# **River Basin Catchment Summary**



# **Ynys Mon**

### **1.0** Introduction

This Drainage and Wastewater Management Plan (DWMP) sets out how Dŵr Cymru Welsh Water (DCWW) will manage and improve its assets to maintain a resilient and robust wastewater drainage system. The plan aims to manage flooding and pollution from our wastewater assets in the future, for our customers and our environment.

### **1.1** Catchment Information

Ynys Mon (see Figure 1 below) consists of 29 wastewater catchments with a total population of 71507. There is a total sewer length of 550km, where 291km is associated to the foul system, 28km is associated to the surface water system and 204km is associated to the combined system. There are 29 Wastewater Treatment Works (WwTW), 121 Sewerage Pumping Stations (SPSs), and 92 Combined Storm Overflows (CSOs) across this river basin catchment level.

The Ynys Mon catchment covers the Isle of Anglesey. The catchment is covered by a series of rivers, including; the Braint, the Cefni, the Ffraw, the Crigyll, the Alaw, the Tan R'Allt and the Wygyr.



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Figure 1 - River basin location detailing the associated tactial planning catchments

# 2.0 Stakeholder Engagement

The DWMP aims to enable DCWW to work collaboratively with stakeholders, regulators and local authorities to tackle current and future challenges. DCWW has identified stakeholder objectives that align with the aims of the DWMP and goals of other management plans. Table 1 details the main opportunities we have identified but this is not intended to be exhaustive. Note that these stakeholders have their own planning processes and plans which do not necessarily align with those of DCWW.

#### Table 1 - Stakeholder opportunity partnerships

Plans	Stakeholder Engagement	Responsible Bodies/Primary Stakeholder
Local Management Plans	Natural Resources Wales (NRW) Ynys Mon Management Catchment Strategy: (https://naturalresources.wales/media/679396/2016_updated_ynys_mon_catchment _summary_nrw.pdf)	Natural Resources Wales Environment Agency Local partnerships
Flood Risk Management Plans (FRMP)	The Ynys Mon Flood Risk Management Plan is located online at https://cdn.cyfoethnaturiol.cymru/media/675146/final_frmpwestern- wales_pk26b82.pdf?mode=pad&rnd=131466534560000000. The report highlights the coastal flooding caused by a combination of high tides and strong winds in 2014 which particularly impacted Porthcawl and Swansea Bay but no properties were officially reported as flooded.	Welsh Government Water companies Coastal Groups (local authority led) Natural Resources Wales Environment Agency Lead local flood authorities
Shoreline Management Plans (SMP)	The Ynys Mon catchment is covered by SMP 21 – St Anne's Head to the Great Orme. Further information can be found here https://www.grwparfordirolgorllewincymru.cymru/page/home-page	Coastal Groups (local authority led) County councils Lead local flood authorities
River Basin Management Plan (RBMP)	River Basin Management Plans (RBMPs) set out how a combination of organisations and parties work together to improve water quality and environment within a catchment under the Water Framework Directive (WFD). The Ynys Mon catchment comes under the Western Wales RBMP, which can be found here: https://naturalresources.wales/media/676165/wwrbdsummary.pdf	Water companies Coastal Groups (local authority led) Natural Resources Wales Welsh Government Environment Agency Defra
Flood and Coastal Erosion Risk Management Programme (FCERM)	There is opportunity to work with other strategically outlined FCERM schemes planned in the region from 2021 to 2022, as shown in Figure 2.	Coastal Groups (local authority led) Natural Resources Wales Welsh Government Environment Agency Defra
Local Development Plans (LDPs)	The latest local development plans have been incorporated into the plan and future iterations of LDPs will be amended into the DWMP in future cycles.	Local Councils
Other Stakeholders and Non- governmental Organisation (NGOs)	There are a range of other stakeholders of varying interests regarding water in this region including national charities and organisations, as well as local conservation groups for wild swimming and angling (see right).	North Wales Wildlife Trust North Wales Rivers Trust Swim Anglesey Ynys Mon Angling

### WALES

FLOOD AND COASTAL CAPITAL INVESTMENT 2021-22



Figure 2 - Flood and Coastal Investment overview

### 3.0 Risk

We have assessed our likely performance from now to 2050 against the objectives that we set in our most recent business plan. The results of this assessment are presented in the following sections.

To understand future performance, we need to estimate how much population will change by, the degree to which climate change will impact Wales and areas of England that boarder our company, and how further surface water connected to the sewer network might increase the amount and rate at which rainfall drains into our sewers.

Urban creep is the term used to explain loss of green spaces, for example when new driveways or house extensions are built. It often leads to more rainwater entering sewers. Our forecasts suggest that urban creep will add up to 0.63 metres squared of impermeable ground per house per year.

The population in the Ynys Mon region is set to decrease to 51400 by 2050, a change of -28% based on our future projections. However there are major developments in localised areas that will contribute to future pressures on the network, including Caergybi - Parc Cybi and Caergybi - former alluminium works.

Climate change is predicted to increase the intensity of storms by around 35% in this region. In a typical year, winters are likely to be warmer and wetter, and summers generally drier. More intense rainfall will happen more frequently.

# 3.1 Risk Based Catchment Screening

The Risk Based Catchment Screening (RBCS) is the initial screening process to determine if a more detailed risk assessment is required. The assessment screens catchments against planning indicators which have been stipulated in the national guidance for DWMPs. A catchment will pass through to a more detailed risk assessment if it fails against one or more of these indicators, the results are shown in Figure 3.

For the Ynys Mon catchment the biggest concerns indicated by the RBCS are catchment characterisation (based on a vulnerability assessment of flooding due to local characteristics e.g. topography), external sewer flooding and planned residential development.



\*\* Categorised as a "planned" scheduled action within the Natural Resources Wales Action Database or considered as "Remedy" on Natural England Designated Sites system.

\*\*\*\* Categorised as a "identified" scheduled action within the Natural Resources Wales Action Database or considered as "Threat" on Natural England Designated Sites system.

+ Frequency investigation triggered.

++Overflow risks not covered by other indicators.

Figure 3 - Risk Based Catchment Screening results

# **3.2** Baseline Risk And Vulnerability Assessment (BRAVA)

Following on from the RBCS, the Baseline Risk and Vulnerability Assessment (BRAVA) highlights current and future risk. The risk scores are driven by company targets which were set in our last business plan. These targets were subdivided according to population or sewer length, depending on the measure, to derive a target for each river basin catchment.



BRAVA Results - 2025

Figure 4 - BRAVA 2025 Summary



Figure 5 - BRAVA 2050 Summary

In both 2025 and 2050 risk of flooding in an extreme storm and external flooding caused by blockages are the biggest concerns in the Ynys Mon catchment.

Figures 6 and 7 indicate the current and predicted risk of flooding, pollution, and both flooding and pollution caused by lack of capacity (termed 'hydraulic overload') across our networks. These maps illustrate where the issues occur and can be used to target where we want to work with the community and stakeholders to resolve issues. By working together, we can combine knowledge and resources to deliver the best outcomes for local communities and the environment. We want to include your feedback in our decision-making process.

BRAVA results 2025 Flooding and Pollution caused by Hydraulic Overload

No known risk
Pollution
Flooding
Both



BRAVA results 2050 Flooding and Pollution caused by Hydraulic Overload
No known risk
Pollution



Figure 7 - Associated Strategic Planning Area priority (2050)

# (2025)

**Figure 6 - Associated Strategic Planning Areas priority** 

# 4.0 Supply Demand

Supply-demand is an assessment of the capacity of our treatment works. It approximately assesses whether all the treatment works in a region can collectively cope with current and future flows in dry weather. The suitability of the treatment works dry weather consents is tested against forecast future growth and changes in water consumption. This assesses the region's capacity, with no allowance for error, to treat the predicted changes in DWF in the future with no spare treatment works capacity.

Table 2 shows the supply-demand assessment for this region. Where a region may not have adequate capacity, it is flagged dark blue for further investigation. There may be local incapacity issues at individual treatment works within the region.

L2 Area	2025	2030	2035	2040	2045	2050
Ynys Mon						

**Table 2 - Supply Demand Balance** 

# 5.0 Options

Over time the pressures on our sewerage network change due to influences such as catchment growth, creep of rainwater into the network, or influences such as climate change impacting rainfall patterns. To ensure the plan is robust over the 30-year planning horizon we have tested various types of schemes, and combination of schemes, to ensure a robust journey plan is delivered. Figure 8 shows the journey plan scheme types that are most likely to be beneficial in this region across the plan.



#### Figure 8 - Journey Plan

We have undertaken analysis to determine the likely costs to mitigate future predicted pollution and flooding. We assess combined sewer overflows based on the number of times they are predicted to spill in a 'typical year'. Table 3 illustrates both the size and cost of potential mitigation measures required to mitigate risk to varying standards. The assessment calculates the impact of rainfall and drainage contribution to the network relative to today's cost.

Mitigating the risk posed by flooding has been assessed in terms of the probability of occurrence, we use the size of a storm event that has the probability of occurring once every 30 years. Table 4 illustrates both the size and cost of potential mitigation measures to mitigate varying flood risk types. These have been assessed against a 'typical year' of rainfall.

The choice of scenarios for storm overflow mitigation in Table 3 is a separate cost and would be required in addition to the choice of scenarios for flooding protection in Table 4. The chosen scenarios for Storm overflows and flooding are to be added together.

Choice of Scenario	Current Scenario (£)	2030 Scenario (£)	2050 Scenario (£)
Maintain Existing Performance*	-	£106,000,000	£149,900,000
40 spills in a Typical Year	£24,000,000	£27,000,000	£28,000,000
20 spills in a Typical Year	£40,000,000	£43,000,000	£48,000,000
10 spills in a Typical Year	£55,000,000	£63,000,000	£65,000,000
0 spills in a Typical Year	£146,000,000	£163,000,000	£180,000,000
Equivalent No. Principality Stadiums Full of Water in 10 spills scenario	0.40	0.46	0.52

\* Maintain is a considered scenario where we will continue to maintain the current level of service within the region and improve the network and address known and emerging risk.

#### Table 3 - Summary of Combined Sewer Overflow Option Investment Strategy Costs

Choice of Scenario	Current Scenario (£)	2050 Scenario (£)	2050 Resilience Scenario (£)
			1 in 50 yr. (Storm Dennis)
Internal escapes	£7,000,000	£9,000,000	£11,000,000
External escapes in	£20,000,000	£25,000,000	£34,000,000
gardens			
Escapes in highways	£59,000,000	£73,000,000	£100,000,000
No future flooding	-	£46,000,000	£15,000,000
Total	£86,000,000	£153,000,000	£160,000,000

#### **Table 4 - Summary of Flooding Option Investments Strategy Costs**

Tables 3 and 4 are strategic cost indications to illustrate the level of investment needed to provide protection against drainage and network failure, pollution events and flooding, internal and external to properties. The solutions developed highlight the level of investment required to bring our entire network up to the level of protection required to be resilient for future risk and demands. The range of scenarios is to provide a choice for understanding and discussion of future direction.

We are beginning to break down the investment indicated in Table 3 and 4 by creating practical schemes ready for delivery these schemes are designed as 100% traditional, 100% sustainable or green and 100% mixture of the 2. These packages have then been analysed in terms of their long term benefit and environmental and social cost to society and one has been chosen for inclusion as our preferred best value option. The areas where we have started our delivery programme aims to provide protection, to our worst served customers and rivers designated as Special Areas of Conservation (SAC) under the Habitat Directive, as a priority against drainage and network failure which result in pollution events and flooding. The solutions developed highlight the level of investment required to bring our network to the level of protection required to mitigate against these risks.

More detailed information can be seen in the Level 3 reports. For more information on the methodology see the plan main report.

If you want to work with us to develop joint projects to reduce the risk of flooding and protect the environment, please get in touch.

We will continue to work with Welsh Government, Regulators and Local Authorities about the pace, scale and affordability of improvements to be made.

We will be consulting on the preferred approach to planning and once its concluded the next stage is to develop the pipeline of options to meet the pace scale and affordability discussed with Welsh Government and our regulators.

# **DWMP Tactial Planning Catchment Summary**



### Alaw

### **1.0** Introduction

This Drainage and Wastewater Management Plan (DWMP) sets out how Dŵr Cymru Welsh Water (DCWW) will manage and improve its assets to maintain a resilient and robust wastewater drainage system. The plan aims to manage flooding and pollution from our wastewater assets in the future, for our customers and our environment by working collaboratively with stakeholders, regulators and local authorities to provide a complete partnership in tackling current and future problems.

