide not in either table in the tender specification is Ra-223 which is a short lived alpha emitting radionuclide whose use in medical treatments is increasing. Being a short-lived radionuclide requires

special consideration of its behaviour in the environment. [redacted]

[redacted]

Work package 3 – Update model parameters

Using the latest published science (e.g. IAEA publications such as TRS472 and ICRP Publication 119) data sets will be gathered to underpin the expected behaviour of radionuclides in the modelling of the environments that they are discharged into and transfer through. These data sets will be agreed on with the FSA project manager.

[redacted] **Review of the new SPIRIT model parameterisation**: We will conduct a thorough review of the available scientific data relevant to all components of SPIRIT such as scenarios, radionuclides behaviour and legislation as outlined in work packages 1 and 2. Our group has extensive experience reviewing parameters against new information. [redacted]

Work packages 1, 2 and 3 represent the research and scoping stages where we will determine the data components (radionuclides, scenarios, pathways and parameters) required to build a theoretical SPIRIT II that will provide improved functionality and flexibility in the user's ability to modify input parameters. Work package 4 will be structured around a two- way dialogue with the FSA and possibly other potential users, where we will submit our findings with the aim of ensuring that our plans meet the needs of the FSA and there is agreement on the science case behind the fundamental changes.

Work package 4 – Engage with FSA staff

Engaging with FSA staff and any other interested parties as agreed with FSA (for example, previous model developers) will be on an ongoing basis throughout the project as this is seen as crucial to the success of the project in terms of delivering a suitable, flexible, robust SPIRIT II to the FSA. We will engage at key points as well where decisions need to be made on the next steps. These are identified below:

We will determine what functionality and user interface - to ensure that any amendments to SPIRIT - are required, agreed and fit for purpose based on the planned use of SPIRIT II. Furthermore, this will be extended to include the plans for the user guide and supporting documentation to ensure that all details on the proposed changes to SPIRIT are fully documented and captured.

1) To review the outcomes of work packages 1, 2 and 3 we will conduct a workshop with a focus group selected from the FSA staff members (as indicated in the tender). This will be based on firstly a short training/awareness raising session for the participants so that they can see what the proposed changes in SPIRIT II are and how they have been implemented. This will be followed by a testing group session based on some of the scenarios developed in work package 1 plus the participants own input into testing/checking of SPIRIT II using a prototype of the new tool and/or component parts to demonstrate the functionality being proposed. Finally, we would be asking the members
of this focus group to voice their opinion of the tool with the intention to identify areas where information and

functionality can be improved to offer a better service from SPIRIT and we will take these findings into account in any redesign of SPIRIT II and the final documentation.

By the conclusion of work packages 1, 2, 3 and 4 we will have a prototype of SPIRIT II that will feed into work package 5, which will produce the SPIRIT II tool.

Work package 5 – SPIRIT design

On the basis of the FSA agreed changes to be implemented in the creation of SPIRIT II the design and user interface will be evaluated so that only those changes that are essential to expand the functionality of SPIRIT are made.

1) **Layout design:** The design of SPIRIT II will be based on the current layout used in SPIRIT but will be modified to include the required updates. Our main objective would be to expand SPIRIT's analytical capabilities whilst maintaining its original format and simplicity. To ensure the SPIRIT II robustness we will be conducting a strict verification analysis of all its components, the results of which will be documented and reported to the FSA.

2) **Compatibility test:** We aim to maintain flexibility in the tool and to make it easy to update in the future. [redacted]

3) **User manual and training:** In addition to the spreadsheet tool and detailed user manual and technical reports deliverables (that will be dealt with in work package 7), we offer to provide training for FSA staff in the use of the new Tool. The workshop proposed in the FSA tender document will provide an initial opportunity for this with respect to the component parts of the SPIRIT II tool. In work package 7 we will provide an additional training session.

4) User interface:

a. Macros: [redacted] Macros can be an issue with computer firewalls and also you need to enable macros on individual computers to be able to run macros (this is not the default setting for security related issues). Furthermore, we know that when Microsoft releases new versions of Excel that macros can be disrupted usually in our experience because minor tweaks to the software have been made such as changes to colour codes etc. However, using macros can improve the user-friendliness and functionality of Excel based tools. So we will, where appropriate, discuss the use of macros with the FSA and to implement these as and if agreed. We will provide a very simple set of instructions for how to set up Excel to allow macros to run. We will also test the transfer of the tool through the FSA's firewall.

b. If macros were agreed for use, we will implement an approach whereby the macros are used in the dose assessment calculations but that, once the run has been completed, the results will be stored without the macro. This means that the results can be shared between users by email for example without fear of problems being caused by the firewalls. [redacted] Finally, we recognize the importance of maintaining macros in the modified SPIRIT especially if and when new versions of Excel are released. [redacted]

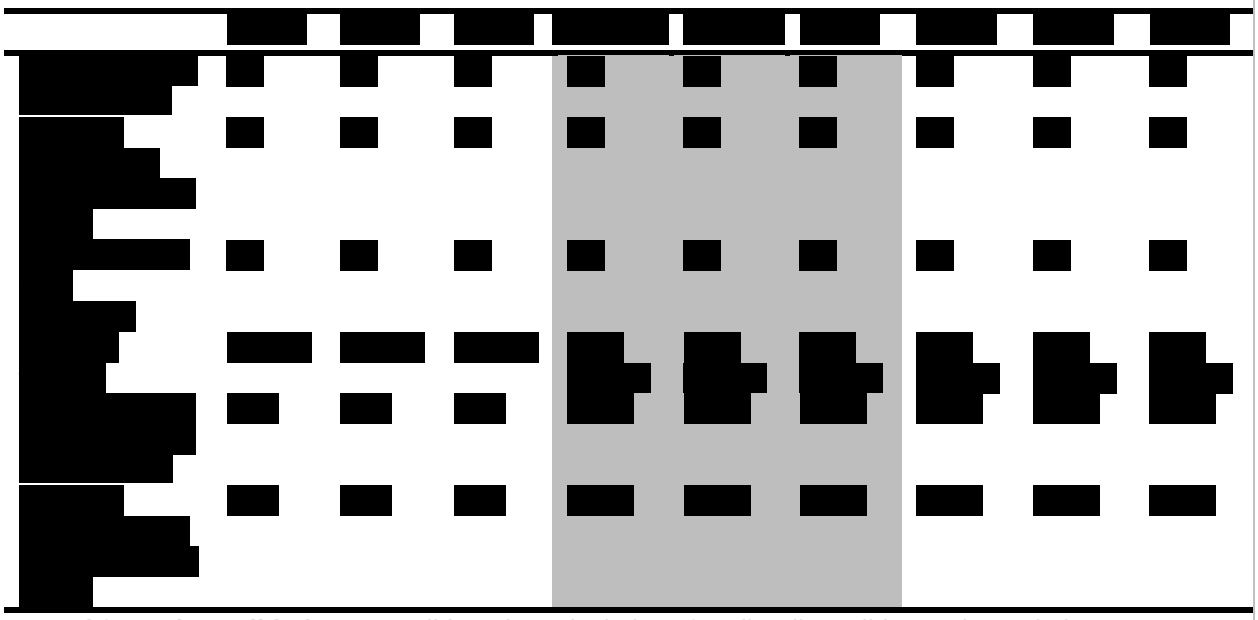
5) **Referencing:** To ensure transparency, we normally show all the parameters and calculations used within the spreadsheet tools along with the results obtained. All parameters for use in the spreadsheet modelling system will be derived from literature in the public domain (e.g. from ICRP, NRPB/HPA/PHE, EC, IAEA and EA).

By the conclusion of work packages 1,2,3,4, and 5 we will be in possession of a fully functional SPIRIT II and in work package 6 we will perform a battery of tests to determine the suitability and robustness of the SPIRIT II for use in radiological dose assessments.

Work package 6 – Compare SPIRIT II with previous assessment method and other assessment tools. Data analysis, tests and intercomparisons with other models e.g. EA IRAT will be conducted during this work package.

The first part of this work package will be a thorough and complete QA check on all the parameters and equations within the SPIRIT II using our ISO17025 quality management's verification and validation system. This will be fully documented and will check every aspect in the tool. The outputs from this QA will form part of the final reporting in work package 7.

1) **Parameters validation:** we will conduct a comparison between SPIRIT II, MRT and IRAT and any relevant PHE models, PRISM and PC Cream 08. For this we will use the same inputs and parameters in all tools. The calculations will be run 9 times using 3 different discharges at limit values and 3 sets of parameters.



2) **Calculations and formulas validation:** To validate the calculations for all radionuclides and population groups, we will include a True/False test using Excel's IF/AND function. This formula can be used to verify that each cell in SPIRIT, SPIRIT II, IRAT and MRT produce the same outputs in the testing process. The IF function in excel returns one value if the condition specified evaluates to TRUE and another value if it evaluates to FALSE. This will be an easy way to identify any potential errors.

