4 Current Status of Infrastructure

4.1 Introduction

Irish Water are committed to continuous improvement to our water supply network. Throughout the development of the Framework Plan and the draft RWRP-EM there has been a requirement to continue to design and deliver projects, particularly in relation to critical water quality risks (which could have the potential to impact human health) and / or supply reliability issues. For example, this may include projects required to remove 'boil water' notices. These critical works are addressed through our critical infrastructure projects which are completed under our capital investment plans. Critical projects and programmes to address potential public health issues are therefore on-going and are not impacted or delayed by the delivery of the NWRP.

Outside of the NWRP, Irish Water's investment follows investment periods (known as Revenue Control periods) which set out how much Irish Water can spend on projects and programmes for that period. These are subject to oversight by and approval of the Commission for Regulation of Utilities (CRU). Our first Capital Investment Plan covered the period 2014-2016 whilst the second investment plan covered 2017 to 2019. We are currently carrying out work which was identified in our RC3 Capital Investment Plan 2020-2024.Throughout the development of the NWRP and draft RWRP-EM, Irish Water have continued working on a range of existing critical infrastructure projects funded by Irish Water's RC3 Capital Investment Plan and we continue to identify and complete further critical infrastructure projects.

Between January 2014 and December 2019 Irish Water invested €3.9 billion in public water and wastewater infrastructure, with a further projected spend of circa €5bn by 2024. We have invested in a range of water projects and programmes that will support and enable proper planning and sustainable development at a National, Regional and Local Level. The objective of this approach has been to deliver a balanced portfolio of investment across the three (3) themes of Quality, Conservation and Future Proofing.

This section provides in-sight into the current status of the infrastructure within the Eastern and Midlands Region, critical infrastructure work that has already been completed and critical infrastructure work that is currently ongoing.

4.2 National Investment Programmes

Irish Water are committed to improving the Quality of water received by our customers. In order to bring about improvements, we have identified critical water quality requirements nationally and are currently delivering a range of national programmes to address high risk water supplies.

National programmes being implemented to address asset reliability and water quality issues include:

- The **Source Protection Programme** which develops or upgrades groundwater sources.
- The **Reservoir Cleaning Programme** which involves inspections of reservoirs and the development of a prioritised works (cleaning/repair) schedule for implementation. The programme aims to reduce network water Quality issues.
- The **Disinfection Programme** which consists of chlorination upgrades and/or UV installations/upgrades to help resolve network water Quality issues.
- The **Lead Mitigation Programme** which is a pilot programme that involves the addition of orthophospate (a food additive) to the water to prevent lead in domestic pipes dissolving into drinking water. This programme will run in parallel to the Targeted Lead Services Replacement of all lead pipework on the public parts of the distribution system and the Government National Lead Strategy.
- **Trihalomethane (THMs) Reduction** works (Box 4.1.).

Through our National Disinfection Programme, we have upgraded a total of 255 WTPs. Under our National Lead Programme we have replaced a total of 38,414 lead services, which represents a significant investment in protecting public health. We are also targeting investment to improve water Quality in order to lift Boil Water Notices (BWN). Since 2014 we have lifted 243 BWN's impacting over 1.7 million people of which over 40,000 of these people were on BWN's for a period of over a year. Through investment in water assets and infrastructure, Irish Water has removed 87 public water schemes from the EPA's remedial action list (RAL) between 2014 and 2020 reducing the number of WTPs on the RAL from 140 to 53. This has improved the Quality and Quantity of water supplied to over 555,600 people in the Eastern and Midlands Region.

These national programmes are currently funded and being delivered as part of our regulated Capital Investment Plan 2020-2024 however, due to the condition of our existing asset base and the large number of sites to be addressed, it may take several investment cycles before we have the appropriate risk controls in place across all our supplies. For this reason, the development of our Preferred Approaches, presented in Section 7 and Section 8 of this Plan, consider these water Quality issues alongside the supply demand balance issues. As explained in Section 2 of this Plan, our long-term approach will increasingly include catchment management for drinking water source protection in partnership with key stakeholders

Box 4.1 – Trihalomethanes

Trihalomethanes are a by-product that can be formed when we disinfect* water supplies that contain naturally occurring organic matter. Within the Drinking Water Regulations, the maximum permitted levels of THMs in drinking water is set at 100 mg/L. When Irish Water took over the public supply in Ireland in 2014 it was estimated that 74 water supply zones (WSZs) within the public water supply were at risk of exceeding the limits for THMs. The European Court of Justise initiated an infringement case against Ireland for failing to address this issue.

Since then, Irish Water has invested in our water supplies and resolved the THM issues in 57 of the 74 WSZs originally listed as part of the infringement case. The remaining 17 WSZs cover a population of 181,000, and will be addressed as follows:

- A further eight (8) supplies will be removed from this list by the end of 2021 (a reduction in impacted population of 129,000).
- The remaining nine (9) supplies will be permanently resolved by 2024.

* It should be noted that the potential health risks associated with THMs are much lower than the risk of serious illness that could result from drinking water that has not been properly disinfected.

4.3 Progress in the Eastern and Midlands Region

4.3.1 National Investment Programmes within the Eastern and Midlands Region

The implementation status of national programmes across the Eastern and Midlands Region is summarised in Table 4.1. 58 of the 243 BWNs that have been lifted were located in the Eastern and Midlands Region benefitting over 1.4 million customers. Currently there are approximately 563 customers on BWN in the Eastern and Midlands Region.

Within the RWRP-EM there are currently 8 WTPs which are subject to an EPA Direction whilst 12 WTPs are listed on the EPA's remedial action list. Aughrim Annacurra, Castlemahon, Foynes and Fedamore WTP are included on both the RAL and are subject to EPA Directives.

