

Ryde/Binstead

Flood Investigation Report



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Document Information

Document Information	
Document Reference	2013-IWC-LLFA-009-13
Document Revision	
Report Status	FINAL
Date	24 June 2014
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Checked	
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Executive Summary

This Flood Investigation Report has been compiled by the Isle of Wight Council as Lead Local Flood Authority (LLFA). As LLFA it has a duty to investigate significant flood events as defined under the Flood and Water Management Act 2010.

Upon becoming aware of a flooding event within the Isle of Wight Council will consider whether an investigation should be carried out under the requirements of Section 19, Part 3 of the Flood and Water Management Act 2010. This investigation will determine which risk management authorities have a responsibility for managing flooding at the identified flood site and will ensure that there is an appropriate response to the flood incident.

It was deemed necessary to undertake an investigation into the flooding incidents in the Binstead and Ryde area due to the number of properties affected, the frequency of flood event and the involvement of a range of agencies in the events.

This report provides a summary of the extent and consequences of the flooding and actions undertaken or proposed by each of the identified authorities with a responsibility for flooding within the identified area. This includes information relating to options for improvement works or general maintenance carried out at n the area.

Whilst this report has sought to identify causes of flooding within the Binstead and Ryde and has made recommendations as to how the risk and / or impact of flooding may be reduced, this does not provide the Isle of Wight Council with the mandate or funding to implement any measures to reduce or remove the risk of flooding at this site.

Introduction

Requirement for Investigations

The Isle of Wight Council, within their role as Lead Local Flood Authority, have a responsibility to record and report flood incidents, as detailed in Section 19 of sub-section 3 of the Flood and Water Management Act 2010.

<p style="text-align: center;">Part 1 FLOOD AND COASTAL EROSION RISK MANAGEMENT</p> <p>3. Supplemental powers and duties Section 19: Local authorities: Investigations</p> <p>1) On becoming aware of a flood in its area, a lead local flood authority must, to the extent that it considers it necessary or appropriate, investigate –</p> <ul style="list-style-type: none">(a) which risk management authorities have relevant flood risk management functions, and(b) whether each of those risk management authorities has exercised, or is proposing to exercise, those functions in response to a flood. <p>2) Where an authority carried out an investigation under subsection 1) it must –</p> <ul style="list-style-type: none">(a) publish the results of its investigations; and(b) notify and relevant risk management authorities
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This report investigates the flooding incident in the Binstead/Ryde area as the impacts to people, property and infrastructure were deemed to trigger the need for an investigation.

This report aims to provide details of the flooding incident that occurred with a review of the roles and responsibilities of all risk management authorities having a responsibility for flooding at the identified site. It will also include an overview of any works undertaken or options proposed at the site in order to reduce the risk of flooding at the identified site.

Site location and description

This report refers to two specific areas of Ryde. Firstly, Binstead and in particular the area around



Figure 1: Ryde aerial view

Cemetery Road and secondly the area around The Strand in Ryde. These areas are both residential in nature.

Ryde is a Key Regeneration Area which is located on the north eastern coast of the Island and is a Georgian and Victorian town resort. It is the urban area with the largest population on the Island and is a smaller retail and employment centre for the Island. It is a coastal town with traditional enclosed pasture land to the south. Critical to the character of Ryde is the sloping land from the foreshore to the ridge and the valley that divides the town.

The town of Ryde is built along the coast and on the sides of the valley through which Monktonmead flows. A detailed hydraulic model of the Monktonmead Brook is held by the EA. Although flood risk close to the Monktonmead Brook is very high, it becomes very low with distance away from the river and up valley sides.

There is a tunnelled section of railway under Ryde which runs below sea level which has pumps to drain it.

The coastline near Ryde has been classified as being at medium risk of wave exposure.

