

Cardiff Flood Risk Management Plan

December 2015



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Executive Summary

Flood Risk Management Plans (FRMPs) highlight the hazards and risks of flooding from rivers, the sea, surface water, groundwater and reservoirs, and set out how Risk Management Authorities (RMAs) work together with communities to manage flood risk.

As a Lead Local Flood Authority (LLFA) with a Flood Risk Area a statutory responsibility was placed on the City of Cardiff Council to prepare a FRMP. This FRMP has been developed with this in mind and sets out how Cardiff Council will over the next 6 years manage flooding so that the communities most at risk and the environment benefit the most.

Purpose of Flood Risk Management Plans in managing flood risk

Flooding remains a key threat to communities across Wales, and managing this risk through careful planning is important to minimise the risk to communities. This FRMP takes forward the objectives and actions set out in our [Local Flood Risk Management Strategy \(LFRMS\)](#).

This FRMP will also aim to achieve some of the objectives set out in the Welsh Government's National Flood and Coastal Erosion Risk Management Strategy¹ which provides the national framework for flood and coastal erosion risk management in Wales through four overarching objectives:

- **Reducing the consequences** for individuals, communities, businesses and the environment from flooding and coastal erosion.
- **Raising awareness** of and engaging people in the response to flood and coastal erosion risk.
- Providing an **effective and sustained response** to flood and coastal erosion events.
- **Prioritising investment** in the most at risk communities.

Study Area

The area which this plan covers is the administrative extents of the City of Cardiff Council, more commonly referred to as Cardiff Council. Cardiff Council as the LLFA has statutory responsibility for managing the flood risk from surface runoff, groundwater and ordinary watercourses, otherwise known as local flood risk sources.

Just over 12,000 people are considered to be at risk of flooding within the low risk (more extreme) flood extents.

¹ <http://wales.gov.uk/topics/environmentcountryside/epq/flooding/nationalstrategy/strategy/?lang=en>

How we currently manage flood risk in Cardiff

In the last five years Cardiff Council has received over 3,000 reports of flooding across the authority area. All services across Cardiff contribute to managing flood risk across the county, examples include;

- Cardiff Council's Emergency Management Unit have a number of emergency plans that can be put in place if a significant flood event was to occur in Cardiff. Emergency event scenarios are run with all parts of the Council and other emergency services to test the Council's resilience for such events. Emergency Management officers also provide advice to local businesses and communities in how do deal with and reduce their own consequence should a flood event occur.
- The council highways service area work hard to maintain and repair the council owned drains, culverts and gullies, through a programme of inspections and cleaning to remove blockage and debris from watercourses as well as to maintain grids and trash screens.
- We are continually reviewing the need for capital investment to reduce flood risk across the area. Investment monies are secured from various sources including grant funding from the Welsh Government, European Regional Development Fund (ERDF) as well as Council funds.
- Coastline erosion surveys have been carried out so we better understand the risks that face our communities that live near the coast

Cardiff Flood Risk Management Plan Objectives

In November 2011 the WG published "The National Strategy for Flood and Coastal Erosion Risk Management in Wales". This document identifies four Overarching Objectives that must be addressed within Local Strategies.

The four overarching objectives are:

- Reducing the consequences for individuals, communities, businesses and the environment from flooding and coastal erosion,
- Raising awareness of and engaging people in the response to flood and coastal erosion risk,
- Providing an effective and sustained response to flood and coastal erosion events, and
- Prioritising investment in the most at risk communities.

How we will manage flood risk at a local level

Across Cardiff we have totalled proposed measures against the four themes, as shown below. This captures all measures for managing and reducing flood risk from local flood risk sources.



A level of effort will be required in raising awareness of flood risk, so that all residents can help the LLFA **prepare** for flooding events and manage levels of flood risk to acceptable levels. These typically will involve further activities to;

- Raise flood awareness within the community, and
- Work with partners to improve resilience within the community.

We need to improve our understanding of how our drainage systems **protect** our area, especially historic systems of drainage pipes and culverts where records are not available.

- Improve the level of understanding of the capacity of culverts across the area to convey floodwaters
- review our inspection regime of culvert inlets and debris screens to ensure priority is being provided to those that have the greatest risk

Measures to enable communities to **recover** following a flood event, and be more resilient in the future are also a priority. These typically will involve:

- Recovery plans; community and infrastructure, and
- National level; lessons learnt from flood events, change to insurance policy etc.

Monitoring and review

The National Strategy will be formally reviewed on a six-yearly cycle, mirroring the requirements of the Flood Risk Regulations 2009.

Cardiff Council has therefore decided to adopt the following approach;

- Annual Review; planned Actions to ensure they continue to reflect and realise the stated Objectives.
- Full Review; will take place every 6 years the first being in January 2021.
- Ad-hoc / post-event review; following serious flood event.

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Appendix B. Risk Management Authorities

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1 Introduction

1.1 What are Flood Risk Management Plans?

Flood Risk Management Plans (FRMPs) highlight the hazards and risks of flooding from rivers, the sea, surface water, groundwater and reservoirs, and set out how Risk Management Authorities (RMAs) work together with communities to manage flood risk.

1.2 Who is responsible for preparing FRMPs

For Wales, Natural Resources Wales (NRW) must produce FRMPs for each River Basin District. These FRMPs must cover flooding from main rivers, the sea and reservoirs.

Lead Local Flood Authorities (LLFAs) must produce FRMPs for all [Flood Risk Areas](#) covering flooding from local sources, namely;

- surface water,
- ordinary watercourses, and
- groundwater.

As an LLFA with a Flood Risk Area a statutory responsibility was placed on the City of Cardiff Council to prepare a FRMP. Across Wales 8 LLFAs are required to produce FRMPs but all 22 LLFAs in Wales have opted to produce a plan for this first round of reporting.

For future cycles of FRMPs beyond 2015, it is NRW intention to work in partnership with all Risk Management Authorities (RMAs) to produce joint FRMPs for all sources of flood risk.

RMAs are:

- Natural Resources Wales,
- Lead Local Flood Authorities (in Wales this is the 22 unitary authorities),
- internal drainage boards (IDB), since April 2015, responsibility for IDB duties has transferred to NRW,
- water companies, and
- highway authorities (which includes responsibilities of the local authorities).

1.3 Cardiff Council's approach

Using available information we have sought to collate and update our understanding of the current and potential future level of flood risk from local flood sources which we are responsible for.

For this plan we have reviewed the impact and where practicable identified activities (measures) which we will look to carry out to manage flood risk to an acceptable level within the authority's area.

2 Purpose of Flood Risk Management Plans in managing flood risk

2.1 What is a Flood Risk Management Plan

Flooding remains a key threat to communities across Wales, and managing this risk through careful planning is important to minimise the risk to communities. Flood risk management planning allows RMAs to develop a better understanding of risk from all sources of flooding and agree priorities to manage that risk.

This FRMP has been developed with this in mind and sets out how Cardiff Council will over the next 6 years manage flooding so that the communities most at risk and the environment benefit the most. In doing so, this FRMP takes forward the objectives and actions set out in our [Local Flood Risk Management Strategy \(LFRMS\)](#).

This FRMP will also aim to achieve some of the objectives set out in the Welsh Government's National Flood and Coastal Erosion Risk Management Strategy² which provides the national framework for flood and coastal erosion risk management in Wales through four overarching objectives:

- **Reducing the consequences** for individuals, communities, businesses and the environment from flooding and coastal erosion.
- **Raising awareness** of and engaging people in the response to flood and coastal erosion risk.
- Providing an **effective and sustained response** to flood and coastal erosion events.
- **Prioritising investment** in the most at risk communities.

2.2 What is included in this FRMP

The information included in this FRMP include the components set out in the EU Flood Directive and the Flood Risk Regulations 2009 (see Appendix A). Most of this information has been gathered and updated through this first cycle, and has been drawn from the findings of our PFRA³ and the measures we identified and set out in our LFRMS.

This FRMP sets out appropriate objectives for the management of flood risk within the areas covered by the plan.

The objectives focus on reducing the adverse consequences of flooding;

- for human health,
- the environment,
- cultural heritage, and
- economic activity.

To do so, this FRMP;

- highlights the areas most at risk of flooding from surface water, ordinary watercourse and ground water in Cardiff Council's area,
- draws the conclusions from these risks, and

² <http://wales.gov.uk/topics/environmentcountryside/epq/flooding/nationalstrategy/strategy/?lang=en>

³ Preliminary Flood Risk Assessment – Initial assessment prepared as required by the Flood Risk Regulations

- sets out the measures we will take over the next 6 years to mitigate these risks and make our communities more resilient.

Due to the nature of flooding and current funding situation, we have also looked at measures to reduce the likelihood of flooding using non-structural measures and covering all aspects of flood risk management, including raising awareness of flooding and better understanding of local flooding issues. All the measures identified in this plan have been classed in 4 categories:

- Prevention
- Protection
- Preparedness
- Recovery and Review

See Table 7-5 for further details.

2.3 Legislative Context

2.3.1 Flood Risk Regulations

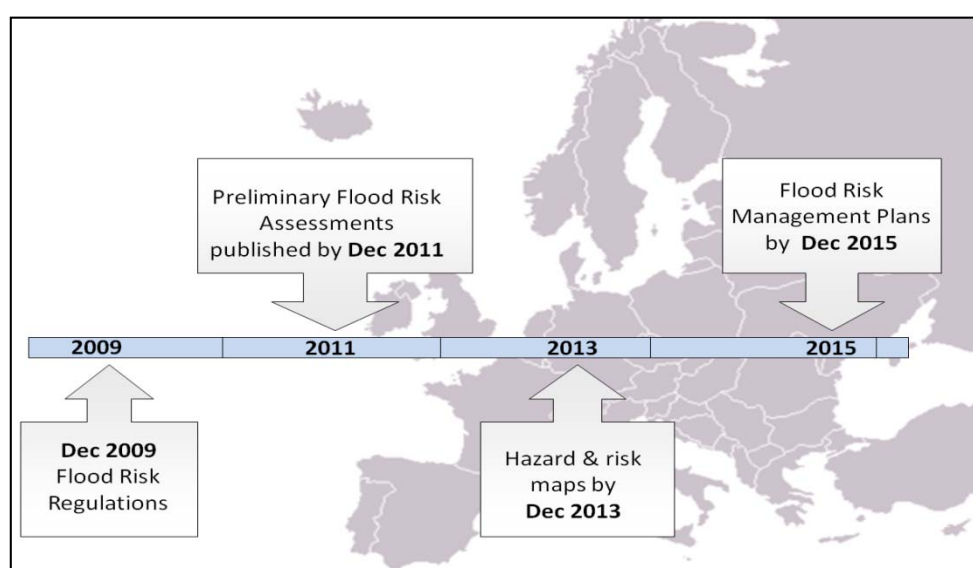
Under the Flood Risk Regulations 2009, LLFAs are responsible for producing FRMPs for Indicative Flood Risk Areas that were identified in the Preliminary Flood Risk Assessments (PFRAs)⁴.

NRW is responsible for producing FRMPs for communities at risk of flooding from main rivers and the sea.

LLFAs are only required to produce local FRMPs to manage flooding from surface water, ordinary watercourses and groundwater.

The Regulations set out a six year cycle with timescales for reporting to the European Commission and the publication of 3 key outputs as set out below.

Figure 2–1 Flood Risk regulations (2009) Timescale



⁴ In Wales Indicative Flood Risk Areas have been identified where more than 5,000 people are at risk of flooding

Preliminary Flood Risk Assessment

The PFRA was a high level screening exercise that compiled information on significant local flood risk from past and future floods, based on readily available information. The scope of the PFRA was to consider flooding from surface runoff, groundwater and ordinary watercourses, and any interaction these sources have with main rivers with the aim of identifying flood risk areas as set out under the European Flood Directives (see section 3.3).

Production of flood hazard and flood risk maps for Flood Risk Areas

In 2013 the Environment Agency, working with NRW and LLFAs, produced the updated Flood Map for Surface Water.

The updated map represents a significant improvement on the previous surface water flood maps (2008 and 2010), both in terms of method and representation of the risk of flooding. The updated Flood Map for Surface Water (uFMfSW) assesses flooding scenarios as a result of rainfall with the following chance of occurring in any given year:

- 1 in 30 year (3% AEP),
- 1 in 100 year (1% AEP), and
- 1 in 1000 year (0.1% AEP).

The updated map also provides the following data for each flooding scenario:

- Extent,
- Depth,
- Velocity (including flow direction at maximum velocity), and
- Hazard (as a function of depth and velocity).

It also includes information about the source of the data (i.e. whether it was from the nationally produced modelling or locally produced modelling) and the confidence in the data outputs. Further detail assessing the output from the hazard maps is provided in section 3.4.

Flood Risk Management Plans for Flood Risk Areas.

We are currently in the first cycle of the Flood Risk Regulations and FRMPs represent the final output of this cycle and must be published by December 2015.

2.3.2 Flood and Water Management Act

The Flood and Water Management Act was introduced in April 2010 in England and Wales. It was intended to implement Sir Michael Pitt's recommendations following the widespread flooding of 2007⁵. The act was also intended to clarify roles and responsibilities between RMAs.

Under the Act, the Welsh Government was required to produce a [National Strategy for Flood and Coastal Erosion Risk Management](#), and Cardiff Council as the LLFA was required to produce a LFRMS. The strategy was adopted by the council September 2014. The LFRMS must be consistent with the National Strategy for Flood and Coastal Erosion Management.

⁵ The Pitt Review - Learning Lessons from the 2007 floods, Cabinet Office, June 2008, http://webarchive.nationalarchives.gov.uk/20100807034701/http://archive.cabinetoffice.gov.uk/pittreview/thepittreview/final_report.html

LFRMS were created to define who the Risk Management Authorities are within a local area, what their function are and what their responsibilities are. LFRMS underwent public consultation.

2.3.3 Water Framework Directive

The Water Framework Directive (WFD) 2000 is a European Union directive which commits member states to achieve good qualitative and quantitative status of all water bodies by 2015.

One of the requirements of the WFD is that NRW (and the Environment Agency in England) must produce and update a River Basin Management Plan for each district. Cardiff lies within the catchment for the River Severn and is included in the South East Valleys Catchment Management Plan.

Objectives of the Directive

The Directive aims for 'good status' for all rivers, lakes, ground and surface waters in the EU.

The ecological and chemical status of water bodies is assessed according to the following criteria:

- Biological quality (fish, benthic invertebrates, aquatic flora),
- Hydromorphological quality such as river bank structure, river continuity or substrate of the river bed,
- Physical-chemical quality such as temperature, oxygenation and nutrient conditions, and
- Chemical quality that refers to environmental quality standards for river basin specific pollutants. These standards specify maximum concentrations for specific water pollutants. If even one such concentration is exceeded, the water body will not be classed as having a "good ecological status".

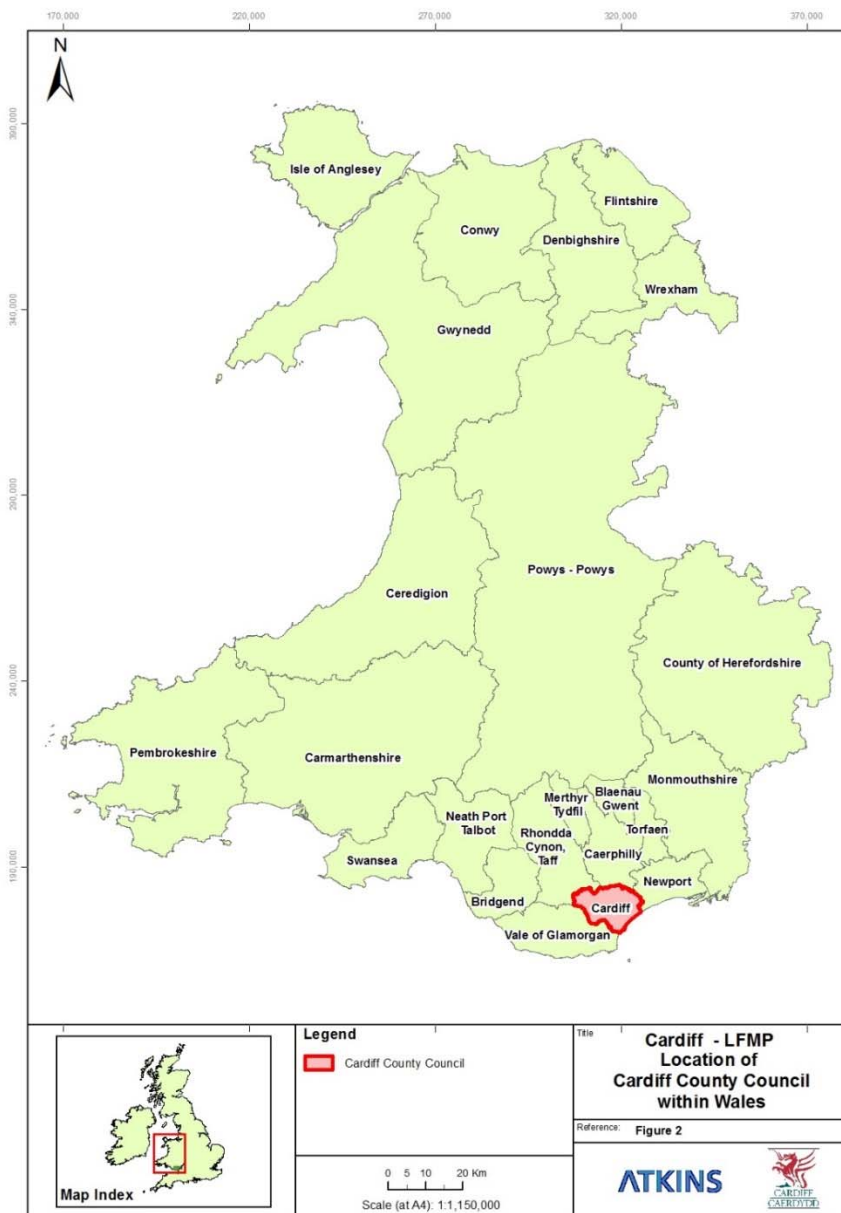
3 Study Area

3.1 Administrative Area

The area which this plan covers is the administrative extents of the County Council of the City and County of Cardiff, more commonly referred to as Cardiff Council.

Cardiff Council covers an area of approximately 158 km² and contains a population of around 346,100 (Census 2011, initial figures). In Cardiff there are estimated to be nearly 150,000 residential properties, 8,000 non-residential properties and 1,300 critical services (hospitals, nursing/care/retirement homes, electricity sub stations, schools, Police, Fire and Ambulance Stations, prisons and sewage or wastewater treatment works).

Figure 3–1 Location of Cardiff Council within Wales



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3.2 Flood Risk within Cardiff

3.2.1 Main River Catchments

Cardiff falls within the Ely, Taff and Rhymney main river catchments. Parts of the county are considered to be at risk of flooding from main rivers, with a number of areas benefiting from existing defences. Flood risk from these sources is managed by NRW.

3.2.2 Local flood risk within Cardiff

Cardiff Council as the LLFA has statutory responsibility for managing the flood risk from surface runoff, groundwater and ordinary watercourses, otherwise known as local flood risk sources.

Flood waters however do not respect statutory boundaries. In recognition of the need for greater collaboration, the Flood and Water Management Act 2010 imposes a duty to cooperate on the Risk Management Authorities to facilitate partnership working, the sharing of information and enhanced communications. Therefore where practicable we work in partnership with the other Risk Management Authorities to manage flood risk across the authority area. See Section 4.1.6 for examples of this in practice.

The following provides a summary of the considered level of risk from local flood risk sources.

Ordinary Watercourses

There are four key ordinary watercourses in Cardiff; the Whitchurch Brook, Fairwater Stream, Roath Brook and Nant Glandulas. A number of other ordinary watercourses are present in the area, many of which are partly culverted under the densely developed areas of the city. The Dock Feeder, is also considered to be an ordinary watercourse, and runs from an offtake from the River Taff at Blackweir to Bute Dock through sections of open canalised channels and culverts.

The Wentlooge Levels within the Cardiff Council boundary extends from the Rhymney River in the west to St Mellons Business Park in the East. The Wentlooge Levels comprise an area of reclaimed land. As part of the reclamation and subsequent management, an extensive system of ditches (reens) exists to drain the low lying land. A high level study was undertaken as part of the Cardiff Strategic Flood Consequence Assessment (SFCA, Atkins, 2009 & 2012)⁶ to indicatively assess the risk of flooding from the reen system. This assessment only predicted significant flooding of low lying areas outside the Cardiff Council boundary. Therefore, in addition to the active management and regular maintenance of the reen system by the IDB, it is considered that there is no significant risk of flooding from the reens within the Cardiff Council boundary.

Surface Water Runoff

Flooding from surface water runoff is usually caused by intense rainfall either after periods of persistent rainfall, which has saturated the catchment, or following a period of dry weather, causing the ground surface to become hard and impermeable. Both scenarios result in high runoff from the catchment leading to high peak flows.

⁶ Cardiff SFCA Phase 3 Study - Area A Wentloog Fluvial
<https://www.cardiff.gov.uk/ENG/resident/Planning/Local-Development-Plan/Evidence-Base/Pages/Evidence-Base.aspx>

Flooding in these circumstances is often exacerbated by lack of cut off ditches and drains, ditches being filled in or piped, or the poor maintenance of ditches and watercourses by riparian owners. Damage to streams and other drains may also be caused by developers or livestock. Increases to the runoff characteristics of the catchment may be caused by farmers ploughing at right angles to contours rather than parallel to them, removal of top soil, removal of vegetation, including the felling of trees or other site clearance. Generally these issues are all likely to give rise to increases in surface water flows.

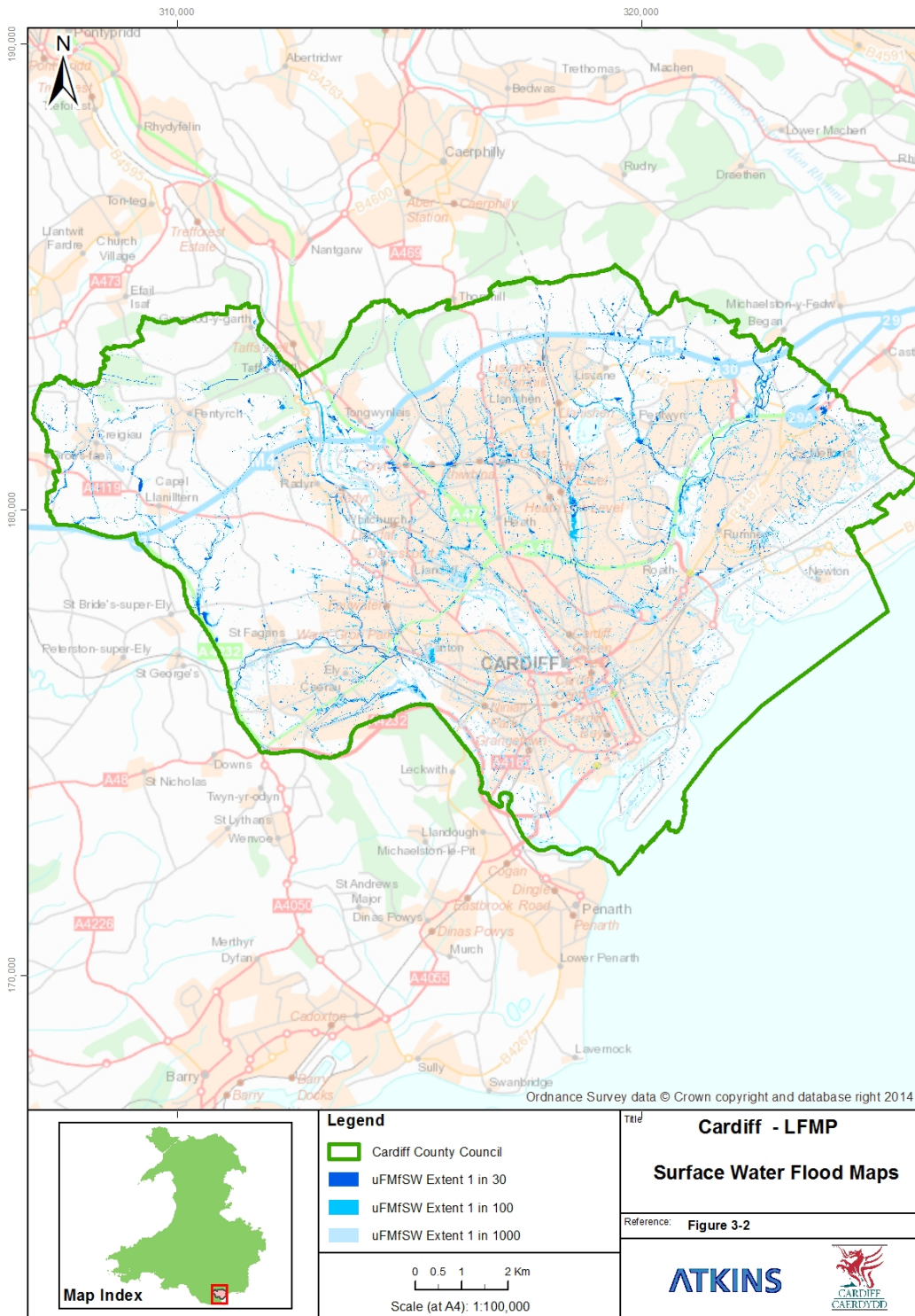
Runoff will also be altered if an area is subject to new development which increases the paved or roofed area and reduces the opportunity for water to soak into the ground. In these instances through the planning process we will, in partnership with other statutory consultees look to impose controls to restrict the maximum rate of runoff from these developments to a level no greater than green field runoff or existing discharge rates where appropriate.

Flood mapping by NRW provides an indication of the extents of surface water flooding that could occur across the county, as shown in the following figure.

Groundwater Flooding

Groundwater flooding occurs when water levels in the ground rise above surface levels. It is most likely to occur in areas underlain by permeable rocks, called aquifers. These can be extensive, regional aquifers, such as chalk or sandstone, or may be more local sand or river gravels in valley bottoms underlain by less permeable rocks. There is no information on historic groundwater flooding which suggests that the risk of groundwater flooding is low in Cardiff.

Figure 3-2 Surface Water Flood Maps across Cardiff



© Crown copyright and database rights (2015) Ordnance Survey (INSERT LICENCE NUMBER HERE). Contains Ordnance Survey data. © Crown copyright and database right (2015). Project: P:\GBSAA\WaterIndustry\5138009 Cardiff LFRP\60 Works Process\64 Drawings\CAD_GIS_BIM\01-WIP\G\WAP\5138009ATKZF1_CC_Surface_Water_Flood_maps.mxd

3.3 Preliminary Flood Risk Assessment

The PFRA process was carried out in order to establish the level of flood risk within each LLFA area. The process looked specifically at flooding from surface water, ground water and ordinary watercourses.

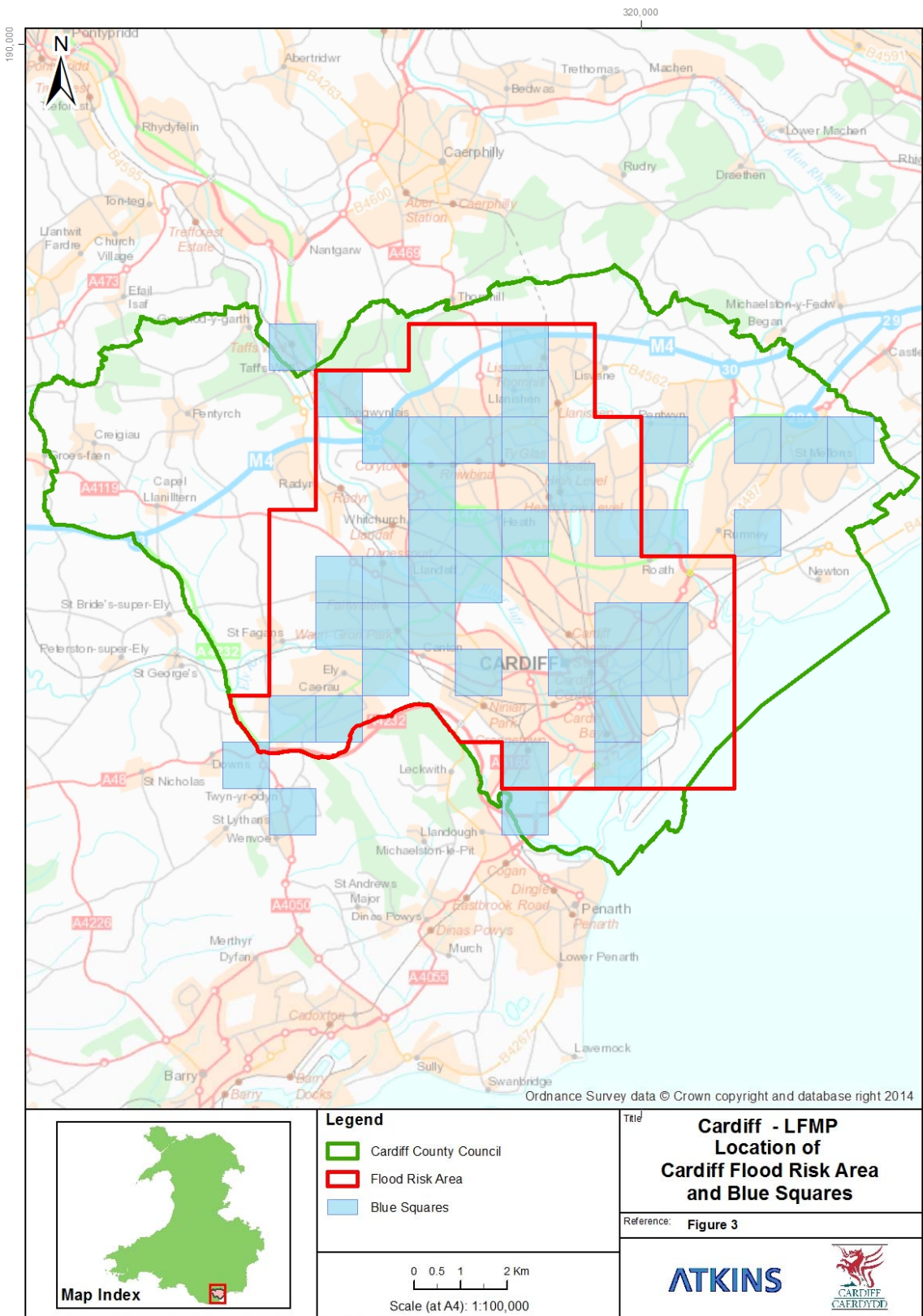
In order to have a consistency of approach, DEFRA and Welsh Government (WG) identified a number of key risk indicators and their thresholds to establish significant risk and to determine the existence of Flood Risk Areas.

The methodology was based on using the flood maps produced by the NRW to identify 1km squares where flood risk exceeds a defined threshold. These squares are known as areas above Flood Risk Threshold (Blue Squares). The key flood risk indicators and their thresholds for a 1km square were set as follows:

- a minimum of 200 people,
- a minimum of 20 businesses, and
- 2 or more critical services.

The following figure identifies the Blue Square areas and the extents identified as the Flood Risk Area within Cardiff.

Figure 3–3 Map showing the boundary of areas covered in the FRMP



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3.4 How our Conclusions were drawn from the Flood Risk Maps

The updated flood risk maps have been developed with the benefit of improved availability of widespread digital information and data. This includes analysis of the potential of flood depths across areas with a high-level of confidence as a result we have data representing the potential extents for 6 different flood depths: 0mm, 150mm, 200mm, 300mm, 600mm, 900mm for a series of different flood events.

The analysis for this plan has therefore adopted an approach, which is consistent across Wales, to not take into account areas predicted to be affected by flood depths less than 200mm. This level was chosen reflecting the minimum typical level of a property threshold level above adjacent road levels, allowing for the level of detail that the modelling is based on.

The analysis for the flood maps in general does not take into account the benefit that any culverts may provide. As a result the flood extents that are shown can be considered to be the worst case position.

3.4.1 Top communities at risk from surface water flooding in Cardiff Council

Based on inspection of the updated flood hazard and flood risk maps we have been able to assess the risk from local flood risk sources across Cardiff. For the purpose of this analysis we have divided the authority area on a community basis based on council ward boundaries.

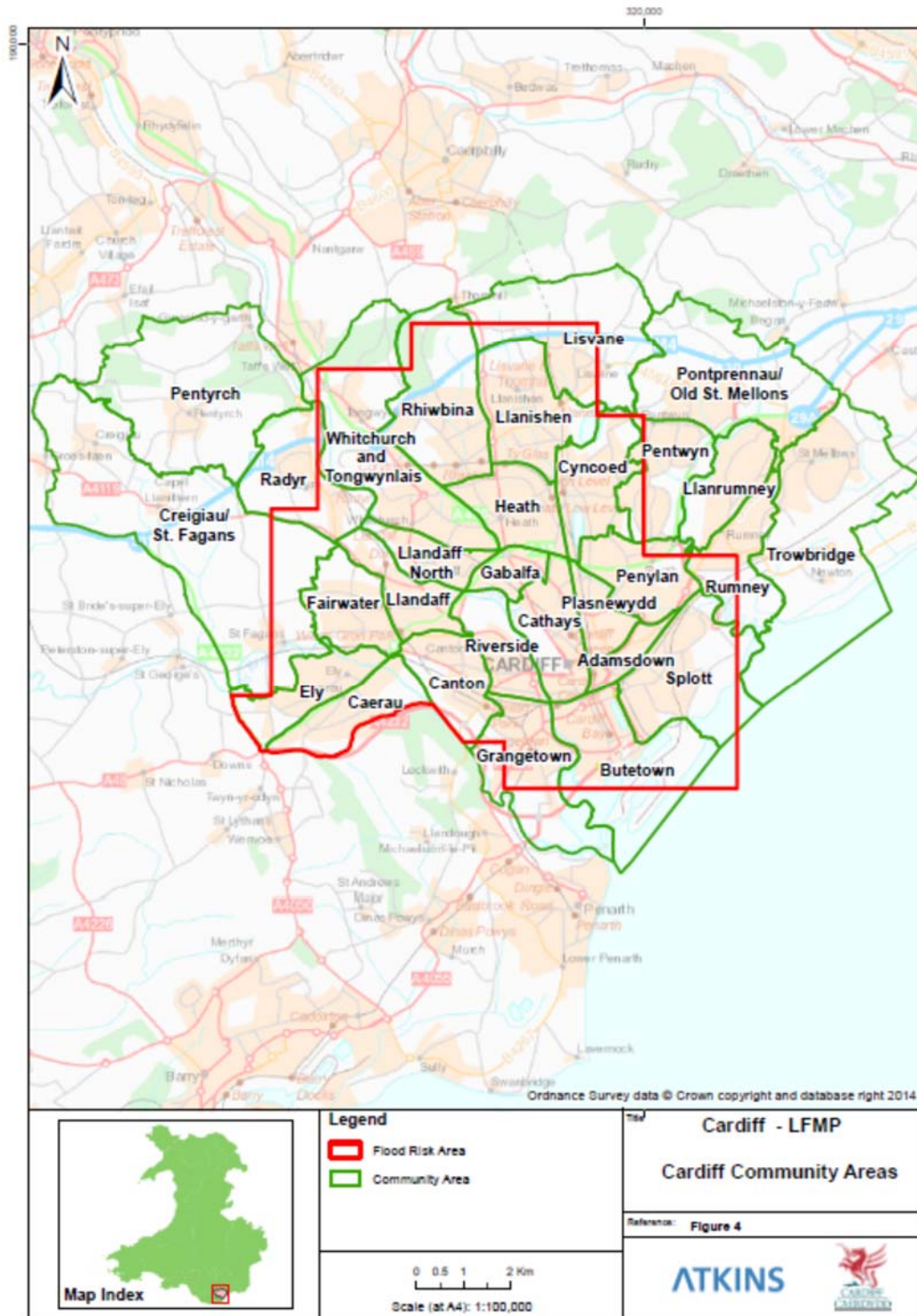
There are 29 wards within the authority; Llanrumney Pentyrch, Pontpennau/Old St. Mellons and Trowbridge wards are not within the flood risk area, as shown on Figure 3–4 overleaf.

Just over 12,000 people are considered to be at risk of flooding within the low risk (more extreme) flood extents. The following table provides a summary of the number of people at risk of flooding from local flood risk sources within Cardiff and the flood risk area.

Table 3–1 Summary risk communities

	Within Flood Risk Area	Total population affected	Population affected within FRA extents
Adamsdown	Yes	355	355
Butetown	Yes	226	226
Caerau	Yes	486	486
Canton	Yes	313	313
Cathays	Yes	280	280
Creigiau/St. Fagans	Yes	49	-
Cyncoed	Yes	202	176
Ely	Yes	301	301
Fairwater	Yes	360	360
Gabalfa	Yes	94	94
Grangetown	Yes	1,076	1,076
Heath	Yes	334	334
Lisvane	Yes	71	68
Llandaff	Yes	313	313
Llandaff North	Yes	1,422	1,422
Llanishen	Yes	832	832
Llanrumney	No	214	-
Pentwyn	Yes	268	61
Pentyrch	No	172	-
Penylan	Yes	952	926
Plasnewydd	Yes	362	362
Pontprennau/Old St. Mellons	No	99	-
Radyr	Yes	162	47
Rhiwbina	Yes	322	322
Riverside	Yes	1,730	1,730
Rumney	Yes	256	139
Splott	Yes	768	768
Trowbridge	No	891	-
Whitchurch and Tongwynlais	Yes	1,020	1,020

Figure 3-4 Flood risk area and communities within Cardiff



4 How we currently manage flood risk in Cardiff

Flood risk management is not new to Cardiff and work has been on-going for several years to prevent, prepare and reduce the likelihood and consequences of flooding. Flood mitigation work can take on two distinct forms; structural and non-structural:

- Structural - are infrastructure changes; physical structures; coastal defences that help retain, channel or prevent water movement.
- Non-structural - are more informative or less obvious such as awareness raising, emergency planning, planning controls, sympathetic landscaping or making use of sustainable drainage methods (SuDs).

Both approaches have been used by Cardiff.

4.1 Cardiff Council current actions

In the last five years Cardiff Council has received over 3,000 reports of flooding across the authority area. The figure overleaf provides a record of the locations of incidents by community area. Based on volume of reported incidents the top five areas are;

- Grangetown 9%
- Cathays 7%
- Penylan 6%
- Canton 6%
- Splott 6%

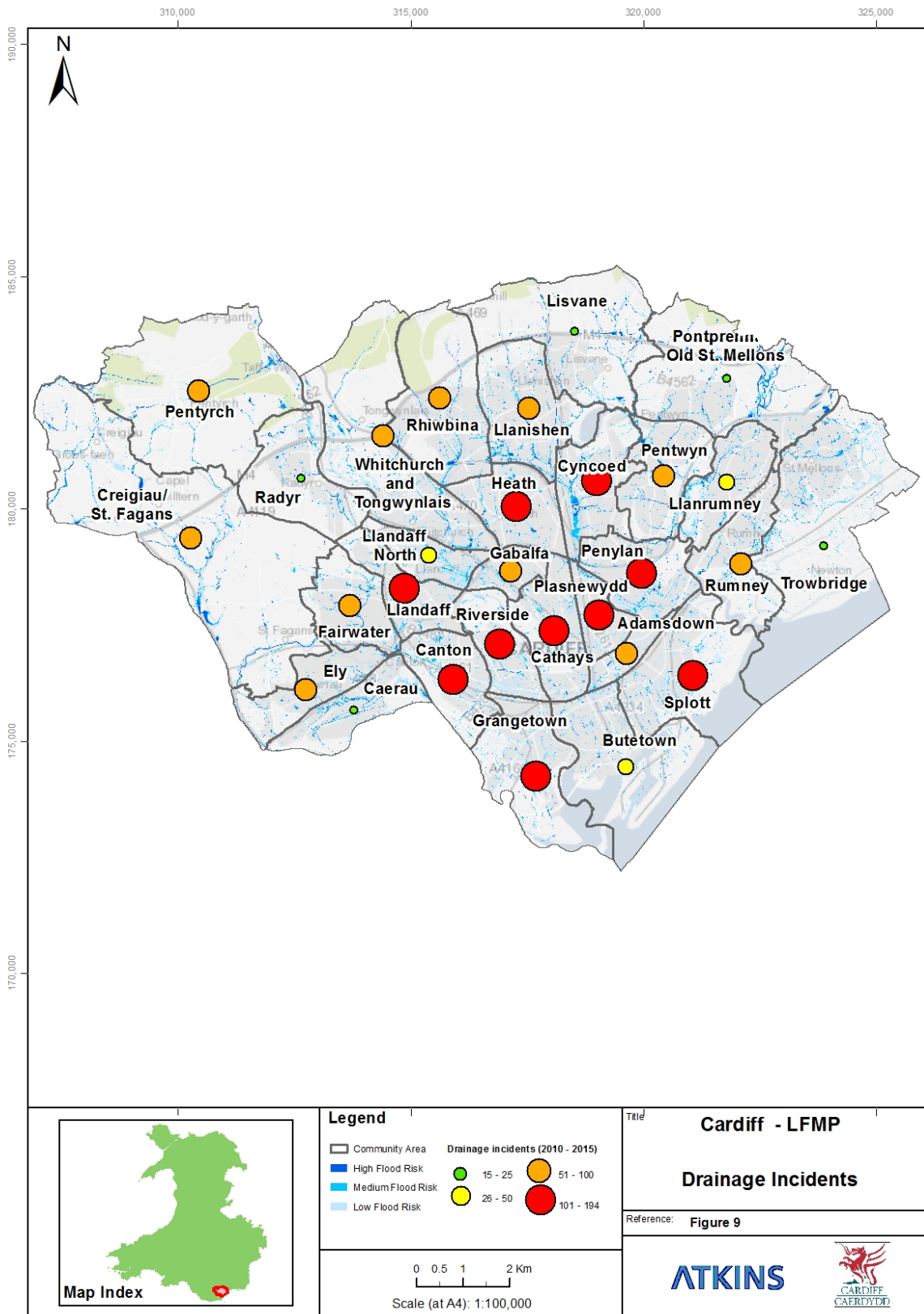
4.1.1 Emergency responses

Cardiff Council's Emergency Management Unit have a number of emergency plans that can be put in place if a significant flood event was to occur in Cardiff. There are now four active Community Flood Plan areas;

- Rhiwbina Garden Village,
- Talbot Street,
- Marlborough Road, and
- Waterloo Gardens.

