FastTrack Drainage

Template guidance

Hydraulic microdrainage (.mdx)

Site layout AutoCAD (.dwg)

Application form (.xlxs)

Scottish Water Horizons

Introduction

FastTrack Drainage Guidance

This document has been designed to help you complete the AutoCAD, Microdrainage and application form needed so that it can be imported into the FastTrack Drainage system.

FastTrack Drainage is an online design validation system, which will validate designs before they're sent to Scottish Water for approval.

The system provides evidence that the proposed sewage infrastructure design has been assessed against Sewers for Scotland technical specification, with the aim of significantly simplifying and speeding up the approval process.

Scottish Water Horizons

Table of contents

Executive summary

The FastTrack Drainage online service has been designed so that it looks for data to be structured in a particular format, therefore, it is important that the guidelines contained within this document are followed, otherwise it is likely that the online service will identify non-compliance with the input data and the application will be returned with a request for alterations to be made.

To enable the AutoCAD and Microdrainage input data to move through the online service smoothly, the following guidance has have been prepared;

1. Microdrainage Model

The model should be produced with a standard set of design criteria and parameters. Multiple microdrainage models can be uploaded (i.e. for multiple phases). However, these must be stored in one workspace and uploaded in a single file that also matches a single AutoCAD drawing.

2. AutoCAD Drawing with supplementary ESRI Tagged Data

The drawings produced for use with the online service will also require to be set to a standard in terms of entity types used to show drainage, SuDS and development infrastructure elements (i.e. roads, houses etc). To provide a level of additional information to the online service these entities also require to be attributed with data utilising a free AutoCAD plugin developed by ESRI. A single AutoCAD drawing shall be uploaded for each application, however as noted in point 1 above, several networks can correspond to this.

3. Application Excel Template

This template allows the Customer to populate contact and development specific details to enable the application to be processed. There are also a number of declarations that the Customer is required to confirm prior to submitting the application to the online service. If any of these declarations cannot be answered with a 'yes' then the Customer should take corrective action to the submission in order to enable a 'yes' response to be entered into the template. Any applications submitted with declarations set to a 'no' response will fail pre-flight checks and the application returned.

Executive summary continued

A common approach adopted by hydraulic modelling software is to divide sewerage infrastructure into nodes and links. The FastTrack Drainage Online Service follows this convention. It is important to highlight the requirement that the CAD model and Microdrainage model must be consistent and fully match.

For sewers, their XY coordinates in AutoCAD must be within 200 mm of their XY coordinates in the Microdrainage model. These coordinates should be geographically the same as the physical location of the site. The online system will check whether the application matches a location in Scotland, and if not, the application will fail pre- flight Checks.

For manholes, and any other nodes objects the AutoCAD shape (circles for manholes) must contain the XY coordinate point of the same object in the Microdrainage model. If not, when the files are uploaded to the online service, they will fail the pre-flight checks, and a notification will be passed back to the Customer to revise and resubmit the data.

In addition to the above, it is critical that items are applied to the correct feature class. For example, the online service would be unable to tell if Private Parking had been incorrectly attributed as Public Parking within the feature class properties. If this happened, then the results generated by the online service would be invalid.

This guidance document will set out in detail those criteria, specified feature class and methodology for completing the templates.

1.Application process

1.1 The Existing Process

At present an Application for New Sewers to Serve Housing Developments (SF1) is submitted to Scottish Water enclosing paper copies of Microdrainage simulation results, layout drawings, long sections and standard detail drawings. If there are any inconsistencies in the submission or it contains errors or non-compliances, the submission is returned to the Customer for review and amending before being resubmitted.

This can become quite an iterative process and as it relies on manual review of the submission(s) by Scottish Water, can lead to programme delays.

1.2 The FastTrack Drainage Process

The application process being developed for the FastTrack Drainage Online Portal will allow a more rapid review of elements of the SF1 submission (gravity sewers) initially through the use of an automated validation of the input data against Sewers for Scotland Version 4 specification. This will allow any non-compliance with the specification to be identified early.

In order to achieve this, Microdrainage models will need to be prepared adhering to a standard format. Layout drawings in AutoCAD will also require to be submitted on a standard drawing template which will contain all relevant feature classes to be applied and any additional data fields associated with these.

A FastTrack Drainage Application Excel Spreadsheet containing key application information must be completed and uploaded with the application. This also includes a series of declarations that the Customer must confirm to enable an application to be uploaded. A third tab allows the applicant to document any specification waivers from Sewers for Scotland that the developer has included within the submitted design and has either agreed or intends to agree with Scottish Water. Note that FastTrack Drainage will not approve deviation from the Sewers for Scotland specification and this should be agreed separately with Scottish Water.

The following sections of this document set out the requirements for the Microdrainage, AutoCAD and FastTrack Drainage Application Excel Spreadsheet.

1. Application process continued

As identified earlier, it is important to highlight the requirement that the CAD model and Microdrainage model are consistent and fully match. i.e. manhole and sewer positions must be the same in both. If not, when the files are uploaded to the online portal, they will not pass the pre-flight checks, and a notification would be passed back to the Customer to revise and resubmit the data.

The online portal will only validate against the proposed gravity sewers. Pumping stations are currently excluded from the FastTrack Drainage Online Service and will still require to be submitted to Scottish Water for approval. Additionally, diversions are also excluded and should be agreed separately with Scottish Water.

It should be noted that the SUDS components of a submission are not subject to an automated check at this stage, however a manual review against a Sewers for Scotland 4 checklist will be carried out, and the results uploaded to the FastTrack Drainage Online Portal. Examples of the checklists used for the end of pipe SUDs features that Scottish Water can vest in are included in Appendix A.5.

The FastTrack Drainage Online Service can be accessed from the following link:

Please note that at the present time, the Portal needs to be accessed using Google Chrome. Access using Internet Explorer or Microsoft Edge is not currently supported.

https://swh.fasttrackdrainage.co.uk/ (via Google Chrome)

1. Application process continued

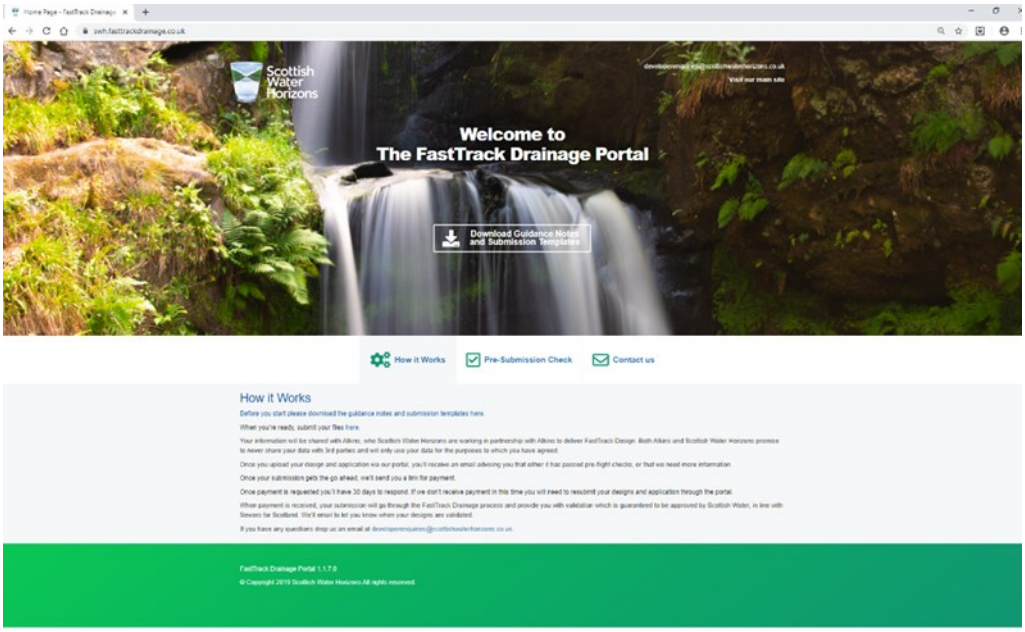
Below are screen shots that show the FastTrack Drainage home page and pre submission check page. A 'How to' video on how to use the service is available via the following link;

https://www.youtube.com/channel/UCbPwV09tQtD74Joj4AW-vfA

FastTrack Drainage Home Page

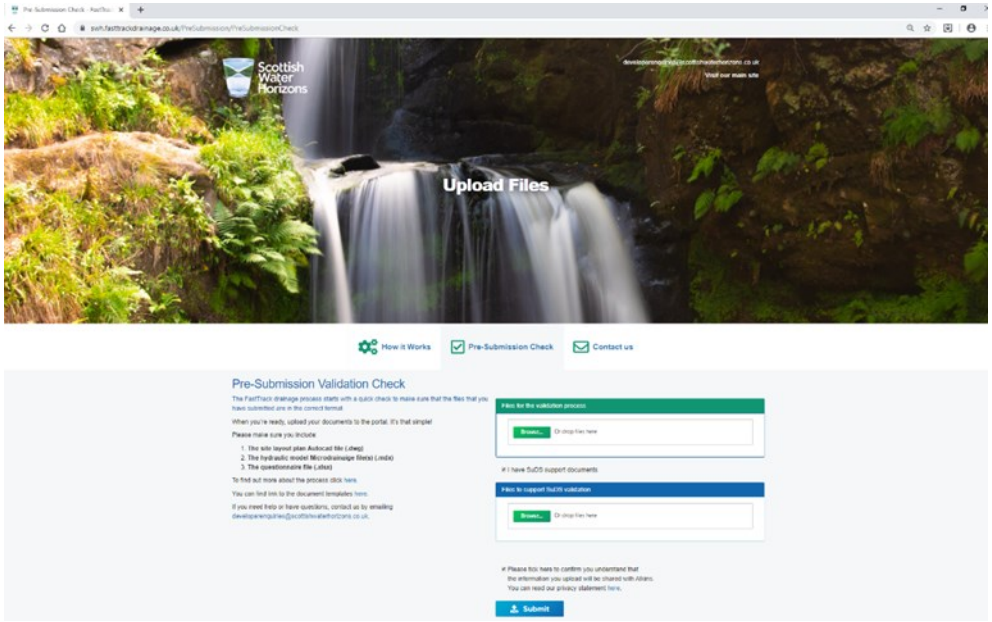
On this page, the Customer can download this guidance document, AutoCAD template and excel application form. If there are any queries with the service or completing these, the Customer can get in touch with Scottish Water Horizons via the 'Contact Us' link on this page.

Once the Customer has all the information ready to make a submission, the Pre Submission Check link can be selected to move forward into the upload page.



1. Application process continued

Pre Submission Check and Upload of Submission Files



This page allows the Customer to upload the submission files that are required to progress with the online validation of the drainage design. The documents can be uploaded by either using the browse function or the drag and drop approach.

The minimum information required for upload is:

Microdrainage Model
AutoCAD Drawing with supplementary ESRI Tagged Data
Excel Application Template

If the application includes a SUDS feature that is to be considered for technical approval by Scottish Water (Pond, Detention Basin, Swale, Piped Filter Trench, Underground Storage), then the following must be uploaded by clicking the 'I have SuDS support documents' check box.

