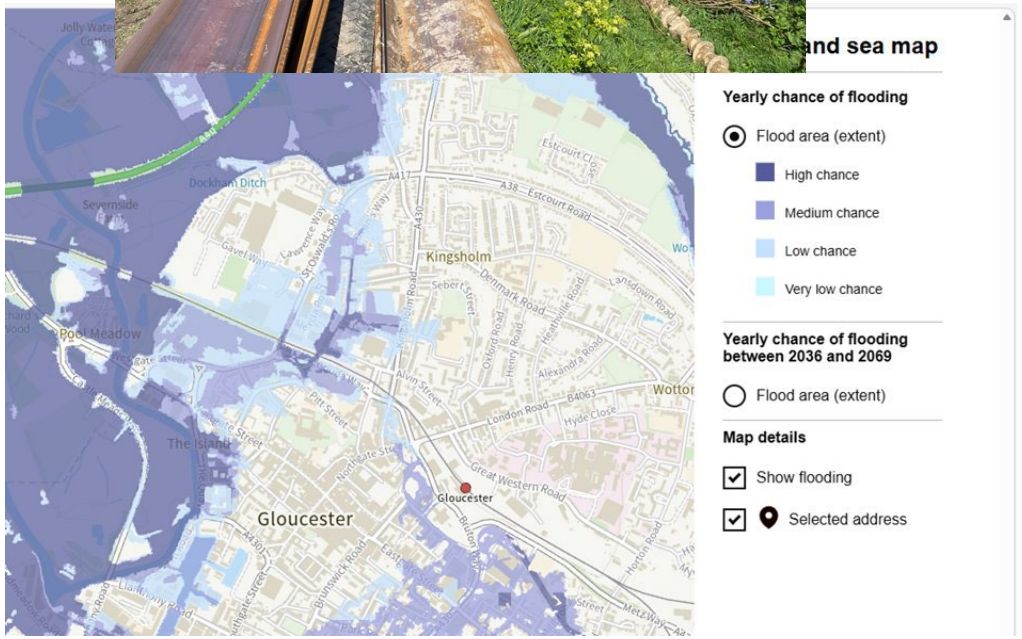
Role of the Environment Agency - Internal

Capital Projects

- Support scheme appraisal
  - demonstrate economic viability (Treasury's Green Book)
  - Damaged assessed using Multi-Colored Manual
- Modelling underpins the evidence base:
  - Quantifies flood risk and damages
  - Assesses scheme benefits and option
- 250 projects:
  - Invested £2.65 billion since 2024
  - 62,000 homes and businesses are better protected
  - Will prevent an estimated £10 billion

Mapping Projects

- National and catchment-scale flood models
- More than 1,000 detailed local flood risk models
- Used to:
  - Inform public understanding of flood risk
  - Support policy, planning, and investment decisions



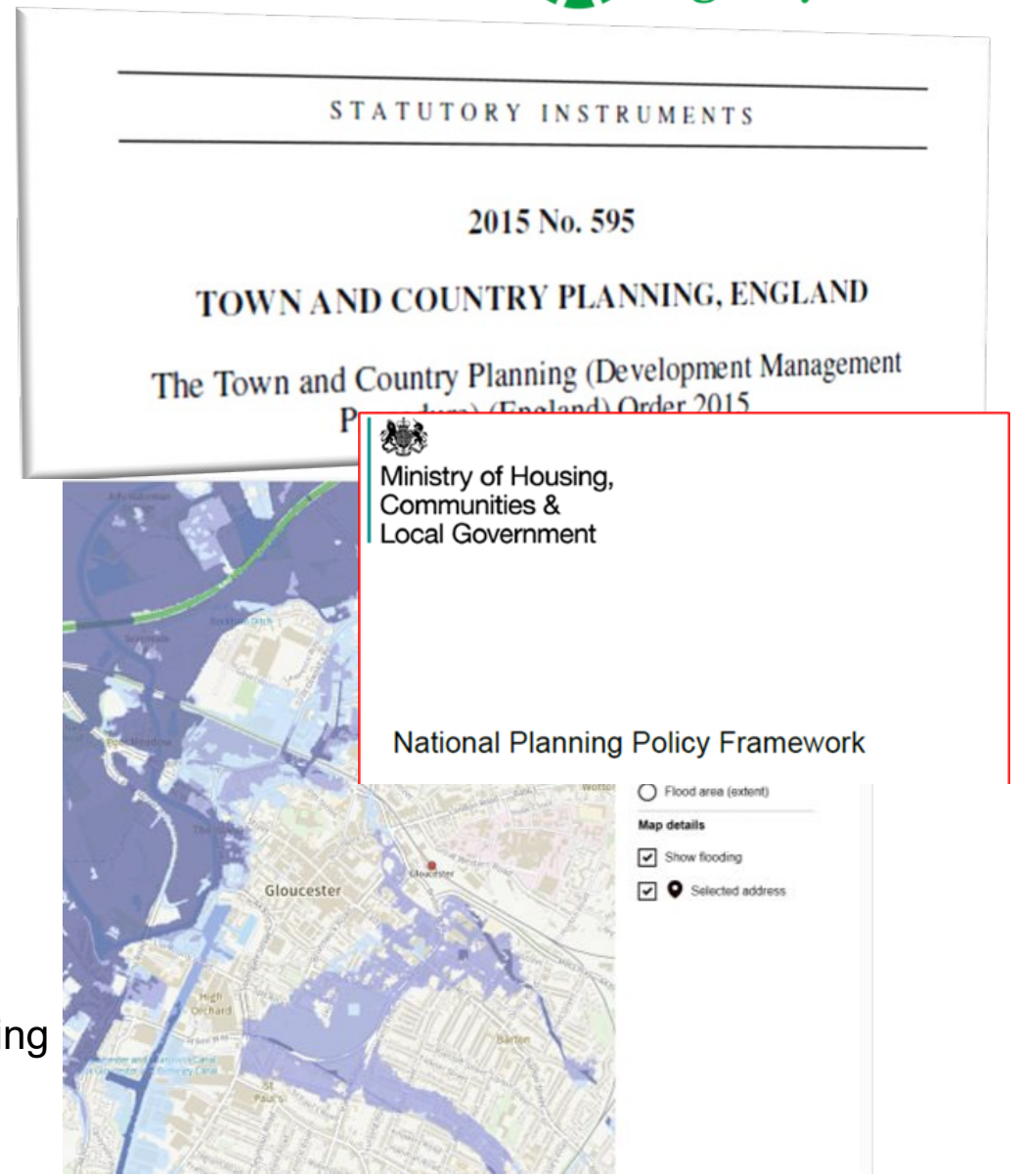
Role of the Environment Agency- External

Planning Applications

- Produced by developers and consultants
- Assess site-specific flood risk and impacts of development
- Reviewed by EA as a Statutory Consultee
- Statutory Consultee
- Responses within a 21-days
- Assessment focuses on two key questions:
  - Is the development safe for its lifetime?
  - Will the development increase flood risk elsewhere?
- Evidence provided through a Flood Risk Assessment (FRA)
- 197 applications reviewed 2025/2026

Evidence & Risk Reviews (Flood Map Challenge)

- Third-party models used to challenge EA flood mapping
- Provide updated local evidence where appropriate
- EA review to ensure technical consistency
- Third-party submissions to challenge EA flood mapping
- New or improved modelling used to refine flood risk understanding
- 13 applications reviewed 2025/2026 (stop and slow)



How the EA Assures Modelling

Environment Agency

Early Engagement

- Early involvement is critical
- Review method statement

Internal projects

- Define clear, proportionate modelling scope and expectations

External projects

- Early discussions through Pre-Application (Pre-App)