Emergency event scenarios are run with all parts of the Council and other emergency services to test the Council's resilience for such events. Emergency Management officers also provide advice to local businesses and communities in how do deal with and reduce their own consequence should a flood event occur. We have also created a group made up of the at-risk communities and their elected members called 'Cardiff Resilient Communities'. We held a workshop in October 2014 to update them on work being undertaken by us as responders and to gauge what they require from us to enhance their work within their communities.

Figure 4-1 Map of Reported Flooding Incidents across Cardiff (2010 -2015)



© Crown copyright and database rights (2015) Contains Ordnance Survey data. © Crown copyright and database right (2015).
Project: P:\GBSAA\WaterIndustry\5138009 Cardiff LFRP\60 Works Process\64 Drawings\CAD_GIS_BIM\01-WIP\G\WAP\5138009\ATKZ\FX_CC_Drainage_Incidents.mxd

4.1.2 Community Awareness

Community awareness of the risks of flooding is growing across Cardiff. NRW, Communities First and the Council's Emergency Management Unit run community workshops and action days to support communities that are at a risk of flooding. They raise awareness across all communities and businesses of the level of flood risk that a community faces, and identify steps individuals can take to help improve the resilience of their homes.

Although the general awareness of flooding is growing, partially due to national media coverage of flooding incidents such as Boscastle, Gloucestershire and more recently Aberystwyth, more needs to be done to prepare communities for such incidents.

4.1.3 Highways Maintenance

The council highways service area work hard to maintain and repair the council owned drains, culverts and gullies, through a programme of inspections and cleaning to remove blockage and debris from watercourses as well as to maintain grids and trash screens. They undertake a mixture of proactive maintenance and reactive work, dealing with calls for blocked drains and surface water flooding. They can also operate portable pumps to reduce the damage that would otherwise be caused by a flooding incident.

There are an estimated 50,000 road gullies / drains across Cardiff along with over 100 trash screens. To visit all sites over a year would require far greater budgets and resources than we have available. We prioritise the sites we visit based on our previous experience of the areas affected. This approach is continually under review.

We are responsible for over 250 culverts across Cardiff that we are aware of. We do not know the structural condition of the majority of these culverts. In some cases, especially where development has expanded over time, we are uncertain of the extent of the areas they drain water away from, and as a result if they are of adequate size.

4.1.4 Flood alleviation schemes

Cardiff Council is continually reviewing the need for capital investment to reduce flood risk across the area. One current example is the recent scheme delivered in Rhiwbina.

The urban watercourses in Rhiwbina have an established history of flooding to residential and commercial properties over the past twenty years. The most recent and significant event occurred in June 2009 inundating properties in Wenallt Road, Heol Uchaf, Pen Y Dre and several other locations in Rhiwbina village. The flooding caused significant damage to both residential and commercial properties. The cost of the scheme has been estimated at £1.5M. Grant funding has been secured from the WG and the European Regional Development Fund (ERDF) for the majority of the scheme, whilst a proportion of the scheme has been allocated from Council funds. The scheme was completed earlier this year.

The Council also continues to work with NRW to explore new alleviation schemes in high risk areas of the City, such as Penylan, Waterloo Gardens area.

4.1.5 Cardiff Bay Barrage

In November 1999 the barrage was completed and the sluice gates closed at high water to retain sea water from the Bristol Channel within the 500-acre bay. The Cardiff Bay Barrage was created to meet two needs. First, to create a 2km² permanent fresh water lagoon that would attract investment into the largely disused Cardiff docklands area and spur

regeneration. Second, to provide a vital flood relief structure from both rising sea levels and water levels in the rivers Taff and Ely. Both benefits have been realised and demonstrates how operating flood defence structures can have multiple benefits. Cardiff Bay Barrage now forms a significant section of the Cardiff coast line coastal defence system.

4.1.6 Partnership working

Cardiff Council engages with a number of related public bodies to try and realise a better environment for the people of Cardiff. Cardiff Council are members of the following organisations / working groups;

- **South East Wales Flood Risk Management Group (SEWFRMG)** has been set up to promote the exchange of information between Local Authorities (LA), Internal Drainage Boards (IDB), NRW, the Welsh Local Government Association (WLGA) and WG and to provide a basis for a regional strategic overview.
- **Caldicot & Wentloog Levels Internal Drainage Board (CWLIDB)** *From April 2015 responsibility for CWLIDB transferred to Natural Resources Wales.* The IDB is responsible for the day to day management of the drainage system on the Gwent Levels where valuable agricultural, commercial and residential land would otherwise be flooded on an annual basis. The work of the IDB is also essential to maintaining the nationally important ecological and archaeological interest of the area.

Underpinning this is the responsibility placed upon each LLFA by the Flood & Water Management Act (FWMA) to consult with RMAs:

“A relevant authority must cooperate with other relevant authorities in the exercise of their flood and coastal erosion functions.”

- **Cardiff Area Flood Group.** The Cardiff Area Flood Group has been established to ensure a multi-agency approach to a major flooding incident within the City and County of Cardiff.
- **Severn Estuary Coastal Group (SECG)** is a partnership of local authorities and other organisations around the Severn Estuary that is developing Shoreline Management Plans (SMPs).

4.1.7 Local Flood Risk Management Strategy

The Flood and Water Management Act was introduced in April 2010 in England and Wales. It was intended to implement Sir Michael Pitt’s recommendations following the widespread flooding of 2007⁷. The act was also intended to clarify roles and responsibilities between RMAs.

Under the Act, the Welsh Government was required to produce a [National Strategy for Flood and Coastal Erosion Risk Management](#), and Cardiff Council as the LLFA was required to produce a LFRMS. The strategy was adopted by the council September 2014. The LFRMS must be consistent with the National Strategy for Flood and Coastal Erosion Management. LFRMS were created to define who the Risk Management Authorities are within a local area,

⁷ The Pitt Review - Learning Lessons from the 2007 floods, Cabinet Office, June 2008, http://webarchive.nationalarchives.gov.uk/20100807034701/http://archive.cabinetoffice.gov.uk/pittreview/thepittreview/final_report.html

what their function are and what their responsibilities are. LFRMS underwent public consultation.

In November 2011 the WG published “The National Strategy for Flood and Erosion Risk Management in Wales”. This document identifies four Overarching Objectives that must be addressed within Local Strategies.

The four overarching objectives are:

- Reducing the consequences for individuals, communities, businesses and the environment from flooding and coastal erosion,
- Raising awareness of and engaging people in the response to flood and coastal erosion risk,
- Providing an effective and sustained response to flood and coastal erosion events, and
- Prioritising investment in the most at risk communities.

4.1.8 Our Local Flood Risk Management Objectives

The strategy guidance, issued by the WG in November 2011, includes for specific flood risk management objectives in relation to social, economic and environmental risk. These are as set out below;

- **Social**
 - Reduce distress (Number of people at risk of flooding)
 - Reduce community disruption (Number of residential and commercial properties)
 - Reduce risk to life (function of the number of people at risk and flood conditions)
 - Reduce disruption to key infrastructure
- **Economic**
 - Reduce economic damage (e.g. Annual Average Damages - AAD)
 - Reduce cost of management (not a risk management outcome for use in appraisal)
- **Environmental**
 - Reduce damages to Natura 2000 / SSSIs / BAP sites (or improve sites)
 - Improve naturalness (reduce modification of channels / waterbodies)

4.1.9 Local Strategy Sub-objectives

Under our responsibility set out in the FWMA we prepared a LFRMS, which supports the National Flood & Coastal Erosion Risk Strategy. In the Strategy we established a protocol as to how we will prioritise investment to achieve the overarching National Objectives, and our Local Strategy sub-objectives.

In order to implement the National Strategy Objectives, Cardiff Council based the Local Strategy upon the following eight local strategy sub-objectives.

Table 4-1 Our Local Strategy Objectives

National Strategy Main Objective	Local Strategy Sub Objectives (numbering referencing relative to the National Strategy)
1 - Reducing the impacts on individuals, communities, businesses and the environment from flooding and coastal erosion	2 - Provide Strategic Leadership and Direction at a local Level
	3 - Develop policies for effective land use management and enhanced development control procedures where appropriate
	4 - Establish regular maintenance schedules for flood and coastal erosion risk management assets
2 - Raising awareness of and engaging people in the response to flood and coastal erosion risk	5 - Ensure that by 2026 everyone who lives in a flood risk area understands the flood risk they are subject to, the consequences of this risk and how to live with that risk
3 - Providing an effective and sustained response to flood and coastal erosion events	7 - Ensure the preparation and testing of Emergency Plans
	8 - Respond to events in a timely and appropriate manner
	9 - Facilitate recovery from flooding within the shortest possible timescales
4 - Prioritising investment in the most at risk communities	Local 1 - External funding

Measures have been used to implement the sub-objectives and these were considered against three options which required varying levels of investment and effort to identify a preferred approach;

- **Do-Nothing** – Stop any related existing actions and/or expenditure. This provides a baseline position against which to measure any benefit that an increase in effort provides,
- **Business as usual** – This considers a continuation of current actions in the future. Levels of expenditure would be retained with the chance that the flood risk may increase in the future due to further expansion of the local area or climate change, and
- **Do-more** – These measures identify new actions that the Council could or will have to undertake due to new legislative duties. The increased level of effort could vary depending on the type of action measure being considered, and the considered benefit of providing the additional resource. They also identify actions which could be undertaken if further funding was available.

A summary of the measures implemented within the LFRMS are presented in the table below and a detailed summary of the measures is presented in Appendix C.

Table 4-2 Our Local Strategy Measures

LFRMS Measure	Preferred Approach
Delivery of the second round of Shoreline Management Plans by 2012 with proportionate implementation over the life of the Strategy	Business As Usual
Development of Local Flood Risk Management Strategies	Business As Usual
Implementation of statutory responsibilities including those set out within the Flood and Water Management Act 2010 and the Flood Risk Regulations	Business As Usual
Appropriate mapping of all sources of risk	Business As Usual
Proportionate implementation of the Catchment Flood Management Plans over the life of the Strategy	Do More
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	Do More
Link with wider work undertaken with regards making Cardiff a more resilient and sustainable area to live	Do More
Reduce Corporate liability to Cardiff Council related to the impact of flood risk (and related aspects such as climate change)	Do More
Preparation of Supplementary Planning Guidance to help manage flood risk	Do More
Compliance with the requirements of Planning Policy Wales and relevant Technical Advice Notes.	Business As Usual
Appropriate undertaking of Strategic Flood Consequence Assessments and their use to inform Local Development Plans.	Business As Usual
Approval and adoption of SuDS drainage systems by the SuDS Approving and Adopting Body.	Business As Usual
Development of a register of natural and manmade structures or features likely to have an effect on flood risk by 2015.	Do More
Establishment of a programme of regular and appropriate maintenance for flood and coastal erosion risk management assets.	Do More
Designation of natural and manmade structures or features likely to have an effect on flood or coastal erosion risk over the life of the Strategy.	Do More
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	Do More
Identification of at risk groups within communities, including vulnerable individuals.	Do More
Raise awareness internally with regards impact of flood risk on normal operations and post event situations	Do More
Continuation and expansion of Floodline Warning Direct Service of the life of the Strategy	Business As Usual

Complete emergency plans for all sources of flood risk.	Business As Usual
Development of community level emergency plans as required by relevant communities	Business As Usual
LFRMS Measure	Preferred Approach
A pan-Wales emergency exercise to test response and recovery arrangements by 2016	Business As Usual
Local level emergency exercises to test response and recovery arrangements over the life of the Strategy.	Do More
Early and appropriate response to emergency events for all events.	Business As Usual
Development and implementation of effective evacuation protocols for emergency events	Business As Usual
Development of mutual aid protocols for resources, equipment and respite for emergency events.	Business As Usual
Identification and provision of suitable respite accommodation as appropriate over the life of the Strategy.	Business As Usual
Development of procedures for the effective clearance of debris.	Business As Usual
Development of repair schedules including provision for the installation of resilient measures by 2015.	Business As Usual
Investigations into the causes of flooding to be undertaken where necessary within one month.	Do More
Post flood-event recovery plan in place	Do More
Contribution funding from third-parties / non-public sources	Do More

4.2 Summary of the Process for the Selection and Prioritising Measures to Achieve Objectives

We seek to prioritise our investment and measure to maximise the benefit we can achieve.

The adopted measures in our LFRMS have been assessed to determine to which of the Local and thus National flood risk strategy objectives they contribute to. These have been weighted based on the timescales in which they need to be achieved to give a 'priority score' to identify the top 3 delivery categories (groups of similar measures).

Table 4–3 identifies the priority measures for Cardiff Council under the top 3 delivery categories.

4.3 How we prioritise our work

Cardiff Council's current position is that priority should be given to measures that;

- build stronger links with key stakeholders and neighbouring Local Authorities,
- continue to build on the work undertaken with regards to community resilience planning,
- embed awareness of flooding mitigation measures across all Council functions,
- fully understand the coastal erosion risks,
- raise awareness across all communities of Cardiff, particularly focusing on those at highest risk of flooding and those that require more support such as low socio-economic standing and vulnerable communities, and
- reduce the consequences of flooding through the construction of appropriately designed sustainable defences which benefit the local environment.

The following table is taken from our LFRMS setting out the measures we are seeking to put in place to manage flood risk in Cardiff.

Table 4–3 Cardiff Local Flood Strategy Priority Measures

Delivery Theme	Activity type	Suggested Measure(s)	Cardiff Council Proposed Action	Timescale
Flood Forecasting & Response	Flood Awareness	<ul style="list-style-type: none"> • Identification of at risk groups within communities, including vulnerable individuals. 	<ul style="list-style-type: none"> • Through Emergency Planning and Corporate Communications we can ensure the businesses are aware of the risk, and the actions they can take to reduce the impact 	<ul style="list-style-type: none"> • Ongoing
	Emergency Response Plans	<ul style="list-style-type: none"> • Complete emergency plans for all sources of flood risk. • Local level emergency exercises to test response and recovery arrangements over the life of the Strategy. • Early and appropriate response to all emergency events. • Development and implementation of effective evacuation protocols for emergency events • Identification and provision of suitable respite accommodation as appropriate over the life of the Strategy. 	<ul style="list-style-type: none"> • We have an established emergency planning procedure in place for major emergencies, including flooding. • Review within 12 months that the identified changes to our plan are in place and can be built on • We will continue to test and review our plans, and discussion with adjacent local authorities the potential need for mutual support when required • Development and implementation of effective evacuation protocols for emergency events • We will continue to test and review our plans, and discussion with adjacent local authorities the potential need for mutual support when required 	<ul style="list-style-type: none"> • Ongoing • Review Nov 2015 • In place and subject to ongoing review
	Community Flood Plans	<ul style="list-style-type: none"> • Development of community level emergency plans as required by relevant communities 	<ul style="list-style-type: none"> • Continue working with the EA on the development of community level emergency plans 	<ul style="list-style-type: none"> • ongoing
Asset Management &	Asset Management	<ul style="list-style-type: none"> • Development of a register of natural and manmade structures or features 	<ul style="list-style-type: none"> • Develop initial register using available software and update when necessary 	<ul style="list-style-type: none"> • Commence April 2014

Delivery Theme	Activity type	Suggested Measure(s)	Cardiff Council Proposed Action	Timescale
Maintenance	Plans	<p>likely to have an effect on flood risk by 2014.</p> <ul style="list-style-type: none"> • Establishment of a programme of regular and appropriate maintenance for flood and coastal erosion risk management assets. 	<p>(passive approach). Use powers, and enforcement where required to manage risk</p> <ul style="list-style-type: none"> • Implement system to ensure drainage aspects are considered as part of any proposal which affects the highway • Review and confirm coastal waters defined limits • Support schemes such as the Greener Grangetown Project • Provide evidence to upstream authorities and highlight the operational issue to try and control debris at source • Review options and include within future Plans / Spatial reviews • "Highway Drainage - review how works are planned and what their Planned Outcome is • Land Drainage - determine level of service and necessary maintenance • Ordinary Watercourse - culvert clearance is carried out at priority sites, review system to assess if this can be updated • Coastal - review potential risk from erosion" • Coastal - review potential risk from erosion, and undertake necessary works • SMP2 action - Ensure environmental issues are taken into account in the design / construction of new defences. Ensure any works adhere to agreed working practices e.g. to prevent disturbance to birds 	
Asset Management &	Defence / Structure Management	<ul style="list-style-type: none"> • Designation of natural and manmade structures or features likely to have an effect on flood or coastal erosion risk 	<ul style="list-style-type: none"> • Currently planning how the register will be developed working in partnership with other South East Wales Local Authorities. We 	<ul style="list-style-type: none"> • Commence 2014/2015

Delivery Theme	Activity type	Suggested Measure(s)	Cardiff Council Proposed Action	Timescale
Maintenance (continued)		<p>over the life of the Strategy.</p> <ul style="list-style-type: none"> Development of repair schedules including provision for the installation of resilient measures by 2015. 	<p>will need to budget for ongoing inspection and updating of the register</p> <ul style="list-style-type: none"> Develop repair schedules including provision for the installation of resilient measures by 2015. Undertake a coastline survey to assess erosion risks to our coastline communities. Explore defence schemes for the Penylan, Waterloo Gardens area of the City with Natural Resources Wales. 	
	Channel Maintenance	<ul style="list-style-type: none"> Development of procedures for the effective clearance of debris. 	<ul style="list-style-type: none"> Development of procedures 	<ul style="list-style-type: none"> In place and subject to ongoing review
	Culvert Maintenance	<ul style="list-style-type: none"> Establishment of a programme of regular and appropriate maintenance for flood and coastal erosion risk management assets. 	<ul style="list-style-type: none"> Ordinary Watercourse - culvert clearance is carried out at priority sites, review system to assess if this can be updated 	<ul style="list-style-type: none"> Ongoing review

Delivery Theme	Activity type	Suggested Measure(s)	Cardiff Council Proposed Action	Timescale
<p>High Level Awareness & Engagement</p>	<p>Partnership Working</p>	<ul style="list-style-type: none"> Implementation of statutory responsibilities including those set out within the Flood and Water Management Act 2010 and the Flood Risk Regulations. Link with wider work undertaken with regards making Cardiff a more resilient and sustainable area to live Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit. Raise awareness internally with regards impact of flood risk on normal operations and post event situations Contribution funding from third-parties / non-public sources 	<ul style="list-style-type: none"> We have delivered our PFRA which identifies the key risk areas. Further actions identified within the LFRMS will help us continue to deliver this objective" Ensure that Actions are captured which provide synergy across various plans to deliver a more resilient Cardiff. Support NRW and canvas awareness and feedback from residents that they are aware of their level of flood risk through the "Ask Cardiff" annual questionnaire. Discuss with insurance industry representative body as to the opportunities available to manage flood risk to ensure insurance remains affordable across the county Develop Policy for recovery / receipt of funding contributions either directly via Community Infrastructure Levy , or recovery through future rate levy with developer guarantees (TIF etc) 	<ul style="list-style-type: none"> Flood Hazard Maps by Dec 2013 Local Flood Risk Management Plans by Dec 2015 Ongoing Planned action following consultation response Commence April 2013

4.4 Who we work with to manage flood risk in Cardiff

It is important to identify the various roles and responsibilities of the Council and the numerous key parties that contribute to flood risk management within Cardiff. The more formal and statutory bodies are called RMAs. Contact details for the RMAs are set out in Appendix B.

Those bodies that have a statutory role to support flood risk management in Cardiff and have a significant role to play in Cardiff's flooding work may also have responsibilities in other Local Flood Risk Management areas. They may also have different functions, roles, duties and responsibilities in other areas (e.g. fisheries, waste management or biodiversity).

Figure 4–2 Flood Risk Management Authorities



Although the WG is not a RMA, it does have wide-ranging responsibilities in relation to flooding and coastal erosion:

- Overall responsibility for all matters relating to flooding and coastal erosion,
- Setting national policy,
- Developing a National flood and erosion strategy,
- Creating legislation,
- Providing most public sector funding, and
- Determining what action (if any) should be taken if the National Strategy is not being implemented or if actions are increasing levels of risk from flood and erosion.

4.5 How this FRMP has been co-ordinated

Co-ordination and development of this FRMP has been achieved through regular meetings of the various groups as listed below:

- South and East Wales Flood Risk Management Group attended by all LLFAs in South Wales, NRW, WLGA and DC/WW,
- Flood Risk Management Plans Working Group attended by all LLFAs in South East Wales, WG, NRW and WGLA, and
- Internal Cardiff Council departments

5 How we will manage flood risk at a local level

Flood risk management is not new to Cardiff and work has been on-going for several years to prevent, prepare and reduce the likelihood and consequences of flooding. Flood mitigation work can take on two distinct forms; structural and non-structural

- Structural - are infrastructure changes; physical structures or coastal defences that help retain, channel or prevent water movement.
- Non-structural - are more informative or less obvious such as awareness raising, emergency planning, planning controls, sympathetic landscaping or making use of sustainable drainage methods (SuDs)

Both approaches have been used by Cardiff.

5.1.1 FRMP Measures

The measures detailed within the City of Cardiff Council LFRMS have been adopted in this FRMP to manage flood risk within the authority.

5.1.2 Wellbeing of Future Generations Bill

It is a requirement of the Wellbeing of Future Generations Bill, that attention to the wider, longer-term benefits that can be delivered is given. To help in implementing the legacy of the Bill, consideration has been given to how the adopted measures within this FRMP help deliver the goals of the WFG:

- A prosperous Wales;
- A resilient Wales;
- A healthier Wales;
- A more equal Wales;
- A Wales of cohesive communities;
- A Wales of vibrant culture and thriving Welsh language; and
- A globally responsible Wales.

A table providing a summary of the measures adopted within this FRMP and their potential to deliver the WFG is presented below.

Table 5-1 Summary of adopted measures for this FRMP

Main Objective	Sub Objective	Measure	Wellbeing of Future Generations						
			A prosperous Wales	A resilient Wales	A healthier Wales	A more equal Wales	A Wales of cohesive communities	A Wales of vibrant culture and thriving Welsh Language	A globally responsible Wales
1 - Reducing the impacts on individuals, communities, businesses and the environment from flooding and coastal erosion	2 - Provide Strategic Leadership and Direction at a local Level	Delivery of the second round of Shoreline Management Plans by 2012 with proportionate implementation over the life of the Strategy							
		Development of Local Flood Risk Management Strategies.							
		Implementation of statutory responsibilities including those set out within the Flood and Water Management Act 2010 and the Flood Risk Regulations.							
		Appropriate mapping of all sources of flood risk.							
		Proportionate implementation of the Catchment Flood Management Plans over the life of the Strategy.							
		reduction of number of properties identified at risk of flooding from Local Flood Risk sources							
		Link with wider work undertaken with regards making Cardiff a more resilient and sustainable area to live							
		Reduce Corporate liability to Cardiff Council related to the impact of flood risk (and related aspects such as climate change)							
3 - Develop policies for effective land use management and enhanced development control procedures where appropriate	Preparation of Supplementary Planning Guidance to help manage flood risk								

Main Objective	Sub Objective	Measure	Wellbeing of Future Generations						
			A prosperous Wales	A resilient Wales	A healthier Wales	A more equal Wales	A Wales of cohesive communities	A Wales of vibrant culture and thriving Welsh Language	A globally responsible Wales
		Compliance with the requirements of Planning Policy Wales and relevant Technical Advice Notes.							
		Appropriate undertaking of Strategic Flood Consequence Assessments and their use to inform Local Development Plans.							
		Approval and adoption of SuDS drainage systems by the SuDS Approving and Adopting Body.							
	4 - Establish regular maintenance schedules for flood and coastal erosion risk management assets	Development of a register of natural and manmade structures or features likely to have an effect on flood risk by 2015.							
		Establishment of a programme of regular and appropriate maintenance for flood and coastal erosion risk management assets.							

Main Objective	Sub Objective	Measure	Wellbeing of Future Generations						
			A prosperous Wales	A resilient Wales	A healthier Wales	A more equal Wales	A Wales of cohesive communities	A Wales of vibrant culture and thriving Welsh Language	A globally responsible Wales
		Designation of natural and manmade structures or features likely to have an effect on flood or coastal erosion risk over the life of the Strategy.							
2 - Raising awareness of and engaging people in the response to flood and coastal erosion risk	5 - Ensure that by 2026 everyone who lives in a flood risk area understands the flood risk they are subject to, the consequences of this risk and how to live with that risk	Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.							
		Identification of at risk groups within communities, including vulnerable individuals.							
		Raise awareness internally with regards impact of flood risk on normal operations and post event situations							
		Continuation and expansion of Floodline Warning Direct Service of the life of the Strategy							
3 - Providing an effective and sustained response to flood and coastal erosion events	7 - Ensure the preparation and testing of Emergency Plans	Complete emergency plans for all sources of flood risk.							
		Development of community level emergency plans as required by relevant communities							
		A pan-Wales emergency exercise to test response and recovery arrangements by 2016							
		Local level emergency exercises to test response and recovery arrangements over the life of the Strategy.							

Main Objective	Sub Objective	Measure	Wellbeing of Future Generations						
			A prosperous Wales	A resilient Wales	A healthier Wales	A more equal Wales	A Wales of cohesive communities	A Wales of vibrant culture and thriving Welsh Language	A globally responsible Wales
	8 - Respond to events in a timely and appropriate manner	Early and appropriate response to emergency events for all events.							
		Development and implementation of effective evacuation protocols for emergency events							
		Development of mutual aid protocols for resources, equipment and respite for emergency events.							
		Identification and provision of suitable respite accommodation as appropriate over the life of the Strategy.							
	9 - Facilitate recovery from flooding within the shortest possible timescales	Development of procedures for the effective clearance of debris.							
		Development of repair schedules including provision for the installation of resilient measures by 2015.							
		Investigations into the causes of flooding to be undertaken where necessary within one month.							
		Post flood-event recovery plan in place							
	4 - Prioritising investment in the most at risk communities	Local 1 - External funding	Contribution funding from third-parties / non-public sources						

5.2 Strategic Environmental Screening

A Strategic Environmental Assessment (SEA) has previously been completed to accompany the implementation of the objectives and measures detailed within the LFRMS.

The SEA identified potential environmental effects created as a result of the implementation of the LFRMS. As detailed within Section 5.1.1 of this document, the measures that were implemented within the LFRMS have been formerly adopted by the FRMP to help manage the risk from flooding. Following a review of the measures implemented within the FRMP, it is considered that the measures are the same as the LFRMS and there have been no amendment to receptors within the authority.

In conclusion, it is considered that the previous SEA undertaken for the LFRMS is still relevant and there is no requirement for a new SEA to be undertaken.

Where site specific, physical intervention is undertaken, an Environmental Impact Assessment will be completed to complement the works. This will ensure that any works do not have a detrimental impact on the environment.

5.3 Flood Risk Management Plan Measures and EU Reporting Codes

To allow for ease of reporting back to the European Union we have aligned our proposed measures with those included in the reporting data, as set out below. The measures are grouped into the four themes; Prevention, Protection, Preparedness, Recovery.

Preventing: by avoiding putting people or the environment at risk of flooding, for example, one way of preventing risks arising would be by not building homes in areas that can be flooded.

Preparing: by taking actions that prepare people for flooding, for example, by improving awareness of flood risk, or by providing warning and forecasting for floods so that people can take precautions to safeguard their valuables.

Protecting: by protecting people from the risk of flooding. For example, by the maintenance or refurbishment of existing defences or using waterproof boards over doors and airbricks, people can protect their properties from the damage caused by flood water.

Recovery and review: by learning from when flooding happens and how to recover from it, for example, by improving the availability of recovery services such as providing temporary accommodation, after flooding has occurred.

Table 5-2 details the four aspects and the European Union reporting codes.

These can be cross-referenced to demonstrate how they will help realise the overall objectives set out in the LFRMS, as summarised within Table 5-3.

Table 5-2 EU Reporting Codes

EU Reporting Codes	EU Reporting Description
M1 Action	
M11	No measure is proposed to reduce the flood risk in the APSFR or other defined area

EU Reporting Codes	EU Reporting Description
M2 Prevention	
M21	Avoidance, measure to prevent the location of new or additional receptors in flood prone areas, such as land use planning policies or regulation
M22	Removal or relocation, measure to remove receptors from flood prone areas, or to relocate receptors areas of lower probability of flooding and or of lower hazard
M23	Reduction, measures to adapt receptors to reduce the adverse consequences in the event of a flood actions or buildings, public networks, etc...
M24	Other prevention, other measures to enhance flood risk prevention (may include, flood risk modelling and assessment, flood vulnerability assessment, maintenance programmes or policies etc...)
M3 Protection	
M31	Natural flood management / run off and catchment management, Measures to reduce the flow into natural or artificial drainage systems, such as overland flow interceptors and or storage, enhancement of infiltration, etc and including in-channel, flood plain works and the reforestation of banks, that restore natural systems to help slow flow and store water.
EU Reporting Codes	EU Reporting Description
M32	Water flow regulation, Measures involving physical intervention to regulate flows, such as construction modification or removal of water retaining structures (e.g. dams or other on-line storage areas or development of existing flow regulation rules and which have significant impact on the hydrological regime.
M33	Channel, coastal and floodplain works, Measures involving physical interventions to freshwater channels, mountain streams estuaries coastal waters and flood prone areas of land, such as construction, modification or removal of structures or the alteration of channels, sediment dynamics management, dykes etc.
M34	Surface water management, measures involving physical interventions to reduce surface water flooding, typically, but not exclusively, in an urban environment, such as enhancing artificial drainage capacity or through sustainable drainage systems (SuDS).
M35	Other protection, other measures to enhance protection against flooding, which may include flood defences asset maintenance programmes or policies.
M4 Preparedness	
M41	Flood forecasting and Warning, Measures to establish or enhance a flood forecasting or warning system
M42	Emergency Event response planning, contingency planning, measures to establish or enhance flood event institutional emergency response planning.
M43	Public awareness and preparedness, measures to establish the public awareness or preparedness for flood events.
M44	Other preparedness, other measures to establish or enhance preparedness for flood events to reduce adverse consequences.

EU Reporting Codes	EU Reporting Description
M5 Recovery and Review	
M51	(Planning for recovery and review phase is in principle part of the preparedness), individual and societal recovery, clean up and restoration activities (buildings, infrastructure, etc) Health and mental health supporting actions, inc managing stress disaster financial assistance (grants, tax) inc disaster legal assistance, disaster unemployment assistance, temporary or permanent relocation, other
M52	Environmental recovery, clean up and restoration activities (with several sub topics as mould protection, well-water safety and securing hazardous material containers)
M53	Other, other recovery and review, lessons learnt from flood events insurance policies.
M6 Other	
M61	Other

Table 5-3 Summary of Cardiff Council FRMP Measures and attributed EU reporting codes

Measure	EU Reporting Codes
Delivery of the second round of Shoreline Management Plans by 2012 with proportionate implementation over the life of the Strategy	M44 - Preparedness
Development of Local Flood Risk Management Strategies	M44 - Preparedness
Implementation of statutory responsibilities including those set out within the Flood and Water Management Act 2010 and the Flood Risk Regulations	M32 - Protection
Appropriate mapping of all sources of risk	M22 - Prevention
Proportionate implementation of the Catchment Flood Management Plans over the life of the Strategy	M44 - Preparedness
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	M22 – Prevention
Link with wider work undertaken with regards making Cardiff a more resilient and sustainable area to live	M21 – Prevention
Reduce Corporate liability to Cardiff Council related to the impact of flood risk (and related aspects such as climate change)	M21 – Prevention
Preparation of Supplementary Planning Guidance to help manage flood risk	M21 – Prevention
Compliance with the requirements of Planning Policy Wales and relevant Technical Advice Notes.	M21 – Prevention
Appropriate undertaking of Strategic Flood Consequence Assessments and their use to inform Local Development Plans.	M21 – Prevention
Approval and adoption of SuDS drainage systems by the SuDS Approving and Adopting Body.	M34 – Protection
Development of a register of natural and manmade structures or features likely to have an effect on flood risk by 2015.	M24 – Prevention
Establishment of a programme of regular and appropriate maintenance for flood and coastal erosion risk management assets.	M24 – Prevention
Designation of natural and manmade structures or features likely to have an effect on flood or coastal erosion risk over the life of the Strategy.	M32 – Protection
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	M43 - Preparedness
Identification of at risk groups within communities, including vulnerable individuals.	M43 - Preparedness

Measure	EU Reporting Codes
Raise awareness internally with regards impact of flood risk on normal operations and post event situations	M42 - Preparedness
Continuation and expansion of Floodline Warning Direct Service of the life of the Strategy	M41 - Preparedness
Complete emergency plans for all sources of flood risk.	M42 - Preparedness
Development of community level emergency plans as required by relevant communities	M42 – Preparedness
A pan-Wales emergency exercise to test response and recovery arrangements by 2016	M42 - Preparedness
Local level emergency exercises to test response and recovery arrangements over the life of the Strategy.	M42 - Preparedness
Early and appropriate response to emergency events for all events.	M42 - Preparedness
Development and implementation of effective evacuation protocols for emergency events	M42 - Preparedness
Development of mutual aid protocols for resources, equipment and respite for emergency events.	M42 - Preparedness
Identification and provision of suitable respite accommodation as appropriate over the life of the Strategy.	M42 - Preparedness
Development of procedures for the effective clearance of debris.	M24 - Prevention
Development of repair schedules including provision for the installation of resilient measures by 2015.	M24 – Prevention
Investigations into the causes of flooding to be undertaken where necessary within one month.	M24 – Prevention
Post flood-event recovery plan in place	M52 – Recovery and Review
Contribution funding from third-parties / non-public sources	M61 - Other

6 Co-ordination with the Severn River Basin Management Plan

6.1 General

The European Floods Directive (Directive 2007/60/EC⁸) aims to provide a consistent approach to managing flood risk across Europe. The Directive is implemented in the UK through the Flood Risk Regulations 2009.

The Flood Risk Regulations place a duty that by December 2015 NRW will produce FRMPs for all of Wales, covering flood risk from main rivers, the sea and reservoirs at River Basin District (RBD) scale. The Environment Agency will perform the same role for England and they will work together as partners to address cross-border areas. This means NRW will produce FRMPs covering flood risk from main rivers, reservoirs and the sea for the Severn, the Dee and the Western Wales RBDs (working with the Environment Agency for the cross border Severn and Dee FRMPs).

Under the Flood Risk Regulations, LLFAs are responsible for producing FRMPs for 'Flood Risk Areas', being areas that were identified through the PFRA published in December 2011. These areas include the identified area for Cardiff.

Cardiff is located within the southern part of the Severn River Basin, South East Valleys Catchment.

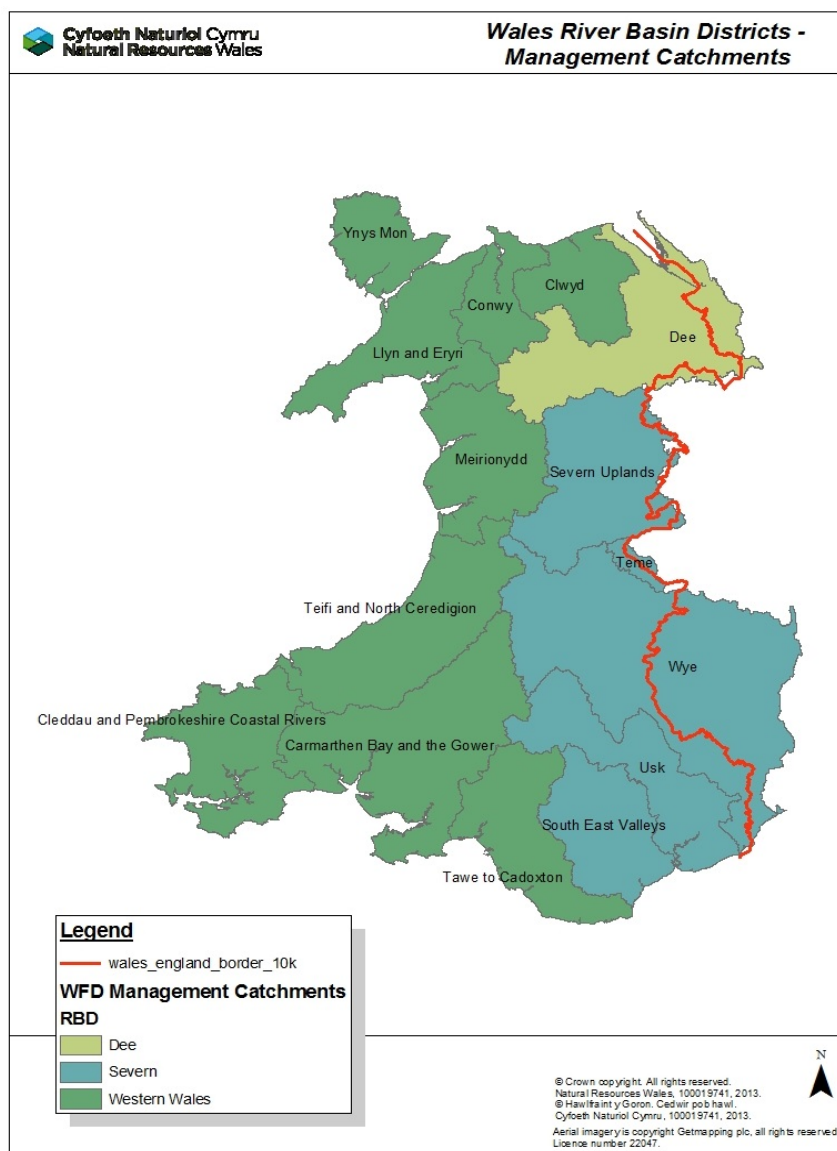
6.2 Severn River Basin District Overview

The Severn River Basin District is home to over 5.3 million people and covers an area of 21,590 km², with about one third of the district in Wales. The River Severn is the longest river in Britain and flows into the Severn Estuary. As well as the River Severn and its main tributaries the district includes the rivers of South East Wales, including the Wye, Usk and Taff, and those of the counties of Avon and Somerset that drain into the Severn Estuary.

The district has several major urban centres, including Bristol, Cardiff and Coventry. However, much of the river basin district is rural in character, particularly within the Welsh Borders. About 80% of the land is managed for agriculture and forestry. The key economic sectors in the district are business services, wholesale and distribution, public administration and health. Transport equipment and metals manufacturing are also important industrial sectors.

⁸ Directive 2007/60/EC <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32007L0060>

Figure 6–1 River Basin District Management Catchment



6.3 Summary of co-ordination of development and implementation with the River Basin Management Plan

The draft Seven River Basin Management Plan, prepared jointly by the Environment Agency and NRW as a requirement of the WFD, was published on the NRW website on 10 October 2014.

As part of the development on the RBMP NRW completed a consultation process from October 2014 through to April 2015 including the provision of a questionnaire. The draft RBMPs is available on the Natural Rescores Wales.

We have examined the objectives and measures proposed within the RBMP and through the LLFA working group we have aligned the proposed measures to be consistent at a LLFA level. It is anticipated as consultation continues additional measures and links will be identified by to strengthen the link between this FRMP and the RBMP.

Table 6-1 Summary of Severn RBMP Measures

Full list of measure categories included in the Severn RBMP	Linked FRMP Measure
Physical Modification	
Removal or easement of barriers to fish migration	<i>No proposed linked measure</i>
Removal or modification of engineering structure	<i>No proposed linked measure</i>
Improvement to condition of channel/bed and/or banks/shoreline	<i>No proposed linked measure</i>
Improvement to condition of riparian zone and/or wetland habitats	<i>No proposed linked measure</i>
Change to operations and maintenance	Establishment of a maintenance program for flood and coastal assets
Vegetation management	Link with wider work to make Cardiff a more sustainable city
Pollution from wastewater	
Reduce point source pollution at source	Adoption of SuDS drainage systems by SuDS approving body.
Reduce point source pathways (i.e. control entry to water environment)	Adoption of SuDS drainage systems by SuDS approving body.
Mitigate/Remediate point source impacts on receptor	Adoption of SuDS drainage systems by SuDS approving body.
Pollution from towns, cities and transport	
Reduce diffuse pollution at source	Adoption of SuDS drainage systems by SuDS approving body.
Reduce diffuse pollution pathways (i.e. control entry to water environment)	Adoption of SuDS drainage systems by SuDS approving body.
Mitigate/Remediate diffuse pollution impacts on receptor	Adoption of SuDS drainage systems by SuDS approving body.
Changes to natural level and flow of water	
Use alternative source/relocate abstraction or discharge	Adoption of SuDS drainage systems by SuDS approving body.
Water Demand Management	<i>No proposed linked measure</i>
Control pattern/timing of abstraction	<i>No proposed linked measure</i>
Improvement to condition of channel/bed and/or banks/shoreline	Reduction of number of properties identified at risk of flooding
Managing invasive non-native species	
Prevent introduction	<i>No proposed linked measure</i>
Early detection, monitoring and rapid response (to reduce the risk of establishment)	<i>No proposed linked measure</i>
Mitigation, control and eradication (to reduce extent)	<i>No proposed linked measure</i>
Building awareness and understanding (to slow the spread)	<i>No proposed linked measure</i>
Pollution from rural areas	
Reduce diffuse pollution at source	Adoption of SuDS drainage systems by SuDS approving body.
Mitigate/Remediate diffuse pollution impacts on receptor	Adoption of SuDS drainage systems by SuDS approving body.
Reduce point source pathways (i.e. control entry to water environment)	Adoption of SuDS drainage systems by SuDS approving body.
Pollution from abandoned mines	
Mitigate/Remediate point source impacts on receptor	<i>No proposed linked measure</i>

7 Cardiff Local Authority Overview

7.1 Breakdown by Community Area

Within this section we present a summary of the current situation at a county wide level and proposed actions we will look to put in place to manage risk to appropriate levels. A more detailed breakdown by community is provided in Table 7.6.

