

Appendix 3A: Agglomeration Loading & Methodology



Castletroy Wastewater Treatment Plant

Agglomeration Loading Report

Project No. Y17709
March 2018



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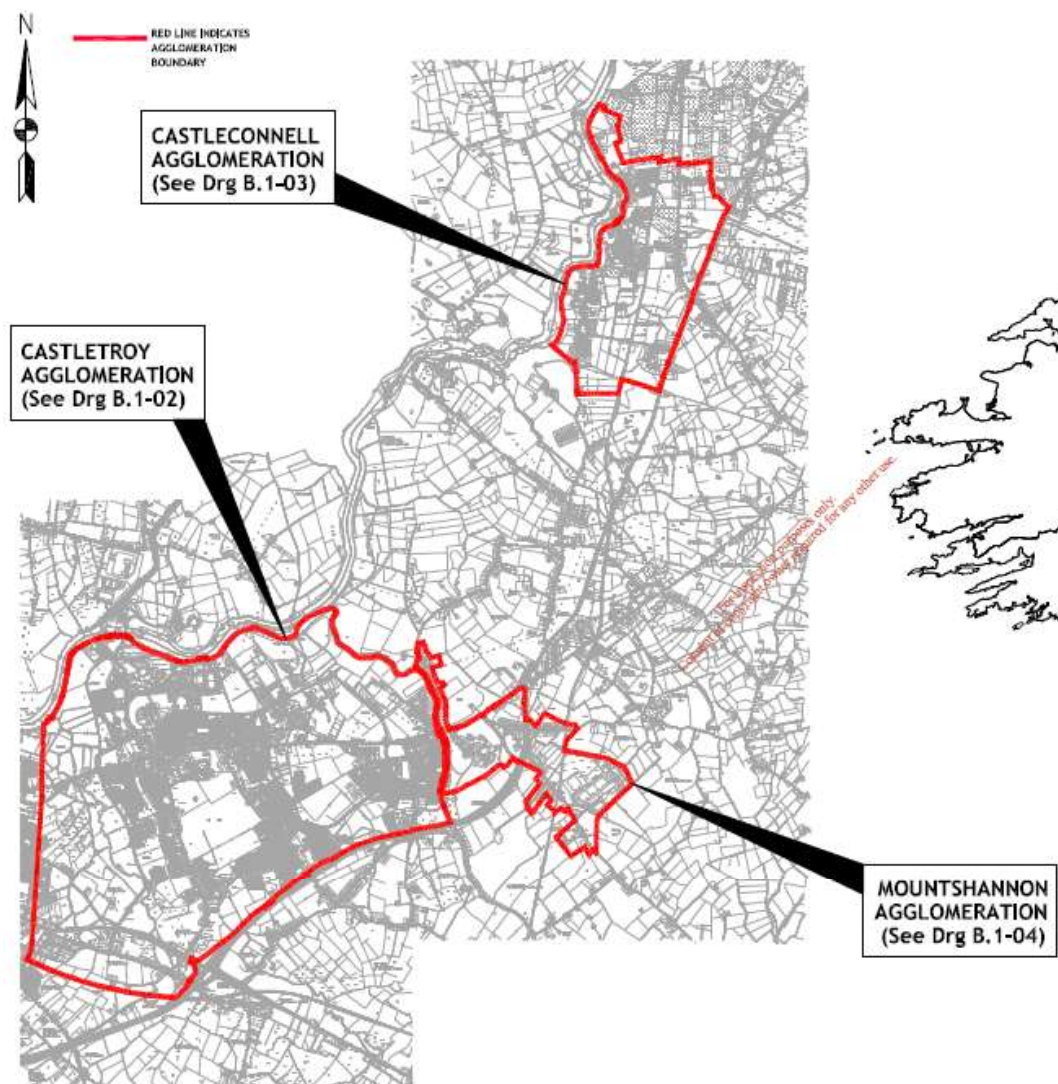
SECTION 1: INTRODUCTION

This section of the report examines the current agglomeration loadings and proposed design population equivalents in accordance with relevant Irish Water policies. Castletroy is a suburb of Limerick City and home to University of Limerick. The Castletroy Wastewater Treatment plant agglomeration also includes for Castletroy, Castleconnell and Mountshannon.

The population estimates for Castletroy have considered the information from the 2016 Census results, Castletroy Local Area Development Plan 2009 to 2015 and information from the Geo-directory (2017).

Population projections have been carried out based on recommendations from Irish Water Wastewater Asset Planning detailed in the Growth and Headroom Technical Guidance Note (TGN) - December 2017.

Figure 1.1: Outline Map of Castletroy WWTP Agglomeration



1.1 Current Loadings

The existing population and hydraulic loads have increase substantially since 2014. These loads are due to an increase in industrial, commercial and institutional activity within the Castletroy agglomeration.

The following Graph 1.1 and Table 1.1 summarises the available Flow and Load to Castletroy WWTP during the period from January 2016 until December 2017.

Graph 1.1: Current Population Estimates from January 2016 to December 2017

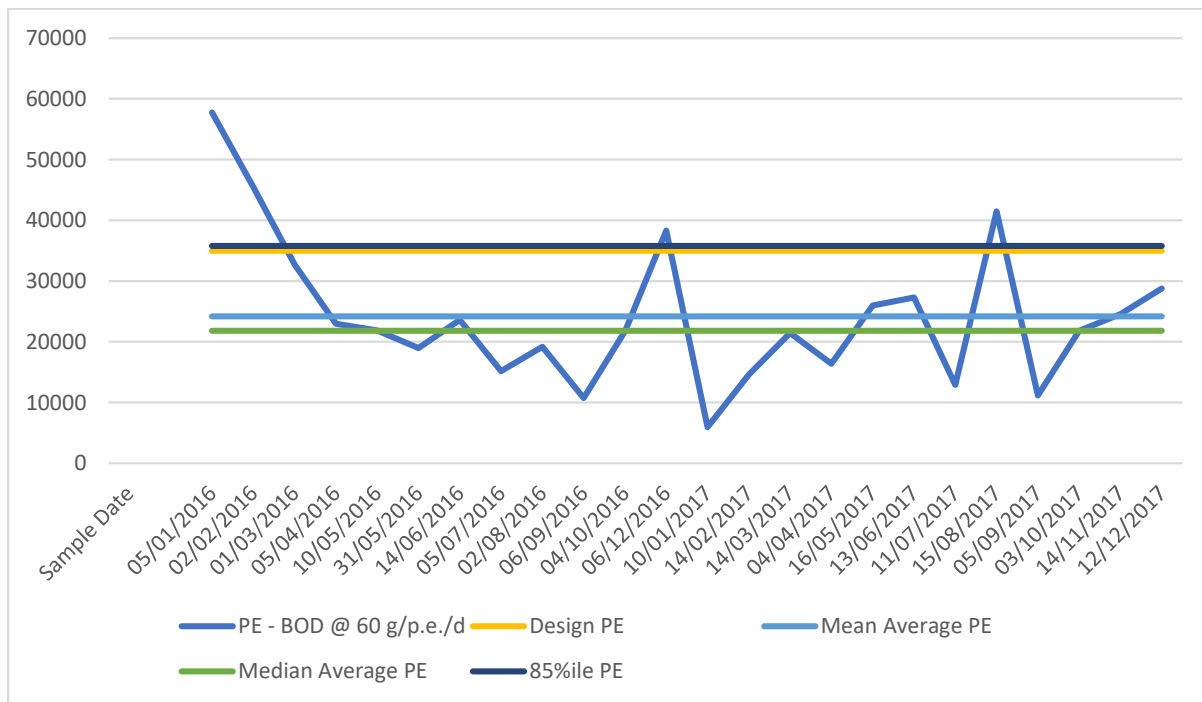


Table 1.1: Actual Loading to Castletroy WWTP from January 2016 to December 2017

Loading	2016 - 2017
Hydraulic Loading – Average Daily Flow (m ³ /day)	8,043
Organic Loading (PE) – Mean Average	24,198
Organic Loading (PE) – Median Average	21,832
Organic Loading (PE) – 85%ile of the reported loadings for this period	35,780

Notes:

- 1) Flow and load survey is required to validate current loading to the WWTP as flow proportional sampling was not in operation during this period.
- 2) A load of 1 PE or 60 g BOD/day, is assigned to every person. This reflects the 85%ile unit load per inhabitant in accordance with German Standards ATV-DVWK-A-198E. Accordingly this is deemed to be the peak-week domestic load.
- 3) WWTP Design Capacity is 35,000 PE (current operation without SALNES Filter). Capacity can be increased to c. 45,000 PE if SALSNES filter is brought back into operation.

1.2 Current Agglomeration Generated Load

The population estimates for Castletroy have considered the information from the 2016 Census results, Castletroy Local Area Development Plan 2009 to 2015 and information from the Geo-directory (2017).

1.2.1 Domestic/Residential Populations

Census Data

The census data from 2011 to 2016 was examined to establish the current domestic populations and the growth rates. This data is summarised in Table 1.2.

Table 1.2: Castletroy Census Population Change 2011 to 2016

Census Population Estimates	2011	2016
Castletroy Census	14,681	14,433
Castleconnell Census	1,917	2,107
Agglomeration Total	16,598	16,540

The Census 2011 and 2016 figures were abstracted from the CSO SAPMAP, a count was carried out of the populations within each of the small areas within the Castletroy agglomeration. It is evident from the census studies that there is relatively no change in domestic population figures. However, it is assumed that the CSO data does not fully capture the entire student community living within this area of the survey.

Data figures show that the number of residents living on-site at University of Limerick during the Census 2016 survey was 1,023. We know that there is accommodation for approximately 2,000 students at this location. To prevent an overlap of populations these figures will be excluded from the domestic population estimates and included in the institutional estimates.

Table 1.3: Summary Domestic Population Estimates

Census Population Estimates	2016
Castletroy Agglomeration	16,540
Less Students Living within University of Limerick captured in Census survey	1,023
Total Domestic Population	15,517

Geo-directory Domestic Population Data

The 2017 Geo-directory data identified 5,997 domestic households, 89 premises that are combined commercial and residential, and 63 properties that had an unsure purpose. It has been assumed that the 63 unknown properties can or are potentially being used as domestic households. That provides a total number of households of **6,149**.

The average number of persons per household has been identified as 2.7 persons from the 2016 Census figures. This provides a total population estimate of **16,602** persons living within the Castletroy agglomeration.

Table 1.4: Summary of Domestic Geo-directory population estimates Castletroy

Geo-directory Data	No. Households 2011	No. Households 2017
Households	5,962	5,997
Both (Commercial/Residential)		89
Unknown		63
Total Households	5,962	6,149
Persons Per House	2.7	2.70
Total No. Persons – Geo-directory @ 2.7 persons per house	16,097	16,602

Summary

The 2016 census survey provides an accurate account of the actual number of people living within the Castletroy agglomeration. The Geo-directory data provides the number of households within the agglomeration, this figure along with the average number of persons per household of 2.7 (Census 2016, Limerick city) provides an estimate of the number of people that could potentially be living within the agglomeration.

For this report we have chosen to use the Census 2016 data which provides the actual number of people living (**15,517 PE**) within the agglomeration.

1.2.2 Institutional Populations

Castletroy WWTP captures a significant Institutional load within the agglomeration. The institutional estimates were carried out using current national and secondary school enrolment figures (2017/2018) from the Department of Education website. Third level enrolment figures were received from the corresponding main website.

The wastewater loading rates were based on the EPA Wastewater Treatment Manual recommendations.

Table 1.5: Castletroy Institutional Loading Estimates (2017)

Schools	Student No.'s	Staff No.'s	Flow (m ³ /d)	BOD (kg/day)	PE (Hydraulic)	PE (Organic)
Monaleen National School	864	60	36.96	18.48	205	184.8
Milford National School	498	41	21.56	10.78	120	107.8
Gaelscoil Chaladh an Treoigh	367	35	16.08	8.04	89	80.4
Castleconnell National School	208	10	8.72	4.36	48	43.6
Castletroy College (Secondary School)	1150	100	50	25	278	250
3rd Level Education						
Limerick City College	150	10	6.4	3.2	36	32
* University of Limerick	11,600	1,300	541.8	129	3,010	2,709
Nursing Homes/Care Centre's	<i>Patients No.'s</i>					
The Park Nursing Home	54	25	18.9	4.05	105	94.5
Rosary Hill NH (Castleconnell)	24	18	8.4	1.8	47	42
Milford Care Centre	Patient numbers not available		29.18		162	145.9
St Vincents Centre	Patient numbers not available					
Total			738	204.71	4,100	3,690

* It has been assumed that the average loading rate for the University of Limerick is 41 litres per person over the 365 days of the year. This is based on the actual water usage of the University of Limerick in 2016 which totalled 193,364m³. The water usage includes for the residential students who live on campus along with the day students and staff members. The University of Limerick is a significant contributor to the loading of the Castletroy WWTP with student numbers at 11,600 and 1,300 staff. It has been noted that some 2,000 students live within the grounds of the University both on the North and South banks of the River Shannon. 1,023 of which had been captured within the domestic census survey for 2016.

1.2.3 Commercial Population Estimates

Castletroy has a large diversity of commercial businesses contributing to the wastewater catchment. To capture the most accurate estimate of this contribution we have analysed both the Geo-directory data along with Irish Water's commercial water usage data. The second option we have used for commercial contribution to the wastewater network is estimating 16% of the Domestic population loading as suggested by the *Irish Water population estimate guidance document*.