Table 4.1 National Investment Programmes in the Eastern and Midlands Region

Study Area	Source Protection Programme	Reservoir Cleaning Programme	Disinfection Programme (completed upgrade works*)
SA1	None identified	2 of 15 sites	11 of the 18 WRZs completed (20 WTPs in total)
SA2	Initial borehole assessments complete	0 of 11 sites	3 of 12 WTPs completed
SA3	None identified	38 of 48 sites	1 of 19 WTPs completed: 6 in-progress
SA4	None identified	8 of 36 sites	7 of 15 WTPs in-progress
SA5	None identified	1 of 32 sites	1 of 12 WTPs completed
SA6	None identified	7 of 63 sites	15 of 42 WTPs completed
SA7	None identified	5 of 20 sites 7 sites ongoing	11 of 18 WTPs ongoing
SA8	Progress at 35 sites; 11 sites to be upgraded under current programme cycle	11 of 130 sites 32 inspected	Progressed at 35 sites. 11 sites in-progress (47 WTP's in total).
SA9	1 site completed	9 of 125 sites	4 of 12 WTPs

*Any other requirements within the remaining supplies will be identified via Drinking Water Safety Plans with solutions developed as part of the Regional Plan.

4.3.2 Identification of Critical Infrastructure Projects within the Eastern and Midlands Region

There are currently 62 local critical infrastructure projects which have been completed or are currently in progress (in-flight) in the Eastern and Midlands Region. These include WTP upgrades to improve water Quality, critical mains replacements to improve supply Reliability, critical network upgrades, reservoir refurbishments, construction of new reservoirs and the installation of new boreholes. These works are important as the benefits of having sufficient water supplies in terms of Quality and Quantity are negated if we cannot distribute the water we produce effectively around our networks. We also need sufficient treated water storage to enable us to respond to planned or unplanned outages on our trunk main and distribution networks. It is likely that it may take 5-10 investment cycles before we address all issues with the existing water supplies. As a result of this, priority projects (such as those to remove sites from the RAL) have been identified.

4.3.3 Completed Critical Infrastructure Projects

Nationally, between 2014 and 2019 we delivered key outcomes to support growth including constructing 11 new WTPs and upgrading 36 WTPs. We have also laid a total of 1,906km of new and rehabilitated water main. Major national strategic infrastructure water projects have also been progressed. Case studies of work completed in the Eastern and Midlands Region include:

- The National Leakage Reduction Programme addressing leakage in SA6 (Mountrath, Mountbolus, Mountmellick, Portlaoise and Carlow) (Box 4.2).
- The Vartry Water Supply Scheme (Co Dublin and Wicklow) - a major national strategic infrastructure project completed within the Eastern and Midlands Region (Box 4.3).
- Portloman WTP upgrade (Box 4.4).
- Staleen WTP upgrade (Box 4.5).
- Borrisokane Drinking Water Safety Plan (Box 4.6).

It should be noted that some critical infrastructure projects such as the upgrade to Vartry WTP and Staleen WTP have been progressed to support growth as part of our current regulated investment cycle. As such these measures do not improve Levels of Service, they prevent current levels from deteriorating further. Future need will be addressed through the Preferred Approaches discussed in Section 6 - 8.

Box 4.2 – National Leakage Reduction Programme

Everyday treated water in Ireland is lost through leaks before it reaches our taps. Leaks can be difficult to find because they happen in the vast and complex network of pipes below ground. Many of these pipes are now old and damaged and need to be repaired or replaced to improve our water Quality and supply.

To reduce drinking water lost to leaks Irish Water have implemented the National Leakage Reduction Programme (investing an expected €500 million up to the end of 2021) to provide a more reliable water supply. As part of the National Leakage Reduction Programme, we're working with Local Authorities across the country. This involves fixing or replacing old, damaged pipes and reducing high levels of leakage to provide a more reliable water supply. Watermain replacement works have been carried out across Study Area 6, including Mountrath, Mountbolus, Mountmellick, Portlaoise and Carlow. As part of this programme Irish Water, in partnership with Wicklow County Council, has delivered over 17 kilometers of new water mains and improved the water supply for more than 70,000 people in County Wicklow since 2018.

The National Leakage Reduction Programme provides various benefits including:

- A more reliable water supply
- Improved water quality
- Reduced levels of leakage
- Individual water connections

Due to the implementation of this programme we are now saving 166 million litres of drinking water daily.

In 2018 the rate of leakage nationally was 46%, but our ongoing work has reduced this to 38%.

Box 4.3 – Vartry[1]

The Vartry Water Treatment Plant (SA9) provides over 200,000 people with drinking water. It is currently on the EPA Remedial Action List as security of supply and drinking water Quality Need to be addressed.

The Vartry WTP security of supply is at risk due to the algal (diatom) blooms which can occur from March to May each year which can reduce the amount of drinking water that the plant can output by over 50%. In addition, the existing tunnel that supplies the drinking water to communities in north Wicklow and south Dublin is over 150 years old and is at risk of collapse. Upgrades are required to improve the final quality of the drinking water and ensure it fully complies with the Drinking Water Regulations.

Vartry Water Supply Scheme Upgrade project will ensure that water provided complies with water quality standards set out in the EU Drinking Water Directive and the current, national Drinking Water Regulations. There are three main aspects of this project:

- Vartry Water Treatment Plant Upgrade - constructing a new water treatment plant on the site of the existing plant at Vartry.
- Vartry to Callowhill Pipeline - constructing a 4km pipeline to secure the transfer of treated water from Vartry to Callowhill pumping station.
- Stillorgan Reservoir Upgrade - constructing a new covered storage reservoir as part of the Stillorgan Reservoir Upgrade.

During the construction phase of the new WTP, we were dependant on supply from the old WTP to ensure supply to the Greater Dublin Area. However, in February 2021 issues arose with the integrity of the filter beds at the old WTP. To avoid a risk of a precautionary boil water notice to customers served by the old WTP, Irish Water installed emergency UV filters at Callow Hill, a location downstream of the plant prior to distribution to customers. The emergency UV filters with treatment capacity of over 40Ml/day were installed in May 2021 and allowed us to safeguard supply to the Greater Dublin Area pending the commissioning of the new WTP.

Box 4.4 – Portloman WTP[2]

Portloman WTP was placed on the EPA's Remedial Action List (RAL). The quantity and quality of water available from the source had shown significant variation for a number of years impacting on the operations of the WTP. Any interruption to deployable output from the WTP would result in immediate interruptions to the water supply for a population of up to 50,000. In addition, monitoring, control and treatment was inadequate in mitigating and or preventing inadequately treated drinking water entering the water supply for Mullingar and the surrounding area.

