



Professional Service Contract

Contract Data Forms

June 2017

(with amendments January 2023)

Template version history

V 1	as per bidder pack (was V4 in bidder pack)	Go live
V 1.1	Update to include missing date field in CD Pt 2 section 5	April 2024
V 2	Updates to Z clauses to ensure they are applicable to Main Option and Framework Schedules: Z6 added Z24 terminology updated, Z130 removed	June 2024
V 2.1	Updates to Liabilities and Insurance in Section 8 and Z125 mandated	Dec 2024
V2.2	X18 updated and guidance notes around Y(UK)2 added for clarity	Jan 2024

Contract Execution

This agreement is made between the *Client*, the *Consultant* and the Named Suppliers.

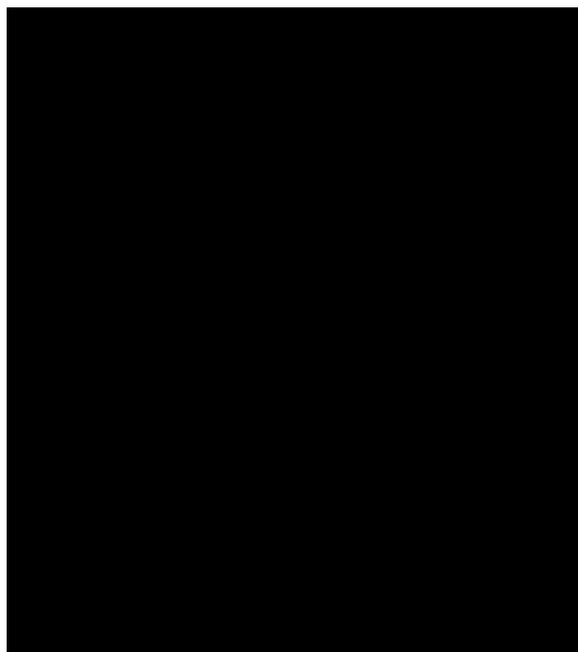
Terms in this agreement have the meanings given to them in the contract between the Environment Agency and AECOM Ltd for the Bourne Brook Modelling – CS28766 (the *service*).

The *Consultant* offers to Provide the Services in accordance with these conditions of contract for an amount to be determined in accordance with these conditions of contract.

The *Consultant* was appointed to the 2024 Mapping and Modelling Framework and executed the framework agreement

Executed under hand

By



(Named Suppliers)

Consultant, Consultant second signatory)

Contract Data

PART ONE – DATA PROVIDED BY THE CLIENT

Completion of the data in full, according to the Options chosen, is essential to create a complete contract.

1 General

The *conditions of contract* are the core clauses and the clauses for the following main Option, the Option for resolving and avoiding disputes and secondary Options of the NEC4 Professional Service Contract June 2017 (with amendments January 2019)

Main Option Option for resolving and avoiding disputes

Secondary Options

The *service* is

The *Client* is

Name

Address for communications

Address for electronic communication

The *Service Manager* is

Name

Address for communications

Address for electronic communications



The Scope is in

2024-12_13_Scope_Bourne Brook (Tamworth) Hydraulic Model Update_V3.doc , dated 20th December 2024.

The *language of the contract* is

English

The *law of the contract* is the law of

England and Wales, subject to the jurisdiction of the courts of England and Wales

The *period for reply* is

2 weeks

except that

• The *period for reply* for

n/a

is

n/a

• The *period for reply* for

n/a

is

n/a

The *period for retention* is 6 year(s) following Completion or earlier termination

The following matters will be included in the Early Warning Register

Additional cost and programme implications for the Bourne Brook survey

Early warning meetings are to be held at intervals no longer than

2 weeks

2 The Consultant's main responsibilities

If the *Client* has identified work which is set to meet a stated *condition* by a *key date*

The *key dates* and *conditions* to be met are

	<i>condition</i> to be met	<i>key date</i>
(1)	Not used	
(2)	Not used	
(3)	Not used	

If Option A is used The *Consultant* prepares forecasts of the total *expenses* at intervals no longer than

If Option C or E is used The *Consultant* prepares forecasts of the total Defined Cost plus Fee and *expenses* at intervals no longer than

3 Time

The *starting date* is

The *Client* provides access to the following persons, places and things

	access	access date
(1)	<input type="text" value="Share point"/>	<input type="text" value="8<sup>th</sup> September 2025"/>
(2)	<input type="text" value="Asite"/>	<input type="text" value="8<sup>th</sup> September 2025"/>
(3)	<input type="text"/>	<input type="text"/>

The *Consultant* submits revised programmes at intervals no longer than

If the *Client* has decided the *completion date* for the whole of the *service* The *completion date* for the whole of the *service* is

If no programme is identified in part two of the Contract Data The period after the Contract Date within which the *Consultant* is to submit a first programme for acceptance is

4 Quality management

The period after the Contract Date within which the *Consultant* is to submit a quality policy statement and quality plan is

The period between Completion of the whole of the *service* and the *defects date* is

5 Payment

The *currency of the contract* is the

The *assessment interval* is

If the *Client* states any *expenses*

item	amount
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>

The *interest rate* is % per annum (not less than 2) above the
Base rate of the bank

If the period in which payments are made is not three weeks and Y(UK)2 is not used

The period within which payments are made is

If Option C or E is used and the *Client* states any locations

The locations for which the *Consultant* provides a charge for the cost of support people and office overhead are

If Option C is used ~~The *Consultant's share percentages* and the *share ranges* are~~

<i>share range</i>		<i>Consultant's share percentage</i>
less than	<input type="text" value="80"/> %	<input type="text" value="0"/> %
from	<input type="text" value="80"/> % to <input type="text" value="120"/> %	<input type="text" value="50"/> %
from	<input type="text" value="-"/> % to <input type="text" value="-"/> %	<input type="text" value="-"/> %
greater than	<input type="text" value="120"/> %	<input type="text" value="100"/> %

If Option C or E is used

~~The *exchange rates* are those published in~~

on (date)

