
Project title	Grangegorman Development	Job number	D7390.10
cc		File reference	I001
Prepared by	Niall Cunningham	Date	22 March 2011
Subject	Foul Effluent Generation and Potable Water Demand Estimates		

1. INTRODUCTION

This technical note is a brief summary of the methodology employed to generate the foul and potable water estimates for the Grangegorman site. Appended to this technical note are the foul and potable water demand estimates for the development for each of the design years.

It should be noted that the estimates prepared and presented in this technical note have been developed at the very outset of the detailed design process. The figures presented are therefore conservative estimates based on maximum population figures. The volumetric and biological loading rates used in the design calculation take no account of any design sustainability approach, a key area of focus of the Grangegorman design team.

It is therefore envisaged that the loading estimates presented in this technical note will reduce as the detailed design for the Grangegorman site is developed. Updated estimates will be presented with subsequent planning applications.

2. METHODOLOGY

It is envisaged that the development of the Grangegorman site will be implemented in three phases. The first phase will be complete by 2016, the second by 2020 and the final and full development of the site by the year 2030.

Using the accommodation schedule developed at master plan stage as a starting template, the schedule of accommodation was developed for all elements for each design year. Both the Dublin Institute of Technology (DIT) and the Health Service Executive (HSE) were consulted and the schedule of accommodation was revised to reflect the most up to date development quantum including buildings, floor areas and anticipated population estimates.

The foul effluent loading rates used in the calculation for the site are those as recommended by the Environmental Protection Agency (EPA) – Ref Wastewater Treatment Manual – Treatment Systems for Small Communities, Business, Leisure Centres and Hotels.

The potable water demand figures are based on the assumption that the foul/wastewater flow volume estimates would typically represent 80% of the potable water consumption on the site. Again this approach is general considered to be conservative.

Foul Effluent

Grangegorman Foul Effluent Generation 2016

1 P.E. = 200 l/person/day
 1 BOD₅ P.E.= 60 g BOD₅/day
 Day = 9:00am-5:30pm
 Evening= 5:30pm-9:30pm
 Student residences= Before 9:00am, after 5:30pm

Element 1 HSE Facilities			Total Area (m ²)	Total	
				Volumetric P.E.	Biological P.E.
Tranche 1	Package 1	Replacement Mental Health - Total Area 14,510m ² - Planning submission 3112/09	7,300	99	87
		Laundry Refurb Daycare - 200m ² Studio - 800m ²	1,450	3	7
		Connolly Norman Refurb	560	15	25
	Package 2	*DIT Optometry	600	12	22
Sub-total Element 1 HSE Facility - 2016				133	148

Element 2 (DIT) (Core and Complimentary Elements)			Total Area (m ²)	Total	
				Volumetric P.E.	Biological P.E.
Tranche 1	Package 1A	Primary Infrastructure	N/A		
	Package 2A	Tourism & Food, Science, Engineering Craft Training (Part), DIT Research Ce	37,360		
		Population		1,320	2200
		Teaching kitchens - 2500m2 assume 400 covers/day		30	100
		Laboratory - 3000m2			
	Package 2B	Business, Library with support space	28,300		
		Academic Hub		60	100
		Business		960	1600
		Computer(ICT) & Facilities Management		30	50
		General Public using Library facilities		90	150
	Package 2C	Cafeteria incl staff common, Social Hub (Part), Student Housing (Part) and R	8,800		
		Student Union		68	113
	Package 2E	Student Hub (Part)and Clock Tower Refurb	6,970	30	50
	Package 2F	Applied Arts	21,340		
	Applied Arts		990	1650	
	Junior Music - 200 students for 3 hours each 1 day per week		12	20	
	performance space - 500 visitors 1 day per week		25	83	
Package 2G	Cafeteria and Retail (Part)	3,800			
	Staff		27	45	
Package 2H	Indoor Sports	2,000			
Package 2J	Student Housing (Part)	31,820			
	1000 Beds		600	500	
Package 2M	Research Centre included 2A	3,900			
Package 2N	Science & Industry Centre/Incubation 1 Person/20m2	5,300	80	133	
	Sports Pitches and Parkland	N/A			
Tranche 2	Package 2L	Sports Centre	6,980	216	433