Table 1.6: Commercial Loading Estimates

Population Estimate	Organic Loading (kg/BOD/day)	Average Water Usage (m ³ /d)	PE
Option 1: IW - Water usage Data*		109.4	607
Option 2: 16% Domestic Population	148.96	558.61	2,483

* Excluding Hotels

The geo-directory data for the Castletroy agglomeration has identified a total of 329 commercial premises. It is estimated that a number of these premises are currently vacant, however it must be assumed that they may become occupied in the future.

Irish Water commercial water usage data has been provided for the Castletroy agglomeration, this data includes for a total of 60 premises that are actively using water. These figures do not provide a full representation of the commercial businesses in the Castletroy agglomeration.

It was established that the water usage data was not available for one of the larger hotels within the agglomeration (Castletroy Park Hotel). The following table provides an estimate for the potential contribution of all the hotels within the agglomeration to the wastewater network.

Table 1.7: Hotel Loading Estimates

Hotel Name	No. of Rooms	Occupancy Rate*	l/PE/day**	Total (l/day)	Total PE
Castletroy Park Hotel	107 (2 guests per room)	73%	250	39,055	217
Castletroy Park hotel – additional planning permission granted	26	73%	250	9,490	53
Kilmurry Lodge Hotel	110	73%	250	40,150	223
Castle Oaks House Hotel	64 rooms & 23 holiday homes	73%	250	34,693	193
Total				123,388	686

* February 2018 Irish Hotel Federation data

**EPA Wastewater Treatment Manual for small Communities and Businesses

Due to the significantly low population estimate of 607 PE using Irish Water non-domestic water usage, it was decided to proceed with the more widely used methodology of 16 % for assessing the commercial businesses contributing to the wastewater agglomeration. 16% of the domestic population equates to a commercial population estimate of **2,483 PE**. This figure shall represent all commercial businesses including all the hotels within the agglomeration.

1.2.4 Industrial Population Estimates

Castletroy maintains a highly industrialised agglomeration, with the National Technology Park reaching out over 150 hectares and up to 80 organisations including Cook Medical, Ethicon, Vistakon, Northern Trust, Gilt and IDA's Mid-West Regional Office. The principle industry is Johnson & Johnson Vision Care (Vistakon) which is a cosmetic eyewear production facility.

There are three industries within the Castletroy agglomeration that require Integrated Pollution Control (IPC) Licences from the EPA. These licences specify the emission limit values for both the strength and quantity of the wastewater that can be discharged to the wastewater network. The following table 1.8 is a summary of these three industries'.

Table 1.8: Industrial Loading Summary

Facility	Daily Average Flow (m ³ /d)	Daily Organic Loading (kg/BOD/day)	Provision Required Daily Flows (m ³ /d)	Provision Required Daily Organic Loading (kg/BOD/day)
Vistakon Ireland	1,190	620	5,940	1,980
Cook Ireland Ltd	64	33	328	109.22
Info Lab Ltd.	1.12	1	210	70
Total	1,255.12	654	6,478	2,159.2

The actual total organic loading from the above three industries is 10,899 PE, with a total commitment of **35,987 PE** to be provided for.

1.2.5 Summary of Existing Loadings

A summary of the theoretical existing loadings based on Census 2016 figures, Geo-directory data, Department of Education figures, EPA IPC licences and Irish Water non-domestic water usage data, population estimates have been compiled for the maximum discharge from all contributing sources.

Table 1.9: Summary Population Estimates

	Flow(m ³ /d)	BOD (kg/day)	PE (Hydraulic)	PE (Organic)
Domestic Population (Census 2016)	3,491	931.02	15,517	15,517
Commercial Loading (16% of Domestic)	558.61	148.96	2,483	2,483
Institutional Population	738	204.71	4,100	3,412
Industrial Loading ¹	1,255.12	654	5,578	10,899
Total Loading²	6,043.06	1,938.61	27,678	32,588

¹ BOD loading as reported in Vistakon's 2016 AER is 520 mg/l BOD (620 kgBOD / day). EPA IPC licence allows for 1,100 mg/l BOD concentration (a total of 1,980 kgBOD/day).

² Includes Domestic Population (Census 2016) only.

1.3 Future Generated Load and Agglomeration Design PE

1.3.1 Domestic / Residential Contribution

The population growth rate in Castletroy has been high ranging from 4.7% to 7.69% between 1996 and 2011. It is evident from the 2016 CSO figures that the most recent growth rates for this area have stabilised and showing a slight decline in population with a negative rate of -0.34%. This negative growth rate may not completely reflect the growth within this agglomeration due to high student numbers living in the area. Irish Water have provided a projected urban average annual percentage growth rate of 3.28% for the next 10 years up to 2028 and a growth rate of 0.63% for the following 15 years up to the year 2042 as stated in the IW Wastewater Asset Planning Growth and Headroom TGN.

It is assumed that the non-domestic PE being discharged to the wastewater treatment plant will grow at the same rate as the domestic PE.

Table 1.10: 10-year Growth & Headroom Projections

Populations	Year 2017	Growth (3.28%) to 2028	Rate to Year	Headroom (20% on 10 year Growth)	Total (10 year Loading)	Future (Year)
Domestic Population	15,517	21,427		4,285	25,713	

Table 1.11: 25-year Growth & Headroom Projections

Populations	Year 2017	Includes Growth Rate (0.63%) 2028 to 2042	Rate to Year	Headroom (20% on 25-year Growth)	Total Loading	Future
Domestic Population	15,517	23,544		4,709	28,253	

1.3.2 Commercial Contribution

Current commercial activity within the Castletroy agglomeration is a clear reflection of the domestic population, the University of Limerick and the increasing hotel occupancy rates and demand. The future growth rates over a 10-year period are demonstrating an increase of 1,631 PE.

Table 1.12: 10-year Growth & Headroom Projections

Populations	Year 2017	Growth Rate @ 16% of Domestic	Rate @	Headroom (20% on 10 year Growth)	Total (10 year Loading)	Future (Year)
Commercial Loading	2,483	3,428		686	4,114	

Table 1.13: 25-year Growth & Headroom Projections

Populations	Year 2017	Growth Rate @ 16% of Domestic	Rate @	Headroom (20% on 25-year Growth)	Total Loading	Future
Commercial Loading	2,483	3,767		753	4,520	

1.3.3 Institutional Contribution

It is considered that institutional growth rates within this agglomeration will be due to expansions to the University of Limerick. This will have a significant impact on both domestic and commercial population figures and loadings to the Castletroy WWTP. As part of the Economic and Spatial Plan for Limerick 2030 a series of developments are on the horizon for the University, such developments include €110 million student and teaching facilities, €100 million research and building infrastructure and €14 million sports facilities.

Table 1.14: 10-year Growth & Headroom Projections

Populations	Year 2017	Growth (3.28%) to 2028	Rate to Year	Headroom (20% on 10 year Growth)	Total (10 year Loading)	Future (Year)
Institutional Population	3,690	5,096		1,019	6,115	

Table 1.15: 25-year Growth & Headroom Projections

Populations	Year 2017	Includes Growth Rate (0.63%) 2028 to 2042	Year	Headroom (20% on 25-year Growth)	Total Loading	Future
Institutional Population	3,690	5,599		1,120	6,719	

1.3.4 Headroom Allowance

The headroom allowance is related to the regional planning guidelines and the figure of 20% is used for the Castletroy agglomeration as it is a large urban settlement. The allowance has been added to the domestic, commercial and institutional related population projected growth figure. For the year 2028, the estimated headroom required is to cater for an additional **6,115 PE**. This will bring the total 10-year future domestic, commercial and institutional related projected population equivalent to **35,942 PE**.

1.3.5 Industrial Contribution

The main industrial contribution at present to the Castletroy WWTP is from Vistakon. The current load generated is estimated at 620 kg/BOD/day (10,333 PE) based on their 2016 AER reports to the EPA.

Future connection agreements between Irish Water and the IDA are currently in the negotiation stages for the total capacity commitment of 2,500 kg/BOD/day (41,487 PE) to be provided for future growth to the existing industrial plant.

Table 1.16: IDA Industrial Future Loads

	Flow(m ³ /d)	Flow (m ³ /hr)	BOD (kg/day)	BOD Conc. (mg/l)	PE
IDA Future Committed Load	2,500	104	2,500	1,000	41,487

Note: assume high strength influent as per Vistakon IPC licence i.e. 1,000 mg/l BOD concentration

1.3.6 Summary of Projected Agglomeration Design PE

The future loading projections for the Castletroy wastewater treatment plant have been broken down into two categories; a 10-year growth period up to 2028 and a 25-year growth period up to the year 2042. Headroom of 20% is provided after the growth rates are considered for the domestic related population estimates. Table 1.17 and 1.18 provide a detailed breakdown of the projected figures.

Table 1.17: Design PE - 10-Year Loading Projections

Populations	Year 2017 PE	Growth Rate (3.28%) to Year 2028	Headroom (20% on 10-year Growth)	Total Future (10 Year) Loading
Domestic Population	15,517	21,427	4,285	25,713
Commercial Loading	2,483	3,428	686	4,114
Institutional Population	3,690	5,096	1,019	6,115
Industrial Loading ¹	35,987 (actual loading = 10,899)	N/A	N/A	41,487
Total Loading	57,677 (32,579)	29,951	5,990	77,429 (77,500)

¹ Total IDA Committed load is 35,987 PE (existing IPC) plus additional 5,500 PE = 41,487 PE.

Table 1.18: Design PE - 25-year Loading Projections

Populations	Year 2017 PE	Growth Rate (0.63%) Year 2028 to 2042	Headroom (20% on 25-year Growth)	Total Future Loading
Domestic Population	15,517	23,544	4,709	28,253
Commercial Loading	2,483	3,767	753	4,520
Institutional Population	3,690	5,599	1,120	6,719
Industrial Loading ¹	35,987 (actual loading = 10,899)	N/A	N/A	41,487
Total Loading	57,677 (32,579)	32,910	6,582	80,979 (81,100)

¹ Total IDA Committed load is 35,987 PE (existing IPC) plus additional 5,500 PE = 41,487 PE.

2018 Flow Load and Results

From SCADA

Date	Flow Reading	Total flow to plant	Sample number	COD mg/l	Filtered Cod mg/l	BOD mg/l	BOD/COD
29.03.18	6,964	8,475	1814185	612	248	228	2.684211
30.03.18	4,977	7,679	1814187	655	318	285	2.298246
02.04.18	7,465	10,948	1814189	340	232	160	2.125
04.04.18	5,340	8,800	1814191	520	323	235	2.212766
07.04.18	6,255	8,844	1815066	433	275	180	2.405556
09.04.18	6,316	8,843	1815130	535	321	208	2.572115
11.04.18	5,970	8,171	1815199	503	292	190	2.647368
13.04.18	5,815	7,574	1816006	412	312	228	1.807018
16.04.18	5,979	8,122	1816062	781	245	340	2.297059
18.04.18	5,227	8,266	181161	686	181	320	2.14375
20.04.18	4,484	7,253	1817021	916	347	350	2.617143
23.04.18	4,432	6,960	1817105	758	302	280	2.707143
25.04.18	5,512	7,590	1817220	1205	318	550	2.190909
27.04.18	4,752	7,111	1818008	611	489	285	2.14386
30.04.18	4,769	6,880	1818166	921	406	366	2.516393
02.05.18	5,789	6,973	1819007	711	431	360	1.975
04.05.18	6,264	6,828	1819009	691	410	280	2.467857
07.05.18	4,363	6,122	1819072	923	199	445	2.074157

Average	5,593	7,858	294
Median	5,651	7,635	283
Minimum	4,363	6,122	160
Maximum	7,465	10,948	550

85% ile 6287.328 8819.35 362.7

Suspended Solids mg/l	Volatile Solids mg/l	VSS/SS ratio	pH	Conductivity µS/cm	Total Nitrogen mg/l	Ammonia mg/l	Nitrate mg/l	Nitrite mg/l	Total Phosphorus mg/l	Ortho -P mg/l	Alkalinity mg/l
213	202	0.948356808	6.966	1376	34.5	23	2.4	0.19	4.5	1	64
251	223	0.888446215	6.992	1503	34.5	21.5	3.2	0.25	5.85	1.9	67
119	113	0.949579832	7.627	1005	24.5	16.5	1.2	0.09	2.8	0.78	71
151	144	0.953642384	7.157	1404	36	23.75	2.2	0.19	4	0.92	58
102	100	0.980392157	6.832	1086	31	28.75	<1	0.12	2.15	2	54
250	245	0.98	6.884	1359	48	22.25	<1	0.13	2.45	0.78	66
166	160	0.963855422	7.223	1658	43	38	1.9	0.094	5.05	2.7	66
176	172	0.977272727	7.455	1438	42.5	33	<1	0.011	5.05	4	58
220	215	0.977272727	7.3	1424	36	22.5	<1	0.093	5.7	2.5	70
380	354	0.931578947	7.41	1594	32	26.25	<1	0.088	8.05	1.2	72
436	428	0.981651376	7.18	1566	42	34.75	1.6	0.176	9	4.38	70
366	354	0.967213115	7.373	1462	63	58.5	<1	0.16	7.4	0.59	65
572	544	0.951048951	7.466	1462	66	45.75	1.2	0.13	11.7	1.75	66
158	150	0.949367089	7.04	1491	62.5	28.75	<1	0.109	4.85	2.8	66
154	148	0.961038961	7.38	1578	60	58.5	1.7	0.015	3.41	0.15	74
256	250	0.9765625	7.13	1985	60	38.5	2	0.3	6.85	3.16	80
294	290	0.986394558	7.65	1440	68	55.5	2.3	0.46	5.9	2.41	70
472	452	0.957627119	7.53	1476	51	27.25	2	0.275	10	1.1	72

