



October 2014

**Draft Extreme Weather  
Resilience Report: Torbay  
2013/14**

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# 1 Executive summary

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The succession of storm events from December 2013 through to February 2014 highlighted the cost, damage and disruption that extreme weather can cause to homes, businesses and vital services. The flooding events, storm surges, tidal issues and high winds experienced in Torbay had a significant impact on individual people, communities and infrastructure underlining the impact that extreme weather can have on community resilience, transport, local government and the economy.

Torbay Council is working to gain a collective understanding of the most urgent extreme weather and climate risks as well as a commitment to action. Working with the Heart of the South West Local Enterprise Partnership (HOTSW LEP), regional local authorities and other organisations, Torbay is contributing to the development of projects that help the Bay and its communities withstand extremes of weather more robustly.

The South West Peninsula is southern Britain's front-line for intense storms tracking across the Atlantic under the influence of the jet stream and the UK Climate Projections (UKCP09) identify that severe weather is likely to be experienced more regularly in the future.

January 2014 was stormiest period experienced in the UK for at least 20 years and was the wettest period since 1910. The frequency of storm surges (8) that caused much of the damage and disruption would have been considerably worse for Torquay, Paignton and Brixham towns and harbours if the winds were in the east.

Torbay's orientation and topography meant that its natural defences prevented what could have been catastrophic damage and even more disruption. The Torbay area, though not as severely affected as some other Local Authority areas in the South West, still suffered damage and disruption. Torbay's location and infrastructure continues to be vulnerable and is highly reliant on a small number of strategic transport routes meaning that closures, incidents and delays on the highway and rail network can be very significant.

The main line railway was severely damaged at Dawlish severing a key transport link to the South West for many weeks. Huge waves overtopped coastal flood defences and many coastal communities in the region experienced flooding and damage to infrastructure, buildings and sea defences. Coastal damage was exacerbated by the cumulative effect of the sequence of storms in rapid succession resulting in major coastal erosion and the altering of beach profiles.

The economic impact of the storms on the local economy both in the short term through operational issues, but perhaps more damagingly, in the longer term through a lack of transport resilience that affects economic output, investment confidence and the perception of Torbay as a place to do business. Particularly vulnerable to these effects is the tourist industry which is a significant part of Torbay's economy.

Whilst it is difficult to attribute extremes of weather to climate change, the consensus view among the scientific community is that we will see an increasing number of extreme weather events in the future because of climate change. Torbay Council's Energy and Climate Change Strategy adopted in July 2014 underpins the council's response to improving resilience to the changing climate.

Torbay Council mobilised some of its own resources and successfully secured various grants to support the repair of damaged infrastructure which involved insurable assets were recovered via insurers but such losses were low in number and value. For non-insurable assets, a claim was submitted to the Bellwin\* scheme which has yet to be approved.

<b>Funded cost of storm damage repairs</b>	<b>Amount</b>	<b>Funder</b>
Torbay Council funding used so far for structural repairs	£248,000	TC
Bellwin claim	£185,183	DCLG
Severe Weather Recovery Scheme (2013/14)	£336,225	DfT
Pothole Fund (2014/15)	£198,969	DfT
Small ports recovery fund	£295,000	DfT
Sea defence repairs	£408,000	EA
<b>Total funding allocated to date</b>	<b>£1,671,377</b>	

\* The Bellwin Scheme is a discretionary government grant which gives special financial assistance to local authorities which would otherwise be faced with an undue financial burden as a result of providing relief and carrying out immediate work due to large-scale emergencies. Where the criteria of the Bellwin scheme are met, the grant is normally payable to authorities at 85 per cent of the eligible costs incurred above a threshold set for each authority.

Severe weather events have the potential to weaken highways, structures and coastal features leaving them more prone to catastrophic failure in subsequent events. The long term impact if the events of 2013/14 will not be fully realised for several years but the long term effect is that they may have increased vulnerability to future weather events. This cost therefore has yet to be realised. The Council is also currently seeking approximately £5.7M of capital funding to address major structural defects that have been identified within Haldon and Princess Piers at Torquay Harbour.

## 2 Direct impact of the 2013/14 storm events

The direct impact of the 2013/14 storm events caused damage to coastal defences and promenades, sea front closures, landslides, flooding and damage to property and roads, as well as many damaged and fallen trees.