### 1.1 Catchment Information

The Alaw planning catchment lies within the Ynys Mon river basin catchment, (see Figure 1 below), it consists of 7 wastewater catchments (see Figure 2 below). There is a combined population of 13052, this is set to decrease to 10914 by 2050, a change of -16%. There is a total sewer length of 108km, with a foul sewer length of 61km, a surface water length of 1km and a combined sewer length of 38km. There are 7 Wastewater Treatment Works (WwTW), 22 Sewerage Pumping Stations (SPSs), and 20 Combined Storm Overflows (CSOs) across this tactical planning unit.

The Alaw catchment borders the Irish Sea on the east and reaches Beddmanarch Bay on the west. Stretching across Ynys Mon, it includes the River Alaw and the River Goch, with Llyn Alaw in the centre of the catchment.



Data is available from https://www.openstreetmap.org/copyright © OpenStreetMap contributors

Figure 1 - River basin location detailing the associated tactial planning catchments



Figure 2- Tactical planning catchments

### 2.0 Stakeholder Engagement

The DWMP aims to enable DCWW to work collaboratively with stakeholders, regulators and local authorities to tackle current and future challenges. DCWW has identified stakeholder objectives that align with the aims of the DWMP and goals of other management plans. Table 1 details the main opportunities we have identified but this is not intended to be exhaustive. Note that these stakeholders have their own planning processes and plans which do not necessarily align with those of DCWW.

#### **Scheme Information**

Stakeholder enagement meetings area scheduled to commence in 2022. These meetings will be held between DCWW and the respective parties, such as NRW, EA, Councils and ENGO's. Further information of the outcome and points of focus towards short and long term strategy planning will be provided in the next cycle of the DWMP assessment.

Table 1 - Current and future investigation schemes

### 3.0 Risk

We have assessed our likely performance from now to 2050 against the objectives that we set in our most recent business plan. The results of this assessment are presented in the following sections.

To understand future performance, we need to estimate how much population will change by, the degree to which climate change will impact Wales and areas of England that border our company, and how further surface water connected to the sewer network might increase the amount and rate at which rainfall drains into our sewers.

Urban creep is the term used to explain loss of green spaces, for example when new driveways or house extensions are built. It often leads to more rainwater entering sewers. Our forecasts suggest that urban creep will add up to 0.63 metres squared of impermeable ground per house per year.

Climate change is predicted to increase the intensity of storms by around 35% in this region. In a typical year, winters are likely to be warmer and wetter, and summers generally drier. More intense rainfall will happen more frequently. The population in the Ynys Mon region is set to decrease to 10900 by 2050, a change of -16% based on our future projections. However there are major developments in localised areas that will contribute to future pressures on the network, including two in Amlwch - Cyn Safle Shell and at the Industrial Estate.

### 3.1 Risk Based Catchment Screening

The Risk Based Catchment Screening (RBCS) is the initial screening process to determine if a more detailed risk assessment is required. The assessment screens catchments against planning indicators which have been stipulated in the national guidance for DWMPs. A catchment will pass through to a more detailed risk assessment if it fails against one or more of these indicators, the results are shown in Figure 3.

For the Alaw catchment the biggest concern indicated by the RBCS is catchment characterisation (based on a vulnerability assessment of flooding due to local characteristics e.g. topography). External sewer flooding, other RMAs, planned residential development and sewer blockages are the other big concerns.



**RBCS** Results

\*To sewer flooding due to extreme wet weather events.

\*\*Categorised as a "planned" scheduled action within the Natural Resources Wales Action Database or considered as "Remedy" on Natural England Designated Sites system.

\*\*\*Categorised as a "identified" scheduled action within the Natural Resources Wales Action Database or considered as "Threat" on Natural England Designated Sites system.

+Frequency investigation triggered.

++Overflow risks not covered by other indicators,

Figure 3 - Risk Based Catchment Screening results

### **3.2** Baseline Risk And Vulnerability Assessment (BRAVA)

Following on from the RBCS, the Baseline Risk and Vulnerability Assessment (BRAVA) highlights current and future risk. The risk scores are driven by company targets which were set in our last business plan. These targets were subdivided according to population or sewer length, depending on the measure, to derive a target for each river basin catchment.



#### Figure 4 - BRAVA 2025 Summary

In 2025, external flooding due to storms is the biggest concern in the Alaw catchment, followed by internal flooding due to storms.





In 2050, external flooding due to storms and blockages are the biggest concerns in the Alaw catchment.

Figures 6 and 7 indicate the current and predicted risk of flooding, pollution, and both flooding and pollution caused by lack of capacity (termed 'hydraulic overload') across our networks. These maps illustrate where the issues occur and can be used to target where we want to work with the community and stakeholders to resolve issues. By working together, we can combine knowledge and resources to deliver the best outcomes for local communities and the environment. We want to include your feedback in our decision-making process.











Figure 6 - Associated Strategic Planning Areas priority (2025)

Figure 7 - Associated Strategic Planning Areas

### 3.3 Water Quality

Water quality is the classification of the quality of watercourses or water bodies in accordance to its physical, biological and chemical properties. Water quality is an important factor of environmental monitoring, ensuring that not only the water body is safe but the surrounding habitat and ecosystem is also.

Water quality status is categorised from 1 to 4, with 4 being the worst case. The priority status is based on the significance towards the risk factors triggering water quality. Alaw has a water quality priority status for 2050 of 1 which indicates targeted investment to mitigate and focus during AMP11.

# 4.0 Supply Demand

Supply-demand is an assessment of the capacity of our treatment works. It approximately assesses whether all the treatment works in a region can collectively cope with current and future flows in dry and wet weather. There are two parts to the assessment: dry weather flow (DWF) and a wet weather capacity assessment.

For the DWF part of the assessment, the suitability of the dry weather consents is tested against forecast future growth and changes in water consumption. Results for three scenarios are provided: the 0% headroom scenario assesses the region's capability for treating the predicted changes in DWF in the future with no allowance for error, with no spare treatment works capacity. The other scenarios indicate resilience - i.e. could we cope if we had flows 10% or 20% higher than estimated?

The wet weather assessment takes storm consent values where available as an indication of treatment works capacity and estimates the amount of incoming flow the treatment works is able to treat across a year. Again, three scenarios are shown, with differing treatment "targets" - i.e. if we wanted to ensure that 70% of the wet weather flows in a catchment were treated, could the treatment works cope? Changes in rainfall due to climate change and changing dry weather flows within the region mean that the percentage of flow treated across a year can change in the future.

Table 2 shows the supply-demand assessment for this region. Where a region may not have adequate capacity under a given scenario, it is flagged dark blue for further investigation. There may be local incapacity issues at individual works within the region.

L3 Area	Headroom	2025	2030	2035	2040	2045	2050
	0%						
	10%						
	20%						
Alaw	Treatment Target	2025	2030	2035	2040	2045	2050
	70%						
	80%						
	90%						

**Table 2 - Supply Demand Balance** 

# 5.0 Options

Over time the pressures on our sewerage network change due to influences such as catchment growth, creep of rainwater into the network, or influences such as climate change impacting rainfall patterns. To ensure the plan is robust over the 30-year planning horizon and to account for the uniqueness of each catchment we have tested various types of schemes, and combination of schemes, to ensure a robust 'best value' plan is delivered.

The types of schemes tested are detailed in Table 3 and can be categorised into either improving network resilience to rainfall or improving network headroom in dry weather flow conditions.

Improving Resilience					
10% Reduction in area draining to the combined sewers	Represents removal of runoff from large commercial buildings.	Short term			
25% Reduction reduction in area draining to the combined sewers	Represents removal of area runoff from non-residential paved areas where there is only one stakeholder (e.g. Local Authority or Highways Agency).	Medium term			
50% Reduction reduction in area draining to the combined sewers	Represents removal of runoff from any connected area including residential properties. There are likely to be multiple stakeholders to engage with.	Long term			
	Improving Headroom				
Reducing infiltration	Reducing infiltration into sewers by 50%, which could be achieved by relining or replacing the public sewers .	Medium term			
Reducing water use	Represents a reduction in water use per person to around 100l per person per day by 2050 by application of water efficiency measures	Medium term			
Reducing trade flow	Reduce trade flows by around 25% by application of water efficiency measures.	Long term			

Table 3 - Risk mitigation details

We have undertaken an analysis of all our wastewater catchments to determine the benefit in terms of potential volume of water removed from our systems for each scheme type to determine a journey plan, (see Figure 8 below), which provides the direction of the best scheme types to undertake in this catchment for the most benefit against predicted future risk from growth, creep and climate change.



#### Figure 8 - Journey Plan

#### Approaches to managing risk

We have undertaken analysis to determine the likely costs to mitigate future predicted pollution and flooding. We assess combined sewer overflows based on the number of times they are predicted to spill in a 'typical year'. Table 4 illustrates the cost of potential measures to mitigate risk to varying standards. The assessment calculates the impact of rainfall and drainage contributions to the network relative to todays costs.

Mitigating the risk posed by flooding has been assessed in terms of probability of occurrence, we use the size of a storm event that has the probability of occuring once every 30 years. Table 5 illustrates the cost of potential mitigation measures to mitigate varying flood risk types.

The choice of scenarios for storm overflow mitigation in Table 4 is a seperate cost and would be required in addition to the choice of scenarios for flooding protection in Table 5. The chosen scenarios for Storm overflows nd flooding are to be added together.

Choice of Scenario	Current Scenario (£)	2030 Scenario (£)	2050 Scenario (£)
Maintain Existing Performance*	-	£5,000,000.00	£7,000,000.00
40 spills in a Typical Year	£0.00	£2,000,000.00	£4,000,000.00
20 spills in a Typical Year	£4,000,000.00	£6,000,000.00	£7,000,000.00
10 spills in a Typical Year	£7,000,000.00	£11,000,000.00	£11,000,000.00
0 spills in a Typical Year	£26,000,000.00	£31,000,000.00	£38,000,000.00
Equivalent No. Olympic Swimming Pools in 10 spills scenario	7.00	19.00	29.00

\* Maintain is a considered scenario where we will continue to maintain the current level of service within the region and improve the network and address known and emerging risk.

#### Table 4 - Summary of Combined Sewer Overflow option investments

Choice of Scenario	Current Scenario (£)	2050 Scenario (£)	2050 Resilience Scenario (£) 1 in 50 yr (Storm Dennis)
Internal escapes	£0	£0	£0
External escapes in gardens	£0	£1,000,000	£0
Escapes in highways	£6,000,000	£7,000,000	£9,000,000
No future flooding	-	£10,000,000	£6,000,000
Total	£6,000,000.00	£18,000,000	£15,000,000

#### **Table 5 - Summary of Flooding option investments**

We have developed solutions which aim to provide protection against drainage and network failure, pollution events and flooding, internal and external to properties. The solutions developed highlight the level of investment required to bring our entire network up to the level of protection required to be resilient for future risk and demands. The range of scenarios is to provide a choice for understanding and discussion of future direction.

We are beginning to break down the investment indicated in Table 4 and 5 by creating practical schemes ready for delivery these schemes are designed as 100% traditional, 100% sustainable or green and 100% mixture of the 2. These packages have then been analysed in terms of their long term benefit and environmental and social cost to society and one has been chosen for inclusion as our preferred best value option. The areas where we have started our delivery programme aims to provide protection, to our worst served customers and rivers designated as Special Areas of Conservation (SAC) under the

For more information on the methodology developed to carry out the asessments see the DWMP plan main report.

If you want to work with us to develop joint projects to reduce the risk of flooding and protect the environment, please get in touch.

We will continue to work with Welsh Government, Regulators and Local Authorities about the pace, scale and affordability of improvements to be made.

We will be consulting on the preferred approach to planning and once its concluded the next stage is to develop the pipeline of options to meet the pace scale and affordability discussed with Welsh Government and our regulators.

Table 6 - Summary of solutions put forward are a first cycle preferred plan before SEA/HRA

L4 Catchments	No. Schemes
Amlwch WwTW	3
LLANFACHRAETH STW	0
BODEDERN (ANGLESEY) STW	0
Cae Rhos WwTW Brynteg Anglesey	0
LLANDDEUSANT	0
LLANERCHYMEDD	0
BENLLECH OUTFALL	0

### **DWMP Tactial Planning Catchment Summary**



### **Braint - lower**

### **1.0** Introduction

This Drainage and Wastewater Management Plan (DWMP) sets out how Dŵr Cymru Welsh Water (DCWW) will manage and improve its assets to maintain a resilient and robust wastewater drainage system. The plan aims to manage flooding and pollution from our wastewater assets in the future, for our customers and our environment by working collaboratively with stakeholders, regulators and local authorities to provide a complete partnership in tackling current and future problems.

