Flood Risk Management Plan

An Aíní – An Ailbhine
Nanny – Delvin

2018
Plean um Bainistiú Priacal Tuile
Flood Risk Management Plan

Amhantrach (08) An Ainí - An Ailbhíne
River Basin (08) Nanny - Delvin

Limistéir um Measúnú Breise a chuimsítear sa phlean seo:
Areas for Further Assessment included in this Plan:

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Ullmhaithe ag Oifig na nOibreacha Poiblí 2018
Prepared by the Office of Public Works 2018

De réir In accordance with
Rialacháin na gComhphobal Eorpach (Measúnú agus Bainistiú Priacal Tuile) 2010 agus 2015
European Communities (Assessment and Management of Flood Risks) Regulations 2010 and 2015
Séanadh Dlíthiúil

Tugadh na Pleananna um Bainistiú Priacal Tuile chun cinn mar bhonn eolais le céimeanna indéanta agus molta chun priacal tuile in Éirinn a threagairt agus le gniomhaíochtaí eile pleanála a bhaineann leis an rialtas. Ní ceart iad a úsáid ná brath orthu chun críche ar bith eile nó um próiseas cinnteoireachta ar bith eile.

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The Flood Risk Management Plans have been developed for the purpose of informing feasible and proposed measures to address flood risk in Ireland and other government related planning activities. They should not be used or relied upon for any other purpose or decision-making process.
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– Meath County Council
– Offaly County Council
– South Dublin County Council
– Westmeath County Council
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ACHOIMRE FHEIDHMEACH

RÉAMHRÁ


Is cuspóir don Phleach straitéis, ar a n-áirítear sraith céimeanna molta, um bainistiú costéifeachtach inbhuanaithe faidtear mach an phriacail tuile ins an Abhantrach a leagan amach, ar a n-áirítear limitistéir inar cinneadh go bhfuil an priacal tuile dóchúil suntasach.

Tá an Plean seo, don tréimhse 2018-2021, ar cheann de 29 bPlean atá dá bhfoilsíú; leagann gach ceann acu amach an réimse indéanta de chéimeanna um bainistiú priacal tuile atá molta dá nAbhantrachra ar leith. Céim shuntasach chun tosaigh is ea ullmhú na bPleananna seo maidir le feidhmiú pholasai an Ríaltais um bainistiú priacail tuile, mar atá leagtha amach i dTuarascáil an Ghrúpa um Aithbhreithniú ar Pholasai Tuile (OPW, 20041), agus freagraíonn sé oibleagáidí na hÉireann faoi Threoir ‘Tulite’ an AE 2007 (EU, 20072).

Cuimsíonn an Plean céimeanna indéanta a tugadh chun cinn trí réimse clár agus tionscnamh polasaí a n-áirítear:

- Céimeanna neamhstruchtúrtha um chosc agus ullmhacht priacail tuile atá infheidhme ar bhonn náisiúnta, dírithe ar thionchar thuilte a laghdú, a tugadh agus atá á dtabhairt chun cinn chun polasaí Ríaltais um bainistiú priacail tuile a feidhmiú (OPW, 2004).

Scrúdaigh an Clár MBPTA an priacail tuile, agus céimeanna feideartacha um an priacail a fhreagairt, in 300 pobal ar fud na tíre atá ár phriacail dóchúil suntasach tuile. Léiriódh na pobail seo ins an Réamh-Mheasúnú um Priacail Tuile (RPT); measúnú náisiúnta scagtha a bhí anseo. I dTábla ES-1 thios tugtar liosta na bpobal atá léirithe tríd an próiseas RPT mar phobail atá faoi phriacail dóchúil suntasach tuile in Abhantrach An Ainí - An Ailbhine chomh maith leis na foiní tuile a cinneadh a bheith suntasach maidir le gach pobal. Tugadh cinn agus foilsíodh sraith mapaí tuile le haghaidh gach pobal diobh, ag léiriú na limitistéir atá ar phriacail tuile.

Tógann an Plean ar, agus cuireann sé leis, an clár náisiúnta d’oibreacha cosanta tuile a criochnaio dhírithe anseo, atá faoi dhearadh agus faoi thógáil ag an am seo nó á thagadh amach trí thionscadail nó pleannanna eile, ar a n-áirítear Plean um Bainistiú Priacal Tuile Fhine Gall – Oirthear na Mí, agus cothabháil leanúnach ar sceimeanna draenála agus faoisimh tuile atá ar bun cheana féin.


Rinneadh scagadh ar an Phlean maidir le Measúnú Straitéiseach Comhshaol (MSC) agus Measúnú Cúi (MC) faoi Treoir um Ghnáthóga, agus cinneadh nach raibh gá le MSC nó MC maidir leis an Phlean seo.

1 Tuarascáil an Ghrúpa um Aithbhreithniú ar Pholasai Tuile, OPW, 2004 (www.floodinfo.ie)
2 Treoir faoi mheasúnú agus bainistiú priacail tuile, 2007/60/EC
### Táble ES-1  Pobail atá ar Phriacal Dóchúil Suntasach Tuile taobh istigh d’Abhantrach An Ainí - An Ailbhine

<table>
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<td>Sord</td>
<td>Abhann / Taoidmhear</td>
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</tbody>
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### CUSPÓIRÍ AN PHLEAN

Is é cuspóir foriomlán an Phlean ná tionchair tuitel a bhainistiú agus a laghdú, agus aird ar shochair agus éifeachtaí eile, ar fud réimse leathan earrála, ar a n-áirítear sláinte daoine, an comhshaol, an oidhreacht chultúrtha agus gníomhachtaí eacnamaíoch, trí scéimeanna inmharthana cosanta tuile agus céimeanna eile, bunaithe ar thuiscint chruinn ar phriacal tuile mar atá léirithe in ullmhú mapaí tuile.

Maidir le gach ceann ar leith de na hearnála seo tugadh chun cinn sraith cuspóirí a bhí comhsheasmhach ar bhonn náisiúnta. Tugtar liosta de na cuspóirí ar leith seo agus an tábhacht a bhaineann le gach ceann díobh i Rannán 1.4 den Phlean.

### RAON AN PHLEAN

Leagtar amach raon an Phlean tíos:

- **Raon Spásúil**: Leagann an Plean amach céimeanna, scéimeanna cosanta tuile go hiondúil, chun priacl tuile a bhainistiú agus a laghdú ins na pobail sin a léiríodh ins na pobail sin a léiriúdh tríd an RPT a bheith faoi phrical dóchúil suntasach tuile. Leagtar amach freisin réimse polasaí agus céimeanna neamhachruithe, atá in ait nó faoi fhorbairt, a thacaíonn le laghdú agus bainistiú priacal tuile ar fud ná hAbhanraí.

- **Foinsí Priacal Tuile**: Freagraionn na céimeanna cosanta tuile atá leagtha amach sa Phlean priacl tuile ó na foinsí tuile mar a léiriúdh i dTábla ES-1 i bpobal amháin nó níos mó, mar cinneadh tríd an RPT go raibh na foinsí seo dóchúil suntasach ins na pobail seo. Féadfaidh an réimse polasaí agus céimeanna neamhachruithe tacú le laghdú agus le bainistiú priacl tuile ó fhoinsí uile priacal tuile.
COMHAIRLIÚCHÁN AGUS PLÉ LE POBAL AGUS LE PÁIRITITHE LEASMHARÁ

Rinneadh comhairliúchán poiblí ar scála leathan le linn do na mapáí tuile agus na Pleananna a bheith dá n-ullmhú. Cuireadh suíomhanna gréasáin don Chlár MBPTA agus do na Tionscadail ar fáil chun eolas faoin pháisteas iomlán agus faoi na tionscadail bhainteacha a sholáthar agus chun torthaí na dtionscadal a fhósíú (tá an t-eolas a bhí ar fáil ar na suíomhanna gréasáin sin ar fáil anois ag www.floodinfo.ie).

Thionól an OPW breis agus 200 Lá Comhairliúchán Phoiblí maidir leis na mapáí tuile ins na pobail bhainteacha; bhídeis ag daoine tuigte staitiúla agus cruinneas na mapáí a phlé leis na hinnealtóirí ón OPW agus a gcuid comhairleoirí. Tharla comhairliúchán reachtúil phoiblí faoi na mapáí tuile go deánach sa bhliain 2015. In ullmhú na mapáí criochnaithe tugadh aird ar na tráchtai, tuairimí agus agóidí ó na Laethanta Comhairliúchán Phoiblí agus ón chomhairliúchán foróiríúil chun eolas a fhósíú ar thu ilte agus tuairimí agus tuairimí agus an phobail a chuimsíú ins na mapáí.

Tionóladh dhá bhabhta de Laethanta breise Comhairliúchán Phoiblí ins na pobail maidir leis na roghanna dóchúla agus ansin mainistir na comhairliúchán seo agus tugadh san áireamh iad de réir mar bhuath mar a bhí na Pleananna dá gcríochnú.

Tionsaíodh Grúpaí Náisiúnta agus Réigiúnacha Páirtithe Leasmhara chun deis a thabhairt do pháirtithe leasmhara páirt a ghlacadh in ullmhú na mapáí tuile agus na bPleananna. Bhí bruinntiúil comhordaithe leis na húdaráis trí a bhéadh le Dréacht-Phleananna um tánaistí na criostal tuile. Tionóladh comhairliúchán reachtúil phoiblí eile maidir leis na Dréacht-Phleananna. Breathnaiodh an réimse leathan tuairimí agus aighneachaí a tháinig trí na comhairliúchán seo agus tugadh san áireamh iad de réir mar ba chú a bhí na Pleananna dá gcriochnú.

Tá cur síos ar na ghníomhaíochtaí maidir le comhairliúchán leis an bpobal agus le páirtithe leasmhara i Rannán 4 den Phlean.

MEASÚNÚ TEICNIÚIL

Freagraíodh go hiomlán, tríd an Staidéar MBPTA Fhine Gall – Oirthear na Mí, ceisteanna in Abhantrach na hAiní – Ailbhinne maidir leis na mapáí tuile a ullmhú agus measúnú ar chéimeanna dochúla inmharchana um bainistí tuile agus leasú chun tionscadail a dhéanamh, agus a cheisteanna a chur i mbeadh i bhfuilinntiúil i gceánacht thúsacha. Freaíodh an fhreagraíodh tríd an Staidéar ar chéimeanna a chur i mbun de dhéanamh i bhfhorbairt as an Treoir um Ghnáthóga. Ní aistrithe an fhreagraíodh faoi chumhachtachtaí le mosúil an meabhrachta.
Tá cur síos ar na ceisteanna agus measúnaithe comhshaoil a ndearadh i Rannán 6 den Phlean.

CÉIMEANNA MOLTA

Tá achoimre ar na céimeanna atá molta sa Phlean, agus na scéimeanna agus oibreacha um bainistíu priacal tuile atá curthe chun cinn nó á moladh trí thionscadal nó pleannanna eile, leagtha amach anseo thios.

CÉIMEANNA ATÁ MOLTA SA PHLEAN

*Céimeanna is Infheidhmithre do gach Limistéar*

Bainistíu Pleanála agus Forbartha Inbhuanaithe: Tá feidhmiú cóir na dTreoirlínte ar an Chóras Pleanála agus Bainistíu Priacal Tuile (RTTPA/OPW, 2009) ag na húdaráis phleanála fíor-riachtanach chun forbairt mhí-oiriónach i limistéir atá ar phriacal tuile a sheachaint, agus mar sin mheadú nach gá ar phriacal tuile a sheachaint amach anseo. Soláthróidh an mhapáil tuile a tháinig tríd an Chlár MBPTA bonn fianaise níos mó um chinnití inbhuanaithe pleannála.

Córais Inbhuanaithe um Dhraenáil Uirbeach (CIDU): De réir na dTreoirlínte ar an Chóras Pleanála agus Bainistíu Priacal Tuile (RTTPA/OPW, 2009), ba cheart do na húdaráis phleanála féachaint chuig cruadhchlú agus cruaphábhaíl a laghdú agus teicníci inbhuanaithe draenála a hheidhmiú chun tionchar dóchuíl forbartha ar phriacal tuile le sruth anuas a laghdú.

**Pleanáil um Oiriúnú:** Tar éis don Rialtas an Creat Náisiúnta um Oiriúnú d’Athrú Aeráide a faomhadh, is gá do phríomhéar ó húdaráis an uillmhuirn i lár Cuimhneacháin a bhaint amach sa Rialtas um Oiriúnú an Acht iontachta a bhí ann dá leithéid féin a fhásadh. Is iomlán de dteicní síochánaíochtaí a bhfuil aitherí don Rialtas agus a tháinig tríd an Chlár MBPTA bonn fianaise níos mó um chinnití inbhuanaithe pleannála.

Bainistíu Talamhúsáide agus Bainistíu Nádúrtha Priacal Tuile: Oibreoidh an OPW leis an Ghníomhaireacht um Chaomhnú Comhshaoil, leis na hÚdaráis Áitiúla agus le gníomhaireachtaí eile le linn measúnaithe a leibhéal tionscadail ar oibreacha fisiciúla agus níos leithne ar leibhéal abhantrai, chun cénimeanna ar bith mar chéimeanna nádúrtha um choinneál isce a léiriú, a thairbheoidh aidhmhanna faoin Treoir um Chreat Uisce, bainistíu priacal tuile agus bithéagsúlacht.

Scéimeanna um Dhraenáil Artaireach: Tá dualgas reachtúil ar an OPW faoin Acht um Dhraenáil Artaireach 1945, agus Leasú 1995, agus leis an Acht sin, cothabháil a dhéanamh ar na Scéimeanna um Dhraenáil Artaireach agus um Fhaoiseamh Tuile a thóg an OPW faoi na hAchtanna sin.

Ceantair Dhraenála: Is ar na hÚdaráis Áitiúla cuí a lúinn an dualgas reachtúil cothabhála maidir leis an 4,600 km de chainéil abhann a tháirbhheann ó na Scéimeanna Ceantair Dhraenála.

Cothabháil Cainéal nach cuid de Scéim iad: Taobh amaigh de na Scéimeanna um Dhraenáil Artaireach agus na Scéimeanna Ceantair Dhraenála, is ar úinéirí talún a bhfuil cúrsaí uscse ar a gcuid taíte a luíonn cúram a gcothabhála. Tá treoir faoi chearta agus dualgais úinéirí talún, maidir le cothabháil cúrsaí uscse ar a gcuid taíte nó ina gcóngar, ar féidir ag [www.flooding.ie](http://www.flooding.ie).
Réamhaisnéis agus Foláireamh Tuile: Ar 5 Eanáir 2016 chinn an Rialtas ar Sheirbhís Náisiúnta um Réamhaisnéis agus Foláireamh Tuile a bhunú. Pléifidh an seirbhís le réamhaisnéis tuile ó thuille abhann agus cósta; nuair a bheidh sé ag feidhmiú ina iomlán eiseofar réamhaisnéisi agus foláirimh ginearáulta ar scálaí náisiúnta agus abhantraí ar aon. Tá clár cúig bliana aontaithe chun an seirbhís seo a bhunú.

Pleanáil um Fhreagairt Éigeandála: Tá doiciméad Bainistíú Straitéiseach Éigeandála (BSE): Struchtúir agus Creat Náisiúnta á dhréáchtadh faoi láthair ag Taschfhórsa Rialtais agus Pleanáil Éigeandála. Beidh Caibidil ann maidir le Téarnamh, a chuirrseidh conas a phléifear le cistiú um éigeandálacha, agus um chostais téarnaimh ach go háirithe, amach anseo.

Díonacht Aonair agus Phobail a Chothú: Tá taispeánadh Bóthar Straitéiseach Éigeandála (BSE) Struchtúir agus Creat Náisiúnta á dhréáchtadh faoi láthair agus Rialtais Aitiúil (RTPRA) maidir leis an scéim, agus a bheidh sa tógáil mar chuid den athbhreithniú foriomlán ar an Chreat um Bhainistiú Mórán Cháimhlechta.

Cosaint Mhaoine Aonair: Tá dhá scéim phíollachta um Chosaint Mhaoine Aonair (CMA) ar bun faoi láthair agus bheidh a dhatháigh sa chuid is féidir Díonacht Phobail a chur chun cinn mar chuid den athbhreithniú foriomlán ar an Chreat um Bhainistiú Mórán Cháimhlechta.

Bailiú Sonraí maidir le Tuilte: Tá bailiú sonraí a bhfoilsiú, agus a bhfuil ar bhun tuilte a chur i mbrón le fáil a bheidh in aon duine aithne aCHE Céimeanna ar Leibhéal Abhantraí / Fo-Abhantraí
Níl aon chéimeanna nua faoi gcotherbhál leanúnach ar leibhéal abhantraí / fo-Abhantraí.

Céimeanna ar Leibhéal Pobail
Níl aon chéimeanna nua atá faoi gcotherbhál leanúnach ar leibhéal pobail.

Céimeanna agus Oibreacha um Fhaoiseamh Tuile atá Tugtha Chun Cinn nó Molta trí Thionscadail nó trí Phleananna Eile

Tá Scéim um Fhaoiseamh Tuile ann chéanna féin a dhéanann cosaint ar mhaoine ins na pobail seo a leanas. Déanfar cothabhal leanúnach ar na scéimeanna seo.

− Dámh Liaig
− Baile an Réslaigh

Tá Scéim um Fhaoiseamh Tuile faoi dhearadh nó fhoireann thógáil cheanais féin do na pobail seo a leanas agus leanfar leis seo a chur chun cinn:

− Cill Dheágláin
− Na Sceirí
− Baile an Bhíotaigh / An Inse
Do na pobail seo a leanas rinneadh scrúdú ar chéimeanna struchtúrtha dóchúla indéanta um fhaoiseamh tuile dar léiríodh scéim um fhaoiseamh tuile atá inmharthana ar bhonn teicniúil. Ach beidh gá le measúnú níos mionsonraithe ar chostais agus ar thairbhí a chriochnú um a chinneadh an bhfuil an Scéim atá molta indéanta:

- Ráth Tó
- An Ros

**FEIDHMIÚ, MONATÓIREACHT AGUS ATHBHREITHNIÚ AN PHLEAN**

Is gá infheistióocht chaipitiúil suntasach chun na céimeanna uile, mar atá leagtha amach sa Phlean seo agus ins na Pleananna uile, a fheidhmiú. Mar sin is gá tosaíocht a thabhairt don infheistióocht is gá chuin an sraith náisiúnta de chéimeanna molta a fheidhmiú.

I dteannta le foilsiú an Phlean seo agus na bPleananna eile, fógraíodh an chéad sraith d'oibreacha cosanta tuile dar tugadh tosaiocht dóibh atá leagtha amach sa Phlean seo agus san 28 bPlean eile. Oibreoidh an OPW agus na hÚdaráis Áitiúla go dlúth lena chéile chun feidhmiú éifeachtach na dtionscadail tosaigh seo a thabhairt chun críche agus ina dhiaidh sin ar na tionscadail eile.

Léirítear sa Phlean an dream/na dreamanna atá freagrach as feidhmiú na gcéimeanna molta um bainistiú priacal tuile ar bhonn tosaíochta mar atá leagtha amach thuas.

Is é an tAire Stáit le cúram speisialta um Oifig na nOibreacha Poiblí agus Faoiseamh Tuile atá ina Chathaoirleach ar an An Ghrúpa Idir-Rannach um Chomhordú Pholasaí Tuile. Is é an Grúpa seo a chomhordainn agus a dhéanann monatóireacht ar dhul chun cinn mairid le feidhmiú na moltaí atá leagtha amach in Athbhreithniú Pholasai Tuile an Rialtais 2004, ar a n-áirítear na céimeanna atá leagtha amach ins na Pleananna.

EXECUTIVE SUMMARY

INTRODUCTION

This is the Flood Risk Management Plan (the 'Plan') for the Nanny - Delvin River Basin. A description of the River Basin is provided in Section 2 of the Plan.

The purpose of the Plan is to set out the strategy, including a set of proposed measures, for the cost-effective and sustainable, long-term management of flood risk in the River Basin, including the areas where the flood risk has been determined as being potentially significant.

This Plan, which is for the period of 2018-2021, is one of 29 Plans being published; each setting out the feasible range of flood risk management measures proposed for their respective River Basins. The preparation of these Plans represents a significant milestone in the implementation of Government policy on flood risk management, as set out in the Report of the Flood Policy Review Group (OPW, 2004), and addresses Ireland's obligations under the 2007 EU 'Floods' Directive (EU, 2007).

The Plan includes feasible measures developed through a range of programmes and policy initiatives including:

- Non-structural flood risk prevention and preparedness measures that are applicable nationally, aimed at reducing the impacts of flooding, that have been and are being developed to implement Government policy on flood risk management (OPW, 2004).

The CFRAM Programme has examined the flood risk, and possible measures to address the risk, in 300 communities throughout the country at potentially significant flood risk. These communities were identified through the Preliminary Flood Risk Assessment (PFRA - See Section 3 of the Plan), which was a national screening assessment of flood risk. The communities identified through the PFRA process as being at potentially significant flood risk in the Nanny - Delvin River Basin are listed in Table ES-1 below, along with the sources of flood risk that were deemed to be significant for each community. A set of flood maps, indicating the areas prone to flooding, has been developed and published for each of the communities.

The Plan builds on and supplements the national programme of flood protection works completed previously, that are under design and construction at this time or that have been set out through other projects or plans, including the Fingal - East Meath Flood Risk Management Plan, and the ongoing maintenance of existing drainage and flood relief schemes.

The preparation of flood maps and the assessment of potentially viable measures to manage the risk in communities at potentially significant flood risk was fully addressed in the Nanny-Delvin River Basin through the Fingal - East Meath CFRAM Study, with measures determined through that Study set out in the Fingal - East Meath Flood Risk Management Plan. Therefore, no further structural flood protection measures are proposed as part of this Plan.

The Plan was subject to screening for Strategic Environmental Assessment (SEA), and Appropriate Assessment (AA) under the Habitats Directive, which determined that SEA and AA were not required for this Plan.

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4 Directive on the assessment and management of flood risks, 2007/60/EC
Table ES-1  Communities at Potentially Significant Flood Risk within the Nanny - Delvin River Basin

<table>
<thead>
<tr>
<th>COUNTY</th>
<th>COMMUNITY NAME</th>
<th>SOURCE(S) OF FLOOD RISK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meath</td>
<td>Ashbourne</td>
<td>Fluvial</td>
</tr>
<tr>
<td>Dublin</td>
<td>Balbriggan</td>
<td>Fluvial</td>
</tr>
<tr>
<td>Meath</td>
<td>Bettystown</td>
<td>Fluvial / Tidal</td>
</tr>
<tr>
<td>Dublin</td>
<td>Donabate</td>
<td>Fluvial / Tidal</td>
</tr>
<tr>
<td>Meath</td>
<td>Duleek</td>
<td>Fluvial</td>
</tr>
<tr>
<td>Meath</td>
<td>Gormanston</td>
<td>Fluvial / Tidal</td>
</tr>
<tr>
<td>Dublin</td>
<td>Lusk</td>
<td>Fluvial</td>
</tr>
<tr>
<td>Dublin</td>
<td>Oldtown</td>
<td>Fluvial</td>
</tr>
<tr>
<td>Dublin</td>
<td>Portrane</td>
<td>Tidal</td>
</tr>
<tr>
<td>Meath</td>
<td>Ratoath</td>
<td>Fluvial</td>
</tr>
<tr>
<td>Dublin</td>
<td>Rush</td>
<td>Tidal</td>
</tr>
<tr>
<td>Dublin</td>
<td>Skerries</td>
<td>Fluvial / Tidal</td>
</tr>
<tr>
<td>Dublin</td>
<td>Staffordstown/Turvey</td>
<td>Fluvial / Tidal</td>
</tr>
<tr>
<td>Dublin</td>
<td>Swords</td>
<td>Fluvial / Tidal</td>
</tr>
</tbody>
</table>

**OBJECTIVES OF THE PLAN**

The overall objective of the Plan is to manage and reduce the potential consequences of flooding, recognising other benefits and effects across a broad range of sectors including human health, the environment, cultural heritage and economic activity, through viable flood protection schemes and other measures informed by a sound understanding of the flood risk established through the preparation of flood maps.

A nationally consistent set of specific objectives relating to each of these sectors was developed for the preparation of the Plans. These specific objectives and the importance given to each are listed in Section 1.4 of the Plan.

**SCOPE OF THE PLAN**

The scope of the Plan is set out below:

- **Spatial Scope:** The Plan sets out measures, typically flood protection schemes, to manage and reduce flood risk in the communities that were identified through the PRFA as being at potentially significant flood risk. The Plan also sets out a range of non-structural policies and measures, which are in place or under development, that contribute to the reduction and management of flood risk throughout the River Basin.

- **Sources of Flood Risk:** The flood protection measures that are set out in the Plan address flood risk from the sources of flooding as identified in Table ES-1 in one or more communities, as these sources were determined through the PFRA to be potentially significant in these communities. The range of non-structural policies and measures set out in the Plan can contribute to the reduction and management of flood risk from all sources of flood risk.

Extensive public consultation has been undertaken throughout the preparation of the flood maps and the Plans. Websites for the CFRAM Programme and Projects were also maintained throughout the process to provide information on the overall process and the relevant projects.
and to provide access to project outputs (the information that was available from these websites is now available through www.floodinfo.ie).

Over 200 Public Consultation Days were held by the OPW in or near the relevant communities in relation to the flood maps, where residents and the engineers of the OPW and its consultants could discuss past floods and the accuracy of the maps. A statutory public consultation on the draft maps was also undertaken late in 2015. The preparation of the final maps have taken the comments, observations and objections from the Public Consultation Days and formal consultation on board to reflect the local knowledge of flooding and people's views of the maps.

Two rounds of further Public Consultation Days were held in or near the communities in relation to potential options and then the Draft Plans for managing the flood risk. A further statutory public consultation was held in relation to the Draft Plans. The extensive comments and submissions made through these consultations have all been considered and taken into account as appropriate in finalising the Plans.

National and Regional Stakeholder Groups were formed to provide an opportunity for input by stakeholders to participate in the preparation of the flood maps and the Plans. Coordination and engagement meetings were held with the authorities responsible for implementing the Water Framework Directive and, for river basins that are shared with Northern Ireland, with the relevant authorities in the North.

The public and stakeholder consultation and engagement activities are described in Section 4 of the Plan.

**TECHNICAL ASSESSMENT**

The preparation of flood maps and the assessment of potentially viable measures to manage the risk in communities at potentially significant flood risk was fully addressed in the Nanny-Delvin River Basin through the Fingal - East Meath CFRAM Study, with measures determined through that Study set out in the Fingal - East Meath Flood Risk Management Plan. Therefore, no further technical assessment was undertaken as part of the preparation of this Plan.

**ENVIRONMENTAL ASSESSMENTS**

The Plan was subject to screening for Strategic Environmental Assessment (SEA), and Appropriate Assessment (AA) under the Habitats Directive, which determined that SEA and AA were not required for this Plan.

It should be noted that approval of the Plan does not confer consent to the construction of any physical works. Environmental Impact Assessment and Project-level Appropriate Assessment must be undertaken in accordance with the relevant legislation where relevant as part of the progression of proposed measures that involve physical works.