Ongoing Technical Support

- Role of the model assurer:
  - Assess whether the modelling approach is appropriate and robust
  - Identify limitations, risks, and uncertainties
  - Provide technical advice and recommendations (not decisions)

Internal projects

- Work with consultants to ensure requirements are understood and delivered
- Technical lead embedded within project team

External projects

- EA local team triages applications and determines level of technical review
- Complex models are passed to specialist reviewers for assurance
- Final position provided by the local EA team to the Local Planning Authority

Final Review and Sign Off

- Assess the quality and robustness of final model against guidance

Internal projects

- Ensure all required deliverables

Hydraulic Model Review

Key Principles

Strike the right balance in responses
- ✓ Explain what the issue is and why it matters
- ✓ Avoid unhelpful comments (e.g. “this is wrong”)
- ✓ Set out issue impact required action
- ✓ Provide direction, not solutions
- ✓ Write on behalf of the Environment Agency
- ✓ Use neutral, professional, evidence, based language

Standards and guidance
- ✓ Base comments on published guidance
- ✓ Align with industry best practice

Not a tick box exercise
- ✓ Proforma is a tool, not the review itself
- ✓ Do not rely on checklist order alone
- ✓ Use judgement and experience
- ✓ Automated tools highlight issues not conclusions
- ✓ Always explain impact and context of findings

Expect robust justification and reporting
- ✓Expect clear evidence and reporting
- ✓“Existing EA model” is not sufficient justification
- ✓All decisions must be documented and justified
- ✓Explain checks, methods, and implications
- ✓If it’s not documented, it hasn’t happened
- ✓Avoid assumptions ensure a clear audit trail

Proportionate
- ✓Understand the purpose of the modelling
- ✓Not all issues are critical reflect this in comments
- ✓Avoid over-engineering (“gold plating”)
- ✓Ensure model is fit for purpose

RAG status
- ✓Apply EA RAG definitions consistently
- ✓Base status on impact to results and decisions
- ✓Actions expected only for Amber and Red
- ✓Status depends on model use, risk, and context

Review scoring

OK – Good practice.

No Objection.

Green – Negligible impact on the results that is unlikely to change the outcome of the study.

No Objection. Acknowledgement of the comment expected

Amber – Potential impact on the results that may change the outcome of the study.

Requires justification of approach or rectification

Planning: Consider objecting to the application based on comments highlighted.

Red – Has an impact on the results that may have a significant impact on the outcome of the study.

Thorough justifying of the approach from applicant based on evidence or update the model in accordance with the comment.

Planning: Objection - Application to be objected if comments are highlighted in this category.

Main Tools to Support Assurance

Hydrology

- LIT 11832 Flood Estimation Guidelines
- LIT 66039 Flood Estimation Calculation Review Template
- LIT 65087 Flood Estimation Report Template
- LIT 72793 - Flood Estimation for Reservoir Safety Calculation Review Template

Hydraulic Modelling

- LIT 56326 - Fluvial Modelling Standards
- **LIT 74721 - Non-real time Hydraulic Model Method Statement Review Template**
- **LIT 17617 - Non-real time Hydraulic Model Review Template**
- **LIT 56342 - Fluvial Model Assessment Tool**

Coastal Modelling

- LIT 56561 Coastal Standards
- LIT 56562 Estuary Hydraulic Modelling Assessment
- LIT 65994 Estuary Model Assessment Tool

Method Statement Review

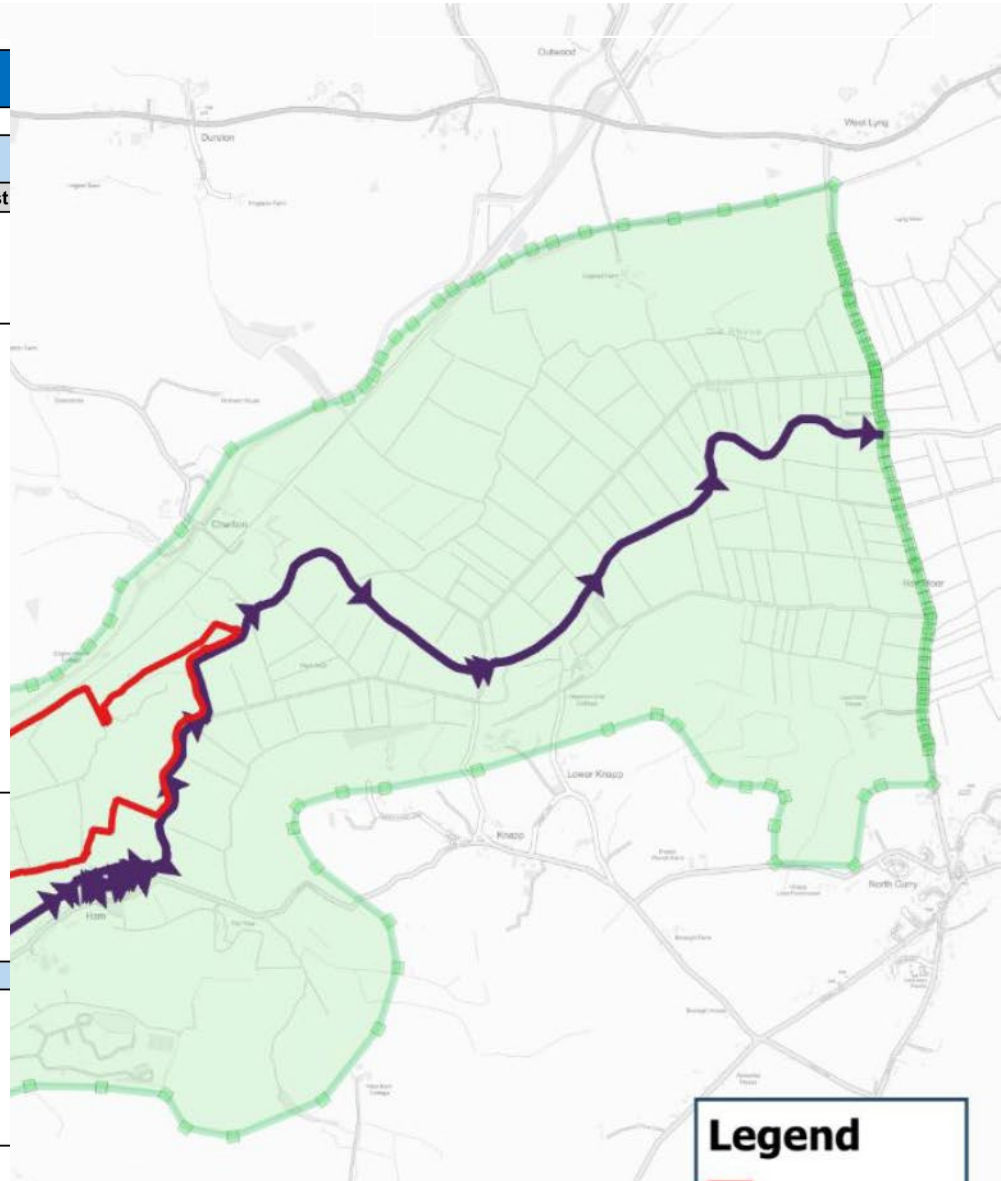
Sections

- Project Aims and Data Review
- Model Approach
- Methodology
- Events & Scenarios
- Deliverables and Limitations

