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Update Report
Related to Incidents of Flooding
Within the Dollar Catchment
& Potential Flood Risk Mitigation Proposals

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1. Introduction

1.1. Background

Further to the Scottish Water (SW) and Clackmannanshire Council (CC) report issued in October 2012 and the subsequent updates issued by e:mail correspondence to local resident representatives during 2013, this report aims to summarise the current position with regard to the drainage network investigations carried out into the historical reported incidents of flooding and the associated potential flood risk mitigation proposals for the north Dollar catchment.

It is recorded that in addition to the flooding events occurring in July and August 2012, further flooding in the catchment occurred in July 2013, following which a meeting was convened with representatives of SW, CC and affected residents on 1/8/2013.

Three locations within the catchment have been identified as being the principal areas impacted by the recent flooding incidents, namely, Princes Crescent / Tarmangie Drive / White Wisp Gardens, The Ness (Upper) and The Ness (Lower).

2. Completed Investigations / Remedial Work into Drainage Network

2.1. CC Investigations / Remedial Work

CC has recently undertaken extensive drainage mitigation works to the north east of the housing area on Upper Hillfoots Road including improved carriageway drainage systems and installation of constructed means to direct flood flows on the carriageway surface towards the Kelly Burn glen. Also, investigations in the Dollar east drainage network including mapping of general contributing drainage pipework and road gulley connectivity checks have been carried out. Cleaning of identified locations of silt / stone / debris deposition in the drainage network was also carried out by CC.

In addition to these packages of substantial road drainage improvement works carried out on Upper Hillfoots Road (2012/13), CC has completed a first phase of road gully improvement works within the Princes Crescent, Tarmangie Drive, White Wisp Gardens and The Ness areas. The locations of each of the improved road gullies are detailed on the drawings in Appendix 1 of this report. The locations of additional road gullies identified for improvement will be subject of further agreement between CC and SW depending on the recommendations of the ongoing drainage network modelling studies.

2.2. SW Investigations

Investigation of connectivity of the foul and surface water drainage pipes in the upper catchment area has been carried out with in excess of 100 properties surveyed. No consistent pattern of foul and surface water connectivity has been identified. Individual sub-catchment areas revealed different general connectivity patterns with some individual property variances within the sub-catchment areas.

However, it is apparent that in a number of locations there have been surface water connections from house roof drainage made to the foul drainage system, although only one house surveyed to date has been identified as having the foul drainage connected to the surface water system. Surface water collected by road gullies in certain locations has also been identified as connecting to the foul drainage system.

The results of the detailed network surveys detailed above from both CC and SW have now being incorporated into the drainage network model for the catchment to update the model accuracy and to allow an optioneering (a "best option selection process") to be carried out for potential upgrades of the drainage network.

A flow monitor has also been installed in the surface water sewer in Princes Crescent, the data from which is being used by the SW drainage modelling team in the validation exercise of the drainage model for the area.

The results of the foul and surface water drainage connectivity checks carried out by SW are shown on the plan in Appendix 2 of this report.

2.3. Joint Meeting

A joint meeting with SW / CC was held on 28/1/2014 to assess the findings of the drainage network investigations carried out to date and to consider potential optioneering work with a view to agreeing what proposals can be confirmed at this stage for implementing any identified required drainage network upgrades to mitigate flooding risk. Further information on the outcome of this meeting and the conclusions reached is detailed in section 3 below.

3. Future Investigations and Potential Proposals

3.1. SW Drainage Network Modelling Work

As detailed above, the investigation of connectivity of the foul and surface water drainage in the upper catchment area has been carried out and the results collated. This information has been relayed to the SW drainage network modelling team. In addition, information collated by CC following their drainage investigations has also been taken into account.

An important aspect in the use of drainage network models to predict the performance of a particular drainage system is to ensure that the model is accurately validated, i.e. that the results of the model outputs accurately reflect the actual performance of the drainage network. In this respect, initial validation exercises for the Dollar network model have proved to be unsatisfactory. There can be various reasons for validation problems to occur in drainage network modelling exercises, however, in relation to Dollar one key aspect is the connection of land drainage north of the Upper Hillfoots area into the drainage pipes serving the village. It is not a preferred means of managing these drainage sources by accommodating them within domestic drainage networks and the associated flows generated can be difficult to assess and quantify. As such, further modifications to the drainage model for Dollar are currently ongoing to take this factor into account with the goal of achieving a satisfactory validation outcome. The sewer flow meter currently installed in Princes Crescent is providing additional data to assist with this exercise.