263

235

102

572

405.2

46

43

25

68

62.725

34

29

17

59

50.1375

6

5

2

12

8.4775

2.962

Flow to Full Treatment

Kg BOD Load / day	PE - Organic based on 60 g BOD / day	kg SS Load / day	PE - Suspended Solids @ 75 g / PE / day		kg TKN / day	PE - TKN @ 12 g / PE / day	PE - Flow @ DWF 225 l / PE / day	
			1,483	19,777			240	20,021
1,588	26,463	1,483	19,777	240	20,021	30950.4		
1,418	23,639	1,249	16,655	172	14,308	22118.4		
1,194	19,907	888	11,844	183	15,241	33177.6		
1,255	20,913	806	10,750	192	16,019	23731.2		
1,126	18,766	638	8,507	194	16,160	27801.6		
1,314	21,895	1,579	21,053	303	25,263	28070.4		
1,134	18,906	991	13,214	257	21,393	26534.4		
1,326	22,096	1,023	13,645	247	20,594	25843.2		
2,033	33,880	1,315	17,538	215	17,937	26572.8		
1,673	27,878	1,986	26,484	167	13,939	23232		
1,569	26,158	1,955	26,068	188	15,695	19929.6		
1,241	20,684	1,622	21,630	279	23,270	19699.2		
3,032	50,530	3,153	42,041	364	30,318	24499.2		
1,354	22,572	751	10,011	297	24,750	21120		
1,746	29,093	734	9,793	286	23,846	21196.8		
2,084	34,733	1,482	19,759	347	28,944	25728		
1,754	29,232	1,842	24,555	426	35,496	27840		
1,942	32,360	2,059	27,459	223	18,544	19392		
1,599	26,650	1,420	18,932	254	21,208	24,858		
1,494	24,898	1,399	18,649	244	20,307	25,114		
1,126	18,766	638	8,507	167	13,939	19,392		
3,032	50,530	3,153	42,041	426	35,496	33,178		
1983	33044	1969	26255	323	26920	27944		

Flow to Inlet Works

Kg BOD Load / day	PE - Organic based on 60 g BOD / day	kg SS Load / day	PE - Suspended Solids @ 75 g / PE / day		kg TKN / day	PE - TKN @ 12 g DWF 225 l / PE / day	PE - Flow @
1,932	32,205	1,805	24,069	292	24,366	37667	
2,189	36,475	1,927	25,699	265	22,077	34129	
1,752	29,195	1,303	17,371	268	22,352	48658	
2,068	34,467	1,329	17,717	317	26,400	39111	
1,592	26,532	902	12,028	274	22,847	39307	
1,839	30,656	2,211	29,477	424	35,372	39302	
1,552	25,875	1,356	18,085	351	29,279	36316	
1,727	28,781	1,333	17,774	322	26,825	33662	
2,761	46,025	1,787	23,825	292	24,366	36098	
2,645	44,085	3,141	41,881	265	22,043	36738	
2,539	42,309	3,162	42,164	305	25,386	32236	
1,949	32,480	2,547	33,965	438	36,540	30933	
4,175	69,575	4,341	57,886	501	41,745	33733	
2,027	33,777	1,124	14,981	444	37,036	31604	
2,518	41,968	1,060	14,127	413	34,400	30578	
2,510	41,838	1,785	23,801	418	34,865	30991	
1,912	31,864	2,007	26,766	464	38,692	30347	
2,724	45,405	2,890	38,528	312	26,019	27209	
2,245	37,417	2,001	26,675	354	29,478	34,923	
2,047	34,122	1,796	23,947	319	26,612	33,931	
1,552	25,875	902	12,028	265	22,043	27,209	
4,175	69,575	4,341	57,886	501	41,745	48,658	
2681	44679	3003	40037	441	36763	39197	

Castletroy Influent Sample Results

Castletroy WWTP						CTROY					
Entity	Station	Sample Date	COD Chemical Oxygen Demal mg/l	BOD, 5 days with Inhibition (Carbon) mg/l	Flow m ³ /24 hrs	COD Loading KG/Day	BOD Loading KG/Day	PE	Organic	COD/BOD ratio	PE
Castletroy Waste Water Treatment Plant	Influent	11-Jan-2022	363	131	12615	4579.25	1652.57	2754.75		2.77	56,067
Castletroy Waste Water Treatment Plant	Influent	1-Feb-2022	617		12356	7623.65	0.00				54,916
Castletroy Waste Water Treatment Plant	Influent	8-Feb-2022	598	479	11856	7089.89	5679.02	94650.40	1.25		52,693
Castletroy Waste Water Treatment Plant	Influent	15-Feb-2022	435	187	15576	6775.56	2912.71	48545.20	2.33		69,227
Castletroy Waste Water Treatment Plant	Influent	1-Mar-2022	441	196	11129	4907.89	2181.28	36354.73	2.25		49,462
Castletroy Waste Water Treatment Plant	Influent	8-Mar-2022	484	266	9095	4401.98	2419.27	40321.17	1.82		40,422
Castletroy Waste Water Treatment Plant	Influent	15-Mar-2022	334	78.3	10698	3573.13	837.65	13960.89	4.27		47,547
Castletroy Waste Water Treatment Plant	Influent	29-Mar-2022	544	208	8245	4485.28	1714.96	28582.67	2.62		36,644
Castletroy Waste Water Treatment Plant	Influent	5-Apr-2022	565	307	8540	4825.10	2621.78	43696.33	1.84		37,956
Castletroy Waste Water Treatment Plant	Influent	12-Apr-2022	649	273	6833	4434.62	1865.41	31091.15	2.38		30,369
Castletroy Waste Water Treatment Plant	Influent	26-Apr-2022	662	245	6984	4623.41	1711.08	28518.00	2.70		31,040
Castletroy Waste Water Treatment Plant	Influent	10-May-2022	488	226	7483	3651.70	1691.16	28185.97	2.16		33,258
Castletroy Waste Water Treatment Plant	Influent	17-May-2022	594	245	6654	3952.48	1630.23	27170.50	2.42		29,573
Castletroy Waste Water Treatment Plant	Influent	24-May-2022	694		6255	4340.97	0.00				27,800
Castletroy Waste Water Treatment Plant	Influent	31-May-2022	649	268	6210	4030.29	1664.28	27738.00	2.42		27,600
Castletroy Waste Water Treatment Plant	Influent	8-June-2022	368	150	6277	2309.94	941.55	15692.50	2.45		27,898
Castletroy Waste Water Treatment Plant	Influent	14-June-2022	845	315	6146	5193.37	1935.99	32266.50	2.68		27,316
Castletroy Waste Water Treatment Plant	Influent	21-June-2022	674	311	6006	4048.04	1867.87	31131.10	2.17		26,693
Castletroy Waste Water Treatment Plant	Influent	28-June-2022	437		8830	3858.71	0.00				39,244
Castletroy Waste Water Treatment Plant	Influent	5-July-2022	568	361	7214	4097.55	2604.25	43404.23	1.57		32,062
Castletroy Waste Water Treatment Plant	Influent	12-July-2022	488	185	6238	3044.14	1154.03	19233.83	2.64		27,724
Castletroy Waste Water Treatment Plant	Influent	26-July-2022	568	230	6050	3436.40	1391.50	23191.67	2.47		26,889
Castletroy Waste Water Treatment Plant	Influent	3-Aug-2022	583	248	7529	4389.41	1867.19	31119.87	2.35		33,462
Castletroy Waste Water Treatment Plant	Influent	9-Aug-2022	543	206	5919	3214.02	1219.31	20321.90	2.64		26,307
Castletroy Waste Water Treatment Plant	Influent	16-Aug-2022	674	341	9855	6642.27	3360.56	56009.25	1.98		43,800
Castletroy Waste Water Treatment Plant	Influent	23-Aug-2022	688		5975	4110.80	0.00				26,556
Castletroy Waste Water Treatment Plant	Influent	30-Aug-2022	608	271	6021	3660.77	1631.69	27194.85	2.24		26,760
Castletroy Waste Water Treatment Plant	Influent	6-Sep-2022	553	219	9152	5061.06	2004.29	33404.80	2.53		40,676
Castletroy Waste Water Treatment Plant	Influent	13-Sep-2022	574	273	7770	4459.98	2121.21	35353.50	2.10		34,533
Castletroy Waste Water Treatment Plant	Influent	20-Sep-2022	753	240	6488	4885.46	1557.12	29592.00	3.14		28,836
Castletroy Waste Water Treatment Plant	Influent	27-Sep-2022	732	295	7201	5271.13	2124.30	35404.92	2.48		32,004

2022 Analysis				
	COD (kg/day)	BOD (kg/day)	PE (Organic)	COD/BOD Ratio
Average	4,547.69	1,753.62	33,556.95	2.59
85% ile	5,350.22	2,063.08	39,478.77	
Design Capacity			45000.00	
	5951.65	2295		
Available Capacity	601.43	231.92	5,521.23	

EPA Monitoring Feb 2020 Site visit Report

Site Visit Report

The site visit process is a sample on a particular day of an installation's compliance with some of its licence conditions. Where non-compliance against a particular condition has not been reported, this should not be construed to mean that there is full compliance with that condition of the licence.

Instructions and actions arising from the visit shall be addressed, or where applicable noted, by the licensee in order to ensure compliance, to improve the environmental performance of the installation and to provide clarification on certain issues.

The licensee shall take the actions specified to close out the non-compliances and observations raised in this Site Visit Report.

Licensee	
Name of Installation	Johnson & Johnson Vision Care (Ireland)
Licensee	Johnson & Johnson Vision Care (Ireland)
Licence Register No.	P0818-03
CRO Number	210174
Site Address	National Technology Park, Plassey, Limerick, V94 H97W
Site Visit Reference No.	SV18932

Report Detail	
Issue Date	07/04/2020
Prepared By	Annette Jordan

Site Visit Detail					
Date Of Inspection	19/02/2020	Announced	No		
Time In	11:20	Time Out	11:40		
Agency Personnel On Site	David Galvin				
Licensee Personnel and Role	N/A				
Photo Taken	No	Samples Taken	Yes	Video Taken	No
Odour Assessment	No				

> Scope

This site visit was conducted as part of the EPA's emissions monitoring programme. The monitoring report is attached.

> Media

Water.

> Site Areas Inspected

Emissions monitoring points and/or sampling locations as specified in attached report.

> Documents Inspected

N/A

EPA Laboratory Test Report

EPA Regional Inspectorate Castlebar
 John Moore Road
 Castlebar
 Co. Mayo

Final

Report To: OEE Cork Office of Environmental Enforcement, EPA, Inniscarra, County Cork.	Project: EPA-20-00384 Report Number : 5232 Entity: P0818-03 Location/Site: J&J Vision Care
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Sample Number: 20-02919	Sampled Date: 19/02/2020 11:30:00
Sampling Point: P0818-SE1	Sampled By: D Galvin
Description: J&J Vision Care Ltd t/a VISTAKON Limerick - SE1	Replicate / Split: Split
Sample Condition: Normal	Grab/Composite: Composite
	Received in Lab: 20/02/2020

Parameter	Result	Units	Limits	Measurement Uncertainty	Analysis Date	Lab	Method
Temperature	11.1	°C	≤ 40			CB	
Total Volume	nm	m ³	≤ 1800			CB	
Ammonia	<0.02	mg/l N		22%	20/02/2020	CB	EPA_W07 *
BOD	1000	mg/l O ₂	≤ 1100	40%	20/02/2020	CB	EPA_W04 *
Chloride	1450	mg/l		16%	20/02/2020	CB	EPA_W07 *
COD	2750	mg/l O₂	≤ 2000	11%	20/02/2020	CB	EPA_W01 *
pH	7.7	pH units		0.2 pH units	20/02/2020	CB	EPA_W09 *
Suspended Solids	14	mg/l	≤ 100	19%	21/02/2020	CB	EPA_W03 *
TDS	2899	mg/l	≤ 5000		21/02/2020	CB	
Total Nitrogen	0.62	mg/l N		14%	25/02/2020	CB	EPA_W10 *
Total Phosphorus	1.5	mg/l P	≤ 2	26%	26/02/2020	CB	EPA_W06 *
Sulphate	37	mg/l		11%	13/03/2020	KK	EPA_W12 *

Comment: Composite sampling period 0000 h on 18/02/20 to 0000 h on 19/02/20. Flow meter and composite sampler working. No evidence of spills or incidents at sampling point.

Sample Number:	20-02920	Sampled Date:	19/02/2020
Sampling Point:	P0818-SW-2	Sampled By:	D Galvin
Description:	J&J Vision Care Ltd t/a VISTAKON Limerick - SW-2	Replicate / Split:	N/A
		Grab/Composite:	N/A
Sample Condition:	No sample	Received in Lab:	N/A

Parameter	Result	Units	Limits	Measurement Uncertainty	Analysis Date	Lab	Method
Sample Obtained?	No					CB	

Comment: No sample taken due to inclement weather.

Report Approved By:



Alan Stephens - Regional Chemist

Results in bold are outside specified limits, not taking account of measurement uncertainty. * Indicates accredited method. nm = not measured, nr = not reported, vob = visible on bottom.

Field Measurements are performed on the date of sampling. Results relate only to the item tested as received.

This test report shall not be reproduced except in full without approval of the laboratory.

It is noted that the results of analysis gave a non-compliant result for Chemical Oxygen Demand at emissions to sewer location SE1.

The licensee shall ensure emissions are in compliance with licence limits at all times.

Any corrective actions required to restore compliance shall be undertaken by the licensee without delay.

FOLLOW-UP ACTIONS

You are required to complete the instructions and actions, as outlined in this report, within the specified timeframe. Where required, you shall respond to actions specified in Compliance Investigations within the required timeframe. The licensee shall maintain documentary evidence, for review by the EPA, that the prescribed corrective actions were completed within the required timeframe.