6 Compensation events

If there are additional

These are additional compensation events

None

8 Liabilities and insurance

If there are additional
Client's liabilities

These are additional *Client's* liabilities

(1) Not used

(2) Not used

(3) Not used

The minimum amount of cover and the periods for which the *Consultant* maintains insurance are

EVENT	MINIMUM AMOUNT OF COVER	PERIOD FOLLOWING COMPLETION OF THE WHOLE OF THE SERVICE OR TERMINATION
The <i>Consultant's</i> failure to use the skill and care normally used by professionals providing services similar to the <i>service</i>	<p>Whichever is greater of £2 million or the amount required by law</p> <p>in respect of each claim, without limit to the number of claims</p>	6 years following Completion of the whole works or earlier termination
Loss of or damage to property and liability for bodily injury to or death of a person (not an employee of the <i>Consultant</i>) arising from or in connection with the <i>Consultant</i> Providing the Service	<p>Whichever is greater of £5 million or the amount required by law</p> <p>in respect of each event, without limit to the number of events</p>	12 months
Death of or bodily injury to employees of the <i>Consultant</i> arising out of and in the course of their employment in connection with the contract	<p>Whichever is greater of £5 million or the amount required by law</p> <p>in respect of each event, without limit to the number of events</p>	For the period required by law

The *Consultant* provides these additional insurances

(1) Insurance against

Minimum amount of cover is

The deductibles are

(2) Insurance against

Minimum amount of cover is

The deductibles are

(3) Insurance against

Minimum amount of cover is

The deductibles are

n/a

n/a

n/a

n/a

n/a

n/a

n/a

The *Consultant's* total liability to the *Client* for all matters arising under or in connection with the contract, other than the excluded matters is limited to

£2 million

Resolving and avoiding disputes

The *tribunal* is

Litigation in the courts

If the *tribunal* is arbitration

The *arbitration procedure* is

to be confirmed

The place where arbitration
is to be held is

to be confirmed

The person or organisation who will choose an arbitrator if the Parties cannot agree a choice or if the *arbitration procedure* does not state who selects an arbitrator is

to be confirmed

The *Senior Representatives* of the *Client* are

Name (1)

Address for communications

Address for electronic communications

Name (2)

Address for communications

Address for electronic communications

The *Adjudicator* is

Name

to be confirmed

Address for communications

to be confirmed

Address for electronic communications

to be confirmed

The *Adjudicator nominating body* is

Institution of Civil Engineers

X2: Changes in the law

If Option X2 is used The *law of the project* is

X5: Sectional Completion

If Option X5 is used The *completion date* for each section of the *service* is

<i>section</i>	<i>description</i>	<i>completion date</i>
(1)	<input type="text" value="Not used"/>	<input type="text" value="Not used"/>
(2)	<input type="text"/>	<input type="text"/>
(3)	<input type="text"/>	<input type="text"/>
(4)	<input type="text"/>	<input type="text"/>

X7: Delay damages

If Option X7 is used without Option X5 Delay damages for Completion of the whole of the *service* are per day

If Option X7 is used with Option X5 Delay damages for each *section* of the *service* are

<i>section</i>	<i>description</i>	<i>amount per day</i>
(1)	<input type="text" value="not used"/>	<input type="text" value="not used"/>
(2)	<input type="text"/>	<input type="text"/>
(3)	<input type="text"/>	<input type="text"/>
(4)	<input type="text"/>	<input type="text"/>
The delay damages for the remainder of the <i>service</i> are		<input type="text"/>

X8: Undertakings to Others

If Option X8 is used The *undertakings to Others* are provided to

X10: Information modelling

If Option X10 is used

If no *information execution plan* is identified in part two of the Contract Data The period after the Contract Date within which the *Consultant* is to submit a first Information Execution Plan for acceptance is

X11: Termination by the Client

X13: Performance bond

If Option X13 is used The amount of the performance bond is

X18: Limitation of liability

If Option X18 is used

The *Consultant's* liability to the *Client* for indirect or consequential loss is limited to

£2 million

The *Consultant's* liability to the *Client* for Defects that are not found until after the *defects date* is limited to

£2 million

The *end of liability date* is 6 years after the Completion of the whole of the *service*

Y(UK)1: Project Bank Account

Charges made and interest ~~the~~ paid by the *project bank* ~~The Consultant is / is not to pay any charges made and to be paid any interest paid by project bank (Delete as applicable)~~

Y(UK)2: The Housing Grants, Construction and Regeneration Act 1996

If Option Y(UK)2 is used and the final date for payment is not fourteen days after the date on which payment becomes due

The period for payment is days after the date on which payment becomes due

Y(UK)3: The Contracts (Rights of Third Parties) Act 1999

If Option Y(UK)3 is used	term	beneficiary
	<input type="text" value="Not applicable"/>	<input type="text" value="Not applicable"/>
	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>

If Y(UK)3 is used with	term	beneficiary
Y(UK)1 the following entry is added to the table for Y(UK)3	<input type="text" value="The provisions of Options Y(UK)1"/>	<input type="text" value="Named Suppliers"/>

Z: Additional conditions of contract

If Option Z is used

The *additional conditions of contract* are

Z1 Disputes:

Delete existing clause W2.1

Z2 Prevention

The text of clause 18 Prevention is deleted.

Delete the text of clause 60.1(12) and replace with:

The service is affected by any of the following events

- War, civil war, rebellion, revolution, insurrection, military or usurped power;
- Strikes, riots and civil commotion not confined to the employees of the *Consultant* and sub consultants,
- Ionising radiation or radioactive contamination from nuclear fuel or nuclear waste resulting from the combustion of nuclear fuel,
- Radioactive, toxic, explosive or other hazardous properties of an explosive nuclear device,
- Natural disaster,
- Fire and explosion,
- Impact by aircraft or other aerial device or thing dropped from them.