Irish Water, working in partnership with Westmeath County Council, has completed works to improve the water supply and the WTP has now been removed from the EPA's Remedial Action List. The upgrades modernised and improved the water treatment monitoring and control process. Turbidity monitors were installed on the existing ultrafiltration unit in order to monitor the treated water quality. Additional alarms and controls were also installed to mitigate against any inadequately treated water going into the supply.

The works will benefit over 48,000 customers and ensure the delivery of a clean, safe drinking water supply.

Box 4.5 – Staleen Wastewater Treatment Plant[3]

Staleen Water Treatment Plant (WTP) which supplies water to Drogheda, South Louth and the East Meath area has recently been improved through the investment of €29 million. As part of the works the treatment facilities and associated Roughgrange pumping station were upgraded. A critical water main supplying raw water to the treatment plant was also replaced.

The WTP was on the EPA's remedial action list (RAL) as trihalomethane concentrations were in excess of the Drinking Water Regulations Standard. In order to improve treatment efficiencies, the coagulation, flocculation and clarification (CFC) process was upgraded, the filtration process was upgraded and additional filtration tanks installed, the chemical treatment process was upgraded and UV disinfection was installed. In addition, measures have been implemented to improve the energy efficiency of the pumping station, which is one of Irish Water's top energy consuming installations. The storage reservoir at Donore has also seen refurbishment works carried out.

Works at the plant are complete and the supply was removed from the RAL list on Q1 2021. The investment will benefit a population of over 70,000 people and will bring a range of benefits including the delivery of a safe and secure drinking water supply. There will be improved drinking water quality, in particular for THM compliance, and reduced disruptions to the drinking water supply.

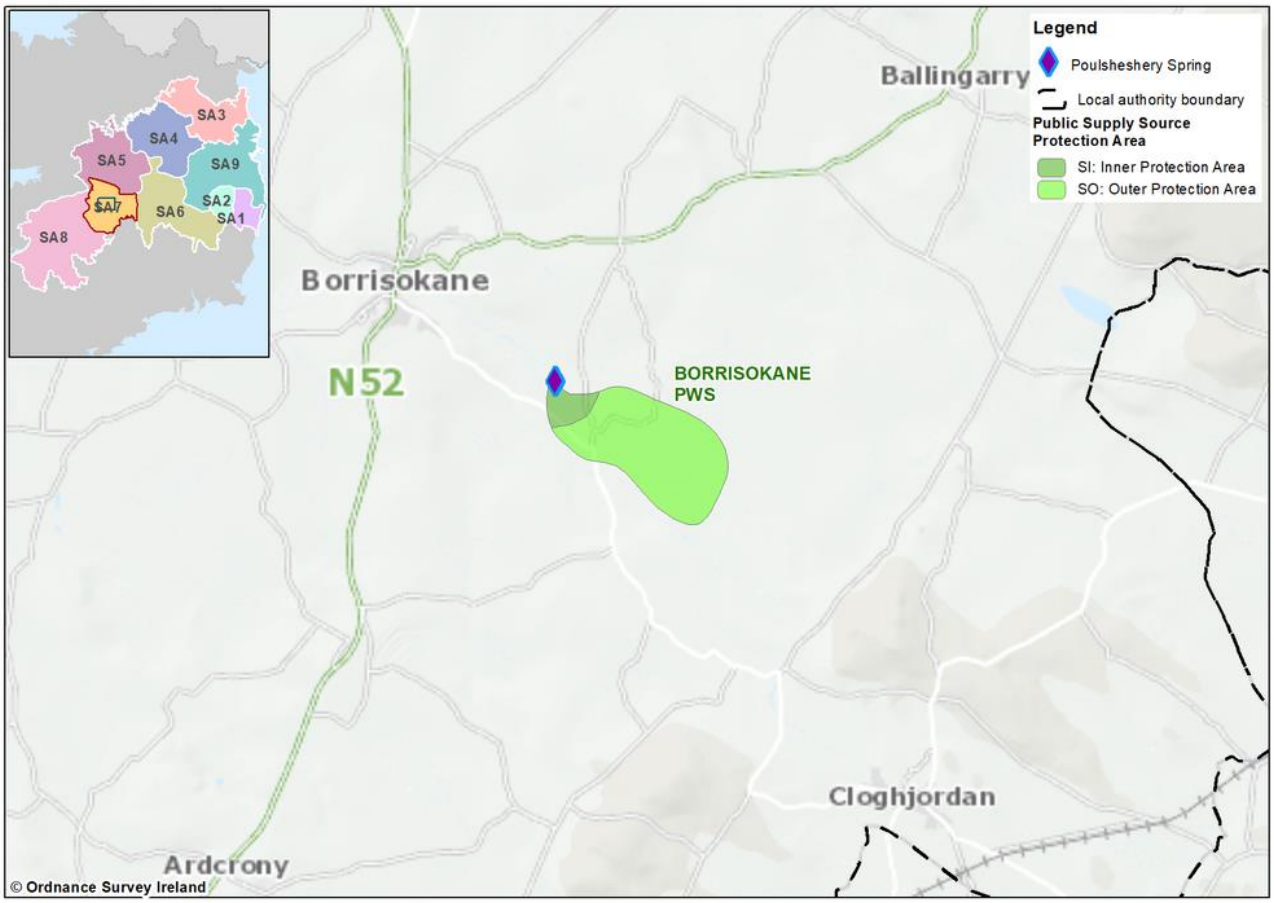
Box 4.6 – Borrisokane Drinking Water Safety Plan[4]

Following the placement of Borrisokane supply on a Boil Water Notice, Irish Water applied the Drinking Water Safety Plan, *Cryptosporidium* Source Risk Assessment Methodology to understand the potential risk score to this supply and inform the appropriate treatment barrier.

Borrisokane receives water from an old spring[4], named Poulsheshery in the townland of Crotta located two kilometres southeast of Borrisokane village, North County Tipperary. The spring draws water from the Ballinderry Lismaline, Nenagh groundwater body. The delineated Source Protection Zone (SPZ) for the spring is 1.97 km^2 as shown on the map below. The theoretical recharge associated with this spring is 1233 m^3 day^{-1}.