Table S2A,02 Example of the validation True/False methodology used for MRT

	WORKER	FARMING FAMILY	CHILD PLAYING IN BURN	ANGLER	IRRIGATED FOOD CONSUMER
Tritium	TRUE	TRUE	TRUE	TRUE	TRUE
Tritium (Organically Bound)	TRUE	TRUE	TRUE	TRUE	TRUE
Carbon-11	TRUE	TRUE	TRUE	TRUE	TRUE
Carbon-14	TRUE	TRUE	TRUE	TRUE	TRUE
Fluorine-18	TRUE	TRUE	TRUE	TRUE	TRUE
Sodium-22	TRUE	TRUE	TRUE	TRUE	TRUE
Sodium-24	TRUE	TRUE	TRUE	TRUE	TRUE
Phosphorus-32	TRUE	TRUE	TRUE	TRUE	TRUE
Phosphorus-33	TRUE	TRUE	TRUE	TRUE	TRUE
Sulphur-35	TRUE	TRUE	TRUE	TRUE	TRUE
Chlorine-36	TRUE	TRUE	TRUE	TRUE	TRUE
Calcium-45	TRUE	TRUE	TRUE	TRUE	TRUE
Calcium-47	TRUE	TRUE	TRUE	TRUE	TRUE
Vanadium-48	TRUE	TRUE	TRUE	TRUE	TRUE
Chromium-51	TRUE	TRUE	TRUE	TRUE	TRUE
Manganese-52	TRUE	TRUE	TRUE	TRUE	TRUE
Manganese-54	TRUE	TRUE	TRUE	TRUE	TRUE
Manganese-56	TRUE	TRUE	TRUE	TRUE	TRUE
Iron-55	TRUE	TRUE	TRUE	TRUE	TRUE

3) **Validation report:** Wewill be presenting a report to FSA including methodology for the validation, showing that all calculations in SPIRIT II are correct in comparison [redacted] IRAT and log of all the test outputs. A summary of this report will be produced in the final project reports in work package 7.
4) **Intercomparison report:** We will provide a detailed report outlining the key differences between SPIRIT and SPIRIT II. This report will also detail any implications of the changes made to parameters for past radiological dose assessments if FSA can provide some examples of past assessments. This will help the users to understand how different the results between SPIRIT and SPIRIT II may be.

Work package 7 – Deliver SPIRIT II and associated documentation

Work package 7 will result in a two-part report consisting of a user guide and a guide to the methodology along with a copy of the SPIRIT II spreadsheet tool being delivered to the FSA project manager. Regular communication between the project team manager and the FSA project manager will ensure that progress is on track and any issues raised and dealt with. The specifics of this work package are explained below.

1) We propose to develop SPIRIT II following the existing excel format although the new version of SPIRIT may include simple macro modelling techniques in a user-friendly interface. Regardless of the use of macros, we will ensure that SPIRIT II will be compatible with all versions of Excel and Windows. [redacted]
2) We also suggest that we identify a small number of people who can act as a testing/sounding board for SPIRIT II and we propose to interact with them via email/phone to ensure that the look and feel of the new SPIRIT meets the requirements of the FSA.
3) Once finalised, we propose that the spreadsheets will be 'locked' to prevent accidental editing/change except in the cells where users may enter information. This functionality was implemented in MRT and ORT to ensure no unauthorised changes may be made to the tools. FSA staff will have the ability to unlock the tool but we recommend that the tool is used in the 'locked' version to prevent accidental editing of key equations or parameters.
4) Report writing:
    a. To provide a clear presentation for SPIRIT II, we will produce a user manual which we will use an agreed format with the FSA and that will make use of screen shots to illustrate how the tool can be used.
    b. The second report, again format and content agreed with FSA, will include:
        i. A verification report of the DPUR used in SPIRIT II
        ii. SPIRIT's component verification

iii. We will also provide a summary of the main differences between the two versions of SPIRIT and explain how they may differ in output and why.
iv. The reports will contain all the input and output values involved during the development of all tasks listed above and will be reported clearly reported.
v. A description of all scenarios, pathways, radionuclides chosen for inclusion along with their scientific justification.
vi. A description of how all scalable parameters have been obtained.
vii. We have also allowed in the costing for time to deal with any comments from the Food Standard Agency on the final reports

5) Training: a 0.5-1 day training session will also be provided to FSA staff on the use of SPIRIT II. This will focus on the user functionality and make use of some scenarios for radiological dose assessment as part of the training. [redacted]

Example references that will be drawn upon during the course of this project:

Authorisation of Discharges of Radioactive Waste to the Environment: Principles for the Assessment of Prospective Public Doses. Environment Agencies' Document, December 2002. http://www.environment-agency.gov.uk/business/ras/452235/.

Environment Agency (2012) Principles for the Assessment of Prospective Public Doses arising from Authorised Discharges of Radioactive Waste.

Environment Agency, Initial Radiological Assessment Methodology (Parts 1 and 2), Science Report SC030162/SR1 (2006).

European Commission (1995). Methodology for Assessing the Radiological Consequences of

European Commission, Basic Safety Standards, Directive 2013/59/Euratom Commission of the European Communities, Official Journal of EC, Series L, No 13/1 (2013).

European Commission, Basic Safety Standards, Directive 96/29/Euratom Commission of the European Communities, Official Journal of EC, Series L, No 159 (1996).

Health Protection Agency, HPA Advice on the Application of the ICRP's 2007 Recommendations to the UK, HPA, Chilton, (2009).

IAEA (2010) Handbook of parameter values for the prediction of radionuclide transfer in terrestrial and freshwater environments. Technical Report Series 472.

ICRP, 2006. Assessing Dose of the Representative Person for the Purpose of the Radiation Protection of the Public. ICRP Publication 101a. Ann. ICRP 36 (3).

ICRP, 2007. The 2007 Recommendations of the International Commission on Radiological Protection. ICRP Publication 103. Ann. ICRP 37 (2-4).

ICRP, 2012. Compendium of Dose Coefficients based on ICRP Publication 60. ICRP Publication 119. Ann. ICRP 41(Suppl.).

Joint Agencies (Environment Agency, SEPA, DoE NI, NRPB and FSA), Interim Guidance, Authorisation of Discharges of Radioactive Waste to the Environment.

NDAWG (2004) Radiological Assessment Exposure Pathways Checklist (Common and Unusual)

NDAWG (2008) Guidance Note 1 – overview of guidance on the assessment of radiation doses from routine discharges of radionuclides to the environment.

NDAWG (2009) Guidance Note 3 – Guidance on exposure pathways

Punt A., Millward G. and Gardner M. (2007) Radionuclide partitioning to sewage sludge – a laboratory investigation. Environment Agency Science Report SC020150/SR1

Radioactivity in Food and the Environment reports available from
http://www.food.gov.uk/science/research/radiologicalresearch/radiosurv/rife

Routine Releases of Radionuclides to the Environment. Radiation Protection 72. EUR 15760 EN.

Smith JG and Simmonds JR (2015) The methodology for assessing the radiological consequences of routine releases of radionuclides to the environment used in PC-CREAM 08. HPA-RPD-058

Smith, J G, Bedwell, P, Walsh C and Haywood, S M, (2006) A Methodology for Assessing Doses from Short-term Planned Discharges to Atmosphere, NRPB-W54, NRPB, Chilton (Issue 5, 2006).

Smith, K R and Jones A L, (2003) Generalised Habit Data for Radiological Assessments, NRPB-W41, NRPB, Chilton.

B. INNOVATION

Please provide details of any aspect of the proposed work which are considered innovative in design and/or application? E.g. Introduction of new or significant improved products, services, methods, processes, markets and forms of organization .

SPIRIT II will represent a significant update and level of innovation since the original SPIRIT tool was produced. There are new legislative requirements and recommendations in place (for example, the International Commission on Radiological Protection's Recommendations in 2007, the European Basic Safety Standards (2013) and the new Ionising Radiations Regulations (2017) and Environmental Permitting Regulations (latest update in 2016) etc.) and changes to SPIRIT may be required to meet the Food Standards Agency revised permit review process. Furthermore, there are a number of new recommendations/requirements in documents from the National Dose Assessment Working Group (NDAWG) on guidance for assessment of radiation doses from routine discharges of radionuclides to the environment, uncertainty in radiological assessments, recommendations for improvements in dose assessment models, dealing with short-term releases and use of habits data for prospective assessments. Further guidance and advice is available from ICRP, IAEA and Public Health England.

Additionally there are some significant new publications containing updated parameters for dose assessment modelling, e.g. IAEA Technical Reports Series no 472, which is a handbook of parameter values for the prediction of radionuclide transfer in terrestrial and freshwater environments, together with new compilations of dose coefficients from ICRP Publication 119 (ICRP, 2012). Other innovations include: updated clearance values and developments relating to NORM releases.