1. Application process continued

The application should also upload within the SUDS section any other documents in PDF format that would normally be submitted as part of a submission to Scottish Water as part of the wider development:

Detailed drawings (i.e. plan, cross-section and long-section) of the proposed SUDS asset

A PDF copy of the Microdrainage calculations and model simulations (1, 30 and 200 year)

The following information:

- Impermeable area (of the development site)
- Permeable area (of the development site)
- Volume (total)
- Permanent pond volume
- Pond / detention basin embankment volume
- Max flood water level
- Max groundwater level
- Max 1-year water level
- Max 30-year water level
- Max 200-year water level
- Max 1-year water level in the adjacent watercourse
- Floor level in adjacent premises
- Drain time
- Outlet - discharge control orifice diameter
- Outlet - discharge control rate
- Discharge rate in accordance with the Local Authority requirements

Additional information for swales

- Average residence time for the 1 in 1 year flow
- Ground Level
- The top of the swale outlet headwall

Additional information for filter trenches

- Ground Level
- Piped filter trench depth
- Type - conveyance or storage.

Note – All upload file extensions should be lower case. If for example a Microdrainage file is uploaded with the mxd file extension in capital letters, then the upload would fail.

2. Microdrainage model

2.1 General Microdrainage Requirements

The Microdrainage file uploaded to the online service should only include the latest foul and surface water network model revisions. Any previous versions of the network's should be deleted using the 'Network Manager' tool prior to upload.

The Microdrainage file should consist of all drainage structures being proposed, including manholes, pipes, underground attenuation and SuDS features. A valid diameter of an outfall structure should be defined in the model. This can either be the size of the existing or proposed pipe at the point of connection.

At present, the online service can validate the foul sewer network that is designed by the 'Foul – Main' network methodology, with domestic flow input only (the design flows for foul gravity sewers for residential developments shall use a peak flow rate of 4300 litres per unit dwelling per 24 hours) . Any industry / trade flow will not be validated and adding this type may result in a failure in the pre-flight check.

A 3D ground surface (TIN surface) showing the proposed development ground level should be included as part of the Microdrainage model that is uploaded. This 3D ground surface should cover the entire development area where existing or proposed sewers are present, otherwise online service validation will fail for rules relating to sewer or manhole depth. Failure to include a complete TIN surface for the site will result in a failure at Pre-flight check stage. Additionally, including only cover levels at chambers/nodes and cover level along 1/3 and 2/3 of pipe length is inadequate to give representation of true site ground level characteristics and would fail Pre-flight checks.

If Causeway PDS or equivalent ground modelling software has been used to create the ground model, this should be imported in its entirety into the Microdrainage model prior to upload. Care should be taken to make sure that the ground model matches the manhole cover levels within the Microdrainage file.

2. Microdrainage model

2.2 Stormwater design

The Stormwater Microdrainage model should be created using the design parameters stated within Sewers for Scotland Version 4. Design event rainfall shall be based on the use of the most recent version of the 'Flood Estimation Handbook' specific to the location of the development. An allowance for climate change of an additional 30% (by factoring the rainfall intensity hyetograph values) shall be applied unless otherwise agreed with Scottish Water.

In addition, care should be taken to ensure that the parameters identified within Sewers for Scotland Version 4 are selected. Particular attention should be made to:

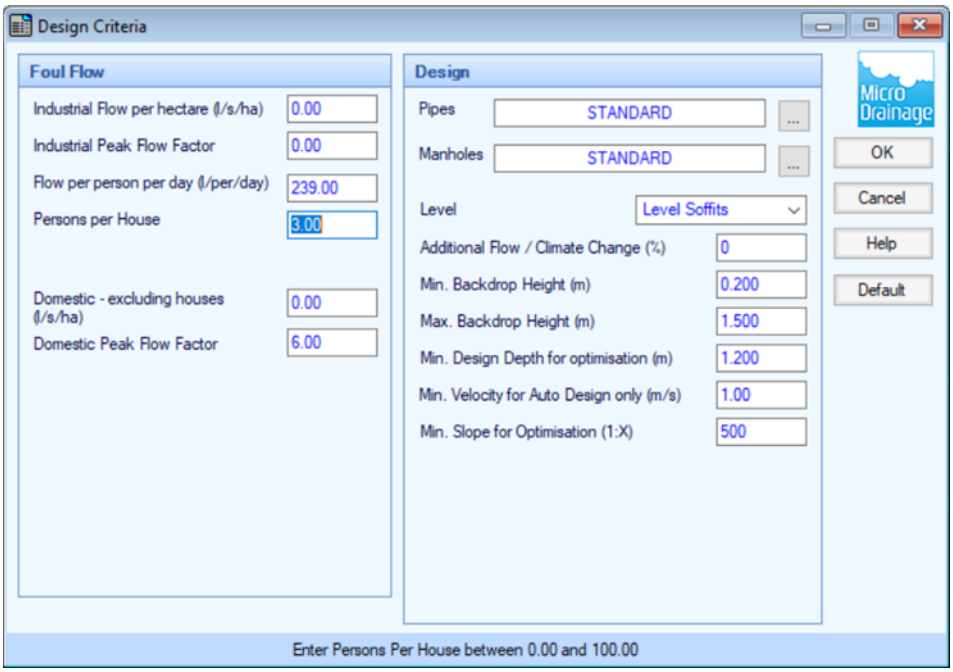
- M5-60 & Ratio, R are taken for the correct location.
- Ensure correct allowance is added for climate change.
- Ensure correct roughness values are used - 0.6mm for Surface Water Sewers.
- Ensure 10% Urban Creep has been considered for the future development. This can be achieved by reducing the permeability of the permeable area by 10%.
- Ensure manhole sizes are set up to the Sewers for Scotland 4th edition standard.
- Ensure the minimum surface water pipe diameter is 150mm.

2. Microdrainage model

2.3 Foul water design

Foul sewer design for housing can be designed using a peak flow rate of 4300litres/dwelling/24hours or in accordance with BS EN752 using the discharge unit method described in BS EN 12056-2.

For the purposes of the online service, it is assumed that the housing input data will be based on 4300litres/dwelling/24hours. This can be achieved by ensuring that the value of Flow per person per day times Persons per house equals to 4300 l/s/day as below example:



- Ensure correct roughness values are used – 1.5mm for Foul Water Sewers
- Ensure the minimum foul sewer pipe diameter to be 150mm.

3. Layout drawing template

3.1 Layout layering

The supporting layout drawing submitted should reflect accurately the drainage infrastructure designed in the Microdrainage hydraulic model, with additional supplementary information to put the drainage design in context i.e. road line/kerb strings, building outlines etc.

The layout drawing will be submitted using the template file 'FastTrack Drainage Layout Template', this contains the approved FastTrack Drainage feature classes that the software engine can process. To apply the AutoCAD elements to feature classes a process of mapping 'user organisation' layer names to FastTrack Drainage defined feature classes is used. This process will allow online service users to maintain their organisations layering convention and apply AutoCAD entities to FastTrack Drainage feature classes, assuming drafting rules, specified in subsequent sections have been followed.

Once the user layer names have been applied to the FastTrack Drainage feature classes, this association can be saved and imported to future submissions negating the need to map layers across to feature classes with each submission, assuming that a consistent layering convention has been used over the submissions.

It is critical that items are applied to the correct feature class. For example, the online service would be unable to tell if Trees had been incorrectly placed on the Shrubs layer. If this happened, then the results generated by the online service would be invalid and would not be able to detect a non-compliance with Sewers for Scotland.

Refer to the following table for a list feature classes stored within the 'FastTrack Drainage Layout Template' file.

3. Layout drawing template continued

3.1 Layout layering continued

Table 3-1 Feature Classes

D3i_Boundaries
D3i_Buildings
D3i_Channels
D3i_DisconnectingChamber
D3i_Flora
D3i_Gullies
D3i_Headwalls
D3i_Laterals
D3i_LocalAuthorityLand
D3i_Manholes
D3i_PrivateGardens
D3i_PrivateParking
D3i_PublicParking
D3i_PublicSpaces
D3i_Roads
D3i_Sewers
D3i_SiteBoundary
D3i_SUDS

3. Layout drawing template continued

3.2 Layout entities

Additionally, the drawing entities will also require to be drawn or generated in a specific format that is recognised by the online service (i.e. line, polyline, closed polyline, circle, donut etc).

For further information on entities please refer to Appendix A.2.

3.3 General drafting

The submitted Layout Template should be as clean and tidy as possible and contain only agreed relevant information within and immediately adjacent to the site. It should contain only items within the model space, no populated layout tab is required.

Before submission to the FastTrack Drainage Online Service, it should be ensured that no external references or blocks containing unvalidatable information are contained within the layout final layout document. The layout should be purged and audited before final submission.

Any existing drainage assets should be drawn on the AutoCAD drawing to identify their accurate position and dimensions. Further supplementary information relating to the cover level and invert level of existing assets should be added via the ESRI plug in (see section 3.4 below).

There are a few critical drafting rules to be adhered to in order that the online service can logically process the information contained within the AutoCAD plan:

- Existing chambers require a unique manhole reference to be attributed within the feature classes;
- Existing sewers require to terminate in a chamber, with upstream and downstream manhole attributed with the unique manhole reference;
- Abandoned sewers should be attributed as 'proposed' and 'is abandoned' within the feature class;
- Any drawn elements outside of the development boundary should be removed. This is to ensure that the online service is not processing unwanted data that is not relevant to the application;

3. Layout drawing template continued

3.3 General drafting continued

- SuDS features within the plan require to be ringfenced by a closed polyline which is then applied to the D3i_SUDS feature class, this is to ensure further manual checks can be carried out against the supporting SuDS documentation.
- Boundary elements should be drawn as accurately as possible, adjacent boundaries should butt against each other without overlapping or 'bleeding' into one another.

Please refer to Appendix A.3 for details of additional data attributes within the feature classes that will require to be populated for the existing entities shown within the AutoCAD plan.

3.4 ESRI Plug in to AutoCAD

The Microdrainage mdx file and the AutoCAD dwg files together convey a lot of information. However, they do not convey all the information that the FastTrack Drainage Online Services requires in order to be successful.

Here is an example of missing data: Existing sewers and manholes. These are typically absent from the Microdrainage model because the modeller is interested in proving the performance of new proposed drainage rather than existing drainage. Existing sewers and manholes shall be represented in the uploaded AutoCAD dwg file as mandated in this User Guide.

However, these are typically portrayed in simplistic 2D line work in plan, frequently derived from Water Companies 2D GIS systems as lines and nodes. Therefore, the AutoCAD lines and nodes do not inherently contain information in the vertical axis such as manhole cover levels, sewer invert levels, manhole structure underside level etc. If the sewers are represented by a simple centreline then the diameter and cross section shape of the sewers is also missing.

There are other examples of missing data, such as information about design intent – e.g. "This sewer to be protected by concrete surround" or "This manhole to be demolished and replaced due to its condition." For an automated process like the FastTrack Drainage Online Portal to succeed, it is necessary to capture such annotations against the objects that they relate to, and to categorise them to some degree since computers (with rare exceptions) cannot easily and reliably read language and derive meaning very well.

3. Layout drawing template continued

3.4 ESRI Plug in to AutoCAD continued

It is therefore necessary to tag the objects with additional data directly within AutoCAD using an ESRI plug in.

The screenshot below shows such a typical tagging system. The plugin for AutoCAD shown below was developed by ESRI and is freely downloadable from their website and takes around 5 or 6 minutes to install. In the picture below, you can see a simple example of a line and a circle which represent the simplistic linework of sewers and manholes respectively.

The "Sewer" and "Manhole" FeatureClass has been defined to contain the fields shown by way of an example of what might be included. These FeatureClasses automatically apply themselves to all circles or lines in a given AutoCAD layer as set up in the FeatureClass definitions.