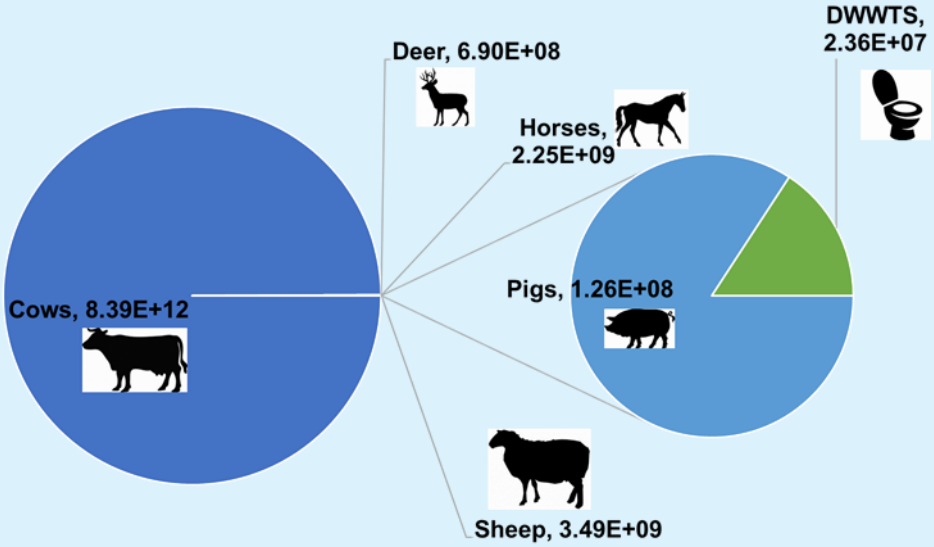
The SPZ contained no point source discharges determining that additional diffuse sources of contamination were present.

In order to fully understand the root cause of the failure of the supply to meet required protozoa limits oocyst (a thick-walled structure containing a zygote that serves to transfer parasites to a new host) loadings were calculated. Oocyst loadings were calculated for cows, sheep, horses, pigs and deer and subtracted from an oocyst retention factor based on hydrogeological settings within the SPZ.



Box 4.7 Continued – Borrisokane Drinking Water Safety Plan

The relative contribution of oocyst load by input type can be seen below.



The maximum Cryptosporidium oocyst concentration observed in the raw water was 28.3 oocysts m^{-3}, which equates to a Log_{10} of 1.45. The Cryptosporidium Source Risk Assessment (CSRA) predicted a Log_{10} score of 2.34.

As the survey had identified no point source discharges in the immediate vicinity, and in accordance with Irish Waters Barrier approach, it was determined that there was a barrier deficit, and a UV disinfection system was proposed for the site.

4.3.4 In-Flight Critical Infrastructure Projects

Some of the in-flight projects across the Eastern and Midlands Region are presented in Table 4.2.

New boreholes are being developed at both Rathdrum and at Jones Well WTP in order to address water supply issues. The Rathdrum supply provides water to a population of approximately 1,900 but during the 2018 drought period there was an insufficient yield resulting in the need to bring in water by road tanker. In response to this a new production well is currently under construction. Similarly, a new production well is being developed at Jones Well WTP to increase supplies due to deficits in the Dunkerrin/Moneygall WRZ as a result of previous asset design and current asset condition.

Athlone WTP is currently being upgraded, with an investment of over €4 million, in order to increase capacity and secure the future water supply in Athlone. As a short-term response we prioritised our Leakage Reduction Programme in Athlone in 2020 to bring about a short-term reduction in water need. Under our National Leakage Reduction Programme we are investing €500 million in the public water network across Study Area 6 as discussed in Box 4.2. Leakage has also been targeted within the Greater Dublin Area (GDA) where leakage reductions have already been incorporated into the Supply Demand Balance (SBD) (Section 3.2.6.6). A rolling programme of active leakage control, pressure management, find and fix and network upgrades are currently ongoing in SA1 and SA2 and are starting in SA4 and SA8. The Water Supply Project Eastern and Midlands Region is currently under design for SA9 to address water deficits in the region (Box 4.6).

Table 4.2 In-Flight Projects in the Eastern and Midlands Region

In-Flight Project	Study Area	Progress
Rathdrum Supply	SA1	Under Construction
Distribution Network Repairs and Upgrades	All Study Areas	In Progress
Upgrade of Athlone WTP	SA5	In Progress
National Leakage Reduction Programme	All Study Areas	In Progress
Dunkerrin/Moneygall WRZ (Jones Well WTP)	SA7	On Going
Water Supply Project Eastern and Midlands Region	SA9	In design

Upon progression with the NWRP and draft RWRP-EM, “In-flight” projects will be assessed against the Preferred Approaches identified and adapted as required. It should be noted that assessments and Preferred Approaches and solutions at this stage are at a Plan Level. The Preferred Approaches will have their own public consultations as part of the development of the RWRPs. These public consultations will take place throughout 2021 and 2022.Environmental impacts and costing of projects are further reviewed at Project Level. No statutory consent or funding consent is conferred by inclusion in the RWRP-EM. Any projects that are progressed following this Plan will require individual environmental assessments, including Environmental Impact Assessment (as required) and screening for Appropriate Assessment, in support of planning applications (where a project requires planning permission) or in support of licencing applications (for example, for new abstractions). Any such applications will also be subject to public consultation.

Box 4.8 – Water Supply Project Eastern and Midlands Region (WASP-EMR)[5]

The Eastern and Midlands Region is expected to experience high levels of population growth and economic development reflected in the Regional Spatial and Economic Strategy (RSES). Significant growth is expected in the Growth Centres and Key Towns identified in the strategy including Arklow, Athlone, Athy, Carlow, Drogheda, Mullingar, Navan, Portlaoise and Tullamore. As a result, the Eastern and Midlands Region will see an increase in water need leading to a further increase in water deficit. Since 2014, Irish Water have been working on the identification of an appropriate new source of water supply to meet this deficit. Extensive studies and analysis have been undertaken to identify and assess all possible supply options.

Box 4.8 Continued – Water Supply Project Eastern and Midlands Region (WSP-EMR)[5]

A process involving detailed studies, investigation and consultation let to the identification of an abstraction of water from Parteen Basin on the Lower River Shannon as the Preferred Option to meet the identified Need. The Preferred Scheme involves the treatment of water nearby, at Birdhall, Co Tipperary.

Treated water would then be piped 170km to a new reservoir at Peamount in County Dublin, connecting to the Greater Dublin network. Future provision of treated water supplies to communities in North Tipperary, Offaly, Laois, Westmeath, Kildare, Meath and Wicklow would also be enabled.