~~Z3 Disallowed Costs Option C~~

~~Add the following in second bullet of 11.2 (18) add:~~

~~(including compensation events with the sub contractor, i.e. payment for work that should not have been undertaken).~~

~~Add the following additional bullets after 'and the cost of':~~

- ~~• Mistakes or delays caused by the *Consultant's* failure to follow standards in Scopes/quality plans.~~
- ~~• Reorganisation of the *Consultant's* project team.~~
- ~~• Additional costs or delays incurred due to *Consultant's* failure to comply with published and known guidance or document formats.~~
- ~~• Exceeding the Scope without prior instruction that leads to abortive cost~~
- ~~• Re-working of documents due to inadequate QA prior to submission, i.e. grammatical, factual arithmetical or design errors.~~
- ~~• Production or preparation of self-promotional material.~~
- ~~• Excessive charges for project management time on a commission for secondments or full-time appointments (greater than 5% of commission value)~~
- ~~• Any hours exceeding 8 per day unless with prior written agreement of the *Service Manager*~~
- ~~• Any hours for travel beyond the location of the nearest consultant office to the project unless previously agreed with the *Service Manager*~~
- ~~• Attendance of additional individuals to meetings/ workshops etc who have not been previously invited by the *Service Manager*~~
- ~~• Costs associated with the attendance at additional meetings after programmed completion, if delay is due to *Consultant* performance.~~
- ~~• Costs associated with rectifications that are due to *Consultant* error or omission.~~
- ~~• Costs associated with the identification of opportunities to improve our processes and procedures for project delivery through the *Consultant's* involvement~~
- ~~• Was incurred due to a breach of safety requirements, or due additional work to comply with safety requirements~~
- ~~• Was incurred as a result of the *Client* issuing a Yellow or Red Card to prepare a Performance Improvement Plan~~
- ~~• Was incurred as a result of rectifying a non-compliance with the Framework Agreement and/or any call off contracts following an audit~~

Z4 Share on termination

Delete existing clause 93.3 and 93.4 and replace with:

92.3 In the event of termination in respect of a contract relating to services there is no *Consultant's* share¹

Z6 The Schedule of Cost Components

Amend Clause 11.2 (17)

Defined Cost is the cost of the components in the Short Schedule of Cost Components as amended in the Framework Schedule 2 less Disallowed Cost.

Add clause 11.2 (19)

The People Rates are the *people rates* unless later changed in accordance with the contract.

Z24 Requirement for Invoice

Add the following sentence to the end of clause 51.1:

The Party to which payment is due submits an invoice to the other Party for the amount to be paid within one week of the *Service Manager's* Assessment.

Delete existing clause 51.2 and replace with:

51.2 Each certified payment is made within one week after the paying Party receives an invoice from the other Party and

If a certified payment is late, interest is paid on the late payment. Interest is assessed from the date by which the late payment should have been made until the date when the late payment is made, and is included in the first assessment after the late payment is made

Z125 Limitation of Liability

Under clause 87.1

after the fourth bullet point

insert the additional bullet points:

- loss of or damage to the *Client's* property, to the sum that the *Consultant* is required to insure under the contract in respect of such loss or damage,
- death of or bodily injury to employees of the *Consultant* arising out of and in the course of their employment in connection with the contract, to the sum that the *Consultant* is required to insure under the contract in respect of such death or bodily injury.

PART TWO – DATA PROVIDED BY THE CONSULTANT

Completion of the data in full, according to the Options chosen, is essential to create a complete contract.

1 General

The *Consultant* is

Name

Address for communications

Address for electronic communications

The *fee percentage* is

The *key persons* are

Name (1)

Job

Responsibilities

Qualifications

Experience

Name (2)

Job

Responsibilities

Qualifications

Experience

The following matters will be included in the Early Warning Register

Additional cost and programme implications for Bourne Brook survey

2 The Consultant's main responsibilities

If the *Consultant* is to provide Scope

The Scope provided by the *Consultant* is in

AECOM - Bourne Brook Modelling - Q1 Methodology
AECOM - Bourne Brook Modelling - Q2 Social Value
AECOM - Bourne Brook Modelling - Q3 Programme
AECOM - Bourne Brook Modelling - Q4 Staff

5 Payment

If the *Consultant* states expenses

The expenses stated by the *Consultant* are any

item	amount
Site visit	150.00

If Option A or C is used

The *activity schedule* is

The tendered total of the Prices is

Resolving and avoiding disputes

The *Senior Representatives* of the *Consultant* are

Name (1)

Address for communications

Address for electronic communications

Name (2)

Address for communications

Address for electronic communications

X10: Information modelling

If Option X10 is used

If an *information execution plan* is to be identified in the Contract Data

The *information execution plan* identified in the Contract Data is

Y(UK)1: Project Bank Account

If Option Y(UK)1 is used

The *project bank* is

named suppliers are

Data for the Short Schedule of Cost Components

The *people rates* are

category of person (grade1-5)	Unit (hours)	Rate (Staff Grade Rate Cap £/hr)	Contract Rate Variance (<=1)	Contract <i>people rate</i> (£/hr)
1	hours	32.64	1	32.64
2	Hours	41.73	1	41.73
3	Hours	48.02	1	48.02
4	Hours	58.17	1	58.17
5	hours	77.71	1	77.71

Project Details

Environment Agency

NEC4 Professional Service Contract (PSC)

Modelling Technical Scope

Project / contract Information

Project name	Bourne Brook (Tamworth) Hydraulic Model Update
Expected completion date	20/12/2025
Version number	3
Environment Agency Area	West Midlands
Area lead	Ian Cook (ian.cook2@environment-agency.gov.uk)
Modelling technical lead	tbc
Contact for additional information	

This scope should be read in conjunction with LIT 56326 Fluvial Modelling Standards current at the Contract Date. In the event of conflict, this Scope shall prevail. The service shall be compliant with the minimum technical requirements set out in LIT 56326 Fluvial Modelling Standards and LIT 18686 NEC4 Minimum Technical Requirements for Modelling current at the Contract Date.