To complement the model validation exercise, final checks and assessment of all the survey information collated to date is being undertaken to ensure that all the necessary data is captured such that that the drainage area model is as robust and accurate as possible.

Completion of the above exercises will provide a working drainage model for the catchment which allows assessment of the performance of the system and optioneering for identified hydraulic deficiencies. In this respect, and prior to confirmation following drainage model validation being achieved, the following options have been initially identified as potential measures to reduce the risk of flooding incidents occurring at specific locations within the catchment.

3.2. Princes Crescent / Tarmangie Drive / White Wisp Gardens

As outlined in section 2.1 above, CC has already carried out road gulley capacity upgrade work in Princes Crescent, Tarmangie Drive, The Ness (Upper and Lower) and White Wisp Gardens. In addition, the SW modelling team has considered the capacity of the surface water outfall from this area to the adjacent watercourse and has confirmed that increasing the size of the outfall pipe would have a beneficial impact on the capacity of the upstream surface water drainage network in this area. Accordingly, further modelling checks to confirm the initial findings of this proposal are to be carried out and SW is to arrange a cost estimate for carrying out the potential outfall upsizing work.

A further potential measure to improve the capture and direction of surface water run-off into the drainage pipework at this location is also being considered, e.g. the installation of a "cut-off" drainage channel across Tarmangie Drive at a suitable location, e.g. at the junction with Princes Crescent.

3.3. The Ness (Upper)

Non return valves (NRVs) on the drainage discharge connections from house nos. 84, 86, 88 and 90 The Ness have been installed. The aim of these NRVs is to prevent the back flow of any surcharge encountered in the main collector foul sewer, thereby preventing any flow from this sewer from surcharging into the properties connected to the sewer.

It is also considered that the work to intercept surface water run-off in the Princes Crescent / Tarmangie Drive / White Wisp Gardens area as detailed in 3.2 above would also have a beneficial impact on the downstream Upper Ness area by preventing surface water from reaching this location. In addition to this work, the recent network surveys have identified a large number of houses in the area of Tarmangie Drive & White Wisp Gardens where the roof drainage has been connected to the foul drainage system, thereby, compromising the available capacity of the foul system. It has also been identified that some road gulley drainage has been connected to the foul drainage pipes in this area.

Potential work to remove the house roof drainage and / or road gullies from the foul system and re-direct it into the surface water system is to be considered. Accordingly, the SW modelling team is to undertake a drainage modelling assessment of this option to assess if this would have a beneficial impact on the performance of the drainage network in the area. The modelling work will also consider the option of upsizing the surface water outfall at this location as per the assessment for Princes Crescent / Tarmangie Drive / White Wisp Gardens. Associated cost estimates for these options will also be prepared.

3.4. The Ness (Lower)

Non return valves (NRVs) on the drainage discharge connections from house nos. 10, 12 and 14 The Ness have been installed. In addition, further flood risk mitigation work has been carried out to no. 14 by replacing air vents on the external walls of the property and some landscaping work to assist in the escape of any flood water which may accumulate at this location in future.

SW currently has appointed one of their consultancy framework partners, Montgomery Watson Harza (MWH), to devise options with associated costs for implementing a flood mitigation scheme for this location. This project is currently within the ongoing SR10 investment programme and is due for completion by March 2015. Initial optioneering for this project indicates that an increase in the drainage pipe capacity coupled with provision of additional drainage storage in the network is the favourable option which will be recommended for implementation. Further information on the confirmed proposals for this location will be provided when these are finalised.

4. Summary

From the foregoing information in this report it is hoped that it is conveyed that a considerable degree of investigation work into the drainage provisions of the north Dollar catchment, as well on site intervention works, have been carried out by CC and SW. It is considered that the investigation work is essential to allow an adequate understanding of the flood mechanism factors impacting on the performance of the drainage systems serving the area.

It should be highlighted that as previously noted in this report, it has been identified that land drainage connections have at some point in the past been connected to the surface water drainage pipes serving the north Dollar domestic catchment. This is not a desirable arrangement and contributes risks to the SW domestic and CC road drainage systems due to the difficulty in accurately assessing the contributory drainage flow rates from these sources. This has adversely impacted on the validation exercise of the SW drainage model for the area although additional steps are being taken with the aim of taking appropriate allowances into account to confirm the validation of the drainage model.