Element 4 (GDA Managed Developments)			Total Area (m ²)	Total	
				Volumetric P.E.	Biological P.E.
Tranche 1	Package 2	Primary Shcool 1 pupil/6m2	2,770		150
		DCC Library refer 2B	1,660	90	
Sub-total Elements 2, 3 & 4 - 2016				4,689	7500

Total - All Elements 2016				4,823	7,648
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Grangegorman Foul Effluent Generation 2020

1 P.E. = 200 l/person/day
 1 BOD₅ P.E.= 60 g BOD₅/day
 Day = 9:00am-5:30pm
 Evening= 5:30pm-9:30pm
 Student residences= Before 9:00am, after 5:30pm

Element 1 HSE Facilities			Total Area (m ²)	Total	
				Volumetric P.E.	Biological P.E.
Tranche 1	Package 1	Replacement Mental Health - Total Area 14,500m ²	7,300	99	87
		- Planning submission 3112/09	7,200	99	87
		- Remaining Area			
	Package 2	Laundry Refurb	1,450		
		Daycare - 650m ²		3	7
		Studio - 800m ²		15	25
Package 3	Connolly Norman Refurb	560	12	22	
	Primary Care	4,100	59	123	
	*DIT Optometry	600	5	8	
	High Support Hostel	1,010	15	19	
Residential Private		6,500	216	238	
Sub-total Element 1 HSE Facility - 2020				522	615

Element 2 (DIT) (Core and Complimentary Elements)			Total Area (m ²)	Total	
				Volumetric P.E.	Biological P.E.
Tranche 1	Package 1A	Primary Infrastructure	N/A		
	Package 2A	Tourism & Food, Science, Engineering Craft Training (Part), DIT Research Cent	37,360	1,320	2200
		Population		30	100
		Teaching kitchens - 2500m ² assume 400 covers/day Laboratory - 3000m ²			
	Package 2B	Business, Library with support space	28,300		
		Academic Hub		60	100
		Business		960	1600
		Computer(ICT) & Facilities Management General Public using Library facilities		30	50
	Package 2C	Cafeteria incl staff common, Social Hub (Part), Student Housing (Part) and Res	8,800		
		Student Union		68	113
	Package 2E	Student Hub (Part)and Clock Tower Refurb	6,970	30	50
	Package 2F	Applied Arts	21,340		
		Applied Arts Junior Music - 200 students for 3 hours each 1 day per week performance space - 500 visitors 1 day per week		990	1650
	Package 2G	Cafeteria and Retail (Part)	3,800		
Staff			27	45	
Package 2H	Indoor Sports	2,000	62	124	
Package 2J	Student Housing (Part)	31,820			
	1000 Beds		600	500	
Package 2M	Research Centre included 2A	3,900			
Package 2N	Science & Industry Centre/Incubation	5,300			
	1 Person/20m ²		80	133	
	Sports Pitches and Parkland	N/A			
Tranche 2	Package 2D	Engineering & Built Environment incl Craft Training (Part)	31,860	1,605	2675
	Package 2K	Student Housing (part)	28,370		
		1000 Beds		600	500
Package 2L	Sports Centre	6,980	216	433	
Element 3 (Mixed Use)			Total Area (m²)	Total	
				Volumetric P.E.	Biological P.E.
Mixed Use Population 1/27m ² /d - 2020			60,430	224	373
Element 4 (GDA Managed Developments)			Total Area (m²)	Total	
				Volumetric P.E.	Biological P.E.
Tranche 1	Package 1	Primary School 1 pupil/6m ²	2,770		
	Package 2	DCC Library refer 2B	1,660	90	150
Tranche 2	Package 3	Social Housing 1 person/27m ²	3,300	37	61
				73	61
Sub-total Elements 2, 3 & 4 - 2020				7,228	11,170
Total - All Elements 2020				7,750	11,785

Grangegorman Foul Effluent Generation 2030

1 P.E. = 200 l/person/day
 1 BOD₅ P.E.= 60 g BOD₅/day
 Day = 9:00am-5:30pm
 Evening= 5:30pm-9:30pm
 Student residences= Before 9:00am, after 5:30pm