**Table 1** Summary of direct impacts on infrastructure

Sea front closures	Various sites and locations across Torbay
Sea wall damage	Brixham - Victoria Breakwater - Paignton - Goodrington, Hollicombe Torquay - Corbyn Head, Meadfoot, Torre Abbey, Princess Pier, Institute Beach, Oddicombe to Babbacombe,
Land slides	Marldon Road, Goodrington North, Warberry Road and Oldway Road
Promenade damage	Torre Abbey
Overtopping	Torre Abbey, Paignton, Preston, Livermead, Goodrington, Meadfoot, Beacon Cove, Oddicombe, The Strand, Brixham
Flooding	Long Road, Clennon Valley, Stoke Gabriel, Cockington , The Strand Tor Hill Road and Recreation Ground, Rathmore Road
Property damage	Castle Circus, St Marychurch , Torquay Road, Union Street, Oddicombe Beach properties and Torquay Rugby Club House.
Fallen trees	50 across Torbay

As well as direct impacts on infrastructure, there were wider impacts on the Torbay economy.

A total of 227 Torbay businesses responded to a flood impact survey issued by the Torbay Development Agency (TDA) in February 2014 where 35% said that their business had been directly affected by

flooding. The main economic impacts of the extreme weather were being the inability to travel to customers or customers travelling to the Bay and the additional cost and time involved in travel. Weather conditions limited those businesses working outdoors and tourism booking levels were reduced.

Tourism surveys were circulated among tourism businesses in Devon and Cornwall. A total of 154 responses were obtained, mostly from business contacts of the English Riviera Tourism Company that circulated the survey early in June, as well as other contacts in Devon. The tourism sector is said to be the business sector most negatively affected by the severe weather conditions.

The preliminary results of the tourism survey indicated that the rail disruption had a negative short-term and long-term impact on business performance. The disruption has impacted not only on those visitors who do come by rail but also in generating the perception that the south-west was cut off or closed for business not only during the period of disruption but afterwards as well. The Torbay Community was clear in its message that the area was open for business once the major disruption had passed but the impression left by media images was difficult to mitigate.

### 3 Highway network

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Torbay Council's highways department is directly responsible for maintaining 522.5 kilometres of carriageway and 817 kilometres of footway highway network within Torbay. All highway authorities are classified as risk management authorities under the Flood and Water Management Act 2010 (FWMA) and must adhere to all the responsibilities imposed on risk management authorities; a duty to cooperate with other risk management authorities and authority to take on flood and coastal erosion risk

During the severe weather events the worst road damage in Torbay was limited to sections of the sea front and Cockington. The prolonged wet period may have encouraged a higher rate of run-off affecting some of the looser surfaces but there is no easy way of quantifying this. However, Torbay's direct damage to coastal defences and adjacent highways and footpaths was considerable. Cockington Lane was affected by flooding, and was closed to through traffic from 20th December to 9th January.

The main flood related problems in Torbay were associated with overtopping of coastal defences and heavy rainfall resulting in the capacity of sewers, watercourses, main rivers and highway drains being exceeded. In addition many highways were flooded as a result of surface water run off being unable to enter road gullies.

The seafront including Torbay Road (A3022) was closed four times between the 3rd and 7th Feb at the height of the storm surge. 17,000 vehicles use Torbay Road on average between the hours of 7am to 7pm, with any diverted traffic through unclassified routes. It is also a major bus link with a normal route of

2.6 miles diverted over the ring road on a route that is 8.4 miles causing massive passenger disruption. A total of seven overtopping events forced the closure of the seafront between February 2012 and February 2014 and is likely to continue to be susceptible to closures in the future

Many other roads were temporarily closed as in excess of 250 incidents of fallen and damaged publicly owned trees and an undefined large number of privately owned trees caused problems across the area. These closures left a lengthy backlog of problems for the Council to deal with. Problems have also arisen from cliff falls and landslides across the area which is threatening the connectivity through damage to roads.



The value of the road network as an asset in Torbay ('Depreciated Replacement Cost') is just over £30M according to the latest condition survey data. Preventative maintenance treatments (ensuring repairs to roads are completed before they reach a poor condition) have featured in all annual programmes for a number of years. The use of preventative treatment has increased since 2007 as the effect overall is to reduce the cost of repairs. The Torbay 'Life Cycle Planning Toolkit' suggests that £13M will be required before the principles of preventative treatments can be fully adopted.

