



# National Certificate of Authorisation Programme (NCAP)

## Site Assessment Report A0110: Garristown 1

### Document Control Sheet

Client:	Irish Water		
Project Title:	National Certificate of Authorisation Programme		
Document Title:	NCAP Site Assessment Report: <b>A0110 Garristown 1</b>		
Document No:	MGW0256RP002-A0110 Garristown		
Text Pages:	15	Appendices:	6

Rev.	Status	Date	Author(s)		Reviewed By		Approved By	
A01	Approval	27 <sup>th</sup> September 2018	TL	<i>Timothy L. Healy</i>	MMcG/KH	<i>[Signature]</i>	PJG	<i>[Signature]</i>

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# 1 INTRODUCTION

Irish Water has engaged RPS to assist in the delivery of the National Certificate of Authorisation Programme (NCAP). The primary objectives of the NCAP are as follows;

- Ensure compliance with the requirements of the Waste Water Discharge Authorisation (WWDA) Certificate of Authorisation.
- Identify appropriate improvements to the waste water treatment plant, which are necessary to ensure all discharge(s) from the agglomeration contribute towards achieving at least good status in accordance with the European Communities Environmental Objectives (Surface Waters) Regulations 2009 and/or the European Communities Environmental Objectives (Groundwater) Regulations 2010.
- Assess all secondary discharge points, storm water overflows and emergency overflows within the agglomeration using the Irish Water Stormwater Overflow Assessment Template to identify and determine the integrity, effectiveness of operation and improvements necessary to ensure compliance with the requirements of the relevant Certificate of Authorisation.
- Replace existing infrastructure where economically feasible having carried out a detailed assessment of alternatives and following the completion of a cost benefit analysis.

## 1.1 SITE ASSESSMENT REPORTS

The initial stage of the NCAP will include the preparation of a Site Assessment Report (SAR) for each of the agglomerations included within the programme. The primary objective of the SAR will be to assess the impact of the discharges from each agglomeration on the receiving water for sites that discharge to surface waters and to receptors for sites that discharge to groundwater.

A SAR relating to the impact of the waste water treatment plant (WWTP) discharges on the receiving surface waters will be largely based on the findings of desktop assessments including Waste Assimilative Capacity (WAC) assessment and additional reports previously prepared for Irish Water. All sites discharged into a waterbody identified as Under Pressure by the Water Framework Directive review were automatically visited. Where a site visit has taken place, the SAR will also include a Small Stream Risk Score (SSRS) Assessment and details collected during the site visit.

## 1.2 SITE ASSESSMENT SUMMARY

This report is the SAR for the **Garristown 1** agglomeration, located in **Fingal, Co. Dublin**. The agglomeration includes the following discharges:

- Primary discharge from Garristown 1 wastewater treatment plant to the DELVIN\_010 receiving water.

The wastewater treatment plant (WWTP) was selected for a visit as the receiving waterbody was identified as being under pressure to achieve the WFD objectives.

**Table 1.1 – Site Assessment Summary**

Parameter	Value
Agglomeration Name	Garristown 1
Local Authority	Fingal
Certificate Number	A0110
Primary Discharge Receiving Waterbody	DELVIN_010
Primary Discharge Receiving Water Body Type	River
Fresh Water Pearl Mussel	No
Additional Agglomeration Discharges	None
Level of Treatment at WWTP	3- Tertiary & NR
Destination of WWTP Sludge	Oldtown WWTP
WAC Calculation Assessment	No Evidence of Impact
Effluent Data Availability	Full
Site Visit	26 <sup>th</sup> March 2018
Small Streams Risk Score Assessment	No Apparent Impact

### 1.3 REFERENCE DATA

The following reference data was used to complete this Site Assessment Report:

- Irish Water Asset Database for Wastewater Certificate Sites. Issued to RPS August 2017.
- Irish Water Effluent Average Effluent Results for 2014-2016. Issued to RPS August 2017.
- Irish Water Effluent Average Effluent BOD Results for 2014-2017. Issued to RPS July 2018.
- EPA Certificate of Authorisation Application and Supporting Documentation including Applicant and EPA correspondence. Accessed and downloaded online (<http://www.epa.ie/licensing/watwaste/wwda/>) August 2017.
- Notes from RPS Site Visit with Fingal County Council on the 26<sup>th</sup> of March 2018.
- Irish Water Sludge Removal Record spreadsheet. 20-October-2017. Issued to RPS December 2017.
- Irish Water Domestic Census Data for Certificate Sites. Issued to RPS March 2018.