### 1.1 Catchment Information

The Braint - lower planning catchment lies within the Ynys Mon river basin catchment, (see Figure 1 below), it consists of 6 wastewater catchments (see Figure 2 below). There is a combined population of 9624, this is set to decrease to 8056 by 2050, a change of -16%. There is a total sewer length of 87km, with a foul sewer length of 77km, a surface water length of 1km and a combined sewer length of 5km. There are 6 Wastewater Treatment Works (WwTW), 18 Sewerage Pumping Stations (SPSs), and 16 Combined Storm Overflows (CSOs) across this tactical planning unit.

The Braint - lower catchment borders the Menai Strait on the Isle of Anglesey. The River Braint flows down to join the Menai Strait at Llanfairpwllgwyngyll. Llanfairpwllgwyngyll and Gaerwen are it's major urban areas.



Data is available from https://www.openstreetmap.org/copyright © OpenStreetMap contributors

Figure 1 - River basin location detailing the associated tactial planning catchments



Figure 2- Tactical planning catchments

### 2.0 Stakeholder Engagement

The DWMP aims to enable DCWW to work collaboratively with stakeholders, regulators and local authorities to tackle current and future challenges. DCWW has identified stakeholder objectives that align with the aims of the DWMP and goals of other management plans. Table 1 details the main opportunities we have identified but this is not intended to be exhaustive. Note that these stakeholders have their own planning processes and plans which do not necessarily align with those of DCWW.

#### **Scheme Information**

Stakeholder enagement meetings area scheduled to commence in 2022. These meetings will be held between DCWW and the respective parties, such as NRW, EA, Councils and ENGO's. Further information of the outcome and points of focus towards short and long term strategy planning will be provided in the next cycle of the DWMP assessment.

Table 1 - Current and future investigation schemes

### 3.0 Risk

We have assessed our likely performance from now to 2050 against the objectives that we set in our most recent business plan. The results of this assessment are presented in the following sections.

To understand future performance, we need to estimate how much population will change by, the degree to which climate change will impact Wales and areas of England that border our company, and how further surface water connected to the sewer network might increase the amount and rate at which rainfall drains into our sewers.

Urban creep is the term used to explain loss of green spaces, for example when new driveways or house extensions are built. It often leads to more rainwater entering sewers. Our forecasts suggest that urban creep will add up to 0.63 metres squared of impermeable ground per house per year.

Climate change is predicted to increase the intensity of storms by around 35% in this region. In a typical year, winters are likely to be warmer and wetter, and summers generally drier. More intense rainfall will happen more frequently. The population in the Ynys Mon region is set to decrease to 8100 by 2050, a change of -16% based on our future projections. However there are major developments in localised areas that will contribute to future pressures on the network, including two in Gaerwen - Stad Diwydiannol.

### 3.1 Risk Based Catchment Screening

The Risk Based Catchment Screening (RBCS) is the initial screening process to determine if a more detailed risk assessment is required. The assessment screens catchments against planning indicators which have been stipulated in the national guidance for DWMPs. A catchment will pass through to a more detailed risk assessment if it fails against one or more of these indicators, the results are shown in Figure 3.

For the Braint - lower catchment the biggest concerns indicated by the RBCS are catchment characterisation (based on a vulnerability assessment of flooding due to local characteristics e.g. topography) and external sewer flooding.



\*To sewer flooding due to extreme wet weather events.

\*\*Categorised as a "planned" scheduled action within the Natural Resources Wales Action Database or considered as "Remedy" on Natural England Designated Sites system.

\*\*\*Categorised as a "identified" scheduled action within the Natural Resources Wales Action Database or considered as "Threat" on Natural England Designated Sites system.

+Frequency investigation triggered.

++Overflow risks not covered by other indicators,

Figure 3 - Risk Based Catchment Screening results

### **3.2** Baseline Risk And Vulnerability Assessment (BRAVA)

Following on from the RBCS, the Baseline Risk and Vulnerability Assessment (BRAVA) highlights current and future risk. The risk scores are driven by company targets which were set in our last business plan. These targets were subdivided according to population or sewer length, depending on the measure, to derive a target for each river basin catchment.



#### Figure 4 - BRAVA 2025 Summary

In 2025, external flooding due to storms and blockages are the biggest concerns in the Braint - lower catchment, followed by internal flooding due to storms.





In 2050, external flooding due to storms and blockages are the biggest concerns in the Braint - lower catchment, followed by internal flooding due to storms.

Figures 6 and 7 indicate the current and predicted risk of flooding, pollution, and both flooding and pollution caused by lack of capacity (termed 'hydraulic overload') across our networks. These maps illustrate where the issues occur and can be used to target where we want to work with the community and stakeholders to resolve issues. By working together, we can combine knowledge and resources to deliver the best outcomes for local communities and the environment. We want to include your feedback in our decision-making process.











Figure 6 - Associated Strategic Planning Areas priority (2025)

**Figure 7 - Associated Strategic Planning Areas** 

### 3.3 Water Quality

Water quality is the classification of the quality of watercourses or water bodies in accordance to its physical, biological and chemical properties. Water quality is an important factor of environmental monitoring, ensuring that not only the water body is safe but the surrounding habitat and ecosystem is also.

Water quality status is categorised from 1 to 4, with 4 being the worst case. The priority status is based on the significance towards the risk factors triggering water quality. Braint - lower has a water quality priority status for 2050 of 1 which indicates targeted investment to mitigate and focus during AMP11.

# 4.0 Supply Demand

Supply-demand is an assessment of the capacity of our treatment works. It approximately assesses whether all the treatment works in a region can collectively cope with current and future flows in dry and wet weather. There are two parts to the assessment: dry weather flow (DWF) and a wet weather capacity assessment.

For the DWF part of the assessment, the suitability of the dry weather consents is tested against forecast future growth and changes in water consumption. Results for three scenarios are provided: the 0% headroom scenario assesses the region's capability for treating the predicted changes in DWF in the future with no allowance for error, with no spare treatment works capacity. The other scenarios indicate resilience - i.e. could we cope if we had flows 10% or 20% higher than estimated?

The wet weather assessment takes storm consent values where available as an indication of treatment works capacity and estimates the amount of incoming flow the treatment works is able to treat across a year. Again, three scenarios are shown, with differing treatment "targets" - i.e. if we wanted to ensure that 70% of the wet weather flows in a catchment were treated, could the treatment works cope? Changes in rainfall due to climate change and changing dry weather flows within the region mean that the percentage of flow treated across a year can change in the future.

Table 2 shows the supply-demand assessment for this region. Where a region may not have adequate capacity under a given scenario, it is flagged dark blue for further investigation. There may be local incapacity issues at individual works within the region.

L3 Area	Headroom	2025	2030	2035	2040	2045	2050
Braint - lower	0%						
	10%						
	20%						
	Treatment Target	2025	2030	2035	2040	2045	2050
	70%						
	80%						
	90%						

**Table 2 - Supply Demand Balance** 

# 5.0 Options

Over time the pressures on our sewerage network change due to influences such as catchment growth, creep of rainwater into the network, or influences such as climate change impacting rainfall patterns. To ensure the plan is robust over the 30-year planning horizon and to account for the uniqueness of each catchment we have tested various types of schemes, and combination of schemes, to ensure a robust 'best value' plan is delivered.

The types of schemes tested are detailed in Table 3 and can be categorised into either improving network resilience to rainfall or improving network headroom in dry weather flow conditions.

Improving Resilience					
10% Reduction in area draining to the combined sewers	Represents removal of runoff from large commercial buildings.	Short term			
25% Reduction reduction in area draining to the combined sewers	Represents removal of area runoff from non-residential paved areas where there is only one stakeholder (e.g. Local Authority or Highways Agency).	Medium term			
50% Reduction reduction in area draining to the combined sewers	Represents removal of runoff from any connected area including residential properties. There are likely to be multiple stakeholders to engage with.	Long term			
	Improving Headroom				
Reducing infiltration	Reducing infiltration into sewers by 50%, which could be achieved by relining or replacing the public sewers .	Medium term			
Reducing water use	Represents a reduction in water use per person to around 100l per person per day by 2050 by application of water efficiency measures	Medium term			
Reducing trade flow	Reduce trade flows by around 25% by application of water efficiency measures.	Long term			

Table 3 - Risk mitigation details

We have undertaken an analysis of all our wastewater catchments to determine the benefit in terms of potential volume of water removed from our systems for each scheme type to determine a journey plan, (see Figure 8 below), which provides the direction of the best scheme types to undertake in this catchment for the most benefit against predicted future risk from growth, creep and climate change.





#### Approaches to managing risk

We have undertaken analysis to determine the likely costs to mitigate future predicted pollution and flooding. We assess combined sewer overflows based on the number of times they are predicted to spill in a 'typical year'. Table 4 illustrates the cost of potential measures to mitigate risk to varying standards. The assessment calculates the impact of rainfall and drainage contributions to the network relative to todays costs.

Mitigating the risk posed by flooding has been assessed in terms of probability of occurrence, we use the size of a storm event that has the probability of occuring once every 30 years. Table 5 illustrates the cost of potential mitigation measures to mitigate varying flood risk types.

The choice of scenarios for storm overflow mitigation in Table 4 is a seperate cost and would be required in addition to the choice of scenarios for flooding protection in Table 5. The chosen scenarios for Storm overflows nd flooding are to be added together.

Choice of Scenario	Current Scenario (£)	2030 Scenario (£)	2050 Scenario (£)
Maintain Existing Performance*	-	£11,000,000.00	£15,000,000.00
40 spills in a Typical Year	£3,000,000.00	£3,000,000.00	£3,000,000.00
20 spills in a Typical Year	£4,000,000.00	£4,000,000.00	£4,000,000.00
10 spills in a Typical Year	£4,000,000.00	£6,000,000.00	£6,000,000.00
0 spills in a Typical Year	£17,000,000.00	£16,000,000.00	£18,000,000.00
Equivalent No. Olympic Swimming Pools in 10 spills scenario	44.00	49.00	53.00

\* Maintain is a considered scenario where we will continue to maintain the current level of service within the region and improve the network and address known and emerging risk.

#### Table 4 - Summary of Combined Sewer Overflow option investments

Choice of Scenario	Current Scenario (£)	2050 Scenario (£)	2050 Resilience Scenario (£) 1 in 50 yr (Storm Dennis)
Internal escapes	£2,000,000	£2,000,000	£2,000,000
External escapes in gardens	£2,000,000	£2,000,000	£3,000,000
Escapes in highways	£11,000,000	£13,000,000	£19,000,000
No future flooding	-	£8,000,000	£0
Total	£15,000,000.00	£25,000,000	£24,000,000

#### **Table 5 - Summary of Flooding option investments**

We have developed solutions which aim to provide protection against drainage and network failure, pollution events and flooding, internal and external to properties. The solutions developed highlight the level of investment required to bring our entire network up to the level of protection required to be resilient for future risk and demands. The range of scenarios is to provide a choice for understanding and discussion of future direction.

We are beginning to break down the investment indicated in Table 4 and 5 by creating practical schemes ready for delivery these schemes are designed as 100% traditional, 100% sustainable or green and 100% mixture of the 2. These packages have then been analysed in terms of their long term benefit and environmental and social cost to society and one has been chosen for inclusion as our preferred best value option. The areas where we have started our delivery programme aims to provide protection, to our worst served customers and rivers designated as Special Areas of Conservation (SAC) under the

For more information on the methodology developed to carry out the asessments see the DWMP plan main report.

If you want to work with us to develop joint projects to reduce the risk of flooding and protect the environment, please get in touch.

We will continue to work with Welsh Government, Regulators and Local Authorities about the pace, scale and affordability of improvements to be made.

We will be consulting on the preferred approach to planning and once its concluded the next stage is to develop the pipeline of options to meet the pace scale and affordability discussed with Welsh Government and our regulators.