Currently twenty-five percent of Torbay roads have been identified for different planned treatments waiting for suitable funding. This has allowed for additional funding to be targeted on vulnerable roads preventing pothole formation. Additionally surface dressing of major high speed roads has routinely been carried out and will continue to occur whilst the structural condition of carriageways remains suitable.

The Council received a significant increase from 11 to 23 Public Liability pothole claims compared to the same period last year. Conduct of these claims are still in some cases on-going and where the Council is found to be legally liable, settlement will be made from Council funds as the amounts fall below excess levels, leaving the Council responsible for meeting the costs of the claims.

The last time the Council saw such a spike in highway pothole claims was in 2010/11 when we were then subjected to wet and freezing conditions affecting the fabric of the highway. Both 2010/11 and 2013/14 show a direct correlation for an increase in pothole claims as a result of damage to the highway due to extreme weather conditions.

Torbay Council has an efficient highways maintenance regime, maintaining roads to a recognised Code of Good Practice backed by rigorous systems of inspection. However the current level of funding is not sufficient to allow enough preventative maintenance to take place to keep the overall asset in a stable condition. It is estimated that £2M is required per annum to maintain the highway network in its current condition. However this was before the storm events took place. In 2014/15 the government capital highways budget allocation will be £1,094,000, £134,000 less than 2013/14. The funding is intended to cover Torbay's carriageway network and all other highway assets, including footways, structures, street lighting, signs and barriers. The reduction in capital and revenue funding has reduced the amount of maintenance funding available to the network.

Recent grant applications have resulted in a top-up £535,194 allocation from the Department of Transport (DfT) but still only partially close the gap between network needs and the funding available to address them. This grant funding included the following:

- The Council was awarded from £336,225 Severe Weather Recovery Scheme to help manage the impacts that the 2013/14 storm events had on road conditions. This funding was used to support existing revenue funding, ensuring that adequate resources are in place to respond to the increased level of level of new defects identified and reported and to extend the planned resurfacing programmes to cover more of the roads in the worst condition, whilst continuing to concentrate other resources on preventative maintenance.
- The Council was also awarded £198,969 from the DfT's Pothole Fund to undertake more permanent repairs of the significantly increased numbers and sizes of potholes on the highway network. This focus on potholes, is pushing the Council to adopt a 'worst first' approach, rather than targeting investment at assets which represent the greatest risk or where treatment represents optimum benefit in terms of an assets 'whole life' cost and maximise value for money. Torbay Council is still left with the legacy of remaining repairs from damage caused by the storms of 2013/14, which will need to be funded from future capital allocations.



As well as considering local roads Torbay Council is part of a consultation group to improve the strategic resilience of the A303/A30/A358 corridor. The partnership is working closely with the Highways Agency to support its feasibility study of the route. The results of the study are due to be reported to Government in time for the Autumn Statement. Improving the corridor is supported by a cross-party group of MPs, all five South West LEPs and a wide range of businesses, emergency services and local authorities including Cornwall Council, Dorset County Council, Plymouth City Council and Devon County Council.

## 4 Far South West rail network

The railway is arguably the most vulnerable of all the strategic routes in the region given its low lying route through Devon, Somerset and route along the coast at Dawlish. All forms of extreme weather can impact on rail operations and compounding this challenge is that many of the railway's earthworks and embankments have not been constructed to modern design standards.

Damage to the network, with associated delays and service cancellations, was significant in the period from December 2013 to February 2014. Sections of the Great Western Mainline and Torbay branch line were closed during the period which impacted significantly on rail connectivity at times cutting off the whole South West Peninsula. These closures are summarised in Table 2:

**Table 2** Lines closures affecting Torbay services between December 2013 and February 2014

Location	Cause	Length of closure
Riviera Line	Flooding at Edginswell	1 day (08/02)
Dawlish seawall	Sea wall collapse	60 days (03/02-03/04)
Exeter-Waterloo Line	Crewkerne landslip	1 day (08/02)
Exeter to Exmouth	Exe estuary wall damage	1 day (14/02)
Newton Abbot to Plymouth	Sea wall collapse	3 days (04/02-07/02)
Exeter to London Paddington	Somerset Levels flooding	7 days (03/02-10/02)
Exeter to Bristol	Somerset Levels flooding	31 days (07/02-10/03)

Most notably the sea wall at Dawlish, closed due to damage on 3rd February, sustained its worst damage since Victorian times with the complete collapse of an 80 metre section of wall on 4th February. This breach suffered further significant damage on 14th February, extending it to over 100 metres. A landslide behind the railway at Teignmouth further delayed repair work with no trains due to run until 4th April. Overall it resulted in 7500 full or part service cancellations to and from west of Exeter and created severe disruption for rail travellers throughout the South West Peninsula due to the organisation challenges encountered by rail operators.