Updating SPIRIT in line with the advice/recommendations and new parameters alone will provide an updated tool that is fit for purpose for radiological assessment. Additional modifications to the functionality of the tool will also provide more flexibility and user friendliness in the use of the tool. After a quick review of the current level of functionality within SPIRIT to date, we anticipate suggesting increased functionality through, for example:

1) Allowing more flexibility for the user to modify key input parameters such as habits consumption rates for different foodstuffs.
2) Allowing selection/updating of habits information for each site under assessment or to allow use of generic UK habits data.
3) By allowing different ways for the user to view, export, or print the results of the assessments undertaken.
4) By ensuring that changes made to assessments are automatically logged so that if a user modifies an assessment all details justifying the modifications made are recorded.
5) Review and update dispersion modelling aspects (if this is included in the SPIRIT model) – although it is recognised that this may be the remit of the environment agencies rather than the Food Standards Agency.
6) Inclusion of a larger range of radionuclides within the assessment tool and potentially providing the flexibility for the FSA to add-in additional radionuclides in the future (provided the associated parameters required are known).
7) Other aspects will be discussed with FSA staff and implemented as and when agreed.

We believe that the changes recommended above will provide the Food Standards Agency with an updated, fit for purpose and robust tool for undertaking radiological risk assessments in line with statutory requirements.

References

IAEA 2010 Handbook of Parameter Values for the Prediction of Radionuclide Transfer in Terrestrial and Freshwater Environments. Technical Report Series 472.
ICRP 2012 Compendium of Dose Coefficients based on ICRP Publication 60, ICRP Publication 119, Ann. ICRP 41 (Suppl.).
NDAWG/1/2009 Short term releases to rivers.
NDAWG/2/2006 Overview of radiological assessment models – key gaps and uncertainties.
NDAWG Guidance Note 4 Guidance on considering uncertainty and variability in radiological assessments.
NDAWG Guidance Note 7 Use of habits data in prospective dose assessments.

3: THE PROJECT PLAN AND DELIVERABLES

A. THE PLAN

Please provide a detailed project plan including, the tasks and sub-tasks required to realise the objectives (detailed in Part 1). The tasks should be numbered in the same way as the objectives and should be clearly linked to each of the objectives. Please also attach a flow chart illustrating the proposed plan.

1. Review of Scenarios and Pathways
   1.1. **Component review of the original SPIRIT**. As detailed in section 2 we will undertake a thorough review of all components of SPIRIT to identify its potential for update and to build up on the existing format.

   [redacted]

   1.2. **Review of scenarios.** Based on a reviewed list of scenarios we will also suggest potential updates to be discussed with the FSA for inclusion in SPIRIT II. A detailed description of this task can be seen in section 2.

   [redacted]

   1.3. **Review of pathways.** As described in section 2 we will review all relevant pathways.

   [redacted]

   1.4. **Proposed list of scenarios.** A list of proposed scenarios will be presented to FSA for approval. The list of scenarios proposed for SPIRIT II will be built upon the existing scenarios in SPIRIT.

   [redacted]

   1.5. **Initial FSA consultation.** We do this remotely by means of a written report of the scenarios and pathways review, emails and conference call. [redacted]

   [redacted]

2. **Review of Radionuclides**
   2.1. **Review of radionuclides.** We will conduct a thorough revision of all radionuclides presented in tables 1 and 2 for the new version of SPIRIT and inspect them in the light of any new legislation and scientific developments, to identify and update the list of radionuclides. (This task will run in parallel to task 1.1)

   [redacted]

   2.2. **Proposed List of radionuclides.** We will submit to the FSA a new list of existing radionuclides and with potential new inclusions of novel radionuclides that may be disposed to sewage as well as NORM radionuclides from the oil and gas industry. A detailed approach to task this is detailed in section 2 of this tender.

   2.2.1. [redacted]

2.3. Produce a list of parameters for each radionuclide. For each radionuclide we will provide a comprehensive list of parameter values and updated where significantly changed values now exist in the literature. This list will be submitted the FSA for approval for updates.

[redacted]

3. Update model parameters

3.1. Reviewing of SPIRIT II model parameters. Wewill conduct a thorough review of the available scientific data relevant to all components of SPIRIT such as scenarios, radionuclides behaviour and legislation.

[redacted]

3.2. Additional radionuclides/surrogates. As detailed in section 2 any additional radionuclides that are added to the list for inclusion in the modified SPIRIT II not in Tables 1 and 2 already will be charge at an additional £600 per radionuclide over and above the costing provided

[redacted]

4. Engage with FSA staff

4.1. FSA consultation. An ongoing activity throw-out the project with emphasis on one or two workshops to gather information from FSA staff and to demonstrate potential developments to agree on the final SPIRIT II.

[redacted]

5. Design SPIRIT II

5.1. Layout design. Our main objective would be to expand SPIRIT's analytical capabilities whilst maintaining its original format and simplicity. To ensure the New SPIRIT robustness we will be conducting a strict verification analysis of all its components, the results of which will be reported to the FSA.

[redacted]

5.2. Compatibility test. The main objective of this task is to maintain flexibility in the tool and to make it easy to update in the future.

[redacted]

5.3. Tool functionality. As shown in section 2 we are suggesting two approaches for the functionality of SPIRIT II (The potential use of macros to be agreed with FSA)

[redacted]

5.4. User manual and training. In addition to the spreadsheet tool and detailed user manual and technical reports delivery we offer to provide training for FSA staff in the use of SPIRIT II.

[redacted]

5.4.2. [redacted]

5.5. **Review of outcomes** Once task 1 – To review the outcomes of the previous tasks we propose to conduct a second workshop with a focus group selected from the FSA staff members (as indicated in the tender).

[redacted]

6. Compare SPIRIT II with previous assessment method and other tools

6.1. Parameter validation. To validate all parameters in SPIRIT II [redacted] For this we will conduct a comparison between SPIRIT II, MRT and IRAT. A detailed validation method is presented in section 2 of this tender.

[redacted]

6.2. Calculations and formulae validation. To validate all calculations and formulas in SPIRIT II [redacted] For this we will conduct a comparison between SPIRIT II, MRT and IRAT. A detailed validation method is presented in section 2 of this tender.

[redacted]

6.2.3. **Validation report.** A report of all validation tests carried out for SPIRIT II will be submitted to FSA. This report will include show that all calculations in SPIRIT are correct in comparison with MRT and IRAT and log of all the test outputs.

[redacted]

7. Deliver SPIRIT II and associated documentation

7.1. Report writing. We will provide a clear presentation for the new SPIRIT, we will produce a series of written reports and user manuals following an agreed format with the FSA.

[redacted]

7.2. Handover agreement.

7.2.1. [redacted]

B. DELIVERABLES

Please outline the proposed project milestones and deliverables. Please provide a timetable of key dates or significant events for the project (for example fieldwork dates, dates for provision of research materials, draft and final reporting). Deliverables must be linked to the objectives.
For larger or more complex projects please insert as many deliverables /milestones as required.
Each deliverable should be:

i. no more 100 characters in length
ii. self-explanatory
iii. cross referenced with objective numbers i.e. deliverables for Objective 1 01/01, 01/02 Objective 2 02/01, 02/02 etc

Please insert additional rows to the table below as required.

A final deliverable pertaining to a retention fee of 20 % of the total value of the prosed work will automatically be calculated on the financial template.

DELIVERABLE NUMBER OR MILESTONE IN ORDER OF EXPECTED	TARGET DATE	TITLE OF DELIVERABLEOR MILESTONE
1	19/10/2018	Work package 1 progress report – deliverable for objective 01
2	26/10/2018	Work package 2 progress report – deliverable for objective 02
3	09/11/2018	Work package 3 progress report – deliverable for objective 03
4	15/03/2019	Work package 4 progress report – deliverable for objective 04
5	01/03/2019	Work package 5 progress report – deliverable for objective 05
6	06/03/2019	Work package 6 progress report – deliverable for objective 06
7	15/03/2019	New SPIRIT – deliverable for objective 07
8	15/03/2019	Report Part 1 – user guide – deliverable for objective 07
9	15/03/2019	Report Part 2 – guide to methodology – deliverable for objective 07

4: ORGANISATIONAL EXPERIENCE, EXPERTISE and STAFF EFFORT

A. PARTICIPATING ORGANISATIONS' PAST PERFORMANCE

Please provide evidence of up to three similar projects that the project lead applicant and/or members of the project team are currently undertaking or have recently completed. Please include:

- The start date (and if applicable) the end date of the project/(s)
- Name of the client who commissioned the project?
- Details of any collaborative partners and their contribution
- The value
- A brief description of the work carried out.
- How the example(s) demonstrate the relevant skills and/or expertise.
- What skills the team used to ensure the project (s) were successfully delivered.