Table 6 - Summary of solutions put forward are a first cycle preferred plan before SEA/HRA

L4 Catchments	No. Schemes
LLANGAFFO (ANGLESEY)	0
NEWBOROUGH (ANGLESEY)	0
BRYNSIENCYN (ANGLESEY)	0
PENTRAETH	0
GAERWEN (ANGLESEY)	0
LLANFAIR PG (ANGLESEY)	0

### **DWMP Tactial Planning Catchment Summary**



### Cefni - tidal limit to Ceint

### **1.0** Introduction

This Drainage and Wastewater Management Plan (DWMP) sets out how Dŵr Cymru Welsh Water (DCWW) will manage and improve its assets to maintain a resilient and robust wastewater drainage system. The plan aims to manage flooding and pollution from our wastewater assets in the future, for our customers and our environment by working collaboratively with stakeholders, regulators and local authorities to provide a complete partnership in tackling current and future problems.

### 1.1 Catchment Information

The Cefni - tidal limit to Ceint planning catchment lies within the Ynys Mon river basin catchment, (see Figure 1 below), it consists of 4 wastewater catchments (see Figure 2 below). There is a combined population of 20186, this is set to decrease to 7797 by 2050, a change of -61%. There is a total sewer length of 98km, with a foul sewer length of 44km, a surface water length of 13km and a combined sewer length of 37km. There are 4 Wastewater Treatment Works (WwTW), 14 Sewerage Pumping Stations (SPSs), and 17 Combined Storm Overflows (CSOs) across this tactical planning unit.

The Cefni - tidal limit to Ceint catchment borders the Irish Sea on the Isle of Anglesey. The River Cefni flows down to join the sea at Malltraeth. Llangefni and Malltraeth are it's major urban areas.



Data is available from https://www.openstreetmap.org/copyright © OpenStreetMap contributors

Figure 1 - River basin location detailing the associated tactial planning catchments



Figure 2- Tactical planning catchments

### 2.0 Stakeholder Engagement

The DWMP aims to enable DCWW to work collaboratively with stakeholders, regulators and local authorities to tackle current and future challenges. DCWW has identified stakeholder objectives that align with the aims of the DWMP and goals of other management plans. Table 1 details the main opportunities we have identified but this is not intended to be exhaustive. Note that these stakeholders have their own planning processes and plans which do not necessarily align with those of DCWW.

#### Scheme Information

Stakeholder enagement meetings area scheduled to commence in 2022. These meetings will be held between DCWW and the respective parties, such as NRW, EA, Councils and ENGO's. Further information of the outcome and points of focus towards short and long term strategy planning will be provided in the next cycle of the DWMP assessment.

Table 1 - Current and future investigation schemes
## 3.0 Risk

We have assessed our likely performance from now to 2050 against the objectives that we set in our most recent business plan. The results of this assessment are presented in the following sections.

To understand future performance, we need to estimate how much population will change by, the degree to which climate change will impact Wales and areas of England that border our company, and how further surface water connected to the sewer network might increase the amount and rate at which rainfall drains into our sewers.

Urban creep is the term used to explain loss of green spaces, for example when new driveways or house extensions are built. It often leads to more rainwater entering sewers. Our forecasts suggest that urban creep will add up to 0.63 metres squared of impermeable ground per house per year.

Climate change is predicted to increase the intensity of storms by around 35% in this region. In a typical year, winters are likely to be warmer and wetter, and summers generally drier. More intense rainfall will happen more frequently. The population in the Ynys Mon region is set to decrease to 7800 by 2050, a change of -61% based on our future projections. However there are major developments in localised areas that will contribute to future pressures on the network, including two in Llangefni - Bryn Cefni and near Lledwigan.

### 3.1 Risk Based Catchment Screening

The Risk Based Catchment Screening (RBCS) is the initial screening process to determine if a more detailed risk assessment is required. The assessment screens catchments against planning indicators which have been stipulated in the national guidance for DWMPs. A catchment will pass through to a more detailed risk assessment if it fails against one or more of these indicators, the results are shown in Figure 3.

For the Cefni - tidal limit to Ceint catchment the biggest concerns indicated by the RBCS are planned residential development and external sewer flooding.



\*To sewer flooding due to extreme wet weather events.

\*\*Categorised as a "planned" scheduled action within the Natural Resources Wales Action Database or considered as "Remedy" on Natural England Designated Sites system.

\*\*\*Categorised as a "identified" scheduled action within the Natural Resources Wales Action Database or considered as "Threat" on Natural England Designated Sites system.

+Frequency investigation triggered.

++Overflow risks not covered by other indicators,

Figure 3 - Risk Based Catchment Screening results

## **3.2** Baseline Risk And Vulnerability Assessment (BRAVA)

Following on from the RBCS, the Baseline Risk and Vulnerability Assessment (BRAVA) highlights current and future risk. The risk scores are driven by company targets which were set in our last business plan. These targets were subdivided according to population or sewer length, depending on the measure, to derive a target for each river basin catchment.



### Figure 4 - BRAVA 2025 Summary

In 2025, external flooding due to storms and blockages are the biggest concerns in the Cefni - tidal limit to Ceint catchment, followed by Treatment Works storm compliance.





In 2050, external flooding due to storms and blockages are the biggest concerns in the Cefni - tidal limit to Ceint catchment, followed by Treatment Works storm compliance.

Figures 6 and 7 indicate the current and predicted risk of flooding, pollution, and both flooding and pollution caused by lack of capacity (termed 'hydraulic overload') across our networks. These maps illustrate where the issues occur and can be used to target where we want to work with the community and stakeholders to resolve issues. By working together, we can combine knowledge and resources to deliver the best outcomes for local communities and the environment. We want to include your feedback in our decision-making process.

Figure 5 - BRAVA 2050 Summary











Figure 6 - Associated Strategic Planning Areas priority (2025)

Figure 7 - Associated Strategic Planning Areas

## 3.3 Water Quality

Water quality is the classification of the quality of watercourses or water bodies in accordance to its physical, biological and chemical properties. Water quality is an important factor of environmental monitoring, ensuring that not only the water body is safe but the surrounding habitat and ecosystem is also.

Water quality status is categorised from 1 to 4, with 4 being the worst case. The priority status is based on the significance towards the risk factors triggering water quality. Cefni - tidal limit to Ceint has a water quality priority status for 2050 of 1 which indicates targeted investment to mitigate and focus during AMP11.

# 4.0 Supply Demand

Supply-demand is an assessment of the capacity of our treatment works. It approximately assesses whether all the treatment works in a region can collectively cope with current and future flows in dry and wet weather. There are two parts to the assessment: dry weather flow (DWF) and a wet weather capacity assessment.

For the DWF part of the assessment, the suitability of the dry weather consents is tested against forecast future growth and changes in water consumption. Results for three scenarios are provided: the 0% headroom scenario assesses the region's capability for treating the predicted changes in DWF in the future with no allowance for error, with no spare treatment works capacity. The other scenarios indicate resilience - i.e. could we cope if we had flows 10% or 20% higher than estimated?

The wet weather assessment takes storm consent values where available as an indication of treatment works capacity and estimates the amount of incoming flow the treatment works is able to treat across a year. Again, three scenarios are shown, with differing treatment "targets" - i.e. if we wanted to ensure that 70% of the wet weather flows in a catchment were treated, could the treatment works cope? Changes in rainfall due to climate change and changing dry weather flows within the region mean that the percentage of flow treated across a year can change in the future.

Table 2 shows the supply-demand assessment for this region. Where a region may not have adequate capacity under a given scenario, it is flagged dark blue for further investigation. There may be local incapacity issues at individual works within the region.

L3 Area	Headroom	2025	2030	2035	2040	2045	2050
Cefni - tidal limit to Ceint	0%						
	10%						
	20%						
	Treatment Target	2025	2030	2035	2040	2045	2050
	70%						
	80%						
	90%						

**Table 2 - Supply Demand Balance** 

# 5.0 Options

Over time the pressures on our sewerage network change due to influences such as catchment growth, creep of rainwater into the network, or influences such as climate change impacting rainfall patterns. To ensure the plan is robust over the 30-year planning horizon and to account for the uniqueness of each catchment we have tested various types of schemes, and combination of schemes, to ensure a robust 'best value' plan is delivered.

The types of schemes tested are detailed in Table 3 and can be categorised into either improving network resilience to rainfall or improving network headroom in dry weather flow conditions.

Improving Resilience					
10% Reduction in area draining to the combined sewers	Represents removal of runoff from large commercial buildings.	Short term			
25% Reduction reduction in area draining to the combined sewers	Represents removal of area runoff from non-residential paved areas where there is only one stakeholder (e.g. Local Authority or Highways Agency).	Medium term			
50% Reduction reduction in area draining to the combined sewers	Represents removal of runoff from any connected area including residential properties. There are likely to be multiple stakeholders to engage with.	Long term			
	Improving Headroom				
Reducing infiltration	Reducing infiltration into sewers by 50%, which could be achieved by relining or replacing the public sewers .	Medium term			
Reducing water use	Represents a reduction in water use per person to around 100l per person per day by 2050 by application of water efficiency measures	Medium term			
Reducing trade flow	Reduce trade flows by around 25% by application of water efficiency measures.	Long term			

Table 3 - Risk mitigation details

We have undertaken an analysis of all our wastewater catchments to determine the benefit in terms of potential volume of water removed from our systems for each scheme type to determine a journey plan, (see Figure 8 below), which provides the direction of the best scheme types to undertake in this catchment for the most benefit against predicted future risk from growth, creep and climate change.





#### Approaches to managing risk

We have undertaken analysis to determine the likely costs to mitigate future predicted pollution and flooding. We assess combined sewer overflows based on the number of times they are predicted to spill in a 'typical year'. Table 4 illustrates the cost of potential measures to mitigate risk to varying standards. The assessment calculates the impact of rainfall and drainage contributions to the network relative to todays costs.

Mitigating the risk posed by flooding has been assessed in terms of probability of occurrence, we use the size of a storm event that has the probability of occuring once every 30 years. Table 5 illustrates the cost of potential mitigation measures to mitigate varying flood risk types.

The choice of scenarios for storm overflow mitigation in Table 4 is a seperate cost and would be required in addition to the choice of scenarios for flooding protection in Table 5. The chosen scenarios for Storm overflows nd flooding are to be added together.

Choice of Scenario	Current Scenario (£)	2030 Scenario (£)	2050 Scenario (£)
Maintain Existing Performance*	-	£33,000,000.00	£51,000,000.00
40 spills in a Typical Year	£7,000,000.00	£7,000,000.00	£6,000,000.00
20 spills in a Typical Year	£9,000,000.00	£8,000,000.00	£10,000,000.00
10 spills in a Typical Year	£12,000,000.00	£12,000,000.00	£12,000,000.00
0 spills in a Typical Year	£39,000,000.00	£44,000,000.00	£48,000,000.00
Equivalent No. Olympic Swimming Pools in 10 spills scenario	60.00	67.00	73.00

\* Maintain is a considered scenario where we will continue to maintain the current level of service within the region and improve the network and address known and emerging risk.

#### Table 4 - Summary of Combined Sewer Overflow option investments

Choice of Scenario	Current Scenario (£)	2050 Scenario (£)	2050 Resilience Scenario (£) 1 in 50 yr (Storm Dennis)
Internal escapes	£1,000,000	£1,000,000	£1,000,000
External escapes in gardens	£2,000,000	£3,000,000	£3,000,000
Escapes in highways	£12,000,000	£16,000,000	£21,000,000
No future flooding	-	£15,000,000	£2,000,000
Total	£15,000,000.00	£35,000,000	£27,000,000

#### **Table 5 - Summary of Flooding option investments**

We have developed solutions which aim to provide protection against drainage and network failure, pollution events and flooding, internal and external to properties. The solutions developed highlight the level of investment required to bring our entire network up to the level of protection required to be resilient for future risk and demands. The range of scenarios is to provide a choice for understanding and discussion of future direction.

We are beginning to break down the investment indicated in Table 4 and 5 by creating practical schemes ready for delivery these schemes are designed as 100% traditional, 100% sustainable or green and 100% mixture of the 2. These packages have then been analysed in terms of their long term benefit and environmental and social cost to society and one has been chosen for inclusion as our preferred best value option. The areas where we have started our delivery programme aims to provide protection, to our worst served customers and rivers designated as Special Areas of Conservation (SAC) under the

For more information on the methodology developed to carry out the asessments see the DWMP plan main report.

If you want to work with us to develop joint projects to reduce the risk of flooding and protect the environment, please get in touch.

We will continue to work with Welsh Government, Regulators and Local Authorities about the pace, scale and affordability of improvements to be made.

We will be consulting on the preferred approach to planning and once its concluded the next stage is to develop the pipeline of options to meet the pace scale and affordability discussed with Welsh Government and our regulators.