The disruption events of 2014 are by no means new phenomena, repeating similar incidents as in previous years. The linear nature of the South West rail network and the absence of alternative routes beyond Exeter make it highly vulnerable to weather related disruptions.

The Torbay flood impact survey said that 55% of local business were experiencing difficulties because of the closure of rail links into Torbay with 75% of respondents' feeling investment in the South West rail infrastructure is poor or very poor. The Riviera line was closed for a day due to flooding at Edginswell effectively severing rail access from Torbay to anywhere outside of the Bay.

Torbay Council is part of a Peninsula Rail Task Force actively campaigning to secure investment to improve the resilience, speed and quality of services on the network. Improving the transport corridor is supported by a cross-party group of MPs, all five South West LEPs and a wide range of businesses, emergency services and local authorities.

The Mayor of Torbay was part of a cross-party Transport Select Committee in March 2014 to make Torbay's voice heard in the urgent appeal to restore rail links to the destination. Mayor of Torbay, Gordon Oliver said: *"I cannot overstate the urgency of reinstating rail links to Britain's most popular resort; and I delivered this message very clearly to the Transport Select Committee, who were left in no doubt as to our acute need for repaired and enhanced rail links".*

The Committee acknowledged the gravity of the message, and assured those local authorities present that urgent exploration of additional routes to the Dawlish line are being explored and that central government is prioritising the repairs at Dawlish to be completed in advance of the previously estimated timescales. The line at Dawlish was repaired in April 2014 and the government has tasked Network Rail to examine the feasibility of an additional line whilst confirming that the Dawlish Line will remain the main strategic route to the South West.

## 5 Torbay's coastal defences

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Torbay Council is responsible for 36km of shoreline of which 9km is defended against coastal erosion by solid coastal defences with the remaining 27km of coastline consisting of natural undefended cliffs.

A combination of high tides, strong winds and large waves caused a succession of 5 major and 5 minor storms to hit coastal regions in Devon throughout January to mid- February. Due to the number of warnings provided before each storm event a number of properties were effectively protected using sandbags.

During the storm events there was severe damage to Torbay's coastal defences and seawalls at Victoria Breakwater in Brixham, Goodrington and Hollicombe in Paignton and Corbyn Head, Livermead, Torre Abbey, Princess Pier and Meadfoot in Torquay.

Even before the Winter 2013/14 storm events Torbay had experienced damage from extreme weather. In April 2013 a wash out behind the Livermead sea wall caused the South West Water rising main (which transfers all of Torquay's sewage to Brokenbury Sewage Treatment Works) to fail. In addition, there was a significant risk of the high pressure gas main under Torbay Road failing and therefore sheet piles were installed overnight in order to alleviate this risk. The main coast road between Torquay and Brixham (A379) had to be closed for three weeks resulting in major disruption to businesses and road users. The overall cost of the repairs to the sea wall and the revetment were in the region of £0.75M excluding the cost of the repair works to the rising main.



Extreme weather can affect the stability of sea cliffs, coastal outcrops and inland escarpments causing landslips and cliff falls. Early in 2013, following rock falls, one property at Oddicombe collapsed and due to structural damage at another property residents have had to leave their home. Other significant locations where rock falls have occurred include cliffs at Meadfoot Sea Road, Institute Beach, Hollicombe, Paignton Harbour; and Goodrington North. The quarry face at rear of Manscombe Close was also affected. The budget estimate for the stability works to those cliffs where funding has been secured is in the region of £0.5M.

In addition to repairing the damage to coastal defences earlier in the year £408,000 has been secured through the Environment Agency emergency storm funding for 2013/14. In addition a further £200,000

has been secured for the repairs to the coastal defence at Princess Pier through the small ports grant fund for storm repairs. The remaining costs associated with repairing this damage were included within the Council's Bellwin claim.