Project Overview

- a) We need an accurate and up to date model of this watercourse. Existing modelling, does not extend far enough. And we have concerns with existing modelling given the complexity of this watercourse. There are a range of issues along this watercourse (not limited to and in no particular order): 1) flood risk (Fazeley & North of Drayton Manor), 2) EA assets (Fazeley and Hints), 3) significant abstraction especially around Drayton Manor theme park, 4) HS2 route interaction, 5) Highways inflows (A38/M6 Toll).

- b) We anticipate the study area to cover the area at greatest risk of fluvial flooding, from approximately the M6 Toll/A38 (SK1342103617) to the confluence with the River Tame in Fazeley (SK2094301638). This would include the Bourne Brook Cut in addition to the Bourne Brook in the area around Drayton Manor in Fazeley.

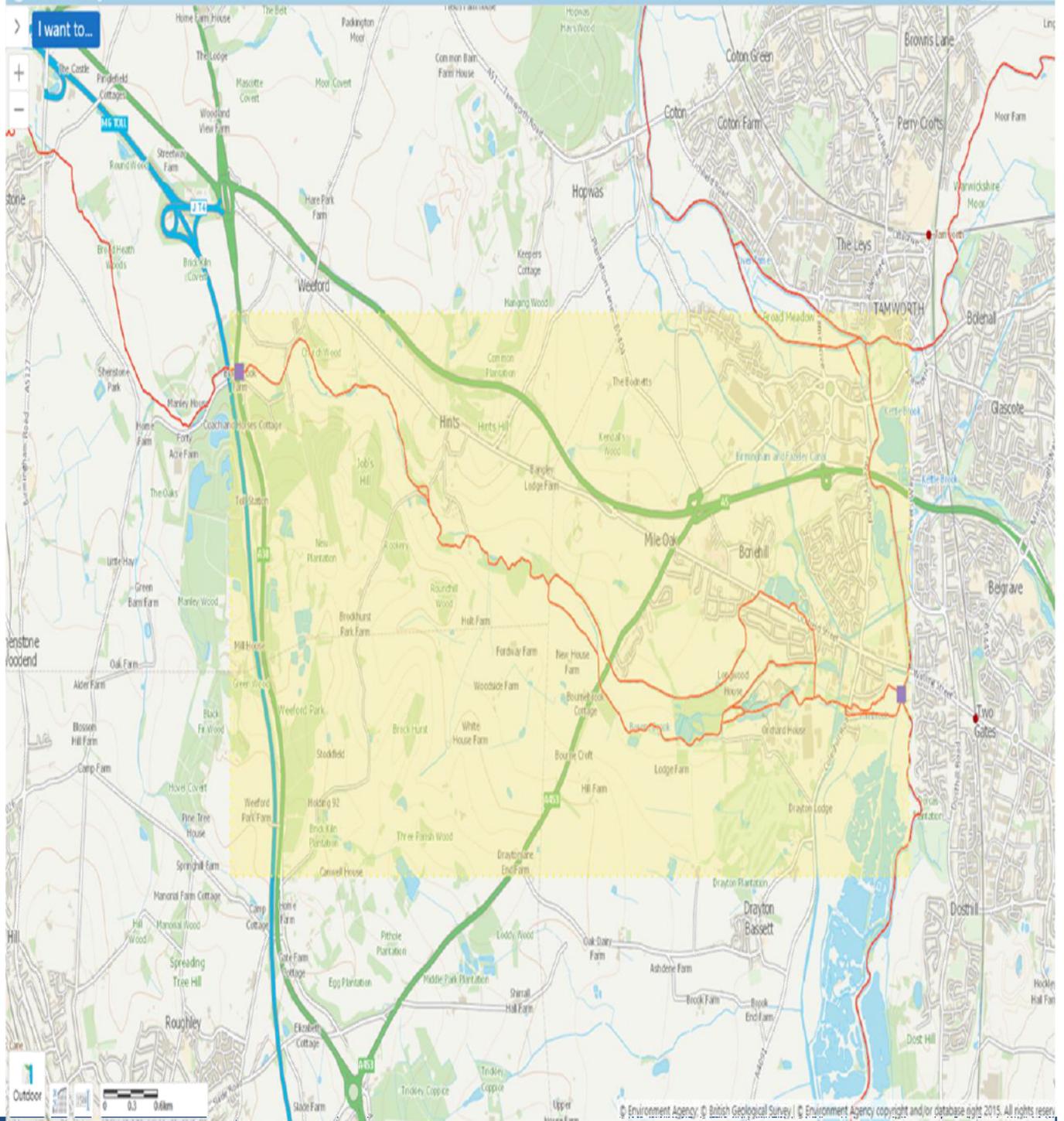
Note: The following clauses are not used in this document:

Section 3: 3.1, 3.2
Section 4:
Section 5: 5.1.3, 5.1.5, 5.3.1, 5.3.2, 5.3.3, 5.3.3, 5.3.3, 5.3.3, 5.4.3, 5.8.1, 5.8.2, 5.8.3, 5.8.4, , 5.10.1, 5.10.2, 5.11.1, 5.11.2, 5.11.3
Section 8: 8.3, 8.6, 8.7, 8.8, 8.9,
Section 9: 9.2, 9.3, 9.5.1, 9.5.2, 9.5.3, 9.5.4, 9.6, 9.6.1, 9.6.2, 9.6.3, 9.7.2, 9.7.4, 9.7.5, 9.7.6, 9.7.7, 9.7.8,
Section 10: 10.2, 10.5, 10.6,
Section 11: 11.2, 11.3, 11.10, 11.11,

Map of Study Area

Easimap2 Incidents

Search...



1: Hydraulic Model Review

The *Consultant* shall review the model and provide written commentary using the standard Environment Agency Non-Real Time Hydraulic Model Review template.

The *Consultant* shall submit a method statement for acceptance by the *Client* prior to model update activity, providing clear recommendations on required activities to update the model in line with the Environment Agency hydrology and modelling guidance.

2: Hydrological Model & Tidal / Coastal Boundary Review

The *Consultant* shall review the model using the Environment Agency hydrological review sheet. Clear recommendations on required activities to update the hydrology to the *Client's* stated needs.

