



Status Report		
WaterBody Category:	Subbasin Waterbody	
WaterBody Name:	Ballinspittle River (Coastal)	
WaterBody Code:	IE_SW_20_1050	
Overall Status Result:		

	Status Element Description	Result
EX	Status from Monitored or Extrapolated Waterbody	
	Biological Elements	
Q	Macroinvertebrates (Q-Value)	
F	Fish	
DI	Phytobenthos (Diatoms)	n/a
FPM	Status value as determined by Margartifera	n/a
	Supporting Elements	
MOR	Hydromorphology	n/a
SP	Specific Pollutants	n/a
PC	General Physico-Chemical	n/a
	Chemical Status	
PAS	Chemical Status	n/a
	Overall Ecological Status	
O	Overall Ecological Status	

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Date Reported to Europe: 22/12/2008

Date Report Created 14/10/2009

Risk Report

WaterBody Category: Subbasin Waterbody
WaterBody Name: Ballinspittle River (Coastal)
WaterBody Code: IE_SW_20_1050
Overall Risk Result: **2b** Not At Risk



Risk Test Description	Risk
Point Risk Sources	
RP1 WWTPs (2008)	2b Not At Risk
RP2 CSOs	2b Not At Risk
RP3 IPPCs (2008)	2b Not At Risk
RP4 Section 4s (2008)	2b Not At Risk
RPO Overall Risk from Point Sources - Worst Case (2008)	2b Not At Risk
Diffuse Risk Sources	
RD1 EPA diffuse model (2008)	1a At Risk
RD2a Road Wash - Soluble Copper	2b Not At Risk
RD2b Road Wash - Total Zinc	2b Not At Risk
RD2c Road Wash - Total Hydrocarbons	2b Not At Risk
RD3 Railways	2b Not At Risk
RD4a Forestry - Acidification (2008)	2b Not At Risk
RD4b Forestry - Suspended Solids (2008)	2b Not At Risk
RD4c Forestry - Eutrophication (2008)	2a Probably Not At Risk
RD5a Unsewered Areas - Pathogens (2008)	2a Probably Not At Risk
RD5b Unsewered Phosphorus (2008)	2b Not At Risk
RD5 Overall Unsewered (2008)	2b Not At Risk
RD6a Arable	2a Probably Not At Risk
RD6b Sheep Dip	2b Not At Risk
RD6c Forestry - Dangerous Substances	2b Not At Risk
RDO Diffuse Overall -Worst Case (2008)	1a At Risk

Date Reported to Europe: 22/12/2008

Date Report Created 14/10/2009

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Morphological Risk Sources		
RM1	Channelisation (2008)	2b Not At Risk
RM2	Embankments (2008)	2b Not At Risk
RM3	Impoundments	2b Not At Risk
RM4	Water Regulation	2b Not At Risk
RMO	Morphology Overall - Worst Case (2008)	2b Not At Risk
Q/RDI or Point/Diffuse		
QPD	Q class/EPA Diffuse Model or worst case of Point and Diffuse (2008)	2b Not At Risk
Hydrology		
RHY1	Water balance - Abstraction	2b Not At Risk
Overall Risk		
RA	Rivers Overall - Worst Case (2008)	2b Not At Risk

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Date Reported to Europe: 22/12/2008

Date Report Created 14/10/2009

Objectives Report

WaterBody Category: Subbasin Waterbody
WaterBody Name: Ballinspittle River (Coastal)
WaterBody Code: IE_SW_20_1050
Overall Objective: [REDACTED]



Objectives Description		Result
Objectives		
OB1	Objective 1 - Protected Areas	Not Applicable
OB2	Objective 2 - Protect High and Good Status	[REDACTED]
OB3	Objective 3 - Restore Less Than Good Status	Not Applicable
OB4	Objective 4 - Reduce Chemical Pollution	Not Applicable
OBO	Overall Objective	[REDACTED]
Deadline		
YR	Default Year by which the objective must be met	2015
EX	Revised Objective Deadline	2007
OBO	Overall Objective and Deadline	[REDACTED]

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Date Reported to Europe: 22/12/2008

Date Report Created 14/10/2009

Basic Measures Report

WaterBody Category: Subbasin Waterbody
WaterBody Name: Ballinspittle River (Coastal)
WaterBody Code: IE_SW_20_1050



Basic Measures Description		Applicable
Key Directives		
BA	Bathing Waters Directive	No
BI	Birds Directive	No
HA	Habitats Directive	No
DW	Drinking Waters Directive	Yes
SEV	Major Accidents and Emergencies (Seveso) Directive	Yes
EIA	Environmental Impact Assessment Directive	Yes
SE	Sewage Sludge Directive	Yes
UW	Urban Waste Water Treatment Directive	No
PL	Plant Protection Products Directive	Yes
NI	Nitrates Directive	Yes
IP	Integrated Pollution Prevention Control Directive	Yes
Other Stipulated Measures:		
CR	Cost recovery for water use	Yes
SU	Promotion of efficient and sustainable water use	Yes
DWS	Protection of drinking water sources	Yes
AB	Control of abstraction and impoundments	Yes
PT	Control of point source discharges	Yes
DI	Control of diffuse source discharges	Yes
GWD	Authorisation of discharges to groundwater	No
PS	Control of priority substances	Yes
MOR	Control of physical modifications to surface waters	Yes
OA	Controls on other activities impacting on water status	Yes
AP	Prevention or reduction of the impact of accidental pollution incidents	Yes

Date Reported to Europe: 22/12/2008

Date Report Created 14/10/2009

Urban and Industrial Discharges Supplementary Measures Report

WaterBody Category: Subbasin Waterbody
WaterBody Name: Ballinspittle River (Coastal)
WaterBody Code: IE_SW_20_1050



	Point discharges to waters from municipal and industrial sources	Result
PINDDIS	Is there one or more industrial discharge (Section 4 licence issued by the local authority or IPPC licence issued by the EPA) contained within the water body?	Yes
PINDDISR	Are there industrial discharges (Section 4 licence issued by the local authority or IPPC licence issued by the EPA) that cause the receiving water to be 'At Risk' within the water body?	No
PB1	Basic Measure 1 - Measures for improved management.	No
PB2	Basic Measure 2 - Optimise the performance of the waste water treatment plant by the implementation of a performance management system.	No
PB3	Basic Measure 3 - Revise existing Section 4 license conditions and reduce allowable pollution load.	No
PB4	Basic Measure 4 - Review existing IPPC license conditions and reduce allowable pollution load.	No
PB5	Basic Measure 5 - Investigate contributions to the collection system from unlicensed discharges.	No
PB6	Basic Measure 6 - Investigate contributions to the collection system of specific substances known to impact ecological status.	No
PB7	Basic Measure 7 - Upgrade WWTP to increase capacity.	No
PB8	Basic Measure 8 - Upgrade WWTP to provide nutrient removal treatment.	No
PS1	Supplementary Measure 1 - Measures intended to reduce loading to the treatment plant.	No
PS2	Supplementary Measure 2 - Impose development controls where there is, or is likely to be in the future, insufficient capacity at treatment plants.	No
PS3	Supplementary Measure 3 - Initiate investigations into characteristics of treated wastewater for parameters not presently required to be monitored under the urban wastewater treatment directive.	No
PS4	Supplementary Measure 4 - Initiate research to verify risk assessment results and determine the impact of the discharge.	No
PS5	Supplementary Measure 5 - Use decision making tools in point source discharge management.	No
PS6	Supplementary Measure 6 - Install secondary treatment at plants where this level of treatment is not required under the urban wastewater treatment directive.	No
PS7	Supplementary Measure 7 - Apply a higher standard of treatment (stricter emission controls) where necessary.	No

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Date Report Created 14/10/2009

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PS8	Supplementary Measure 8 - Upgrade the plant to remove specific substances known to impact on water quality status.	No
PS9	Supplementary Measure 9 - Install ultra-violet or similar type treatment.	No
PS10	Supplementary Measure 10 - Relocate the point of discharge.	No

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Date Report Created 14/10/2009

Physical Modifications Supplementary Measures Report

WaterBody Category: Subbasin Waterbody

WaterBody Name: Ballinspittle River (Coastal)

WaterBody Code: IE_SW_20_1050



Physical Modifications Supplementary Measures		Applicable
Reduce		
SM1	Codes of Practice	Yes
SM2	Support for voluntary initiatives	Yes
Remediate		
SM3	Channelisation impact remediation schemes	No
SM4	Channelisation investigation	No
SM5	Overgrazing remediation	No
SM6	Impassable barriers, impact confirmed, investigation into feasibility of remediation required	No
SM7	Impassable barriers investigation	Yes

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Date Reported to Europe: 22/12/2008

Date Report Created 14/10/2009

Unsewered Properties Supplementary Measures Report

WaterBody Category: Subbasin Waterbody
WaterBody Name: Ballinspittle River (Coastal)
WaterBody Code: IE_SW_20_1050



	Supplementary Measures for Unsewered Properties	Applicable
SP1	Amend building regulations	Yes
SP2	Establish certified expert panels for site investigation and certification of installed systems	Yes
SP3	Assess applications for new unsewered systems by applying risk mapping/decision support systems and codes of practice	Yes
SP4	Carry out an inspection programme in prioritised locations for existing systems and record results in an action tracking system	No
SP5	Enforce requirements for percolation	No
SP6	Enforce requirements for de-sludging	Yes
SP7	Consider connection to municipal systems	No

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Date Reported to Europe: 22/12/2008

Date Report Created 14/10/2009

Forestry Measures Report

WaterBody Category: Subbasin Waterbody
WaterBody Name: Ballinspittle River (Coastal)
WaterBody Code: IE_SW_20_1050



	Forestry Measures for	Applicable
	Forestry	
SF1	Management Instruments - Ensure regulations and guidance are cross referenced and revised to incorporate proposed measures	No
SF2	Acidification - Avoid or limit afforestation on 1st and 2nd order stream catchments in acid sensitive areas	No
SF3	Acidification - Revise the Acidification Protocol to ensure actual minimum alkalinities are detected and revise boundary conditions for afforestation in acid sensitive areas	No
SF10	Pesticide Use - Pre-dip trees in nurseries prior to planting out	No
SF11	Pesticide Use - Maintain registers of pesticide use	No
SF12	Acidification - Restructure existing forests to include open space and structural diversity through age classes and species mix, including broadleaves	No
SF13	Acidification - Mitigate acid impacts symptomatically using basic material	No
SF14	Acidification - Manage catchment drainage to increase residence times and soil wetting	No
SF15	Acidification - Implement measures to increase stream production.	No
SF16	Eutrophication - Establish riparian zone management prior to clearfelling	No
SF17	Eutrophication and Sedimentation - Enhance sediment control	No
SF18	Eutrophication - Manage catchment drainage to increase residence times and soil wetting, including no drainage in some locations	No
SF19	Sedimentation - Establish riparian zone management prior to clearfelling	No
SF20	Sedimentation - Enhance sediment control	No
SF21	Sedimentation - Manage catchment drainage to increase residence times and soil wetting, including no drainage in some locations	No
SF22	Hydromorphology - Enhance drainage network management, minimise drainage in peat soils	No
SF23	Pesticide Use - Develop biological control methods	No

Date Reported to Europe: 22/12/2008

Date Report Created 14/10/2009

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SF4	Eutrophication and Sedimentation - Avoid or limit forest cover on peat sites	No
SF5	Eutrophication and Sedimentation - Change the tree species mix on replanting	No
SF6	Eutrophication and Sedimentation - Limiting felling coup size	No
SF7	Eutrophication and Sedimentation - Establish new forest structures on older plantation sites	No
SF8	Hydromorphology - Audit existing drainage networks in forest catchments	No
SF9	Pesticide Use - Reduce pesticide usage	No

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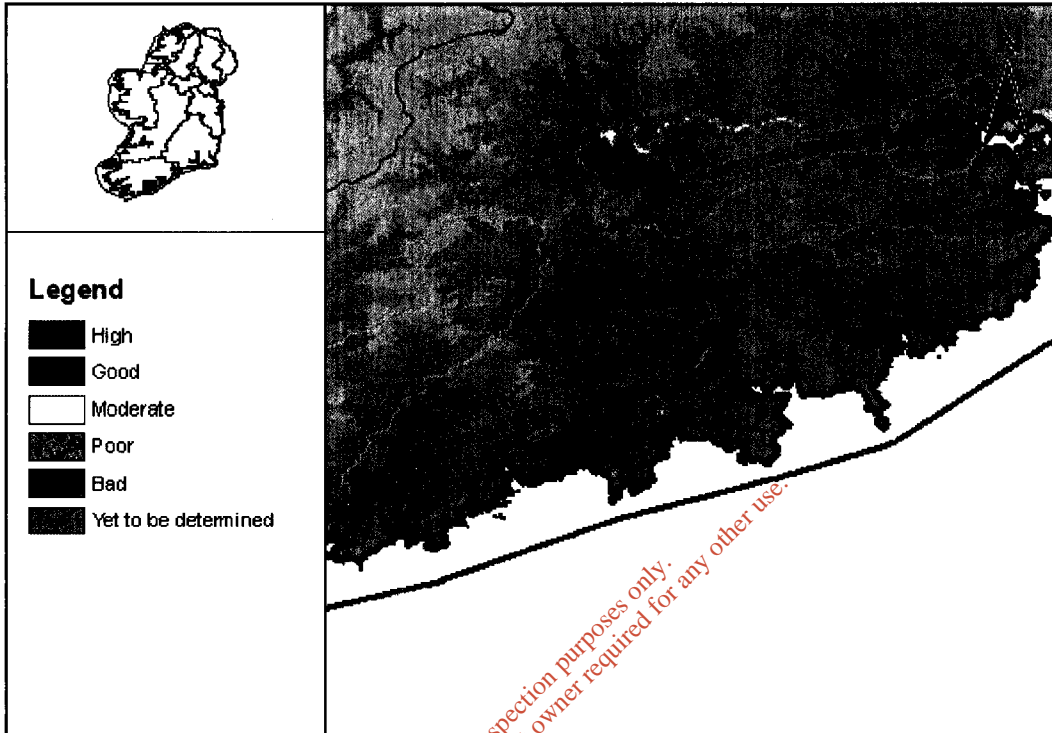
Date Reported to Europe: 22/12/2008

Date Report Created 14/10/2009

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Full Report for Waterbody Bandon_1



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Date Reported to Europe: 22/12/2008

Date Report Created 16/10/2009



Summary Information:	
WaterBody Category:	Groundwater Waterbody
WaterBody Name:	Bandon_1
WaterBody Code:	IE_SW_G_014
Overall Status:	[REDACTED]
Overall Objective:	[REDACTED]
Overall Risk:	1a At Risk
Applicable Supplementary Measures:	Unsewered; Report data based upon Draft RBMP, 22/12/2008.

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Date Reported to Europe: 22/12/2008

Date Report Created 16/10/2009

Chemical and Quantitative Status Report	
WaterBody Category:	Groundwater Waterbody
WaterBody Name:	Bandon_1
WaterBody Code:	IE_SW_G_014
Overall Status Result:	[REDACTED]

	Status Element Description	Result
	Groundwater Quality	
WB	Water Balance Status	GS-HC
INT	Saline Intrusions Status	GS-HC
DW	Drinking Waters Status	GS-LC
DIF	Diffuse Elements (General) Status	GS-LC
	Groundwater Quality (Point Source)	
CL	Contaminated Land Status	GS-LC
MI	Mine Status	GS-HC
UR	Urban Status	GS-HC
PTO	Overall Point Source Status	GS-HC
	Groundwater Quality (General)	
GQ	General Groundwater Quality Status	GS-LC
	Surface Water	
TC	Transitional & Coastal Status	GS-LC
SWO	Surface Water Quality Overall Status	GS-LC
SWQ	Surface Water Quantity Overall Status	GS-HC
	Groundwater Dependent Terrestrial Ecosystems	
TE	GWDTE Status	GS-HC
	Overall	
QUO	Overall Quantitative Status	GS-HC
O	Final Status Classification	[REDACTED]

Date Reported to Europe: 22/12/2008

Date Report Created 16/10/2009

Risk Report

WaterBody Category: Groundwater Waterbody

WaterBody Name: Bandon_1

WaterBody Code: IE_SW_G_014

Overall Risk Result: **1a** At Risk

Risk Test Description		Risk
Groundwater Quality		
WB	Water Balance Risk	2b Not At Risk
INT	Intrusions Risk	2b Not At Risk
DW	Drinking Waters Risk	1a At Risk
DIF	Diffuse Elements (General) Risk	1a At Risk
Groundwater Quality (Point Risk)		
LF	Landfill Risk	2b Not At Risk
QY	Quarry Risk	2b Not At Risk
UW	UWWT Risk	2b Not At Risk
CL	Contaminated Land Risk	2a Probably Not At Risk
MI	Mine Risk	2b Not At Risk
UR	Urban Risk	2b Not At Risk
Groundwater Quality (General)		
GQ	General Groundwater Quality Risk	1a At Risk
Surface Water		
RV	River Risk	2a Probably Not At Risk
TC	Transitional & Coastal Risk	1b Probably At Risk
SWO	Surface Water Quality Overall Risk	1b Probably At Risk
SWQ	Surface Water Quantity Overall Risk	2b Not At Risk
Groundwater Dependent Terrestrial Ecosystems		
TE	GWDTE Risk	2b Not At Risk
Overall Risk		
RA	Overall Risk	1a At Risk

Date Reported to Europe: 22/12/2008

Date Report Created 16/10/2009

Objectives Report

WaterBody Category: Groundwater Waterbody

WaterBody Name: Bandon_1

WaterBody Code: IE_SW_G_014

Overall Objective: [REDACTED]

Objectives Description		Result
Objectives		
OB1	Groundwater Quantitative Objective	[REDACTED]
OB2	Groundwater Chemical Objective	[REDACTED]
OBO	Overall Objective	[REDACTED]
Deadline		
EX	Revised Objective Deadline	2015
OBO	Overall Objective and Deadline	[REDACTED]

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Date Reported to Europe: 22/12/2008

Date Report Created 16/10/2009

Basic Measures Report

WaterBody Category: Groundwater Waterbody

WaterBody Name: Bandon_1

WaterBody Code: IE_SW_G_014

Basic Measures Description		Applicable
Key Directives		
BA	Bathing Waters Directive	Yes
BI	Birds Directive	No
HA	Habitats Directive	No
DW	Drinking Waters Directive	Yes
SEV	Major Accidents and Emergencies (Seveso) Directive	Yes
EIA	Environmental Impact Assessment Directive	Yes
SE	Sewage Sludge Directive	Yes
UW	Urban Waste Water Treatment Directive	Yes
PL	Plant Protection Products Directive	Yes
NI	Nitrates Directive	Yes
IP	Integrated Pollution Prevention Control Directive	Yes
Other Stipulated Measures		
CR	Cost recovery for water use	Yes
SU	Promotion of efficient and sustainable water use	Yes
DWS	Protection of drinking water sources	Yes
AB	Control of abstraction and impoundments	Yes
PT	Control of point source discharges	Yes
DI	Control of diffuse source discharges	Yes
GWD	Authorisation of discharges to groundwater	Yes
PS	Control of priority substances	No
MOR	Control of physical modifications to surface waters	No
OA	Controls on other activities impacting on water status	Yes
AP	Prevention or reduction of the impact of accidental pollution incidents	Yes

Date Reported to Europe: 22/12/2008

Date Report Created 16/10/2009



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Date Reported to Europe: 22/12/2008

Date Report Created 16/10/2009

Unsewered Properties Supplementary Measures Report

WaterBody Category: Groundwater Waterbody

WaterBody Name: Bandon_1

WaterBody Code: IE_SW_G_014

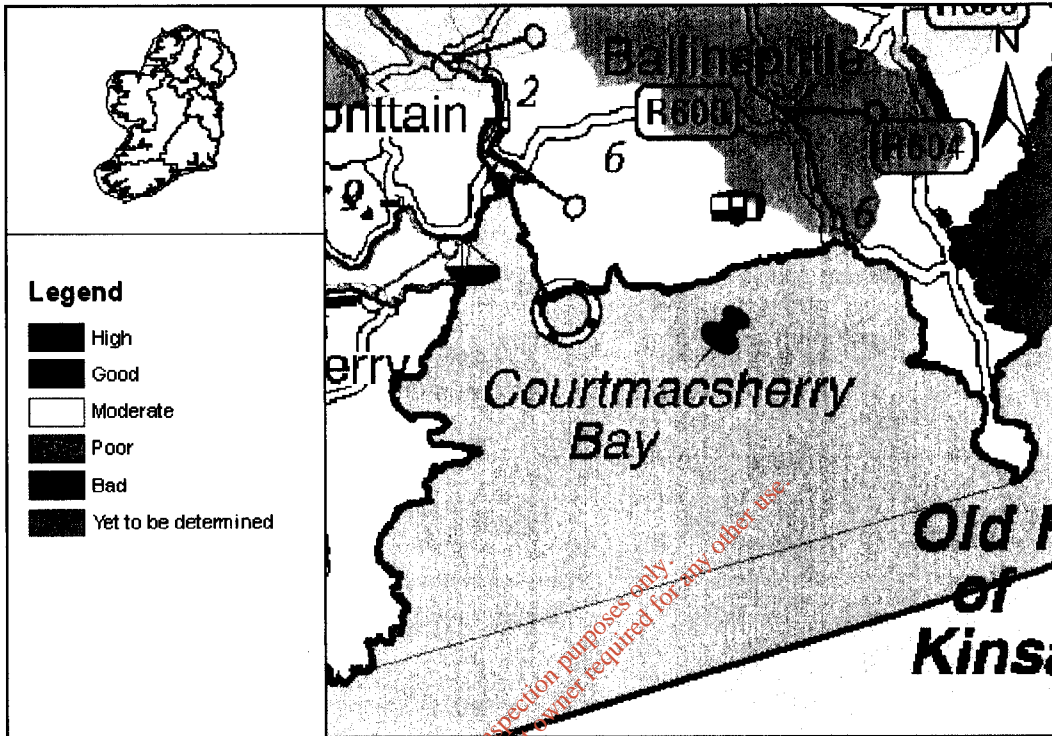
	Supplementary Measures for Unsewered Properties	Applicable
SP1	Amend building regulations	Yes
SP2	Establish certified expert panels for site investigation and certification of installed systems	Yes
SP3	Assess applications for new unsewered systems by applying risk mapping/decision support systems and codes of practice	Yes
SP4	Carry out an inspection programme in prioritised locations for existing systems and record results in an action tracking system.	Yes
SP5	Enforce requirements for percolation	following inspection
SP6	Enforce requirements for de-sludging	Yes
SP7	Consider connection to municipal systems	Where feasible

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Date Reported to Europe: 22/12/2008

Date Report Created 16/10/2009

Full Report for Waterbody Courtmacsherry Bay



Date Reported to Europe: 22/12/2008

Date Report Created 04/11/2009



Summary Information:

WaterBody Category: Coastal Waterbody
WaterBody Name: Courtmacsherry Bay
WaterBody Code: IE_SW_090_0000
Overall Status: UNASSIGNE
D
Overall Objective: To be
determined
Overall Risk: **2b** Not At Risk
**Applicable Supplementary
Measures:** Urban & Industrial;
Report data based upon Draft RBMP, 22/12/2008.