Responses to feedback received by Irish Water during the fourth phase of public consultation (Final Options Appraisal Report and Environmental Impact Statement Scoping) on the Project was published in April 2018. Work is progressing to develop the Planning application documents for the Scheme, including the technical design and the preparation of an Environmental Impact Assessment Report. The findings of the NWRP Framework Plan and RWRP-EM will be taken into account in the further development of the Project and there will be a further opportunity for public engagement in relation to the Project before a planning application is submitted to An Bord Pleanála.

4.4 Summary

In summary, there are asset reliability issues across the distribution network within the Eastern and Midlands Region. Progress in addressing these issues is presented in Figures 4.1 – 4.9.

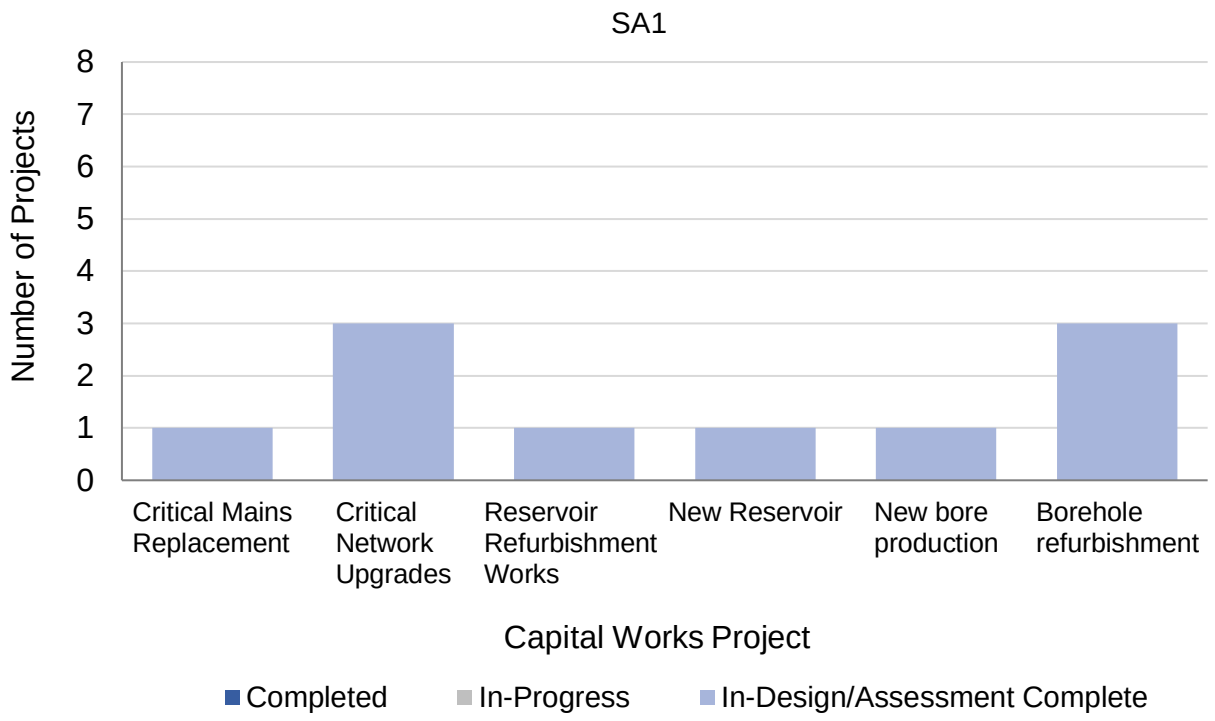