The environmental issues and assessments undertaken are described in Section 6 of the Plan.

**PROPOSED MEASURES**

A summary of the measures proposed in the Plan and the flood relief schemes and works that have been progressed or proposed through other projects or plans are set out below.
MEASURES PROPOSED IN THE PLAN

Measures Applicable for all Areas

Sustainable Planning and Development Management: The proper application of the Guidelines on the Planning System and Flood Risk Management (DHPLG/OPW, 2009) by the planning authorities is essential to avoid inappropriate development in flood prone areas, and hence avoid unnecessary increases in flood risk into the future. The flood mapping produced through the CFRAM Programme will provide an even greater evidential basis for sustainable planning decisions.

Sustainable Urban Drainage Systems (SUDS): In accordance with the Guidelines on the Planning System and Flood Risk Management (DHPLG/OPW, 2009), planning authorities should seek to reduce the extent of hard surfacing and paving and require the use of sustainable drainage techniques to reduce the potential impact of development on flood risk downstream.

Adaptation Planning: Following approval by Government of the National Climate Change Adaptation Framework key sectors and Local Authorities are required to develop sectoral and local adaptation plans. This will require a revised sectoral plan to be prepared by the OPW, covering the flood risk management sector. Other sectors identified in the Framework and Local Authorities will also be required to take account of flood risk when preparing their own sectoral and local adaptation plans.

Land Use Management and Natural Flood Risk Management: The OPW will work with the Environment Protection Agency, Local Authorities and other agencies during the project-level assessments of physical works and more broadly at a catchment-level to identify any measures, such as natural water retention measures, that can have benefits for Water Framework Directive, flood risk management and biodiversity objectives.

Arterial Drainage Schemes: The OPW has a statutory duty under the Arterial Drainage Act, 1945, and the Amendment of the Act, 1995, to maintain the Arterial Drainage and Flood Relief Schemes constructed by it under those Acts.

Drainage Districts: The statutory duty of maintenance for 4,600 km of river channel benefitting from Drainage District Schemes rests with the relevant Local Authorities.

Maintenance of Channels not part of a Scheme: Outside of the Arterial Drainage and Drainage District Schemes, landowners who have watercourses on their lands have a responsibility for their maintenance. Guidance to clarify the rights and responsibilities of landowners in relation to the maintenance of watercourses on or near their lands is available at www.flooding.ie.

Flood Forecasting and Warning: A Government decision was taken on 5 January 2016 to establish a National Flood Forecasting and Warning Service. The service will deal with flood forecasting from fluvial (river) and coastal sources and when fully operational will involve the issuing of flood forecasts and general alerts at both national and catchment scales. A 5-year programme has been agreed to oversee the establishment of this new service.

Emergency Response Planning: A Government Task Force on Emergency Planning is currently drafting a Strategic Emergency Management (SEM): National Structures and Framework document. This is to include a Chapter on Recovery to include how funding for emergencies, particularly recovery costs, may be handled in the future.
Promotion of Individual and Community Resilience: The Department of Housing, Planning & Local Government (DHPLG) is researching how Community Resilience may be advanced as part of the overall review of the Framework of Major Emergency Management.

Individual Property Protection: The outcomes of two Individual Property Protection (IPP) pilots currently underway will inform the Government on any feasible support it could provide to at risk properties.

Flood-Related Data Collection: The ongoing collection and, where appropriate, publication of flood-related data is a measure that will help to continually improve preparation for, and response to, flooding.

Voluntary Home Relocation: In extreme circumstances, the flood risk to a home may be such that the homeowner may consider that continuing to live in the property is not sustainable and would choose to relocate. On 11 April 2017, the Government agreed the administrative arrangements for a once-off Homeowners Voluntary Relocation Scheme for those primary residential properties that flooded during 4 December 2015 to 13 January 2016.

Catchment / Sub-Catchment-Level Measures

There are no new catchment / sub-catchment-level measures proposed under this Plan.

Community-Level Measures

There are no new community-level measures proposed under this Plan.

Flood Relief Schemes and Works Progressed or Proposed through Other Projects or Plans

There is an existing Flood Relief Scheme providing protection to properties in the following communities. Ongoing maintenance will be undertaken of these schemes.

− Duleek
− Rowlestown

There is a Flood Relief Scheme already in design or construction for the following communities, which will continue to be progressed:

− Ashbourne
− Skerries
− Bettystown / Laytown

Potentially viable structural flood relief measures have been investigated for the following communities for which a technically viable flood relief scheme has been identified. However, a more detailed assessment of the costs and benefits will need to be completed to determine if the proposed Scheme is feasible:

− Ratoath
− Rush
IMPLEMENTATION, MONITORING AND REVIEW OF THE PLAN

Implementing all of the measures, set out in this and all Plans, requires a significant capital investment. It has therefore been necessary to prioritise the investment required to implement the national set of proposed measures.

A prioritised initial tranche of flood protection works set out within this and the 28 other Plans to be advanced to the more detailed project level of assessment has been announced in conjunction with the publication of this and the other Plans. The OPW and Local Authorities will work closely to bring about the effective implementation of these initial projects and then subsequent projects.

The Plan identifies the body/bodies responsible for implementing the proposed flood risk management measures in a prioritised manner as above.

The Minister of State with special responsibility for the Office of Public Works and Flood Relief chairs the Interdepartmental Flood Policy Co-ordination Group. This Group co-ordinates and monitors progress in the implementation of the recommendations set out in the Government’s 2004 Flood Policy Review, including the measures set out in the Plans.

These Plans are for the period 2018 - 2021. They will be reviewed in terms of progress made and be updated by the OPW and other stakeholders in 2021.
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INTRODUCTION AND BACKGROUND

1.1 OVERVIEW
This is the Flood Risk Management Plan (the ‘Plan’) for the Nanny-Delvin (UoM08) River Basin.

The purpose of the Plan is to set out the strategy, including a set of measures, for the cost-effective and sustainable, long-term management of flood risk in the Nanny-Delvin River Basin, including the areas where the flood risk has been determined as being potentially significant. The Plan includes feasible measures developed through a range of programmes or policy initiatives including:

- Non-structural flood risk prevention and preparedness measures that are applicable nationally, aimed at reducing the impacts of flooding, to implement the recommendations of the Report of the Flood Policy Review Group, 2004

The Plan builds on and supplements the programmes of flood protection works completed previously, that are under design and construction at this time or that have been set out through other projects or plans, and the ongoing maintenance of existing drainage and flood relief schemes. The Fingal East Meath Flood Risk Assessment and Management Study (FEM-FRAMS) and its recommendations are of particular note in this regard (see Section 1.3.4).

The Objectives and scope of the Plan are set out in Sections 1.4 and 1.5 respectively.

This Plan is one of 29 Plans being published; each setting out the feasible range of flood risk management measures for their respective River Basins. The preparation of these Plans is a central part of the implementation of Government policy on flood risk management (OPW, 2004), and meets Ireland's obligations under the 2007 EU ‘Floods’ Directive (EU, 2007). Screening for Strategic Environmental Assessment and Appropriate Assessment under the Habitats Directive have been undertaken as part of the preparation of the Plan.

The Government’s National Development Plan 2018-2027 has provided the capital envelope for a prioritised programme of investment for the advancement and implementation of ongoing flood relief projects and the flood protection measures set out within this and the 28 other Plans.

1.2 FLOODING AND FLOOD RISK
Flooding is a natural event that can happen at any time in a wide variety of locations.

Flood hazard is the potential threat posed by flooding to people, property, the environment and our cultural heritage. Flooding only presents a risk however when people, property, businesses, farms, infrastructure, the environment or our cultural heritage can be potentially impacted or damaged by floods.

Flood risk is the combination of the probability of flood events of different magnitudes and the degree of the potential impact or damage arising from a flood.

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2 Directive on the assessment and management of flood risks, 2007/60/EC
1.2.1 Types and Causes of Flooding
Flooding can occur from a range of sources, individually or in combination, including:

− Coastal flooding (from the sea or estuaries)
− Fluvial flooding (from rivers or streams)
− Pluvial flooding (from intense rainfall events and overland flow)
− Groundwater flooding (typically from turloughs in Ireland)
− Other sources, such as from water-bearing infrastructure

A description of each of these sources of flooding is provided in Appendix A.

1.2.2 Impacts of Flooding
Flooding can cause damage, loss or harm in a number of ways, including:

− Impacts of people and society, including physical injury, illness, stress and even loss of life
− Damage to property, such as homes and businesses
− Damage to, and loss of service from, Infrastructure (such as water supply or roads)
− Impacts on the environment, such as damage or pollution of habitats
− Damage to our cultural heritage, such as monuments and historic buildings

A description of each of these potential impacts of flooding is provided in Appendix A.

1.2.3 Potential Impacts of Future Change
Climate change is likely to have a considerable impact on flood risk in Ireland, such as through rising mean sea levels, increased wave action and the potential increases in winter rainfall and intense rainfall events. Land use change, for example through new housing and other developments, can also increase potential future flood risk.

1.3 BACKGROUND

1.3.1 Flood Policy and Legislative Background
Flood risk to urban areas in Ireland has been addressed, since the 1995 Amendment to the Arterial Drainage Act (1945), through the use of structural or engineered solutions (flood relief schemes). In line with internationally changing perspectives, the Government adopted a new policy in 2004 that shifted the emphasis in addressing flood risk towards:

− A catchment-based context for managing risk and the identification of solutions to manage existing and potential risks
− More pro-active flood hazard and risk assessment and management, with a view to avoiding or minimising future increases in risk, e.g., from development on floodplains,
− Increased use of non-structural and flood impact mitigation measures

Notwithstanding this shift, engineered solutions to manage existing and potential future risks will continue to form a key component of the overall national flood risk management programme and strategy.

Specific recommendations arising from the policy review included:
− the preparation of flood maps, and,
− the preparation of flood risk management plans.

A further influence on the management of flood risk in Ireland is the EU ‘Floods’ Directive [2007/60/EC]. The aim of this Directive is to reduce the adverse consequences of flooding on human health, the environment, cultural heritage and economic activity. The ‘Floods’ Directive was transposed into Irish law by Statutory Instrument SI No. 122 of 2010\(^3\) and amended by SI No. 495 of 2015\(^4\).

Under the ‘Floods’ Directive, Ireland, along with all other Member States, are required to undertake a Preliminary Flood Risk Assessment (PFRA) to identify areas of potentially significant flood risk (referred to in Ireland as Areas for Further Assessment, or ‘AFAs’), and then for these areas to prepare flood maps in relation to the sources of flood risk deemed to be significant. Ireland is then required to prepare Plans for each River Basin, focussed on managing and reducing the risk within the AFAs. The PFRA, flood maps and the Plans need to be reviewed on a 6-yearly cycle.

### 1.3.2 Competent and Responsible Authorities for the ‘Floods’ Directive

The Office of Public Works (OPW) was designated following the Government approval of the Report of the Flood Policy Review Group (OPW, 2004) as the lead agency for flood risk management in Ireland. As lead agency, the OPW was designated as the Competent Authority under SI No. 122 of 2010 for the implementation of the Directive.

The following authorities may be designated by the OPW under SI Nos. 122 of 2010 and 495 of 2015 as being responsible for the implementation of key requirements of the EU ‘Floods’ Directive (Preliminary Flood Risk Assessment, preparation of flood maps, and identification of flood risk management measures) with respect to infrastructure for which they have responsibility:

− All local authorities
− Electricity Supply Board (ESB)
− Waterways Ireland
− Irish Water

### 1.3.3 The ‘CFRAM’ Programme

The purpose of the CFRAM Programme is to assess the existing fluvial and coastal flood risk, and the potential increase in risk due to climate change, ongoing development and other pressures that may arise in the future, and develop a Plan setting out a sustainable, long-term strategy to manage this risk. The OPW in conjunction with the CFRAM Study Consultants (the ‘Consultants’, being RPS for the Eastern CFRAM Study), are undertaking the National Catchment-based Flood Risk Assessment and Management (CFRAM) Programme.

The objectives of the CFRAM Programme are to:

− Identify and map the existing and potential future fluvial and coastal flood hazard and flood risk in the Areas for Further Assessment (AFAs),
− Identify viable structural and non-structural options and measures for the effective and sustainable management of flood risk in the AFAs,

Prepare a set of Plans, and associated Strategic Environmental and Habitats Directive (Appropriate) Assessments, that sets out the proposed strategies, measures and actions that should be pursued by the relevant bodies, including the OPW, local authorities and other Stakeholders, to achieve the most cost-effective and sustainable management of existing and potential future flood risk, taking account of environmental plans, objectives and legislative requirements and other statutory plans and requirements.

The CFRAM Programme has been implemented for seven large areas called River Basin Districts (RBDs) that cover the whole country. Each RBD is then divided into a number of River Basins (Units of Management, or ‘UoMs’), where one Plan has been prepared for each River Basin. A map of the RBDs and the UoMs is provided in Figure 1.1.

The CFRAM Programme is focused on a number of areas where the risk has been determined through the PFRA to be potentially significant, which are referred to as Areas for Further Assessment, or ‘AFAs’, and on the sources of flooding within these areas that were determined to be the cause of significant risk.

Further details on the CFRAM Programme can be found on the OPW website: www.floodinfo.ie.

1.3.4 Pilot CFRAM Projects

Following the adoption of the new policy by Government in 2004, the OPW commenced a series of pilot CFRAM Projects to test and develop the approach before rolling-out the Programme nationally. The area within the Nanny-Delvin River Basin (UoM08) was included as the main component of the Fingal East Meath FRAM Study (‘FEM-FRAMS’), with smaller adjoining areas of the Boyne and Liffey-Dublin Bay River Basin Districts. Details of the FEM-FRAMS can be found on the OPW website; www.floodinfo.ie. This Plan notes the measures set out through the FEM-FRAMS, including an update on their current status.

1.3.5 Other Relevant Flood Risk Management Projects

The National CFRAM Programme is delivering on the requirements of the Government Policy and the EU ‘Floods’ Directive for most of the AFAs. In some areas however, other parallel or preceding projects have delivered on these requirements. In relation to this Plan, these projects are:

- The Duleek Flood Relief Scheme
- The Ashbourne Flood Relief Scheme

The process undertaken in preparing the flood maps and/or determining suitable flood risk management options under these projects would be generally similar to those undertaken for the CFRAM Programme. This Plan also notes the measures set out through the above Projects, including an update on their current status.
1.3.6 Other Relevant Policies and Plans

The 2004 Report of the Flood Policy Review Group and SI Nos. 122 and 495 of 2010 and 2015 respectively are the policy and legislation that directly relate to the preparation of this
Plan. However, a wide range of legislation, policies and plans are relevant to, or may be impacted by, this Plan. The relevant legislation, policies and plans (as of June 2017) are listed in Table 1.1.

Table 1.1  Legislation, Policies and Plans Relevant to the Plan

<table>
<thead>
<tr>
<th>Legislation / Policy / Plan</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Legislation</strong></td>
<td></td>
</tr>
<tr>
<td>Arterial Drainage Act, 1945, and Amendment Act, 1995</td>
<td>Acts empowering the Commissioners of Public Works to implement Arterial Drainage Schemes (1945) and Flood Relief Schemes (1995), which must then be maintained.</td>
</tr>
<tr>
<td>Commissioners of Public Works (Functions and Powers) Act, 1996</td>
<td>Act to make further provision in relation to the functions and powers of the Commissioners of Public Works including in relation to flooding. The Minor Works Programme (to fund local authorities to implement local flood relief schemes) is an administrative scheme operated by the OPW under its general powers and functions to make schemes to address flood risk.</td>
</tr>
<tr>
<td>Coast Protection Act, 1963</td>
<td>Act to provide for the making and execution of coast protection schemes and to provide for other matters connected with the matters aforesaid.</td>
</tr>
<tr>
<td>Local Government (Works) Act, 1949</td>
<td>Enables local authorities to execute works affording relief or protection from flooding</td>
</tr>
<tr>
<td>SI No. 477 of 2011</td>
<td>Transposing Instruments for the EU Birds and Habitats Directives: - European Communities (Birds and Natural Habitats) Regulations 2011</td>
</tr>
<tr>
<td>Planning and Development Act, 2000 (No. 30 of 2000) and associated regulations</td>
<td>Principal Planning Act (and amendments) - Planning and Development Regulations 2001 to 2015 Provides for the adoption of Guidelines under Section 28 Sets out planning requirements for certain flood relief works by local authorities</td>
</tr>
<tr>
<td>Climate Action and Low Carbon Development Act, 2015</td>
<td>Provides for the making of a National Adaptation Framework to specify the national strategy for the application of adaptation measures in different sectors and by local authorities to reduce the vulnerability of the State to the negative effects of climate change, including potential increases in flood risk.</td>
</tr>
<tr>
<td><strong>Policies</strong></td>
<td></td>
</tr>
</tbody>
</table>
### Guidelines on the Planning System and Flood Risk Management, 2009

Guidelines published under Section 28 of the Planning and Development Acts that provide a transparent and robust framework for the consideration of flood risk in planning and development management.

### Major Emergency Management Framework, 2006

Sets out common arrangements and structures for front line public sector emergency management in Ireland to facilitate the co-ordination of the individual response efforts of the Principal Response Agencies to major emergencies.

### National Adaptation Framework, 2012 & 2018

Set out Government policy for addressing climate change adaptation in Ireland, focusing on key climate sensitive sectors and mandating certain Government Departments, other public sector bodies and Local Authorities to prepare sectoral and local climate change adaptation plans.  
A new statutory Framework was introduced in January 2018 under the Climate Action and Low Carbon Development Act, 2015.

### Plans

### Climate Change Sectoral Adaptation Plan for Flood Risk Management, 2015

Sets out the policy on climate change adaptation of the OPW, the lead agency for flood risk management in Ireland, based on a current understanding of the potential consequences of climate change for flooding and flood risk in Ireland, and the adaptation actions to be implemented by the OPW and other responsible Departments and agencies in the flood risk management sector.  
A revised statutory Sectoral Adaptation Plan will be prepared under the 2018 National Adaptation Framework.

### National Spatial Strategy, 2002 - 2020

A 20-year coherent national planning framework for Ireland that aims to achieve a better balance of social, economic and physical development across Ireland, supported by more effective and integrated planning.

### River Basin Management Plans

Plans (RBMPs) prepared under the Water Framework Directive (2000/60/EC) that summarise the waterbodies that may not meet the environmental objectives of the WFD and identify which pressures are contributing to the environmental objectives not being achieved. The plans describe the classification results and identified measures that can be introduced in order to safeguard waters and meet the environmental objectives of the WFD.


The second cycle (2018-2021) represents a new approach to river basin management planning. Ireland is now taking a single river basin district approach with a much improved evidence base to underpin decision making at both national and local level


### Regional Planning Guidelines

Planning strategies at the regional level to provide the link between the national and local planning frameworks, which work within the overall approach taken in the NSS, while providing more detail and establishing a development and spatial framework that can be used to strengthen local authority development plans and other planning strategies at county, city and local level.

- Regional Planning Guidelines for the Greater Dublin Area (RPG): 2010-2022 (Dublin Regional Authority and Mid East Regional Authority, 15th June 2010)
Development Plans

The development plan sets the agenda for the development of the local authority’s area over its six year lifespan. Development, whether it be residential, industrial, commercial or amenity, must generally take place in accordance with the development plan. The plan is therefore a blueprint for the economic and social development of the city, town or county for which it has been made.

- Draft Fingal Development Plan: 2017-2023
- Fingal Development Plan: 2011 – 2017
- County Meath Development Plan: 2013 - 2019

Local Areas Plans

Local Area Plans provide more detailed planning policies at a local level for either urban areas or wider urban and rural areas where significant development and change is anticipated.

- Local Area Plans (LAPs) (Fingal County Council, 2007)
- Dublin Airport LAP, June 2006
- Balbriggan SE LAP,
- Ballybohill LAP,
- Donabate LAP,
- Garristown LAP,
- Portmarnock LAP,
- Rush Kenure LAP,
- Streamstown LAP,
- Balbriggan North LAP,
- Balbriggan Stephenstown LAP,
- Kinsealy LAP, Lusk LAP,
- Oldtown LAP, Rolestown LAP,
- Rush Skerries Road LAP
- Ashbourne LAP,
- Ashbourne LAP,
- Ratoath LAP

Other

- National Development Plan: 2007-2013 Transforming Ireland – A Better Quality of Life for All
- Dunshaughlin Electoral Area Development Plan (Meath County Council, 2009):

1.4 FLOOD RISK MANAGEMENT OBJECTIVES

1.4.1 Overview

The Flood Risk Management Objectives set out the goals the Plan is aiming to achieve. They have a key role in the preparation of the Plan, and the identification of appropriate measures, as the options that are available to manage flood risk within a given area are appraised against these Objectives to determine how well each option contributes towards meeting the defined goals. Establishing such Objectives is also a requirement of the EU 'Floods' Directive [Art. 7(2)].

The Flood Risk Management Objectives are aimed at considering potential benefits and impacts across a broad range of sectors including human health, the environment, cultural heritage and economic activity. The Flood Risk Management Objectives are well aligned with the objectives defined for the Strategic Environmental Assessment (see Section 6.3), as both are aimed at defining sustainable measures providing benefits to a wide range of sectors.

1.4.2 Definition of the Flood Risk Management Objectives

A set of Flood Risk Management Objectives was developed and applied through the Pilot CFRAM Studies, with stakeholder consultation to ensure the Objectives set were
appropriate. In commencing the National CFRAM Programme, the Objectives developed for the Pilot Studies were reviewed and refined. The OPW considered it appropriate to publicly consult on the proposed Objectives, and launched a public consultation in October 2014. Seventy one submissions were received which informed amendments then made to define the final Objectives. The final set of Objectives are set out in Table 1.2.

Sets of Objectives, similar to those adopted for the National CFRAM Programme, have also been adopted for other flood relief scheme projects undertaken in parallel to the CFRAM Programme. Details of these are set out in the relevant project reports (Section 1.3.5).

The purpose of the Global Weightings referred to in Table 1.2 is set out in Section 7.3.4.

1.5 SCOPE OF THE PLAN

This Plan sets out a sustainable, long-term strategy to manage the flood risk within the Nanny-Delvin River Basin, focused on the areas of potentially significant flood risk (AFAs), and the sources of flooding giving rise to that risk.

1.5.1 Spatial Scope of the Plan

The Plan is focussed on the areas, the ‘AFAs’, where the risk was determined through the PFRA as being potentially significant. There are 300 AFAs, which are typically communities (villages, towns and cities) where the flood risk is concentrated, throughout the country. The areas covered by this Plan are set out in Section 3.2 (Table 3.1).

Some flood risk mitigation measures developed for the AFAs will have benefits for other areas, and so areas outside of the AFAs may also benefit from the proposed specific measures set out in the Plan.

While the Plan does not include locally specific flood protection measures to address the flood risk in areas outside of the AFAs, it does set out the range of policies and measures, which are in place or under development, that can contribute to the reduction and management of flood risk throughout the River Basin, including areas outside of the AFAs, such as spatial planning, emergency response planning and maintenance of drainage schemes.

1.5.2 Sources of Flooding Addressed in the Plan

The Plan for the Nanny Delvin River Basin addresses fluvial and coastal sources of flooding in one or more communities (AFAs), as these sources were determined through the PFRA to be potentially significant in one or more communities within the area covered by the Nanny-Delvin River Basin Plan. The sources of flooding addressed for each of the AFAs are indicated in Table 3.1.

Other sources of flood risk within these communities, which were not deemed to have been significant for those communities within the scope of the PFRA, have not been specifically addressed (i.e., through locally specific flood protection measures). The Plan does however set out a range of policies and measures that can contribute to the reduction and management of flood risk for all sources of flood risk throughout the River Basin, including areas outside of these communities, such as spatial planning, emergency response planning and maintenance of drainage schemes.
### Table 1.2 Flood Risk Management Objectives and Global Weightings for the National CFRAM Programme

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>OBJECTIVE</th>
<th>SUB-OBJECTIVE</th>
<th>GLOBAL WEIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Social</td>
<td>Minimise risk to human health and life</td>
<td>i) Minimise risk to human health and life of residents</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii) Minimise risk to high vulnerability properties</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Minimise risk to community</td>
<td>i) Minimise risk to social infrastructure and amenity</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii) Minimise risk to local employment</td>
<td>7</td>
</tr>
<tr>
<td>2 Economic</td>
<td>Minimise economic risk</td>
<td>i) Minimise economic risk</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Minimise risk to transport infrastructure</td>
<td>i) Minimise risk to transport infrastructure</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Minimise risk to utility infrastructure</td>
<td>i) Minimise risk to utility infrastructure</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Minimise risk to agriculture</td>
<td>i) Minimise risk to agriculture</td>
<td>12</td>
</tr>
<tr>
<td>3 Environmental</td>
<td>Support the objectives of the WFD</td>
<td>i) Provide no impediment to the achievement of water body objectives and, if possible, contribute to the achievement of water body objectives.</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Support the objectives of the Habitats Directive</td>
<td>i) Avoid detrimental effects to, and where possible enhance, Natura 2000 network, protected species and their key habitats, recognising relevant landscape features and stepping stones.</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Avoid damage to, and where possible enhance, the flora and fauna of the catchment</td>
<td>i) Avoid damage to or loss of, and where possible enhance, nature conservation sites and protected species or other known species of conservation concern.</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Protect, and where possible enhance, fisheries resource within the catchment</td>
<td>i) Maintain existing, and where possible create new, fisheries habitat including the maintenance or improvement of conditions that allow upstream migration for fish species.</td>
<td>13</td>
</tr>
<tr>
<td>CRITERIA</td>
<td>OBJECTIVE</td>
<td>SUB-OBJECTIVE</td>
<td>GLOBAL WEIGHTING</td>
</tr>
<tr>
<td>----------</td>
<td>-----------</td>
<td>---------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>3</td>
<td>Environmental (Continued)</td>
<td>e) Protect, and where possible enhance, landscape character and visual amenity within the river corridor</td>
<td>i) Protect, and where possible enhance, visual amenity, landscape protection zones and views into / from designated scenic areas within the river corridor.</td>
</tr>
<tr>
<td></td>
<td>f) Avoid damage to or loss of features, institutions and collections of cultural heritage importance and their setting</td>
<td>i) Avoid damage to or loss of features, institutions and collections of architectural value and their setting.</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>f) Avoid damage to or loss of features, institutions and collections of cultural heritage importance and their setting</td>
<td>ii) Avoid damage to or loss of features, institutions and collections of archaeological value and their setting.</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>Technical</td>
<td>a) Ensure flood risk management options are operationally robust</td>
<td>i) Ensure flood risk management options are operationally robust</td>
</tr>
<tr>
<td></td>
<td>b) Minimise health and safety risks associated with the construction, operation and maintenance of flood risk management options</td>
<td>i) Minimise health and safety risks associated with the construction, operation and maintenance of flood risk management options</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>c) Ensure flood risk management options are adaptable to future flood risk, and the potential impacts of climate change</td>
<td>i) Ensure flood risk management options are adaptable to future flood risk, and the potential impacts of climate change</td>
<td>20</td>
</tr>
</tbody>
</table>
1.5.3 Level of Detail of the Plan

The Plan sets out the strategy, actions and measures that are considered to be the most appropriate at this stage of assessment, which has involved detailed modelling and appraisal of possible options for managing and reducing flood risk, including environmental assessment to the degree of detail appropriate for the Plan. The observations and views submitted as part of the consultation on the Draft Plan (See Section 4.4.6) have been reviewed and taken into account in the preparation of this Plan.
1.6 STRUCTURE OF THE PLAN

The structure of the Plan is set out below.