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Date Reported to Europe: 22/12/2008

Date Report Created 04/11/2009



Status Report

WaterBody Category: Coastal Waterbody
WaterBody Name: Courtnacsherry Bay
WaterBody Code: IE_SW_090_0000
Overall Status Result: UNASSIGNE
 D



	Status Element Description	Result
EX	Status from Monitored or Extrapolated Waterbody	Extrapolated
	General Conditions	
DIN	Dissolved Inorganic Nitrogen	
MRP	Molybdate Reactive Phosphorus	
DO	Dissolved Oxygen as percent saturation	
BOD	Biochemical Oxygen Demand	
T	Temperature	
	Biological Elements	
PB	Phytoplankton - Phytoblooms	
PBC	Phytoplankton - PhytoBiomass (Chlorophyll)	
MA	Macroalgae	
RSL	Reduced Species List	
SG	Angiosperms - Seagrass and Saltmarsh	
BE	Benthic Invertebrates	
FI	Fish	
	HydroMorphology	
HY	Hydrology	
MO	Morphology	
	Specific Pollutants	
SP	Specific Relevant Pollutants (Annex VII)	
	Conservation Status	
CN	Conservation Status (Expert Judgement)	
	Protected Area Status	
PA	Overall Protected Area Status	

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Overall Status		
ES	Ecological Status	
CS	Chemical Status	
O	Overall Ecological Status	UNASSIGNED

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Date Reported to Europe: 22/12/2008

Date Report Created 04/11/2009



Risk Report	
WaterBody Category:	Coastal Waterbody
WaterBody Name:	Courtmacsherry Bay
WaterBody Code:	IE_SW_090_0000
Overall Risk Result:	2b Not At Risk



Risk Test Description	Risk
Point Risk Sources	
CP1 WWTPs (2008)	2b Not At Risk
CP2 CSOs	
CP3 IPPCs (2008)	2b Not At Risk
CP4 Section 4s (2008)	2b Not At Risk
CPO Overall Risk from Point Sources - Worst Case (2008)	
Morphological Risk Sources	
MOR Overall Morphological Risk - Worst Case	2b Not At Risk
Marine Direct Impacts	
MDI1 Dangerous Substances	
MDI2 OSPAR	
MDI3 UWWT Regs Designations	
MDI Marine Direct Impacts Overall - Worst Case	
O	
Overall Risk	
CP Worst case of Point and Marine Direct Impacts Overall (2008)	2b Not At Risk
RA Coastal Risk Overall - Worst case (2008)	2b Not At Risk

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Date Reported to Europe: 22/12/2008
 Date Report Created 04/11/2009

Objectives Report

WaterBody Category: Coastal Waterbody
WaterBody Name: Courtmacsherry Bay
WaterBody Code: IE_SW_090_0000
Overall Objective: To be determined




	Objectives Description	Result
	Objectives	
OB1	Objective 1 - Protected Areas	Not Applicable
OB2	Objective 2 - Protect High and Good Status	Not Applicable
OB3	Objective 3 - Restore Less Than Good Status	Not Applicable
OB4	Objective 4 - Reduce Chemical Pollution	Not Applicable
OBO	Overall Objective	To be determined
	Deadline	
YR	Default Year by which the objective must be met	Not Applicable
OBO	Overall Objective and Deadline	To be determined

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Date Reported to Europe: 22/12/2008

Date Report Created 04/11/2009

Basic Measures Report		
WaterBody Category:	Coastal Waterbody	
WaterBody Name:	Courtmacsherry Bay	
WaterBody Code:	IE_SW_090_0000	

Basic Measures Description		Applicable
Key Directives		
BA	Bathing Waters Directive	Yes
BI	Birds Directive	Yes
HA	Habitats Directive	Yes
DW	Drinking Waters Directive	No
SEV	Major Accidents and Emergencies (Seveso) Directive	Yes
EIA	Environmental Impact Assessment Directive	Yes
SE	Sewage Sludge Directive	Yes
UW	Urban Waste Water Treatment Directive	No
PL	Plant Protection Products Directive	Yes
NI	Nitrates Directive	Yes
IP	Integrated Pollution Prevention Control Directive	Yes
Other Stipulated Measures		
CR	Cost recovery for water use	Yes
SU	Promotion of efficient and sustainable water use	No
DWS	Protection of drinking water sources	No
AB	Control of abstraction and impoundments	No
PT	Control of point source discharges	Yes
DI	Control of diffuse source discharges	Yes
GWD	Authorisation of discharges to groundwater	No
PS	Control of priority substances	Yes
MOR	Control of physical modifications to surface waters	Yes
OA	Controls on other activities impacting on water status	Yes
AP	Prevention or reduction of the impact of accidental pollution incidents	Yes

Date Reported to Europe: 22/12/2008

Date Report Created 04/11/2009

Urban and Industrial Discharges Supplementary Measures Report

WaterBody Category: Coastal Waterbody

WaterBody Name: Courtmacsherry Bay

WaterBody Code: IE_SW_090_0000

south
western
river basin district



	Point discharges to waters from municipal and industrial sources	Result
PINDDIS	Is there one or more industrial discharge (Section 4 licence issued by the local authority or IPPC licence issued by the EPA) contained within the water body?	Yes
PINDDISR	Are there industrial discharges (Section 4 licence issued by the local authority or IPPC licence issued by the EPA) that cause the receiving water to be 'At Risk' within the water body?	No
PB1	Basic Measure 1 - Measures for improved management.	No
PB2	Basic Measure 2 - Optimise the performance of the waste water treatment plant by the implementation of a performance management system.	No
PB3	Basic Measure 3 - Revise existing Section 4 license conditions and reduce allowable pollution load.	No
PB4	Basic Measure 4 - Review existing IPPC license conditions and reduce allowable pollution load.	No
PB5	Basic Measure 5 - Investigate contributions to the collection system from unlicensed discharges.	No
PB6	Basic Measure 6 - Investigate contributions to the collection system of specific substances known to impact ecological status.	No
PB7	Basic Measure 7 - Upgrade WWTP to increase capacity.	No
PB8	Basic Measure 8 - Upgrade WWTP to provide nutrient removal treatment.	No
PS1	Supplementary Measure 1 - Measures intended to reduce loading to the treatment plant.	No
PS2	Supplementary Measure 2 - Impose development controls where there is, or is likely to be in the future, insufficient capacity at treatment plants.	No
PS3	Supplementary Measure 3 - Initiate investigations into characteristics of treated wastewater for parameters not presently required to be monitored under the urban wastewater treatment directive.	No
PS4	Supplementary Measure 4 - Initiate research to verify risk assessment results and determine the impact of the discharge.	No
PS5	Supplementary Measure 5 - Use decision making tools in point source discharge management.	No
PS6	Supplementary Measure 6 - Install secondary treatment at plants where this level of treatment is not required under the urban wastewater treatment directive.	No
PS7	Supplementary Measure 7 - Apply a higher standard of treatment (stricter emission controls) where necessary.	No

Date Reported to Europe: 22/12/2008

Date Report Created 04/11/2009

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PS8	Supplementary Measure 8 - Upgrade the plant to remove specific substances known to impact on water quality status.	No
PS9	Supplementary Measure 9 - Install ultra-violet or similar type treatment.	No
PS10	Supplementary Measure 10 - Relocate the point of discharge.	No

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Date Report Created 04/11/2009

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SITE SYNOPSIS

SITE NAME: OLD HEAD OF KINSALE SPA

SITE CODE: 004021

The Old Head is a 5 km long headland formed of steeply inclined beds of rock. These show a cross section of the transition between the Devonian and Carboniferous periods and so have considerable interest from a geological point of view. The site comprises a section of the cliffs on the western side of the narrow isthmus leading to the Head. These are vertical rock cliffs providing optimum habitat for ledge nesting seabirds. Maritime grassland and heath occurs above the steep cliffs though part of this has now been converted to amenity grassland as a golf course. The cliff-top vegetation is characterised by such species as Autumn Gorse (*Ulex gallii*), Bell Heather (*Erica cinerea*), Bent Grasses (*Agrostis* spp.) and Heath Bedstraw (*Galium saxatile*), with Sea Campion (*Silene maritima*), Thrift (*Ameria maritima*), Wood Sage (*Teucrium scorodonia*) and Burnet Rose (*Rosa pimpinellifolia*) also present. The site includes a 500 m seaward extension, where the seabirds forage, rest and socialise.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Kittiwake and Guillemot.

The Old Head is the largest seabird colony on the south coast between the Bull Rock and the Saltee Islands. It supports nationally important populations of Kittiwake (951 pairs in 2001) and Guillemot (3,477 individuals in 2001), as well as smaller numbers of Fulmar (37 pairs), Shag (26 pairs), Herring Gull (11 pairs) and Razorbill (59 occupied sites). The populations of Kittiwake and Razorbill have declined since the late 1980s for reasons unclear but perhaps due to depleted prey stocks. Chough and Peregrine, which breed elsewhere on the Head, are regularly seen within the site. The seabird populations are well monitored. The site is a designated Refuge for Fauna.

7.9.2006

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Client: Cork County Council
Project Title: Garrettstown Sewerage Scheme
Document Title: Preliminary Report
Document Issue: 2

Date: June 2006
Project No.: C004256
Page No.: i



CORK COUNTY COUNCIL

GARRETTSTOWN SEWERAGE SCHEME

Preliminary Report

**Volume 1
Main Report**

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Water Services Capital
South Cork Rural
Cork Co. Council
County Hall,
Cork

White Young Green Ireland Ltd.,
Consulting Engineers,
Unit 14, Penrose Wharf,
Penrose Quay,
Cork

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CORK COUNTY COUNCIL

GARRETTSTOWN SEWERAGE SCHEME

Preliminary Report

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White Young Green Ireland Ltd.
Unit 14,
Penrose Wharf,
Penrose Quay,
Cork

Tel: 021 4861488

Fax: 021 4861489

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Prepared by:	N. O'Brien	N. O'Brien			
Approved by:	K Thornton	K Thornton			

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GARRETTSTOWN SEWERAGE SCHEME

PRELIMINARY REPORT

1.0 EXECUTIVE SUMMARY

1.1 Introduction

Cork County Council has appointed White Young Green Ireland Ltd. (WYG) to carry out a Preliminary Report for a proposed sewerage scheme for the coastal settlement of Garrettstown and to examine the feasibility of upgrading the sewerage system in the adjacent village of Ballinspittle and connecting it to the Garrettstown scheme. Currently there is no public collection system in Garrettstown. A recent housing development, Glor na dTonn, has its own separate collection system and a temporary wastewater treatment plant with treated effluent being discharged to a local stream. Remaining properties and caravan parks are served by individual septic tanks.

Ballinspittle has a combined foul and stormwater collection system which discharges to a septic tank which provides preliminary treatment of the wastewater.

Garrettstown has two popular bathing areas both of which currently hold Blue Flag status.

The locations of Garrettstown and Ballinspittle are shown in **Figure 1.1**.

The design year for which the scheme will be sized has been stated in the Brief as 2030.

1.2 Brief

The Brief for this Preliminary Report, in summary is to;

- Investigate the existing foul and storm drainage systems in Garrettstown and Ballinspittle;
- Investigate the existing wastewater treatment systems in Garrettstown and Ballinspittle;
- Make recommendations regarding the upgrading and extension of the sewerage and wastewater treatment infrastructure to meet the needs of Garrettstown and its environs to 2025;
- Assess the feasibility/cost effectiveness of connecting Ballinspittle to Garrettstown Sewerage Scheme;

This included;

- Reviewing the County and Local Area Development Plans and establishing the development objectives of Garrettstown and Ballinspittle villages and environs;
- Establishing the hydraulic and biological loading for the proposed wastewater treatment works;
- Reporting on the requirements for a sewage treatment works and submit recommendations for;

- i. The provision, as necessary, of primary screening, grit removal, storm overflows, primary settlement, energy efficient process design, laboratory facilities, landscaping, appropriate sludge treatment facilities and reuse proposals in accordance with the Local Authority's Sludge Management Plan. Mitigation of any environmental impacts including the impact of noise, odour and aerosols;
- ii. Appropriate wastewater treatment technology and its suitability to treat the wastewaters arising in Garrettstown and Ballinspittle villages;
- iii. Modifications to the existing works (in Ballinspittle) to facilitate their integration into a coordinated plant for long term operation, if appropriate;

Following a meeting with Cork County Council on 7th December 2005, the scope of the brief was extended. It was agreed, because of current development proposals, that White Young Green Ireland Ltd. should also;

- Assess the potential for development at the Old Head of Kinsale;
- Assess the potential of adding in foul gravity flows from the Old Head of Kinsale.

The recommended improvements will be in full compliance with the requirements of;

- Environmental Protection Agency Act, 1992 (Urban Waste Water Treatment) Regulations, (S.I. 254 of 2001) implementing EC Directive 91/271/EEC concerning Urban Wastewater Treatment;
- Department of the Environment, Heritage and Local Government "Procedures and Criteria in relation to Storm Water Overflows" following on from the EU Urban Waste Water Directive;
- BS 6297:1983 – British Standard for Small Sewage Treatment Works;
- The Water Research Centre – Sewerage Rehabilitation Manual;
- Department of the Environment, Heritage and Local Government Circular Letter L6/94, concerning Sludge Treatment;
- The Phosphate Regulations, SI258 of 1998;
- Circular L16/02 on Water Services Pricing Policy;
- Circular L10/01 on public Private Partnership;
- EC (Use of sewage sludge in agriculture) Regulations (S.I. No. 148 of 1998 and S.I. No. 267 of 2001);
- The Irish National Sludge Strategy and the Cork County Sludge Management Plan;
- The European Communities (Quality of Bathing Water) Regulations S.I. No. 84 of 1998, S.I. No. 155 of 1992 and S.I. No. 145 of 1994 implementing EC

Directive 76/160/EEC concerning the Quality of Bathing Water and other relevant Statutory Instruments;

- The European Communities Shellfish Directives (91/492/EEC and 91/493/EEC);
- European Communities (Quality of Salmonid Waters) Regulations (S.I. 293 of 1998);
- Other National and EU legislation where applicable e.g. Waste Management Act 1996, National Monuments Act 1994, Foreshore Act 1933, the Planning Acts, Legislation on Archaeology, N.H.A.'s, S.A.C's and S.P.A.'s.

A copy of the Brief is included in **Appendix A**.

Levels

All levels referred to in this report relate to Malin Head Ordnance Datum.

SI Units

Both imperial and metric measurements are given in this report. The imperial unit is used to specify the diameter of older sewers.

1.3 Structure of Report

Chapter 2 contains a description of the main elements of the **existing** Ballinspittle and Garrettstown **sewerage schemes**.

Chapter 3 contains details of the **receiving water quality** for the existing Ballinspittle Sewerage Scheme and the proposed Garrettstown Sewerage Scheme.

Chapter 4 contains details of the **data collection** used to assess the current and future flows and loads in Ballinspittle and Garrettstown.

Chapter 5 contains details of the **existing flows and loads** in Ballinspittle and Garrettstown. The details are summarised as follows;

		Winter	Summer
Ballinspittle	PE	351	349
	Flow (m3/day)	63.3	62.9
Garrettstown	PE	201	1,231
	Flow (m3/day)	36.1	221.5

Chapter 6 reviews a number of methodologies for predicting growth in demand between 2005 and 2025. Taking into account the likely growth in the various demand sectors, it estimates the **ultimate flow and loads for the year 2025** is as follows;

		Winter	Summer
Ballinspittle	PE	862	860
	Flow (m3/day)	155.3	154.9
Garrettstown	PE	417	1,540
	Flow (m3/day)	75.0	277.2

Chapter 7 details the assessment of the current Ballinspittle sewerage collection system based on CCTV, Flow, Load & Impermeable Area Surveys.

Chapter 8 assesses the options for the location of the proposed wastewater treatment plant (WWTP) site. Site 3 adjacent to the Pitch & Putt Club is the preferred location for the WWTP on environmental, engineering and economic grounds.

Chapter 9 looks at the sensitivity of receiving waters and proposed options for outfalls. Bullen's Bay is the location of the preferred outfall.

Chapter 10 contains details on the proposed collection system including a gravity sewer from the Old Head of Kinsale and the possibility of a connection to Ballinspittle.

Chapter 11 discusses the Value Engineering exercise that was completed for a new sewerage scheme for Garrettstown and Ballinspittle. The final recommendations were as follows;

- Combined WWTP for Ballinspittle and Garrettstown;
- Combined Wastewater treatment plant for Garrettstown and Ballinspittle near Bullen's Bay;
- Short sea outfall with UV disinfection;
- Outfall to Bullen's Bay.

Chapter 12 looks at the **environmental considerations** taken into account in the preliminary design of the Garrettstown Sewerage Scheme.

Chapter 13 contains details of the treatment of the wastewater. A Sequence Batch Reactor (SBR) type activated sludge type waste water treatment plant is recommended.

Chapter 14 summarises the recommendations for the Garrettstown Sewerage Scheme.

Chapter 15 reviews the capital and all in cost of the proposed work based on detailed estimates in Appendix L. The costs are further separated into those associated with Garrettstown and Ballinspittle.

Chapter 16 makes recommendations for the **operation and maintenance strategy** for the proposed scheme.

1.4 Summary of Works

The following is a summary of the recommended works for the Scheme:-

GARRETTSTOWN

- Provision of approximately 6,230m of 225mm diameter precast concrete (PCC) gravity sewer with associated manholes;
- Provision of approximately 1,640m of 100mm diameter ductile iron rising main with associated chambers;
- Provision of Pumping Station No 1 north of 'Glor na dTonn' with a pumping rate of 7.43l/s for Garrettstown only flows;
- Provision of Pumping Station No 2 adjacent to Garrettstown Strand public toilets with a pumping rate of 12.19l/s for Garrettstown only flows ;
- Provision of Pumping Station No.3 adjacent to Pitch + Putt Club with a pumping rate of 29.74l/s for Garrettstown only flows ;
- Provision of Pumping Station No 4 adjacent to Bullen's Bay with a pumping rate of 7.39 l/s ;
- Provision of a Waste Water Treatment Plant at Site No. 3, near Garrettstown Pitch& Putt Club to serve a Phase 1 PE of 1,600 with provision for the extension of the plant to treat an ultimate PE of 2,200 as Phase 2;
- Provision of approximately 1,560m of a 250mm diameter outfall pipe from the proposed waste water treatment plant to Bullen's Bay.

BALLINSPIITTE

- Provision of a Pumping Station at the site of the existing septic tank;
- Decommissioning of the existing septic tank;
- Provision of approximately 250m of 225mm diameter precast concrete(PCC) gravity sewer and associated manholes;
- Provision of approximately 790m of 100mm diameter ductile iron rising main and associated chambers.

1.5 Summary of Costs

The following is a summary of the cost estimate for the recommended works.

Description	Amount (€)
Garrettstown Collection System	2,314,839
Ballinspittle Collection System	331,875
Wastewater Treatment Plant	1,346,125
Outfall	1,403,719
Sub-total	5,396,558
VAT @ 13.5%	728,535
Total Contract Costs	6,125,093
Non-Contract Costs	1,070,200
Overall Total	7,195,293

1.6 Recommendations

It is recommended that the works described in this report and summarised in Section 1.4 above are carried out in order to provide a sewerage scheme for Garrettstown and allow for future flows and compliance with modern design criteria and the relevant bathing water and blue flag beach standards. It is also recommended that the sewerage flows from Ballinspittle be pumped forward for treatment to the proposed Garrettstown WWTP. The estimated capital cost of the recommendations is **€6,125,093 inclusive of VAT**

2.0 DESCRIPTION OF EXISTING SCHEME IN GARRETTSTOWN AND BALLINSPITTLE

2.1 Garrettstown

Garrettstown is a coastal settlement and holiday resort, located approximately 3 kilometres to the south of the village of Ballinspittle 8 kilometres to the south west of Kinsale and 35 kilometres to the south-west of Cork City.

Garrettstown Strand and White Strand lie on the western end of the settlement and Bullen's Bay to the east. Garrettstown is a popular holiday resort and day trip location which is particularly busy during the summer months. Garrettstown is situated within an extensive area of designated landscape. The regional road, the R604, which runs through Garrettstown, is designated scenic route.

Garrettstown has a convenience shop, public houses, a nursing home, pitch and putt club, tennis courts, recycling facilities and other facilities within the settlement which support the tourist industry. There are also caravan facilities, self-catering accommodation and bed and breakfast accommodation in the area.

Amenities in the area include the two blue flag beaches of Garrettstown Strand and White Strand, associated beach walks and the proposed Natural Heritage Areas of Kilcolman Bog/Garrylucas Marsh, Garrettstown Marsh and The Old Head of Kinsale headland. The designated areas are shown on **Figure 2.1**. There are public car parking facilities available at both beaches.

Currently there is no public sewerage system in Garrettstown. A recent housing development, "Glor na dTonn", has its own separate foul sewer collection system and associated temporary wastewater treatment plant with treated effluent being discharged to a local stream that outfalls to Garrettstown Strand. This is a temporary measure until a public foul sewerage system is in operation. Remaining properties and caravan parks are served by individual septic tanks. There are public toilets located adjacent to both Garrettstown Strand and White Strand. Refer to **Photograph 2.1** and **2.2** for details. The extent of the existing infrastructure in Garrettstown is shown in **Figure 2.2** in Appendix A.



Photograph 2.1 View of Garrettstown toilets looking East



Photograph 2.2 Stream outfall to Garrettstown Strand. View looking East

2.2 Ballinspittle

Ballinspittle is located approximately 7 kilometres to the south-west of Kinsale, 13.5 kilometres to the south-east of Bandon and 34.5 kilometres to the south-west of Cork City. A stream flows southward through the village and onwards to Garrettstown Strand.

Ballinspittle is a well-established village with an attractive streetscape and a number of important community facilities including a primary school, church, garda station, public houses, supermarkets, post office, health centres, petrol station, agricultural, co-operative, other retail services, play school, bed and breakfast, garage, GAA pitches and tennis court.

Ballinspittle is served by a combined foul and stormwater collection system and a septic tank with an estimated capacity of 105 pe. The septic tank provides only preliminary treatment, reducing Biological Oxygen Demand (BOD) by approximately 20-30%. It also has little effect in reducing the number of coliforms in the water. The overflow from the septic tank inlet discharges unscreened flows directly to Ballinspittle River. The septic tank is overloaded at present as the current load from Ballinspittle is estimated at 351 pe.

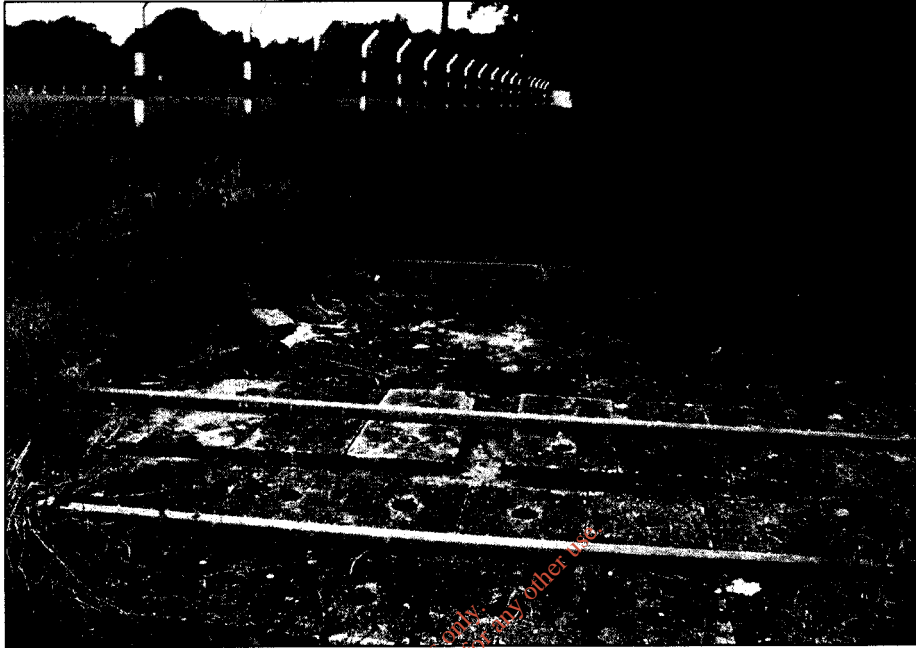
From Ballinspittle this river flows southwards to Courtmaksherry Bay via the Blue Flag Beach at Garrettstown Strand. The river often has a low flow and it has been reported that on a number of occasions there have been problems with the pollution of the river which consequently affects the Blue Flag status of Garrettstown Strand. The existing collection system in Ballinspittle is shown in **Figure 2.3** in Appendix A.