The following figures provide an overview of the potential impact of flooding across Cardiff, showing the potential extent of people, infrastructure and natural environment that may be affected.

Figure 7-1 Flood Risk Map – Risks to People

Figure 7-2 Flood Risk Map – Economic Activity

Figure 7-3 Flood Risk Map – Economic Damage

Figure 7-4 Flood Risk Map – Risks to Natural and Historic Environment

Table 7-1 overleaf provides a comparison of the assessments completed for this Plan against previous assessments completed using older data for the RBMP and PFRA. The overall level of risk has not altered significantly using the various datasets. As noted in section 3.4 the main difference has been the improved definition in the quality of modelling data and thus analysis that has been able to be carried out as technology and digital data progresses.

Table 7-1 Counts for Flood Risk across Cardiff

COUNTS FOR Cardiff Total COMMUNITY AREA							
	Total whole of Cardiff	Total within Flood Risk Area	Total affected based on RBMP analysis,	Total affected based on PFRA Analysis	Risk Counts within flood risk area		
					HIGH	MED	LOW
Risk to People and Property					Residents in areas at risk of flooding		
People (n) (multiplier 2.35)	350,098	278,609	22,010	10,114	703	1,323	12,009
					Residential Properties at risk of flooding		
Residential Properties (n)	148,978	118,557	9,365	4,304	299	563	5,110
Services (n)	277	957	30	29	4	14	67
Risk to Economic Activity							
Non-Residential Properties (n)	22,259	17,693	1,849	776	86	288	1,402
Airports (n)	-	-	0	0	-	-	-
Primary/Trunk Roads (km)	17	6	11	2.9	4	5	6
Main Line Railways (km)	51	43	4	not assessed	31	37	43
Agricultural Land – Grades 1, 2 and 3 (ha)	14,009	7,429	81	not assessed	97	271	932
Risk to Natural and Historic Environment							
Bathing Waters (n)	-	-	0		-	-	-
Environmental Permitting Regulations (EPR) Installations (n)	109	80	7	not assessed	-	-	9
Special Areas of Conservation (SAC) (ha)	818	134	0	2	-	-	-
Special Protection Areas (SPA) (ha)	662	117	0	0	-	-	-
Ramsar Sites (ha)	662	117	0	0	-	0	0
World Heritage Sites (ha)	-	-	0	0	-	-	-
Sites of Special Scientific Interest (SSSI) (ha)	1,413	188	2	7	17	17	25
Parks and Gardens (ha)	428	360	35	not assessed	5	19	54
Scheduled Ancient Monuments (ha)	27	27	1	4	0	0	1
Listed Buildings (n)	851	720	29	55	6	19	47
Licensed Abstractions (LA) (n)	35	24	6	not assessed	2	2	5
Sites of Interest for Nature Conservation (SINC) (ha)	-	-	not assessed	not assessed	-	-	-

7.1.1 Cardiff LLFA – Delivery Plan

A breakdown of risks and potential measures (actions) for each Community Area is provided in section 6.3. The following table sets out the totals affected within the defined Flood Risk Area for various category of receptors. Overleaf (Table 7-3) is a breakdown by Community Area, for the impact during the low-risk (more extreme) events, including for completeness those areas that are not within the Flood Risk Area.

Table 7-2 Counts for Cardiff Flood Risk Area

COUNTS FOR Cardiff Total FLOOD RISK AREA				
	Total in defined area	Risk Counts		
		HIGH	MED	LOW
Risk to People and Property		Residents in areas at risk of flooding		
People (n) (multiplier 2.35)	278,609	703	1,323	12,009
		Residential Properties at risk of flooding		
Residential Properties (n)	118,557	299	563	5,110
Services (n)	957	4	14	67
Risk to Economic Activity				
Non-Residential Properties (n)	17,693	86	288	1,402
Airports (n)				
Primary/Trunk Roads (km)	6	4	5	6
Main Line Railways (km)	43	31	37	43
Agricultural Land – Grades 1, 2 and 3 (ha)	7,429	97	271	932
Risk to Natural and Historic Environment				
Bathing Waters (n)				
Environmental Permitting Regulations (EPR) Installations (n)	80	0	0	9
Special Areas of Conservation (SAC) (ha)	134	0	0	0
Special Protection Areas (SPA) (ha)	117	0	0	0
Ramsar Sites (ha)	117	0	0	0
World Heritage Sites (ha)				
Sites of Special Scientific Interest (SSSI) (ha)	188	17	17	25
Parks and Gardens (ha)	360	5	19	54
Scheduled Ancient Monuments (ha)	27.0	0.1	0.3	1.4
Listed Buildings (n)	720	6	19	47
Licensed Abstractions (LA) (n)	24	2	2	5
Sites of Interest for Nature Conservation (SINC) (ha)				

Table 7-3 Summary counts for all Communities (low-risk event)

	Adamsdown	Butetown	Caerau	Canton	Cathays	Creigiau/St. Fagans	Cyncoed	Ely	Fairwater	Gabalfa	Grangetown	Heath	Lisvane	Llandaff	Llandaff North
Risk to People and Property															
People (n) (multiplier 2.35)	355	226		313			176	301	360		1,076	334		313	1,422
Residential Properties (n)	151	96 486	207	133 280	119		75		153 94	40		142 68	29		605
Services (n)		9	4	4	4		1	3	5	4	1			3	3
Risk to Economic Activity															
Non-Residential Properties (n)	29	150	30	67	190	1	128 13	18	17	458 29	142	45	133 3	28	26
Airports (n)															
Primary/Trunk Roads (km)	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-
Main Line Railways (km)	1	3		4	3	2	1	0	2	1	3	2	2	2	3
Agricultural Land – Grades 1, 2 and 3 (ha)	16			43					37						48
Risk to Natural and Historic Environment															
Bathing Waters (n)	44	56		43	13	55	31		18	31	38	20	29		
Environmental Permitting Regulations (EPR) Installations (n)		2										1		1	
Special Areas of Conservation (SAC) (ha)															
Special Protection Areas (SPA) (ha)															
Ramsar Sites (ha)															
World Heritage Sites (ha)															
Sites of Special Scientific Interest (SSSI) (ha)															
Parks and Gardens (ha)				6	8	0	17			0		0	0	0	
Scheduled Ancient Monuments (ha)			1	0	0									0	
Listed Buildings (n)		9		1	8	2	3		1					2	1
Licensed Abstractions (LA) (n)		1					2								
Sites of Importance for Nature Conservation (SINC) (ha)															

.....continued on the following page

	Llanishen	Pentwyn	Penylan	Plasnewydd	Radyr	Rhiwbina	Riverside	Rumney	Splott	Whitchurch and Tongwynlais	Not within defined flood risk area			
											Llanrumney	Pentyrch	Pontprennau/Old St. Mellons	Trowbridge
Risk to People and Property														
People (n) (multiplier 2.35)	832	61	926	362	47	322	1,730	139	768	1,020	214	172	99	891
Residential Properties (n)	354	26	394	154	20	137	736	59	327	434	91	73	42	379
Services (n)	2		5	2	1	3	4	1	3	5	1			2
Risk to Economic Activity														
Non-Residential Properties (n)	80	14	93	42	5	52	172		53	103	25	13	26	30
Airports (n)														
Primary/Trunk Roads (km)										3				
Main Line Railways (km)	2			1	3	2	1	1	3	1				4
Agricultural Land – Grades 1, 2 and 3 (ha)	71	10	45	23	17	49	41	11	55	88	50	51	80	97
Risk to Natural and Historic Environment														
Bathing Waters (n)														
Environmental Permitting Regulations (EPR) Installations (n)			2						3					1
Special Areas of Conservation (SAC) (ha)												0		0
Special Protection Areas (SPA) (ha)														0
Ramsar Sites (ha)								0						0
World Heritage Sites (ha)														
Sites of Special Scientific Interest (SSSI) (ha)	14		1					1		10		81		833
Parks and Gardens (ha)			1	6			11			4			1	
Scheduled Ancient Monuments (ha)					0	0		0		0				0
Listed Buildings (n)				3		12	1			4		2		
Licensed Abstractions (LA) (n)	2													
Sites of Importance for Nature Conservation (SINC) (ha)														

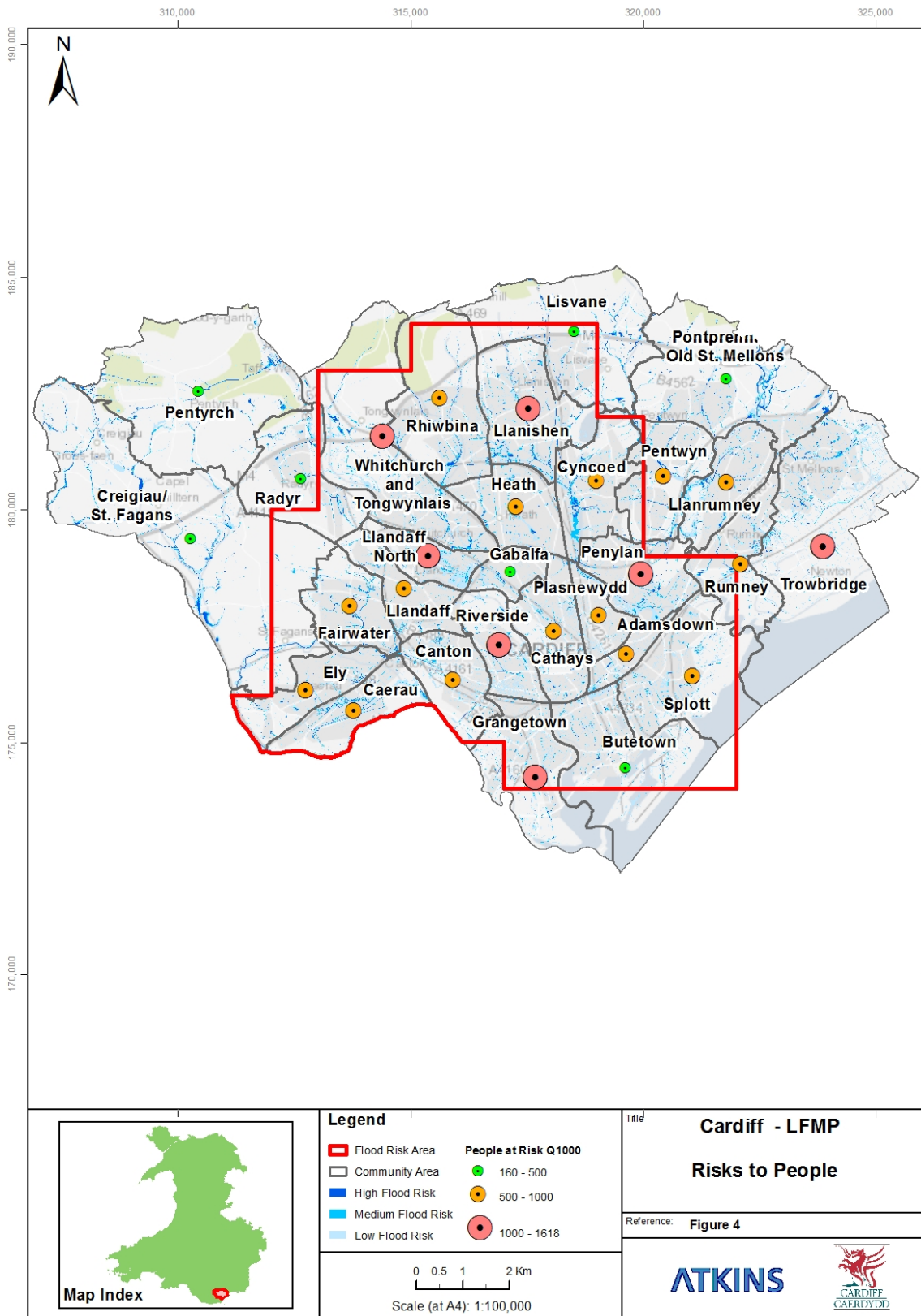
7.1.2 Risk to People and Property

With nearly 150,000 residential properties in Cardiff, nearly 120,000 (approximately 80%) of them are considered to be within the Flood Risk Area. However, of these just over 5,000 (3.5%) are considered to be at-risk of flooding during the low-risk (more extreme) events.

Figure 7–1 provides a comparison across Cardiff of the potential numbers of people affected. The following areas have over 300 people affected during low-risk events;

- Ely,
- Grangetown,
- Llandaff North,
- Llanishen,
- Penylan,
- Riverside,
- Splott, and
- Whitchurch and Tongwynlais.

Figure 7-1 Flood Risk Map – Risks to People



7.1.3 Risk to Economic Activity

The risk to wider infrastructure is more extensive than the number of residential properties. The values provided in Table 7-1 show the extent of trunk roads and railways identified as being affected during high-risk (more frequent) events.

We have completed a high-level assessment of the economic impact of flood damages (from local flood sources) using published guidance (Flood & Coastal Defence Project Appraisal Guidance, Multi-Coloured Manual⁹). Based on this analysis we estimate in any given year the area of Cardiff will incur over £26M worth of damages (Average Annual Damage, AAD) due to flooding from local flood sources. Over twenty-five years, this could account for potential damage equal to a Net Present Value of nearly £430M in current-day prices.

The following table provides a breakdown by ward of this assessment. Based on the average damage per property affected the worst areas are;

- Cathays,
- Pentwyn,
- Pontprennau/Old St. Mellons,
- Heath, and
- Butetown.

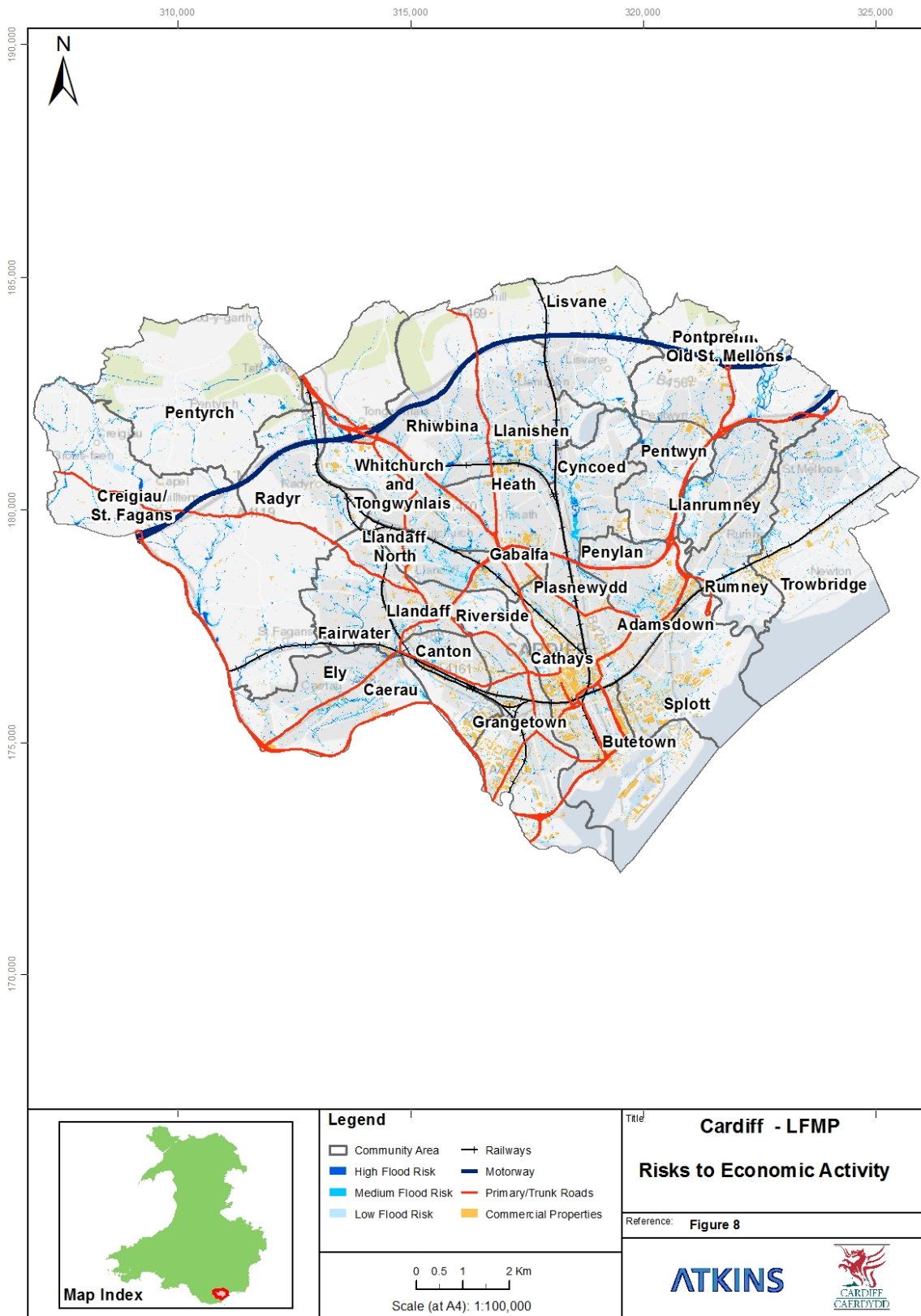
⁹ <http://www.mcm-online.co.uk/handbook/>

Table 7-4 Summary of economic impact of flooding across Cardiff

Ward	AAD £k
Adamsdown	410
Butetown	1,710
Caerau	1,230
Canton	940
Cathays	4,690
Creigiau/St. Fagans	90
Cyncoed	320
Ely	430
Fairwater	360
Gabalfa	290
Grangetown	1,520
Heath	2,530
Lisvane	130
Llandaff	300
Llandaff North	120
Llanishen	1,630

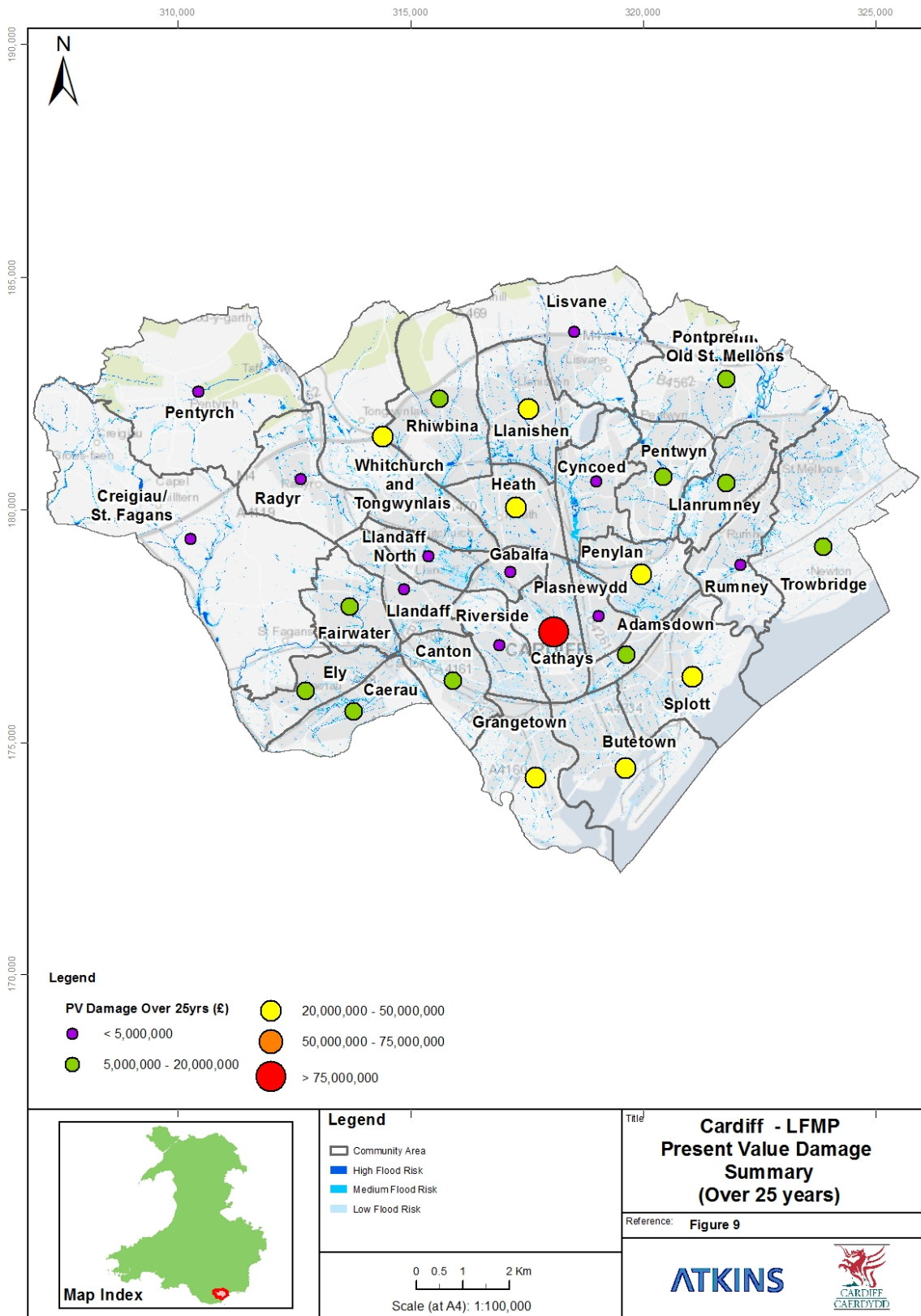
Ward	AAD £k
Llanrumney	570
Pentwyn	670
Pentyrch	260
Penylan	1,520
Plasnewydd	110
Pontprennau/Old St. Mellons	820
Radyr	240
Rhiwbina	390
Riverside	200
Rumney	300
Splott	1,940
Trowbridge	800
Whitchurch and Tongwynlais	1,620
Total	26,140

Figure 7-2 Flood Risk Map – Economic Activity



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Project: P:\GBSAA\Water\Industry\5138009 Cardiff LFRP\60 Works Process\64 Drawings\CAD_GIS_BIM\01-WIP\GIM API\5138009ATKZ\F8_CC_Risks_to_Economic_Activity.mxd

Figure 7-3 Flood Risk Map – Economic Damage

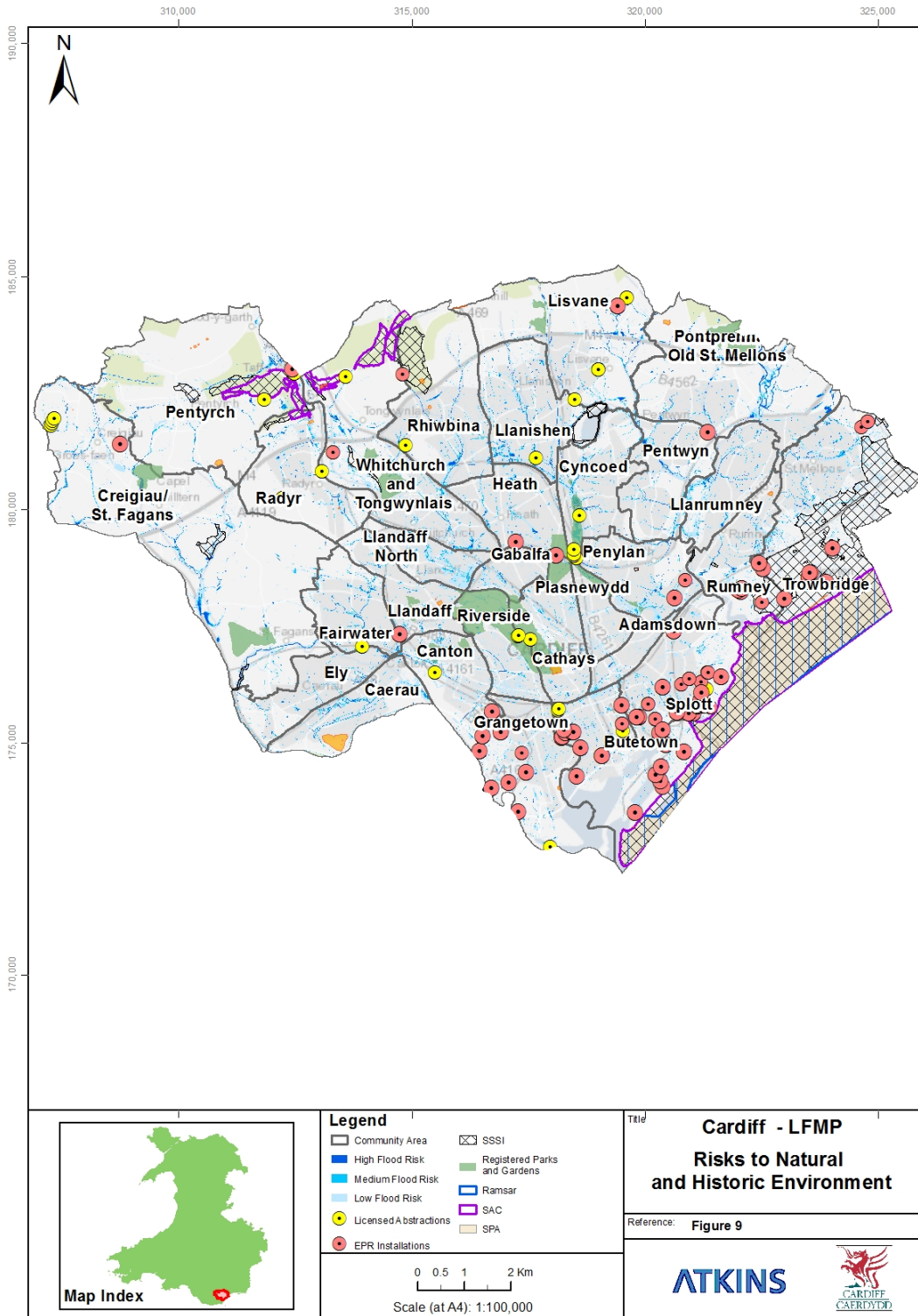


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7.1.4 Risk to Natural and Historic Environment

Large areas of parks are shown to be affected during low-risk (more extreme) events, notably Roath and Heath Parks providing benefit in reducing flood risk to the wider area. During the high-risk (more frequent) events there is limited impact on environmentally designated sites from local flood risk sources.

Figure 7-4 Flood Risk Map – Risks to Natural and Historic Environment



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Project: P:\GBSAA\Water\Industry\15138009 Cardiff LFRP\60 Works Process\64 Drawings\CAD_GIS_BIM\01-WIP\GIM AP\5138009ATKZF8_CC_Risks_to_Natural_Historic_Environment.mxd

7.2 Proposed measures

Table 7.5 below provides a summary of the measures to be implemented across the entirety of Cardiff.

Table 7-5 Proposed Measures for Local Flood Risk Management

EU Reporting Code	Activity
M44 - Preparedness	Delivery of the second round of Shoreline Management Plans by 2012 with proportionate implementation over the life of the Strategy
M44 - Preparedness	Development of Local Flood Risk Management Strategies
M32 - Protection	Implementation of statutory responsibilities including those set out within the Flood and Water Management Act 2010 and the Flood Risk Regulations
M22 - Prevention	Appropriate mapping of all sources of risk
M44 - Preparedness	Proportionate implementation of the Catchment Flood Management Plans over the life of the Strategy
M21 – Prevention	Link with wider work undertaken with regards making Cardiff a more resilient and sustainable area to live
M21 – Prevention	Reduce Corporate liability to Cardiff Council related to the impact of flood risk (and related aspects such as climate change)
M21 – Prevention	Preparation of Supplementary Planning Guidance to help manage flood risk
M21 – Prevention	Compliance with the requirements of Planning Policy Wales and relevant Technical Advice Notes.
M21 – Prevention	Appropriate undertaking of Strategic Flood Consequence Assessments and their use to inform Local Development Plans.
M34 – Protection	Approval and adoption of SuDS drainage systems by the SuDS Approving and Adopting Body.
M24 – Prevention	Development of a register of natural and manmade structures or features likely to have an effect on flood risk by 2015.
M24 – Prevention	Establishment of a programme of regular and appropriate maintenance for flood and coastal erosion risk management assets.
M32 – Protection	Designation of natural and manmade structures or features likely to have an effect on flood or coastal erosion risk over the life of the Strategy.
M43 - Preparedness	Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.
M43 - Preparedness	Identification of at risk groups within communities, including vulnerable individuals.

EU Reporting Code	Activity
M42 - Preparedness	Raise awareness internally with regards impact of flood risk on normal operations and post event situations
M41 - Preparedness	Continuation and expansion of Floodline Warning Direct Service of the life of the Strategy
M42 - Preparedness	A pan-Wales emergency exercise to test response and recovery arrangements by 2016
M42 - Preparedness	Local level emergency exercises to test response and recovery arrangements over the life of the Strategy.
M42 - Preparedness	Early and appropriate response to emergency events for all events.
M42 - Preparedness	Development and implementation of effective evacuation protocols for emergency events
M42 - Preparedness	Development of mutual aid protocols for resources, equipment and respite for emergency events.
M42 - Preparedness	Identification and provision of suitable respite accommodation as appropriate over the life of the Strategy.
M24 - Prevention	Development of procedures for the effective clearance of debris.
M24 – Prevention	Development of repair schedules including provision for the installation of resilient measures by 2015.
M24 – Prevention	Investigations into the causes of flooding to be undertaken where necessary within one month.
M52 – Recovery and Review	Post flood-event recovery plan in place
M61 - Other	Contribution funding from third-parties / non-public sources

7.3 Breakdown by Area

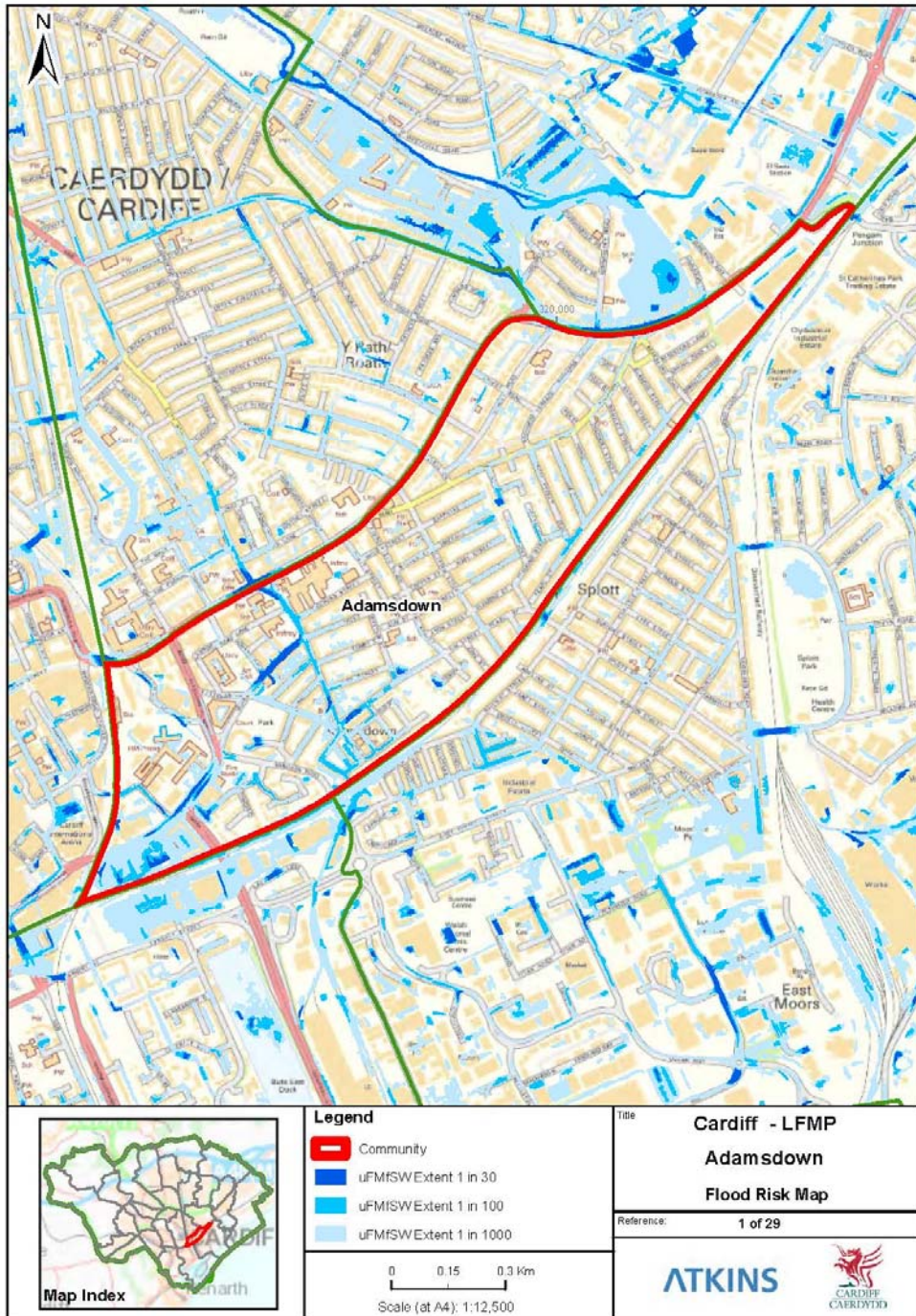
The following figures provide an overview of the potential impact of flooding across Cardiff, broken down by area showing the potential extent of people, infrastructure and natural environment that may be affected.

Adamsdown	Llanishen
Butetown	Llanrumney – Outside of Flood Risk Area
Caerau	Pentwyn
Canton	Pentyrch – Outside of Flood Risk Area
Cathays	Penylan
Creigiau/ St. Fagans	Plasnewydd
Cyncoed	Pontprennau/ Old St. Mellons – Outside of Flood Risk Area
Ely	Radyr
Fairwater	Rhiwbina
Gabalfa	Riverside
Grangetown	Rumney
Heath	Splott
Lisvane	Trowbridge – Outside of Flood Risk Area
Llandaff	Whitchurch and Tongwynlais
Llandaff North	

7.3.1 Adamsdown

During high-risk (more frequent) events surface water flooding is generally contained to the roads, with 4 properties predicted to be affected. During low-risk (more extreme) events overland flow from surface water is predicted to affect the Adam St car park area, as well as the main roads towards the south west of the area. Potential ponding of floodwaters will also affect access to and along Newport Road and Bute Terrace / Adam St under the railway.

Figure 7-5 Flood Risk Map – Adamsdown



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Table 7-6 Counts for Adamsdown Flood Risk Area

COUNTS FOR Adamsdown FLOOD RISK AREA				
	Total in defined area	Risk Counts		
		HIGH	MED	LOW
Risk to People and Property		Residents in areas at risk of flooding		
People (n) (multiplier 2.35)	10,646	9	21	355
		Residential Properties at risk of flooding		
Residential Properties (n)	4,530	4	9	151
Services (n)	26	-	-	-
Risk to Economic Activity				
Non-Residential Properties (n)	666	1	2	29
Airports (n)				
Primary/Trunk Roads (km)	-	-	-	-
Main Line Railways (km)	0.74	0.15	0.15	0.69
Agricultural Land – Grades 1, 2 and 3 (ha)	107	1	3	16
Risk to Natural and Historic Environment				
Bathing Waters (n)				
Environmental Permitting Regulations (EPR) Installations (n)	-	-	-	-
Special Areas of Conservation (SAC) (ha)	-	-	-	-
Special Protection Areas (SPA) (ha)	-	-	-	-
Ramsar Sites (ha)	-	-	-	-
World Heritage Sites (ha)				
Sites of Special Scientific Interest (SSSI) (ha)	-	-	-	-
Parks and Gardens (ha)	-	-	-	-
Scheduled Ancient Monuments (ha)	-	-	-	-
Listed Buildings (n)	24	-	-	-
Licensed Abstractions (LA) (n)	-	-	-	-
Sites of Importance for Nature Conservation (SINC) (ha)				

Adamsdown – Delivery Plan

The following summarise actions we propose to manage local flood risk to an acceptable level within the community.

FRMP Measure	EU Reporting Code	Timescale	Responsible Authority
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	M22 – Prevention	2016 - 2021	City of Cardiff Council
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	M43 Preparedness	2016 – 2021	City of Cardiff Council
Post flood-event recovery plan in place	M52 – Recovery and Review	2016 - 2021	City of Cardiff Council



7.3.2 Butetown

Butetown is a combination of high-density residential areas and the mainly commercial Cardiff Bay development area. During high-risk events there are localised issues of surface water flooding in area where development has led to large areas of impermeable surfacing. The counts of affected assets do not increase significantly during the low-risk events.

Figure 7-6 Flood Risk Map - Butetown

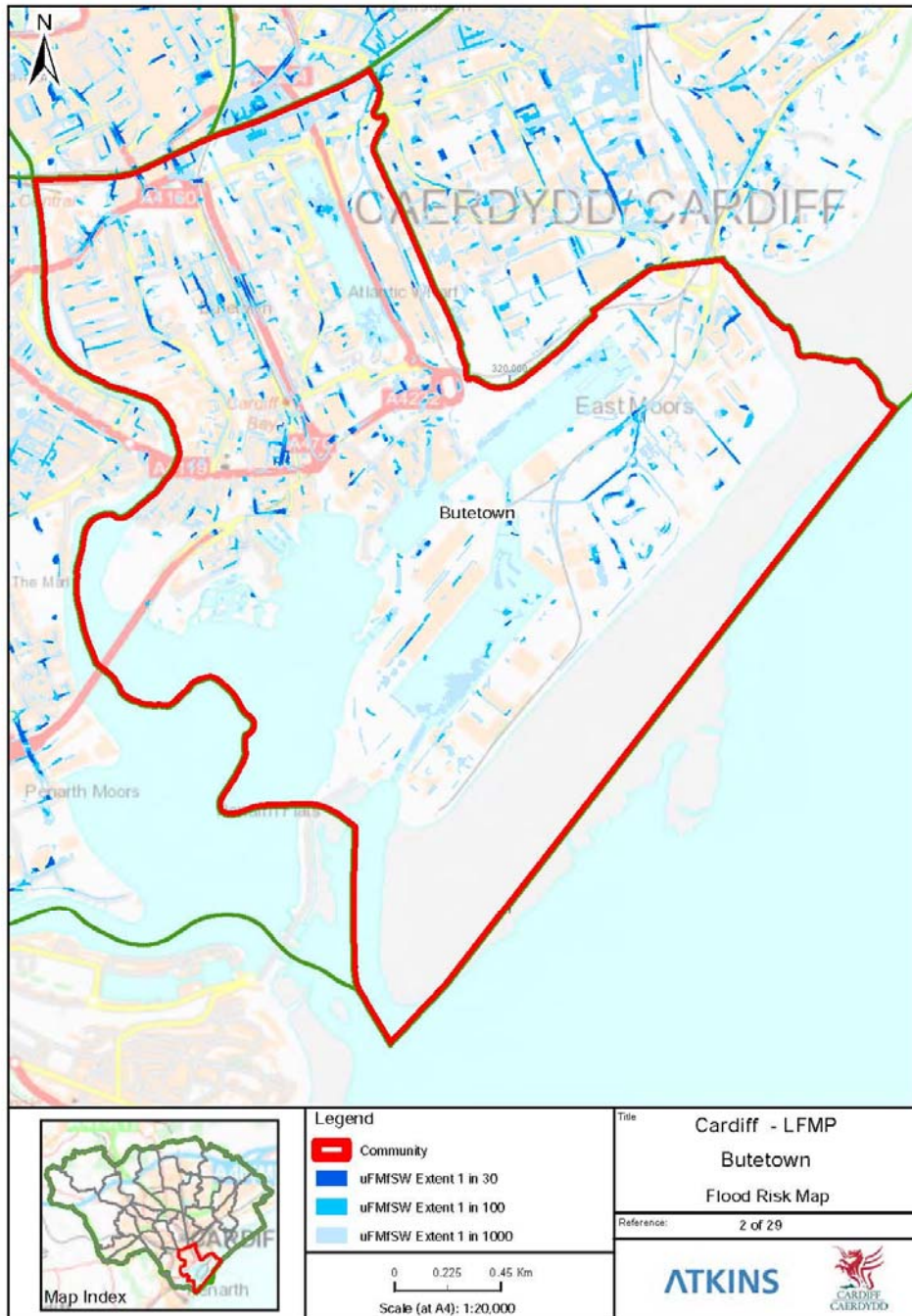


Table 7-7 Counts for Butetown Flood Risk Area

COUNTS FOR Butetown FLOOD RISK AREA				
	Total in defined area	Risk Counts		
		HIGH	MED	LOW
Risk to People and Property		Residents in areas at risk of flooding		
People (n) (multiplier 2.35)	13,787	16	19	226
		Residential Properties at risk of flooding		
Residential Properties (n)	5,867	7	8	96
Services (n)	88	3	7	9
Risk to Economic Activity				
Non-Residential Properties (n)	1,524	14	48	150
Airports (n)				
Primary/Trunk Roads (km)	-	-	-	-
Main Line Railways (km)	2.74	1.71	2.43	2.69
Agricultural Land – Grades 1, 2 and 3 (ha)	421	2	9	44
Risk to Natural and Historic Environment				
Bathing Waters (n)				
Environmental Permitting Regulations (EPR) Installations (n)	28	-	-	2
Special Areas of Conservation (SAC) (ha)	48.66	-	-	-
Special Protection Areas (SPA) (ha)	39.66	-	-	-
Ramsar Sites (ha)	39.66	-	-	-
World Heritage Sites (ha)				
Sites of Special Scientific Interest (SSSI) (ha)	41	-	-	-
Parks and Gardens (ha)	-	-	-	-
Scheduled Ancient Monuments (ha)	0	-	-	-
Listed Buildings (n)	113	-	2	9
Licensed Abstractions (LA) (n)	3	-	-	1
Sites of Importance for Nature Conservation (SINC) (ha)				

Butetown – Delivery Plan

The following summarise actions we propose to manage local flood risk to an acceptable level within the community.

