



Belfast Flood Alleviation Improvement Works

Significant Issues Report

May 2014

47069440

Prepared for:

Belfast City Council

UNITED
KINGDOM &
IRELAND



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| | | |
|-------------------|---|----|
| TABLE OF CONTENTS | NON-TECHNICAL SUMMARY..... | I |
| | 1. INTRODUCTION..... | 1 |
| | 2. BACKGROUND TO FLOODING IN BELFAST | 2 |
| | 2.1 Sources of Available Information | 5 |
| | 3. DATA COLLECTION PROCESS | 6 |
| | 3.1 Responsible Authorities | 6 |
| | 3.2 Preparation of Request for Information..... | 6 |
| | 3.2.1 Flooding Areas | 6 |
| | 3.3 Meetings with Agencies | 7 |
| | 4. DATA ANALYSIS | 8 |
| | 4.1 Standards Used | 8 |
| | 4.2 Information on Flooding Areas..... | 9 |
| | 4.2.1 Areas Flooded by Severe Weather..... | 10 |
| | 4.2.2 Areas on the DG5 Register..... | 11 |
| | 4.2.3 Areas Where Collaborative Working is Taking Place | 12 |
| | 4.2.4 Areas Where Investigation Work is Ongoing | 14 |
| | 4.2.5 Completed Flood Alleviation Works..... | 14 |
| | 4.2.6 Programmed Flood Alleviation Works..... | 16 |
| | 4.2.7 Areas Where Additional Investigation Work May Be Required..... | 19 |
| | 5. PLANNING FOR THE FUTURE | 21 |
| | 5.1 Collaborative Working | 21 |
| | 5.1.1 Areas where opportunities currently exist..... | 22 |
| | 5.2 Private Infrastructure..... | 22 |
| | 5.3 Designing for Exceedance | 23 |
| | 5.4 Lessons to be Learnt from Others | 24 |
| | 5.4.1 Metropolitan Glasgow Strategic Drainage Partnership.... | 24 |
| | 5.4.2 Chicago Green Alleys | 26 |
| | 5.4.3 Greenstreets@CountersCreek, London | 27 |
| | 5.5 Sustainable Drainage Solutions (SuDS) | 27 |
| | 5.6 Involving the Public | 29 |
| | 5.7 Belfast City Council Masterplan | 30 |
| | 5.7.1 Local Government Reform..... | 31 |
| | 6. STATUTORY LEGISLATION AND PLANNING | 33 |
| | 6.1 Northern Ireland Environment Agency..... | 33 |
| | 6.1.1 EU Water Framework Directive (2000/60/EC)..... | 35 |
| | 6.1.2 EU Habitats Directive (92/43/EEC) | 35 |
| | 6.1.3 EU Freshwater Fish Directive (78/659/EEC) | 35 |
| | 6.1.4 EU Urban Waste Water Treatment Directive (91/271/EEC) | 35 |
| | 6.1.5 The European Directive on the Assessment and | |

| | | |
|-----------|--|-----------|
| | Management of Flood Risks (2007/60/EC)..... | 36 |
| 6.1.6 | Northern Ireland Sustainable Development Strategy 200636 | |
| 6.1.7 | Draft Planning Policy Statement 15 (PPS 15) – Planning and Flood Risk | 36 |
| 6.1.8 | Planning Policy Statement 7 (PPS 7) – Safeguarding the Character of Established Residential Areas’ | 38 |
| 6.2 | The Water Environment (Floods Directive) Regulations (Northern Ireland) 2009 | 38 |
| 7. | MULTI-AGENCY STAKEHOLDER GROUPS | 40 |
| 7.1 | Stormwater Management Group..... | 40 |
| 7.1.1 | Ballyclare Pilot Study | 41 |
| 7.2 | Flood Investment and Planning Group | 41 |
| 7.3 | Floods Directive Steering Group..... | 41 |
| 7.4 | Floods Directive Stakeholder Group | 42 |
| 7.5 | Belfast Resilience Forum | 42 |
| 7.6 | North Eastern River Basin District Flood Forum | 43 |
| 8. | SIGNIFICANT ISSUES | 44 |
| 9. | CONCLUSION | 47 |
| | APPENDIX A LIST OF FLOODING AREAS | |
| | APPENDIX B FLOODING AREAS DATABASE | |

| | | |
|-------------------------|---|-----------|
| TABLE OF FIGURES | FIGURE 1 FLOODING IN SOUTH BELFAST | 2 |
| | FIGURE 2 FLOODING AT LADAS DRIVE..... | 3 |
| | FIGURE 3 FLOODING AT BROADWAY UNDERPASS..... | 4 |
| | FIGURE 4 FLOODING AT STOCKMAN’S LANE | 4 |
| | FIGURE 5 STRATEGIC FLOOD MAP NI FOR EAST BELFAST | 5 |
| | FIGURE 6 FLOODING AT SUNWICH STREET IN 2007..... | 11 |
| | FIGURE 7 KNOCKNAGONEY DRIVE DURING A FLOOD EVENT. 13 | |
| | FIGURE 8 NOTICE AT GRILLE ON THE LADYBROOK RIVER | 15 |
| | FIGURE 9 SURFER BATTLING FLOOD WATER ON THE CASTLEREAGH ROAD IN 2012 | 17 |
| | FIGURE 10 FLOODING IN THE ORANGFIELD AREA IN 2007 | 18 |
| | FIGURE 11 TORYGLEN REGIONAL SUDS SCHEME PROPOSAL25 | |
| | FIGURE 12 CHICAGO GREEN ALLEY PERMEABLE PAVING..... | 26 |

| | | |
|------------------------|--|-----------|
| | FIGURE 13 FILTER DRAIN | 29 |
| | FIGURE 14 SWALE | 29 |
| | FIGURE 15 EXAMPLES OF BLUE-GREEN SPACES | 31 |
| TABLE OF TABLES | TABLE 1 FLOODING AREAS BY LOCATION | 6 |

NON-TECHNICAL SUMMARY

Belfast City Council requested the preparation of a report on flood alleviation schemes in Belfast, the purpose of which is to consider the current way that flood risk is managed in the City and how this can be developed and improved for the future.

Belfast has been impacted by a number of serious flooding incidents since 2005 and the Council has identified a number of flooding areas of particular concern. The three drainage agencies in Northern Ireland; DRD Roads Service, Northern Ireland Water and DARD Rivers Agency; were contacted and requested to provide information on flooding incidents within these areas and details of any completed, ongoing, programmed or proposed schemes to alleviate the causes of this flooding.

Seventy-two flooding areas were identified by Belfast City Council. Following the data collection period, a further eight areas were added to this list. In total information was provided on 65 of the flooding areas, with the drainage agencies having no knowledge of, or information on flooding at 15 locations.

Twelve flooding areas were identified as flooding because of severe weather, meaning the storm event causing the flooding was more severe than the accepted design standard that the drainage system was designed to take.

Eight areas were identified as having properties on the Northern Ireland Water DG5 Register. The DG5 Register is a register of properties that have flooded during non-severe weather because the local drainage infrastructure has insufficient capacity to carry the required flows.

Investigation work into the causes of flooding is ongoing in a number of the flooding areas. The report outlines the nature of these investigations and, where possible, provides information on the timescales in which they are anticipated to be completed.

Flood alleviation schemes have been completed in 11 of the flooding locations. Works range from Rivers Agency upgrading grilles to the provision of additional road gullies by Roads Service to help remove surface water from the road carriageway more efficiently.

A number of programmed flood alleviation schemes were also identified. These are mainly concentrated within the East Belfast area and should alleviate flooding in more than a dozen of the flooding areas.

Collaborative working, that is schemes where more than one of the drainage agencies is involved, covers a number of the flooding areas. This type of integration occurs where it can be identified that infrastructure belonging to more than one drainage agency may have contributed to the cause of flooding. A number of multi-agency stakeholder groups exist that aim to support collaboration between the agencies for the improvement of flood resilience in Belfast and beyond.

The need to plan for the future is important when trying to reduce the impact of flooding. A number of initiatives are outlined in the report to help achieve this, including accepting that no below ground drainage system can ever be designed that would be able to cope with some of the severe weather events experienced in recent years. To construct such a system would be prohibitively large and costly. It is therefore necessary to look for more innovative solutions for stormwater management including those at risk helping themselves (self-help).

Designing for exceedance is an essential approach to be considered in the provision of drainage infrastructure. This means that once the capacity of the drainage system is exceeded, there is a dedicated above ground route where excess water can be directed to a suitable location, where flood damage will be much less. This may include the provision of flood storage areas in playing fields, car parks or other large open areas where flood water can be stored for limited periods.

There are many lessons to be learnt from other areas both nationally and internationally. The work being completed in Glasgow by the Metropolitan Glasgow Strategic Drainage Partnership (MGSDP) and that completed by Thames Water in the Counters Creek area of London are examples of how flood alleviation can be achieved in a sustainable manner. The Chicago Green Alleys initiative is also an example of how employing a range of sustainable techniques can reduce the impact of severe weather on drainage infrastructure.

The potential exists within Belfast for the implementation of a wide variety of Sustainable Drainage Solutions (SuDS), alongside traditional drainage methods, to help alleviate flooding. SuDS are forms of surface water management, which aim to be more sustainable than traditional piped systems, reducing both the risk of flooding and pollution.

The public need to be educated about the significant role they have to play in protecting themselves against flooding. This self-help mentality needs to be encouraged and advice on measures to protect homes made more readily available. Rivers Agency are developing a business case for an Individual Property Protection scheme that would empower the public to help themselves, reduce the likelihood of their homes flooding and reduce financial hardship.

The 2013 – 2020 Belfast City Masterplan identifies the high proportion of brownfield sites within the City and the need to develop a green infrastructure plan to for these sites in conjunction with development proposals. This could be further developed to include blue-green spaces and it is recommended that the Council engage the Blue-Green Cities Research Team to determine if there are opportunities available to become involved with the project.

The design of any stormwater system must take account of a range of Statutory and European legislation and requirements. These pieces of legislation aim to minimise the risk of flooding by putting restrictions on the volume and final discharge location of stormwater. They impose a requirement to protect the freshwater and marine environment and place environmental

restrictions on the water to be discharged, including specifying the level of treatment required, in order to protect habitats.

There are a number of existing groups in Northern Ireland focused on targeting flooding. The main purpose of these groups is to establish and develop a strategy for the management of surface water in Northern Ireland.

The groups aim to promote collaborative working between a range of agencies including DRD, DOE, Northern Ireland Environment Agency, Rivers Agency, Roads Service, Northern Ireland Water and DFP. They are focussed on developing a procedure that will promote the use of Sustainable Drainage Systems (SuDS), designing for exceedance and will seek to further develop stormwater management on a catchment basis.

There is no single process to cover all issues involved with trying to improve the flood resilience of Belfast and expectations need to be managed that all flooding can be prevented. The causes of flooding are varied and the organisation, or person, responsible for providing alleviation may not always be apparent. Therefore, it is suggested that a number of initiatives need to be established, as set out above, to drive flood alleviation in the City.

Through establishing these processes, along with other initiatives set out in the report, it should be possible to improve the flood resilience of Belfast and protect it for future generations.

1. INTRODUCTION

URS was appointed as sub-consultant to Turner and Townsend, acting as Project Managers, to prepare a report into flooding in a number of areas located throughout the Belfast City Council area.

The purpose of the report is to bring together all information on flood alleviation improvement schemes in Belfast. This will allow the consideration of planned improvements in a joined up manner that will identify any potential issues with the approach, current design standards, infrastructure or flooding causes which lie beyond the remit of any agency. This information will then be used to address the potential impacts on the Council's long term vision for developing and improving the City.

2. BACKGROUND TO FLOODING IN BELFAST

There have been a number of serious local flooding incidents throughout Belfast since 2005, with 2010 the only exemption.

The severity of flooding has ranged from minor flooding of roads and gardens to the complete submergence of the Broadway Underpass in August 2008. Details of some of these flooding events are provided below.

1 December 2005

An active front moved east across Northern Ireland during the morning of the 1st December 2005. This produced several hours of heavy rainfall with the Belfast Area worst affected with some parts in the south of the city receiving 25 to 30mm of rain in a 4 hour period, estimated to be a rainfall event with a return period of around 20 years. Lower Ormeau Road was the worst area affected with around 40 homes internally flooded. In addition 12 properties flooded in the Sydenham area. The floods were related to surface water and/or out-of-sewer flooding. This type of rainfall is not uncommon and other factors appear to have played a part in the flooding on this occasion.



Figure 1 Flooding in South Belfast

12 June 2007

Intense storms developed across central parts of Northern Ireland from late morning on 12 June 2007. The storms were intense and slow moving with 50mm of rain falling in the Belfast area in a 90 minute period.

Around 400 properties in East Belfast were adversely affected by the extreme rainfall. Some of the worst flooding occurred at Ladas Drive when the Loop River, which rose by over 2m, burst its banks. The Knock River at Orangefield also overtopped its banks and caused serious flooding problems in the Orangefield area with 80 residents of a local Residential Home evacuated after it was badly damaged by floodwater.



Figure 2 Flooding at Ladas Drive

16 August 2008

Recorded rainfall on 16 August 2008 was typically between 80 to 100% of the normal monthly average. Rainfall depths were typically in the range of 40 to 65mm with Belfast worst affected by the flooding. The Broadway underpass was flooded to a depth of around 4.6m when floodwater overflowed from a trash grille on the River Clowney and as a result the Westlink was closed for a period of 4 days. There was significant damage to infrastructure, services and property and Belfast City Council processed a high volume of applications from householders for emergency flood relief payments. It was estimated that the main source of flooding was surface water (pluvial) and that this may have contributed to around 60% of the total damage.



Figure 3 Flooding at Broadway Underpass

27 & 28 June 2012

The volume of rainfall on 27 June 2012 was exceptional with the most intense rainfall concentrated on localised areas. 44mm of rain fell in a 3 hour period in Belfast, equivalent to a return period of the order of 120 years. Around 1400 properties were internally flooded, all of which were issued with the £1,000 hardship payment.



Figure 4 Flooding at Stockman’s Lane

2.1 Sources of Available Information

A number of resources are available providing information on the anticipated extent of flooding from a variety of sources. The most readily available of these, the Strategic Flood Map NI, is produced by Rivers Agency. Figure 5 shows the areas affected by flooding in East Belfast. Areas shown in pink are those affected by surface water flooding and those in blue are areas that would be inundated by rivers and the sea.