Flood Risk Management Plan

Section 1 Provides an introduction and background to the Plan, including the flood risk management Objectives the Plan is aiming to achieve, and sets out the scope of the Plan

Section 2 Provides an overview of the catchment and coastal areas covered by the Plan, including a summary of the flood history and existing flood risk management measures

Section 3 Describes the PFRA undertaken to identify the AFAs that are the focus of this Plan

Section 4 Outlines the public and stakeholder consultation and engagement undertaken throughout the National CFRAM Programme and other relevant projects.

Section 5 Details the existing and potential future flood hazard and risk in areas covered by the Plan

Section 6 Describes the environmental assessments undertaken to ensure that the Plan complies with relevant environmental legislation and inform the process of identifying the suitable strategies that will, where possible, enhance the environment

Section 7 Sets out the measures to manage the flood risk in the area covered by the Plan, and how these were developed and assessed, and provides a summary of the measures proposed in the Plan

Section 8 Outlines how the implementation of the Plan will be monitored and reported, and then reviewed and updated at regular intervals

APPENDIX A Provides an overview of flooding and flood risk

APPENDIX B Describes in more detail a physical overview of the River Basin

APPENDIX C Summarises the process in undertaking the Preliminary Flood Risk Assessment

APPENDIX D Provides details on certain aspects of the stakeholder and public engagement and consultation

APPENDIX E Sets out the flood risk in each AFA

APPENDIX F Provides a summary of the different methods of flood risk management

Strategic Environmental Assessment Statement

Natura Impact Statement

The flood maps that have informed and form part of this Plan are available from the OPW website: www.floodinfo.ie.
2 OVERVIEW OF THE RIVER BASIN

2.1 THE NANNY-DELVIN RIVER BASIN

The Eastern CFRAM Study covers an area of approximately 6,250 km$^2$ and includes four River Basins or Units of Management (UoM) the Boyne (UoM07), the Nanny-Delvin (UoM08), Liffey-Dublin Bay (UoM09) and Avoca-Vartry (UoM10).

There is a high level of flood risk within some locations in the Nanny-Delvin River Basin with significant coastal and fluvial flooding events having occurred in the past. The River Basin covers an area of approximately 772 km$^2$ which includes parts of Counties Meath and Dublin that are within the Meath and Fingal County Council administrative areas.

![Figure 2.1: Nanny-Delvin RBD Location Map](image)

2.2 TOPOGRAPHY, GEOLOGY, SOILS AND GROUNDWATER

The topography of the Nanny Delvin River Basin is relatively flat. The highest ground is in the centre of the River Basin around Garristown (elevation 188m OD). The lowest points are along the Irish Sea coastline and estuaries.

The geology of the area consists of sedimentary limestones and sandstones of Lower to Middle Carboniferous age interbedded with calcareous shales. These are overlain by a variety of rocks and soft alluvial deposits and glacially deposited tills including boulder clay, kames and eskers, most of which were deposited by melting glaciers. There are many geological fault lines throughout the River Basin where slippage could occur.

There are a variety of aquifers present within the River Basin including unconsolidated gravels / sands / silts and bedrock aquifers. These groundwater bodies vary from Karstic in...
Skerries and Bettystown, productive fissured bedrock in Lusk and poorly productive bedrock in all other areas.

The types of sub-soil within the River Basin derived from the surface geology. These sub-soils are predominantly overlain by shaly limestone, basalt and granite from a cover of deep poorly drained minerals e.g. under the River Nanny Estuary. There are peaty sub-soils in some areas.

Further details on the topography, geology, soils and groundwater in the Nanny-Delvin River Basin is available in the FEM-FRAMS documents on www.floodinfo.ie.

2.3 LAND USE AND LAND MANAGEMENT

The 2011 census data held by the Central Statistics Office (CSO, 2011) show a total population for the Eastern CFRAM Study Area of approximately 1.83 million, of which 1.18 million are in County Dublin and 0.5 million in Dublin City. The 2011 census recorded Swords (one of the most densely populated areas within the eastern region, with a population of 36,924) as having increased by 12% in population since 2006 (CSO, 2011). Fingal had the fastest growth rate of the Dublin local authority areas (2006-2011), with 40% of the population growth within the Dublin region recorded in Fingal.

The Eastern CFRAM Study Area is the most highly urbanised basin district in Ireland, with discontinuous urban fabric covering 6% of the area, which includes the greater Dublin area. Agricultural lands comprise over 70% of the area with the majority used for pasture (55%) as well as large areas of arable land. Peat bogs also comprise a relatively large portion of the area, covering around 7% of the land area.

Increases in population can also pose development pressures resulting in changes in land use. Data from the 2000-2006 CORINE database showed an increase in urbanisation in the order of 40% with urban development increasing from 56km$^2$ to 79km$^2$. Population increase and associated urbanisation within the Nanny-Delvin River Basin is centralised around Swords, Balbriggan and Ashbourne however there are a number of other urban settlements within the catchment with growth rates well above the national average.

Areas covered by built development such as urban centres and transport infrastructure occupy approximately 7.5% of the Nanny-Delvin River Basin with the remaining area covered by forest and semi-natural habitat, water bodies and wetland areas.

In future years pasture is likely to remain the dominant land use, although the pattern of use may become more or less intensive. Other changes that are likely to occur include increased development and urbanisation, which may reduce the proportion of land in agricultural use. Further detail on land use and land use management in the Nanny-Delvin River Basin is available in the FEM-FRAMS documents on www.floodinfo.ie.

2.4 HYDROLOGY

The Nanny-Delvin River Basin comprises a group of river catchments and coastline. The area is bounded by the River Boyne to the north and west, the Tolka and Santry Rivers to the south and by the Irish Sea to the east. All watercourses in the River Basin flow to the Irish Sea either directly or via estuaries, as follows:

- Four watercourses, namely the, the Ward River, the Broadmeadow River, the Lissenhall Stream and the Turvey River flow to the Irish Sea via Malahide Estuary.
- Three watercourses, namely the, the Mayne River, the Sluice River and the Gaybrook River flow into the Irish Sea via Baldoyle Estuary.
− Six watercourses, namely, the Ballyboghill River, the Corduff River, the Baleally Stream, the Bride Stream, the Jone’s Stream and the Rush West Stream flow to the Irish Sea via Rogerstown Estuary.

− Ten watercourses, namely, the Bracken River, the Delvin River, the Nanny River, the Rush Town Stream, the St. Catherine’s Stream, the Rush Road Stream, the Mill Stream, the Balbriggan North Stream, the Mosney Stream and the Brookside Stream flow directly to the Irish Sea.

Within the Nanny-Delvin River Basin the OPW has implemented and maintains the Broadmeadow and Ward Arterial Drainage Scheme and the Matt Arterial Drainage Scheme, completed by the OPW during the 1960’s, under the 1945 Arterial Drainage Act. The OPW continues to have statutory responsibility for inspection and maintenance of the Scheme, which includes much of the main channels and a large number of designated tributaries. The primary focus of arterial drainage schemes is not for flood relief but for the improvement of agricultural land. Whilst not intended as a flood alleviation scheme the arterial drainage works have undoubtedly reduced the fluvial flood risk in certain parts of the Nanny-Delvin River Basin.

Drainage Districts represent areas where the Local Authorities have responsibilities to maintain watercourse channels and therefore contribute to maintaining the existing regime. In relation to the seven Drainage Districts located within Nanny-Delvin River Basin, none are located directly on the key watercourses where fluvial and coastal flood risk is being considered within Ireland’s first cycle assessment under the Floods Directive.

Full details of the methodology, datasets used and outcomes of the hydrological analysis for the Eastern CFRAM Study Area can be found at www.floodinfo.ie.

2.5 FLOOD HISTORY

Historically there have been a number of areas prone to fluvial and/or tidal flooding within the Nanny-Delvin River Basin. The main source of information on historic floods is the OPW National Flood Hazard Mapping website, as available at www.floodinfo.ie, which provides an abundance of historic flood information throughout Ireland. A record of at least 141 historic flood events in the FEM-FRAMS study area since the 1940’s was available in GIS (MapInfo) layer. Historic flood reports, including those on the flooding in summer 2008, were also received from FCC, MCC and from a number of organisations, websites and individuals. Information on the August/September 2008 flooding in the study area was collected during the defence asset field survey.

The most ‘significant’ flooding events in the study area are listed in Table 2 2.

The major flood events in the last 30 years were the August 1986 (Hurricane Charlie), November 2000 and November 2002, which all resulted in considerable flood damage in the study area. The highest recorded tidal levels in Dublin Bay occurred in February 2002, resulting in tidal damage to properties along the Fingal and Meath coast.

Information on these past floods, such as flood flows, levels, depths, extents and mechanisms, has been used as appropriate in the CFRAM Programme to inform the preparation of the flood maps and Plans, where such information has been available at the relevant stage of the Programme and has been considered adequately reliable.
Table 2.2  Significant recent fluvial and Tidal flood events within the study area

<table>
<thead>
<tr>
<th>Flood Event Date</th>
<th>Main Flood Mechanism</th>
<th>Rivers/Coast Affected</th>
<th>Areas Affected:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1924*</td>
<td>Tidal</td>
<td>Coastal</td>
<td>Coastal area of Fingal and Meath counties</td>
</tr>
<tr>
<td>December 1954</td>
<td>Fluvial</td>
<td>Nanny River</td>
<td>Washed away Drogheda Bridge</td>
</tr>
<tr>
<td>November 1982</td>
<td>Fluvial</td>
<td>Ward River, Broadmeadow River, Mill Stream</td>
<td>Swords, Malahide, Skerries</td>
</tr>
<tr>
<td>August 1986</td>
<td>Fluvial</td>
<td>Broadmeadow River, Ward River, Mill Stream, Nanny River</td>
<td>Swords, Skerries, Balbriggan, Duleek</td>
</tr>
<tr>
<td>June and October 1993</td>
<td>Fluvial</td>
<td>Mayne River, Nanny River</td>
<td>Balgriffen, Duleek</td>
</tr>
<tr>
<td>February 2002</td>
<td>Tidal</td>
<td>Ward River, Mayne River, Turvey River, Sluice River</td>
<td>Swords, Portmarnock, Maynetown, Skerries, Portrane, Bettystown, Malahide, Rush</td>
</tr>
<tr>
<td>October/November 2002</td>
<td>Fluvial</td>
<td>Ward River, Sluice River, Mill Stream, Ballyboghil River</td>
<td>Portmarnock, Swords, Malahide, Skerries, Ballyboghil, Donabate, Portrane, Rush, Balbriggan</td>
</tr>
<tr>
<td>November 2000/November 2004</td>
<td>Fluvial/tidal</td>
<td>Sluice River, Brooks Stream, Mayne River</td>
<td>Bettystown, Rush, Skerries</td>
</tr>
<tr>
<td>August 2008</td>
<td>Fluvial/fluvial</td>
<td>Sluice River, Hazelbrook Stream, Gaybrook Stream near Swords, Corduff Stream</td>
<td>Lusk, Ashbourne, Malahide, Swords, Kinsaley Village</td>
</tr>
<tr>
<td>November 2014</td>
<td>Fluvial</td>
<td>Broadmeadow &amp; Ward – Channel C1/7</td>
<td>Ashbourne</td>
</tr>
</tbody>
</table>

*Note: The Dublin Coastal Flooding Protection Project Final Report (2005) has reported this extreme tidal even in 1924 whereas the Mornington District Surface Water & Flood Protection Scheme Final Preliminary Report (2004) has reported this anecdotal event in 1922.

2.6  EXISTING FLOOD RISK MANAGEMENT MEASURES

2.6.1  Ashbourne Flood Relief Scheme
The Ashbourne Flood Relief Scheme was initiated in 2015 following major flooding in November 2014. It is currently at construction stage, and is expected to be completed in 2018. The Scheme, which comprises of the construction of an overflow weir to divert flow to the Broadmeadow River and the improvement of channel and culvert capacity along channel C1/7 of the Broadmeadow and Ward Scheme, is expected to provide protection against a 100-Year flood (1% Annual Exceedance Probability) for 69 properties against flooding from channel C1/7 of the Broadmeadow and Ward Scheme.

2.6.2  Duleek Flood Relief Scheme
The Duleek Flood Relief scheme was initiated in 1995 and was constructed from 1997 to 1998. The Scheme, comprises flood defence walls and embankments along the Nanny River and Paramadden stream and a storm water pumping station, provides protection against a 100-Year fluvial flood (1% Annual Exceedance Probability) for 88 properties.

2.6.3  Skerries AFA
The FEM-FRAMS was initiated in 2008 and included assessment of the Skerries area. A flood risk assessment was completed and a flood relief scheme proposed for the AFA. The Scheme, which comprises, construction of hard defences (embankments & flood walls),
culvert removal and the upgrade of three access bridges, is expected to provide protection against an estimated 100-Year fluvial flood (1% Annual Exceedance Probability) and a 200-Year flood (0.5% Annual Exceedance Probability) tidal event for 61 properties.

2.6.4 Laytown, Bettystown & Coastal Areas AFA and Minor Flood Relief Works
The FEM-FRAMS was initiated in 2008 and included assessment of Laytown, Bettystown and accompanying coastal areas. A flood risk assessment was completed and a flood relief scheme proposed for the Laytown area. The Scheme, which comprises, construction of hard defences (embankments & flood walls), is expected to provide protection against an estimated 100-Year fluvial flood (1% Annual Exceedance Probability) and a 200-Year flood (0.5% Annual Exceedance Probability) tidal event for 11 properties.

In addition to the works identified under the FEM-FRAMS a culvert was replaced on the Brookside Stream in Bettystown.

2.6.5 Ratoath AFA and Minor Flood Relief Works
The FEM-FRAMS was initiated in 2008 and included assessment of the Ratoath area. A flood risk assessment was completed and a flood relief scheme proposed for the AFA. The Scheme, which comprises of improving channel conveyance, is expected to provide protection against an estimated 100-Year fluvial flood (1% Annual Exceedance Probability) for nine properties.

However the measure identified has a BCR below unity and a detailed assessment of the costs is recommended to determine if an economically viable measure may exist that could justify the progression to full project level assessment.

The Ratoath Minor Flood Relief Works involved replacement of a culvert along a tributary, identified by the FEM-FRAMS, within the Ratoath AFA.

2.6.6 Rowlestown Minor Flood Relief Works
The Rowlestown Minor Flood Relief Works, identified by the FEM-FRAMS, was completed by the OPW in 2013. Further study developed the preliminary pilot study option and updated modelling and mapping. The Scheme, that comprises spillway construction, embankment stability works and culvert improvements, will provide protection to the Q50 Standard of Protection for three properties against flooding from an artificial watercourse that supplies a mill.

2.6.7 Rush AFA
The FEM-FRAMS was initiated in 2008 and included assessment of the Rush area. A flood risk assessment was completed and a flood relief scheme proposed for the AFA. The Scheme, which comprises, improvement of channel conveyance together with construction of hard defences (embankments & flood walls), is expected to provide protection against an estimated 100-Year fluvial flood (1% Annual Exceedance Probability) for 27 properties.

However the measure identified has a BCR below unity and a detailed assessment of the costs is recommended to determine if an economically viable measure may exist that could justify the progression to full project level assessment.
2.6.8 Arterial Drainage Schemes and Drainage Districts

The following Arterial Drainage Schemes and Drainage Districts have been completed, and are maintained by the OPW or local authority respectively, in the Nanny-Delvin RBD.

- Broadmeadow & Ward ADS
  - Unit of Management (Hydrometric Area): 08
  - Scheme Name: Broadmeadow and Ward
  - Years of Works: Started 1961 Completed 1964
  - Length of Channel: 158 Km
  - Length of Embankment: 0 Km
  - Benefitting Area (km$^2$): 29.81

- Matt ADS
  - Unit of Management (Hydrometric Area): 08
  - Scheme Name: Matt
  - Years of Works: Started 1964 Completed 1965
  - Length of Channel: 13 Km
  - Length of Embankment: 0 Km
  - Benefitting Area (km$^2$): 1.91

- Ward DD
- Curragha DD
- Garristown & Delvin DD
- Bartramstown DD
- Nanny DD
- Nanny Upper DD and
- Mornington DD

2.6.9 Minor Works

The Minor Flood Mitigation Works and Coastal Protection Scheme (the 'Minor Works Scheme') is an administrative scheme introduced in 2009 and operated by the OPW under its general powers and functions to provide funding to local authorities to enable the local authorities, to address qualifying local flood problems with local solutions.

Under the scheme, applications from local authorities are considered for projects that are estimated to cost up to €750,000 in each instance. Funding of up to 90% of the cost is available for approved projects, with the balance being funded by the local authority concerned. Local authorities submit funding applications in the prescribed format, which are then assessed by the OPW having regard to the specific technical, economic, social and environmental criteria of the scheme, including a cost benefit assessment. With regard to the latter, proposals must meet a minimum benefit to cost ratio of 1.35 or 1.5 : 1 (depending on cost) in order to qualify. Full details are available on www.opw.ie

By the end of 2017, over 650 applications for flood relief works under the Minor Works Scheme have been approved since the inception of the Scheme in 2009. Details of the Scheme and works for which funding under the Scheme have been approved are available from the OPW Website: http://www.opw.ie/en/floodriskmanagement/operations/minorfloodworkscoastalprotectionscheme/
3 PRELIMINARY FLOOD RISK ASSESSMENT

3.1 INTRODUCTION
The Preliminary Flood Risk Assessment (PFRA) was a national screening exercise, based on available and readily-derivable information, to identify areas where there may be a significant risk associated with flooding.

The PFRA in Ireland was finalised in December 2011, following public consultation. A summary of how the PFRA was undertaken is provided in Appendix C.

3.2 OUTCOMES OF THE PFRA
The OPW designated 300 AFAs around Ireland, informed by the PFRA, the public consultation outcomes and the Flood Risk Reviews (further details available in Appendix C of this Plan and from the OPW website: www.floodinfo.ie. The AFAs were the focus of the CFRAM Studies and parallel detailed studies.

A list of all AFAs is provided in Appendix C of the Report on the Designation of the Areas for Further Assessment (OPW, 2012). Table 3.1 identifies the AFAs that are within the area covered by this Plan, and the sources of flood risk that were deemed to be significant for each AFA, which are also shown in Figure 3.1.

Table 3.1 List of the AFAs within the Nanny-Delvin River Basin

<table>
<thead>
<tr>
<th>ID No.</th>
<th>COUNTY</th>
<th>NAME</th>
<th>SOURCE(S) OF FLOOD RISK</th>
</tr>
</thead>
<tbody>
<tr>
<td>80052</td>
<td>Meath</td>
<td>Ashbourne</td>
<td>Fluvial</td>
</tr>
<tr>
<td>80053</td>
<td>Dublin</td>
<td>Balbriggan</td>
<td>Fluvial</td>
</tr>
<tr>
<td>70031</td>
<td>Meath</td>
<td>Bettystown</td>
<td>Fluvial / Tidal</td>
</tr>
<tr>
<td>80055</td>
<td>Dublin</td>
<td>Donabate</td>
<td>Fluvial / Tidal</td>
</tr>
<tr>
<td>80056</td>
<td>Meath</td>
<td>Duleek</td>
<td>Fluvial</td>
</tr>
<tr>
<td>80067</td>
<td>Meath</td>
<td>Gormanston</td>
<td>Fluvial / Tidal</td>
</tr>
<tr>
<td>80057</td>
<td>Dublin</td>
<td>Lusk</td>
<td>Fluvial</td>
</tr>
<tr>
<td>80058</td>
<td>Dublin</td>
<td>Oldtown</td>
<td>Fluvial</td>
</tr>
<tr>
<td>80059</td>
<td>Dublin</td>
<td>Portrane</td>
<td>Tidal</td>
</tr>
<tr>
<td>80060</td>
<td>Meath</td>
<td>Ratoath</td>
<td>Fluvial</td>
</tr>
<tr>
<td>80061</td>
<td>Dublin</td>
<td>Rush¹</td>
<td>Tidal</td>
</tr>
<tr>
<td>80062</td>
<td>Dublin</td>
<td>Skerries</td>
<td>Fluvial / Tidal</td>
</tr>
<tr>
<td>80063</td>
<td>Dublin</td>
<td>Staffordstown/Turvey</td>
<td>Fluvial / Tidal</td>
</tr>
<tr>
<td>80064</td>
<td>Dublin</td>
<td>Swords</td>
<td>Fluvial / Tidal</td>
</tr>
</tbody>
</table>

¹Fluvial flooding was not identified under the PFRA as a potentially significant source of flood risk for the Rush AFA; however, it was considered in the FEM-FRAMS for this community and is included in this Plan.
Figure 3.1: Map of the AFAs within the Nanny-Delvin River Basin

It should be noted that the FEM-FRAMS pre-dated the outcomes of the PFRA, and so other areas were modelled and mapped in the study that were not subsequently designated as AFAs by the PFRA. Reporting on these additional areas is available in the appropriate FEM-FRAMS reports but is not included in this Plan.

3.3 FURTHER INFORMATION

The Main Report on the PFRA, the Report on the Designation of the Areas for Further Assessment and a number of technical reports are available from the OPW website (www.floodinfo.ie). These reports describe the process followed in the first cycle of the PFRA, describe how the AFAs were designated and provide a full national list of the AFAs.

The PFRA will be reviewed as required under the relevant legislation. It is anticipated that the review of the PFRA will consider and support a range of issues in more detail than in the first cycle of the implementation of the 'Floods' Directive, and other issues that were not possible to consider in the first cycle given the information that was available or readily-derivable at the time. Such issues may include:

- Rural and dispersed flood risk: The CFRAM Programme has focused on communities at potentially significant flood risk (the AFAs) where the risk was understood to be concentrated and where it is more likely that viable measures could be identified. In the second cycle, it is foreseen that there will be a greater level of assessment of rural and dispersed risk.

- The potential impacts of climate change: The OPW has supported research commissioned by the EPA to investigate potential impacts of climate change on extreme rainfall patterns and hence on flood flows. This should support future assessments of potential future changes in flood risk.
Critical Infrastructure: Assets that are critical to normal societal function and that may be at risk from flood events need to be identified. This will enable assessments of the potential 'knock-on' effects for other assets and services, such that appropriate risk management measures can be implemented to help ensure Ireland's resilience to severe flood events.

The outcomes of the PFRA undertaken in the second cycle of the 'Floods' Directive implementation, which will include environmental screening / assessments as appropriate, will inform the need for further detailed assessment and flood mapping and the review of the Plans.
4 PUBLIC AND STAKEHOLDER CONSULTATION AND ENGAGEMENT

4.1 OVERVIEW
Public and stakeholder engagement is a critical component to the process of developing a sustainable, long-term strategy for flood risk management. This engagement is necessary to ensure that flood risk management measures are suitable and appropriate, as well as technically effective.

This section describes the public and stakeholder consultation and engagement that has been undertaken under the CFRAM Study for the Nanny-Delvin River Basin in the development of this Plan. An overview of the CFRAM consultation stages and structures is provided diagrammatically in Figure 4.1.

4.2 AVAILABILITY OF PROJECT INFORMATION
A website for the National CFRAM Programme and the PFRA was established in 2011, and a Project-specific website was developed upon inception of the FEM-FRAMS Project. Relevant information from these websites is now available from the OPW website (www.floodinfo.ie) which provides information on the 'Floods' Directive and SI Nos. 122 of 2010 and 495 of 2015, the PFRA and the CFRAM Programme, and provides access to view and download reports, the Plans and other project outputs.

Information on OPW flood relief schemes and other, parallel projects is provided through the OPW Website, www.opw.ie.

Flood maps prepared through the CFRAM Programme and through other projects are available through the OPW website (www.floodinfo.ie).

4.3 STAKEHOLDER ENGAGEMENT

4.3.1 The CFRAM Steering and Progress Groups

4.3.1.1 The National CFRAM Steering Group
The National CFRAM Steering Group was established in 2009, and met on nine occasions to the date of publication of this Plan. It was established to provide for the engagement of key Government Departments and other state stakeholders in guiding the direction and the process of the implementation of the 'Floods' Directive, including the National CFRAM Programme. The membership of this Group is provided in Appendix D.1.

The National CFRAM Steering Group reported, through the OPW, to the Inter-Departmental Coordination Group (now the Interdepartmental Flood Policy Co-ordination group).
Figure 4.1: Overview of the CFRAM Consultation Stages and Structures

- Preliminary Flood Risk Assessment
  - National Public Consultation: Aug - Nov 2011

- Eastern CFRAM Project Launch
  - Public Open Evening, January 2012

- Flood Maps
  - National CFRAM Public Consultation: November – December 2015

- Flood Risk Management & SEA Objectives
  - Consultation (Independent Poll) on Objective Weightings: April - May 2015

- Flood Risk Management Plans
  - National Public Consultation: July – Dec 2016
4.3.1.2 Eastern Project Steering Group
A Project Steering Group was established for the Eastern CFRAM Project, which includes the Nanny-Delvin River Basin, in 2011. This Group, which included senior representatives of the members, provided for the input of the members to guide the CFRAM Programme and act as a forum for communication between the CFRAM Programme and senior management of key stakeholders. The Project Steering Group typically met twice a year.

The membership of this Group is provided in Appendix D2.

4.3.1.3 Eastern CFRAM Project Progress Group
A Project Progress Group was established for the Eastern CFRAM Project in 2011. This group was a working group that supported the Project Steering Group and met approximately every six weeks. The Group was established to ensure regular communication between key stakeholders and the CFRAM Project and to support the successful implementation of the Project.

The membership of this Group was largely the same as for the Eastern CFRAM Project Steering Group.

4.3.2 Stakeholder Consultation Groups
Stakeholder Groups were formed at national and regional level to provide an opportunity for input by non-governmental stakeholder groups to participate in the 'Floods' Directive and CFRAM processes.

4.3.2.1 National CFRAM Stakeholder Group
The National CFRAM Stakeholder Group was established in 2014, and met three times to the date of publication of this Plan. It was established to provide for the engagement of key national non-governmental stakeholder organisations at key stages in the process of the implementation of the National CFRAM Programme. Members of the organisations listed in Appendix D.3 were invited to meetings of this Group.

4.3.2.2 Eastern Project (Regional) CFRAM Stakeholder Group
The Eastern CFRAM Stakeholder Group was established in 2012, and met on five occasions to the date of publication of this Plan. It was established to provide for the engagement of local non-governmental stakeholder organisations at key stages in the process of the implementation of the Eastern CFRAM Project. The organisations listed in Appendix D.4 attended meetings of this Group, although many other organisations were also invited to attend.