Figure 4.1 Critical Works Projects in SA1

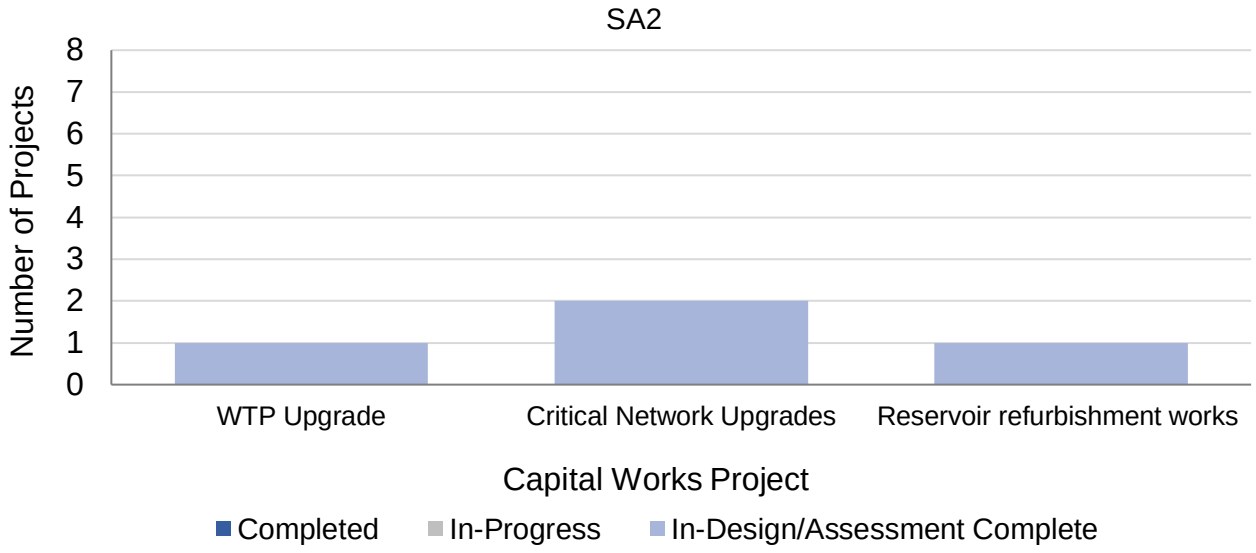


Figure 4.2 Critical Works Projects in SA2

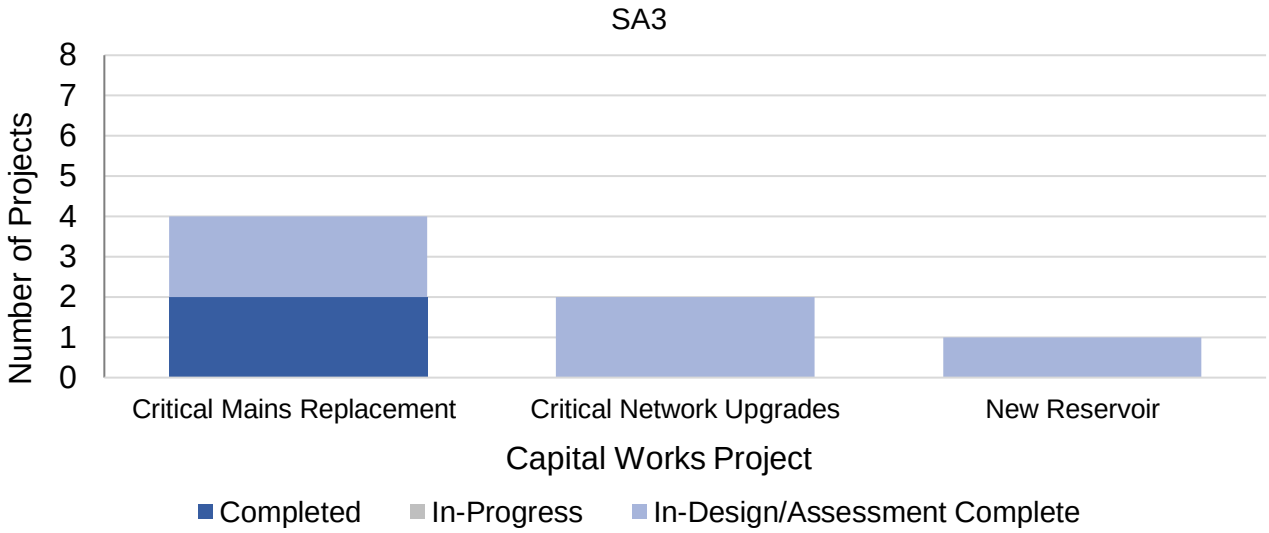


Figure 4.3 Critical Works Projects in SA3

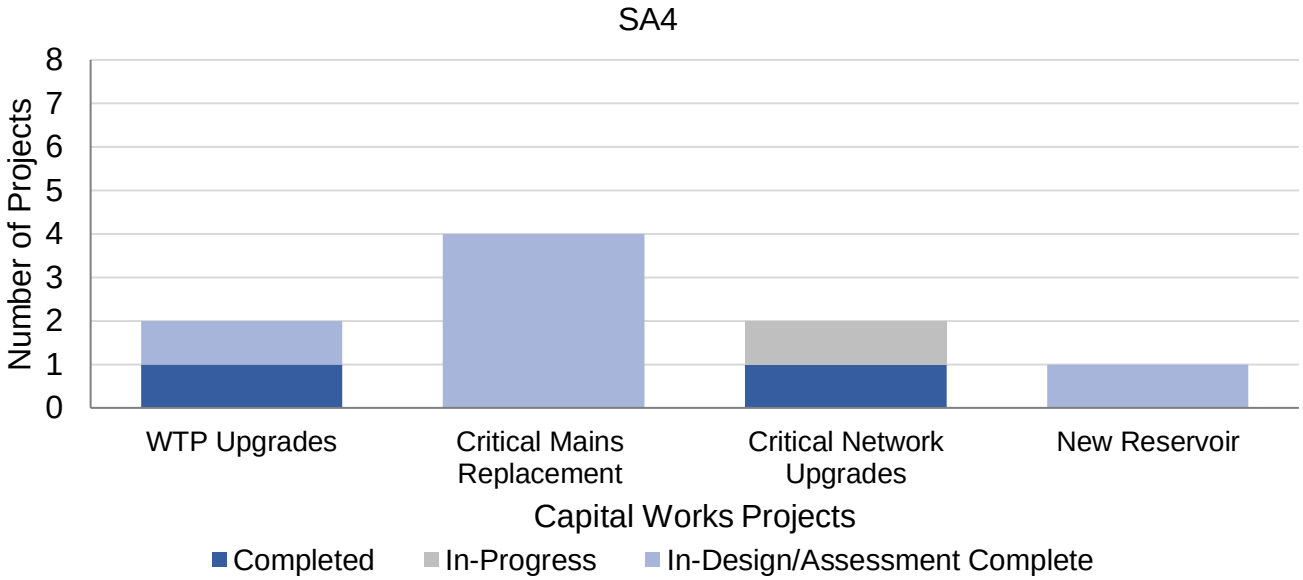


Figure 4.4 Critical Works Projects in SA4

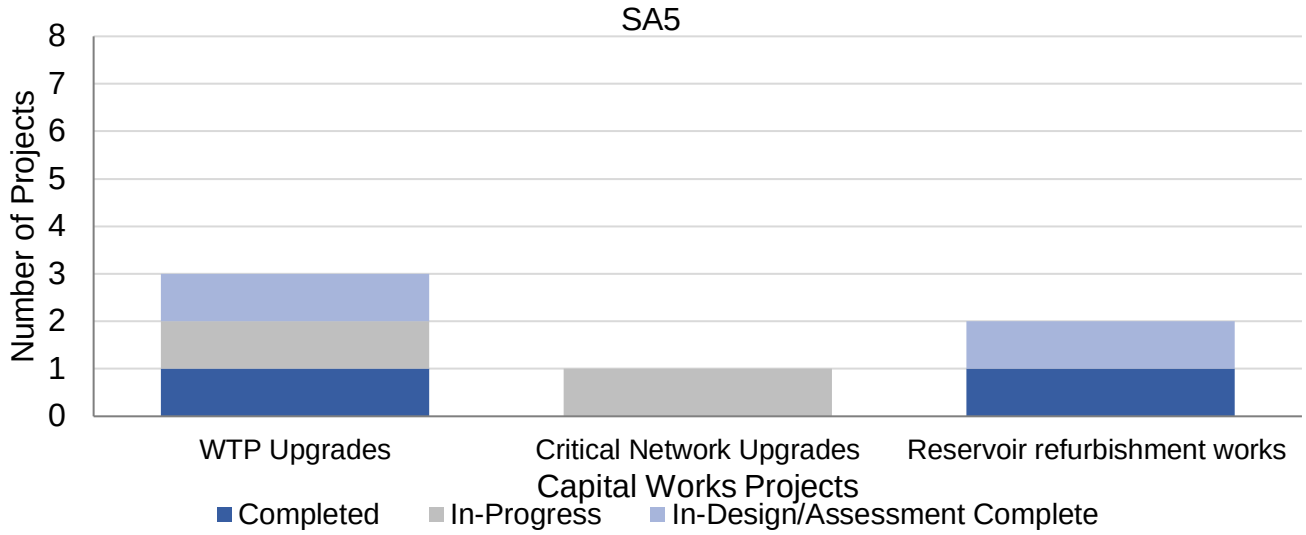


Figure 4.5 Critical Works Projects in SA5

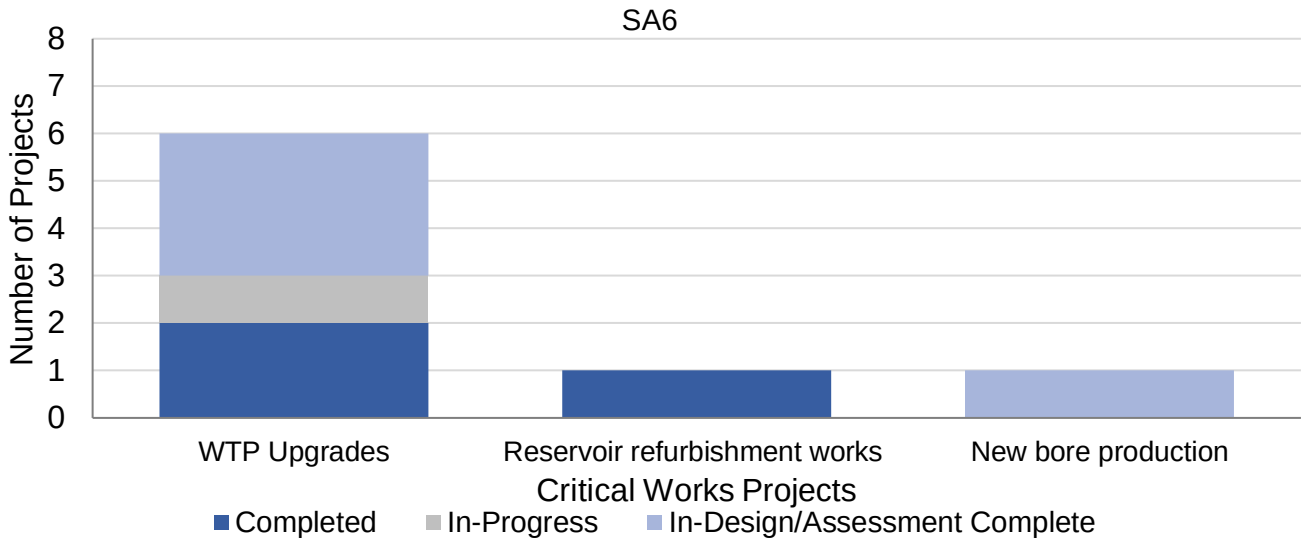


Figure 4.6 Critical Works Projects in SA6

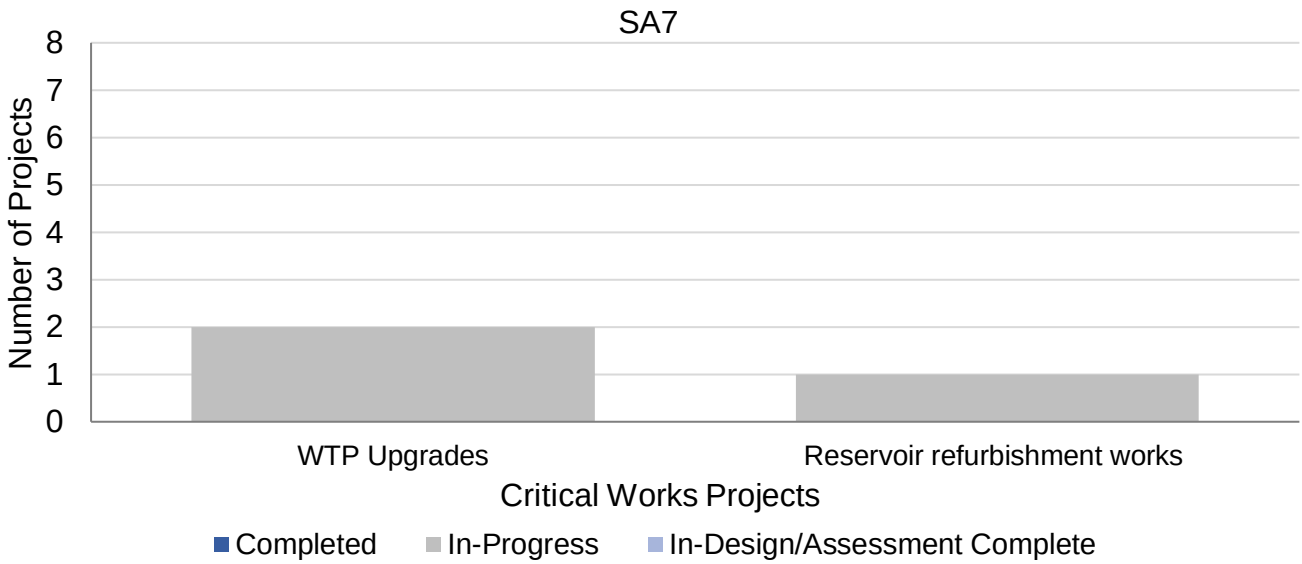


Figure 4.7 Critical Works Projects in SA7

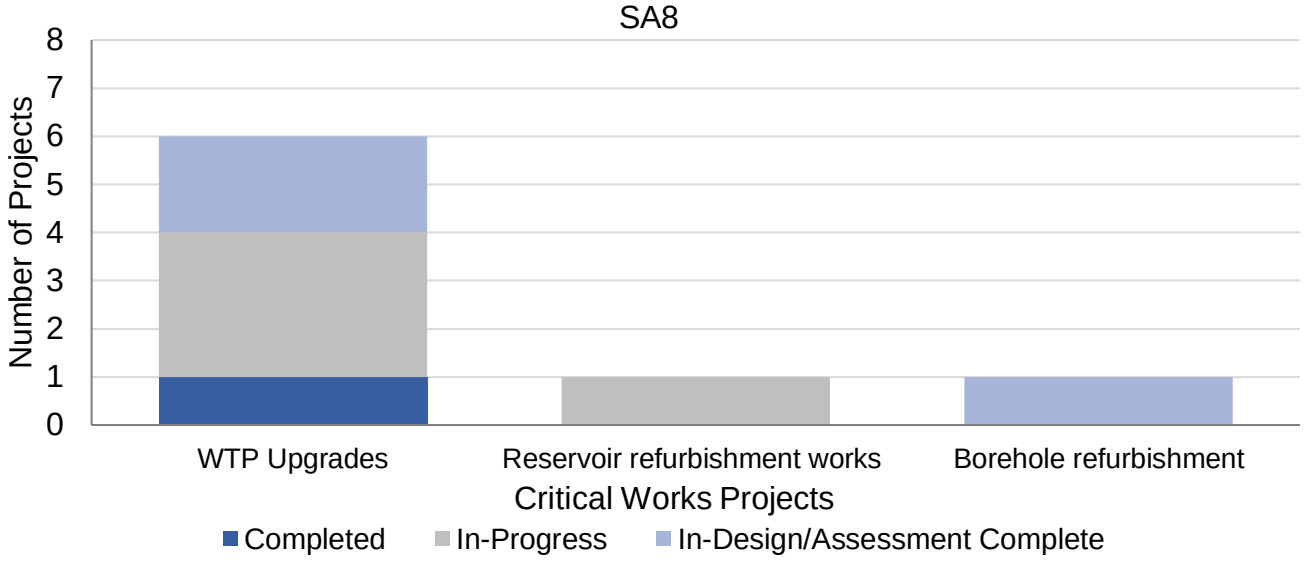


Figure 4.8 Critical Works Projects in SA8

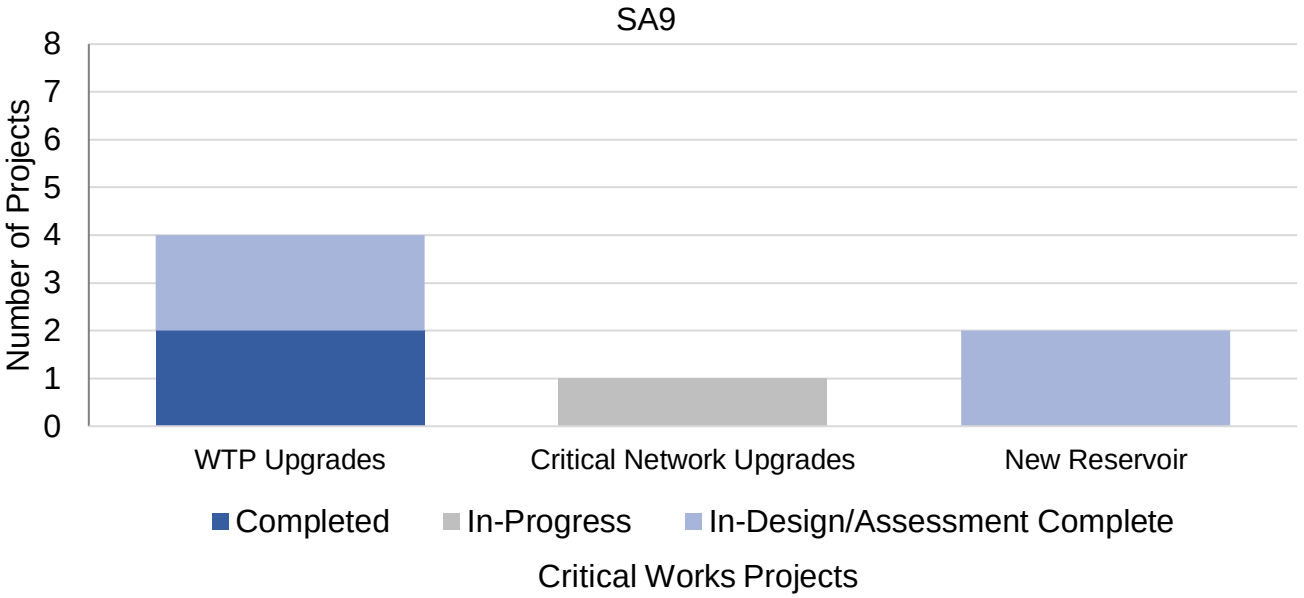


Figure 4.9 Critical Works Projects in SA9

4.5 Conclusions

Irish Water are committed to improving supply Reliability across the Eastern and Midlands Region. This section provides in-sight into the work that has already been completed to improve our water network