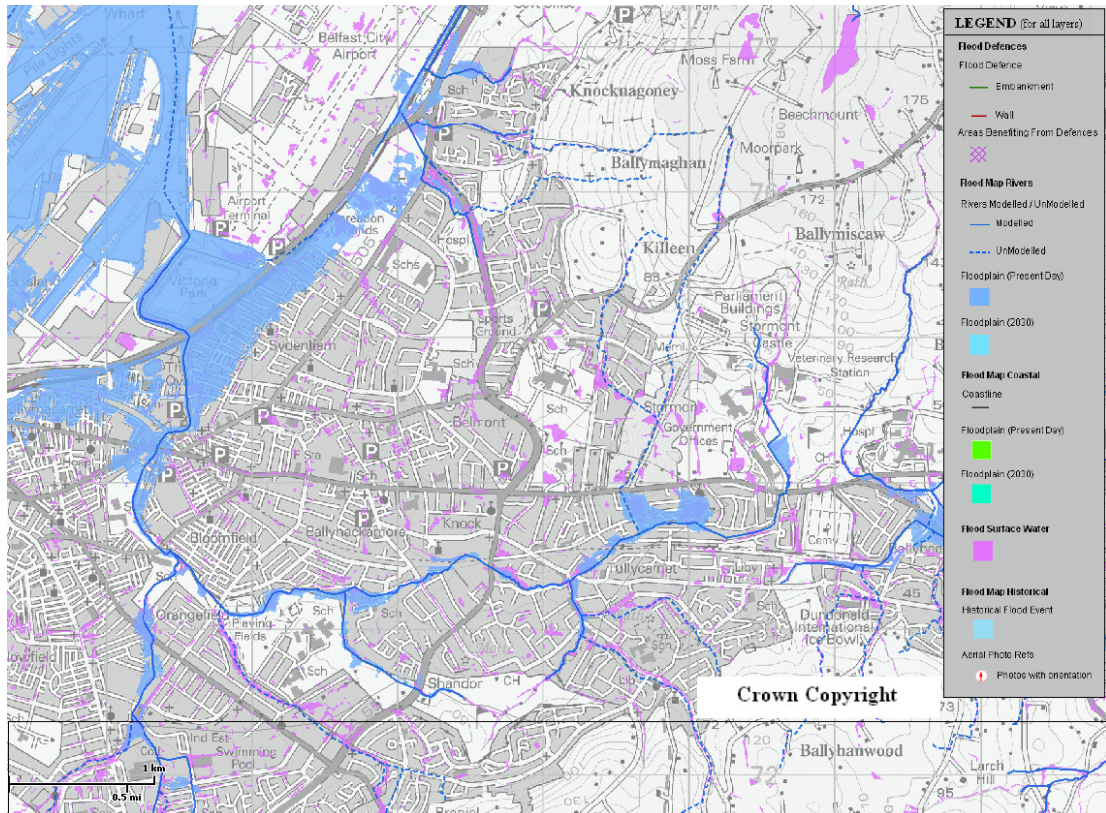


Figure 5 Strategic Flood Map NI for East Belfast

As required by the Floods Directive, the Department of Agriculture and Rural Development Rivers Agency, as the Competent Authority for the implementation of the Directive, is in the process of producing Flood Risk and Hazard Maps for Significant Flood Risk Areas, of which Belfast is one. These maps are now available having been completed in December 2013. Using these maps, Rivers Agency, with input from others, has commenced work on Flood Risk Management Plans that are required to be completed by 2015.

3. DATA COLLECTION PROCESS

3.1 Responsible Authorities

Belfast City Council identified the following agencies as having some role in the management of flood risk in Northern Ireland:

- DRD Roads Service
- Northern Ireland Water
- DARD Rivers Agency

During the development of the project scope, the Council liaised closely with members of each organisation regarding the data acquisition and to gain their support.

3.2 Preparation of Request for Information

In order that the data collection process was as comprehensive as possible, URS wrote to the three agencies identified above requesting information on flooding in a list of flooding areas identified by Belfast City Council. These areas are ones that have flooded frequently in the past.

To ensure that the information provided by each agency was in a similar format, a proforma was prepared and agreed with Belfast City Council. This was issued to the agencies along with the letter and list of flooded areas.

3.2.1 Flooding Areas

Belfast City Council has identified a list of 72 areas that are located throughout Belfast, as per Table 1. A breakdown of the areas by location is included in Appendix A.

| Location | No. of Flooding Areas |
|--------------|-----------------------|
| North | 6 |
| West | 7 |
| South | 19 |
| East | 37 |
| Tidal | 3 |
| Total | 72 |

Table 1 Flooding Areas by Location

The data collection process was focussed on gathering all known information on the causes of flooding within these areas. Information on whether or not any flood alleviation works are completed, ongoing, programmed or proposed within the areas was also requested. There

was also a request for information on private infrastructure and how this may be contributing to flooding in any of the areas identified.

3.3 Meetings with Agencies

During the data collection process, both Northern Ireland Water and Rivers Agency requested a meeting to discuss the acquisition in more detail. The agencies were concerned with the level of detail included in the proforma and with the time that it would take to collate the information required.

Meetings were held separately on 15th August 2013 and 27th August 2013. As a result of these meetings it was agreed that the agencies should provide as much detail as was readily available on flood events within the areas requested.

A joint agency response on behalf of the three main drainage agencies was provided via DRD Water Policy Division on 19th September 2013.

4. DATA ANALYSIS

Following the receipt of the combined agency response, URS undertook a data analysis process. The outcome of this was to further develop the response provided by the agencies and to revert to them with some questions regarding the information provided. A follow up meeting was held on 22nd October 2013 at which all issues were resolved.

4.1 Standards Used

Each of the three drainage agencies designs its infrastructure to different standards. The difference in the design standards used is as a result of the nature of the water that is being conveyed.

DRD Roads Service surface water drainage is designed for a rainfall event with a 1 in 1 year return period in accordance with the Design Manual for Roads and Bridges (DMRB). Northern Ireland Water stormwater drainage infrastructure is designed for a 1 rainfall event with a 1 in 30 year return period in accordance with WRc Sewers for Adoption Northern Ireland 1st Edition. DARD Rivers Agency infrastructure is designed for a flow with a 1 in 100 year return period.

A rainfall event with a 1 in 1 year return period can be considered to have a 100% chance of occurring in any one year. Similarly, a 1 in 30 year return period rainfall event has a 1 in 30 chance of occurring in any one year. A 1 in 100 year return period flow is considered to have a 1% chance of occurring in any one year.

The primary purpose of the Roads Service drainage system is to remove surface water to prevent flooding of the road itself. Roads Service is responsible for the maintenance of the existing carriageway drainage which in many instances connects to either Northern Ireland Water or Rivers Agency infrastructure. It undertakes minor improvements to its infrastructure but does not complete specific flood alleviation schemes and has the power to deal with overland flow onto roads.

The Northern Ireland Water stormwater system is one route through which surface water is conveyed to its final discharge location. In Belfast, a high proportion of stormwater discharges through a combined drainage system that also conveys foul water. It is when this system is exceeded that there is the potential for land and property to be flooded by 'dirty' water.

All new infrastructure projects are required to provide separate foul and stormwater drainage systems. In most instances the stormwater runoff from the site post-development must be no greater than the existing stormwater runoff and in many cases this can only be achieved by Sustainable Drainage Systems (SuDS). Northern Ireland Water is open to the possibility of adopting an increased range of SuDS types, as demonstrated by the 2012 Carrowreagh SuDS Pilot Project. However, there are a number of issues that need to be resolved before this process can be implemented fully.

DARD Rivers Agency aims to reduce the risk to life and damage to property from flooding from rivers and the sea and to undertake watercourse and coastal flood management in a sustainable manner.

It is responsible for maintaining designated watercourses (under the terms of the Drainage (NI) Order 1973), regulation of maintenance by riparians of private watercourses, regulation of proposed works which impact on the function of watercourses and development of viable works to reduce flood risk from watercourses.

Rivers Agency's network of designated culverts and open watercourses is also a potential discharge location for both Roads Service and Northern Ireland Water stormwater. However, stormwater can also be discharged to private watercourses, drains and culverts, making the resolution of flooding problems complex.

This interdependency means that there needs to be coordination between the agencies with respect to flood alleviation in Belfast and beyond.

4.2 Information on Flooding Areas

The final database of information on the 72 identified areas is included in Appendix B. The agencies added eight areas to the spreadsheet bringing the total number of areas to 80. Comments were provided on 65 of the 80 sites. Four of these were commented on by Roads Service, 34 by Rivers Agency and 40 by Northern Ireland Water. 16 sites were responded on by more than one agency.

The 15 sites that were not commented on by any of the agencies are as follows:

- Deerpark Gardens
- Riverdale Park South
- Glencolin Heights
- Brooke Drive
- Woodbourne Crescent
- Marlborough Court
- Northbrook Street (jcn Lower Windsor Avenue)
- Florenceville Drive
- Friendly Street
- Ava Avenue
- Channing Street

- Cregagh Street
- Richardson Court
- Orangefield Avenue
- Knock Eden Parade

The agencies have advised that they have no knowledge of, or information on, flooding at these locations.

A review of the Rivers Agency Heat Map was undertaken by Belfast City Council. This is a map of all properties that have received a flood relief payment as a result of being internally flooded. All but one of the 15 areas above had properties recorded on the Heat Map.

Further investigation identified that the timing of these flood relief payments coincided with some of the most severe weather events experienced in Belfast which resulted in widespread flooding across the City. In some cases, the severity of the weather event may have resulted in the drainage infrastructure systems becoming overwhelmed leading to inundation.

It may also be possible that, as a result of the widespread nature of the flooding at the time, the flooding was not reported to any of the agencies. If flooding is not reported to the three drainage agencies, it is not possible for them to record the events to allow them to assess the potential cause of the flooding and how or if it was impacted by their infrastructure.

4.2.1 Areas Flooded by Severe Weather

Northern Ireland Water responds to assist in dealing with incidents of flooding due to severe weather. Properties flooded due to severe weather are recorded on a section of the DG5 Register but this would not trigger follow up action unless there are other issues in the immediate area. The DG5 Register is maintained by Northern Ireland Water and is a record of the properties at risk from internal flooding in a 2 in 10, 1 in 10 and 1 in 20 year return period rainfall event.

Twelve of the flooding areas are recorded as flooding due to severe weather:

- Brompton Park
- Deerpark Road
- Ferndale Court
- Moonstone Street
- Gilnahirk Avenue
- Sunwich Street
- Richardson Street

- Castlereagh Road
- Connsbrook Avenue
- Lisavon Drive
- Lisavon Street
- Larkfield Manor



Figure 6 Flooding at Sunwich Street in 2007

4.2.2 Areas on the DG5 Register

Properties are recorded on the DG5 register if they are at risk of flooding during non-severe weather because the sewer does not have sufficient capacity to carry the volume of water falling on the ground. Capital investment projects are identified to remove as many properties as possible from the Register. There are approximately 200 properties on the Register across Northern Ireland with a few new properties added each year as they are discovered. Northern Ireland Water intends to address as many of these properties as possible during their price control periods PC13 and PC15, subject to the economic viability of individual projects, availability of funding and approval from the Utility Regulator.

Of the 80 flooding areas, eight are identified as having properties on the DG5 Register, as follows:

- Sicily Park
- Greystown Avenue
- Marguerite Park
- Great Northern Street (including Brookland Street)
- Eastleigh Dale
- York Street
- Maryville Avenue
- Hawthornden Road

Northern Ireland Water have also indicated that they have recently completed 2-Dimensional modelling of overland flows at Hillsborough Drive and Ardgowan Street and as a result have determined that flooded properties in these areas should be moved to the DG5 Register. A 2-Dimensional model is also being prepared for Tildarg Street with a similar outcome expected.

Once added to the DG5 register, the properties will be subject to a standard prioritisation methodology that will establish their position on the register, which in turn will influence when a scheme will be developed in order to subsequently remove them from it.

4.2.3 Areas Where Collaborative Working is Taking Place

There are a number of instances where the agencies are currently working collaboratively to resolve flooding issues. Collaborative working takes place where it can be demonstrated that the cause of flooding falls within the responsibility of more than one of the drainage agencies. The establishment of the Flood Investment and Planning Group is one example of how this process is supported as it aims to formalise this integrated approach to flood alleviation and drainage issues.

The South Belfast Flood Alleviation Scheme is being jointly investigated by Northern Ireland Water and Rivers Agency. The outcome of this scheme should help to alleviate flooding in Sicily Park and have a positive impact on flooding at Greystown Avenue, Priory Park and Locksley Park. The scheme is supported by both Belfast City Council and Northern Ireland Environment Agency and includes a short term solution to remove services from existing private culverts with the potential to construct additional road gullies in the area. Medium and long term proposals are due to be submitted to DRD and DFP in Spring 2014 and include the possible provision of a retention feature in Musgrave Park and integration with the larger Glenmachan Project. Once completed, this scheme will remove properties in the area from the DG5 Register.

Roads Service has identified flooding at Knocknagoney Drive and Knocknagoney Avenue as arising due to runoff from land adjacent to the Old Holywood Road. They have carried out investigations into the road drainage in the area and have determined this system is in good service condition. They have replaced two road gullies and carried out repairs to a third at Knocknagoney Drive and are investigating the ownership of the land adjacent to the Old Holywood Road. In addition, Rivers Agency has carried out improvement works to one of the manholes and will undertake a CCTV survey, which should all help to alleviate flooding in the area.

Flood alleviation works in relation to Knock Eden Crescent were undertaken by both Rivers Agency and Northern Ireland Water. Rivers Agency has identified the potential cause of flooding being due to two blocked grilles at Knock Dual Carriageway. Both grilles have been upgraded. Northern Ireland Water has also repaired a sewer blockage which may also have contributed to the flooding. There has been no recurrence of flooding since these works have been carried out.



Figure 7 Knocknagoney Drive during a flood event

4.2.4 Areas Where Investigation Work is Ongoing

The agencies are currently undertaking investigation works to determine potential causes of flooding and identify possible flood alleviation solutions in a number of areas.

Northern Ireland Water is investigating flooding caused by an overloaded sewer at York Street. The project is at an early stage of development with a number of options being considered. These include increasing sewer capacity, attenuation, off-line or on-line storage and separating storm water from the existing combined sewer. Works are proposed to be completed within the PC13 to PC15 timeframe.

At Carrington Street, investigations carried out by Northern Ireland Water identified debris in the downstream siphon. Repair work has been carried out and the model has been re-run and no out of sewer flooding is apparent. Northern Ireland Water has commented that some road flooding may remain.

Rivers Agency has carried out a pre-feasibility report into the potential cause of flooding at Riverdale Park East. The nature and outcome of proposals are currently at an early stage of development.

Northern Ireland Water identified one cause of flooding at Stockmans Lane following a period of severe weather. Rivers Agency has installed a water level recorder with text alerts to monitor water levels in order to establish whether the watercourse contributes to flooding.

Rivers Agency has de-silted an open watercourse to prevent the transport of silt blocking the grille upstream at Glen Ebor Park.

4.2.5 Completed Flood Alleviation Works

The agencies are continually carrying out works to improve flood resilience. Works have been completed in a number of the identified flooding areas as summarised in the following paragraphs.

The cause of flooding at Westland Road was identified as being primarily due to a combination of runoff from the adjacent golf course and existing gullies becoming blocked by leaves. Following the installation of additional gullies by Roads Service and additional drainage being provided within the grounds of the golf course, there have been no recent reports of flooding.