What it means to you as an AutoCAD drainage designer is that every time you create a new circle or a new line, these FeatureClasses automatically attach themselves to your new circle or line without you needing to do anything at all.

The ESRI plug in can be downloaded and installed free via the following link;

https://www.esri.com/en-us/arcgis/products/arcgis-for-autocad

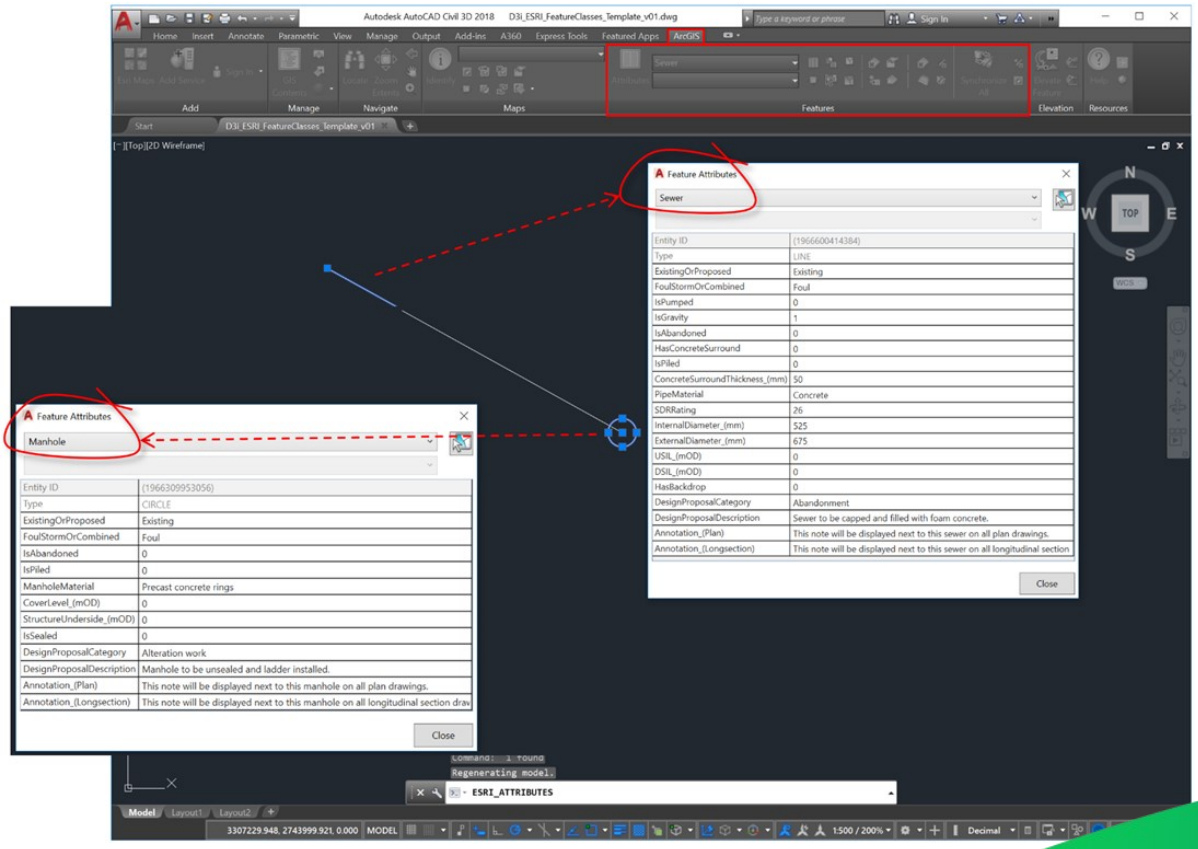
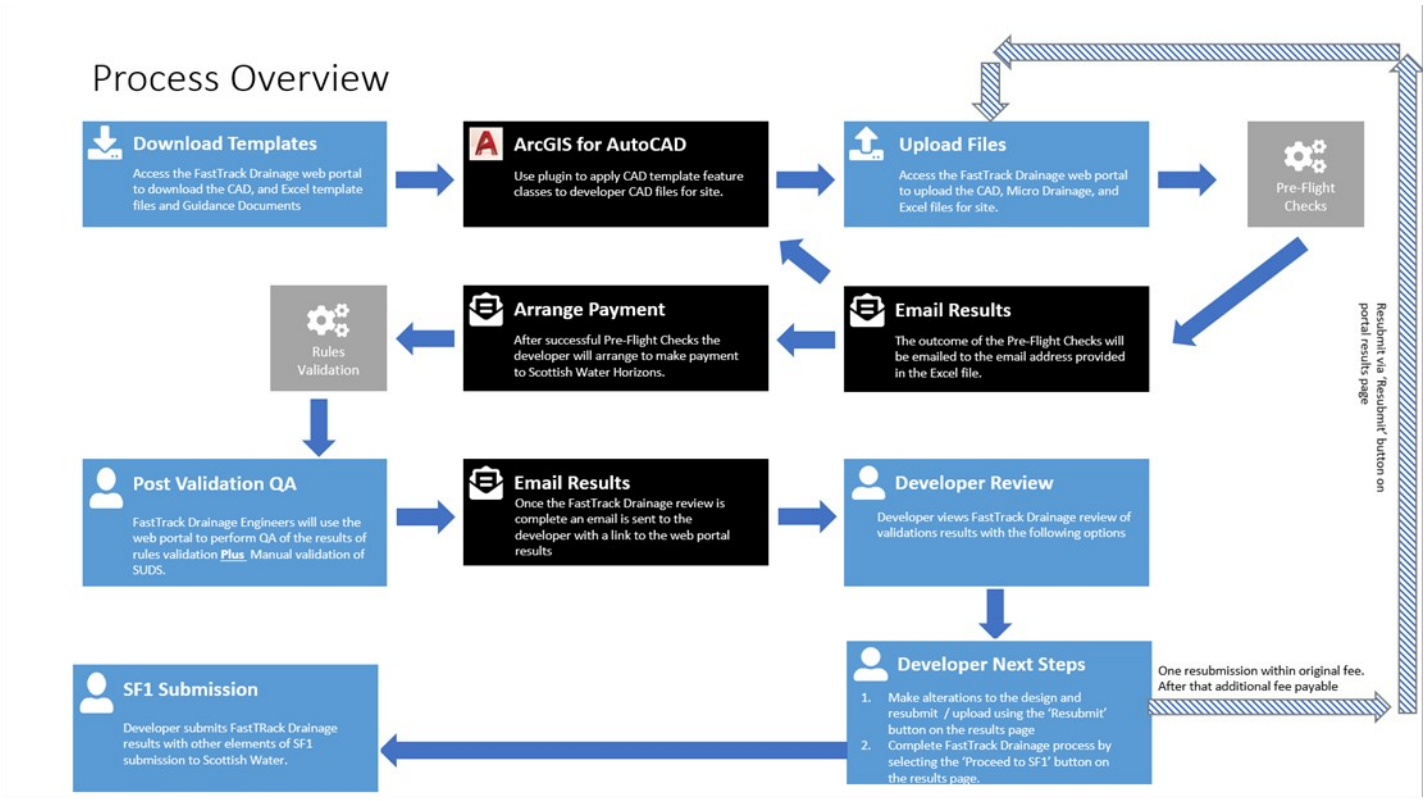


Figure 2 ESRI ArcGIS AutoCAD Plugin

4. Process overview

4.1 End to end process



4.2 Review of Initial Submission by FastTrack Drainage

Once the FastTrack Drainage review has been undertaken, the applicant will receive an email with a link to the validation results. This should be accessed using Google Chrome as identified earlier in this guidance document.

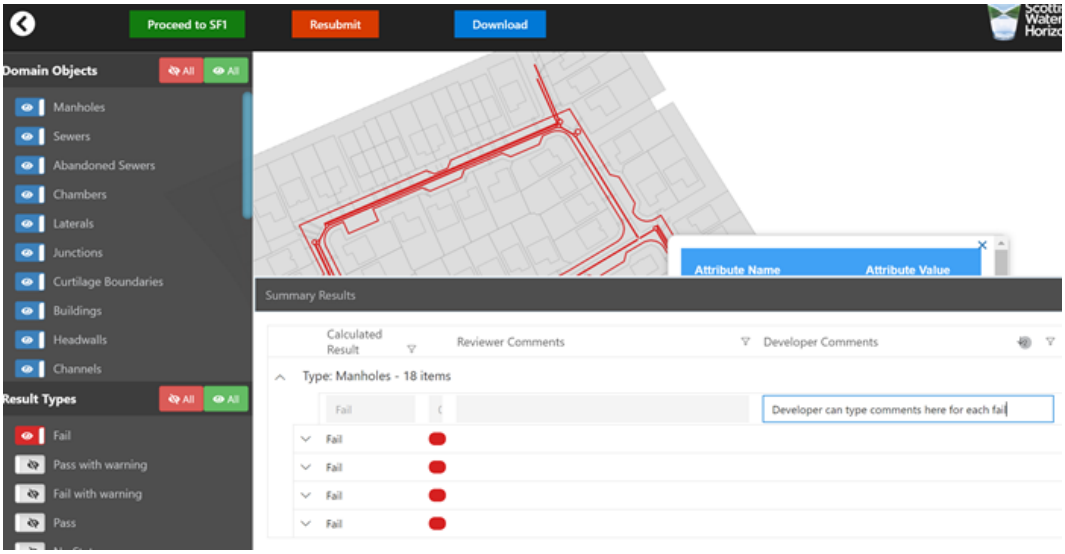
The results page will show visually the passes and failures against Sewers for Scotland in both map and tabular format as shown in the screenshot below. The applicant can provide comments in the 'Developer Comments' box to detail any reasons or mitigating factors proposed to explain the failures.

The download button at the top of the results page can be used to download an excel summary of the portal

results and also the SUDS review results. An example of the typical checks made by the portal is contained in Appendix A.4.

4. Process overview continued

4.2 Review of Initial Submission by FastTrack Drainage continued



4.3 Resubmission by Customer Following Initial Review by FastTrack Drainage

If the applicant proposes no changes to the design prior to submission to Scottish Water then the 'Proceed to

SF1' button at the top of the results page should be selected. See section below for further guidance.

If the applicant has updated the design to correct any non compliances with the specification, then the 'Resubmit' button should be used to resubmit the design for validation. It should be highlighted that only one resubmission is included within the original fee and is limited to updating the original design to correct the non compliances with specification.

Note: If the resubmit button is not used and the Customer uses the original portal landing page to resubmit the design then the Customer will be charged a resubmission fee.

4. Process overview continued

4.4 Review of Resubmission by Fast Track Drainage

Following review by FastTrack drainage of the Customers resubmission, the Customer will receive another email with a link to the validation results. This should be accessed in the same manner as before.

Should the Customer need to update the design to address any remaining non conformities with the specification, then a fresh application will need to be uploaded from the main portal landing page with a new application fee payable.

If the applicant proposes no changes to the design prior to submission to Scottish Water then the 'Proceed to

SF1' button at the top of the results page. See below for further guidance.

4.5 Proceed to SF1

If the submission has passed validation or the Customer decides that they wish to submit it to Scottish Water for formal approval, then the 'Proceed to SF1' button should be selected to close the workflow on FastTrack Drainage.

The Customer should then send the FastTrack Validation results along with their formal SF1 application and supplementary information (as detailed on the Scottish Water SF1 Form) to Scottish Water.

Appendices

The following section contains appendices as referenced throughout this guidance document:

A.2 Expected layout entities
A.3 Features classes and attributed data

Scottish Water Horizons

A.1. Expected Layout Entities

Please see below for a list of expected entities contained within the Layout Drawing.