Prior to validation of the model being achieved, initial flood mitigation optioneering has still been possible for the high risk areas in the catchment as detailed in section 3. These options are now subject to more detailed modelling assessment in conjunction with associated construction cost estimates. It is programmed that this work will be complete during April 2014 at which point the preferred optioneering work and associated construction costs will be confirmed. This then allows the proposals to be fully considered by CC and SW and the necessary requests made for financial approval to implement the identified work. It must be pointed out that confirmation of the necessary financial approval for identified work cannot be confirmed within the context of this report and this will be subject to further notification following due consideration by both SW and CC of available financial budgets which may be allocated to authorise the work.

Appendix 3 contains a log of the actions as discussed in this report.

Appendix 1

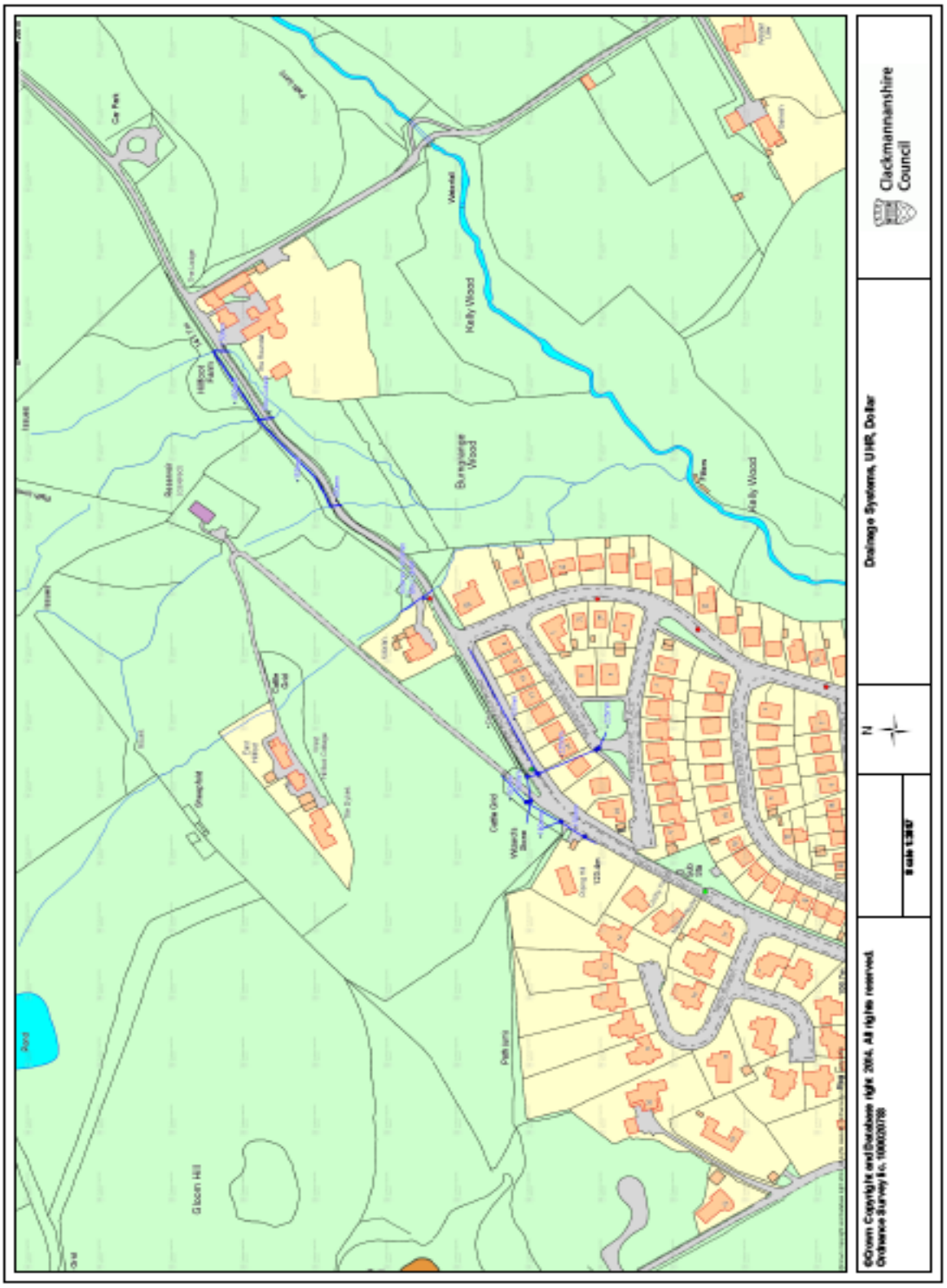
CC Plans of Road Gulley Improvements

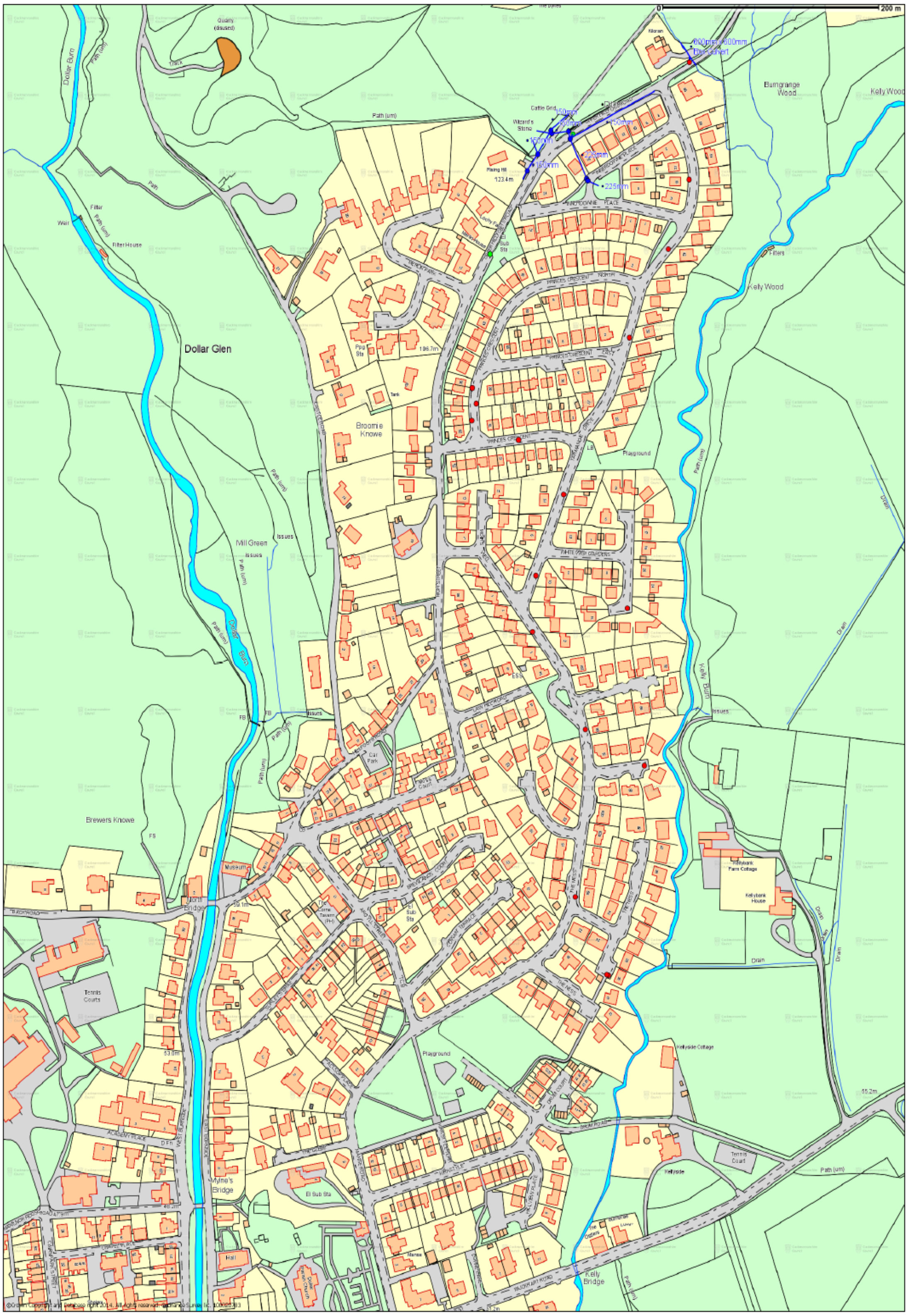
Legend:

Road Gullies Renewed marked in red

Road Gullies to be Renewed marked in green

Existing surface water manholes and pipework marked in blue


Clackmannanshire Council
Drainage Systems, UHR, Dollar
N
©Crown Copyright and Database right 2014. All rights reserved. Ordnance Survey No. 100020783
Kelly Wood
Burnsyange Wood
Glean Hill