as well as ongoing and planned work. Critical projects and programmes to address potential public health issues are on-going and are not impacted or delayed by the delivery of the NWRP.

Between January 2014 and December 2019 Irish Water invested €3.9 billion in public water and wastewater infrastructure, with a further projected spend of circa €5bn by 2024. We have invested in a range of water projects and programmes that will support and enable proper planning and sustainable development at a National, Regional and Local Level. The objective of this approach has been to deliver a balanced portfolio of investment across the three (3) themes of Quality, Conservation and Future Proofing.

Irish Water are progressing National Programmes across all SAs to address asset Reliability and water Quality issues. They include the:

- Source Protection Programme – with notable works ongoing in SA8.
- Reservoir Cleaning Programme – with work ongoing/planned in each of the region's SAs.
- Disinfection Programme – with work now complete in SA2, SA3, SA5 and SA6 and ongoing in the remaining SAs.
- Lead Mitigation Programme- planned across the Eastern and Midlands Region in line with the Government National Lead Strategy.

Across the Eastern and Midlands Region, works have been completed to address critical water Quality issues at Staleen, Portloman WTP and Borrisokane. Leakage is being addressed across all Study Areas through the National Leakage Reduction Programme. Ongoing works include the installation of new boreholes at Rathdrum (SA1) and Jones Well WTP in Dunkerrin/Moneygall (SA7), upgrades to Athlone WTP (SA5) and distribution network repairs and upgrades across all Study Areas.

These projects are of vital importance and are critical to meeting Ireland's growing water needs.

4.6 References

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