Validated Items	Expected Entity Type	Associated Feature Class	Comments
Proposed Gravity Drainage Infrastructure			
D3i - Proposed Foul Water Sewer	Line / Polyline	D3i_Sewers	Foul Sewer to be adopted by Scottish Water.
D3i - Proposed Foul Water Sewer Chambers	Circle / Donut	D3i_Manholes	Foul Manholes to be adopted by Scottish Water. Chamber to be drawn as circular entity with diameter drawn indicative of proposed chamber size
D3i - Proposed Foul Water Laterals	Line / Polyline	D3i_Laterals	Foul Lateral to be adopted by Scottish Water
D3i - Proposed Foul Water Disconnecting Chambers	Circle / Donut	D3i_DisconnectingChamber	Foul Disconnecting chamber to remain private Chamber to be drawn as circular entity with diameter drawn indicative of proposed chamber size
D3i - Proposed Surface Water Sewer	Line / Polyline	D3i_Sewers	Surface Water Sewer to be adopted by Scottish Water.
D3i - Proposed Surface Water Sewer Chambers	Circle / Donut	D3i_Manholes	Surface Water Manholes to be adopted by Scottish Water. Chamber to be drawn as circular entity with diameter drawn indicative of proposed chamber size
D3i - Proposed Surface Water Laterals	Line / Polyline	D3i_Laterals	Surface Water Lateral to be adopted by Scottish Water
D3i - Proposed Surface Water Disconnecting Chambers	Circle / Donut	D3i_DisconnectingChamber	Surface Water Disconnecting chamber to remain private Chamber to be drawn as circular entity with diameter drawn indicative of proposed chamber size
D3i - Proposed Surface Water Channels	Line / Polyline	D3i_Channels	
D3i - Proposed Road Gullies	Closed Polyline	D3i_Gullies	Item to be shown including tail as closed polyline
D3i - Proposed Combined Sewer	Line / Polyline	D3i_Sewers	Combined Sewer to be adopted by Scottish Water. (Unlikely to be applicable)
D3i - Proposed Combined Sewer Chambers	Circle / Donut	D3i_Manholes	Combined Manholes to be adopted by Scottish Water. (Unlikely to be applicable) Chamber to be drawn as circular entity with diameter drawn indicative of proposed chamber size
Proposed Pumped Drainage Infrastructure			**For information only – excluded from D3i Validation**
D3i - Proposed Foul Water Pumping Station	Circle / Donut		Chamber to be drawn as circular entity with diameter drawn indicative of proposed chamber size

D3i - Proposed Foul Water Rising Main	Line / Polyline		Route of proposed foul water rising main to be adopted by Scottish Water
D3i - Proposed Surface Water Pumping Station	Circle / Donut		Chamber to be drawn as circular entity with diameter drawn indicative of proposed chamber size
D3i - Proposed Surface Water Rising Main	Line / Polyline		Route of proposed surface water rising main.
General - Proposed			
D3i - Site Boundary	Closed Polyline	D3i_SiteBoundary	The development site boundary
D3i - Proposed Building Outline	Closed Polyline	D3i_Buildings	The outline of a single proposed building
D3i - Boundary Outline (Fue Boundary)	Closed Polyline	D3i_Boundaries	The individual curtilage of each property must be represented. The closed polygon should not overlap with adjacent polygons otherwise there is a risk that the Pre-Flight Check will fail and generate the following notification; Item of type D3i_Boundaries has OGC invalid geometry
D3i - Road Edge Outline	Closed Polyline	D3i_Roads	This is the road kerbline The closed polygon should not overlap with adjacent polygons otherwise there is a risk that the Pre-Flight Check will fail and generate the following notification; Item of type D3i_Roads has OGC invalid geometry.
D3i - Proposed Private Parking	Closed Polyline	D3i_PrivateParking	This is the boundary of private parking spaces within private or management company ownership
D3i - Proposed Public Parking	Closed Polyline	D3i_PublicParking	This is the boundary of public parking spaces within Local Authority ownership
D3i - Proposed Public Spaces	Closed Polyline	D3i_PublicSpaces	Areas of the development excluding public roads and footpaths which are in Local Authority ownership
D3i - Private Spaces Outline	Closed Polyline	D3i_PrivateGardens	Areas of the development excluding property curtilage or private parking spaces that are in private ownership i.e. private courtyard
D3i - Proposed Headwall	Polyline	D3i_Headwalls	
D3i - Proposed Trees	Closed Polyline/Block?	D3i_Flora	Block to show mature tree canopy extents Assumes trees are deep routed
D3i - Proposed Shrubs	Closed Polyline/Block?	D3i_Flora	Block to show mature shrub extents Assumes shrubs are shallow rooted
Existing Gravity Drainage Infrastructure			
D3i - Existing Foul Water Sewer	Line / Polyline	D3i_Sewers	
D3i - Existing Foul Water Sewer Chambers	Circle / Donut	D3i_Manholes	Chamber to be drawn as circular entity with diameter drawn indicative of proposed chamber size
D3i - Existing Foul Water Laterals	Line / Polyline	D3i_Laterals	
D3i - Existing Surface Water Sewer	Line / Polyline	D3i_Sewers	

D3i - Existing Surface Water Sewer Chambers	Circle / Donut	D3i_Manholes	Chamber to be drawn as circular entity with diameter drawn indicative of proposed chamber size
D3i - Existing Surface Water Laterals	Line / Polyline	D3i_Laterals	
D3i - Existing Road Gullys	Closed Polyline	D3i_Gullies	Item to be shown including tail as closed polyline
D3i - Existing Combined Sewer	Line / Polyline	D3i_Sewers	
D3i - Existing Combined Sewer Chambers	Circle / Donut	D3i_Manholes	
Existing Pumped Drainage Infrastructure			
D3i - Existing Foul Water Pumping Station	Closed Polyline		Pumping station to be drawn as circular entity with diameter drawn indicative of proposed chamber size
D3i - Existing Foul Water Rising Main	Line / Polyline		
D3i - Existing Surface Water Pumping Station	Closed Polyline		Pumping station to be drawn as circular entity with diameter drawn indicative of proposed chamber size
D3i - Existing Surface Water Rising Main	Line / Polyline		
Existing Drainage Infrastructure - To Be Abandoned			
D3i - Abandoned Combined Sewer Network	Line / Polyline /Hatching	D3i_Sewers	Combined sewer that is proposed to be abandoned
D3i - Abandoned Foul Water Network	Line / Polyline /Hatching	D3i_Sewers	Foul sewer that is proposed to be abandoned
D3i - Abandoned Surface Water Network	Line / Polyline /Hatching	D3i_Sewers	Surface Water sewer that is proposed to be abandoned
General - Existing			
D3i - Existing Building Outline	Closed Polyline	D3i_Buildings	The outline of a single proposed building
D3i - Existing Headwall	Polyline	D3i_Headwalls	
D3i - Existing Ditch Watercourse	Line / Polyline		
D3i - Existing Trees	Closed Polyline/Block?	D3i_Flora	Block to show mature tree canopy extents
D3i - Existing Shrubs	Closed Polyline/Block?	D3i_Flora	Block to show mature shrub canopy extents
SUDS			**For information only – excluded from D3i Validation**
Proposed SUDS Attenuation Features	SuDS items to be contained within closed polyline which is applied to the D3i_Suds feature class	D3i_Suds	Those SUDS features to be adopted by Scottish Water
Proposed Private SUDS Attenuation Features	SuDS items to be contained within closed polyline which is applied	D3i_Suds	Those SUDS features to be privately maintained

	to the D3i_Suds feature class		
Additional			
D3i - Proposed Foul Water Network text	Text		Drafting purpose only - Items are not validated against
D3i - Proposed Surface Water Network text	Text		
D3i - Proposed Text	Text		

A.2. Feature Classes & Attributed Data

Please see below for a list of defined feature classes and additional attributes required. This additional information will be added using the ESRI.

D3i_Boundaries
Existing/Proposed

D3i_Buildings
Existing/Proposed

D3i_Channels
Base Width
Existing/Proposed
Left Side Slope
Right Side Slope
Top of bank right
Top of bank Left

D3i_DisconnectingChamber
Existing/Proposed
Water type

D3i_Flora
Existing /Proposed
Type

D3i_Gullies
Existing /Proposed
Water type

D3i_Headwalls
Existing /Proposed
Water type

D3i_Laterals
Existing /Proposed
External Diameter
Internal Diameter
Material
Nominal Diameter
Water Type

D3i_LocalAuthorityLand
No additional attributed data required

D3i_Manholes
Access Location Bearing
Cover Level
Existing /Proposed
External Diameter
Has Backdrop
Is abandoned
Is piled
Is sealed
Material
Name
Shape
Water type

D3i_PrivateGardens
Existing /Proposed

D3i_PrivateParking
No additional attributed data required

D3i_PublicParking
No additional attributed data required

D3i_PublicSpaces
No additional attributed data required

D3i_Roads
Existing /Proposed

D3i_Sewers
connected dwellings
DS invert level
DS Manhole
Existing /Proposed
External Diameter
Gravity or Pumped
Has Concrete Surround
Internal Diameter
Is abandoned
Is piled
Material
Nominal Diameter
SDR Rating
US Invert Level
US manhole
Water type

A.3. Example Validation Checks Undertaken by FastTrack Portal

Building
Building within boundary
Proposed Build over or near to (any) sewer
Chambers
Chamber less than 0.5 m from boundary edge
Chamber should be within a boundary
Curtilage Boundaries
Building boundary has at most one foul disconnecting chamber
Building boundary has at most one surface disconnecting chamber
Building boundary has potential shared foul disconnecting chamber
Building boundary has potential shared surface disconnecting chamber
Manholes
Backdrops not used
Manhole cover depth - no accidentally buried covers
Manhole dia versus largest pipe <= 1500mm
Manhole soffit depth not greater than 6m
manhole to manhole collision
manhole to pipe collision
Manhole Type C minimum diameter
Manhole within local authority land
New sewer connection
Proposed Manhole to (any) kerb prox
Proposed manhole to (any)sewer
Roads
Proposed kerb to (any) manhole prox
Proposed kerb to (any) sewer prox
Sewers
Minimum sewer diameter
Build near a public sewer
Foul gravity sewer roughness check
Foul self-cleansing velocity
foul sewer below (deeper than) the surface water sewer
Housing foul design flows
Manhole at head of sewer
Manhole per change in direction check (horizontal)
Material lookup in DO
Maximum distance between manholes on sewer - sewer length check
Minimum gravity sewer size
New sewer water type check
Proposed Minimum clearance (vertical) between any sewers
Proposed Sewer not under (any) road depth check
Proposed sewer to (any) kerb prox
Proposed Sewer under (any) building
Proposed Sewer under (any) road depth check
Proposed sewers to (any) manhole
sewer to manhole collision
Sewer within local authority area
Surface Water gravity sewer roughness check
Surface Water sewer self cleansing velocity