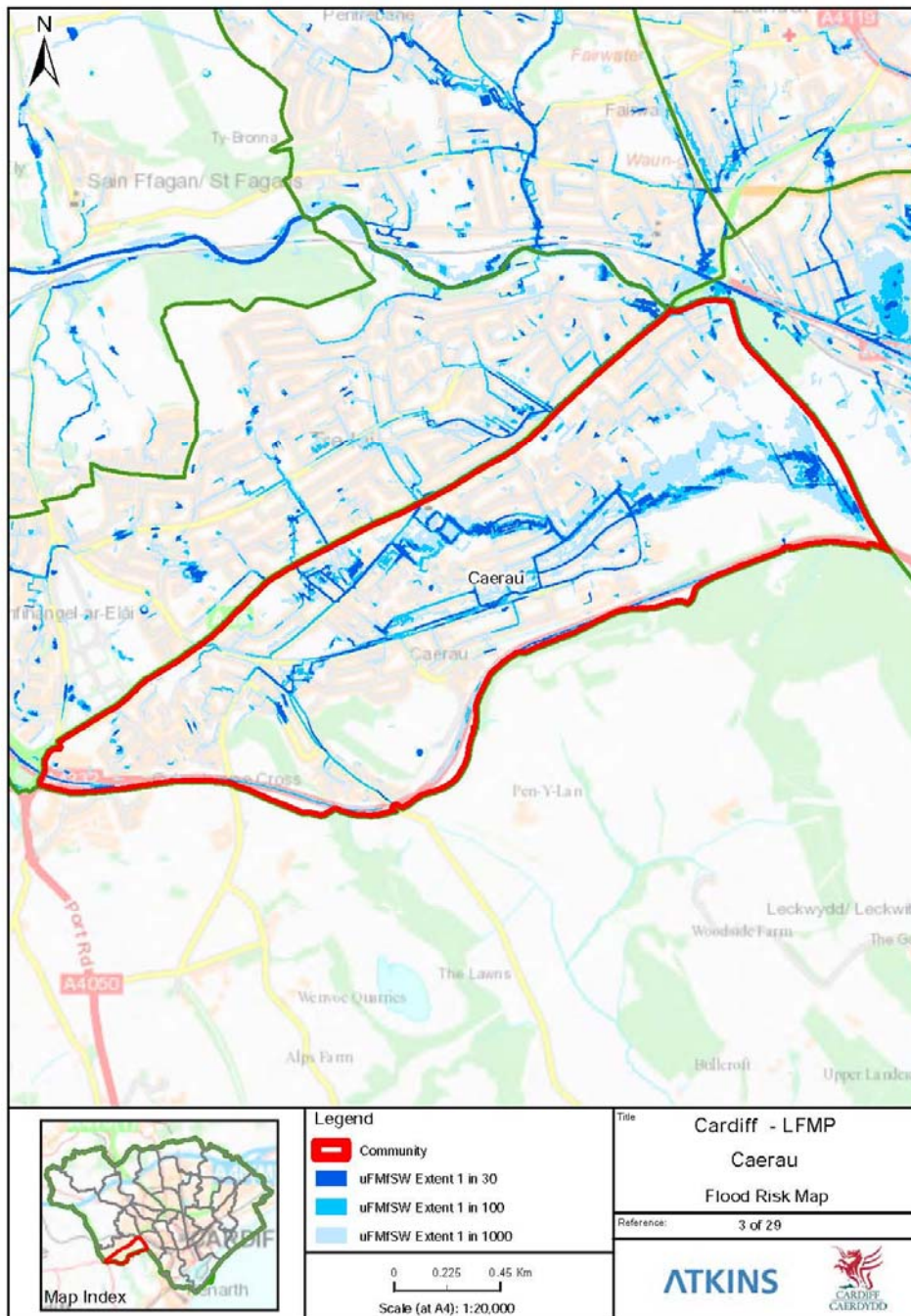
FRMP Measure	EU Reporting Code	Timescale	Responsible Authority
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	M22 – Prevention	2016 - 2021	City of Cardiff Council
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	M43 - Preparedness	2016 - 2021	City of Cardiff Council
Post flood-event recovery plan in place	M52 – Recovery and Review	2016 - 2021	City of Cardiff Council



7.3.3 Caerau

The area is bounded by the A4232 to the west and south and the Ely River to the north and east. During high-risk (more frequent) events overland flow paths are predicted to affect the Western Leisure Centre thus limiting its use during flood events. During low-risk (more extreme) events surface water flow paths flow in a generally eastern direction following the fall of the land and flow across Trelai Park, potentially affecting a SAM site, before discharging to the River Ely (once flood levels in the river abate).

Figure 7-7 Flood Risk Map - Caerau



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Table 7-8 *Counts for Caerau Flood Risk Area*

COUNTS FOR Caerau FLOOD RISK AREA				
	Total in defined area	Risk Counts		
		HIGH	MED	LOW
Risk to People and Property		Residents <u>in</u> areas at risk of flooding		
People (n) (multiplier 2.35)	11,195	45	61	486
		Residential Properties <u>at risk of</u> flooding		
Residential Properties (n)	4,764	19	26	207
Services (n)	32	-	1	4
Risk to Economic Activity				
Non-Residential Properties (n)	358	5	9	30
Airports (n)				
Primary/Trunk Roads (km)	-	-	-	-
Main Line Railways (km)	-	-	-	-
Agricultural Land – Grades 1, 2 and 3 (ha)	302	7	18	56
Risk to Natural and Historic Environment				
Bathing Waters (n)				
Environmental Permitting Regulations (EPR) Installations (n)	-	-	-	-
Special Areas of Conservation (SAC) (ha)	-	-	-	-
Special Protection Areas (SPA) (ha)	-	-	-	-
Ramsar Sites (ha)	-	-	-	-
World Heritage Sites (ha)				
Sites of Special Scientific Interest (SSSI) (ha)	-	-	-	-
Parks and Gardens (ha)	-	-	-	-
Scheduled Ancient Monuments (ha)	14	0	0	1
Listed Buildings (n)	3	-	-	-
Licensed Abstractions (LA) (n)	-	-	-	-
Sites of Importance for Nature Conservation (SINC) (ha)				

Caerau – Delivery Plan

The following summarise actions we propose to manage local flood risk to an acceptable level within the community.

FRMP Measure	EU Reporting Code	Timescale	Responsible Authority
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	M22 – Prevention	2016 - 2021	City of Cardiff Council
Development of procedures for the effective clearance of debris.	M24 - Prevention	2016 - 2021	City of Cardiff Council
Development of mutual aid protocols for resources, equipment and respite for emergency events.	M42 - Preparedness	2016 - 2021	City of Cardiff Council
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	M43 - Preparedness	2016 - 2021	City of Cardiff Council
Post flood-event recovery plan in place	M52 – Recovery and Review	2016 - 2021	City of Cardiff Council



7.3.4 Canton

Bisected by the A48 Cowbridge Road East and the main railway link into Cardiff the area has seen historic flooding around Victoria Park. During high-risk (more frequent) events surface water flooding in the streets around the park is predicted to occur with no residential properties identified to be at risk of flooding. During low-risk (more extreme) events there are localised sections affected across the area with over a hundred properties at-risk. Flood risk from the River Ely provides the dominant risk to the area during all events.

Figure 7-8 Flood Risk Map - Canton

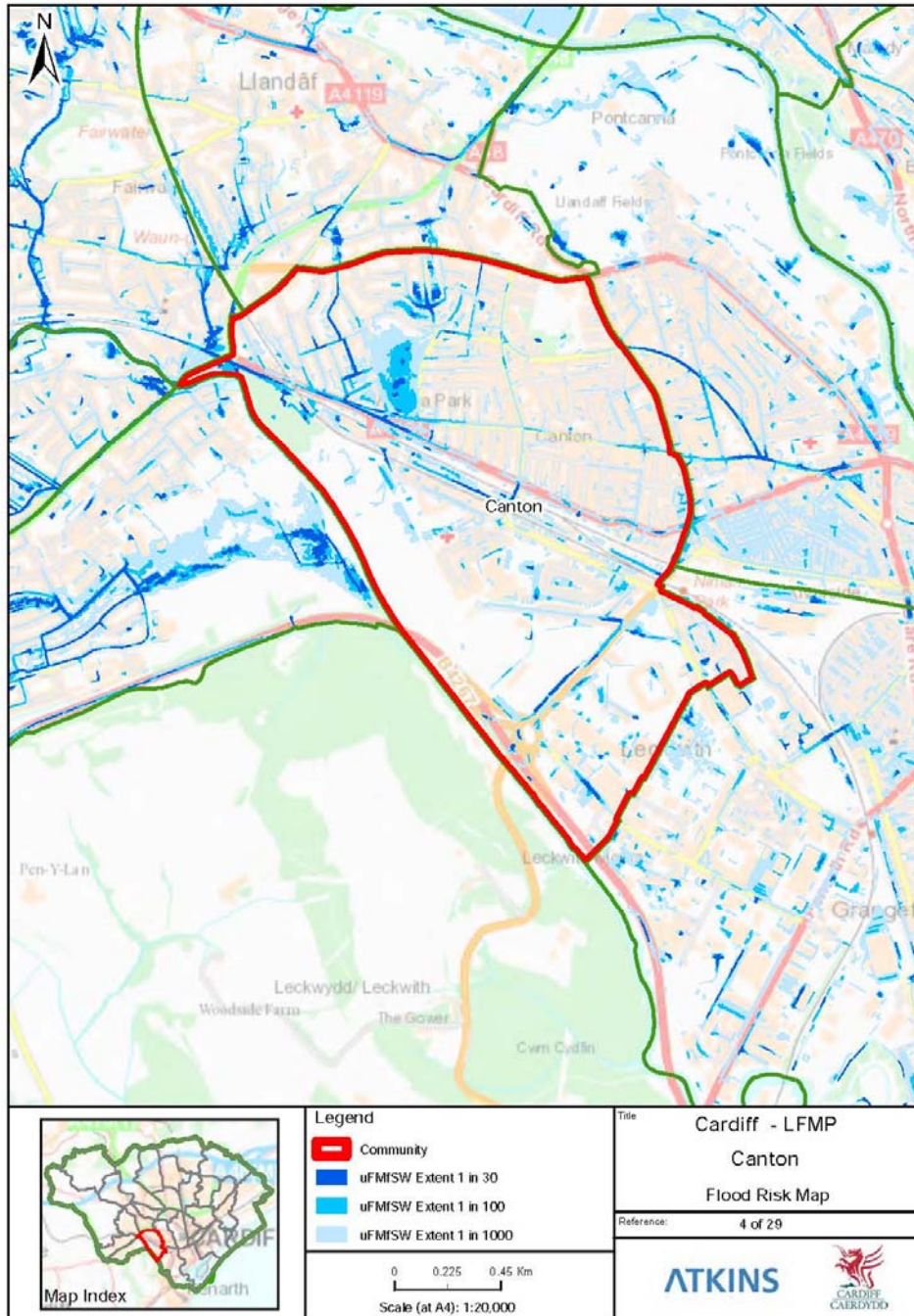


Table 7-9 Counts for Canton Flood Risk Area

COUNTS FOR Canton FLOOD RISK AREA				
	Total in defined area	Risk Counts		
		HIGH	MED	LOW
Risk to People and Property		Residents in areas at risk of flooding		
People (n) (multiplier 2.35)	14,897	-	5	313
		Residential Properties at risk of flooding		
Residential Properties (n)	6,339	-	2	133
Services (n)	46	-	2	4
Risk to Economic Activity				
Non-Residential Properties (n)	917	1	8	67
Airports (n)				
Primary/Trunk Roads (km)	-	-	-	-
Main Line Railways (km)	4.71	2.98	4.25	4.25
Agricultural Land – Grades 1, 2 and 3 (ha)	306	3	12	43
Risk to Natural and Historic Environment				
Bathing Waters (n)				
Environmental Permitting Regulations (EPR) Installations (n)	1	-	-	-
Special Areas of Conservation (SAC) (ha)	-	-	-	-
Special Protection Areas (SPA) (ha)	-	-	-	-
Ramsar Sites (ha)	-	-	-	-
World Heritage Sites (ha)				
Sites of Special Scientific Interest (SSSI) (ha)	-	-	-	-
Parks and Gardens (ha)	13	0	3	6
Scheduled Ancient Monuments (ha)	0	-	-	0
Listed Buildings (n)	22	-	-	1
Licensed Abstractions (LA) (n)	1	-	-	-
Sites of Importance for Nature Conservation (SINC) (ha)				

Canton – Delivery Plan

The following summarise actions we propose to manage local flood risk to an acceptable level within the community.

FRMP Measure	EU Reporting Code	Timescale	Responsible Authority
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	M22 – Prevention	2016 - 2021	City of Cardiff Council
Development of procedures for the effective clearance of debris.	M24 – Prevention	2016 - 2021	City of Cardiff Council
Development of mutual aid protocols for resources, equipment and respite for emergency events.	M42 - Preparedness	2016 - 2021	City of Cardiff Council
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	M43 - Preparedness	2016 - 2021	City of Cardiff Council
Post flood-event recovery plan in place	M52 – Recovery and Review	2016 - 2021	City of Cardiff Council



7.3.5 Cathays

Bounded by the Cardiff Valleys railway line to the east and the River Taff and Pontcanna fields to the west Cathays is a high-density residential area with nearly 7,000 properties in the area. During high-risk (more frequent) events properties along Maindy Road with 11 residential properties in total predicted to be affected across the area. There is little change in the extents during low-risk (more extreme) events with 190 residential properties predicted to be affected.

Figure 7-9 Flood Risk Map - Cathays

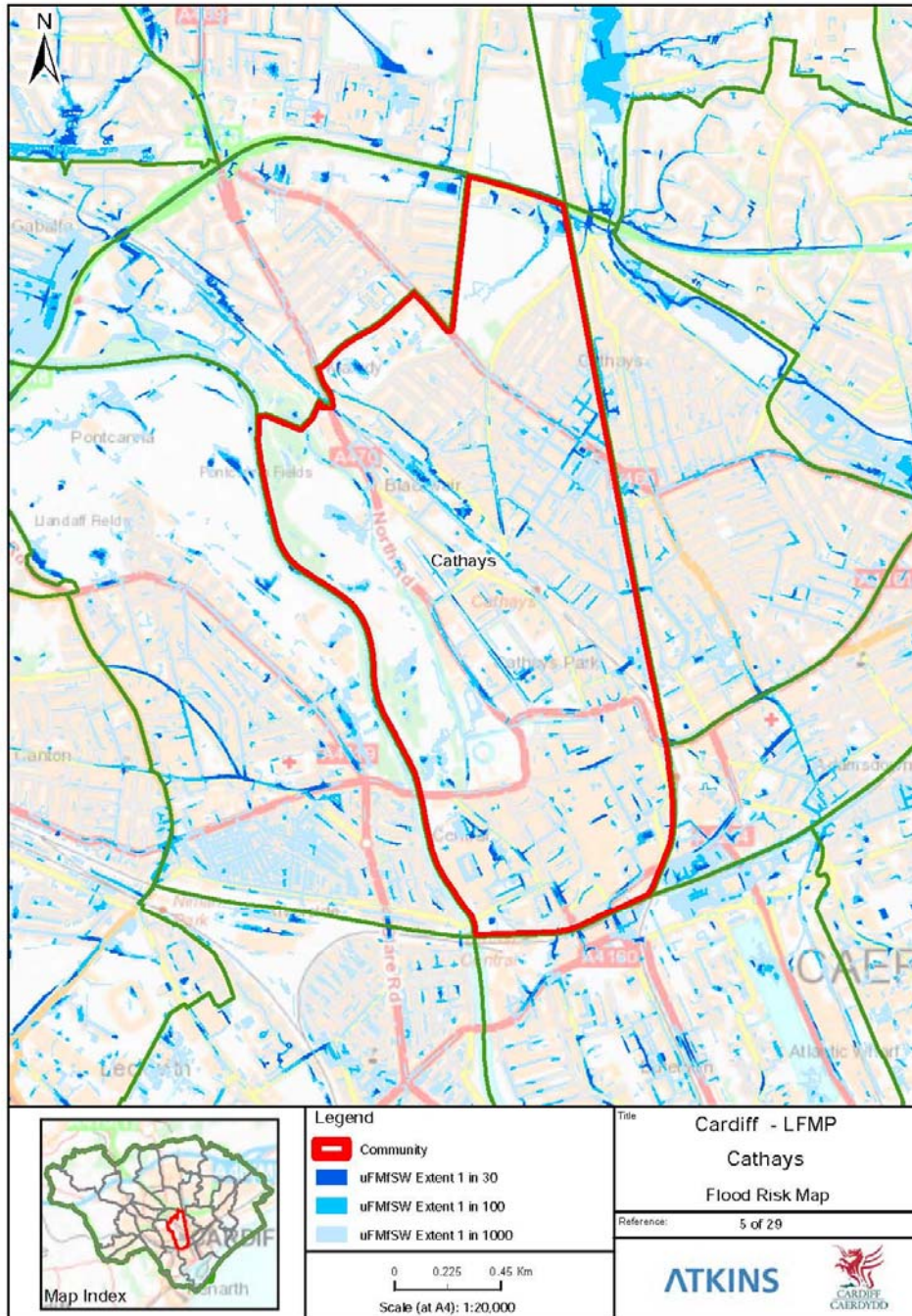


Table 7-10 Counts for Cathays Flood Risk Area

COUNTS FOR Cathays FLOOD RISK AREA				
	Total in defined area	Risk Counts		
		HIGH	MED	LOW
Risk to People and Property		Residents in areas at risk of flooding		
People (n) (multiplier 2.35)	16,156	2	28	280
		Residential Properties at risk of flooding		
Residential Properties (n)	6,875	1	12	119
Services (n)	109	-	1	4
Risk to Economic Activity				
Non-Residential Properties (n)	2,435	11	46	190
Airports (n)				
Primary/Trunk Roads (km)	-	-	-	-
Main Line Railways (km)	2.89	1.54	2.70	2.73
Agricultural Land – Grades 1, 2 and 3 (ha)	334	2	9	43
Risk to Natural and Historic Environment				
Bathing Waters (n)				
Environmental Permitting Regulations (EPR) Installations (n)	1	-	-	-
Special Areas of Conservation (SAC) (ha)	-	-	-	-
Special Protection Areas (SPA) (ha)	-	-	-	-
Ramsar Sites (ha)	-	-	-	-
World Heritage Sites (ha)				
Sites of Special Scientific Interest (SSSI) (ha)	-	-	-	-
Parks and Gardens (ha)	84	0	1	8
Scheduled Ancient Monuments (ha)	5	-	-	0
Listed Buildings (n)	189	-	3	8
Licensed Abstractions (LA) (n)	2	-	-	-
Sites of Importance for Nature Conservation (SINC) (ha)				

Cathays – Delivery Plan

The following summarise actions we propose to manage local flood risk to an acceptable level within the community.

FRMP Measure	EU Reporting Code	Timescale	Responsible Authority
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	M22 – Prevention	2016 - 2021	City of Cardiff Council
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	M43 - Preparedness	2016 - 2021	City of Cardiff Council
Post flood-event recovery plan in place	M52 – Recovery and Review	2016 - 2021	City of Cardiff Council



7.3.6 Creigiau/ St. Fagans

This is the westernmost area within the authority, and at the downstream end of the Ely Moors. There are localised areas of flooding from ordinary watercourses which discharge to the River Ely. The Nant Dowlais affects areas of agricultural land adjacent to the A4232, and in low-risk (more extreme) events will impact on minor roads connecting St Fagans and St Brides Super Ely. No properties are identified to be affected by local flood risk sources within the area.

Figure 7-10 Flood Risk Map - Creigiau/St. Fagans

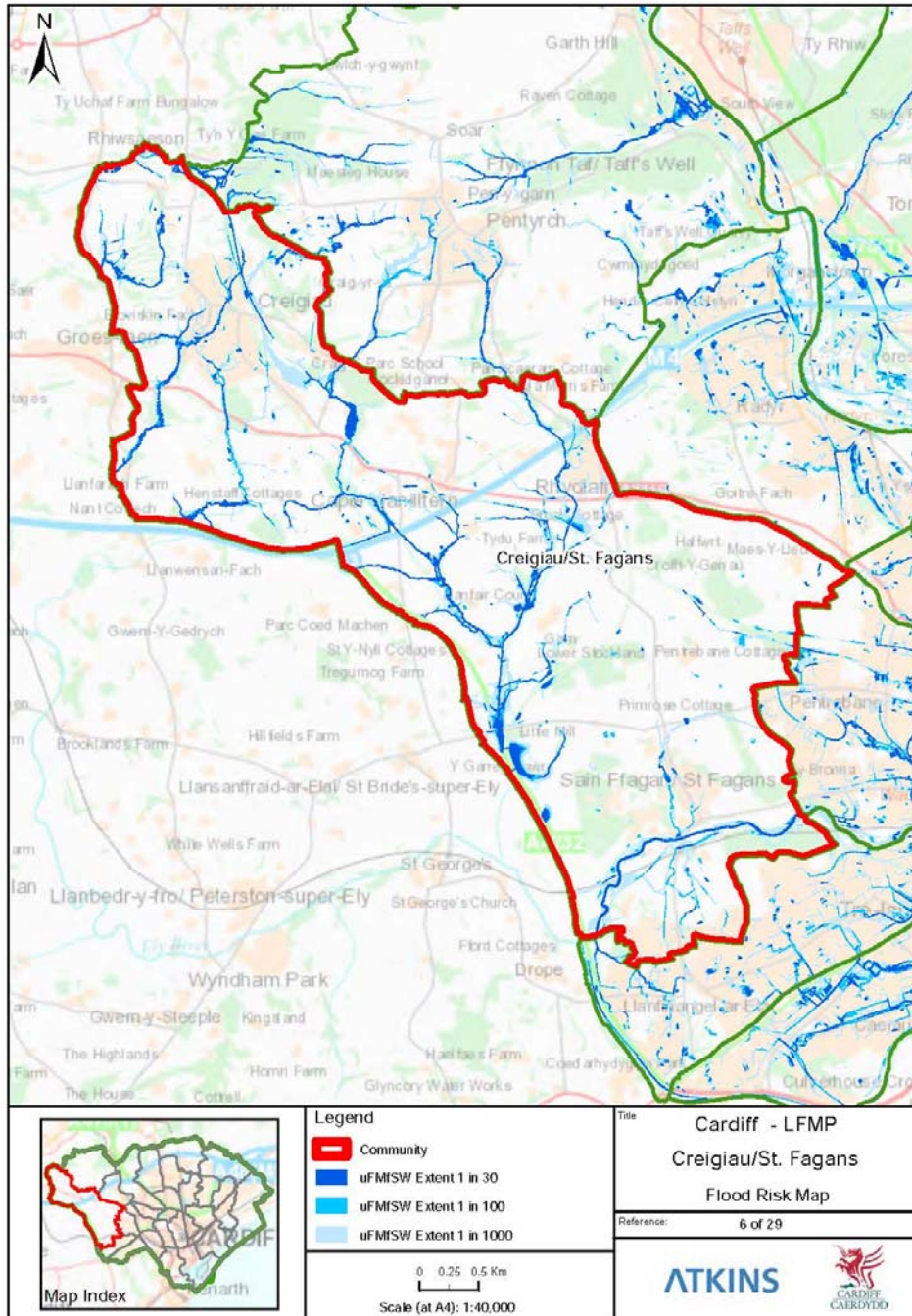


Table 7-11 Counts for Creigiau/St. Fagans Flood Risk Area

COUNTS FOR Creigiau/St. Fagans FLOOD RISK AREA				
	Total in defined area	Risk Counts		
		HIGH	MED	LOW
Risk to People and Property		Residents in areas at risk of flooding		
People (n) (multiplier 2.35)	1,029	-	-	-
		Residential Properties at risk of flooding		
Residential Properties (n)	438	-	-	-
Services (n)	3	-	-	-
Risk to Economic Activity				
Non-Residential Properties (n)	104	-	-	1
Airports (n)				
Primary/Trunk Roads (km)	-	-	-	-
Main Line Railways (km)	1.14	2.20	2.20	2.20
Agricultural Land – Grades 1, 2 and 3 (ha)	323	2	4	13
Risk to Natural and Historic Environment				
Bathing Waters (n)				
Environmental Permitting Regulations (EPR) Installations (n)	-	-	-	-
Special Areas of Conservation (SAC) (ha)	-	-	-	-
Special Protection Areas (SPA) (ha)	-	-	-	-
Ramsar Sites (ha)	-	-	-	-
World Heritage Sites (ha)				
Sites of Special Scientific Interest (SSSI) (ha)	-	-	-	-
Parks and Gardens (ha)	40	-	0	0
Scheduled Ancient Monuments (ha)	0	-	-	-
Listed Buildings (n)	39	-	1	2
Licensed Abstractions (LA) (n)	-	-	-	-
Sites of Importance for Nature Conservation (SINC) (ha)				

Creigiau/St. Fagans – Delivery Plan

The following summarise actions we propose to manage local flood risk to an acceptable level within the community.

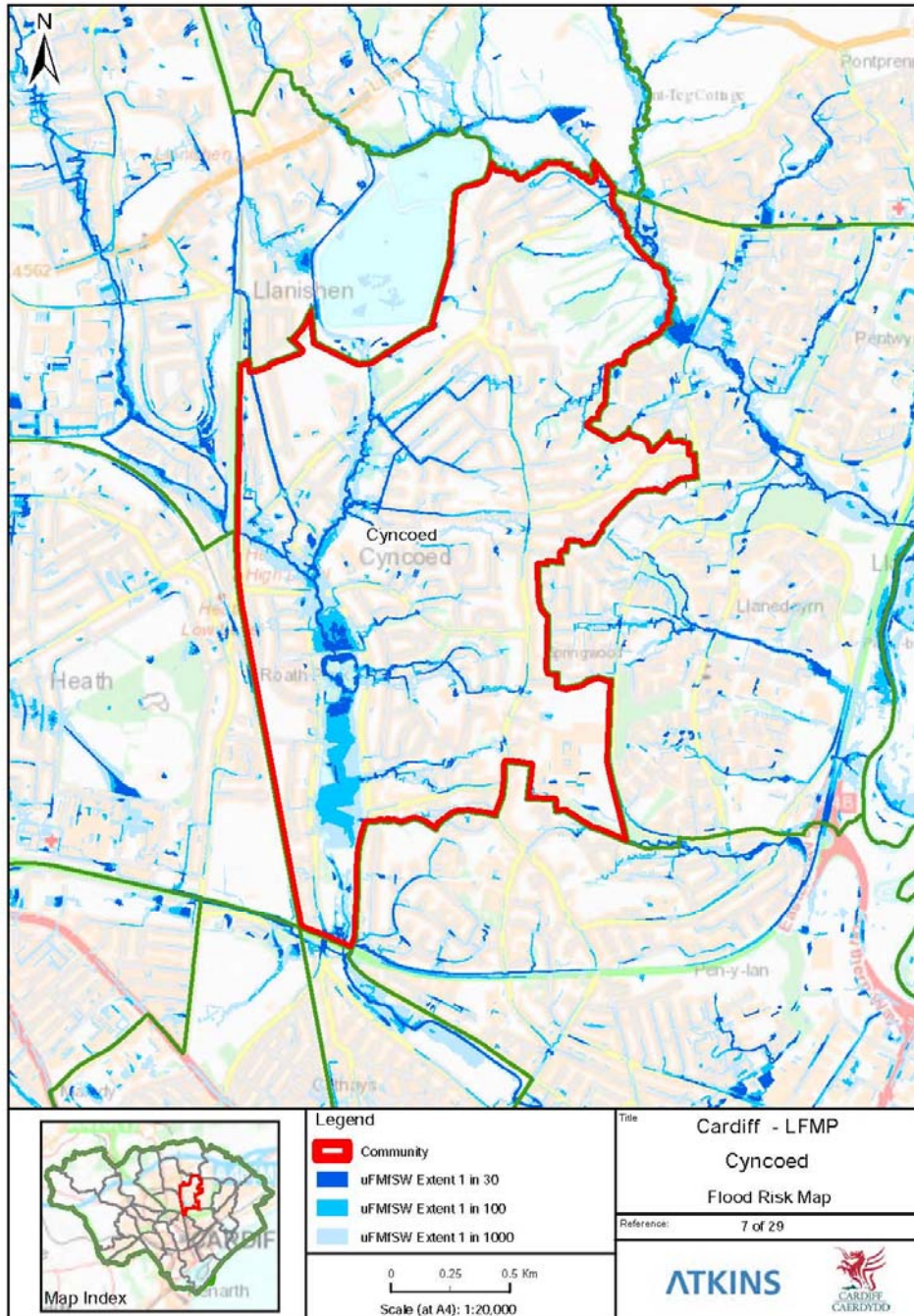
FRMP Measure	EU Reporting Code	Timescale	Responsible Authority
Establishment of a programme of regular and appropriate maintenance for flood and coastal erosion risk management assets.	M24 – Prevention	2016- 2021	City of Cardiff council
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	M22 – Prevention	2016- 2021	City of Cardiff council
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	M43 - Preparedness	2016- 2021	City of Cardiff council
Post flood-event recovery plan in place	M52 – Recovery and Review	2016- 2021	City of Cardiff council



7.3.7 Cyncoed

During high-risk (more frequent) events localised flooding is predicted with 10 residential properties and roads adjacent to Roath Brook and its tributaries predicted to be affected by flooding. During low-risk (more extreme) events the extents and impact of the flood extents affects a wider network of roads with 75 residential properties predicted to be affected.

Figure 7-11 Flood Risk Map - Cyncoed



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Table 7-12 Counts for Cyncoed Flood Risk Area

COUNTS FOR Cyncoed FLOOD RISK AREA				
	Total in defined area	Risk Counts		
		HIGH	MED	LOW
Risk to People and Property		Residents in areas at risk of flooding		
People (n) (multiplier 2.35)	9,809	24	9	176
		Residential Properties at risk of flooding		
Residential Properties (n)	4,174	10	4	75
Services (n)	43	-	-	1
Risk to Economic Activity				
Non-Residential Properties (n)	491	-	1	13
Airports (n)				
Primary/Trunk Roads (km)	-	-	-	-
Main Line Railways (km)	1.72	-	-	1.43
Agricultural Land – Grades 1, 2 and 3 (ha)	362	7	22	55
Risk to Natural and Historic Environment				
Bathing Waters (n)				
Environmental Permitting Regulations (EPR) Installations (n)	-	-	-	-
Special Areas of Conservation (SAC) (ha)	-	-	-	-
Special Protection Areas (SPA) (ha)	-	-	-	-
Ramsar Sites (ha)	-	-	-	-
World Heritage Sites (ha)				
Sites of Special Scientific Interest (SSSI) (ha)	-	-	-	-
Parks and Gardens (ha)	27	2	10	17
Scheduled Ancient Monuments (ha)	-	-	-	-
Listed Buildings (n)	7	-	2	3
Licensed Abstractions (LA) (n)	5	-	-	2
Sites of Importance for Nature Conservation (SINC) (ha)				

Cyncoed – Delivery Plan

The following summarise actions we propose to manage local flood risk to an acceptable level within the community.

FRMP Measure	EU Reporting Code	Timescale	Responsible Authority
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	M22 – Prevention	2016 - 2021	City of Cardiff Council
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	M43 - Preparedness	2016 - 2021	City of Cardiff Council
Post flood-event recovery plan in place	M52 – Recovery and Review	2016 - 2021	City of Cardiff Council

Review of current maintenance regimes if a revised approach can be completed.

Included in overall preparedness and recovery plans for Cardiff



7.3.8 Ely

During high-risk (more frequent) events 31 residential properties are predicted to be at risk, across over 6,000 which are located in the area. There is a localised area at risk of flooding during these events adjacent to where Cowbridge Road West crosses the River Ely. This area is also known to be at high-risk of flooding from the river. More widespread, but localised areas of flood risk are predicted during low-risk (more extreme) events due to overland flows with 128 residential properties identified to be at-risk.

Figure 7-12 Flood Risk Map - Ely

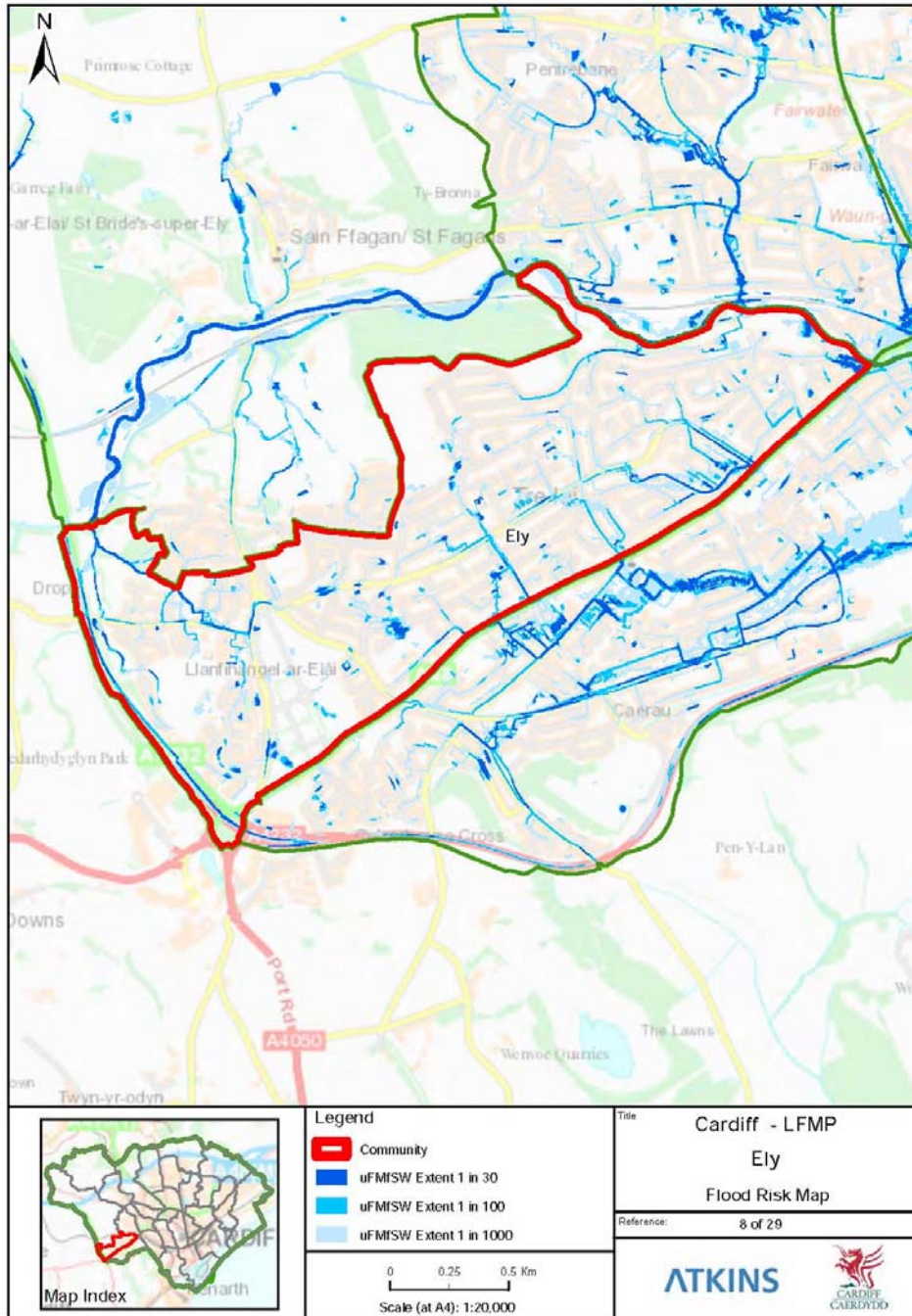


Table 7-13 Counts for Ely Flood Risk Area

COUNTS FOR Ely FLOOD RISK AREA				
	Total in defined area	Risk Counts		
		HIGH	MED	LOW
Risk to People and Property		Residents in areas at risk of flooding		
People (n) (multiplier 2.35)	14,535	73	89	301
		Residential Properties at risk of flooding		
Residential Properties (n)	6,185	31	38	128
Services (n)	36	-	-	3
Risk to Economic Activity				
Non-Residential Properties (n)	270	1	3	18
Airports (n)				
Primary/Trunk Roads (km)	3	1	2	3
Main Line Railways (km)	0.16	0.16	0.16	0.16
Agricultural Land – Grades 1, 2 and 3 (ha)	295	5	11	31
Risk to Natural and Historic Environment				
Bathing Waters (n)				
Environmental Permitting Regulations (EPR) Installations (n)	-	-	-	-
Special Areas of Conservation (SAC) (ha)	-	-	-	-
Special Protection Areas (SPA) (ha)	-	-	-	-
Ramsar Sites (ha)	-	-	-	-
World Heritage Sites (ha)				
Sites of Special Scientific Interest (SSSI) (ha)	-	-	-	-
Parks and Gardens (ha)	-	-	-	-
Scheduled Ancient Monuments (ha)	-	-	-	-
Listed Buildings (n)	3	-	-	-
Licensed Abstractions (LA) (n)	1	-	-	-
Sites of Importance for Nature Conservation (SINC) (ha)				

Ely – Delivery Plan

The following summarise actions we propose to manage local flood risk to an acceptable level within the community.

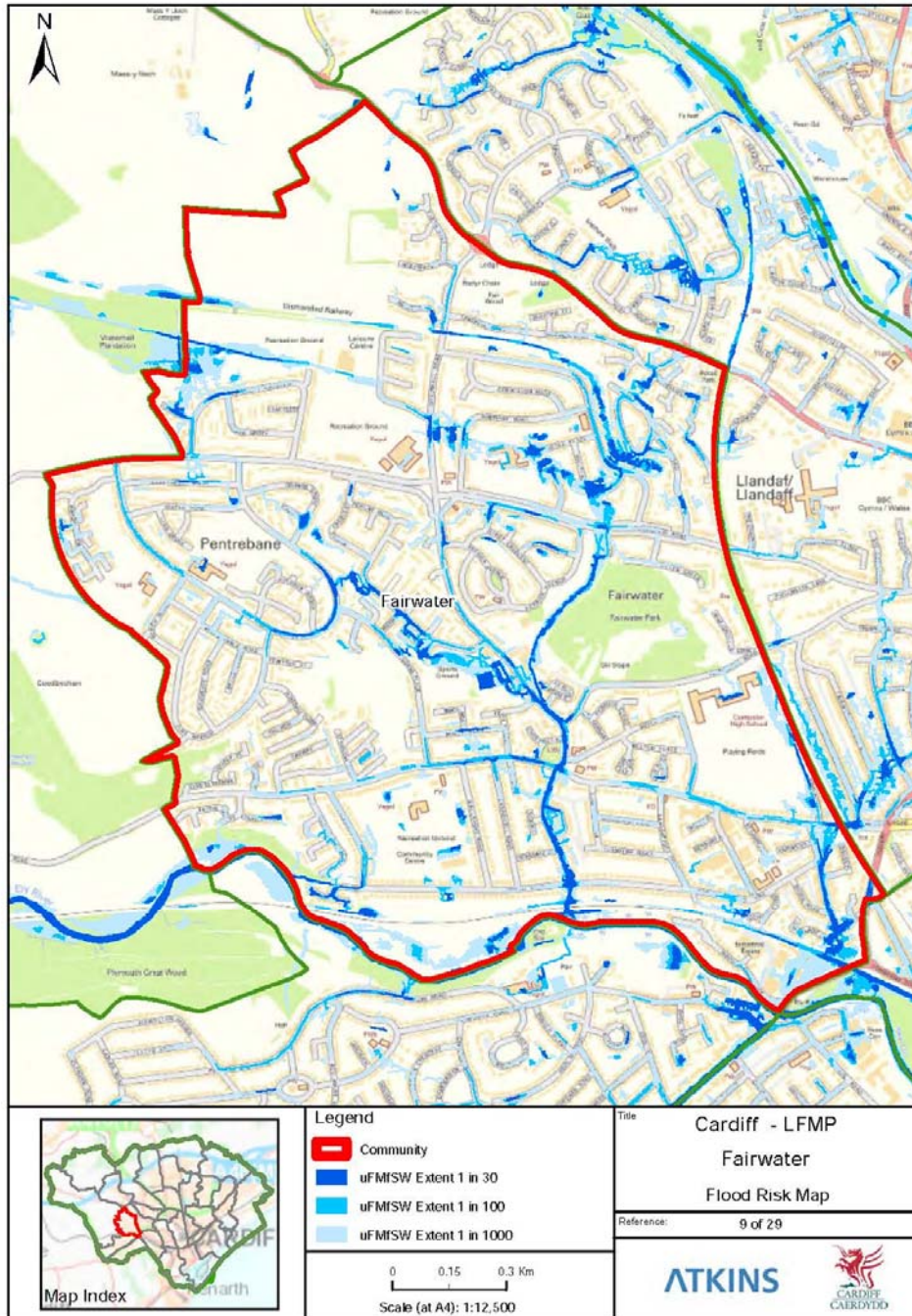
FRMP Measure	EU Reporting Code	Timescale	Responsible Authority
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	M22 – Prevention	2016 - 2021	City of Cardiff Council
Establishment of a programme of regular and appropriate maintenance for flood and coastal erosion risk management assets.	M24 – Prevention	2016 - 2021	City of Cardiff Council
Development of mutual aid protocols for resources, equipment and respite for emergency events.	M42 - Preparedness	2016 - 2021	City of Cardiff Council
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	M43 - Preparedness	2016 - 2021	City of Cardiff Council
Post flood-event recovery plan in place	M52 – Recovery and Review	2016 - 2021	City of Cardiff Council



7.3.9 Fairwater

Fairwater Brook flows through the area. There is an identified flood risk from the brook during high-risk (more frequent) events, however, only 27 residential properties out of over 6,000 within the area are predicted to be flooded. The junction of St Fagan Road and Fairwater Road is predicted to be affected; with flood waters shown to be flowing overland in a westerly direction. Frequent attendance of council staff is needed to ensure the culvert under the road is kept clear.