2.3 Existing Collection System

The existing Ballinspittle sewerage network is managed by the Kinsale Area office. The public water network in the area is also managed via the Kinsale Area office. The existing sewerage system in Ballinspittle is combined.

While there is no accurate date of the construction of the existing sewerage collection system, it is believed to date back to the early 1950's. The existing combined sewerage network comprises one catchment. Cork Co. Council provided a copy of a drawing of Ballinspittle Drainage, (dated June 1950), that indicates 17 manholes, approximately 928m of 9" (225mm) diameter sewers, and a reinforced concrete septic tank. The catchment is drained by gravity to a septic tank located within the GAA grounds.

The septic tank comprises a twin cell chamber with internal dimensions per cell of 5' (1.5m) wide and 15' (4.6m) long with sloping floors, rising in the direction of flow, giving a cell depth ranging from 10' (3m) to 7'7 1/2" (2.3m). The flow is divided into two streams in the inlet chamber upstream of the septic tank. The inlet chamber contains a side weir overflow to discharge flows in excess approximately 100mm depth to the adjacent stream. The overflow is unscreened. Downstream of the septic tank the effluent flows through two channels and a 9" (225mm) diameter pipe to an adjacent percolation area and onwards to the adjacent Ballinspittle River that flows south to Garrettstown Strand. Refer to Photograph 2.3 for a view of the existing septic tank.



Photograph 2.3 Ballinspittle Septic Tank

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3.0 RECEIVING WATER QUALITY

3.1 General

Currently effluent from the septic tank serving Ballinspittle Sewerage Scheme discharges to a percolation area adjacent to Ballinspittle River. The river flows to Courtmacsherry Bay via the blue flag beach at Garrettstown Strand. In addition effluent from the septic tank serving the public toilets adjacent to Garrettstown Strand discharges to a local stream, known as Garrettstown Stream which similarly flows to Courtmacsherry Bay via Garrettstown Strand.

3.2 Discharge Standards

There are a number of regulations that govern the quality of receiving waters (sea water and freshwater), in Ireland. The relevant documents that must be complied with are as follows;

- Urban Wastewater Treatment Regulations 2001(SI No 254 of 2001);
- Local Government (Water Pollution) Act, 1977 (Water Quality Standards for Phosphorus Regulations 1998(SI No 258 of 1998);
- Water Quality (Dangerous Substances Regulations) 2001(S.I. No 12 of 2001).
- Freshwater Fish Directive(78/659/EEC);
- Surface Water Directive(75/440/EEC) as implemented by SI 294 of 1989;
- Bathing Water Directive(76/160/EEC) as implemented by SI No 177 of 1998;
- Nitrates Directive (91/676/EEC) 1991.

Urban Waste Water Treatment Regulations

The treated effluent from the proposed wastewater treatment plant and discharging to coastal waters of Bullen's Bay will have to comply with the

- Urban Waste Water Treatment Regulations, (S.I. 254 of 2001) which implement Urban Wastewater Treatment Directive (21/271/EEC).

These regulations cover various requirements in relation to the collection and treatment of urban wastewater. The primary functions of implementing the regulations will be the responsibility of Cork County Council.

The relevant Clauses of the above regulations, applicable to Garrettstown Sewerage Scheme are as follows:

Collection System

"Article 3(1) Subject to sub-articles (2) and (3) a sanitary authority shall provide a collecting system for urban waste water - (c) by 31 December 2005 for every agglomeration with a population equivalent between 2,000 and 15,000."

The population equivalent of Garrettstown and Ballinspittle are each currently less than 2,000.

Although as stated in Chapter 2, Ballinspittle Village is currently served by a collection system and septic tank that is currently overloaded, there is no statutory requirement under the Regulations to upgrade the collection system.

Waste Water Treatment

"Article 7. A sanitary authority shall ensure by 31 December 2005, that urban waste water entering a collection system shall before discharge be subject to appropriate treatment in the following cases:-

- (a) In respect of discharges to freshwater and estuaries from agglomerations with a population equivalent of less than 2,000;
- (b) In respect of discharges to coastal waters from agglomerations with a population equivalent of less than 10,000."

The proposed outfall from Garrettstown Sewerage Scheme will discharge to coastal waters and therefore, a waste water treatment plant providing appropriate treatment shall be required.

"Appropriate Treatment" as defined by the UWWTF and UWWTD means treatment of urban waste water by any process and/or disposal system which after discharge allows the receiving waters to meet the relevant quality objectives and the relevant provisions of the UWWTD and of other Community Directives.

Therefore the proposed Garrettstown WWTP will consist of preliminary treatment and secondary treatment to achieve a minimum effluent standard as set out in Table 3.1 below.

Table 3.1 Treated Effluent Characteristics

Parameter	Concentration	Minimum / Maximum
BOD ₅	25 mg/l O ₂	70-90
COD	125 mg/l O ₂	75
Total Suspended Solids	35 mg/l	90

Local Government (Water Pollution) Act, 1977 (Water Quality Standards for Phosphorus Regulations 1998(SI No 258 of 1998)

The Local Government (Water Pollution) Act 1977 (Water Quality Standards for Phosphorus) Regulations 1998(SI No. 258 of 1998) were introduced to counter eutrophication observed throughout Irish watercourses and also to comply with the 1976 Dangerous Substances Directive.

The Phosphorus Regulations (S.I. No. 258 of 1998) set Quality Standards for rivers based on their existing EPA, Biological Quality Rating (Q Index) or to the concentration of molybdate-reactive phosphate (MRP) although the Q-rating is seen as a better indicator of long term water quality than the MRP. No deterioration in water quality is allowed. These new standards must be met by 31st December 2007. The target values are as indicated in the **Table 3.2** below;

Table 3.2 Phosphorus Regulations Target Values

Existing Q-Value	Target Q-Value	Target MRP (Qg/l)
5	5	15
4/5	4/5	20
4	4	30
3/4	4	30
3	3/4	50
2/3	3/4	50
<2	3	70

Water Quality (Dangerous Substances Regulations) 2001 (S.I. No 12 of 2001)

The Water Quality (Dangerous Substances Regulations) 2001(S.I. No 12 of 2001) apply to, the licensing of new trade and sewerage effluents and to the review of existing licenses granted under Section 4 and Section 16 of The Local Government (Water Pollution) Act (No 1, 1977). Any new licenses granted by Cork County Council or the Environment Protection Agency (EPA) will need to comply with the requirements of these regulations.

Cork County Council confirmed that only one discharge license granted of late is in Ballinspittle. The license is for the treated effluent from a 17 unit housing development with its own private treatment plant and reed bed. In Garrettstown there two discharge licenses have been granted. One accounts for the treated effluent from the 18 unit housing development of Glor na dTonn. The other license is for the redevelopment of Coakley's Atlantic Hotel. The redevelopment has recently been awarded full planning permission.

Freshwater Fish Directive

Council Directive 78/659/EEC 1978 on the quality of fresh waters needing protection in order to support fish life was given effect in Ireland through the EC (Quality of Salmonid Waters Regulations) 1988(SI No.293 of 1988).

Garrettstown Stream has not been designed as a salmonid river under the 1988 Salmonid Regulations and so there are no further refinements of the treated effluent characteristics listed in **Table 3.1** above arising from the Freshwater Fish Directive.

Surface Water Directive

As water is not abstracted from Garrettstown Stream, Council Directive 75/440/EEC 1975 and the associated EC (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations 1989 (SI No 294 of 1989) are not applicable. Therefore, there are no further refinements of the treated effluent characteristics listed in **Table 3.1** above arising from the Surface Water Directive.

The European Communities (Quality of Bathing Water) Regulations 1992 (SI No.155 of 1992), S.I. No. 155 of 1992 and S.I. No. 145 of 1994 implementing EC Directive 76/160/EEC concerning the Quality of Bathing Water and other relevant Statutory Instruments

The relevant clause of the Quality of Bathing Waters Regulations and amendments (S.I No's. 155 of 1992, 145 of 1994, 230 of 1996 and 177 of 1998), give further effect to the Bathing Water Directive as follows: -

"Article 3 (1) Waters in which bathing is practised at the bathing areas specified in the First Schedule shall meet the quality standards specified in the Second Schedule on the basis of and subject to the conditions so specified."

The First Schedule of these regulations lists the beaches at Garrettstown and White Strand at Garrylucas as Bathing Areas. This means that the bathing water quality standards specified in the Second Schedule, Part 1 of these regulations in terms of bacterial levels are applicable to Garrettstown Strand and White Strand.

The "Blue Flag" scheme is a voluntary scheme administered in Ireland by An Taisce and at the European Level by the Foundation for Environmental Education in Europe (FEEE). The Environmental Protection Agency (EPA) co-operates with this agency to check all water quality samples obtained by An Taisce and participates in the National "Blue Flag" Jury, which assists in the initial assessment of the Irish applicants for the "Blue Flag" award by FEEE.

To receive a Blue Flag, a bathing area in addition to maintaining a higher standard of water than the Bathing Water Quality Standards, must also meet specified objectives with regard to the provision of safety services and facilities, environmental management of the beach area and environmental education. The Blue Flag Scheme and the Bathing Water Quality Standards that are applicable to Garrettstown Strand and White Strand are as follows;

Table 3.3 Bathing Water and Blue Flag Beach Water Quality Standards

Parameter	Total Coliforms (No/100 ml)	Faecal Coliforms (No/100 ml)	Faecal Streptococci (No/100 ml)	Enteroviruses
Bathing Water Standards	80% < 5,000 95% < 10,00	80% < 1,000 95% < 2,000	95% < 300	95% - 0 (PFU/10)
Blue Flag Standards	500	100	100	0 (No/100 ml)

The influences on bathing water quality are complex and site specific and can be due to a number of factors such as;

- Presence of storm overflows;
- Animal & Bird Life e.g. the influence of dogs and other animals has led to dog bans on beaches during the summer months. Grazing sheep have caused problems at a beach in North Devon, UK. Several studies have shown that gulls have a potential to cause bacterial contamination. This has been shown through studies near Wakefield (UK), Lancaster and in the Strathclyde Area;

- Surface water discharges to bathing areas. These are polluted, for example, due to wrong/illegal connections to surface water sewers, or other diffused sources of pollution;
- Other Anthropogenic sources e.g. the nature of the water body in the bathing area and the disturbance of sediment with the change in tidal regime in the spring / neap cycle present different conditions within the bathing area. These conditions can lead to an ever changing arrangement of mudflats and fine sand which provide an effective obstacle to penetration of bacteria by natural sunlight and hence the bacterial decay rates can be greater than 24 hours compared to 6-9 hours in most conditions.

Nitrates Directive

Council Directive 91/676/EEC (The Nitrates Directive) 1991 is concerned with the protection of waters from pollution caused by nitrates from Agricultural Sources. Under Ireland's implementation of the Nitrates Directive the whole country has been designated as a Nitrate Vulnerable Zone.

With regard to surface waters, 'sensitive waters' are identified as waters with nitrate levels in excess of the Maximum Allowable Concentration (MAC) of 11.3mg/l of Nitrogen as specified in the Surface Water Directive (75/440/EEC).

3.3 Water Quality, Chemistry and Biology

3.3.1 Cork County Council Monitoring Programme

Cork County Council's Water Quality Laboratory is based in Inniscarra, Co. Cork. Monitoring of the quality of the water in Garrettstown Stream (adjacent to the Garrettstown Strand public toilets) and at Garrettstown Strand is carried out by the laboratory to check compliance with the Quality of Bathing Water Regulations (1992) and its relevant amendments and the Blue Flag Beach Scheme. Data was available for 24th June 2004 for Garrettstown Stream and between May and August 2004 for Garrettstown Strand. The available data is tabulated in Table 3.4 and Table 3.5 as follows;

Table 3.4 Coliform Levels in Garrettstown Stream

Parameters	Unit	20/06/04
Total Coliforms	MPN/100ml	61,300
Faecal Coliforms	no/100ml	27,500
Faecal Streptococci	no/100ml	No data

Table 3.4 2004 Water Quality at Garrettstown Strand

Parameter	Unit	12/05	20/05	09/06	23/06	07/07	22/07	04/08	17/08	31/08
Total Coliforms	MPN/100ml	35	6	5	10	2	60	28	5	20
Faecal Coliforms	no/100ml	25	1	10	6	1	0	33	3	8
Faecal Streptococci	no/100ml	58	10	40	50	10	120	155	5	30

The available data for Garrettstown Stream would indicate that the Total Coliform and Faecal Coliform levels recorded in the stream were outside the requirements of the Bathing Water and Blue Flag Quality Standards. All the recorded Coliform levels in the samples taken from water at Garrettstown Strand were within the Blue Flag Scheme standards.

Although, an unacceptable Blue Flag level of Faecal Streptococci was recorded on two occasions in July and August 2004, the level was still within the allowable standards set for Bathing Water Quality.

However, the exceedances coincide with the peak tourist season when there is the highest level of usage of the welfare facilities at Garrettstown Strand and the lowest flow in the stream when the assimilative capacity of the stream is not sufficient to dilute the effluent to the required blue flag standards.

3.3.2 EPA Monitoring Programme

The quality of rivers and streams is routinely monitored by the EPA as part of a Biological River Quality Monitoring Programme. In addition, many of the rivers and streams are monitored for physio-chemical parameters by this agency or by local authorities. The EPA publishes the results of these surveys. The data presented in this section is taken from biological and physio-chemical survey reports published by the EPA. The report used is:

- Interim Report on the Biological Survey of River Quality- Results of the 2003 Investigations

The results of the biological surveys (i.e., macroinvertebrate, macrophyte and algal species list) are condensed into a format readily understandable by non-biologists. They are presented as a scale of biotic indices ("Biological Quality Ratings" or "Q Values") ranging from Q5 to Q1 with intermediate values also (i.e., Q1-2, Q2-3, Q3-4 etc).

The Q5 value represents pristine unpolluted condition whereas Q1 represents grossly polluted conditions. In the interests of simplicity the nine-point scale of Q Values may be related to four "Quality Classes" as shown in **Table 3.5** below;

Table 3.5 – River Quality Classes

Quality Ratings	Quality Class	Pollution Status	Condition (re beneficial uses)
Q5, Q4-5, Q4	Class A	Unpolluted	Satisfactory
Q3-4	Class B	Slightly polluted	Unsatisfactory
Q3, Q2-3	Class C	Moderately polluted	Unsatisfactory
Q2, Q1-2, Q1	Class D	Seriously polluted	Unsatisfactory

The general characteristics of the various quality classes are given in **Table 3.6** below.

Table 3.6 – General Characteristics of various Biological Quality Classes

Quality Classes	Class A		Class B	Class C		Class D
	Q5	Q4	Q3-4	Q3	Q2	Q1
Quality Ratings (Q)						
Pollution status	Pristine, Unpolluted	Unpolluted	Slight pollution	Moderate pollution	Heavy pollution	Gross pollution
Organic waste load	None	None	Light	Considerable	Heavy	Excessive
Max. BOD	Low (<3 mg/l)	Low (<3 mg/l)	Occasionally elevated	High at times	Usually high	Usually very high
Dissolved oxygen	Close to 100% at all times	80-120%	Fluctuates from <80% to >120%	Very unstable Potential fish kills	Low, sometimes zero	Very low, often zero
Annual median Ortho-Phosphate	0.015 mg P/l	0.03 mg P/l	0.045 mg P/l	0.070 mg P/l	>0.1 mg P/l	>0.1 mg P/l
Siltation	None	May be light	May be light	May be considerable	Usually heavy	Usually very heavy and anaerobic
Water quality	Highest quality	Fair quality	Variable quality	Doubtful quality	Poor quality	Bad quality
Abstraction potential	Suitable for all	Suitable for all	Potential problems	Advanced treatment	Low grade abstractions	Extremely limited
Fishery potential	Game fisheries	Good game fisheries	Game fish at risk	Coarse fisheries	Fish usually absent	Fish absent
Amenity value	Very high	High	Considerable	Reduced	Low	Zero
Condition	Suitable for all	Suitable for all	Considerable	Unsatisfactory	Unsatisfactory	Unsatisfactory

Ballinspittle River

Ballinspittle River is monitored by the EPA. The monitoring station is located in Catchment 20, at Ballinspittle Bridge (OS Grid Reference X158719 Y46103) which is approximately 450m upstream from the septic tank and from where grab samples were taken in November and December 2005. The Biological Quality Rating for the Ballinspittle Station between 1989 and 2003 is available on the EPA website (www.epa.ie). This shows a Q value of 4, which is classed as unpolluted water, suitable for all uses. Chemical Data is available for the period 1998-2000 and is detailed in Table 3.7 below.

Table 3.7 Chemical Data for Ballinspittle River (1998-2000)

PARAMETER	Parameter Units	Minimum	Median	Maximum	No of Samples
BOD	mg/l O ₂	0.7	0.7	0.7	1
Dissolved Oxygen	mg/l O ₂	9.9	11.1	12.2	2
Dissolved Oxygen	% Saturation	99	111	122	2
Ortho Phosphates	mg/l P	0.1	0.03	0.04	4
pH	pH	7.8	7.8	7.8	1
Temperature	°C	9	15.9	16	3
Total Ammonia	mg/l N	0.02	0.03	1.2	4
Un-ionised Ammonia	mg/l NH ₃	0	0	0	1

3.3.3 Other Sampling

3.3.3.1 Ballinspittle River -Precision Industrial Services Limited

Precision Industrial Services Limited (PIS) carried out water sampling of the Ballinspittle River, immediately upstream of the septic tank serving Ballinspittle Sewerage Scheme. The water sampling was carried out on a weekly basis during the course of the Flow, Load, Rainfall and Impermeable Area Survey. Samples were taken for analysis on five dates between 18th November 2005 and 15th December 2005. The results for the parameters tested are as detailed in Table 3.8 below.

Table 3.8 PIS Water Sampling Results for Ballinspittle River

Test Description	Units	17/11/05	18/11/05	18/11/05	21/11/05	21/11/05	21/11/05	21/11/05	21/11/05	21/11/05
BOD	mg/l	2	<1	1	<1	2	16	<1	<1	11
DO	mg/l	<0.5	<0.5	6.7				-	8.5	4.9
CO ₂ (total)	mg/l	<20	<20	20				<20	<20	436
Suspended Solids	mg/l	4	2	<2	5	9	516	2	8	484
Ortho Phosphates	mg/l	0.7	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
pH		7.9	7.5	7.8	7.7	7.9	12.3	8.1	7.8	12.1
NH ₃	mg/l	<0.1	<0.1	0.1				<0.1	<0.1	<0.1
NH ₄	mg/l	10.1	9.1	9.1				9.3	10	9.5
Free Ammonia	mg/l				<0.1	<0.1	<0.1			

The results indicate that there are a number of incidences when the Chemical Oxygen Demand concentration and the Suspended Solids concentration of the river are exceeding the concentrations set out in Part 1 of the Second Schedule of the Urban Waste Water Treatment Regulations 2001(SI 254 of 2001).

3.3.3.2 Bullen's Bay-AWN Consulting Limited

AWN Consulting Limited carried out water sampling in Bullen's Bay on 6th August 2002 as part of a report for Cork County Council entitled, 'Assessment of Bullen's Bay, Garrettstown as a Receiving Water for Treated Effluent'.

Eight (8) samples (A-H) of seawater were taken in a V formation moving out from the shore and tested for BOD₅, Nitrate (NO₃), Suspended solids, Ammonium (NH₄); Phosphorus (P); Total Coliforms and E. Coli. Grab samples were also taken at the same locations and tested for PH, dissolved oxygen and temperature. The seawater at Bullen's Bay is not designated as bathing area or being sensitive for shellfish. However, it has pier and boating activity associated with it. Therefore, the Bathing Water Standards are the most onerous regulations that apply to Bullen's Bay.

The results of the water sampling and grab sampling for the parameters tested are shown in Table 3.9 below and indicate that the general water quality is high.

Table 3.9 AWN Water Sampling Results for Bullen's Bay

Parameters	Units	A	B	C	D	E	F	G	H
BOD	mg/l	<1	<1	<1	<1	<1	<1	<1	<1
Dissolved Oxygen	mg/l	11.47	10.78	12.03	11.87	11.03	11.65	12.23	11.97
Suspended Solids	mg/l	<4	<4	<4	<4	<4	7	<4	145
Ortho Phosphates	mg/l	0.203	0.203	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
pH		7.97	8.13	8.45	8.45	8.26	8.35	8.01	8.23
Ammonia	mg/l	0.55	0.46	0.5	0.52	0.65	0.531	0.624	0.554
Nitrate	mg/l	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1
E.Coli	MPN/100mls	200	22	17	5	1	1	1	1
Total Coliforms	MPN/100mls	200	22	17	5	1	1	1	1
Temperature	°C	17.8	18.2	17.4	17.1	17.4	15.3	16.8	16.6

Sample H shows an exceedance of the allowable suspended solids concentration.

3.3.3.3 Hydrographic Surveys Limited

Hydrographic Surveys Limited, as part of their brief for a hydrographic survey of Bullen's Bay, took water samples from Bullen's Bay. Three samples were taken from the shore on 28th July 2005 and a further 2 samples were taken offshore on 10th August 2005. The results of the water sampling for the parameters tested are shown in Table 3.10 below.

Table 3.10 Hydrographic Surveys Water Sampling Results for Bullen's Bay

Ref	Units	4128L1 Bullen's Bay 1 28/07/2005	4128L2 Bullen's Bay 2 28/07/2005	4128L3 Bullen's Bay 3 28/07/2005	4128L4 Bullen's Bay 4 10/08/2005	4128L5 Bullen's Bay 5 10/08/2005
BOD (Saline Water)	mg/l	5	3	6	<2	<2
Suspended Solids	mg/l	38	18	7	<5	5
Orthophosphate (Saline Water)	ug/l	6	<5	14	<5	<5
pH (Saline Water)		8.1	8.1	8.1	8.1	8.2
Salinity	ppt	31.6	33.1	31.7	33.8	33.9
Chloride (Cl)	mg/l	17,874	18,827	17,717	19,413	20,039
Ammonia (Saline Water)	ug/l	43	9	93	6	6
Nitrate (Saline Water)	ug/l	<22	<22	806	<22	<22
Nitrite (Saline Water)	ug/l	<16	<16	<16	<16	<16
Colour (Filtered) True	HAZEN	<15	<15	<15	<15	<15
Turbidity	N.T.U.	7.7	7.9	1.8	0.7	0.7
E.Coli Count	MPN/100mls	64	70	34	2	<1
Enterococci (Intestinal) water	CFU/100mls	800	148	340	2	0
Total Coliform Count- Colilert	MPN/100mls	517	86	248	20	13
Colour (Filtered) True	HAZEN	12	8	7	-	-

The measured total coliform numbers are all within the standards of the Bathing Water Regulations.

4.0 DATA COLLECTION

4.1 Background

In this Section the information used to determine the current and future population, together with the commercial/ industrial loads of the study area is identified.

4.2 Sources of Information

The following relevant information was obtained to assist in the assessment of the current and future flows and loads sources:-

- Commercial rates list;
- Water meter readings;
- 2002 Central Statistics Office(CSO) Census Reports and relevant publications of the CSO;
- 2003 Cork County Development Plan;
- Bandon Electoral Area Draft Local Area Plan and Adopted Amendments;
- An Post Geo-Directory;
- Cork Area Strategic Plan(2001-2027);
- National Spatial Strategy;
- CCTV, Flow, Rainfall and Impermeable Area Surveys;
- Previous Reports;
- Statutory Bodies.