4.3.3 Coordination with the Implementation of the Water Framework Directive
The Water Framework Directive (WFD) is concerned with the protection of the ecological quality of our waters. While the 'Floods' Directive is concerned with the protection of people and society from our waters, both Directives are concerned with water and river basin management, and hence coordination is required between the two processes to promote integrated river basin management, achieve joint benefits where possible and address potential conflicts.

There has been, and will continue to be, coordination with the authorities responsible for the implementation of the WFD through a range of mechanisms, including bi-lateral meetings and cross-representation on various management groups, as set out in Section 6.5.
4.4 PUBLIC CONSULTATION AND ENGAGEMENT

In addition to the structured engagement with relevant stakeholders through the Steering, Progress and Stakeholder Groups, the public have also been given the opportunity and encouraged to engage with the implementation of the 'Floods' Directive and the CFRAM process. These engagement and consultation steps are set out in Figure 4.1, and are described in the sub-sections below.

4.4.1 Consultation on Preliminary Flood Risk Assessment

The public and stakeholder consultation and engagement in the Preliminary Flood Risk Assessment (PFRA) is described in Section 3.

4.4.2 Launch of the Eastern CFRAM Project

The Eastern CFRAM Project commenced in June 2011, and a public open evening event was held in The Red Cow Hotel on 26/01/2012 from 6 pm onwards.

The public open evening was attended by approximately 60 people. The majority of the attendees were homeowners and landowners who have experienced flooding of their homes and lands. The event was also attended by elected members and members of non-governmental environmental organisations.

Many of the attendees at the open evening had seen and/or heard newspaper and radio advertisements on the day of the event. Some had been informed of the event by their local elected representative or had seen the event advertised on local authority websites.

4.4.3 Consultation on Flood Maps

The preparation of the flood maps, which serve a range of functions (see Section 5.3) is the second key requirement of the 'Floods' Directive. The FEM-FRAMS had previously produced flood hazard mapping which was consulted upon with the public under the National CFRAM Programme through local Public Consultation Days and a national statutory consultation.
4.4.3.1 Public Consultation Days

The OPW identified that effective consultation and public engagement would require local engagement at a community level, and hence determined that Public Consultation Days (PCDs) would be held in each AFA (where possible and appropriate) to engage with the communities at various stages of the Projects, including during the production of the flood maps.

The PCDs were advertised locally in advance, and were held at a local venue in the community during the afternoon and early evening. OPW, Local Authority and RPS staff were present to explain the maps that were displayed in the venue and answer any questions on the maps and the CFRAM process, and to collate local information to refine or confirm the maps.

4.4.3.2 National Flood Map Consultation

The Government considered it appropriate to stipulate in SI No. 122 of 2010 that a national consultation exercise should be undertaken\(^5\). The consultation on the flood maps for all areas, including those developed through the Pilot CFRAM Projects and other Projects, was launched in November 2015. Observations and Objections submitted through the consultation process have been assessed and the flood maps are being amended accordingly, where appropriate.

4.4.4 Consultation on Flood Risk Management Objectives

The Flood Risk Management Objectives of the National CFRAM Programme define what the process is trying to achieve in terms of reduction of flood risk, and where possible provide wider benefits, to human health, the environment, cultural heritage and economic activity. The Objectives are described further in Section 1.4.

The OPW considered it appropriate to publicly consult on the proposed flood risk management Objectives, and launched a public consultation in October 2014. Submissions received were duly considered and amendments made to the Objectives where appropriate. The Objectives were finalised in March 2015.

A Multi-Criteria Assessment (MCA) is used as part of the process for assessing potential options for reducing or managing flood risk for each AFA. The MCA and this process are described in Section 7 herein. The MCA makes use of weightings to rank the importance of the Objectives. The OPW considered it appropriate to consult on the weightings that would be assigned to each Objective, and commissioned an independent poll of over 1000 members of the public on the weightings through a structured questionnaire. The results of this poll were analysed by UCD\(^6\), and the weightings for each of the Objectives then set.

4.4.5 Consultation on Draft Plans

The Draft Plan for the Nanny-Delvin River Basin as published for the purposes of public consultation on 22/09/16. Observations from the public and from relevant Councils were to be submitted to the OPW by 02/12/16 and 23/12/16 respectively. Presentations were made to Councils during the public consultation period.

In parallel and complementary to the formal public consultation process, a series of PCDs, similar to those held for the consultation on the flood maps (Section 4.4.3 above), were held to engage locally and directly with the community and provide people with opportunity to

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\(^5\) Sections 12, 13 and 14, SI No. 122 of 2010

\(^6\) (UCD, 2015): Weighting the Perceived Importance of Minimising Economic, Social and Environmental/ Cultural Risks in Flood Risk Management, University College Dublin, 2015
discuss and fully understand the Draft Plans. A total of 143 elected representatives and members of the public attended.

The observations submitted to the OPW through the public consultation processes were considered and the Plans amended accordingly where appropriate. A synopsis of the observations submitted and amendments made to the Plan arising from the observations is available from the OPW website (www.floodinfo.ie).
5  FLOOD HAZARD AND RISK ASSESSMENT

A general description of flooding and flood risk has been provided in Section 1.2 of this Plan. This Section describes the assessment processes followed under the CFRAM Programme to determine the extent and nature of flooding in the AFAs within the Nanny-Delvin River Basin, and the resultant flood risk. A description of these processes and outcomes for other projects is provided in the relevant project reports (see Section 1.3.5).

To ensure consistency in approach where required, a National Technical Coordination Group was established under the National CFRAM Programme to bring together all of the Consultants with the OPW, and other organisations as necessary, to determine common standards and methodologies.

5.1 HYDROLOGICAL ANALYSIS

The hydrological analysis for the Nanny-Delvin River Basin was completed under the FEM-FRAMS and it was not updated for the purposes of developing the Plan for the Nanny-Delvin River Basin.

5.2 HYDRAULIC MODELLING

The hydraulic analysis for the Nanny-Delvin River Basin was completed under the FEM-FRAMS and it was not updated other than where the public consultation process on the flood maps highlighted particular areas where reviews were necessary, for the purposes of developing the Plan for the Nanny-Delvin River Basin.

5.3 FLOOD HAZARD MAPPING

The flood maps serve a range of functions:

Public Awareness:
Flood maps, and in particular flood extent maps and flood depth maps, inform the public, home owners, business owners, landowners and farmers, landlords and tenants about the likely risk of flooding in their areas, including the likely frequency of occurrence and depth. This knowledge can help people make decisions and prepare for flood events to reduce the potential impacts of flooding.

Planning & Development Management:
The flood maps should inform the Spatial Planning processes and support Planning Development decisions to avoid unnecessary development in flood-prone areas, in line with the 2009 Guidelines on The Planning System and Flood Risk Management7.

Emergency Response Management:
The flood maps should aid in the preparation and implementation of flood event emergency response plans, by providing information on areas prone to flooding, the potential depths of flooding and what might be at risk in the event of a flood.

Flood Risk Management Decision Support:
Flood maps, and in particular various flood risk maps, are intended to be used as a decision support tool in the identification, planning, development, costing, assessment and

7 DCHPLG/OPW 2009: Guidelines on The Planning System and Flood Risk Management
prioritisation of flood risk management options, such as flood defence schemes, flood warning systems, public awareness campaigns etc.

Based on extensive survey and analysis of river flows and the development of computer models to determine how flooding occurs, a range of fluvial and coastal flood hazard maps has been produced for each AFA within the Nanny-Delvin River Basin.

Flood hazard maps include maps of the projected extent of flooding for a range of flood events of different severity or probability, and the depth of flooding that would be expected for these events. The range of flood event probabilities include frequent events that may have recently been observed, up to very extreme events that may not have been previously seen, but which could occur at some point in the future.

The mapping also provides tabulated information on water level and flow for key points along the watercourses during the mapped flood event probabilities. These key locations include AFA boundaries / centres, river confluences, gauging stations along the watercourses and other locations approximately every 5km along a modelled watercourse. Model flows were validated against the estimated flows at hydrological estimation check points to determine if the model is well anchored to the hydrological estimates. The comparisons indicated that the models were generally well anchored to the hydrological estimates with very good correlation during the high frequency events where little flow is lost to overland flow. Any differences there may be between model flows and hydrological estimates during the medium to low frequency events can be attributed to the loss of flow from the watercourse to the floodplain. There is a change in the shape of the hydrograph due to attenuation, the higher return period hydrographs become longer as the attenuated flow makes its way through the system.

Flood maps represent the current understanding of areas prone to flooding and the nature of the flood in a given area for a flood event of a given probability. The maps therefore need to be updated on an ongoing basis to reflect changes in the physical environment, the availability of new information (e.g. after a major flood has occurred, new calibration data is captured or where improved hydrological / flood flow estimates are available), or for other reasons that could indicate that improvements in map accuracy can be achieved. Subsequent to the completion of FEM-FRAMS, a number of updates were made to take account of such changes in the following locations –

- Cuckoo Stream (Mayne) - Dublin Airport Authority provided information subsequent to the FEM-FRAMS, which was reviewed by OPW and incorporated into the hydraulic model and updated mapping produced.
- Gaybrook Stream: OPW updated the mapping following the completion of works at Aspen by Fingal County Council.
- Rowlestown: OPW updated the mapping following the completion of works at Rowlestown by OPW.

The mapping produced by the FEM-FRAMS was included in the consultation on the draft CFRAM hazard mapping that was undertaken during 2015 as described in Section 4.4.3. Following receipt of an observation during the consultation, the flood maps, including the risk maps (see below), for Skerries are currently under review and will be updated as appropriate following this review.

The final flood hazard mapping for the Nanny-Delvin River Basin can be found at www.floodinfo.ie.
The flood maps will continue to be reviewed on an ongoing basis as new information becomes available (e.g. in relation to future or recent floods), with a formal review to be completed by the end of 2019 (see Section 8.4).

5.4 FLOOD RISK ASSESSMENT AND MAPPING

The Flood Risk Analysis is undertaken to assess and map the existing and potential future flood risk within the Study Area.

The analysis focuses on the receptors at risk from flooding and are categorised as social (including risk to people), environmental, cultural heritage or economic receptors. The risk to a receptor can be affected by its location within the flood extent or the proportion of the receptor within the flood extent, the depth to which it floods, the velocity of the water adjacent to the receptor and the receptors’ vulnerability to flooding.

The clearest way to present the flood risk within an area being studied is through flood risk maps. The flood risk maps show the potential consequences of flooding. These maps detail the source of the risk and the receptors at risk. The flood risk maps include:

- Social Risk map
- Environmental Risk map
- Cultural Heritage Risk map
- Economic Risk map
- Economic Activity map
- Number of Inhabitants map
- Economic Risk Density map

Receptors were determined to be at risk from flooding if they were located within the flood extent, or with any part of their footprint intersecting with the flood extent. The degree of flood risk within buildings depends on the internal floor levels in comparison to simulated flood levels; internal floor levels were established by adjusting topographical ground levels outside the building, by allowance for threshold level change (based on the number of steps visible externally).

The risk mapping presents risk to number of inhabitants, environment and types of economic activity and these were also consulted on alongside the draft hazard mapping for each AFA. The final flood risk mapping for the Nanny-Delvin River Basin can be found at www.floodinfo.ie.

5.5 CONSIDERATION OF FUTURE CHANGES

It is likely that climate change will have a considerable impact on flood risk in Ireland.

- Sea level rise is already being observed and is projected to continue to rise into the future, increasing risk to our coastal communities and assets, and threatening damage to, or elimination of, inter-tidal habitats where hard defences exist (referred to as ‘coastal squeeze’).
- It is projected that the number of heavy rainfall days per year may increase, which could lead to an increase in both fluvial and pluvial (urban storm water) flood risk, although there is considerable uncertainty associated with projections of short-duration, intense rainfall changes due to climate model scale and temporal and spatial down-scaling issues.
- The projected wetter winters could give rise to increased fluvial flood risk and groundwater flood risk associated with turloughs.
These potential impacts could be significant for Ireland, where most of the main cities are on the coast and many of the main towns are on large rivers.

While there is considerable uncertainty associated with most aspects of the potential impacts of climate change on flood risk, it is prudent to take the potential for change into account in the development of Flood Risk Management policies and strategies and the design of Flood Risk Management measures.

Other changes, such as in land use, farming practices and future development could also have an impact on future flood risk through increased runoff and a greater number of people and number and value of assets within flood prone areas.

The National CFRAM Programme and parallel projects include the assessment of risk for two potential future scenarios; the Mid-Range Future Scenario (MRFS) and the High-End Future Scenario (HEFS). These scenarios include for changes as set out in Table 5.6.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>MRFS</th>
<th>HEFS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extreme Rainfall Depths</td>
<td>+ 20%</td>
<td>+ 30%</td>
</tr>
<tr>
<td>Peak Flood Flows</td>
<td>+ 20%</td>
<td>+ 30%</td>
</tr>
<tr>
<td>Mean Sea Level Rise</td>
<td>+ 500 mm</td>
<td>+ 1000 mm</td>
</tr>
<tr>
<td>Land Movement</td>
<td>- 0.5 mm / year¹</td>
<td>- 0.5 mm / year¹</td>
</tr>
<tr>
<td>Urbanisation</td>
<td>No General Allowance – Review on Case-by-Case Basis</td>
<td>No General Allowance – Review on Case-by-Case Basis</td>
</tr>
<tr>
<td>Forestation</td>
<td>- 1/6 Tp²</td>
<td>- 1/3 Tp² + 10% SPR³</td>
</tr>
</tbody>
</table>

Note 1: Applicable to the southern part of the country only (Dublin – Galway and south of this)
Note 2: Reduction in the time to peak (Tp) to allow for potential accelerated runoff that may arise as a result of drainage of afforested land
Note 3: Add 10% to the Standard Percentage Runoff (SPR) rate: This allows for temporary increased runoff rates that may arise following felling of forestry.

Section 7.3.3 briefly describes how climate change was taken into account in the assessment of flood risk management options, which is detailed further in the relevant project reports.

5.6 COMMUNITIES (AFAS) OF LOW RISK

The FEM-FRAMS identified Areas of Potential Significant Risk (APSRs) based on Local Authority recommendations and knowledge. The APSRs consisted of the towns and villages in the river basin which were previously flooded and for which significant development was anticipated. The PFRA was also completed for the Nanny-Delvin River Basin and the AFAs within the area covered by this Plan were identified through this process. All the areas identified at potential significant risk of flooding by the PFRA were already included in the FEM-FRAMS.

For certain AFAs, more detailed analysis has determined that there is in fact currently a low level of flood risk to the community from rivers and/or the sea. In such cases, the development of flood risk management measures aimed specifically at reducing the risk in such AFAs (i.e., local flood protection schemes) has not been pursued. Some of the River Basin-level measures will however still be relevant and applicable as some infrastructure,
such as roads, may nonetheless be prone to flooding, and land around the AFA may be prone to flooding.

In the Nanny-Delvin River Basin, the level of risk has been determined as being low in the following AFAs:

- Donabate
- Gormanston
- Lusk
- Oldtown
- Portrane
- Staffordstown/Turvey
- Swords.

The FEM-FRAMS also investigated smaller low/very low risk areas (not designated as AFAs in the PFRA) including the following: N2/Hurley crossing (north Ashbourne); Ballyboghil; Coolatrath; Donacarney; Dunshaughlin; Garristown; Gormanston aerodrome; Julianstown; Kentstown; Killeek; Naul; Rowans Little; Skehubble; and Stamullen.

The level of risk in the AFAs where the CFRAM process has determined that there is currently a low level of flood risk will be reviewed, along with all areas, as part of the review of the PFRA (see Section 3.3). This includes AFAs where the current level of risk may be low, but where the level of risk may increase in the future due to the potential impacts of climate change and so action in the future may be required to manage such impacts.

It is important to note that a low level of existing risk does not infer that undeveloped lands around the community are not prone to flooding, only that a limited number of existing properties are prone to flooding. When considering planning and development management, the potential for flooding in undeveloped areas needs to be fully considered for the AFAs where the risk to the existing community is low, as well as for all other communities, in accordance with the Guidelines on the Planning System and Flood Risk Management (see Section 7.4.1.1).

6 ENVIRONMENTAL CONSIDERATIONS

6.1 OVERVIEW

The Plan for the Nanny-Delvin River Basin has been the subject of a Strategic Environmental Assessment (SEA) Screening and an Appropriate Assessment (AA) Screening to determine if the measures proposed in the Plan would require full assessment to meet the requirements of the Irish Regulations transposing the EU SEA and Habitats Directive respectively\(^8\). The outcomes of the SEA Screening are provided in Section 6.3 of this Plan, while the outcomes of the AA Screening are provided in Section 6.4.

It is emphasised that the Plan sets out the strategy, actions and measures that are considered to be the most appropriate at this stage of assessment.

In this context, it should be noted that the SEA Screening and AA Screening undertaken in relation to the Plan are plan-level assessments. The approval / adoption of the Plan has not and does not confer approval or permission for the installation or construction of any physical

\(^8\) SI No. 435 of 2004 (SEA Directive) and SI No. 477 of 2011 (Habitats Directive)
works. EIA and/or AA Screening, and, where so concluded from the screening, Environmental Impact Assessment and / or Appropriate Assessment, must be undertaken in accordance with the relevant legislation where relevant as part of the progression of measures that involve physical works. The body responsible for implementation of such measures (see Section 7) is required to ensure that these requirements will be complied with.

The additional measures in the Nanny – Delvin River Basin FRMP, above and beyond the Fingal East Meath Flood Risk Management Plan (‘FEM FRMP’), are solely Governance & Policy Changes, and these are the only measures to which the Nanny – Delvin River Basin FRMP gives effect.

The environmental assessments set out herein relate to the Plan, and measures set out and proposed under the Plan (see Table 7.4). Flood relief schemes and works proposed or progressed through other projects and plans (see Table 7.5) are not the focus of the environmental assessments of the Plan, but are considered in terms of their in-combination or cumulative effects with the measures set out within the Plan.

### 6.2 ENVIRONMENTAL CONSTRAINTS AND OPPORTUNITIES IN THE NANNY DELVIN RIVER BASIN

The Nanny – Delvin River Basin contains a wealth of features of biodiversity, cultural, social, archaeological and landscape value; and its watercourses, estuaries and coastal waters provide a range of environmental services, including drinking water, fisheries, habitat for flora and fauna, industry and amenity.

Many of the environmental features within the study area (Figure 6.1) are afforded protection under international/national legislation and/or local planning policy. The environmental features located within the floodplains of the study area and at risk from flooding or affected by proposed flood risk management options have been specifically considered during the preparation of the Plan for the Nanny – Delvin River Basin. These include:

- Habitats and species of nature conservation and biodiversity value located within and outside EU-designated Natura 2000 sites (i.e. Special Protection Areas (SPA) and Special Areas of Conservation (SAC)); and nationally important Natural Heritage Areas (NHAs);
- Archaeological sites and features listed on the national Sites and Monuments Records and the Meath and Fingal Records of Monuments and Places; and structures of architectural significance listed on the Meath and Fingal Records of Protected Structures and within Architectural Conservation Areas (Figure 6.2);
- Fisheries within the rivers, estuaries and coastal waters, including designated Shellfish Waters;
- Areas of significant landscape character and scenic value designated under the Meath and Fingal Development Plans; and
- Requirements for the protection and improvement of water quality and the ecological status of water bodies under the EU Water Framework Directive, Bathing Waters Directive and national legislation.

The development of the Plan for the Nanny – Delvin River Basin has incorporated relevant environmental issues, constraints and opportunities within the plan-making process – taking into account the sensitivity and value of relevant environmental features.
6.3 STRATEGIC ENVIRONMENTAL ASSESSMENT

The approach to the SEA of the Plan for the Nanny – Delvin River Basin has drawn from Irish and international best practice guidance. The Plan for the Nanny – Delvin River Basin represents a stand-alone Plan that supplements the existing FEM FRMP with positive governance and policy recommendations. The additional measures in the Plan for the Nanny – Delvin River Basin, above and beyond the FEM FRMP, are solely governance and policy changes, and these are the only measures to which the Plan for the Nanny – Delvin River Basin gives effect. A SEA Screening of these proposed governance and policy measures was undertaken to ascertain if the Plan required full SEA.

The first step of the SEA Screening process was to undertake a pre-screening check using the decision tree from the EPA publication “Development of Strategic Environmental Assessment (SEA) Methodologies for Plans and Programmes in Ireland”. The decision tree is based on a series of administrative questions that allows rapid screening–out of plans and

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programmes that are clearly not going to have an environmental impact, and screening-in of those that definitely do require an SEA.

The outcomes of the pre-screening stage for the Plan for the Nanny – Delvin River Basin are as follows:

- The Plan is subject to preparation and adoption by a national authority, the Office of Public Works (OPW).
- The Plan is required under the Floods Directive, as implemented in Ireland through the European Communities (Assessment and Management of Flood Risks) Regulations 2010 [S.I.122/2010, as amended by S.I.495/2015].
- The Plan is prepared for water management.
- The measures being proposed in the Plan do not have the potential to provide a framework for development consent for projects listed in the EIA Directive. The measures being proposed in the Plan for the Nanny – Delvin River Basin are governance and policy recommendations that will not lead to any development. These measures supplement, but do not replace, the measures in the FEM FRMP from 2011.

This final point would lead to the conclusion that SEA is not required for the Plan of the Nanny – Delvin River Basin.

To ensure that this is the correct decision and that there is no potential for these governance and policy measures to have significant impacts on the environment it was decided to further investigate these proposed options being put forward in this Plan, in case there may be the potential for direct or indirect impacts, or even in-combination or cumulative impacts with the measures currently being implemented from the FEM FRMP from 2011. This second stage of SEA Screening is called the environmental significance screening. The outcomes of this stage can be summarised as:

- The Plan for the Nanny – Delvin River Basin proposes national level, non-structural, governance and policy measures with no specific location or size. These measures generally aim to prevent development within flood zones, and to increase public awareness and resilience to flooding. These measures:
  - Do not set the framework for future development projects.
  - Are non-structural and are unlikely to cause any environmental problems or have any negative environmental effects, including potential cumulative or in-combination negative environmental effects.
  - Supplement the proposals of the FEM FRMP of 2011, but do not replace the original measures.
  - Are unlikely to have any transboundary effects.
  - Are unlikely to have any risks to human health or the environment.
  - Are unlikely to have any negative effects on the local or regional population.
  - Are unlikely to affect any of the special natural characteristics or cultural heritage features in the River Basin.
  - Are unlikely to cause exceedance of any environmental quality standards or limit values.
  - Will not propose the intensification of existing land uses.
  - Will not have any effects on areas or landscapes, which have a recognised national, European Union or international protection status.
As the responsible authority for the Plan for the Nanny – Delvin River Basin, the OPW determined that the Plan does not require SEA. The full SEA Screening Report for the Plan for the Nanny – Delvin River Basin can be found in Volume II.

6.4 APPROPRIATE ASSESSMENT

An Appropriate Assessment (AA) Screening was carried out to test for the likely significance of any impacts of the measures proposed in the Plan for the Nanny – Delvin River Basin on designated European sites. The Screening for Appropriate Assessment for the Nanny – Delvin River Basin FRMP, prepared under the Eastern CFRAM Study, was considered in the context of the European sites identified within the project’s zone of influence, their Qualifying Interests and Special Conservation Interests and any conservation objectives, which have been set. From the findings of the Screening exercise, it was concluded that the proposed Plan:

- Is not directly connected with or necessary to the management of any European site;
- Will not give rise to significant effects on the Qualifying Interests of any European site within the project’s zone of influence, in view of best scientific knowledge and in view of the conservation objectives of those sites.

The European Sites included in AA Screening Search Exercise are shown in Figure 6.2.
6.5 COORDINATION WITH WATER FRAMEWORK DIRECTIVE

The Water Framework Directive (WFD) is concerned with the protection of the ecological quality of our waters. While the 'Floods' Directive is concerned with the protection of people and society from our waters, both Directives are concerned with water and river basin management, and hence coordination is required between the two processes to promote integrated river basin management, achieve joint benefits where possible and address potential conflicts.

6.5.1 Bi-Lateral Meetings

The Department of Housing, Planning and Local Government (DHPLG) is the lead Government Department for the WFD, and the nominated Competent Authority for establishing the environmental objectives and preparing a programme of measures and the River Basin Management Plans. The OPW has held bi-lateral meetings with senior representatives in DHPLG to establish the appropriate methods and approaches to coordination, which were agreed to be primarily through cross-representation on management / governance groups.

For the second cycle of implementation of the WFD, the Environmental Protection Agency (EPA) has been defined as the Competent Authority for undertaking the characterisation and reporting of same to the Commission, and is also required to assist the DHPLG in its assigned duties. The OPW has held bi-lateral meetings with the EPA since 2013 to determine the suitable approaches to the practical aspects of implementation, which were agreed to be through cross-representation on management / governance groups, and ongoing bi-lateral meetings. These meetings have included workshops to share relevant data.

6.5.2 Cross-Representation on Management Groups

The governance structure for the WFD in Ireland was restructured for the second cycle under SI No. 350 of 2014, with a number of groups subsequently set up in 2014 and 2015.

6.5.2.1 WFD: Water Policy Advisory Committee

The Water Policy Advisory Committee (WPAC) was formally established in 2014 as the 'Tier 1' management committee. Its role is to provide strategic direction and advise the Minister for Housing, Planning and Local Government on the implementation of the WFD.

The OPW is represented on the WPAC to help ensure coordination in the implementation of the WFD and the 'Floods' Directive at a strategic level.

6.5.2.2 WFD: The National Implementation Group

The 'Tier 2' management committee is the National Implementation Group (NIG), which was established in March 2015. The purpose of the NIG is to assist the EPA and DHPLG with the technical and scientific implementation aspects of the WFD to ensure effectiveness, consistency and efficiency. The Group has also been established to provide a mechanism for coordination with the implementation of the 'Floods' Directive.

Working Groups have been established by the NIG to assist with the implementation of certain aspects of the WFD, including characterisation and hydromorphology. A working group on the programme of measures has also been established under the WPAC.

The OPW is represented on the NIG, and also on the characterisation and hydromorphology working groups, to promote coordination on the technical and scientific aspects of mutual relevance in implementation.
6.5.2.3 WFD: Catchment Management Network

The Catchment Management Network was convened to provide a forum for the organisations involved in implementation of the WFD, and other key stakeholders, at the regional and local level, including the local authorities. The Network first met at a launch event and workshop in November 2014, which the OPW attended. The OPW has since continued to engage with the Network to consider the coordination issues in implementation at a local level.

Local Authorities Water and Communities Office

The Local Authority Water and Communities Office (LAWCO) was established in 2015 and is led jointly by Kilkenny and Tipperary County Councils on behalf of the local authority sector. LAWCO’s functions include supporting communities to take action to improve their local water environment and provision of coordination at a regional level across public bodies involved in water management. The OPW has been kept aware of the development of the LAWCO through the WPAC and NIG. This local level of activity may provide a suitable point of coordination for local flood risk management activities such as flood protection works being implemented under the Minor Works Scheme or the promotion of natural water retention measures.