3: Local Flood History

The *Consultant* shall produce a written commentary in the Interim Hydrology Report or Hydrology Review Report to document local flood history analysis. The commentary shall consider the following:

- 3.3 The *Consultant* shall collect and evaluate data from the *Client*.
- 3.4 The *Consultant* shall collect and evaluate data from social media / other potential sources of information.

4: Site Visit and Topographic Survey

The *Consultant* shall:

- 4.1 Visit the site to understand the local flood flow pathways and flood history. The *Client* will facilitate this visit / these visits and arrange for appropriate staff to accompany the *Consultant* to provide local knowledge. The *Consultant* shall give the *Client* 10 working days' notice prior to any required visits.
- 4.2 The *Consultant* shall specify the survey scope in accordance with the *Client's* standard survey specification. The following locations and survey types shall be considered:

Upstream Location: SK1342103617; Extent (km): 16; Survey Type: Bank top surveyEA asset survey In channel cross section surveyStructure survey

5: Hydrological Assessment & Hydrometric Review

The *Consultant* shall undertake the following activities to provide a hydrological assessment and / or hydrometric review in accordance with the Environment Agency's Flood Estimation Guidelines.

Reporting

- 5.1.1 Submit a Hydrology Method statement for acceptance by the *Client* before commencing the hydrological assessment and/or hydrometric review. This shall set out the proposed approach, review of hydrometric data, catchment schematisation, and set out the methods and outputs.
- 5.1.2 Submit a Draft Hydrology Report to the *Client* for acceptance prior to the commencement of design simulations.

5.1.4 Submit a Final Hydrology Report to the *Client* for acceptance prior to commencement of hydraulic modelling.

Review data availability

5.2.1 Undertake a review of the hydrometric data (rainfall, levels, flow, flood extent) that are available for use in the study (including donor catchments, model calibration and verification of models). Assess data availability, and the uncertainties in the accuracy of the data and what effect this could have on the reliability and accuracy of model outputs.

5.2.2 Review the performance of all rating relationships that will be used in this study during high flow conditions. The rating throughout the full range of flows shall also be assessed, albeit in a less rigorous manner. The review shall include commentary on the extrapolation above validated range, modular limits, likely hydraulic control in drowned mode and inter-site comparison. Clear conclusions on the suitability of ratings for rainfall-runoff model development and calibration of hydraulic models must be provided. Conclusions must include an estimate of likely gauge accuracy (% error in flow) for flows up to and including AMAX1. An indication of gauge accuracy at high and extreme flows (0.1% AEP or similar) shall be provided where possible. If this is not possible then the *Consultant* shall provide reasons.

5.2.3 Review the available survey data and any existing hydraulic models to determine whether a detailed model can be updated / constructed to improve the rating relationship at required gauging stations. State the extent of model required, any new survey requirements, and the most appropriate modelling approach. Consider whether simpler methods (e.g. velocity/area) can produce the required results.

5.2.4 Recommend any improvements to hydrometric networks and data collection in floods.

Catchment understanding

5.4.1 Schematise the catchment. Subcatchment schematisation shall represent key hydrological features (e.g. changes in catchment response, key tributaries/confluences, flood storage reservoirs). Catchment delineation must be verified including use of surface water sewer data in urbanised catchments. A GIS shape file of subcatchment boundaries must be provided for acceptance by the *Client* as part of the Draft Hydrology Report. Boundary unit type (ReFH, FEH, pumped catchment, etc) and inflow locations (point, distributed lateral) shall be described and justified.

5.4.2 Update subcatchment schematisation to improve delineation of urbanised areas, improve resolution of inflows, changes on the ground.

Design flow estimation - general

5.5 Tabulate the hydraulic model node labels corresponding to the locations of all level and flow recorders and other points of interest within the modelled area.

Design flow estimation - statistical method

5.6.1 Agree peak flow data to be used for the analyses with the *Client*. The data will be based on available data as modified during the study (e.g. by the modelled rating curves).

5.6.2 Undertake flood frequency analysis at all gauging stations using the agreed peak flow data. By default, FEH statistical methods (using the latest updates) will be applied - changes to these methods shall be agreed with the *Client*. Compare with any relevant previous estimates. The degree of uncertainty in the estimates shall be assessed. The effect of these uncertainties on the modelled levels and flood extents shall be assessed and documented.

5.6.3 Estimates of peak flows of different annual exceedence probabilities shall also be made at the following location:

5.6.4 Where available use historical information to inform flood frequency analyses and choice of design values.

Design flow estimation - rainfall-runoff methods

5.7.1 Assess the applicability of rainfall-runoff methods such as ReFH1 and ReFH2.

5.7.2 Determine the critical design storm(s), including storm duration, DDF and ARF parameters. If the modelled area has a large variation in catchment size and response at different points of interest, the selection of design storms shall take this into account.

5.7.3 Derive design flood hydrographs (e.g. ReFH, factor ReFH to fit statistical \ accepted design peaks, Archer method).

5.7.4 Improve estimated rainfall-runoff parameters in accordance with the FEH Guidelines.

Reconcile results and produce final design values

5.9.1 Reconcile the results from different approaches (e.g. rainfall-runoff and statistical). If peak flows are significantly changed, the effect on runoff volumes shall be investigated and hydrograph shapes amended if necessary.

5.9.2 Compare flood estimates with previous studies at all gauging stations and other points of interest. Justify the final selection of methodology to be taken forward to design runs.