Events & Scenarios					
Item No.	**Item Checked**	**RAG 1**	**1st Review Comments**	**1st Review Actions**	
5.1	What scenarios are they planning to undertake? Are the scenarios they are planning to undertake appropriate to meet the requirements of the scope/project?	OK	One defended scenario to start. Options appraisal to come after baseline. Verification to be complete after FSA improvements		
5.2	What events are they planning to simulate? Are the %AEP design events they plan to simulate appropriate to meet the requirements of the scope/project?	Red	Yes, described in section 5.2. These meet the scope other than 0.1% has been left off	Please update Table 5-1 to match scope and include 0.1% AEP	
5.3	If climate change scenarios are required, are uplift allowances proposed in-line with current guidance?	OK	Climate change not included in method statement. It is not required for the baseline defended but has been requested for the options modelling		
5.4	How are proposed scenarios going to be modelled? Are these methods appropriate?	OK	One defended scenario to start. Options appraisal to come after baseline. Defended scenario is update of basline model to better represent FSA		
5.5	How will the proposed scenarios be set up in the model control files and is this appropriate?	N/A			
5.6	Which sensitivity tests are proposed? Are these appropriate?	Red	Tests on 1% AEP for +/-20% to roughness and flows. Method statement only indicates channel roughness	Please update for 1D and 2D roughness. Scope states roughness and does not specify 1D only	
5.7	How will the proposed sensitivity tests be set up in the model control files and is this appropriate?	Green	No information provided on this	Useful to have but not essential	
5.8	Calibration/verification	OK	Two events to be used - Oct 23 and Nov 25. This matches the scope		

Model Scenarios

MODEL SCENARIOS						
EVENTS & SCENARIOS						
Item No.	**Item Checked**	**Model developer comments**	**RAG 1**	**1st Review Comments**	**1st Actions for model developer**	**1st**
2.1	Are the simulated events sufficient to meet project requirements?		OK			
2.2	Are climate change runs aligned with current guidance?		Amber	The consultant has applied the central allowance; however, since the site is classified as essential infrastructure, the higher allowance should be modelled. A 40-year lifetime has been assumed. There must be certainty around this assumption, supported by assurances from the developer and a plan to decommission the site after 40 years as well as evidence it will be constructed next year. Please discuss and agree with the area team. The consultant states that a 70% uplift value has been applied to the tidal boundary, but the specific value is not provided. This represents the higher central value, which is appropriate for assessing whether tidal or fluvial influences are dominant.	Use the higher allowance as its essencial infrustructure. Agree lifetime of development with the Environment Agency Area team. Please provide the exact vallue used to increase the tidal boundary.	
2.3	Are undefended scenarios required (for Flood Zones etc.) and if so have any raised defences and structures been removed in line with guidance?		N/A			
SCHEME PROJECTS						
2.4	Where a scheme is being developed, have appropriate model runs been provided to compare the baseline and with-scheme scenarios? Have the with-scheme scenarios been schematised appropriately?		N/A			
	Has a study for quantifying uncertainty					



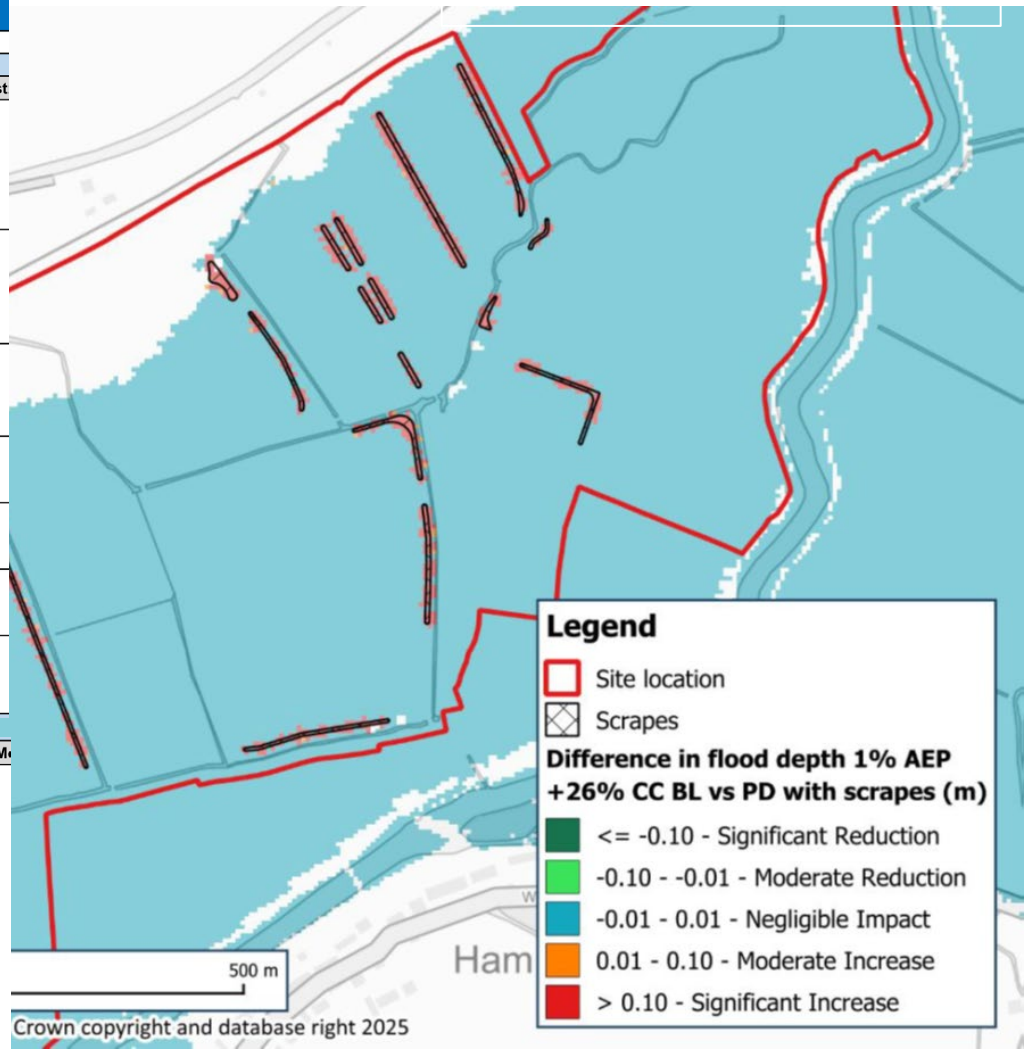
2D Model Build

2D MODEL BUILD

DIGITAL TERRIAN MODEL

Item No.	Item Checked	Model developer comments	RAG 1	1st Review Comments	1st Actions for model developer	1st
6.1	What datasets have been used to define the floodplain (i.e. LiDAR, topographic survey etc.) and have these datasets been correctly represented in the model DTM?		Amber	LiDAR data has been used, and the consultant has explained that a survey is available but lacks sufficient detail. A comparison against this survey is still needed.	Compare the LiDAR used in the model with survey data for the development site.	
6.2	What grid resolution has been used within the model and is it suitable to capture key flow routes within the model (e.g. between buildings)		Green	An 8 m grid has been used, but the report does not discuss the appropriateness of this choice. While this is reasonable for the relatively flat areas, channels within the developed area are narrower than 8 m and are therefore not accurately represented in the model. To use an 8 m grid effectively, z-lines should be incorporated to ensure proper conveyance of flow through these channels.	Represent channels in the development site using zlines	
6.3	Has the DTM been rotated to optimise flow route representation? Is this appropriate?		OK			
6.4	How have buildings been represented within the DTM? Is this appropriate?		Green	Buildings outside the site of interest have been assigned a roughness value of 0.1.	Please set building roughness to 0.3	
6.5	Are bank crests accurately represented?		OK			
6.6	Are raised defences/embankments accurately represented?		N/A			
6.7	Are conveyance routes underneath raised embankments accurately represented?		Amber	See 5.1		

