Appendix C

Model Audit Check-list

Technical reviewer – Simon Ainley

Parameter / Task(s)	Project Methods	Complete	Technical Review	Comments
		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	
Structure Detail				
Obtain MasterMap		100%	N/A	

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

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