## 6 Flooding in Torbay

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Torbay Council is the Lead Local Flood Authority (LLFA) for Torbay as defined by the Flood and Water Management Act 2010. It has responsibility for managing local flood risk from surface water, ordinary watercourses and ground water and is required to investigate all significant flood events (defined as more than 5 properties internally flooded during a storm event). The responsibility for consenting and enforcement on ordinary watercourses within Torbay has also transferred from the Environment Agency to Torbay Council under this act. The Council maintains, applies and monitors a Local Flood Risk Management Strategy (LFRMS) to address potential flood risk arising from local sources.



The occurrence and severity of flooding in Torbay has increased over recent years. Torbay is exposed to the combined potential flood risk from main river (formerly critical ordinary watercourses), tidal and coastal flooding. Both the urban drainage systems and surface water run-off also contribute significantly to the historical flooding within Torbay.

The succession of storms in 2013/14 brought the highest winter rainfall across Southern England since records began in 1766, resulting in widespread flooding, and extensive wind and coastal damage. The prolonged rainfall experienced over a 6 day period in 2012 generated 24 reports on internal flooding and 34 reports of external flooding to both residential and commercial properties throughout Torbay.

In 2013/14 flooding from surface water run-off, main rivers, ordinary watercourses, combined sewers and highway drainage occurred in Torquay, Paignton and Brixham. However, the majority of the flooding that affected coastal areas of Torbay was due to overtopping of coastal defences. In many areas this flood water resulted in the closure of highways, many of which were closed during every storm event between December 2013 and March 2014. In addition to the flooding across the whole storm period, a considerable number of fallen trees and branches on Torbay's roads, together with three embankment slips caused as a result of saturated ground and excessive rainfall.

Across Torbay, 14 properties (1 residential and 13 commercial) are reported to have experienced internal flooding between 23rd December 2013 to 14th February 2014; a significant reduction in comparison to the approximately 2000 properties in 2012 and early 2013.

There were reports of surface water flooding in Cockington village; however there were no properties flooded due to the action of TOR2 and the community. Working with the Environment Agency the Council is working to develop community flood warden schemes in Torquay, Paignton and Brixham. It should be acknowledged that the number of properties reported to have internally flooded is highly likely to be an underestimate due to the negative impact on property insurance.

## 7 Green infrastructure

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Torbay Council manages 46 miles of Public Rights of Way (PRoW) which includes 12.5 miles of the South West Coast Path National Trail. Much of the public right of way network is managed by the Torbay Coast and Countryside Trust on behalf of Torbay Council. Green infrastructure helps to provide natural coastal protection; it contributes to the area's green infrastructure network and sustains a wide variety of wildlife.

### 7.1 Trees and Woodlands

The woodlands in the Bay suffered from higher than usual number of fallen and damaged trees due to the high winds. Torbay Council aims to further develop tree planting, greenspace management and sustainable urban drainage systems as a method of increasing resilience.

Torbay has a legacy of veteran Victorian trees which are vulnerable to prevailing and non-prevailing winds. Many are close to arterial roads and within urban areas and have the potential to create infrastructure damage. The Council's Natural Environment Services use tree management software and

close working arrangements cross-departmentally to respond to emergencies and the impact of extreme weather. The annual budget allocation of £40k for emergency works was exceeded during the storm period of 2013/14, with the actual cost is still being determined.

## 7.2 South West Coast Path

The storms caused damage to the South West Coast Path with sections being closed or diverted. Torbay Coast and Countryside Trust cleared the section it manages from Sharkham point to Maidencombe. The issues that affected the route were fallen trees, landslides and flooding.

The landslides at Saint Mary's Bay and Maidencombe were significant. The Saint Mary's Bay site is currently still closed with a diversion in place which takes people away from the coast. At Maidencombe a section was closed for around nine months whilst other sections of the route suffered from small scale erosion where path repairs and drainage works were necessary.

The cost of completing the backlog of repair work caused by extreme weather exceeds the Coast Path's annual maintenance fee (£16,000 from Natural England to the Torbay Coast and Countryside Trust) and so additional funding is being sought. The South West Coast Path and local routes are key tourism assets for the English Riviera with closures having an economic impact on local businesses such as pubs, cafes and accommodation providers.

## 7.3 Beaches

The effects of the storm altered beach profiles and moved large quantities of beach material creating some loss of amenity, as sand and shingle beaches now have large stones, cobbles, rocks and boulders strewn across them. Many of the beach hut facilities are packed away and moved in the winter but some privately owned beach hut stands were washed away.