6.5.2.4 ‘Floods’ Directive: Steering and Progress Groups

The EPA are represented on the National CFRAM Steering Group, as described in Section 4.3.1.1 above, and have advised on coordination matters, such as defining Objectives relevant to the WFD (see Section 1.4). EPA representatives and the WFD Project Coordinators (appointed in the first cycle of WFD implementation, and to be replaced by LAWCO officers) are also represented on the Project Steering and Progress Groups as described.

6.5.3 Exchange of Information

Relevant information was exchanged between the Competent Authorities relating the ‘Floods’ Directive and the WFD as necessary.

6.5.4 Coordination on Measures

One of the Flood Risk Management Objectives (Objective 3.a, Table 1.2) is to support the objectives of the WFD. This required an assessment of potential flood risk management measures against the objectives and requirements of the WFD to determine which measures might have a benefit or cause an impact in terms of the objectives of the WFD, varying in scale and duration. In this way, the potential contribution of flood risk management measures towards, or potential impacts on, the objectives of the WFD are embedded into the process for the identification of proposed measures.

Following approval of the Plans, the next stage to progress the proposed flood risk management measures will be to undertake more detailed assessment and design at a project-level, before submitting the proposals for Public Exhibition (under the Arterial Drainage Acts) or planning permission. This assessment will normally include an Environmental Impact Assessment (EIA) and, where necessary, a project-level Appropriate Assessment (AA) in line with the Birds and Habitats Directives.

The assessment at the project-level will also enable a detailed appraisal of the potential impacts of the final measure on the water body hydromorphology, hydrological regime and status to be undertaken including, where necessary (if impacts can not be avoided or mitigated), a detailed appraisal under Article 4(7) of the WFD (derogation related to deterioration caused by new modifications). This will build on the initial work done during the preparation of the Plans.
The work planned by EPA to improve assessment methods for river morphology has the potential to assist in:

− assessing the potential impact of flood management measures on WFD objectives,
− identifying the most appropriate mitigation measures, and,
− supporting decisions on the application of Article 4(7) derogations.

The EPA and OPW will work together to develop technical methods to assist in the assessment of impacts from flood protection schemes.

The OPW is also liaising with the EPA on the potential impact of WFD measures on flood risk, which are typically neutral (no impact), or may have some benefit in reducing runoff rates and volumes (e.g., through agricultural measures such as minimising soil compaction, contour farming or planting, or the installation of field drain interception ponds).

The OPW will continue to work with the EPA and other agencies implementing the WFD to identify, where possible, measures that will have benefits for both WFD and flood risk management objectives, such as natural water retention measures. It is anticipated that this is most likely to be achieved in areas where phosphorous loading is a pressure on ecological status in a sub-catchment where there is also an identified potentially significant flood risk (i.e., an AFA). This coordination will also address measures that may otherwise cause potential conflict between the objectives of the two Directives.

6.6 PROGRESSION OF MEASURES AND ASSESSMENT OF FUTURE WORKS

6.6.1 Approval of the Plan

As set out in Section 6.1 above, the approval / adoption of the Plan has not and does not confer approval or permission for the installation or construction of any physical works.

The progression of any physical measure towards the implementation of flood relief works or a ‘Scheme’ must, where applicable, include EIA and/or AA Screening, and, where so concluded from the screening, Environmental Impact Assessment and / or Appropriate Assessment, in accordance with the relevant legislation, and taking into account new information available at that time (e.g., as available from the Environmental Monitoring Framework and from the www.catchments.ie website). However as discussed earlier, the additional measures in the Nanny – Delvin River Basin FRMP, above and beyond the FEM-FRMP, are solely governance and policy changes, and these are the only measures to which the Nanny – Delvin River Basin FRMP gives effect.

It is not anticipated that any EIA work will be required for the governance and policy measures proposed in the Nanny – Delvin River Basin FRMP. However, to remain aligned with all other CFRAM FRMPs, if EIA were required alternatives to the potential works set out in the Plan must be considered. It is emphasised that the Plan sets out the strategy, actions and measures that are considered to be the most appropriate at this stage of assessment. Any future potential flood relief works or ‘Schemes’ set out in the CFRAM FRMPs will need to be further developed at a local, project level before Exhibition under the Arterial Drainage Acts 1945 and 1995 (OPW managed schemes) or submission for planning approval under the Planning and Development legislation/regulations (Local Authority managed schemes). The project-level assessment of all measures will include the consideration of alternatives, taking into account local information that can not be captured at the Plan-level of assessment, such as ground investigation results and project-level
environmental assessments. The project-level assessment may give rise at that stage to amendment of the proposed works to ensure that the works:

− are viable and fully adapted, developed and appropriate within the local context,
− comply with environmental legislation,
− consider at a project-level of detail the potential impacts and benefits related to the objectives of the Water Framework Directive (see Section 6.5.4)
− provide benefits with regards to other objectives (e.g., water quality, biodiversity) where reasonably possible and viable, such as through the use of natural water retention measures, removing barriers to fish migration or the creation of habitat features.

No measure in the Plan has been considered for, or been subject to an assessment under, the ‘Imperative Reasons of Over-riding Public Interest (IROPI)’ procedure under the Birds and Habitats Directive (Article 6[4]).

In addition to planning or confirmation, licences may be required by the implementing body to progress certain physical works, such as those that may cause damage or disturbance to protected species or their habitats, and the granting of such licences during or following the project-level assessment would be required before such works could proceed.

The body responsible for the implementation of such measures (typically the OPW or a local authority - see Section 8) is required to ensure that the requirements above, and the requirements of all relevant environmental legislation (such as the Environmental Liability and Water Framework Directives), are complied with.

### 6.6.2 Implementation Routes for Physical Works

#### 6.6.2.1 Works Requiring Planning Consent or Confirmation

As set out above, the body responsible for the implementation of any measures that would involve physical works, such as a flood relief scheme, will typically be either the OPW or the relevant local authority. There are no such measures proposed by this Plan, however in case measures which require a degree of physical works do become necessary whilst the Plan is still in existence, for example the installation of a flow measurement gauge to support a policy level measure on data collection, and also to remain aligned with all other CFRAM FRMPs, the following information has been included within this Nanny – Delvin River Basin FRMP. There are three primary legislative routes by which such works may progress to construction stage, as set out in Figure 8.1, are:

− Project led by OPW (or by a Local Authority on behalf of the OPW), under the Arterial Drainage Acts.
− Project led by the relevant Local Authority under the Planning and Development Regulations.
− Project led by the relevant Local Authority under the Strategic Infrastructure Act.

As noted above, while the Plans have conducted a Strategic Environmental Assessment and Appropriate Assessment, the progression of any measure by either the OPW or a local authority will include all applicable ‘project level’ assessments, such as:

− Environmental Impact Assessment: For a project above the thresholds specified under Article 24 of the European Communities (Environmental Impact Assessment) Regulations, 1989 as amended or a project likely to have significant effects on the environment, having regard to the criteria specified for under Article 27 of the same EIA Regulations 1989 as amended.
Appropriate Assessment: All projects will be screened for Appropriate Assessment and, where there is a potential for a significant effect on a European (Natura 2000) site, an Appropriate Assessment will be undertaken in accordance with the European Communities (Birds and Natural Habitats) Regulations 2011.

6.6.2.2 Exempted Development

For some measures, the physical works involved are of limited scale and scope. These will typically be works that would be progressed by the local authority, with funding provided by the OPW through the Minor Flood Mitigation Works and Coastal Protection Scheme (the 'Minor Works Scheme' - see Section 2.6.5), that are deemed as exempted development in accordance with the Planning and Development Act 2000 (as amended).

As public bodies, the local authorities are required to comply with all relevant legislation, and hence must undertake EIA and/or AA screening for physical works where relevant (i.e., where the works are not exempt or below relevant thresholds) and as required by legislation. As a condition of the provision of funding for such works, the OPW requires written confirmation from the local authority of compliance with all relevant environmental legislation.

6.6.3 Mitigation Measures

Any projects stemming from the Flood Risk Management Plans (FRMP) would apply a range of standard processes and measures that will mitigate potential environmental impacts. While the applicability of processes and particular measures will be dependent on the nature and scale of each project, examples of typical processes and measures that will be implemented where applicable at the different stages of project implementation are set out below.

6.6.3.1 Project Mitigation: Consenting Process

As set out in Section 6.6.2 above, the consenting process for the progression of measures involving physical works will require the applicable environmental assessments. Also, the consenting authorities may set out specific environmental conditions as part of the project approval.

6.6.3.2 Project Mitigation: Pre-Construction / Detailed Design

The Nanny – Delvin River Basin FRMP does not propose any physical works and the measures proposed in the Plan are solely policy and governance measures. However to remain aligned with all other CFRAM FRMPs it must be noted that for the detailed design of projects, where options are available, the design uses a hierarchy to mitigation measures along the following principles:

− Avoidance: avoid creating the potential impact where feasible.
− Mitigation: minimise the potential impact through mitigating measures
− Enhancement: Enhance the environment to better than pre-project conditions, where reasonably possible

The progression of a flood management project through the detailed design phase can entail a series of surveys to inform the design, where the scale of surveys would be proportionate to the complexity and potential impacts of the project. These can include:

− engineering structure surveys,
− topographical surveys,
– habitat & species surveys\textsuperscript{10}
– ornithological surveys,
– bat surveys,
– fish surveys,
– water quality surveys,
– archaeological surveys,
– landscape and visual assessments,
– land valuation surveys and
– other surveys as deemed necessary to prepare a project.

Where necessary, Wildlife Derogation Licences and archaeological licences will be sought from Department of Culture, Heritage & Gaeltacht.

The scope of the EIS will include a hydro-morphological assessment to more clearly consider and support the Water Framework Directive (WFD) objectives (see Section 6.5.4).

The potential role for non-structural measures for each flood risk area, including natural type flood management measures will be examined in more detail and incorporated into the scheme design if deemed appropriate.

\textbf{6.6.3.3 Project Mitigation: Construction Stage}

The Nanny – Delvin River Basin FRMP does not propose any physical works and the measures proposed in the Plan are solely policy and governance measures. However to remain aligned with all other CFRAM FRMPs it must be noted that for large and complex projects and sites, where environmental management may entail multiple aspects, a project specific Construction Environmental Management Plan (CEMP) may be developed. This will form a framework for all environmental management processes, mitigation measures and monitoring and will include other environmental requirements such as invasive species management measures, if applicable.\textsuperscript{11}

A designated environmental officer, project ecologist and project archaeologist will be appointed, as appropriate for the project.

\textsuperscript{10} In the context of ecological mitigation, the habitat and species surveys are conducted as required to assess the various aspects for the project, such as ecological surveys for:
– protected or notable habitats and species, including Annex 1 habitats, Annex II and Annex IV species,
– species protected under the Wildlife Acts,
– species protected under the Flora Protection Order,
– the resting and breeding places of relevant species and,
– invasive species, both plant and animal.

\textsuperscript{11} There are a range standard type mitigation measures consisting of good construction practices and good planning of works, that are used within flood management projects such as for example: Refuelling of plant and vehicles away from watercourses, Installation of wheel-wash and plant washing facilities, working only within environmental windows e.g. in-stream works in salmonid channels from May to September, Integrate fisheries in-stream enhancement through the Environmental River Enhancement Programme
6.6.3.4 Project Monitoring

The Plan with its associated environmental assessments sets out a series of monitoring requirements, in connection with the SEA objectives and the predicted effects of the Plan. For measures involving physical works, the project-level EIA and AA, where conducted, will set out the specific monitoring required for each measure.
7 MANAGING FLOOD RISK

7.1 OVERVIEW
The purpose of the Plan is to set out the strategy for the sustainable, long-term management of flood risk in the Nanny-Delvin River Basin, focussed on the AFAs. The strategy comprises a set of potential measures, that may be actions, physical works or 'Schemes', further assessments or data collection. For each area or location, a number of options would typically have been available as to what measures could be brought forward and proposed as part of the Plan.

This Section describes the process pursued under the National CFRAM Programme and other policies, projects or initiatives for identifying what flood risk management measures might be suitable for a given area or location, and then how the options for such measures were appraised to determine which options would be most effective and appropriate for each area or location. This process makes use of the flood mapping (Section 5), information provided through public consultation events and processes, and a range of other data and information, as appropriate. Similar processes were followed for the Pilot CFRAM Projects and other projects undertaken in parallel with the CFRAM Programme. The Section concludes with a summary of the measures proposed under this Plan.

Further information on the process set out within this Section on the identification and appraisal of options for managing flood risk within the Nanny-Delvin River Basin is set out in the Preliminary Options Report for the FEM-FRAMS project, and in similar reports for parallel studies. These reports are available from the OPW website: www.floodinfo.ie.

7.2 METHODS OF FLOOD RISK MANAGEMENT
There are a wide range of different approaches, or methods, that can be taken to reduce or manage flood risk. These can range from non-structural methods that do not involve any physical works to prevent flooding but rather comprise actions typically aimed at reducing the impacts of flooding, to structural works that reduce flood flows or levels in the area at risk or that protect the area against flooding. The range of methods for managing flood risk that are considered include those outlined below.

7.2.1 Flood Risk Prevention Methods
Flood risk prevention measures are aimed at avoiding or eliminating a flood risk. This can be done by not creating new assets that could be vulnerable to flood damage in areas prone to flooding, or removing such assets that already exist. Alternatively, prevention can be achieved by completely removing the potential for flooding in a given area, although in practice this is rarely possible (the frequency or magnitude of flooding can be reduced by flood protection measures, but it is generally not possible to remove the risk of flooding entirely).

Flood prevention is hence generally focussed on sustainable planning and / or the re-location of existing assets, such as properties or infrastructure, and includes:
- Sustainable Planning and Development Management
- Sustainable Urban Drainage Systems (SUDS)
- Voluntary Home Relocation
- Preparation of Local Adaptation Planning
- Land Use Management and Natural Flood Risk Management Measures
7.2.2 Flood Protection Methods

Flood protection measures are aimed at reducing the likelihood and/or the severity of flood events. These measures, typically requiring physical works, can reduce risk in a range of ways, such as by reducing or diverting the peak flood flows, reducing flood levels or holding back flood waters.

Protection measures typically considered include:

− Enhance Existing Protection Works
− Flood Defences
− Increasing Channel Conveyance
− Diverting Flood Flows
− Storing Flood Waters
− Implementing Channel Maintenance Programmes
− Maintenance of Drainage Schemes
− Land Commission Embankments

The preferred Standard of Protection offered by flood protection measures in Ireland is the current scenario 1% Annual Exceedance Probability (AEP) flood for fluvial flooding and 0.5% AEP flood for tidal flooding (also referred to as the 100-year and 200-year floods respectively), although these standards can increase or decrease depending on local circumstances.

7.2.3 Flood Preparedness (Resilience) Methods

In some instances, it may not be possible to reduce the likelihood or severity of flooding to an area at risk. However, actions and measures can be taken to reduce the consequences of flooding, i.e., reduce the risk to people and of damage to properties and other assets, and make sure that people and communities are resilient to flood events. This can be achieved by being aware of and preparing for the risk of flooding, knowing when floods are going to occur, taking actions immediately before, during and after a flood. The actions and measures of this type include:

− Flood Forecasting and Warning
− Emergency Response Planning
− Promotion of Individual and Community Resilience
− Individual Property Protection
− Flood-Related Data Collection

7.2.4 Continue Existing Regime / Do Nothing / Minor Measures

In some circumstances the existing programme of works may be sufficient to effectively manage the existing flood risk. For instance, the OPW Arterial Drainage Maintenance Programme ensures that some towns and villages around the country already enjoy a significantly reduced level of flood risk, and in some communities, the 1% AEP flood is contained within the river channel and so there is very little flood risk. In such circumstances, there may be no need to implement additional measures, and so continuing the existing regime of works may be sufficient to adequately meet the flood risk management Objectives.

In other areas, the level of risk may be relatively low and the cost of implementing any substantial additional measures may be significant. Where the costs of implementing new measures are higher than the benefits of such measures, in terms of risk reduction, then it will not be possible to justify such works. In this case, it may not be possible to undertake any new measures, or only implement low-cost actions such as local maintenance of a
channel or minor repairs / alterations to existing structures to reduce the risk and/or avoid a future increase in risk.

7.2.4.1 Maintain Existing Flood Risk Management Works
Flood protection works require maintenance to keep them in good order and able to offer the Standard of Protection they were designed to provide (subject to further works that may be necessary arising from the impacts of climate change). If the level of maintenance is inadequate, the condition can deteriorate and the likelihood of failure of the measure during flood events, including those below the standard of protection, can increase. Maintenance of existing flood risk management works, such as flood relief schemes, should therefore be undertaken by the owner of the works to ensure their performance as designed.

7.3 DEVELOPMENT AND APPRAISAL OF FLOOD RISK MANAGEMENT OPTIONS
This Section describes the process, or steps, pursued under the National CFRAM Programme for identifying the measures that would be most effective and appropriate for each area and location. Section 7.3.8 describes how other measures were identified through other policies, projects and initiatives.

7.3.1 Spatial Scales of Assessment
Measures to manage flood risk can be applied at a range of spatial scales, namely the whole River Basin, at a catchment- or sub-catchment level, or at an AFA or local level. For the Nanny-Delvin River Basin only measures applicable to the whole River Basin have been identified under the CFRAM Programme and included in this Plan.

Flood risk management measures applicable at the River Basin level are generally non-structural measures already in-place or mandated under existing legislation or policy (as set out in Table 1.1 or determined through Government Decisions). These measures are set out in the Plan for clarity, and are being kept under review.

7.3.2 Measures Identified from Other Policies, Projects and Initiatives
In addition to the measures identified through the CFRAM Programme, a number of other measures and actions are required or have been deemed to be of benefit in managing flood risk through other policies, projects and initiatives. A range of policy and legal requirements, as identified in Table 1.1, mandate that certain measures be implemented, such as the ongoing maintenance of Flood Relief Schemes and Arterial Drainage and Drainage District Schemes, or the consideration of flood risk in planning and development management. Other measures and actions have been identified through past or ongoing projects including those identified through the FEM-FRAMS and subsequent works, such as certain flood relief schemes. Other initiatives, such as policy recommendations from the Interdepartmental Flood Policy Co-ordination group are also noted for implementation.

7.4 OUTCOMES
The application of the process and the resultant outcomes for the Nanny-Delvin River Basin, are set out in the sub-sections below. No new Community-Level (AFA) Measures are proposed under this Plan.

7.4.1 Measures Applicable for All Areas
There are certain prevention and preparedness measures related to flood risk management, as described in Section 7.2 above and in Appendix F, that form part of wider Government policy. These measures, set out below under the themes of prevention, protection and
preparedness, should be applied as appropriate and as applicable across all areas of the River Basin, including properties and areas outside of the AFAs, as well as within.

7.4.1.1 Prevention: Sustainable Planning and Development Management
The application of the Guidelines on the Planning System and Flood Risk Management by the planning authorities is essential to avoid inappropriate development in flood prone areas, and hence avoid unnecessary increases in flood risk into the future. The flood mapping produced through the CFRAM Programme and parallel projects will facilitate the continued application of the Guidelines.

<table>
<thead>
<tr>
<th>Measure Name:</th>
<th>Application of the Guidelines on the Planning System and Flood Risk Management (DHPLG/OPW, 2009)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code:</td>
<td>IE08-UoM-9011-M21</td>
</tr>
<tr>
<td>Measure:</td>
<td>The Planning Authorities will ensure proper application of the Guidelines on the Planning System and Flood Risk Management (DHPLG/OPW, 2009) in all planning and development management processes and decisions, including where appropriate a review of existing land use zoning and the potential for blue/green infrastructure, in order to support sustainable development, taking account of the flood maps produced through the CFRAM Programme and parallel projects.</td>
</tr>
<tr>
<td>Implementation:</td>
<td>Planning Authorities</td>
</tr>
<tr>
<td>Funding:</td>
<td>Existing duties (Planning Authorities)</td>
</tr>
</tbody>
</table>

7.4.1.2 Prevention: Sustainable Urban Drainage Systems
Sustainable Urban Drainage Systems (SUDS) can play a role in reducing and managing run-off from new developments to surface water drainage systems, reducing the impact of such developments on flood risk downstream, as well as improving water quality and contributing to local amenity.

<table>
<thead>
<tr>
<th>Measure Name:</th>
<th>Implementation of Sustainable Urban Drainage Systems (SUDS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code:</td>
<td>IE08-UoM-9012-M34</td>
</tr>
<tr>
<td>Measure:</td>
<td>In accordance with the Guidelines on the Planning System and Flood Risk Management (DHPLG/OPW, 2009), planning authorities should seek to reduce the extent of hard surfacing and paving and require, subject to the outcomes of environmental assessment, the use of sustainable drainage techniques.</td>
</tr>
<tr>
<td>Implementation:</td>
<td>Planning Authorities</td>
</tr>
<tr>
<td>Funding:</td>
<td>Existing duties (Planning Authorities)</td>
</tr>
</tbody>
</table>
7.4.1.3 Prevention: Voluntary Home Relocation

In extreme circumstances, the flood risk to a home may be such that the homeowner may consider that continuing to live in the property is not sustainable and would choose to relocate.

In response to the floods of Winter 2015/2016, the Government has agreed to the administrative arrangements for a voluntary homeowner relocation scheme, to provide humanitarian assistance for those primary residences worst affected by these floods. At present, there is no Scheme to provide financial assistance to other home-owners choosing to relocate due to their flood risk.

The Interdepartmental Flood Policy Co-ordination group is considering the future policy options for voluntary home relocation for consideration by Government.

<table>
<thead>
<tr>
<th>Measure Name:</th>
<th>Voluntary Home Relocation Scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code:</td>
<td>IE08-UoM-9052-M22</td>
</tr>
<tr>
<td>Measure:</td>
<td>Implementation of the once-off Voluntary Homeowner Relocation Scheme that has been put in place by Government in 2017. The Interdepartmental Flood Policy Co-ordination Group is considering the policy options around voluntary home relocation for consideration by Government.</td>
</tr>
<tr>
<td>Implementation:</td>
<td>Home-Owners with humanitarian assistance to those qualifying under the Voluntary Homeowners Relocation Scheme, 2017</td>
</tr>
<tr>
<td>Funding:</td>
<td>Homeowners and the OPW, under the 2017 Scheme</td>
</tr>
</tbody>
</table>

7.4.1.4 Prevention: Local Adaptation Planning

The consultation document on the National Climate Change Adaptation Framework recognises that local authorities also have an important role to play in Ireland’s response to climate adaptation. Given the potential impacts of climate change on flooding and flood risk, the local authorities should take fully into account these potential impacts in the performance of their functions, in particular in the consideration of spatial planning and the planning and design of infrastructure, in line with the Local Authority Adaptation Strategy Development Guidelines (EPA, 2016).

<table>
<thead>
<tr>
<th>Measure Name:</th>
<th>Consideration of Flood Risk in local adaptation planning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code:</td>
<td>IE08-UoM-9013-M21</td>
</tr>
<tr>
<td>Measure:</td>
<td>Local authorities should take into account the potential impacts of climate change on flooding and flood risk in their planning for local adaptation, in particular in the areas of spatial planning and the planning and design of infrastructure.</td>
</tr>
<tr>
<td>Implementation:</td>
<td>Local Authorities</td>
</tr>
<tr>
<td>Funding:</td>
<td>Existing duties (Local Authorities)</td>
</tr>
</tbody>
</table>
7.4.1.5 Prevention: Land Use Management and Natural Flood Risk Management Measures

The OPW has been liaising with the EPA on the potential impact of WFD measures on flood risk, which are typically neutral (no impact), or may have some benefit in reducing runoff rates and volumes (e.g., through agricultural measures).

The OPW will work with the EPA, local authorities and other agencies to identify, where possible, measures that will have benefits for both WFD and flood risk management objectives, such as natural water retention measures, and also for biodiversity and potentially other objectives. This will form part of the project-level assessment required to progress physical works and flood relief schemes towards planning or Exhibition and confirmation (see Section 8.1), where potential works may be amended or enhanced by the introduction of natural water retention and similar measures. The work will include seeking, and where possible implementing, pilot studies in coordination with the Local Authority WFD Offices and other relevant agencies. It is anticipated that this is most likely to be achieved in areas where there are pressures on the ecological status of a water body in a sub-catchment where there is also an identified potentially significant flood risk (i.e., an AFA). This coordination will also facilitate the resolution of issues for measures that may otherwise cause potential conflict between the objectives of the two Directives in certain water bodies.

<table>
<thead>
<tr>
<th>Measure Name:</th>
<th>Assessment of Land Use and Natural Flood Risk Management Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code:</td>
<td>IE08-UoM-9021-M31</td>
</tr>
<tr>
<td>Measure:</td>
<td>The OPW will work with the EPA, local authorities and other agencies during the project-level assessments of physical works and more broadly at a catchment-level to identify, where possible, measures that will have benefits for both WFD and flood risk management objectives, such as natural water retention measures, and also for biodiversity and potentially other objectives, including the use of pilot studies and applications, where possible.</td>
</tr>
<tr>
<td>Implementation:</td>
<td>Local Authority WFD Offices, OPW, EPA, Others</td>
</tr>
<tr>
<td>Funding:</td>
<td>Existing Duties (OPW, Others)</td>
</tr>
</tbody>
</table>
7.4.1.6 Protection: Minor Works Scheme
The Minor Flood Mitigation Works and Coastal Protection Scheme (the ‘Minor Works Scheme’) is an administrative scheme operated by the OPW under its general powers and functions to support the local authorities through funding of up to €750k to address qualifying local flood problems with local solutions.

<table>
<thead>
<tr>
<th>Measure Name:</th>
<th>Minor Works Scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code:</td>
<td>IE08-UoM-9051-M61</td>
</tr>
<tr>
<td>Measure:</td>
<td>The OPW will continue the Minor Works Scheme subject to the availability of funding and will keep its operation under review to assess its continued effectiveness and relevance.</td>
</tr>
<tr>
<td>Implementation:</td>
<td>OPW, Local Authorities</td>
</tr>
<tr>
<td>Funding:</td>
<td>OPW, Local Authorities</td>
</tr>
</tbody>
</table>

7.4.1.7 Protection: Maintenance of Arterial Drainage Schemes and Existing Flood Relief Schemes
There are two Arterial Drainage Schemes namely the Broadmeadow & Ward and the Matt along with the existing Duleek flood relief scheme as set out in Section 2.6 within the Nanny-Delvin River Basin. The OPW has a statutory duty under the Arterial Drainage Act, 1945, and the Amendment of the Act, 1995, to maintain the Arterial Drainage and flood relief Schemes. The local authorities should also maintain those flood relief schemes for which they have maintenance responsibility. This Plan does not amend these responsibilities to provide additional flood relief. The Plan therefore does not set out additional measures in this regard.