Table 6 - Summary of solutions put forward are a first cycle preferred plan before SEA/HRA

L4 Catchments	No. Schemes
LLANGEFNI	0
BODFFORDD (ANGLESEY) STW	0
ABERFFRAW STW	0
MALLTRAETH (ANGLESEY) STW	0

# **DWMP Tactial Planning Catchment Summary**



### Crigyll

### **1.0** Introduction

This Drainage and Wastewater Management Plan (DWMP) sets out how Dŵr Cymru Welsh Water (DCWW) will manage and improve its assets to maintain a resilient and robust wastewater drainage system. The plan aims to manage flooding and pollution from our wastewater assets in the future, for our customers and our environment by working collaboratively with stakeholders, regulators and local authorities to provide a complete partnership in tackling current and future problems.

## 1.1 Catchment Information

The Crigyll planning catchment lies within the Ynys Mon river basin catchment, (see Figure 1 below), it consists of 5 wastewater catchments (see Figure 2 below). There is a combined population of 3433, this is set to decrease to 3261 by 2050, a change of -5%. There is a total sewer length of 39km, with a foul sewer length of 27km, a surface water length of 1km and a combined sewer length of 7km. There are 5 Wastewater Treatment Works (WwTW), 8 Sewerage Pumping Stations (SPSs), and 5 Combined Storm Overflows (CSOs) across this tactical planning unit.

The Crigyll catchment lies on the Isle of Anglesey, bordering the Irish sea in the South West. The River Crigyll flows down into the sea at Rhosheigr. Rhosheigr and Gwaichmai are the largest urban areas.



Data is available from https://www.openstreetmap.org/copyright © OpenStreetMap contributors

Figure 1 - River basin location detailing the associated tactial planning catchments



Figure 2- Tactical planning catchments

### 2.0 Stakeholder Engagement

The DWMP aims to enable DCWW to work collaboratively with stakeholders, regulators and local authorities to tackle current and future challenges. DCWW has identified stakeholder objectives that align with the aims of the DWMP and goals of other management plans. Table 1 details the main opportunities we have identified but this is not intended to be exhaustive. Note that these stakeholders have their own planning processes and plans which do not necessarily align with those of DCWW.

#### **Scheme Information**

Stakeholder enagement meetings area scheduled to commence in 2022. These meetings will be held between DCWW and the respective parties, such as NRW, EA, Councils and ENGO's. Further information of the outcome and points of focus towards short and long term strategy planning will be provided in the next cycle of the DWMP assessment.

Table 1 - Current and future investigation schemes

## 3.0 Risk

We have assessed our likely performance from now to 2050 against the objectives that we set in our most recent business plan. The results of this assessment are presented in the following sections.

To understand future performance, we need to estimate how much population will change by, the degree to which climate change will impact Wales and areas of England that border our company, and how further surface water connected to the sewer network might increase the amount and rate at which rainfall drains into our sewers.

Urban creep is the term used to explain loss of green spaces, for example when new driveways or house extensions are built. It often leads to more rainwater entering sewers. Our forecasts suggest that urban creep will add up to 0.63 metres squared of impermeable ground per house per year.

Climate change is predicted to increase the intensity of storms by around 35% in this region. In a typical year, winters are likely to be warmer and wetter, and summers generally drier. More intense rainfall will happen more frequently. The population in the Ynys Mon region is set to decrease to 3300 by 2050, a change of -5% based on our future projections. However there are major developments in localised areas that will contribute to future pressures on the network, including Gwalchmai - land ajacent to A5.

### 3.1 Risk Based Catchment Screening

The Risk Based Catchment Screening (RBCS) is the initial screening process to determine if a more detailed risk assessment is required. The assessment screens catchments against planning indicators which have been stipulated in the national guidance for DWMPs. A catchment will pass through to a more detailed risk assessment if it fails against one or more of these indicators, the results are shown in Figure 3.

For the Crigyll catchment the biggest concerns indicated by the RBCS are - catchment characterisation (based on a vulnerability assessment of flooding due to local characteristics e.g. topography).



\*To sewer flooding due to extreme wet weather events.

\*\*Categorised as a "planned" scheduled action within the Natural Resources Wales Action Database or considered as "Remedy" on Natural England Designated Sites system.

\*\*\*Categorised as a "identified" scheduled action within the Natural Resources Wales Action Database or considered as "Threat" on Natural England Designated Sites system.

+Frequency investigation triggered.

++Overflow risks not covered by other indicators,

Figure 3 - Risk Based Catchment Screening results

## **3.2** Baseline Risk And Vulnerability Assessment (BRAVA)

Following on from the RBCS, the Baseline Risk and Vulnerability Assessment (BRAVA) highlights current and future risk. The risk scores are driven by company targets which were set in our last business plan. These targets were subdivided according to population or sewer length, depending on the measure, to derive a target for each river basin catchment.



### Figure 4 - BRAVA 2025 Summary

In 2025, external flooding due to storms, sewer collapses and internal flooding due to storms are the biggest concerns in the Crigyll catchment.





In 2050, external flooding due to storms, followed equally by four other indicators, are the biggest concerns in the Crigyll catchment.

Figures 6 and 7 indicate the current and predicted risk of flooding, pollution, and both flooding and pollution caused by lack of capacity (termed 'hydraulic overload') across our networks. These maps illustrate where the issues occur and can be used to target where we want to work with the community and stakeholders to resolve issues. By working together, we can combine knowledge and resources to deliver the best outcomes for local communities and the environment. We want to include your feedback in our decision-making process.











Figure 6 - Associated Strategic Planning Areas priority (2025)

Figure 7 - Associated Strategic Planning Areas

## 3.3 Water Quality

Water quality is the classification of the quality of watercourses or water bodies in accordance to its physical, biological and chemical properties. Water quality is an important factor of environmental monitoring, ensuring that not only the water body is safe but the surrounding habitat and ecosystem is also.

Water quality status is categorised from 1 to 4, with 4 being the worst case. The priority status is based on the significance towards the risk factors triggering water quality. Crigyll has a water quality priority status for 2050 of 1 which indicates targeted investment to mitigate and focus during AMP11.

# 4.0 Supply Demand

Supply-demand is an assessment of the capacity of our treatment works. It approximately assesses whether all the treatment works in a region can collectively cope with current and future flows in dry and wet weather. There are two parts to the assessment: dry weather flow (DWF) and a wet weather capacity assessment.

For the DWF part of the assessment, the suitability of the dry weather consents is tested against forecast future growth and changes in water consumption. Results for three scenarios are provided: the 0% headroom scenario assesses the region's capability for treating the predicted changes in DWF in the future with no allowance for error, with no spare treatment works capacity. The other scenarios indicate resilience - i.e. could we cope if we had flows 10% or 20% higher than estimated?

The wet weather assessment takes storm consent values where available as an indication of treatment works capacity and estimates the amount of incoming flow the treatment works is able to treat across a year. Again, three scenarios are shown, with differing treatment "targets" - i.e. if we wanted to ensure that 70% of the wet weather flows in a catchment were treated, could the treatment works cope? Changes in rainfall due to climate change and changing dry weather flows within the region mean that the percentage of flow treated across a year can change in the future.

Table 2 shows the supply-demand assessment for this region. Where a region may not have adequate capacity under a given scenario, it is flagged dark blue for further investigation. There may be local incapacity issues at individual works within the region.

L3 Area	Headroom	2025	2030	2035	2040	2045	2050
Crigyll	0%						
	10%						
	20%						
	Treatment Target	2025	2030	2035	2040	2045	2050
	70%						
	80%						
	90%						

**Table 2 - Supply Demand Balance** 

# 5.0 Options

Over time the pressures on our sewerage network change due to influences such as catchment growth, creep of rainwater into the network, or influences such as climate change impacting rainfall patterns. To ensure the plan is robust over the 30-year planning horizon and to account for the uniqueness of each catchment we have tested various types of schemes, and combination of schemes, to ensure a robust 'best value' plan is delivered.

The types of schemes tested are detailed in Table 3 and can be categorised into either improving network resilience to rainfall or improving network headroom in dry weather flow conditions.

Improving Resilience					
10% Reduction in area draining to the combined sewers	Represents removal of runoff from large commercial buildings.	Short term			
25% Reduction reduction in area draining to the combined sewers	Represents removal of area runoff from non-residential paved areas where there is only one stakeholder (e.g. Local Authority or Highways Agency).	Medium term			
50% Reduction reduction in area draining to the combined sewers	Represents removal of runoff from any connected area including residential properties. There are likely to be multiple stakeholders to engage with.	Long term			
	Improving Headroom				
Reducing infiltration	Reducing infiltration into sewers by 50%, which could be achieved by relining or replacing the public sewers .	Medium term			
Reducing water use	Represents a reduction in water use per person to around 100l per person per day by 2050 by application of water efficiency measures	Medium term			
Reducing trade flow	Reduce trade flows by around 25% by application of water efficiency measures.	Long term			

Table 3 - Risk mitigation details

We have undertaken an analysis of all our wastewater catchments to determine the benefit in terms of potential volume of water removed from our systems for each scheme type to determine a journey plan, (see Figure 8 below), which provides the direction of the best scheme types to undertake in this catchment for the most benefit against predicted future risk from growth, creep and climate change.





#### Approaches to managing risk

We have undertaken analysis to determine the likely costs to mitigate future predicted pollution and flooding. We assess combined sewer overflows based on the number of times they are predicted to spill in a 'typical year'. Table 4 illustrates the cost of potential measures to mitigate risk to varying standards. The assessment calculates the impact of rainfall and drainage contributions to the network relative to todays costs.

Mitigating the risk posed by flooding has been assessed in terms of probability of occurrence, we use the size of a storm event that has the probability of occuring once every 30 years. Table 5 illustrates the cost of potential mitigation measures to mitigate varying flood risk types.

The choice of scenarios for storm overflow mitigation in Table 4 is a seperate cost and would be required in addition to the choice of scenarios for flooding protection in Table 5. The chosen scenarios for Storm overflows nd flooding are to be added together.

Choice of Scenario	Current Scenario (£)	2030 Scenario (£)	2050 Scenario (£)
Maintain Existing Performance*	-	£10,000,000.00	£15,000,000.00
40 spills in a Typical Year	£0.00	£0.00	£0.00
20 spills in a Typical Year	£3,000,000.00	£3,000,000.00	£3,000,000.00
10 spills in a Typical Year	£6,000,000.00	£6,000,000.00	£6,000,000.00
0 spills in a Typical Year	£11,000,000.00	£11,000,000.00	£11,000,000.00
Equivalent No. Olympic Swimming Pools in 10 spills scenario	8.00	8.00	9.00

\* Maintain is a considered scenario where we will continue to maintain the current level of service within the region and improve the network and address known and emerging risk.

#### Table 4 - Summary of Combined Sewer Overflow option investments

Choice of Scenario	Current Scenario (£)	2050 Scenario (£)	2050 Resilience Scenario (£) 1 in 50 yr (Storm Dennis)
Internal escapes	£3,000,000	£3,000,000	£5,000,000
External escapes in gardens	£3,000,000	£3,000,000	£5,000,000
Escapes in highways	£3,000,000	£3,000,000	£5,000,000
No future flooding	-	£3,000,000	£4,000,000
Total	£9,000,000.00	£12,000,000	£19,000,000

#### **Table 5 - Summary of Flooding option investments**

We have developed solutions which aim to provide protection against drainage and network failure, pollution events and flooding, internal and external to properties. The solutions developed highlight the level of investment required to bring our entire network up to the level of protection required to be resilient for future risk and demands. The range of scenarios is to provide a choice for understanding and discussion of future direction.

We are beginning to break down the investment indicated in Table 4 and 5 by creating practical schemes ready for delivery these schemes are designed as 100% traditional, 100% sustainable or green and 100% mixture of the 2. These packages have then been analysed in terms of their long term benefit and environmental and social cost to society and one has been chosen for inclusion as our preferred best value option. The areas where we have started our delivery programme aims to provide protection, to our worst served customers and rivers designated as Special Areas of Conservation (SAC) under the

For more information on the methodology developed to carry out the asessments see the DWMP plan main report.

If you want to work with us to develop joint projects to reduce the risk of flooding and protect the environment, please get in touch.

We will continue to work with Welsh Government, Regulators and Local Authorities about the pace, scale and affordability of improvements to be made.

We will be consulting on the preferred approach to planning and once its concluded the next stage is to develop the pipeline of options to meet the pace scale and affordability discussed with Welsh Government and our regulators.

