Memorandum

To	Ballinasloe FRS Steering Committee	Date	17 February 2022
Copies		Reference number	271741-00
From	Arup	File reference	
Subject	Assessment of minor tributaries		

1 Background

Section 3.1.2 of the project brief lists 19 minor watercourses/drainage channels within the scheme area that are to be assessed as part of the study. This technical note presents an initial assessment of the flood risk associated with each of the watercourses. It also provides a recommendation as to how each watercourse will be considered as part of the hydraulic analysis of the study. It is noted that the actual number of watercourse assessed is greater than the 19 listed in the brief due to the splitting up of a number of watercourses into smaller reaches and also by assessing a number of additional reaches that were not listed in the Section 3.1.2 of the brief.

1.1 The watercourses

An infill hydrographic survey was scoped based on an initial review of channels identified in the brief, and all other available data. Each of the identified watercourses were surveyed by McDonald Surveys as part of the infill survey. Figure 1 presents the name, location and alignment of each of the watercourses. McDonald utilised a different watercourse naming convention to the one listed in Section 3.1.2 of the project brief to allow an easier navigation through the surveyed dataset.

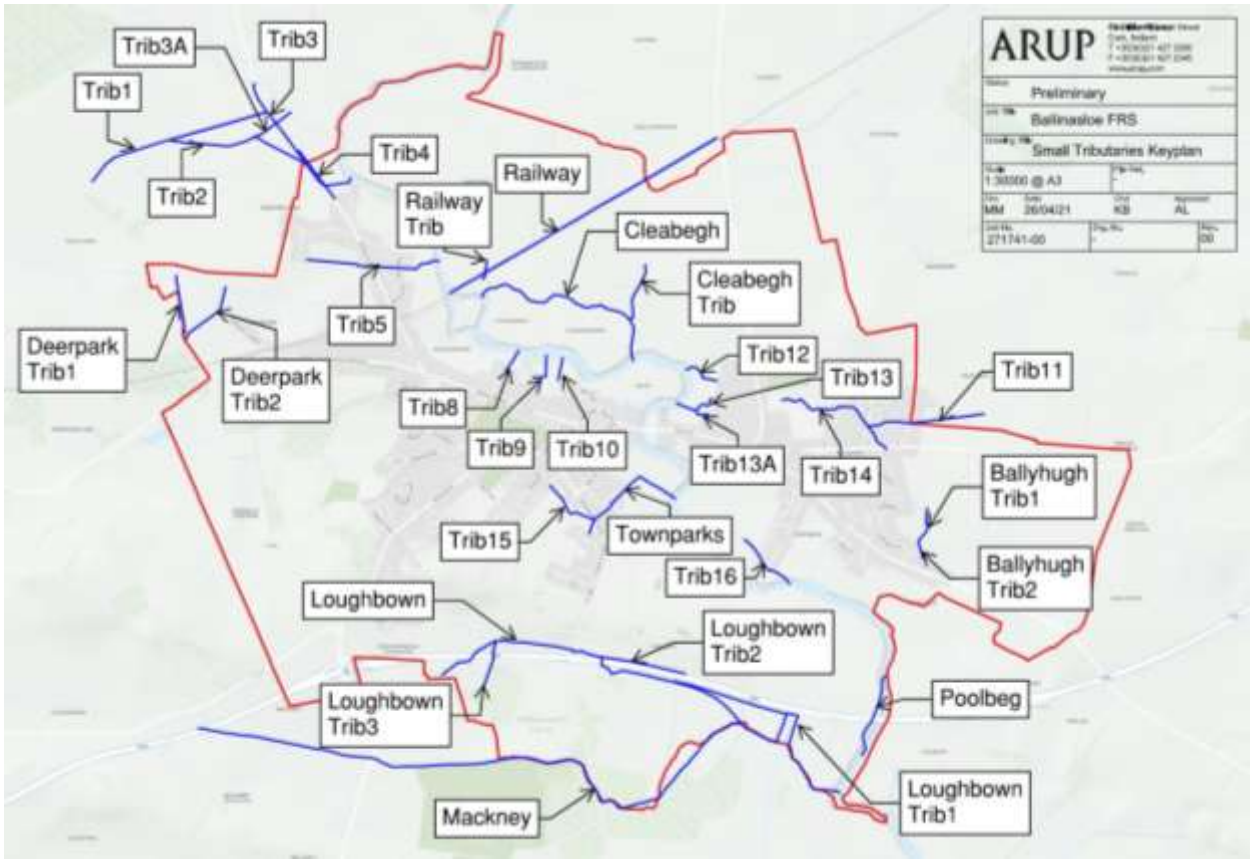

Figure 1 Location and alignment of the minor water courses

1.2 Screening assessment overview

The following methodology was adopted as part of the initial assessment:

- Undertake a detailed inspection of the alignment and geometry of each of the minor watercourses and their connectivity to the River Suck and/or a major tributary of the Suck;
- Assess the likelihood of the River Suck (or one of its major tributaries) surcharging up the minor watercourse leading to an increase in flood risk;
- Make a recommendation on how each watercourse is to be represented in the hydraulic model developed as part of the study.

The findings of the assessment are presented in the next section for each of the watercourses.

2 Screening Assessment

2.1 Overview

This section presents the initial assessment for each of the minor watercourses/drainage considered as part of the study. The reader is referred to Figure 1 which presents the location and alignment of each of the watercourses.

2.2 Trib 1 (Bunowen)

This is a minor watercourse that acts as a tributary to the Bunowen River. There are no sensitive receptors (i.e. houses or commercial properties) in its vicinity. It is not proposed to explicitly model the watercourse in 1D but instead to represent it in the 2D component of the model by setting the elevation of the grid cells along its alignment to the surveyed bed levels of the watercourse.