(i) Compliance Investigations

You are not required to respond directly to items contained in this EPA site visit report; where an issue requires a direct response, the EPA will generate a Compliance Investigation through the EDEN system. You will receive notification when a Compliance Investigation instruction or action is generated.

(ii) Publication of reports and licensee response.

Please note that this Site Visit Report will be made available for public viewing via the EPA's Licence Enforcement Access Portal within one day of the issue date and will be published on the Licence Details Page of the EPA's website, www.epa.ie, that relates to your licence 60 calendar days after the issue date.

You may if you choose submit, within 45 calendar days of the issue date of this Site Visit Report, a Licensee Public Response that will be published alongside the Site Visit Report. This Response, should you wish to avail of it, provides you with an opportunity to inform the public about how you are implementing the actions set out in the report, activities underway, timescales and target completion dates. Please be aware that the content of your Licensee Public Response must be factual and should not breach the EPA's stated online publication standards.

If you wish to submit a Licensee Public Response to an EPA Site Visit Report, you should do this by clicking on the 'Make a Response' link on the Site Visits page in EDEN. A .pdf document containing your response can be attached and submitted from here.

(iii) Response to Site visit report

Where you do wish to respond directly to a site visit report, you should do this by generating a 'Licensee Return' of the type 'Site Updates/Notifications' and the sub-type 'Response to EPA Report' in EDEN.

Please note that you are required to comply with the conditions of your licence at all times, and where noncompliance occurs you must restore compliance within the shortest possible time. These actions will be verified during subsequent EPA visits.

Please quote the above Inspection Reference Number in any future correspondence in relation to this Report.

Vision Care SE-1 Flow Loading for 2021

Date	SE-1 Total Flow				
Limits	1800	680 mg/l	kg/day	PE	
01/01/2021	1,270.03	863.62	1,096.82	18,280.40	
02/01/2021	981.04	667.11	654.46	10,907.65	
03/01/2021	1,139.71	775.00	883.28	14,721.31	
04/01/2021	1,329.88	904.32	1,202.63	20,043.92	
05/01/2021	1,202.99	818.03	984.09	16,401.43	
06/01/2021	1,185.95	806.45	956.40	15,940.08	
07/01/2021	981.38	667.34	654.91	10,915.21	8,090.98
08/01/2021	1,021.63	694.71	709.73	11,828.92	
09/01/2021	1,282.99	872.43	1,119.32	18,655.38	
10/01/2021	909.65	618.56	562.67	9,377.92	
11/01/2021	931.55	633.45	590.09	9,834.90	
12/01/2021	1,017.46	691.87	703.95	11,732.55	
13/01/2021	1,204.93	819.35	987.26	16,454.37	
14/01/2021	1,262.90	858.77	1,084.54	18,075.72	7,631.11
15/01/2021	1,339.29	910.72	1,219.71	20,328.57	
16/01/2021	1,103.62	750.46	828.22	13,803.74	
17/01/2021	1,034.04	703.15	727.08	12,118.04	
18/01/2021	1,059.66	720.57	763.56	12,725.97	
19/01/2021	1,255.53	853.76	1,071.92	17,865.36	
20/01/2021	1,134.51	771.47	875.24	14,587.28	
21/01/2021	965.73	656.70	634.19	10,569.86	7,892.38
22/01/2021	1,243.89	845.85	1,052.14	17,535.64	
23/01/2021	1,127.38	766.62	864.27	14,404.50	
24/01/2021	957.51	651.11	623.44	10,390.69	
25/01/2021	989.93	673.15	666.37	11,106.23	
26/01/2021	988.22	671.99	664.07	11,067.89	
27/01/2021	1,073.37	729.89	783.44	13,057.40	
28/01/2021	1,195.49	812.93	971.85	16,197.56	7,575.79
29/01/2021	1,153.77	784.56	905.21	15,086.77	
30/01/2021	977.76	664.88	650.09	10,834.83	
31/01/2021	1,031.23	701.24	723.14	12,052.27	
01/02/2021	1,085.11	737.87	800.68	13,344.59	
02/02/2021	985.92	656.83	634.44	10,574.02	
03/02/2021	1,175.37	798.25	939.42	15,656.94	
04/02/2021	1,015.90	690.81	701.80	11,696.60	7,405.06
05/02/2021	1,331.28	905.27	1,205.17	20,086.14	
06/02/2021	1,143.11	777.31	888.56	14,809.27	
07/02/2021	1,186.93	807.11	957.99	15,966.43	
08/02/2021	1,088.74	740.34	806.04	13,434.02	
09/02/2021	988.63	672.27	664.62	11,077.08	
10/02/2021	1,087.33	739.38	803.95	13,399.25	
11/02/2021	1,004.40	682.99	686.00	11,433.29	7,830.42
12/02/2021	1,064.82	724.08	771.01	12,850.21	
13/02/2021	1,110.87	755.39	839.14	13,985.70	
14/02/2021	916.28	623.07	570.91	9,515.12	
15/02/2021	1,106.27	752.26	832.21	13,870.11	
16/02/2021	948.21	644.78	611.39	10,189.82	
17/02/2021	907.01	616.77	559.41	9,323.56	
18/02/2021	1,240.20	843.34	1,045.91	17,431.76	7,293.66
19/02/2021	1,283.06	872.48	1,119.45	18,657.42	
20/02/2021	1,173.81	798.19	936.92	15,615.41	
21/02/2021	1,153.21	784.18	904.33	15,072.12	
22/02/2021	1,410.67	959.26	1,353.19	22,553.22	
23/02/2021	852.13	579.45	493.77	8,229.42	
24/02/2021	949.39	645.59	612.91	10,215.20	
25/02/2021	1,186.38	806.74	957.10	15,951.64	8,008.65
26/02/2021	1,124.70	764.80	860.17	14,336.10	
27/02/2021	1,286.36	874.72	1,125.21	18,753.52	
28/02/2021	1,219.16	829.03	1,010.72	16,845.31	
01/03/2021	915.51	622.55	569.95	9,499.13	
02/03/2021	987.12	671.24	662.60	11,043.27	
03/03/2021	1,436.84	977.05	1,403.87	23,397.77	
04/03/2021	1,104.14	750.82	829.01	13,816.75	8,073.83
05/03/2021	1,116.45	759.19	847.59	14,126.55	

06/03/2021	1,579.11	1,073.79	1,695.64	28,260.67	
07/03/2021	1,112.49	756.49	841.59	14,026.52	
08/03/2021	1,397.34	950.19	1,327.74	22,129.00	
09/03/2021	953.74	648.54	618.54	10,309.03	
10/03/2021	1,223.88	832.24	1,018.56	16,976.00	
11/03/2021	1,246.95	847.93	1,057.32	17,622.02	8,629.96
12/03/2021	925.81	628.55	582.84	9,714.07	
13/03/2021	1,104.43	751.01	829.44	13,824.01	
14/03/2021	1,125.18	765.12	860.90	14,348.34	
15/03/2021	1,309.87	890.71	1,166.72	19,445.27	
16/03/2021	1,247.56	848.34	1,058.36	17,639.27	
17/03/2021	1,279.33	869.94	1,112.95	18,549.10	
18/03/2021	1,133.06	770.48	873.00	14,550.02	8,125.24
19/03/2021	1,090.00	741.20	807.91	13,465.13	
20/03/2021	1,046.88	711.88	745.25	12,420.85	
21/03/2021	1,183.63	804.87	952.67	15,877.77	
22/03/2021	1,052.88	715.96	753.82	12,563.64	
23/03/2021	1,110.48	755.13	838.55	13,975.88	
24/03/2021	961.01	653.49	628.01	10,466.79	
25/03/2021	1,329.22	903.87	1,201.44	20,024.03	7,774.10
26/03/2021	1,198.98	815.31	977.54	16,292.27	
27/03/2021	1,660.17	1,128.92	1,874.19	31,236.53	
28/03/2021	1,071.59	728.68	780.85	13,014.12	
29/03/2021	1,478.11	1,005.11	1,485.67	24,761.17	
30/03/2021	1,320.17	897.72	1,185.14	19,752.29	
31/03/2021	1,345.34	914.83	1,230.76	20,512.65	
01/04/2021	1,251.66	851.13	1,065.32	17,755.40	9,326.02
02/04/2021	1,195.72	813.09	972.23	16,203.79	
03/04/2021	1,257.16	854.87	1,074.71	17,911.78	
04/04/2021	1,197.06	814.00	974.41	16,240.13	
05/04/2021	1,352.11	919.43	1,243.18	20,719.62	
06/04/2021	1,628.77	1,107.56	1,803.97	30,066.11	
07/04/2021	1,521.02	1,034.29	1,573.18	26,219.69	
08/04/2021	889.18	591.04	513.72	8,562.04	9,021.02
09/04/2021	1,295.02	880.61	1,140.41	19,006.87	
10/04/2021	1,249.35	849.56	1,061.40	17,689.92	
11/04/2021	1,201.79	817.22	982.12	16,368.72	
12/04/2021	1,141.88	776.48	886.65	14,777.42	
13/04/2021	1,444.02	981.93	1,417.93	23,632.20	
14/04/2021	1,299.51	883.67	1,148.33	19,138.90	
15/04/2021	1,381.47	939.40	1,297.75	21,629.21	9,013.04
16/04/2021	1,512.21	1,028.30	1,555.01	25,916.83	
17/04/2021	1,136.80	773.02	878.77	14,646.23	
18/04/2021	1,587.93	1,079.79	1,714.63	28,577.25	
19/04/2021	1,275.92	867.63	1,107.02	18,450.35	
20/04/2021	1,489.52	1,012.87	1,508.70	25,144.92	
21/04/2021	1,382.59	940.16	1,299.86	21,664.29	
22/04/2021	970.55	659.97	640.54	10,675.63	9,355.52
23/04/2021	1,194.26	812.10	969.85	16,164.25	
24/04/2021	1,541.42	1,048.17	1,615.66	26,927.72	
25/04/2021	1,591.17	1,082.00	1,721.64	28,693.98	
26/04/2021	1,518.59	1,032.64	1,568.16	26,135.98	
27/04/2021	1,551.99	1,055.35	1,637.90	27,298.29	
28/04/2021	1,177.03	800.38	942.07	15,701.20	
29/04/2021	1,464.46	995.83	1,458.36	24,305.96	10,038.92
30/04/2021	1,177.06	800.40	942.12	15,702.00	
01/05/2021	1,530.30	1,040.60	1,592.44	26,540.61	
02/05/2021	1,440.97	979.86	1,411.95	23,532.47	
03/05/2021	854.52	581.07	496.54	8,275.65	
04/05/2021	1,159.24	788.28	913.81	15,230.16	
05/05/2021	1,410.57	959.19	1,353.00	22,550.02	
06/05/2021	1,303.89	886.65	1,156.09	19,268.13	8,876.55
07/05/2021	1,255.41	853.68	1,071.72	17,861.95	
08/05/2021	1,314.81	894.07	1,175.53	19,592.22	
09/05/2021	1,610.89	1,095.41	1,764.58	29,409.62	
10/05/2021	1,567.88	1,066.16	1,671.61	27,860.14	
11/05/2021	1,265.43	860.49	1,088.89	18,148.21	
12/05/2021	1,267.02	861.57	1,091.63	18,193.85	
13/05/2021	1,463.37	995.09	1,456.19	24,269.79	9,744.81
14/05/2021	1,314.16	893.63	1,174.37	19,572.85	
15/05/2021	1,230.51	836.75	1,029.63	17,160.42	