4.3 Commercial Rates List

The Rates Department of Cork County Council supplied a list of all of the commercial enterprises in the study area. This list does not distinguish between enterprises that do and do not use water and/or produce effluent. However, water users and effluent producers can be determined from an inspection of the type of enterprise and from site visits where required. The Commercial Rates List is included in **Appendix C**.

4.4 Water Meter Readings

Water meter readings, both bulk and individual customer readings, were obtained from the local water Curator for the period September 2003 to September 2004. Customer water meter readings indicate the volume of water used by individual customers but cannot always be correlated to effluent load to the existing sewerage collection systems as many customers are served by private septic tanks. Meter readings are also used to examine the variation in water usage over the year. Water meter readings are included in **Appendix C**.

4.5 2002 CSO Census Reports

CSO census figures are published for towns and District Electoral Divisions (DED's). Garrettstown is located within three DED's. Ballinspittle is located in two DED's. Refer to **Figure 4.1** in Appendix A for details. The 2002 CSO Census Report was used to determine the 2002 populations in the study areas and to assess the variation in population over previous years. Current household occupancy rates were also obtained from this Report. The CSO publications, "Population and Labour Force Projections 2006-2036", and "Regional Population Projections 2006-2021", were used in the assessment of future population growth trends in the study areas.

4.6 County Cork Development Plan 2003

The 2003 County Cork Development Plan was studied to determine overall development policy in the Garrettstown and Ballinspittle areas and to assess likely impact of this policy on the population trends.

4.7 Bandon Electoral Area Draft Local Area Plan January 2005 (BEADLAP)

BEADLAP, together with the adopted amendments (Sept. 2005) were examined to determine the specific development objectives for Ballinspittle and Garrettstown. The Local Area Plan development boundary approximates to 21.0 hectares for Ballinspittle and 33.6 hectares for Garrettstown. The areas zoned for residential development in the BEADLAP were checked to determine their ability to accommodate the estimated growth to 2030 (see Section 6.7).

4.8 An Post Geo-Directory

The March 2005 An Post Geo-Directory gives the location of all postal addresses in the Garrettstown and Ballinspittle areas. It also differentiates between residential and commercial addresses. Using the An Post Geo-Directory it is possible to count the number of residential and commercial properties within a defined boundary.

4.9 Cork Area Strategic Plan (2001-2021)

The Cork Area Strategic Plan 2001 – 2021 (CASP) was adopted by Cork City Council and Cork County Council in October 2001 as a framework to enable Cork to become a leading European city region. It was in response to a Government supported European wide initiative to create a sustainable approach to social and economic development. CASP was produced in advance of the National Spatial Strategy.

According to the CASP report, development in the Coastal Zone should be limited to essential needs, such as for fisheries and agriculture. Any tourist or housing developments should be located within or close to existing settlements. In all cases, any development should be well sited in relation to the topography, landscape or townscape setting and meet the highest standards of design and materials.

4.10 National Spatial Strategy 2002-2020

The National Spatial Strategy 2002-2020(NSS) looks at the overall strategy for Ireland until 2020. Outside of Dublin the main cities/gateways are identified as Cork, Galway, Limerick and Waterford. Further development and growth of these gateways and their surrounding regions is forecast so that they can help to counterbalance Dublin and also enrich the various towns, villages and rural areas in their hinterlands.

4.11 CCTV/ Flow, Rainfall and Impermeable Area Surveys

A CCTV survey and a Flow, Rainfall and Impermeable Area survey were carried out to determine the extent and condition of the existing collection system in Ballinspittle. The results of the flow survey were used to estimate the proportion of storm water collected in the combined sewerage system

4.12 Previous Reports

4.12.1 1985 Outline Report

An outline report detailing the sewerage of the Garrettstown Area was prepared by Cork County Council in November 1985. In the short term a secondary treatment plant was proposed for the Garrylucas area with treated effluent being discharged to sea. In the long term, it was recommended that discharge from three areas, identified as areas where authorised, holiday type accommodation should be concentrated, namely,

- Garrettstown House;
- Garrylucas;
- Bullen's Bay

should be linked and discharged to sea at Bullen's Bay. This would make the proposed plant at Garrylucas and its associated outfall defunct.

The proposed scheme was broken into the five (5) stages

Stage I

Waste Water Treatment Plant at Proposed Site, north of Kilcolman Bog with outfall to Courtmacsherry Bay

Stage II

Sewer other sites in Garrylucas Area to the Waste Water Treatment Plant

Stage III

Provide Tidal Holding Tank and Sea outfall at Bullen's Bay to cater for Caravan Sites at Speckled Door

Stage IV

Provide Pumphouse at Garrylucas and rising main to connect Garrylucas to Bullen's Bay Outfall

Stage V

Connect Areas in West Garrettstown to Garrylucas

4.12.2 1987 Hydrographic Survey

Hydrographic Surveys Limited carried out a bathymetric survey around Garrylucas Point, Courtmacsherry Bay for Dermot Nestor, Consulting Engineers. The survey was to support An Bord Pleanala requirements for the design of a suitable location for an effluent outfall from a proposed caravan park at Garrylucas East for a Mr. Christy Buckley.

4.12.3 1988 Preliminary Report

Cork County Council completed an in house Preliminary Report on Garrettstown Sewerage Scheme in February 1988. This report deals with the short term plans to cope with effluent arising from the Garrylucas Area. It also considered the question of a phased policy for the long term plans to deal with sewage from the area. The proposed scheme was to comprise of;

- Secondary treatment of effluent from Garrylucas Area (2 catchments) in a wastewater treatment package plant located to the west of Kilcolman Bog;
- A tidal holding tank to limit discharge to the sea during the ebb tide;
- Sea outfall from the tidal holding tank to discharge at Garrylucas Point, i.e., between Garrettstown Strand and White Strand, i.e. Courtmacsherry Bay.

Refer to **Appendix C** for details.

4.12.4 1990 Hydrographic Survey

Cork County Council commissioned Hydrographic Surveys Limited to carry out a discrete dye survey and a drogue survey around Garrylucas Point, in Courtmacsherry Bay to progress the outfall design for the proposed Garrettstown Sewerage Scheme. The discrete dye survey revealed that the dye came ashore within a short period of time after its release. The drogues were released as far as 800m away from the shore and all the drogues came ashore west of Garrylucas Point. Refer to **Appendix C** for more details.

4.12.5 2002 Assessment of Kilcolman Bog as a Receiving Water for Treated Effluent

Cork County Council commissioned AWN Consulting to conduct an assessment of Kilcolman Bog as a possible receiving water for secondary treated effluent water from the Garrettstown area. It was concluded that a continuous discharge to the wetland would have an adverse effect on the ecosystem in the wetland. Refer to **Appendix C** for details.

4.12.6 2003 Assessment of Bullen's Bay as a Receiving Water for Treated Effluent

Cork County Council commissioned AWN Consulting to conduct an assessment of Bullen's Bay as a possible receiving water for secondary treated effluent from the Garrettstown area. The findings were that Bullen's Bay would be suitable as an outfall location but that a hydrographic survey of the area would be required to determine the tidal flow in the area. Refer to **Appendix C** for details.

4.13 Statutory Bodies

As part of the data collection, WYG contacted a number of the Statutory Bodies. Refer to Table 4.1 below for details. The purpose of this was to inform them of the preparation of the

Preliminary Report and to seek any advice they may have in relation to their remit in the areas of the Scheme.

Table 4.1 Statutory Bodies contacted in the preparation of the Preliminary Report

Statutory Body	Topic	Response
Catherine Power, Cork County Council	Archaeology	Yes
Valerie Hannon, Cork County Council	Waste permits & discharge licences	Yes
IDA, Ireland South West	Seeking comments	Yes
Faillte Ireland	Seeking comments	No
National Parks & Wildlife Service	Seeking comments	No
An Taisce	Seeking comments	No
Office of Community & Enterprise	Seeking comments	No
Southern Fisheries Board	Seeking comments	No
Department of Environment, Heritage & Local Government	Seeking comments	Yes
Department of Communications, Marine & Natural Resources	Seeking comments & information on foreshore licence application.	Yes

All relevant comments were taken into consideration in the preparation of the Preliminary Report

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5.0 CURRENT FLOWS AND LOADS

5.1 Catchment Areas

Existing drawings and site inspections were used to initially define the existing catchment areas. The results of the CCTV survey and the Flow, Rainfall and Impermeable Area survey were also used to confirm the extent of the catchment area within the Ballinspittle Sewerage Scheme. The extent of the existing collection systems are shown in **Figures 2.2 and 2.3** in Appendix A.

Bandon Electoral Area Draft Local Area Plan (Jan.2005) (BEADLAP) boundaries and its adopted amendments for Garrettstown and Ballinspittle have been used as the drainage catchment boundary for the proposed sewage scheme and in the calculation of the future flows and loads. The Local Area Plan boundary areas approximate to 33.6 hectares for Garrettstown and 21.0 hectares for Ballinspittle. The local area plan boundaries include significant area zoned as open space.

In addition, on direction from Cork County Council the area that drains by gravity northwards from the Old Head to the Speckled Door Pub was also included in the estimation of the current and future flows for Garrettstown.

The areas zoned for development in the BEADLAP and its adopted amendments have been checked in section 6.7 to determine their ability to accommodate the estimated growth to 2030.

5.2 Current Domestic Population

5.2.1 Typical Loads

The current domestic loads in Garrettstown and Ballinspittle are based on house counts using the An Post Geo-Directory, verified and up-dated where necessary through site visits. Using the 2002 CSO Census Report figures for the average number of persons per private household in each Province, County and City, the average house occupancy rate for the Garrettstown and Ballinspittle project has been identified as 3 persons.

The per capita flow and load has been taken from the Environmental Protection Agency (EPA) publication, 'Treatment Systems for Small Communities, Business, Leisure Centres and Hotels' and is estimated as **180 litres per capita per day (including infiltration) and 60 grammes BOD per capita per day.**

5.2.2 Garrettstown

The Consulting Engineer's Brief states that there are 140 houses in Garrettstown however the number of residential houses in Garrettstown is calculated as 83 based on the An Post Geo-Directory. This was verified through Ordnance Survey maps and site visits. It is estimated from discussions that 30% of homes are holiday homes in Garrettstown. This determines the number of permanent residential homes to be 58. The estimated current domestic flow and load for Garrettstown for summer and winter is shown in **Table 5.1** below.

Table 5.1 Estimated Current Domestic Flows and Loads in Garrettstown

Description	Unit	Summer	Winter
Residential houses	No	83	58
Population (average 3 per household)	persons	249	174
BOD loading/head/day	g	60	60
Total BOD loading	kg / day	14.94	10.44
Flow/ head/day	litres	180	180
Total Flow (DWF)	l / day	44,820	31,320
Total Flow (DWF)	l / s	0.52	0.36
Total Population Equivalent	PE	249	174

5.2.3 Ballinspittle

The Consulting Engineer's Brief reports that there are currently 75 houses in Ballinspittle however the number of residential houses in Ballinspittle is calculated as 68 based on the An Post Geo-Directory house count. This was verified by Ordnance Survey maps and site visits. It is established from discussions that there are no holiday homes in Ballinspittle. The estimated current domestic flow and load for Ballinspittle for summer and winter is shown in **Table 5.2** below.

Table 5.2 Estimated Current Domestic Flows and Loads in Ballinspittle

Description	Unit	Summer	Winter
Residential houses	No	68	68
Population (average 3 per household)	persons	204	204
BOD loading/head/day	g	60	60
Total BOD loading	kg / day	12.24	12.24
Flow/ head/day	litres	180	180
Total Flow (DWF)	l / day	36,720	36,720
Total Flow (DWF)	l / s	0.43	0.43
Total Population Equivalent	PE	204	204

5.2.4 Summary of Domestic Flows and Loads

The total of the estimated current domestic flows and loads are summarised in **Table 5.3** below.

Table 5.3 Estimated Total Current Domestic Flows and Loads in Ballinspittle and Garrettstown combined

Description	Unit	Summer	Winter
Residential houses	No	151	126
Population (average 3 per household)	persons	453	378
BOD loading/head/day	g	60	60
Total BOD loading	kg / day	27.18	22.70
Flow/ head/day	litres	180	180
Total Flow (DWF)	l / day	81,540	68,040
Total Flow (DWF)	l / s	0.94	0.79
Total Population Equivalent	PE	453	378

5.3 Agricultural Loading

There is not considered to be any loading from the agricultural sector in either Garrettstown or Ballinspittle.

5.4 Current Industrial/ Commercial Loading

There is no significant industry in Garrettstown and Ballinspittle. Commercial businesses are primarily tourist based and seasonal. Current industrial/commercial businesses are charged for water usage on the basis of a meter reading or at flat rate. Based on a site survey, water meter records and the Cork Co. Council rates list the non domestic users have been identified in the study areas.

The tourist based businesses, especially caravan parks and holiday homes, are seasonal in nature with July and August being the peak months for their activities. This is supported by the bulk water readings. Tourist based activities are primarily located in Garrettstown. Because of the seasonal variations in flows, summer and winter flows and loads have been calculated.

In order to quantify the commercial loading in the study area, either typical loadings from previous WYG studies or from the EPA publication, 'Treatment Systems for Small Communities, Business, Leisure Centres and Hotels', were applied to the various non-domestic premises, or recorded water meter readings were used where considered accurate. Only annual customer water meter readings are available. Therefore, water meter readings for customers with seasonal variations in demands were not used as peak flows could not be determined from the water meter records. Typical loadings and the relevant extract from EPA publication, 'Treatment Systems for Small Communities, Business, Leisure Centres and Hotels' are included in **Appendix C**. The typical flow rates for commercial premises are based on WYG database of water meter readings and relevant usage rates.

An estimate of summer and winter flows and loads has been made by deducting school figures from the total figures to give peak summer figures and deducting caravan, holiday, guest house and B & B figures from the total figures to give winter figures. 50% of the total flows and loads from bars and public houses have been assumed for the winter season.

Peak flows for caravan parks have been estimated based on information provided from the different caravan park owners. The caravan parks in Garrettstown are open from April to the last weekend in October. The peak period is July/August.

Peak flows were calculated using the number of caravans, an occupancy rate of 3 and a wastewater loading rate for caravan parks of 140l/head/day based on the level of service in the caravan sites.

The estimated flows and loads for metered and non-metered non-domestic customers are set out in the following tables for Garrettstown and Ballinspittle and summarised in **Table 5.11**. Enterprises with a significant seasonal variation in flow and load are noted in the tables.

GARRETTSTOWN

Table 5.4 Estimated Current Flows and Loads for Metered Non-Domestic Customers in Garrettstown*

Premises	Seasonal	Total Peak Flow (l/day)	Estimated PE
Cahalane's caravan park (12 units)	✓	5,040	28
O'Callaghan's caravan park (28 units)		26,040	145
Mr. Paddy Bowen (caravan park) (28 units)	✓	11,760	65
Nicholas Sellors (Manning's caravan park) (35 units)	✓	14,280	79
Superioress Ursuline SRS (retirement home)		1,034	6
Superior Rosminian Fathers		1,893	10
Total		60,047	333

*Based on water meter records and EPA flows and loads from **Appendix C**

Table 5.5 Estimated Current Flows and Loads for Non-metered, Non-domestic Customers in Garrettstown**

Premises	Seasonal	Total Peak Flow (l/day)	Estimated PE
Speckled Door Pub	✓	3,000	17
Garrettstown Beach Shop and café	✓	3,000	17
Lordan's Caravan park (120 units)	✓	50,400	280
Mawe's Caravan Park (140 units)	✓	58,800	327
Cork County Council Public Toilets	✓	800	4
Pitch+ Putt Club- Public Toilets	✓	800	4
Total		116,800	649

Based on rates list, site survey and EPA flows and loads from **Appendix C

Table 5.6 Total Estimated Current Flows and Loads for Non-domestic Customers in Garrettstown

Description	Summer		Winter	
	Total Flow (l/s)	PE	Total Flow (l/s)	PE
Metered Customers	60,047	333	2,927	17
Non-metered Customers	116,800	649	1,900	11
Total	176,867	982	4,827	27

BALLINSPITTLE

Table 5.7 Estimated Current Flows and Loads for Metered Non-domestic Customers in Ballinspittle*

Premises	Seasonal	Total Flow (l/s)	Estimated PE
Paddy Murray		1,258	7
Jim Fergusson		1,320	7
Barryroe Co-op		90	1
Donal Lordan		1,009	6
James McCarthy		3,644	20
Ballinspittle Community Centre		2,970	17
Mick & Pat Hurley		2,167	12
Total		12,458	69

*Based on water meter records from Appendix C

Table 5.8 Estimated Current Flows and Loads for Non-metered, Non-domestic Customers in Ballinspittle **

Premises	Seasonal	Total Flow (l/s)	PE
Ballinspittle Post Office		200	1
Shop & Garage		2,500	14
School (closed for 2 months in summer)	✓	5,400	30
Shop		200	1
Church		700	4
GAA Hall		800	4
B&B(summer only)	✓	2,520	14
B&B(summer only)	✓	2,520	14
Playschool		1,000	6
Hairdresser		2,800	16
Health centre		500	3
Total		19,140	107

** Based on rates list, site survey and typical flows and loads from Appendix C

Table 5.9 Total Estimated Current Flows and Loads for Non-domestic Customers in Ballinspittle

Description	Summer		Winter	
	Total Flow (l/d)	PE	Total Flow (l/d)	PE
Metered Customers	12,458	69	12,458	69
Non-metered Customers	13,740	76	14,100	78
Total	26,198	145	26,558	147

The summer flow has been adjusted such that the flow from the school is not included. The winter flow has been adjusted such that the flow from the B+ B's is not included.

SUMMARY

Table 5.10 Total Estimated Current Flows and Loads for All Non-Domestic Customers in Ballinspittle and Garrettstown combined

Description	Summer		Winter	
	Total Flow (l/d)	PE	Total Flow (l/d)	PE
Garrettstown	176,667	982	4,827	27
Ballinspittle	26,198	145	26,558	147
Total	202,865	1,127	31,385	174

The total current estimated domestic and non-domestic flows and loads for Garrettstown and Ballinspittle are summarised in Table 5.11 below.

Table 5.11 Summary of Total Estimated Current Flows and Loads

Description	Summer		Winter	
	Flow (l/day)	PE	Flow (l/day)	PE
Garrettstown - Domestic	44,820	249	31,320	174
Garrettstown - Non domestic	176,667	982	4,827	27
Total Garrettstown	221,487	1,231	36,147	201
Ballinspittle - Domestic	36,720	204	36,720	204
Ballinspittle - Non domestic	26,198	145	26,558	147
Total Ballinspittle	62,918	349	63,278	351
Total Domestic	81,540	453	68,040	378
Total Non-domestic	202,865	1,127	31,385	174
Overall Total	284,405	1,580	99,425	552

Therefore, the estimated current flow and load for summer is 284,405 l/day, equivalent to 3.3l/s with a PE of 1,580 and the estimated current flow and load for winter is 99,425 l/day, equivalent to 1.15 l/s with a PE of 552.

5.5 Meter records

Bulk water meter records were obtained from the water curator for the reservoirs in Garrettstown and Ballinspittle. The bulk meter records for Garrettstown reservoir are split into Garrettstown Upper and Garrettstown Lower. Our study area is supplied by Garrettstown Lower Network, while Garrettstown Upper covers areas outside our catchment. The bulk meter readings show a variation in flow from $15.0\text{m}^3/\text{day}$ for the average daily flow in the minimum week to $138\text{m}^3/\text{day}$ for the average daily flow in the peak week. The increase in demand in the peak week of the summer period is assumed to be related to tourism demands, consisting of caravan parks and day trippers.

The estimated current flow for summertime in Garrettstown is $205\text{m}^3/\text{day}$ ($204,937\text{l/day}$). Refer to **Table 5.11**. The bulk meter reading for Garrettstown Lower is $138\text{m}^3/\text{day}$ for the average day in the peak week in the summer period. The difference ($205-138=67\text{m}^3/\text{day}$) is explained by premises having their own private supplies. For example, Lordan's caravan park in Garrettstown has its own private well which has an estimated demand of $54\text{m}^3/\text{day}$.

The estimated current flow for winter in Garrettstown is $25\text{m}^3/\text{day}$ ($25,147\text{l/day}$). Refer to **Table 5.11**. The average flow from the meter records is $30\text{m}^3/\text{day}$. The difference here ($30-25=5\text{m}^3/\text{day}$) can be explained by water leakage which would amount to 35% taking an average real consumption of 135l/head/day . Due to high demands and consequent low pressures in summertime, leakage is likely to be considerably less significant in summer.

Bulk water meter records for Ballinspittle reservoir were also examined. Our estimated current flow for Ballinspittle is $63\text{m}^3/\text{day}$ ($62,918\text{l/day}$). This is consistent with the bulk water meter readings which give an average reading of $60.5\text{m}^3/\text{day}$.

Water meter readings are included in **Appendix C**.

6.0 FUTURE FLOWS AND DESIGN LOADS

6.1 Design Horizon

The various elements which constitute the main drainage infrastructure in any drainage area have considerably different design lives. Pumping stations, particularly the mechanical and electrical equipment, are generally designed for a maximum life of circa 10 to 15 years, even with high standards of maintenance. Wastewater treatment plants similarly would have a design life of 20 to 25 years. In recent years, process technologies have been changing and developing, in response to industry demands, for better process efficiencies and less labour intensive methodologies. Sewer systems are usually designed for 40 to 50 year horizons, as virtually no mechanical/electrical equipment is involved, and construction methods and materials are consistent with such design lives. It is also desirable to excavate trenches along public road for replacement sewers as infrequently as possible due to the cost and disruption.

It is unrealistic to try and predict foul flow and load much beyond a 25-year timescale given uncertainties in population, economic and industrial forecasts. Consequently, it was decided to base the preliminary design on the projected population for the year 2030. However, in the assessment of sizes of new sewers that would have a design life of 50 years, allowance has been made for additional flows beyond this design horizon.

Future domestic demand will vary from its current value due to:-

- Natural increase/decrease in population;
- Change in house occupancy rates;
- Migration into and out of supply area;
- Improvements in living and household standards;
- Increased usage of water consuming apparatus;
- Introduction of lower water using apparatus.

It was decided to compare four different methods to determine the future design population. These were;

- Historical population trends;
- The CSO Population and Labour Force Projections 2006-2036;
- The 2003 Cork County Development Plan, the Bandon Electoral Area Draft Local Area Plan 2005 and its Adopted Amendments and Cork Area Strategic Plan;
- Recent Trends in planning applications (2003 – 2005).

6.2 Historical Population Trends

There are no separate CSO Census figures available for Garrettstown or Ballinspittle. Ballinspittle is located in Ballinspittle and Laherne DED while Garrettstown is located between Laherne, Ballinspittle and Ballymacken DEDs. The 1996 and 2002 CSO Census figures for DED's in which Garrettstown and Ballinspittle are located were examined and compared with census figures on a regional and national level in order to determine local, regional and national trends.

Table 6.1 National and Regional Population Statistics

Area	Census 1996	Census 2002	% Growth between Censuses	Average Annual % Growth
National	3,626,087	3,917,203	8.03%	1.30%
Co. Cork (excl City)	293,323	324,762	10.72%	1.71%
Bandon Electoral Area	21,048	25,886	22.99%	3.51%
Kinsale town	2,007	2,257	12.46%	1.98%
Bandon town	4,751	5,271	10.95%	1.75%
Innishannon	498	679	36.35%	5.30%
Ballinspittle DED	435	513	17.93%	2.79%
Laherne DED	288	309	7.29%	1.18%
Ballymacken DED	311	316	1.61%	0.27%

Table 6.1 above shows that the national average growth in population between 1996 and 2002 was approximately 8.03%. On a regional basis this figure is 10.72% for County Cork excluding Cork City and 22.99% for the Bandon Electoral Area. Towns in the south west Cork area had growth rates varying from 10.95% to 36.3% over the census period. The figure for Ballinspittle DED is 17.9%, Laherne DED is 7.3% and Ballymacken DED is 1.6%.