To complete the process loading assessments that have been completed, the following reference specifications have been consulted.

- Irish Water Specification 700-99-01: Flow measurement.
- Irish Water Specification 700-99-02: Inlet Works and Storm Water.
- Irish Water Specification 700-99-07: Primary Treatment Standard
- Irish Water Specification TEC-600-01: Physical Site Security Policy
- EPA (1) Preliminary Treatment and (2) Primary Secondary and Tertiary Treatment Manuals.
- Scottish Water: Functional Specifications: Wastewater Treatment Works Section 301: Wastewater Treatment Works. Version 5.0.

## 2 DESIGN POPULATION & LOADINGS

The original agglomeration PE from the certificate application submitted in 2009 was estimated to be 320. This agglomeration PE was estimated based on a house count as indicated in the original application, however details of the number of houses was not provided.

The original certificate estimation does not correlate well with the 2017 PE Estimate provided by Irish Water, based on updated census information which indicates an agglomeration PE of 487. A breakdown of the 2017 PE calculation is provided in [Appendix A](#).

For the purpose of this site assessment a PE of 487 has been used as it represents the worst case scenario. A review of the agglomeration loadings, both domestic and non-domestic should be completed to confirm the current PE loading to the WWTP.

**Table 2.1 – PE Estimate for Agglomeration**

Parameter	Original Certificate	Irish Water 2017 Estimate	PE to Be Used for Assessment
Domestic PE	288	412	412
Non-Domestic PE	32	75	75
Total PE	320	487	487

\* The PE breakdown was not provided in the certificate application. The non-domestic PE has therefore been assumed to be 10% of the total PE value.

The original certificate application indicates that the WWTP has design capacity of 1500 PE. The plant was upgraded in 2008/2009 and the original design capacity of the plant had been 200 PE. A summary of the current WWTP capacity against the estimated current loading is summarised in [Table 2.2](#).

**Table 2.2 – Treatment Capacity Overview**

Parameter	Value
Status	Unknown
Original Design Capacity (PE)	1500
Current Estimated Treatment Capacity (PE)	Unknown
Current Loading (PE)	487
Available Headroom	Unknown

A more detailed overview of the WWTP process units and capacities are provided in [Section 3](#). The methodology used to estimate the treatment capacity indicated in [Table 2.2](#) above is outlined as part of this assessment.