Item No.	Item Checked	Model developer comments	RAG 1	1st Review Comments	1st Actions for model developer	1st M
8.1	Have any structures been included in the 2D domain (floodplain or channel) and how have they been represented? Are structure details (invert, length etc.) correct compared to survey?		Red	Scrapes in the model seem to be set at 0.1mAOD not 0.1m below the existing ground level. This will significantly overestimate the volume within these scrapes. (Red rating) The solar farm fields have been representyed using a restriction layer set aty 1%. Further evidence is needed alongside the table in the report to show that this is the cortrect vallue. Provide a plan of the support locations for the sollar pannels. From past experience this vallue is usually betweren 3% and 5%. (Amber rating) The solar panels are located within the floodplain. The consultant has adequately represented the overall loss of floodplain storage, but the but not modelled the solar panel support loss on flood plane volume within the model. Please consider accounting for the volume lost due to the support structures within the model. (Green rating)	Update ths scrapes to represent 0.1m below ground level as discussed in the report. (red rating) Provide more clarity on how the constriction percentage was estimated. (Amber rating) Provide further discussion on the constriction calculation. (Amber rating)	



Iterative Process

MODEL STABILITY

1D MODEL STABILITY

Item No.	Item Checked	RAG 1	w C	ew	s	RAG 2	w C	esp	RAG 3	w C	esp	RAG 4	w C	esp	RAG 5	w C	esp
13.1	Errors/Comments/Warnings?	Amber	W	Pl	A	OK			OK	Fo		OK	Se		OK	Se	
13.2	Convergence	Amber	U	Pl	I	Amber	Lo	No	Amber	Th	We	Red	LF	Se	Green	Wh	
13.3	Does a basic check of animations and graphed outputs give an indication of good model stability?	OK	Mo			N/A			N/A	Th		N/A	Th		Green	So	

2D MODEL STABILITY

Item No.	Item Checked	RAG 1	w C	ew	s	RAG 2	w C	esp	RAG 3	w C	esp	RAG 4	w C	esp	RAG 5	w C	esp
14.1	Is mass balance within tolerable limits?	Green	Ma	Wi	I	Green			Green	Fo	No	Green	Fo		Green	Se	
14.2	Are CE and dV values relatively stable and remain so once the run has got going.	Green	Su	Wi	I	Green			Green	Fo	No	Green	Fo		Green	Se	
14.3	Errors/Comments/Warnings?	Green	W	Pl	A	Green	Ag		Green	Pr	We	Green	W		Green	Se	
14.4	Negative Depths	OK	No			OK			Amber	Th	We	Green	Si		Green	Se	
14.5	Does a basic check of animations and graphed outputs give an indication of good model stability?	OK	OK			N/A			N/A	Th		N/A	Th		N/A		
14.6	2d extents and outputs	Amber	Gl	Pl	I	OK	Re		OK	Re		N/A	Th		N/A		

1D/2D MODEL LINKS

Model_Stability

MODEL LINKS

Item No.	Item Checked	RAG 1	ew Co	view A	Respo	RAG 2	ew Co	view Respo	RAG 3	ew Co	esponse (07	RAG 4	ew Co	Respo	RAG 5	mm
12.1	How have the 1D/2D models been coupled, is it appropriate?	Amber	Linking method is appropriate	Please investigate	See response to 12.2										OK	ref to 12
12.2	Is the digitisation of the links acceptable?	Red	There are a number of gaps	Please investigate	These are the location of juncti	Amber	I see that the reservoir (Ver		Amber	This configuration is unchange	The rivers sections at the Ver/C	Amber	Discussed in meeting		OK	Ple e ref to pre ou
12.2	Is the digitisation of the links acceptable?					Red	res011 has not been connected	res011'	Red	This configuration is unchange	The resevoir unit is a legac	V93_Calibration_Che	OK	Discussed in meee ting.		OK	Ple e ref to pre ou
12.2	Is the digitisation of the links acceptable?					Red	Please see sheet UCL67. Ther	UCL67	OK	I have looked again at the						OK	Ple e ref to pre ou
12.2	Is the digitisation of the links acceptable?					Red	There is a large reservior CHS	CHS_279	Red	This configuration is unchange	This configuration is a legac	OK	The reservoir unit has been		OK	OK	Ple e ref to pre ou
12.2	Is the digitisation of the links acceptable?								Amber	London Coln ey\2d_bc_hxi_L	2d_bc_hxi_LC_polyline_018.sh	OK	Fixed		OK	Ple e ref to pre ou
12.3	Is the 2d representation of the river channel comparable in width with the 1d model cross sections?	OK								No WLL lines as yet					OK	
12.4	Representation of 1D output in 2D domain	OK													OK	

Fluvial Model Assessment Tool

Environment Agency

Fluvial Model Assessment Tool		
Background		
The Fluvial Model Assessment Tool uses the model elements within the Environment Agency's Model Quality Assurance Record (QAR) review spreadsheet, as well as some additional details, linking this to the new Fluvial Modelling Standards guidance document (2021). This tool assigns a quality category and condition assessment score to the model. It allows users to assess overall model condition and advise on the purposes for which the model can be used. It does not replace the QAR nor offer the same level of technical detail. The scoring tool is split into Source / Modelling Approach / Pathway / Receptor components. The tool requires users to assign A, B, C or U quality scores for each model element and to complete the condition assessment. Users do not need to have undertaken the hydraulic review, but a working knowledge of hydraulic models, and familiarity with the model in question and of the Modelling Standards guidance document is required. Instructions are provided in the "Instructions" worksheet.		
Tool version number		
Version: 004		
BIM name: ELA-JBA-XX-XX-DB-Z-0000-A1-C01-E1000-EA3-LOD3-2020s1360_ModelScoringTool		
Background information		
Project reference:	ENV0003318C	
Date of assessment:	02/02/2026	
Client:	CLA PSO	
Background information (including purpose of project / model)	The Pow Beck catchment, Whitehaven, has a frequent history of fluvial and pluvial flooding and extreme tidal events. The most recent flood events include October 2008, 2021, 2022 and August 2017 and the largest occurring in November 1999. For each of these events, flooding likely resulted from fluvial, pluvial sources in response to prolonged and high intensity rainfall, and from the tide (especially pre-construction of the Whitehaven Marina sea wall in 1998). Current flood risk mapping in the area is over nine years old (Pow Beck Strategic Flood Risk Mapping Study, 2013). To improve the understanding of flood risk in the study area, there is a need to update the modelling, making use of the latest available data (improved accuracy and resolution), tools, technical guidance, best practices, and standards. A sea lock was installed in 1998 which was designed to increase Whitehaven Marina's standard of protection from the 50% AEP to the 0.5% AEP tidal event. This study will consider fluvial risk only. **Hydrology review - some comments appear to be unresolved within the review spreadsheet.**	
Hydrology type (drop down)	Ungauged Stats	
Model type (drop down)	1D-2D	
Model software (drop down)	FM-TUFLOW	"Flood Modeller ver. 6.1.0.9389 TUFLOW (Classic) Ver. 2020-10-AF-iDP-w64"
Data used for review		
Main report file name	ENV0003318C-JAC-XX-503-RP-HY-0003-S3-P02-Pow Beck Model User Report	
FEH calculation record file name	ENV0003318C-JAC-XX-503-RP-HY-0001-S3-P02-L0103-EA4-LOD4-Pow Beck Flood Estimation Report	
Model report file name	ENV0003318C-JAC-XX-503-RP-HY-0003-S3-P02-Pow Beck Model User Report	
Source of topography	topography of the floodplain is represented using the latest 2022 1m resolution LiDAR dataset downloaded from the Defra web service.	
1D model control file name	Pow_Beck v172 Pow_Beck_v175_NODEF (Undefended)	
2D model control file name	TUFLOW - PowBeck_DEF_PD_~e1~.tcf Pow_Beck_165_NODEF_PD_~e1~.tcf"	
Associated EA QAR record	https://defra.sharepoint.com/:x:/r/teams/Team1569/Quality%20Assurance%20for%20Modelling/Live%20Projects/CLA/2023_PowBeck/Quality%20Assurance%20Record/LIT56566%20Quality%20Assurance%20Record%20for%20Flood%20Risk%20Modelling.xlsm?d=wa09b3058a8c74406876d4e4f916fd844&csf=1&web=1&e=s5eu3N	

