Environment Agency
NEC4 professional services contract (PSC)
Scope

Project / contract Information

Project name	Lee 2100 (Modelling Phase 1 Quality Assurance)
Project SOP reference	ENV0002914C
Contract reference	31378
Date	11/11/2020
Version number	2
Author	[redacted]

Revision history

Revision date	Summary of changes	Version number
06/11/2020	First issue – draft issued for review	1
11/11/2020	Updated following review by Commercial Services Manager. Minor amendments to formatting of defined contract terms. Appendices updated.	2

This Scope should be read in conjunction with the version of the Minimum Technical Requirements current at the Contract Date. In the event of conflict, this Scope shall prevail. The *services* are to be compliant with the following version of the Minimum Technical Requirements:

Document	Document Title	Version No	Issue date
412_13_SD01	Minimum Technical Requirements	2	18th March 2020
NEC4 Minimum Technical Requirements for Modelling_v1	NEC4 Minimum Technical Requirements for Modelling_v1	1	20 September 2019
379_05	379_05 Computational modelling to assess flood and coastal risk	2	27th October 2010

Details of the *service*

Details of the *service* are:

1. Overview

The *Client's* Programme and Contract Management Team is working with the *Client's* Area Programme Team, Partnerships and Strategic Overview Team and Asset Performance Team to deliver the Lee 2100 Programme. The aim of this programme is to develop a catchment wide flood risk management strategy for the River Lee for the short, medium and long-term (2030, 2070, and 2100).

In order to inform the Strategy, updates and improvements to the existing hydraulic models for the Upper Lee, Lower Lee and their tributaries are required. The main objective is to have reliable and up to date models that provide a consistent understanding of fluvial flood risk across the catchment, including the risk from the most recent climate change allowances. Considering the age and the status of some models, it is necessary to update their inputs and calibrate them against the most recent available data.

The models will be used for a number of key flood risk management activities including flood risk mapping, flood warnings benefit/damages assessment to inform capital investment decisions and maintenance, and to plan our incident response. Customers also use model output data to understand and manage their own flood risk. This means that it is essential our models provide the most up-to-date and accurate flood zones and mapping.

Jacobs UK Ltd, as the framework delivery partner for the Eastern Hub, have been commissioned to carry out hydraulic model updates for seven watercourses within the River Lee catchment. The individual technical modelling scopes that make up Jacobs commission are included in Appendix 1 and are listed in Table 1 below.

Table 1: List of technical modelling scopes included in Appendix 1

Watercourse Name	Name of Technical Scope
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted] addition, to support the development of the Strategy, 'Do Nothing' scenario models for each of the watercourses in the Upper Lee and the Lower Lee catchments are also included in Jacobs' scope. Technical scopes for this are included in Appendix 1 and listed in Table 2 below.

Table 2: Do Nothing Scenario Technical Scopes included in Appendix 1

Catchment Name	Name of Technical Scope
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

This commission will support the objectives of the Lee 2100 Programme which are:

- Update of the 2010 flood risk management strategy for short, medium and long term (2030, 2070, 2100).
- Development of an integrated programme of work and intervention plan to ensure that flooding and the water environment is managed efficiently and in a comprehensive way.

3. Outcome Specification

The required outcome of this commission is to provide a full quality assurance service for the technical deliverables of the Lee 2100 Modelling Phase 1 contract, to ensure the deliverables align to the scope and meet the *Client's* technical requirements. This is to include the following for each model:

a) Review of model methodology statements
b) Review of hydrology
c) Review of draft hydraulic model deliverables

The level of detail required for each model is shown in Table 3 below:

Table 3: Description of Quality Assurance requirements

No.	Activity	Detail of requirement	Deliverable
1	Methodology statement review	A review of the technical aspects of the work including questioning / justifying the proposed method. The Method statements will consist of: • An over-arching method statement (setting out objectives, overall modelling approach that is to be adopted for all scopes and approach to cascading of flows). • Individual methods for each technical scope. These will be succinct and contain only information specific to each scope.	Comments from the *Consultant* required for each statement.
2	Upper and Lower Lee hydrology reviews	A review of the hydrology of all catchments, using the *Client's* standard review template.	Completed *Client's* hydrology review template (one for each model)
3	Upper Lee model reviews	Full review of each of the sub-catchment models for the Upper Lee (6 catchments, so 6 models)	Completed *Client's* hydraulic review spreadsheet (One for each model)