The 2013/14 storms caused considerable damage to the café and businesses operating on Oddicombe beach. The damage sustained at Meadfoot promenade delayed the Meadfoot Beach Redevelopment Project, incurring financial implications based on loss of income and increased costs.



The beaches of Torbay are an important element of the Bays tourism offer and have a high recreational value for local people. The effects of the storm altered beach profiles and moved large quantities of beach material creating some loss of amenity, as sand and shingle beaches now have large stones, cobbles, rocks and boulders strewn across them.

The 2013/14 storms caused considerable damage to the café and businesses operating on Oddicombe beach. The damage sustained at Meadfoot promenade delayed the Meadfoot Beach Redevelopment Project, incurring financial implications based on loss of income and increased costs.

The impact of the storms on seabirds and marine life has not been fully assessed considering larger than usual numbers of birds and marine animals were stranded on beaches dying from exhaustion. Extremes of weather pose threats and opportunities to the unique coastal geological landscape that has UNESCO global geopark status.

## 8 Brixham, Torquay and Paignton Harbours

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As a statutory entity Tor Bay Harbour Authority, owned and operated by Torbay Council, has existed since 1970 and in operational terms it has direct control over 22 miles of coastline and 16 square miles of open sea. This area includes the three enclosed harbours at Torquay, Paignton and Brixham.

All of Torbay's three enclosed harbours suffered damage to masonry, steps, rails and lighting from high winds and tidal surges over the storm period. They are an essential and usually unseen part of our transport system and tourism offer with well-rehearsed procedures for shutting down when the docking of vessels becomes too hazardous, and when quayside equipment needs to be locked down. Closure procedures exist for certain quays, piers, breakwaters and footpaths for use when public safety is put at risk during extreme weather.

Torbay Council received more than £300,000 from a £1.7million government investment package to repair small damages across England as a result of the 2013/14 winter storms. Transport Secretary Patrick McLoughlin, who announced the £1.7 million funding package, said 'Our small ports are vital to the livelihoods of the communities they serve and are the life blood of the local economy.'



Storm damage has been repaired at Torquay Harbour, Princess Pier, Torquay Town Dock pontoons. Paignton harbour East Quay wall and landing quay, Brixham harbour and breakwater masonry, railings and lighting.

The Council is currently seeking approximately £5.7M of capital funding to address major structural defects that have been identified within Haldon and Princess Piers at Torquay harbour. At present the structures have been assessed as having a limited useful life expectancy unless further remedial works are undertaken. The main structural defects identified include; widespread scour below sea level, many voids within the piers below sea level incomplete rock armour and voids within the central core of the piers.



As sea levels rise, consideration is necessary to improve their resilience levels to very high tides, including how they will cope with overtopping of quays for short periods, and protect critical infrastructure, such as IT systems and electricity sub-stations. Any significant failure of key elements of harbour infrastructure will have an immediate effect on the wider economy, especially areas like the fishing industry, tourism and marine leisure.

The Royal National Mission to Deep Sea Fishermen launched a nationwide appeal to help support the welfare of fishermen & their families for the men who were unable to get to sea because of the storms. In the region covered by the Brixham office over the period 40 larger boats and countless smaller vessels were confined to harbours. The Fishermen's Mission in Brixham assisted 228 families with a total of £114,000 in the area covered by the office.

## 9 Summary and Recommendations

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Torbay Council is working to gain a collective understanding of the most urgent extreme weather and climate risks as well as a commitment to action. Working in partnership with Heart of the South West Local Enterprise Partnership (HOTSW LEP), The Peninsula Rail Task Force and regional local authorities and other organisations, Torbay is contributing to the development of projects that help the Bay and its communities withstand extremes of weather more robustly.

Torbay and the South West Peninsula are vulnerable to a range of weather conditions. The last two winters, for example, have suffered from different issues. In 2012/13 the problems were generally associated with flooding and the subsequent impact upon properties and the rail line north of Exeter. However the greatest impact in 2013/2014 has been on coastal communities with a greater number of storms and tidal surges. These events are very hard to predict which increases the Peninsula's level of vulnerability to extreme weather and add further strength to the need for greater investment in climate adaptation providing more resilience.

With many local roads closed for varying periods because of flooding, as well as trees or power lines temporarily blocking the carriageway, there is significant evidence that supports the case that connectivity improvements will be the key to unleashing economic growth in the sub-region. This in turn would provide a major contribution towards the national economy.