Figure 7-13 Flood Risk Map - Fairwater



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Table 7-14 Counts for Fairwater Flood Risk Area

COUNTS FOR Fairwater FLOOD RISK AREA				
	Total in defined area	Risk Counts		
		HIGH	MED	LOW
Risk to People and Property		Residents in areas at risk of flooding		
People (n) (multiplier 2.35)	14,265	63	78	360
		Residential Properties at risk of flooding		
Residential Properties (n)	6,070	27	33	153
Services (n)	42	-	-	5
Risk to Economic Activity				
Non-Residential Properties (n)	351	9	11	17
Airports (n)				
Primary/Trunk Roads (km)	-	-	-	-
Main Line Railways (km)	1.93	1.93	1.93	1.93
Agricultural Land – Grades 1, 2 and 3 (ha)	305	7	14	37
Risk to Natural and Historic Environment				
Bathing Waters (n)				
Environmental Permitting Regulations (EPR) Installations (n)	-	-	-	-
Special Areas of Conservation (SAC) (ha)	-	-	-	-
Special Protection Areas (SPA) (ha)	-	-	-	-
Ramsar Sites (ha)	-	-	-	-
World Heritage Sites (ha)				
Sites of Special Scientific Interest (SSSI) (ha)	-	-	-	-
Parks and Gardens (ha)	-	-	-	-
Scheduled Ancient Monuments (ha)	-	-	-	-
Listed Buildings (n)	10	1	1	1
Licensed Abstractions (LA) (n)	-	-	-	-
Sites of Importance for Nature Conservation (SINC) (ha)				

Fairwater – Delivery Plan

The following summarise actions we propose to manage local flood risk to an acceptable level within the community.

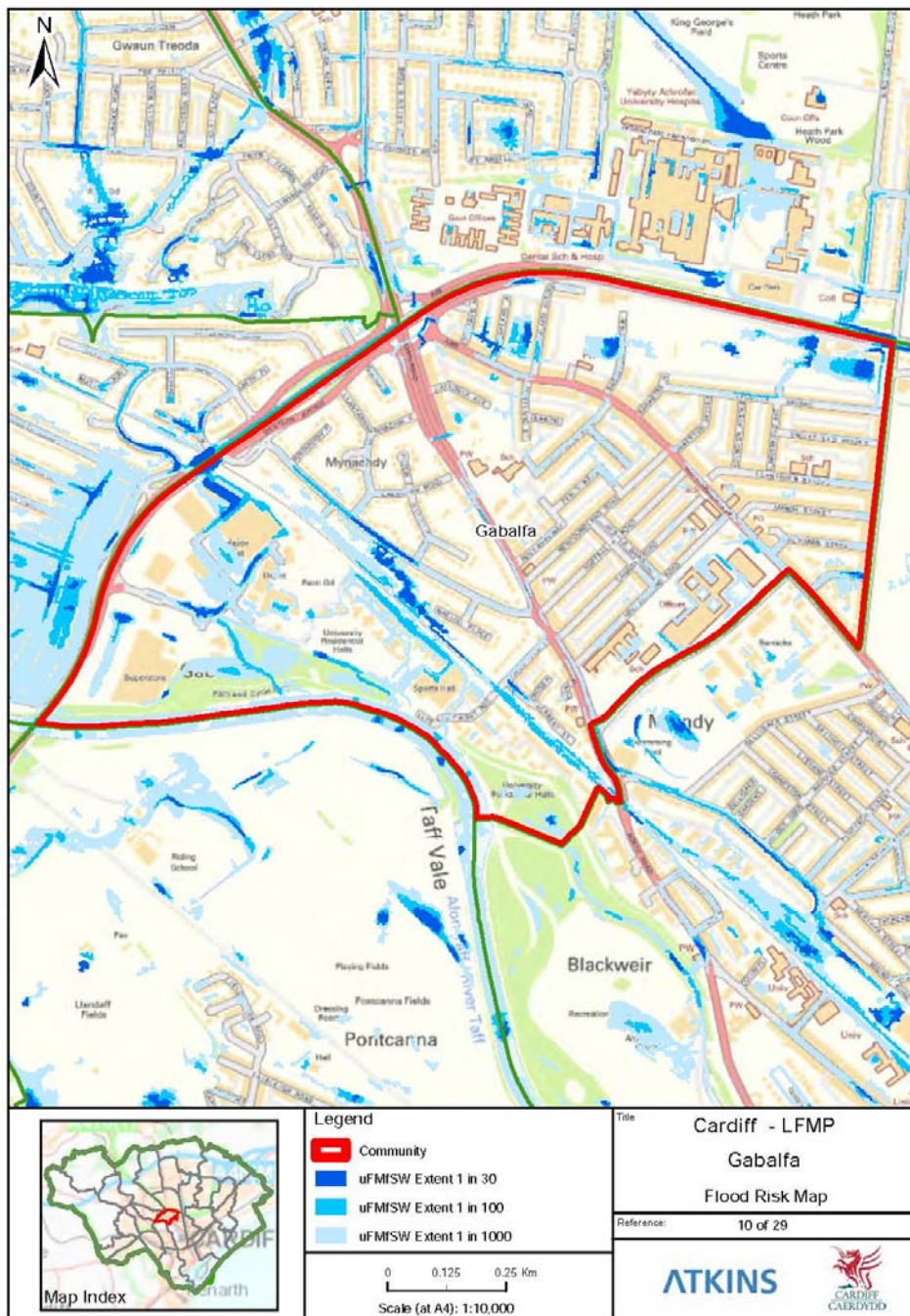
FRMP Measure	EU Reporting Code	Timescale	Responsible Authority
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	M22 – Prevention	2016 - 2021	City of Cardiff Council
Establishment of a programme of regular and appropriate maintenance for flood and coastal erosion risk management assets.	M24 – Prevention	2016 - 2021	City of Cardiff Council
Development of mutual aid protocols for resources, equipment and respite for emergency events.	M42 - Preparedness	2016 - 2021	City of Cardiff Council
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	M43 - Preparedness	2016 - 2021	City of Cardiff Council
Post flood-event recovery plan in place	M52 – Recovery and Review	2016 - 2021	City of Cardiff Council



7.3.10 Gabalfa

The area is bi-sected by the Cardiff Valley rail line. The eastern side is predominantly residential, whilst to the west is the Cardiff University Tal Y Bont Residences and sports complex and the Western Avenue Retail Park. Overland flow to the east is contained by the railway and affects Mynachdy Road, although limited impact to properties. The Western Avenue Retail Park is predicted to be affected during high-risk (more frequent) events, possibly due to the large areas of impermeable surfacing. During low-risk (more extreme) events access to the student residences may be affected.

Figure 7-14 Flood Risk Map - Gabalfa



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Table 7-15 Counts for Gabalfa Flood Risk Area

COUNTS FOR Gabalfa FLOOD RISK AREA				
	Total in defined area	Risk Counts		
		HIGH	MED	LOW
Risk to People and Property		Residents in areas at risk of flooding		
People (n) (multiplier 2.35)	8,568	7	14	94
		Residential Properties at risk of flooding		
Residential Properties (n)	3,646	3	6	40
Services (n)	25	-	-	4
Risk to Economic Activity				
Non-Residential Properties (n)	539	3	12	29
Airports (n)				
Primary/Trunk Roads (km)	-	-	-	-
Main Line Railways (km)	1.13	1.13	1.13	1.13
Agricultural Land – Grades 1, 2 and 3 (ha)	127	1	4	18
Risk to Natural and Historic Environment				
Bathing Waters (n)				
Environmental Permitting Regulations (EPR) Installations (n)	-	-	-	-
Special Areas of Conservation (SAC) (ha)	-	-	-	-
Special Protection Areas (SPA) (ha)	-	-	-	-
Ramsar Sites (ha)	-	-	-	-
World Heritage Sites (ha)				
Sites of Special Scientific Interest (SSSI) (ha)	-	-	-	-
Parks and Gardens (ha)	3	0	0	0
Scheduled Ancient Monuments (ha)	-	-	-	-
Listed Buildings (n)	4	-	-	-
Licensed Abstractions (LA) (n)	-	-	-	-
Sites of Importance for Nature Conservation (SINC) (ha)				

Gabalfa – Delivery Plan

The following summarise actions we propose to manage local flood risk to an acceptable level within the community.

FRMP Measure	EU Reporting Code	Timescale	Responsible Authority
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	M22 – Prevention	2016 - 2021	City of Cardiff Council
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	M43 - Preparedness	2016 - 2021	City of Cardiff Council
Post flood-event recovery plan in place	M52 – Recovery and Review	2016 - 2021	City of Cardiff Council

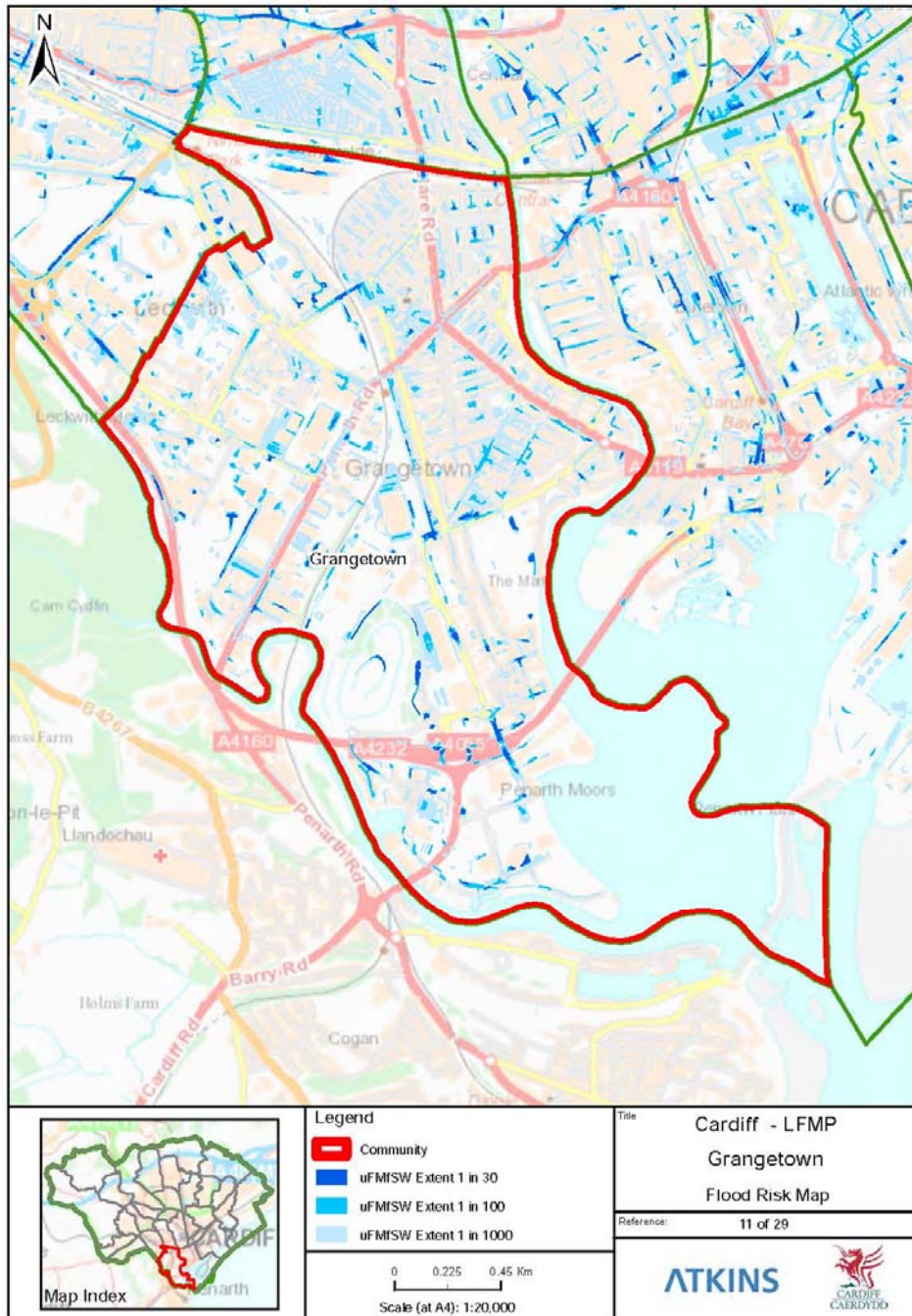


7.3.11 Grange town

Bounded to the west by River Ely and east by River Taff. In general, flood risk is spread across the general area with overland surface water flows channel down the roads. 4 properties are identified at risk of flooding from surface water during high-risk (more frequent) events, out of over 6,000. This rises to 458 during low-risk (more extreme) events.

The area is also bi-sected by the railway line to Penarth; generally residential properties to the east and a large commercial area to the west off Sloper Road, including the Royal Mail Cardiff Mail Distribution Centre. These commercial properties are shown to be affected during the low-risk events.

Figure 7-15 Flood Risk Map - Grange town



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Table 7-16 Counts for Grangetown Flood Risk Area

COUNTS FOR Grangetown FLOOD RISK AREA				
	Total in defined area	Risk Counts		
		HIGH	MED	LOW
Risk to People and Property		Residents in areas at risk of flooding		
People (n) (multiplier 2.35)	14,584	9	89	1,076
		Residential Properties at risk of flooding		
Residential Properties (n)	6,206	4	38	458
Services (n)	43	-	-	1
Risk to Economic Activity				
Non-Residential Properties (n)	921	2	9	142
Airports (n)				
Primary/Trunk Roads (km)	-	-	-	-
Main Line Railways (km)	3.78	0.37	1.98	2.59
Agricultural Land – Grades 1, 2 and 3 (ha)	257	1	5	31
Risk to Natural and Historic Environment				
Bathing Waters (n)				
Environmental Permitting Regulations (EPR) Installations (n)	5	-	-	-
Special Areas of Conservation (SAC) (ha)	-	-	-	-
Special Protection Areas (SPA) (ha)	-	-	-	-
Ramsar Sites (ha)	-	-	-	-
World Heritage Sites (ha)				
Sites of Special Scientific Interest (SSSI) (ha)	-	-	-	-
Parks and Gardens (ha)	-	-	-	-
Scheduled Ancient Monuments (ha)	0	-	-	-
Listed Buildings (n)	6	-	-	-
Licensed Abstractions (LA) (n)	-	-	-	-
Sites of Importance for Nature Conservation (SINC) (ha)				

Grangetown – Delivery Plan

The following summarise actions we propose to manage local flood risk to an acceptable level within the community.

FRMP Measure	EU Reporting Code	Timescale	Responsible Authority
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	M22 – Prevention	2016 - 2021	City of Cardiff Council
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	M43 - Preparedness	2016 - 2021	City of Cardiff Council
Post flood-event recovery plan in place	M52 – Recovery and Review	2016 - 2021	City of Cardiff Council

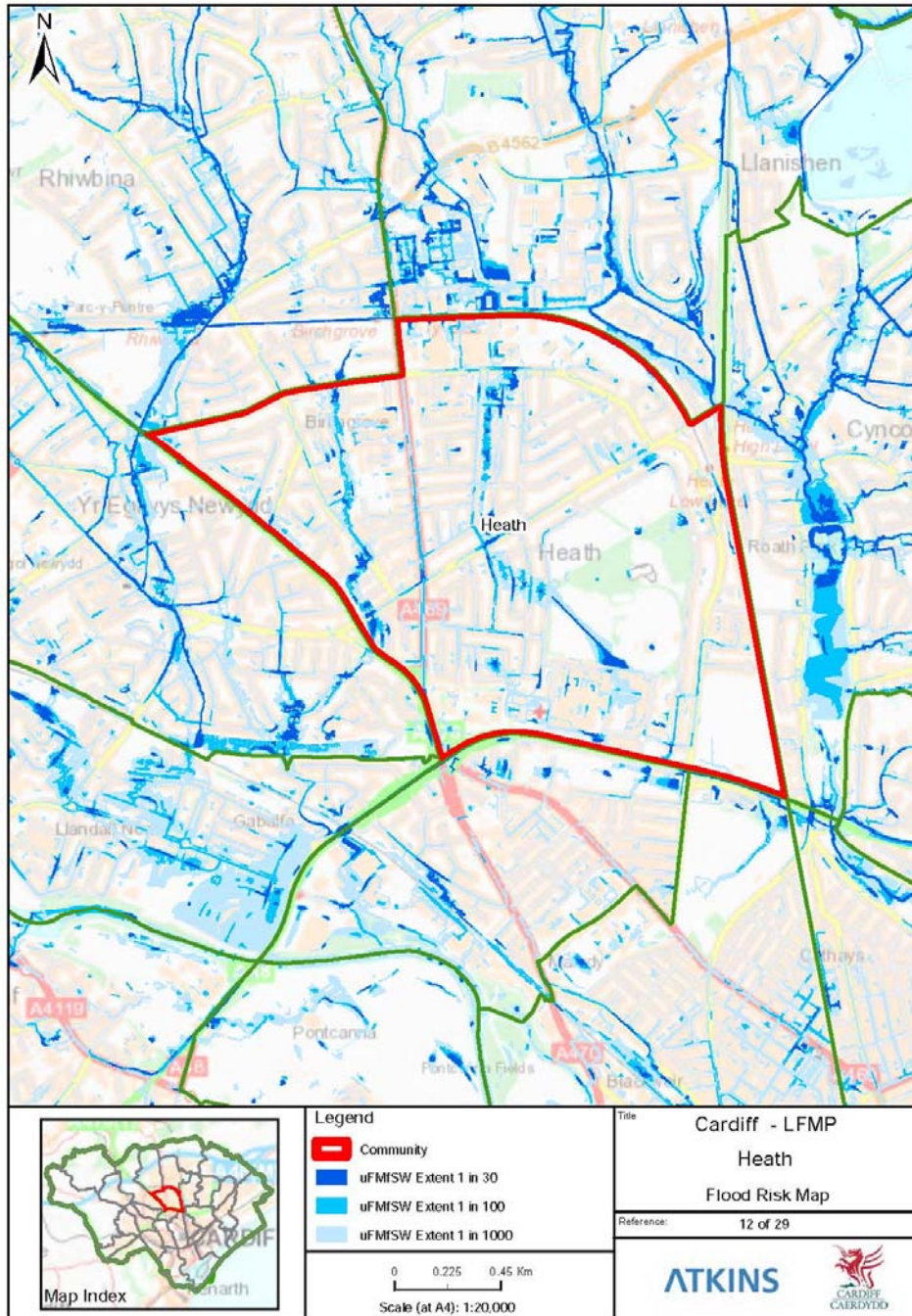


7.3.12 Heath

Two areas of risk are identified along the ordinary watercourse of Rhydwaedlyd Brook. At the tributary with the Whitchurch Brook overland flows are likely to affect Ty-Wern Road and Pantbach Road.

The area includes the University Hospital Wales. Parts of the hospital campus are predicted to be affected by overland flows along the historic route of Nant y Wedal, which runs through Heath Park.

Figure 7-16 Flood Risk Map - Heath



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Table 7-17 Counts for Heath Flood Risk Area

COUNTS FOR Heath FLOOD RISK AREA				
	Total in defined area	Risk Counts		
		HIGH	MED	LOW
Risk to People and Property		Residents in areas at risk of flooding		
People (n) (multiplier 2.35)	12,342	14	42	334
		Residential Properties at risk of flooding		
Residential Properties (n)	5,252	6	18	142
Services (n)	35	-	-	-
Risk to Economic Activity				
Non-Residential Properties (n)	645	1	3	45
Airports (n)				
Primary/Trunk Roads (km)	-	-	-	-
Main Line Railways (km)	1.81	0.36	0.36	1.68
Agricultural Land – Grades 1, 2 and 3 (ha)	316	3	10	38
Risk to Natural and Historic Environment				
Bathing Waters (n)				
Environmental Permitting Regulations (EPR) Installations (n)	1	-	-	1
Special Areas of Conservation (SAC) (ha)	-	-	-	-
Special Protection Areas (SPA) (ha)	-	-	-	-
Ramsar Sites (ha)	-	-	-	-
World Heritage Sites (ha)				
Sites of Special Scientific Interest (SSSI) (ha)	-	-	-	-
Parks and Gardens (ha)	14	-	0	0
Scheduled Ancient Monuments (ha)	-	-	-	-
Listed Buildings (n)	4	-	-	-
Licensed Abstractions (LA) (n)	-	-	-	-
Sites of Importance for Nature Conservation (SINC) (ha)				

Heath – Delivery Plan

The following summarise actions we propose to manage local flood risk to an acceptable level within the community.

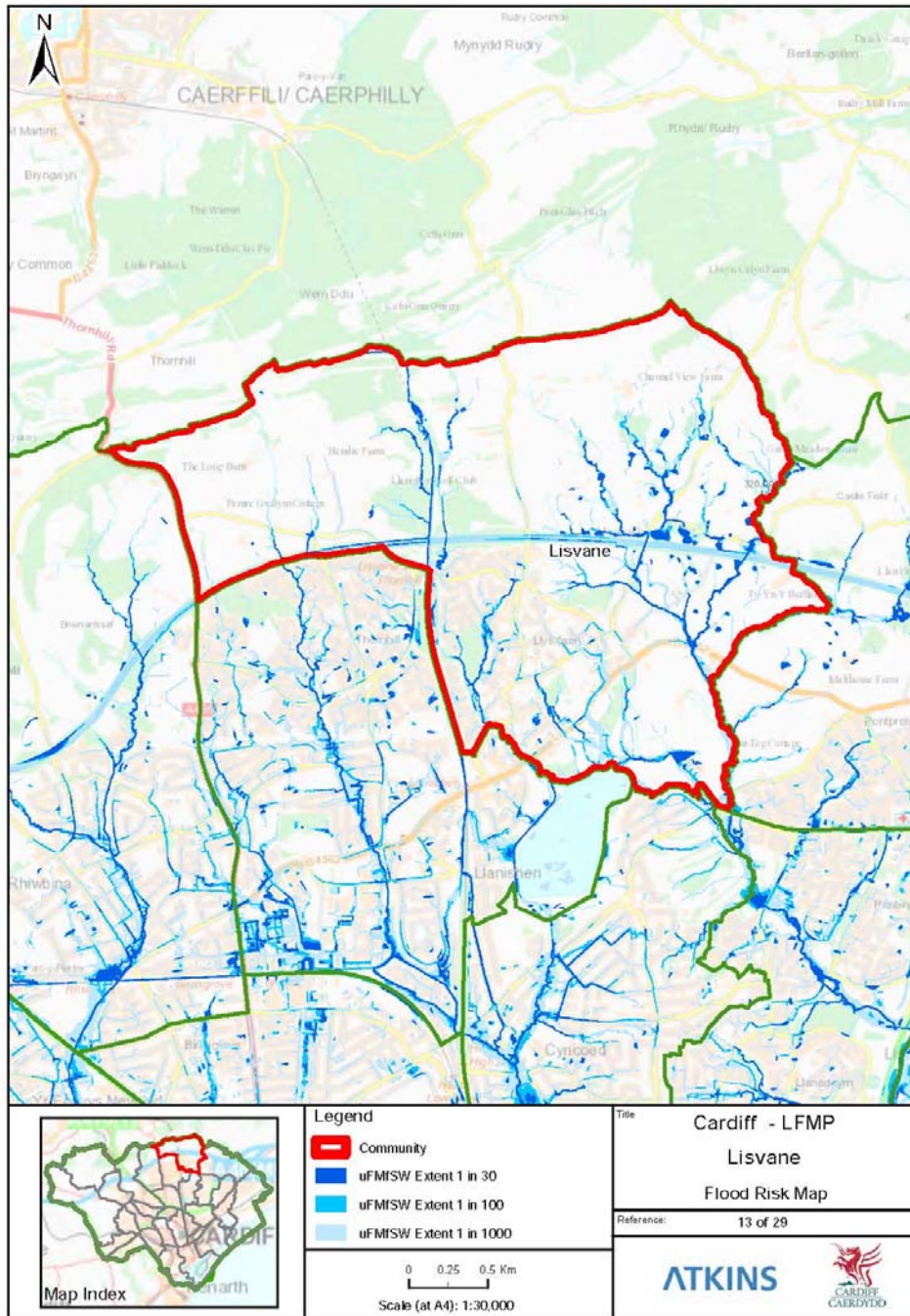
FRMP Measure	EU Reporting Code	Timescale	Responsible Authority
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	M22 – Prevention	2016 - 2021	City of Cardiff Council
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	M43 - Preparedness	2016 - 2021	City of Cardiff Council
Post flood-event recovery plan in place	M52 – Recovery and Review	2016 - 2021	City of Cardiff Council



7.3.13 Lisvane

The areas at risk within Lisvane are predominantly currently agricultural land with at-risk areas confined to the watercourse corridors as the land falls to the south. With over 1,000 properties identified in the area, 29 are predicted to be affected during low-risk (more extreme) events. A large part of the area is identified within the Local Development Plan as potential development sites.

Figure 7-17 Flood Risk Map - Lisvane



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Table 7-18 Counts for Lisvane Flood Risk Area

COUNTS FOR Lisvane FLOOD RISK AREA				
	Total in defined area	Risk Counts		
		HIGH	MED	LOW
Risk to People and Property		Residents in areas at risk of flooding		
People (n) (multiplier 2.35)	2,949	14	19	68
		Residential Properties at risk of flooding		
Residential Properties (n)	1,255	6	8	29
Services (n)	12	-	-	-
Risk to Economic Activity				
Non-Residential Properties (n)	280	-	-	3
Airports (n)				
Primary/Trunk Roads (km)	-	-	-	-
Main Line Railways (km)	1.31	1.60	1.60	1.60
Agricultural Land – Grades 1, 2 and 3 (ha)	244	4	7	20
Risk to Natural and Historic Environment				
Bathing Waters (n)				
Environmental Permitting Regulations (EPR) Installations (n)	-	-	-	-
Special Areas of Conservation (SAC) (ha)	-	-	-	-
Special Protection Areas (SPA) (ha)	-	-	-	-
Ramsar Sites (ha)	-	-	-	-
World Heritage Sites (ha)				
Sites of Special Scientific Interest (SSSI) (ha)	-	-	-	-
Parks and Gardens (ha)	13	0	0	0
Scheduled Ancient Monuments (ha)	0	-	-	-
Listed Buildings (n)	3	-	-	-
Licensed Abstractions (LA) (n)	4	-	-	-
Sites of Importance for Nature Conservation (SINC) (ha)				

Lisvane – Delivery Plan

The following summarise actions we propose to manage local flood risk to an acceptable level within the community.

FRMP Measure	EU Reporting Code	Timescale	Responsible Authority
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	M22 – Prevention	2016 - 2021	City of Cardiff Council
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	M43 - Preparedness	2016 - 2021	City of Cardiff Council
Post flood-event recovery plan in place	M52 – Recovery and Review	2016 - 2021	City of Cardiff Council



7.3.14 Llandaff

Llandaff is predominantly a residential area where the surface water overland flows have the potential to cause flooding to two localised areas, albeit with low overall levels of flood risk. One location of localised flooding is close to the area’s south west boundary, where overland flows follow the natural topography and collect around the low-point adjacent to Waungron Road Recycling Depot and under the railway bridge. The second location of localised flooding is at the northern extents of the area where surface water flows collect, potentially affecting properties and main streets, before flowing towards and into the River Taff.

Figure 7-18 Flood Risk Map - Llandaff

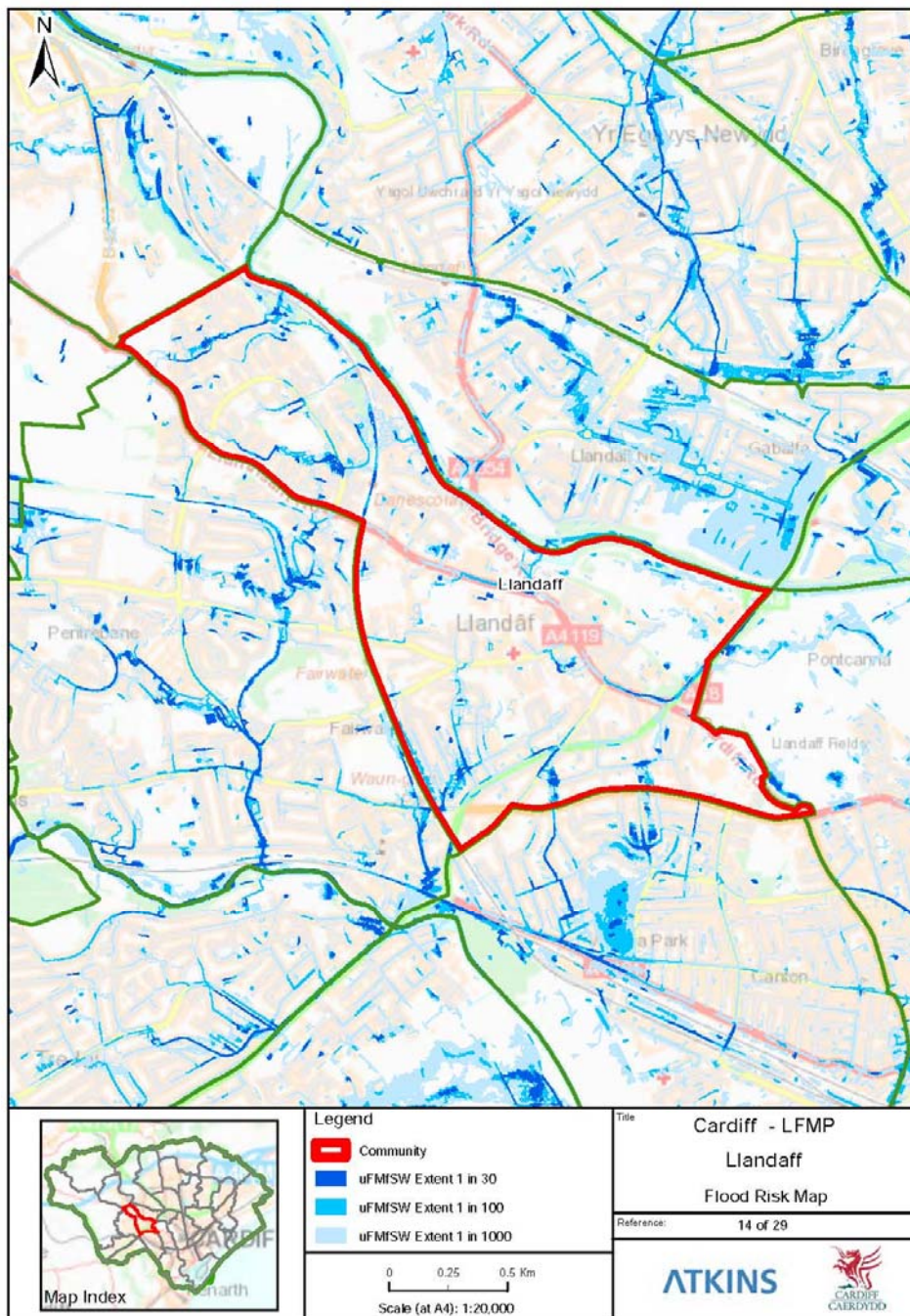


Table 7-19 Counts for Llandaff Flood Risk Area

COUNTS FOR Llandaff FLOOD RISK AREA				
	Total in defined area	Risk Counts		
		HIGH	MED	LOW
Risk to People and Property		Residents in areas at risk of flooding		
People (n) (multiplier 2.35)	9,278	38	56	313
		Residential Properties at risk of flooding		
Residential Properties (n)	3,948	16	24	133
Services (n)	29	-	1	3
Risk to Economic Activity				
Non-Residential Properties (n)	633	-	3	28
Airports (n)				
Primary/Trunk Roads (km)	-	-	-	-
Main Line Railways (km)	2.54	2.34	2.34	2.44
Agricultural Land – Grades 1, 2 and 3 (ha)	256	3	10	29
Risk to Natural and Historic Environment				
Bathing Waters (n)				
Environmental Permitting Regulations (EPR) Installations (n)	1	-	-	1
Special Areas of Conservation (SAC) (ha)	-	-	-	-
Special Protection Areas (SPA) (ha)	-	-	-	-
Ramsar Sites (ha)	-	-	-	-
World Heritage Sites (ha)				
Sites of Special Scientific Interest (SSSI) (ha)	-	-	-	-
Parks and Gardens (ha)	8	0	0	0
Scheduled Ancient Monuments (ha)	1	-	-	0
Listed Buildings (n)	82	-	-	2
Licensed Abstractions (LA) (n)	-	-	-	-
Sites of Importance for Nature Conservation (SINC) (ha)				

Llandaff – Delivery Plan

The following summarise actions we propose to manage local flood risk to an acceptable level within the community.

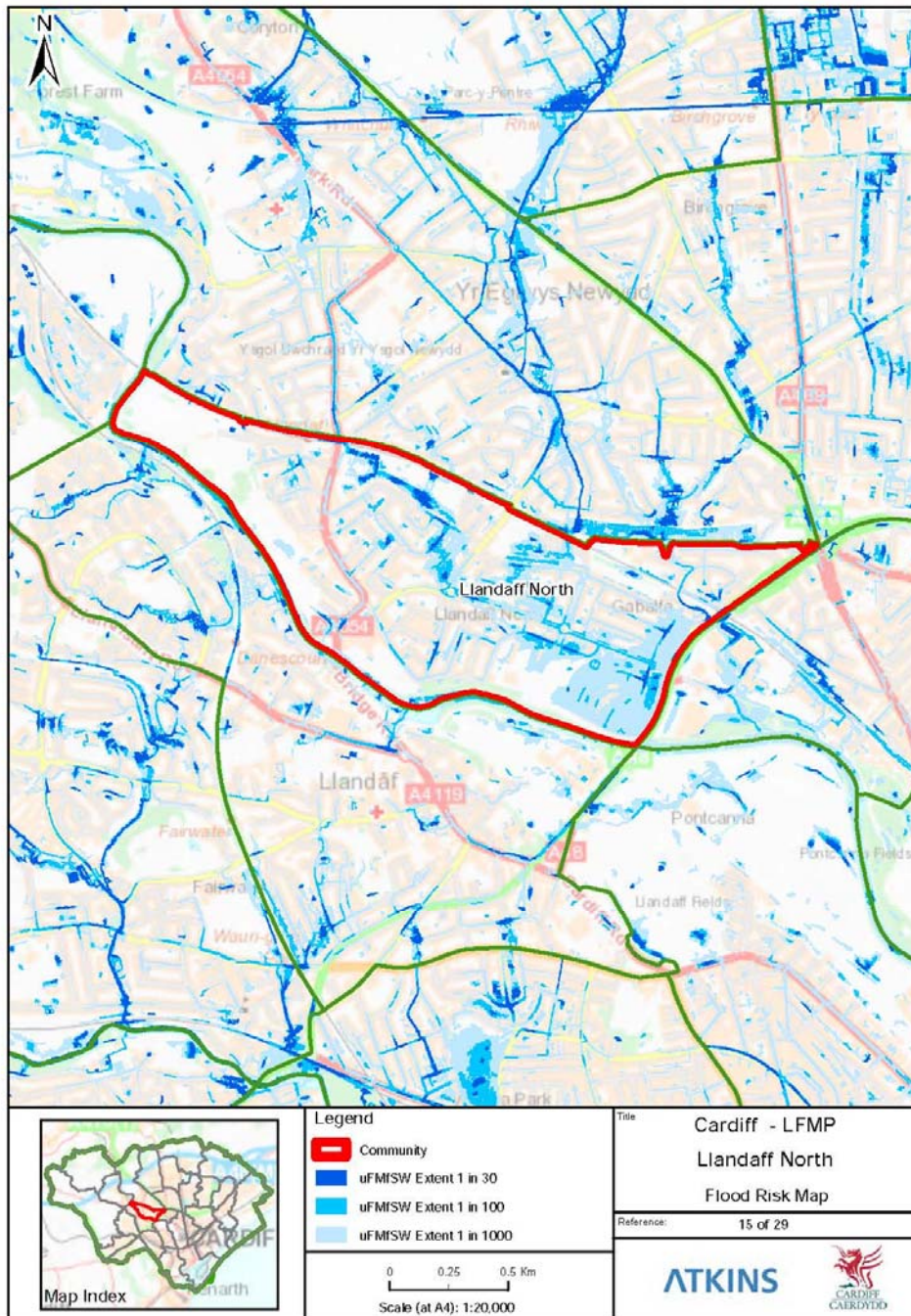
FRMP Measure	EU Reporting Code	Timescale	Responsible Authority
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	M22 – Prevention	2016 - 2021	City of Cardiff Council
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	M43 - Preparedness	2016 - 2021	City of Cardiff Council
Post flood-event recovery plan in place	M52 – Recovery and Review	2016 - 2021	City of Cardiff Council



7.3.15 Llandaff North

Llandaff North is predominantly a residential area bounded by the River Taff to the south and the railway line to the north. The area is affected by surface water overland flows, with the main extent of the properties affected during the low-risk (more extreme) events being within the area adjacent to the River Taff. At this location the surface water is contained by a small embankment on which sits the A48.

Figure 7-19 Flood Risk Map – Llandaff North



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Table 7-20 Counts for Llandaff North Flood Risk Area

COUNTS FOR Llandaff North FLOOD RISK AREA				
	Total in defined area	Risk Counts		
		HIGH	MED	LOW
Risk to People and Property		Residents in areas at risk of flooding		
People (n) (multiplier 2.35)	8,011	2	73	1,422
		Residential Properties at risk of flooding		
Residential Properties (n)	3,409	1	31	605
Services (n)	20	-	-	3
Risk to Economic Activity				
Non-Residential Properties (n)	269	-	3	26
Airports (n)				
Primary/Trunk Roads (km)	-	-	-	-
Main Line Railways (km)	3.10	2.79	3.10	3.10
Agricultural Land – Grades 1, 2 and 3 (ha)	188	2	11	48
Risk to Natural and Historic Environment				
Bathing Waters (n)				
Environmental Permitting Regulations (EPR) Installations (n)	-	-	-	-
Special Areas of Conservation (SAC) (ha)	-	-	-	-
Special Protection Areas (SPA) (ha)	-	-	-	-
Ramsar Sites (ha)	-	-	-	-
World Heritage Sites (ha)				
Sites of Special Scientific Interest (SSSI) (ha)	-	-	-	-
Parks and Gardens (ha)	-	-	-	-
Scheduled Ancient Monuments (ha)	-	-	-	-
Listed Buildings (n)	1	-	-	1
Licensed Abstractions (LA) (n)	-	-	-	-
Sites of Importance for Nature Conservation (SINC) (ha)				

Llandaff North – Delivery Plan

The following summarise actions we propose to manage local flood risk to an acceptable level within the community.

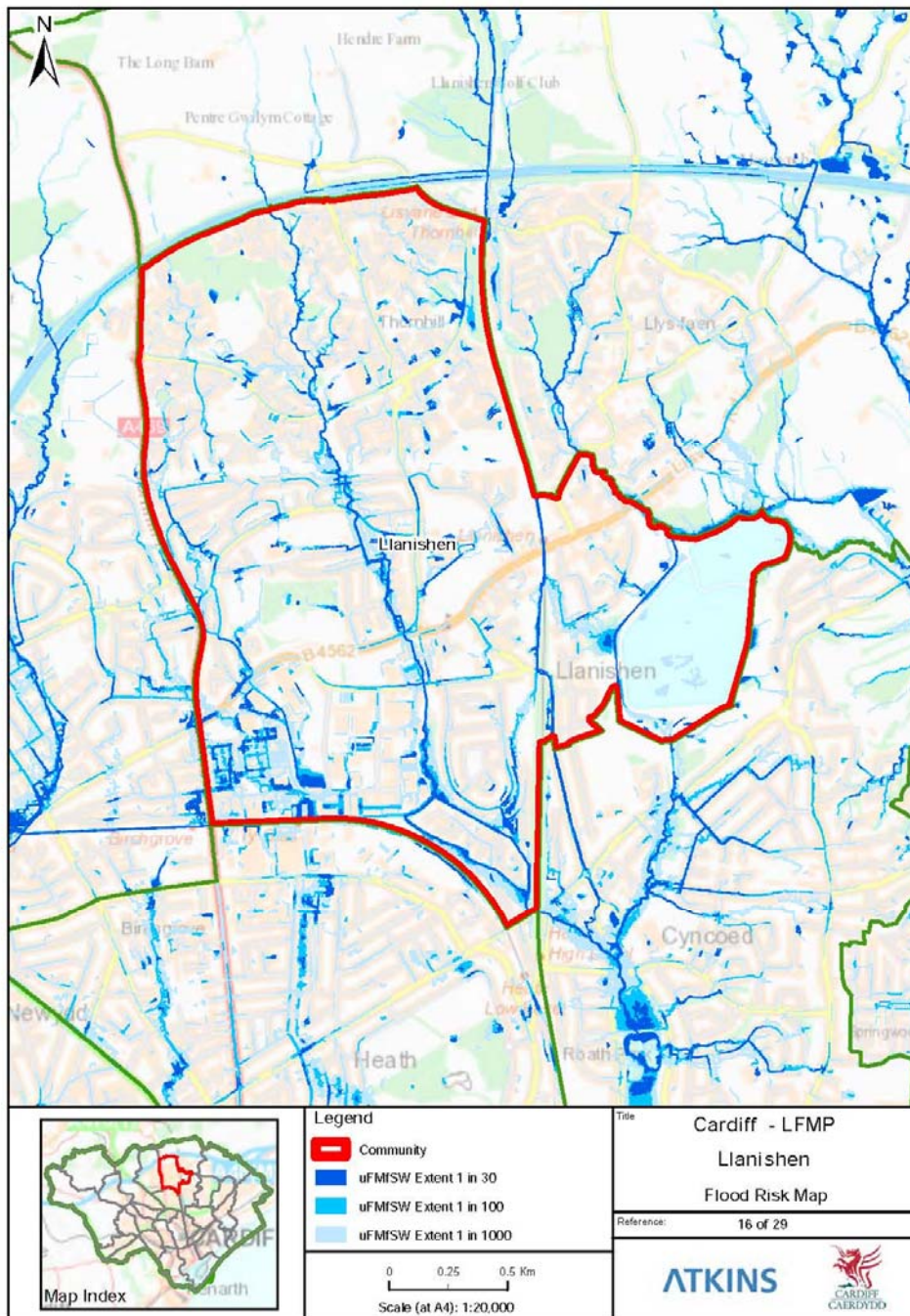
FRMP Measure	EU Reporting Code	Timescale	Responsible Authority
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	M22 – Prevention	2016 - 2021	City of Cardiff Council
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	M43 - Preparedness	2016 - 2021	City of Cardiff Council
Post flood-event recovery plan in place	M52 – Recovery and Review	2016 - 2021	City of Cardiff Council



7.3.16 Llanishen

Llanishen is bounded by the M4 to the north, the Valleys railway line to the south and the east and the A469 to the west. The area contains the residential areas of Thornhill and Llanishen, as well as the HMRC offices. There is a localised flood risk associated with the Llanishen Brook, which flows north to south through the area, with the localised issues identified in the locations where the brook passes under Ty-Glas Road. Of the 7,672 residential properties located within Llanishen, 34 residential properties are predicted to be at a risk of flooding during a high-risk (more frequent) event, while 354 residential properties are at a risk of flooding during a low-risk (more extreme) event.