16/05/2021	1,586.58	1,078.87	1,711.72	28,528.68	
17/05/2021	1,351.64	919.12	1,242.31	20,705.21	
18/05/2021	1,323.53	900.00	1,191.18	19,852.96	
19/05/2021	1,406.61	956.49	1,345.42	22,423.59	
20/05/2021	1,772.04	1,204.99	2,135.29	35,588.09	9,985.07
21/05/2021	1,015.16	690.31	700.77	11,679.56	
22/05/2021	1,178.05	801.07	943.71	15,728.42	
23/05/2021	1,325.52	901.35	1,194.76	19,912.70	
24/05/2021	1,248.70	849.12	1,060.29	17,671.52	
25/05/2021	1,314.82	894.08	1,175.55	19,592.52	
26/05/2021	1,030.95	701.05	722.74	12,045.72	
27/05/2021	1,139.57	774.91	883.06	14,717.69	8,252.77
28/05/2021	1,211.07	823.53	997.35	16,622.49	
29/05/2021	1,331.15	905.18	1,204.93	20,082.22	
30/05/2021	1,211.86	824.06	998.65	16,644.19	
31/05/2021	1,154.33	784.94	906.08	15,101.41	
01/06/2021	1,094.67	744.38	814.85	13,580.76	
02/06/2021	1,088.09	739.90	805.08	13,417.98	
03/06/2021	1,332.48	906.09	1,207.34	20,122.37	8,423.65
04/06/2021	1,299.33	883.54	1,148.02	19,133.60	
05/06/2021	1,068.69	726.71	776.63	12,943.78	
06/06/2021	1,118.82	760.80	851.20	14,186.59	
07/06/2021	728.33	495.26	360.72	6,011.93	
08/06/2021	1,373.66	934.09	1,283.12	21,385.34	
09/06/2021	1,055.07	717.45	756.96	12,615.96	
10/06/2021	1,438.47	978.16	1,407.05	23,450.89	8,082.37
11/06/2021	1,030.79	700.94	722.52	12,041.98	
12/06/2021	1,244.25	846.09	1,052.75	17,545.79	
13/06/2021	1,103.49	750.37	828.03	13,800.49	
14/06/2021	1,285.98	874.47	1,124.55	18,742.44	
15/06/2021	1,140.06	775.24	883.82	14,730.35	
16/06/2021	972.87	661.55	643.60	10,726.73	
17/06/2021	1,356.75	922.59	1,251.72	20,862.07	8,134.19
18/06/2021	1,269.33	863.14	1,095.62	18,260.25	
19/06/2021	1,058.24	719.60	761.51	12,691.88	
20/06/2021	1,334.52	907.47	1,211.04	20,184.03	
21/06/2021	917.17	623.68	572.02	9,533.61	
22/06/2021	1,001.99	681.35	682.71	11,378.48	
23/06/2021	665.73	452.70	301.37	5,022.89	
24/06/2021	1,350.74	918.50	1,240.66	20,677.65	7,597.72
25/06/2021	1,048.00	712.64	746.85	12,447.45	
26/06/2021	1,336.09	908.54	1,213.89	20,231.55	
27/06/2021	1,204.31	818.93	986.24	16,437.40	
28/06/2021	1,053.86	716.62	755.22	12,587.04	
29/06/2021	1,147.27	780.14	895.04	14,917.26	
30/06/2021	1,329.45	904.03	1,201.86	20,030.96	
01/07/2021	907.68	617.22	560.24	9,337.34	8,026.66
02/07/2021	1,240.46	843.51	1,046.34	17,439.06	
03/07/2021	1,057.22	718.91	760.05	12,667.43	
04/07/2021	960.51	653.15	627.35	10,455.90	
05/07/2021	1,219.97	829.58	1,012.06	16,867.70	
06/07/2021	1,246.99	847.95	1,057.39	17,623.15	
07/07/2021	1,045.05	710.63	742.65	12,377.47	
08/07/2021	1,041.49	708.21	737.60	12,293.28	7,811.69
09/07/2021	1,179.54	802.09	946.09	15,768.23	
10/07/2021	1,110.56	755.18	838.67	13,977.89	
11/07/2021	1,191.87	810.47	965.98	16,099.61	
12/07/2021	590.48	401.53	237.09	3,951.56	
13/07/2021	1,267.40	861.83	1,092.29	18,204.76	
14/07/2021	1,270.50	863.94	1,097.64	18,293.93	
15/07/2021	1,230.02	836.41	1,028.81	17,146.76	7,840.37
16/07/2021	451.15	306.78	138.40	2,306.74	
17/07/2021	1,165.79	792.74	924.17	15,402.75	
18/07/2021	1,516.52	1,031.23	1,563.89	26,064.77	
19/07/2021	929.80	632.26	587.88	9,797.98	
20/07/2021	1,066.95	725.53	774.10	12,901.67	
21/07/2021	1,116.38	759.14	847.49	14,124.78	
22/07/2021	1,158.94	788.08	913.34	15,222.28	7,405.53
23/07/2021	1,197.61	814.37	975.30	16,255.06	
24/07/2021	1,225.96	833.65	1,022.02	17,033.75	
25/07/2021	1,198.87	815.23	977.36	16,289.28	

26/07/2021	1,254.54	853.09	1,070.23	17,837.20	
27/07/2021	1,396.88	949.88	1,326.87	22,114.44	
28/07/2021	1,210.45	823.11	996.33	16,605.48	
29/07/2021	731.88	497.68	364.24	6,070.68	8,216.19
30/07/2021	1,258.86	856.02	1,077.62	17,960.26	
31/07/2021	1,155.52	785.75	907.95	15,132.57	
01/08/2021	1,169.47	795.24	930.01	15,500.15	
02/08/2021	1,234.36	839.36	1,036.08	17,267.97	
03/08/2021	1,358.66	923.89	1,255.25	20,920.85	
04/08/2021	1,099.13	747.41	821.50	13,691.65	
05/08/2021	988.41	672.12	664.33	11,072.15	8,264.41
06/08/2021	1,249.07	849.37	1,060.92	17,681.99	
07/08/2021	1,257.88	855.36	1,075.94	17,932.30	
08/08/2021	830.62	564.82	469.15	7,819.20	
09/08/2021	1,290.78	877.73	1,132.96	18,882.61	
10/08/2021	1,130.78	768.93	869.49	14,491.52	
11/08/2021	1,258.50	855.78	1,077.00	17,949.99	
12/08/2021	1,054.59	717.12	756.27	12,604.48	8,072.22
13/08/2021	1,240.99	843.87	1,047.24	17,453.97	
14/08/2021	1,022.34	695.19	710.72	11,845.36	
15/08/2021	1,024.74	696.82	714.06	11,901.04	
16/08/2021	532.55	362.13	192.65	3,214.24	
17/08/2021	1,361.35	925.72	1,260.23	21,003.77	
18/08/2021	1,205.61	819.81	988.38	16,472.95	
19/08/2021	1,071.56	728.66	780.80	13,013.40	7,459.14
20/08/2021	965.88	656.80	634.39	10,573.14	
21/08/2021	1,281.31	871.29	1,116.39	18,606.56	
22/08/2021	1,307.90	889.37	1,163.21	19,386.83	
23/08/2021	1,256.41	854.36	1,073.42	17,890.42	
24/08/2021	1,137.69	773.63	880.15	14,669.17	
25/08/2021	1,301.17	884.80	1,151.27	19,187.82	
26/08/2021	1,087.55	738.53	804.28	13,404.67	8,337.91
27/08/2021	1,074.54	730.69	785.15	13,085.88	
28/08/2021	1,014.15	689.62	699.38	11,656.34	
29/08/2021	449.93	305.95	137.66	2,294.29	
30/08/2021	1,096.72	745.77	817.90	13,631.67	
31/08/2021	625.21	425.14	265.80	4,430.06	
01/09/2021	902.22	613.51	553.52	9,225.34	
02/09/2021	1,151.02	782.69	900.90	15,014.93	6,313.79
03/09/2021	919.56	625.30	575.00	9,583.36	
04/09/2021	901.20	612.82	552.27	9,204.50	
05/09/2021	1,084.73	737.62	800.11	13,335.24	
06/09/2021	1,359.72	924.61	1,257.21	20,953.50	
07/09/2021	991.13	673.97	667.99	11,133.17	
08/09/2021	1,040.71	707.68	736.49	12,274.88	
09/09/2021	912.60	620.57	566.33	9,438.84	7,209.65
10/09/2021	1,162.12	790.24	918.36	15,305.93	
11/09/2021	1,157.50	787.10	911.07	15,184.47	
12/09/2021	1,035.57	704.19	729.24	12,153.93	
13/09/2021	1,281.16	871.19	1,116.13	18,602.20	
14/09/2021	1,280.16	870.51	1,114.39	18,573.18	
15/09/2021	1,252.39	851.63	1,066.57	17,776.11	
16/09/2021	1,465.01	996.21	1,459.45	24,324.22	8,633.91
17/09/2021	1,244.71	846.40	1,053.53	17,558.77	
18/09/2021	1,022.20	695.10	710.53	11,842.12	
19/09/2021	1,338.05	909.87	1,217.46	20,290.95	
20/09/2021	1,370.99	932.27	1,278.14	21,302.29	
21/09/2021	1,244.63	846.35	1,053.39	17,556.51	
22/09/2021	1,208.42	821.73	992.99	16,549.83	
23/09/2021	1,253.57	852.43	1,068.58	17,809.63	8,682.57
24/09/2021	1,138.13	773.93	880.83	14,680.52	
25/09/2021	1,255.46	853.71	1,071.80	17,863.37	
26/09/2021	1,307.19	888.89	1,161.95	19,365.78	
27/09/2021	1,358.88	924.04	1,255.66	20,927.62	
28/09/2021	1,074.33	730.54	784.85	13,080.76	
29/09/2021	1,254.68	853.18	1,070.47	17,841.18	
30/09/2021	1,255.54	853.77	1,071.94	17,865.65	8,644.21
01/10/2021	1,185.35	806.04	955.44	15,923.95	
02/10/2021	1,321.46	898.59	1,187.45	19,790.91	
03/10/2021	915.14	622.30	569.49	9,491.45	
04/10/2021	1,134.86	771.70	875.78	14,596.28	

05/10/2021	1,343.59	913.64	1,227.56	20,459.32	
06/10/2021	1,247.61	848.37	1,058.44	17,640.68	
07/10/2021	1,430.77	972.92	1,392.03	23,200.50	8,578.78
08/10/2021	1,467.24	997.72	1,463.90	24,398.32	
09/10/2021	1,074.38	730.58	784.92	13,081.98	
10/10/2021	1,469.32	999.14	1,468.05	24,467.55	
11/10/2021	1,151.39	782.95	901.48	15,024.59	
12/10/2021	1,173.71	798.12	936.76	15,612.75	
13/10/2021	1,303.56	886.42	1,155.50	19,258.38	
14/10/2021	1,208.85	820.66	990.41	16,506.85	8,846.45
15/10/2021	1,232.55	838.13	1,033.04	17,217.37	
16/10/2021	1,390.64	945.64	1,315.04	21,917.30	
17/10/2021	1,050.33	714.22	750.17	12,502.86	
18/10/2021	991.71	674.36	668.77	11,146.21	
19/10/2021	1,101.42	748.97	824.93	13,748.76	
20/10/2021	1,249.71	848.80	1,062.01	17,700.12	
21/10/2021	1,162.87	790.75	919.54	15,325.69	8,179.23
22/10/2021	1,545.98	1,051.27	1,625.24	27,087.28	
23/10/2021	1,249.39	849.59	1,061.46	17,691.05	
24/10/2021	1,092.52	742.91	811.65	13,527.47	
25/10/2021	1,365.39	928.47	1,267.72	21,128.62	
26/10/2021	1,437.09	977.22	1,404.35	23,405.91	
27/10/2021	906.05	616.11	558.23	9,303.83	
28/10/2021	1,000.82	680.56	681.12	11,351.93	8,597.24
29/10/2021	1,354.47	921.04	1,247.52	20,792.01	
30/10/2021	1,537.48	1,045.49	1,607.41	26,790.24	
31/10/2021	1,133.08	770.49	873.03	14,550.53	
01/11/2021	1,010.24	686.96	694.00	11,566.63	
02/11/2021	1,045.70	711.08	743.57	12,392.87	
03/11/2021	1,229.11	835.79	1,027.28	17,121.40	
04/11/2021	1,422.79	967.50	1,376.55	22,942.42	8,732.87
05/11/2021	1,483.67	1,008.90	1,496.87	24,947.80	
06/11/2021	1,164.22	791.67	921.68	15,361.29	
07/11/2021	1,315.43	894.49	1,176.64	19,610.70	
08/11/2021	1,302.02	885.37	1,152.77	19,212.90	
09/11/2021	1,051.85	715.26	752.34	12,539.07	
10/11/2021	1,093.61	743.65	813.27	13,554.47	
11/11/2021	1,472.08	1,001.01	1,473.57	24,559.55	8,882.88
12/11/2021	1,011.07	687.53	695.14	11,585.64	
13/11/2021	1,254.45	853.03	1,070.08	17,834.64	
14/11/2021	1,167.15	793.66	926.32	15,438.71	
15/11/2021	1,189.01	808.53	961.35	16,022.44	
16/11/2021	1,474.56	1,002.70	1,478.54	24,642.37	
17/12/2021	1,079.31	733.93	792.14	13,202.31	
18/11/2021	974.67	662.78	645.99	10,766.46	8,150.22
19/11/2021	923.13	627.73	579.47	9,657.92	
20/11/2021	1,275.36	867.24	1,106.05	18,434.16	
21/11/2021	1,493.68	1,015.70	1,517.13	25,285.57	
22/11/2021	1,286.65	874.92	1,125.72	18,761.97	
23/11/2021	1,206.65	820.52	990.08	16,501.38	
24/11/2021	1,242.31	844.77	1,049.47	17,491.12	
25/11/2021	1,099.23	747.48	821.65	13,694.14	8,527.01
26/11/2021	1,408.38	957.70	1,348.80	22,480.05	
27/11/2021	1,469.77	999.44	1,468.95	24,482.54	
28/11/2021	1,272.14	865.06	1,100.47	18,341.19	
29/11/2021	1,135.11	771.87	876.16	14,602.71	
30/11/2021	1,138.49	774.17	881.39	14,689.81	
01/12/2021	1,218.97	828.90	1,010.40	16,840.06	
02/12/2021	1,043.18	709.36	739.99	12,333.21	8,686.04
03/12/2021	1,207.18	820.88	990.95	16,515.88	
04/12/2021	482.67	328.35	158.55	2,642.52	
05/12/2021	1,549.61	1,053.73	1,632.88	27,214.63	
06/12/2021	1,328.47	902.00	1,196.48	19,941.26	
07/12/2021	1,249.77	849.84	1,062.11	17,701.82	
08/12/2021	1,351.93	919.31	1,242.85	20,714.10	
09/12/2021	1,198.93	813.91	974.20	16,236.60	8,364.76
10/12/2021	1,381.78	939.61	1,298.33	21,638.91	
11/12/2021	1,244.23	846.08	1,052.71	17,545.23	
12/12/2021	1,145.89	779.21	892.88	14,881.39	
13/12/2021	1,222.45	831.27	1,016.18	16,936.35	
14/12/2021	1,082.36	736.00	796.62	13,277.04	
15/12/2021	1,176.72	800.17	941.58	15,692.93	
16/12/2021	1,105.49	751.73	831.03	13,850.56	8,358.92
17/12/2021	818.88	556.84	455.98	7,599.73	
18/12/2021	1,278.46	869.35	1,111.43	18,523.88	
19/12/2021	1,388.66	944.29	1,311.30	21,854.93	
20/12/2021	1,275.36	867.24	1,106.05	18,434.16	
21/12/2021	1,210.74	823.30	996.81	16,613.44	
22/12/2021	1,487.65	1,011.60	1,504.91	25,081.83	
23/12/2021	1,217.20	827.70	1,007.47	16,791.19	8,676.95
24/12/2021	1,224.05	832.35	1,018.84	16,980.72	
25/12/2021	1,196.98	813.95	974.28	16,237.96	
26/12/2021	1,111.19	755.61	839.63	13,993.76	
27/12/2021	1,569.73	1,067.42	1,675.56	27,925.93	
28/12/2021	1,461.56	993.86	1,452.59	24,209.79	
29/12/2021	1,074.48	730.65	785.06	13,084.42	
30/12/2021	1,279.81	870.27	1,113.78	18,563.02	8,917.80
31/12/2021	1,471.42	1,000.57	1,472.25	24,537.54	
Average	1,189.24	808.68	987.61	16,460.12	