A collapsed sewer at Tennent Street and a blocked sewer at Tildarg Avenue have been repaired by Northern Ireland Water.

Near Orchardville Crescent, the grille on the Ladybrook River has been upgraded by Rivers Agency and the designation was extended in November 2012. This means that Rivers Agency is able to maintain a longer stretch of the River. In addition to this, the Agency has installed a notice at the new grille requesting that residents notify them if the grille becomes

blocked. This is an innovative approach to help Rivers Agency quickly respond to a potential flooding incident and consideration should be given to rolling this initiative out to other suitable locations.

The Ladybrook River also runs adjacent to the River Close area. The watercourse was maintained in the early summer of 2013 and there have been no further reports of flooding.

To help alleviate flooding at Castlewood Manor and the Orchardville area, Roads Service has de-silted pipes beneath the M1 motorway, replaced gullies and installed approximately 90m of replacement storm sewer pipeline.

Rivers Agency has identified one possible cause of flooding at Finaghy Road South as being due to a section of privately maintained open watercourse that has since been culverted by one of the local schools, close to Rathmore Gardens. Rivers Agency de-silted the downstream system and the manholes in the Council owned park have been raised to ground level with the lids replaced with gully grates.



Figure 8 Notice at grille on the Ladybrook River

An additional road gully has been provided at Orpen Drive and the size of the connection pipe has been increased by Roads Service. However, the downstream discharge location of this drainage is to a private watercourse.

A CCTV survey carried out by Northern Ireland Water into flooding at Marguerite Park identified a section of broken storm sewer pipe at the junction of Diamond Park and Marguerite Park. Roads Service replaced the broken pipe in July 2013. However, the road drainage in this area connects to a private watercourse that is blocked and this is being investigated by Roads Service.

At Cloghan Crescent, the culvert and watercourse have been de-silted by Rivers Agency in an attempt to alleviate flooding in the area.

Roads Service is to investigate the road drainage network at Gilnahirk Road to determine whether it is contributing to flooding problems in the area. Rivers Agency has secured a manhole on part of the culverted section of the Gilnahirk Stream.

An equipment failure at Park Avenue in East Belfast resulted in 19 properties flooding internally. Northern Ireland Water has repaired the equipment and there has been no recurrence of the flooding, suggesting that flooding issue has been resolved.

4.2.6 Programmed Flood Alleviation Works

A series of severe flood events over a number of years in East Belfast has identified under-capacity problems relating to existing culverts and watercourses within the area.

The East Belfast Flood Alleviation Scheme (EBFAS) works focus on the protection of areas currently subject to flooding during periods of heavy rainfall events. River capacity will be increased through the enlargement of channel sections and the provision of larger capacity culverts. Physical flood defence measures, such as sheet piles, will be used to contain the rivers during spate events where required.

The EBFAS was originally integrated within the contract for the Connswater Community Greenway (CCG) project. This is a project developed by the East Belfast Partnership to create a linear park through East Belfast and is being funded by the Big Lottery Fund, Belfast City Council, DARD Rivers Agency and the Department of Social Development. As the 'Greenway' project followed the lines of the Knock River, Loop River and the Connswater, Rivers Agency brought forward its proposals for flood alleviation works on these rivers to facilitate the 'Greenway' project.

Phase I of the Connswater Community Greenway project, which incorporates elements of the East Belfast Flood Alleviation Scheme works, is nearing completion. These works are concentrated on the Victoria Park and Orangefield Park areas.

Rivers Agency is now progressing with what it terms as flood alleviation elements of the project. These elements are works which do not require to be constructed in an integrated fashion along with the ‘Greenway’ environmental enhancements and therefore can be completed separately by the Agency. These works relate specifically to culverts or flood defences along the following sections:

- Montgomery Road culvert
- Ladas Drive culvert
- Ladas Way culvert
- Castlereagh Road culvert and flood walls
- Clara Park culvert and flood walls
- Grand Parade culvert



Figure 9 Surfer battling flood water on the Castlereagh Road in 2012

Interim flood protection measures are also being considered at Knockvale Park. This ‘stand-alone’ project is currently at tender stage.

Phase II of the project includes works in the remaining and following sections; Cregagh Glen, Upper Knockbreda Road, Cregagh Road, Montgomery Road, Ladas Drive, Ladas Way, Castlereagh Road, Elmgrove, Dixon Park, Sandown Road, Clara Park, Grand Parade,

Elmgrove, Knock Road, Beersbridge Road, Connswater Bridge, Newtownards Road, Hollywood Arches, Mersey Street and Sydenham Bypass.



Figure 10 Flooding in the Orangefield Area in 2007

The works will alleviate flooding in the following flooding areas:

- Clara Way
- Clarawood Walk
- Sandhill Parade
- Sandhill Park
- Orangefield Park
- Orangefield Green
- Orangefield Lane
- Castlereagh Road
- Loopland Park
- Loopland Gardens

- Loopland Drive
- Ladas Drive
- Knockvale Grove

Northern Ireland Water has identified a number of discrete flooding schemes as part of their East Belfast Drainage Area Study. The scope of these schemes includes upsizing of sewers, installation of offline storage tanks and the construction of additional sewers. Of the flooding areas by Belfast City Council, the following will benefit from these schemes:

- Castleview Road
- Eastleigh Dale and Pasadena Gardens
- Gilnahirk Road junction Lower Braniel Road
- Cherryvalley Gardens / Gilnahirk Road

In addition to the these areas, the following areas will also benefit; Upper Newtownards Road and Hawthornden Road, Sydenham Avenue, Cabin Hill Park, Glensharragh Gardens, Wandsworth Road, Old Holywood Road, Orangefield Parade and Meadowbank Park / Ardcarne.

No dates have been provided as to when these schemes are programmed to take place or as to when funding may become available. As is the case on all schemes of a similar nature, Northern Ireland Water will work closely with Rivers Agency when developing these projects.

4.2.7 Areas Where Additional Investigation Work May Be Required

Further investigation work may be required at a number of the identified flooding areas to help determine the possible cause of flooding and consider potential solutions.

Flooding at Glencairn Way has been attributed to overland flow. It may be possible to find a suitable method of diverting the flow away from residential areas and attenuating the flow before it discharges into the public sewer network. However, this would require identification of and agreement from the appropriate landowners.

Rivers Agency has commented that there have been no recent problems at the grille on the watercourse adjacent to Sunningdale Park. Further investigation work may be required to help identify other potential causes of flooding in the area.

Flooding in the Lille Park area has been attributed to a private drain that runs from Ormonde Park to Finaghy Road North, to the rear of properties in Lille Park. Roads Service has cleared and jetted all gullies and de-silted the storm sewer in Lille Park. In addition to this, Northern Ireland Water has identified the cause of flooding as severe weather. It may be prudent for

the agencies to work together to see if an economically viable solution to this flooding can be found.

Overland flow from the Stormont Hotel may be contributing to flooding at Castlevue Road. A previous flood report identifies works within the hotel grounds to alleviate flooding within their site, which may have resulted in escalating the flooding on Castlevue Road during periods of severe weather.

An overloaded sewer at Orangefield Drive South has been identified as contributing to flooding in the area. Northern Ireland Water has commented that this has been recorded on part of the DG5 Register. For all DG5 properties, Northern Ireland Water will identify capital investment projects to remove as many of these properties as possible from the register during PC13 and PC15. This will be subject to the economic viability of individual projects, availability of funding and approval from the Utility Regulator.

In the case of Lockview/Stranmillis, Rivers Agency has stated that storm tide forecasts have been shared with Belfast City Council and other responders. Additional investigations may be required to determine if there are any potential flood alleviation solutions for this area.

It is worth noting that Belfast Resilience Forum has recently completed a Coastal Flooding Protocol, which is to be included within the Flood Plan for the City. Rivers Agency is the lead organisation in advising on the response to tidal flooding. It receives an alert from UK Coastal Monitoring and Forecasting (UKCMF) in advance of an anticipated tidal flood event. Rivers Agency then contacts the Met Office to obtain meteorological information and use this in conjunction with the UKCMF data to determine if awareness raising is required. If required, it will then contact the PSNI requesting them to convene a multi-agency forum with key agencies to discuss the appropriate process for dealing with the anticipated flooding.

This protocol was most recently implemented at the beginning of 2014 when a storm surge was anticipated to occur at the same time as a period of severe weather. On this occasion major flooding did not occur and the implementation of the protocol was determined to be a success.

5. PLANNING FOR THE FUTURE

5.1 Collaborative Working

The three drainage agencies are actively working collaboratively with each other to improve the flood resilience within Belfast. However, there are some political obstacles obstructing the full potential of collaborative working being realised, not least that the three organisations are under the umbrella of two different government departments which may create difficulties in determining where final responsibilities lie. This issue was highlighted in the PEDU report, published in September 2012 following significant flooding in Belfast in June of that year. The report recommended that consideration is given to consolidation of all flood response organisations under the one departmental ambit. This recommendation has been deferred as part of the wider review of post-2015 structures of government. The wider review of government departments is being taken forward by the Office of the First Minister and Deputy First Minister.

One other difficulty arising from this is when it comes to scheme funding. As the agencies are funded by different government departments, problems may arise regarding financial contributions to any particular project. This issue could be lessened by harmonisation of government departments.

In May 2010, DRD published the document “Social & Environmental Guidance for Water & Sewerage Services 2010-2013”. The document sets out to provide the Northern Ireland Authority for Utility Regulation with guidance on the key environmental and social policies that DRD expects it to contribute to in carrying out its role in regulating the water industry. A draft “Social & Environmental Guidance for Water & Sewerage Services 2015-2021” was published in November 2013 and is currently out for public consultation. This document sets out guidance for the upcoming price control period, PC15.

DARD Rivers Agency is the Competent Authority for the implementation of the Floods Directive. However, DRD realises that as owners of key drainage infrastructure, Roads Service and Northern Ireland Water are required to exercise their functions in a manner that secures compliance with the Directive and to do this effectively requires an integrated approach to flood risk management by all three authorities.

The Flood Investment and Planning Group (FIPG) was established following the publication of the PEDU report with the aim of formalising the existing integrated working between the three drainage agencies and to provide a forum to progress flooding and drainage related issues.

The FIPG provides a co-ordinated approach to the identification of flooding issues to be addressed on a multi-agency basis, including proposals for the investigation of flooding, and to propose potential solutions, agree responsibilities and make the case for investment.

Collaborative working between the agencies in South Belfast is already evident on the South Belfast Flood Alleviation Scheme. The scheme, that aims to alleviate flooding in Sicily Park and the surrounding area, is being led by Northern Ireland Water.

There are a number of short and medium term solutions that will assist with the long term solution to reduce the risk of flooding in the area. Short term solutions, which included a detailed investigation into the sewerage, watercourse and culvert systems, identification and repair of collapses within private culverts and a £100k investment by Northern Ireland Water to remove services from private culverts and assist Rivers Agency to identify additional utility services within these culverts, is now complete.

The medium term solution is at outline design stage with the timescale for submission of the business case to DRD programmed for spring 2014. Proposals include upgrading sewers including storm sewer separation and possible provision of a stormwater retention feature in Musgrave Park.

The long term solution, which is part of the larger Glenmachan Project, is also being progressed. The business case for the project is programmed for completion and submission to DRD and DFP in spring 2014.

5.1.1 Areas where opportunities currently exist

In general, where it can be identified that assets belonging to more than one drainage agency are contributing to flooding, the agencies are dedicated to working together in developing a solution to alleviate it.

The FIPG provides a mechanism for facilitating problems where it is not clear as to the cause of flooding and there may be the need for multi-agency involvement.

The proposed works on the York Street Interchange is an excellent example of a scheme where multi-agency involvement could provide significant flood alleviation benefits for Belfast. The scheme is being procured by Roads Service with the preferred option currently undergoing design development.

A storm separation system is being considered in conjunction with Northern Ireland Water and a meeting has taken place between Roads Service and Rivers Agency to discuss potential measures that could be incorporated within the overall scheme design to offer additional flood protection measures to Belfast.

5.2 Private Infrastructure

There are many thousands of metres of private watercourses, drains and culverts located throughout the whole of Northern Ireland. The inspection and maintenance of this infrastructure is beyond the statutory remit of any of the drainage agencies. People who own

or occupy the land through which these private watercourses, drains and culverts flow have a statutory obligation to clean them as necessary to maintain the flow of water through them.

Under the Drainage (NI) Order 1973, Rivers Agency has enforcement powers to ensure compliance with these requirements in relation to private watercourses. They offer advice to help owners or occupiers understand the regulations and explain the circumstances where they would be expected to comply with them. However, Rivers Agency does not have the man power or financial resources to carry out routine inspections to ensure that land owners or occupiers are complying with their statutory duty.

Therefore, in an attempt to alleviate flooding, there is an onus on land owners and occupiers to regularly inspect and maintain the private watercourses, drains and culverts within their land. It is likely that many of these persons may be unaware of their statutory duty meaning that there may be a need to promote this within the public arena.

Land owners and occupiers should also be aware that if they wish to carry out modifications to watercourses, either designated or private, that will affect the flow regime or result in additional flow being discharged into a drainage system, then they must apply for Schedule 6 Consent under the Drainage (NI) Order 1973. Works that require this consent include culverting, watercourse realignment and the placing of structures on or adjacent to the banks of a watercourse.

5.3 Designing for Exceedance

Throughout all correspondence with the drainage agencies, the term “designing for exceedance” was an essential approach to be considered in relation to the provision of any drainage infrastructure. This is coupled with the fact that no drainage system will ever be able to cope with some of the significant weather events that can occur.

The storm drainage network in many areas of Belfast is combined with the foul drainage network. Many new developments that must provide separate storm and foul drainage networks are curtailed by having to eventually discharge into the combined sewer network outside of their site boundary.

To replace the combined sewer network with new dedicated storm and foul drainage systems would be extremely costly and disruptive. It is therefore necessary to look to innovative solutions to managing flood risk within the City.

Designing for exceedance means that once the capacity of the drainage system is exceeded, there are dedicated flow paths in place that will convey and contain flow to a suitable downstream discharge location. This may also include the provision of flood storage areas in playing fields, car parks or other large open areas where exceedance flood volumes can be discharged and retained for limited periods.

Belfast City Council has an important role to play in helping to achieve this proposal as many of the large open spaces in Belfast are Council owned. One proposal to alleviate flooding in South Belfast, as part of the South Belfast Flood Alleviation Scheme, is to construct a stormwater retention feature within Musgrave Park, which is a Belfast City Council owned public park. This feature would provide additional storage capacity for stormwater during periods of heavy rainfall, thus, helping to reduce flooding in the area.

Public acceptance that this type of external flooding is tolerable will need to be dealt with. The downstream impact also needs to be assessed to ensure that alleviation of flooding in one area is not causing flooding in another.