Figure 7-20 Flood Risk Map – Llanishen



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Table 7-21 Counts for Llanishen Flood Risk Area

COUNTS FOR Llanishen FLOOD RISK AREA				
	Total in defined area	Risk Counts		
		HIGH	MED	LOW
Risk to People and Property		Residents in areas at risk of flooding		
People (n) (multiplier 2.35)	18,029	80	132	832
		Residential Properties at risk of flooding		
Residential Properties (n)	7,672	34	56	354
Services (n)	57	-	1	2
Risk to Economic Activity				
Non-Residential Properties (n)	755	8	24	80
Airports (n)				
Primary/Trunk Roads (km)	-	-	-	-
Main Line Railways (km)	2.23	1.81	1.81	2.23
Agricultural Land – Grades 1, 2 and 3 (ha)	486	11	26	71
Risk to Natural and Historic Environment				
Bathing Waters (n)				
Environmental Permitting Regulations (EPR) Installations (n)	-	-	-	-
Special Areas of Conservation (SAC) (ha)	-	-	-	-
Special Protection Areas (SPA) (ha)	-	-	-	-
Ramsar Sites (ha)	-	-	-	-
World Heritage Sites (ha)				
Sites of Special Scientific Interest (SSSI) (ha)	11	6	6	14
Parks and Gardens (ha)	-	-	-	-
Scheduled Ancient Monuments (ha)	-	-	-	-
Listed Buildings (n)	9	-	-	-
Licensed Abstractions (LA) (n)	2	2	2	2
Sites of Importance for Nature Conservation (SINC) (ha)				

Llanishen – Delivery Plan

The following summarise actions we propose to manage local flood risk to an acceptable level within the community.

FRMP Measure	EU Reporting Code	Timescale	Responsible Authority
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	M22 – Prevention	2016 - 2021	City of Cardiff Council
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	M43 - Preparedness	2016 - 2021	City of Cardiff Council
Post flood-event recovery plan in place	M52 – Recovery and Review	2016 - 2021	City of Cardiff Council

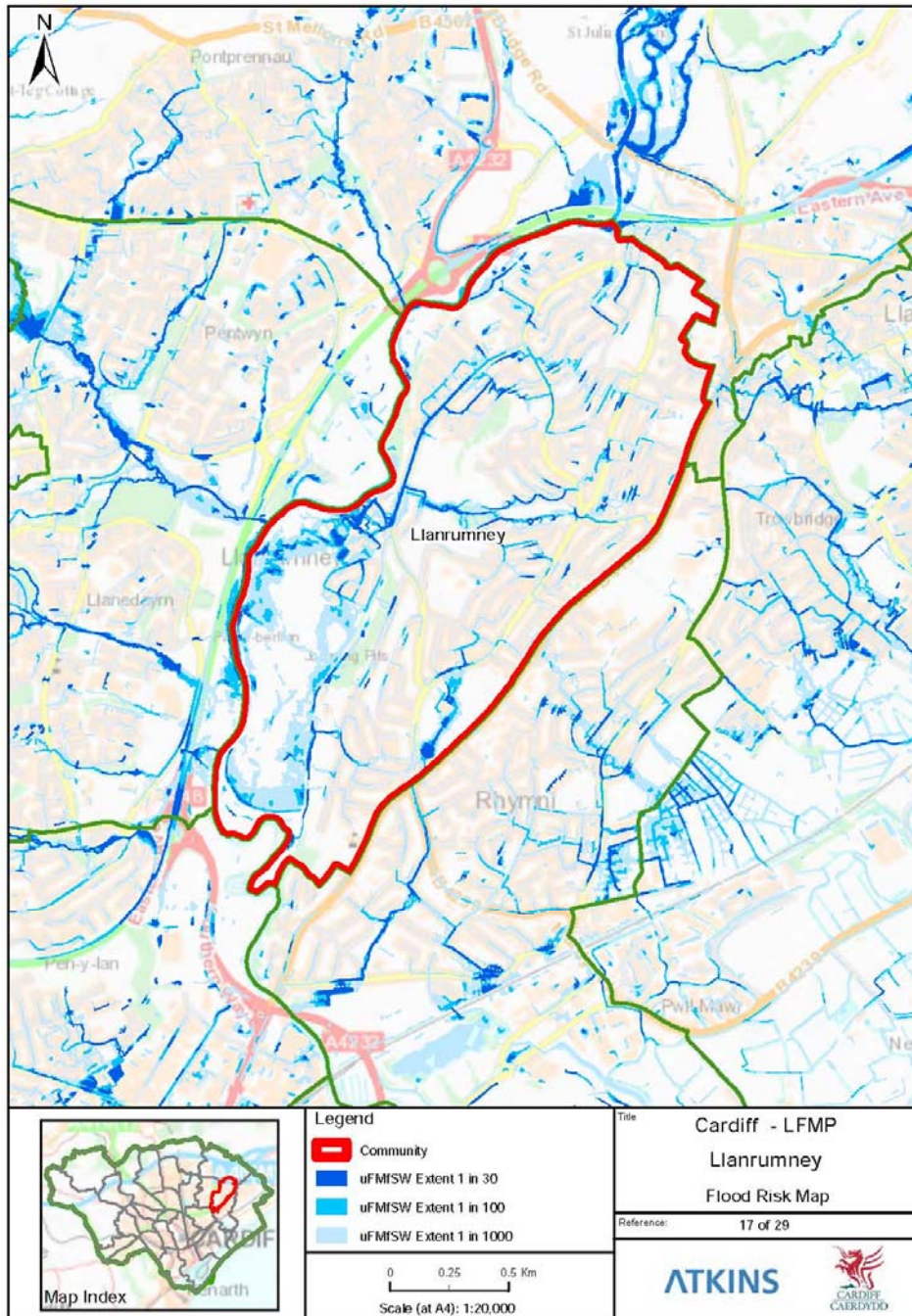


7.3.17 Llanrumney – Outside of Flood Risk Area

The area is located outside of the defined flood risk area.

The area of Llanrumney is bounded by the River Rhymney to the west and Newport Road to the east. Residential properties are above the River Rhymney flood plain. The surface water flood risk maps indicate surface water is contained within the main road network prior to flowing onto the River Rhymney flood plain adjacent to Llanrumney High School.

Figure 7-21 Flood Risk Map – Llanrumney



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**Table 7-22 Counts for Llanrumney Community Area
(not inc within Flood Risk Area)**

COUNTS FOR Llanrumney FLOOD RISK AREA				
	Total in defined area	Risk Counts		
		HIGH	MED	LOW
Risk to People and Property		Residents in areas at risk of flooding		
People (n) (multiplier 2.35)	11,336	33	28	214
		Residential Properties at risk of flooding		
Residential Properties (n)	4,824	14	12	91
Services (n)	5	-	-	1
Risk to Economic Activity				
Non-Residential Properties (n)	253	4	11	25
Airports (n)				
Primary/Trunk Roads (km)	-	-	-	-
Main Line Railways (km)	-	-	-	-
Agricultural Land – Grades 1, 2 and 3 (ha)	306	6	17	50
Risk to Natural and Historic Environment				
Bathing Waters (n)				
Environmental Permitting Regulations (EPR) Installations (n)	-	-	-	-
Special Areas of Conservation (SAC) (ha)	-	-	-	-
Special Protection Areas (SPA) (ha)	-	-	-	-
Ramsar Sites (ha)	-	-	-	-
World Heritage Sites (ha)				
Sites of Special Scientific Interest (SSSI) (ha)	-	-	-	-
Parks and Gardens (ha)	-	-	-	-
Scheduled Ancient Monuments (ha)	-	-	-	-
Listed Buildings (n)	1	-	-	-
Licensed Abstractions (LA) (n)	-	-	-	-
Sites of Importance for Nature Conservation (SINC) (ha)				

Llanrumney – Delivery Plan

The following summarise actions we propose to manage local flood risk to an acceptable level within the community.

FRMP Measure	EU Reporting Code	Timescale	Responsible Authority
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	M22 – Prevention	2016 - 2021	City of Cardiff Council
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	M43 - Preparedness	2016 - 2021	City of Cardiff Council
Post flood-event recovery plan in place	M52 – Recovery and Review	2016 - 2021	City of Cardiff Council



7.3.18 Pentwyn

Pentwyn contains 2,010 residential properties located across the residential areas of Pentwyn and Llanederyn. Within Pentwyn and Llanederyn the areas of flood risk are located around the corridors of the three ordinary watercourses, where it has been identified that during a high-risk (more frequent) event 2 properties are predicted to be at a risk of flooding. The number of residential properties at a risk of flooding increases to 26 during a low-risk (more extreme) events.

Figure 7-22 Flood Risk Map – Pentwyn

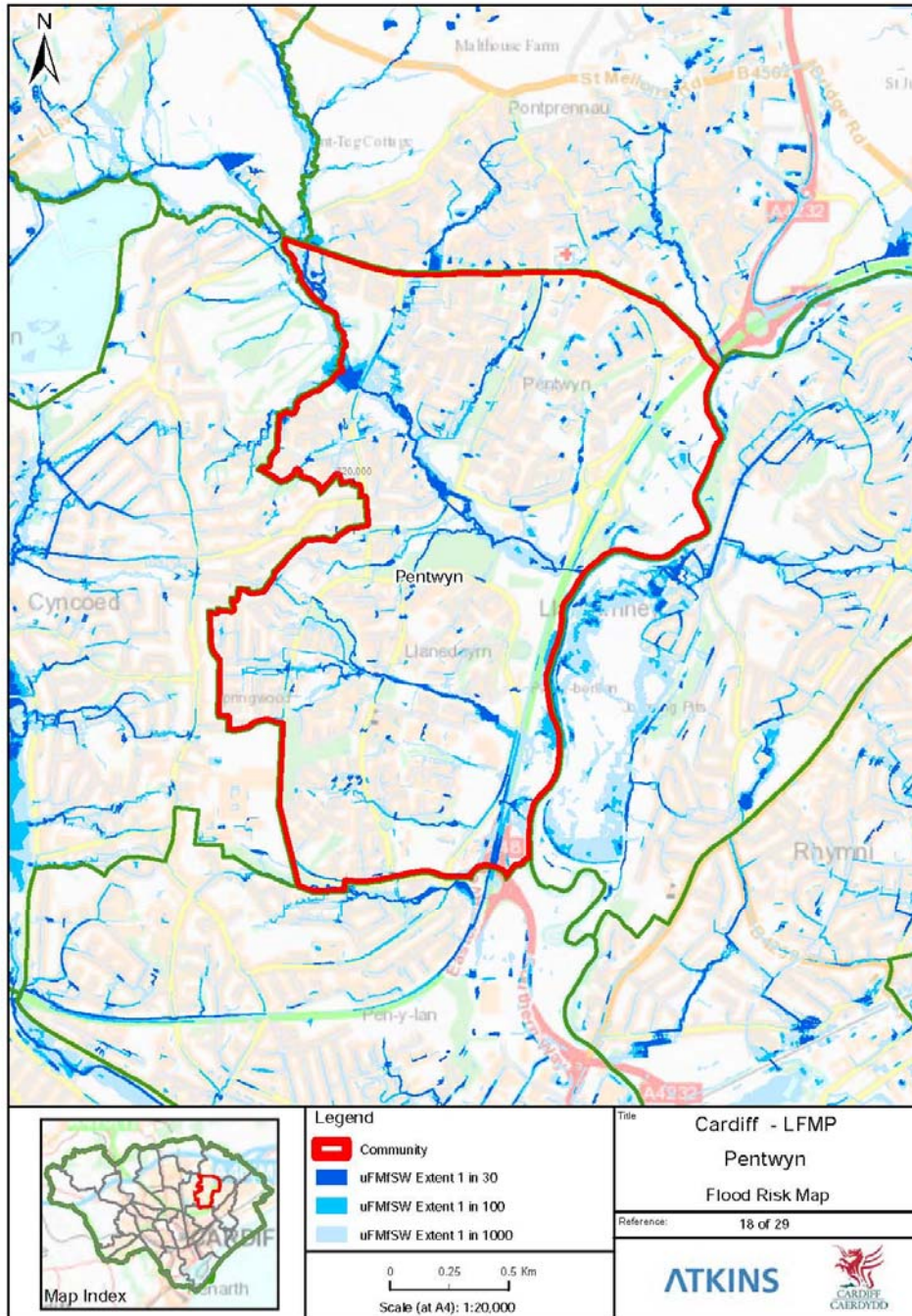


Table 7-23 Counts for Pentwyn Flood Risk Area

COUNTS FOR Pentwyn FLOOD RISK AREA				
	Total in defined area	Risk Counts		
		HIGH	MED	LOW
Risk to People and Property		Residents in areas at risk of flooding		
People (n) (multiplier 2.35)	4,724	5	9	61
		Residential Properties at risk of flooding		
Residential Properties (n)	2,010	2	4	26
Services (n)	9	-	-	-
Risk to Economic Activity				
Non-Residential Properties (n)	54	5	7	14
Airports (n)				
Primary/Trunk Roads (km)	-	-	-	-
Main Line Railways (km)	-	-	-	-
Agricultural Land – Grades 1, 2 and 3 (ha)	82	2	4	10
Risk to Natural and Historic Environment				
Bathing Waters (n)				
Environmental Permitting Regulations (EPR) Installations (n)	-	-	-	-
Special Areas of Conservation (SAC) (ha)	-	-	-	-
Special Protection Areas (SPA) (ha)	-	-	-	-
Ramsar Sites (ha)	-	-	-	-
World Heritage Sites (ha)				
Sites of Special Scientific Interest (SSSI) (ha)	-	-	-	-
Parks and Gardens (ha)	-	-	-	-
Scheduled Ancient Monuments (ha)	-	-	-	-
Listed Buildings (n)	-	-	-	-
Licensed Abstractions (LA) (n)	-	-	-	-
Sites of Importance for Nature Conservation (SINC) (ha)				

Pentwyn – Delivery Plan

The following summarise actions we propose to manage local flood risk to an acceptable level within the community.

FRMP Measure	EU Reporting Code	Timescale	Responsible Authority
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	M22 – Prevention	2016 - 2021	City of Cardiff Council
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	M43 - Preparedness	2016 - 2021	City of Cardiff Council
Post flood-event recovery plan in place	M52 – Recovery and Review	2016 - 2021	City of Cardiff Council

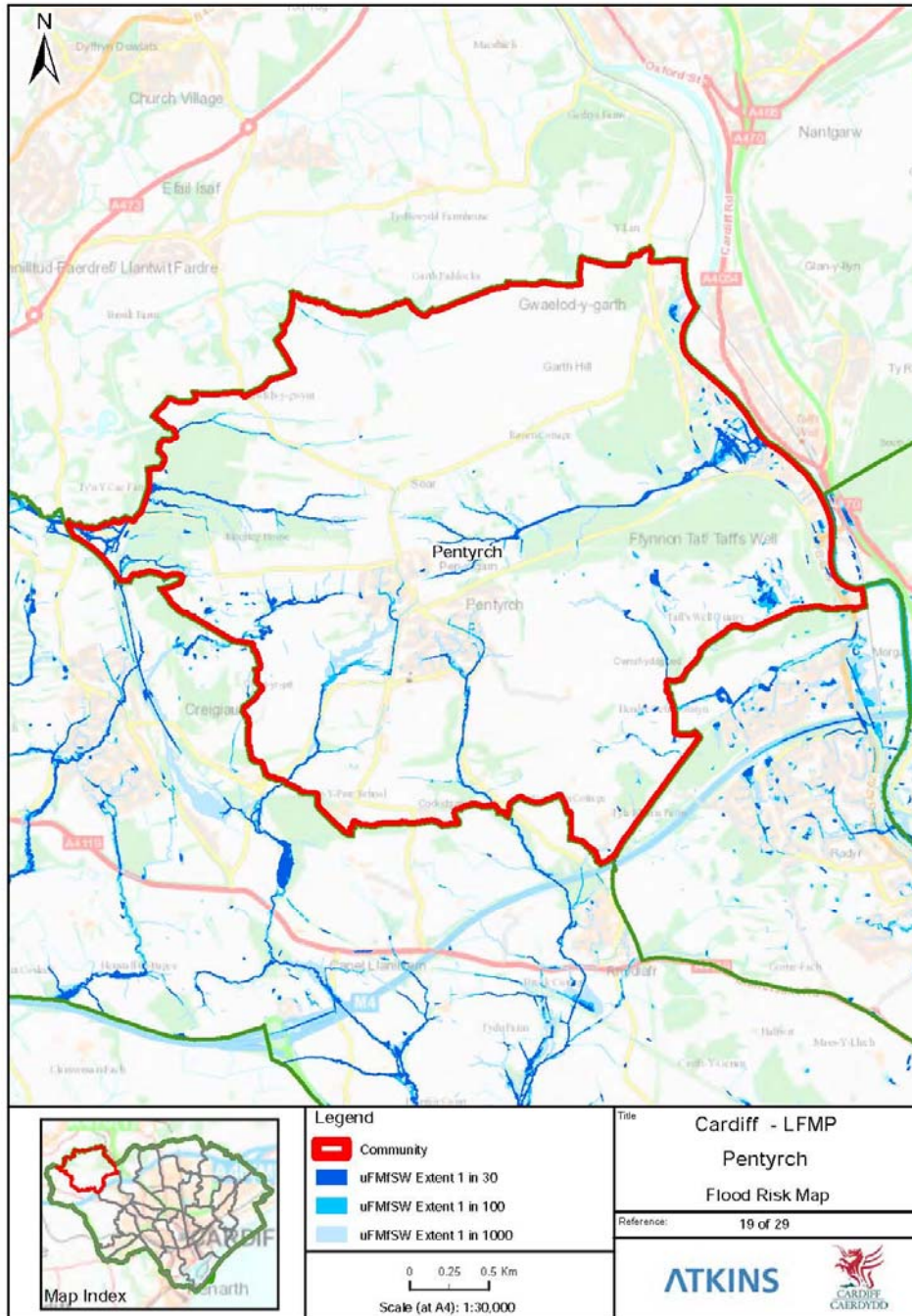


7.3.19 Pentyrch – Outside of Flood Risk Area

The area is located outside of the defined flood risk area.

Pentyrch is predominantly rural. The residential area of Taffs Well is within the area. The flood risk within this area is mainly associated with the Nant Cwmlwydrau which is culverted under the residential area from its upper most extent at Main Road. There is also predicted to be localised flooding alongside the corridors at the various watercourses that flow into the River Ely and the River Clan.

Figure 7-23 Flood Risk Map – Pentyrch



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**Table 7-24 Counts for Pentyrch Community Area
(not inc within Flood Risk Area)**

COUNTS FOR Pentyrch FLOOD RISK AREA				
	Total in defined area	Risk Counts		
		HIGH	MED	LOW
Risk to People and Property		Residents in areas at risk of flooding		
People (n) (multiplier 2.35)	3,370	49	56	172
		Residential Properties at risk of flooding		
Residential Properties (n)	1,434	21	24	73
Services (n)	2	-	-	-
Risk to Economic Activity				
Non-Residential Properties (n)	419	1	1	13
Airports (n)				
Primary/Trunk Roads (km)	-	-	-	-
Main Line Railways (km)	0.07	-	-	-
Agricultural Land – Grades 1, 2 and 3 (ha)	1,130	14	23	51
Risk to Natural and Historic Environment				
Bathing Waters (n)				
Environmental Permitting Regulations (EPR) Installations (n)	1	-	-	-
Special Areas of Conservation (SAC) (ha)	53.19	0.01	0.02	0.13
Special Protection Areas (SPA) (ha)	-	-	-	-
Ramsar Sites (ha)	-	-	-	-
World Heritage Sites (ha)				
Sites of Special Scientific Interest (SSSI) (ha)	81	77	77	81
Parks and Gardens (ha)	4	-	-	-
Scheduled Ancient Monuments (ha)	2	-	-	-
Listed Buildings (n)	16	-	-	2
Licensed Abstractions (LA) (n)	2	-	-	-
Sites of Importance for Nature Conservation (SINC) (ha)				

Pentyrch – Delivery Plan

The following summarise actions we propose to manage local flood risk to an acceptable level within the community.

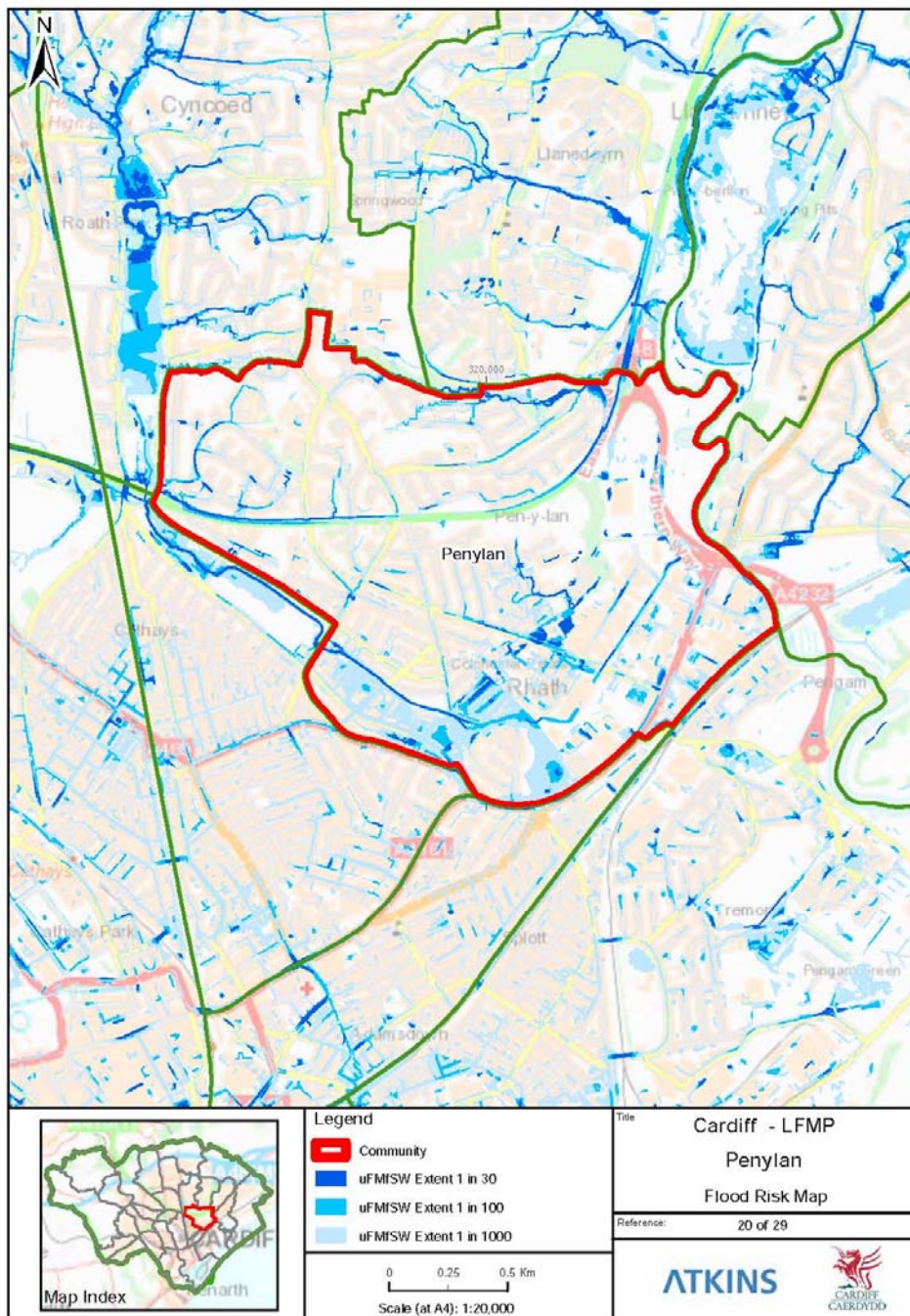
FRMP Measure	EU Reporting Code	Timescale	Responsible Authority
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	M22 – Prevention	2016 - 2021	City of Cardiff Council
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	M43 - Preparedness	2016 - 2021	City of Cardiff Council
Post flood-event recovery plan in place	M52 – Recovery and Review	2016 - 2021	City of Cardiff Council



7.3.20 Penylan

The main flood risk to Penylan is from the main river – Roath Brook, which flows along the areas southern boundary. The assets at a risk of flooding from the Roath Brook involve a number of properties (residential and non-residential) as well as the infrastructure which is located around Waterloo Gardens. NRW and Cardiff County Council are currently working in conjunction to investigate an option to manage the flood risk to the area from the Roath Brook. The residential area of Penylan is generally at a low risk of flooding from surface water overland flows.

Figure 7-24 Flood Risk Map – Penylan



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Table 7-25 Counts for Penylan Flood Risk Area

COUNTS FOR Penylan FLOOD RISK AREA				
	Total in defined area	Risk Counts		
		HIGH	MED	LOW
Risk to People and Property		Residents in areas at risk of flooding		
People (n) (multiplier 2.35)	11,621	26	61	926
		Residential Properties at risk of flooding		
Residential Properties (n)	4,945	11	26	394
Services (n)	50	1	1	5
Risk to Economic Activity				
Non-Residential Properties (n)	1,004	1	29	93
Airports (n)				
Primary/Trunk Roads (km)	-	-	-	-
Main Line Railways (km)	-	-	-	-
Agricultural Land – Grades 1, 2 and 3 (ha)	303	4	12	45
Risk to Natural and Historic Environment				
Bathing Waters (n)				
Environmental Permitting Regulations (EPR) Installations (n)	3	-	-	2
Special Areas of Conservation (SAC) (ha)	-	-	-	-
Special Protection Areas (SPA) (ha)	-	-	-	-
Ramsar Sites (ha)	-	-	-	-
World Heritage Sites (ha)				
Sites of Special Scientific Interest (SSSI) (ha)	1	-	1	1
Parks and Gardens (ha)	3	0	0	1
Scheduled Ancient Monuments (ha)	0	-	-	-
Listed Buildings (n)	6	-	-	-
Licensed Abstractions (LA) (n)	-	-	-	-
Sites of Importance for Nature Conservation (SINC) (ha)				

Penylan – Delivery Plan

The following summarise actions we propose to manage local flood risk to an acceptable level within the community.

FRMP Measure	EU Reporting Code	Timescale	Responsible Authority
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	M22 – Prevention	2016 - 2021	City of Cardiff Council
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	M43 - Preparedness	2016 - 2021	City of Cardiff Council
Post flood-event recovery plan in place	M52 – Recovery and Review	2016 - 2021	City of Cardiff Council

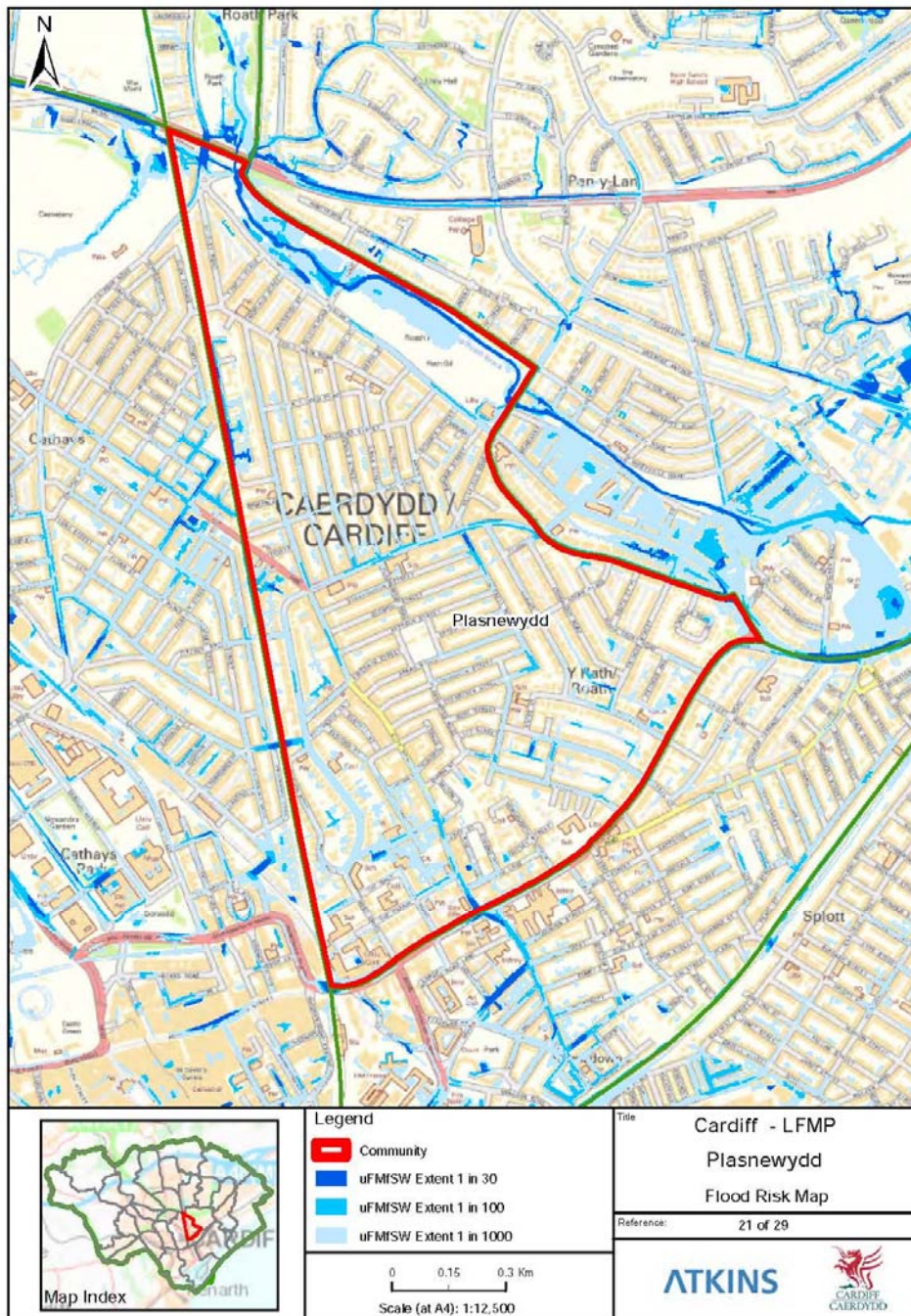


7.3.21 Plasnewydd

Plasnewydd covers the majority of the Roath area of Cardiff, with localised flood issues being affected from the lake in Roath Park. Due to the area's topography surface water generally flows in a south-west direction potentially affecting the area surrounding the Cardiff University Campus.

The underpass at Lowther Road is a known flooding hotspot, affected by high intensity rainfall events and anticipated to be the result of inadequate sewer capacity. Cardiff City Council will work with DCWW to identify the source and determine a potential resolution.

Figure 7-25 Flood Risk Map – Plasnewydd



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Table 7-26 Counts for Plasnewydd Flood Risk Area

COUNTS FOR Plasnewydd FLOOD RISK AREA				
	Total in defined area	Risk Counts		
		HIGH	MED	LOW
Risk to People and Property		Residents in areas at risk of flooding		
People (n) (multiplier 2.35)	18,626	7	24	362
		Residential Properties at risk of flooding		
Residential Properties (n)	7,926	3	10	154
Services (n)	50	-	-	2
Risk to Economic Activity				
Non-Residential Properties (n)	1,220	-	2	42
Airports (n)				
Primary/Trunk Roads (km)	-	-	-	-
Main Line Railways (km)	1.40	1.40	1.40	1.40
Agricultural Land – Grades 1, 2 and 3 (ha)	163	2	5	23
Risk to Natural and Historic Environment				
Bathing Waters (n)				
Environmental Permitting Regulations (EPR) Installations (n)	-	-	-	-
Special Areas of Conservation (SAC) (ha)	-	-	-	-
Special Protection Areas (SPA) (ha)	-	-	-	-
Ramsar Sites (ha)	-	-	-	-
World Heritage Sites (ha)				
Sites of Special Scientific Interest (SSSI) (ha)	-	-	-	-
Parks and Gardens (ha)	13	1	2	6
Scheduled Ancient Monuments (ha)	-	-	-	-
Listed Buildings (n)	41	2	2	3
Licensed Abstractions (LA) (n)	-	-	-	-
Sites of Importance for Nature Conservation (SINC) (ha)				

Plasnewydd – Delivery Plan

The following summarise actions we propose to manage local flood risk to an acceptable level within the community.

FRMP Measure	EU Reporting Code	Timescale	Responsible Authority
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	M22 – Prevention	2016 - 2021	City of Cardiff Council
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	M43 - Preparedness	2016 - 2021	City of Cardiff Council
Post flood-event recovery plan in place	M52 – Recovery and Review	2016 - 2021	City of Cardiff Council

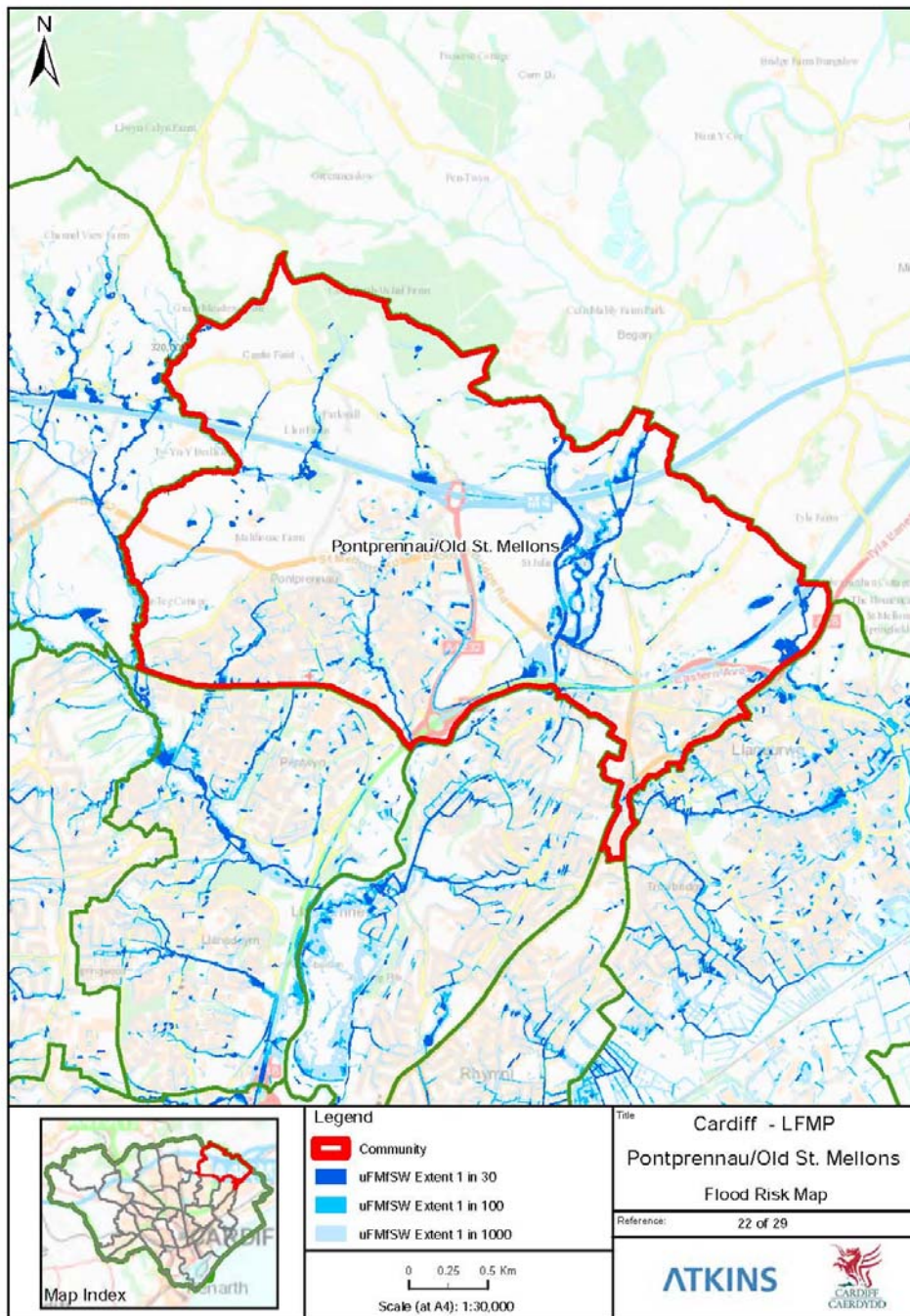


7.3.22 Pontprennau/ Old St. Mellons – Outside of Flood Risk Area

The area is located outside of the defined flood risk area.

Pontprennau has been subject to significant expansion in recent years, however, the area has been built to modern standards with suitable drainage infrastructure. As a consequence the flood risk identified on the surface water flood maps can be mainly related to two ordinary watercourses. To mitigate the risk development has been set back from the watercourses allowing the watercourse corridors to be largely retained.

Figure 7-26 Flood Risk Map – Pontprennau/ Old St. Mellons



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**Table 7-27 Counts for Pontprennau/Old St. Mellons Community Area
(not inc within Flood Risk Area)**

COUNTS FOR Pontprennau/ Old St. Mellons FLOOD RISK AREA				
	Total in defined area	Risk Counts		
		HIGH	MED	LOW
Risk to People and Property		Residents in areas at risk of flooding		
People (n) (multiplier 2.35)	9,433	14	14	99
		Residential Properties at risk of flooding		
Residential Properties (n)	4,014	6	6	42
Services (n)	9	-	-	-
Risk to Economic Activity				
Non-Residential Properties (n)	688	7	8	26
Airports (n)				
Primary/Trunk Roads (km)	-	-	-	-
Main Line Railways (km)	-	-	-	-
Agricultural Land – Grades 1, 2 and 3 (ha)	863	20	34	80
Risk to Natural and Historic Environment				
Bathing Waters (n)				
Environmental Permitting Regulations (EPR) Installations (n)	-	-	-	-
Special Areas of Conservation (SAC) (ha)	-	-	-	-
Special Protection Areas (SPA) (ha)	-	-	-	-
Ramsar Sites (ha)	-	-	-	-
World Heritage Sites (ha)				
Sites of Special Scientific Interest (SSSI) (ha)	-	-	-	-
Parks and Gardens (ha)	45	-	-	0.9
Scheduled Ancient Monuments (ha)	1	-	-	-
Listed Buildings (n)	20	-	-	-
Licensed Abstractions (LA) (n)	-	-	-	-
Sites of Importance for Nature Conservation (SINC) (ha)				

Pontprennau/Old St. Mellons – Delivery Plan

The following summarise actions we propose to manage local flood risk to an acceptable level within the community.

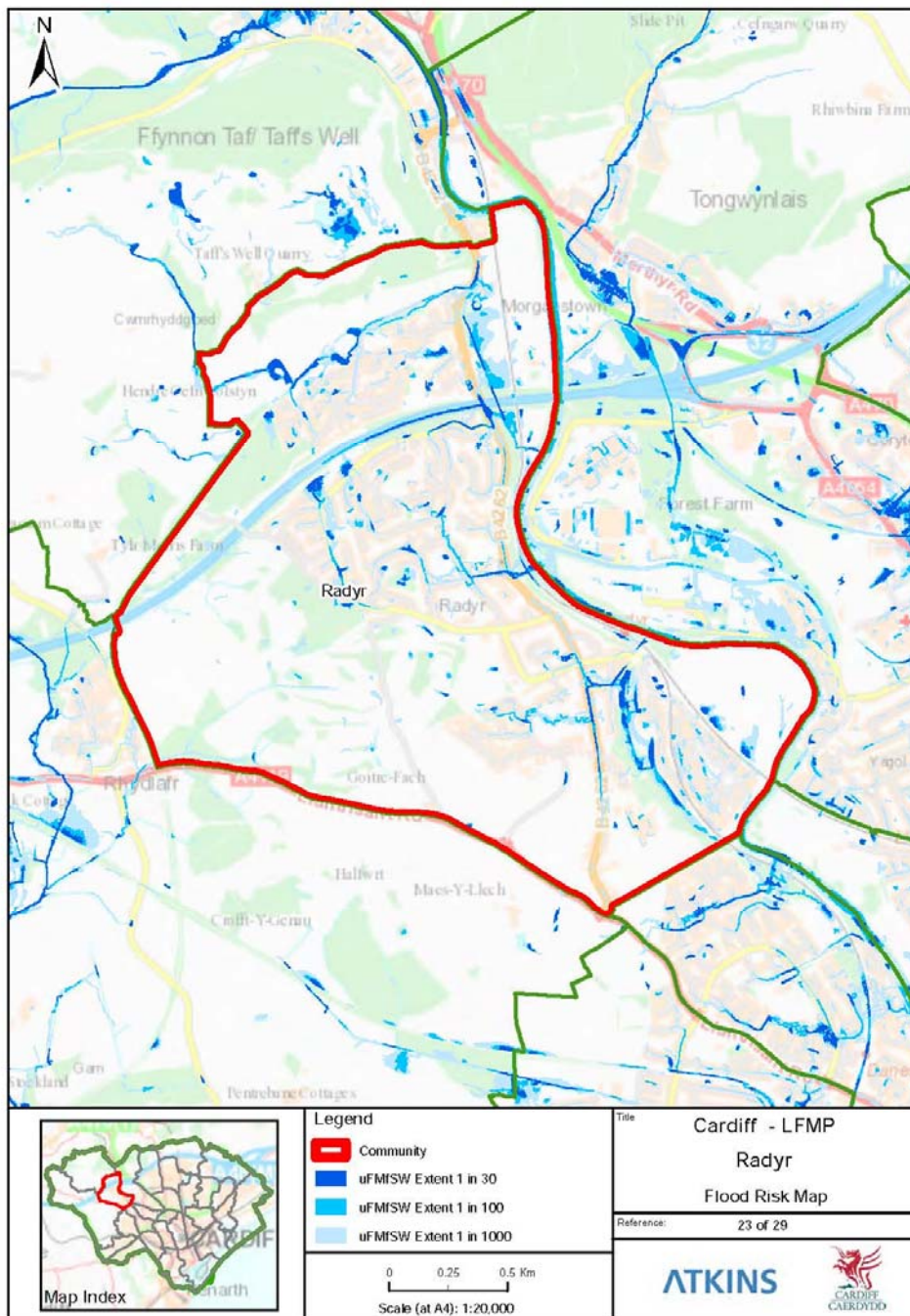
FRMP Measure	EU Reporting Code	Timescale	Responsible Authority
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	M22 – Prevention	2016 - 2021	City of Cardiff Council
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	M43 - Preparedness	2016 - 2021	City of Cardiff Council
Post flood-event recovery plan in place	M52 – Recovery and Review	2016 - 2021	City of Cardiff Council



7.3.23 Radyr

The western half of Radyr is predominantly rural, which contains a combination of farmland and woodland as well as the Radyr Golf Course. To the east, the ground levels drop down to the River Taff and to the residential area of Radyr. The main risk of flooding to the area is from the surface water overland flows, which are channelled down the hills towards the river. Generally these flows are contained to the main roads. Of the 915 residential properties located in Radyr, 3 have been identified to be at a risk of flooding during a high-risk (more-frequent) events.