The ERL has undertaken a considerable range of contracts over recent years, and continuously strives to bring benefit to the work undertaken, for example either directly or through the jointly supervised PhD or MSc student projects. The ERL focuses on providing bespoke products and services. Some brief examples are given below followed by three in-depth case studies of relevant and similar projects to the SPIRIT update.

Project	Description
OSPAR non-nuclear reporting for period 2015-2017	Provision of the non-nuclear reporting for OSPAR since 2015 for BEIS.
Environment Agency technical peer review	Review of the 2017 Environment Agency Habitat reports checking the data entry, assessment calculations and provision of advice on the report content.
Scales for Post-Closure Assessment Scenarios (SPACE), BIOPROTA	Development of a methodology for environmental assessments of the impact of radionuclide releases from GDFs in the post-closure phase.
Dalgety Bay – Particle dosimetry	We have undertaken both infield and laboratory dosimetry work associated with the radium contamination.
Development of dosimetric assessment tools for multiple sources entering sewers and the offshore environment	Production of dosimetric spreadsheet tools a) for multiple sources discharging into a single sewer system and b) for the offshore environment. We have developed a simple spreadsheet-screening tool, which can use the information for multiple permitted discharges and estimate doses to a number of human and wildlife receptors from the single permitted discharge as well as the cumulative impact. We are also developing a dose assessment screening tool for use in the offshore environment (most tools to date have focused on coastal, freshwater or aerial discharges only).
Transfer- Exposure – Effects (TREE) NERC funded research project	This five-year project, which commenced in October 2013 is a NERC consortium funded project of £2.5 million that aims to integrate the science needed to underpin radioactivity assessments for humans and wildlife.
Input into ICRP Committees 4 and 5	Contribution and leading on a task group to further develop guidance and advice on the international system of radiological protection by embedding environmental protection into the system.
Review of OSPAR radiological risk assessment reference criteria	On behalf of Environment Agency and DECC, ERL has been reviewing an IAEA proposal for a method to produce environmental reference criteria for use in the OSPAR risk assessments. The terms of reference were to explore the technical issues of relevance to OSPAR and to determine whether the proposed method was fit for purpose.
Participation in IAEA MODARIA programme	For the last seven years, [redacted] has participated in the IAEA MODARIA, EMRAS and EMRASII programmes, which have been designed to assess and further develop models that are used for radiological risk assessments

	for humans and non-human species. This has contributed significantly to the science underpinning these dose assessment models.
Provision of ad-hoc radiological risk assessment advice to Environment Agency and SEPA	For the past three years [redacted] has provided specialist dose and risk assessment advice to the Environment Agency and SEPA under *ad-hoc* contracts.
ARCoES	EPSRC consortium *Adaptation & Resilience of Coastal Energy Supply* (EPSRC consortium value £1.3 million), investigating the impact of contaminant release from reworked sediments along the coastline as climate change occurs
Habits Survey	Conducting habits surveys and dose assessments for nuclear licenced sites across Scotland.

Below we outline three examples of our development of radiological risk assessment tools that are of direct relevance to the research required by Food Standards Agency on SPIRIT.

Case Study 1: Offshore Radiological Assessment Tools

[redacted]

There are two variants of ORT – PORT and SORT, which address the differences in dispersion of produced waters (PORT) and scale (SORT). In both cases, the models have been based on different release scenarios e.g. continuous releases for produced waters and episodic releases for scale. Different buoyance and dispersion parameters have been used to represent the scale and produced waters.

PORT is an offshore radiological assessment tool, which calculates doses to members of the public from produced water NORM discharges released directly into the marine environment by a rig operating in Scottish offshore areas. The methodology used in the development of PORT was previously implemented in the Scottish Environment Protection Agency's Offshore Radiological Tool (ORT). ORT follows the dose per unit intake (DPUR) methodology used in the Environment Agency's Initial Radiological Assessment Tool (IRAT) (Environment Agency, 2006) and the guidance of the National Dose Assessment Work Group (NDAWG, 2013). The tool uses scenarios of a fisherman on a boat in a local compartment around the oil rig and their family, as well as a fisherman and family on the coast. Each family consists of three age groups: Adult, Child and Infant (ICRP, 1996).

PATHWAYS

PORT considers the radiation exposure resulting from the consumption of seafood (internal pathway) and from radionuclides present in the marine environment (external pathway). The tool assumes exposure to the fisherman's family from consumption of fish, molluscs and crustaceans. Within PORT, the assessor can modify the consumption rates for these food stuffs (see Fig 1).

EXPOSURE SCENARIOS

The dose assessment for the fisherman on the boat assumes that the activity concentration in the local compartment is homogenous and is used to calculate directly the external dose to the fisherman on the boat as well as to determine the uptake of the radionuclides from produced water into any fish, crustaceans or molluscs that the boat fisherman catches to calculate internal doses for the fisherman on the boat and their family.

For the fisherman on the coast, PORT uses a linear equation derived from a particle dispersion model produced by the National Oceanography Centre (NOC) (full details are given below) to predict the activity concentration of the radionuclides of interest at the coastline. The NOC model predicted the dispersion of particles from an offshore oil rig 20 km from the coastline. The linear equation used in PORT is a simplification to allow activity concentrations at different distances from the oil rig to the shore to be estimated and thus allows the offshore rig location to be moved by the assessor within PORT. The calculated activity concentrations at the coastline are used to determine the external dose and uptake of the radionuclides into any fish, crustaceans and molluscs for internal dose for the fisherman onshore and their family.

PORT allows the assessor to modify key parameters such as the local compartment size, the location of the offshore rig and the consumption rates of the fish, crustacea and molluscs. The results are then summarised (see Fig 2) to give the dose to the fisherman, adult, child and infant family members by radionuclide (and the sum of all the radionuclides). PORT also identifies the most exposed receptor in each case.

PRODUCED WATER'S MOVEMENT MODEL

A bespoke version of the National Oceanography Centre's (NOC) offshore modelling system 'POLPRED' was created to carry out the particle dispersion modelling work to simulate the movement of produced waters released into the marine environment by an offshore rig. This modelling software has the capability of simulating the movement of a particle in the water under the influence of both the tidal currents and diffusion to model the natural spread of material that may be suspended or dissolved in the water.

For this project the software was specifically modified to allow for the tracking of the release of 35,000 independent particles and for the timed release of these particles at any specified rate. This provided the ability to model both point and continuous releases during the time frame of the model runs. For this work, it was assumed that produced water releases were continuous.