Table 6.2 below shows the population for Ballinspittle DED between 1971 and 2002 based on the CSO Census of Population.

Table 6.2 Population for Ballinspittle DED

Year	Population	% Change	Average Annual % Change
1971	379		
1981	419	10.6%	1.01%
1986	437	4.3%	0.85%
1991	388	-11.2%	-2.35%
1996	435	12.1%	2.31%
2002	513	17.9%	2.79%

It is noted that there has been a 35.3% increase in the population of Ballinspittle DED between 1971 and 2002. This is equivalent to an average annual increase of 1.0%. The most significant increase of 17.9% was noted between the 1996 and 2002 CSO Census figures. This may have been due to increased one-off rural housing and the expansion of the other settlements within Ballinspittle DED.

Historical CSO Census figures for Laherne between the years 1971 and 2002 are shown in **Table 6.3** below.

Table 6.3 Population for Laherne DED

Year	Population	% Change	Average Annual % Change
1971	335		
1981	268	-20.0%	-2.21%
1986	262	-2.2%	-0.45%
1991	268	2.3%	0.45%
1996	288	7.5%	1.45%
2002	309	7.3%	1.18%

Table 6.3 indicates that there has been a 7.76% decrease in population between 1971 and 2002. There was a considerable decrease between 1971 and 1981 of 20%. The population remained almost static between 1981 and 1991. Overall, there was an increase of 15.2% between 1981 and 2002 which is equivalent to an average annual increase of 0.68% over that time period.

Table 6.4 Population for Ballymacken DED

Year	Population	% Change	Average Annual % Change
1971	267		
1981	321	20.2%	1.86%
1986	342	6.5%	1.27%
1991	307	-12.0%	-2.52%
1996	317	3.3%	0.65%
2002	316	1.6%	0.27%

Table 6.4 indicates that there has been an increase of 18.3% between 1971 and 2002. This is equivalent to an average annual increase of 0.5%. There was a significant increase of 20.2% between 1971 and 1981. However there was a decrease in population between the 1986 census and the 1991 census. There was a 6.5% increase between 1981 and 1986, a 3.3% increase between 1991 and 1996 and the lowest increase of 1.6% was between 1996 and 2002. Overall, the increase in population between 1971 and 2002 is equivalent to an annual average increase of 0.55%

The catchment area for Garrettstown Sewerage Scheme is located in three DED's namely Ballinspittle, Laherne and Ballymacken. Refer to **Figure 4.1** in Appendix A for details.

To predict future population trends for the Garrettstown catchment, an average growth of 1.41% was calculated based on the proportions of the Garrettstown catchment in each of the three DED's in the period 1996 - 2002. The calculation is set out in **Table 6.5** below.

Table 6.5 Average Historical Growth Rate for Garrettstown

DED	Area (ha)	% of Total Catchment	Average % Growth Rate
Ballinspittle	14.7	43.78%	1.22%
Laherne	1.7	5.02%	0.06%
Ballymacken	17.2	51.20%	0.14%
Total	33.6	100.00%	1.42%

The catchment area for Ballinspittle sewerage scheme is located in two DED's, Ballinspittle and Laherne. A similar calculation for Ballinspittle gives an average annual growth rate of 1.9% as shown in Table 6.6 below.

Table 6.6 Average Historical Growth Rate for Ballinspittle

DED	Area (ha)	% of Total Catchment	Average % Growth rate
Ballinspittle	8.8	42.0%	1.17%
Laherne	12.2	58.0%	0.68%
Total	21.0	100.0%	1.85%

The estimated future population for Garrettstown and Ballinspittle based on Historical Trends is shown in Table 6.7 below.

Table 6.7 Estimated Future Population Based on Historical Trends

Catchment	2006	2010	2015	2020	2025	2030
Garrettstown-Summer	249	267	287	307	330	354
Garrettstown-Winter	174	187	200	215	230	247
Ballinspittle	204	224	245	269	295	323

6.3 CSO POPULATION AND LABOUR FORCE PROJECTIONS 2006-2036

The Central Statistics Office (CSO) in their Report, "Population and Labour Force projections, 2006-2036", predict that the population of the State will be between 4.9 and 5.6 million by 2036. Their projections are based on a number of assumptions relating to future trends in fertility, mortality, migration and labour force participation. Six population scenarios are given ranging from High Fertility (F1) and High Migration (M1) to Low Fertility (F3) and Low Migration (M2).

It is expected that the growth in Ballinspittle and Garrettstown would match the low migration and medium fertility (M2F2) scenario as there is little migration into the study area and the mixed age profile would suggest medium fertility.

Three further refinements of the M2F2 scenario are presented in the CSO Report, "Regional Population Projections, 2006-2021", entitled recent, medium and traditional trends. Refer to **Table 6.8** below.

Table 6.8 Population Projection Scenarios

Assumption	Trend	Definition
M2 F2	Recent	Low Migration and Medium Fertility
M2 F2	Medium	Low Migration and Medium Fertility
M2 F2	Traditional	Low Migration and Medium Fertility

Percentage population increases over 5 year periods between 2006 and 2021 and average annual percentage increases have been calculated for the country as a whole and on a regional basis for the recent, medium and traditional trends. Garrettstown and Ballinspittle are considered to follow the projections for the **medium** M2F2 south-west regional trend.

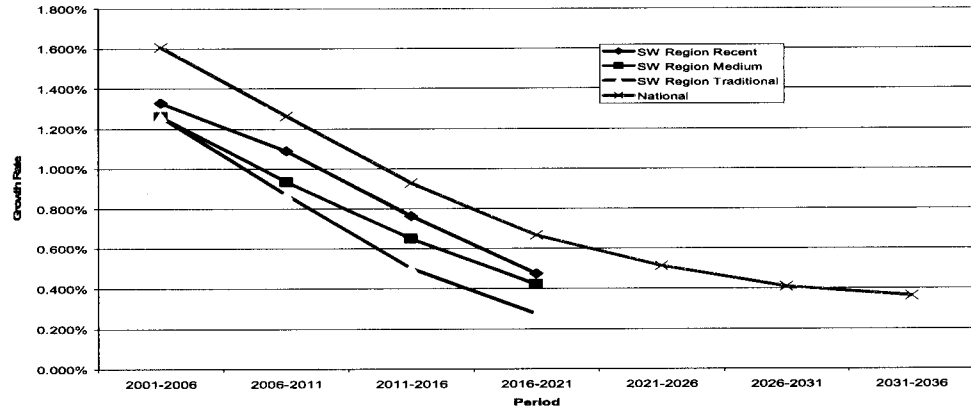
Recent, medium and traditional trends for the M2F2 scenarios are compared in **Table 6.9** and **Graph 6.1** below. The national projections are the same for recent, medium and traditional scenarios.

Table 6.9 Average Annual % Population Change Based On National and Regional CSO M2F2 Population Projections

Period	Recent	Medium	Traditional	National
2001 - 2006	1.328%	1.261%	1.261%	1.606%
2006 - 2011	1.089%	0.935%	0.871%	1.264%
2011 - 2016	0.763%	0.650%	0.498%	0.925%
2016 - 2021	0.473%	0.421%	0.275%	0.671%
2021 - 2026	-	-	-	0.512%
2026 - 2031	-	-	-	0.409%
2031 - 2036	-	-	-	0.363%

This trend is projected beyond 2021 in a similar profile to the national trend as shown graphically in **Graph 6.1** below.

Graph 6.1: Average Annual % Population Change Based On National and South West Regional CSO M2F2 Population Projections



The projected growth rates are set out below in **Table 6.10**

Table 6.10 Average Annual % Population Change Based On National and Medium South West Regional CSO M2F2 Population Projections

Period	Average Annual Growth Rate
2001 - 2006	1.261%
2007 - 2011	0.935%
2012 - 2016	0.650%
2017 - 2021	0.421%
2022 - 2026	0.266%
2027 - 2031	0.163%
2032 - 2036	0.117%

Population projections for the two settlements are set out in **Table 6.11** based on the above CSO population projections.

Table 6.11 Population Projections for Garrettstown and Ballinspittle Based on CSO M2F2 Medium Population Projections

Year	2006	2010	2015	2020	2025	2030
Garrettstown Summer	249	262	271	277	282	284
Garrettstown Winter	174	183	189	194	197	199
Ballinspittle	204	214	222	227	231	233

6.4 Development Plans Population Projections

6.4.1 Development Plans

The Cork County Development Plan 2003, the Bandon Electoral Area Draft Local Area Plan (Jan. 2005) & Adopted Amendments and the Cork Area Strategic Plan (2001) were consulted to assess the development potential of Garrettstown and Ballinspittle and to determine likely population growth profiles in these areas based on development plan objectives.

6.4.2 Cork County Development Plan 2003

The Cork County Development Plan 2003 (CCDP 2003) was formally accepted by Cork County Council at its meeting of 13th of January 2003. Under the provisions of the Planning and Development Act 2000, the plan formally came into operation on 10th of February 2003. Unlike previous county development plans (which were intended to have a five year lifetime) this is a six year plan. It is expected to remain in force (subject to any interim variations that the Council may make) until early 2009.

Growth forecasts in the CCDP 2003 are based on the recommendations of the Cork Area Strategic Plan and the North & West Cork Strategic Plan and are set at 16.15% for the period 2000 to 2011. This growth will not be uniform throughout the county but will be higher than average in the environs of Cork City and the larger towns and lower than average in rural areas. The total growth rate is equivalent to an average annual growth rate of 1.37%.

Garrettstown and Ballinspittle are outside of the area described as Metropolitan Cork in the CCDP 2003. Instead they would be considered as, 'rural villages outside of Metropolitan Cork' In the section on Settlement Policy in the CCDP 2003, one of its objectives is stated as;

SPL 1-8	<p>The Role of Rural Villages Outside of Metropolitan Cork</p> <p>(a) It is an objective to facilitate the strengthening of existing rural villages as a primary focus for the development of rural areas and the provision of local services.</p> <p>(b) It is an objective to recognize the need to strengthen infrastructure and public transport connections with larger towns and settlements.</p> <p>(c) It is an objective to build up the population of rural villages in order to reverse rural decline and to retain and improve key facilities which in turn serve the wider rural community.</p>
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In developing proposals for the Garrettstown Sewerage Scheme, aspects of the Development Plan which are considered include:

- Population;
- Geographic extent of existing and proposed development;
- Land availability and housing density.

6.4.3 Bandon Electoral Area Draft Local Area Plan (Jan. 2005) & Adopted Amendments

The CCDP 2003 requires that a series of Local Area Plans be produced to define development plan policies at a local level. The Local Area Plans are based on electoral areas and must be consistent with the Cork County Development Plan 2003 (as varied), the North and West Cork Strategic Plan 2002 – 2020 and the Cork Area Strategic Plan 2001- 2020 (CASP). The Local Area Plans set out objectives and policies for development in terms of:

- General Development and Zoning;
- Amenity and Recreational Development and Tourism;
- Infrastructural Development.

Garrettstown and Ballinspittle are located in the Bandon Electoral Area and are included in the Bandon Electoral Area Draft Local Area Plan (Jan. 2005) and its Adopted Amendments (BEADLAP). The BEADLAP predicts 6.50% growth in the Bandon Electoral Area over the course of the period 2002 to 2011. This is equivalent to an annual average growth rate of 0.7%. It is considered that the majority of the growth will be centered in the larger towns.

In the overall strategy of the BEADLAP and its adopted amendments, Garrettstown is recognised as a location which consists of a number of settlement nodes and is also a popular holiday and day trip resort. The strategic aims for Garrettstown is to consolidate settlement 's individual centres, allow for small-scale expansion which would be sympathetic with the existing settlement, to encourage the provision of additional community facilities to improve public amenity and recreation facilities and to protect the unique natural heritage, ecology and scenic landscape within and surrounding the settlement.

The strategic aims for Ballinspittle are to encourage the consolidation of the village centre, preserve the unique character and streetscape of Ballinspittle and to promote sympathetic development involving a mix of house types in tandem with the provision of services.

The general zoning for the development of Ballinspittle and Garrettstown is shown on **Figures 6.1** and **6.2** in Appendix A respectively. These figures indicate development areas providing for residential, and specific open space, sports, recreation and amenity development.

6.4.4 Cork Area Strategic Plan

The Cork Area Strategic Plan (CASP) was prepared to provide a vision and strategy for the Cork City Region up to 2020. The CASP covers an area determined by a journey time of about 45 minutes from Cork City and it includes Cork City, the satellite towns of Midleton, Carrigtohill, Carrigaline, Ballincollig and Blarney and the ring towns and rural hinterlands of Bandon, Macroom, Mallow, Fermoy, Youghal and Kinsale. Whereas Garrettstown and Ballinspittle are not specifically included in the CASP, the strategies put forward in the CASP will impact on them as they would be within 45 minutes journey time of Cork City and are in the hinterland of Bandon and Kinsale

The predicted population growth rate set out in the CASP for ring towns and rural areas for the period 2000 to 2020 is 13.9%, equivalent to an annual average growth rate of 0.65%.

6.4.5 Summary

The growth rates predicted in the various development plans are summarised below in **Table 6.12**.

Table 6.12 Development Plan Population Growth Projections

Development Plan	Growth Rate	Period	Average Annual Growth Rate
CCDP 2003	16.15%	2000 - 2011	1.37%
BEADLAP	6.50%	2002 - 2011	0.70%
CASP	13.90%	2000 - 2020	0.65%

It is considered that the CCDP 2003 growth would be appropriate in the initial period (2005-2010) with the BEADLAP and CASP growth rate applicable in the long term with a reducing growth in the period between.

Based on the above, a possible growth rate that would be applicable to Garrettstown and Ballinspittle is set out in **Table 6.13** below and the associated population projection figures are set out in **Table 6.14**.

Table 6.13 Predicted Growth Rates Based on Development Plans

Period	Average Annual Growth Rate
2005 - 2010	1.37%
2011 - 2015	1.19%
2016 - 2020	1.01%
2021 - 2025	0.83%
2025 - 2030	0.65%

Table 6.14 Population Growth Projections Based on Development Plans

Year	2005	2010	2015	2020	2025	2030
Garretstown-Summer	249	267	283	297	310	320
Garretstown-Winter	174	186	198	208	217	224
Ballinspittle	204	218	232	244	254	262

6.5 Trends in Planning Applications

An inspection of the records at the Cork Co. Council Planning Department in June 2005 showed that a significant number of planning applications have been submitted for proposed dwellings, either single or part of a development within the development boundaries of Garrettstown and Ballinspittle from the start of 2003. These are listed below.

Garrettstown

Planning Ref	Year	Description	Status
049745	2004	Bays for caravans, mobile homes and ancillary works	Incomplete Application
053478	2005	Extension of caravan park	New Application received 20/05/2005
047326	2004	Construction of conservatory extension	Permission granted
048422	2004	Extension to side of dwelling house	Permission granted
048981	2004	Alterations, ground floor extension & 1st floor extension to single storey dwelling	Refused
049743	2004	Demolition of existing hotel and construction of new hotel incorporating bar, restaurant and leisure centre	Permission Granted 24/01/05
045902	2004	Replacement of septic tank to caravan park with new treatment unit and percolation area	Further Information received 28/02/05
032304	2003	Demolition of ruined dwelling and construction of 2 no. Apartments	Further Information not received
05931	2005	Dwelling house	Refused
05771	2005	Retention of tiled concrete roof to two storey dwelling	Permission granted
	2004	18 dwelling houses	Permission granted

Ballinspittle

Planning Ref	Year	Description	Status
036028	2003	Dwelling House & garage	Conditional
034503	2003	Dwelling House & garage	Conditional
033502	2003	22 houses	Withdrawn
035846	2003	Alterations & 1st floor, extra to dwelling	Conditional
044649	2004	Dwelling house & treatment plant	Conditional
046359	2004	Dwelling & Treatment Plant	Conditional
046473	2004	8 dwelling houses	Conditional
044329	2004	2 silo slurry tank & calving house	Conditional
04670	2004	Dwelling & garage	Conditional
044683	2004	23 no dwelling houses, 9 houses & treatment plant	Incomplete application
051217	2005	Dwelling & granny flat	Refused
052342	2005	Dwelling house & garage	Further Information (not received)
	2005	28 dwelling houses	Part 8 planning

The above planning applications are an indication of current development in the study areas. However, it is not definite if all of the applications will receive planning permission or eventually be constructed. **Table 6.15** below sets out the predicted growth rate, if in the short term 50% of the above residences, (excluding those refused planning permission) were built over a two year period.

Table 6.15 Predicted Growth Rates Based on Planning Applications

Location	Existing Residences	New Residences	Average Annual Growth Rate
Garrettstown	54	9	8.01%
Ballinspittle	68	20	13.76%

It should be noted that the above predictions do not take account of planning permissions granted in previous years. Using the above growth rates gives the following population projections.

Table 6.16 Population Growth Projections Based on Planning Applications

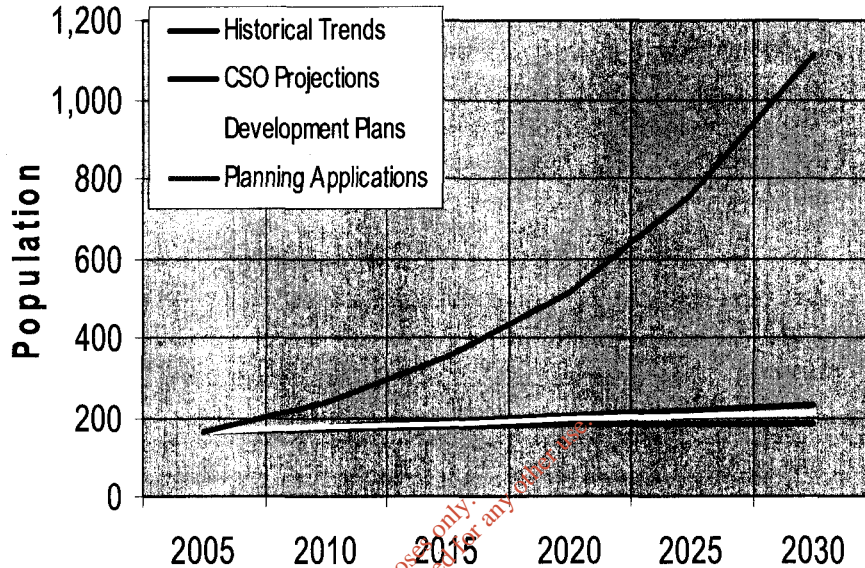
Year	2005	2010	2015	2020	2025	2030
Garrettstown-Summer	249	366	538	791	1,163	1,710
Garrettstown-Winter	174	256	376	553	813	1,195
Ballinspittle	204	389	740	1,411	2,688	5,120

6.6 Adopted Growth Rates

Different growth rates have been adopted for Garrettstown and Ballinspittle. Ballinspittle has more facilities and may possibly be more attractive for development for commuters to Cork City. Garrettstown has less land zoned for residential development than Ballinspittle.

GARRETTSTOWN

Graph 6.2: Graphs of Population Projections for Garrettstown



From the above Graph, the above projections correlate well over the first 5 years with a 36% difference between the highest and lowest projection. At 25 years, the difference between the highest and lowest projections is almost 383%. The CSO Projections are the most conservative while the trends based on planning applications are the most optimistic. In particular a single large scale development has skewed the growth rates based on planning applications. Planning applications are more suitable for current predictions while Development Plans and Historical Trends are more appropriate for long term predictions.

Table 6.17 below outlines the various percentage growth rates applied to predict future populations in Garrettstown. It is proposed that the planning application growth rate be adopted to determine the population projections for the scheme for the first five years i.e. an average growth rate of 8.01%. To predict future population for 2015, an average growth rate of 4.61% is taken. This is based on an average of the growth rates for planning applications, historical trends and development plans.

The next fifteen years were calculated using an average growth rate based on the Historical Trends and Development Plans. The CSO population projection growth rate will form the lower boundary and the Planning Application growth rate will form the upper boundaries. These projections are shown in **Table 6.18** below.

Table 6.17 Summary of Average Annual Percentage Growth Rate for Garrettstown

Period	Average Annual Percentage Growth Rate
2005 - 2010	8.01%
2011 - 2015	4.61%
2016 - 2020	1.21%
2021 - 2025	1.13%
2025 - 2030	1.05%

Table 6.18a Adopted Population Projections for Garrettstown- Summer

	2005	2010	2015	2020	2025	2030
Lower Boundary	249	262	271	277	282	284
Upper Boundary	249	366	538	791	1,163	1,710
Adopted Projection	249	366	459	487	515	543
Average Annual Growth		8.01%	4.61%	1.21%	1.13%	1.05%

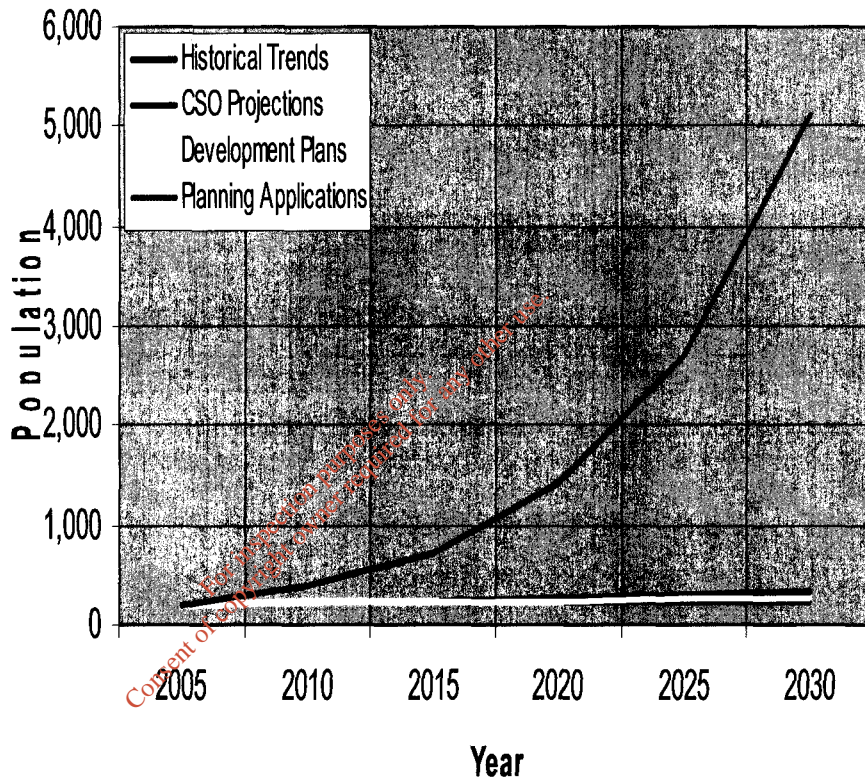
Table 6.18b Adopted Population Projections for Garrettstown- Winter

	2005	2010	2015	2020	2025	2030
Lower Boundary	174	183	189	194	197	199
Upper Boundary	174	256	376	553	813	1,195
Adopted Projection	174	256	321	340	360	379
Average Annual Growth		8.01%	4.61%	1.21%	1.13%	1.05%

From Table 6.8a above it is important to note that even though the predicted percentage growth rates between 2005 and 2010 seem quite high at 8.01% reducing down to 4.61% between 2010 and 2015, in real terms it amounts to an additional 39 houses between 2005 and 2010, i.e., an average of 8 per year and a further 31 houses (average 6 per year) between 2010 and 2015.

BALLINSPITTLE

Graph 6.3: Population Projections for Ballinspittle



There is an 81% difference between the highest and lowest in the first five years. The CSO Projections are the most conservative while the trends based on the planning applications are the most optimistic. Again, a single large scale development has skewed the growth rates based on recent planning applications. Planning applications are considered to be more appropriate for short term predictions in Ballinspittle while long term predictions are based on more conservative figures from CSO projections and Development Plans.