Scoring criteria

Quality category	Score	Detail
Design	A	The best possible quality at the current state of knowledge and technology. Suitable for detailed scheme design work, individual property level protection, flood mapping/flood warning for higher risk communities.
Appraisal	B	Between the minimum acceptable quality and the best available quality. In practice, it may contain elements of both. Suitable for appraisal of flood risk management schemes, economic damage estimation, flood mapping and flood warning for medium risk communities.
Strategic	C	Minimum acceptable quality standard at the current state of technology. Aims to provide a balance between project cost and effort. Suitable for catchment wide analysis, flood mapping and Flood Alert Areas for lower risk communities or rural areas.
Unsuitable	U	Unsatisfactory quality with major errors or omissions.

Condition assessment	Score
1	Very good
2	Good
3	Fair
4	Poor
5	Very poor

Tool Conclusions	
Category	**Quality category**
Source category:	Strategic
Modelling Approach category:	Strategic
Pathway category:	Strategic
Receptor category:	Design
Overall category:	Strategic
Condition assessment	Good
Final Score	**C2**

Critical element checks	
Each model element has a "critical" or "non-critical" designation; the overall quality score cannot exceed the lowest quality score for a critical element. "Critical" or "non-critical" designation can be changed, although this is not recommended. The check below records whether critical elements have been changed from the default - details of which elements have changed can be found in Column N of the scoring worksheets.	
Critical element check - Source	OK
Critical element check - Modelling Approach	OK
Critical element check - Pathway	OK
Critical element check - Receptor	OK

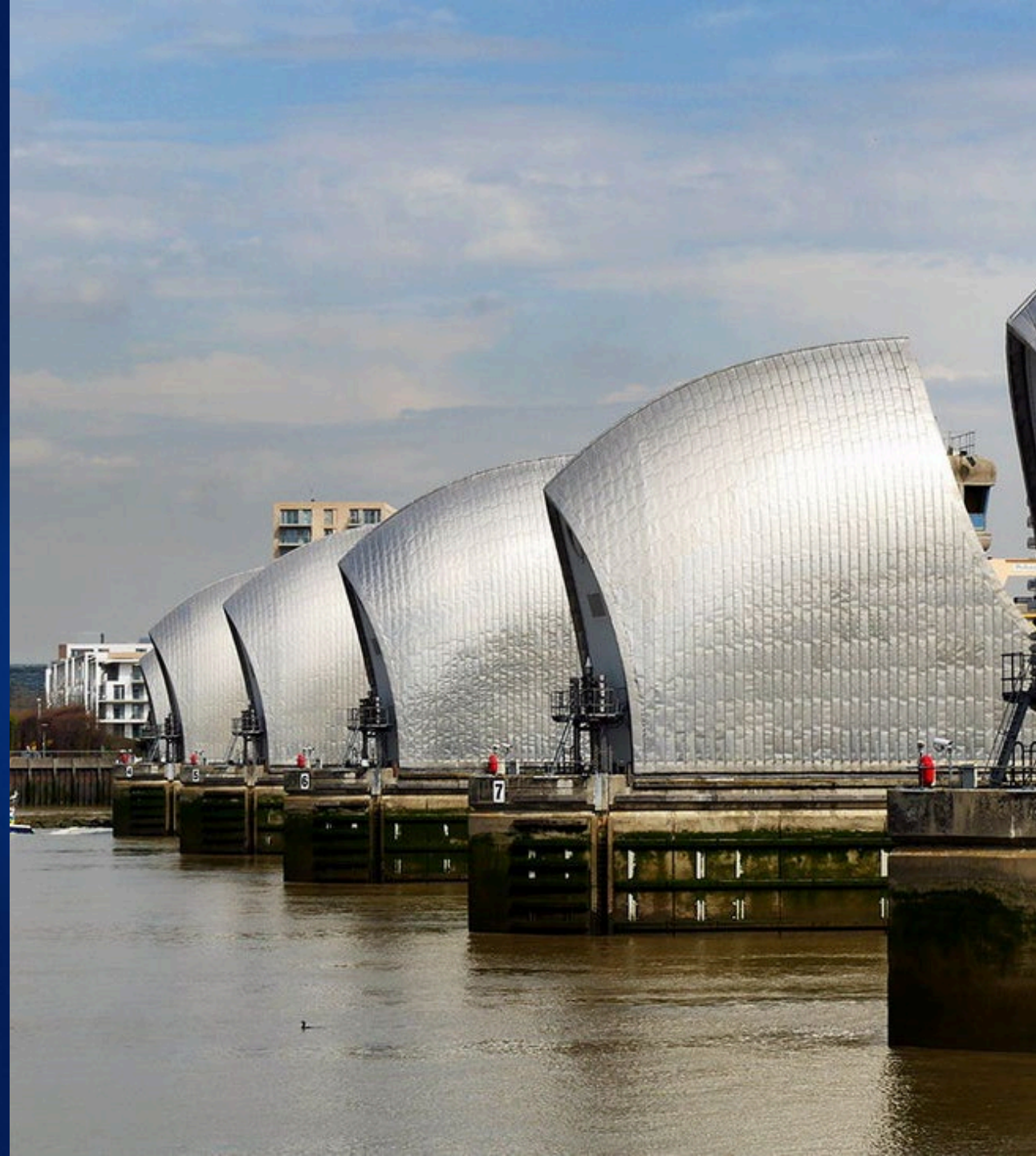
Environment Agency

Source: Modelling Approach — See Chapter 4 of Standards for Modelling in Fluvial Systems