Element 1 HSE Facilities			Total Area (m ²)	Total	
				Volumetric P.E.	Biological P.E.
Tranche 1	Package 1	Replacement Mental Health - Total Area 14,500 ²	7,300	99	87
		- Planning submission 3112/09 floor area 8754m ²	7,200	99	87
		- Remaining Area 5756m ²	1,450		
	Package 2	Laundry Refurb			
		Daycare - 650m ²		3	7
		Studio - 800m ²		15	25
Package 3	Connolly Norman Refurb	560	12	22	
	Primary Care	4,100	59	123	
	*DIT Optometry	600	5	8	
Tranche 2	Package 3	High Support Hostel	1,010	15	19
		Community Generated Rehab	1,400	4	8
		Primary Care	7,500	65	142
		Dementia Unit	1,700	42	35
		Community Nursing Unit	5,500	20	42
		Respite/Intermediate Care Unit	1,400	23	22
Services for People with Disabilities	3,100	6	12		
Residential Private		6,500	216	238	
HSE Expansion		8,000	198	156	
Sub-total Element 1 HSE Facility - 2030				881	1030
Element 2 (DIT) (Core and Complimentary Elements)			Total Area (m ²)	Total	
				Volumetric P.E.	Biological P.E.
Tranche 1	Package 1A	Primary Infrastructure	N/A		
	Package 2A	Tourism & Food, Science, Engineering Craft Training (Part), DIT Research Cent	37,360		
		Population		1,320	2200
		Teaching kitchens - 2500m ² assume 400 covers/day Laboratory - 3000m ²		30	100
	Package 2B	Business, Library with support space	28,300		
		Academic Hub		60	100
		Business		960	1600
		Computer(ICT) & Facilities Management General Public using Library facilities		30	50
	Package 2C	Cafeteria incl staff common, Social Hub (Part), Student Housing (Part) and Res	8,800		
		Student Union		68	113
	Package 2E	Student Hub (Part)and Clock Tower Refurb	6,970	30	50
	Package 2F	Applied Arts	21,340		
		Applied Arts		990	1650
		Junior Music - 200 students for 3 hours each 1 day per week performance space - 500 visitors 1 day per week		12	20
	Package 2G	Cafeteria and Retail (Part)	3,800		
		Staff		27	45
Package 2H	Indoor Sports	2,000	62	124	
Package 2J	Student Housing (Part) 1000 Beds	31,820	600	500	
Package 2M	Research Centre included 2A	3,900			
Package 2N	Science & Industry Centre/Incubation 1 Person/20m ²	5,300	80	133	
Sports Pitches and Parkland			N/A		
Tranche 2	Package 2D	Engineering & Built Environment incl Craft Training (Part)	31,860	1,605	2675
	Package 2K	Student Housing (part) 1000 Beds	28,370	600	500
		Sports Centre	6,980	216	433
	Package 2Q	Research Centre 1 Person/20m ² additionally funded performance space 800 visitors 2 days per week	7,890	120	200
		3,580	40	133	
Element 3 (Mixed Use)			Total Area (m²)	Total	
Mixed Use Population 1/100m ² /d - 2020 Population 1/100m ² /d - 2030			60,430	224	373
				448	746
Element 4 (GDA Managed Developments)			Total Area (m ²)	Total	
				Volumetric P.E.	Biological P.E.
Tranche 1	Package 1	Primary School 1 pupil/6m ²	2,770		
	Package 2	DCC Library refer 2b	1,660	90	150
Tranche 2	Package 3	Social Housing 1 person/27m ²	3,400		
				37	61
Sub-total Elements 2, 3 & 4 - 2030				7,762	12,188
Sub-total Elements 1, 2, 3 & 4 - 2030				8,643	13218
Expansion on elements 2, 3 & 4 by 2030 (10%)				776	1219
Total - Full Site Development				9,419	14,437

Potable Water

Grangegorman Potable Water Demand 2016

1 P.E. = 200 l/person/day

Day = 9:00am-5:30pm

Evening= 5:30pm-9:30pm

Student residences= Before 9:00am, after 5:30pm

Element 1 HSE Facilities			Total Area (m ²)	Total
				Volumetric P.E.
Tranche 1	Package 1	Replacement Mental Health - Total Area 14,510m ²		
		- Planning submission 3112/09	7,300	124
		Laundry Refurb	1,450	
		Daycare - 200m ²		4
		Studio - 800m ²		19
		Connolly Norman Refurb	560	15
	Package 2	*DIT Optometry	600	6
Sub-total Element 1 HSE Facility - 2016				167