Table 6.19 below outlines the average annual percentage growth rates adopted to forecast future populations in Ballinspittle. Recent planning applications are considered to be the most appropriate to apply to predict the future population in the short term. Therefore an average growth rate of 13.76% is used until 2010. More conservative growth rates ranging from 1.3% to 1.45% based on Historical Trends and Development Plans are applied for long term population projections from 2016 – 2025 with an average figure used for 2011-2016.

Table 6.19 Summary of Average Annual Percentage Growth Rate for Ballinspittle

Period	Average Annual Percentage Growth Rate
2005 - 2010	13.76%
2011 - 2015	7.60%
2016 - 2020	1.45%
2021 - 2025	1.37%
2025 - 2030	1.30%

Table 6.20 Adopted Population Projections for Ballinspittle

	2005	2010	2015	2020	2025	2030
Lower Boundary	204	214	222	227	231	233
Upper Boundary	204	389	740	1,411	2,688	5,120
Adopted Projection	204	389	561	602	645	688
Average Annual Growth		13.76%	7.60%	1.45%	1.37%	1.30%

From the above table it is important to note that in real terms the adopted population projections amount to an additional 185 houses between 2005 and 2010, i.e., an average of 37 per year and a further 172 houses (average 34 per year) between 2010 and 2015.

6.7 Current Residential Zoned Lands

Garrettstown

There are no additional lands zoned specifically for residential development in the Bandon Electoral Area Draft Local Area Plan (Jan. 2005) and its Adopted Amendments for Garrettstown. Approximately 33.6ha have been generally zoned for development but subject to proper planning considerations. The extent of the development boundary is shown in **Figure 6.1** in Appendix A.

Ballinspittle

From the Bandon Electoral Area Draft Local Area Plan (Jan. 2005) (BEADLAP) there are 4 areas zoned for residential development in Ballinspittle, namely R-01, R-02, R-03 and R-04. The density of these zoned lands is also identified in the Draft Local Area Plan as being medium, medium, medium and very low densities, respectively. The number of houses applicable to the densities are set out in the BEADLAP. The adopted amendments to the BEADLAP extend the Ballinspittle development boundary as identified by areas BDN 08.06.01, 08.06.04 and 08.06.05. The extent of the area zoned for development (approximately 21ha) are shown in **Figure 6.2** in Appendix A and listed below in **Table 6.21**.

Table 6.21 Local Area Plan and Adopted Amendments Zoning for Ballinspittle

Area	Description	Area (ha)	Density (houses/ha)	Total no. of houses
R-01	Medium Density Residential Development	1.1	35	39
R-02	Medium density residential development to include a mix of house types and sizes	1.2	35	42
R-03	Medium density residential development to include a mix of house types and sizes	1.3	35	46
R-04	Very low density residential development, individual serviced sites	1.3	5	7
BDN 08.06.01	Low density residential development	1.62	12	19
BDN 08.06.04	Very low density residential development, individual serviced sites	0.54	5	2.7
BDN 08.06.05	Low density residential development	0.82	12	10
				164

Based on an average house occupancy rate of 3, the zoned land can accommodate an additional population of 492. The predicted population increase of 484 (688-204) from Table 6.20 above can be catered for in the zoned areas.

6.8 Future Industrial / Commercial Flows

A limited increased demand in the commercial (shops, hotels, pubs, holiday home complexes etc) sector should stem from the expected increase in population. In discussions to date, there has been no indication of any significant increase in the non-domestic. Providing capacity in the proposed wastewater treatment plant for future non-domestic loads would result in Cork County Council having to bear additional costs which may not be recovered. It is therefore proposed to allow for an increase in the non-domestic flow and load of 16% of the future domestic flows and loads. This is in line with previous studies and will cater for the commercial sector associated with the increased residential sector.

Garrettstown

There are no areas zoned for commercial development in Garrettstown in the BEADLAP and its adopted amendments. The existing Coakley's hotel adjacent to Garrettstown Strand has been granted full Planning Permission for the demolition of the existing hotel and redevelop a new hotel with a bar, restaurant, leisure centre, 18 double rooms, 31 hotel suites an underground car park and a private sewerage treatment plant. It would be the intention that this development would be adopted into the in the Garrettstown Sewerage Scheme.

Ballinspittle

There are no areas zoned for commercial development in Ballinspittle in the BEADLAP and its Adopted Amendments.

6.9 Summary of Future Flows and Loads

Garrettstown

The total estimated future domestic and non-domestic flows and loads for Garrettstown are summarised in **Table 6.22** below for summer time and in **Table 6.23** for winter time. The future flows and loads have been calculated in accordance with **Table 6.17 Summary of Average Annual Percentage Growth Rate for Garrettstown** namely

Period	Average Annual Percentage Growth Rate
2005 - 2010	8.01%
2011 - 2015	4.61%
2016 - 2020	1.21%
2021 - 2025	1.13%
2025 - 2030	1.05%

Table 6.22 Estimated Future Flows and Loads for Garrettstown (Summer)

		2005	2010	2015	2020	2025	2030
Domestic	Flow (l/d)	44,820	65,893	82,562	87,701	92,767	97,729
	Load (PE)	249	366	459	487	515	543
Non-Domestic*	Flow (l/d)	176,040	180,172	182,839	183,661	184,471	185,265
	Load (PE)	982	1,001	1,016	1,020	1,025	1,029
Total	Flow (l/d)	220,860	246,065	265,401	271,362	277,238	282,995
	Load (PE)	1,231	1,367	1,474	1,508	1,540	1,572

* Future Non-Domestic Demands comprise 16% of the future Domestic Demand

Table 6.23 Estimated Future Flows and Loads for Garrettstown (Winter)

		2005	2010	2015	2020	2025	2030
Domestic	Flow (l/d)	31,320	46,080	57,780	61,200	64,800	68,220
	Load (PE)	174	256	321	340	360	379
Non-Domestic	Flow (l/d)	4,827	7,174	9,038	9,613	10,179	10,734
	Load (PE)	27	40	50	53	57	60
Total	Flow (l/d)	36,201	53,220	66,732	70,898	75,004	79,027
	Load (PE)	201	296	371	394	417	439

* Future Non-Domestic Demands comprise 16% of the future Domestic Demand

Ballinspittle

The total estimated future domestic and non-domestic flows and loads for Ballinspittle are summarised in **Table 6.24** below for summer time and in **Table 6.25** for winter time. The future flows and loads have been calculated in accordance with **Table 6.19 Summary of Average Annual Percentage Growth Rate for Ballinspittle**.

Table 6.24 Estimated Future Flows and Loads for Ballinspittle (Summer)

		2005	2010	2015	2020	2025	2030
Domestic	Flow (l/d)	36,720	69,958	100,902	108,423	116,074	123,847
	Load (PE)	204	389	561	602	645	688
Non-Domestic	Flow (l/d)	26,100	31,418	36,369	37,572	38,797	40,040
	Load (PE)	145	175	202	209	216	222
Total	Flow (l/d)	62,820	101,376	137,271	145,996	154,871	163,887
	Load (PE)	349	563	763	811	860	910

* Future Non-Domestic Demands comprise 16% of the future Domestic Demand.

Table 6.25 Estimated Future Flows and Loads for Ballinspittle (Winter)

		2005	2010	2015	2020	2025	2030
Domestic	Flow (l/d)	36,720	69,958	100,902	108,423	116,074	123,847
	Load (PE)	204	389	561	602	645	688
Non-Domestic	Flow (l/d)	26,558	31,876	36,827	38,031	39,255	40,499
	Load (PE)	147	177	204	211	218	224
Total	Flow (l/d)	63,278	101,834	137,729	146,454	155,329	164,345
	Load (PE)	351	565	765	813	862	912

* Future Non-Domestic Demands comprise 16% of the future Domestic Demand

The total PEs for Garrettstown and Ballinspittle are summarised in Table 6.26 below.

Table 6.26 Estimated Future Loads for Garrettstown and Ballinspittle Combined

Year	2005	2010	2015	2020	2025	2030
Summer Load (PE)	1,580	1,930	2,237	2,319	2,401	2,482
Winter Load (PE)	552	861	1,135	1,207	1,279	1,351

7.0 ASSESSMENT OF EXISTING SCHEME

7.1 General

A number of surveys were carried out on the existing schemes to establish their condition. As there is no public system in Garrettstown, Ballinspittle Sewerage Scheme was the only scheme assessed. The surveys that were carried out comprise;

- Close Circuit Television(CCTV) Survey;
- Flow, Rainfall and Impermeable Area Survey.

7.2 Existing Sewer Survey

White Young Green Ireland Ltd., commissioned Munster Drain Ltd., to carry out a CCTV survey and a manhole survey of the existing Ballinspittle network between the 22nd September and 14th October 2005. The purpose of the survey was to confirm the extent of the existing collection system and also to establish pipe length, size, material type and condition.

A pre-inspection survey was carried out to establish if the CCTV camera (mounted on a remotely controlled tractor unit) could access all the sewers. Where necessary, sewers were jetted to remove grit.

A manhole survey was carried out to identify the cover and invert level of all accessible manholes. The location of all pipes entering and leaving each manhole was also recorded. Out of a total of 29 manholes, only 14 were surveyed. The remaining manholes were inaccessible, i.e., buried in fields or in the roadway.

7.2.1 Assessment

The structural condition of the sewers surveyed as part of the CCTV survey were visually assessed and graded depending on their internal condition in accordance with the Sewerage Rehabilitation Manual (SRM). The sewer defects were graded 1 to 5 as set out in Table 7.1 below:

Table 7.1– Sewer Internal Condition Grades*	
Grade	Description
1	Acceptable Structural Condition
2	Minimal collapse risk in the short term but potential for further deterioration
3	Collapse unlikely in the near future but further deterioration likely
4	Collapse likely in the foreseeable future
5	Collapsed or collapse imminent.
* Source – Sewerage Rehabilitation Manual (SRM)	

The grade for the entire sewer length is based on the highest internal grade along that sewer length. Normally, sewers graded 4 or 5 will be targeted for upgrading immediately. It should be noted that, with modern trenchless technology, it is now possible to upgrade only the affected section of sewer.

The CCTV survey of the existing sewerage collection system in Ballinspittle determined that there are 29 manholes (F1 to F26) in the collection system with an overall recorded length of 827.4m. Refer to **Figure 7.1** in Appendix A for details. 95% of the network is made from pre-cast concrete and 5% from uPVC.

The network is summarised in **Table 7.2** below:

Diameter (mm)	Material		
	uPVC	PCC	Total(m)
225	-	787.5	787.5
300	39.9	-	39.9
Total(m)	39.9	787.5	827.4

Table 7.2 - Length of Sewers in Ballinspittle

In summary, 5% of the sewers are 300mm diameter and 95% are 225mm diameter.

7.2.2 Condition

There is a minor defect in one of the concrete sewer runs. The details are given in the Munster Drain Ltd., CCTV report in **Appendix D**. However, the overall condition of the network is satisfactory.

7.2.3 Programme

The work was carried out in a satisfactory manner. However, the work took longer than anticipated as a large amount of grit was found and this had to be removed to allow the survey to proceed. In addition the network was more extensive than expected.

7.2.4 Layout

The extent differs only slightly from the layout originally expected.

7.3 Existing Flow, Rainfall and Impermeable Area Survey

White Young Green Ireland Ltd., commissioned Precision Industrial Systems Limited to carry out a flow, rainfall and impermeable area survey on the existing combined sewer network in Ballinspittle during the five week period between 10th November and 15th December 2005. In addition, as discussed in Section 4.3.3.1 weekly grab samples were taken from Ballinspittle River, upstream of the outfall from the septic tank and sent to an accredited laboratory for analysis.

The flow and rainfall survey of Ballinspittle was carried out to measure the catchments response to measured rainfall for the purpose of calibrating the hydraulic model and evaluating the performance of the existing sewer system. In addition an impermeable area survey of Ballinspittle was undertaken to check whether areas are drained by combined, separate or partially separate sewers.

7.3.1 Equipment

Rainfall Recorders

Two 0.2mm tipping bucket rain gauges were used to record rainfall. Each rain gauge was connected to a Detectronic data logger. Data was retrieved from the memory of the logger weekly by a laptop computer, which is then linked to a PC for processing. The rainfall recorders were placed at two locations on the flat roof of Ballinspittle Primary School. The location of the rainfall gauges is indicated on **Figure 7.2** in Appendix A.

Flow Monitors

Two flow monitors were installed on the existing collection system. The flow monitors used were Detectronic 3510 survey loggers. These totally self-contained units are microprocessor controlled and set to measure, automatically, both depth and velocity of flow at predetermined intervals. The data is stored in a solid state memory within the monitor.

Using a separate retrieval device, the data are extracted from the monitors on a weekly basis and subsequently processed on a micro-computer.

The recorded values of depth and velocity are average values taken over the recording interval which proceeds the recording time. The interval between each recording is set at the time of commencement of the monitoring period and, in this survey, was two minutes.

The flow monitors were installed in Manholes F7 (Site 4) to the rear of the supermarket and F20 (Site 1) near Ballinspittle Bridge as identified in **Figure 7.2** in Appendix A.

7.3.2 Assessment of Flows

The flows from three storm events (30th November 2005, 1st December 2005 and 7th December 2005) and two dry periods (22nd November 2005 and 25th November 2005) were selected for detailed analysis as is recommended in the Water Research Centre (WRC) publication, 'A Guide to Short Term Flow Surveys of Sewer Systems'. These are detailed in the Ballinspittle Flow, Load and Impermeable Area Survey Report in **Appendix E**. In general the analysis found that there was a good response to rainfall in the recorded flows in both manholes with rapid increase in the depths and velocity recorded. However both sites had intermittent ragging of the sensor, which reduced the velocity recorded for the majority of the survey period.

A summary of the data from the three storm events and two dry periods is shown in **Table 7.3** and **Table 7.4** below.

Table 7.3 Manhole F7 – Site 4

Event	Date	Total Flow (m ³)	Peak Flow (l/s)	Peak Depth (mm)	Total Rainfall (mm)	Duration of Rainfall (mins)
DWF 1	22-Nov-05	32.2	1.1	39	0	N/A
DWF 2	25-Nov-05	37.4	2.5	52	0	N/A
Storm 1	30-Nov-05	7.5	6.6	74	4	32
Storm 2	01-Dec-05	20.4	11.2	104	15	152
Storm 3	07-Dec-05	48.9	4.2	63	15.6	438

From the above table, the average Dry Weather Flow (DWF) is calculated as 0.4l/s ($0.5 \times (37.4 + 32.3) / (24 \times 60 \times 60)$) or 34.56 m³/day.

Table 7.4 Manhole F20 – Site 1

Event	Date	Total Flow (m ³)	Peak Flow (l/s)	Peak Depth (mm)	Total Rainfall (mm)	Duration of Rainfall (mins)
DWF 1	22-Nov-05	47.6	1.2	38	0	N/A
DWF 2	25-Nov-05	56.2	1.3	39	0	N/A
Storm 1	30-Nov-05	26.7	12	110	4	32
Storm 2	01-Dec-05	72.4	29.7	167	15	152
Storm 3	07-Dec-05	129	8.9	96	15.6	438

From the above the average Dry Weather Flow (DWF) is calculated as 0.6 l/s $(0.5 \times (56.2 + 47.6) / ((24 \times 60 \times 60))$ or 51.84m³/day.

7.4 Impermeable Area Survey

The Impermeable Area Survey identifies the paved areas, pitched and flat roofs within Ballinspittle that contribute to the flows in the existing combined sewerage scheme.

7.5 Capacity of Existing Scheme to Serve Future Flow and Load

The existing sewerage scheme in Ballinspittle is a combined system. The results of the CCTV survey in Section 7.2 confirmed that the general condition of the sewers is satisfactory.

The hydraulic capacity of the sewers is capable of serving the current and future requirements of Ballinspittle.

7.6 Garrettstown

There is no existing sewerage scheme in Garrettstown and therefore, a new scheme is required to serve the current and future needs of the area.

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8.0 WASTEWATER TREATMENT PLANT SITE ASSESSMENT

8.1 Wastewater Treatment Plant Site Options

A site (Site 1) was previously identified by Cork County Council for a wastewater treatment plant in Garrylucas. White Young Green Ireland Ltd. identified a second possible site (Site 2) close to Bullen's Bay. Subsequently a third possible site (Site 3) was identified adjacent to the Pitch & Putt Club. All three sites are owned by separate private individuals and the area of land required has been sized to cater for expansion of the proposed treatment plant in the future, if required. The locations of the sites are identified on **Figure 8.1** in Appendix A.

Site 1 (0.8 ha) is located in agriculture lands to the north of Kilcolman Bog/Garrylucas Marsh (Grid Reference E160970 N43620). Kilcolman Bog/Garrylucas Marsh comprises 22ha of fen/wetland habitat. The route of the proposed access road to the site is along an existing gravel track that runs along the northern boundary of Kilcolman Bog/Garrylucas Marsh.

Site 2(0.75ha) is located in Agricultural lands to the east of Kilcolman Bog/Garrylucas Marsh, near to Bullen's Bay (Grid Reference E161642 N43496). Access to the site is from the R604.

Site 3(0.75ha) is located in agricultural lands between Kilcolman Bog/Garrylucas Marsh and the Pitch & Putt Club/ strip of sand dunes (Grid Reference E161313 N43024). Access to the proposed site will be from the R604. The access road will go through an unmanaged area at the south east end of the Pitch & Putt course.

The above site options together with the 2 outfall options, in Section 9 resulted in the various scheme options described below. The options are shown on **Figures 8.2 to 8.7** in Appendix A.

WWTP Site 1 Outfall 1

WWTP situated north of Kilcolman Bog/Garrylucas Marsh with outfall to Courtmacsherry Bay

WWTP Site 1 Outfall 2

WWTP situated north of Kilcolman Bog/Garrylucas Marsh with outfall to Bullen's Bay

WWTP Site 2 Outfall 1

WWTP situated near Bullen's Bay with outfall to Courtmacsherry Bay.

WWTP Site 2 Outfall 2

WWTP situated near Bullen's Bay with outfall to Bullen's Bay

WWTP Site 3 Outfall 1

WWTP situated near the Pitch & Putt Club with an outfall to Courtmacsherry Bay

WWTP Site 3 Outfall 2

WWTP situated near the Pitch & Putt Club with outfall to Bullen's Bay

The assessment of the most suitable location for the wastewater treatment plant (i.e., Site 1, Site 2 or Site 3) is based on Economical, Engineering and Environmental considerations.

Once the most appropriate of the sites has been identified, it is recommended that the purchase of the site should proceed under the dual process of **Compulsory Purchase Order**

(CPO) process and Active Negotiations. Both will be progressed in parallel to ensure no delays.

8.2 Assessment

Economical

Preliminary cost estimates were prepared for all of the scheme options. The cost estimates included the costs of collection systems to link the catchments to the WWTP including trunk sewers, pumping stations and rising mains, WWTP including land costs and marine outfalls. Operating costs for the WWTP and pumping stations were included as net present values (NPV) based on a 20 year life with a 5% rate of return. Whole lifecycle costs, combining capital costs and the NPV of operating costs, were then calculated.

The cost estimates are summarised below in **Table 8.1** below.

Table 8.2 Summary of Total Lifecycle Costs

Options	Capital Cost	NPV of Operating Cost	Total Lifecycle Cost
WWTP Site 1, Outfall Courtmacsherry Bay	€4,778,989	€512,405	€5,291,394
WWTP Site 1, Outfall Bullen's Bay	€5,289,415	€369,427	€5,658,842
WWTP Site 2, Outfall Courtmacsherry Bay	€5,340,691	€524,597	€5,865,288
WWTP Site 2, Outfall Bullen's Bay	€4,904,669	€375,051	€5,279,720
WWTP Site 3, Outfall Courtmacsherry Bay	€4,720,593	€511,131	€5,231,724
WWTP Site 3, Outfall Bullen's Bay	€4,866,571	€361,584	€5,228,155

Site 3 with an outfall to Courtmacsherry Bay has the lowest capital cost. However, Site 3 with an outfall to Bullen's Bay has the lowest operating cost and the lowest total lifecycle cost.

Engineering

The design of the wastewater treatment plant will be similar for all three sites. Site 1 and 3 may involve a specific drainage design in order to ensure that the flow of groundwater to Kilcolman Bog/Garrylucas Marsh is not impeded by the construction and operation of the wastewater treatment plant. Site 2 is downstream of the bog and the movement of groundwater in this area is not likely to be affected by the wastewater treatment plant. Despite the additional drainage works for sites 1 and 3 there is little or no advantage in choosing one site over the other.

Environmental

A comparison of the various scheme options was carried out considering environmental and other issues such as visual impact, noise, odour, ecology, water quality, etc. as shown in Table 8.3 below.

The schemes were ranked from 1 to 6 in order of relative severity of impact with 1 having the lowest impact. If schemes were considered to have similar impacts, an average of the rankings was applied to the similarly ranked options. The scheme with the lowest overall total is considered to have the lowest impact and therefore the preferred scheme from an environmental aspect.

In summary, the WWTP in Garrettstown will be located in area outside of the designated development boundary in the Cork County Development Plan and the BEADLAP and its Adopted Amendments.

Site 3 is considered to have the lowest impact with Site 2 having the next lowest impact. Site 1 is deemed to have the greatest impact on the environment and is therefore not preferred as an option for the WWTP.

8.3 Conclusions

The cost estimates and impact assessments described above clearly show that Site 3 is the preferred site for the WWTP.

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Table 8.3 Table of Scheme Impacts

	Site 1 (Garrylucas)		Site 2 (Bullen's Bay)		Site 3 (Pitch & Putt Club)	
	Courtmacsherry Bay	Bullen's Bay	Courtmacsherry Bay	Bullen's Bay	Courtmacsherry Bay	Bullen's Bay
Outfall / Receiving Waters						
Area Required (Ha)	0.8	0.8	0.75	0.75	0.75	0.75
Zoning	None	None	None	None	None	None
Human Environment	2	1	6	5	4	3
Flora	5	6	4	3	2	1
Fauna	5	6	4	3	2	1
Landscape	5.5	5.5	3.5	3.5	1.5	1.5
Cultural Heritage	3.5	3.5	3.5	3.5	3.5	3.5
Visual Impact	5.5	5.5	3.5	3.5	1.5	1.5
Marine Environment	5	2	5	2	5	2
Distance from houses	1.5	1.5	5.5	5.5	3.5	3.5
Odour/Noise Impact	1.5	1.5	3.5	3.5	5.5	5.5
Access	5.5	5.5	3.5	3.5	1.5	1.5
Land Availability	3.5	3.5	5.5	5.5	1.5	1.5
Totals	43.5	41.5	47.5	41.5	31.5	25.5
Percentage	171%	163%	186%	163%	124%	100%

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9.0 RECIPIENT WATERS AND OUTFALL

9.1 General

In this section, the assessment of outfall locations is considered. As part of this assessment, hydrographic, dye tracing, bathymetric and intertidal surveys were carried out in Bullen's Bay. The information from these surveys, along with information from a previous hydrometric survey of Courtmacsherry Bay, was used in the hydrodynamic and dispersion modelling of the receiving waters to assess the likely impact of treated effluent from various outfall lengths and locations.

Cost estimates were prepared for the various outfall options so that a combination of economic and environmental criteria could be used in the evaluation of the preferred option.