ID	Element	Relevant guidance section	Critical / Non-critical	Question	Scoring guidance (entries here do not form an exhaustive list - use Comments to justify a different approach)	Quality score response	Overall score: Strategi… / Comment
Approach 1	Conceptual approach	4.1.1	No	Has a conceptual model been developed and is this appropriate to address the project requirements?	**A** = Detailed conceptual model and/or method statement. **B** = Conceptual model and/or method statement including all information barring some non-critical elements. **C** = Basic conceptual model and/or method statement broadly aligning with best practice sufficient to establish if industry standard methodologies are considered. **U** = No method statement or poor quality method statement missing key sources of information. **Other** = No method statement commissioned (i.e. on legacy models)	A	
Approach 2	Model type	4.1.2	Yes	Has a suitable choice between 1D, 2D and 1D-2D been made and justified?	**A** = Appropriate model choice with justification. **B** = Appropriate model choice with limited justification. **C** = Appropriate model choice with no justification. **U** = Inappropriate model choice.	A	
Approach 3	Software choice	4.1.3	No	Has the modeller chosen an appropriate modelling software?	**A** = Appropriate model software choice. **U** = Inappropriate model software choice.	A	
Approach 4	Timestep	4.2	No	Is the choice between steady/unsteady appropriate with a timestep suitable for the area of interest and adhering to software specific guidance?	**A** = Appropriate timestep choice. **U** = Inappropriate timestep choice.	A	1D Timestep = 1s 2D Timestep = 2s 2D Cell Size = 4m
Approach 5	Model performance - calibration / verification / validation	4.3.1 4.3.2 4.3.3	Yes	If sufficient data is available, has the model been calibrated or verified appropriately?	**A** = Calibrated to ±0.15m at >50% of available sites / against available data. Excellent match to observed extents. **B** = Calibrated to between ±0.15 - 0.25m at >50% of available sites / against available data. Or verification against LMED / observed data. Generally good match to observed extents. **C** = No calibration data available, but design event levels common sense checked against local knowledge. **U** = Calibration data ignored without explanation or model significantly over or under estimates with no good reason. Known flood extents unable to be recreated.	C	Limited observed events meant they flood events.
Approach 6	Model performance - sensitivity testing	4.3.4	Yes	Has sensitivity testing been completed?	**A** = Completion of all scoped sensitivity tests with accompanying discussion of results and recommendations to reduce uncertainty. **U** = No sensitivity tests, tests not adhering to scope requirements or inappropriately modelled tests. **Other** = Use for projects where sensitivity not expected (e.g. climate change update simulations)	A	Model sensitivity to a selection of ke have been considered for the 1% Al (5%, 2% and 1% AEP events for the for the defended scenario. Flow +/-… lowered by 20%. In-Channel Rough (open channel) roughness raised ar Due to high velocities, controlled by was not possible to reduce in-chann reaches of Midgey Gill. These areas as the high velocities drive lower wa Boundary Sea Lock, Close/Open, Whitehaven and closed respectively. Downstrea unadjusted MHWS tide for the close scenario, the tidal boundary minimu 2.5mAOD to maintain model stabilit
Approach 7	Mathematical stability	4.4	Yes	Does the model exhibit acceptable mathematical stability and mass conservation?	**A** = Stability measures within recommended tolerances with minor periods of non-convergence not impacting peak flows or levels. Evidence that efforts have been made to reduce instability. **B** = Instability present not impacting peak flows or levels. Evidence that efforts have been made to reduce instability. **C** = Widespread instability present which impacts peaks flows or levels. Evidence that efforts have been made to reduce instability and residual instability approved in technical review. **U** = Poor stability beyond tolerances and negatively impacting results with no accompanying justification or approval.	B	1D - Mass Balance within +/-1%, BA iterations for majority of the model r show instability prior to/ after the pe the Q200) this occurs at the peak. "I Gill and Whinlatter Drain for the Q20 that are in channel with no receptors ever reaching receptors. Instability c the model. The cause of this instabi conditions driven by a very steep ch 2D - DEF scenario - Peaks at betwe 1.8% to 2%. Under 1% by 4.5hrs to AEP events (including Cal/Val). Che
Approach 8	Required outputs	4.5	No	Is the model set up to allow extraction of the required outputs?	**A** = Yes **U** = No. Note: various outputs can only be produced during post processing which may be completed post model review. Lack of appropriate outputs does not undermine overall model quality if the model is able to produce such outputs.	A	
Approach 9	Reporting	4.6	Yes	Has an appropriate level of reporting been provided alongside the hydraulic model?	**A** = High quality reporting, following recommendations in Modelling Standards guidance **B** = High quality reporting, following recommendations in Modelling Standards guidance with minor omissions. **C** = Acceptable quality reporting to allow model sign off, but additional detail would aid future users. **U** = Insufficient reporting to justify modelling approaches adopted.	A	

Flood Platform
by Jacobs

Project Example:
Thames Flood Mapping



Thames Flood Mapping

- Safeguarding 1.51M people & $546B in property
- 100km of most complex modelling in the Europe
- 10,000+ unique high-resolution 2D simulations on Flood Platform; derived from large scale 1D modelling.
- Collaboration with Jacobs, JBA and Client (EA)
- Significant improvement to evidence base to provide better value and efficiency of flood protection spending.

Flood Platform
by Jacobs

Project Challenges

- Multiple stakeholders from several consultants with varying skillsets.
  - Technical stakeholders – reviewing models for modelling correctness
  - Area teams – comparing multiple models to check that it matches their local expertise and expectations
- Must ensure that the produced models and their outputs are of a high quality.
  - Consider size of input datasets and produced results.
  - Consider sheer quantity of simulations.
- High security requirements.

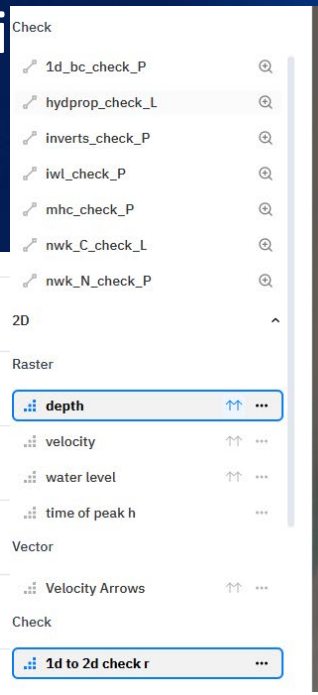
How to enable different (non-technical) stakeholders to do their own checks?

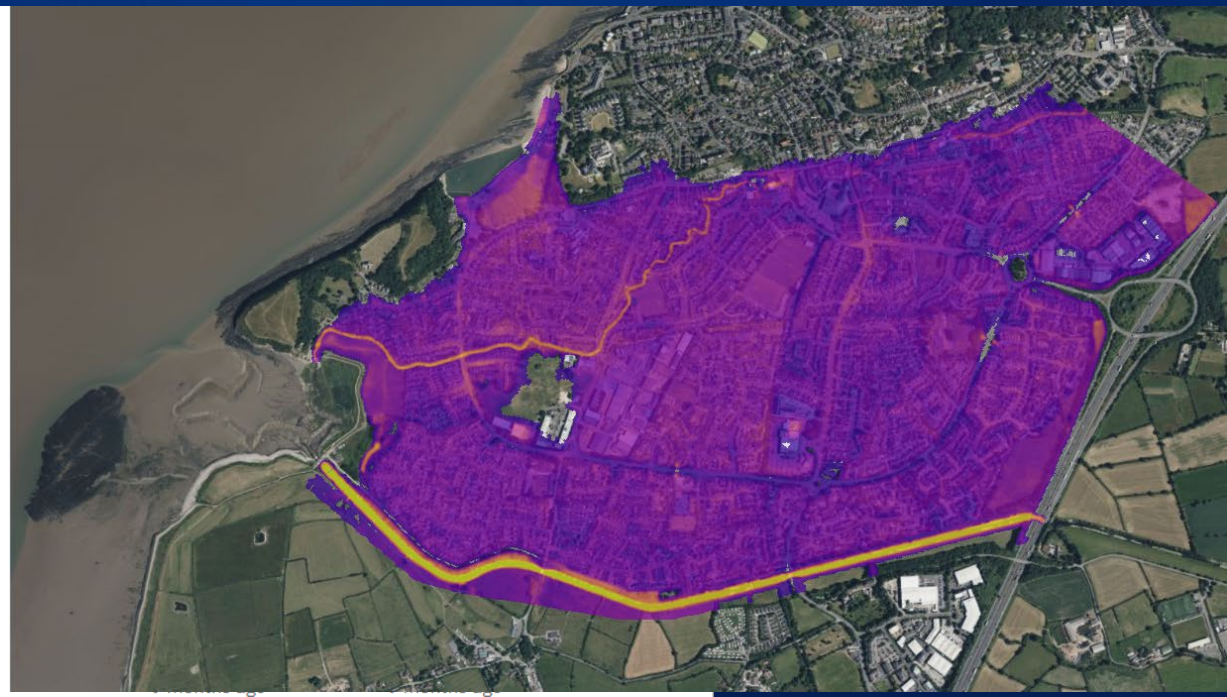
How do we undertake our QA processes for something of this scale?