Incidents triggering investigation

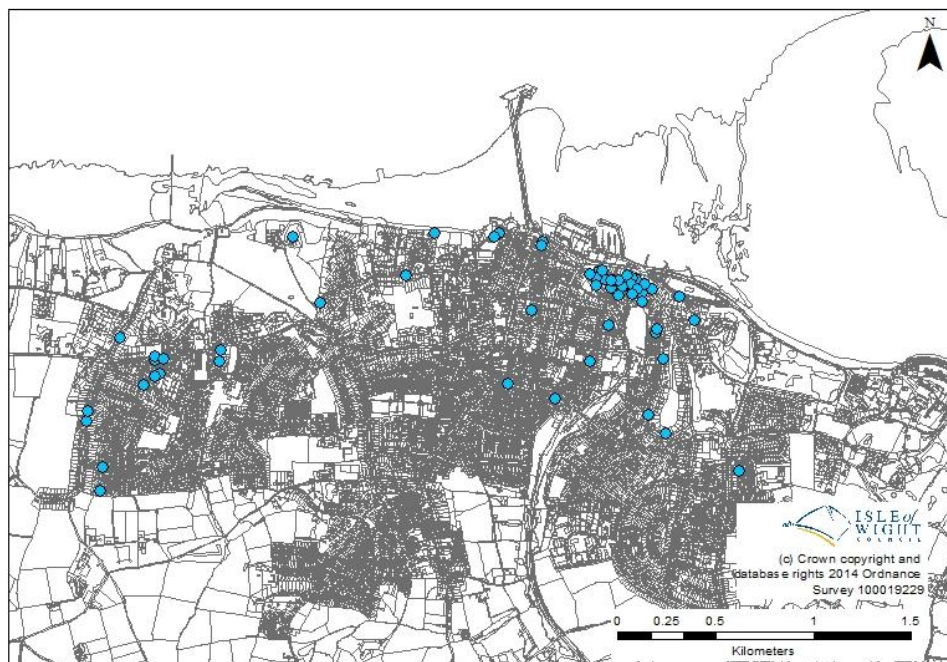


Figure 2: Properties affected in Binstead and Ryde

Binstead Area

Flooding occurred in the Binstead area on 24th December 2013. Local anecdotal evidence provided by the Binstead Flood Action Group linked flooding to work to a culvert in the Cemetery Road area and the IW Council were asked to investigate whether this was an issue and to take appropriate action to rectify any problem identified. This was first reported to the Council in 2010 at which stage the IW Council issued a notice under the land drainage act to remove an unauthorised alteration to the ordinary watercourse. Since that time, further complaints have been received about works to the watercourse; however It is acknowledged however that this was not likely to be the sole reason for flooding.

There were also reports of flood water coming from the cemetery land itself.

Ryde Area

A local survey undertaken by the Ryde Flood Group indicates that 13 properties on The Strand, 2 on Westhill Road and 1 property in St Thomas Street flooded in the storm event on the 23rd December. Of those local incidents reported, 10 property occupiers referred to foul drainage flooding or flooding from the combined drainage system as the cause of their flood.

The first major incident of occurred on 23rd/24th December 2013 and during the event IWF&RS attended calls to 22 affected properties in the main Ryde area and 25 affected properties in the Binstead area. Action undertaken ranged from removal by hand of flood water from basements, arranging provision of additional sandbags and providing general advice through to pumping flood water from properties. An additional 2 incidents were responded to in the Ryde area in January 2014.

Over the period covered by the report Island Roads received 10 reports of incidents of Highway flooding in the Ryde and Binstead areas.

Reports appear to have been made directly to IWF&RS and/or Island Roads with limited reporting of foul flooding to Southern Water. Southern Water hold a register of properties at risk of foul flooding (known as the DG5 Register) and additional property level funding for prevention/mitigation/alleviation projects is made available to Southern Water per property on the risk register. If incidents are not reported to Southern Water this can therefore have a direct impact on the additional allocation of funds to them to undertake works in an area. Properties are assessed prior to being added to the risk register and assessment is based on incidents of no more than a 1 in 20 event.