Table 6 - Summary of solutions put forward are a first cycle preferred plan before SEA/HRA

L4 Catchments	No. Schemes
PENCARNISIOG	0
GWALCHMAI	0
LLYNFAES	0
BRYN DU (ANGLESEY)	0
BRYNGWRAN (ANGLESEY)	0

# **DWMP Tactial Planning Catchment Summary**



### Lleiniog

### **1.0** Introduction

This Drainage and Wastewater Management Plan (DWMP) sets out how Dŵr Cymru Welsh Water (DCWW) will manage and improve its assets to maintain a resilient and robust wastewater drainage system. The plan aims to manage flooding and pollution from our wastewater assets in the future, for our customers and our environment by working collaboratively with stakeholders, regulators and local authorities to provide a complete partnership in tackling current and future problems.

## 1.1 Catchment Information

The Lleiniog planning catchment lies within the Ynys Mon river basin catchment, (see Figure 1 below), it consists of 2 wastewater catchments (see Figure 2 below). There is a combined population of 3970, this is set to decrease to 3208 by 2050, a change of -19%. There is a total sewer length of 46km, with a foul sewer length of 29km, a surface water length of 3km and a combined sewer length of 13km. There are 2 Wastewater Treatment Works (WwTW), 10 Sewerage Pumping Stations (SPSs), and 8 Combined Storm Overflows (CSOs) across this tactical planning unit.

The Lleiniog catchment Lies on the eastern point of Anglesey, bordering the Irish Sea on three sides. The Lleiniog flows to join the sea near Llangoed. Llangoed and Llanddona are its largest urban areas.



Data is available from https://www.openstreetmap.org/copyright © OpenStreetMap contributors

Figure 1 - River basin location detailing the associated tactial planning catchments



Figure 2- Tactical planning catchments

### 2.0 Stakeholder Engagement

The DWMP aims to enable DCWW to work collaboratively with stakeholders, regulators and local authorities to tackle current and future challenges. DCWW has identified stakeholder objectives that align with the aims of the DWMP and goals of other management plans. Table 1 details the main opportunities we have identified but this is not intended to be exhaustive. Note that these stakeholders have their own planning processes and plans which do not necessarily align with those of DCWW.

#### **Scheme Information**

Stakeholder enagement meetings area scheduled to commence in 2022. These meetings will be held between DCWW and the respective parties, such as NRW, EA, Councils and ENGO's. Further information of the outcome and points of focus towards short and long term strategy planning will be provided in the next cycle of the DWMP assessment.

Table 1 - Current and future investigation schemes

## 3.0 Risk

We have assessed our likely performance from now to 2050 against the objectives that we set in our most recent business plan. The results of this assessment are presented in the following sections.

To understand future performance, we need to estimate how much population will change by, the degree to which climate change will impact Wales and areas of England that border our company, and how further surface water connected to the sewer network might increase the amount and rate at which rainfall drains into our sewers.

Urban creep is the term used to explain loss of green spaces, for example when new driveways or house extensions are built. It often leads to more rainwater entering sewers. Our forecasts suggest that urban creep will add up to 0.63 metres squared of impermeable ground per house per year.

Climate change is predicted to increase the intensity of storms by around 35% in this region. In a typical year, winters are likely to be warmer and wetter, and summers generally drier. More intense rainfall will happen more frequently. The population in the Ynys Mon region is set to decrease to 3200 by 2050, a change of -19% based on our future projections. However there are major developments in localised areas that will contribute to future pressures on the network, including Beaumaris - Casita.

### 3.1 Risk Based Catchment Screening

The Risk Based Catchment Screening (RBCS) is the initial screening process to determine if a more detailed risk assessment is required. The assessment screens catchments against planning indicators which have been stipulated in the national guidance for DWMPs. A catchment will pass through to a more detailed risk assessment if it fails against one or more of these indicators, the results are shown in Figure 3.

For the Lleiniog catchment the biggest concerns indicated by the RBCS are catchment characterisation (based on a vulnerability assessment of flooding due to local characteristics e.g. topography), external sewer flooding, planned residential development, sewer collapses and other RMAs.



**RBCS** Results

\*To sewer flooding due to extreme wet weather events.

\*\*Categorised as a "planned" scheduled action within the Natural Resources Wales Action Database or considered as "Remedy" on Natural England Designated Sites system.

\*\*\*Categorised as a "identified" scheduled action within the Natural Resources Wales Action Database or considered as "Threat" on Natural England Designated Sites system.

+Frequency investigation triggered.

++Overflow risks not covered by other indicators,

Figure 3 - Risk Based Catchment Screening results

# **3.2** Baseline Risk And Vulnerability Assessment (BRAVA)

Following on from the RBCS, the Baseline Risk and Vulnerability Assessment (BRAVA) highlights current and future risk. The risk scores are driven by company targets which were set in our last business plan. These targets were subdivided according to population or sewer length, depending on the measure, to derive a target for each river basin catchment.



### Figure 4 - BRAVA 2025 Summary

In 2025, pollution, internal and external flooding due to storms are the biggest concern in the Lleiniog catchment.





In 2050, pollution, internal and external flooding due to storms are the biggest concern in the Lleiniog catchment.

Figures 6 and 7 indicate the current and predicted risk of flooding, pollution, and both flooding and pollution caused by lack of capacity (termed 'hydraulic overload') across our networks. These maps illustrate where the issues occur and can be used to target where we want to work with the community and stakeholders to resolve issues. By working together, we can combine knowledge and resources to deliver the best outcomes for local communities and the environment. We want to include your feedback in our decision-making process.







BRAVA results 2050 Flooding and Pollution caused by Hydraulic Overload
No known risk
Pollution
Flooding
Both



Figure 6 - Associated Strategic Planning Areas priority (2025)

Figure 7 - Associated Strategic Planning Areas

## 3.3 Water Quality

Water quality is the classification of the quality of watercourses or water bodies in accordance to its physical, biological and chemical properties. Water quality is an important factor of environmental monitoring, ensuring that not only the water body is safe but the surrounding habitat and ecosystem is also.

Water quality status is categorised from 1 to 4, with 4 being the worst case. The priority status is based on the significance towards the risk factors triggering water quality. Lleiniog has a water quality priority status for 2050 of 1.

# 4.0 Supply Demand

Supply-demand is an assessment of the capacity of our treatment works. It approximately assesses whether all the treatment works in a region can collectively cope with current and future flows in dry and wet weather. There are two parts to the assessment: dry weather flow (DWF) and a wet weather capacity assessment.

For the DWF part of the assessment, the suitability of the dry weather consents is tested against forecast future growth and changes in water consumption. Results for three scenarios are provided: the 0% headroom scenario assesses the region's capability for treating the predicted changes in DWF in the future with no allowance for error, with no spare treatment works capacity. The other scenarios indicate resilience - i.e. could we cope if we had flows 10% or 20% higher than estimated?

The wet weather assessment takes storm consent values where available as an indication of treatment works capacity and estimates the amount of incoming flow the treatment works is able to treat across a year. Again, three scenarios are shown, with differing treatment "targets" - i.e. if we wanted to ensure that 70% of the wet weather flows in a catchment were treated, could the treatment works cope? Changes in rainfall due to climate change and changing dry weather flows within the region mean that the percentage of flow treated across a year can change in the future.

Table 2 shows the supply-demand assessment for this region. Where a region may not have adequate capacity under a given scenario, it is flagged dark blue for further investigation. There may be local incapacity issues at individual works within the region.

L3 Area	Headroom	2025	2030	2035	2040	2045	2050
Lleiniog	0%						
	10%						
	20%						
	Treatment Target	2025	2030	2035	2040	2045	2050
	70%						
	80%						
	90%						

**Table 2 - Supply Demand Balance** 

# 5.0 Options

Over time the pressures on our sewerage network change due to influences such as catchment growth, creep of rainwater into the network, or influences such as climate change impacting rainfall patterns. To ensure the plan is robust over the 30-year planning horizon and to account for the uniqueness of each catchment we have tested various types of schemes, and combination of schemes, to ensure a robust 'best value' plan is delivered.

The types of schemes tested are detailed in Table 3 and can be categorised into either improving network resilience to rainfall or improving network headroom in dry weather flow conditions.

Improving Resilience					
10% Reduction in area draining to the combined sewers	Represents removal of runoff from large commercial buildings.	Short term			
25% Reduction reduction in area draining to the combined sewers	Represents removal of area runoff from non-residential paved areas where there is only one stakeholder (e.g. Local Authority or Highways Agency).	Medium term			
50% Reduction reduction in area draining to the combined sewers	Represents removal of runoff from any connected area including residential properties. There are likely to be multiple stakeholders to engage with.	Long term			
	Improving Headroom				
Reducing infiltration	Reducing infiltration into sewers by 50%, which could be achieved by relining or replacing the public sewers .	Medium term			
Reducing water use	Represents a reduction in water use per person to around 100l per person per day by 2050 by application of water efficiency measures	Medium term			
Reducing trade flow	Reduce trade flows by around 25% by application of water efficiency measures.	Long term			

Table 3 - Risk mitigation details

We have undertaken an analysis of all our wastewater catchments to determine the benefit in terms of potential volume of water removed from our systems for each scheme type to determine a journey plan, (see Figure 8 below), which provides the direction of the best scheme types to undertake in this catchment for the most benefit against predicted future risk from growth, creep and climate change.





#### Approaches to managing risk

We have undertaken analysis to determine the likely costs to mitigate future predicted pollution and flooding. We assess combined sewer overflows based on the number of times they are predicted to spill in a 'typical year'. Table 4 illustrates the cost of potential measures to mitigate risk to varying standards. The assessment calculates the impact of rainfall and drainage contributions to the network relative to todays costs.

Mitigating the risk posed by flooding has been assessed in terms of probability of occurrence, we use the size of a storm event that has the probability of occuring once every 30 years. Table 5 illustrates the cost of potential mitigation measures to mitigate varying flood risk types.

The choice of scenarios for storm overflow mitigation in Table 4 is a seperate cost and would be required in addition to the choice of scenarios for flooding protection in Table 5. The chosen scenarios for Storm overflows nd flooding are to be added together.

Choice of Scenario	Current Scenario (£)	2030 Scenario (£)	2050 Scenario (£)
Maintain Existing Performance*	-	£5,000,000.00	£4,000,000.00
40 spills in a Typical Year	£2,000,000.00	£2,000,000.00	£2,000,000.00
20 spills in a Typical Year	£2,000,000.00	£2,000,000.00	£2,000,000.00
10 spills in a Typical Year	£4,000,000.00	£4,000,000.00	£4,000,000.00
0 spills in a Typical Year	£15,000,000.00	£17,000,000.00	£18,000,000.00
Equivalent No. Olympic Swimming Pools in 10 spills scenario	6.00	8.00	9.00

\* Maintain is a considered scenario where we will continue to maintain the current level of service within the region and improve the network and address known and emerging risk.

#### Table 4 - Summary of Combined Sewer Overflow option investments

Choice of Scenario	Current Scenario (£)	2050 Scenario (£)	2050 Resilience Scenario (£) 1 in 50 yr (Storm Dennis)
Internal escapes	£1,000,000	£2,000,000	£1,000,000
External escapes in gardens	£0	£0	£0
Escapes in highways	£7,000,000	£10,000,000	£10,000,000
No future flooding	-	£7,000,000	£0
Total	£8,000,000.00	£19,000,000	£11,000,000

#### **Table 5 - Summary of Flooding option investments**

We have developed solutions which aim to provide protection against drainage and network failure, pollution events and flooding, internal and external to properties. The solutions developed highlight the level of investment required to bring our entire network up to the level of protection required to be resilient for future risk and demands. The range of scenarios is to provide a choice for understanding and discussion of future direction.

We are beginning to break down the investment indicated in Table 4 and 5 by creating practical schemes ready for delivery these schemes are designed as 100% traditional, 100% sustainable or green and 100% mixture of the 2. These packages have then been analysed in terms of their long term benefit and environmental and social cost to society and one has been chosen for inclusion as our preferred best value option. The areas where we have started our delivery programme aims to provide protection, to our worst served customers and rivers designated as Special Areas of Conservation (SAC) under the

For more information on the methodology developed to carry out the asessments see the DWMP plan main report.

If you want to work with us to develop joint projects to reduce the risk of flooding and protect the environment, please get in touch.

We will continue to work with Welsh Government, Regulators and Local Authorities about the pace, scale and affordability of improvements to be made.

We will be consulting on the preferred approach to planning and once its concluded the next stage is to develop the pipeline of options to meet the pace scale and affordability discussed with Welsh Government and our regulators.