9.2 Water Quality Standards

The quality of the treated effluent is expected to meet the minimum standards set out in the Urban Waste Water Treatment Regulations (S.I. 254 of 2001) which implement Urban Wastewater Treatment Directive (21/271/EEC). These standards are:

Table 9.1 Treated Effluent Standards

Parameter	Concentration
BOD	25 mg/l
COD	125 mg/l
SS	35 mg/l

The waters around Garrylucas Point in Courtmacsherry Bay have Blue Flag Beach status. The waters around Bullen's Bay are popular for boating activities and some shoreline shellfish picking. Although not designated as Bathing Waters, it is recommended that this standard should be applied to Bullen's Bay because of the water based activities in the area. The receiving waters will therefore be required to meet the Bathing Water Bathing Water Directive (76/160/EEC) as implemented by SI No 177 of 1998.

It is generally accepted that the characteristics of secondary treated effluent without disinfection will contain Faecal Coliform levels of 1×10^6 MPN/100m. Depending on the sensitivity of the receiving waters and their designation, i.e., bathing waters and/or blue flag beaches, disinfection may be required to significantly reduce bacterial and viral concentrations should the water quality modelling indicate so.

Table 9.2 Treated Effluent Bacteria Levels for Different Bathing Water Standards

Parameter	Total Coliforms (No/100 ml)	Faecal Coliforms (No/100 ml)	Faecal Streptococci (No/100 ml)	Enteroviruses
Bathing Water Standards	80% < 5,000 95% < 10,000	80% < 1,000 95% < 2,000	95% < 300	95% - 0 (PFU/10 litres)
Blue Flag Standards	500	100	100	0 (No/100 ml)

9.3 Outfall Options

Two outfall locations were considered for the discharge of treated effluent. These were:

- Garrylucas Point in Courtmacsherry Bay, i.e. between White Strand and Garrettstown Strand;
- Bullen's Bay.

The outfall options are shown in **Figure 9.1 in Appendix A.**

In theory, the treated effluent from the WWTP could discharge through any of the outfalls. There would be different costs, however, related to differing lengths of pipelines and pumping requirements. The preferred option was also be evaluated for the inclusion of flows from Ballinspittle.

9.4 Previous Studies

Hydrographic Surveys Ltd. carried out previous surveys in May 1985, February 1987 and the period, June to August 1990 in the vicinity of Garrylucas Point in Courtmacsherry Bay to assess it as a possible outfall location. The survey methods employed during the course of these studies included the following:

- Bathymetric survey involving detailed echo-sounding within the study area(1987);
- Dye survey employing discrete dye releases at a possible outfall location using fluorescent dye and tracked over a full Spring/Neap tide(1990);
- Drogue tracking with releases 1m below the surface from a number of possible outfall locations seawards of Garrylucas Point over a complete spring tidal cycle (1985 and 1990).

9.4.1 Hydrographic Survey 1985

The brief for the survey was to establish the set and drift of the tidal currents off Garrettstown Strand for the purpose of assessing a wastewater outfall location adjacent to the Curauan Rock off Garrylucas Point. The survey was carried out at Neap tides when the currents were at their weakest. A copy of this report is included in Appendix F.

A Drogue float was used to measure the drift and the direction of the current. Six (6) floats were released. Three (3) were set to a depth of 1m while the remaining three were set to the 2m depth. The floats were released in a line running west- east from Curaluan Rock.

The results of the survey show that the drift of the drogues was longitudinally to the south west, following the main tidal stream around Ireland. The current direction appeared to be wind influenced which would result in any discharges released offshore from Garryvoe being pushed back onto Garryvoe beach as the prevailing winds are south-westerly.

9.4.2 Hydrographic Survey 1987

The brief was to carry out a bathymetric survey. The result of the bathymetric survey in the vicinity of Garrylucas Point in Courtmacsherry Bay shows a generally flat area sloping gently away from the shore.

9.4.3 Hydrographic Survey 1990

A discrete dye release, 1m off the seabed was carried out from the proposed outfall location at Garrylucas Point. The results showed the dye coming ashore within a short period of time after release.

Drogue releases at varying distances up to 800m from the shore were then undertaken to establish if any current would show an off shore excursion in the period 30 minutes to 3 hours after the release of the drogues. The result of the survey show that all the drogues came ashore west of Garrylucas Point. Although the wind conditions were different, the drogue results correlate with the results of the 1985 drogue survey. Refer to **Appendix F** for details.

9.5 Hydrographic Survey 2005

Hydrographic Surveys Ltd, carried out surveys in the vicinity of Bullen's, Co. Cork on behalf of White Young Green Ireland Ltd. in the period July to August 2005. The survey methods employed during the course of this study included the following:

- Tide Elevation Measurements recorded over a period of 4 weeks;
- Continuous self-recording current metering measurements at one location at mid-depth over a 4 week period;
- Discrete current metering measurements carried out simultaneously at one location, at three different water column depths over a full spring tidal cycle;
- Drogue tracking with releases at surface and mid-depth from one possible outfall location over a complete spring tidal cycle;
- Bathymetric survey involving detailed echo-sounding within the study area;
- Dye survey employing discrete dye releases at a possible outfall location using fluorescent dye and tracked over a full spring tide;
- Water quality sampling of the seawater from 5 specified locations and tested for chemical and bacteriological parameters;
- Meteorological measurements of wind speed and direction recorded continuously using a weather station at an exposed coastal location in proximity of study area.

The survey points and a full description of the surveys and the results of the surveys are included in the Reports prepared by Hydrographic Surveys Ltd. and included in **Appendix F**.

The site at Bullen's Bay is sheltered from the south west by the Old Head of Kinsale Peninsula. The seabed depth ranges from 1.2 m to 30.2m OD Malin Head and the seabed is characterised by a rocky shoreline that slopes towards the sea and gradually becomes deeper.

The seabed to the north of the survey area has a shorter depth range (1.8m-15.3m OD) that that to the south.

Direct current meter observations of the survey site indicate an uneven split in the tide with a 4.5 hour flood to the northeast and an 8 hour ebb period in a predominantly southern

direction. In addition the flood element of the tide is predominantly at surface level. The area is also influenced by an offshore eddy according to the Irish Coast Pilot publication.

There was good agreement between the recorded velocities of the direct recorded current meters (DRCM) and the drogues. The wind was found to be extremely influential at surface level and in times of strong winds also impact at mid and near seabed depths. The DCRM measurements indicate that mid depth and near seabed readings flow consistently towards the south and south west.

The guide lines of the continuous self-recording current meter were found to be tangled when it was recovered and inspection of the data showed very little variation in direction. Therefore the data was not considered to be accurate and the data was not submitted for harmonic analysis.

The high water and low water spring tide dye releases gave quite different results. The high water dye release moved 3,000m in a south, south east direction over a 4.5hour period (although it did not move significantly over the first 1.5 hours of the survey), while the low water dye release moved less than 2,000m in an easterly direction over a 3.5 hour period.

9.6 Hydrodynamic and Dispersion Modelling

Hydro Environmental Ltd., Galway was appointed by WYG Ireland Ltd, on behalf of Cork County Council, to undertake a hydrodynamic and water quality model study of Courtmacsherry Bay and Bullen's Bay so as to assess the water quality impact of the discharge of treated effluent from the proposed Garrettstown Sewerage Scheme. This was carried out in the period September to December 2005.

The objectives of the marine hydrographic survey and water quality model study are as follows:-

- To simulate the water circulation patterns in Courtmacsherry Bay and Bullen's Bay under different tide and wind conditions;
- To assess various outfall location options in terms of near and far field water quality impacts;
- To predict the spread and fate of faecal coliforms and BOD for specified loadings and wastewater treatment levels (i.e. secondary treated and disinfected);

A two-dimensional depth averaged hydrodynamic and advection-dispersion model of Courtmacsherry Bay and Bullen's Bay was used to simulate the hydrodynamic mixing, spread and fate of pollutant concentrations under different tide and wind conditions, different outfall locations, and different treatment standards.

The following effluent loads have been used in the assessment of outfall options.

Table 9.3 Effluent Loads

Catchment	Summer Time		Winter Time	
	PE	Flow (m ³ /d)	PE	Flow (m ³ /d)
Garrettstown	1,572	245	439	79
Ballinspittle	910	164	912	164
Overall Total	2,482	409	1,351	283

A draft copy of the, 'Garrettstown Sewerages Scheme Outfall Site Selection Study', is included in **Appendix G**. This is summarised in section 9.7 below.

9.7 Summary of Hydrodynamic and Dispersion Modelling

Two outfall lengths along each outfall route were considered for depth averaged simulations modelling a continuous 3DWF and secondary treated effluent concentration of 10^6 No/100ml faecal coliforms. The faecal coliform simulations were carried out for Spring Tide hydrodynamic conditions. The simulations were also depth averaged.

Courtmacsherry Bay

The survey information indicates that the tidal flows are slack and very variable. An outfall close to *Curlaun rock off Garrylucas Point* is not suitable as the effluent plume migrates northwards to the Garrettstown shoreline without any influence from onshore prevailing southerly and south westerly winds. At **Location A** (see figure 1 in Appendix G) the Blue Flag Standard of 100 No. /100ml faecal coliforms is exceeded and an outfall at this point will require further bacterial reduction through disinfection to ensure Blue Flag Standards are met. The effluent plume characteristics for the longer sea outfall at **Location B** (see figure 1 in Appendix G) also show migration towards the shore, but due to longer travel distance and deeper water depth the concentrations that arrive at the shoreline are within Blue Flag standards and no further bacterial reduction of the effluent would be required. The mandatory Bathing Water standard of 1,000 No/100ml faecal coliforms is met by both outfall options with the limit exceeded only within 200m of the outfall itself.

Although the modelling was based on a peak discharge of 3 DWF the average discharge will be approximately 1.6 DWF. There is a linear relationship between the number of faecal coliforms in the receiving water and the volume of treated effluent being discharged. Therefore the average faecal coliform level could be up to 53% (1.6/3) lower than predicted for the peak 3 DWF. However the Blue Flag Beach Standard of 100No/100ml faecal coliforms would not be achieved at **Location A** without disinfection.

Bullen's Bay

The simulation results show that a proposed outfall to Bullen's Bay is suitable for the secondary treated discharge from Garrettstown Sewerage Scheme in respect to the bacterial impact and water quality of the bathing water standards. In the nearshore area predicted concentrations are well below the mandatory level of 1,000 No/100 ml faecal coliforms for either Location A or Location B (see figure 1 in Appendix G) even though Location A is in a slacker flow area.

A third outfall point, namely Location C (see figure 1 in Appendix G) was identified within the approach channel to the Inner Bullen's Bay, approximately 250m north east of the pier wall. The simulations show that the Bathing Water Standard of 1,000/100ml faecal coliforms is marginally exceeded at the Quay Wall for approximately 2 hours per tidal cycle in and around high water when a peak flow of 3DWF is applied. (The 1,000/100ml faecal coliforms standard has to be achieved by 80% of the samples with the standard not exceeded by any two consecutive samples in any one case).

As stated previously in reality the average discharge from the treatment plant would be controlled and average out at approximately 1.6DWF. In this instance, the faecal coliform levels would be well within the Bathing Water Standards of 1,000/100ml without disinfection.

Further survey and simulation work at detailed design stage could refine the location for the outfall even further. However for the preparation of this Preliminary Report cost estimates the cost of the Bullen's Bay outfall will be based on the discharge at Location C.

9.8 Cost Estimates

Cost estimates were prepared for each of the outfall locations. These were based on an assessment of the construction costs for the foreshore and offshore sections of the outfall as estimated by an experienced civil engineering contractor. The length of the outfalls at Locations 1 and 2 were also extended checked to ensure that there is a minimum depth of water at the end of the outfall of 2 metres. This is considered necessary in order to avoid an interference with swimmers and to provide protection to the outfalls from marine vessels. A summary of the costs for each outfall (foreshore and offshore only) option is set out below.

Table 9.4 Outfall Costings

	Bullen's Bay	Courtmacsherry Bay
Pipe diameter (mm)	250	250
Length - Foreshore (m)	76	101
- off shore (m)	232	205
Total (m)	308	306
Outfall - Foreshore	€64,980	€86,355
Outfall - Offshore	€626,400	€553,500
UV disinfection	-	€55,000
UV Operation Cost (NPV)	-	€12,000
Total	€691,380	€706,855

* NPV based on 5% rate of return over 20 years

It is clear from the cost estimates that there is very little in the difference in the construction of an outfall to Location Point C in Bullen's Bay versus an outfall to Location Point A in Courtmacsherry Bay. However the outfall at Location A in Courtmacsherry Bay requires a UV disinfection system with ongoing operation and maintenance to maintain the Blue Flag Beach Status at White Strand and Garrettstown Strand. If there is a failure in the working of the UV disinfection system then the water quality in Courtmacsherry Bay and the reputation of the area will be compromised.

9.9 Conclusions

Therefore, in concurrence with the recommendations of Hydro Environmental Ltd., the favoured outfall option is a secondary treated discharge to Bullen's Bay based on;

- less sensitive receiving waters;
- the availability of deep water close to the shore;
- prevailing winds that will deflect the surface plume seaward;
- less risk of failure to maintain water quality standard

9.10 Intertidal Survey of Bullen's Bay

Limosa Environmental Ltd. completed a littoral or intertidal survey and assessment of Bullen's Bay and an assessment regarding to the development of the proposed treated effluent outfall from Garrettstown WWTP into this bay. The aim of the survey was to map and classify the intertidal habitats of Bullen's Bay.

The report concluded that, *'despite the sheltered nature of Bullen's Bay, the proposed WWTP treated effluent emissions are considered unlikely to have a significant negative effect upon its littoral biotopes and is predicted to be a minor negative impact'*.

The full survey details are included as part of the Ecological Scoping Report in **Appendix J**. Refer to **Figure 9.2** in Appendix A for an Intertidal Biotope Map for Bullen's Bay.

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10.0 OPTIONS FOR COLLECTION SYSTEMS

10.1 General

Garrettstown has no existing public collection system. It is proposed to provide a foul only collection system that will serve developments along the main Ballinspittle to Lower Old Head road (R604) from Maw's Caravan Site to the west to Bullen's Bay to the east. Sewers will also be laid along the road north to Coolbane and south to Old Head from the Speckled Door Pub. The extent of the proposed collection system is shown in figures 10.1 and 10.2 in Appendix A and will be dependent on;

- the natural drainage catchment;
- economic viability of connecting to ribbon development;
- location of the wastewater treatment plant.

10.2 Alternatives

A conventional collection system to serve Garrettstown would comprise a combination of gravity sewers and pumping stations with rising mains due to the undulating topography.

A vacuum collection system was considered as it would remove the need for pumping stations and rising mains. A number of factors militated against the use of such a system. These were:

- High capital cost;
- Unfamiliarity with maintenance of such a system among Council Maintenance staff;
- Entire network becomes inoperable if vacuum is lost anywhere in the system;

An alternative to the vacuum system would be a pressurised system with separate pumping stations serving individual or clusters of houses and small diameter mains linking the pumping stations to a central pumping station. This system was not considered to be suitable due to;

- high operating costs;
- potential for blocking of pumps and pipework;
- need to find suitable locations for the package pumping stations, possibly in private property.

10.3 Proposed Scheme

The proposed collection system to serve Garrettstown will therefore comprise a combination of gravity sewers and pumping stations with rising mains. Precast concrete pipes with insitu concrete manholes are proposed for the gravity system. Generally, 225mm diameter pipes will be sufficient. Ductile iron pipes with high alumina cement mortar lining are proposed for the rising mains. 100mm diameter rising mains are generally proposed due to the low flows and the need to ensure adequate turnover in the rising mains, especially during the winter period.

Foul flows only will be collected for onward transmission to a wastewater treatment plant. The existing housing density is generally low and therefore, storm water will continue to discharge to soakaways or water courses as is current practice.

In consideration of either a stand alone wastewater treatment plant for Garrettstown or a wastewater treatment plant serving both Ballinspittle and Garrettstown, an option for the addition of the flows from Ballinspittle was considered. The proposed layout for Option A- Separate collection system for Garrettstown and Ballinspittle is shown in **Figures 10.1-10.2 in Appendix A** with design calculations included in **Appendix H**. The proposed layout for the addition of Ballinspittle Sewerage Scheme to the Garrettstown Sewerage Scheme is shown in **Figure 10.3 in Appendix A**.

10.4 Pumping Stations

The proposed collection system will comprise **four** package pumping stations. These will be submersible stations with a duty / standby pump arrangement. Motor starters and controls will be housed in a kiosk located adjacent to the pumping station. The Pump Stations will be designed to pump 6 Dry Weather Flow (DWF). The pump station flow rates for serving Garrettstown only are detailed in Table 10.1 below. If the flows from Ballinspittle are combined with the Garrettstown Flows then the pumping rates would need to be increased for proposed Pump Stations 1, 2 and 3 as shown in Table 10.1.

Table 10.1 Pumping Rates

	Garrettstown only (l/s)	Garrettstown and Ballinspittle (l/s)	Length of rising main (m)
Pump Station Nr 1	7.43	23.24	350
Pump Station Nr 2	12.19	28.00	609
Pump Station Nr 3	29.74	45.55	285
Pump Station Nr 4	7.39	7.39	395

A typical pumping station layout is shown in **Figure 10.4 in Appendix A**.

10.5 Emergency Capabilities

Malfunction of pumping stations may occur due to loss of electricity supply or due to equipment failure. It is recommended that no overflow facilities be provided from the pumping stations due to the sensitivity of the receiving waters. Instead, facilities will be put in place to minimise the risk of spillage from the sewerage system. These will include:

- Additional storage capacity to provide a minimum of 24 hours storage will be provided at each of the pumping stations to cater for emergency situation.
- Control kiosks will be fitted with sockets to allow mobile generators to be connected to the pumping station in the event of electricity power failure.
- A minimum of 50% standby capacity will be provided for all pumping plant.
- The telemetry system will dial out alarms to the operator / caretaker in the event of critical equipment or power failure.

The above provisions will ensure the minimum possible likelihood of an emergency spillage.

10.6 Option A - Separate collection system for Garrettstown and Ballinspittle

In this option the flows from Ballinspittle will stay independent of the proposed Garrettstown collection system and continue to flow to the local septic tank. The current treatment process will have to be upgraded however before discharge to the Ballinspittle River as it is currently overloaded.

Garrettstown - West Catchment

From MH F1.01 the proposed 225mm diameter PCC Foul Sewer Run 1 will gravitate in a southerly direction over a distance of 692 m to the proposed Pump Station No. 1 (ref. figures 10.4 and 10.5 in Appendix A). Foul Sewer Run No. 2 will also gravitate to this Pump Station over a distance of 315m (ref. figure 10.6). From here the sewage will be pumped over a distance of approximately 350m to the start of Foul Sewer Run 3.

From **MH F3.01** the sewage will fall by gravity over a distance of approximately 570m to the proposed Pump Station No. 2, located at the approximate site of the existing public toilets adjacent to Garrettstown Strand. (ref. figure 10.7) The flows from Glor na dTonn housing estate will be picked up by Foul Sewer Run No. 3. Foul Sewer Run 4 will gravitate from the east over a distance of approximately 610m to this Pump Station (ref. figure 10.8). From Pump Station No 2 the sewage will be pumped over a distance of 620m to the start of Foul Sewer Run 5 namely header MH F5.01.

From **MH F5.01** the sewage will fall by gravity over a distance of approximately 835m to the proposed Pump Station No.3 adjacent to the Pitch+ Putt Club (ref. figure 10.9). Gravity sewer Run No. 6 will gravitate over an approximate distance of approximately 425m to MH F5.04 (ref. figure 10.10).

From Pump Station No. 3 the sewage will be pumped over a short distance of approximately 260m to the proposed Waste Water Treatment Plant.

Garrettstown - East Catchment

Gravity flows from the Old Head Gravity Sewer Run No. 9 will gravitate over an approximate distance of 1,530m to MH F8.04 on Gravity Sewer Run No 8 (ref figures 10.14, 10.15 and 10.16). From **MH F8.01** the foul flows will fall by gravity over an approximate distance of approximately 400m to the proposed Pump Station No. 4 near Bullen's Bay (ref. figure 10.13).

From Pump Station No 4 the flows will be pumped over a distance of approximately 400m into the start of Foul Sewer Run 7. From **MH F7.01** the sewage will fall by gravity over a distance of approximately 785m to the proposed Pump Station No 3 (ref. figures 10.11 and 10.12) before being pumped to the proposed Waste Water Treatment Plant for treatment.

10.7 Option B- Single collection system for Garrettstown and Ballinspittle

Option B considers the flows from both Ballinspittle and Garrettstown. The existing combined foul and storm flows and future foul flows from Ballinspittle will gravitate as normal to the existing septic tank. It is proposed that a new (fifth) pumping station be located at the septic tank to collect all the flows from the Ballinspittle catchment for onward transmission via a 790m length of 100mm diameter ductile iron rising main to the high point along the road between Ballinspittle and Garrettstown. From here a 250m section of gravity sewer will need to be laid so that the Ballinspittle flows will gravitate into proposed Manhole F1.01 in the Garrettstown Sewerage system.

If the flows from Ballinspittle are combined with the Garrettstown flows then Foul Sewer Run No 5 will need to be 300mm diameter PCC rather than the 225 mm diameter sewer required to serve Garrettstown catchment only. As mentioned previously in Section 10.4 the pumping rates would also need to be increased for proposed Pump Stations 1, 2 and 3 as indicated in **Table 10.1** above.

11.0 VALUE ENGINEERING

11.1 Value Engineering Principles

Value Engineering is the systematic application of recognised techniques which identify the function of a product or service, establish a value for that function, and provide the necessary function reliably at the lowest overall cost. The required function should always be achieved at the lowest possible life-cycle cost that maintains the requirements for performance, maintainability, safety, and aesthetics.

11.2 Options Considered

A Value Engineering workshop was held on 7th December 2005 to consider the suitable options available for the Garrettstown Sewerage Scheme. The workshop was attended by members of the project team including staff from Cork County Council, the design team and the peer review group.

The options considered are listed hereunder

- Separate WWTP vs. combined WWTP for Ballinspittle and Garrettstown;
- Combined WWTP location- Garrylucas vs. near Bullen's Bay;
- Long sea outfall without UV disinfection vs. short sea outfall with UV disinfection;
- Outfall location- Courtmacsherry Bay vs. Bullen's Bay.

Subsequent to the value engineering workshop, site 3 was identified. The value engineering output was reviewed to consider site 3.

11.3 Methodology

The options were analysed under a number of criteria to determine the best option. The ten (10) criteria (A to J) and the level of preference (1-3) are as follows;

Table 11.1: Criteria considered for Value Engineering Exercise

A	Capital Cost
B	Operating Cost
C	Maintenance Cost
D	Security of Supply
E	Land Availability
F	Ease of Expansion
G	Ease of Maintenance
H	Environmental Impacts
I	Safety and Health
J	Programme

Table 11.2: Levels of Preference

1	Minor Preference
2	Medium Preference
3	Major Preference

11.4 Options Assessment

When the weighting of each criteria over the other criteria was completed preferences within each of the seven options emerged. The detailed assessments of the various options are included in **Appendix E**. A summary of the assessments is shown below in **Table 11.3** below.

Table 11.3 - Summary of Value Engineering Assessments

Alternatives	Separate WWTP	Combined WWTP
Weighting	18%	82%
Alternatives	WWTP Location- Garrylucas	WWTP Location- Bullen's Bay
Weighting	27%	73%
Alternatives	Long Sea Outfall	Short Sea outfall with UV disinfection
Weighting	54%	46%
Alternatives	Outfall to Bullen's	Outfall to Courtmacsherry Bay
Weighting	54%	46%

11.5 Outcome

The final recommendations based on the assessments described above are as follows:

- 1 Combined WWTP for Ballinspittle and Garretstown;
- 2 Combined wastewater treatment plant near Bullen's Bay;
- 3 Long sea outfall without disinfection;
- 4 Outfall to Bullen's Bay.

It should also be noted that an alternative WWTP site (Site 3) located near Bullen's Bay and adjacent to the Pitch & Putt Club became a viable option after the above Value Engineering exercise took place.

