#	Question	Answer
1	What effect benching has on the K loss within the MH?	Benching (or shaping of the floors of the chambers) typically works by reducing the expansion and contraction at the base of the chamber during low flow conditions. For higher flows it is likely to be less effective. If including the effect of benching you would want to be able to vary the K value from low flows to high flows.
2	How does drop manhole construction effect the K value?	The K values will depend on the inlet and outlet pipe sizes compared to the overall manhole size, and to an extent on whether it is square or circular. It will also depend on whether benching has been used to give guided channel flow at low flow rates. Section 5.12.5.4 "Engelund Manhole Loss Approach" of the TUFLOW Manual is a worthwhile read for more information.
3	Can we use same equations, in open channel flow for Energy Losses calculations (for k value)?	In TUFLOW the manhole losses, are generally specific to manhole / pipe systems. For example expansion/contraction in the manhole chamber or drop losses are probably not relevant for open channel. However, form or bend losses (e.g. multiplier on the velocity head v2/2g) can be applied in open channels. The equation presented for the loss associated with water expanding is derived from first principles fluid mechanics and is also highly relevant for open channel flow.
4	Is TUFLOW free or we have to paid, if free we can get download link?	TUFLOW has a free demo mode that can be used for small models and for learning and doing tutorials without needing a licence. Otherwise you have to rent or purchase. The free Demo version is fully enabled with all functionality, though has the following limits: 100,000 total cells and 30,000 active (potentially flooded) cells, 100 1D channels, a maximum simulation time of 10 minutes. Here's a link to more information on the demo mode: https://wiki.tuflow.com/index.php?title=New_User_Guide_Free_Demo_Version. Here's a link to the pricelists if you would like to see the cost options: https://www.tuflow.com/pricing/
5	Can TUFLOW be used to estimate low flow estimation in small streams?	Yes, it can be used for this purpose
6	If losses in a model are applied on the conduit not the pit. To model a fixed pit loss such as QUDM K should it only be applied as the US HL of the outgoing conduit and leave the DS HL of any incoming conduits as zero?	Yes, correct and that is how TUFLOW applies the fixed K value, as K values are based on the outlet pipe velocity. For variable, losses are applied to the inlet pipe outflow (exit loss), outlet pipe inflow (entrance loss) and as an additional loss (if needed) based on the outlet pipe velocity as presented in the webinar. FYI, in TUFLOW you can set manholes to be either a fixed K loss or the variable K approach via 1d_mh GIS layer(s). The default is to apply variable (Engelund approach) but the global default can be changed to fixed if desired. For more information see Section 5.12.5 of the current manual from https://www.tuflow.com/Download/TUFLOW/Releases/2018-03/TUFLOW%20Manual.2018-03.pdf.
7	Losses at pits are complex, varying depending on depth of flow over inlet, within connected pipes, depth within pit, etc. When in TUFLOW modelling a pit as a R type pit, is it possible to pick suitable loss values? Or is this why Q pits recommended?	We strongly recommend using Q pits for modelling kerb inlets, catchpits, drains, etc., provided you have appropriate y-Q curves. FYI, TUFLOW automatically extends the y-Q curve for higher depths based on the orifice equation and if downstream controlled because of conditions in the pipe network it reverts to a drowned condition. If using the R pit (which as a pre-cursor to the Q pit), whilst the pit is free-falling into the pipe system below (which is most of the time until the system surcharges), entrance/exit losses don't apply (because the flow is inlet controlled), so the R pit would be using the weir equation for unsubmerged flow or orifice flow for submerged flow and could be a poor representation of the pit flow behaviour, especially if the pit also has a grate and other non-rectangular characteristics.
8	Can we increase the capacity of the pipe flow through velocity control?	The context is not clear to me. You won't be able to increase the capacity of the pipe by reducing (controlling) the inlet velocity. Under certain flow regimes and inlet designs you could increase flow capacity but this would have to be done by changing the pipe dimensions/slope.
9	Are the dataset publicly available?	No, these datasets have been provided by a city for demonstration purposes only, not for distribution sorry.