A.4. Checklists for Manual Checking of SUDS Features

Ref	GENERAL Section 2A and 2B Sewers for Scotland 4th edition	Section	Answer required to Pass
	Section 2A - Design Submissions		
1	The Developer has provided separate foul and surface water systems for the proposed development.	2A: 2.1 - 1	Yes
2	Proposed SUD System is treating naturally surface water only.	2A: 2.1 - 2	Yes
3	The SUD System conveys, treats and discharges SW's statutory surface water to the nearest practical water course.	2A: 2.1 - 2	Yes
4	Proposed SUD System is not part of the Local Authority flood prevention plan requesting long-term storage to deal with temporary flood storage of storm events.	2A: 2.1 - 4	Yes
5	The Developer (and/or his designer) is wholly responsible for the design and construction of sewerage infrastructure, including SUD Systems, and certifies that their design complies with Sewers for Scotland 4th edition and accepts liability for compliance through their professional indemnity insurance.	2A: 2.1 - 6	
6	IF a pond or basin which has not been included in a notice plan is provided, the developer shall the following: convey the land upon which it is located at no additional cost to Scottish Water; ensure that Scottish Water receives, to its satisfaction, the rights of access; ensure that both the electricity supply and telecommunication connection are provided by Scottish Water-approved suppliers and are transferred to Scottish Water at the time of vesting.	2A: 2.1 - 8.e	Yes or n/a
7	Control of pollution, oil/petrol interceptors and other pre-treatment devices upstream of SUDS are provided IF required.	2A: 2.1 - 8.g	Yes or n/a
8	There are none groundwater or land drainage connections made to the SUD System.	2A: 2.1 - 9	
9	SUD System other than infiltration SUDS has been proposed (as Scottish Water does not currently vest infiltration SUDS).	2A: 2.1 - 12	Yes
10	Pre- and post-development runoff calculations to determine the scale of SUDS required have been completed.	2A: 2.1 - 12	Pass with warning
11	IF development/sewers are within 1-in-200 year flood risk areas, then the assessment of flood risk has been completed.	2A: 2.1 - 12	Pass with warning
12	IF swales and piped filter trenches are used as SUD components, they are used as 'end of pipe' systems only (as only then they can be vested by Scottish Water).	2A: 2.2 - 2	N/A or Yes
13	If attenuation storage structure (pond or basin) is proposed, then it is to be vested in Scottish Water including their embankments and access roads.	2A: 2.2 - 4	N/A or Yes
14	All SUD systems proposed are located in passive public open space (NOT within property boundaries or SUD systems draining roads water in close proximity to roads).	2A: 2.2 - 5	Yes
	Section 2B - Surface Water Drainage Design		
15	SUD system is designed so that flooding does not occur in any part of the site in a 1-in-30 year return period design storm flood frequency, with a 1-in-200 year overall minimum flood resilience assessment	2B: 2.6 - 1	Pass with warning

Ref	GENERAL Section 2A and 2B Sewers for Scotland 4th edition	Section	Answer required to Pass
	check (a copy of the model and results are available to SW on request).		
16	Proposed attenuation storage is on the list of the following, acceptable for Scottish Water to vest: - detention ponds, - detention basins, - swales, - piped filter trenches, - underground storage pipes and tanks. (Note: The following are not considered appropriate for vesting by Scottish Water: soakaways, infiltration type filter drains, infiltration swales; blue and green roofs; rainwater harvesting systems; water butts; and permeable hard-standings.)	2B: 2.7 - 5	Yes
17	IF an underground storage is proposed, it is used in conjunction with SUD techniques for discharges direct to a watercourse in urbanised city/town centre development sites (as an underground storage alone does not provide treatment; for exceptions see note in section 2.7-6).	2B: 2.7 - 6	N/A or Yes
18	The minimum velocity for pipes that only receive discharges from SUD systems is greater than 0.3 metres/second for a 1-year event	2B: 2.7.2 - 1	Pass with warning
19	The roughness value (ks) for surface water sewer design shall be 0.6 mm.	2B: 2.7.2 - 3	Yes
20	For surface water quality treatment, a minimum permanent pool volume of one treatment volume is provided for residential developments. (Large commercial and industrial sites may require enhanced design criteria - up to four treatment volumes.)	2B: 2.8 - 3	Pass with warning

Ref	*SWALES* *Section 2B - 2.11* *Sewers for Scotland 4th edition*	*Section*	*Answer required to Pass*
	SWALE APPEARANCE, DIMENSIONS, ETC.		
1	Swales are implemented only as 'end of pipe' SUDS (as the 'end of pipe' swales are the only type of swale that Scottish Water will consider vesting).	2B: 2.11.1	Yes
2	Swales are designed to appear as natural depressions.	2B: 2.11.1	Yes
3	Swale is linear in appearance with organic gentle curves. The bend radius is more than twice the top width of the swale.	2B: 2.11.2 - 2	Yes
4	A risk assessment has been undertaken to demonstrate that infiltration from a swale is permissible with regards to groundwater flooding, ground and groundwater contamination, and geotechnical stability. Where infiltration is not permissible the swale is to be lined. The swale is not used to collect sheeting flow from the surrounding land or highways.	2B: 2.11.1	Yes
5	The swale is designed to convey or store the 1 in 30-year event when full. All swales have the capacity to convey, or store, the 1 in 30 year event for the discharge it receives, and the ability to remain operational with exceedance events up to the 1 in 200 year flood.	2B: 2.11.1, 2.11.4 - 2	Yes
6	The swale provides, for all inflows, an average residence time of 9 minutes for the 1 in 1 year flow, to permit sufficient water quality treatment when the flow depth is less than 100mm, and have a corresponding flow velocity less than 0.3 m/s. A length of swale is a length required to achieve the minimum average residence time of 9 minutes for the 1 in 1 year flow.	2B: 2.11.1	Yes
7	Swale's maximum depth of the intended wetted channel (depth to invert) of 750mm for 80% of the swale length to account for piped inlet and outlets. *(Deeper swales shall be vested where dictated by topography and deemed acceptable by the health and safety risk assessment.)*	2B: 2.11.1	Yes
8	A maximum water depth of 600mm for design events, including any storage component.	2B: 2.11.1	Yes
9	A freeboard of 150mm is included to the design.	2B: 2.11.1	Yes
10	A treatment flow depth of 100mm, at which depth the flow is limited to 0.3m/s. Swales provide for a normal treatment depth (or permanent pool volume) of 100mm with a corresponding flow velocity of 0.3m/s.	2B: 2.11.1, 2.11.4 - 3	Yes
11	The maximum flow velocity during the 1 in 1 year design event is less than 0.3m/s (and under no circumstances exceeds 1 m/s).	2B: 2.11.4 - 3	Yes
12	Energy dissipation is employed where inflows are determined by the design to be greater than 1m/s, this being the permissible velocity for grass.	2B: 2.11.3 - 1	Yes or n/a
13	Swale's steepest side slope of 1 in 4 (preferably shallower).	2B: 2.11.1, 2.11.7 - 5	Yes

Ref	*SWALES* *Section 2B - 2.11* *Sewers for Scotland 4th edition*	*Section*	*Answer required to Pass*
14	A slope shallower than 1 in 33 is required where no check dams are included. *(See 2B - 2.11.4- 7 to 10 for more details)* A maximum longitudinal gradient of steeper than 1 in 33 is permitted where check dams and other approved flow detention devices are included. Swale is not designed at a slope steeper than 1 in 10. No swale is designed with a longitudinal gradient of less than 1 in 100 unless where permanent pools are featured. The minimum permissible bed gradient for a swale is 1 in 200.	2B: 2.11.4 - 7 to 10, 2.11.1	Yes
15	A minimum flat base width of the swale is 500mm or twice the diameter of the inlet pipes – whichever is the greater. A maximum flat base width of the swale is 2000mm.	2B: 2.11.1	Yes
16	Swale is located at least 3m from the nearest private land boundary and the nearest buildings.	2B: 2.11.2 - 1	Yes
17	The maximum flood water level in any swale is at least 500mm below the floor level of any adjacent premises.	2B: 2.11.2 - 1	Yes
18	Any external sheeting flows that could discharge into the swale are intercepted and prevented from entering the swale (however the design should consider the requirement for additional interception features to convey these flows).	2B: 2.11.2 - 3	Yes
19	The Developer confirmed that when designing and locating the swale, flow paths and the potential effects of surface flooding resulting from storm events exceeding the design criteria were considered.	2B: 2.11.2 - 6	Yes
20	The maximum 1-year return period event water level in the swale is higher than the appropriate return period event water level of the receiving watercourse, sewer or SUDS, as specified by the relevant Authority.	2B: 2.11.2 - 6	Yes
21	The swale is capable of discharging the design event to half empty within 24hours.	2B: 2.11.4 - 3	Yes
22	A Manning's roughness value of 0.350 was used for treatment flows up to 150mm depth, reducing to 0.100 for flow at the design depth of 600mm (full capacity).	2B: 2.11.4 - 4	Yes
23	Where the risk assessment requires, swales are made watertight to 150mm below surrounding ground level using an appropriate impermeable liner. A liner is always required where used on a site with a sensitive underlying groundwater zone, or if used to treat runoff from a potential pollution location. *See 2B-2.11.4-5 section for liner details.*	2B: 2.11.4 - 4, 5	Yes or n/a
24	No swales to be under drained unless into a contained (lined) piped system, or where infiltration is proven by the design risk assessment. Any under drain is only permitted where constructed within the final 3m of the downstream end of the swale in order to prevent waterlogging, and in compliance with the general concepts of the piped filter trench section. *See 2B - 2.11.5,6 sections for more details.*	2B: 2.11.4 - 5, 6	Yes
	ACCESS ROAD		

Ref	*SWALES* *Section 2B - 2.11* *Sewers for Scotland 4th edition*	*Section*	*Answer required to Pass*
25	Swale to have a maintenance access, approximately 3.5 m wide, to the inlet(s) and outlet suitable for a vehicle and trailer (vehicular access route along the full length of the swale), and located above the maximum 30-year water level.	2B: 2.11.1, 2.11.2 - 1, 2.11.6 - 1 to 6	Yes
26	A maximum slope of 1:12 to be provided on any defined vehicular maintenance access route into the swale, where provided.	2B: 2.11.7 - 6	Yes or n/a
27	All vehicular access points are level, secure and stable.	2B: 2.11.7 - 7	Yes
28	All vertical drops greater than 1.2 m shall be protected using guardrails or similar fencing (this is intended for the inlet and outlet headwalls only). Swales should not be fenced off.	2B: 2.11.7 - 8, 10	Yes
	INLET		
29	Each inlet structure shall include a sediment forebay, where appropriate a safety grille, and point source erosion control. The inlet structure, or structures, include for a sediment forebay or other sediment control device, and, where the incoming pipe is greater than 350mm diameter, a hinged safety grille is incorporated. Bar spacing shall not exceed 150 mm and shall not be less than 75 mm. (Refer to Figure 8 and 9).	2B: 2.11.1, 2.11.3 - 1, 2.11.8 - 11, 12	
30	The base of the sedimentation forebay to be constructed using reinforced concrete.	2B: 2.11.3 - 1	Yes
31	Sediment forebays serving residential areas are sized to allow 1 year's worth of sediment storage based on 0.3m3 per hectare, based on hectares of impermeable (including roofed and paved) area. Those swales serving industrial and commercial areas to have their forebays sized to allow 1 year's worth of sediment storage based on 0.8m3 per hectare.	2B: 2.11.3 - 1	Yes
32	Mitred pipework with concrete collars, subject to the appropriate finishing, are permitted where depths and sizing permits. All incoming pipework greater than 600mm in diameter to be afforded a full headwall.	2B: 2.11.3 - 1	Yes
33	The inlet structure to a swale includes a man-entry chamber and headwall. All incoming flows connect to an inlet structure.	2B: 2.11.3 - 1	Yes
34	The swale inlet structure is furnished with the ability to block the discharge of water - by means of a tamper proof shut-off valve operated from surface level, or similar devices.	2B: 2.11.3 - 1	Yes
35	The invert(s) of all the incoming sewers to the headwall chamber are at or above the maximum 1-year water level in the swale.	2B: 2.11.3 - 1	Yes
36	The inlet into the swale is no more than 100mm above the swale invert and discharged onto concrete or revetment apron (that includes sediment foreby) to minimise erosion.	2B: 2.11.3 - 1	Yes
	OUTLET		
37	An outlet structure has got an integral overflow and shut off facility. *(The storage capacity of the swale can only be considered as part of the design where the outlet from or intermediate control from the swales is regulated.)*	2B: 2.11.1	Yes
38	There is a separate spill overflow structure (with a planned flood route).	2B: 2.11.1	Yes
39	The outlet structure (i.e. flow control) includes a man-entry chamber.	2B: 2.11.5 - 1	Yes