Figure 7-27 Flood Risk Map – Radyr



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Table 7-28 Counts for Radyr Flood Risk Area

COUNTS FOR Radyr FLOOD RISK AREA				
	Total in defined area	Risk Counts		
		HIGH	MED	LOW
Risk to People and Property		Residents in areas at risk of flooding		
People (n) (multiplier 2.35)	2,150	7	16	47
		Residential Properties at risk of flooding		
Residential Properties (n)	915	3	7	20
Services (n)	7	-	-	1
Risk to Economic Activity				
Non-Residential Properties (n)	287	-	-	5
Airports (n)				
Primary/Trunk Roads (km)	-	-	-	-
Main Line Railways (km)	2.44	2.24	2.62	3.33
Agricultural Land – Grades 1, 2 and 3 (ha)	162	2	6	17
Risk to Natural and Historic Environment				
Bathing Waters (n)				
Environmental Permitting Regulations (EPR) Installations (n)	-	-	-	-
Special Areas of Conservation (SAC) (ha)	-	-	-	-
Special Protection Areas (SPA) (ha)	-	-	-	-
Ramsar Sites (ha)	-	-	-	-
World Heritage Sites (ha)				
Sites of Special Scientific Interest (SSSI) (ha)	-	-	-	-
Parks and Gardens (ha)	-	-	-	-
Scheduled Ancient Monuments (ha)	1	0	0	0
Listed Buildings (n)	6	-	-	-
Licensed Abstractions (LA) (n)	-	-	-	-
Sites of Importance for Nature Conservation (SINC) (ha)				

Radyr – Delivery Plan

The following summarise actions we propose to manage local flood risk to an acceptable level within the community.

FRMP Measure	EU Reporting Code	Timescale	Responsible Authority
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	M22 – Prevention	2016 - 2021	City of Cardiff Council
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	M43 - Preparedness	2016 - 2021	City of Cardiff Council
Post flood-event recovery plan in place	M52 – Recovery and Review	2016 - 2021	City of Cardiff Council

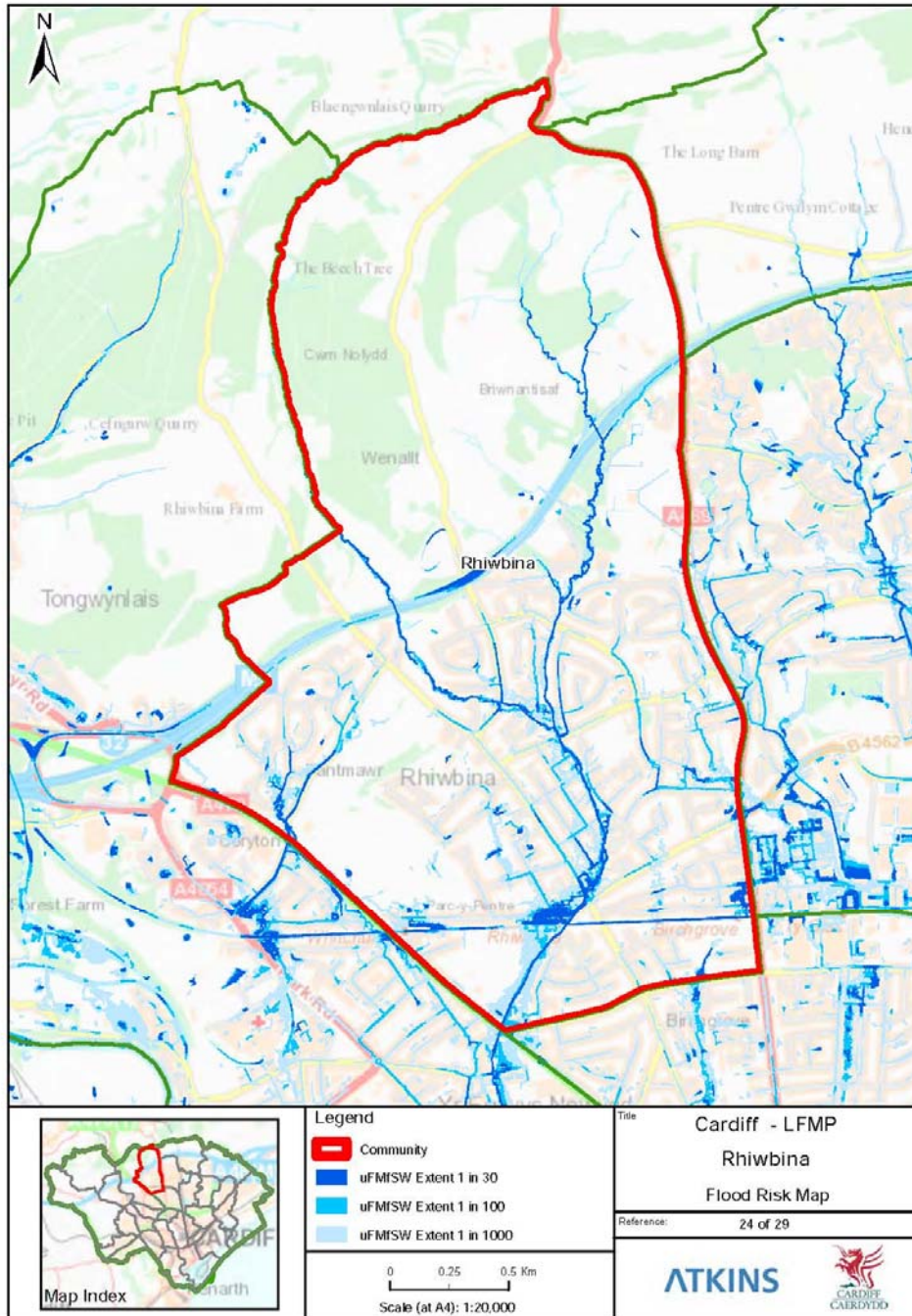


7.3.24 Rhiwbina

Rhiwbina is bounded by the A470 road to the west and the A469 road to Thornhill to the east. To the south of the M4, the area is mainly residential, whilst to the north the area although currently rural is identified as possible area for future development.

The area is currently receiving investment to reduce the flood risk to properties from the Rhydwaedlyd Brook. During a high-risk (more frequent) event 38 properties have been identified to be at a risk of flooding rising to 137 in low-risk (less extreme) events.

Figure 7-28 Flood Risk Map – Rhiwbina



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Table 7-29 Counts for Rhiwbina Flood Risk Area

COUNTS FOR Rhiwbina FLOOD RISK AREA				
	Total in defined area	Risk Counts		
		HIGH	MED	LOW
Risk to People and Property		Residents in areas at risk of flooding		
People (n) (multiplier 2.35)	12,168	89	85	322
		Residential Properties at risk of flooding		
Residential Properties (n)	5,178	38	36	137
Services (n)	42	-	-	3
Risk to Economic Activity				
Non-Residential Properties (n)	436	9	19	52
Airports (n)				
Primary/Trunk Roads (km)	0	-	-	-
Main Line Railways (km)	1.55	1.55	1.55	1.55
Agricultural Land – Grades 1, 2 and 3 (ha)	575	8	18	49
Risk to Natural and Historic Environment				
Bathing Waters (n)				
Environmental Permitting Regulations (EPR) Installations (n)	-	-	-	-
Special Areas of Conservation (SAC) (ha)	-	-	-	-
Special Protection Areas (SPA) (ha)	-	-	-	-
Ramsar Sites (ha)	-	-	-	-
World Heritage Sites (ha)				
Sites of Special Scientific Interest (SSSI) (ha)	38	-	-	-
Parks and Gardens (ha)	-	-	-	-
Scheduled Ancient Monuments (ha)	1	-	0	0
Listed Buildings (n)	75	3	7	12
Licensed Abstractions (LA) (n)	1	-	-	-
Sites of Importance for Nature Conservation (SINC) (ha)				

Rhiwbina – Delivery Plan

The following summarise actions we propose to manage local flood risk to an acceptable level within the community.

FRMP Measure	EU Reporting Code	Timescale	Responsible Authority
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	M22 – Prevention	2016 - 2021	City of Cardiff Council
Establishment of a programme of regular and appropriate maintenance for flood and coastal erosion risk management assets.	M24 – Prevention	2016 - 2021	City of Cardiff Council
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	M43 - Preparedness	2016 - 2021	City of Cardiff Council
Post flood-event recovery plan in place	M52 – Recovery and Review	2016 - 2021	City of Cardiff Council



7.3.25 Riverside

Located alongside the River Taff to the west and the main railway line to the south, Riverside is a high-density terraced residential area with nearly 7,000 properties in the area. The River Taff provides the predominant flood risk to the area which is managed by NRW. There is however a low risk of surface water flooding to the majority of the streets within the area with 736 residential properties predicted at be at a risk of surface water flooding during a low-risk (more extreme) event.

Figure 7-29 Flood Risk Map – Riverside

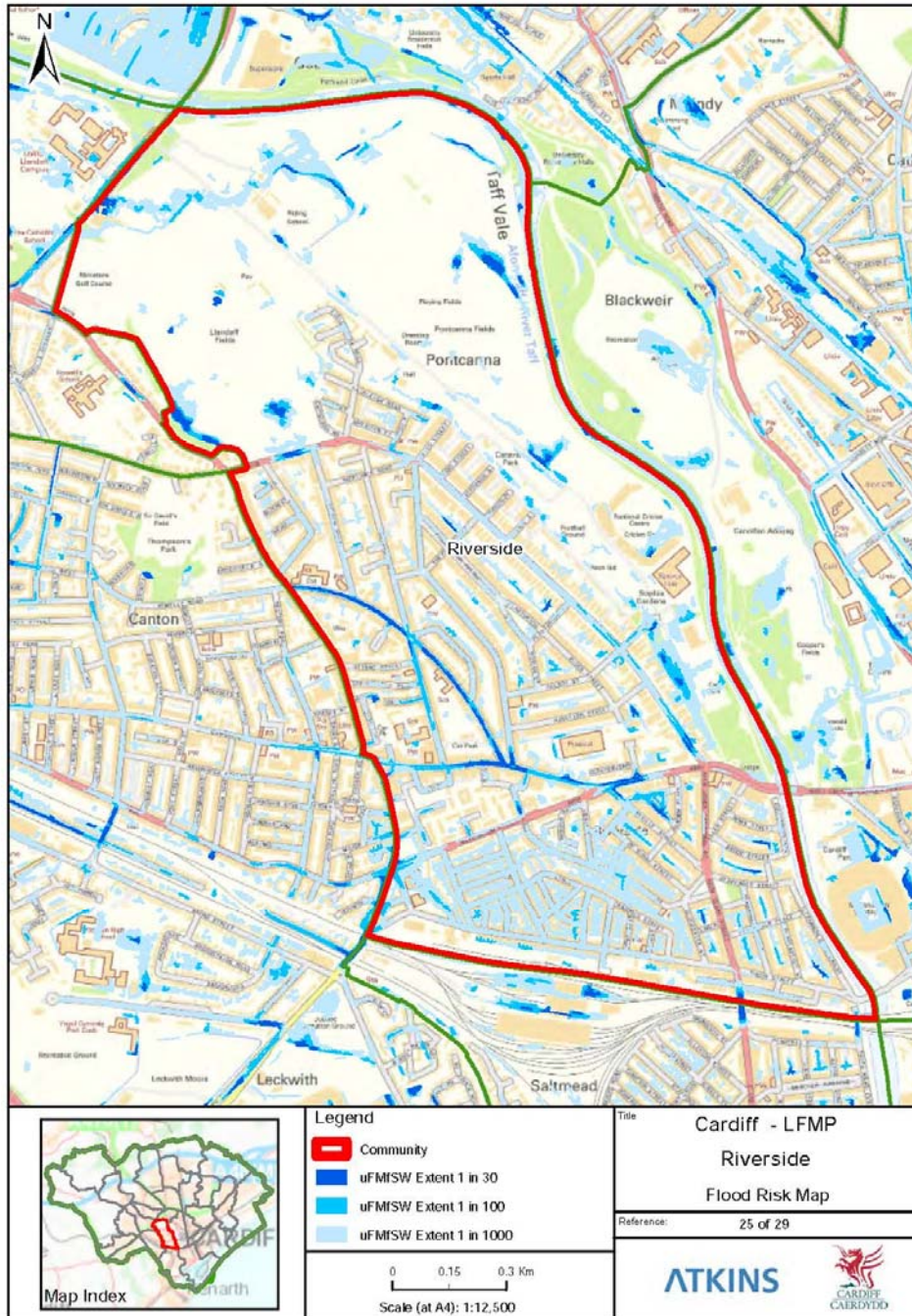


Table 7-30 Counts for Riverside Flood Risk Area

COUNTS FOR Riverside FLOOD RISK AREA				
	Total in defined area	Risk Counts		
		HIGH	MED	LOW
Risk to People and Property		Residents in areas at risk of flooding		
People (n) (multiplier 2.35)	15,628	-	33	1,730
		Residential Properties at risk of flooding		
Residential Properties (n)	6,650	-	14	736
Services (n)	40	-	-	4
Risk to Economic Activity				
Non-Residential Properties (n)	1,141	2	11	172
Airports (n)				
Primary/Trunk Roads (km)	-	-	-	-
Main Line Railways (km)	1.32	1.32	1.32	1.32
Agricultural Land – Grades 1, 2 and 3 (ha)	258	2	7	41
Risk to Natural and Historic Environment				
Bathing Waters (n)				
Environmental Permitting Regulations (EPR) Installations (n)	-	-	-	-
Special Areas of Conservation (SAC) (ha)	-	-	-	-
Special Protection Areas (SPA) (ha)	-	-	-	-
Ramsar Sites (ha)	-	-	-	-
World Heritage Sites (ha)				
Sites of Special Scientific Interest (SSSI) (ha)	-	-	-	-
Parks and Gardens (ha)	109	1	3	11
Scheduled Ancient Monuments (ha)	-	-	-	-
Listed Buildings (n)	27	-	-	1
Licensed Abstractions (LA) (n)	2	-	-	-
Sites of Importance for Nature Conservation (SINC) (ha)				

Riverside – Delivery Plan

The following summarise actions we propose to manage local flood risk to an acceptable level within the community.

FRMP Measure	EU Reporting Code	Timescale	Responsible Authority
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	M22 – Prevention	2016 - 2021	City of Cardiff Council
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	M43 - Preparedness	2016 - 2021	City of Cardiff Council
Post flood-event recovery plan in place	M52 – Recovery and Review	2016 - 2021	City of Cardiff Council



7.3.26 Rumney

The northern part of Rumney is mainly a residential area, whereas to the south the area contains the heavy-industry area of Lamby Way. The area is also bi-sected by the main railway line which provides the potential for an overland flow path to form along the railway. The risk of surface water flooding identified within Rumney is generally low, although it is predicted that during a high-risk (more frequent) event 11 residential properties are at a risk of surface water flooding.

To the west the area is bounded by the River Rhymney which contains flood defences that are managed by NRW.

Figure 7-30 Flood Risk Map – Rumney

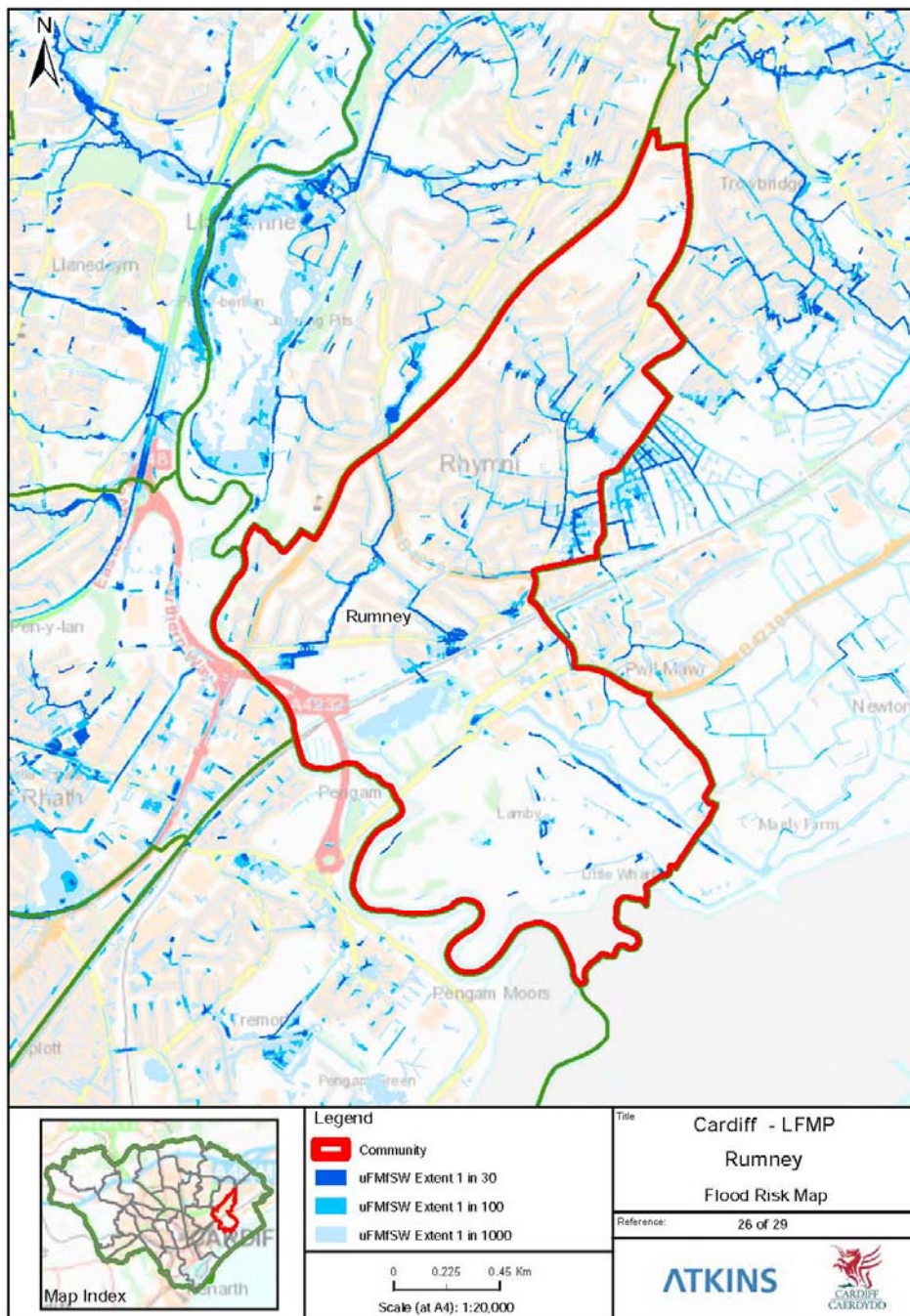


Table 7-31 Counts for Rumney Flood Risk Area

COUNTS FOR Rumney FLOOD RISK AREA				
	Total in defined area	Risk Counts		
		HIGH	MED	LOW
Risk to People and Property		Residents in areas at risk of flooding		
People (n) (multiplier 2.35)	1,800	26	52	139
		Residential Properties at risk of flooding		
Residential Properties (n)	766	11	22	59
Services (n)	4	-	-	1
Risk to Economic Activity				
Non-Residential Properties (n)	107	-	-	-
Airports (n)				
Primary/Trunk Roads (km)	-	-	-	-
Main Line Railways (km)	0.86	1.18	1.18	1.18
Agricultural Land – Grades 1, 2 and 3 (ha)	98	1	3	11
Risk to Natural and Historic Environment				
Bathing Waters (n)				
Environmental Permitting Regulations (EPR) Installations (n)	3	-	-	-
Special Areas of Conservation (SAC) (ha)	0.34	-	-	-
Special Protection Areas (SPA) (ha)	0.34	-	-	-
Ramsar Sites (ha)	0.34	-	-	0.00
World Heritage Sites (ha)				
Sites of Special Scientific Interest (SSSI) (ha)	1	1	1	1
Parks and Gardens (ha)	-	-	-	-
Scheduled Ancient Monuments (ha)	1	-	0	0
Listed Buildings (n)	1	-	-	-
Licensed Abstractions (LA) (n)	-	-	-	-
Sites of Importance for Nature Conservation (SINC) (ha)				

Rumney – Delivery Plan

The following summarise actions we propose to manage local flood risk to an acceptable level within the community.

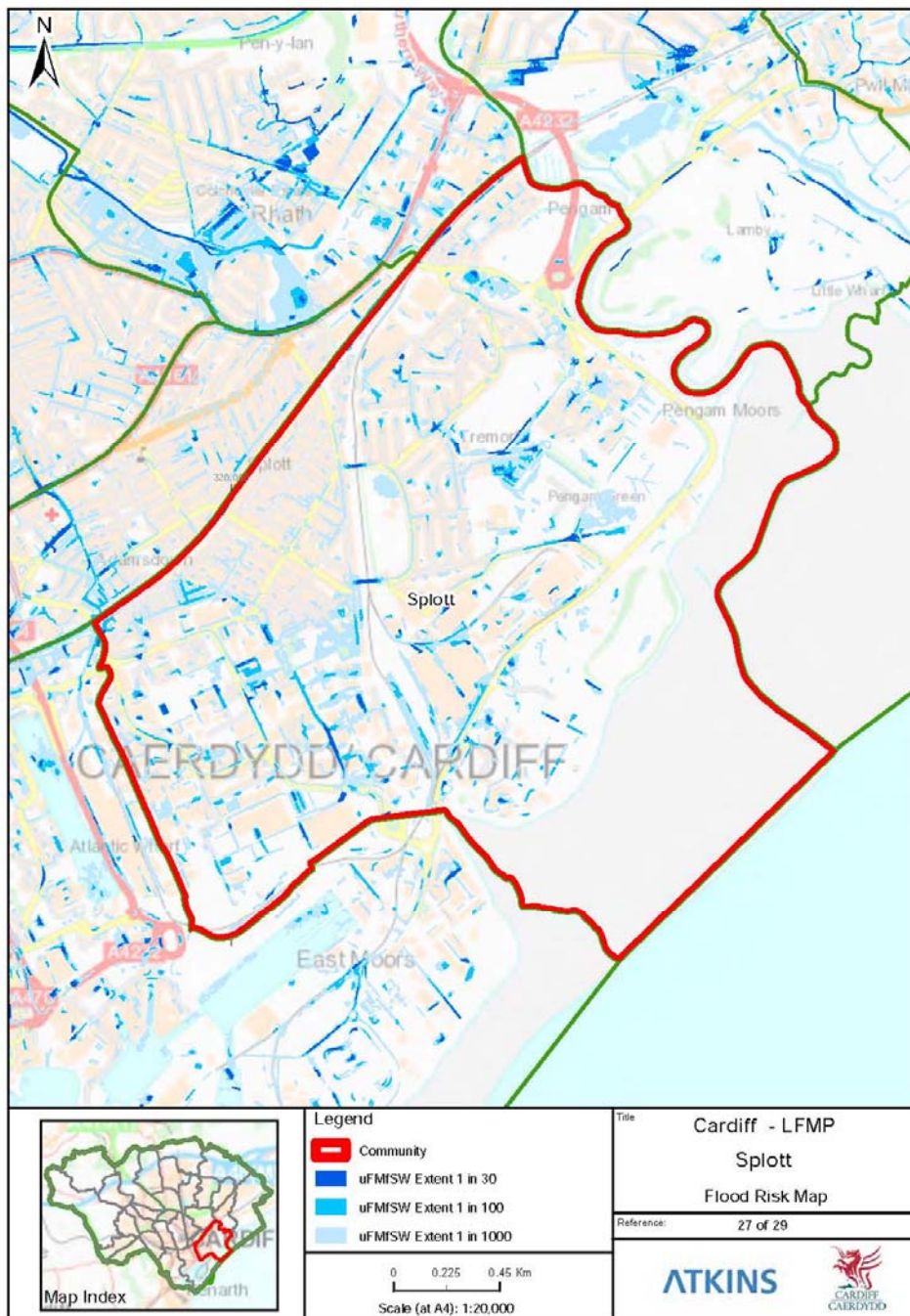
FRMP Measure	EU Reporting Code	Timescale	Responsible Authority
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	M22 – Prevention	2016 - 2021	City of Cardiff Council
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	M43 - Preparedness	2016 - 2021	City of Cardiff Council
Post flood-event recovery plan in place	M52 – Recovery and Review	2016 - 2021	City of Cardiff Council



7.3.27 Splott

The area of Splott is predominantly a residential area, containing 6,160 residential properties. The main source of flood risk is considered to be from surface water run-off and associated overland flows that form during the more extreme events. During a high-risk (more frequent) event the surface water flooding is generally contained to the roads, with 1 residential property being identified as at a risk of flooding. During low-risk (more extreme) events the extent of surface water flooding increases, such that 327 residential properties will be predicted to flood.

Figure 7-31 Flood Risk Map – Splott



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Table 7-32 Counts for Splott Flood Risk Area

COUNTS FOR Splott FLOOD RISK AREA				
	Total in defined area	Risk Counts		
		HIGH	MED	LOW
Risk to People and Property		Residents in areas at risk of flooding		
People (n) (multiplier 2.35)	14,476	2	21	768
		Residential Properties at risk of flooding		
Residential Properties (n)	6,160	1	9	327
Services (n)	59	-	-	3
Risk to Economic Activity				
Non-Residential Properties (n)	1,215	-	9	53
Airports (n)				
Primary/Trunk Roads (km)	-	-	-	-
Main Line Railways (km)	2.66	1.91	2.66	2.66
Agricultural Land – Grades 1, 2 and 3 (ha)	482	2	10	55
Risk to Natural and Historic Environment				
Bathing Waters (n)				
Environmental Permitting Regulations (EPR) Installations (n)	34	-	-	3
Special Areas of Conservation (SAC) (ha)	76.69	-	-	-
Special Protection Areas (SPA) (ha)	76.69	-	-	-
Ramsar Sites (ha)	76.69	-	-	-
World Heritage Sites (ha)				
Sites of Special Scientific Interest (SSSI) (ha)	77	-	-	-
Parks and Gardens (ha)	-	-	-	-
Scheduled Ancient Monuments (ha)	-	-	-	-
Listed Buildings (n)	6	-	-	-
Licensed Abstractions (LA) (n)	1	-	-	-
Sites of Importance for Nature Conservation (SINC) (ha)				

Splott – Delivery Plan

The following summarise actions we propose to manage local flood risk to an acceptable level within the community.

FRMP Measure	EU Reporting Code	Timescale	Responsible Authority
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	M22 – Prevention	2016 - 2021	City of Cardiff Council
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	M43 - Preparedness	2016 - 2021	City of Cardiff Council
Post flood-event recovery plan in place	M52 – Recovery and Review	2016 - 2021	City of Cardiff Council



7.3.28 Trowbridge – Outside of Flood Risk Area

The area sits outside of the defined flood risk area.

The area of Trowbridge is mainly located on the Wentlog Levels, the area includes the residential area of St. Mellons.

Figure 7-32 Flood Risk Map – Trowbridge



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**Table 7-33 Counts for Trowbridge Community Area
(not inc within Flood Risk Area)**

COUNTS FOR Trowbridge FLOOD RISK AREA				
	Total in defined area	Risk Counts		
		HIGH	MED	LOW
Risk to People and Property		Residents in areas at risk of flooding		
People (n) (multiplier 2.35)	15,665	61	195	891
		Residential Properties at risk of flooding		
Residential Properties (n)	6,666	26	83	379
Services (n)	9	-	-	2
Risk to Economic Activity				
Non-Residential Properties (n)	829	4	7	30
Airports (n)				
Primary/Trunk Roads (km)	-	-	-	-
Main Line Railways (km)	3.88	-	2.28	3.88
Agricultural Land – Grades 1, 2 and 3 (ha)	915	8	24	97
Risk to Natural and Historic Environment				
Bathing Waters (n)				
Environmental Permitting Regulations (EPR) Installations (n)	13	-	-	1
Special Areas of Conservation (SAC) (ha)	384.47	-	0.01	0.14
Special Protection Areas (SPA) (ha)	376.75	-	0.01	0.14
Ramsar Sites (ha)	376.75	-	0.01	0.14
World Heritage Sites (ha)				
Sites of Special Scientific Interest (SSSI) (ha)	833	456	833	833
Parks and Gardens (ha)	-	-	-	-
Scheduled Ancient Monuments (ha)	1	-	-	0
Listed Buildings (n)	9	-	-	-
Licensed Abstractions (LA) (n)	-	-	-	-
Sites of Importance for Nature Conservation (SINC) (ha)				

Trowbridge – Delivery Plan

The following summarise actions we propose to manage local flood risk to an acceptable level within the community.

FRMP Measure	EU Reporting Code	Timescale	Responsible Authority
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	M22 – Prevention	2016 - 2021	City of Cardiff Council
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	M43 - Preparedness	2016 - 2021	City of Cardiff Council
Post flood-event recovery plan in place	M52 – Recovery and Review	2016 - 2021	City of Cardiff Council

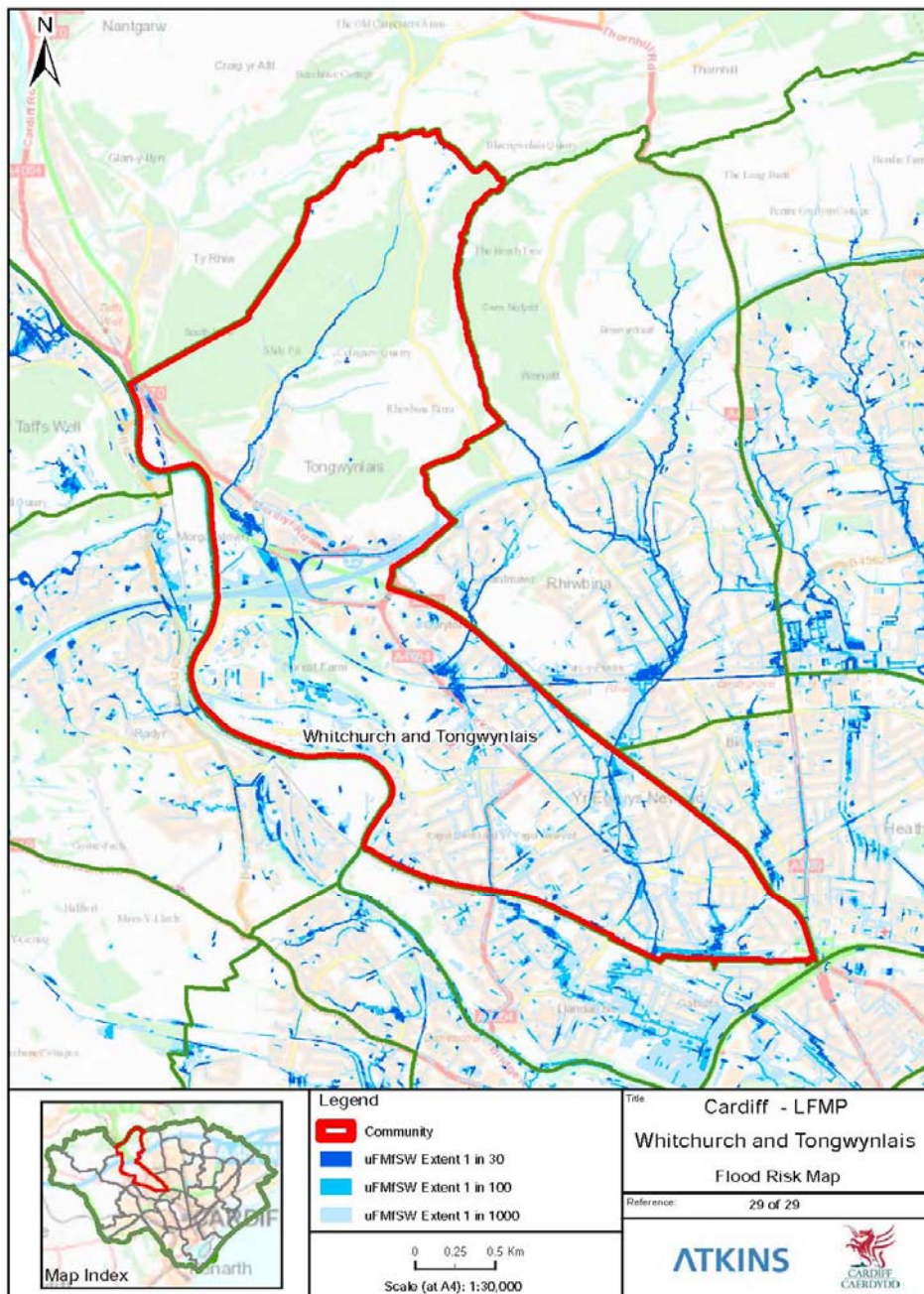


7.3.29 Whitchurch and Tongwynlais

Whitchurch and Tongwynlais is centred around the Gabalfa Interchange of the M4. To the north of the M4 is located Tongwynlais which is largely a rural area with the Nant Gwynlais flowing to the River Taff. Within Tongwynlais surface water is shown to affect the roads within the town.

To the south of the M4 is the more densely developed area of Whitchurch. In general, there are pockets of the area which are at surface water flood risk. However, the main identified source of flood risk is from the Whitchurch Brook. The brook flows in a north to south direction and is partly culverted along its length until it flows under the A48 and into the River Taff.

Figure 7-33 Flood Risk Map – Whitchurch and Tongwynlais



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Table 7-34 Counts for Whitchurch and Tongwynlais Flood Risk Area

COUNTS FOR Whitchurch and Tongwynlais FLOOD RISK AREA				
	Total in defined area	Risk Counts		
		HIGH	MED	LOW
Risk to People and Property		Residents in areas at risk of flooding		
People (n) (multiplier 2.35)	17,315	143	287	1,020
		Residential Properties at risk of flooding		
Residential Properties (n)	7,368	61	122	434
Services (n)	50	-	-	5
Risk to Economic Activity				
Non-Residential Properties (n)	1,071	13	29	103
Airports (n)				
Primary/Trunk Roads (km)	4	3	3	3
Main Line Railways (km)	0.59	0.56	0.59	0.59
Agricultural Land – Grades 1, 2 and 3 (ha)	678	10	28	88
Risk to Natural and Historic Environment				
Bathing Waters (n)				
Environmental Permitting Regulations (EPR) Installations (n)	3	-	-	-
Special Areas of Conservation (SAC) (ha)	8.65	-	-	-
Special Protection Areas (SPA) (ha)	-	-	-	-
Ramsar Sites (ha)	-	-	-	-
World Heritage Sites (ha)				
Sites of Special Scientific Interest (SSSI) (ha)	19	10	10	10
Parks and Gardens (ha)	35	0	1	4
Scheduled Ancient Monuments (ha)	1	-	-	0
Listed Buildings (n)	39	-	1	4
Licensed Abstractions (LA) (n)	2	-	-	-
Sites of Importance for Nature Conservation (SINC) (ha)				

Whitchurch and Tongwynlais – Delivery Plan

The following summarise actions we propose to manage local flood risk to an acceptable level within the community.

FRMP Measure	EU Reporting Code	Timescale	Responsible Authority
Reduction of number of properties identified at risk of flooding from Local Flood Risk sources	M22 – Prevention	2016 - 2021	City of Cardiff Council
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	M43 - Preparedness	2016 - 2021	City of Cardiff Council
Post flood-event recovery plan in place	M52 – Recovery and Review	2016 - 2021	City of Cardiff Council



7.5 Cardiff wide summary

Potential benefit

In the above section we provide the detail of proposed measures to be delivered for each community area. Across Cardiff we have totalled proposed measures against the four themes, as shown below. This captures all measures for managing and reducing flood risk from local flood risk sources.

A level of effort will be required in raising awareness of flood risk, so that all residents can help the LLFA **prepare** for flooding events and manage levels of flood risk to acceptable levels. These typically will involve further activities to;

- Raise flood awareness within the community, and
- Work with partners to improve resilience within the community.

We need to improve our understanding of how our drainage systems **protect** our area, especially historic systems of drainage pipes and culverts where records are not available.

- Improve the level of understanding of the capacity of culverts across the area to convey floodwaters
- review our inspection regime of culvert inlets and debris screens to ensure priority is being provided to those that have the greatest risk

Measures to enable communities to **recover** following a flood event, and be more resilient in the future are also a priority. These typically will involve:

- Recovery plans; community and infrastructure, and
- National level; lessons learnt from flood events, change to insurance policy etc.



Investment prioritisation

The potential benefits of any investment is difficult to quantify within a high-level plan such as this. However, the adopted approach is that investment would focus on the numbers of properties, people, or natural features at high-risk (more frequent) of flooding to the medium risk.

To determine a potential prioritisation we have ranked the communities based on the following criteria using the value for the low-risk (more extreme) event;

- Number of people considered to be at-risk (people impact), and
- The average AAD per property affected (economic impact).

We have given an equal weighting to these two factors, and in doing so identified the following communities as those where we will prioritise investment;

- Caerau,
- Cathays,
- Heath,
- Llanishen,
- Penylan,
- Splott, and
- Whitchurch and Tongwynlais.

Where two measures provide a similar outcome in realising the overall Objectives of the plan that priority will be given where investment provides benefit to the greatest number of properties within the high-risk band.

Question 6. Should some types of measures be prioritised differently to others?

Intervention timescale

The plan has considered the following timescales:

Short-term; (2015 – 2021) Some actions around preparation and prevention are ongoing and will continue for the foreseeable future.

Medium-term; (2021 onwards) Where investment in new technology or changes to existing infrastructure are envisaged this will need to be planned and included within the Council's budgetary forecasts.

Long-term; (2021 onwards). Funding for investment in one-off schemes, particularly those identified to protect existing communities, takes time to secure and deliver the required benefits. Identifying these investments will continue in parallel with the medium-term interventions. They may require investment by private parties as well as the council.

Cost estimate

At this stage costs have not been estimated for the various measures that have been identified. There will be economies of scale with some measures being implemented across all Community Areas, whilst others will be site specific needing further assessment and understanding of the problem prior to solutions being identified and costed.

8 Consultation

8.1 Method of Consultation

A period of consultation on the City and County of Cardiff Flood Risk Management Plan was carried out between Monday 12th October 2015 and Friday 6th November 2015. Cardiff City Council consulted risk partners and the public on the FRMP via the following avenues:

1. All RMAs, as listed in Appendix B
2. All Cardiff employees
3. Engagement with members of the public using the following means:-
 - a) Cardiff website
 - b) Social media including Facebook and Twitter
 - c) Councillor briefings

A series of questions are set out in this plan, and are repeated below. Consultation responses to these questions will be reviewed and considered.

Question 1. Do the numbers of properties and extents of flood risk across the communities in Cardiff set out the most significant flood risk?

Question 2. Have any known local flood risk issues not been identified?

Question 3. Which of the four aspects for managing flood risk are the most important?

- A) Protection
- B) Prevention
- C) Preparedness
- D) Recovery and Review

Question 4. With reference to table – 6.3, which measure do you believe will be the most effective at managing flood risk within Cardiff?

Question 5. What do you consider to be the greatest cause of flood risk in Cardiff?

- A) Groundwater
- B) Surface Water Runoff
- C) Blocked culvert inlets
- D) Highway drainage
- E) Ordinary watercourses (i.e. not rivers)
- F) Combined sewers
- G) Other

Question 6. Should some types of measures be prioritised differently to others?

The Flood Risk Management Plan draft effectively targets and aims to achieve the objectives set out by the Welsh Government's National Flood and Coastal Erosion Risk Management Strategy (FCERM) of:

- Reducing Consequences
- Raising awareness and engaging people
- Providing an effective and sustained response
- Prioritising investment.

Question 7. In relation to the objectives above, do you agree with them?

- A) Fully agree
- B) Partially agree
- C) Disagree

Question 8. How do you think you, as an individual/organisation, could support the work set out in the Draft Flood Risk Management Plan to reduce flood risk?

8.2 Public Consultation

A number of responses provided positive feedback from our consultation period, summarised below.

Question 1.

100% of the responses agreed that the numbers of properties and the extents of flood risk set out the most significant flood risk across the council.