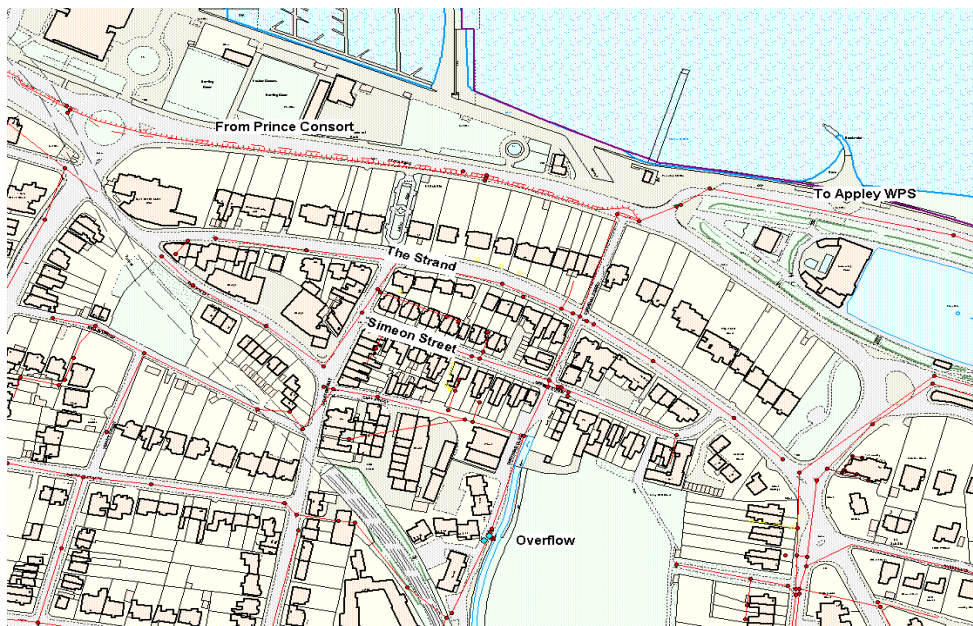


Figure 3: Southern Water sewer system in the area of The Strand

Appley plant is a transfer and storm station. Under normal operation the Appley Station pumps Ryde's sewage to Sandown treatment works. At high flows, 3 pumps operate that pump storm water 1.5km out to sea once it has been screened. The pumps are arranged as 1 duty pump and 2 assist pumps. During the period of storms, there was a problem with one of the storm pumps but Southern Water quickly arranged hire pumps to mitigate flooding. Level alarms in the storm well trigger an emergency call out for Southern Water staff (electrician and operator). Southern Water is currently in the process of completing the £250,000 pumping station refurbishment.

History of flooding

Flood risk in Ryde is dominated by the threat of tidal flooding and fluvial flooding from Monktonmead Brook and has historically been a problem. The Monktonmead Brook drains a catchment of approximately 10km² and flows north into the sea via an outfall at Ryde. A culvert carries flows the last 170m to the seawall and a pumping station, after which a 60m long culvert carries flows to an outfall on the beach. Flows usually drain through gravity. A tidal flap at the sea wall closes against high tides leading to tide locking. High water levels in the Brook trigger operation of the pumps, which lift water over the seawall and into the last 60m of outfall. Historically many

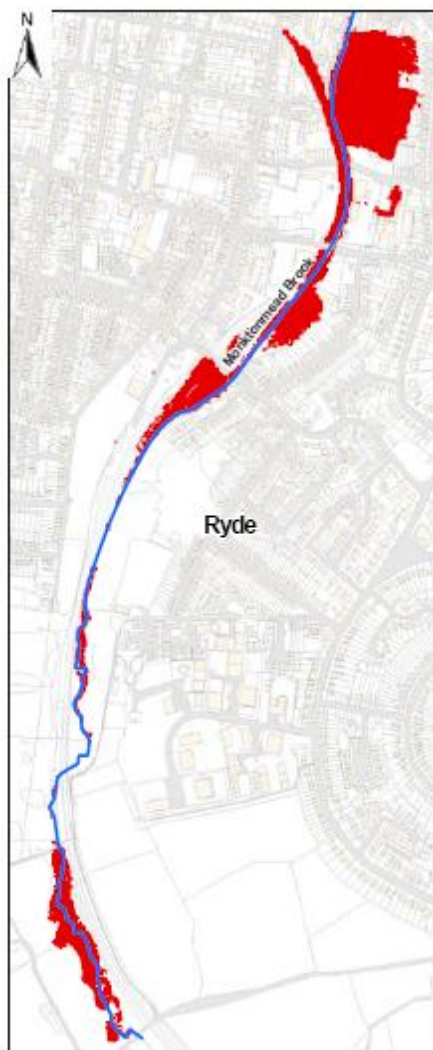
properties were built with basements which were originally non-inhabitable rooms, but over time those basements have been converted into habitable areas and are now at risk of flooding.