Ref	*SWALES* *Section 2B - 2.11* *Sewers for Scotland 4th edition*	*Section*	*Answer required to Pass*
40	The outlet structure (i.e. flow control) is designed to operate and discharge the design-limiting discharge rates in accordance with the Local Authority requirements as part of its flood prevention duties.	2B: 2.11.5 - 1	Yes
41	Mitred pipework with concrete collars is permitted where depths and sizing permits. All outgoing pipework greater than 600mm to be afforded a full headwall.	2B: 2.11.5 - 1	Yes
42	All outgoing pipework/chambers include a sediment control device, such as a catchpit.	2B: 2.11.5 - 1	Yes
43	Throttle controls shall be provided using high-grade galvanised or stainless steel fixed to the concrete structure.	2B: 2.11.5 - 1	Yes
44	The swale outlet is furnished with the ability to block the discharge of water - by means of a tamper proof shut-off valve operated from surface level, or similar devices.	2B: 2.11.5 - 1	Yes
45	The minimum diameter of any limiting discharge control orifice to be 75 mm unless otherwise agreed. Vortex control units or similar may be used to control outflow rates. Slotted or vee notch weirs may also be used.	2B: 2.11.5 - 1	Yes
46	If discharging to a receiving water, subject to the Local Authority requirements, the outlet structure control(s) shall discharge at the design 1-year return period outflow rate when the swale is at the 1- year return period water level for the critical design storm event. Similarly, this applies to the control for the 30-year return period and any greater return period event as required by the Local Authority as part of its flood prevention duties. The full 1-in-30 year limiting flow rate can be discharged (within the constraints of head-discharge design) once the maximum water level of the 1-year return period event has been exceeded. Similarly, this applies to the control for the 30-year return period and any greater return period event as required by the Local Authority as part of its flood prevention duties. In all cases, flood routing shall be assessed for a 1-in-200 year event to ensure the integrity of the SUDS arrangements and their protection from erosion or associated risk.	2B: 2.11.5 - 1	Yes or n/a
47	The outlet structure includes an integral overflow to enable pass forward flow in the event of blockage.	2B: 2.11.5 - 1	Yes
48	An emergency overflow is provided which enables design exceedance flows up to the 1 in 200 year event to discharge past / along the swale whilst not increasing the risk of detriment to the swale or its adjacent land.	2B: 2.11.5 - 1	Yes
49	Means are provided to drain the lowest point in the swale at the outlet in such case where the outlet has failed. A pipe may be laid to the lowest point in the swale and a valve at the same level be provided in the outlet chamber. The capacity of the drawdown function to be no smaller than the capacity of the inlet pipe(s) to the swale. The penstock or other valving to be able to be operated safely from ground level, outside of the outlet structure.	2B: 2.11.5 - 1	Yes
50	The top of the swale outlet headwall is minimum 300mm above the top water level of the maximum design return period storm	2B: 2.11.5 - 1	Yes

Ref	*SWALES* *Section 2B - 2.11* *Sewers for Scotland 4th edition*	*Section*	*Answer required to Pass*
	event but no more than 100mm above surrounding ground level at that point.		
51	For swale planting guidance - see section 2B - 2.11.9.	2B: 2.11.9	
	REFERENCES		
	CIRIA 753 - swale dimensions Figure 10 - Typical plan of swale Figure 11 - Typical swale cross-section Figure 12 - Typical swale and check dam long-section Figure 8 - Typical outfall safety grill for outfalls 350mm dia or greater Figure 9 - Typical outfall to water course (suitable for outfall pipes of less than 350mm)	2B: Figure 8, 9, 10, 11 and 12	

<u>To be provided by the Developer:</u>

Detailed drawings (i.a. plan, cross-section and long-section) of the proposed swale(s) and the following information:
Impermeable area (of the development site)
Permeable area (of the development site)
Swale volume
Average residence time for the 1 in 1 year flow
Max top water level
Max groundwater level
Ground level
Max 1-year water level in the swale
Max 30-year water level in the swale
Max 200-year water level in the swale
Max 1-year water level in the receiving watercourse
The top of the swale outlet headwall
1 in 1 year event discharge
1 in 30 year event discharge
1 in 200 year event discharge
Floor level in adjacent premises
Outlet - discharge control orifice diameter
Outlet - discharge control rate
Discharge rate in accordance with the Local Authority requirements

Ref	DETENTION BASINS Section 2B - 2.10 Sewers for Scotland 4th edition	Section	Answer required to Pass
	DETENTION BASIN APPEARANCE, LEVELS, GRADIENTS, DIMENSIONS		
1	Detention basin appears natural (i.a. has no angular corners).	2B: 2.10.1 - 1	Yes
2	Detention basin has slopes no greater than 1:4.	2B: 2.10.1 - 3b	Yes
3	Detention basin has a low-flow channel through the basin, connecting the inlet structure(s) to the outlet structure(s) *(refer to Figure 5 for low-flow channel requirements).*	2B: 2.10.1 - 3f	Yes
4	It falls towards the centre (i.e. low flow channel across the base of the basin).	2B: 2.10.1 - 4c	Yes
5	The maximum depth of water level for attenuation of runoff shall not normally be greater than 1.3m *(refer to Figure 5)*.	2B: 2.10.1 - 4d	Yes
6	Detention basin's maximum depth is 3m.	2B: 2.10.1 - 4a	Yes
7	If any detention basin volumes exceeds 5,000 m3 and any embanked detention basin is greater than 10,000 m3, it was referred to Scottish Water for special consideration.	2B: 2.10.2 - 1	N/A or Yes
8	The maximum water level in any detention basin is at least 500 mm below the floor level of any adjacent premises.	2B: 2.10.3 - 3	Yes
9	The maximum 1-year return period event basin water level is higher than the appropriate return period event water level of the adjacent watercourse, as specified by the Local Authority as part of its flood prevention duties. (*Appropriate hydraulic checks on the implications of high watercourse levels shall be made, where appropriate.)*	2B: 2.10.3 - 5	Yes
10	If discharging to a receiving water the outlet structure control(s) discharge at the design 1-year return period outflow rate when the basin is at the 1-year return period water level for the critical design storm event. Similarly, this applies to the control for the 1-in-30 year return period and any greater return period event, as required by the Local Authority as part of its flood prevention duties. The full 1-in-30 year limiting flow rate can be discharged (within the constraints of head-discharge design) once the maximum water level of the 1-year return period event has been exceeded. Similarly, when the 1-in-30 year water level has been exceeded, any higher limiting discharge flow rate can be mobilised. When the maximum design water level has been exceeded and the basin's overflow comes into operation.	2B: 2.10.5 - 2	Yes
11	Embankments are minimum 300mm above the maximum return period storm event.	2B: 2.10.5 - 4	Yes
12	Drain down time is a minimum of 12 hours (to allow for sedimentation to take place).	2B: 2.10.6 - 2	Yes
	ACCESS ROAD		
13	Detention basin has access with a minimum width of 3.5 m to access the basin suitable for maintenance vehicles including a tanker with sufficient capacity to completely empty the basin (up to a maximum of 18,000 litres).	2B: 2.10.1 - 3a, 2.10.7 - 3	Yes
14	The base of the detention basin is specifically designed for the operation of maintenance vehicles - if vehicular access into the structure is proposed.	2B: 2.10.1 - 4b	Yes or No

Ref	DETENTION BASINS Section 2B - 2.10 Sewers for Scotland 4th edition	Section	Answer required to Pass
	INLET		
15	The detention basin inlets are slightly higher than the base of the detention basin with suitable energy dissipation and erosion protection provision.	2B: 2.10.4 - 1	Yes
16	Detention basins is designed with a slight depression in the area of the inlet structures. A slight depression forming a bioretention area is designed around inlets. This bioretention area is to be protected from high energy flows, which will aid water quality treatment. The bioretention area is not in deep water, with a 150 mm maximum water depth.	2B: 2.10.4 - 3, 2.10.6 - 1	Yes. If No, to be agreed with SWH if acceptable
17	All exposed pipe inlets or outlets larger than 350mm have safety grilles, which are designed to minimise the risk of blockage and allow safe access for cleaning during extreme events. *(Refer to Figures 8 and 9 respectively).*	2B: 2.10.4 - 2	N/A or Yes
18	All penstocks or similar control valves can be operated safely from outside of the inlet structure.	2B: 2.10.4 - 4	Yes
	OUTLET		
19	Detention basin has an outlet structure, with an integral overflow and drawdown facility, located as far from the inlet as reasonably practicable.	2B: 2.10.1 - 3c, d, 2.10.5 - 3	Yes
20	Detention basin has a separate emergency overflow structure (with a planned flood route). An emergency overflow is provided as a separate structure and is not to be constructed through an embankment.	2B: 2.10.1 - 3e, 2.10.5 - 3	Yes
21	The outlet structure (i.e. flow control manhole) is a man-entry chamber, designed to operate and discharge the design-limiting discharge rates in accordance with the Local Authority requirements. Throttle controls are provided using high-grade galvanised or stainless steel fixed to the concrete structure. The minimum diameter of any limiting discharge control orifice is 75 mm unless otherwise agreed. Orifice or vortex control units or similar may be used to control outflow rates. *(Refer to Figures 4 and 7).*	2B: 2.10.5 - 1	Yes
22	The outlet structure is designed to operate and discharge the design discharge rates at the requisite storm return periods.	2B: 2.10.5 - 5	Yes
23	All penstock or similar control valves shall be able to be operated safely from outside of the outlet structure.	2B: 2.10.5 - 6	Yes
	GROUND, GROUNDWATER		
24	Where detention basin liners are used in areas of high groundwater, the basin shall have a base level 500 mm above the maximum groundwater level.	2B: 2.10.6 - 3	N/A or Yes
25	On brownfield sites, the developer made a declaration to Scottish Water that contamination risk to surface water drainage into the SUD system had fully addressed any risk of groundwater pollution.	2B: 2.10.6 - 4	Pass with warning
	REFERENCES		

Ref	DETENTION BASINS Section 2B - 2.10 Sewers for Scotland 4th edition	Section	Answer required to Pass
	Figure 5 - Typical basin layout Figure 6 - Typical basin cross-section Figure 7 - Typical basin flow control manhole Figure 8 - Typical outfall safety grill for outfalls 350mm dia or greater Figure 9 - Typical outfall to water course (suitable for outfall pipes of less than 350mm)	2B: Figure 5,6,7,8 and 9	

<u>To be provided by the Developer:</u>
Detailed drawings (i.a. plan, cross-section and long-section) of the proposed detention basin(s) and the following information:
Detention basin volume (total)
Detention basin embankment volume
Max flood water level
Max groundwater level
Max 1-year water level in the detention basin
Max 30-year water level in the detention basin
Max 200-year water level in the detention basin
Max 1-year water level in the adjacent watercourse
Floor level in adjacent premises
Drain time
Outlet - discharge control orifice diameter
Outlet - discharge control rate
Discharge rate in accordance with the Local Authority requirements