There is currently one significant example of designing for exceedance currently being undertaken in Belfast. As part of the Connswater Greenway project, the flood plain for the Knock River has been altered to allow part of Orangefield (Greenville) Park to flood, thereby reducing the impact of severe weather and high-river flows on the adjacent properties. This scheme has seen Belfast City Council and Rivers Agency working together to produce a socially, environmentally and economically viable solution to flooding in the area.

5.4 Lessons to be Learnt from Others

Belfast could look to other cities around the world for examples of where collaboration and innovative stormwater management solutions are having a positive impact on flooding.

5.4.1 *Metropolitan Glasgow Strategic Drainage Partnership*

The Metropolitan Glasgow Strategic Drainage Partnership (MGSDP) is a partnership formed by organisations involved with the operation of the sewerage and drainage network within the area - Scottish Water, Glasgow City Council, Scottish Canals, South Lanarkshire Council, Clyde Gateway URC, Scottish Enterprise and the Scottish Environment Protection Agency (SEPA).



Figure 11 Toryglen Regional SuDS Scheme Proposal

The partnership has a range of objectives which include flood risk reduction and integrated investment planning. Their 2060 Vision is to transform how the city region thinks about and manages rainfall to end uncontrolled flooding and improve water quality.

This vision will be realised through partnership working shaped by the Guiding Principles:

- Enhancement of our urban biodiversity and landscape
- Reconnection to our waterways
- Design for the severity of the rain
- Presumption that water will be kept on the surface
- Creation of integrated blue-green networks
- Integrated urban master planning and design
- Sustainable and affordable drainage solutions
- Climate-change ready

The Partnership has emphasised that the key issues in effective flood management are streamlined legislation and flexibility in funding. This would assist the key stakeholders, local authorities, Scottish Water and SEPA, to work in a more effective and collaborative way to develop and implement sustainable flood management solutions.

5.4.2 Chicago Green Alleys

The city of Chicago has more miles of alleyways than any other city in the world. Flooding is often an issue in these alleys as many were built without a connection to the city’s combined sewer and stormwater systems.

One solution to this problem would be to connect the alleys to the existing sewer network, however, the City of Chicago have decided to look at more sustainable solutions. Where soil conditions are appropriate, water is allowed to infiltrate into the ground through permeable paving or infiltration basins. This helps to solve the persistent flooding problem with the environmental benefit of cleaning and recharging groundwater. In areas where soils do not drain freely, permeable pavement is used in combination with subsurface drainage systems to slow runoff and reduce stress on the combined sewer system.

The Chicago Green Alley Handbook states that if all alleyways in the city were green alleys then up to 80% of rainwater falling on these surfaces throughout the year could pass through permeable paving back into the earth, reducing localised flooding, recharging groundwater and saving the taxpayer money.



Figure 12 Chicago Green Alley Permeable Paving

The Handbook encourages the public to participate in the green alleys project by implementing best management practices within their own site boundary. These include installing rain gardens, water butts, green roofs and permeable paving. They have also provided guidance on how the public can help to maintain the green alleys to be as functional as possible.

5.4.3 **Greenstreets@CountersCreek, London**

This is a pilot project investigating the benefits of Sustainable Drainage Systems (SuDS) in managing urban flooding, funded by Thames Water.

Three trial streets in the Counters Creek catchment of London have been selected to participate in the scheme. In addition to work taking place on the public carriageway, Thames Water offered residents the opportunity to have their garden upgraded with different types of SuDS features. The costs of the installation and first year's maintenance are covered by Thames Water. At the end of the trial period, the residents have the option to keep the new garden or to have it returned to its former state. The programme for the scheme was for installation works to be completed by November 2013 followed by a performance monitoring period running until November 2014.

The three streets were chosen as the sewers in these locations are not greatly influenced by rainwater flow from adjacent streets, making them more suitable for accurately measuring the direct benefit of SuDS on the drainage network.

5.5 **Sustainable Drainage Solutions (SuDS)**

In 2006 a Northern Ireland SuDS Working Party was established with the key objective of producing a SuDS Strategy for Northern Ireland. In 2011 NIEA published a document titled, "Managing Stormwater – A Strategy for Promoting the Use of Sustainable Drainage Systems (SuDS) within Northern Ireland". The document defines SuDS as:

"the generic name for a range of techniques which seek to deal in an integrated way with the issues of water quantity, water quality and amenity.

SuDS are one form of surface water management, which aim to be more sustainable than traditional piped systems, reducing both the risk of flooding and pollution. Such systems aim to manage storm water as near to source as possible, slow down run-off, treat it naturally and release good quality water to watercourses or groundwater. SuDS features mimic natural wetland systems. Wetlands act as nature's sponges, slowing the flow and improving water quality. Wetlands historically have been important Irish ecosystems because of the high rainfall experienced in many areas. The use of SuDS involves moving away from a reliance on traditional underground pipe drainage systems, to engineering solutions which replicate natural drainage processes."

The Working Party proposes that the Northern Ireland Executive establishes SuDS as the preferred approach for managing the storm water discharges which arise from the

development of land. It suggests, as part of a number of recommendations, that ideally one organisation would have responsibility for assessing the flood control, water quality and amenity aspects of SuDS in new developments. However, under the existing legislation and governance arrangements, NIEA and Rivers Agency both have a role to play.

The document highlights that reliance on traditional drainage systems is proving inadequate to address the issue of storm drainage, with more intense and increasingly unpredictable rainfall arising from climate change. The importance of traditional piped systems as a valuable asset is raised and they are expected to continue to play a key role. However, it recommends the need for the adoption of a wider range of drainage techniques for new development, which can achieve the twin objectives of extending the life of existing infrastructure and dealing effectively with the issue of storm water drainage. The limitations of the traditional approach have been uncovered by the impacts of climate change and the improvements demanded by both the Water Framework Directive and the Floods Directive.

It is believed that the automatic right to connect surface water run-off to a surface or combined public sewer in Northern Ireland, granted under section 163 of the Water and Sewerage Services (Northern Ireland) Order 2006, is one of the reasons why there has been such a slow uptake of SuDS. In Great Britain, DEFRA's Flood and Water Management Act (2010) encourages the use of sustainable drainage in new developments and re-developments. It does this by requiring drainage systems to be approved, against a set of National Standards, before building can commence and a connection to the sewer can be allowed (if needed). This Act also makes local authorities in Great Britain responsible for adopting and maintaining SuDS.

The potential exists within Belfast for the implementation of a wide variety of SuDS, alongside traditional drainage methods, to help alleviate flooding. However, to be successful will require a commitment from the drainage agencies that these systems would be adopted in a similar manner to traditional drainage systems.

Currently, Northern Ireland Water only adopts 'hard' SuDS, for example, geocellular retention tanks or similar. The agencies are cautious to extend this process to other SuDS types, such as swales, filter drains and retention ponds, as they are concerned over the legal responsibilities surrounding maintenance following installation from both a financial and health and safety perspective. These issues would need to be addressed and resolved before it is possible to fully implement a policy that would establish SuDS as a viable stormwater management solution that could be accepted on a wider scale than it is currently.



Figure 13 Filter Drain



Figure 14 Swale

Achieving this will require input at a high level and a procedure will need to be developed so that those responsible for the assessment of schemes have clear direction as to what is or is not acceptable. It will then be possible for the agencies and developers to design drainage and flood alleviation solutions that incorporate SuDS, as well as other solutions identified within this report.

In a local context, there is multi-agency involvement ongoing in Ballyclare where a pilot project to demonstrate measures to effectively manage stormwater within the catchment of the town is underway. The scheme also aims to manage the capacity of the local wastewater treatment work and ultimately improve local water resources. This project aspires to work alongside local developers to explore how sustainable stormwater management solutions could be integrated, for example, when building large-scale development or access roads within the catchment. Findings from this work package will inform future legislation and policy, necessary to drive forward the implementation of sustainable stormwater management in Northern Ireland.

5.6 Involving the Public

Getting the public involved in the management of flood risk is an important factor in the alleviation of flooding.

Consideration could be given to the potential benefits of extending initiatives, such as that in place at Woodlands Grange, to other suitable locations throughout the city. Here a notice has been placed beside the newly constructed grille encouraging residents to contact Rivers Agency if the grille becomes blocked. This inclusive approach to flood risk management is working to the advantage of both the residents and Rivers Agency.

The potential for developing a mechanism to provide funding to residents to assist with the installation of SuDS within their property boundary could be investigated. For example, if residents wish to upgrade their driveway, funding could be made available if they were to install permeable paving. Although this would not completely remove the risk of their property

flooding, the SuDS would effectively lengthen the drainage path to the threshold of their property, thus providing additional time for flood barriers to be installed to help to protect the property from the approaching water.

A number of protection devices are available that provide property level protection against flooding. Rivers Agency is in the process of preparing a business case for an “Individual Property Protection” grant to be made available to residents living in areas prone to flooding. It is envisaged that this grant will replace the hardship payment currently available following a flood event, the purpose of which is to encourage a self-help approach amongst members of the public.

Some examples of the range of devices available include:

- Automatic flood-proof air bricks
- Flood resistant air brick covers
- Non-return valves for drains and water inlets/outlets
- Purpose built flood boards for doors

There are also a range of other measures that can be retrofitted to properties to help improve their flood resistance and/or reduce the impact of flooding on a property. These include:

- Raising door threshold levels
- Raising damp-proof brick courses
- Re-pointing mortar and applying waterproof sealing to external walls
- Apply sealant to floors and/or replace wooden floorboards in concrete
- Laying floor tiles rather than fitted carpets
- Keeping irreplaceable or valuable items on high mounted shelves
- Fitting water resistance skirting boards or applying varnish to wooden ones
- Fitting synthetic or waxed doors, or make sure wooden doors are easy to remove before a flood

5.7 Belfast City Council Masterplan

The 2013 – 2020 Belfast City Masterplan outlines proposals for how Belfast should be developed in the coming years.

One of the problems identified by the Masterplan is the high proportion of brownfield sites within the City, many of which are in public ownership. It also notes the absence of green space in the city centre and the impact this has on environmental quality and amenity in the area.

One of the strategic objectives of the Masterplan is to develop a green infrastructure strategy for the city. One idea suggested is the development of pocket parks on publicly owned brownfield sites. The proposal could be further developed to include blue-green spaces within these parks, through the inclusion of SuDS, thus further improving their environmental sustainability potential with the advantage of reducing stormwater runoff within the centre of the town through their creation.

Through the development of additional parks, particularly those utilising SuDS and blue-green spaces, there exists an opportunity to attract tourism and additional investors into the city by promoting Belfast as an innovative and sustainable city of the future.



Figure 15 Examples of blue-green spaces

The University of Nottingham commenced a research programme into blue-green cities in February 2013, the purpose of which is to evaluate the multiple flood risk benefits in blue-green cities. They define a blue-green city as one that aims to:

“recreate a naturally-oriented water cycle while contributing to the amenity of the city by bringing water management and green infrastructure together.”

It may be beneficial to engage with the Blue-Green Cities Research Team to determine whether any opportunities are available to become involved with the project.

5.7.1 Local Government Reform

The reform of local government in Northern Ireland will reduce the current 26 Councils to 11. The new councils will be responsible for the delivery of more services and, in partnership with others, will be responsible for guiding the future development of their areas.

One of the responsibilities attributed to the new councils will be leading and facilitating the community planning process. The aim is to ensure that the delivery of services is more responsive to the needs of citizens and will put local representatives at the head of this process. Key departments and agencies will be required to be engaged in the community

planning process and have regard of community plans when considering how to deliver services at a local level.

The new council for Belfast District will encompass the existing Belfast City Council along with parts of Castlereagh, Lisburn and North Down councils. A new Shadow Council will be in place by June 2014, which will ultimately become responsible for dealing with development plans and planning matters post March 2015. This provides an opportunity to align planning processes and consider how the Belfast City Council Masterplan can be further developed to help alleviate some of the flooding issues within the city.

6. STATUTORY LEGISLATION AND PLANNING

The design of any stormwater system must take account of a range of Statutory and European legislation and requirements.

These pieces of legislation aim to minimise the risk of flooding by putting restrictions on the volume and final discharge location of stormwater. They impose a requirement to protect the freshwater and marine environment and place environmental restrictions on the water to be discharged, including specifying the level of treatment required, in order to protect habitats.

One common point is the promotion of Sustainable Drainage Systems (SuDS) to achieve these objectives. However, the use of SuDS must be assessed on a case by case basis to determine their suitability and effectiveness as an appropriate stormwater management technique.

By ensuring those responsible for approving and/or consulting on proposals for new developments are aware of the requirements of these pieces of legislation, they can be used effectively to help alleviate flooding in the flooded areas considered in this report.

6.1 Northern Ireland Environment Agency

Within their Stormwater Management – Implementation in Northern Ireland document, NIEA have highlighted the need for Sustainable Stormwater Management. The document states that:

“Traditionally the drainage generated in built-up areas is managed through conventional underground pipe systems. These are designed to prevent flooding locally by conveying water away as quickly as possible downstream of a development. However, this alteration in the natural flow of drainage can lead to pollution problems within catchments.

For example, when it rains, stormwater flows can pick up pollutants and wash these into rivers and streams. Rapid and increased stormwater runoff can also cause downstream flooding, localised erosion, destroy habitats and contribute to combined sewer overflows (CSOs). In addition, such engineered systems are not designed with wider social considerations in mind e.g. amenity, aesthetics and biodiversity.

It is now recognised that continuing to implement conventional drainage systems in urban areas and ignoring wider issues, is an unsustainable long-term option. It does not make economic sense to continue to use conventional underground pipe systems. Conventional systems have only limited appeal and can add to the existing problem.

The solution is sustainable stormwater management. The benefit of this approach is that it takes account of water quantity and future quality, challenges environmental and amenity issues by mimicking natural systems. The cost of the new approach is less and the multiple benefits will help society adapt to climate change.”

The document continues to highlight the following benefits of Sustainable Stormwater Management:

“Sustainable Stormwater Management is designed to:

- *Manage runoff flowrates, reducing peak flow and increase pipe capacity to lower flood risks*
- *Reduce the impact of urbanisation and the danger of flooding*
- *Provide water treatment, protecting water resources from point and diffuse pollution*
- *Protect water and air quality*
- *Reduce stormwater treatment costs and sewage treatment costs. It will also lower hydraulic loading*
- *Improve aesthetics and urban amenity - such systems are integrated into the environment as visually attractive features*
- *Improve biodiversity, providing a new habitat for wildlife that would otherwise be scarce in the built environment*
- *Promote groundwater recharge”*

In terms of Legislation and Policy Drivers, NIEA, within the document, outline that:

“There is a range of legislation & policy which is driving the implementation of stormwater management in Northern Ireland.