The key causes for flooding in the Monktonmead Brook area are considered to be:

- Flashy urban catchment
- Tide flap and supported pumping during high flow
- Sewer flooding.
- Storm water entering the combined sewer system.

River courses naturally have a functional floodplain and for the Monktonmead Brook the overspill of water into the functional floodplain is affected by tidal activity and levels in the river.

The functional floodplain diagram is based upon a model run for a 1 in 20 year fluvial event, in a “without pumps working” scenario. The floodplain identification is a critical planning tool relating to areas at risk of flooding and to which flood risk policy in the Island’s development plan directly relates.



In 1990 a marina was constructed and following construction, sand has accumulated on the beach surrounding the sea outfall leading to it becoming regularly buried and migration of sand up the culvert. The accumulation of sand restricts the water flow through the outfall. The backing up of water leads to an increase in pumping and associated increase in flood risk to residential and commercial properties and associated infrastructure.

There is no doubt that the tide can and does have an impact on fluvial flooding. If high fluvial discharges coincide with mean high water then discharge is inhibited. Effectively a high tide raises the downstream boundary of the river and when this occurs the fluvial waters will spill out into the floodplain.

Figure 4: Monktonmead Brook Functional Floodplain

Catchment Flood Management Plan

Monktonmead Brook forms part of the catchment sub-area and because of the influence on water flows from tidal conditions there is a risk of flooding in the Ryde area.

Flood flows in the sub-area largely occur on Monktonmead Brook and the risk of flooding elsewhere is limited. These flows can result in relatively fast rises in river discharge and flood events that pass relatively quickly. Flooding in Ryde results from rainfall run-off over predominantly impermeable surfaces combined with tide locked fluvial flows. The pumping station in Ryde helps to evacuate flows during tide locked periods and provides the town a 1% probability standard of protection.