Ref	PONDS Section 2B - 2.9 Sewers for Scotland 4th edition	Section	Answer required to Pass
	POND APPEARANCE, LEVELS AND DIMENSIONS		
1	Pond appears natural (i.a. has no angular corners).	2B: 2.9.1 - 1	Yes
2	Pond has an open clear water pond area.	2B: 2.9.1 - 2d	Yes
3	Shallow water aquatic bench around the pond supports both submerged and emergent aquatic plants, the latter acting as barrier planting.	2B: 2.9.1 - 2e	Yes
4	A minimum pond length to width ratio of 3.5 to 1.	2B: 2.9.1 - 3a	Yes
5	A zone with permanent pool deep-water depth is minimum 1.2m.	2B: 2.9.1 - 3b	Yes
6	A maximum permanent pool deep-water depth is 2.0m.	2B: 2.9.1 - 3c	Yes
7	The maximum range of water level for attenuation of runoff is not greater than 2m.	2B: 2.9.1 - 3l	Yes
8	A minimum permanent pool volume is based on 15mm of rainfall from impermeable surfaces draining to the pond (for exception see note in section 2.9.1-3).	2B: 2.9.1 - 3d, 2.9.7 - 1	Yes
9	The alignment of the inlet and outlet maximises flow detention times and minimises the risk of flows short circuiting. Outlets are located as far from the inlet as reasonably practicable.	2B: 2.9.1 - 3h, 3i	Yes
10	The width of the aquatic bench is a minimum of 2m and is continuous around the pond, except in front of the inlet(s).	2B: 2.9.1 - 3j	Yes
11	The depth of the aquatic bench ranges from the permanent pool water's edge up to a maximum depth of 450mm.	2B: 2.9.1 - 3k	Yes
12	IF any pond volumes exceed 5,000 m3 and any embanked pond is greater than 10,000 m3, it was referred to Scottish Water for special consideration.	2B: 2.9.2 - 2	Yes
13	The maximum flood water level in any detention pond is at least 500mm below the floor level of any adjacent premises.	2B: 2.9.3 - 3	Yes
14	The maximum 1-year return period event pond water level is higher than the appropriate return period event water level of the adjacent watercourse, as specified by the Local Authority. *(Appropriate hydraulic checks on the implications of high watercourse levels have been made, where appropriate.)*	2B: 2.9.3 - 4	Yes
15	Developer to confirm: Pond forebays are sized to allow 25 years of sediment storage.	2B: 2.9.5 - 5, 6	
16	The top of the embankments is minimum 300mm above the top water level.	2B: 2.9.6 - 6	Yes
17	Drain down time is minimum of 12 hours.	2B: 2.9.7 - 4	Yes
18	The maximum side slope between the maintenance access path and the aquatic bench to be 1:4, with a maximum slope of 1:12 on the defined maintenance access route into the pond. The perimeter of the pond 1 m inside and outside the water's edge (water level during dry periods) to have a gradient of less than 1:10. Other areas (above and below the pond) to have gradients of less than 1:4.	2B: 2.9.9 - 1, 2.9.11 - 2	Yes
19	All vertical drops greater than 1.2 m are protected.	2B: 2.9.9 - 2	Yes
	ACCESS ROAD		

Ref	PONDS Section 2B - 2.9 Sewers for Scotland 4th edition	Section	Answer required to Pass
20	Pond has a maintenance access route approximately 3.5 m wide, suitable for a vehicle, which is located immediately above the maximum 30-year water level provides an access to the inlet, fore bay, outlet and control structures.	2B: 2.9.1 - 2a, 2.9.8 - 1	Yes
21	Where fencing is provided, all access gates are lockable and the minimum height of the fence is 1.1m.	2B: 2.9.9 - 6	Yes or n/a
	INLET AND SEDIMENTATION FOREBAY		
22	Pond has an inlet structure with an overflow and bypass.	2B: 2.9.1 - 2b	Yes
23	Pond has a sedimentation forebay. The volume of the sediment forebay comprises approximately 10% of the pond's permanent volume.	2B: 2.9.1 - 2c, 3e	Yes
24	The sedimentation forebay is separated from the main pond area with gabions or another robust type of structure, proposed to be built to within 150mm below the permanent pool water level and extend horizontally for the full width between the main pond and the sedimentation forebay.	2B: 2.9.1 - 4	Yes
25	The average width of the sedimentation forebay is 5 to 10 times the diameter of the inlet pipes (or equivalent diameter if more than one).	2B: 2.9.1 - 3f	Yes
26	The minimum length of the sedimentation forebay is 10m or four times the width of the sedimentation forebay.	2B: 2.9.1 - 3g	Yes
27	The floor of the sedimentation forebay is designed 300mm above the floor of the main pond.	2B: 2.9.5 - 2	Yes
28	The inlet into the sedimentation forebay is above the permanent pool water level and discharges onto a reverted apron which has energy dissipation characteristics. The apron extends to the base of the sedimentation forebay.	2B: 2.9.4 - 4	Yes
29	If the pond is located in permeable soils, the permanent pool water level is at least 300mm higher than the maximum groundwater level.	2B: 2.9.3 - 5	Yes or n/a
30	Inlet structure is a man-entry chamber immediately upstream of the sedimentation forebay.	2B: 2.9.4 - 1	Yes
31	Penstocks and a bypass sewer are provided in the inlet structure and can be operated from outside of the inlet structure.	2B: 2.9.4 - 2	Yes
32	The bypass sewer is sized to provide an equal flow capacity to the inlet sewer(s). Where a bypass sewer was omitted as thought unnecessary or impractical, a written agreement with Scottish Water has been obtained.	2B: 2.9.4 - 2	Yes
33	The invert(s) of all the incoming sewers to the inlet structure are at or above the maximum 1-year water level in the pond.	2B: 2.9.4 - 3	Yes
	OUTLET		
34	Pond has an outlet structure with an integral overflow (if not provided at the inlet) and drawdown facility.	2B: 2.9.1 - 2f, 2.9.6 - 4	Yes
35	Pond has a separate spill overflow structure (with a planned flood route). The emergency overflow is provided.	2B: 2.9.1 - 2g, 2.9.6 - 4	Yes

Ref	PONDS Section 2B - 2.9 Sewers for Scotland 4th edition	Section	Answer required to Pass
36	The outlet structure (i.e. flow control manhole) is a man-entry chamber with throttle controls provided using high-grade galvanised or stainless steel fixed to the concrete structure. The minimum diameter of any limiting discharge control orifice is 75 mm unless otherwise agreed. Orifice or vortex control units or similar may be used to control outflow rates. Outlet is designed to discharge the design-limiting discharge rates in accordance with the Local Authority requirements.	2B: 2.9.6 - 1	Yes
37	Means are provided to drain the lowest point in the detention pond. A penstock or other valving is provided in the outlet manhole and can be operated safely from outside of the outlet structure.	2B: 2.9.6 - 5	Yes
38	All exposed pipe inlets or outlets which are larger than 350mm have safety grilles (unless design restricts unauthorised access into the structures).	2B: 2.9.9 - 7	Yes
39	Safety grilles: bar spacing to be between 75mm and 150mm.	2B: 2.9.9 - 8	Yes
	GROUND, GROUNDWATER, VEGETATION		
40	Pond is made watertight to 300mm above the outlet pipe level. Where pond is constructed in permeable soils, appropriately impermeable liner is used. The membrane liner shall be at least 0.75mm thick, under laid by 50mm of sand to prevent damage. The liner shall have a slope of 2% towards the drain down outlet. The liner material shall be a single layer of butyl compound or polythene. If polythene is used, it shall in addition be protected by a geotextile fabric.	2B: 2.9.7 - 2	Yes
41	Pond liners to be finished at a height 150mm below the outlet control unit but not lower than the invert level if used on a site with a sensitive underlying groundwater zone or if used to treat runoff from a potential pollution location.	2B: 2.9.7 - 3	Yes or n/a
	REFERENCES		
	References: Figure 1 - Pond Layout Figure 2 - Typical pond cross-section Figure 3 - Typical cross-section through pond aquatic bench Figure 4 - Typical pond flow control manhole	2B: Figure 1, 2, 3 and 4	

<u>To be provided by the Developer</u>:
Detailed drawings (i.a. plan, cross-section and long-section) of the proposed ponds and the following information:
Impermeable area (of the development site)
Permeable area (of the development site)
Pond volume (total)
Permanent pond volume
Pond embankment volume
Max flood water level
Max groundwater level
Max 1-year water level in the pond
Max 30-year water level in the pond

Max 200-year water level in the pond
Max 1-year water level in the adjacent watercourse
Floor level in adjacent premises
Drain time
Outlet - discharge control orifice diameter
Outlet - discharge control rate
Discharge rate in accordance with the Local Authority requirements

Ref	PIPED FILTER TRENCHES Section 2B - 2.12 Sewers for Scotland 4th edition	Section	Answer required to Pass
	GENERAL APPEARANCE, DIMENSIONS, ETC.		
1	Piped filter trenches are implemented only as 'end of pipe' SUDS.	2B: 2.12 - 1	Yes
2	The piped filter trench is designed to store or convey the 1 in 30-year event.	2B: 2.12 - 1, 2.12.6 - 2	Yes
3	Includes a stone filled trench, being either visible, or buried, at the surface, and in all cases lined with an impermeable membrane.	2B: 2.12.1 - 1	Yes
4	Includes intermediate chambers to limit the continuous piped length to a maximum of 90m.	2B: 2.12.1 - 1, 2.12.4 - 10	Yes
5	Includes a separate continuous perforated inlet (overflow) pipe within the upper layers of the stone filled trench.	2B: 2.12.1 - 1	Yes
6	Includes a separate continuous perforated outlet (drain) pipe within the lower layers of the stone filled trench, being at least 500mm below the inlet / overflow pipe.	2B: 2.12.1 - 1	Yes
7	Includes a separate spill overflow structure (with a planned flood route).	2B: 2.12.1 - 1	Yes
8	Piped filter trench depth is between 1500mm and 3000mm.	2B: 2.12.1 - 1	Yes
9	Minimum base width is the greater of 500mm or three times the diameter of the inlet pipes, with maximum base width of 3000mm.	2B: 2.12.1 - 1	Yes
10	Maximum longitudinal gradient is 1:50. No trench or pipework to be laid at a gradient steeper than 1 in 50. The minimum gradient for pipework is 1 in 200.	2B: 2.12.1 - 1, 2.12.4 - 6	Yes
11	The self-cleansing flow velocity of 0.75m/s to 1m/s is designed for the peak flow at the 1-year return period event.	2B: 2.12.1 - 1	Yes
12	The piped filter trench is separated from the edge of the filter trench by at least 2m from the nearest private land boundary, being the distance from the edge of the trench to the boundary.	2B: 2.12.2 - 1	Yes
13	Where not part of the drainage design, any external flows e.g. land drainage/ groundwater that might discharge into the piped filter trench must be intercepted.	2B: 2.12.2 - 2	N/A or Yes
14	Where a piped filter trench is intended to collect sheet surface flows, stone shall be used to ground level and the edge of the filter trench should be levelled with the surrounding surfaces. Where specifically not intended to collect flows from the ground surface, the top of the piped filter trench shall be buried beneath a layer of topsoil. An impermeable separation membrane shall be used to prevent the migration of surface water and sediments into the stone.	2B: 2.12.2 - 2	Yes
15	The maximum flood water level in any piped filter trench is at least 500 mm below the floor level of any adjacent premises.	2B: 2.12.2 - 3	Yes
16	The maximum 1-year return period event water level in the piped filter trench shall be higher than the appropriate return period event water level of the receiving watercourse, or sewer and SUDS, as specified by the relevant Authority.	2B: 2.12.2 - 4	Yes
17	Multiple pipes shall start and end at man entry chambers.	2B: 2.12.3 - 8	Yes
18	All pipework through the trench to be fully perforated pipework of nominal diameter no less than 150mm.	2B: 2.12.4 - 5	Yes
19	Distribution pipework to be formed of long radius natural curvature pipework. Elbow bends are not permitted unless suitable rodding/jetting access is provided for.	2B: 2.12.4 - 7	Yes