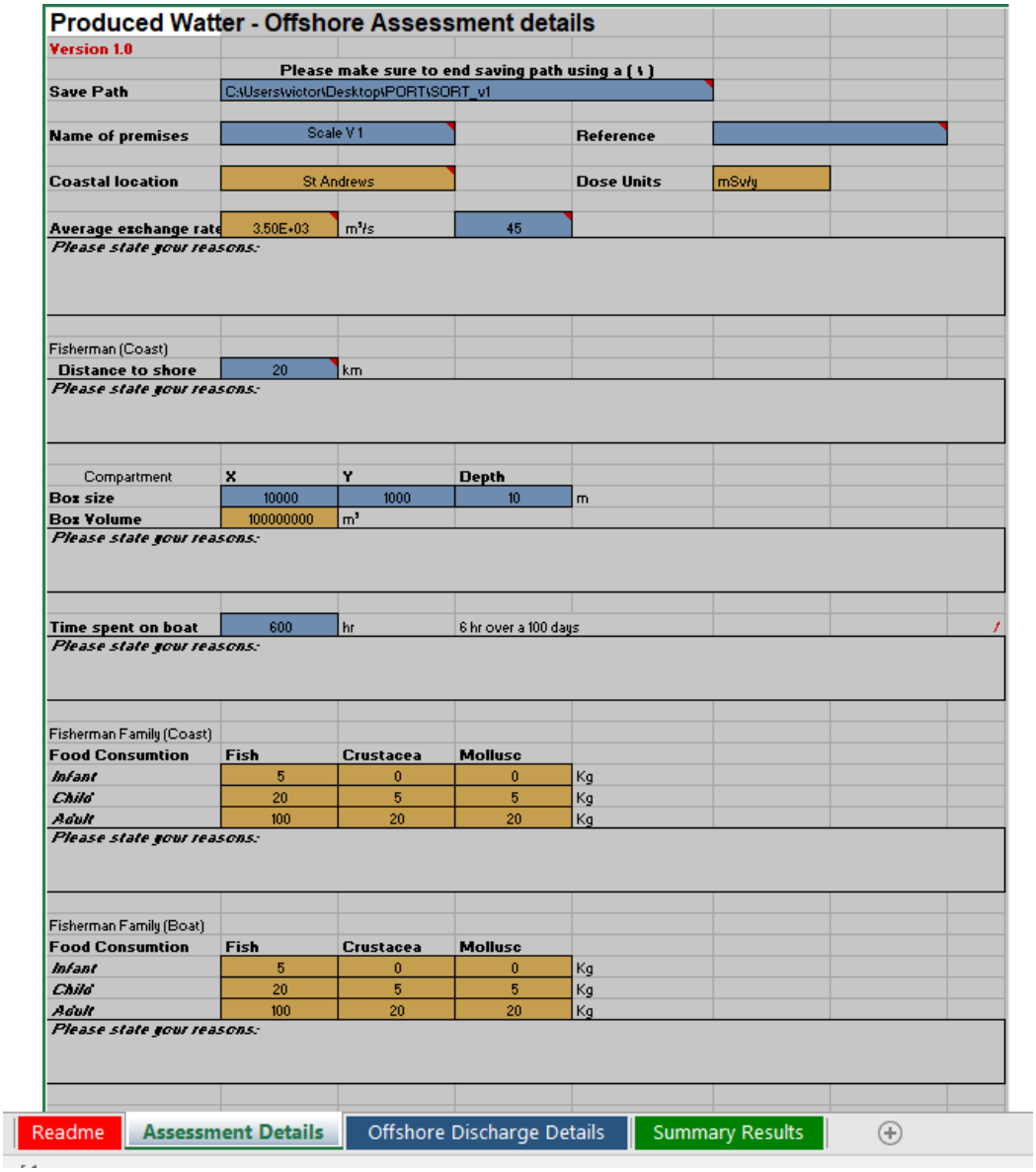


Fig 1. Example of the data entry sheet for PORT demonstrating the user's ability to modify key assessment

parameters.

PORT_v1Produced Water V 1_2017-9-12-18-6 SEPA PORT V 1.0

Summary Fisherman (COAST)

Radionuclide	Year 1 Fisherman (Coast) Total dose	Fisherman Family (Coast-Infant) Total dose	Fisherman Family (Coast-Child) Total dose	Fisherman Family (Coast-Adult) Total dose	Worst dose	Worst population group (Coast)
	mSv/y	mSv/y	mSv/y	mSv/y	mSv/y	
Radium-223	5.6E-11	2.4E-12	8.0E-12	4.0E-11	5.6E-11	Fisherman
Radium-226	3.7E-10	3.9E-12	2.6E-11	2.5E-10	3.7E-10	Fisherman
Radium-228	1.8E-09	5.6E-12	1.1E-10	1.3E-09	1.8E-09	Fisherman
Other alpha-emitting nuclides	3.7E-10	3.9E-12	2.6E-11	2.5E-10	3.7E-10	Fisherman
Other beta/gamma-emitting nucl	4.0E-11	1.3E-13	1.1E-12	3.7E-11	4.0E-11	Fisherman
	8.2E-08	7.5E-11	7.2E-09	5.8E-08	8.2E-08	mSv/y

Assessment Details | Offshore Discharge Details | Summary Results | Fisherman Coast Summary | Fisherman Boat Summary

Fig 2. Summary of the dose assessment results for the fisherman on the coast, showing the total dose for the fisherman and their family. PORT also identifies the worst affected group by radionuclide.

Case Study 2: Multi-Permit Discharge Radiological Assessment Tool (MRT)

[redacted] developed the Multi-Permit Discharge Radiological Assessment Tool (MRT) based on the Environment Agency's Initial Radiological Assessment spreadsheet Tool (IRAT) for assessing the dose to wildlife and humans from discharges going to sewer. The IRAT sewer tool deals with single permit discharges and does not account for cumulative impacts. In MRT, it is possible to incorporate one or more permits to determine doses from multiple sources. In this way the user can add and remove as many discharge permits as required that enter a single sewage works.

Discharge at limit values for each one of these permits is required, whilst MRT calculates cumulative values. MRT then allows the user to calculate radionuclide doses from some or all of the multiple permits as convenient, as well as the total doses for a particular sewage works.

	Valid	Valid	Valid	
Add new permit				
Remove permit				
Calculate Doses	PERMIT No. 1	PERMIT No. 2	PERMIT No. 3	
Radionuclide	Discharge at Limits	Discharge at Limits	Discharge at Limits	Cumulative Discharge at Limits
	Bq/y	Bq/y	Bq/y	Bq/y
Tritium	1.00E+00	1.00E+00	1.00E+00	3.00E+00
Tritium (Organically Bound)	1.00E+00	1.00E+00	1.00E+00	3.00E+00
Carbon-11	1.00E+00	1.00E+00	1.00E+00	3.00E+00
Carbon-14	1.00E+00	1.00E+00	1.00E+00	3.00E+00
Fluorine-18	1.00E+00	1.00E+00	1.00E+00	3.00E+00
Sodium-22	1.00E+00	1.00E+00	1.00E+00	3.00E+00

For each permit, external, internal and total doses can be calculated for 6 population groups. These groups are sewage worker, farming family, a child playing in a burn, angler, irrigated food consumer and fisherman. In addition to these, the assessment includes two wildlife groups (river wildlife and estuary wildlife) in which doses to the worst affected organisms are calculated.

The modifications included in MRT allow the user to calculate doses to each group by individual premises as well as the cumulative dose from the authorized discharges to the sewage.

Case Study 3: Radiological Habits Dose Assessment Tool

[redacted]

We have developed a dose assessment spreadsheet tool for the SEPA [redacted] for individualized habits assessments as part of the University of Stirling's Radiological Habits Project, which is conducting habits surveys around the Scottish nuclear licensed sites on behalf of SEPA. For this project [redacted] developed a Microsoft Access database for collating and then processing the habits information collected during surveys in the field. The processed data then forms the RIFE habits spreadsheet that SEPA provides to enable dose assessments to be made for the nuclear licensed sites in Scotland. The database also outputs information automatically that feeds into our Habits Dose Assessment Tool (HDAT). HDAT is a Microsoft Excel spreadsheet based tool that takes the individualized habits data for those surveyed and estimates the dose to people in three age categories (infants, children and adults). HDAT uses site-specific data on: i) the different food stuff activity concentrations (from RIFE) ii) external measurements of dose from around the sites of interest (by our field teams and/or RIFE information) iii) along with shielding factors for people spending time in buildings etc. and iv) information on direct shine from our own measurements around the site of interest and then knowledge of people's activities when passing by the site.

Fig 3 Habits dose assessment tool (HDAT) calculations are based on the input of individualized habits data as shown

Added by																													
Original ID code	Postcode	Distance from site (m)	Fish (Kg/y)	Crustaceans (Kg/y)	Molluscs (Kg/y)	Inadvertent ingestion of Water (m3/y)	Drinking Water (m3/y)	Green leafy vegetable (Kg/y)	Other Domestic Vegetables (Kg/y)	Root Vegetables (Kg/y)	Potato (Kg/y)	Domestic Fruit (Kg/y)	Cattle meat (Kg/y)	Pig meat (Kg/y)	Sheep meat (Kg/y)	Poultry (Kg/y)	Eggs (Kg/y)	Milk (L/y)	Wild/Free foods (Kg/y)	Rabbit/Hares (Kg/y)	Honey (Kg/y)	Wild Fungi (Kg/y)	Venison (Kg/y)	Game Birds (Kg/y)	Wild Fowl (Kg/y)	Intertidal occupancy over Saltmarsh (m5y)	Intertidal occupancy over rock (h/y)	Intertidal occupancy over sand (h/y)
RFI3	G847TW	0	0	0	0		0	3.8	0.26	5.79	20	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RFI33	G848YT	0	2	0	0		219	7.99	7.5	8.5	10	22.3	0	0	0	0	120.64	0	17	0	0	0	0	0	0	0	0	0	0	0
RFI53	G848NF	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RFL30		0	4.99	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RFP1	G840LY	0	0	0	0		0	0	0	0	0	0.5	0	0	0	0	9.047999	0	3.15	0	0	0	0	0	0	0	0	202	0
RFP11	G848SD	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0
RFP2	G840LY	0	0	0	0		0	0	0	0	0	0.5	0	0	0	0	9.047999	0	3.15	0	0	0	0	0	0	0	0	182.5	0
RFT12	G605JP	0	13.5	0	1.4		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26	0

B. NAMED STAFF MEMBERS AND DETAILS OF THEIR SPECIALISM AND EXPERTISE

For each participating organisation on the project team please list:- the names and grades of all staff who will work on the project together with details of their specialism and expertise, their role in the project and details of up to 4 of their most recent, relevant published peer reviewed papers (where applicable). If new staff will be hired to deliver the project, please detail their grade, area/(s) of specialism and their role in the project team.

Lead Applicant	University of Stirling

Named staff members, details of specialism and expertise.