4	Lower Lee model reviews	Full review of all four sub-models, and checking that the previous review comments have been incorporated which had highlighted a lot of issues with instabilities.	Completed *Client's* hydraulic review spreadsheet (One for each model)
5	Upper Lee Do Nothing model reviews	Review of changes to the six baseline sub-models e.g structures, Manning's n etc. Further details of proposed changes are provided in the Upper Lee Do Nothing scope. As this review is commenting on solely the changes made to the baseline model, only the appropriate sections of the hydraulic review spreadsheet will need to be completed.	Partially completed *Client's* hydraulic review spreadsheet (Either one for all Upper Lee models or separate ones for each model)
6	Lower Lee Do Nothing model reviews	Review of changes to the four baseline sub-models e.g structures, Manning's n etc. Further details of proposed changes are provided in the Lower Lee Do Nothing scope. As this review is commenting on solely the changes made to the baseline model, only the appropriate sections of the hydraulic review spreadsheet will need to be completed.	Partially completed *Client's* hydraulic review spreadsheet (Either one for all Lower Lee models or separate ones for each model)

In order to deliver these outcomes the *Consultant* shall allow for attendance at the following meetings with the *Client* and Jacobs:

a) One start-up meeting
b) One post-review meeting to discuss the model methodology statement
c) Two hydrology pre-review meetings (one for Upper Lee and one for Lower Lee)
d) Two hydraulics pre-review meetings ((one for Upper Lee and one for Lower Lee)
e) One do nothing pre-hydraulics review meeting (including both the Upper and Lower lee)

In addition, the *Consultant* shall allow for attendance at the following meetings.

f) Teleconferences to be held by the *Client* to get verbal feedback for each of activities carried out as listed in Table 1.

g) On request the *Consultant* shall attend meetings between the *Client* and Jacobs to provide independent advice to both parties.

More information on key model assumptions, questions and agreements on approach are listed in Appendix 1.

4. Drawings, site information or reports already available

a) Lee 2100 Modelling Phase 1 Contract Scope Documents (Appendix 2)
b) Models in the River Lee Catchment Map (Appendix 3)
c) River Lee Modelling Climate Change Model Runs Report – Jacobs, 7 May 2020 (Appendix 4)

5. Constraints on how the *Consultant* provides the services

a) Where specified, the *Consultant* shall use the *Client's* standard review template spreadsheets
b) In carrying out the tasks please reference the Aqua book (in particular page 6, section 1.10 extracted below) and use Aqua book compatible terminology / language. www.gov.uk/government/publications/the-aqua-book-guidance-on-producing-quality-analysis-for-government

Extract from the Aqua Book

1.10 No single piece of guidance can provide a route to a definitive assessment of whether a piece of analysis is of sufficient quality for an intended purpose. However, the Aqua Book sets out the following principles of analytical quality assurance that will help to support commissioning and delivery of fit-for-purpose analysis:

- **Proportionality of response**: The extent of the analytical quality assurance effort should be proportionate in response to the risks associated with the intended use of the analysis. These risks include financial, legal, operational and reputational impacts. In addition, analysis that is frequently used to support a decision-making process may require a more comprehensive analytical quality assurance response.
- **Assurance throughout development**: Quality assurance considerations should be taken into account throughout the life cycle of the analysis and not just at the end. Effective communication is crucial when understanding the problem, designing the analytical approach, conducting the analysis and relaying the outputs.
- **Verification and validation**: Analytical quality assurance is more than checking that the analysis is error-free and satisfies its specification (verification). It must also include checks that the analysis is appropriate, i.e. fit for the purpose for which it is being used (validation).
- **Analysis with RIGOUR**: Quality analysis needs to be repeatable, independent, grounded in reality, objective, have understood and managed uncertainty, and the results should address the initial question robustly. In particular, it is important to accept that uncertainty is inherent within the inputs and outputs of any piece of analysis. It is important to establish how much we can rely upon the analysis for a given problem.