This includes:

- *EU Water Framework Directive 2000/60/EC (WFD)*
- *EU Habitats Directive 92/43/EEC*
- *EU Freshwater Fish Directive 78/659/EEC*
- *EU Urban Waste Water Treatment Directive 91/271/EEC*
- *The European Directive on the Assessment and Management of Flood Risks (2007/60/EC) (The Floods Directive)*
- *Northern Ireland Sustainable Development Strategy 2006*
- *Planning Policy Statement 15 (PPS 15) – Planning and Flood Risk*
- *Planning Policy Statement 7 (PPS 7) – Safeguarding the Character of Established Residential Areas”*

6.1.1 ***EU Water Framework Directive (2000/60/EC)***

The Water Framework Directive (WFD) introduces a new holistic approach to the management of water quality, and establishes a new system for the protection and improvement of all aspects of the water environment including rivers, lakes, estuaries, coastal waters and groundwater.

The Directive requires all inland and coastal waters to reach at least “good status” by 2015. Achieving this ambitious target will require management planning at river basin level, linking with other key policy areas such as agriculture, land use, biodiversity, tourism, recreation and flood protection. Requirements for public participation at key stages will lead to greater public involvement in determining the future management of our water environment. In general, the aim of 2000/60/EC is to get polluted waters clean again, and ensure clean waters are kept clean.

The Department of the Environment is responsible for co-ordinating the implementation of the WFD in Northern Ireland.

6.1.2 ***EU Habitats Directive (92/43/EEC)***

The main aim of the Habitats Directive is to promote the maintenance of biodiversity by requiring Member States to take measures to maintain or restore natural habitats and specified wild species at a favourable conservation status, introducing robust protection for those habitats and species of European importance. In applying these measures Member States are required to take account of economic, social and cultural requirements, as well as regional and local characteristics.

6.1.3 ***EU Freshwater Fish Directive (78/659/EEC)***

This Directive concerns the quality of fresh waters and applies to those waters designated by the Member States as needing protection or improvement in order to support fish life.

The aim of this Directive is to protect or improve the quality of those running or standing fresh waters which support or which, if pollution were reduced or eliminated, would become capable of supporting fish belonging to:

- indigenous species offering a natural diversity, or
- species the presence of which is judged desirable for water management purposes by the competent authorities of the Member States

6.1.4 ***EU Urban Waste Water Treatment Directive (91/271/EEC)***

The objective of 91/271/EEC is to protect the environment from the adverse effects of urban waste water discharges and discharges from certain industrial sectors and concerns the collection, treatment and discharge of:

- Domestic waste water
- Mixture of waste water
- Waste water from certain industrial sectors

6.1.5 *The European Directive on the Assessment and Management of Flood Risks (2007/60/EC)*

The Directive, which shall be carried out in coordination with the Water Framework Directive, aims to reduce and manage the risks that floods pose to human health, the environment, cultural heritage and economic activity. The Directive required Member States to initially carry out a preliminary assessment by 2011 to identify the river basins and associated coastal areas at risk of flooding. For such zones flood risk maps are to be produced by 2013. Flood risk management plans focused on prevention, protection and preparedness are to be established by 2015. The Directive applies to inland waters as well as all coastal waters across the whole territory of the EU.

6.1.6 *Northern Ireland Sustainable Development Strategy 2006*

The Northern Ireland Sustainable Development Strategy 2006 has now been superseded by the 2010 strategy. The 2010 strategy has been ‘designed to provide a framework that can support and inform the decisions and actions taken by individuals, groups and organisations in progressing the sustainability agenda’. The strategy must be considered alongside the Sustainable Development Implementation Plan (2011 – 2014), which provides practical expression to the commitments through the targets for delivery.

6.1.7 *Draft Planning Policy Statement 15 (PPS 15) – Planning and Flood Risk*

Draft Planning Policy Statement (PPS) 15, ‘Planning and Flood Risk’ sets out the Department’s planning policies to minimise flood risk to people, property and the environment. It embodies the Government’s commitment to sustainable development and the conservation of biodiversity. It adopts a precautionary approach to development and the use of land that takes account of climate change and is supportive to the wellbeing and safety of people. The document is being updated and the consultation period for the Revised Draft ended on 10 January 2014. The Department is considering all comments received during the consultation period, following which the draft document will be amended if necessary and published in final form. As it stands, the policy objectives set out in the Revised Draft are to:

- seek to prevent inappropriate new development in areas known to be at risk of flooding, or that may increase the flood risk elsewhere
- ensure that the most up to date information on flood risk is taken into account when determining planning applications and zoning / designating land for development in development plans
- adopt a precautionary approach to the identification of land for development through the development plan process and the determination of development proposals, in those

areas susceptible to flooding where there is a lack of precise information on present day flood risk or future uncertainties associated with flood estimation, climate change predictions and scientific evidence

- manage development in ways that are proportionate and appropriate to the 4 main sources of flood risk present in Northern Ireland, i.e. fluvial, coastal, surface water and water impoundment (reservoir) breach or failure
- seek to protect development that is permitted within flood risk areas by ensuring that adequate and appropriate measures are employed to mitigate and manage the flood risks
- promote sustainable development through the retention and restoration of natural flood plains and natural watercourses as a form of flood alleviation and an important environmental and social resource
- promote sustainable development through encouraging the use of sustainable stormwater management for the drainage of new development
- promote public awareness of flood risk and the flood risk information that is available and of relevance to undertaking development
- promote an integrated and sustainable approach to the management of development and flood risk which contributes to:
 - the safety and wellbeing of everyone
 - the prudent and efficient use of economic resources
 - the conservation and enhancement of biodiversity

The policy highlights that although the traditional method of conveying stormwater drainage through underground pipes reduces localised flooding, it can simply transfer risk to other parts of the catchment. As a result, the commitment to a sustainable approach to building and the use of land is underlined in the Regional Development Strategy for Northern Ireland. The water quality improvements required by the EC Water Framework Directive, and the need to minimise changes in the volume and rate of surface run-off from development sites, are also identified as reasons for the promotion of Sustainable Drainage Systems.

The Revised Draft policy states that:

“Consistent with the requirements of PPS 7 ‘Quality Residential Environments’; incorporating watercourses into the open space requirements for new residential development will be preferred to locating them to the rear of properties where they are difficult to maintain or can become dumping grounds contributing to flood risk. Where possible the removal of culverts and the re-introduction of the natural watercourse should be encouraged.

The adoption of sustainable drainage solutions (SuDS) for the disposal of stormwater may be a much more sustainable alternative than culverting or other options involving the artificial modification of watercourses. The use of SuDS source control solutions such as ponds and swales and their integration into new development schemes as amenity features will therefore be encouraged. Such

solutions, by negating increased site discharges will reduce the need for flood alleviation / culverting works downstream and any associated maintenance.

It is acknowledged that in exceptional circumstances, culverting of a section of a watercourse may be unavoidable. This may apply where there are insurmountable inherent structural problems such as slope stability and land slippage. However, even in such circumstances, other solutions such as bank reinforcement, gabion wall construction and underpinning should be considered first. Similarly, where there are health and safety concerns arising from open access to watercourses or hazardous riverbanks, the construction of solid barriers such as fencing, or planting of 'soft' landscape barriers, should be considered as alternatives to culverting."

6.1.8 Planning Policy Statement 7 (PPS 7) – Safeguarding the Character of Established Residential Areas'

PPS 7 outlines the Department's planning policies for achieving quality in new residential development and advises on the treatment of this issue in development plans. The main objectives of this Statement are:

- To promote an integrated approach to achieving sustainable and quality residential environments
- To promote quality residential development that:
 - creates places for people which are attractive, locally distinctive and appropriate to their surroundings, safe, convenient, adaptable and easy to maintain
 - respects and enhances features of value and local character and promotes biodiversity
 - reduces reliance on the private car, supports movement by pedestrians and cyclists, provides adequate and convenient access to public transport and connects well with the wider locality
- To promote the comprehensive planning and development of residential areas and ensure that adequate information accompanies planning applications which will enable the delivery of an improved design quality
- To ensure that adequate provision is made for infrastructure and appropriate local neighbourhood facilities as an integral part of residential development

6.2 The Water Environment (Floods Directive) Regulations (Northern Ireland) 2009

Protecting the community from the risk and impact of flooding is at the heart of the European Floods Directive. Introduced in 2009, it provides a new approach to managing flood risk on a catchment wide scale.

Under the Directive, Rivers Agency has identified the areas in Northern Ireland which have the most significant flood risk, known as Significant Flood Risk Areas (SFRAs). These areas are now the focus for more detailed planning and mapping. Flood Risk Management plans will

also be developed to reduce the adverse impact of flooding on human health, the environment, our cultural heritage and economic activity.

Flood risk management under the Floods Directive takes place alongside government's ongoing programme of drainage and flood alleviation measures. In facing the challenges of flooding, Government manages flood risk by:

- **Prevention:** avoiding construction in flood-prone areas and by adapting future developments to the risk of flooding
- **Protection:** taking measures to reduce the likelihood and impact of floods
- **Preparedness:** informing the public about flood risk and what to do in the event of a flood

The Directive sets out the following timescale:

- **Completion of the preliminary flood risk assessment by December 2011** - Belfast has been identified as a Significant Flood Risk Areas (SFRA) under the Directive and as such is included in the flood risk management plans.
- **Produce flood risk and flood hazard maps for significant risk areas by December 2013** – In addition to the Rivers Agency Strategic Flood Map NI, which has been available since 2008, Belfast City Council has access to the stakeholder viewer that displays the draft flood risk and hazard maps.
- **Produce flood risk management plans by 2015** - These set out our objectives, measures and an action plan for managing flood risk. Belfast City Council is a member of the North Eastern River Basin District Flood Forum and will be involved in the development of the flood risk management plan.

7. MULTI-AGENCY STAKEHOLDER GROUPS

There are a number of existing groups in Northern Ireland focused on targeting flooding. The main purpose of these groups is to establish and develop a strategies for the management of surface water in Northern Ireland.

The groups aim to promote collaborative working between a range of agencies including DRD, DOE, Northern Ireland Environment Agency, Rivers Agency, Roads Service, Northern Ireland Water and DFP. They are focussed on developing a procedure that will promote the use of Sustainable Drainage Systems (SuDS), designing for exceedance and will seek to further develop stormwater management on a catchment basis.

The following sections outline the specific roles of these groups.

7.1 Stormwater Management Group

The Stormwater Management Group (SMG) is an inter-departmental policy coordination and implementation group, jointly chaired by Northern Ireland Environment Agency (NIEA) Water Management Unit (WMU) and Department for Regional Development (DRD) Water Policy Division. The group is an amalgam of the Sustainable Urban Drainage Working Party and the Surface Water Flood Management Implementation Group.

Other members of the group include:

- DOE Environmental Policy Division
- DOE Planning Policy Division
- DOE Planning NI
- DRD Roads Service
- DARD Rivers Agency
- Northern Ireland Authority for Utility Regulation
- Northern Ireland Water

The aim of the SMG group is to examine a range of approaches to develop more integrated stormwater management in Northern Ireland. It shall include examples of best practice in both technical terms and stakeholder collaboration. It also aims to see whether closer collaboration between relevant organisations could identify innovative and feasible solutions, despite perceived regulatory difficulties. With this strong cross-organisational commitment the group will coordinate and oversee the development and implementation of sustainable integrated, catchment-based stormwater management systems in Northern Ireland. These systems will be driven by regulation, policy and initiatives aimed at mitigating flood risk thereby protecting citizens, property and the environment.

Key deliverables of the Stormwater Management Group include:

- implementation of strategy
- legislation to enforce stormwater management
- technical guidance on implementation
- approval body which will assess and approve proposals for new and retrofit schemes, and
- new companies to service the new stormwater systems

7.1.1 Ballyclare Pilot Study

Currently the group is carrying out a pilot study in Ballyclare exploring the benefits of the implementation of sustainable drainage systems within the catchment of the town. This pilot will identify the range of benefits and issues required to inform the legislation, policy and appraisals necessary to drive forward the implementation of sustainable stormwater management in Northern Ireland. Already it has identified that by taking storm water out of the foul sewer, the treatment costs incurred by Northern Ireland Water will be less and the existing dry streams in Ballyclare will support aquatic life again. Overall, the study has developed new ways of working between the members of the Stormwater Management Group, which are essential to delivering the principles of better regulation and to efficiently achieve shared goals.

7.2 Flood Investment and Planning Group

The Flood Investment and Planning Group has recently been formed following publication, in September 2012, of the PEDU report into flooding in Belfast in June 2012.

The group is chaired by the Water Policy Division of DRD and its purpose is to assist the main drainage agencies in working collaboratively on capital projects that will address flooding issues by improving coordination of investment.

7.3 Floods Directive Steering Group

Rivers Agency is the designated authority with responsibility for the implementation of the Floods Directive in Northern Ireland. However, the successful implementation of the Directive will require effective cooperation, coordination and communication across a number of departments, agencies and a government company. In pursuance of this collective approach, Rivers Agency has established the Floods Directive Steering Group. The Steering Group comprises senior representatives from all of the key governmental stakeholders with an interest in the Floods Directive and provides strategic direction for its implementation.

The main aims of the Steering Group are to:

1. Consider and comment on the approach taken by the Rivers Agency’s Floods Directive Implementation Group.
2. Ensure that there is a high-level commitment within all of the governmental stakeholders to provide the resources necessary to meet the requirements of the Directive.
3. Ensure the strategic co-ordination of all work required by governmental bodies in taking forward the Directive towards full implementation.
4. Facilitate the alignment of all government policies/programmes and the Directive.
5. Identify and make recommendations for the development of water and land-use policies that might affect flood risk and the management of flood risk.

7.4 Floods Directive Stakeholder Group

The Floods Directive Stakeholder Group comprises government representatives with responsibility for flood risk management, the environment, fisheries, planning and civil contingencies. Farming and insurance interests are also represented. It helps develop policies to deliver the Floods Directive and ensures compliance with the environmental objectives of the Water Framework Directive.

7.5 Belfast Resilience Forum

Belfast Resilience Forum brings together representatives from more than 50 different organisations to agree in advance how they will work together to help the public in an emergency.

Their role is to prepare emergency plans for major disasters, such as:

- severe weather
- fire
- industrial accidents
- major transport accidents
- widespread human and animal health problems

Through Belfast Resilience the organisations also:

- train and practice how they would respond in an emergency
- evaluate past emergency responses to try to improve how they work together, and
- work together to encourage people to be more prepared for emergencies

7.6 North Eastern River Basin District Flood Forum

The North Eastern River Basin District Flood Forum was established by Rivers Agency and is one of three Local Flood Forums to help develop a better understanding of flood risk and how it can be pro-actively managed in the future.

The forum is made up of government departments, agencies, stakeholders and the public or their representatives and provides groups with an opportunity to participate in the preparation of flood risk management plans.

This level of local engagement allows officials to get a real sense of what it is like to experience flooding and this will assist in the drafting of measures to reduce the impact.

8. SIGNIFICANT ISSUES

1. Maximise the benefits of coordinated and collaborative working

The report recognises that the drainage agencies are actively working together to resolve flooding issues but also highlights the political restrictions surrounding maximising the potential of coordination being realised. The PEDU recommendation on consolidation of flood response agencies within a single department has been deferred as part of the wider review of post-2015 structures of government. This wider review of government departments is being taken forward by the Office of the First Minister and Deputy First Minister (OFMDFM).