The recent extreme weather events and severe disruption to the transport network in 2013-14 have had a significant impact on Torbay Councils budget and the economic performance of the Bay and the South West as a whole. The Met Office and Environment Agency agree that these events reflect an increasing likelihood of more frequent and intense storms.

The UK Climate Projections 2009 (UKCP09) predicts that the annual mean temperature in Devon is very likely to continue throughout the 21st century beyond the one degree Celsius rise already experienced since 1900. This increase in temperature is very likely to increase the frequency and intensity of rainfall events, particularly in the winter months, and further increase sea levels by between 20cm and 68cm by the 2080s.

The projections identify that the severe weather experienced in Devon in both the 2012/13 and 2013/14 winters is likely to be experienced more regularly in the future. The Met Office suggests that we should also plan to be resilient to wet summers and to cold winters through this century. As such, strategic infrastructure interventions are required to adapt to climate change and mitigate the associated transportation and economic risks.

The Government has recognised this to some degree through the short-term allocation of increased national funding for the immediate repair of existing flood and coastal protection assets affected by the events of 2013/14. However, what is urgently required is a more sustained programme of investment through regional programmes and local intervention.

## Recommendations

- That Torbay Council continue to enhance partnership working through the Peninsular Rail Task Force and Network Rail to further develop resilience in the Far South West and ensure that information from the events of 2013/14 are shared to reduce the impacts of future extreme weather events
- That Network Rail be recommended to prioritise future funding to improve resilience and connectivity to the far South West ensuring future strategic plans include the need to improve resilience to this area. This should include plans to raise track heights and raise line-side equipment cabinets above track level on sections of track to reduce the vulnerability of the rail network, and additional passing places on the Waterloo Line to act as an alternative route should the need arise.
- In the event of major disruption to rail services, coordination arrangements over adjacent geographical areas are enhanced by Network Rail and the Train Operating Companies.
- That Torbay Council continues to enhance partnership working with the Local Enterprise Partnership, South West Transport Authorities and the Highways Agency to develop a resilient strategic highway network funded with support from central government.

- That Torbay Council acting as Lead Local Flood Authority facilitate new studies and undertake small scale flood risk management measures to tackle new recovery and resilience requirements, on top of the existing and planned programmes of work.
- That Government should consult Local Highway Authorities on a single set of criteria to be applied to emergency highway repair funding, to minimise the administrative burden when applying for funds at times of crisis.
- That Torbay Council develops a prioritised harbour repair programme with funding assistance from outside bodies.
- That Torbay Council further develop the resilience of Torbay's coastline using the Flood Steering Group to enhance partnership working with the Environment Agency (EA) and South West Water.
- That Torbay Council supports tourism businesses through increased publicity and media campaigns during extreme weather events. That Torbay Council also surveys the impact of future events on this sector.
- That Torbay Council and the Torbay Coast and Countryside Trust work in partnership to identify ways in which Torbay's green infrastructure can reduce and slow flooding during extreme weather events.
- That Torbay Council supports the development of the Environment Agency Flood Warden initiative.
- That Torbay Council explores ways of sharing information in real time between emergency response teams during emergency events, for example using 'Resilience Direct'.

## 10 Local framework documents, strategies and plans

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Torbay is administered by the unitary authority of Torbay Council and consists of 62.87 square kilometres (24.27 sq miles) of land, spanning the towns of Torquay, Paignton and Brixham, located around an east-facing natural harbour (Tor Bay) on the English Channel. The following framework documents, strategies and plans that are particularly pertinent to this document are:

- Local Plan - <http://www.torbay.gov.uk/newlocalplan>
- Shoreline Management Plan - <http://www.torbay.gov.uk/southdevonanddorsetsmplan>
- Energy and Climate Change Strategy - <http://www.torbay.gov.uk/index/yourservices/environment/climatechangepstrat2014-19.pdf>
- South Coast Marine Plan - <https://www.gov.uk/south-inshore-and-south-offshore-marine-plan-areas>
- Tor Bay Harbour's Port Masterplan <http://www.torbay.gov.uk/portmasterplan>
- Itrees - <http://www.torbay.gov.uk/index/yourbay/parks/trees/tuf.pdf>
- Torbay Coastal Zone Management Plan 2013 -2018 <http://seatorbay.org.uk/sites/default/files/pictures/Coastal%20Zone%20Management%20Planv9lo gos.pdf>