Ref	PIPED FILTER TRENCHES Section 2B - 2.12 Sewers for Scotland 4th edition	Section	Answer required to Pass
20	An intermediate catchpit chamber with sediment sump to be constructed online to assist maintenance.	2B: 2.12.4 - 10	Yes
	ACCESS ROAD		
21	All piped filter trenches include maintenance access, approximately 3.5 m wide, to all inlets and outlets and any intermediate chambers, suitable for a vehicle and trailer. The access to be located above the maximum 30-year water level in the trench. All piped filter trenches have vehicular access to the inlets, outlets and any intermediate chambers.	2B: 2.12.1 - 1, 2.12.6 - 2 to 7, 2.12.2 - 1	Yes
	INLET		
22	Includes an inlet structure with a shut off facility, and a sediment control device (e.g. catchpit), or upstream sediment management.	2B: 2.12.1 - 1	Yes
23	The inlet structure to a piped filter trench shall include a man-entry chamber. All incoming flows shall connect to a chamber and not into the filter trench itself.	2B: 2.12.3 - 1	Yes
24	The invert(s) of all the incoming sewers to the inlet chamber are at or above the maximum 1-year water level in the piped filter trench.	2B: 2.12.3 - 2	Yes
25	The invert of the lower (outlet / drain) pipe is no more than 90mm and no less than 75mm above trench invert. This pipe to be closed at the inlet structure by use of a bung, valve or other proprietary pipe product, tamper proof and suitable for secure/safe opening/removal from ground level.	2B: 2.12.3 - 3	Yes
26	The inlet structure, or structures, includes a sediment catchpit or other sediment control device unless sediment is otherwise intercepted and managed upstream of the SUDS.	2B: 2.12.3 - 4	Yes
27	Sediment controls serving residential areas are sized to allow 1 year's worth of sediment storage based on 0.3m3 per hectare, based on hectares of impermeable (including roofed and paved) area. Those piped filter trenches serving industrial and commercial areas to have their controls sized to allow 1 year's worth of sediment storage based on 0.8m3 per hectare.	2B: 2.12.3 - 5	Yes
28	Where the incoming pipe is greater than 600mm diameter, the design shall consider the use of multiple continuous pipes along the trench (multiple distribution and collection pipes). All incoming pipework greater than 900mm shall incorporate the use of multiple continuous pipes along the trench.	2B: 2.12.3 - 6	N/A or Yes
29	The inlet pipe(s) are furnished with the ability to block the discharge of water - by means of a tamper proof shut-off valve operated from surface level, or provision for stop logs or similar devices	2B: 2.12.3 - 7	Yes
30	A continuous perforated inlet / overflow pipe to be installed no higher than 600mm below the ground surface.	2B: 2.12.4 - 4	Yes
	OUTLET		
31	Includes an outlet structure with an integral overflow and shut off facility.	2B: 2.12.1 - 1	Yes
32	The perforated outlet / drain pipe to be laid no more than 90mm and no less than 75mm above the invert level (liner) of the trench.	2B: 2.12.4 - 8	Yes
33	The perforated outlet / drain pipe to be laid no less than 500mm below the inlet / overflow pipe.	2B: 2.12.4 - 9	Yes

Ref	PIPED FILTER TRENCHES Section 2B - 2.12 Sewers for Scotland 4th edition	Section	Answer required to Pass
34	The outlet structure (i.e. flow control) to include a man-entry chamber and designed to operate and discharge the design-limiting discharge rates in accordance with the Local Authority requirements.	2B: 2.12.5 - 1	Yes
35	The outlet pipe to be furnished with the ability to block the discharge of water - by means of a tamper proof shut-off valve operated from surface level, or provision for stop logs or similar devices. The outlet structure to have an overflow to enable pass forward flow in the event of blockage or other such event.	2B: 2.12.5 - 5	Yes
36	The minimum diameter of any limiting discharge control orifice to be 75mm unless otherwise agreed. Vortex control units or similar may be used to control outflow rates. Slotted or vee notch weirs may also be used.	2B: 2.12.5 - 6	Yes
37	The outlet structure / flow control chamber to include an integral overflow to enable pass forward flow in the event of blockage or other such event.	2B: 2.12.5 - 7	Yes
38	Flood routing to be assessed for a 1-in-200 year event. A separate emergency overflow to be provided.	2B: 2.12.5 - 8	Yes
39	The top of the piped filter trench outlet chamber to be no more than 100mm above surrounding ground level at that point.	2B: 2.12.5 - 9	Yes
	MATERIALS		
40	An easily removed separation geomembrane to be used to trap sediment near the surface of the drain. This membrane is to be buried by a sacrificial stone or topsoil layer of 300mm, and anchored outside the trench liner to ensure no migration of materials into the trench.	2B: 2.12.4 - 2	Yes
41	The sacrificial stone to be a single size clean stone of nominal size 40mm. A gabion mattress basket can be used to enclose the stone.	2B: 2.12.4 - 3	Yes
42	The stone used to fill the filter trench to be typically single sized granular clean stone of between 20mm and 60mm with a void ratio of 20% to 40%.	2B: 2.12.4 - 11	Yes
43	Piped filter trenches to be made watertight using an appropriate impermeable liner, regardless of soils and underlying geology. *For liner details see Section 2B - 2.12.4 - 12 to 16.*	2B: 2.12.4 - 12 to 16, 2.12.6 - 1	Yes
44	Throttle controls to be provided using high-grade galvanised or stainless steel fixed to the concrete structure in such a way as to be tamper proof.	2B: 2.12.5 - 4	Yes
	REFERENCES		
	References: Figure 13 - Typical plan of piped filter trenches Figure 14 - Typical piped filter trench cross-section Figure 15 - Typical pipe filter trench long-section Figure 8 - Typical outfall safety grill for outfalls 350mm dia or greater Figure 9 - Typical outfall to water course (suitable for outfall pipes of less than 350mm)	2B: Figure 8, 9, 13, 14 and 15	

To be provided by the Developer:

Detailed drawings (i.a. plan, cross-section and long-section) of the proposed piped filter trench(es) and the following information: Impermeable area (of the development site)
Permeable area (of the development site)
Piped filter trench volume
Max top water level
Max groundwater level
Ground level
Piped filter trench depth
Max 1-year water level in the piped filter trench
Max 30-year water level in the piped filter trench
Max 200-year water level in the piped filter trench
Max 1-year water level in the receiving watercourse
1 in 1 year event discharge
1 in 30 year event discharge
1 in 200 year event discharge
Floor level in adjacent premises
Outlet - discharge control orifice diameter
Outlet - discharge control rate
Discharge rate in accordance with the Local Authority requirements

Ref	UNDERGROUND STORAGE Section 2B - 2.13 Sewers for Scotland 4th edition	Section	Answer required to Pass
1	The use of underground storage was allowed by specific agreement with Scottish Water. (Where attenuation is required in excess of a 1- in-30 year storm event by the Local Authority, any additional storage should be within low amenity open spaces and above ground level).	2B: 2.13.1 - 1	Yes
2	An access to allow inspection and maintenance is provided.	2B: 2.13.1 - 2	Yes
3	Design allows CCTV and jetting operations.	2B: 2.13.1 - 2	Yes
4	Design has no detrimental effect on the operation / frequency of any downstream assets.	2B: 2.13.1 - 2	Yes
5	Underground storage is protected from silt and sediments through the installation of a suitable screen / silt trap device with the aim to minimise sedimentation.	2B: 2.13.1 - 2	Yes
6	Oversized storage pipes used for storage, > 600mm dia, to be Concrete, Structurally reinforced Polyethylene or Engineered Thermoplastic.	2B: 2.13.1 - 2	Yes
7	The use of geocellular storage units to be in non-trafficked areas only.	2B: 2.13.1 - 2	Yes
8	Larger underground storage structures permits man-entry and include suitable clear opening for safe access/egress from each end of the structure, and if it is longer than 50 m, then intermediate access points shall be provided. Smaller underground storage structures to have suitable access points to permit remote cleaning and inspection.	2B: 2.13.1 - 3, 2.13.2 - 2, 2.13.4 - 2	Yes
9	Underground storage is either: pre-fabricated structure, oversized pipes or cast in-situ concrete structure.	2B: 2.13.1 - 4	Yes
10	The maximum water level in underground storage structure is at least 500mm below the lowest floor level of any adjacent premises.	2B: 2.13.1 - 5	Yes
11	The storage has been sized in accordance with the hydraulic design requirements detailed in Sections 2.7 to 2.10.	2B: 2.13.2 - 1	Yes
12	Low-flow channels are provided in man-entry sized pipes	2B: 2.13.2 - 3	Yes
13	The minimum gradient for storage systems is 1:100 for off-line tanks and 1:200 for on-line tanks.	2B: 2.13.2 - 4	Yes
14	The outlet structure is designed to operate and discharge the design-limiting discharge rates. Orifice or vortex control units or similar may be used to control outflow rates.	2B: 2.13.3 - 1	Yes
15	Throttle controls are provided, fixed to the concrete outlet structure. The minimum size of any orifice is 75 mm diameter.	2B: 2.13.3 - 2	Yes
16	A penstock is provided and can be operated safely from outside of the outlet structure.	2B: 2.13.3 - 3	Yes
17	The outlet structure has an overflow provided. In addition, an emergency overflow is provided as a separate structure (not to be constructed through an embankment).	2B: 2.13.3 - 4	Yes
18	Ventilation is provided.	2B: 2.13.4 - 3	Yes
	REFERENCES:		

Ref	UNDERGROUND STORAGE **Section 2B - 2.13** **Sewers for Scotland 4th edition**	Section	Answer required to Pass
19	References: Section 2.7 - Design Philosophy Section 2.8 - Water Quality Section 2.9 - Ponds Section 2.10 - Detention Basins		

To be provided by the Developer:

Detailed drawings (i.a. plan, cross-section and long-section) of the proposed underground storage structure and the following information:
Impermeable area (of the development site)
Permeable area (of the development site)
Underground storage structure volume (total)
Volume of water to be stored
Max water level
Max groundwater level
Max 1-year water level in the underground storage structure Max 30-year water level in the underground storage structure Max 200-year water level in the underground storage structure Max 1-year water level in the adjacent watercourse
Floor level in adjacent premises
Outlet - discharge control orifice diameter
Outlet - discharge control rate
Discharge rate in accordance with the Local Authority requirements

developerenquiries@scottishwaterhorizons.co.uk

Scottish Water Horizons

www.scottishwaterhorizons.co.uk

Scottish Water Horizons is a wholly owned subsidiary of Scottish Water. The company plays a key role in supporting the development of Scotland's sustainable and circular economy by making the most of the public utility's vast array of assets.

10/2019 V1.500