A number of strategic groups exist to look at issues surrounding flood alleviation. The groups have varying roles and levels of responsibility and are chaired by a range of organisations, as set out in Section 7 of the report. The establishment of a single group or overseeing organisation may help to harmonise the work that is currently being undertaken by these organisations.

2. Sustainable Drainage Systems (SuDS)

The issues surrounding the adoption of SuDS need to be investigated as there is a level of concern regarding legal responsibilities associated with the maintenance and health and safety management of soft SuDS once they have been installed. If these issues can be resolved, it may be possible to widen the adoption of SuDS which may help to increase their use as a viable drainage technique alongside traditional drainage systems.

The Storm Water Management Group and Northern Ireland Water could be engaged regarding the possibility of developing a business case for the establishment of a pilot programme similar to that undertaken at Counters Creek in London. This could be discussed alongside the potential for developing a mechanism whereby funding could be made available to members of the public incentivising them to install SuDS within their property boundary, similar to that available for installing solar panels.

A review of the proposals within the Belfast City Council Masterplan to create pocket parks in the city centre could be undertaken, with both the Stormwater Management Group and Rivers Agency, to identify potential opportunities for accommodating blue-green spaces within the city.

In doing this inspiration can be drawn from lessons learnt by others, for example, the work being undertaken by the Metropolitan Glasgow Strategic Drainage Partnership, as to how SuDS is helping to resolve flooding issues in other areas.

3. Integrated Planning

The new council for Belfast District will encompass the existing Belfast City Council along with parts of Castlereagh, Lisburn and North Down councils. A new Shadow Council will be in place by June 2014, which will ultimately become responsible for dealing with development and planning matters. This provides an opportunity for alignment of planning processes and to consider how the Belfast City Council Masterplan or new Development Plan can influence flood alleviation within the city in line with Draft Planning Policy Statement 15 (PPS15).

The report highlights the benefits of SuDS and how this is identified as the preferred surface water management technique for new developments within proposals contained in Draft PPS15.

A Flood Risk Management Plan is being prepared for Belfast following its identification as Significant Flood Risk Area under the EU Floods Directive. This strategic plan will set out a framework of measures, focussed on prevention, protection and preparedness, to manage flood risk for delivery or planning at local level. Measures recommended might include identifying opportunities where an area may benefit from integrated flood protection techniques, such as designing for exceedance and SuDS.

The North Eastern River Basin District Flood Forum and the new Belfast Shadow Council could effectively engage regarding the role of the Forum and how it is assisting the flood risk management planning process for the new Belfast District.

4. Individual Property Protection

Rivers Agency has developed a business case for an individual property protection scheme, it is currently with DFP. Such a scheme has significant potential to empower the public to help themselves, reduce the likelihood of their homes flooding and prevent financial hardship. It is proposed that this scheme will replace the current Flooding Hardship Payment Scheme, which the Council administers on behalf of the Department of the Environment. It is anticipated that Rivers Agency may engage the Council regarding proposals, finance, timeframes and administrative arrangements for the introduction of this scheme.

5. Coastal Flooding

The risk of coastal flooding, including the recent threat to Belfast at the beginning of 2014, has highlighted the importance of individual agencies protecting their own infrastructure. Flooding of critical infrastructure such as pumping stations, electricity substations and telecommunications hubs would compound the impact of a flooding incident on residents and businesses and inhibit the ability of the city to recover quickly after an incident. While some organisations already have business continuity plans in place, all government

departments and organisations should be encouraged to assess their own assets and implement protective measures, with financial support where necessary.

6. Improvement Schemes

The report identifies a number of areas which are subject to ongoing investigation into the causes of flooding, or where improvement measures are being developed, or have been put in place. In some cases these schemes will be considered by the FIPG as requiring multi-agency involvement or because no owner can be identified. If multi-agency involvement is required, an assessment could be made to determine if the use of integrated flood alleviation solutions is appropriate.

“Designing for Exceedance” is an essential approach to be considered in the provision of drainage infrastructure given that it is unlikely that any drainage system will be able to cope with some of the significant weather events that can occur. An example of this is providing storage for exceedance flows within public owned parks, similar to the work currently taking place in Orangefield Park.

Where recurring flooding issues have not been resolved, it is important that these issues continue to be highlighted to the relevant drainage agency or to the FIPG for follow up review.

9. CONCLUSION

It is difficult to establish a single process that will cover all issues involved in trying to improve the flood resilience of Belfast and expectations need to be managed that all flooding can be prevented. The causes of flooding are varied and the organisation or person responsible for providing alleviation may not always be apparent. Therefore, it is suggested that a number of initiatives need to be established to drive flood alleviation in the city.

The need for multi-agency collaboration to continue and develop is important. The drainage agencies currently strive to work together on policy and capital projects in relation to flooding issues where it can be demonstrated that integrated working is required. These relationships need to be supported by both central and local government to allow this good work to continue.

Pilot schemes, such as those highlighted within Section 5 of the report, are important tools in assessing the potential of innovative solutions to the management of flood risk. Through joined up planning and coordination, it may be possible to identify locations within the City where pilot schemes could be implemented. If successful, these initiatives could be rolled out in other areas.

The self-help proposal also needs to be promoted and this could be achieved using the community planning process already underway in parts of the City.

With the establishment of the new local government structure within Northern Ireland by April 2015, and the subsequent effect on the planning process, there is potential to increase awareness of the potential flood alleviation benefits of SuDS among those who will be responsible for assessing planning matters in the future. Increasing awareness and understanding of these techniques and how they can be used alongside traditional drainage methods should help to minimise the impact of flooding from new developments within the City.

Through establishing these processes, along with other initiatives set out within the report, it should be possible to improve the flood resilience of Belfast and protect the City for future generations.

APPENDIX A LIST OF FLOODING AREAS

PRIORITY FLOODING AREAS

North Belfast Areas prone to flooding

Address

Brompton Park
Deerpark Gardens
Glencairn Way
Westland Road
Sunningdale Park
Tennent Street

West Belfast areas prone to flooding

Address

Riverdale Park East
Riverdale Park South
Glencolin Heights
Brooke Drive
River Close
Woodbourne Crescent
Castlewood Manor

South Belfast areas prone to flooding

Address

Stockmans Lane
Greystown Avenue
Orchardville Crescent
Sicily Park
Priory Park
Locksley Park
Orpen Park
Finaghy Road South
Marguerite Park
Lille Park
Maryville Avenue
Ferndale Court
Marlborough Court
Northbrook Street (jcn Lower Windsor Ave)
Great Northern Street (jcn Brookland Street)
Florenceville Drive
Moonstone Street
Friendly Street
Ava Avenue

East Belfast areas prone to flooding

Address

Eastleigh Dale
Hawthornden Road
Castleview Road
Cloughan Crescent
Gilnahirk Road

East Belfast areas prone to flooding

Address

Clara Way
Clarawood Walk
Sandhill Parade
Sandhill Park
Orangefield Park
Orangefield Green
Orangefield Lane
Channing Street
Hillsborough Drive
Ardgowan Street
Cregagh Street
Tildarg Street
Sunwich Street
Richardson Court
Carrington Street
Castlereagh Road
Lopland Park
Lopland Gardens
Lopland Drive
Ladas Drive
Connsbrook Avenue
Park Avenue
Lisavon Drive
Larkfield Manor
Knocknagoney Avenue
Knocknagoney Drive
Quarry Road
Glen Ebor Park
Orangefield Avenue
Knockvale Grove
Castleview Road
Knock Eden Crescent

Areas at risk from Tidal Flooding

Address

York Street
Lower Sydenham
Lockview / Strandmillis

APPENDIX B FLOODING AREAS DATABASE

Roads Service Information

PRIORITY AREAS

| No | Area | Address | Roads Service | | | |
|----|------------------|-----------------------------|--|---|---|--|
| | | | Cause of Flooding | Works Completed / Programmed | Outcome | URS Comments / Queries |
| 1 | North | Brompton Park | | | | |
| 2 | North | Deerpark Gardens | | | | |
| 3 | North Additional | Deerpark Road | | | | |
| 4 | North | Glencairn Way | | | | |
| 5 | North | Westland Road | Runoff from adjacent golf course. Previous road flooding primarily due to leaves blocking gullies. | Club contacted and additional drainage provided to prevent this. Additional gullies recently installed. | No recent reports of flooding. | |
| 6 | North | Sunningdale Park | | | | |
| 7 | North | Tennent Street | | | | |
| 8 | North | York Street | | | | |
| 9 | West | Riverdale Park East | | | | |
| 10 | West | Riverdale Park South | | | | |
| 11 | West | Glencolin Heights | | | | |
| 12 | West | Brooke Drive | | | | |
| 13 | West | River Close | | | | |
| 14 | West | Woodbourne Crescent | | | | |
| 15 | West | Castlewood Manor | runoff flooding along road from disused factory site. The main cause of flooding at this location is the River's Agency grille on the access road to the Visteon Plant, debris flowed down the river and blocked this grille which then overflowed onto the adjacent roads. | Since the flooding in June 2012 River's Agency have upgraded the grille; HMM have desilted the pipes beneath the M1 motorway, Belfast South have replaced gullies and installed approx. 90m of replacement storm sewer pipeline | There may be some minor run-off from the access road to the Visteon plant, we are aiming to identify the owner so that we can write to them regarding runoff | Are any works proposed to deal with additional runoff? |
| 16 | West Additional | Tildarg Avenue | | | | |
| 17 | South | Stockmans Lane | | | | |
| 18 | South | Greystown Avenue | | | | |
| 19 | South | Orchardville Crescent | | | | |
| 20 | South | Sicity Park | | | | |
| 21 | South | Priory Park | | | | |
| 22 | South | Locksley Park | | | | |
| 23 | South | Orpen Park | local drainage discharges into undesignated water course | Additional gully provided and connection pipe increased in size. | | |
| 24 | South | Finaghy Road South | | | | |
| 25 | South | Marguerite Park | Road drainage connects to undesignated watercourse that is blocked. | CCTV survey completed | NI Water CCTV work identified a section of broken storm sewer pipe at the junction of Diamond Gardens and Marguerite Park. We replaced this broken pipe in July 2013. Not aware of any other roads related flooding issues. Aware that NI Water have an overflow from their foul sewer into our storm sewer in Marguerite Park. | |

PRIORITY AREAS

| No | Area | Address | Roads Service | | | |
|----|-----------------|--|---|------------------------------|---------|------------------------|
| | | | Cause of Flooding | Works Completed / Programmed | Outcome | URS Comments / Queries |
| 26 | South | Lille Park | runoff from road flooding in area is due to the undesignated watercourse that runs from Ormonde Park to Finaghy Road North, to the rear of the properties in Lille Park. All gullies in Lille Park have been cleared and jetted, we have also had the storm sewer desilted. | | | |
| 27 | South | Maryville Avenue | | | | |
| 28 | South | Ferndale Court | | | | |
| 29 | South | Marlborough Court | | | | |
| 30 | South | Northbrook Street (jcn Lower Windsor Ave) | | | | |
| 31 | South | Great Northern Street (jcn Brookland Street) | | | | |
| 32 | South | Florenceville Drive | | | | |
| 33 | South | Moonstone Street | | | | |
| 34 | South | Friendly Street | | | | |
| 35 | South | Ava Avenue | | | | |
| 36 | East | Eastleigh Dale | | | | |
| 37 | East | Hawthornden Road | | | | |
| 38 | East | Castleview Road | | | | |
| 39 | East | Cloughan Crescent | | | | |
| 40 | East | Gilnahirk Road | | investigate road drainage | | |
| 41 | East Additional | Gilnahirk Avenue | | | | |
| 42 | East | Clara Way | | | | |
| 43 | East | Clarawood Walk | | | | |
| 44 | East | Sandhill Parade | | | | |
| 45 | East | Sandhill Park | | | | |
| 46 | East | Orangefield Park | | | | |
| 47 | East | Orangefield Green | | | | |
| 48 | East | Orangefield Lane | | | | |
| 49 | East Additional | Orangefield Drive South | | | | |
| 50 | East | Channing Street | | | | |
| 51 | East | Hillsborough Drive | | | | |
| 52 | East | Ardgowan Street | | | | |
| 53 | East | Cregagh Street | | | | |
| 54 | East | Tildarg Street | | | | |
| 55 | East | Sunwich Street | | | | |
| 56 | East | Richardson Court | | | | |
| 57 | East Additional | Richardson Street | | | | |
| 58 | East | Carrington Street | | | | |
| 59 | East | Castlereagh Road | | | | |
| 60 | East | Lopland Park | | | | |
| 61 | East | Lopland Gardens | | | | |

PRIORITY AREAS

| No | Area | Address | Roads Service | | | |
|----|-----------------|---------------------------|--|------------------------------|---|------------------------|
| | | | Cause of Flooding | Works Completed / Programmed | Outcome | URS Comments / Queries |
| 62 | East | Loopland Drive | | | | |
| 63 | East | Ladas Drive | | | | |
| 64 | East | Connsbrook Avenue | | | | |
| 65 | East | Park Avenue | | | | |
| 66 | East | Lisavon Drive | | | | |
| 67 | East Additional | Lisavon Street | | | | |
| 68 | East | Larkfield Manor | | | | |
| 69 | East | Knocknagoney Avenue | Runoff from land adjacent to Old Hollywood Rd. Rivers Agency grill which overflows into Knocknagoney Grille, Drive and Avenue. | investigate road drainage. | Road drainage in area has been checked and is clear and running normally | |
| 70 | East | Knocknagoney Drive | Runoff from land adjacent to Old Hollywood Rd. | investigate road drainage. | Road drainage in area has been checked and is clear and running normally. In Knocknagoney Drive we have installed 2 new gullies and repaired 1No. We are also investigating ownership of land adjacent to Old Hollywood Road and will writing to owner to request action with regard to runoff. | |
| 71 | East | Quarry Road | | | | |
| 72 | East | Glen Ebor Park | | | | |
| 73 | East | Orangefield Avenue | | | | |
| 74 | East | Knockvale Grove | | | | |
| 75 | East | Knock Eden Crescent | | | | |
| 76 | East Additional | Knock Eden Parade | | | | |
| 77 | Tidal | York Street | | | | |
| 78 | Tidal | Lower Sydenham | | | | |
| 79 | Tidal | Lockview / Strandmillis | | | | |