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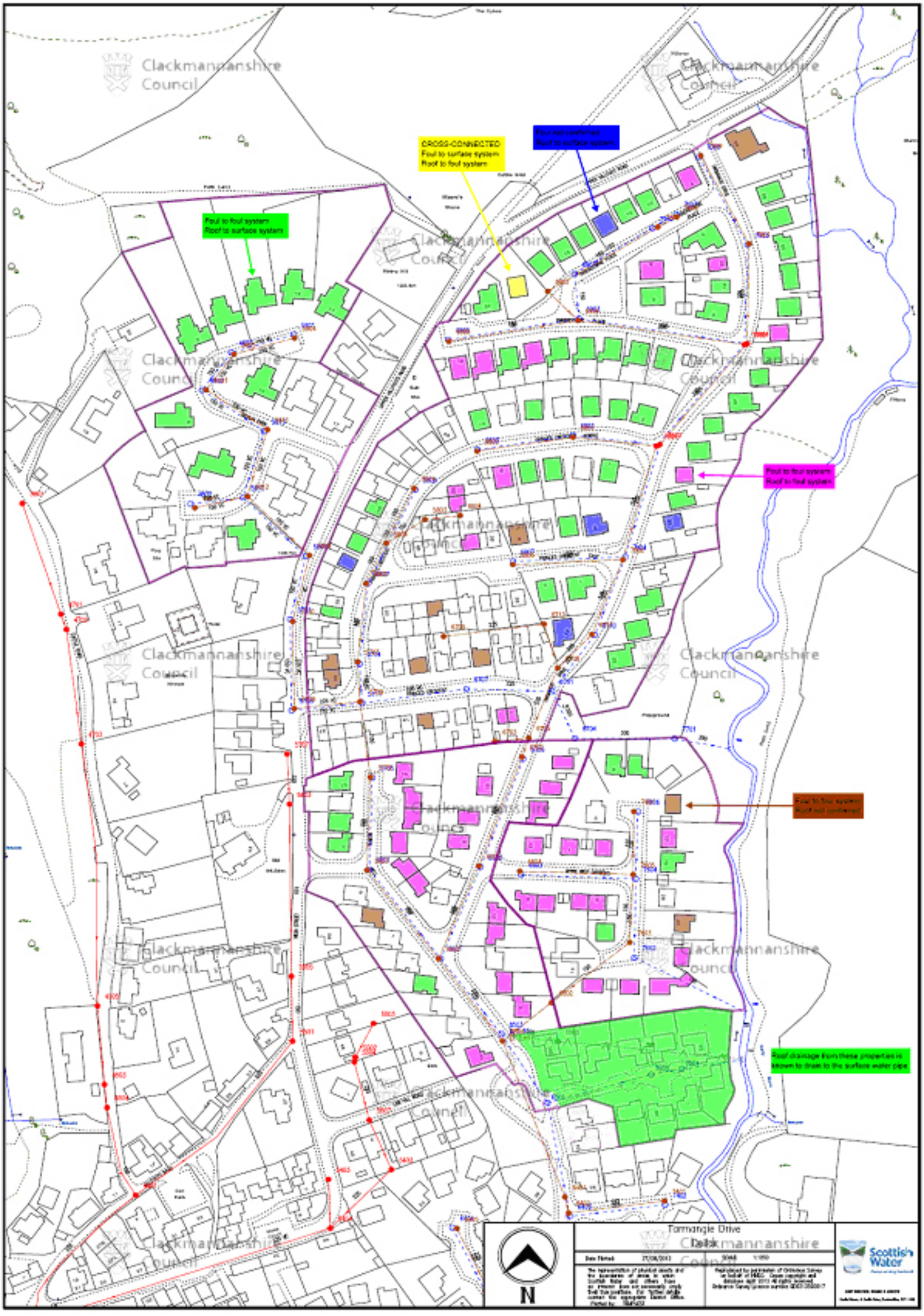
Appendix 2

SW Plan of Drainage Connectivity Checks


CROSS-CONNECTED
Foul to surface system
Roof to foul system
Foul not confirmed
Roof to surface system
Foul to foul system
Roof to surface system
Foul to foul system
Roof to foul system
Foul to foul system
Roof not confirmed
Roof drainage from these properties is known to drain to the surface water pipe
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Appendix 3

Action Log

Action	Owner	Date
Identify / confirm location of road gullies for upgrade	CC / SW	April 2014
Confirm validation of drainage network model	SW Modelling Team	March 2014
Princes Crescent – Confirm option for upsizing surface water outfall and obtain associated cost estimate	SW	April 2014
Ness (Upper) - Confirm option for removing surface water from foul network and obtain associated cost estimate	SW	April 2014
Ness (Upper) – Confirm option for upsizing surface water outfall and obtain associated cost estimate	SW	April 2014
Ness (Lower) – Confirm finalised proposal for flood risk mitigation project and associated timescale	SW	April 2014