Table 6 - Summary of solutions put forward are a first cycle preferred plan before SEA/HRA

L4 Catchments	No. Schemes
LLANGOED (ANGLESEY)	0
BEAUMARIS & LLANFAES (ANGLESEY)	0

## **DWMP Tactial Planning Catchment Summary**



### **Un-named - Crigyll Caradog catchment**

### **1.0** Introduction

This Drainage and Wastewater Management Plan (DWMP) sets out how Dŵr Cymru Welsh Water (DCWW) will manage and improve its assets to maintain a resilient and robust wastewater drainage system. The plan aims to manage flooding and pollution from our wastewater assets in the future, for our customers and our environment by working collaboratively with stakeholders, regulators and local authorities to provide a complete partnership in tackling current and future problems.

## 1.1 Catchment Information

The Un-named - Crigyll Caradog catchment planning catchment lies within the Ynys Mon river basin catchment, (see Figure 1 below), it consists of 1 wastewater catchments (see Figure 2 below). There is a combined population of 18864, this is set to decrease to 16010 by 2050, a change of -15%. There is a total sewer length of 148km, with a foul sewer length of 30km, a surface water length of 8km and a combined sewer length of 102km. There are 1 Wastewater Treatment Works (WwTW), 42 Sewerage Pumping Stations (SPSs), and 24 Combined Storm Overflows (CSOs) across this tactical planning unit.

The Un-named - Crigyll Caradog catchment catchment includes Holy Island and neighbouring Mainland, situated at the Western edge of Anglesey. Holyhead and Treardour are its major urban areas.



Data is available from https://www.openstreetmap.org/copyright © OpenStreetMap contributors

Figure 1 - River basin location detailing the associated tactial planning catchments



Figure 2- Tactical planning catchments

### 2.0 Stakeholder Engagement

The DWMP aims to enable DCWW to work collaboratively with stakeholders, regulators and local authorities to tackle current and future challenges. DCWW has identified stakeholder objectives that align with the aims of the DWMP and goals of other management plans. Table 1 details the main opportunities we have identified but this is not intended to be exhaustive. Note that these stakeholders have their own planning processes and plans which do not necessarily align with those of DCWW.

#### Scheme Information

Stakeholder enagement meetings area scheduled to commence in 2022. These meetings will be held between DCWW and the respective parties, such as NRW, EA, Councils and ENGO's. Further information of the outcome and points of focus towards short and long term strategy planning will be provided in the next cycle of the DWMP assessment.

Table 1 - Current and future investigation schemes
## 3.0 Risk

We have assessed our likely performance from now to 2050 against the objectives that we set in our most recent business plan. The results of this assessment are presented in the following sections.

To understand future performance, we need to estimate how much population will change by, the degree to which climate change will impact Wales and areas of England that border our company, and how further surface water connected to the sewer network might increase the amount and rate at which rainfall drains into our sewers.

Urban creep is the term used to explain loss of green spaces, for example when new driveways or house extensions are built. It often leads to more rainwater entering sewers. Our forecasts suggest that urban creep will add up to 0.63 metres squared of impermeable ground per house per year.

Climate change is predicted to increase the intensity of storms by around 35% in this region. In a typical year, winters are likely to be warmer and wetter, and summers generally drier. More intense rainfall will happen more frequently. The population in the Ynys Mon region is set to decrease to 16000 by 2050, a change of -15% based on our future projections. However there are major developments in localised areas that will contribute to future pressures on the network, including Caergybi - Park Cybi and former Anglesey aluminum site.

## 3.1 Risk Based Catchment Screening

The Risk Based Catchment Screening (RBCS) is the initial screening process to determine if a more detailed risk assessment is required. The assessment screens catchments against planning indicators which have been stipulated in the national guidance for DWMPs. A catchment will pass through to a more detailed risk assessment if it fails against one or more of these indicators, the results are shown in Figure 3.

For the Un-named - Crigyll Caradog catchment the biggest concerns indicated by the RBCS are Storm Overflow Assessment Framework, external sewer flooding, treatment works - quality compliance, other RMAs, planned residential development, Water Inudstry National Environment Programme and sewer collapses.



**RBCS** Results

\*To sewer flooding due to extreme wet weather events.

\*\*Categorised as a "planned" scheduled action within the Natural Resources Wales Action Database or considered as "Remedy" on Natural England Designated Sites system.

\*\*\*Categorised as a "identified" scheduled action within the Natural Resources Wales Action Database or considered as "Threat" on Natural England Designated Sites system.

+Frequency investigation triggered.

++Overflow risks not covered by other indicators,

Figure 3 - Risk Based Catchment Screening results

# **3.2** Baseline Risk And Vulnerability Assessment (BRAVA)

Following on from the RBCS, the Baseline Risk and Vulnerability Assessment (BRAVA) highlights current and future risk. The risk scores are driven by company targets which were set in our last business plan. These targets were subdivided according to population or sewer length, depending on the measure, to derive a target for each river basin catchment.





In 2025, 8 out of 14 of the indicators are a concern in the Un-named - Crigyll Caradog catchment catchment.







Figures 6 and 7 indicate the current and predicted risk of flooding, pollution, and both flooding and pollution caused by lack of capacity (termed 'hydraulic overload') across our networks. These maps illustrate where the issues occur and can be used to target where we want to work with the community and stakeholders to resolve issues. By working together, we can combine knowledge and resources to deliver the best outcomes for local communities and the environment. We want to include your feedback in our decision-making process.











Figure 6 - Associated Strategic Planning Areas priority (2025)

Figure 7 - Associated Strategic Planning Areas

# 3.3 Water Quality

Water quality is the classification of the quality of watercourses or water bodies in accordance to its physical, biological and chemical properties. Water quality is an important factor of environmental monitoring, ensuring that not only the water body is safe but the surrounding habitat and ecosystem is also.

Water quality status is categorised from 1 to 4, with 4 being the worst case. The priority status is based on the significance towards the risk factors triggering water quality. Un-named - Crigyll Caradog catchment has a water quality priority status for 2050 of 1.

# 4.0 Supply Demand

Supply-demand is an assessment of the capacity of our treatment works. It approximately assesses whether all the treatment works in a region can collectively cope with current and future flows in dry and wet weather. There are two parts to the assessment: dry weather flow (DWF) and a wet weather capacity assessment.

For the DWF part of the assessment, the suitability of the dry weather consents is tested against forecast future growth and changes in water consumption. Results for three scenarios are provided: the 0% headroom scenario assesses the region's capability for treating the predicted changes in DWF in the future with no allowance for error, with no spare treatment works capacity. The other scenarios indicate resilience - i.e. could we cope if we had flows 10% or 20% higher than estimated?

The wet weather assessment takes storm consent values where available as an indication of treatment works capacity and estimates the amount of incoming flow the treatment works is able to treat across a year. Again, three scenarios are shown, with differing treatment "targets" - i.e. if we wanted to ensure that 70% of the wet weather flows in a catchment were treated, could the treatment works cope? Changes in rainfall due to climate change and changing dry weather flows within the region mean that the percentage of flow treated across a year can change in the future.

Table 2 shows the supply-demand assessment for this region. Where a region may not have adequate capacity under a given scenario, it is flagged dark blue for further investigation. There may be local incapacity issues at individual works within the region.

L3 Area	Headroom	2025	2030	2035	2040	2045	2050
Un-named - Crigyll Caradog catchment	0%						
	10%						
	20%						
	Treatment Target	2025	2030	2035	2040	2045	2050
	70%						
	80%						
	90%						

**Table 2 - Supply Demand Balance** 

# 5.0 Options

Over time the pressures on our sewerage network change due to influences such as catchment growth, creep of rainwater into the network, or influences such as climate change impacting rainfall patterns. To ensure the plan is robust over the 30-year planning horizon and to account for the uniqueness of each catchment we have tested various types of schemes, and combination of schemes, to ensure a robust 'best value' plan is delivered.

The types of schemes tested are detailed in Table 3 and can be categorised into either improving network resilience to rainfall or improving network headroom in dry weather flow conditions.

Improving Resilience			
10% Reduction in area draining to the combined sewers	Represents removal of runoff from large commercial buildings.	Short term	
25% Reduction reduction in area draining to the combined sewers	Represents removal of area runoff from non-residential paved areas where there is only one stakeholder (e.g. Local Authority or Highways Agency).	Medium term	
50% Reduction reduction in area draining to the combined sewers	Represents removal of runoff from any connected area including residential properties. There are likely to be multiple stakeholders to engage with.	Long term	
	Improving Headroom		
Reducing infiltration	Reducing infiltration into sewers by 50%, which could be achieved by relining or replacing the public sewers .	Medium term	
Reducing water use	Represents a reduction in water use per person to around 100l per person per day by 2050 by application of water efficiency measures	Medium term	
Reducing trade flow	Reduce trade flows by around 25% by application of water efficiency measures.	Long term	

Table 3 - Risk mitigation details

We have undertaken an analysis of all our wastewater catchments to determine the benefit in terms of potential volume of water removed from our systems for each scheme type to determine a journey plan, (see Figure 8 below), which provides the direction of the best scheme types to undertake in this catchment for the most benefit against predicted future risk from growth, creep and climate change.



#### Figure 8 - Journey Plan

#### Approaches to managing risk

We have undertaken analysis to determine the likely costs to mitigate future predicted pollution and flooding. We assess combined sewer overflows based on the number of times they are predicted to spill in a 'typical year'. Table 4 illustrates the cost of potential measures to mitigate risk to varying standards. The assessment calculates the impact of rainfall and drainage contributions to the network relative to todays costs.

Mitigating the risk posed by flooding has been assessed in terms of probability of occurrence, we use the size of a storm event that has the probability of occuring once every 30 years. Table 5 illustrates the cost of potential mitigation measures to mitigate varying flood risk types.

The choice of scenarios for storm overflow mitigation in Table 4 is a seperate cost and would be required in addition to the choice of scenarios for flooding protection in Table 5. The chosen scenarios for Storm overflows nd flooding are to be added together.

Choice of Scenario	Current Scenario (£)	2030 Scenario (£)	2050 Scenario (£)
Maintain Existing Performance*	-	£38,000,000.00	£54,000,000.00
40 spills in a Typical Year	£11,000,000.00	£12,000,000.00	£11,000,000.00
20 spills in a Typical Year	£17,000,000.00	£18,000,000.00	£19,000,000.00
10 spills in a Typical Year	£20,000,000.00	£22,000,000.00	£23,000,000.00
0 spills in a Typical Year	£35,000,000.00	£41,000,000.00	£42,000,000.00
Equivalent No. Olympic Swimming Pools in 10 spills scenario	110.00	122.00	132.00

\* Maintain is a considered scenario where we will continue to maintain the current level of service within the region and improve the network and address known and emerging risk.

#### Table 4 - Summary of Combined Sewer Overflow option investments

Choice of Scenario	Current Scenario (£)	2050 Scenario (£)	2050 Resilience Scenario (£) 1 in 50 yr (Storm Dennis)
Internal escapes	£1,000,000	£1,000,000	£1,000,000
External escapes in gardens	£11,000,000	£14,000,000	£21,000,000
Escapes in highways	£16,000,000	£20,000,000	£30,000,000
No future flooding	-	£0	£0
Total	£28,000,000.00	£35,000,000	£52,000,000

#### **Table 5 - Summary of Flooding option investments**

We have developed solutions which aim to provide protection against drainage and network failure, pollution events and flooding, internal and external to properties. The solutions developed highlight the level of investment required to bring our entire network up to the level of protection required to be resilient for future risk and demands. The range of scenarios is to provide a choice for understanding and discussion of future direction.

We are beginning to break down the investment indicated in Table 4 and 5 by creating practical schemes ready for delivery these schemes are designed as 100% traditional, 100% sustainable or green and 100% mixture of the 2. These packages have then been analysed in terms of their long term benefit and environmental and social cost to society and one has been chosen for inclusion as our preferred best value option. The areas where we have started our delivery programme aims to provide protection, to our worst served customers and rivers designated as Special Areas of Conservation (SAC) under the

For more information on the methodology developed to carry out the asessments see the DWMP plan main report.

If you want to work with us to develop joint projects to reduce the risk of flooding and protect the environment, please get in touch.

We will continue to work with Welsh Government, Regulators and Local Authorities about the pace, scale and affordability of improvements to be made.

We will be consulting on the preferred approach to planning and once its concluded the next stage is to develop the pipeline of options to meet the pace scale and affordability discussed with Welsh Government and our regulators.