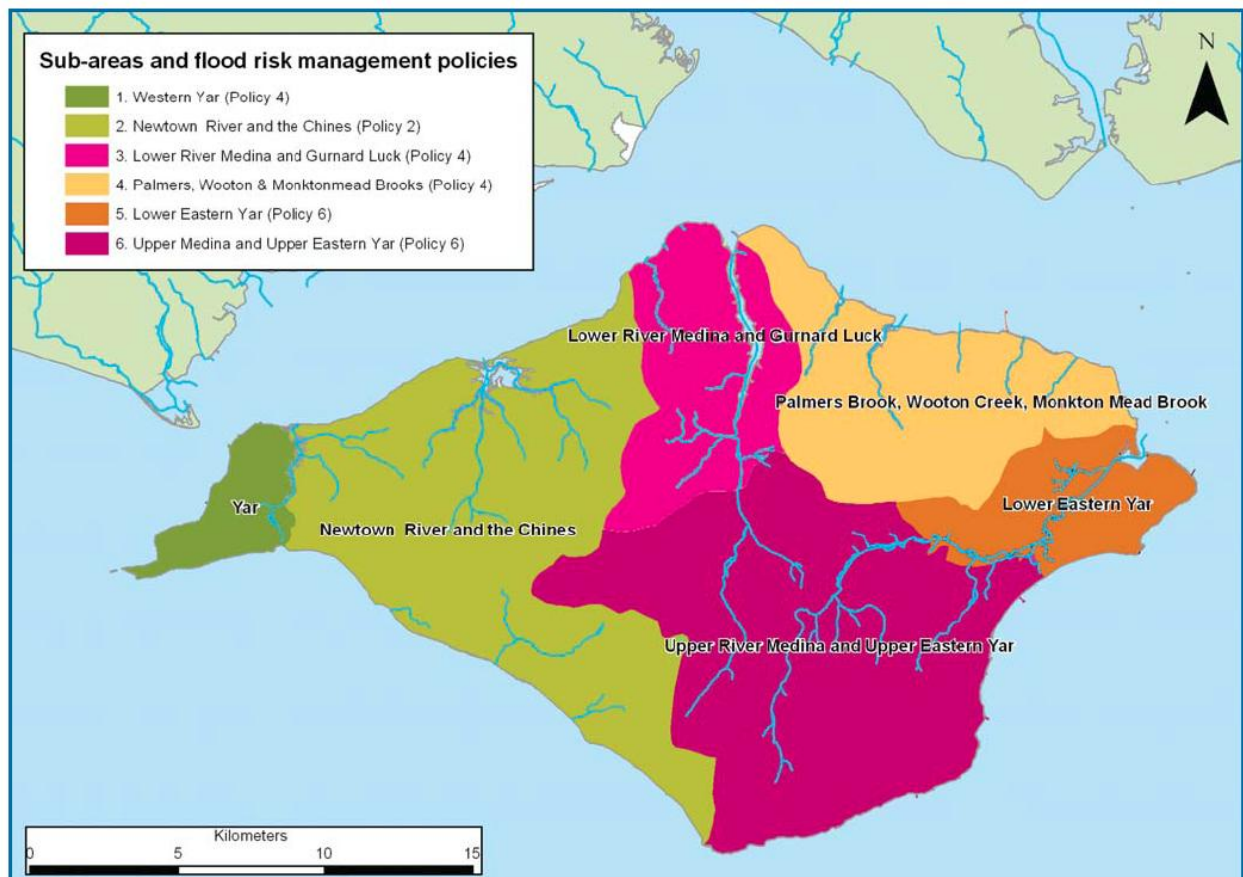


Figure 5: Catchment Flood Management Plan sub-areas

Policy 4 sets out the approach to flood risk within the CFMP.

→ Policy 4

Areas of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change

This policy will tend to be applied where the risks are currently deemed to be appropriately-managed, but where the risk of flooding is expected to significantly rise in the future. In this case we would need to do more in the future to contain what would otherwise be increasing risk. Taking further action to reduce risk will require further appraisal to assess whether there are socially and environmentally sustainable, technically viable and economically justified options.

The CFMP notes that prior to 2000 there are a limited number of records of fluvial flooding on the Island. Events affecting more than 10 properties were fairly low, with the exception being Ryde, which has a long history of flooding dating back over 100 years. In particular incidents were recorded in 1914; 1962, 1971, 1974, 1975, 1989, 1993 and 1999.

In 1999 during a heavy rainfall event, the town was severely affected by flooding. The flooding is understood to have resulted from water levels rising in the Brook due to sand in the outfall restricting discharge. As a result of the 1999 flooding, a scheme was completed in 2001 to restore a standard of protection approaching 1 in 75 years. The scheme included increasing pumping capacity, providing a new pumping station and replacing the outfall structure. Despite the upgrades, sand has continued to accumulate and obstruct the outfall.

In the autumn 2000 event Ryde was identified as being the settlement which sustained the most severe floods. Investigations on Monktonmead Brook have previously been carried out as there has been a history of regular flooding problems. Many of the properties were flooded from sewers being overwhelmed and because of high water levels in the brook prevented free discharge of storm drains. The high river flow coincided with the high tide locking in the brook. During the 2000 event circa 70 houses were flooded by the high groundwater and combined sewers overflowing. Basement flooding was a key issue.

In 2010 approximately 60 properties flooded (December) from an event with an estimated return period of only 1 in 10 years.

The outfall outlet was adapted in 2012 by the installation of a structure containing a number of flap valves with the intention to allow fluvial flow out of the culvert, but prevent sand migrating in. Recent observations of the outfall adaptation have shown half the flap valves to be regularly buried by sand and with seaweed, jamming the valves open. Sand blockage continues to occur in the culvert and frequency and duration of pumping will be affected by this.

In 2011 the EA appointed consultants to undertake a study to identify potential options which may alleviate flood risk in Ryde. This study demonstrated, through analysis and detailed hydraulic modelling, that restoring a blockage-free discharge for the Brook would restore a standard of protection in Ryde approaching 1 in 75 years. This standard of protection represents few or no properties at risk of flooding during an event.

Over 25 options were identified from which a short-list was identified and subjected to hydraulic modelling and analysis. This work demonstrated that the greatest benefits arise from maintaining a clear outfall for the Brook that drains through gravity. In addition to achieving a clear outfall the EA is also exploring secondary measures including individual property protection, to minimise the impact of flooding at the most vulnerable properties.