10	Is QGIS TUFLOW Plugin available for free for public?	Yes - it is a free. In QGIS go to Plugins >> Manage and Install Plugins... Then select "All" in the left panel and enter "TUFLOW" in the search field

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11	Can you provide comment or guidance on modelling techniques to achieve the correct depth at the surface to ensure correct inlet capture with the pit rating curves versus depth. Also, can you comment on the role of unlimited inlet pits and cases where these are applicable. Often large scale Council wide studies do not include all pipe networks (e.g. pipes <450mm not included) and the most upstream pit requires a greater inlet to allow more flow than the actual pit to represent the upstream network.	The Sub-Grid Sampling (SGS) feature of TUFLOW HPC will significantly assist in achieving the most accurate flow depth estimate at your pit inlet locations, as the low point of the 2D cell (on which the depth feeding the pit is based) will be based on the lowest DEM elevation within the cell (rather than a single elevation sampled at the middle of the cell). Using a finer mesh with the Quadtree functionality will also help with Quadtree and SGS combined being a great combination for modelling flow patterns in detail along urban gutters and floodways. In situations where the complete pipe network is not modelled there are numerous common approaches adopted by modellers (depending on personal preference). Here are the common approaches. 1) Use direct rainfall (rainfall-on-grid) boundary conditions, model all inlets, only model the larger pipes in the pipe network. Where a small pipe is being ommitted, connect the flows from the inlet to the main pipe network using the virtual pipes functionality (see Section 5.12.2 of the current manual, but also see Section 6.6 of the current release notes as this explains how the virtual pipe network is connected to the start of the pipe network hydraulically modelled). Manual: https://www.tuflow.com/Download/TUFLOW/Releases/2018-03/TUFLOW%20Manual.2018-03.pdf Release Notes: https://downloads.tuflow.com/TUFLOW/Releases/2020-10/TUFLOW%20Release%20Notes.2020-10-AC.pdf 2) Use lumped hydrology inflows. Only model the main pipe network and connected inlets (excluding the smaller features). Apply the flows directly to the pits either via 1d_bc Q polygon boundaries with a P flag (this automatically distributes the total flow to all the pits within the polygon) or 2d_sa boundraies with a pit flag which is effectively the same but the flow is applied to the ground surface rather than directly into the manhole. Some of the flow will surcharge out of the pits if the downstream pipe capacity is exceeded.
12	Commonly we don't model every single urban pipe - just the large or "trunk" pipes. There are several options in TUFLOW to connect these 1D networks to the 2D terrain and enable flow transfer. Do you have thoughts re using 1D Q boundary conditions with a P flag (put directly into pipes at bottom of pits) vs using SA with "pits" flag and creating very large (fake) pit inflow curves?	1D Q boundary conditions with a P flag (put directly into pipes at bottom of pits) vs using SA with "pits" flag are valid approaches. Please see the previous answer.
13	Can you use drainage spatial data stored in a SQL database rather than a native gis format like .Shp or .TAB	This year you will be able to using the 2022 release! We've built in the geopackage format to TUFLOW which uses the SQL-Lite protocols. Currently testing at the moment, but it's so much better than using .shp or .mif files. Much better data management wise and much faster to view as it is all spatially indexed. This feature will be in the first 2022 TUFLOW release. Support for GeoTIFFs and Geopackage raster formats is also being provided in the 2022 release.
14	Does cover consider SGS sampling data?	The Pipe Integrity Tool uses the source DEM data, not the SGS sample interval. As such it is using the highest possible resolution from the input dataset (independent of whatever SGS parameters you choose).
15	A little bit out of the scope of this presentation, but can you comment on the methodology you used to validate/ calibrate your rain on grid urban pit pipe model? As I'm assuming many of the pipe flows from sub-catchments weren't gauged. Thanks!	If none of the pipes are gauged you will just have to work off recorded surface water levels wherever you can find them. If no above ground recorded flood levels are available, as a minimum you should be asking council for their stormwater issues register. Check your modelled above ground flood inundation areas to see if they correlate with the locations identified in the council register.
16	What are stored, lost and sealed manholes?	Not sure what is meant by stored or lost manholes? Sealed manholes probably means the cover is welded or somehow attached to the chamber to stop it popping off. This can go very wrong if the pressure in the pipes exceeds the strength of the seal.

#	Question	Answer
17	Any developments by TUFLOW to suggest a required pipe size increase for under-capacity pipes (like 12d's drainage analysis is able to).	This has certainly been discussed by the R&D team, but not yet implemented. As computers get faster, this is certainly becoming more feasible for 2D models with 1D urban drainage. To answer your question directly, there is currently no automated approach. It remains the modellers responsibility, noting that by using python scripting and possibly software like PEST, multiple iterations could be performed in one batch to try and provide guidance on optimal pipe sizing. You can look at the maximum %full data for the pipes using the 1d_cca output layer and that will highlight which pipes are under-sized.
