

Appendix C

Model Audit Check-list

<i>Parameter / Task(s)</i>	<i>Project Methods</i>	<i>Complete</i>	<i>Technical Review</i>	<i>Comments</i>
DATA PREPARATION				
River Model				
Ensure 3rd Party Licence obtained (if necessary)		N/A	N/A	
Obtain Cross Section Data		100%	N/A	
Obtain Bank Level Information		N/A	N/A	
Obtain Bridge / Culvert / Weir Information		100%	N/A	
Obtain Modelling Report		100%	N/A	
Obtain Assess / Structure Photos		100%	N/A	
Assess and Confirm Suitability of Bridge / Culvert / Weir Survey data for Modelling		100%	N/A	
Obtain Hydrometric Data i.e. river flow, river level, rainfall etc.		100%	N/A	
Identify Hydrological Parameters		N/A	N/A	
Ground Model				
Obtain LIDAR		100%	N/A	
Confirm and document resolution		N/A	N/A	
Ground Truth		N/A	N/A	
Road Curb Stamping	Sug. -0.1m	N/A	N/A	
Sewer Model				
Obtain Existing Model	Pref. 0.5m accuracy	100%	N/A	
Obtain Client Network Data		100%	N/A	
Obtain Asset Survey Information		N/A	N/A	
Assess existing model for network omissions		100%	Yes	
Obtain Highway Gully Information		100%	N/A	
Boundary Conditions				
Obtain Tide Level Data		N/A	N/A	
Obtain River Model Inflows		N/A	N/A	
Obtain River Model Boundary		N/A	N/A	
Obtain 2D Model Extent		100%	N/A	
Obtain MasterMap		100%	N/A	
Structure Detail				

<i>Parameter / Task(s)</i>	<i>Project Methods</i>	<i>Complete</i>	<i>Technical Review</i>	<i>Comments</i>
<i>Extract Structures from MM</i>		100%	N/A	
<i>Assess Catchment for Non-mapped Structures</i>		N/A	N/A	
MODEL BUILD				
Model Workspace Setup				
<i>Default Simulation Parameters</i>		100%	Yes	
<i>User Defined Defaults</i>		100%	Yes	
Sewerage & Highway Drainage				
<i>Import Client Network Data</i>	Note data source, link to any manipulation files	100%	N/A	
<i>Add Missing Nodes</i>		100%	Yes	
<i>Add Missing Conduits</i>		100%	Yes	
<i>Infer Missing Cover Levels</i>		100%	Yes	
<i>Infer Missing Invert Levels</i>		100%	Yes	
<i>Infer Missing Pipe Diameters</i>		100%	Yes	
<i>Incorporate MH Surveys</i>	Note data source, checker to note sample proportion checked, usually 5%.	N/A	N/A	
<i>Review Pipe Sizes Recorded During Flow Survey</i>	Record inconsistencies and how resolved.	N/A	N/A	
<i>Assess Siltation (MH & CCTV Surveys)</i>		N/A	N/A	
<i>Review Pipe Roughness</i>		N/A	N/A	
<i>Incorporate Ancillary Surveys/Record Drawings/Recent Schemes</i>	List ancillaries and their data sources	N/A	N/A	
<i>Consider local changes to pipe roughness (CCTV Surveys)</i>		N/A	N/A	
<i>Build Gully Network from survey data</i>		100%	Yes	
<i>Review Physical Connectivity</i>		100%	Yes	
<i>Storage Compensation</i>		N/A	N/A	
<i>Review Flood Type & Parameters</i>		100%	Yes	
<i>Review Pipe Diameters</i>	Based on flags / missing data	100%	Yes	
<i>Review Pipe Lengths (Asset vs. Model)</i>	Review imported length data against model interpolated lengths	100%	N/A	
<i>Review Node Levels</i>	Based on flags / variation from LIDAR	100%	N/A	
<i>Review Invert Levels</i>	Based on flags / interpolated data	100%	N/A	
<i>Set Conduit Length Flag to "Default"</i>	To overcome errors in base data, note with reasons if any subsequent model build uses fixed lengths.	N/A	N/A	Gully links set to a maximum length of 50m for the ones having length larger than 50m
<i>Infer Headloss</i>		100%	Yes	