Roles and responsibilities

- The IW Council is responsible for highway drainage, which is managed for council by Island Roads under the Isle of Wight Highways PFI Contract. In addition, under the Emergency and Reactive Response section of the PFI contract Island Roads provide 24/7 emergency assistance in accordance with their Flood Management Plan. In addition, where the council is also landowner, the council has riparian landowner rights to maintain flows of water through watercourses (which includes ditches).
- Island Roads are responsible for a defined Project Network which is made up of assets such as public roads, footways, verges, gullies, street furniture etc.

- The Environment Agency is responsible for main river and coastal related matters. They provide a 24 hour response to incidents, so if anyone notices debris or a blockage that is likely to cause flooding or any form of pollution it can be reported.
- Southern Water services are responsible for foul drainage and operate the local pumping station at Appley.
- Residents are riparian landowners. Where an individual owns land that has a watercourse running through it or owns land that adjoins a watercourse it is the responsibility of that landowner to maintain the flow of water through the watercourse. In addition where riparian landowners are affected by main rivers they can undertake works to keep water flow clear, with permission from the EA. Monktonmead Brook is classified as main river. The riparian owner has no duty to maintain the defences along the main river or to remove trees and other structures on the bank that could fall into the watercourse. However if a defence collapses, the riparian owner has responsibility to remove the material from the watercourse.
- Islandline/South West Trains own and maintain the rail network and the railway tunnel in Ryde.

Actions carried out following flooding

Binstead Area

In early January 2014 Island Roads undertook gully cleaning in the Binstead area.

The IW Council owns and manages the cemetery land. It has commissioned Dares to undertake a full drainage survey of the cemetery area and the findings of the report are expected in early July 2014. The IW Council will liaise with Island Roads with regard to any future works in the area, especially where the cemetery water flows into a local gully as there is a need to ensure that the gully discharges properly into the highway drainage system.

On-site investigation and CCTV of the culvert in Cemetery Road has been undertaken which has concluded that the new concrete square culvert has a larger cross sectional area than the pipe that it discharges into and its capacity has not limited the flow of water through the culvert.

Ryde Area

The Isle of Wight Council in liaison with Island Roads have confirmed what are considered to be the critical gullies in the area of The Strand and these are illustrated on the plan provided in Appendix A of this document. Programming cleaning to ensure cleaning prior to the winter season is under discussion with Island roads.

To fully understand the sewerage network performance and the interaction between the various drainage systems (watercourse, highway drainage and public sewerage system), Southern Water area undertaking a detailed investigation in The Strand and surrounding area. The existing computer model of the system is being enhanced to include a greater level of detail about the area so that flood mechanism, interaction between drainage systems and solutions can be identified. This detailed investigation consists of the following surveys:

Flow survey: four monitors have been installed in the sewerage system to record the depth and velocity of flow in dry weather and rainfall. A depth only monitor and pump monitoring equipment

have been installed at Appley Park wastewater pumping station (WPS) to record pump operation in a variety of conditions. As part of the survey work pump performance will be confirmed.

Manhole and flow survey: Manhole and CCTV surveys will be carried out to confirm the level and configuration of the principal manholes within the sewerage system as this will allow a greater understanding of the hydraulic performance. As part of the investigation a full survey of Simeon Street Combined Sewer Overflow (CSO) will be completed.

Impermeable Area survey (IAS): This is a survey of the hard surfaces (roads, roofs etc.) in the area to understand where rainwater drains to in storm events i.e. directly to Monktonmead Brook, highway drainage system or public sewerage system.

Property level survey: Southern Water will gather data of all necessary levels including lateral connections and property basements. This will inform whether options for projects to relieve flood events will have any impact other low lying areas.

Progress to date is as follows:

Table 1: Southern Water progress to date on actions in Ryde

Activity and progress to date:
Flow survey – this is now in its seventh week and will be installed until sufficient data has been collected to calibrate the hydraulic model.
Manhole, IAS and Drop tests are underway
Property level surveys have been completed.

Once all surveys are completed and the hydraulic model verified the model will be used to understand performance and interactions in a variety of rainfall conditions.