How do you ensure that the QA is done to the same standard as any other model?

Use of Flood Platform

- Specifically for QA, we're using Flood Platform to allow users from different companies to review modelling results.
- Remove hardware/software barri
- Consistent presentation of results.
- Easy to compare results between simulations and expected results





Clevedon_UNDEF_T75_009	Complete	ESTRY 1D & TUFLOW 2D	Undefended				
Clevedon_UNDEF_T10_009	Complete	ESTRY 1D & TUFLOW 2D	Undefended				
Clevedon_UNDEF_T5_009	Complete	ESTRY 1D & TUFLOW 2D	Undefended				
Clevedon_DEF_T75_009	Complete	ESTRY 1D & TUFLOW 2D	Defended				
Clevedon_DEF_T1000_009	Complete	ESTRY 1D & TUFLOW 2D	Defended				
Clevedon_DEF_T50_009	Complete	ESTRY 1D & TUFLOW 2D	Defended				
Clevedon_DEF_T5_009	Complete	ESTRY 1D & TUFLOW 2D	Defended	20%	T5	9 months ago	9 months ago

QA Tool Design Ethos

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- Concerns:
  - Not enough automation - Doesn’t help reduce workload much.
  - Too much automation - Oversimplifies, removes nuance, might hide something critical.
- Benefits:
  - Can produce consistent and reproducible outputs.
  - Easy to repeat when iterating; and scalable across thousands of independent models.

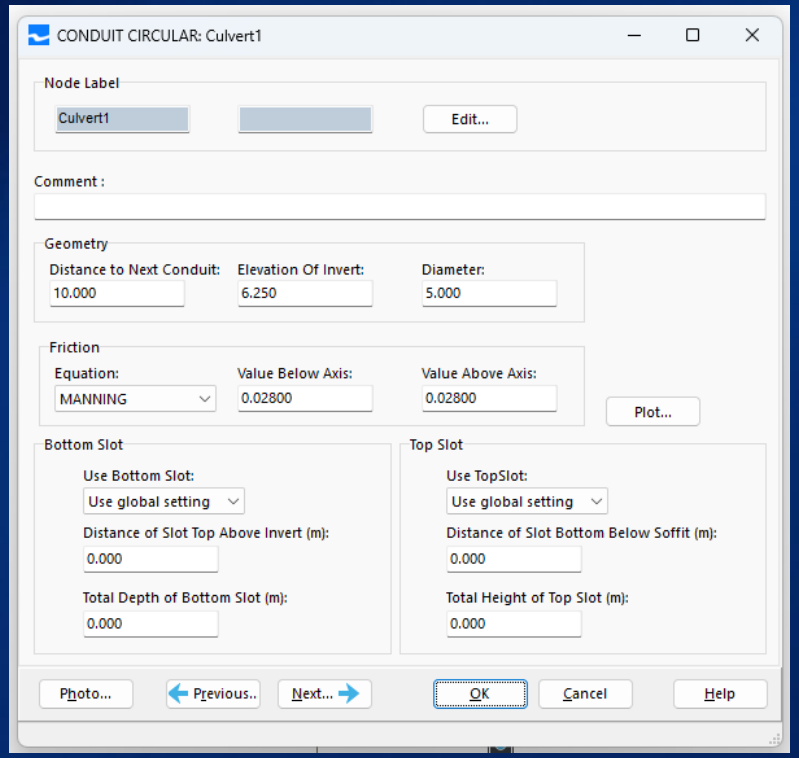
Focus on aggregating and presenting model data.

Some checks are more suited to automation.

Help modellers without doing the job for them.

Example – Manual

- EA's non-realtime Hydraulic Model Review spreadsheet, items 5.1-5.6:
  - What structures are represented?
  - Are the invert levels correct to survey?
  - Is orifice mode enabled?
  - Do structures have overtopping/bypass spill units?
  - Are movable structures modelled correctly?
  - Do structures use default coefficients?



Example - Automated

- Python script collects all structure data.
- Grades individual structures against simple criteria for RAG grade.
- Configurable criteria.

Unit Label, Type	Orifice Mode	Bridge Bypass/Overtopping	Flat Spill
ROT03_4228u, BRIDGE	Transition width of 0.200m	Cannot detect upstream Junction unit.	
ROT03_3465u, SPILL			No segment of spill determined to be flat.
ROT03_2813bu, BRIDGE	Transition width of 0.200m	Cannot detect upstream Junction unit.	
ROT03_2813su, SPILL			No segment of spill determined to be flat.
ROT03_2249u, SPILL			Some amount of spill determined to be flat (12.57%).
ROT03_2217bu, BRIDGE	Transition width of 0.200m	Cannot detect upstream Junction unit.	
ROT03_2217su, SPILL			No segment of spill determined to be flat.
ROT03_1229u, BRIDGE	Orifice mode not enabled	Cannot detect upstream Junction unit.	
ROT03_27Bu, BRIDGE	Transition width of 0.200m	Cannot detect upstream Junction unit.	
ROT03_27Su, SPILL			No segment of spill determined to be flat.
ROT02_3936bu, BRIDGE	Transition width of 0.200m	Cannot detect upstream Junction unit.	
			Significant amount of spill determined to be flat (100.00%).

Orifice Mode

Evaluate bridge units based on if they have orifice mode enabled and the transiton distances used.

- Returns N/A grade if not a bridge or doesnt have orifice mode feature.
- Returns RED grade if orifice flow not applied.
- Returns AMBER if orifice flow enabled but has small transition distance (less than 0.2).
- Returns GREEN if orifice flow enabled and has required transition distance or greater.

Flat Spill

Evaluate spill units based on flatness.

- Returns N/A grade if not a spill unit.
- Returns AMBER if spill unit has any two adjacent height values that are within 0.0 meters.
- Returns RED if significant % of spill width is flat (greater than 40 percent).
- Returns GREEN otherwise.

Bridge Bypass/Overtopping

Check whether bridges have bypass spills. Raises AMBER if this is ambiguous*.