[redacted]

[redacted] research focuses on radiological risk assessment particularly with respect to the environment. Specifically his group is trying to understand better the effects of, and how ecological systems adapt to, environmental stress caused by exposure to ionising radiation and modelling the environmental transfer and behaviour of radionuclides. He has over 25 years' experience researching the transfer, behaviour and fate of radionuclides in the environment and for the last 17 years has been intimately involved in developing frameworks for radiological risk assessment in the environment. He has provided technical expert input into national and international committees (e.g. OSPAR on behalf of DECC/Environment Agency; the IAEA Action Plan on Environmental Protection on behalf of UK; cross government department review of the revision of International and European Basic Safety Standards for radiological protection on behalf of the Environment Agency). He is fully conversant with the OSPAR Convention having acted as the UK's technical lead on the review of the Environmental Assessment Criteria for use in the OSPAR periodic evaluations and as project manager, has successfully delivered on time the non-nuclear report for OSPAR for the last three years. He is a member of the International Commission on Radiological Protection's Committee 4 (Applications of the ICRP recommendations) and 5 (Environmental Protection), and is currently chairing an ICRP Task Group on applying the ICRP recommendations for the environment, He now also chairs the Society of Radiological Protection's Non-nuclear sector committee and has run training courses on radiological protection of the environment on behalf of IAEA, EA, EC and a NERC knowledge exchange programme. He has >140 publications (>60 journal papers) including being a co-author on three ICRP Publications and one IAEA technical report series publication along with several IAEA techdocs.

[redacted]

[redacted] specialises in environmental monitoring and the environment and human health. He has pioneered in developing monitoring techniques, including *in-situ*, mobile and remote sensing, for the quantitative spatial assessment and impact of environmental pollutants (radioactive & nutrient) in aquatic and terrestrial environments, and impacts on human health. He is convener and UK (BSi and DTI funded) representative for the International Electrotechnical Commission (IEC) and is project leader for standards on mobile radiometric (IEC 62438) and *in-situ* gamma spectrometry (IEC 61275). He is an advisor to SEPA and Dounreay Site Restoration Limited (formally UKAEA) through the Dounreay Particle Advisory Group (DPAG: 2000-2008) and the Particle Recovery Advisor Group for Dounreay (PRAG(D): 2009-present). He is steering committee member of the UK's Coordinating Group for Environmental Radioactivity (COGER). In remote sensing, his NERC funded group (Globolakes) is pioneering the application of Earth Observation to extract 20 year time series of quantitative information for 1000 lakes around the world. He has more than 60 publications (38 journal and 4 book chapters). His work has been funded by NERC, ESRC, EA, SEPA BGS/GSNI and industry.

[redacted] https://doi.org/10.1016/j.envpol.2018.04.112 [redacted]

[redacted] specialises in radiological dose assessments to wildlife and humans. In 2014 he co-developed the Multiple authorisation Radiological assessment Tool (MRT) to measure radiological doses to wildlife and humans from multiple sewer discharges in Scotland. He is also responsible for developing an offshore and coastal dose assessment tool for NORM assessments in collaboration with [redacted], the Scottish Environment Protection Agency (SEPA) and the National Oceanography Centre (NOC). This tool includes site-specific dispersion modelling into the assessment in order to obtain realistic results. In addition, during the Habits Survey contract with SEPA he developed the Habits Dose Assessment Tool. This is a spreadsheet-based model that integrates people's habits to estimate individualised external and internal doses from different radionuclides released by nuclear stations around Scotland.

[redacted] works for the ERL on an *ad hoc* basis having completed his PhD at the University of Stirling ([redacted]) in 2017 on the spatio-temporal properties of estuarine radiogenic contaminants. He has recently completed a year-long government funded nuclear decommissioning research and development project with [redacted] which saw him deployed to several nuclear licensed sites. Recently [redacted] has returned to the ERL where he has successfully tendered for a four-year BEIS contract to analyse and report UK non-nuclear sector discharges. [redacted] has expertise in studying the spatio-temporal properties of radionuclides, radioactivity characterisation, remote sensing and spatial analysis. [redacted] has worked on numerous projects including; EDF Torness baseline characterization (2012), Dalgety bay Radium contamination (2013 - 2014), Kinross Radium

site investigation (2014), Environment Agency field dosimetry spatio-temporal review (2017) and more recently OSPAR reporting for The Department for Business, Energy and Industrial Strategy (BEIS) since 2015 – present.

[redacted] will be responsible for the coordination and planning of the SPIRIT II update project along with the acquisition of data sources/key references, quality assurance and report writing. She has project managed the Radiological Habits Survey project around nuclear licensed sites in Scotland for the last three years. This work programme includes understanding of the objectives of the surveys and effective liaison with SEPA, who utilises the data in its annual dose assessment of the impact of radioactive releases in the Radioactivity In Food and the Environment (RIFE) report. Understanding of the surveys requires being able to convey complex information to the public in a sim ple manner whilst remaining independent and objective. Ishbel is an experienced radiological field surveyor using radiometric equipment in support of the habit surveys and has experience in laboratory radiological analysis. Ishbel is trained to ISO: 17025 in measuring *gamma* and *beta* radiation in the field and is an experienced field sampler. She also has received practical training on the use of PC Cream 08 for radiological dose assessment. Ishbel has a range of transferrable skills including computer software and invaluable communication skills.

Participant Organisation 1	
Named staff members, details of specialism and expertise.	
Participant Organisation 1	
Named staff members, details of specialism and expertise.	
Participant Organisation 1	
Named staff members, details of specialism and expertise.	
Participant Organisation 1	
Named staff members, details of specialism and expertise.	

C. STAFF EFFORT

In the table below, please detail the staff time to be spent on the project (for every person named in section above) and their role in delivering the proposal If new staff will be hired in order to deliver the project please include their grade, name and the staff effort required.

Name and Role of Person where known/ Role of person to be recruited	Working hours per staff member on this project
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

5: PROJECT MANAGEMENT

Please fully describe how the project will be managed to ensure that objectives and deliverables will be achieved on time and on budget. Please describe how different organisations/staff will interact to deliver the desired outcomes.
Highlight any in-house or external accreditation for the project management system and how this relates to this project.

The ERL has been providing a radiological monitoring and risk assessment service, including in-situ gamma spectrometry, for over fifteen years. UKAS (ISO 17025:2005) accreditation was awarded to the ERL in 2006, and has been firmly embedded within our activities. Our Quality Policy can be found in Annex 1, and UKAS certification in Annex 2. We operate a project management system in line with ISO17025 from tender production through to interactions with the client and the quality assurance on the final deliverables. Staff to undertake this research project have been identified and will fulfil specified roles within this project should we be successful with our tender.

Project Management and Staffing Arrangements

The project will be managed under the University of Stirling's ISO17025 management system for it's Environmental Radioactivity Laboratory and we will be applying the project management aspects to this project should we be successful (see Annex 2).

[redacted] will be the project manager and lead for this project and he will report directly to the FSA project manager and will be the nominated point of contact between the FSA and Stirling. [redacted] will also provide a quality assurance review of the final deliverables and guidance and advice for the tool development.

[redacted] has extensive experience in developing dose assessment tools and will undertake the lead for the development of the software model. [redacted] on each of the tasks and will be responsible for monitoring progress and producing the task progress report, which will be inspected by the project manager and forwarded to the FSA. [redacted] has been leading and coordinating the radiological habits survey work for the last four years and will perform a key role in helping with the preparation of deliverable reports, acquisition of appropriate literature and provide quality checking of the data entry into the SPIRIT II excel tool.

We feel that this approach provides both the relevant experience of undertaking this project work while ensuring flexibility and continuity in staffing should someone any member of the team be unavailable for any reason. Furthermore, [redacted] will produce a task specification sheet allocating named individuals specific tasks within the project and identifying deadlines. Regular (weekly) internal meetings will monitor progress against this task sheet and the Gantt chart and appropriate resources will be re-allocated if problems arise. The FSA project manager will be kept fully informed of any issues arising and how we propose to deal with them.

Regular, probably fortnightly but the frequency will be agreed at the kick off meeting), short email progress reports will be provided to the FSA project manager detailing progress against the tasks and deliverables. These emails will build as a continuous record of the project activities over time and have been an effective means of communicating progress and issues to clients on other projects.

Please note CVs for the key staff involved in the proposal are available in Annex 5.

Quality Assurance of spreadsheet development

As mentioned already, the project team has been set up to provide a core team delivering the spreadsheet tool [redacted] and then other staff who will provide a peer review/quality assurance component. In this case, [redacted] will develop the spreadsheet tool with [redacted] providing QA on the data entered.