Element 2 (DIT) (Core and Complimentary Elements)			Total Area (m ²)	Total
				Volumetric P.E.
Tranche 1	Package 1A	Primary Infrastructure	N/A	
	Package 2A	Tourism & Food, Science, Engineering Craft Training (Part), DIT Research Ce	37,360	1,650
		Population		38
		Teaching kitchens - 2500m ² assume 400 covers/day		
		Laboratory - 3000m ²		
	Package 2B	Business, Library with support space	28,300	75
		Academic Hub		1,200
		Business		38
		Computer(ICT) & Facilities Management		113
		General Public using Library facilities		
	Package 2C	Cafeteria incl staff common, Social Hub (Part), Student Housing (Part) and R	8,800	84
		Student Union		38
	Package 2E	Student Hub (Part)and Clock Tower Refurb	6,970	
	Package 2F	Applied Arts	21,340	1,238
		Applied Arts		15
	Junior Music - 200 students for 3 hours each 1 day per week		31	
	performance space - 500 visitors 1 day per week			
Package 2G	Cafeteria and Retail (Part)	3,800	34	
	Staff		78	
Package 2H	Indoor Sports	2,000		
Package 2J	Student Housing (Part)	31,820	750	
	1000 Beds			
Package 2M	Research Centre	3,900		
	included 2A		99	
Package 2N	Science & Industry Centre/Incubation	5,300		
	1 Person/20m ²			
	Sports Pitches and Parkland	N/A		
Tranche 2	Package 2L	Sports Centre	6,980	270

Element 4 (GDA Managed Developments)			Total Area (m ²)	Total
				Volumetric P.E.
Tranche 1	Package 2	Primary Shcool	2,770	113
		1 pupil/6m ²		
		DCC Library	1,660	
		refer 2B		
Sub-total Elements 2, 3 & 4 - 2016				5,862

Total - All Elements 2016				6,028
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Grangegorman Potable Water Demand 2020

1 P.E. = 200 l/person/day

Day = 9:00am-5:30pm

Evening= 5:30pm-9:30pm

Student residences= Before 9:00am, after 5:30pm

Element 1 HSE Facilities			Total Area (m ²)	Total
				Volumetric P.E.
Tranche 1	Package 1	Replacement Mental Health - Total Area 14,500m ²		
		- Planning submission 3112/09	7,300	124
		- Remaining Area	7,200	124
	Package 2	Laundry Refurb	1,450	
		Daycare - 650m ²		4
		Studio - 800m ²		19
Package 3	Connolly Norman Refurb	560	15	
	Primary Care	4,100	74	
	*DIT Optometry	600	6	
	High Support Hostel	1,010	19	
Residential Private			6,500	270
Sub-total Element 1 HSE Facility - 2020				653

Element 2 (DIT) (Core and Complimentary Elements)			Total Area (m ²)	Total
				Volumetric P.E.
Tranche 1	Package 1A	Primary Infrastructure	N/A	
	Package 2A	Tourism & Food, Science, Engineering Craft Training (Part), DIT Research Cent	37,360	1,650
		Population		25
		Teaching kitchens - 2500m ² assume 400 covers/day Laboratory - 3000m ²		
	Package 2B	Business, Library with support space	28,300	
		Academic Hub		75
		Business		1,200
		Computer(ICT) & Facilities Management General Public using Library facilities		38
	Package 2C	Cafeteria incl staff common, Social Hub (Part), Student Housing (Part) and Res	8,800	
		Student Union		84
	Package 2E	Student Hub (Part)and Clock Tower Refurb	6,970	38
	Package 2F	Applied Arts	21,340	1,238
		Junior Music - 200 students for 3 hours each 1 day per week performance space - 500 visitors 1 day per week		15
Package 2G	Cafeteria and Retail (Part)	3,800		
	Staff		34	
Package 2H	Indoor Sports	2,000	78	
Package 2J	Student Housing (Part)	31,820		
	1000 Beds		750	
Package 2M	Research Centre included 2A	3,900		
Package 2N	Science & Industry Centre/Incubation	5,300		
	1 Person/20m ²		99	
Sports Pitches and Parkland			N/A	
Tranche 2	Package 2D	Engineering & Built Environment incl Craft Training (Part)	31,860	2,006
	Package 2K	Student Housing (part)	28,370	
		1000 Beds		750
Package 2L	Sports Centre	6,980	270	