Week	SE-1 Loading			
	BOD		COD	
	mg/l		mg/l	
	1100		2000	
A	B	A	B	
1	660	380	1089	630
2	590	680	1518	1704
3	850	600	1826	1098
4	560	500	886	928
5	540	540	960	928
6	340	460	676	930
7	460	570	678	910
8	460	380	699	619
9	220	420	452	830
10	260	280	536	530
11	580	510	837	911
12	360	680	635	1027
13	420	240	647	375
14	160	600	379	1056
15	440	500	379	730
16	500	580	680	745
17	560	520	817	814
18	680	480	1030	904
19	600	520	1038	889
20	300	560	506	995
21	480	440	910	1188
22	660	480	958	741
23	400	400	628	647
24	540	620	778	881
25	660	460	786	1040
26	820	440	1345	1358
27	480	380	652	635
28	600	850	1950	1925
29	960	760	1860	1880
30	760	680	1131	1117
31	740	600	1158	987
32	440	727	540	810
33	400	500	1136	841
34	725	300	1154	423
35	420	677	740	1166
36	300	632	800	1286
37	340	700	751	935
38	255	412	330	710
39	193	212	442	480
40	418.1	672	728	978
41	460.3	304	315.7	622
42	427.9	321	376.6	300
43	146.2	323	501.2	829
44	535.2	957	622	1294
45	670.6	621	1325	1284
46	711.3	659	1220	1100
47	668	852	1488	1630
48	471	512	1040	1072
49	588	536	1129	1108
50	417.8	831	1118	1508
51	667	386	1138	669
52	261	475	398.2	785
Average	503	533	879	957
	518		918	
Max	960	957	1,950	1,925
Min	146	212	316	300
Median	480	516	793	920

4207.31	1.65	1.657895	817.4251	13623.75
4845.755	2.572881	2.505882		
5721.976	2.148235	1.83		
4015.169	1.582143	1.856		
3998.732	1.777778	1.718519		
0	1.988235	2.021739		
	1.473913	1.596491		
	1.519565	1.628947		
	2.054545	1.97619		
	2.061538	1.892857		
	1.443103	1.786275		
	1.763889	1.510294		
	1.540476	1.5625		
	2.36875	1.76		
	0.861364	1.46		
	1.36	1.284483		
	1.458929	1.565385		
	1.514706	1.883333		
	1.73	1.709615		
	1.686667	1.776786		
	1.895833	2.7		
	1.451515	1.54375		
	1.57	1.6175		
	1.440741	1.420968		
	1.190909	2.26087		
	1.640244	3.086364		
	1.358333	1.671053		
	3.25	2.264706		
	1.9375	2.473684		
	1.488158	1.642647		
	1.564865	1.645		
	1.227273	1.114168		
	2.84	1.682		
	1.591724	1.41		
	1.761905	1.722304		
	2.666667	2.03481		
	2.208824	1.335714		
	1.294118	1.723301		
	2.290155	2.264151		
	1.74121	1.455357		
	0.685857	2.046053		
	0.880112	0.934579		
	3.428181	2.566563		
	1.162182	1.352142		
	1.975843	2.067633		
	1.715169	1.669196		
	2.227545	1.913146		
	2.208068	2.09375		
	1.920068	2.067164		
	2.675921	1.814681		
	1.706147	1.733161		
	1.52567	1.652632		
	1.772617			
	2.159371	1.415094		
	1.652083	1.781977		

855ile 673.89 680 Peak Weak

Uisce Éireann (formerly Irish Water)
Wastewater Asset Planning Technical Guidance
Notes

Irish Water Asset Planning – Wastewater Treatment Agglomeration Loading Technical Guidance Note

October 2017

1.0 Introduction

The purpose of this document is to set out how the calculation/assessment of agglomeration loads are standardised across agglomerations for the purpose of the Gate 1 Feasibility Study Reports being completed under the *2017-2021 Investment Plan Wastewater Consultancy Services Terms of Reference (12-085-233)*.

An interim methodology was developed by Irish Water for the purposes of standardising the reporting of generated loads to the European Commission under the requirements of the Urban Waste Water Treatment Directive (UWWTD). This is an assessment based methodology, and as such, may be prone to individual anomalies on an agglomeration level; this may have the effect of under or over sizing a wastewater treatment plant (WWTP) upgrade. Therefore, while the outputs of the interim methodology are to be used for the purposes of investment planning and design, a number of checks should be carried out to validate these outputs to ensure the most representative figures are being used when baselining the current load on a WWTP.

The definition of agglomeration load and the description of the methodology itself are presented hereunder, along with a series of checks that can be applied to validate the methodology outputs.

2.0 Agglomeration load – definition

Irish Water have developed an interim methodology for the standardised calculation of agglomeration loads that arrives at wastewater treatment plants based on an assessment of the connected load. It is this agglomeration load that Irish Water will be reporting to the regulators, and will be using for investment planning and design.

It is recognised that the term 'Generated Load' (as defined in the UWWTD) refers to the entire load that arises within an agglomeration (whether it is fully collected by Irish Water or not). Irish Water are not currently in a position (nor have the legal standing) to collate loading information for agglomeration load elements that are not connected to the Irish Water network (e.g., individual appropriate systems, unconnected domestic load including septic tanks). Therefore, the term 'Agglomeration Load' is being used for the assessed load for investment planning and design purposes.

3.0 Interim methodology – overview

The interim methodology developed by Irish Water is described hereunder as it relates to agglomeration loadings for investment planning and design to provide information to the user on how each of the elements within the methodology have been determined. The methodology has been applied to all agglomerations

using the available data from 2016 (AERs, and other Irish Water data sets), and the 2011 Central Statistics Office Census data. A loading figure has been produced for each agglomeration.

The nature of assessed loads invariably results in the generation of anomalies on an individual agglomeration level. A series of checks is provided for relevant elements of the methodology to address potential anomalies on an agglomeration by agglomeration level.

Generally, the components of load can be individually calculated as follows:

Agglomeration Load =	
Domestic	<i>(Residential)</i>
+ Tourism (Seasonal)	<i>(Non-residential)</i>
+ Institutional	<i>(Resident and non-resident)</i>
+ Commercial	<i>(Industrial – SME/economic activities)</i>
+ Industrial	<i>(Industrial – larger; discharging to sewer)</i>

This above definition reflects the National Urban Wastewater Study¹, which defines the following sectors as below (Table 1).

Table 1 National Urban Wastewater Study sector definitions

Sector	Description of population (which contributes to the public sewerage system)
Domestic	Population permanently resident within the catchment, outside the tourist season.
Leisure/tourism	Residential and day visitors, a proportion of whom will contribute to the commercial sector via hotels, etc.
Institutional including Public Services	Occupants of non-commercial premises who are not included in the above “Domestic” population, e.g., occupants of educational establishments, hospitals or public service officers that originate from outside the catchment.
Commercial	Flows from commercial premises, whether measured or unmeasured, which have not been included under the “domestic” heading. These may include a proportion of the leisure/tourism component plus flows from agricultural activities, such as livestock markets within the urban area.
Industrial	All industrial waste water flows whether metered or not.

Note: In relation to “Industrial” load in the above table, this can only refer to industries discharging to the public sewer.

Under the methodology the load is calculated to be the peak-week load, in accordance with the requirements of the Directive.

¹ Volume 2, Part A Methodology – 4. Flow & Load Assessment, published by DEHLG, February 2004

3.1 Constituent parts of the agglomeration load methodology

Table 2 presents relevant headings used in the interim methodology. The headings in bold are described in the subsections that follow. Loads are assessed for all agglomeration on a systematic basis; outputs for specific agglomerations will be provided in a format similar to Table 2.

Table 2 Selected headings from the interim methodology

Average (2014, 2015 & 2016) Reported Load
Collected Load 2016 AER (PE)
Treatment Plant Capacity PE 2016 AER
Residential Population <u>Connected</u> to Collecting System
Residential Population <u>Not</u> Connected to Collecting System
Generated Load not Collected in Collecting System and not Addressed through IAS
Total Residential Population
Commercial Load (Equals Total Res. Pop x 16%)
Non IPC Licensed Industrial Load P.E. (Section 16)
IPC Licensed Industrial Load P.E.
Hospital Load P.E
Educational Load P.E
Tourism Load P.E
Nursing Load P.E
Other Institutional Loads P.E (Prisons, Creches, National Organisations)
Non-Dom Metered WaterOut Estimate P.E
Total Calculated Generated Load
Percentage of Total Load Connected to Collecting System
Losses of Load from Collecting System
Load Entering Plant

3.2 Domestic and Seasonal

3.2.1 Domestic load

The methodology employed was as follows:

- 1 **Boundary:** The agglomeration boundary per current waste water discharge authorisation (notwithstanding known reservations about the current accuracy of this boundary);
- 2 **Total properties:** Census data to identify and total all occupied, residential properties within the Agglomeration and add CSO vacant properties;
- 3 Determine (long-term) **occupancy status %**
- 4 Relevant county **house occupancy** from Census data was applied;
- 5 **Total residential population:** total properties x occupancy status x house occupancy;

A load of 1 p.e., or 60 g BOD/day, is assigned for every person. This reflects the 85%ile unit load per inhabitant in accordance with German Standard ATV-DVWK-A 198E. Accordingly this is deemed to be the peak-week domestic load.

3.2.2 Leisure / tourism load

The following options were considered:

1. Irish Water non-domestic records for hotels were reviewed.
2. This data source was considered to be a close match to the hotels listed in “Failte Ireland: 2014 Hotel Register” and therefore gave a good level of confidence in the hotel data provided.
3. Failte Ireland’s report on “Accommodation Capacity by County 2015” was reviewed. However, this report only provided details on premises, rooms and beds at a county level.
4. Data held by Camping Ireland on camping sites and caravan parks was reviewed. This data only accounts for sites and parks which are registered with Camping Ireland and includes location details and number of pitches per location.
5. Consideration of average bed numbers per county where individual hotel details were not available.

Tourism load is defined as *no. of hotel guests plus no. of camping park and caravan site occupants plus no. of holiday home occupants.*

There is scope for further investigation to determine appropriate room occupancy rates which could be applied.

3.2.3 Hotels

Initially the “Failte Ireland: 2014 Hotel Register”, with some manual correlation, was trialled. The Register provided data on hotel names, addresses, registered owners and total numbers of rooms. This hotel list was manually matched by hotel name and address to Geo Directory and the agglomerations in which these hotels sit was determined. A factor of 2 was applied to each hotel room to determine maximum *hotel guest numbers*.

Subsequently the Department of Transport, Tourism & Sport provided national hotel data in digital (GIS) format with statistics on how many beds / rooms are in each hotel. It is this data that is used in the current draft interim methodology.

This data, and the calculations, include hotel beds, bed & breakfasts, guest houses and activity holiday accommodation.

The calculation used is:

PE = number of hotel beds + 2 x (B&Bs + Guest Houses + Activity Holiday units)

3.2.4 Camping Parks and Caravan Sites

Initially Failte Ireland indicated that they could provide data on number of pitches in each camping park and caravan site. The data would give site names, addresses, and total numbers of pitches. However this information has not been provided to date.

In the current draft interim methodology the following has been applied:

- The census data of caravan and mobile home (occupied at time of census) has been used in the calculation of domestic load.

No further allowance has been made at this stage. This load is not normally significant but can be highly significant in tourist areas. This element needs further investigation of data sources.

3.2.5 Holiday Homes

The CSO data gives details by county of the number of vacant properties and, of these, identifies the number of holiday homes. The *number of holiday home occupants* is the number of holiday homes multiplied by the county average occupancy rate.

In addition to the above, the following points are noted:

- The NUWWS considers this sector to include Residential visitors and day visitors, a proportion of whom contribute to the commercial sector via hotels etc.
- Residential visitors include a % of unoccupied residential properties (refer to 'Domestic' Note 2 above).
- Tourism load generally occurs at weekends and during holiday seasons when schools are closed, and therefore may not affect the net impact of tourism in some cases. The comparison of tourism load against educational load will be checked on an agglomeration by agglomeration basis. However, for all of the agglomerations in the trial counties of Meath and Monaghan, the total tourism load is small (<1.2% of the total generated load and <20% of the educational load in all the agglomerations). Therefore, in this study, any such potential for double counting tourism and educational loads has been deemed negligible.

3.3 Institutional

3.3.1 Education

Reporting from the Department of Education & Skills lists school names, addresses and pupil numbers for 2014 / 2015. Using a geo-coding tool, it was attempted to automatically match these schools to Geo Directory. There was less than a 20% match.

Direct engagement with Department of Education & Skills, yielded the number of students in each primary and post primary school along with the school's Irish Grid reference. This data refers to 2015 / 2016 Primary & Post Primary Schools. No third level institutions are identified for the trial counties of Meath and Monaghan from the Department of Education and Skills records. However, it is confirmed that for 3rd level education, student place numbers are available on a national basis.