Figure 2 Trib 1 (Bunowen) at cross section 26Trib100001 looking upstream

2.3 Trib 2 (Bunowen)

This minor watercourse is also a tributary to the Bunowen River. There are no sensitive receptors in its vicinity. It is proposed to represent the watercourse in the 2D component of the hydraulic model by setting the elevation of the grid cells along its alignment to the surveyed bed levels of the watercourse.

Figure 3 Trib 2 (Bunowen) at cross section 26Trib200007 looking upstream

2.4 Trib 3 (Bunowen)

This is a minor watercourse that acts as a tributary to the River Suck. There are a number of commercial properties at its downstream end close to the confluence with the Suck.

Flood risk at the downstream end of the tributary is dominated by water levels in the River Suck - the peak Q100 water level on the Suck at its confluence with the tributary is 40.55mOD while the bank level of the tributary ranges from circa 38.7mOD – 38.4mOD. The downstream end of the tributary will therefore be drowned out by the River Suck in a flood event.

Explicitly modelling the channel in 1D and coupling it to the overall 1D/2D model would likely result in a numerically unstable model given the large flood depths relative to the width of the channel. It is therefore proposed to represent the watercourse in the 2D component of the model by setting the elevation of the grid cells along its alignment to the surveyed bed levels along the watercourse.

Flood risk associated with a localised rainfall event on the catchment of the tributary needs to be assessed as part of the optioneering of the study to ensure that any River Suck flood defences are not compromised by a tributary dominated event.

Figure 4 Picture of Trib 3 (Bunowen) at cross section 26Trib300016 looking downstream

2.5 Trib 3A and Trib 3B (Bunowen)

This is a minor tributary to the Bunowen River that is heavily vegetated on both sides of the channel. Trib 3A is upstream of the R358 while Trib 3B is downstream of the road. There are two commercial properties at the downstream end adjacent to Trib 3B.

As flood risk to both of these properties is dominated by the Bunowen River it is not proposed to explicitly represent the watercourse in 1D and couple it to the larger 1D/2D model but instead to represent it in the 2D grid only.

2.6 Trib 4 and Trib 4A

These watercourses are the same as Trib 3 above. No further assessment is therefore required.

2.7 Trib 5

Engineering works were undertaken on this watercourse/drainage ditch as part of the flood scheme that was implemented for the Derrymullen estate post the 2009 flood event in Ballinasloe.