18	Hello which version of QGIS contain TUFLOW plugin?	The TUFLOW Plugin in the QGIS repository for the past 5 years. That being said, we recommend using the newest QGIS release to access the newest TUFLOW Plugin tools
19	Where can I get DEM of 1m resolution?	That very much depends on which part of the world you are in! In Australia there is data available here: https://www.ga.gov.au/scientific-topics/national-location-information/digital-elevation-data
20	How do we go head with underground leakage detection in an unplanned city?	Sorry, we can't help you with that question, but good luck as it sounds like a very challenging task.
21	how did we get the 1d network pipe into qgis?	There is a tool within the QGIS TUFLOW plugin. To find this function in QGIS select *Plugins >> TUFLOW>>Insert TUFLOW attributes to existing GIS layer*
22	I have pipe network (Melbourne based Council) without IL data- along with other issues as you have point out (plenty of errors related to snapping/flow area inconsistent/ wrong connections/loops etc). The QGIS plugin is a powerful tool and it has helped identified areas of deficiency (which is close to 1000 points in my model domain) - may I please ask if there's an automated way we could: 1) troubleshoot flow area issues in bulk? we had previously went and fix key areas manually and ignored everywhere else. 2) troubleshoot pipe direction errors - because we had to derive IL from LiDAR and what ended up was IL we had was all over the place. We didn't know if there's an automation which we could use so ended up troubleshooting it manually again, Thanks a lot and appreciate feedback!	Using the TUFLOW Pipe Integrity Tool you will want to use the Continuity function. Select the "Flow Area Check" and "Invert Check" options. This will produce an output layer highlighting potential problem areas. You will then need to manually judge whether updates to the input data are necessary. We prefer this manual approach for updates such as these. There are however other automated tools that you may want to investigate using. Below is a link to a publication by Eric Xu that may help. You may be able to get a copy of the tool by emailing him. We would also be keen to hear of any ideas for making this process easier by emailing support@tuflow.com. https://modsim2019.exordo.com/files/papers/183/final_draft/xuW.pdf
23	What do I do when large portions of underground pipe layout is cannot be mapped	Yes it does make it tricky when the underground services are not well mapped. If doing flooding assessments where there are large flows, sometimes it may be sufficient to model trunk drainage only and make some assumptions about minor drainage flowing full. This may require less survey. Like any modelling though data is necessary. Use of the virtual pipe feature (see answer to Question 11 above) can be very useful for modelling overland flow into a pipe network in this instance as only the location of the inlet pits are needed or a approximate, sometimes lumped, representation of the pits. This approach is especially good if the pipe network does not surcharge back to the overland flow anywhere or only in a minor way.
24	Is this demo for 1D/2D model? does QGIS has capacity of 1D/2D connection?	Yes, the demo is a 1D/2D model that has flow being dynamically modelled between 1D and 2D. TUFLOW is being used for the 1D and 2D modelling. QGIS is being used for the visualisation and checking of the 1D/2D results.
25	Unfortunately the City of Stonnignton aren't maintaining invert levels in our GIS data. I assume invert level on you GIS drainage data are required to utilise the TUFLOW plugins efficiently.	Yes, you will require invert levels for your modelling. After you have made invert assumptions you can still use the Pipe Integrity tool to check of digitisation directions. Also use the continuity features, for example the check "Inverts" function will identify location with an reverse gradient). You maybe able to assign estimates of inverts by sampling the DEM elevation then subtracting the typical depth down to the pipe invert, but definitely check the integrity afterwards!
26	Thank you for answer, How is the price of TUFLOW with licence, How can I borrow this model?	Please email sales@tuflow.com for a quote. Prices can be found at: https://www.tuflow.com/pricing/. Regarding the model data, the datasets in this presentation have been provided by a City for demonstration purposes only, not for distribution. Instead, we recommend looking at our example model dataset (over 140 example models!) https://wiki.tuflow.com/index.php?title=TUFLOW_Example_Models.

#	Question	Answer
27	I've recently experienced that very large 1d culverts connected to 2d open channels seem to be quite unstable, particularly in HPC and in flat terrain. Can you share any recommended approaches to help settle this down?	This advice from the TUFLOW Wiki might help solve your stability issue: https://wiki.tuflow.com/index.php?title=TUFLOW_1D2D_SX_Advice Otherwise, please contact support@tuflow.com and we'll help you out.
28	what type of inflow was used in this example, is it design rainfall data, are you using IDF curves and what are the RTK values in this example?	These were design event hyetographs from the UK (1 in 5 year and 1 in 1000 year AEP). They were applied using a direct rainfall (rain on grid) approach.