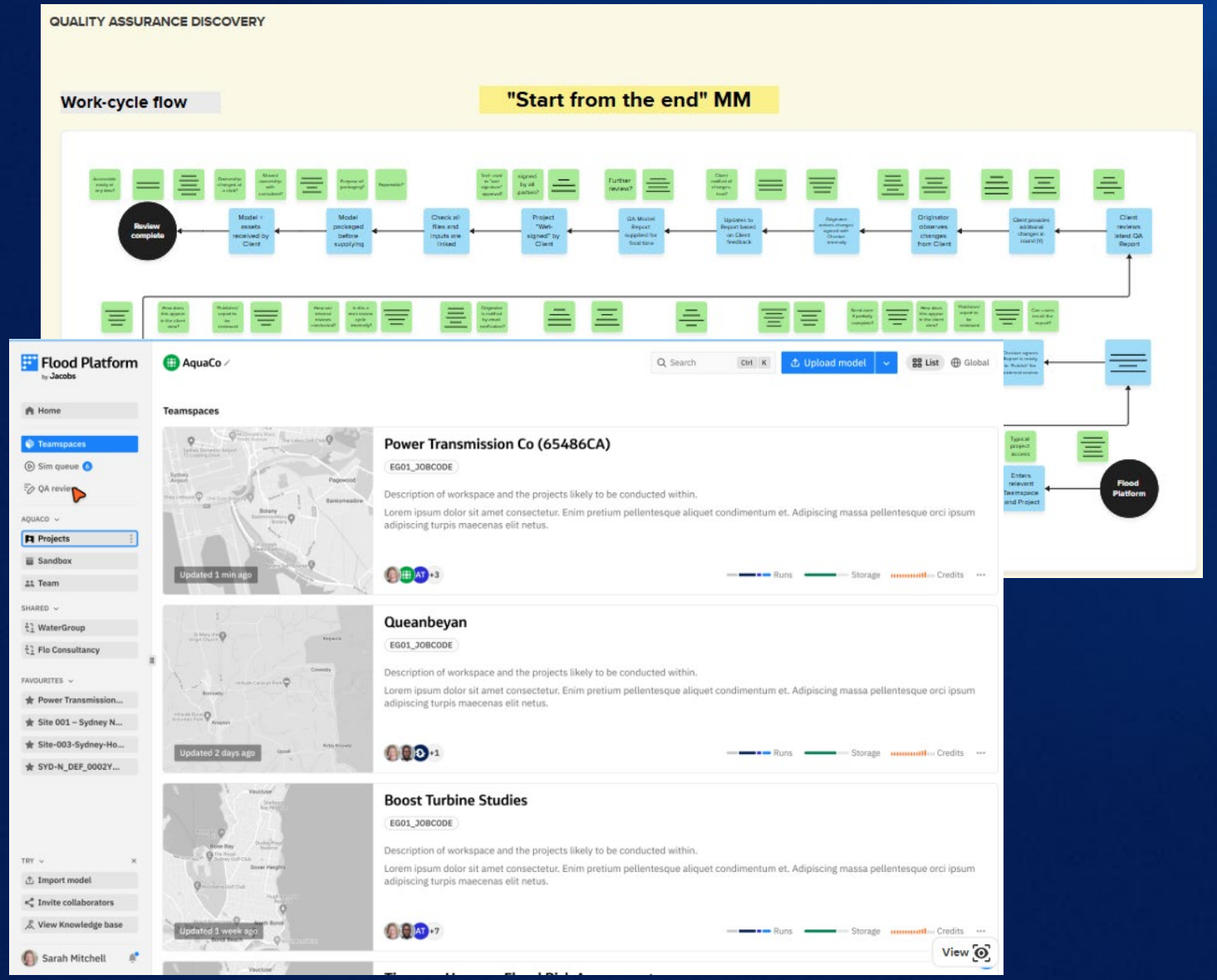
- Returns N/A if not a bridge.
- Returns RED if the spill can be easily be determined to be lower than the springing level of the bridge.
- Returns AMBER if ambiguous, or a junction/linked spill cannot be found.
- Returns GREEN if the spill can easily be determined to be higher than the springing level of the bridge. *(Ambigous states may be that there are multiple spills attached.)

DON03_5078BR	BRIDGE	USBPR1978	Meadowhall Access Bridge (Northpoint)	Mannings: 0.030	h: 5.15 x w: 24.97
DON03_5078SP	SPILL		Spill over deck. KB widthx2. KB increased coeff from 0.9		Elevation: 33.08 x w: 48.00
DON03_4839Bu	BRIDGE	USBPR1978	Meadowhall Way road bridge B	Mannings: 0.030	h: 5.24 x w: 34.79
DON03_4839Su	SPILL		dummy KB added		Elevation: 35.00 x w: 60.00
DON03_4763Bu	BRIDGE	USBPR1978	Meadowhall Way bridge C	Mannings: 0.030	h: 5.09 x w: 30.85
DON03_4763Su	SPILL		dummy KB added		Elevation: 35.00 x w: 60.00
DON03_4559BR	BRIDGE	USBPR1978	Meadowhall Way Bridge D	Mannings: 0.030	h: 4.86 x w: 34.79
DON03_4559SP	SPILL		Spill over the Road Bridge. KB width x2. KB increased coeff from 0.7		Elevation: 34.71 x w: 70.00
DON03_4324BR	BRIDGE	USBPR1978	Supertram bridge	Mannings: 0.030	h: 4.10 x w: 34.79

Future – Integration with Flood Platform

- Currently these are internal tools as we develop them both as part of TE2100 and as efforts to improve our modelling processes across Jacobs.

- Working with the Flood Platform team to eventually turn these tools into features that any Flood Platform user can use.



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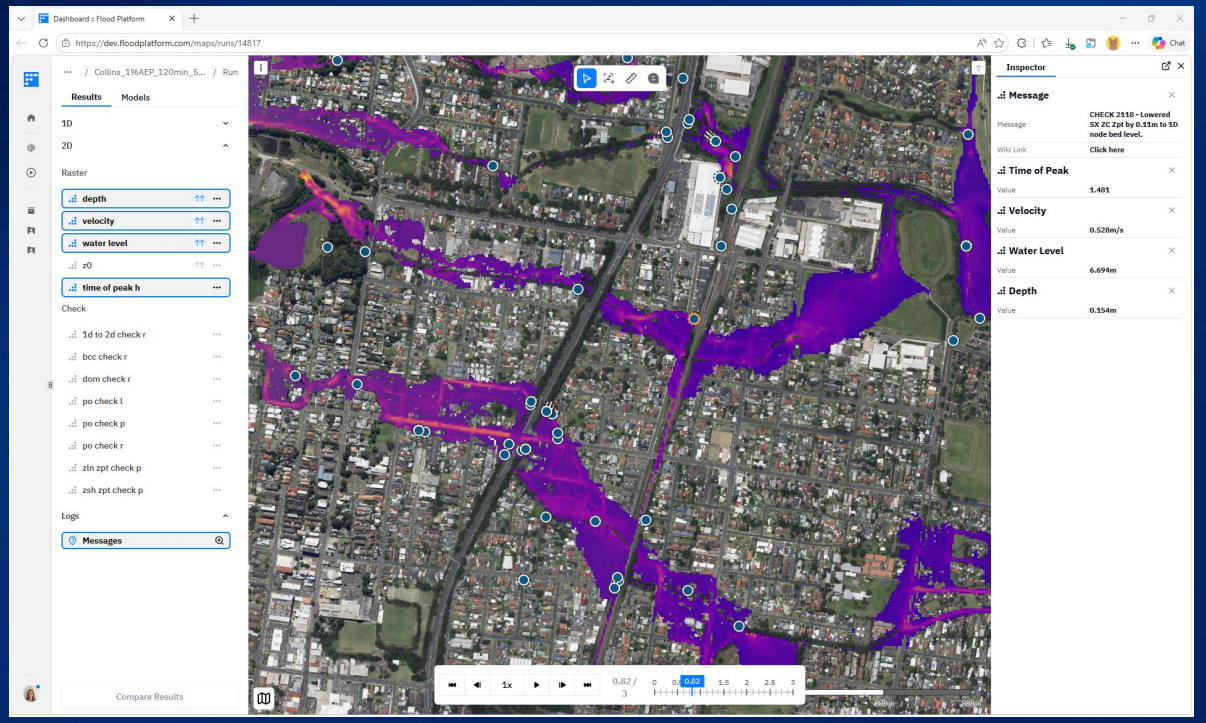
Summary

- Single source of truth
- Standardised file formats, naming conventions and result visualisation
- Automated model checks on upload
- Standard & scalable tools available to all that are commercially supported
- Repeatable & transparent automation



Want to have your say? Got a feature request/feedback?

hello@floodplatform.com

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Q&A