The Arterial Drainage Maintenance service has developed and adheres to a suite of Environmental Management Protocols and Standard Operating Procedures which minimise the potential environmental impact of operations. A Strategic Environmental Assessment (SEA) was conducted for the national Arterial Drainage Maintenance activities for the period 2011-2015 and a further SEA process was again carried out for the national Arterial Drainage Maintenance activities for the period 2016-2021. Appropriate Assessments are also carried out on an ongoing basis for Arterial Drainage Maintenance operations. Operations outside the scope of the SEA or AA processes are subject to Ecological Assessment to consider environmental sensitivities around Arterial Drainage Maintenance.

7.4.1.8 Protection: Maintenance of Drainage Districts
There are seven Drainage Districts within the Nanny-Delvin River Basin, namely the Ward, Curragha, Garristown & Devlin, Bartramstown, Nanny, Nanny Upper and Mornington. The local authorities have a statutory duty to maintain the Drainage Districts, and this Plan does not amend these responsibilities to provide additional flood relief. The Plan therefore does not set out additional measures in relation to the maintenance of Drainage Districts.

7.4.1.9 Maintenance of Channels Not Part of a Scheme
Outside of the Arterial Drainage and Drainage District Schemes, landowners who have watercourses on their lands have a responsibility for their maintenance. Guidance to clarify the rights and responsibilities of landowners in relation to the maintenance of water courses on or near their lands is available at www.flooding.ie.
7.4.1.10   Preparedness: Flood Forecasting

The Government decided in January 2016 to establish a National Flood Forecasting and Warning Service. When fully operational, this will be of significant benefit to communities and individuals to prepare for and lessen the impact of flooding. The Government decision has provided the opportunity to proceed with a first stage implementation of the service and will involve the following elements:

− establishment of a National Flood Forecasting Service as a new operational unit within Met Éireann, and
− establishment of an independent Oversight Unit within the Office of Public Works (OPW).

The service will deal with flood forecasting from fluvial (river) and coastal sources and when established it will involve the issuing of flood forecasts and general alerts at both national and catchment scales.

A Steering Group, including representatives from the OPW, the Department of Housing, Planning and Local Government (DHPLG), Met Éireann and the Local Authorities has been established to steer, support and oversee the establishment of the new service. A number of meetings have taken place to progress this complex project.

Given the complexities involved in establishing, designing, developing and testing this new service, it is anticipated that the first stage of the service will take at least 5 years before it is fully operational. In the interim period, existing flood forecasting and warning systems and arrangements will continue to be maintained.

The FEM-FRAMS proposed flood forecasting and warning systems for the following areas:
• Nanny & Delvin
• Broadmeadow & Ward*
• Mayne & Sluice*
• Coastal SSA

* As standalone measures the FFWSs identified above have a BCR below unity and a detailed assessment of the costs is recommended to determine if an economically viable measure may exist that could justify the progression to full project level assessment.

<table>
<thead>
<tr>
<th>Measure Name:</th>
<th>Establishment of a National Flood Forecasting and Warning Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code:</td>
<td>IE08-UoM-9031-M41</td>
</tr>
<tr>
<td>Measure:</td>
<td>The establishment of a new operational unit in Met Éireann to provide, in the medium term, a national flood forecasting service and the establishment of an independent Oversight Unit in the OPW.</td>
</tr>
<tr>
<td>Implementation:</td>
<td>OPW, DHPLG, Met Éireann and Local Authorities</td>
</tr>
<tr>
<td>Funding:</td>
<td>OPW, DHPLG</td>
</tr>
</tbody>
</table>

7.4.1.11   Preparedness: Review of Emergency Response Plans for Severe Weather

Section 4.7 of the Major Emergency Management (MEM) Framework introduces the concept of self-appraisal as part of the systems approach to emergency management. The purpose of the appraisal process is to assist agencies and regions to review, monitor and assess their activities and to identify issues, which may need to be addressed and consider what
measures they could adopt to improve preparedness, as part of the major emergency
development programmes.

The regional appraisal, which is undertaken annually, is based on a self-assessment
questionnaire, for which the answers are evidence-based and supported with references to
documentary support (e.g. document dates, exercise reports, etc.). The process is
supported by meetings of the National Steering Group project team with Regional Steering
Group Chairs (2 per annum) to shape future MEM developments and identify challenging
issues and areas for improvement. It is the task of the National Steering Group to review
and validate these appraisals and provide appropriate feedback. Flood planning and inter-agency co-ordination are included in appraisals and remains a key
objective for National Steering Group and Regional Steering Groups.

The local authorities should, in particular, review their flood event emergency response
plans, making use of the information on flood hazards and risks provided through the
CFRAM Programme and this Plan.

<table>
<thead>
<tr>
<th>Measure Name:</th>
<th>Ongoing Appraisal of Flood Event Emergency Response Plans and Management Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code:</td>
<td>IE08-UoM-9032-M42</td>
</tr>
<tr>
<td>Measure:</td>
<td>Ongoing, regular appraisal of emergency management activities to improve preparedness and inter-agency coordination and to shape future MEM developments as part of the major emergency development programmes, taking into account in particular the information developed through the CFRAM Programme and this Plan.</td>
</tr>
<tr>
<td>Implementation:</td>
<td>Principal Response Agencies, Regional Steering Groups, National Steering Group</td>
</tr>
<tr>
<td>Funding:</td>
<td>Existing duties (Implementation Bodies)</td>
</tr>
</tbody>
</table>

7.4.1.12 Preparedness: Individual and Community Resilience

While the State, through the OPW, local authorities and other public bodies can take certain
actions (subject to environmental assessment, where relevant) to reduce and manage the
risk of flooding, individual home-owners, businesses and farmers also have a responsibility
to manage the flood risk to themselves and their property and other assets to reduce
damages and the risk to personal health in the event of a flood.

Research by the DHPLG is informing a review of the national emergency framework and the
supports that can be provided to communities to help them respond to all emergencies,
including flooding emergencies. This will build on past initiatives and existing support, such
as that provided through the ‘Plan, Prepare, Protect’ programme (http://www.flooding.ie/) and the ‘Be Winter Ready’ Campaigns (http://winterready.ie/).
Measure Name: Individual and Community Action to Build Resilience

Code: IE08-UoM-9033-M43

Measure: All people at flood risk should make themselves aware of the potential for flooding in their area, and take long-term and short-term preparatory actions (subject to environmental assessment, where relevant) to manage and reduce the risk to themselves and their properties and other assets.

Implementation: Public, business owners, farmers and other stakeholders

Funding: N/A

7.4.1.13 Preparedness: Individual Property Protection

Individual Property Protection can be effective in reducing the damage to the contents, furniture and fittings in a house or business, but are not applicable in all situations (for example, they may not be suitable in areas of deep or prolonged flooding, or for some types of property with pervious foundations and flooring). Property owners considering the use of such methods should seek the advice of an appropriately qualified expert on the suitability of the measures for their property, and consider the possible requirements for environmental assessment.

While there may be some existing tax relief for some homeowners works on their homes which are aimed at preventing the risk of flooding, the Interdepartmental Flood Policy Co-ordination group is considering the administrative arrangements, for consideration by Government, of any appropriate assistance to home owners, where it is suitable, to install Individual Property Protection measures for their property.

Measure Name: Individual Property Protection

Code: IE08-UoM-9053-M43

Measure: Property owners may consider the installation of Individual Property Protection measures. The Interdepartmental Flood Policy Co-ordination group is considering the policy options around installation of Individual Property Protection measures for consideration by Government.

Implementation: Home owners, Interdepartmental Flood Policy Co-ordination group

Funding: Home owners, N/A

7.4.1.14 Preparedness: Flood-Related Data Collection

Ongoing collection and, where appropriate, publication of hydrometric and meteorological data, and data on flood events as they occur, will help us to continually improve our preparation for, and response, to flooding.
<table>
<thead>
<tr>
<th>Measure Name:</th>
<th>Flood-Related Data Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code:</td>
<td>IE08-UoM-9041-M61</td>
</tr>
<tr>
<td>Measure:</td>
<td>The OPW, Local Authorities / EPA and other organisations collecting and, where appropriate, publishing hydro-meteorological data and post-event flood data should continue to do so to improve future flood risk management.</td>
</tr>
<tr>
<td>Implementation:</td>
<td>OPW, Local Authorities / EPA and other hydro-meteorological agencies</td>
</tr>
<tr>
<td>Funding:</td>
<td>Existing duties (Implementation Bodies)</td>
</tr>
</tbody>
</table>

7.4.2 Catchment / Sub-Catchment Measures
No further Sub-Catchment scale measures were identified under the Eastern CFRAM Study in addition to the flood forecasting and warning systems identified in 7.4.1.10.

7.4.3 Ashbourne Flood Relief Scheme Measures
The development of a flood relief scheme is currently underway for Ashbourne as described in Section 2.6.1. No additional measures specific to Ashbourne are proposed.

7.4.4 Duleek Flood Relief Scheme Measures
A flood relief scheme has been implemented for Duleek as described in Section 2.6.2, and is maintained by the OPW. No additional measures specific to Duleek are proposed.

7.4.5 Balbriggan AFA Measures
This area is exposed to fluvial flooding which dictates the types of measures that are relevant. No methods were found to be feasible from the Balbriggan AFA screening in the FEM-FRAMS.

7.4.6 Laytown, Bettystown and Coastal areas AFA Measures
A flood relief scheme for Laytown, Bettystown and Coastal areas AFA was developed under the FEM-FRAMS and proposed for progression to implementation in the FEM FRMP as described in Section 2.6.4. No additional measures specific to Laytown, Bettystown and Coastal areas AFA are proposed.

7.4.7 Skerries AFA Measures
A flood relief scheme for Skerries was developed under the FEM-FRAMS and proposed for progression to implementation in the FEM FRMP as described in Section 2.6.3. The OPW are progressing the detailed design of increased channel conveyance measures for Skerries.

7.4.8 Measures with a Benefit - Cost Ratio below Unity
For some AFAs, no economically viable measure (i.e., a measure with a benefit - cost ratio of greater than 1.0) has been found through the analysis undertaken to date, but a technically viable measure has been identified with a benefit - cost ratio of between 0.5 and 1.0. A more detailed assessment of the costs of such measures may indicate that the measure could be implemented at a cost below that determined through the analysis undertaken to date.
While it would not be prudent to progress such measures to full project-level assessment towards planning / Public Exhibition based on the information available at present, a more detailed assessment of the costs can be progressed to determine if an economically viable measure may in fact exist that could justify the progression to full project-level assessment.

7.4.8.1 Rush AFA
A flood relief scheme for Rush was developed under the FEM-FRAMS and proposed for progression to implementation in the FEM FRMP as described in Section 2.6.7. However the measure identified has a BCR below unity and a detailed assessment of the costs is recommended to determine if an economically viable measure may exist that could justify the progression to full project level assessment.

7.4.8.2 Ratoath AFA
A flood relief scheme for Ratoath was developed under the FEM-FRAMS, elements of which have been constructed as described in Section 2.6.5. Further works including the replacement of the Broadmeadow bridge and associated works are yet to be completed. However the measure identified has a BCR below unity and a detailed assessment of the costs is recommended to determine if an economically viable measure may exist that could justify the progression to full project level assessment.

7.5 PRIORITISATION OF PROPOSED PROTECTION MEASURES
Implementing all of the proposed measures as set out in this, and all, Plans would require a significant capital investment as well as substantial resources to manage the implementation process. The Government's National Development Plan 2018 to 2027 has committed up to €1 billion over the lifetime of the Plan for flood relief measures. This will enable the OPW to continue with the implementation of its existing flood relief capital works programme and will also facilitate the phased implementation of the proposed measures within the Plans. Within this period, it is necessary to prioritise the investment of resources in the delivery of the flood relief capital investment programme.

The basis on which measures in the Plans have been prioritised for implementation is a key consideration in planning the investment of the significant public resources made available for flood relief over the next 10 years. The prioritisation primarily relates to the protection measures to be implemented by the OPW or funded by the OPW but implemented by a local authority.

For the purposes of prioritisation, the measures have been divided into three streams as follows:

1. Large Schemes: Measures costing in excess of €15m
2. Medium and Small Schemes: Measures costing in between €750k/€1m and €15m
3. Minor Schemes: Measures costing less than €750k/€1m

There are only a small number of Large Schemes, all of which will be advanced at an early stage due to their scale and their long lead in period.

It is anticipated that the Minor Schemes will be brought forward by the local authorities, with OPW funding, and so may be advanced at an early stage.

The measures in the remaining stream (Medium and Small Schemes) will be prioritised on a regional basis, by reference to the six CFRAM study areas. The management objective for this €1billion ten year programme of flood relief works is to efficiently utilise available
capacity to plan progression and completion of schemes that deliver greatest protection and maximise return.

7.6 FLOOD RISK MANAGEMENT IN OTHER AREAS
This Plan identifies a series of flood risk management measures for the entire River Basin.

While it is considered that the PFRA identified the areas of significant flood risk throughout Ireland, the PFRA will be reviewed in line with legislation, and other areas can be considered for detailed assessment at that stage.

In the interim, local authorities may avail of the OPW Minor Flood Mitigation Works and Coastal Protection Scheme (Section 2.6.5 and 7.4.1.6), where the relevant criteria are met, to implement local solutions to local flood problems, including in areas outside of the AFAs.

7.7 SUMMARY OF PROPOSED MEASURES
Table 7.4 provides a summary of the measures that are to be progressed through the implementation of the Plan for the Nanny-Delvin River Basin, while Table 7.5 sets out the flood relief schemes and works that have been progressed or proposed through other projects or plans including the FEM-FRAMS.
Table 7.4: Summary of Flood Risk Management Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>Implementation</th>
<th>Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation of Sustainable Urban Drainage Systems (SUDS)</td>
<td>Planning Authorities</td>
<td>Planning Authorities</td>
</tr>
<tr>
<td>Voluntary Home Relocation</td>
<td>Interdepartmental Flood Policy Co-ordination group</td>
<td>OPW (2017 Scheme)</td>
</tr>
<tr>
<td>Consideration of Flood Risk in Local Adaptation Planning</td>
<td>Local Authorities</td>
<td>Local Authorities</td>
</tr>
<tr>
<td>Assessment of Land Use and Natural Flood Risk Management Measures</td>
<td>EPA, OPW, Others</td>
<td>OPW, Others</td>
</tr>
<tr>
<td>Minor Works Scheme</td>
<td>OPW, Local Authorities</td>
<td>OPW, Local Authorities</td>
</tr>
<tr>
<td>Establishment of a National Flood Forecasting and Warning Service</td>
<td>OPW, DHPLG, Met Éireann and local authorities</td>
<td>OPW, DHPLG</td>
</tr>
<tr>
<td>Ongoing Appraisal of Flood Event Emergency Response Plans and Management Activities</td>
<td>Principal Response Agencies, Regional Steering Groups, National Steering Group</td>
<td>Implementation Bodies</td>
</tr>
<tr>
<td>Individual and Community Action to Build Resilience</td>
<td>Public, business owners, farmers and other stakeholders</td>
<td>N/A</td>
</tr>
<tr>
<td>Individual Property Protection</td>
<td>Home Owners, Interdepartmental Flood Policy Co-ordination group</td>
<td>Homeowners</td>
</tr>
<tr>
<td>Flood-Related Data Collection</td>
<td>OPW, Local Authorities / EPA, and other hydro-meteorological agencies</td>
<td>Implementation Bodies</td>
</tr>
</tbody>
</table>

Catchment / Sub-Catchment Measures
No new Sub-Catchment scale measures are proposed under this Plan

Community-Level (AFA) Measures
Progress the project-level development and assessment of a Flood Relief Scheme, including environmental assessment as necessary and further public consultation, for refinement and preparation for planning / Exhibition and, if and as appropriate, implementation, for the Communities set out below.

No new Community-Level (AFA) Measures are proposed under this Plan
Table 7.5 Summary of Flood Relief Schemes and Works Progressed or Proposed through Other Projects or Plans

<table>
<thead>
<tr>
<th>Community (AFA)</th>
<th>Scheme or Works</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ashbourne</td>
<td>Ashbourne Flood Relief Scheme</td>
<td>Under Construction</td>
</tr>
<tr>
<td>Duleek</td>
<td>Duleek Flood Relief Scheme</td>
<td>Complete</td>
</tr>
<tr>
<td>Rowlestown</td>
<td>Rowlestown Minor Flood Relief Works</td>
<td>Complete</td>
</tr>
<tr>
<td>Skerries AFA</td>
<td>Skerries Flood Relief Scheme</td>
<td>Planning / Design Stage</td>
</tr>
<tr>
<td>Laytown, Bettystown &amp; Coastal Areas AFA</td>
<td>Laytown, Bettystown &amp; Coastal Areas Flood Relief Scheme</td>
<td>Proposed (Fingal - East Meath Flood Risk Management Plan, 2014)</td>
</tr>
</tbody>
</table>

Undertake a Detailed Assessment of the Costs of the Potential Measure for the Communities set out below.

<table>
<thead>
<tr>
<th>Rush AFA</th>
<th>OPW and/or Fingal CoCo - To be confirmed</th>
<th>OPW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ratoath AFA</td>
<td>OPW and/or Meath CoCo - To be confirmed</td>
<td>OPW</td>
</tr>
</tbody>
</table>


8 IMPLEMENTATION, MONITORING AND REVIEW OF THE PLAN

8.1 IMPLEMENTATION OF THE PLAN
The Plan sets out the strategy, actions and measures that are considered to be the most appropriate at this stage of assessment, including a programme of structural and non-structural measures to be implemented and has identified the responsible body/bodies for implementing those measures.

8.1.1 River Basin Level Measures
The River Basin level measures, i.e., those applicable in all areas (Section 7.4.1), typically do not involve physical works, and represent the implementation of existing policy and/or the development of new policies or Schemes.

Many prevention and preparedness measures are already in-hand with the relevant implementing bodies or are being proactively progressed by the Inter-Departmental Flood Policy Co-ordination Group. Other such measures requiring new action should be pro-actively and urgently progressed and implemented by the relevant implementing bodies, subject to any licences and/or environmental assessments required, through normal business practices.

8.1.2 Catchment and AFA-Level Physical Measures
No new Community-Level (AFA) Measures are proposed under this Plan.

8.1.3 Other Catchment and AFA-Level Measures
Measures may have been identified at the catchment or AFA-level in the Nanny-Delvin River Basin that do not involve physical works. Such measures might include:

− The need for further hydrometric monitoring / data gathering
− Further study or analysis (for example, in areas of high technical uncertainty)
− The operation of existing structures to manage water levels or flows

Measures relating to the operation of existing structures would typically be the responsibility of the ESB or Waterways Ireland, and represent ongoing practice or the enhancement of same.

For the remaining measures under this category, the OPW will advance these, subject to any licences and/or environmental assessments that may be required, as a matter of priority within available resources.

8.1.4 Public and Stakeholder Consultation and Engagement
The project development stage will involve a significant level of further public consultation on the proposed measures in the Plan at key points in the progress of the design work required to bring those measures to a state of readiness to submit for planning approval (in the case of projects being implemented by local authorities under the Planning and Development Acts) or for Public Exhibition (in the case of projects being implemented by the OPW under the Arterial Drainage Acts ADA). Public Information Days will be organised to inform the communities affected of the progress with the design of the proposed scheme.
In the case of schemes being implemented by the OPW under the ADA, the main public consultation event is the formal Public Exhibition stage. This involves the preparation of the scheme documentation (schedules setting out details and benefits of the scheme, including names of the proprietors, owners and occupiers of the lands with which the proposed scheme will interfere; maps, drawings, plans, sections setting out the technical detail; Environmental Impact Statement, if required; and Interference Notices sent to each affected person detailing the extent of works proposed on their respective lands or property and any proposed compulsory interference with, or acquisition of, these lands and property). All of the Scheme Documents are forwarded to the relevant Local Authority and they are also placed on formal Public Exhibition in a public building(s) in the area typically over a period of 4 weeks when interested parties and the public have the opportunity to study the proposals and make comments, observations, objections, etc. OPW staff and/or consultancy staff are available at Public Exhibition to answer queries and offer clarification. Interference Notices are also forwarded to affected parties in advance of the Exhibition period. All observations received are responded to and, if necessary, the scheme may be revised as a result of them. Following Public Exhibition, the scheme is submitted to the Minister for Finance and Public Expenditure and Reform for Confirmation (approval) of the Scheme.

The OPW is also considering suitable mechanisms at a national level to provide for consultation and engagement for the national flood risk management programme with stakeholders that have a national remit.

8.2 MONITORING OF PROGRESS IN IMPLEMENTATION OF THE PLAN

The OPW will monitor progress in the implementation of measures for which the OPW has responsibility on an ongoing basis as part of its normal business management processes.

The OPW will coordinate and monitor progress in the implementation of the Plans through an inter-departmental coordination group.

On a six-yearly cycle, the OPW will undertake a full review of the progress in the implementation of the Plan and the level of flood risk, and will report this progress publicly and to the European Commission as part of obligations of Ireland under the ‘Floods’ Directive.

In addition to monitoring of implementation of the measures set out in the Plan, monitoring will also be undertaken in relation to:

- Continued collection and analysis of hydro-meteorological data for improved flood flow and sea level frequency analysis and for observation of the potential impacts of climate change
- Ongoing recording of flood events though established systems, with photographs, peak water levels, duration, etc., for recording and publication on the National Flood Event Data Archive (www.floodinfo.ie)
- Monitoring of compliance with the Guidelines on the Planning System and Flood Risk Management through ongoing review of development plans, local area plans and other forward planning documents
- Changes that may affect the areas prone to flooding as shown on the flood maps, with the flood maps updated on an ongoing basis as necessary
8.3 ENVIRONMENTAL MONITORING

The SEA Directive requires that the significant environmental effects of the implementation of a plan are monitored in order to identify at an early stage unforeseen adverse effects and in order to undertake appropriate remedial action. For the other River Basin FRMPs in the Eastern CFRAM Study area the SEA Environmental Reports have proposed monitoring to be included within the Plans. In order to be consistent with other Eastern River Basin FRMPs, this monitoring is adopted with the Nanny – Delvin River Basin FRMP, even though it does not contain any structural measures or set a framework for development. The proposed monitoring programme in Table 8.1, is based on the Targets and Indicators established in the SEA Objectives and should be undertaken during development of the 2nd cycle of the Plans.

8.4 REVIEW OF THE PFRA, FLOOD MAPS AND THE PLANS

In accordance with the requirements of the EU 'Floods' Directive, the PFRA, flood maps and Plans will be reviewed on a six-yearly cycle, with the first reviews of the PFRA, maps and final Plans due by the end of 2018, 2019 and 2021 respectively.

The review of the PFRA is described in Section 3.3.

The review of the flood maps, on an ongoing basis and formally by the end of 2019, will take account of additional information received and/or physical amendments such as the construction of new infrastructure, and, where appropriate, the amendment of the flood maps.

It is anticipated that this review of the Plans will include any changes or updates since the publication of the Plans, including:

- A summary of the review of the PFRA and the flood maps, taking into account the potential impacts of climate change, including where appropriate the addition or removal of AFAs
- An assessment of the progress made towards the achievement of the flood risk management Objectives
- A description of, and an explanation for, any measures foreseen in the final version of the Plan which were planned to be undertaken and have not been taken forward
- A description of any additional measures developed and/or progressed since the publication of the Plan

The Review of the Plan, which will include assessments under SEA and Habitats Directives as appropriate, taking into account new information available at that time (e.g., as available from the Environmental Monitoring Framework and from the www.catchments.ie website), will be published in line with relevant legislation, following public and stakeholder engagement and consultation.
### Table 8.1 Environmental Monitoring of FRMP

<table>
<thead>
<tr>
<th>SEA Topic</th>
<th>Objective</th>
<th>Sub-Objective</th>
<th>Indicator</th>
<th>Possible Data and Responsible Authority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biodiversity, Flora and Fauna</td>
<td>Support the objectives of the Habitats Directive</td>
<td>i) Avoid detrimental effects to, and where possible enhance, Natura 2000 network, protected species and their key habitats, recognising relevant landscape features and stepping stones</td>
<td>Area, condition and trend of European sites and species in the Nanny – Delvin River Basin (European sites to review are those identified by AA Screening.)</td>
<td>NPWS – Conservation Action Plans&lt;br&gt;NPWS reporting on Ireland's Habitats and Species – Article 17 Reports.&lt;br&gt;NPWS reporting on the status of Ireland's Birds – Article 12 Reports.</td>
</tr>
<tr>
<td></td>
<td>Avoid damage to, and where possible enhance, the flora and fauna of the catchment</td>
<td>ii) Avoid damage to or loss of, and where possible enhance, nature conservation sites and protected species or other know species of conservation concern</td>
<td>Area, condition and trend of national, regional or local conservation sites in the Avoca-Nanny – Delvin River Basin (National sites to review are those identified in SEA Environmental Report.)</td>
<td>Local Authority – Local Area Plans and County Development Plans.&lt;br&gt;NPWS - Status of Protected Sites and Species in Ireland Reporting</td>
</tr>
<tr>
<td>Population and Human Health</td>
<td>Minimise risk to human health and life</td>
<td>i) Minimise risk to human health and life of residents</td>
<td>Residential property flooding in the Nanny – Delvin River Basin</td>
<td>OPW, Local Authority and Emergency Services Reporting.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii) Minimise risk to high vulnerability properties</td>
<td>High vulnerability sites impacted by flooding in the Nanny – Delvin River Basin</td>
<td>OPW, Local Authority and Emergency Services Reporting.</td>
</tr>
<tr>
<td>Geology, Soils and Landuse</td>
<td>Minimise risk to agriculture</td>
<td>i) Minimise risk to agriculture</td>
<td>Area of soil resource lost due to flooding and flood risk management in the Nanny – Delvin River Basin.</td>
<td>EPA - CORINE landcover mapping.&lt;br&gt;Local Area Plans and County Development Plans – myplan.ie</td>
</tr>
<tr>
<td>Water</td>
<td>Support the objectives of the WFD</td>
<td>i) Provide no impediment to the achievement of water body objectives and, if possible, contribute to the achievement of water body objectives</td>
<td>Status and status trend of waterbodies, where FRM activities are within and upstream of a waterbody.</td>
<td>EPA / ERBD – WFD status reporting and RBMPs.</td>
</tr>
<tr>
<td>Climate</td>
<td>Ensure flood risk management options are adaptable to future flood risk</td>
<td>i) Ensure flood risk management options are adaptable to future flood risk.</td>
<td>Requirement for adaptation of FRM management activities for climate change in the Nanny – Delvin River Basin.</td>
<td>OPW and Local Authority reporting.</td>
</tr>
<tr>
<td>Material Assets</td>
<td>Minimise risk to transport &amp; utility infrastructure</td>
<td>i) Minimise risk to transport infrastructure</td>
<td>Number and type of transport routes that have flooded in the Nanny – Delvin River Basin.</td>
<td>OPW, Local Authority and NRA reporting.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii) Minimise risk to utility infrastructure</td>
<td>Number and type of utilities that have flooded in the Nanny – Delvin River Basin.</td>
<td>OPW, Local Authority, ESB, Eirgrid, Eircom, BGE, Irish Water and EPA reporting.</td>
</tr>
<tr>
<td>Category</td>
<td>Description</td>
<td>KPI</td>
<td>Data Sources</td>
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<tr>
<td>Cultural Heritage</td>
<td>Avoid damage to or loss of features, institutions and collections of cultural heritage importance and their setting</td>
<td>i) Avoid damage to or loss of features, institutions and collections of architectural value and their setting.</td>
<td>Number of designated architectural heritage features, institutions and collections that have flooded in the Nanny – Delvin River Basin. OPW, Local Authority and DAHRRGA reporting. Archaeological Survey of Ireland Sites and Monuments Records</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii) Avoid damage to or loss of features, institutions and collections of archaeological value and their setting.</td>
<td>Number of designated archaeological heritage features, institutions and collections that have flooded in the Nanny – Delvin River Basin. OPW, Local Authority and DAHRRGA reporting. Archaeological Survey of Ireland Sites and Monuments Records</td>
<td></td>
</tr>
<tr>
<td>Landscape and Visual</td>
<td>Protect, and where possible enhance, landscape character and visual amenity within the river corridor</td>
<td>i) Protect, and where possible enhance, visual amenity, landscape protection zones and views into / from designated scenic areas within the river corridor.</td>
<td>Length of waterway corridor qualifying as a landscape protection zone within urban areas of Nanny – Delvin River Basin. Change of quality in existing scenic areas and routes in the Nanny – Delvin River Basin. Loss of public landscape amenities in the Nanny – Delvin River Basin. Local Authority – Landscape Character Assessments, County Development Plans and Local Area Plans. EPA - CORINE Landcover.</td>
<td></td>
</tr>
<tr>
<td>Fisheries, Aquaculture &amp; Angling</td>
<td>Protect, and where possible enhance, fisheries resource within the catchment</td>
<td>i) Maintain existing, and where possible create new, fisheries habitat including the maintenance or improvement of conditions that allow upstream migration for fish species.</td>
<td>Improvement or decline in fish stocks and habitat quality in the Nanny – Delvin River Basin. Barriers to fish movement within the Nanny – Delvin River Basin. IFI and WFD fish surveys and reports. Local fisheries reporting.</td>
<td></td>
</tr>
<tr>
<td>Amenity, Community &amp; Socio-Economics</td>
<td>Minimise risk to community</td>
<td>i) Minimise risk to social infrastructure and amenity</td>
<td>Social infrastructure and amenity assets impacted by flooding in the Nanny – Delvin River Basin. OPW and Local Authority reporting.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii) Minimise risk to local employment</td>
<td>Non-residential properties impacted by flooding in the Nanny – Delvin River Basin. OPW and Local Authority reporting.</td>
<td></td>
</tr>
</tbody>
</table>
### GLOSSARY AND ACRONYMS