6. Requirements of the programme

a) The schedule for the quality assurance activities shall align to the Lee 2100 Modelling Phase 1 accepted programme. This will be shared with the *Consultant* at the start of the contract and as it is updated.
b) The *Consultant* shall have 10 working days to carry out each individual review activity from the point of receipt of the relevant documentation. If a longer review period is required then this shall be agreed with the *Client*.
c) To assist in spreading out the work load, there will be no more than 2 model review activities scheduled to run at any one time across the programme. If for some reason this is not possible, the *Client* shall make the *Consultant* aware at least 10 working days in advance to understand if sufficient resource is available to carry out the reviews in parallel.

7. Exclusions:

a) There is no requirement for the *Consultant* to undertake any hydraulic modelling.

8. Specifications or standards to be used:

a) Health and safety is the number one priority of the *Client*. This includes the well-being of staff. The *Consultant* will promote and adopt safe working methods.

9. Services and other things provided by the *Client*

a) Arrangement of progress meetings, review meetings with external consultants with the *Client* in attendance.
b) Any other data relevant to the projects owned by the *Client* which is requested by the *Consultant* will be provided along with a data licence.
c) All of the data listed as being supplied to the *Consultant* as part of these studies remains the IP of the *Client*.
d) Asite
e) FastDraft

Appendix 1: Key model assumptions, questions and agreements on approach

1. Critical storm durations are likely to be different across the catchment. The aim is to have a realistic version of flood risk (not necessarily coincident flood peaks) however some sort of analysis of the storm durations would be helpful. Currently suggested carrying out some sensitivity tests but Jacobs should comment on that in their method statement.

2. The *Client* has agreed that the Upper Lee tributary flows should feed into the Lower Lee models. There are sections of the downstream ends of the tributaries where they are covered by the Upper and Lower Lee models. This overlap goes far enough upstream such that sensitivity of the downstream boundary does not propagate to the top of the overlap. Therefore, flow from the Upper Lee tributary models could be extracted from a node in a non-sensitive location and input into the Lower Lee model at the equivalent node. As the downstream boundaries do not impact, the models should be run from upstream to downstream and the downstream boundaries for the upper lee models can use the existing model information with the caveat that the downstream portion of the tributary models should use the Lower Lee model to assess flood risk.

3. The Lower Lee sub-models should ideally be combined into 4 models overall (locations to be determined by Jacobs) however the *Client* is open for this to change if there is a more efficient way of doing things (taking into consideration the number of model runs and run time etc).

4. The *Client* requires these Lower Lee sub-models to cascade the flows. Currently there is a break between model M01 and M02 where flows do not cascade. No agreement has yet been determined on how to deal with this but ideally the flows will cascade. There is also a question of how the downstream boundaries of each model will be managed in order that the inflow to the next model is not partially influenced by the sensitivity in the downstream boundary of the upstream model. There may be an answer to this in the previous modelling however this has not yet been determined.

5. The Lower Lee models need to be updated with the previous review's red and amber comments only. The scope of works does not include updating the model with green comments

6. Whilst some of the Upper Lee tributaries and Lower Lee have been reviewed already, once combined into their respective final models, these should be fully reviewed again. This is because things such as grid size and orientation will have been updated as well as the overall results / stability. These will act as the definitive model reviews for the catchment going forward. When reviewing the Lower Lee model, in spite of green comments not being addressed by Jacobs, these should still be noted in the review because this will be the definitive review we hold on our records and it's important any comments, however small, are noted. The review should state that it has been agreed these comments will not be addressed at this time but ideally would be addressed in any future projects.

7. In terms of programme of model reviews, the *Client* has agreed that there will be no more than 2 reviews going on at the same time across the programme.

[redacted]

[redacted]

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[redacted]