6. RISK MANAGEMENT			
In the table provided, please identify all relevant risks in delivering this project on time and to budget. Briefly outline what steps will be taken to minimise these risks and how they will be managed by the project team. Please add more lines as required			
Identified risk	**Likelihood of risk (high, medium, low)**	**Impact of Risk (high, medium, low)**	**Risk management strategy**
Data corruption	Low	Low	Data are backed up daily and the university's cloud file system (Box) uses unlimited version control, therefore the most data that can be lost is around 30mins of work effort. The cloud storage system used meets the UK's requirements for computer systems being HIPAA compliant and certified by the EU and Swiss Safe Harbor frameworks for the collection and use of personal data from European Member Countries (not that personal data will be used within this project). All data stored on Box are encrypted and the data centres are secure lcoations using biometric entry authorisation, closed-circuit video monitoring and 24/7 guards.
Loss of key staff	Low	Low	As mentioned previously, a combination of staff from within the ERL provides a level of redundancy/support in the event that a staff member is no longer able to work on the project for whatever reason
Business continuity	Low	Medium	The university has an active business continuity management system in place to deal with continuity related issues ranging from bad weather through to active attacks on the university whether physical or cyber in nature. Staff are aware of the continuity arrangements and, for example in 2018, bad weather forced the closure of the university leading to the continuity plan being implemented. Under most circumstances staff are able to continue to operate from home minimising the impact on the business. The management plan is available here: https://www.stir.ac.uk/media/stirling/global-assets/documents/forms/business-continuity-management-system.pdf
Conflicts of interest	Low	Low	The University of Stirling prides itself on the professionalism and integrity of its staff. We are committed to ensuring that any conflicts of interest are handled in a professional and timely manner and also forms part of our UKAS accredited ISO17025 procedures. Any potential conflicts of interest will be notified to relevant SEPA staff and discussions held on how to address any conflicts before any work was commenced. No conflicts of interest between the University and Food Standards Agency have been identified at this stage of the project development.

7. QUALITY MANAGEMENT

A. QUALITY MANAGEMENT

Please provide details of the measures that will be taken to manage and assure the quality of work. You should upload your Quality Assurance policy in the supporting documents section of your application.

This should include information on the quality assurance (QA) systems, , which have been implemented or are planned, and should be appropriate to the work concerned. All QA systems and procedures should be clear and auditable, and may include compliance with internationally accepted quality standards specified in the ITT e.g. ISO 9001 and ISO17025.

Specific to science projects and where relevant, applicants must indicate whether they would comply with the Joint Code of Practice for Research (JCoPR). If applicants do not already fully comply with the JCoPR please provide a statement to this effect to provide an explanation of how these requirements will be met. The FSA reserves the right to audit projects against the code and other quality standards

The lead principle investigator is responsible for all work carried out in the project; (including work supplied by sub-contractors) and should therefore ensure that the project is carried out in accordance with the Joint Code of Practice

As mentioned in section 2 internal peer review and quality assurance will be undertaken by staff in this project. The parameter data input into SPIRIT II and any calculations performed for key dose per unit release values and final reports will all be subject to our normal ISO 17025 accredited quality control procedures used within the ERL. While these procedures are primarily for the ERL's analytical work they also cover how we handle the quality control of data etc. Quality assurance will be provided by Ishbel Dale, David Copplestone and Andrew Tyler. External peer review can be arranged if required using national or international experts.

It should also be noted that, at the University level, all our research work is conducted under the principles of *Good Research Practice*. The *Code of Good Research Practice* draws on a number of different sources (such as the good practice guides & policy statements of a number of organisations). The sources used include:

- Research Councils
- Government departments
- The National Health Service (NHS)
- International research associations & societies
- Charitable organisations
- UK and European legislation

Annex 1: ERL's Quality Policy and Annex 2: UKAS Certification and Declaration 1: Code of practice describing the ERL's quality system can be found below.

We can confirm that we will fully comply with the JCoPR throughout this project and our systems for quality assurance and ways of working are available at any time for audit by the Food Standards Agency. It will be the responsibility of [redacted] that all work carried in this project is done so in accordance with the JCoPR.

B. ETHICS

Please identify the key ethical issues for this project and how these will be managed. Please respond to any issues raised in the Specification document
Please describe the ethical issues of any involvement of people, human samples, animal research or personal data in this part. In addition, please describe the ethical review and governance arrangements that would apply to the work done.

Applicants are reminded that, where appropriate, the need to obtain clearance for the proposed project from their local ethics committee. This is the responsibility of the project Lead Applicant. However, if a sub-contractor requires such clearance the project Lead Applicant should ensure that all relevant procedures have been followed. If there are no ethical issues please state this

The University of Stirling is committed to the highest possible ethical standards. We promote a culture of best practice and integrity in all our research through the core values of honesty, rigour, open communication, care, and respect. To safeguard the interests of researchers, participants and funding bodies, research within the University only proceeds after strict scrutiny by one of our three internal Research Ethics Committees. And full details are available here: https://www.stir.ac.uk/research/research-ethics-and-integrity/

As part of the preparation of this proposal, our research management system required the completion of an ethics checklist at the earliest stage of project development. The ethics checklist has identified no issues in relation to the ethics for the proposed project at this stage and has been approved internally. No significant ethical issues were identified from the project specification and our considerations of how to undertake this work. Being a desk exercise therefore means that ethical considerations are confined to data handling and maintaining a safe work environment for employees that will be engaged on this project. We will ensure that any data provided to the ERL during the project is treated as commercial sensitive and where appropriate non-disclosure agreements will be used to ensure the confidentiality of the data along with our compliance with the Joint Code of Practice for Research (JCoPR). Errors and omissions that may compromise the integrity of the work will be identified and reported to the relevant FSA contact to ensure an open and honest approach to ethical research.

At the University of Stirling we are committed to promoting equality and diversity so that all staff, students and visitors to the University can be confident that they will be treated with dignity and respect. We do not tolerate harassment, victimisation or unjustified discrimination on any of the grounds mentioned above. We aim to maintain a culture inclusive of all sections of society which is free from discrimination and unfair treatment. Equality and diversity is promoted through a variety of initiatives, e.g. Equality Champions within each school, the establishment of an Equality Action Forum to drive forward the University's equality activities and raise awareness of best practice and support in equality matters, a planned 'One Stirling' Campaign currently under development in collaboration with the Students' Union. At the University of Stirling we take a positive and proactive approach to equality and diversity. We meet the requirements of the Equality Act which came into force in April 2010, the public sector equality duty and Scottish specific equality regulations. We are proud to have been awarded the Athena SWAN bronze award in 2013 for our work promoting gender equality in science, technology, engineering, mathematics and medical disciplines. Biological and Environmental Science earned it's own Bronze Athena Swan Award in 2015, and was one of the first to do so at the University of Stirling. http://www.stir.ac.uk/equalityanddiversity/ourapproach/

C. DATA PROTECTION

Please identify any specific data protection issues for this project and how these will be managed. Please respond to any specific issues raised in the Specification document.
Please note that the successful Applicant will be expected to comply with the Data Protection Act (DPA) 1998 and ensure that any information collected, processed and transferred on behalf of the FSA, will be held and transferred securely.

In this part please provide details of the practices and systems which are in place for handling data securely including transmission between the field and head office and then to the FSA. Plans for how data will be deposited (i.e. within a community or institutional database/archive) and/or procedures for the destruction of physical and system data should also be included in this part (this is particularly relevant for survey data and personal data collected from clinical research trials). The project Lead Applicant will be responsible for ensuring that they and any sub-contractor who processes or handles information on behalf of the FSA are conducted securely.

Data protection issues have been identified as data storage and data access. Data will be archived on a University of Stirling network drive that is password protected with access restricted to employees of the ERL. During the project data will be shared using the universities encrypted email system and an industry standard cloud file sharing system that uses two stage authentications for security. As data processing reaches an end point and passes quality control those data sets will be archived within the project folder and made available to the FSA. Should the FSA require it then data generated during the project will be deleted at the end of the project.

The University's cloud based file sharing system, Box, meets the UK's requirements for computer systems being HIPAA compliant and certified by the EU and Swiss Safe Harbor frameworks for the collection and use of personal data from European Member Countries (not that personal data will be used within this project). All data stored on Box are

encrypted and the data centres are secure locations using biometric entry authorisation, closed-circuit video monitoring and 24/7 guards.

Access to ERL data is restricted to employees whom have been assigned to work on this project and data is made available on a needs basis. Employees are aware of data protection good practice and have extensive experience in handling commercially sensitive data from providers ranging from the nuclear sector to government regulators. Employees have undergone varying extents of external background checks and are regarded to be of good character and trustworthy. University of Stirling carries out the Right to Work checks as detailed in on our HR webpage: http://www.stir.ac.uk/hr-od/recruitment/makinganoffer/ Academic staff employed by the University of Stirling are subject to security checks such as Disclosure Scotland.