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Annual Exceedance Probability Or AEP</td>
<td>The probability, typically expressed as a percentage, of a flood event of a given magnitude being equalled or exceeded in any given year. For example, a 1% AEP flood event has a 1%, or 1 in a 100, chance of occurring or being exceeded in any given year.</td>
</tr>
<tr>
<td>Appropriate Assessment</td>
<td>An assessment of the potential impacts of a plan or project on the integrity of a site designated as a Natura 2000 Site, as required under the Habitats Directive.</td>
</tr>
<tr>
<td>Area for Further Assessment Or AFA</td>
<td>Areas where, based on the Preliminary Flood Risk Assessment, the risks associated with flooding are considered to be potentially significant. For these areas further, more detailed assessment was required to determine the degree of flood risk, and develop measures to manage and reduce the flood risk. The AFAs were the focus of the CFRAM Studies.</td>
</tr>
<tr>
<td>Arterial Drainage Scheme</td>
<td>Works undertaken under the Arterial Drainage Act (1945) to improve the drainage of land. Such works were undertaken, and are maintained on an ongoing basis, by the OPW.</td>
</tr>
<tr>
<td>Benefiting Lands</td>
<td>Lands benefiting from an Arterial Drainage Scheme.</td>
</tr>
<tr>
<td>Catchment</td>
<td>The area of land draining to a particular point on a river or drainage system, such as an Area for Further Assessment (AFA) or the outfall of a river to the sea.</td>
</tr>
<tr>
<td>Catchment Flood Risk Assessment and Management Study Or CFRAM Study</td>
<td>A study to assess and map the existing and potential future flood hazard and risk from fluvial and coastal waters, and to define objectives for the management of the identified risks and prepare a Plan setting out a prioritised set of measures aimed at meeting the defined objectives.</td>
</tr>
<tr>
<td>Communities</td>
<td>Cities, towns, villages or townlands where there are a collection of homes, businesses and other properties.</td>
</tr>
<tr>
<td>Consequences</td>
<td>The impacts of flooding, which may be direct (e.g., physical injury or damage to a property or monument), a disruption (e.g., loss of electricity supply or blockage of a road) or indirect (e.g., stress for affected people or loss of business for affected commerce).</td>
</tr>
<tr>
<td>Drainage</td>
<td>Works to remove or facilitate the removal of surface or sub-surface water, e.g., from roads and urban areas through urban storm-water drainage systems, or from land through drainage channels or watercourses that have been deepened or increased in capacity.</td>
</tr>
<tr>
<td>Drainage District</td>
<td>Works across a specified area undertaken under the Drainage Acts to facilitate land drainage.</td>
</tr>
<tr>
<td>Flood</td>
<td>The temporary covering by water of land that is not normally covered by water.</td>
</tr>
<tr>
<td>‘Floods’ Directive</td>
<td>The EU ‘Floods’ Directive [2007/60/EC] is the Directive that came into force in November 2007 requiring Member States to undertake a PFRA to identify Areas for Further Assessment (AFAs), and then to prepare flood maps and Plans for these areas.</td>
</tr>
<tr>
<td>Flood Extent</td>
<td>The extent of land that has been, or might be, flooded. Flood extent is often represented on a flood map.</td>
</tr>
<tr>
<td>Flood Hazard Map</td>
<td>A map indicating areas of land that may be prone to flooding, referred to as a flood extent map, or a map indicating the depth, velocity or other aspect of flooding or flood waters for a given flood event. Flood hazard</td>
</tr>
</tbody>
</table>
maps are typically prepared for either a past event or for (a) potential future flood event(s) of a given probability.

**Flood Risk Map**
A map showing the potential risks associated with flooding. These maps may indicate a particular aspect of risk, taking into account the probability of flooding (e.g., annual average economic damages), but can also show the various receptors that could be affected by floods of different probabilities.

**Flood Risk Management Plan (Plan)**
A Plan setting out a prioritised set of measures within a long-term sustainable strategy aimed at achieving defined flood risk management objectives. The Plan is developed at a River Basin (Unit of Management) scale, but is focused on managing risk within the AFAs.

**Floodplain**
The area of land adjacent to a river or coastal reach that is prone to periodic flooding from that river or the sea.

**Fluvial**
Riverine, often used in the context of fluvial flooding, i.e., flooding from rivers, streams, etc.

**Habitats Directive**
The Habitats Directive [92/43/EEC] aims at securing biodiversity through the provision of protection for animal and plant species and habitat types of European importance.

**Hazard**
Something that can cause harm or detrimental consequences. In this context, the hazard referred to is flooding.

**Hydraulics**
The science of the behaviour of fluids, often used in this context in relation to estimating the conveyance of flood water in river channels or structures (such as culverts) or overland to determine flood levels or extents.

**Hydrology**
The science of the natural water cycle, often used in this context in relation to estimating the rate and volume of rainfall flowing off the land and of flood flows in rivers.

**Hydrometric Area**
Hydrological divisions of land, generally large catchments or a conglomerate of small catchments, and associated coastal areas. There are 40 Hydrometric Areas in the island of Ireland.

**Indicative**
This term is typically used to refer to the flood maps developed under the PFRA. The maps developed are approximate, rather than highly detailed, with some local anomalies.

**Individual Risk Receptor Or IRR**
A single receptor (see below) that has been determined to represent a potentially significant flood risk (as opposed to a community or other area at potentially significant flood risk, known as an Area for Further Assessment, or ‘AFA’).

**Inundation**
Another word for flooding or a flood (see ‘Flood’)

**Measure**
A measure (when used in the context of a flood risk management measure) is a set of works, structural and/or non-structural, aimed at reducing or managing flood risk.

**National CFRAM Programme**
The programme developed by the OPW to implement key aspects of the EU ‘Floods’ Directive in Ireland, which included the CFRAM Studies, and built on the findings of the PFRA.

**Pluvial**
Refers to rainfall, often used in the context of pluvial flooding, i.e., flooding caused directly from heavy rainfall events (rather than over-flowing rivers).

**Point Receptor**
Something that might suffer harm or damage as a result of a flood, that is at a particular location that does not cover a large area, such as a house, office, monument, hospital, etc.

**Possible Area for Further Assessment**
The Possible AFAs are those identified through the draft PFRA where some flood risk has been identified but which, subject to the outcomes of
public consultation and the Flood Risk Review, are not anticipated to be designated as AFAs.

**Preliminary Flood Risk Assessment Or PFRA**
An initial, high-level screening of flood risk at the national level to determine where the risks associated with flooding are potentially significant, to identify the AFAs. The PFRA is the first step required under the EU ‘Floods’ Directive.

**Probable Area for Further Assessment**
The Probable AFAs are those identified through the draft PFRA where significant flood risk has been identified and which, subject to the outcomes of public consultation and the Flood Risk Review, are anticipated to be designated as AFAs.

**Public Consultation Day Or PCD**
A public and stakeholder consultation and engagement event advertised in advance, where the project team displayed and presented material (e.g., flood maps, flood risk management options) at a venue within a community, with staff available to explain and discuss the material, and where members of the community and other interested parties could provide local information and put forward their views.

**Receptor**
Something that might suffer harm or damage as a result of a flood, such as a house, office, monument, hospital, agricultural land or environmentally designated sites.

**Return Period**
A term that was used to describe the probability of a flood event, expressed as the interval in the number of years that, on average over a long period of time, a certain magnitude of flood would be expected to occur. This term has been replaced by ‘Annual Exceedance Probability, as Return Period can be misleading.

**Riparian**
River bank. Often used to describe the area on or near a river bank that supports certain vegetation suited to that environment (Riparian Zone).

**Risk**
The combination of the probability of flooding, and the consequences of a flood.

**River Basin**
An area of land (catchment) draining to a particular estuary or reach of coastline.

**River Basin District Or RBD**
A regional division of land defined for the purposes of the Water Framework Directive. There are eight RBDs in the island of Ireland; each comprising a group of River Basins.

**Riverine**
Related to a river

**Runoff**
The flow of water over or through the land to a waterbody (e.g., stream, river or lake) resulting from rainfall events. This may be overland, or through the soil where water infiltrates into the ground.

**Sedimentation**
The accumulation of particles (of soil, sand, clay, peat, etc.) in the river channel

**Significant Risk**
Flood risk that is of particular concern nationally. The PFRA Main Report (see www.floodinfo.ie) sets out how significant risk is determined for the PFRA, and hence how Areas for Further Assessment have been identified.

**Strategic Environmental Assessment Or SEA**
An SEA is an environmental assessment of plans and programmes to ensure a high level consideration of environmental issues in the plan preparation and adoption, and is a requirement provided for under the SEA directive [2001/42/EC]

**Standard of Protection Or SoP**
The magnitude of flood, often defined by the annual probability of that flood occurring being exceeded (the Annual Exceedance Probability, or ‘AEP’), that a measure / works is designed to protect the area at risk against.

**Surface Water**
Water on the surface of the land. Often used to refer to ponding of rainfall unable to drain away or infiltrate into the soil.
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surge</td>
<td>The phenomenon of high sea levels due to meteorological conditions, such as low pressure or high winds, as opposed to the normal tidal cycles</td>
</tr>
<tr>
<td>Survey Management Project</td>
<td>A project commissioned by the OPW in advance of the CFRAM Studies to specify and manage a large proportion of the survey work.</td>
</tr>
<tr>
<td>Sustainability</td>
<td>The capacity to endure. Often used in an environmental context or in relation to climate change, but with reference to actions people and society may take.</td>
</tr>
<tr>
<td>Tidal</td>
<td>Related to the tides of the sea / oceans, often used in the context of tidal flooding, i.e., flooding caused from high sea or estuarine levels.</td>
</tr>
<tr>
<td>Topography</td>
<td>The shape of the land, e.g., where land rises or is flat.</td>
</tr>
<tr>
<td>Transitional Water</td>
<td>The estuarine or inter-tidal reach of a river, where the water is influenced by both freshwater river flow and saltwater from the sea.</td>
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<tr>
<td>Unit of Management Or UoM</td>
<td>A hydrological division of land defined for the purposes of the Floods Directive. One Plan has been prepared for each Unit of Management, which is referred to within the Plan as a River Basin.</td>
</tr>
<tr>
<td>Vulnerability</td>
<td>The potential degree of damage to a receptor (see above), and the degree of consequences that could arise in the event of a flood.</td>
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<tr>
<td>Waterbody</td>
<td>A term used in the Water Framework Directive (see below) to describe discrete section of rivers, lakes, estuaries, the sea, groundwater and other bodies of water.</td>
</tr>
<tr>
<td>Water Framework Directive Or WFD</td>
<td>The Water Framework Directive [2000/60/EC] aims to protect surface, transitional, coastal and ground waters to protect and enhance the aquatic environment and ecosystems and promote sustainable use of water resources</td>
</tr>
</tbody>
</table>
# LIST OF ACRONYMS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA</td>
<td>Appropriate Assessment</td>
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<tr>
<td>AEP</td>
<td>Annual Exceedance Probability</td>
</tr>
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<td>AFA</td>
<td>Area for Further Assessment</td>
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<td>AR5</td>
<td>5th Assessment Report (IPCC)</td>
</tr>
<tr>
<td>BCR</td>
<td>Benefit - Cost Ratio</td>
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<tr>
<td>CFRAM</td>
<td>Catchment-Based Flood Risk Assessment and Management</td>
</tr>
<tr>
<td>DHPLG</td>
<td>Department of Housing, Planning and Local Government</td>
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<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
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<td>EPA</td>
<td>Environmental Protection Agency</td>
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<td>ESB</td>
<td>Electricity Supply Board</td>
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<td>EU</td>
<td>European Union</td>
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<tr>
<td>FRMP</td>
<td>Flood Risk Management Plan</td>
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<td>FRR</td>
<td>Flood Risk Review</td>
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<tr>
<td>HEFS</td>
<td>High-End Future Scenario</td>
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<tr>
<td>HPW</td>
<td>High Priority Watercourse</td>
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<tr>
<td>INFF</td>
<td>Irish National Flood Forum</td>
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<tr>
<td>IPCC</td>
<td>Intergovernmental Panel on Climate Change</td>
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<tr>
<td>IROPI</td>
<td>Imperative Reasons of Over-riding Public Interest</td>
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<tr>
<td>MCA</td>
<td>Multi-Criteria Analysis</td>
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<tr>
<td>MPW</td>
<td>Medium Priority Watercourse</td>
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<td>MRFS</td>
<td>Mid-Range Future Scenario</td>
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<td>NCCAF</td>
<td>National Climate Change Adaptation Framework</td>
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<td>OPW</td>
<td>Office of Public Works</td>
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<td>PCD</td>
<td>Public Consultation day</td>
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<td>PFRA</td>
<td>Preliminary Flood Risk Assessment</td>
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<td>RBD</td>
<td>River Basin District</td>
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<tr>
<td>RBMP</td>
<td>River Basin Management Plan</td>
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<tr>
<td>SAC</td>
<td>Special Area of Conservation</td>
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<tr>
<td>SEA</td>
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<td>SFRA</td>
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<td>WFD</td>
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APPENDIX A

FLOODING AND FLOOD RISK

A.1 INTRODUCTION
A flood is defined in the 'Floods' Directive as a "temporary covering by water of land not normally covered by water", i.e., the temporary inundation of land that is normally dry. Flooding is a natural process that can happen at any time in a wide variety of locations.

Flood hazard is the potential threat posed by flooding to people, property, the environment and our cultural heritage. The degree of hazard is dependent on a variety of factors that can vary from location to location and from one flood event to another. These factors include the extent and depth of flooding, the speed of the flow over the floodplains, the rate of onset and the duration of the flood.

Flooding only presents a risk however when people, property, businesses, farms, infrastructure, the environment or our cultural heritage can be potentially impacted or damaged by floods. Flood risk is the combination of the probability of flood events of different magnitudes and the degree of the potential impact or damage that can be caused by a flood. The actual damage that can be caused depends on the vulnerability of society, infrastructure and our environment to damage or loss in the event of a flood, i.e., how sensitive something is to being damaged by a flood.

A.2 Types and Causes of Flooding
Flooding can occur from a range of sources, individually or in combination, as described below.

A.2.1 Coastal Flooding
Coastal flooding occurs when sea levels along the coast or in estuaries exceed neighbouring land levels, or overcome coastal defences where these exist, or when waves overtop the coastline or coastal defences. Mean sea levels around Ireland are rising (Dwyer and Devoy, 2012), and are expected to continue to rise due to climate change in the range of 0.52 to 0.98m (IPCC, 2014) by 2100, with an associated increase in flood risk from the sea over the coming decades.

Coastal flooding can also occur in the form of tsunami, and Ireland has suffered from tsunami flooding in the past\(^1\). It was determined during the Preliminary Flood Risk Assessment (PFRA, see Section 3) however that this cause of flooding is not, on the basis of our current understanding, a significant cause of flood risk in Ireland, although further investigation is required on this matter. As a result, tsunami risk is not addressed in this Plan.

A.2.2 Fluvial Flooding
Fluvial flooding occurs when rivers and streams break their banks and water flows out onto the adjacent low-lying areas (the natural floodplains). This can arise where the runoff from heavy rain exceeds the natural capacity of the river channel, and can be exacerbated where a channel is blocked or constrained or, in estuarine areas, where high tide levels impede the flow of the river out into the sea. While there is a lot of uncertainty on the

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\(^1\) The tsunami that devastated Lisbon, Portugal in 1755 also hit the south coast of Ireland according to records of that time, and there are reports of tsunami-like flood events around the South coast from 1761 and 1854 (Pers comm., GSI)
impacts of climate change on rainfall patterns, there is a clear potential that fluvial flood risk could increase into the future.

A.2.3 Pluvial Flooding
Pluvial flooding occurs when the amount of rainfall exceeds the capacity of urban storm water drainage systems or the infiltration capacity of the ground to absorb it. This excess water flows overland, ponding in natural or man-made hollows and low-lying areas or behind obstructions. This occurs as a rapid response to intense rainfall before the flood waters eventually enter a piped or natural drainage system. This type of flooding is driven in particular by short, intense rain storms.

A.2.4 Groundwater Flooding
Groundwater flooding occurs when the level of water stored in the ground rises as a result of prolonged rainfall, to meet the ground surface and flows out over it, i.e. when the capacity of this underground reservoir is exceeded. Groundwater flooding results from the interaction of site-specific factors such as local geology, rainfall infiltration routes and tidal variations. While the water level may rise slowly, it may cause flooding for extended periods of time. Hence, such flooding may often result in significant damage to property or disruption to transport. In Ireland, groundwater flooding is most commonly related to turloughs in the karstic limestone areas prevalent in particular in the west of Ireland.

A.2.5 Other Causes of Flooding
The above causes of flooding are all natural; caused by either extreme sea levels or heavy or intense rainfall. Floods can also be caused by the failure or exceedance of capacity of built or man-made infrastructure, such as bridge collapses, from blocked piped sewerage networks, or the failure or over-topping of reservoirs or other water-retaining embankments (such as raised canals). While it is recognised that some of these other sources may cause local problems, it was determined during the PFRA (see Section 3) however that these causes of flooding are not, in the context of the national flood risk and on the basis of our current understanding, causes of significant flood risk, or can not always be foreseen, and hence are not addressed in the Plan.

A.3 IMPACTS OF FLOODING
A.3.1 Impacts on people and society
Floods can cause physical injury, illness and loss of life. Deep, fast flowing or rapidly rising flood waters can be particularly dangerous. For example, even shallow water flowing at 2 metres per second (m/sec) can knock children and many adults off their feet, and vehicles can be moved by flowing water of only 300mm depth. The risks increase if the floodwater is carrying debris. Some of these impacts may be immediate, the most significant being drowning or physical injury due to being swept away by floods. Floodwater contaminated by sewage or other pollutants (e.g. chemicals stored in garages or commercial properties) can also cause illnesses, either directly as a result of contact with the polluted floodwater or indirectly, as a result of sediments left behind. Those most likely to be at risk are people living in a single-storey bungalow or below ground in a basement, those outdoors on foot or in a vehicle, or people staying in a tent or caravan. As well as the immediate dangers, the impact on people and communities as a result of the stress and trauma of being flooded or having access to their property cut-off by floodwaters, or even of being under the threat of flooding, can be immense. Long-term impacts can arise due to chronic illnesses and the stress associated with being flooded and the lengthy recovery process.

The ability of people to respond and recover from a flood can vary. Vulnerable people, such as the elderly, people with mobility difficulties or those who have a long-term illness,
are potentially less able to respond to a flood emergency. Some people may have difficulty in replacing household items damaged in a flood and may lack the financial means to recover and maintain acceptable living conditions after a flood.

Floods can also cause impacts on communities as well as individuals through the temporary, but sometimes prolonged, loss of community services or infrastructure, such as schools, health services, community centres or amenity assets.

A.3.2 Impacts on property
Flooding can cause severe damage to properties. Floodwater is likely to damage internal finishes, contents and electrical and other services and possibly cause structural damage. The physical effects can have severe long-term impacts, with re-occupation sometimes not being possible for over a year. The costs of flooding are increasing, partly due to increasing amounts of electrical and other equipment within developments. The degree of damage generally increases with the depth of flooding, and sea-water flooding may cause additional damage due to corrosion.

Flooding can also cause significant impacts to agriculture. A certain level of flooding is intrinsic in certain areas, and agricultural management takes this into account, however extreme or summer flooding can have detrimental impacts through loss of production, as well as damage to land and equipment.

A.3.3 Impacts on Infrastructure
The damage flooding can cause to businesses and infrastructure, such as transport or utilities like electricity, gas and water supply, can have significant detrimental impacts on individuals and businesses and also local and regional economies. Flooding of primary roads or railways can deny access to large areas beyond those directly affected by the flooding for the duration of the flood event, as well as causing damage to the road or railway itself. Flooding of water distribution infrastructure such as pumping stations or of electricity sub-stations can result in loss of water or power supply over large areas. This can magnify the impact of flooding well beyond the immediate community. The long-term closure of businesses, for example, can lead to job losses and other economic impacts.

A.3.4 Impacts on the Environment
Detrimental environmental effects of flooding can include soil and bank erosion, bed erosion or siltation, land slides and damage to vegetation and species that are not resilient against flooding, as well as the impacts on water quality, habitats and flora and fauna caused by pollutants carried by flood water. Flooding can however be a necessary element of natural and semi-natural habitats. Many wetland habitats are dependent on continual or periodic flooding for their sustainability and can contribute to the storage of flood waters to reduce flood risk elsewhere.

A.3.5 Impacts on our Cultural Heritage
In the same way as flooding can damage properties, flood events can damage or destroy assets or sites of cultural heritage value. Particularly vulnerable are monuments, structures or assets (including building contents) made of wood or other soft materials, such as works of art and old paper-based items such as archive records, manuscripts or books. Soil erosion during flood events could also destroy buried heritage and archaeological sites.

A.4 Potential Impacts of Future Change
It is likely that climate change will have a considerable impact on flood risk in Ireland, such as through rising mean sea levels, increased wave action and the potential increases in winter rainfall and intense rainfall events. Land use change, for example through new housing and other developments, can also increase potential future flood risk.
APPENDIX B

PHYSICAL OVERVIEW OF THE RIVER BASIN

B.1 TOPOGRAPHY, GEOLOGY, SOILS AND GROUNDWATER

Further detail on the topography, geology, soils and groundwater in the Nanny-Delvin River Basin is available in the FEM-FRAMS documents on www.floodinfo.ie

B.2 LAND USE AND LAND MANAGEMENT

Further detail on land use and land use management in the Nanny-Delvin River Basin is available in the FEM-FRAMS documents on www.floodinfo.ie.
APPENDIX C

SUMMARY OF THE PRELIMINARY FLOOD RISK ASSESSMENT

C.1 INTRODUCTION
The Preliminary Flood Risk Assessment (PFRA) is a national screening exercise, based on available and readily-derivable information, to identify areas where there may be a significant risk associated with flooding.

The PFRA in Ireland was finalised in December 2011, following public consultation.

C.2 OVERVIEW OF THE PFRA
The objective of the PFRA is to identify areas where the risks associated with flooding might be significant. These areas (referred to as Areas for Further Assessment, or ‘AFAs’) are where more detailed assessment will then be undertaken to more accurately assess the extent and degree of flood risk, and, where the risk is significant, to develop where possible measures to manage and reduce the risk. The more detailed assessment, that focussed on the AFAs, was undertaken through the National CFRAM Programme or parallel studies.

It is important to note that the PFRA is not a detailed assessment of flood risk. It is rather a broad-scale assessment, based on available or readily-derivable information, to identify where there is a genuine cause for concern that may require national intervention and assessment, rather than locally developed and implemented solutions.

Three key approaches have been used in undertaking the PFRA to identify the AFAs. These are:

− Historic Analysis: The use of information and records on floods that have happened in the past
− Predictive Analysis: Undertaking analysis to determine which areas might flood in the future, as determined by predictive techniques such as modelling, analysis or other calculations, and of the potential damage that could be caused by such flooding
− Consultation: The use of local and expert knowledge of the local authorities and other Government departments and agencies to identify areas prone to flooding and the potential consequences that could arise

The assessment considered all types of flooding, including natural sources, such as that which can occur from rivers, the sea and estuaries, heavy rain and groundwater, and the failure of built infrastructure. It has also considered the impacts flooding can have on people, property, businesses, the environment and cultural heritage.

Other EU Member States have used similar approaches to undertaking the PFRA as that undertaken in Ireland.

The ‘Floods’ Directive does not provide a definition for ‘significant’ flood risk. A highly prescriptive definition is not suitable given the preliminary nature of the PFRA, and so a set of guiding principles were defined. It should however be remembered that, while flooding of one home will be traumatic to the owner or residents of that home, the PFRA needs to consider what is nationally or regionally significant flood risk.
The provisional identification of the AFAs has involved interpretation of information from all three of the above approaches. The final designation of the AFAs also took into account information and views provided through the public consultation and arising from on-site inspections that were undertaken in parallel with the consultation.

C.3 PUBLIC CONSULTATION ON THE PFRA

The ‘Floods’ Directive requires Member States to publish the PFRA once completed. However, the OPW has also publicly consulted on a draft of the PFRA before it was finalised, published and reported to the European Commission.

Consultation with various bodies has been undertaken during the preparation of the draft PFRA, which has included two rounds of workshops (Summer 2010 and Winter 2010-2011) involving all local authorities. During these workshops, the local authorities provided information on areas known or suspected to be at risk from flooding, and reviewed provisional Areas for Further Assessment (AFAs) identified by the OPW in relation to fluvial and coastal flood risk.