The Penstock upstream of the estate is normally closed. The estate is defended from overland flow from both the Deerpark and the River Suck with direct defences. Given that our baseline hydraulic model considers the scenario with the Derrymullen flood scheme in place it is not proposed to explicitly model the watercourse in 1D as part of the study but instead to represent it in the 2D grid of the model.

It is noted that the floodmaps for the study consider both the defended and undefended cases in Derrymullen.

Figure 5 Trib 5 at cross section 26Trib500022 which is located immediately downstream of Derrymullen Housing Estate. The photo is looking upstream in the direction of the estate.

2.8 Trib 8, Trib 9 and Trib 10 (Suck)

These are three very minor tributaries of the River Suck that will all be drowned out by water levels on the Suck in a flood event. It is therefore not proposed to explicitly model any of these watercourses as part of the study.

2.9 Trib 11

This is a minor watercourse that flows in a Westerly direction through Ballinasloe. The watercourse is open channel until enters a culvert underneath the Glentaun Road (Figure 6). There are a number of residential properties in the immediate vicinity of the watercourse at the entrance to the culvert which are not within the scheme area. Downstream of the culvert the watercourse connects with Trib 14 (refer to Section 2.12).

Figure 6 Trib 11 at cross section 26Trib11000032I_DN which is located immediately upstream of the culvert that flows underneath the Glentaun Road.

There is no risk of the River Suck surcharging up through the culvert and flooding the residential properties – the Q100 peak water of the Suck is circa 38.70mOD at the downstream end of the watercourse while the bed level upstream of the culvert is circa 47.4mOD.

2.10 Trib 12 (Suck)

This is a minor tributary of the River Suck that will be drowned out by water levels on the Suck in a flood event. As noted above, it is likely that the tributary is the downstream end of Trib 11. It is not proposed to explicitly this section of the watercourses as part of the study.

2.11 Trib 13 and Trib 13A

This is a minor tributary of the River Suck that will be drowned out by water levels on the Suck in a flood event. It is not proposed to explicitly this section of the watercourses as part of the study.

2.12 Trib 14 (Suck)

This is a minor watercourse that flows in a North Westerly direction through Ballinasloe. There are a number of residential properties situated in the vicinity of the watercourse which is largely open channel but is culverted as it flows underneath Creagh Road to the immediate north of an existing graveyard. There is a grated chamber as it enters underneath the road which is likely to act as an overflow in wet weather. From our site visit Arup have identified a defined overland flow route downstream of the chamber such that if the chamber was overtopped in a blockage event, water

would likely flow onto to Creagh Road where it would be mostly picked up by the road gullies. We note that initial findings of the CCTV survey indicates that the culvert downstream of the chamber is heavily silted/blocked which introduces a blockage risk at the structure.

Figure 7 Trashscreen at the entrance to the culvert which conveys Trib 14 underneath the Creagh Road

The upstream section of the watercourse (from cross section 26TRIB1400068) was dry on the day that McDonald undertook their survey. Downstream of this location the channel was wet which is likely due to the inflow from Trib 11. Anecdotal data however suggests that there is also a swallow hole located along the watercourse (i.e. downstream of section 26TRIB1400068).

As part of our site visit Arup observed water infiltrating to ground at a low point about halfway along the channel. No flow was observed west of that point and the channel was dry at the western (downstream) end. We note that our observations are different to what was observed by McDonald on the day of the survey which suggests changing hydraulic conditions along the reach due to the influence of water discharging to ground as well as the antecedent rainfall conditions.

The risk of surcharging from the River Suck is remote as the peak Q100 water level on the Suck is more than 3m below the bed level of the watercourse at its downstream end. There may however be a risk of localised flooding associated with an intense rainfall event on the upstream catchment. It is recommended that this mechanism of flooding is assessed as part of the study through the use of a localised pluvial flood model. This work will be undertaken as part of the optioneering of the scheme.

Figure 8 Picture of Trib 14 at cross section 26Trib1400082_DN.

2.13 Trib 15A

This is a minor drain/channel that meets with the Townparks watercourse (discussed in the next section) immediately upstream of the L4602 road (Figure 9).