The recommended wastewater loading rates for schools in the *EPA Wastewater Treatment Manual* as adopted for this study are as follows:

Source	Flow litres/day per person	BOD ₅ grams/day per person
Non-residential with cooking on site	60	30
Non-residential with no canteen	40	20

The methodology for calculating p.e. loading from Schools for all agglomeration sizes was as follows:

- 1 Schools within the Agglomeration were identified

- 2 Student Numbers from the Department of Education dataset of schools of student numbers were obtained
- 3 Residential numbers within an Agglomeration with age profile 4 – 17 years were obtained. This is assumed to be representative of the numbers of school-aged residents within the Agglomeration².
- 4 The numbers of school-aged residents in the Agglomeration were subtracted from Student Numbers. The difference is the number of students from outside the agglomeration. Should the numbers of school-aged residents in the Agglomeration exceed the Student Numbers, it was assumed that 100% of the School Population is resident in the Agglomeration and was accounted for in the Domestic Load.
- 5 School-aged residents less Student Numbers represents the number of students attending schools outside the agglomeration and was used to calculate a reduction in the total generated load.
- 6 A Staff to Student Ratio of 1:28.1 as per National statistical records to determine staff numbers was used.
- 7 It was assumed that the percentage of staff from outside an agglomeration is equivalent to the percentage of students from outside an agglomeration.
- 8 School Load p.e. = School Student and Staff Numbers x % School Population from Outside Agglomeration x (25/60).

A similar approach was applied nationally in addressing 3rd level education facilities.

The educational load calculation including staff can be simplified as follows:

$$\text{Educational Load P.E.} = \% \text{Outside Agglomeration} \times [\text{No. of Student Places} \times 0.4315]$$

Note that Education load does not coincide with peak tourism load. Accordingly the interim methodology will take the peak load as the highest of the two options, (a) with tourism / without educational or (b) with educational / without tourism.

3.3.2 Hospitals

The HSE has two datasets available. One dataset detailed the average bed numbers by hospital for 2012 (inpatient & day beds) and the other data set lists hospitals, addresses and coordinates; by combining the two data sets, a 40% match between hospital bed numbers, addresses and coordinates was achieved nationwide.

At this stage no account has been made to assess contribution from private nursing homes. It is unlikely that this will be significant in the overall context; however this will be further investigated.

²The CSO was contacted to request school aged numbers by agglomeration boundary. Due to matters of disclosure, this data was not made available. Consequently, the CSO data from Small Areas Population Statistics (SAPS) was used to determine the school aged numbers within an agglomeration. It is acknowledged that the Small Areas boundaries do not always coincide with an agglomeration boundary. To deal with this discrepancy, the school-aged population numbers were reduced by the ratio of the agglomeration residential population to SAPS residential population. It is considered that this correlation is reasonable for the determination of school aged numbers within an agglomeration for this pilot study and that this process is subject to further refinement for the development of the long term methodology.

The EPA recommended loadings (*Wastewater Treatment Manuals: Treatment Systems for Small Communities, Business, Leisure Centres & Hotels*) are as follows:

Source	Flow litres/day per person	BOD ₅ grams/day per person
Residential elderly people	250	60
Residential elderly people plus nursing	300	65
Nursing Homes (convalescent)	350	75

Staff numbers have been calculated on a ratio of 1 member of staff per 16.75 patients. This is the average of 1 to 4 for critical care units and 1 to 29.5 for maternity units as defined in the Irish Medical Times. It has been assumed that 50% of staff is resident outside of the agglomeration.

The hospital load calculation including staff can be simplified as follows:

$$\text{Hospital Load P.E.} = \text{No. of Patient Places} \times 1.1465$$

3.3.3 Prisons

Prison data was sourced from the national values from the “Irish Prison Service Annual Report 2014”. This report provides details of operational capacity and addresses for the 14 institutions in the Irish Prison System and consists of 11 traditional “closed” institutions, two open centres and one semi open facility. This data source will be utilised for the national methodology:

http://www.irishprisons.ie/images/pdf/ar2014_english.pdf

Staff numbers have been calculated on a ratio of 1 member of staff per 1.22 inmates. This is the average ratio determined from National prison inmates and staff figures. It is acknowledged that this ratio is significantly higher than the European average. It has been assumed that 50% of staff is resident outside of the agglomeration.

The prison load calculation including staff can be simplified as follows:

$$\text{Prison Load P.E.} = \text{No. of Prisoner Places} \times 1.41$$

3.4 Commercial

The commercial sector is made up of shops, retail, restaurants, pubs etc.

For the trail of the interim methodology, two options were considered as being possible for calculating commercial sector loading:

Option (i) GeoDirectory

The GeoDirectory database can provide a list of non-domestic properties in any given area/agglomeration. The data provided includes landowner name and address and in some cases business name, however data is not always available on the type or size of the property. Therefore projecting loadings from this dataset is limited; or,

Option (ii) % of Domestic/Residential Loading

The National Urban Wastewater Study (NUWWS) found that the 'commercial sector waste water flow and load was generally estimated using the relationship; commercial loading = 16% of domestic/residential loading. This relationship has been used extensively in the estimation of flow and load for design purposes and is widely accepted at a local and national level in Ireland.

Option (ii) has been selected for calculating commercial loading (as 16% of the domestic loading) since this allowance has been developed on a national basis and is not dependent on the availability of commercial property type and / or size. In this interim methodology, it is being used to calculate the commercial p.e. of an agglomeration.

3.5 Industrial Load

This is currently the most challenging component of load for assessment. Significant local engagement, in particular with local authorities, will be required over time to improve this data. Note that the Water Services Strategic Plan sets targets for all trade effluent licensable load to be have conditions determined by Irish Water, which will significantly improve information and feed into the enduring methodology.

The aggregate peak week industrial load for the agglomeration is to be determined. Discharge limits are maximum daily limits. The addition of these maximum values would greatly over-estimate the aggregate peak week load. Accordingly factors have been applied, as indicated under to produce the initial industrial load contribution.

- i. A list of the non-domestic water meters was obtained and the annual meter readings averaged for the past 3 years (2013 – 2015), the meter readings were converted to p.e. and the agglomerations in which the meters are located were identified. This necessitated the assumption of a relationship between flow and load. For the current draft it is assumed that 150l/d equates to 1 p.e., and that the “water in equals water out” principle applies;
- ii. Where a licence exists (Section 16 or IPPC/IED discharging to sewer), the licence was examined to determine the Maximum licensed ELV and it was assumed that the aggregate peak week load was 50% of this value and this was included in the calculation; in addition, for IPC licenced premises, the AERs were also examined to determine the actual average loadings, with a factor (of +20%) to account for peak;
- iii. For those industrial entities that are not apparently licensed (Non-Licensed Industrial Loads), it is assumed that 100% of these are connected to the sewer;
- iv. For these Non-Licensed Industrial Loads which are not captured elsewhere under licenced industrial, commercial or institutional loads, the following calculation has been used:

Non-Licensed Industrial Loads = Total Annual Averaged Meter Readings less Licensed Industrial Loads less Commercial Loads less Institutional Loads;

- v. Should the Non-Licensed Industrial Loads, as calculated above, < 0, it is assumed that all Non-Licensed Industrial Loads are already captured under either Licensed Industrial and /or Commercial and / or Institutional loads;
- vi. Local Authority personnel, who may have more local, “on the ground”, operational knowledge of the total Industrial Load, are consulted as an integral part of the Industrial Load calculation.

Note that the verification and validation of the industrial load contributions shall be carried out in accordance with the Wastewater Source Control and Licensing Technical Guidance Note (October, 2017)

4.0 Required checks to the Interim Methodology

1. Previously reported loads
 - a. Check the load against the load reported by the LA in the original WWDA application for the purpose of identifying a breakdown of existing domestic, holiday home, commercial, industrial & institutional loads. This breakdown can be used for validation purposes.
2. Domestic load
 - a. In relation to the domestic connected and unconnected population, the total of these should be cross-checked against the population in the Census result. If there is a significant difference, ensure that the Census and Agglomeration boundaries are aligned.
 - b. Update of census data with 2016 figures is to be carried by Irish Water across all agglomeration in conjunction with the CSO. This exercise will take a number of months to complete, and may not be available for the purpose of on-going Feasibility Study Reports. To this end, general population changes between the 2011 and 2016 census surveys should be applied on an agglomeration-by-agglomeration basis.
3. Institutional loads
 - a. Schools load - check of the www.schoolday.ie website to identify primary and post-primary schools in an area. This website provides a good indication of pupil and teacher numbers and also identifies any schools that have been amalgamated. The map viewer facility can be used to check if the school is within the WWDA agglomeration boundary.
 - b. Education vs tourism loads – Gaelacht areas may need to be the exception to the double counting exclusion as Irish language summer schools may be run in the education centres during high-tourism season.
 - c. Hospitals – presence of community hospitals (such as care centres) need to be determined and if these are already included in the figure for ‘hospitals’
 - d. Nursing homes – manual check of nursing homes within the agglomeration boundary required, and a determination on whether they are connected to the public sewer. Findings need to be cross-checked with the output from Section 2.2.1 above.
 - e. Army barracks, naval bases -
4. Non-domestic load
 - a. Outputs of the commercial (Section 16) and industrial (IED) loads should be reviewed using the following sources of information:

- i. Wastewater Source Control and Licencing team in Irish Water – (see Wastewater Source Control and Licensing Guidance Note)
- ii. Local knowledge (in conjunction with WWSCL)
- iii. Design review reports or preliminary reports.

Draft - until formally approved by IW

Irish Water Wastewater Asset Planning Growth and Headroom Technical Guidance Note

December 2017

1.0 Purpose

This Technical Guidance Note (TGN) sets out the growth and headroom requirements for the wastewater treatment plants in the 2017-2021 Investment Plan Wastewater Consultancy Services Terms of Reference (12-085-233). This TGN should be read in conjunction with those indicated in Figure 1 below.

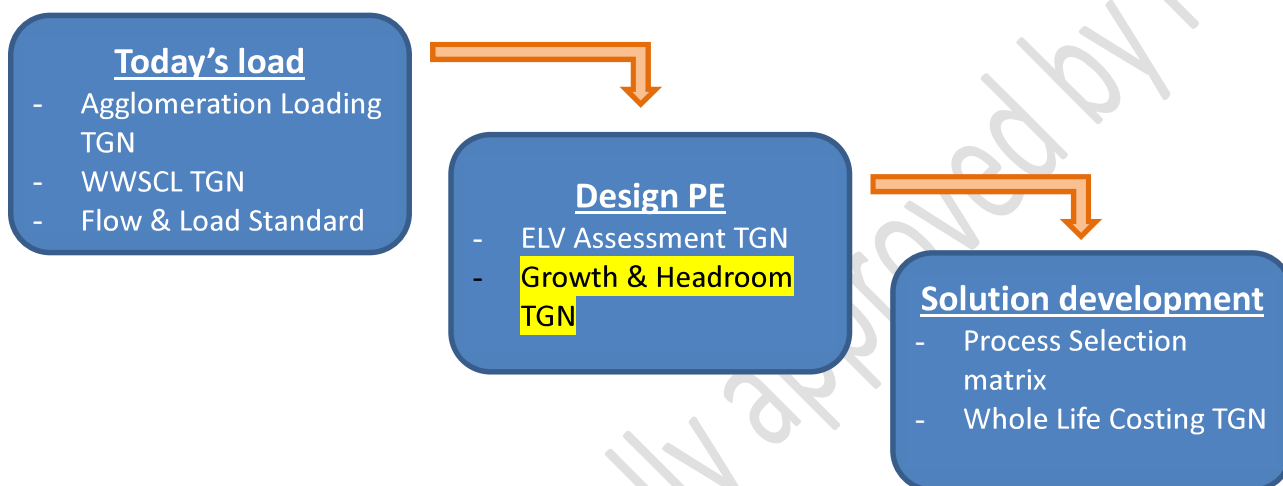


Figure 1 – Gate 1 WWTP Technical Guidance Notes

2.0 Growth

Asset Strategy and Sustainability within Irish Water Asset Management is working extensively with the relevant stakeholders in relation to the provision for growth. This work has involved consultation with individual local and regional planning authorities and the Department of Housing, Planning, and Local Government (DHPLG), and included the review of the following relevant strategies, policies and data sets:

- Local Authority Core Strategies
- Local Authority County Development Plans
- Regional Planning Guidelines
- Regional Spatial and Economic Strategies
- National Planning Framework (as currently available)
- Central Statistics Office census data
- Economic and Social Research Institute population growth models

Based on this work by the Spatial Planning team in Asset Strategy and Sustainability, individual agglomeration specific annualised growth rates have been defined for the 1-10 year design horizon and 11+ year design horizon for the purposes of developing conceptual designs for the Gate 1 wastewater treatment plant projects. These rates are included in the Appendix A.

Provisions for growth and headroom will be approved by Irish Water Asset Management at the conclusion of the Gate 1 process.

3.0 Headroom

3.1 Definitions

The provision of headroom within water and wastewater infrastructure can be defined as per below.