6: Tidal / Coastal Boundary Analysis

This section is not relevant to this study

7: Fluvial - New Hydraulic Model Build

This section is not relevant to this study

8: Fluvial - Update Existing Hydraulic Model(s)

The *Consultant* shall update the defended and defences removed or no defences scenarios from hydraulic model. The scope for updating will be confirmed following acceptance by the *Client* of the Model Review Report. The following activities are required:

The model must be able to simulate flood events for:

Fluvial Removed	Fluvial Defended
50%	50%
20%	20%
10%	10%
5%	5%
3.33%	3.33%
2%	2%
1.33%	1.33%
1%	1%
0.5%	0.5%
0.1%	0.1%

- 8.1 Extension of the model upstream/downstream by 26 km.
- 8.2 Incorporation of:
Bourne Brook (HS2 cross) Model (tbc) Model
Drayton Manor Model (2021) Model
Tamworth 2023 Hydraulic Model (01/2023) Model
- 8.4 Updating of the floodplain representation using latest LiDAR. The area requiring update is shown on the study area plan in project details.
- 8.5 Updating of:
Drayton Manor d/s sluice representing SK1971001655
Tolsons Sluice representing SK1996801812
Drayton Manor u/s sluice representing SK1904301569
Drayton Manor new sluice (approx location) representing SK1892001472
Lichfield St trash screen (454703) representing SK1932502256
Sutton Road Trash Screen (483004) representing SK1765001856
Hints Weir (413057) representing SK1697002320
Hints Culvert (ID413051) representing SK1619702566
Hints Debris Screen (ID763548) representing SK1619702566
- 8.10 The model will be updated with the most up to date topographic survey and remote sensing data available at the time of baseline model development.

9: Model Proving, Calibration and Verification & Sensitivity

The *Consultant* shall provide written interpretation of results, including impact on model calibration / proving, design configuration, onset of flooding, standard of protection and recommendations for prioritisation of maintenance.

- 9.1 Calibrate the through simulation of up to 3 events and verify performance through simulation of up to a further 2 events. Inflows shall be generated using observed rainfall and flow data and the *Consultant* is expected to select events to make best use of available information. Variation in antecedent conditions between events must be explicitly computed.
- The *Consultant* shall achieve peak level fit at all gauged locations of ± 150 mm, with replication of overall hydrograph shape. Variance between the observed and modelled hydrographs shall be presented to the *Client* at a face to face calibration review meeting along with draft flood outlines for any out of bank calibration events. The *Client's* acceptance of the calibration is required before progression to design event simulation.
- Fluvial Models:
- 9.4 The *Consultant* shall undertake sensitivity analysis on the model. Sensitivity analysis shall be undertaken for the 1% AEP or AEP closest to bank top level (where the 1% AEP event is in bank), shall be submitted to the *Client* for acceptance and at a minimum shall comprise:
- $\pm 20\%$ flows
 - $\pm 20\%$ roughness
 - $\pm 20\%$ slope change in downstream boundary
 - Greater and smaller grid cell size than the proposed grid cell size
 - Storm duration
- 9.7 The *Consultant* shall undertake as part of model proving/calibration:
- 9.7.1 Simulations to determine sensitivity to blockage of culverts.
- 9.7.3 Simulations to determine sensitivity to operation of structures.

10: Design Simulations & Results

All scenarios listed below must be delivered for defended scenarios:

Fluvial, tidal, coastal and surface water hazard scenarios are modelled with the flood defence system scenario of defended, no failure by breaching.

Scenarios:

Fluvial Removed	Fluvial Defended
50%	50%
20%	20%
10%	10%
5%	5%
3.33%	3.33%
2%	2%
1.33%	1.33%
1%	1%
0.5%	0.5%
0.1%	0.1%

Climate change scenarios are required as part of this project. Please refer to Minimum Technical Requirements for Modelling for details of climate change requirements.

The *Consultant* shall provide written commentary on the %AEP of onset of flooding, standard of protection and suitability of fit with the anecdotal historic evidence of flooding. Limitations with historical evidence results shall be clearly identified in the conclusions and further recommendations shall be given if appropriate (e.g. state where new telemetry gauges shall be installed, where new survey / LiDAR would improve model accuracy etc). This commentary is to be included within the draft and final Model Report.

In addition the *Consultant* shall:

- 10.1 Identify the design event probabilities for which the defence provides benefit – this shall include all events where retained water level is above local ground levels. The assessment shall include identification of receptors protected. The analysis must be sufficiently detailed to distinguish between individual communities and include strategic infrastructure (trunk road, railways, power sub-stations). Provide this commentary as part of the Model Report.
- 10.3 Produce animations of flow and velocity vectors for the 2D model domain for 2 locations x 4 animations x 2 %AEPs.
- 10.4 Simulate structure blockage scenarios for 3 locations x 2 scenarios x 3 %AEPs.
- 10.7 Produce a table of the number of residential, critical infrastructure and other non-residential properties within all defended and defences removed or no defences exist and blockage %AEP outlines referring to the flood level at the nearest relevant river gauge(s) - if applicable.
- 10.8 Assess the performance of the following structures:
Location - Drayton Manor u/s sluice (SK1892001473), Type - Sluice, 3 scenarios, 3 %AEPs
Location - Tolsons Sluice (SK1996401815), Type - Twin Sluice, 3 scenarios, 3 %AEPs

11: Flood Warning Improvements

The *Consultant* shall deliver the following services in accordance with the guidance as referred to within the latest version of the Minimum Technical Requirements for Modelling document. The following services are anticipated following receipt of the improved flood outlines but allowance shall be made by the *Consultant* for liaising with the Flood Resilience team for specific guidance on the process and at key points:

- 11.1 Review the existing Flood Alert Areas and Flood Warning Areas extents in comparison with the updated modelled outputs and advise whether modifications are required to the extents. Review the first impacts (out of bank), first property to flood and trigger thresholds using the updated and accepted flood maps / levels. There are 2 existing Flood Alert Areas and 2 existing Flood Warning Areas.
- Flood Alert Areas:
Bourne Brook (Tamworth) (033WAF305)
Middle Tame (033WAF304)
- Flood Warning Areas:
River Tame & Bourne Brook at Fazeley (033FWF3TAME017)
Bourne Brook at Hints and Drayton Manor Park (033FWF3BOURNB01)
- 11.1.1 Update the existing Flood Alert Areas and Flood Warning Areas extents based on the updated modelled outputs (defences removed / no defences exist 0.1% AEP plus historic flood extents, where appropriate) following the *Client's* acceptance of recommended modifications from 11.1 and provide revised extents.
- 11.4 Deliver an Excel spreadsheet which includes %AEP, land use type, risk category assigned and number of commercial / residential properties for each FWFRA. Information on suggested FWAs shall include names of FWFRA's aggregated to make the FWA, highest AEP, total number of properties, breakdown of commercial and residential properties, vulnerable receptors (utilities, hospitals, care homes etc) and overall assigned risk category.
- 11.5 Produce flood extent shapefiles with associated level at Flood Warning gauge for each of the 2 existing Flood Warning Areas. Outlines are required for each simulated (with defences) %AEP between onset of flooding and the Extreme Flood Outline. Submit the proposal for the *Client's* acceptance whether onset of flooding is first property to flood, first impacts or overtopping of defences.
- 11.6 Produce flood hazard shapefiles with associated level at the Flood Warning gauge for each of the 2 existing Flood Warning Areas. Outlines are required for each simulated (with defences) %AEP between onset of flooding and the Extreme Flood Outline. Submit the proposal for the *Client's* acceptance whether onset of flooding is first property to flood, first impacts or overtopping of defences.
- 11.7 Review the data quality of the gauge sites in the study area and provide a detailed recommendation for the gauges to be used in level-level correlation for each FWA.
- 11.8 Produce level-level correlation between the onset of flooding location and Flood Warning Gauge Site for each Flood Warning Area. Determine the frequency at which the trigger level will be exceeded. Make recommendations for improvements, explaining the benefits.
- 11.9 Produce travel time between the onset of flooding location and Flood Warning Gauge Site based on model results and verify these results through comparison with the available hydrometric data.

12: Blank section

This section is not relevant to this study

13: Flood Forecasting - Inception Stage

This section is not relevant to this study

14: Flood Forecasting - Model Development and Calibration

This section is not relevant to this study

15: Coastal - New Hydraulic Model

This section is not relevant to this study

16: Coastal - Hydraulic Model Review

This section is not relevant to this study

17: Coastal - Update Existing Hydraulic Model(s)

This section is not relevant to this study

18: Broadscale Modelling

This section is not relevant to this study

19: Options Appraisal

This section is not relevant to this study

20: Surface Water - Hydraulic Model Review

This section is not relevant to this study

21: Surface Water- Update Existing Hydraulic Model(s)

This section is not relevant to this study

22: Surface Water - New Hydraulic Model Build

This section is not relevant to this study

Available Data - Treat as Site Information

All datasets supplied for the project must be returned to the Client upon project completion. Datasets returned should adopt the appropriate security marking, be password protected/encrypted in accordance with the latest government guidelines.

Hydrometric data:

Station	Location	Type (Flow / Level / Rainfall, Wind, Wave Height / Direction)	Period of record	Time interval (15 min/daily)	Fluvial / Coastal	Known data quality issues
Walsall Wood Rain	SK0380004140	Rainfall	02/1977 to 07/2024	15 min	Fluvial	
Lichfield Rain	SK1380010050	Rainfall	03/2000 to 07/2024	15 min	Fluvial	
Atherstone Rain	SP3179098020	Rainfall	01/1966 to 07/2024	15 min	Fluvial	
Lea Marston Rain	SP2064093890	Rainfall	07/1993 to 07/2024	15 min	Fluvial	
Hints	SK1619002580	Flow/Level	11/2000 to 07/2024	15 min	Fluvial	yes

Available Data - Treat as Site Information

Asset data types:

The Client will provide an AIMS Database containing all asset details at the beginning of the project. Assets to be included are:

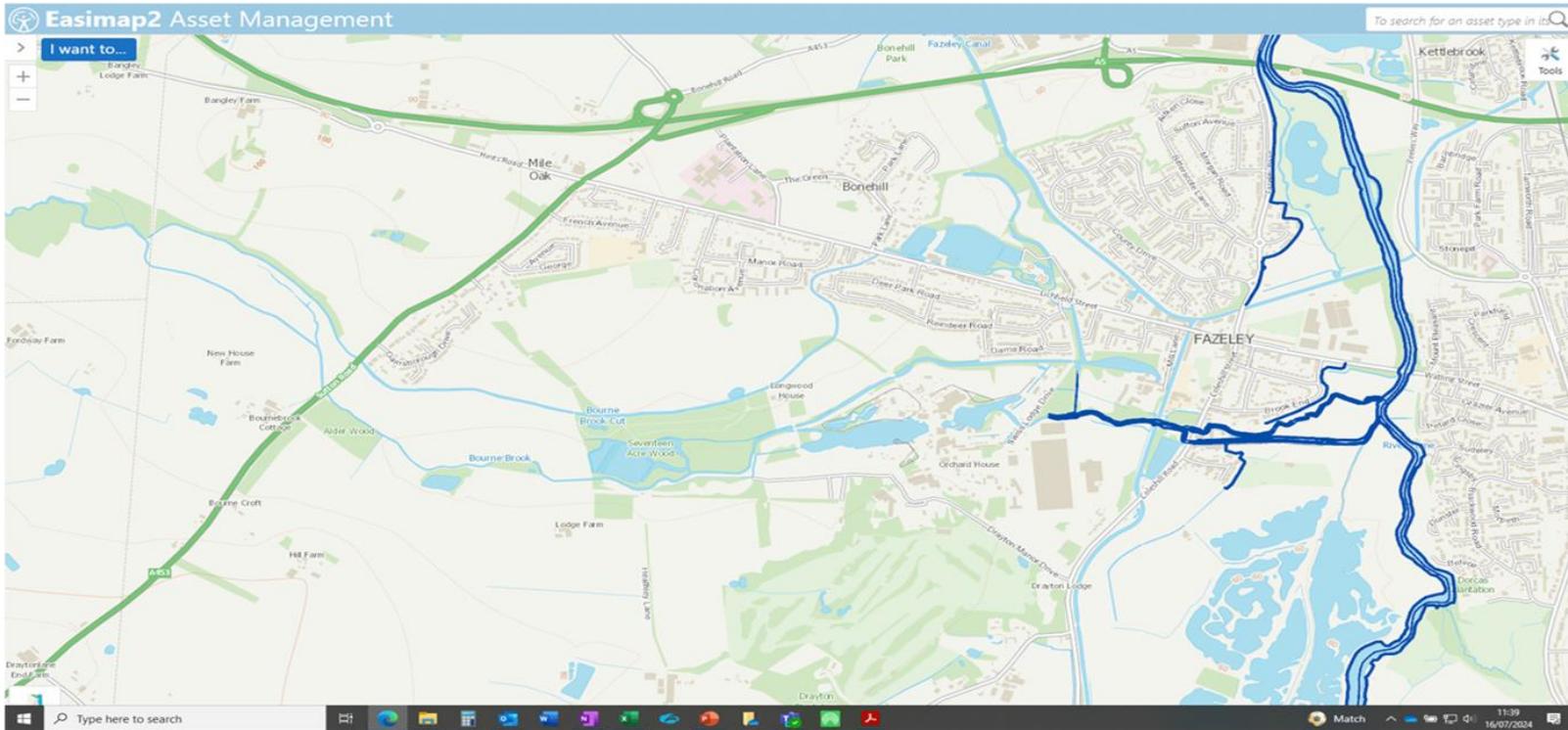
Raised Defences - Walls/Embankments

Sluice Gates/Barriers

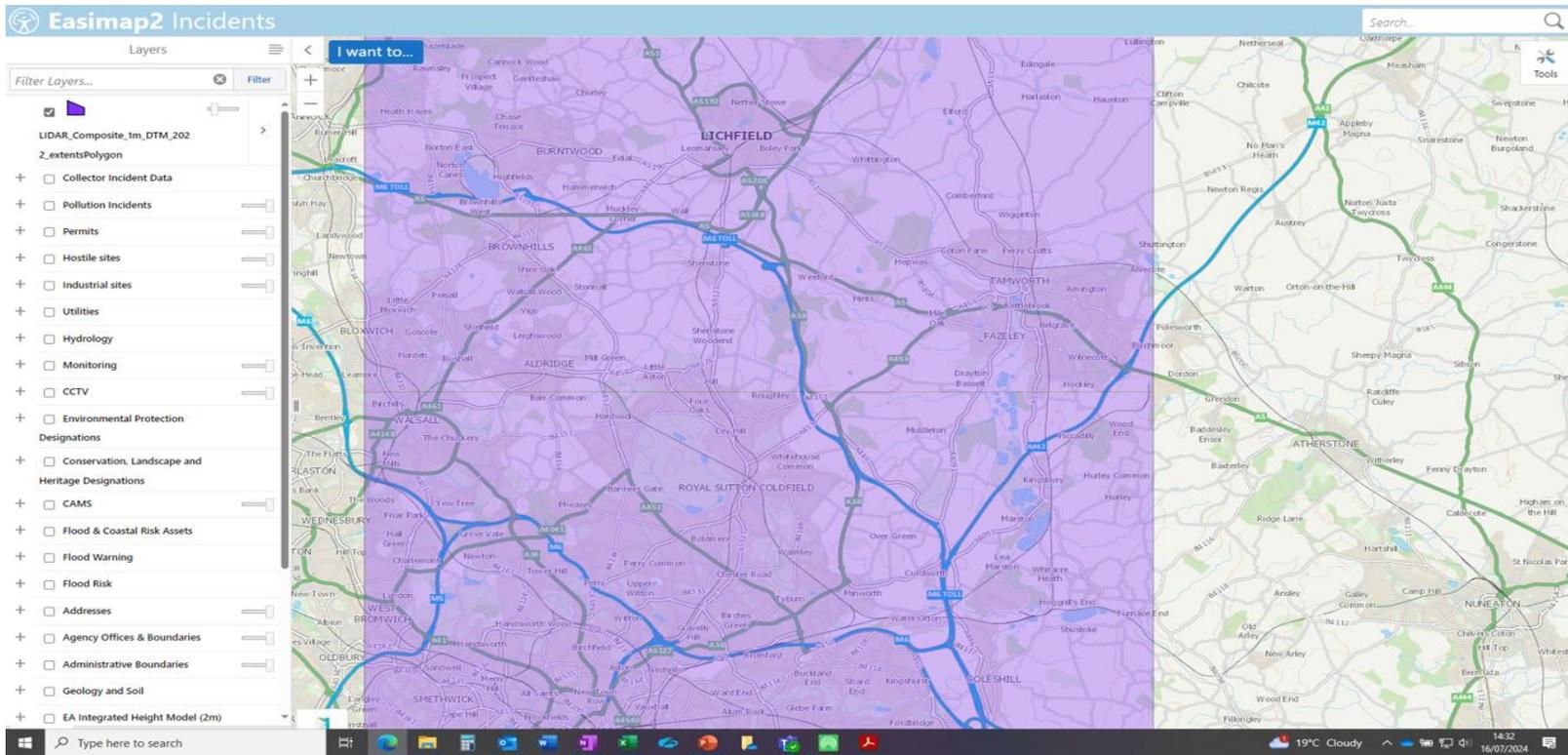
3rd Party Assets

Other

Survey Coverage Map



Remote Sensing Coverage Map



Available Data - Treat as Site Information

All datasets supplied for the project must be returned to the *Client* upon project completion. Datasets returned should adopt the appropriate security marking, be password protected/encrypted in accordance with the latest government guidelines.

Flood history information:

Event Date	Location	Data Type	Other Details	Known data quality issues
10/2023	Dama Road, Fazeley	Other		resident reports - flooding report, extent unknown

Existing Model Summary - Fluvial Hydraulic

Model name	Date	Length of modelled watercourse (km)	Hydraulic model type	Other Type
Bourne Brook (HS2 cross) Model	tbc	tbc	Flood Modeller Pro - Tuflow	
Drayton Manor Model	2021	<1	Flood Modeller Pro - Tuflow	
Tamworth 2023 Hydraulic Model	01/2023	8	FMP/TuFLOW	