Northern Ireland Water Information

PRIORITY AREAS

| NI Water | | | | | | | | | |
|----------|------------------|-----------------------------|-----------------------|-------------------|-------------------|------------------------------|---------|--|--|
| No | Area | Address | Flooding Category | Cause of Flooding | No. of Properties | Works Completed / Programmed | Outcome | URS Comments / Queries | NIW Response |
| 1 | North | Brompton Park | Flooding Other Causes | Severe Weather | 1 | | | Is flooding as a result of FOC, severe weather or both? Has FOC issue been resolved? | The flooding is as a result of severe weather. NI Water responds to assist in dealing with incidents of flooding due to severe weather. Properties that flooded as a result of severe weather are recorded on a section of the DG5 Register but this would not trigger follow up action unless there are other issues in the immediate area. |
| 2 | North | Deerpark Gardens | | | | | | | |
| 3 | North Additional | Deerpark Road | | Severe Weather | | | | | |
| 4 | North | Glencairn Way | | | | | | | |
| 5 | North | Westland Road | | | | | | | |
| 6 | North | Sunningdale Park | | | | | | | |
| 7 | North | Tennent Street | Flooding Other Causes | Sewer Collapse | 1 | | | Is flooding as a result of FOC, severe weather or both? Has FOC issue been resolved i.e. has collapsed sewer been repaired? | The FOC classification denotes internal flooding due to other causes such as sewer collapse. NI Water addresses these incidents as and when they occur. Where there are repeat issues NIW will carry out follow up investigations and may undertake remedial works for example replacement of a length of sewer. |
| 8 | North | York Street | DG5 | Overloaded Sewer | 2 | | | Are there proposals to increase sewer capacity, provide attenuation/storage or alternatives? | The project is at an early stage of development but a number of options to resolve the issue will be considered. This will include increasing sewer capacity, attenuation, on line/off line storage and storm separation. |
| 9 | West | Riverdale Park East | | | | | | | |
| 10 | West | Riverdale Park South | | | | | | | |
| 11 | West | Glencolin Heights | | | | | | | |
| 12 | West | Brooke Drive | | | | | | | |
| 13 | West | River Close | | | | | | | |
| 14 | West | Woodbourne Crescent | | | | | | | |
| 15 | West | Castlewood Manor | | | | | | | |
| 16 | West Additional | Tildarg Avenue | | Blockage | | | | Has blockage been cleared? If yes, has this resolved flooding? | Blockage will have been cleared and there has been no recurrence to indicate the flooding has not been resolved |
| 17 | South | Stockmans Lane | Flooding Other Causes | Severe Weather | 1 | | | Is flooding as a result of FOC, severe weather or both? Has FOC issue been resolved? | The flooding is as a result of severe weather. NI Water responds to assist in dealing with incidents of flooding due to severe weather. Properties that flooded as a result of severe weather are recorded on a section of the DG5 Register but this would not trigger follow up action unless there are other issues in the immediate area. |

PRIORITY AREAS

| NI Water | | | | | | | | | |
|----------|-------|-----------------------|-----------------------------|--|--------------------|------------------------------|---------|---|---|
| No | Area | Address | Flooding Category | Cause of Flooding | No. of Properties | Works Completed / Programmed | Outcome | URS Comments / Queries | NIW Response |
| 18 | South | Greystown Avenue | DG5 & Flooding Other Causes | Overloaded Sewer & Severe Weather | 4 (3 DG5 & 1 SW) | | | Is flooding as a result of FOC, severe weather or both? Has FOC issue been resolved? Are there proposals to increase sewer capacity, provide attenuation/storage or alternatives? | It is likely that there are multiple incidents at multiple addresses which will be categorised into DG5 and FOC. For DG5 properties NIW will identify capital investment projects to remove as many of these properties as possible from the DG5 Register. It is intended to address as many of these properties as possible during PC13 and PC15 periods. This will be subject to the economic viability of individual projects, availability of funding and approval by the Utility Regulator. DG5 go off for detailed design. Sometimes upgrade, sometimes on line/off line attenuation. Range for each. Works should resolve other flooding issues. Viability of projects and availability of funding. Doesn't think NIW have the power to purchase properties. |
| 19 | South | Orchardville Crescent | | Currently not on DG5 register. Feasibility study has been commenced due to Pumping Station issues. | | | | | |
| 20 | South | Sicity Park | DG5 & Flooding Other Causes | Overloaded Sewer & Severe Weather | 22 (4 DG5 & 18 SW) | | | Is flooding as a result of FOC, severe weather or both? Has FOC issue been resolved? Are there proposals to increase sewer capacity, provide attenuation/storage or alternatives? | It is likely that there are multiple incidents at multiple addresses which will be categorised into DG5 and FOC. For DG5 properties NIW will identify capital investment projects to remove as many of these properties as possible from the DG5 Register. It is intended to address as many of these properties as possible during PC13 and PC15 periods. This will be subject to the economic viability of individual projects, availability of funding and approval by the Utility Regulator |
| 21 | South | Priory Park | Flooding Other Causes | Severe Weather | 1 | | | Is flooding as a result of FOC, severe weather or both? Has FOC issue been resolved? | The flooding is as a result of severe weather. NI Water responds to assist in dealing with incidents of flooding due to severe weather. Properties that flooded as a result of severe weather are recorded on a section of the DG5 Register but this would not trigger follow up action unless there are other issues in the immediate area |
| 22 | South | Locksley Park | | | | | | | |
| 23 | South | Orpen Park | Flooding Other Causes | Severe Weather | 10 | | | Is flooding as a result of FOC, severe weather or both? Has FOC issue been resolved? | The flooding is as a result of severe weather. NI Water responds to assist in dealing with incidents of flooding due to severe weather. Properties that flooded as a result of severe weather are recorded on a section of the DG5 Register but this would not trigger follow up action unless there are other issues in the immediate area |

PRIORITY AREAS

| NI Water | | | | | | | | | |
|----------|-------|---|-----------------------------|-----------------------------------|--------------------|------------------------------|---------|---|---|
| No | Area | Address | Flooding Category | Cause of Flooding | No. of Properties | Works Completed / Programmed | Outcome | URS Comments / Queries | NIW Response |
| 24 | South | Finaghy Road South | Flooding Other Causes | Severe Weather | 3 | | | Is flooding as a result of FOC, severe weather or both? Has FOC issue been resolved? | The flooding is as a result of severe weather. NI Water responds to assist in dealing with incidents of flooding due to severe weather. Properties that flooded as a result of severe weather are recorded on a section of the DG5 Register but this would not trigger follow up action unless there are other issues in the immediate area |
| 25 | South | Marguerite Park | DG5 & Flooding Other Causes | Overloaded Sewer & Severe Weather | 31 (3 DG5 & 28 SW) | | | Is flooding as a result of FOC, severe weather or both? Has FOC issue been resolved? Are there proposals to increase sewer capacity, provide attenuation/storage or alternatives? | It is likely that there are multiple incidents at multiple addresses which will be categorised into DG5 and FOC. For DG5 properties NIW will identify capital investment projects to remove as many of these properties as possible from the DG5 Register. It is intended to address as many of these properties as possible during PC13 and PC15 periods. This will be subject to the economic viability of individual projects, availability of funding and approval by the Utility Regulator |
| 26 | South | Lille Park | Flooding Other Causes | Severe Weather | 1 | | | Is flooding as a result of FOC, severe weather or both? Has FOC issue been resolved? | The flooding is as a result of severe weather. NI Water responds to assist in dealing with incidents of flooding due to severe weather. Properties that flooded as a result of severe weather are recorded on a section of the DG5 Register but this would not trigger follow up action unless there are other issues in the immediate area |
| 27 | South | Maryville Avenue | DG5 | Overloaded Sewer | 1 | | | Are there proposals to increase sewer capacity, provide attenuation/storage or alternatives? | For DG5 properties NIW will identify capital investment projects to remove as many of these properties as possible from the DG5 Register. It is intended to address as many of these properties as possible during PC13 and PC15 periods. This will be subject to the economic viability of individual projects, availability of funding and approval by the Utility Regulator |
| 28 | South | Ferndale Court | Flooding Other Causes | Severe Weather | 4 | | | Is flooding as a result of FOC, severe weather or both? Has FOC issue been resolved? | The flooding is as a result of severe weather. NI Water responds to assist in dealing with incidents of flooding due to severe weather. Properties that flooded as a result of severe weather are recorded on a section of the DG5 Register but this would not trigger follow up action unless there are other issues in the immediate area |
| 29 | South | Marlborough Court | | | | | | | |
| 30 | South | Northbrook Street (jcn Lower Windsor Ave) | | | | | | | |

PRIORITY AREAS

| NI Water | | | | | | | | | |
|----------|-----------------|--|-----------------------------|-----------------------------------|-------------------|------------------------------|---------|---|---|
| No | Area | Address | Flooding Category | Cause of Flooding | No. of Properties | Works Completed / Programmed | Outcome | URS Comments / Queries | NIW Response |
| 31 | South | Great Northern Street (jcn Brookland Str | DG5 & Flooding Other Causes | Overloaded Sewer & Severe Weather | 3 (2 DG5 & 1 SW) | | | Is flooding as a result of FOC, severe weather or both? Has FOC issue been resolved? Are there proposals to increase sewer capacity, provide attenuation/storage or alternatives? | It is likely that there are multiple incidents at multiple addresses which will be categorised into DG5 and FOC. For DG5 properties NIW will identify capital investment projects to remove as many of these properties as possible from the DG5 Register. It is intended to address as many of these properties as possible during PC13 and PC15 periods. This will be subject to the economic viability of individual projects, availability of funding and approval by the Utility Regulator |
| 32 | South | Florenceville Drive | | | | | | | |
| 33 | South | Moonstone Street | Flooding Other Causes | Severe Weather | 1 | | | Is flooding as a result of FOC, severe weather or both? Has FOC issue been resolved? | The flooding is as a result of severe weather. NI Water responds to assist in dealing with incidents of flooding due to severe weather. Properties that flooded as a result of severe weather are recorded on a section of the DG5 Register but this would not trigger follow up action unless there are other issues in the immediate area |
| 34 | South | Friendly Street | | | | | | | |
| 35 | South | Ava Avenue | | | | | | | |
| 36 | East | Eastleigh Dale | DG5 & Flooding Other Causes | Overloaded Sewer & Severe Weather | 3 (2 DG5 & 1 SW) | | | Is flooding as a result of FOC, severe weather or both? Has FOC issue been resolved? Are there proposals to increase sewer capacity, provide attenuation/storage or alternatives? | It is likely that there are multiple incidents at multiple addresses which will be categorised into DG5 and FOC. For DG5 properties NIW will identify capital investment projects to remove as many of these properties as possible from the DG5 Register. It is intended to address as many of these properties as possible during PC13 and PC15 periods. This will be subject to the economic viability of individual projects, availability of funding and approval by the Utility Regulator |
| 37 | East | Hawthornden Road | DG5 | Overloaded Sewer | 2 | | | Are there proposals to increase sewer capacity, provide attenuation/storage or alternatives? | For DG5 properties NIW will identify capital investment projects to remove as many of these properties as possible from the DG5 Register. It is intended to address as many of these properties as possible during PC13 and PC15 periods. This will be subject to the economic viability of individual projects, availability of funding and approval by the Utility Regulator |
| 38 | East | Castleview Road | Flooding Other Causes | Severe Weather | 1 | | | Is flooding as a result of FOC, severe weather or both? Has FOC issue been resolved? | The flooding is as a result of severe weather. NI Water responds to assist in dealing with incidents of flooding due to severe weather. Properties that flooded as a result of severe weather are recorded on a section of the DG5 Register but this would not trigger follow up action unless there are other issues in the immediate area |
| 39 | East | Cloughan Crescent | | | | | | | |
| 40 | East | Gilnahirk Road | | | | | | | |
| 41 | East Additional | Gilnahirk Avenue | | Severe Weather | | | | | |

PRIORITY AREAS

| NI Water | | | | | | | | | |
|----------|-----------------|-------------------------|-----------------------|---|-------------------|------------------------------|---------|--|---|
| No | Area | Address | Flooding Category | Cause of Flooding | No. of Properties | Works Completed / Programmed | Outcome | URS Comments / Queries | NIW Response |
| 42 | East | Clara Way | Flooding Other Causes | Severe Weather | 1 | | | Is flooding as a result of FOC, severe weather or both? Has FOC issue been resolved? | The flooding is as a result of severe weather. NI Water responds to assist in dealing with incidents of flooding due to severe weather. Properties that flooded as a result of severe weather are recorded on a section of the DG5 Register but this would not trigger follow up action unless there are other issues in the immediate area |
| 43 | East | Clarawood Walk | Flooding Other Causes | Severe Weather | 1 | | | Is flooding as a result of FOC, severe weather or both? Has FOC issue been resolved? | The flooding is as a result of severe weather. NI Water responds to assist in dealing with incidents of flooding due to severe weather. Properties that flooded as a result of severe weather are recorded on a section of the DG5 Register but this would not trigger follow up action unless there are other issues in the immediate area |
| 44 | East | Sandhill Parade | | | | | | | |
| 45 | East | Sandhill Park | | | | | | | |
| 46 | East | Orangefield Park | | | | | | | |
| 47 | East | Orangefield Green | | | | | | | |
| 48 | East | Orangefield Lane | | | | | | | |
| 49 | East Additional | Orangefield Drive South | | Overloaded Sewer | | | | Are there proposals to increase sewer capacity, provide attenuation/storage or alternatives? | For DG5 properties NIW will identify capital investment projects to remove as many of these properties as possible from the DG5 Register. It is intended to address as many of these properties as possible during PC13 and PC15 periods. This will be subject to the economic viability of individual projects, availability of funding and approval by the Utility Regulator |
| 50 | East | Channing Street | | | | | | | |
| 51 | East | Hillsborough Drive | | Flooding Other Causes Futher investigations are ongoing to review flooding status - likely to move to DG5 | | | | What is the nature of the investigations taking place? | Since the initial response, NIW has completed 2 dimensional modelling of overland flows and have now determined that the properties should be moved to the DG5 register. For DG5 properties NIW will identify capital investment projects to remove as many of these properties as possible from the DG5 Register. It is intended to address as many of these properties as possible during PC13 and PC15 periods. This will be subject to the economic viability of individual projects, availability of funding and approval by the Utility Regulator |