Figure 9 Alignment of Trib 15A

The peak Q100 water on the River Suck on the downstream end is circa 38.06mODM while the elevation of the left back of the watercourse immediately upstream of the L4602 road (indicated with the red circle in Figure 9) is circa 37.6mOD. There is therefore a risk of the River Suck surcharging up the watercourse and inundating the area upstream of the L4602. This mechanism of

flooding is explicitly accounted for as part of the hydraulic modelling by including the culvert in the 1D/2D model.

2.14 Townparks

As noted in the previous section the Townparks stream meets with Trib15A immediately upstream of the L4602 road. Surcharging from the River Suck therefore also needs to be considered for this trib.

2.15 Trib 16

This is a minor tributary of the River Suck that will all be drowned out by water levels on the Suck in a flood event. It is not proposed to explicitly this section of the watercourses as part of the study.

2.16 Cleabegh

This minor watercourse that forms part of the floodplain of the River Suck. It is not proposed to explicitly model the watercourse in 1D as part of the study as it will be drowned out by water levels on the River Suck.

2.17 Cleabegh Trib

This minor watercourse is a Tributary of the River Suck. There are a few properties at the upstream end of the surveyed section of the watercourse. There is no risk of the River Suck surcharging up the watercourse and inundating the properties due to the gradient on the channel.

There may however a risk of localised flooding from an intense rainfall event on the catchment upstream. It is recommended that this mechanism of flooding is assessed as part of the study through the use of a localised pluvial flood model. This work will be undertaken as part of the optioneering of the scheme.

2.18 Deerpark Trib 1 & Deerpark Trib 2

Both of these watercourses are tributaries of the Deerpark stream and flow adjacent to a number of residential/commercial properties. Deerpark trib 2 was not listed in the brief but has been assessed as part of the study.

It is evident from the preliminary results of Arup's hydraulic model that the properties in the vicinity of the watercourses are at risk of flooding from the Deerpark Stream. It is therefore proposed to explicitly model Deerpark Trib 1 using a 1D model which will be coupled to the larger 1D/2D model of the scheme area. This approach will allow for an accurate calculation of design water levels along both watercourses as part of the study which will be used as part of both the existing and proposed scenario assessments.

Figure 10 Deerpark Trib 1 at cross section 26DEERT100013 looking downstream. Existing commercial property is located to the left of the watercourse

2.19 Ballyhugh Trib 1 and Ballyhugh Trib 2

These are minor tributaries of the Ballyhugh Stream. It is not proposed to explicitly model these watercourse as they are both very minor with a small upstream catchments.

2.20 Loughbown (including Loughbown Tribs 1, 3 & 4)

This is a minor tributary of the River Suck that crosses underneath the M6 Motorway at a number of locations within the scheme area. There are a number of residential properties in the vicinity of the watercourse upstream of the overpass of the Motorway.

There is no risk of the River Suck surcharging up the watercourse and inundating the properties given that the lowest level of the left hand bank in the vicinity of the properties is circa 37mOD while the peak Q100 water level on the Suck at the downstream end of the watercourse is circa 36.56mOD.

The risk of a localised tributary dominated event inundating the properties is very low given (a) the design flows for the local catchment are small given the small size of the catchment, and (b) the ffls of the properties are all set at least 2m above the banks of the minor watercourse. There is no additional flood risk associated with the three minor tributaries.

It is however recommended that a culvert downstream of the M6 that facilitates floodplain flow from East to West be explicably included in the 1D/2D hydraulic model.

2.21 River Mackney

This watercourse acts as tributary to the River Suck and drains a largely rural area. It's possible that there may be a small number of residential properties along the R355 road at risk from a localised tributary dominated event. As these properties are however located outside of the scheme area it is not proposed to include the River Mackney as part of the hydraulic analysis of the study.

2.22 Poolbeg Lock side Channel

This channel is to be included as part of the main hydraulic model.

2.23 Railway and Railway Trib

These are minor tributaries to the River Suck that run parallel to the Railway line. It is proposed to represent the watercourses in the 2D component of the hydraulic model by setting the elevation of the grid cells along its alignment to the surveyed bed levels of the watercourse.