Table 6 - Summary of solutions put forward are a first cycle preferred plan before SEA/HRA

L4 Catchments	No. Schemes
HOLYHEAD WWTW	0

# **DWMP Tactial Planning Catchment Summary**



### Wygyr

### **1.0** Introduction

This Drainage and Wastewater Management Plan (DWMP) sets out how Dŵr Cymru Welsh Water (DCWW) will manage and improve its assets to maintain a resilient and robust wastewater drainage system. The plan aims to manage flooding and pollution from our wastewater assets in the future, for our customers and our environment by working collaboratively with stakeholders, regulators and local authorities to provide a complete partnership in tackling current and future problems.

## 1.1 Catchment Information

The Wygyr planning catchment lies within the Ynys Mon river basin catchment, (see Figure 1 below), it consists of 4 wastewater catchments (see Figure 2 below). There is a combined population of 2378, this is set to decrease to 2182 by 2050, a change of -8%. There is a total sewer length of 27km, with a foul sewer length of 24km, a surface water length of 0km and a combined sewer length of 2km. There are 4 Wastewater Treatment Works (WwTW), 7 Sewerage Pumping Stations (SPSs), and 2 Combined Storm Overflows (CSOs) across this tactical planning unit.

The Wygyr catchment sits at the north western end of Angelsey. The River Wygyr flows down to join the Sea at Camaes. Camaes and Llanfechell are its largest urban areas.



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Figure 1 - River basin location detailing the associated tactial planning catchments



Figure 2- Tactical planning catchments

### 2.0 Stakeholder Engagement

The DWMP aims to enable DCWW to work collaboratively with stakeholders, regulators and local authorities to tackle current and future challenges. DCWW has identified stakeholder objectives that align with the aims of the DWMP and goals of other management plans. Table 1 details the main opportunities we have identified but this is not intended to be exhaustive. Note that these stakeholders have their own planning processes and plans which do not necessarily align with those of DCWW.

#### **Scheme Information**

Stakeholder enagement meetings area scheduled to commence in 2022. These meetings will be held between DCWW and the respective parties, such as NRW, EA, Councils and ENGO's. Further information of the outcome and points of focus towards short and long term strategy planning will be provided in the next cycle of the DWMP assessment.

Table 1 - Current and future investigation schemes

## 3.0 Risk

We have assessed our likely performance from now to 2050 against the objectives that we set in our most recent business plan. The results of this assessment are presented in the following sections.

To understand future performance, we need to estimate how much population will change by, the degree to which climate change will impact Wales and areas of England that border our company, and how further surface water connected to the sewer network might increase the amount and rate at which rainfall drains into our sewers.

Urban creep is the term used to explain loss of green spaces, for example when new driveways or house extensions are built. It often leads to more rainwater entering sewers. Our forecasts suggest that urban creep will add up to 0.63 metres squared of impermeable ground per house per year.

Climate change is predicted to increase the intensity of storms by around 35% in this region. In a typical year, winters are likely to be warmer and wetter, and summers generally drier. More intense rainfall will happen more frequently. The population in the Ynys Mon region is set to decrease to 2200 by 2050, a change of -8% based on our future projections. However there are major developments in localised areas that will contribute to future pressures on the network, including Rhosgoch - Safle Shell and Cemaes - land near Holyhead Road.

## 3.1 Risk Based Catchment Screening

The Risk Based Catchment Screening (RBCS) is the initial screening process to determine if a more detailed risk assessment is required. The assessment screens catchments against planning indicators which have been stipulated in the national guidance for DWMPs. A catchment will pass through to a more detailed risk assessment if it fails against one or more of these indicators, the results are shown in Figure 3.

For the Wygyr catchment the biggest concern indicated by the RBCS is planned residential development.



\*To sewer flooding due to extreme wet weather events.

\*\*Categorised as a "planned" scheduled action within the Natural Resources Wales Action Database or considered as "Remedy" on Natural England Designated Sites system.

\*\*\*Categorised as a "identified" scheduled action within the Natural Resources Wales Action Database or considered as "Threat" on Natural England Designated Sites system.

+Frequency investigation triggered.

++Overflow risks not covered by other indicators,

Figure 3 - Risk Based Catchment Screening results

# **3.2** Baseline Risk And Vulnerability Assessment (BRAVA)

Following on from the RBCS, the Baseline Risk and Vulnerability Assessment (BRAVA) highlights current and future risk. The risk scores are driven by company targets which were set in our last business plan. These targets were subdivided according to population or sewer length, depending on the measure, to derive a target for each river basin catchment.



#### Figure 4 - BRAVA 2025 Summary

In 2025, external flooding due to storms and blockages are the biggest concerns in the Wygyr catchment.



Figure 5 - BRAVA 2050 Summary

In 2050, external flooding due to storms and blockages are the biggest concerns in the Wygyr catchment.

Figures 6 and 7 indicate the current and predicted risk of flooding, pollution, and both flooding and pollution caused by lack of capacity (termed 'hydraulic overload') across our networks. These maps illustrate where the issues occur and can be used to target where we want to work with the community and stakeholders to resolve issues. By working together, we can combine knowledge and resources to deliver the best outcomes for local communities and the environment. We want to include your feedback in our decision-making process.











Figure 6 - Associated Strategic Planning Areas priority (2025)

**Figure 7 - Associated Strategic Planning Areas** 

## 3.3 Water Quality

Water quality is the classification of the quality of watercourses or water bodies in accordance to its physical, biological and chemical properties. Water quality is an important factor of environmental monitoring, ensuring that not only the water body is safe but the surrounding habitat and ecosystem is also.

Water quality status is categorised from 1 to 4, with 4 being the worst case. The priority status is based on the significance towards the risk factors triggering water quality. Wygyr has a water quality priority status for 2050 of 1 which indicates targeted investment to mitigate and focus during AMP11.

# 4.0 Supply Demand

Supply-demand is an assessment of the capacity of our treatment works. It approximately assesses whether all the treatment works in a region can collectively cope with current and future flows in dry and wet weather. There are two parts to the assessment: dry weather flow (DWF) and a wet weather capacity assessment.

For the DWF part of the assessment, the suitability of the dry weather consents is tested against forecast future growth and changes in water consumption. Results for three scenarios are provided: the 0% headroom scenario assesses the region's capability for treating the predicted changes in DWF in the future with no allowance for error, with no spare treatment works capacity. The other scenarios indicate resilience - i.e. could we cope if we had flows 10% or 20% higher than estimated?

The wet weather assessment takes storm consent values where available as an indication of treatment works capacity and estimates the amount of incoming flow the treatment works is able to treat across a year. Again, three scenarios are shown, with differing treatment "targets" - i.e. if we wanted to ensure that 70% of the wet weather flows in a catchment were treated, could the treatment works cope? Changes in rainfall due to climate change and changing dry weather flows within the region mean that the percentage of flow treated across a year can change in the future.

Table 2 shows the supply-demand assessment for this region. Where a region may not have adequate capacity under a given scenario, it is flagged dark blue for further investigation. There may be local incapacity issues at individual works within the region.

L3 Area	Headroom	2025	2030	2035	2040	2045	2050
Wygyr	0%						
	10%						
	20%						
	Treatment Target	2025	2030	2035	2040	2045	2050
	70%						
	80%						
	90%						

**Table 2 - Supply Demand Balance** 

# 5.0 Options

Over time the pressures on our sewerage network change due to influences such as catchment growth, creep of rainwater into the network, or influences such as climate change impacting rainfall patterns. To ensure the plan is robust over the 30-year planning horizon and to account for the uniqueness of each catchment we have tested various types of schemes, and combination of schemes, to ensure a robust 'best value' plan is delivered.

The types of schemes tested are detailed in Table 3 and can be categorised into either improving network resilience to rainfall or improving network headroom in dry weather flow conditions.

Improving Resilience			
10% Reduction in area draining to the combined sewers	Represents removal of runoff from large commercial buildings.	Short term	
25% Reduction reduction in area draining to the combined sewers	Represents removal of area runoff from non-residential paved areas where there is only one stakeholder (e.g. Local Authority or Highways Agency).	Medium term	
50% Reduction reduction in area draining to the combined sewers	Represents removal of runoff from any connected area including residential properties. There are likely to be multiple stakeholders to engage with.	Long term	
	Improving Headroom		
Reducing infiltration	Reducing infiltration into sewers by 50%, which could be achieved by relining or replacing the public sewers .	Medium term	
Reducing water use	Represents a reduction in water use per person to around 100l per person per day by 2050 by application of water efficiency measures	Medium term	
Reducing trade flow	Reduce trade flows by around 25% by application of water efficiency measures.	Long term	

Table 3 - Risk mitigation details

We have undertaken an analysis of all our wastewater catchments to determine the benefit in terms of potential volume of water removed from our systems for each scheme type to determine a journey plan, (see Figure 8 below), which provides the direction of the best scheme types to undertake in this catchment for the most benefit against predicted future risk from growth, creep and climate change.





#### Approaches to managing risk

We have undertaken analysis to determine the likely costs to mitigate future predicted pollution and flooding. We assess combined sewer overflows based on the number of times they are predicted to spill in a 'typical year'. Table 4 illustrates the cost of potential measures to mitigate risk to varying standards. The assessment calculates the impact of rainfall and drainage contributions to the network relative to todays costs.

Mitigating the risk posed by flooding has been assessed in terms of probability of occurrence, we use the size of a storm event that has the probability of occuring once every 30 years. Table 5 illustrates the cost of potential mitigation measures to mitigate varying flood risk types.

The choice of scenarios for storm overflow mitigation in Table 4 is a seperate cost and would be required in addition to the choice of scenarios for flooding protection in Table 5. The chosen scenarios for Storm overflows nd flooding are to be added together.

Choice of Scenario	Current Scenario (£)	2030 Scenario (£)	2050 Scenario (£)
Maintain Existing Performance*	-	£3,000,000.00	£5,000,000.00
40 spills in a Typical Year	£1,000,000.00	£1,000,000.00	£1,000,000.00
20 spills in a Typical Year	£2,000,000.00	£2,000,000.00	£2,000,000.00
10 spills in a Typical Year	£2,000,000.00	£2,000,000.00	£2,000,000.00
0 spills in a Typical Year	£4,000,000.00	£4,000,000.00	£4,000,000.00
Equivalent No. Olympic Swimming Pools in 10 spills scenario	5.00	6.00	6.00

\* Maintain is a considered scenario where we will continue to maintain the current level of service within the region and improve the network and address known and emerging risk.

#### Table 4 - Summary of Combined Sewer Overflow option investments

Choice of Scenario	Current Scenario (£)	2050 Scenario (£)	2050 Resilience Scenario (£) 1 in 50 yr (Storm Dennis)
Internal escapes	£0	£0	£0
External escapes in gardens	£1,000,000	£2,000,000	£1,000,000
Escapes in highways	£4,000,000	£5,000,000	£6,000,000
No future flooding	-	£2,000,000	£4,000,000
Total	£5,000,000.00	£9,000,000	£11,000,000

#### **Table 5 - Summary of Flooding option investments**

We have developed solutions which aim to provide protection against drainage and network failure, pollution events and flooding, internal and external to properties. The solutions developed highlight the level of investment required to bring our entire network up to the level of protection required to be resilient for future risk and demands. The range of scenarios is to provide a choice for understanding and discussion of future direction.

We are beginning to break down the investment indicated in Table 4 and 5 by creating practical schemes ready for delivery these schemes are designed as 100% traditional, 100% sustainable or green and 100% mixture of the 2. These packages have then been analysed in terms of their long term benefit and environmental and social cost to society and one has been chosen for inclusion as our preferred best value option. The areas where we have started our delivery programme aims to provide protection, to our worst served customers and rivers designated as Special Areas of Conservation (SAC) under the

For more information on the methodology developed to carry out the asessments see the DWMP plan main report.

If you want to work with us to develop joint projects to reduce the risk of flooding and protect the environment, please get in touch.

We will continue to work with Welsh Government, Regulators and Local Authorities about the pace, scale and affordability of improvements to be made.

We will be consulting on the preferred approach to planning and once its concluded the next stage is to develop the pipeline of options to meet the pace scale and affordability discussed with Welsh Government and our regulators.

Table 6 - Summary of solutions put forward are a first cycle preferred plan before SEA/HRA

L4 Catchments	No. Schemes
CEMAES BAY (ANGLESEY) STW	0
LLANFAETHLU	0
RHYDWYN (ANGLESEY)	0
LLANFECHELL	0