PRIORITY AREAS

| NI Water | | | | | | | | | |
|----------|-----------------|-------------------|-----------------------|--|-------------------|------------------------------|---------|---|---|
| No | Area | Address | Flooding Category | Cause of Flooding | No. of Properties | Works Completed / Programmed | Outcome | URS Comments / Queries | NIW Response |
| 52 | East | Ardgowan Street | | Flooding Other Causes Further investigations are ongoing to review flooding status - likely to move to DG5 | | | | What is the nature of the investigations taking place? | Since the initial response, NIW has completed 2 dimensional modelling of overland flows and have now determined that the properties should be moved to the DG5 register. For DG5 properties NIW will identify capital investment projects to remove as many of these properties as possible from the DG5 Register. It is intended to address as many of these properties as possible during PC13 and PC15 periods. This will be subject to the economic viability of individual projects, availability of funding and approval by the Utility Regulator |
| 53 | East | Cregagh Street | | | | | | | |
| 54 | East | Tildarg Street | | Flooding Other Causes Further investigations are ongoing to review flooding status - likely to move to DG5 | | | | What is the nature of the investigations taking place? | Since the initial response NIW has commenced 2 dimensional modelling of overland flows. NIW are considering whether these properties should be moved to the DG5 Register. In same area as Hillborough Drive and Ardgowan Street. Result is likely to be the same. |
| 55 | East | Sunwich Street | Flooding Other Causes | Severe Weather | 11 | | | Is flooding as a result of FOC, severe weather or both? Has FOC issue been resolved? | The flooding is as a result of severe weather. NI Water responds to assist in dealing with incidents of flooding due to severe weather. Properties that flooded as a result of severe weather are recorded on a section of the DG5 Register but this would not trigger follow up action unless there are other issues in the immediate area |
| 56 | East | Richardson Court | | | | | | | |
| 57 | East Additional | Richardson Street | | Severe Weather | | | | | |
| 58 | East | Carrington Street | | Flooding Other Causes. Further investigations are ongoing to review flooding status | | | | What is the nature of the investigations taking place? | Investigations into the flooding in Carrington Street are now complete. The subsequent recent repair work to the network and re-run model now indicates the out of sewer flooding problem at Carrington Street has been resolved. Debris in downstream siphon. Repair work done, re-run model and no out of sewer flooding shown. Some road flooding may remain but NIW issue has been resolved. |
| 59 | East | Castlereagh Road | Flooding Other Causes | Severe Weather | 2 | | | Is flooding as a result of FOC, severe weather or both? Has FOC issue been resolved? | The flooding is as a result of severe weather. NI Water responds to assist in dealing with incidents of flooding due to severe weather. Properties that flooded as a result of severe weather are recorded on a section of the DG5 Register but this would not trigger follow up action unless there are other issues in the immediate area |
| 60 | East | Lopland Park | | | | | | | |
| 61 | East | Lopland Gardens | | | | | | | |
| 62 | East | Lopland Drive | | | | | | | |
| 63 | East | Ladas Drive | | | | | | | |

PRIORITY AREAS

| NI Water | | | | | | | | | |
|----------|-----------------|---------------------------|-----------------------|-------------------|-------------------|------------------------------|---------|---|---|
| No | Area | Address | Flooding Category | Cause of Flooding | No. of Properties | Works Completed / Programmed | Outcome | URS Comments / Queries | NIW Response |
| 64 | East | Connsbrook Avenue | Flooding Other Causes | Severe Weather | 2 | | | Is flooding as a result of FOC, severe weather or both? Has FOC issue been resolved? | The flooding is as a result of severe weather. NI Water responds to assist in dealing with incidents of flooding due to severe weather. Properties that flooded as a result of severe weather are recorded on a section of the DG5 Register but this would not trigger follow up action unless there are other issues in the immediate area |
| 65 | East | Park Avenue | Flooding Other Causes | Equipment Failure | 19 | | | Has equipment failure been resolved and has this in turn resolved flooding issues? | Equipment failure will have been resolved and there has been no recurrence to indicate the flooding has not been resolved. |
| 66 | East | Lisavon Drive | Flooding Other Causes | Severe Weather | 2 | | | Is flooding as a result of FOC, severe weather or both? Has FOC issue been resolved? | The flooding is as a result of severe weather. NI Water responds to assist in dealing with incidents of flooding due to severe weather. Properties that flooded as a result of severe weather are recorded on a section of the DG5 Register but this would not trigger follow up action unless there are other issues in the immediate area |
| 67 | East Additional | Lisavon Street | | Severe Weather | | | | | |
| 68 | East | Larkfield Manor | Flooding Other Causes | Severe Weather | 2 | | | Is flooding as a result of FOC, severe weather or both? Has FOC issue been resolved? | The flooding is as a result of severe weather. NI Water responds to assist in dealing with incidents of flooding due to severe weather. Properties that flooded as a result of severe weather are recorded on a section of the DG5 Register but this would not trigger follow up action unless there are other issues in the immediate area |
| 69 | East | Knocknagoney Avenue | | | | | | | |
| 70 | East | Knocknagoney Drive | | | | | | | |
| 71 | East | Quarry Road | | | | | | | |
| 72 | East | Glen Ebor Park | | | | | | | |
| 73 | East | Orangefield Avenue | | | | | | | |
| 74 | East | Knockvale Grove | | | | | | | |
| 75 | East | Knock Eden Crescent | Flooding Other Causes | Sewer Blockage | 1 | | | Has blockage been removed and has this resolved flooding? | Blockage will have been cleared and there has been no recurrence to indicate the flooding has not been resolved. |
| 76 | East Additional | Knock Eden Parade | | | | | | | |
| 77 | Tidal | York Street | | | | | | | |
| 78 | Tidal | Lower Sydenham | | | | | | | |
| 79 | Tidal | Lockview / Strandmillis | | | | | | | |

Rivers Agency Information

PRIORITY AREAS

| No | Area | Address | Rivers Agency | | | | Other |
|----|------------------|-----------------------|-------------------|---|-------------------------------|--|---|
| | | | Cause of Flooding | Works Completed / Programmed | Outcome | URS Comments / Queries | |
| 1 | North | Brompton Park | | | | | |
| 2 | North | Deerpark Gardens | | | | | |
| 3 | North Additional | Deerpark Road | | | | | |
| 4 | North | Glencairn Way | | | | | overland flow |
| 5 | North | Westland Road | | | | | overland flow |
| 6 | North | Sunningdale Park | | | No recent problems at grille. | | |
| 7 | North | Tennent Street | | | | | |
| 8 | North | York Street | | | | | |
| 9 | West | Riverdale Park East | | Further investigation required | | What are type and scale of investigations that are to take place and when are these likely to be carried out? Pre-feasibility report being developed. | |
| 10 | West | Riverdale Park South | | | | | |
| 11 | West | Glencolin Heights | | | | | |
| 12 | West | Brooke Drive | | | | | |
| 13 | West | River Close | | Watercourse designated in Nov 12 & maintained in early summer 2013 | | Has this helped to alleviate flooding? Scheme has been designed in order to alleviate flooding. Have not been tested to same extent as previous flood events to date. | |
| 14 | West | Woodbourne Crescent | | | | | |
| 15 | West | Castlewood Manor | | Watercourse investigated & maintained, grille upgraded & designation extended | | Has this helped to alleviate flooding? Scheme has been designed in order to alleviate flooding. Have not been tested to same extent as previous flood events to date. | |
| 16 | West Additional | Tildarg Avenue | | | | | |
| 17 | South | Stockmans Lane | | Investigation ongoing | | What are type and scale of investigations that are to take place and when are these likely to be carried out? Design work costs were too high so other options are being investigated. There are some landowner issues that need to be resolved. | |
| 18 | South | Greystown Avenue | | Capacity of designated culvert being investigated as part of NIW study. | | What are type and scale of investigations that are to take place and when are these likely to be carried out? Part of the wider Sicily Park study | |
| 19 | South | Orchardville Crescent | | Watercourse maintained, grille upgraded & designation extended | | Has this helped to alleviate flooding? RA have placed a notice on the grille asking residents to advise them if the grille is blocked. Using twitter for residents to tweet pictures of the grille before and after clearing works have been carried out. | Runoff from the Belfast City Council playing field a contributory factor. BCC have confirmed willingness to cooperate with the management of flood risk. (Parks Department) |

PRIORITY AREAS

| No | Area | Address | Rivers Agency | | | | Other |
|----|-----------------|--|--|---|---------|---|---|
| | | | Cause of Flooding | Works Completed / Programmed | Outcome | URS Comments / Queries | |
| 20 | South | Sicily Park | | NIW providing CCTV footage to enable consideration of designation of private urban drains | | | |
| 21 | South | Priory Park | | NIW providing CCTV footage to enable consideration of designation of private urban drains | | | |
| 22 | South | Locksley Park | | NIW providing CCTV footage to enable consideration of designation of private urban drains | | | |
| 23 | South | Orpen Park | | | | | |
| 24 | South | Finaghy Road South | Could be Rathmore Gardens. School have piped in a section of open watercourse upstream | System desilted this summer, manholes in the park have been raised to ground level and lids replaced with gully grates. | | Has this helped to alleviate flooding? Scheme has been designed in order to alleviate flooding. Have not been tested to same extent as previous flood events to date. | |
| 25 | South | Marguerite Park | | | | | |
| 26 | South | Lille Park | | | | | private urban drain garden flooding |
| 27 | South | Maryville Avenue | | | | | |
| 28 | South | Ferndale Court | | | | | |
| 29 | South | Marlborough Court | | | | | |
| 30 | South | Northbrook Street (jcn Lower Windsor Ave) | | | | | |
| 31 | South | Great Northern Street (jcn Brookland Street) | | | | | |
| 32 | South | Florenceville Drive | | | | | |
| 33 | South | Moonstone Street | | | | | |
| 34 | South | Friendly Street | | | | | |
| 35 | South | Ava Avenue | | | | | |
| 36 | East | Eastleigh Dale | | | | | |
| 37 | East | Hawthornden Road | | | | | |
| 38 | East | Castleview Road | | | | | Overland flows from hotel. Previous flood report refers to works in the hotel |
| 39 | East | Cloughan Crescent | | RA have desilted the culvert and w/c this summer 2013 | | Has this helped to alleviate flooding? Scheme has been designed in order to alleviate flooding. Have not been tested to same extent as previous flood events to date. | |
| 40 | East | Gilnahirk Road | | secured manhole on culvert | | Has this helped to alleviate flooding? Scheme has been designed in order to alleviate flooding. Have not been tested to same extent as previous flood events to date. | |
| 41 | East Additional | Gilnahirk Avenue | | | | | |
| 42 | East | Clara Way | | Flood alleviation works being progressed as part of the East Belfast Flood Alleviation scheme | | Designers: URS Current status: Tender stage | |
| 43 | East | Clarawood Walk | | Flood alleviation works being progressed as part of the East Belfast Flood Alleviation scheme | | Designers: URS Current status: Tender stage | |

PRIORITY AREAS

| No | Area | Address | Rivers Agency | | | | Other |
|----|-----------------|-------------------------|-------------------|--|---------|---|-------|
| | | | Cause of Flooding | Works Completed / Programmed | Outcome | URS Comments / Queries | |
| 44 | East | Sandhill Parade | | River flood alleviation works being progressed as part of the East Belfast Flood Alleviation scheme | | Designers: URS Current status: Tender stage | |
| 45 | East | Sandhill Park | | River flood alleviation works being progressed as part of the East Belfast Flood Alleviation scheme | | Designers: URS Current status: Tender stage | |
| 46 | East | Orangefield Park | | River flood alleviation works being progressed as part of the East Belfast Flood Alleviation scheme integrated with the Greenway project | | Designers: URS Current status: Tender stage Designer: Macadam Current status: Construction stage | |
| 47 | East | Orangefield Green | | River flood alleviation works being progressed as part of the East Belfast Flood Alleviation scheme integrated with the Greenway project | | Designers: URS Current status: Tender stage Designer: Macadam Current status: Construction stage | |
| 48 | East | Orangefield Lane | | River flood alleviation works being progressed as part of the East Belfast Flood Alleviation scheme integrated with the Greenway project | | Designers: URS Current status: Tender stage Designer: Macadam Current status: Construction stage | |
| 49 | East Additional | Orangefield Drive South | | | | | |
| 50 | East | Channing Street | | | | | |
| 51 | East | Hillsborough Drive | | | | | |
| 52 | East | Ardgowan Street | | | | | |
| 53 | East | Cregagh Street | | | | | |
| 54 | East | Tildarg Street | | | | | |
| 55 | East | Sunwich Street | | | | | |
| 56 | East | Richardson Court | | | | | |
| 57 | East Additional | Richardson Street | | | | | |
| 58 | East | Carrington Street | | | | | |
| 59 | East | Castlereagh Road | | River Flood alleviation works being progressed as part of the East Belfast Flood Alleviation scheme. | | Designers: URS Current status: Tender stage | |
| 60 | East | Loopland Park | | River Flood alleviation works being progressed as part of the East Belfast Flood Alleviation scheme. | | Designers: URS Current status: Tender stage | |
| 61 | East | Loppland Gardens | | River Flood alleviation works being progressed as part of the East Belfast Flood Alleviation scheme. | | Designers: URS Current status: Tender stage | |
| 62 | East | Loopland Drive | | River Flood alleviation works being progressed as part of the East Belfast Flood Alleviation scheme. | | Designers: URS Current status: Tender stage | |
| 63 | East | Ladas Drive | | River Flood alleviation works being progressed as part of the East Belfast Flood Alleviation scheme. | | Designers: URS Current status: Tender stage | |
| 64 | East | Connbrook Avenue | | | | | |
| 65 | East | Park Avenue | | | | | |
| 66 | East | Lisavon Drive | | | | | |
| 67 | East Additional | Lisavon Street | | | | | |
| 68 | East | Larkfield Manor | | | | | |

PRIORITY AREAS

| No | Area | Address | Rivers Agency | | | | Other |
|----|-----------------|---------------------------|--|---|---------|--|-------|
| | | | Cause of Flooding | Works Completed / Programmed | Outcome | URS Comments / Queries | |
| 69 | East | Knocknagoney Avenue | | roughing grille installed, MH to be improved in 2013/14, CCTV culvert system. | | Has this helped to alleviate flooding? Scheme has been designed in order to alleviate flooding. Have not been tested to same extent as previous flood events to date. | |
| 70 | East | Knocknagoney Drive | | roughing grille installed, MH to be improved in 2013/14, CCTV culvert system. | | Has this helped to alleviate flooding? Scheme has been designed in order to alleviate flooding. Have not been tested to same extent as previous flood events to date. | |
| 71 | East | Quarry Road | flood report Oct 12 - flooding related to blocked grille at adjacent Glen Ebor | | | | |
| 72 | East | Glen Ebor Park | | investigating blocked grille and w/c immediately upstream | | | |
| 73 | East | Orangefield Avenue | | | | | |
| 74 | East | Knockvale Grove | | Design being progressed & costed as part of the East Belfast River Flood Alleviation Scheme | | Designers: URS Current status: Tender stage | |
| 75 | East | Knock Eden Crescent | Two grilles at Knock Dual Carriageway blocked and led to surface water flows which may have contributed to this flooding | RA upgrading grilles | | Has this work been completed or when is it programmed to be carried out? Both grilles have been designed. Once is currently been constructed with the other to be constructed in this financial year. | |
| 76 | East Additional | Knock Eden Parade | | | | | |
| 77 | Tidal | York Street | | On behalf of Rivers Agency, Roads Service's consultant has been asked to consider the feasibility of incorporating sea defences within the York Street road scheme | | | |
| 78 | Tidal | Lower Sydenham | | Flood alleviation works being progressed as part of the East Belfast Flood Alleviation scheme integrated with the Greenway project. Back drainage will remain an issue. | | Designer: Macadam Current status: Construction stage | |
| 79 | Tidal | Lockview / Strandmillis | | Storm Tide Forecasts shared with Belfast City Council & other responders | | | |