Consultation was also held with the following organisations to inform the process and draft outcomes of the PFRA:
- Dept. of Agriculture, Food and the Marine
- Dept. of Culture, Heritage and the Gaeltacht
  - National Monuments
  - National Parks and Wildlife Service
- Environmental Protection Agency
- ESB
- Geological Survey of Ireland
- Health Service Executive
- Transport Infrastructure Ireland (formerly National Roads Authority)
- Waterways Ireland

Discussions were also held with utility operators in relation to the location and potential vulnerability of utility infrastructure.

The OPW published the Draft PFRA for consultation on the National CFRAM Programme website (now closed) in August 2011, and placed it on public exhibition in the principal offices of all city and county councils on the same date. While not a requirement of the Directive, SI No. 122 of 2010 set out a requirement for public consultation on the PFRA. The public consultation period began upon publication of the PFRA and extended to 1st November 2011. Submissions were invited in writing, by email, or via the website.

A total of 52 submissions were received under the public consultation process. A breakdown of the source of submissions is set out below:
- County and City Councils 18
- Councillors 4
- Members of the Public 15
- Community Groups / Associations 5
- Other 10

The principal issues raised in the submissions include the following:
– Recommendations for the inclusion of locations for designation as AFAs, and / or expressions of concern related to past flooding, or the potential for flooding, of a particular location
– Comments that certain bodies, and / or their past or ongoing actions, were responsible for causing or aggravating flooding or flood problems
– Requests for inclusion in the consultation / engagement process for the CFRAM Studies
– Comments relating to past planning decisions and / or recommendations for changes to planning law
– Queries on the accuracy of, or suggested correction to, the PFRA maps
– Recommendations as to how flood risk in a location / region could be managed, or concerns as to how future flood risk management could have detrimental impacts

Only a very small number of submissions (7) included comments (positive or negative) on the PFRA process and / or the PFRA consultation process. These were carefully considered by the OPW and it was concluded that there was no basis to amend the PFRA process given nature of the exercise.

All submissions were also considered, in parallel with the findings of the Flood Risk Review (see below), in the final designation of the AFAs.

C.4 FLOOD RISK REVIEWS
To assist in the final designation of AFAs, it was deemed appropriate that the probable and possible AFAs be inspected on-site, informed by the PFRA data and findings, by suitably qualified professionals.

The on-site inspections, referred to as Flood Risk Reviews (FRRs), were undertaken by the Consultants. The inspections included a prior review of available relevant information (such as the PFRA data and findings), interviews with local residents and / or local authority staff (where possible), and an on-site inspection of the AFA to confirm, through duly informed professional opinion, the likely flood extents and potential receptors.

Following the FRR, the consultants submitted to the OPW FRR reports that set out the FRR process, described their findings and made recommendations as to whether or not a location should be designated as an AFA. The final FRR reports are available from the OPW website (www.floodinfo.ie).

The CFRAM Steering and Progress Groups (comprising representatives of the local authorities, regional authorities and the EPA as well as of the OPW 2) considered the FRR reports and their recommendations, and expressed their opinions on the designation of AFAs to the OPW. The OPW has taken these opinions into consideration in the final designation of AFAs.

C.5 OUTCOMES OF THE PFRA
The communities designated as AFAs are set out in Section 3 herein.

Full information on the PFRA, including the outcomes nationally, are set out in the Main Report of the PFRA and the Report on the Designation of the Areas for Further Assessment, which are both available from the OPW website (www.floodinfo.ie).

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2 Representatives of the Rivers Agency of Northern Ireland are also members of the Steering and Progress Groups for CFRAM Studies that cover cross-border catchments.
APPENDIX D
STAKEHOLDER AND PUBLIC ENGAGEMENT AND CONSULTATION

APPENDIX D.1 Membership of the National CFRAM Steering Group
- Office of Public Works
- County and City Managers Association
- Dept. Housing, Planning and Local Government
- Dept. Agriculture, Food and the Marine
- Dept. of Culture, Heritage and the Gaeltacht
- Environmental Protection Agency
- Electricity Supply Board
- Geological Survey of Ireland (Dept. of Communications, Climate action and Environment)
- Irish Water
- Met Eireann
- Office of Emergency Planning
- Rivers Agency (Northern Ireland)
- Waterways Ireland

APPENDIX D.2 Membership of the Eastern CFRAM Steering Group
- Office of Public Works
- RPS
- Environmental Protection Agency
- WFD Local Authorities Water and Communities Office LAWCO
- Cavan County Council
- Dún Laoghaire - Rathdown County Council
- Dublin City Council
- Fingal County Council
- Kildare County Council
- Kilkenny County Council
- Louth County Council
- Meath County Council
- Offaly County Council
- South Dublin County Council
- Westmeath County council
- Wexford County Council
- Wicklow county Council
- ERBD WFD
- Mid-East Regional Authority
- Dublin and Mid-Eastern Regional Authority
### APPENDIX D.3 Organisations Invited to Meetings of the National Stakeholder Group

**Table D.3 Organisations Invited to Meetings of the National Stakeholder Group**

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<td>Badgerwatch</td>
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## APPENDIX D.4 Organisations Represented at Meetings of the Eastern CFRAM Stakeholder Group

### Table D.4 Organisations Represented at Meetings of the Eastern CFRAM Stakeholder Group

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APPENDIX D.5 Public Consultation Days Held at the Draft Flood Risk Management Plan Stage in the Nanny-Delvin River Basin

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APPENDIX E

DESCRIPTION OF THE FLOOD RISK IN EACH AFA

The flood risk assessment for the Nanny-Delvin River Basin was completed under the FEM-FRAMS and it was not updated for the purposes of developing the Plan for the Nanny-Delvin River Basin.
APPENDIX F

METHODS OF FLOOD RISK MANAGEMENT

There are a wide range of different approaches, or methods, that can be taken to reduce or manage flood risk. These can range from non-structural methods, that do not involve any physical works to prevent flooding but rather comprise actions typically aimed at reducing the impacts of flooding, to structural works that reduce flood flows or levels in the area at risk or that protect the area against flooding.

The range of methods for managing flood risk that are considered include those outlined below.

F.1 FLOOD RISK PREVENTION METHODS

Flood risk prevention measures are aimed at avoiding or eliminating a flood risk. This can be done by not creating new assets that could be vulnerable to flood damage in areas prone to flooding, or removing such assets that already exist. Alternatively, prevention can be achieved by completely removing the potential for flooding in a given area, although in practice this is rarely possible (the frequency or magnitude of flooding can be reduced by flood protection measures, but it is generally not possible to remove the risk of flooding entirely).

Flood prevention is hence generally focussed on sustainable planning and / or the re-location of existing assets, such as properties or infrastructure.

F.1.1 Sustainable Planning and Development Management

In November 2009, the Guidelines on the Planning System and Flood Risk Management, jointly developed by DHPLG and the OPW, were published under Section 28 of the Planning Acts. These Guidelines provide a systematic and transparent framework for the consideration of flood risk in the planning and development management processes, whereby:

− A sequential approach should be adopted to planning and development based on avoidance, reduction and mitigation of flood risk.
− A flood risk assessment should be undertaken that should inform the process of decision-making within the planning and development management processes at an early stage.
− Development should be avoided in floodplains unless there are demonstrable, wider sustainability and proper planning objectives that justify appropriate development and where the flood risk to such development can be reduced and managed to an acceptable level without increasing flood risk elsewhere (as set out through the Justification test).

The proper application of the Guidelines by the planning authorities is essential to avoid inappropriate development in flood prone areas, and hence avoid unnecessary increases in flood risk into the future, and to take a precautionary approach in regards to the potential impacts of climate change on flood risk that should be addressed in spatial plans, planning decisions and through Local Adaptation Plans. The flood mapping produced through the CFRAM Programme and parallel projects provided as part of the Plan will facilitate the application of the Guidelines.
In flood-prone areas where development can be justified (i.e., re-development, infill development or new development that has passed the Justification Test), the planning authorities can manage the risk by setting suitable objectives or conditions, such as minimum floor levels or flood resistant or resilient building methods.

F.1.2 Sustainable Urban Drainage Systems (SUDS)
Development of previously ‘green’, or permeable, land within an urban area increases the impermeable area, reducing infiltration and increasing runoff rates and volumes. Traditional urban storm water drainage systems are effective at transferring surface water quickly, but they provide only limited attenuation causing the volume of water in the receiving watercourse to increase more rapidly and increasing flood risk. Sustainable Drainage Systems (SUDS) can play a role in reducing and managing run-off to surface water drainage systems as well as improving water quality and contributing to local amenity. SUDS comprise a wide range of techniques, including swales, basins, ponds and infiltration systems.

In accordance with the Guidelines (see Section 7.2.1.1), planning authorities should seek to reduce the extent of hard surfacing and paving and require the use of sustainable drainage techniques to reduce the potential impact of development on flood risk downstream.

F.1.3 Voluntary Home Relocation
In extreme circumstances, the flood risk to a home may be such that the home owner may consider that continuing to live in the property is not sustainable and would choose to relocate.

F.1.4 Preparation of Local Adaptation Planning
It is likely that climate change will have a considerable impact on flood risk in Ireland, such as through rising mean sea levels and the potential increases in winter rainfall and intense rainfall events. For example, it is known that sea levels are rising at a rate of more than 3mm/yr at present, and the Fifth Assessment Report (AR5) of the Inter-Governmental Panel on Climate Change (IPCC) projects that mean sea level is likely to rise between 0.52m and 0.98m by the end of the century. The flood risk assessment for the future scenarios, described in Section 5 herein, highlight the potential impacts of such changes. More recent research (Jevrejeva et al. 2014) indicates that it is plausible that mean sea level may rise by up to approximately 2m by the end of the century.

The Climate Action and Low Carbon Development Act, 2015, required that the Minister for Communications, Climate Action and Environment prepare a National Climate Change Adaptation Framework (NCCAF) that shall specify the national strategy for the application of adaptation measures in different sectors and by a local authority in its administrative area in order to reduce the vulnerability of the State to the negative effects of climate change. The consultation document on the NCCAF (DCCAE, March 2016) noted that as the impacts of climate change vary by region, adaptation requires locally specific, place-based responses, and that Building resilience to the impacts of the climate change at local level for communities and businesses can be achieved in an effective manner if it is integrated into existing planning frameworks and policies under the remit of the local government sector. The NCCAF was published in January 2018 and sets out that local level adaptation measures will be identified in Local Adaptation Strategies prepared by the relevant local authority and implemented through inclusion in relevant plans and policies under the local authority’s remit. To this end, local authorities should take into account the potential impacts of climate change on flooding and flood risk in their planning for local adaptation, in particular in the areas of spatial planning and the planning and design of infrastructure.
F.1.5 Land Use Management and Natural Flood Risk Management Measures

Flood flows depend on how much rain falls in the catchment and the pattern of rainfall, and also on how much and how rapidly the rain runs off the land into the river. The volume and rate of runoff can be reduced by changing land use practices, such as by reducing stocking rates, changing the way ploughing is undertaken (e.g., along contours rather than perpendicular to contours), the retention, protection and/or rewetting of peatlands and bogs and by planting hedgerows across hillsides.

Similarly, excess runoff can be stored in wetlands, micro-detention basins, or be attenuated in small streams and channels through the use of obstructions to flow, such as large woody-debris dams. While such measures have been shown to reduce flood peaks in small catchments and frequent, less severe flood events, they may be less effective for more severe floods and in larger catchments and often require very significant land owner engagement for implementation (EU, 2014).

These types of measures will often not be able to solve severe flood problems on their own, but they have the potential to form part of the solution and can also help to achieve the goals in a range of areas, including water quality, nature conservation / biodiversity, agriculture and forestry, green growth and climate change mitigation and adaptation (EU, 2014), and as such would be best addressed on a multi-sectoral level in partnership with all relevant agencies, to promote integrated catchment management.

F.2 Flood Protection Methods

Flood protection measures are aimed at reducing the likelihood and/or the severity of flood events. These measures, typically requiring physical works, can reduce risk in a range of ways, such as by reducing or diverting the peak flood flows, reducing flood levels or holding back flood waters. The preferred Standard of Protection offered by such measures in Ireland is the current scenario 1% Annual Exceedance Probability (AEP) flood for fluvial flooding and 0.5 % AEP flood for tidal flooding (also referred to as the 100-year and 200-year floods respectively), although these standards can increase or decrease depending on local circumstances.

A description of the protection measures typically considered is provided below.

F.2.1 Enhance Existing Protection Works

Flood protection works will provide flood protection up to a certain 'Standard of Protection' and, depending on the type of protection measure, may reduce the severity of flooding above this Standard. The Standard of Protection is the magnitude of flood, often defined by the annual probability of that flood occurring being exceeded (the Annual Exceedance Probability, or 'AEP'), that the measure is designed to protect the area at risk against.

In some locations where existing flood protection works exist, measures can be taken, in addition to the necessary ongoing maintenance, to improve the condition of the works to reduce the likelihood of failure, and/or increase the Standard of Protection to further reduce the risk in, and extend, the protected area. This can apply to both structures that were deliberately built as flood protection works, and also other structures (e.g., quay walls, road embankments) that provide some flood protection as a secondary function.

Some natural features can provide defences against floods, or form part of a defence in depth. For example sand dunes and flood marshes often form effective barriers against flooding in coastal areas. These features may be vulnerable to rapid erosion and some enhancement may be useful to retain the feature and their effectiveness in providing a defence function.
F.2.2. Flood Defences
Solid structures built between the source of flood waters (rivers, estuaries or the sea) and an area vulnerable to flooding (people, properties, land and other assets) can prevent flooding up to the Standard of Protection of the structure, hence reducing the flood risk in the area being protected by the structure. Such structures typically include walls (generally in urban areas with limited space) or embankments (generally in rural areas and in urban areas where space is available, such as parks), but can also include other built or natural structures, such as sand dunes. However, the residual risk of flooding which remains after a defence is constructed, which arises as a flood in excess of the design standard of the defence may occur, also needs to be carefully considered during design.

Figure F.1: Flood Defence Wall

Figure F.2: Flood Defence Embankment (During Construction / Maintenance)
F.2.3 Increasing Channel Conveyance

The water level of a river is determined by the flow and the hydraulic characteristics of the river, any structures (e.g., bridges, weirs, walls) in, alongside and over the river and, when in flood, of the floodplain. The hydraulic characteristics determine the conveyance of the river, and changing these characteristics can reduce the water level for a given flow. This can be achieved by works such as dredging to deepen and/or widen the river, reducing the roughness of the rivers, its banks and floodplain to allow more flow to pass, or removing or altering structures to reduce the build up of water upstream of the structure.

Figure F.3: River Widening (During Construction)

Figure F.4: River Widening (After Construction)
By increasing channel (and floodplain) conveyance, river levels during a flood can be lowered, hence reducing the likelihood and severity of flooding. This can be to the point that flooding during events up to the design Standard of Protection is avoided, but this type of measure has the advantage that it also reduces the risk for floods greater than the design Standard of Protection.

This type of measure is typically only applicable for river flooding.

**F.2.4 Diverting Flood Flows**
Flooding of an area from a river occurs because the quantity of flow flowing through an area exceeds the conveyance capacity of the channel and so the river spills out on to its floodplain. Reducing the flow through an area in the event of a flood can reduce the likelihood of flooding for that area, and this can be achieved by diverting some of the flows around the area of risk through a flood diversion channel or across a designated area of land.

**F.2.5 Storing Flood Waters**
Instead of diverting excess flood waters to reduce the flow through an area at risk, the flow can also be reduced by storing flood waters upstream of the area.

This can be in large, single flood attenuation structures, in wash-lands on the floodplain or in multiple, smaller storage areas dispersed around the catchment. Storage using soft measures, such as wetlands or micro-detention basins, or through attenuation in small channels, is generally considered to be part of land use management, or natural flood risk management (see Section 7.2.2.7).

Floods can also be attenuated (i.e., the flood slowed down, the peak flow reduced and the flood volume spread over a longer period of time) by measures along the river and floodplain, e.g., increasing channel and floodplain roughness (introducing impediments to flow in the river, or on floodplains, such as by increasing riparian vegetation or planting hedgerows) or by restoring meanders.

Such measures are often referred to as natural water retention measures or natural flood management. While these have been shown to reduce flood flows in smaller, more common floods, it is understood that their impact in larger, more extreme or rare floods, is reduced. Further research is required on this matter. However, such measures can have significant benefits for environmental enhancement, such as contributing to the objectives of the Water Framework Directive or increasing biodiversity.

**F.2.6 Implementing Channel Maintenance Programmes**
Excess silt and gravels deposited in watercourses and vegetation in and on the banks of river channels, or the blockage of channels by discarded rubbish or bulky objects in urban areas, can reduce the conveyance of a channel, increasing flood levels in the event of a flood and hence increasing the flood risk in the surrounding area. The blockage of culvert screens by debris and rubbish can also increase flood risk.

A regular maintenance programme to remove excess inorganic material, vegetation and/or remove debris and rubbish from river channels, and ensure that culvert screens are kept clear, can help reduce flood levels during flood events.

**F.2.7 Maintenance of Drainage Schemes**
Following the passing of the Arterial Drainage Act, 1945, the OPW began investigations to determine where Arterial Drainage Schemes would be suitable and economically viable. The implementation of the Schemes began in the late-1940s and continued into the early-
1990s, and a total of 11,500kms of river channel now form part of the Arterial Drainage Schemes, that also include 800km of embankments.

The purpose of the Arterial Drainage Schemes was primarily to improve the drainage of agricultural lands to enhance production. This typically involved lowering or widening river beds and removal of weirs to facilitate the drainage and discharge of neighbouring lands and drainage channels. While not the primary focus of the Schemes, they did also provide enhanced conveynance capacity where they passed through towns, villages and dispersed rural communities that in turn has reduced the flood risk to properties in these areas.

While new Arterial Drainage Schemes are no longer being undertaken, the OPW has a statutory duty to maintain the completed schemes in proper repair and in an effective condition. The annual maintenance programme is published by the OPW on the OPW website, and typically involves some clearance of vegetation and removal of silt build-up on a five-yearly cycle.

Drainage Districts are areas where drainage schemes to improve land for agricultural purposes were constructed under a number of Acts of Parliament and Acts of the Oireachtas prior to 1945. 170 Drainage District Schemes were established, covering 4,600km of channel. The statutory duty of maintenance for these schemes lies with the local authorities concerned. The standard of this maintenance varies widely from county to county.

F.2.8 Land Commission Embankments
The Land Commission was created in 1881 as a rent fixing commission by the Land Law (Ireland) Act 1881, and was reconstituted in the Irish Free State by section 2 of the Land Law (Commission) Act, 1923, backdated to the state's creation. With very few exceptions, lands acquired through the Land Commission are now in private ownership. Trusts were established in some cases for the maintenance of flood defences on acquired lands. The Commission was dissolved on 31 March 1999 by the Irish Land Commission (Dissolution) Act, 1992 and the trusts held by the Land Commission were transferred to the Dept. of Agriculture, Food and the Marine - DAFM, with retained funds entrusted to the Public Trustee, who is an officer of the DAFM.

While the Public Trustee administers these funds that may be used for repairs of the embankments, this is applied only in very exceptional circumstances, as the amount of such funds is generally small and wholly inadequate to maintain the various embankments. The DAFM does not however have a general responsibility for the maintenance, repair or restoration of the embankments, which rests with the land owner in most cases (Section 10 of the Land Act, 1965).

F.3 FLOOD PREPAREDNESS (RESILIENCE) METHODS
In some instances, it may not be possible to reduce the likelihood or severity of flooding to an area at risk. However, actions and measures can be taken to reduce the consequences of flooding, i.e., reduce the risk to people and of damage to properties and other assets, and make sure that people and communities are resilient to flood events. This can be achieved by being aware of and preparing for the risk of flooding, knowing when floods are going to occur, taking actions immediately before, during and after a flood. The actions and measures of this type are described below.

F.3.1 Flood Forecasting and Warning
Knowing that a flood event is imminent allows people, communities and local authorities to prepare for the flood by, for example, erecting temporary defences or moving people and assets out of harm’s way.
It is possible to forecast floods under certain conditions using weather predictions, observed rainfall and river levels and flows, and with the aid of computer models. Flood forecasts based on predicted weather are generally less certain than those based on observed rainfall or river levels or flows. The forecast period achievable generally depends on the catchment size and characteristics, and, while in larger catchments it may be possible to provide a number of hours or even days of advance warning of a flood event, in small, flashy catchments this period can be extremely short and therefore of less or potentially no real benefit. Flood forecasting also involves significant uncertainty, as it entails trying to simulate very complex systems in real time with limited data.

The OPW, on behalf of Ireland, signed a partner agreement in 2010 with the European Flood Awareness System (EFAS), which was developed by the EU Joint Research Centre for use by partner organisations. EFAS was developed to help improve and increase preparedness for fluvial floods and is intended to provide early warning or notification of potential flood events under specified criteria. These EFAS flood notifications are disseminated by the OPW to local authorities and other relevant stakeholders. During the floods of winter 2015/16, EFAS provided a number of valuable flood notifications and forecasts which informed and supported the management of these floods. The OPW also provides national tidal and storm surge forecasts for local authorities and other relevant stakeholders and disseminates high tide advisory notices to local authorities when tide, weather and atmospheric conditions are such that coastal flooding may arise.

A number of other project specific flood forecasting systems are in place as part of OPW funded flood relief schemes that include demountable flood defence systems.

Appendix F6 of the Major Emergency Management (MEM) Framework (2006) sets out the arrangements put in place by Met Éireann to issue public service weather warnings to the local authorities. Met Éireann operates a weather warning system that aligns with the EU Meteoalarm system (www.meteoalarm.eu). Met Éireann also issues weather warnings to the public. Warnings for very heavy rainfall may indicate a threat of widespread flooding or flooding for a specific area.

Local warnings are also issued by the local authority. Warnings may be circulated to national and/or local broadcast media, as appropriate, which can be supplemented, in the case of specific local areas identified as being at risk, with emergency vehicles and personnel to deliver the warnings in very exceptional cases.

A Government decision was taken on the 5th January 2016 to establish a National Flood Forecasting and Warning Service (refer Section 7.4.1.10 for further details).

F.3.2 Emergency Response Planning
Well prepared and executed emergency response plans can significantly reduce the impact of flood events, particularly for human health and welfare. The MEM Framework designates the local authority as the lead agency for co-ordinating a response to a flooding emergency. “A Guide to Flood Emergencies (2013)” sets out the sequence of steps required to prepare for and respond to flood emergencies. The Department of Housing, Planning and Local Government is designated as the Lead Government Department for co-ordinating a national response to large scale flood emergencies.

Local authorities develop and review flood plans. Flood plans detail how local authorities receive, assess and respond to weather and flood warnings that can be received from the OPW, Met Éireann, EFAS or other sources, taking into account other relevant information
available to them, such as real-time gauge information (e.g., www.waterlevel.ie) and local knowledge of river systems, roads, infrastructure and vulnerable communities.

Local authorities, as part of their planning for flood emergencies, appoint a Severe Weather Assessment Team. This team monitors weather alerts and provides an analysis of the flood risk before and during an event, as well as providing specialist advice to the operational services deployed to a flood event.

It is the responsibility of the Severe Weather Assessment Team to determine the scale of response that is required, i.e. further action required, the activation of an internal operational response, or the requirement for increased levels of inter-agency co-ordination, up to the declaration of a major emergency and activation of the Major Emergency Plan.

During a flood emergency, where a national response is required to support the local response, the Lead Government Department activate and chair the National Co-ordination Group. Once the National Co-ordination Group is activated, the Lead Government Department establishes links with all Regional / Local Co-ordination Groups. The National Co-ordination Group sets key response objectives, prioritising life safety and protection of property/ critical infrastructure. The National Co-ordination Group works with the Principal Response Agencies to ensure that resources are allocated where needed and can provide optimum benefits. The National Co-ordination Group also develops key public safety messages and provides a single point for information to media and public sector organisations.

F.3.3 Promotion of Individual and Community Resilience

Individuals and communities that are aware of any prevalent flood risk are able to prepare for flood events such that if and when such events occur, people are able to take appropriate actions in advance of, during and after a flood to reduce the harm and damages a flood can cause. This could include short-term preparation and action such as elevating valuables to above likely flood levels, helping neighbours who may have mobility difficulties to prepare and if necessary evacuate, moving vehicles to high ground and evacuating themselves if necessary. Longer-term preparations can involve making homes and properties flood resilient or flood resistant, such as through new floor and wall coverings chosen to be durable in a flood or moving electrical sockets above likely flood levels.

In 2005, the OPW launched the Plan, Prepare, Protect campaign that provides general, practical advice to homeowners, businesses and farmers on what they can do to prepare for flood events and make themselves resilient. This advice has recently been updated and is available to view and download from: www.flooding.ie.

While the Plan, Prepare, Protect campaign provides useful information, as a national campaign it is generic. Resilience also has a strong local dimension involving consultation with the local community, the dissemination of site-specific advice, and the provision of assistance with preparedness at a local level for individuals and businesses known to be at risk. The Report of the Flood Policy Review Group (OPW, 2004) recommends that local authorities should assume responsibility for the local dimension of the flood risk education programme, including raising awareness of individuals and business interests considered to be at risk, and to assist individuals and business interests considered to be at risk with preparations for minimising damages in the event of a flood event.

While the State, through the OPW, local authorities and other public bodies can take certain actions to reduce and manage the risk of flooding, individual home-owners, businesses and farmers also have a responsibility to manage the flood risk to themselves,
their property and other assets to reduce damages and the risk to personal health in the event of a flood.

All people at flood risk within the Nanny-Delvin River Basin should:

− Make themselves aware of the potential for flooding in their area, including the likely extents, depths and risk-to-people
− Consider what long-term preparatory actions they might take to reduce the potential damage, such as implementing property resilience or resistance measures
− Prepare a flood event plan to set out the actions they should take before, during and after a flood event
− Discuss the issue of flooding and flood risk with other people in their communities, and consider forming a local Flood Action Group

Advice on what steps can be taken is provided in the Plan, Prepare, Protect booklet available through www.flooding.ie.

**F.3.4 Individual Property Protection**

Individual Property Protection includes generally low-cost and small-scale measures that can be applied to individual properties to help make them more resistant to flood waters. Examples might include flood-gates to go across doorways, water-proof doors, air-vent covers, non-return valves for pipe-work and sewerage, etc. These measures can be effective in reducing the damage to the contents, furniture and fittings in a house or business, but are not applicable in all situations (for example, they may not be suitable in areas of deep or prolonged flooding, or for some types of property with pervious foundations and flooring).

**F.3.5 Flood-Related Data Collection**

Data on flood flows and levels, as collected through the hydrometric networks of the OPW, EPA / local authorities, the Marine Institute and other organisations, are essential to understand what extreme river flows and levels and sea levels might occur, and hence to enable the appropriate design of structural and non-structural flood risk management measures. Similarly, recording details on flood events that happen are extremely useful to build up our knowledge of flood risk throughout the country and also to understand how the flooding occurs in the affected area to calibrate the computer models used to predict potential future flooding. The ongoing collection and, where appropriate, publication of such data is a measure that will help us to continually improve our preparation for, and response, to flooding.
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