<i>Parameter / Task(s)</i>	<i>Project Methods</i>	<i>Complete</i>	<i>Technical Review</i>	<i>Comments</i>
	Review backdrops and junctions in accordance with help file guidance. Flag appropriately.	100%	Yes	
Rainfall Runoff				
<i>Headloss Coefficients</i>				
<i>Import / Build Subcatchments</i>	Use method appropriate to size of network, note file names if built in MapInfo	100%	Yes	
<i>Consolidate Subcatchments</i>	Correct overlaps, gaps, duplications etc.	100%	Yes	
<i>Runoff Method</i>		100%	Yes	
<i>Land Use ID</i>		100%	Yes	
<i>Populations</i>		N/A	N/A	
<i>Area Measurement Type (Absolute/Percent)</i>		N/A	N/A	
<i>Runoff Areas</i>		100%	Yes	
<i>Runoff Slope Values (if appropriate)</i>		N/A	N/A	
<i>Runoff Surfaces</i>		N/A	N/A	
<i>If using New UK, check final surface in Land Use is New UK, not fixed or other</i>		N/A	N/A	
River Reaches				
<i>Import model river (if applicable)</i>		100%	N/A	
<i>Add river cross sections</i>		100%	N/A	Additional ones from survey are added, if not overlapped previous ones are not deleted
<i>Add river banks</i>		100%	Yes	New banks created
<i>Interpolate missing bank levels from DTM (if applicable)</i>		100%	Yes	
<i>Review and correct DTM bank levels (realism check)</i>		N/A	N/A	
<i>Assess and build bridges (if applicable)</i>		100%	Yes	
<i>Assess and build weirs (if applicable)</i>		100%	Yes	
<i>Assess and Build dams (if applicable)</i>		N/A	N/A	
<i>Incorporate surveyed cross section data</i>	Cross Section Data Translator	100%	Yes	
<i>Incorporate surveyed bank line data</i>		100%	Yes	Bank lines changed to match the cross-section, MasterMap, LIDAR data
<i>Incorporate surveyed bridge section data</i>	Bridge or Culvert Section Data Translator	100%	Yes	
<i>Create River Confluences (if necessary)</i>		N/A	N/A	Apply inlet / outlet parameters using the model build tools
<i>Develop US/DS boundary</i>		100%	Yes	
<i>Assess and apply headlosses at structures</i>		100%	Yes	
<i>Review and adjust bridge lengths</i>		100%	Yes	
<i>Assess Culvert Inlet & Outlet Headloss Parameters</i>		100%	Yes	
<i>Assess & Apply River Channel Roughness</i>		100%	Yes	

Parameter / Task(s)	Project Methods	Complete	Technical Review	Comments
Assess & Apply Bridge Roughness		100%	Yes	
Additional Information		100%	N/A	
Surface Model				
Define Boundary		100%	Yes	
Check 2D boundary suitably extensive to cover the drainage catchment		100%	Yes	
Develop baseline polygon data		100%	Yes	
Create surface model elements		100%	Yes	
Define & Apply Infiltration Parameters		100%	Yes	
Define & Apply Roughness Parameters		100%	Yes	
Apply Topographic Adjustments (if necessary)	Typical values: road = -0.1m / buildings = 0.15m	100%	Yes	
Define wall / impervious structures	Suggest undertaking targeted Google Street View survey	100%	N/A	
Cut River Reach Extent into Surface Model Elements (if necessary)		N/A	N/A	
Review / confirm level of detail		N/A	N/A	
Sub-surface Network - Surface Model Interaction				
Ground model matching		N/A	N/A	
Check Sewer Outfalls Type		100%	Yes	
Check Highway Gullies located within Road Areas		100%	Yes	Gullies moved to match the MasterMap
Review Sub-surface drainage node Flood Type		100%	Yes	
SIMULATIONS				
Rainfall				
Obtain FEH Parameters for Design Rainfall		100%	N/A	
Derive Design NAPI / UCWI Figures		N/A	N/A	
Create 2D Initial Conditions File		N/A	N/A	
Apply Areal Reduction Factors (if necessary)		N/A	N/A	
Derive Climate Change Uplift Factors (if necessary)		100%	N/A	Taken from SWMP as 30%
Inflows				
Identify inflow locations & US River Basins		N/A	N/A	
Add 2D Inflow Points (if necessary)		N/A	N/A	
Derive Inflows using FEH Method		N/A	N/A	
Create Inflow Files		N/A	N/A	

Parameter / Task(s)	Project Methods	Complete	Technical Review	Comments
Time Varying Levels				
Identify DS outfall locations		100%	Yes	
Review Sewer Outfalls for Non-return Valves		N/A	N/A	
Add DS 2D Boundary (if necessary)		100%	Yes	
Derive Time Varying Levels		100%	Yes	
Create Level Files		100%	Yes	
Wastewater & Trade Flow				
Create Wastewater Profile		N/A	N/A	
Create Trade waste Profile		N/A	N/A	
Create Ground Water Profile (if appropriate)		N/A	N/A	
Create RTC file(s) (if appropriate)		N/A	N/A	
<i>Simulation Dialog Settings / Parameters</i>				
2D Parameters		100%	Yes	
Time step Control		100%	Yes	
Diagnostics		100%	Yes	
VALIDATION / CALIBRATION				
Model Stability Testing				
Sense check sewer model predictions		100%	Yes	
Sense check river model predictions		100%	Yes	
Sense check culvert predictions		100%	Yes	
Sense check bridge predictions		100%	Yes	
Sense check operation of sewerage assets		100%	Yes	
Sense check 2D runoff predictions		100%	Yes	
Historical Information				
Obtain flood records		50%	No	
Map & theme records based on cause of flooding (if possible)		0%	No	
Differentiate flooding return periods (if possible)		0%	No	
Model Benchmarking				
Obtain existing model		100%	N/A	
Confirm benchmark simulations (RP & durations)		100%	N/A	
Obtain / derived existing rainfall		100%	N/A	
Obtain / derived existing levels		100%	N/A	

Parameter / Task(s)	Project Methods	Complete	Technical Review	Comments
Obtain / derived existing inflows		100%	N/A	
Run benchmark model		0%	No	
Run new model		100%	N/A	
Check for instabilities		100%	N/A	
Undertaken comparative analysis of simulation predictions		0%	No	
Map variations in predictions (if necessary)		0%	No	
Sensitivity Testing				
1D Roughness	200% / 50% channel roughness	75%	No	
2D Roughness	200% / 50% 2D 'rural' roughness	75%	No	
Infiltration	200% / 50% 2D fixed infiltration runoff	75%	No	
DS Boundary		75%	No	