Our research data management policy was approved by University court on 31 March 2014. Associated polices can be found at: http://www.stir.ac.uk/is/researchers/data/beforeyoustartyourresearch/policy/

As of May 2018, the new GDPR came into force and all our staff have undergo online and face to face training over the requirements of the GDPR and awareness of how this fits into our research. In this project no information that could be considered under the GDPR is expected to be generated or obtained. However, should this occur we will take the appropriate steps to ensure that any such data is handled appropriately, securely, and in line with the GDPR requirements.

D. SUSTAINABILITY

The Food Standards Agency is committed to improving sustainability in the management of operations. Procurement looks to its suppliers to help achieve this goal. You will need to demonstrate your approach to sustainability, in particular how you will apply it to this project taking into account economic, environmental and social aspects. This will be considered as part of our selection process and you must upload your organisations sustainability policies into the eligibility criteria in Bravo.
Please state what(if any) environmental certification you hold or briefly describe your current Environmental Management System (EMS)

As part of the University of Stirling, the ERL is committed to sustainability and adheres to the University's sustainability policy (Annex 3) and through its daily actions endeavors to ensure waste reduction and enhanced efficiencies of energy and material resources.

In September 2014, the University was audited and certificated to BS8555, Phase 3. This means that the University has an externally verified, fully functioning and effective Environmental Management System in place. This was an important stage for the University on its progress towards continual improvement in its environmental performance. It provides assurance that the University's environmental impact has been fully assessed, that it is compliant with environmental legislation, and that it has a comprehensive management programme with challenging objectives and targets in place to drive continual improvement in environmental performance.

The BS8555 implementation programme is coordinated by the Head of Operational Risk and Environmental Sustainability and commenced in 2011. The University was audited and certificated to Phase 1 in December 2011, Phase 2 in December 2012 and Phase 3 in September 2014. Phases 4 - 6 of BS8555 lead on to ISO 14001 certification, however, achievement of Phase 3 is the point where the EMS implementation is seen as fully functioning.

Full details of the university's policies in relation to Sustainability are given here: https://www.stir.ac.uk/about/faculties-and-services/estates-and-campus-services/environment-and-sustainability/

Specifically on this project, we propose to minimize the use of resources by operating a paperless project management and operational system. Any paper that used in the course of the project will have come from recycled sources and any used paper will be recycled. To encourage this behavior more widely, the University has adopted centralized printing services and has removed printers from offices.

It is the policy of the ERL to use the most cost effective and environmentally friendly means of transport where possible. To this end we will make use of public transport for attending meetings for example and/or use video conferencing facilities for meetings. As this project is primarily desk based, we envisage travel only for the purposes of meeting with staff from the Food Standards Agency probably at a kick off meeting, during the consultation phase and on delivery of the end products as a hand over. Other progress meetings are planned to be by video conferencing. Not only does this reduce environmental costs from travel but it also minimizes the cost.

E. DISSEMINATION AND EXPLOITATION (Science Projects Only)

Where applicable please indicate how you intend to disseminate the results of this project, including written and verbal communication routes if appropriate. Applicants are advised to think carefully about how their research aligns with the FSA strategy, what is the impact that their research has on public health/ consumers and decide how the results can best be communicated to the relevant and appropriate people and organisations in as cost-effective manner as possible. Please provide as much detail as possible on what will be delivered. Any costs associated with this must be documented in the Financial Template.

The applicant should describe plans for the dissemination of the results for the project team as a whole and for individual participants. Details should include anticipated numbers of publications in refereed journals, articles in trade journals etc., presentations or demonstrations to the scientific community, trade organisations and internal reports or publications. Plans to make any information and/or reports available on the internet with the FSA's permission are also useful, however, this does not remove the requirement for Tenderers to think how best to target the output to relevant groups.
If a final report is part of the requirement, please make sure, as part of the executive summary, that aims and results are clear to the general audience and that the impact of the research on public health/consumers and it's alignment to FSA priorities is clearly stated.

Please note that permission to publish or to present findings from work supported by the FSA must be sought in advance from the relevant FSA Project Officer. The financial support of the FSA must also be acknowledged.

Please indicate whether any Intellectual Property (IP) may be generated by this project and how this could be exploited. Please be aware the FSA retains all rights to the intellectual property generated by any contract and where appropriate may exploit the IP generated for the benefit of public health.
In this part Applicants should demonstrate the credibility of the partnership for exploitation of the results and explain the partnership's policy in respect of securing patents or granting licenses for the technology (if applicable). It should deal with any possible agreements between the partners to extend their co-operation in the exploitation phase and with relevant agreements with companies, in particular users, external to the partnership

This project will produce a new version of the SPIRIT radiological dose assessment spreadsheet for use by FSA. All outputs arising from this work will be the intellectual property of the FSA. Subject to agreement with the FSA project manager, we would propose to produce a scientific paper describing the developments to SPIRIT, the improvements to functionality and the intercomparison exercise results that are obtained. This will, we hope, be of benefit to the FSA through increased scrutiny through the peer review process of the steps taken in the project and raise awareness of the SPIRIT II tool. Production of any paper and conference presentations that might also be agreed with the FSA, would be conducted by academics at Stirling with no additional cost to the FSA. We believe that this will add value to the project and of course no publication or presentation would be released without express permission and input (e.g. review) from the FSA and any work would duly acknowledge the financial support of the FSA.

Annex 4 – Suppliers Financial Proposal

Tender Reference	FS301079

Tender Title	The Screening Permits for Ingestion Pathway Radiological Assessment Impacts Tool

Full legal organisation name	University of Stirling

Main contact title	[redacted]
Main contact forname	[redacted]
Main contact surname	[redacted]

Main contact position	[redacted]
Main contact email	[redacted]
Main contact phone	[redacted]

Will you charge the Agency VAT on this proposal?	Yes

Please state your VAT registration number:	GB261483657

Project Costs Summary Breakdown by Participating Organisations
Please include only the cost to the FSA.

Organisation	VAT Code*	Total (£)
University of Stirling	STD	£41,018.88

Total Project Costs (excluding VAT) **	**£ 41,018.88**

* Please indicate zero, exempt or standard rate. VAT charges not identified above will not be paid by the FSA
** The total cost figure should be the same as the total cost shown in table 4
** The total cost figure should be the same as the total cost shown below and in the Schedule of payments tab.

Project Costs Summary (*Automatically calculated*)

Staff Costs	[redacted]
Overhead Costs	[redacted]
Consumables and Other Costs	[redacted]
Travel and Subsistence Costs	[redacted]
Total Project Costs	[redacted]

COST OR VOLUME DISCOUNTS - INNOVATION		
The Food Standards Agency collaborates with our suppliers to improve efficiency and performance to save the taxpayer money. A tenderer should include in his tender the extent of any discounts or rebates offered against their normal day rates or other costs during each year of the contract. Please provide full details below:		
SIGNATURE	[redacted]	
NAME	[redacted]	
DATE	05-Sep-2018	
REVISION DATE		Enter the effective date if this version of the template replaces an earlier version

Staff Costs Table

*This should reflect details entered in your technical application section 4C.

Please insert as many lines as necessary for the individuals in the project team.

Please note that FSA is willing to accept pay rates based upon average pay costs. You will need to indicate where these have been used.

* Role or Position within the project	Participating Organisation	Daily Rate (£/Day)	* Daily Overhead Rate(£/Day)	Days to be spent on the project by all staff at this grade	**Total Cost (incl overheads)**
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Total Labour Costs	[redacted]
* Total Overhead Costs (if not shown above)	

Notes

[redacted]

Consumable/Equipment Costs

Please provide a breakdown of the consumables/equipment items you expect to consume during the project

Item	Quantity	Cost/Item (£)	**Total**
[redacted]	[redacted]	[redacted]	[redacted]

Total Material Costs	[redacted]

Travel and Subsistence Costs

Please provide a breakdown of the travel and subsistence costs you expect to incur during the project

Purpose of journey or description of subsistence cost	Frequency	Cost each (£)	**Total Cost**
[redacted]	[redacted]	[redacted]	[redacted]

Total Travel and Subsistence Costs	[redacted]

The Pricing Schedule

Proposed Project Start Date	**15-Oct-2018**	**Amount**				
Invoice Due Date	**Description as to which deliverables this invoice will refer to (*Please include the deliverable ref no(s) as appropriate)***	***Net**	** VAT Code**	**Duration from start of project (Weeks)**	**Duration from start of project (Date)**	**Financial Year**
09-Nov-2018	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
15-Mar-2019	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Retention/ Final Deliverable	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Total	[redacted]

* Please insert the amount to be invoiced net of any VAT for each deliverable
** Please insert the applicable rate of VAT for each deliverable
*** 20% of the total project budget is withheld and will be paid upon acceptance of a satisfactory final report by the agency.
§The number of weeks after project commencement for the deliverable to be completed

Summary of Payments

	Year 1	Year 2	Year 3	Year 4		
Financial Year (Update as applicable in YYYY-YY format)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total Amount	[redacted]				[redacted]	[redacted]