The Island Plan Core Strategy includes a policy approach to flood risk which seeks to ensure that new development does not increase flood risk. Work is currently underway on an Area Action Plan for the Ryde area, and this document could develop a more detailed approach to flood risk in the wider area.

Flood Defence Grant in Aid (FDGiA) has been secured (2014/15) to enable the EA to look at what measures could be realistically implemented to manage flood risk in Ryde. In February 2014 the EA also gained approval to appraise the favoured options from their investigation work in more detail which will result in a Project Appraisal Report (PAR) and enable the EA to have a better understanding of the preferred option and its associated costs. The PAR is expected to be presented to the Project Approval Board by the end of the summer, with appointment of a contractor thereafter. The EA have confirmed that the chosen contractor will undertake both the detailed design and construction of the preferred option with construction planned to commence in 2015, avoiding the tourist season, with completion scheduled the following spring.

The final project identified will be potentially eligible for FDGiA, but it will need to be matched by Partnership Funding from other sources. Partnership Funding shares the costs of projects between government (FDGiA) funding and local investment partners. Partnership funding allows more projects to go ahead and gives communities more responsibility and choice about what is done to protect them from flooding. Contributions will be required for the final scheme that is implemented.

As a short-term solution the EA are exploring the potential for the redistribution of some 7,500m³ of sand from around the outfall and distributing it around 1.5km to the east. This represents an area approximately 250m x 20m x 1.5m deep. The EA have applied for “emergency” funding to carry out these works and the deadline for expenditure is December 2014.

In addition the EA have been exploring whether there is sufficient capacity on the Island to provide the pumps with more electricity and have also been looking at adjustments to the pumps to improve their effectiveness.

The IW Council, EA and Southern Water have been meeting at regular intervals to discuss flood issues in Ryde and will continue this discussion as it is considered critical that there is a co-ordinated agency approach to flood issues within the Ryde area. This is particularly relevant due to the complexity of relationships between flood issues, e.g. tide locking, silting outfall, locking of the CSO’s and combined systems.

By working together the agencies have identified short term mitigation to address the likelihood of flooding:

- Review and prioritise gully cleaning
- Ryde Canoe Lake outfall project 2014/15
- Administration of the adverse weather grants by the IW Council
- Continued close partnership working
- Southern Water sewer cleaning programme
- Maintenance at Appley WPS (Southern Water)
- Assess property level protection opportunity (Southern Water)
- Telemetry systems record pump failure (Southern Water)
- Removal of sand from the tide flaps at the outfall (Environment Agency)

Recommendations and Future Actions

1. To undertake works arising from the Dares drainage investigation at the Cemetery, Binstead and in addition, to investigate the potential for installation of an attenuation tank at Cemetery Road/Binstead Hill in order to slow down the flow of water.
2. The IW Council to commission a surface water management plan (SWMP) for the Ryde catchment area which will inform longer term project development for all agencies involved in water management in the area.
3. The Local Planning Authority to liaise with landowners in Cemetery Road to discuss further improvements to the culverted stream which would further improve the flow of water through the culvert.
4. The IW Council continue to work proactively with both the EA and Southern Water in evolving the option for maintaining flow through the culvert and preventing blockages. This will include identifying/securing capital funding for Partnership Funding.
5. All local agencies to continue to provide an update to both the Binstead Flood Group and the Ryde Flood Group on a quarterly basis.

6. Deliver of the Canoe Lake outfall project
7. IW Council, EA and Southern Water to continue to investigate options for longer-term solutions and accompanying sources of funding. This will include the outfall project as well as options for removing properties from the combined system, removing highway drainage from the combined system and increasing storage capacity in the wider catchment.
8. IW Council to liaise with Island Roads to agree a programme of cleaning for critical gullies.

Table 2: Indicative costs of actions included within the Binstead/Ryde Flood Investigation Report

Action Number	Indicative cost	Budget/funding
1. Additional drainage works	£70k	Capital Bid
1. Attenuation tank	£50 - £75k	Capital Bid
2. Ryde SWMP	£40k	Revenue – Flood Grant
5. Ryde Canoe lake outfall	£110k	Capital budget 2014/15
8. Gully cleaning programme		PFI contract

Appendix 1: Identified critical gullies identified in The Strand area of Ryde



Critical gullies are identified by a red dot on the map.