CER IP submission in 2016 *Spare capacity in water and wastewater infrastructure (treatment plants and networks) to cope with adverse weather conditions or unplanned incidents such as a break in a trunk main or equipment failures at a treatment plant.*

WSSP *Spare capacity above demand to cater for production risk and provide flexibility in capacity to meet new demands, also to cater for variability in demand arising from factors such as weather and operational risk and some upward variation around projected development demand.*

3.2 Guideline Allowances

In determining the design capacity of a wastewater treatment plant upgrade, a headroom allowance is added to the domestic related population projected growth figure. The headroom allowance figure is related to the Regional Planning Guidelines designation of the agglomeration as a large urban settlement, regional gateway, or other town; figures are reproduced as follows from the WSSP:

20% large urban settlements	15% regional gateways and hub towns	10% in other towns
---------------------------------------	-----------------------------------------------	------------------------------

Notes:

- Large urban settlements are the main cities in Ireland namely Dublin, Cork, Limerick, Galway and Waterford.
- "Regional Gateways" are the remainder of the gateways referenced in the National Spatial Strategy, namely Shannon, Dundalk, Sligo, Letterkenny, and a linked Midland Gateway involving Athlone, Tullamore and Mullingar.
- Hub towns are defined in the National Spatial Strategy as Castlebar/Ballina, Cavan, Ennis, Kilkenny, Mallow, Monaghan, Tralee/Killarney, Tuam and Wexford.
- In cases where a WWTP is being provided to rationalise multiple agglomerations, the highest headroom allowance is applied to all

3.3 Application of headroom allowance

The appropriate headroom allowance (in percentage terms, %HR) is added to the domestic related calculated design PE, i.e., the projected domestic, institutional, and commercial loads. Headroom is not added to the design industrial loads.

4.0 Design population equivalent

4.1 Design PE calculation

The design population equivalent for a given wastewater treatment plant can be summarised using the following expression [1]:

$$\text{Design PE} = PE_{dom, x} + PE_{inst, x} + PE_{comm, x} + PE_{ind, x} + PE_{DPI} + \text{Headroom} \quad [1]$$

where $[dom, x]$ = projected domestic load, $[inst, x]$ = projected institutional load, $[comm, x]$ = projected commercial load, $[ind, x]$ = projected industrial load, and $[DPI]$ = fixed population from proposed DPI

The above arguments are further determined as follows

- $PE_{dom, x}$ = connected domestic PE from the Agglomeration Loading TGN (AL TGN) multiplied by the annualised growth rate (%GR) from Appendix A for the required design horizon
- $PE_{inst, x}$ = institutional load from AL TGN multiplied by %GR for the required design horizon
- $PE_{comm, x}$ = commercial load from AL TGN multiplied by %GR for the required design horizon (note that the commercial allowance would have already been applied in the generation of the load figure through the Interim Load Methodology). See additional note below.
- $PE_{ind, x}$ = industrial load from the AL TGN and WWSC TGN, plus any industrial loads arising through completed Connections and Developer Services (CDS) agreements, and known increases arising from discharge to sewer licence reviews (through the WWSC team). See additional note below.
- PE_{DPI} = potential load from developer provided infrastructure that may be connected to the Irish Water network. A list of DPI per agglomeration is provided in Appendix B.
- $\text{Headroom} = [PE_{dom, x} + PE_{inst, x} + PE_{comm, x} + PE_{DPI}] \times \%HR.$

The appropriate design horizon should be selected in accordance with the Process Selection matrix, but in general, is summarised in Table 1 below.

4.2 Commercial loads and tourism

For agglomerations where the tourism loads are likely to exceed the typical commercial allowance in the AL TGN (i.e., 16% of domestic population), an increase in the commercial allowance should be proposed taking account of the potential increase in tourism-related load in peak season.

4.3 Industrial loads

The WWSC TGN has provided guidance on quantifying the current industrial load arising within a catchment connected to the IW sewer network. As stated above, loads arising from completed connection agreements, and discharge to sewer licence reviews (where loads are to be revised upwards, but do not require a new or upgraded physical connection) are considered in the design PE.

In addition to this, local consultation should also be carried out with industry (lead through the WWSC team in Irish Water) to understand where planned increases in production/activity will lead to higher loads arriving at the Irish Water WWTP. This consultation should capture (i) planned higher loads not currently caught in discharge to sewer licence reviews, and (ii) significant load increases while staying within their licence limits.

4.4 Existing zoned lands

When designing for critical pieces of infrastructure (such as terminal pumping stations, rising mains, outfalls and land acquisition), the potential load from zoned lands should be considered over the typical 30-year horizon.

Table 1 – Design horizon table

Unit Processes	Design Horizon		Minimum size criteria	
	10 years	25 years	Applicable	Rules
Inlet works	M&E	Civil	Yes	<ul style="list-style-type: none"> At least match the smallest adequately sized L6/7 process on the site as part of the RC3 assessment Not to exceed 25yr design horizon by more than 10% Be in increments of 25%, 33%, 50% of existing L6/7 process under consideration¹ <p>Note 1</p> <ul style="list-style-type: none"> - 50% additional capacity if 2 units there already, i.e., add a third unit, - 33% additional capacity if 3 units there already, i.e., add a forth unit, - 25% additional capacity if 4 units there already, i.e., add a fifth unit
Primary Settlement	3+ tanks planned: Civil + M&E	1-2 tanks planned: Civil + M&E	Yes	
Secondary Treatment	3+ tanks planned: Civil + M&E	1-2 tanks planned: Civil + M&E	Yes	
Secondary Settlement	3+ tanks planned: Civil + M&E	1-2 tanks planned: Civil + M&E	Yes	
Tertiary: TN	3+ tanks planned: Civil + M&E	1-2 tanks planned: Civil + M&E	Yes	
Tertiary: TP	Civil & M&E	N/A	No	
Tertiary: Sand filtration	4+ tanks planned: Civil + M&E	1-3 tanks planned: Civil + M&E	Yes	
Tertiary: UV	M&E	Civils	Yes	
Storm	> 5,000m ³ storage planned – Civil & M&E	<= 5,000m ³ storage planned civil & M&E	Yes	
Sludge: Thickening	Civil & M&E if > 2 tanks planned	Civil & M&E if 1-2 tanks planned	Yes	
Sludge: Dewatering	M&E	Building: < 10k PE = 120 m ² > 10k PE = 200 m ²	Yes	

5.0 Checks to design PE

5.1 Projected connected domestic PE check

To ensure that the proposed %GR is realistic on an agglomeration level, the following actions should be taken:

1. Sum the population increase from agreed domestic connection agreements from Connection and Developer Services (CDS)
2. Sum the population increase for houses currently at construction (ensuring there is no cross-over with point 1 above)
3. Compare the resultant figure with the projected domestic PE from Section 4 above
4. Where the sum from points 1 & 2 above is greater than the projected PE, inform Asset Management as houses in planning or at construction are contributing the growth allowance.

5.2 Projected connected institutional and commercial PE check

For the projected commercial load, carryout the following actions:

1. Sum the population increase from agreed commercial connection agreements from Connection and Developer Services (CDS)
2. Sum the population increase for commercial units currently at construction (ensuring there is no cross-over with point 1 above) (refer to the Agglomeration Loading TGN for definition of commercial activity).
3. Similarly for institutional developments, check for connection agreements, construction activity and developments in planning.
4. Compare the resultant figure with the projected commercial PE from Section 4 above
5. Where the sum from points 1, 2 & 3 above is greater than the projected PE, inform Asset Management as these developments are contributing to the growth allowance.

5.3 DPI PE check

The list of DPI infrastructure supplied in Appendix B has been provided to Irish Water by the DHPCLG and is divided into four categories:

1. **Category 1** Estates in towns where the solution could be to connect directly to the IW agglomeration network and decommission the stand-alone DPI.
2. **Category 2** Estates with > 50 units located in larger villages, outside an IW agglomeration network, served by stand-alone DPI
3. **Category 3** Estates with < 50 units located in smaller rural settlements, outside an IW agglomeration network, served by stand-alone DPI.
4. **Category 4** Estates with < 5 units located in rural townlands or hinterlands relying primarily on small scale stand-alone DPI or septic tank systems.

The actions listed below should be taken in relation to DPI infrastructure

5.3.1 Accounting for DPI in current load methodology

The AL TGN describes how the connected domestic load within agglomeration boundaries was calculated for each agglomeration. When assessing potential DPI contributions (not currently connected to the network), a check is required to determine if the unconnected DPI load has mistakenly been included in the current

agglomeration loading calculation to prevent double-counting of load. One particular example of this is Virginia in Co. Cavan – the potential DPI load is 1,500 PE, while most of this load is potentially already within the agglomeration boundary, and could therefore already be counted in the interim load methodology.

Instances of the above should be identified and reported to Irish Water Asset Management through the relevant workshops.

5.3.2 Identification of additional DPI and housing schemes

The relevant local authority should be contracted to ensure that the DPI list is complete (the current list will be issued to the Engineering Consultants by Irish Water). In addition, the Engineering Consultants should enquire if there are local authority housing schemes not currently connected to the network that could potentially be included in the design PE allowance.

In both cases, the Engineering Consultants should inform Irish Water of any findings from the above, and define a per PE cost for the proposed upgrade to allow for the calculation for the marginal cost of adding the DPI and LA Housing Scheme load to the WWTP.

Appendix A – annualised growth rates

Project Title	Local Authority	Procurement Call Off	Annualised % Growth Rate (Years 1-10)	Annualised % Growth Rate (Years 11+)
Newmarket WWTP	Cork County	1	0.63	0.63
Boherbue WWTP	Cork County	1	0.63	0.63
Castlemartyr WWTP	Cork County	1	3.49	0.63
Charleville WWTP	Cork County	1	2.50	0.63
Kanturk WWTP	Cork County	1	1.45	0.63
Macroom WWTP	Cork County	1	2.00	0.63
Rosscarbery/Owenahincha WWTP	Cork County	1	0.63	0.63
Ballingeay WWTP	Cork County	1	0.63	0.63
Bantry WWTP	Cork County	1	4.00	0.63
Ballyliffen WWTP	Donegal County	2	1.28	0.63
Dunfanaghy-Portnablagh WWTP	Donegal County	2	0.63	0.63
Fahan WWTP	Donegal County	2	2.37	0.63
Bridgend WWTP	Donegal County	2	2.11	0.63
Burnfoot WWTP	Donegal County	2	1.00	0.63
Muff WWTP	Donegal County	2	1.79	0.63
Mullaghmore WWTP	Sligo County	2	0.63	0.63
Ballina WWTP	Tipperary County	3	2.39	0.63
Cashel WWTP	Tipperary County	3	1.78	0.63
Fethard WWTP	Tipperary County	3	0.94	0.63
Newport (TN) WWTP	Tipperary County	3	3.07	0.63
Tipperary-Town WWTP	Tipperary County	3	0.63	0.63
Cahir WWTP	Tipperary County	3	0.63	0.63
Clogherhead WWTP	Louth County	4	2.20	0.63
Enfield WWTP	Meath County	4	5.00	0.63
Stamullen WWTP	Meath County	4	2.07	0.63
Dunshaughlin WWTP	Meath County	4	5.00	0.63
Trim WWTP	Meath County	4	1.88	1.04
Navan WWTP	Meath County	4	2.00	1.04
Banagher WWTP	Offaly County	4	0.69	0.63
Portlaoise WWTP	Laois County	4	2.49	1.04
Avoca WWTP	Wicklow County	5	0.63	0.63
Baltinglass WWTP	Wicklow County	5	3.25	0.63
Muinebheag & Leighlinbridge WWTP	Carlow County	5	1.00	0.63
Carlow WWTP	Carlow County	5	3.61	1.04
Ferns WWTP	Wexford County	5	2.73	0.63
Bailieborough WWTP	Cavan County	6	2.14	0.63
Ballyjamesduff WWTP	Cavan County	6	3.19	0.63
Cootehill WWTP	Cavan County	6	1.50	0.63
Kingscourt WWTP	Cavan County	6	2.46	0.63
Virginia WWTP	Cavan County	6	2.95	0.63
Drumshanbo WWTP	Leitrim County	6	2.10	0.63
Ballaghaderreen WWTP	Roscommon County	7	1.00	0.63
Eyrecourt WWTP	Galway County	7	0.63	0.63
Portumna WWTP	Galway County	7	0.63	0.63
Ballinrobe WWTP	Mayo County	7	1.95	0.63
Ballyhaunis WWTP	Mayo County	7	2.24	0.63
Claremorris WWTP	Mayo County	7	2.42	0.63
Newport WWTP	Mayo County	7	0.63	0.63

Project Title	Local Authority	Procurement Call Off	Annualised Growth Rate (Years 1-10) %	Annualised Growth Rate (Years 11+) %
Limerick WWTP	Limerick County	8	2.21	2.21
Glin WWTP	Limerick County	8	0.63	0.63
Foynes WWTP	Limerick County	8	0.63	0.63
Castletroy WWTP	Limerick County	8	3.28	0.63
Shannon Town	Clare County	9	1.50	1.04
Ennistymon WWTP	Clare County	9	3.00	0.63
Lahinch WWTP	Clare County	9	0.63	0.63
Newmarket-on-Fergus WWTP	Clare County	9	3.00	0.63
Castleisland WWTP	Kerry County	9	0.73	0.63

Appendix B – DPI population equivalent per agglomeration

Sum of Nom. PE						
Agglomeration	Category 1	Category 2	Category 3	Category 4	(blank)	Grand Total
Avoca				12		12
Bailieborough	399					399
Ballaghaderreen	168		264			432
Ballina	135					135
Ballyjamesduff	810					810
Bantry	12					12
Bridgend	114		207			321
Buncrana	750		120			870
Burnfoot	75		150			225
Cahir	396					396
Carlow	846			15		861
Cashel	204		120			324
Cootehill	669					669
Dunfanaghy Portnablagh	111	162	588	75		936
Fahan			168			168
Ferns				30		30
Fethard			102			102
Kanturk	27					27
Kingscourt	114					114
Limerick	285			15		300
Muinebheag Leighlinbridge	804					804
Newmarket on Fergus	39					39
Portumna	18					18
Virginia	1485				15	1500
Grand Total	7461	162	1719	147	15	9504