12.0 ENVIRONMENTAL CONSIDERATIONS

12.1 General

Garrettstown is situated in an area comprising considerable natural heritage and scenic amenities. In order to assess the optimum location for the proposed wastewater treatment plant and its associated collection system, an ecological and an archaeological assessment of Sites 1, 2 and 3 were carried out as all proposed sites are located near the Kilcolman Bog/Garrylucas Marsh pNHA Ref 087, Garrettstown Marsh pNHA Ref 01053 and The Old Head of Kinsale headland pNHA Ref 0100.

12.2 Ecology

Environmental Impact Assessment (EIA) is the term applied to the systematic examination of the likely impacts of development proposals on the environment, prior to the commencement of the development.

EIA requirements derive from EU Directive 85/337/EEC (as amended by Directive 97/11/EC) on the assessment of the effects of certain public and private projects on the environment.

Directive 97/11/EC introduced guidance by way of criteria for Member States in terms of deciding whether or not a development is likely to have significant effects on the environment. The criteria have been transposed in full into Irish legislation in the third Schedule of the European Communities (Environmental Impact Assessment) (Amendment) Regulations 1999 (S.I. No. 93 of 1999) and in Schedule 7 of the Planning and Development Regulations 2001 (S.I. No. 600 of 2001).

The primary objective of the EIA Directive is to ensure that projects which are likely to have significant effects on the environment are subject to an assessment of their likely impacts. The result of an EIA is assembled in a document known as an Environmental Impact Statement (EIS). This document looks at all the positive and negative effects of a particular project on the environment.

As part of the proposed Garrettstown Sewerage Scheme two reports were produced to assess the potential impact on the local ecology. They are as follows;

Sub Threshold Environmental Impact Assessment (EIA)

The proposed Garrettstown Sewerage Scheme is considered to be below the mandatory national threshold requiring an Environmental Impact Assessment (EIA), i.e., a wastewater treatment plant with a capacity to serve a PE greater than 10,000. WYG produced a report in August 2005 to determine whether or not the proposed sub-threshold development would have significant impacts on the environment and thereby necessitate an EIA.

The criteria contained in Schedule 7 of the Planning and Development Regulations 2001 (S.I. No. 600 of 2001) were used in deciding whether or not the proposed scheme and in particular the WWTP is likely to have a significant effect on the environment.

The report concluded that the proposed Garrettstown Sewerage Scheme is unlikely to have significant effects on the environment and therefore, a full EIA is not required. As part of the

sub- threshold assessment an ecological scoping document was produced by Sub-Consultant Dr. Lesley J. Lewis of Limosa Environmental Ltd.

Ecological Scoping Document

Limosa Environmental Ltd. was commissioned to produce an Ecological Scoping Document for each of the three sites (1, 2, and 3), identified as possible locations for the proposed WWTP. The report concludes that Site 3 is the most appropriate site based on the preliminary site assessment carried out. The main reasons cited are as follows;

- Site 3 is located at a greater distance from Kilcolman Bog/Garrylucas Marsh than Sites 1 and 2;
- The 'zone of influence' for Site 3 is smaller;
- There are no streams or wet ditches associated with Site 3.

The ecological scoping document also recommended further surveys, namely

- Phase I Habitat survey;
- Breeding bird survey;
- Mammal survey;
- Hydrological survey

in order to undertake an ecological impact assessment of the chosen WWTP site. It is recommended that the survey area includes the site of the chosen WWTP development, the immediate surrounding area, (including the portion of the marsh that occurs in closest proximity to the proposed development site and the transition area between the proposed development site and the marsh), and the route of the proposed pipeline (across natural or semi-natural habitats).

In addition Limosa Environmental Ltd completed a littoral (intertidal) survey and assessment of Bullen's Bay. This is discussed earlier in Chapter 9.

The full report is available in **Appendix K**.

12.3 Hydrology

12.3.1 Background

The Ecology Report prepared for Garretstown Sewerage Scheme (Limosa, March 2006; see Appendix K) classifies Kilcolman Bog as a fen wetland of regional and national importance. The report further states that the hydrology of a fen has a fundamental influence upon the type of vegetation present as well as the fauna which it can support. The hydrology of Kilcolman Bog (Garrylucas Marsh) was examined with respect to the potential impact of the proposed sewerage scheme on water levels in the bog.

12.3.2 General Description

Kilcolman Bog is a wetland area which is located approximately 200m north of White Strand, at Garretstown, Co.Cork. It occupies an area of nearly 22ha (14 acres) of wetland with the widest section at the western end and the narrowest at the eastern end.

Kilcolman Bog lies to the east of a ridge of land which runs in a north south direction through Garrylucas Point. The bog is bordered to the North, East and West by pastoral farm land and

to the South by Garrettstown Pitch and Putt Club, the regional road and White Strand. Refer to figure 2.1 in Appendix A for the general layout of Kilcolman Bog.

12.3.3 Geology and Hydrogeology

The underlying bedrock in the area is Carboniferous Marine Sandstone and Shales which have low permeability. At the eastern end of White Strand outcrops of shale are evident which would confirm the bedrock to be slate. Well card data from the Kilcolman area also show that the average depth to the bedrock from five sites is 2.5m with slate, shale or Old Red Sandstone being the predominant material. Because of the low permeability of the underlying rock, it can be assumed that there is little or no flow from groundwater from deep levels into the bog. There may be a small amount of groundwater flow to the bog resulting from rainfall in the adjacent fields percolating into the ground and finding its way to the bog.

12.3.4 Hydrology

The main sources of water flow into the wetland are precipitation directly onto the bog, the stream which flows into the northern side of the bog and surface runoff from the fields surrounding the bog. Flow measurements were taken on behalf of Cork County Council (AWN Report, July 2002). The average flow recorded from the stream was $0.005\text{m}^3/\text{s}$ which is very small when compared to the area of the bog. The predominant water supply to the bog is therefore considered to be rainfall and hence there are likely to be seasonal variations in water level.

As there is considered to be little or no flow of groundwater into bog and as the surface water inflow and outflow from the bog were found to be very low, the bog is considered to be essentially stagnant and is not flushed to any significant degree.

12.3.5 Potential Impacts

The proposed sewerage scheme for Garrettstown will have no impact on the stream entering or leaving Kilcolman Bog. The scheme will also not effect rainfall levels in the area. The construction of the wastewater treatment plant (WWTP) at site 3 could potentially impact on surface water runoff across fields. However, the footprint of the WWTP relative to the overall area of the surrounding land sloping to Kilcolman Bog would be extremely small. Also, any construction work below ground level may cut off shallow groundwater flow.

The construction of sewers along the road to the south of Kilcolman Bog is not considered to have any impact on the bog due to its distance fro the bog and because the topography of the area is sloping from the bog to the road??

12.3.6 Mitigation

It is considered that the proposed WWTP at site 3 will have minimal impact on surface water runoff across fields because of the size of the WWTP relative to the overall area of th surrounding land sloping to Kilcolman Bog. To mitigate any potential impact, impermeab surfaces will be minimised on the WWTP site.

In locations where structures on the WWTP site will be located below ground level, frer drains (trenches filled with broken stone or gravel) will be constructed around the struct thereby removing the possibility of any cut-off of ground water flow.

12.3 Archaeology

The Archaeological Services Unit (ASU) of University College Cork carried out an archaeological assessment of the proposed Garrettstown Sewerage Scheme. The assessment comprises;

- carrying out a desk top study of all available archaeological and historical literature;
- site inspection along the route of the proposed pipeline network, the two proposed waste water treatment plant sites and the two possible outfalls carried out in November 2005.

The proposed sewerage scheme is within an area rich in archaeological sites from the prehistoric to the post medieval periods. However, the proposed collection system is predominantly located along the existing road network in the area. Therefore, the location of the collection system is not considered sensitive in archaeological terms. The most sensitive archaeological areas within the proposed scheme are the proposed waste water treatment plant sites. These are greenfield sites and it is possible that sub-surface archaeological remains exist below the modern landscape.

The zone of constraint surrounding the site of the settlement cluster (RMP CO 124124-56). This area is protected by the National Monuments legislation and any development within the zone is subject to archaeological intervention.

However, there are no upstanding monuments within the proposed scheme and there will be no visual impact on any known archaeological site. In addition, there is no foreseen off-site, secondary or cumulative impact on the archaeological heritage.

However, the Archaeological Assessment concluded that, 'with the exception of a settlement cluster (RMP CO124-053) in Garrylucas townland the proposed sewerage pipe network does not intrude on the archaeological zone surrounding the recorded monuments present in the study area'.

The full report is available in **Appendix K**.

13.0 WASTEWATER TREATMENT PLANT DESIGN

13.1 Combined WWTP for Garrettstown and Ballinspittle

The option of providing a combined WWTP for Garrettstown and Ballinspittle was evaluated in the value engineering workshop and the recommendation was to provide a combined WWTP. The option is considered on a cost basis in this section. The cost of separate WWTPs for Garrettstown and Ballinspittle was compared with the cost of a combined WWTP together with the cost of the pumping station and pipework to transfer the waste flows from Ballinspittle to Garrettstown WWTP.

The costs are detailed in Appendix L and are summarised below in Table 13.1.

Table 13.1 – Cost Comparison for Combined vs. Separate WWTPs

Combined WWTP	Cost (€ incl. VAT)
WWTP at Garrettstown	3,121,073
WWTP Site	275,000
Ballinspittle Collection System	376,678
Increased sewer diameter to accommodate Ballinspittle flows.	18,955
Total (€ including VAT)	3,791,706
Separate WWTPs	
	Cost (€ incl. VAT)
Garrettstown WWTP	2,771,918
Garrettstown WWTP Site	235,000
Ballinspittle WWTP	834,466
Ballinspittle WWTP site	195,000
Total (€ including VAT)	4,036,384

The cost exercise shows that there is a clear economic advantage in providing a combined WWTP for Garrettstown and Ballinspittle. Operationally, a combined WWTP would function more efficiently as the Garrettstown loadings vary significantly between summer and winter while there is little or no seasonal variance in the flows from Ballinspittle.

13.2 Design Loadings

The design loading for the proposed combined sewerage scheme, as calculated in Chapter 6 of this Report, are summarised for five year periods in Table 13.2 below.

Table 13.2 Summary of Combined Load from Garrettstown and Ballinspittle

Year	2005	2010	2015	2020	2025
Summer Load(PE)	1,580	1,930	2,237	2,319	2,400
Winter Load(PE)	552	861	1,136	1,207	1,279

The option of phasing the construction of the WWTP was considered. At a minimum, it is recommended that the WWTP be provided for the 10 year design horizon (2015). However there is only a small increase in loadings expected between 2015 and 2025 and therefore little advantage to be gained from phasing. On the other hand, the cost of adding additional

capacity after 10 years would be more expensive than providing the small additional capacity now. It is recommended, therefore the WWTP be provided to treat the equivalent loading of 2,400PE.

13.3 Planning Permission Wastewater Treatment Plant

Prior to the approval of the contract documents for the construction of the wastewater treatment plant, planning permission (in accordance with the requirements of the Part 8 of the 2000 Planning and Development Regulations) must be attained.

13.3 Discharge Standards

Urban Waste Water Treatment Directive

The treated effluent from the proposed wastewater treatment plant and discharging to coastal waters of Bullen's Bay will have to achieve a minimum standard as set out in Table 13.4 below.

Table 13.4 Treated Effluent Standards

Parameters	Concentration	Minimum Standard
BOD ₅	25 mg/l O ₂	70-90
COD	125 mg/l O ₂	75
Total Suspended Solids	35 mg/l	90

It is not considered necessary to set a limit on Coliform levels as there will be a significant reduction in coliform numbers to meet bathing water standards in Bullen's Bay through dilution and dispersion.

Live Biovalve Mollusc Designation

It should be noted that the Department of Communications, Marine, and Natural Resources has confirmed that Bullen's Bay, is not a licensed area for the cultivation of shellfish such as oysters and particularly scallops. However it is reported that shellfish such as periwinkles are picked from the shore. Therefore, it is important that the treated effluent does not have a negative impact on water quality in Bullen's Bay.

In addition in accordance with the Quality of Shellfish Waters Regulations 1994(SI No 200 of 1994), 'a discharge affecting shellfish waters must not cause the suspended solids content of the waters to exceed by more than 20% the suspended solids content of waters not so affected'.

13.4 Constructed Wetlands

The option of using constructed wetlands as a means of treating the wastewater flows from Garrettstown and Ballinspittle was considered. Constructed wetlands, i.e. reed beds, treat waste water in a similar manner as conventional aerobic/anaerobic treatment processes. As with conventional treatment, an environment is created for the growth of bacteria. The treatment process is complex and involves interaction of various components of the wetland with pollutant removal mechanisms.

Quantification of the exact removal mechanisms is not completely understood, though it is generally recognised that the wetland plants enhance the removal of organic loading and nutrients e.g., Nitrogen and Phosphorus. The percentage removal efficiencies for various parameters like BOD₅, Phosphorus, Suspended Solids etc and their relationship to each other is as yet unresolved however.

Reed beds have been used on a large scale to provide tertiary treatment of effluent that has received secondary treatment. Research has shown that the use of reed beds to provide secondary treatment to UWWD standards has been limited to very small catchments, i.e., less than 100 PE. There is no evidence of reed beds providing primary and secondary treatment to UWWD standards.

Land requirements for a reed bed system are significant at approximately 25m²/PE which includes for 100% spare capacity for when the reed beds have to be replanted and desludged. Based on this, the area of reed bed required to serve the proposed Garrettstown Sewerage Scheme is 39,300 m² (3.93ha). This is more than the total area of 0.8ha identified for the entire WWTP.

The proposed wastewater treatment plant must be capable of dealing with the seasonal nature of the current flow as well as the proposed increase in flows due with the predictions for the future population.

13.5 Wastewater Treatment Plant Design

There are many wastewater treatment processes available on the market. The type of treatment plant chosen is dependent on the influent chemical and biological characteristics of the wastewater (total flow, BOD, Suspended Solids, Nitrogen, Phosphorus, Ammonia levels etc), the variation in the flow and load and also the assimilative capacity of the receiving waters. Typical processes that are likely to be used are as follows;

- Screening.
- Grit Removal.
- Monitoring and Sampling including Flow Measurement.
- Biological Treatment to provide secondary treatment e.g. aerobic digestion
- Sludge Thickening.
- Odour control

Inlet Works/ Preliminary Treatment

The aim of the pre-treatment is to remove as much, organic load and floating and suspended objects, as possible before primary treatment. Therefore the inlet works should include a mechanical screen and a bypass screen to remove large solids. The screens should have a maximum spacing of 6mm and be sized such that the maximum flow through the screens is 71m³/hour (6DWF). In addition, a washpactor will provide screen washing and compaction for the resultant screenings. A grit trap complete with a grit classifier is also recommended as part of the inlet works. The inlet works should be fully covered in order to minimise odour nuisance. The sewage arriving at the WWTP is likely to be septic because of the long lengths of rising main. In addition due to the corrosive nature of the gases emanating from sewage and the potential corrosion from the saline environment close to the sea all materials should be selected to be resistant to attack from sulphuric acid and other corrosive agents.

Secondary Treatment - Activated Sludge

Different systems are available to provide secondary treatment for municipal wastewater. For the purposes of determining land requirements, producing indicative layouts and preparing

detailed costs, the Sequence Batch Reactor (SBR) has been selected as a suitable treatment system for the Garrettstown WWTP.

SBR systems have been successfully used to treat both municipal and industrial wastewater and are ideally suited for wastewater treatment applications that are characterised by low or intermittent flow conditions. A SBR system can achieve good BOD and nutrient removal. In addition the SBR typically eliminates the need for separate primary and secondary clarifiers which reduces operations and maintenance requirements.

Disinfection

Disinfection will not be required for this Scheme based on the dilution and dispersion study of the receiving waters, namely Bullen's Bay. The WWTP should allow for the retrofitting of disinfection equipment however in case treated effluent volumes increase or the water quality standards if the receiving waters are tightened.

Monitoring and Sampling

The influent and effluent monitoring and sampling is required as follows:-

- Provision of raw sewage continuous flow monitoring and facilities for 24-hour composite sampling.
- Provision of final effluent automatic flow monitoring and facilities for 24 hour composite sampling.

Sludge

Secondary Sludge can be returned to the start of the SBR process. Waste sludge should be directed to storage and thickened in a picket fence thickener. A picket fence thickener will assist the sludge to thicken to approximately 3-4% dry solids. It is recommended that the sludge tank should be sized for 14 days storage. The volume of thickened sludge to be tankered off site would amount to 93m³ every 14 days. In addition the tank should be covered to prevent odours.

Sludge Disposal

Disposal of sewerage sludge is subject to the recommendations of the Sludge Management Plan for County Cork, (March 2000). County Cork has been subdivided into Regions numbered 18-22 for the purposes of municipal sludge treatment. As Garrettstown is located in Region 20 the current sludge management plan recommends that thickened sludge from the proposed Garrettstown WWTP be transported to the hub-centre of Ballincollig via the satellite location of Kinsale WWTP. The Cork County Sludge Management Plan is currently under review and the proposed Garrettstown Sewerage Scheme will comply with any amendments to same.

Storm Tank

A storm tank sized to store a minimum of 108m³ i.e., 2 hours x 3DWF, with an emergency overflow facility should be provided at the proposed wastewater treatment plant. The tank should be equipped with a tipping bucket for storm tank cleaning. A duty and standby storm water return pump arrangement may also be required.

Electricity and Water Supply

A three phase electricity supply is required for the site. The installed supply will be dependent on the chosen process. In addition a water supply will also be required to provide wash water etc for the site.

Control and Instrumentation

A SCADA system will facilitate automated and remote process control of the proposed waste water treatment plant.

The treatment process will be considered further at detailed design stage when a decision on the procurement process is made. This will in effect decide whether a traditional specification type design or a Public Private Partnership (PPP) type performance based specification is produced. If a PPP type procurement contract is chosen there will be room for the successful Contractor to put forward a wide variety of efficient treatment processes capable of delivering the required discharge standards.

Aside from the treatment process, mitigation measures will be mandatory in the wastewater treatment plant to maintain noise and odour emissions within recognised and acceptable limits at the site boundary.

A layout of the wastewater treatment plant is shown in **Figure 13.1** in Appendix A.

13.6 Foreshore Acts 1933 and 1992

The foreshore is the land and seabed between the high water mark on Ordnance Survey Maps and the 12 nautical mile limit. It is a requirement under the above Acts to apply for a Foreshore Licence for all new and existing outfalls discharging foul or storm water to coastal or tidal estuaries. The Department of Communications, Marine and Natural Resources (DCMNR) is the Government Department responsible for reviewing applications and granting licences. This licence is subject to an annual rent payable to the government or alternatively a fixed fee may be agreed.

14.0 CONCLUSIONS AND RECOMMENDATIONS

14.1 Conclusions

There are no public sewerage facilities in Garrettstown which has two Blue Flag Beaches and is a popular tourist resort during the summer months. The collection system in Ballinspittle is adequate to serve the current and future flows however the existing septic tank in Ballinspittle is overloaded. Therefore it is recommended that a public sewerage scheme including a wastewater treatment plant to provide secondary treatment be provided that will serve the current and future needs of Garrettstown, Ballinspittle and environs

14.2 Recommended Works

It is recommended that the existing Ballinspittle Sewerage Scheme be connected to the Garrettstown Scheme. The works for the Garrettstown Sewerage Scheme including the Ballinspittle works are summarised below;

GARRETTSTOWN

- Provision for 6,230 m of a 225mm diameter PCC gravity sewer and associated manholes;
- Provision for 1,640m of 100mm diameter DI rising main and associated chambers;
- Provision for 4No. package type pump stations;
- Provision of a waste water treatment plant located near the Garrettstown Pitch+Putt Club to provide secondary treatment for PE of 2,400;
- Provision of 1,560m of a 250mm diameter outfall to Bullen's Bay in order to meet Bathing Water Standards in the vicinity of the pier.

BALLINSPITTLE

- Provision of a Pumping Station at the site of the existing septic tank;
 - Decommissioning of the existing septic tank;
 - Provision of approximately 250m of 225mm diameter precast concrete(PCC) gravity sewer and associated manholes;
 - Provision of approximately 790m of 100mm diameter ductile iron rising main and associated chambers.
- The recommended scheme is shown in Figure 14.1.

15.0 ESTIMATE OF COSTS

15.1 Introduction

The cost estimates prepared in this Preliminary Report include the total costs for the new scheme to serve Garrettstown and Ballinspittle. No phasing of the works is envisaged. The calculation of the costs is included in Appendix L and the summary is shown below in table 15.1

Table 15.1 Summary of Cost Estimates

Description	Amount (€)
Garrettstown Collection System	2,314,839
Ballinspittle Collection System	331,875
Wastewater Treatment Plant	1,346,125
Outfall	1,403,719
Sub-total	5,396,558
VAT @ 13.5%	728,535
Total Contract Costs	6,125,093
Non-Contract Costs	1,070,200
Overall Total	7,195,293

15.2 Unit Costs

The calculation of the unit costs is set out below and is based on the PE for Phase 1 of the scheme.

Table 15.2 Unit Costs

PE	2,400
Cost per PE	€2,998

16.0 OPERATION AND MANAGEMENT STRATEGY

16.1 Level of Service

The target level of service for the Garrettstown Sewerage Scheme is set out below:

- **Collection System;** The proposed public foul sewer collection system (gravity sewers and rising mains) for Garrettstown should be sized to cater for the seasonal variation in flows and thereby avoid septicity.
- **Pumping Station;** pumps should be sized to avoid pumping longer than 16 hours per day to allow time for repair or maintenance. As the pumping stations will be located adjacent to amenity areas the primary concern will be ensuring no odour or noise nuisances.
- **Treatment;** Modular wastewater treatment plant proposed to cater for the seasonal variation in flow. Appropriate level of treatment as per the Environmental Protection Agency Act, 1992 (Urban Waste Water Treatment); Secondary Treatment to a standard of 25mg/litre BOD and 35mg/Litre of suspended solids will be the minimum standard achieved prior to discharge to receiving waters.
- **Outfall;** Sea outfall to Bullen's Bay. Bathing Water Quality Standards to be maintained in receiving waters at all times
- **Storm Water Overflows;** No storm water overflows to be provided at pump stations due to the sensitive nature of the receiving waters

16.2 Management Strategy

Day-to-day operation and maintenance of the collection system will be the responsibility of the Curator under the direction of the Supervisor and the Kinsale Area Engineer. The WWTP may also be operated and maintained by the Curator or by a private service provider retained under a design, build and operate contract.

This is the subject of a separate Public Private Partnership Assessment report

LIST OF ABBREVIATIONS

AC	Asbestos Cement
CaCO ₃	Calcium Carbonate
CI	Cast Iron
Cu	Copper
CSO	Central Statistics Office
m ³ /d	cubic metres per day
m ³ /s	cubic metres per second
d	day
DEHLG	Department of the Environment, Heritage and Local Government
DO	Dissolved Oxygen
DI	Ductile Iron
DWF	Dry Weather Flow
EPA	Environmental Protection Agency
Fe	Iron
gals	Gallons
gpd	gallons per day
gpm	gallons per minute
GSI	Geological Survey of Ireland
GL	ground level
hr	hour
km	kilometres
km ²	Square kilometres
lin.m.	linear metres
l	litre
MAC	Maximum Admissible Concentration
m	metre
mOD	metres Ordnance Datum (Malin Head)
mg	milligrams
mg/l	milligrams per litre
mm	millimetre
mgd	million gallons per day
NO ₃	Nitrate
NH ₄	Ammonia
PVC	Polyvinyl Chloride
PSTN	Public Service Telephone Network
PS	Pumping Station
PWS	Public Water Scheme
SCADA	Supervisory Control & Data Requisition
UFW	Unaccounted for Water
uPVC	Unplasticised Polyvinyl Chloride