Element 3 (Mixed Use)		Total Area (m ²)	Total
			Volumetric P.E.
Mixed Use Population 1/27m ² /d - 2020		60,430	280

Element 4 (GDA Managed Developments)			Total Area (m ²)	Total
				Volumetric P.E.
Tranche 1	Package 1	Primary School 1 pupil/6m ²	2,770	113
	Package 2	DCC Library refer 2B	1,660	
Tranche 2	Package 3	Social Housing 1 person/27m ²	3,300	46
Sub-total Elements 2, 3 & 4 - 2020				9,022

Total - All Elements 2020			9,675	
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Grangegorman Potable Water Demand 2030

1 P.E. = 200 l/person/day

Day = 9:00am-5:30pm

Evening= 5:30pm-9:30pm

Student residences= Before 9:00am, after 5:30pm

Element 1 HSE Facilities			Total Area (m ²)	Total
				Volumetric P.E.
Tranche 1	Package 1	Replacement Mental Health - Total Area 14,500 ²		
		- Planning submission 3112/09 floor area 8754m ²	7,300	124
		- Remaining Area 5756m ²	7,200	124
	Package 2	Laundry Refurb	1,450	
		Daycare - 650m ²		4
		Studio - 800m ²		19
		Connolly Norman Refurb	560	15
Package 3	Primary Care	4,100	74	
	*DIT Optometry	600	6	
Tranche 2	Package 3	High Support Hostel	1,010	19
		Community Generated Rehab	1,400	5
		Primary Care	7,500	81
		Dementia Unit	1,700	53
		Community Nursing Unit	5,500	25
		Respite/Intermediate Care Unit Services for People with Disabilities	1,400 3,100	29 7
Residential Private		6,500	270	
HSE Expansion		8,000	248	
Sub-total Element 1 HSE Facility - 2030				1,101
Element 2 (DIT) (Core and Complimentary Elements)			Total Area (m ²)	Total
				Volumetric P.E.
Tranche 1	Package 1A	Primary Infrastructure	N/A	
	Package 2A	Tourism & Food, Science, Engineering Craft Training (Part), DIT Research Cent	37,360	1,650
		Population		37
		Teaching kitchens - 2500m ² assume 400 covers/day Laboratory - 3000m ²		
	Package 2B	Business, Library with support space	28,300	
		Academic Hub		75
		Business		1,200
		Computer(ICT) & Facilities Management General Public using Library facilities		38 113
	Package 2C	Cafeteria incl staff common, Social Hub (Part), Student Housing (Part) and Res	8,800	84
	Package 2E	Student Hub (Part)and Clock Tower Refurb	6,970	38
	Package 2F	Applied Arts	21,340	1,238
		Applied Arts Junior Music - 200 students for 3 hours each 1 day per week performance space - 500 visitors 1 day per week		15 31
	Package 2G	Cafeteria and Retail (Part) Staff	3,800	34
	Package 2H	Indoor Sports	2,000	78
	Package 2J	Student Housing (Part) 1000 Beds	31,820	750
	Package 2M	Research Centre included 2A	3,900	
	Package 2N	Science & Industry Centre/Incubation 1 Person/20m ²	5,300	99
Sports Pitches and Parkland			N/A	
Tranche 2	Package 2D	Engineering & Built Environment incl Craft Training (Part)	31,860	2,006
	Package 2K	Student Housing (part) 1000 Beds	28,370	750
	Package 2L	Sports Centre	6,980	270
	Package 2Q	Research Centre 1 Person/20m ² additionally funded performance space 800 visitors 2 days per week	7,890 3,580	150 50
Element 3 (Mixed Use)			Total Area (m ²)	Total
				Volumetric P.E.
Mixed Use Population 1/100m ² /d - 2020 Population 1/100m ² /d - 2030			60,430	280 560
Element 4 (GDA Managed Developments)			Total Area (m ²)	Total
				Volumetric P.E.
Tranche 1	Package 1	Primary School 1 pupil/6m ²	2,770	
	Package 2	DCC Library refer 2B	1,660	113
Tranche 2	Package 3	Social Housing 1 person/27m ²	3,400	46
Sub-total Elements 2, 3 & 4 - 2030				9,702
Sub-total Elements 1, 2, 3 & 4 - 2030				10,803
Expansion on elements 2, 3 & 4 by 2030 (10%)				970
Total - Full Site Development				11,773