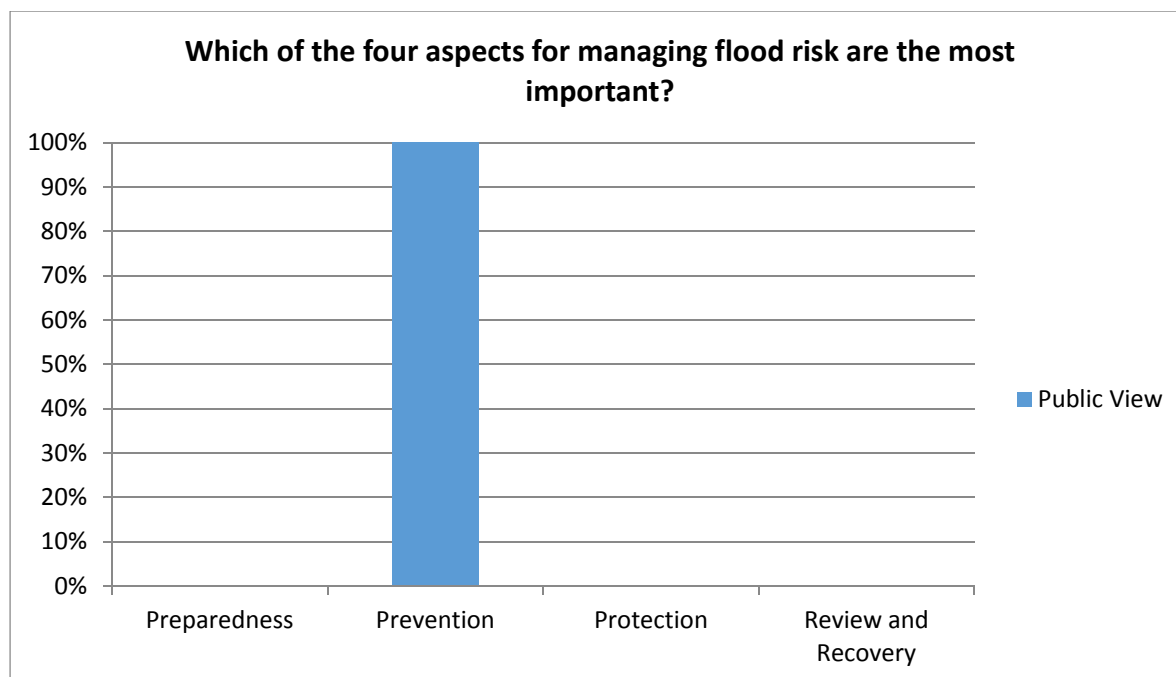
Question 2.

The public response confirmed that the identification of known local flood risk issues were identified. However, it was stated that there is a difficulty identifying individual problems as the FRMP refers to areas rather than specific locations.

The uFMfSW for each individual community area show a maximum scale of 1:10,000 in accordance with NRW's guidelines.

Table 8-1 Public view on the aspects of managing flood risk

Question 3,



As you can see, 100% of feedback agreed that the most important aspect of managing flood risk is the prevention of flooding.

Question 4.

The respondents have a split view with this question. The feedback we have received indicate that the measure of reducing the number of vulnerable properties to flooding is equal to the development of procedures for the effective clearance of debris and the development of repair schedules.

Question 5.

The feedback we have received here is a unanimous view that blocked culvert inlets and blocked gullies are the greatest cause of flood risk in Cardiff.

Question 6.

The consultation shows that all of the respondents agree that some measures should be prioritised differently to others. One view explained that to ensure future development, surface water should be retained at source and to reduce discharge rates. Cardiff Council should also pursue illegal connections for house extensions, drives, patios and other hard areas which add to the surface water drainage network. The response also stated that developers across the city should actually construct and maintain their SuDS features.

Question 7.

We have a clear split between full agreement and a partial agreement of whether or not this FRMP targets to achieve the objectives set out by the Welsh Government's FCERM.

Question 8.

Feedback from how residents or organisations could support the FRMP was reassuring. One respondent suggested that residents be vigilant of the condition of highway gullies outside their property and make an effort to keep them clear of leaf fall. Another resident made it clear to report any issues straight away to the Council and also that raising awareness of flood risk within communities would be beneficial.

8.3 Consultation with other Statutory Bodies

We had feedback from both NRW and DCWW Welsh Water regarding some points within the FRMP. NRW made the following comments and suggestions.

Table 8-2 NRW comments the FRMP

Topic	NRW Comments
A map showing the boundaries of the Flood Risk Area	<p>There is a map included on page 12 and page 15 which shows the Flood Risk Area boundary.</p> <p>Initial review of this draft has deemed this appropriate to meet the requirements.</p>
The conclusions drawn from the flood hazard and risk maps published under Regulation 22 of the Flood Risk Regulations 2009	<p>The section titled 'conclusions from the flood hazard and risk maps' is included on page 13 however the sections of text on pages 48, 50 and 54 seem more like conclusions and it is suggested that you should consider giving them this title so it is clear to the reader that these are also conclusions. The section on page 13 is a little light in conclusion content if taken as the only conclusions to be drawn from maps within the plan.</p> <p>Initial review of this draft has suggested that minor amendments are needed.</p>
Objectives for the purpose of managing the flood risk	<p>Objectives and sub-objectives are included on pages 35 to 38. The title of table 6.1 should be updated to include objectives: 'Summary of adopted objectives and measures for this FRMP'.</p> <p>You may also wish to add a small section to introduce the objectives within the plan (particularly with 'objectives' included in the wording of any title) to better signpost to the objectives so they can be found from the contents table. This is purely a suggestion as we do not know how Europe will review the plans and it is not immediately obvious from looking at the contents page whether there are objectives included.</p> <p>Initial review of this draft has deemed this appropriate to meet the requirements.</p>

<p>Proposed measures for achieving those objectives, and description of the proposed timing and manner of implementing the measures including details of who is responsible for implementation</p>	<p>Measures are also included on pages 35 to 38 and are linked to the objectives and EU codes on pages 41 and 42. Community measures have the EU measure type, timescale and responsible authority.</p> <p>Measures underway from the Local Flood Risk Management Strategy are included on page 28. It is suggested that you should also report these measures to Europe as ongoing measures.</p> <p>It was noted under the Grangetown community area that the Greener Grangetown project is not mentioned. It is suggested that this should be included as a measure or a case study to demonstrate links between flood risk, the Water Framework Directive (WFD) and the community.</p> <p>Initial review of this draft has deemed this appropriate to meet the requirements.</p>
<p>A description of the way implementation of the measures will be monitored</p>	<p>The section on monitoring and review is included on page 150. The plan will be subject to an annual review, a full formal review every 6 years and ad-hoc reviews.</p> <p>Initial review of this draft has deemed this appropriate to meet the requirements.</p>
<p>A report of the consultation</p>	<p>To be completed following consultation.</p>
<p>Where the person preparing the report thinks it appropriate, information about how the implementation of measures under the flood risk management plan and the river basin management plan for the area will be co-ordinated at a river basin level</p>	<p>The section on the RBMP is included on pages 31 and 32. The plan measures should be better linked to RBMP measures where possible and it is suggested that this could be done through table 6.1 with an additional column created for links to specific WFD measures or objectives. Also see previous comment on Greener Grangetown, as this could be used as an example.</p> <p>Minor point 1: should section 5.3 be titled as 'summary of co-ordination of development and implementation with the River Basin Management Plan?'</p> <p>Minor point 2: the link to the draft plan on page 32 will either need updating or removing for the final plans.</p> <p>Initial review of this draft has suggested that minor amendments are needed.</p>
<p>How were the SEA and HRA requirements considered and met?</p>	<p>There is no mention in the plan of the SEA. If adopting the Local Flood Risk Management Strategy's Strategic Environmental Assessment is still relevant, this should be mentioned and linked through the FRMP. If undertaking an SEA specifically for this FRMP, this needs to be submitted with the final plan.</p> <p>Initial review of this draft has suggested that minor amendments are needed.</p>

DCWW gave the following responses.

Table 8-3 DCWW comments the FRMP

Topic	DCWW Comments
<p>Reference to the Water Framework Directive</p>	<p>Article 7 of the Floods Directive requires that flood risk management plans should take the WFDs environmental objectives into account and requires coordination in the application of the two Directives. DCWW are pleased to see the FRMP references the WFD, but would like to see more information on how the objectives of the FRMP align with the Severn River Basin Management Plan.</p>

Section 6 - Plasnewydd flood risk Area.	DCWW do not believe that the cause for the frequent flooding of the underpass at Lowther Road is solely a result of the local sewer system being unable to cope with high-intensity rainfall events. They would be keen to work with Cardiff Council to investigate the cause of the issue and find suitable solutions.
Appendix B referring to Risk Management Authority responsibilities	This section includes information on the responsibilities of RMAs, including reference to DCWW being responsible for surface water sewers. Whilst they have a responsibility for a large number of surface water sewers, they are not responsible for all of them as those discharging to watercourses that were not already adopted by DCWW or subject to a S104 agreement at the time of the Private Sewer Transfer have remained within private ownership.

8.4 Changes following consultation

Addressing the statutory bodies feedback first, we have made some minor changes to the plan to accommodate their views. Firstly, we have addressed the minor changes recommended by NRW which are listed below.

Table 8-4 Cardiff amendments to NRW recommendations

NRW Comments	Cardiff Council Amendments
<p>The section titled 'conclusions from the flood hazard and risk maps' is included on page 13 however the sections of text on pages 48, 50 and 54 seem more like conclusions and it is suggested that you should consider giving them this title so it is clear to the reader that these are also conclusions. The section on page 13 is a little light in conclusion content if taken as the only conclusions to be drawn from maps within the plan.</p> <p>Initial review of this draft has suggested that minor amendments are needed.</p>	<p>We have acted on the NRW's advice and changed the section title, please see amended title.</p> <p>'How our conclusions were drawn from the Flood Risk maps'</p>
<p>The section on the RBMP is included on pages 31 and 32. The plan measures should be better linked to RBMP measures where possible and it is suggested that this could be done through table 6.1 with an additional column created for links to specific WFD measures or objectives. Also see previous comment on Greener Grangetown, as this could be used as an example.</p> <p>Minor point 1: should section 5.3 be titled as 'summary of co-ordination of development and implementation with the River Basin Management Plan?'</p> <p>Minor point 2: the link to the draft plan on page 32 will either need updating or removing for the final plans.</p> <p>Initial review of this draft has suggested that minor amendments are needed.</p>	<p>In response to the NRW comments, we believe that the links between the plan measures and the RBMP are adequate. We have not included Greener Grangetown in this FRMP as Greener Grangetown is not a flood alleviation project.</p> <p>Minor point 1: changed section 5.3 title as recommended</p> <p>Minor point 2: changed as recommended</p>
<p>There is no mention in the plan of the SEA. If adopting the Local Flood Risk Management Strategy's Strategic Environmental Assessment is still relevant, this should be mentioned and linked through the FRMP. If undertaking an SEA specifically for this FRMP, this needs to be submitted with the final plan.</p>	<p>As a result of this FRMP, we have had no requirement to update our SEA so we have not included it within the document. If we establish new works within Cardiff, they will require a full EIA. We have not needed to undertake an SEA specifically for this FRMP.</p>

<p>Initial review of this draft has suggested that minor amendments are needed.</p>	<p>We have undertaken a review of the SEA undertaken as part of the LFRMS. This FRMP formally adopts the measures from the LFRMS and it is considered that there is no requirement to undertake a new SEA. This is reflected in the addition of section 5.2.</p>
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After analysing the DCWW feedback we made the following changes to the report.

Table 8-5 Cardiff amendments to DCWW recommendations

DCWW Comments	Cardiff Council Amendments
<p>Article 7 of the Floods Directive requires that flood risk management plans should take the WFDs environmental objectives into account and requires coordination in the application of the two Directives. DCWW are pleased to see the FRMP references the WFD, but would like to see more information on how the objectives of the FRMP align with the Severn River Basin Management Plan.</p>	<p>We have created table 6.1 to illustrate the link between a number of our measures and the measures of the SRBMP.</p>
<p>DCWW do not believe that the cause for the frequent flooding of the underpass at Lowther Road is solely a result of the local sewer system being unable to cope with high-intensity rainfall events. They would be keen to work with Cardiff Council to investigate the cause of the issue and find suitable solutions.</p>	<p>We have amended this section to reflect DCWW's comment and are keen to work with DCWW to establish a solution to the issue.</p>
<p>The section in Appendix B includes information on the responsibilities of RMAs, including a reference to DCWW being responsible for surface water sewers. Whilst they have a responsibility for a large number of surface water sewers, they are not responsible for all of them as those discharging to watercourses that were not already adopted by DCWW or subject to a S104 agreement at the time of the Private Sewer Transfer have remained within private ownership.</p>	<p>We have altered our statement to include the fact that DCWW have a vested interest for a number of surface water sewers, not all of them.</p>

9 Monitoring and review

The National Strategy will be formally reviewed on a six-yearly cycle, mirroring the requirements of the Flood Risk Regulations 2009. This will enable the WG to consider the information being produced from the mapping and planning exercises that NRW and LLFA will complete.

This information will also continue to inform the development of Local Strategies ongoing and so it seems logical for the Local Strategies to reflect this six yearly review cycle.

However, Local Strategies should be subject to continuous improvement and not be completed as one off exercises. Regular reviews should be built in to allow an alternative approach to be adopted with all of the relevant data being taken into consideration.

Cardiff Council have therefore decided to adopt the following approach;

- Annual Review; planned Actions to ensure they continue to reflect and realise the stated Objectives.
- Full Review; will take place every 6 years the first being in January 2021.
- Ad-hoc / post-event review; following serious flood event.

10 References

Cardiff Local Flood Risk Management Strategy

(<https://www.cardiff.gov.uk/ENG/Home/Pages/default.aspx>)

Cardiff Preliminary Flood Risk Assessment

(<https://www.cardiff.gov.uk/ENG/Home/Pages/default.aspx>)

NRW Severn River Basin District Management Plan

(<https://naturalresources.wales/?lang=en>)

NRW Severn River Basin District Flood Risk Management Plan

(<https://naturalresources.wales/?lang=en>)

National Flood and Coastal Erosion Risk Management Strategy

(<https://www.gov.uk/government/publications/national-flood-and-coastal-erosion-risk-management-strategy-for-england>)

Appendices

Appendix A. EU Flood Directive

Appendix B. Risk Management Authorities

Appendix C. LFRMS Measures

Appendix A. **EU Flood Directive**

Appendix B. Risk Management Authorities

The following table sets out information on the responsibilities, duties and powers of the Risk Management Authorities in the Cardiff area:

- **Risk Management Authority** – the name of the RMA, and where applicable relevant department
- **Responsibilities for flood and erosion risk management** – this column sets out the general responsibilities of the RMA in relation to flood and erosion risk management. This provides information on all the flood and erosion risk management responsibilities of the RMA, not just those under the Flood and Water Management Act.
- **Statutory duties** – these are things that the RMA is required to do by legislation for the management of flood and erosion risk
- **Permissive powers** – powers that allow / enable the RMA to do things. They are not required to use these powers and it is the responsibility of the RMA to decide if they should use these powers.
- **Geographic area of responsibility** – a description of the area within which the RMA has responsibility. This may be a part of, all of or a larger area than that covered by the Cardiff LLFA area.

Risk Management Authority	Responsibilities for flood and erosion risk management	Statutory duties	Permissive powers	Geographic area of responsibility
<p>Natural Resources Wales – Risk Management Authority</p>	<p>Oversight role for all flood and coastal erosion risk management in Wales</p> <ul style="list-style-type: none"> • Provision of technical advice and support to Risk Management Authorities, • Lead on Flood Awareness Wales • Lead on national raising awareness programme • Lead on other national initiatives • Single point of contact for enquiries and information on flood risk <p>Operational responsibilities for flooding from rivers, the sea and coastal erosion</p> <ul style="list-style-type: none"> • Collect data • Map the risks of flooding from main rivers, the sea and reservoirs • Conduct assessments in relation to the risks of flooding from main rivers, the sea and reservoirs • Data review and co-ordination for submission of information to the European Commission • Approve Coastal Protection Authority works in relation to coastal erosion and coastal protection 	<ul style="list-style-type: none"> • Co-operate with other Risk Management Authorities, including sharing data • Report to Welsh Ministers on flood and coastal erosion risk in Wales • Report to Welsh Ministers on the application of the National Strategy for flood and erosion risk management • Set up Regional Flood and Coastal Committees • Act in a manner which is consistent with the National Strategy for Flood and Erosion Risk Management in Wales • Act in a manner which is consistent with Local Flood Risk Management Strategies and guidance 	<ul style="list-style-type: none"> • To request information • To raise levies for local flood risk management works, via Flood Risk Management Wales • To designate certain structures or features that affect flood or coastal erosion risk • To undertake works • To cause flooding or coastal erosion under certain conditions 	<p>All Wales</p>

Risk Management Authority	Responsibilities for flood and erosion risk management	Statutory duties	Permissive powers	Geographic area of responsibility
Cardiff Council Lead Local Flood Authority	<p>Operational responsibilities for local flood risks from ordinary watercourses, surface water and groundwater</p> <ul style="list-style-type: none"> • SuDS Adopting and Approving Body • Maintaining SuDS • Consenting works on ordinary watercourses • Conduct assessments in relation to the risks of flooding from all sources <u>except</u> main rivers, the sea and reservoirs • Map the risks of flooding from all sources <u>except</u> main rivers, the sea and reservoirs • Plan for the management of flooding from all sources <u>except</u> main rivers, the sea and reservoirs 	<ul style="list-style-type: none"> • Preparation of Local Flood Risk Management Strategies (LFRMS) • Act in a manner which is consistent with the National Strategy for Flood and Erosion Risk Management in Wales • Act in a manner which is consistent with Local Flood Risk Management Strategies and guidance • Co-operate with other Risk Management Authorities, including sharing data • Investigate flooding within its area, insofar as appropriate • Maintain a register of structures and features likely to affect flood risk • Contribute to sustainable development • Duties under the civic contingency act to assess risks and write plans against those risks 	<ul style="list-style-type: none"> • To request information • To issue enforcement notices & impose penalties for non-compliance with a request for information • To designate certain structures or features that affect flood or coastal erosion risk • To undertake works • To cause flooding or coastal erosion under certain conditions 	Cardiff Council local authority area
Coastal Protection Authority ¹⁰			<ul style="list-style-type: none"> • To carry out works in relation to coastal erosion and coastal protection • To consent coastal protection works 	Cardiff Council local authority area
Local Highway Authority	<p>Responsibility for all flooded issues affecting highways (except trunk roads)</p> <ul style="list-style-type: none"> • Dealing with the causes of highway flooding where these concerns blocked culverts and/or gullies that cause water to flood the road and affect property on either side. 			

¹⁰ They may also be referred to as 'coastal erosion risk management authority', 'coastal local authority' or 'maritime authority'

Risk Management Authority	Responsibilities for flood and erosion risk management	Statutory duties	Permissive powers	Geographic area of responsibility
Caldicot & Wentlooge Internal Drainage Board – Risk Management Authority	<p>Operational responsibility for land drainage, water level management, and ordinary watercourses within the Caldicot & Wentlooge Drainage District</p> <ul style="list-style-type: none"> Maintaining land drainage structures, water level management structures and ordinary watercourses Contribute to the preparation of local flood risk strategies 	<ul style="list-style-type: none"> Act in a manner which is consistent with the National Strategy for Flood and Erosion Risk Management in Wales Act in a manner which is consistent with Local Flood Risk Management Strategies and guidance Co-operate with other Risk Management Authorities, including sharing data Contribute to sustainable development 	<ul style="list-style-type: none"> To designate certain structures or features that affect flood or coastal erosion risk To undertake works To cause flooding or coastal erosion under certain conditions 	<p>Caldicot & Wentlooge Drainage District – this includes areas within Cardiff and Newport.</p> <p>It does not cover the whole area of the Cardiff LRFMS</p>
Dŵr Cymru Welsh Water – Risk Management Authority	<ul style="list-style-type: none"> Responsible for the provision of water, making appropriate arrangements for the drainage of foul water, the treatment of waste, surface water sewers and combined sewers¹¹, where DCWW have a vested interest. Primary responsibility for floods from water and sewerage systems – this includes sewer flooding, burst pipes or water mains or floods caused by failures in the water or sewerage systems. 	<ul style="list-style-type: none"> Act in a manner which is consistent with the National Strategy for Flood and Erosion Risk Management in Wales To have regard to the content of Local Flood Risk Management Strategies Co-operate with other Risk Management Authorities, including sharing data 		<p>Most of Wales and some areas of England.</p> <p>It includes the whole area of the Cardiff LFRMS</p>
Welsh Government South Wales Trunk	<ul style="list-style-type: none"> Responsibility for all flooding issues affecting trunk roads 			All South Wales

¹¹ 'Combined sewers' carry both surface water run-off and waste water from homes and businesses

Cardiff Flood Risk Management Plan

Risk Management Authority	Responsibilities for flood and erosion risk management	Statutory duties	Permissive powers	Geographic area of responsibility
Road Agent – Risk Management Authority	<ul style="list-style-type: none"> Dealing with the causes of highway flooding where these concerns blocked culverts and/or gullies that cause water to flood the road and affect property on either side. 			local authorities. It includes the whole area of the Cardiff LFRMS

Appendix C. LFRMS Measures

Main Objective	Sub Objective	Measure	Action ref	Current Actions	Planned Actions	Do-Nothing	Business As Usual	Do More	Preferred Approach	Related Strategy Delivery Activity this would support (see Delivery Themes)	Short Term Current LFRMS 2012-2016	Short Term LFRMS 2 2016-2021	Short Term LFRMS 3 2021-2031	Medium Term	Long Term
1 - Reducing the impacts on individuals, communities, businesses and the environment from flooding and coastal erosion	2 - Provide Strategic Leadership and Direction at a local Level	Delivery of the second round of Shoreline Management Plans by 2012 with proportionate implementation over the life of the Strategy	1.2.1		SMP2 Action - Encourage Cardiff Harbour Authority to undertake an assessment of climate change impacts on the operation and performance of Cardiff Barrage taking account of the impacts on flood risk management. The costs of maintaining the Barrage should be included in any investigation	Continue Barrage operation without review of climate change impacts	Current Barrage operation includes an assessment of global sea level rise. Advice and consultation with EA is that there are no current issues with respect to climate change	Review of forecast change in sea levels from Barrage Construction to current-day and current guidance in comparison with advice provided when the Barrage permissions were granted	Business As Usual	5.3					
			1.2.2		SMP2 Action - Carry out a study to determine the effects (if any) of the Cardiff Barrage on sediment transport in adjacent units (SMP1 recommendation).		Sediment and bathymetry surveys are carried out annually to monitor the changes in the bed morphology on the navigable approaches to the barrage.	Commission ongoing monitoring and reporting of the wider estuary system possibly with support from Wales Coastal Monitoring Centre	Business As Usual	5.3					
		Development of Local Flood Risk Management Strategies.	1.2.3	The work being undertaken as part of this assessment is the development of the Local Flood Risk Strategy		Development of Local Flood Risk Management Strategies.		Business As Usual	5.3	x					
		Implementation of statutory responsibilities including those set out within the Flood and Water Management Act 2010 and the Flood Risk Regulations.	1.2.4	We have delivered our PFRA which identifies the key risk areas. Further actions identified within the LFRMS will help us continue to deliver this objective		We have delivered our PFRA which identifies the key risk areas. Further actions identified within the LFRMS will help us continue to deliver this objective		Business As Usual	6.1	x					

Main Objective	Sub Objective	Measure	Action ref	Current Actions	Planned Actions	Do-Nothing	Business As Usual	Do More	Preferred Approach	Related Strategy Delivery Activity this would support (see Delivery Themes)	Short Term Current LFRMS 2012-2016	Short Term LFRMS 2 2016-2021	Short Term LFRMS 3 2021-2031	Medium Term	Long Term
		Appropriate mapping of all sources of flood risk.	1.2.5	PFRA has been completed and our local risk areas identified	NRW are currently supporting all LLFA across Wales to deliver Hazard mapping of Local Flood Risk - June 2013 We will use these maps to help plan options to manage that risk - Dec 2015 (in line with the programme set out in the Flood Risk Regulations)		NRW are currently supporting all LLFA across Wales to deliver Hazard mapping of Local Flood Risk - June 2013 We will use these maps to help plan options to manage that risk - Dec 2015 (in line with the programme set out in the Flood Risk Regulations)		Business As Usual	5.6	x				
	Proportionate implementation of the Catchment Flood Management Plans over the life of the Strategy.		1.2.6		CFMP Action - Roath Park Lake, undertake an assessment of climate change impacts on the operation and performance of the reservoir system with particular consideration of the impacts on flood risk management.		Reporting and assessment in accordance with the requirements of the Reservoirs Act	Review current operations and the potential need for change to allow for climate change	Do More	5.6		x			
		1.2.7		CFMP Action - Develop a Cardiff East Flood Risk Management Strategy to identify short, medium and long term actions, identifying where investment should be targeted to ensure sustainable growth of the area.			Support NRW in developing a sustainable FRM strategy which encompasses all flooding sources	Do More	5.3			x			
		1.2.8		CFMP Action - Asset / Flood Warning System Improvement and Replacement Project (pre-feasibility studies) to assess the viability of flood mitigation measures through Cardiff (Lower Roath Brook and River Rhymney)				Support NRW in understanding and developing proposed solutions which provide the most cost-effective benefit to Cardiff	Do More	2.2	x		x		

Main Objective	Sub Objective	Measure	Action ref	Current Actions	Planned Actions	Do-Nothing	Business As Usual	Do More	Preferred Approach	Related Strategy Delivery Activity this would support (see Delivery Themes)	Short Term Current LFRMS 2012-2016	Short Term LFRMS 2 2016-2021	Short Term LFRMS 3 2021-2031	Medium Term	Long Term
		reduction of number of properties identified at risk of flooding from Local Flood Risk sources	1.2.9	Pre-feasibility studies Post flood reports Identified Schemes include - Rhiwbina Flood Defence Scheme - Grangetown SW reduction - Riverside Flood Awareness	Review output from Hazard Mapping and prepare Medium Term Plan for potential schemes		Continue to investigate and identify potential schemes with schemes being delivered on an ad-hoc basis	Continue to investigate and identify potential schemes with schemes annual budget provided to deliver to identified programme - delivers requirements of Flood Risk Regulations	Do More	5.6	x				
		Link with wider work undertaken with regards making Cardiff a more resilient and sustainable area to live	1.2.10	Existing plans in place which can interact with this Strategy include - One Planet - City Vision - CC Carbon Lite	The SEA for the Strategy records the integral process how the wider plans can impact and influence decisions in developing this strategy		Use the SEA process to record how other plans have influenced this Strategy	Ensure that Actions are captured which provide synergy across various plans to devlier a more resilient Cardiff. Specifics include -	Do More	6.1	x				
			1.2.11		Ensure all Services Areas are aware of the potential impact of flood risk and consider its impact within their decision making process		ad-hoc process for some Service Areas. No evidence provided of recorded decision	All Service Areas to document how flood risk affects their operations, and decision process to manage the risk	Do More	3.2					
		Reduce Corporate liability to Cardiff Council related to the impact of flood risk (and related aspects such as climate change)	1.2.12		Include flood risk as part of any review process	Corporate liability could increase such that it is not an accepted "insurable risk" resulting in financial ocnsequence to the county	Current level of action appears to be minimal and based on historic control measures. Uncertain at present what the financial consequence may be.	Include flood risk (and related changes over time due to climate change) within the development and review of all the Council's actions such that they can be altered if necessary	Do More	3.2		x			
	3 - Develop policies for effective land use management and enhanced development control procedures where appropriate	Preparation of Supplementary Planning Guidance to help manage flood risk	1.3.1	Our LDP is currently being prepared and a SFCA has been developed which has informed the spatial planning allocations within the LDP	We will prepare & update our Supplementary Planning Guidance to account for - Climate Change - SuDS Systems (as below) - Design standards (as below) - Localised issues where applicable - Funding contributions		Continue to recieve planning submissions and provide retrospective guidance on an ad-hoc basis	Prepare SPG as detailed within the planned action leading to better informed and quicker planning application process	Do More	1.1		x			

Main Objective	Sub Objective	Measure	Action ref	Current Actions	Planned Actions	Do-Nothing	Business As Usual	Do More	Preferred Approach	Related Strategy Delivery Activity this would support (see Delivery Themes)	Short Term Current LFRMS 2012-2016	Short Term LFRMS 2 2016-2021	Short Term LFRMS 3 2021-2031	Medium Term	Long Term
					for wider investments in FRM infrastructure										
		Compliance with the requirements of Planning Policy Wales and relevant Technical Advice Notes.	1.3.2	Our Planning teams ensure proposed developments satisfy the requirements of PPW and relevant TAN's, namely TAN14 & TAN15			Our Planning teams ensure proposed developments satisfy the requirements of PPW and relevant TAN's, namely TAN14 & TAN15	Planning teams will deliver SAB duties as well	Business As Usual	1.1	x				
		Appropriate undertaking of Strategic Flood Consequence Assessments and their use to inform Local Development Plans.	1.3.3	Our LDP is currently being prepared and a SFCA has been developed which has informed the spatial planning allocations within the LDP			Our LDP is currently being prepared and a SFCA has been developed which has informed the spatial planning allocations within the LDP		Business As Usual	1.2		x			
			1.3.4	SMP2 action - SMP2 is taken into account in Strategic Flood Consequence Assessments for Council development / land use plans			SMP2 action - SMP2 is taken into account in Strategic Flood Consequence Assessments for Council development / land use plans		Business As Usual	5.3		x			
		Approval and adoption of SuDS drainage systems by the SuDS Approving and Adopting Body.	1.3.5		We will prepare & update our Supplementary Planning Guidance to account for the National Standards which are currently being drafted. We will need to have in place a process and staff to review applications	Legislative requirement - not an option	Allow Planning to process applications following similar system fo current day - ad-hoc response, potential delays in processing or acceptance of long-term poor quality systems	Require potentially 2- 4 FTE to review and monitor applications - allows for follow up enforcement	Do More	1.6	x				

Main Objective	Sub Objective	Measure	Action ref	Current Actions	Planned Actions	Do-Nothing	Business As Usual	Do More	Preferred Approach	Related Strategy Delivery Activity this would support (see Delivery Themes)	Short Term Current LFRMS 2012-2016	Short Term LFRMS 2 2016-2021	Short Term LFRMS 3 2021-2031	Medium Term	Long Term	
	4 - Establish regular maintenance schedules for flood and coastal erosion risk management assets	Development of a register of natural and manmade structures or features likely to have an effect on flood risk by 2015.	1.4.1		We are currently planning how the register will be developed working in partnership with other S East Wales Local Authorities. We will need to budget for ongoing inspection and updating of the register	Legislative requirement - not an option		Develop initial register using available software and update when necessary (passive approach). Use powers, and enforcement where required to manage risk	Do More	4.1	x					
			1.4.2	Alterations to the highway by all parts of the Council are poorly recorded and controlled. Poor record keeping and updating of corporate systems / dept co-ordination leads to inefficient budget spending		Business as usual	Contine to need to carry out defect repairs / alterations to works to manage drainage issues	Implement system to ensure drainage aspects are considered as part of any proposal which affects the highway	Do More	4.1	x					
			1.4.3		review and confirm defined extents of Coastal Act defined waters and those defined within the Barrage Act	uncertainty with regards operational liability of coastal frontage erosion risk	uncertainty with regards operational liability of coastal frontage erosion risk	Review and confirm coastal waters defined limits	Do More	4.1						
			1.4.4	Removal of debris removal from Cardiff Bay that has been washed down from upstream - results in large expenditure liability to CHA	Review upstream LLFA actions to manage debris from entering the rivers in the first place		Continue to remove debris from the Bay on a visual amenity basis.	Provide evidence to upstream authorities and highlight the operational issue to try and control debris at source	Do More	4.1	x					
			1.4.5		SMP2 action - Identify how the Wales Coastal path could be re-routed under MR options			review options and include within future Plans / Spatial reviews	Do More	4.1					x	

Main Objective	Sub Objective	Measure	Action ref	Current Actions	Planned Actions	Do-Nothing	Business As Usual	Do More	Preferred Approach	Related Strategy Delivery Activity this would support (see Delivery Themes)	Short Term Current LFRMS 2012-2016	Short Term LFRMS 2 2016-2021	Short Term LFRMS 3 2021-2031	Medium Term	Long Term	
		Establishment of a programme of regular and appropriate maintenance for flood and coastal erosion risk management assets.	1.4.6	We currently have a maintenance programme in place which reviews our land and highway drainage assets.	We propose to review how the maintenance programme is established to see if there are more efficient approaches that we can adopt	Business as usual	continue carrying out maintainance and repairs following ad-hoc systems / routine that have been in place without review since the council was established	Highway Drainage - review how works are planned and what their Planned Outcome is Land Drainge - determine level of service and necessary maintance Ordinary Watercourse - culvert clearance is carried out at priority sites, review system to assess if this can be updated Coastal - review potential risk from erosion	Do More	4.2	x					
			1.4.7		SMP2 action - Identify where new defences will need to be, when they will need to be replaced, how they should be constructed			Coastal - review potential risk from erosion, and undertake necessary works	Do More	5.1	x - review	x - works				
			1.4.8		SMP2 action - Ensure environmental issues are taken into account in the design / construction of new defences. Ensure any works adhere to agreed working practices e.g. to prevent disturbance to birds	SMP2 action - Ensure environmental issues are taken into account in the design / construction of new defences. Ensure any works adhere to agreed working practices e.g. to prevent disturbance to birds			Business As Usual	5.1	x					
			1.4.9		SMP2 action - Ensure environmental issues are taken into account in the management of the Cardiff Barrage. Ensure any works adhere to agreed working practices e.g. to prevent disturbance to birds	SMP2 action - Ensure environmental issues are taken into account in the management of the Cardiff Barrage. Ensure any works adhere to agreed working practices e.g. to prevent disturbance to birds		Environmental issues are taken into account in the management of the Cardiff Barrage.	Continue to review Barrage operation	Business As Usual	5.1		x			

Main Objective	Sub Objective	Measure	Action ref	Current Actions	Planned Actions	Do-Nothing	Business As Usual	Do More	Preferred Approach	Related Strategy Delivery Activity this would support (see Delivery Themes)	Short Term Current LFRMS 2012-2016	Short Term LFRMS 2 2016-2021	Short Term LFRMS 3 2021-2031	Medium Term	Long Term	
		Designation of natural and manmade structures or features likely to have an effect on flood or coastal erosion risk over the life of the Strategy.	1.4.10		We are currently planning how the register will be developed working in partnership with other S East Wales Local Authorities. We will need to budget for ongoing inspection and updating of the register	Legislative requirement - not an option		We are currently planning how the register will be developed working in partnership with other S East Wales Local Authorities. We will need to budget for ongoing inspection and updating of the register	Do More	4.2	x					
2 - Raising awareness of and engaging people in the response to flood and coastal erosion risk	5 - Ensure that by 2026 everyone who lives in a flood risk area understands the flood risk they are subject to, the consequences of this risk and how to live with that risk	Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	2.5.1	CFMP Action - We have recently prepared a Community Flood Plan for Rhiwbina . We are working in partnership with EA Wales Flood Awareness team.- Grangetown- Riverside- Wentlooge Levels (planned)	We will review if there are other communities who could benefit from a community plan. This will be informed by the hazard mapping being completed to define local flood risk following on from the PFRA. This is also a CFMP Action	Do not continue to support NRW at a local level	Continue to support NRW at a Local Level	Support NRW and canvas awareness and feedback from residents that they are aware through the "Ask Cardiff" annual questionnaire	Do More	6.1	x					
		Identification of at risk groups within communities, including vulnerable individuals.	2.5.2	We identified the number of properties of key types within our PFRA.	We will review these groups and working with our public bodies identify approaches which will assist in getting the message to the identified people	Level of economic impact due to flooding to Cardiff would increase	Whilst we would be aware of the properties at-risk, there will remain an economic impact due to flooding that we could potentially avoid	Through Emergency Planning and Corporate Comms we can ensure the businesses are aware of the risk, and the actions they can take to reduce the impact	Do More	2.1	x					
		Raise awareness internally with regards impact of flood risk on normal operations and post event situations	2.5.3	informal discussion on an ad-hoc basis	Development of specific awareness and review programme across all service areas to be carried out by Emergency Planning Unit	Operational cost due to flooding to Cardiff Council would increase	Operational cost due to flooding to Cardiff Council would increase	informal discussion on an ad-hoc basis - would lead to likely reduction in operational cost	Do More	6.1	x					
		Continuation and expansion of Floodline Warning Direct Service of the life of the Strategy	2.5.4	How do we make the people of Cardiff aware of the Floodline Service??	Work with NRW to promote the system	Level of economic impact due to flooding to Cardiff would increase	Work with NRW to promote the system		Business As Usual	2.2	x					

Main Objective	Sub Objective	Measure	Action ref	Current Actions	Planned Actions	Do-Nothing	Business As Usual	Do More	Preferred Approach	Related Strategy Delivery Activity this would support (see Delivery Themes)	Short Term Current LFRMS 2012-2016	Short Term LFRMS 2 2016-2021	Short Term LFRMS 3 2021-2031	Medium Term	Long Term		
3 - Providing an effective and sustained response to flood and coastal erosion events	7 - Ensure the preparation and testing of Emergency Plans	Complete emergency plans for all sources of flood risk.	3.7.1	We have an established emergency planning procedure in place for major emergencies, including flooding.			We have an established emergency planning procedure in place for major emergencies, including flooding.		Business As Usual	2.4	x						
		Development of community level emergency plans as required by relevant communities	3.7.2	We are working with NRW on the development of community level emergency plans for identified key risk areas such as Grangetown, Butetown and Rhiwbina	others???		We are working with NRW on the development of community level emergency plans for identified key risk areas such as Grangetown, Butetown and Rhiwbina		Business As Usual	2.5	x						
		A pan-Wales emergency exercise to test reponse and recovery arrangements by 2016	3.7.3	We are working with the Welsh Government to plan for and carry out this exercise before 2016			We are working with the Welsh Government to plan for and carry out this exercise before 2016		Business As Usual	2.6	x						
		Local level emergency exercises to test response and recovery arrangements over the life of the Strategy.	3.7.4	We completed an exercise early in 2012 to test our proposed actions. This was successful in identifying some improvements we can apply to our plans.			Carry out the exercise again in 5 years	Review within 12 months that the identified changes to our plan are in place and can be built on	Do More	2.4	x						
	8 - Respond to events in a timely and appropriate manner	Early and appropriate response to emergency events for all events.	3.8.1	We completed an exercise early in 2012 to test our proposed actions. This was successful in identifying some improvements we can apply to our plans.	we will continue to test and review our proposed plans, and discussion with adjacent local authorities with regards the potential need to mutual support when required			we will continue to test and review our proposed plans, and discussion with adjacent local authorities with regards the potential need to mutual support when required		Business As Usual	2.4	x					
		Development and implementation of effective evacuation protocols for emergency events	3.8.2	We have an established emergency planning procedure in place for major emergencies, including flooding.				Development and implementation of effective evacuation protocols for emergency events		Business As Usual	2.4	x					

Main Objective	Sub Objective	Measure	Action ref	Current Actions	Planned Actions	Do-Nothing	Business As Usual	Do More	Preferred Approach	Related Strategy Delivery Activity this would support (see Delivery Themes)	Short Term Current LFRMS 2012-2016	Short Term LFRMS 2 2016-2021	Short Term LFRMS 3 2021-2031	Medium Term	Long Term
		Development of mutual aid protocols for resources, equipment and respite for emergency events.	3.8.3		we will continue to test and review our proposed plans, and discussion with adjacent local authorities with regards the potential need to mutual support when required		we will continue to test and review our proposed plans, and discussion with adjacent local authorities with regards the potential need to mutual support when required		Business As Usual	2.6	x				
		Identification and provision of suitable respite accommodation as appropriate over the life of the Strategy.	3.8.4	We have an established emergency planning procedure in place for major emergencies, including flooding.	we will continue to test and review our proposed plans, and discussion with adjacent local authorities with regards the potential need to mutual support when required		we will continue to test and review our proposed plans, and discussion with adjacent local authorities with regards the potential need to mutual support when required		Business As Usual	2.4	x				
	9 - Facilitate recovery from flooding within the shortest possible timescales	Development of procedures for the effective clearance of debris.	3.9.1				Development of procedures for the effective clearance of debris.		Business As Usual	4.3	x				
		Development of repair schedules including provision for the installation of resilient measures by 2015.	3.9.2				Development of repair schedules including provision for the installation of resilient measures by 2015.		Business As Usual	4.2	x				
		Investigations into the causes of flooding to be undertaken where necessary within one month.	3.9.3	we investigate on an ad-hoc basis	we will prepare a publically available policy that sets out our proposed investigation (detail of) in the event of flooding to properties by sources within our control.			Working with adjacent LLFA we are developing a policy / report template such that there is a consistent adopted approach across SE Wales	Do More	5.1	x				
		Post flood-event recovery plan in place	3.9.4		Recovery plan in plans and adopted by Strategic Management Team. Test exercise required involving all service areas and outside key agencies			Outline plan prepared but not adopted by SMT. No testing of the plan to review its effectiveness	Do More	3.4	x				

Main Objective	Sub Objective	Measure	Action ref	Current Actions	Planned Actions	Do-Nothing	Business As Usual	Do More	Preferred Approach	Related Strategy Delivery Activity this would support (see Delivery Themes)	Short Term Current LFRMS 2012-2016	Short Term LFRMS 2 2016-2021	Short Term LFRMS 3 2021-2031	Medium Term	Long Term
4 - Prioitising investment in the most at risk communities	Local 1 - External funding	Contribution funding from third-parties / non-public sources	4.L1.1		Use SFCA findings to leverage funding contributions where investment could release development sites and reduce level of flood risk to existing areas		Continue to seek investment from public purse with minimal third-party contribution	Develop Policy for recovery / receipt of funding contributions either directly via S106 agreements, or recovery through future rate levy with developer guarantees (TIF etc)	Do More	6.1	x	x			