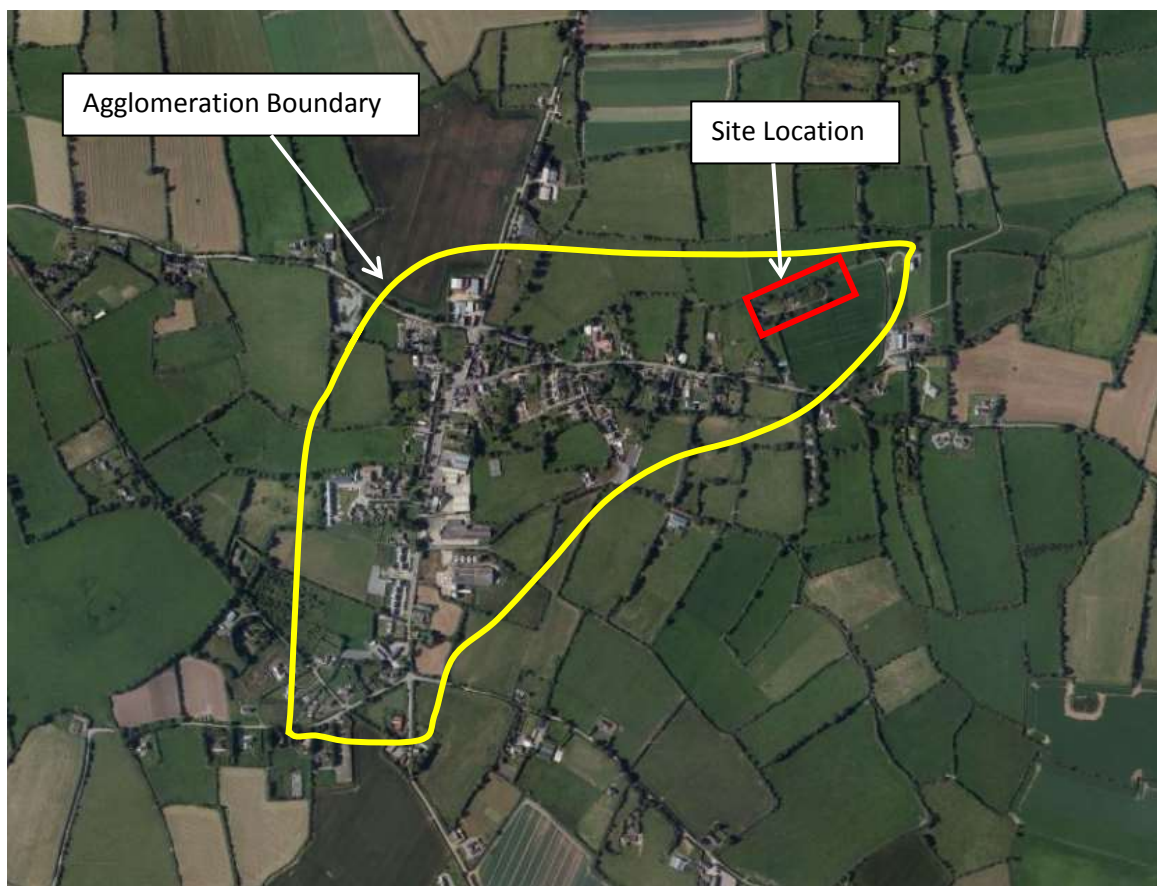
### 3 WWTP SITE & PROCESS DESCRIPTION

#### 3.1 OVERVIEW OF AGGLOMERATION AND SITE DESCRIPTION

The Garristown 1 agglomeration is situated in the north west of the Fingal Administrative area. The Garristown 1 WWTP is located to the east of Garristown village. The sewage flows to the WWTP by gravity. The sewer network is thought to be foul only however the caretaker suspects there is infiltration to the network. Access to the site is along a right of way (ROW). The site is located on council owned property. The site is surrounded by agricultural land.

The WWTP is surrounded by concrete post and tennis wire fencing. There is a lockable gate at the entrance to the council owned site and there is also a gate at the start of the access from the public road.

Figure 3.1 – Satellite View of Agglomeration<sup>1</sup>



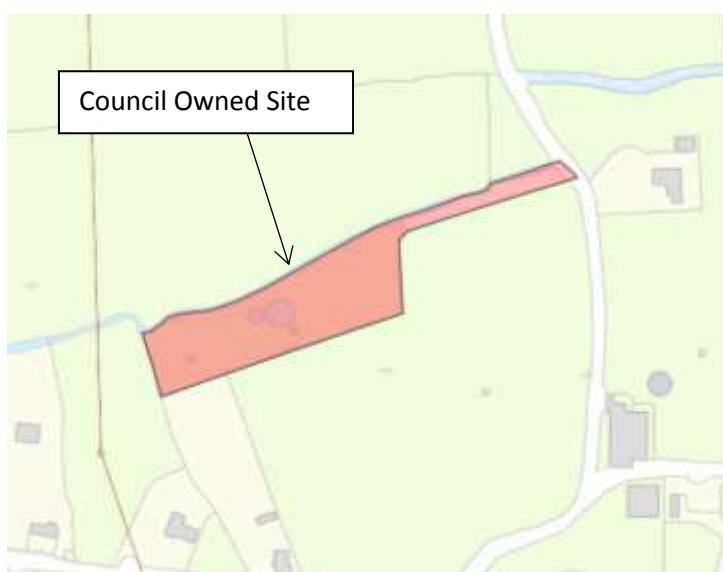
<sup>1</sup> Accessed on Bing Maps 20.09.2018.

**Figure 3.2 – Satellite View of WWTP and Effluent Discharge Location<sup>2</sup>**



A review of information from the Property Registration Authority (via landirect.ie) indicates the site boundary is as expected, and does not identify any wayleaves or right of ways within the immediate WWTP area as presented in **Figure 3.3**. The caretaker indicated the WWTP site is a council owned property. The caretaker also indicated that the council owned property did not extend to the public road and that there was a ROW in place between the road and the site. The extent of land associated with the single folio in **Figure 3.3** includes the access from the main road. The boundary of the council owned site and whether this site has been transferred into Irish Water ownership needs to be investigated by Irish Water and regularised if required.

**Figure 3.3 – Review of Site Boundary<sup>3</sup>**



<sup>2</sup> Accessed on Bing Maps 20.09.2018.

<sup>3</sup> Accessed on landirect.ie 20.09.2018.



A site layout plan is provided in **Appendix B**.

Garristown 1 WWTP contains the following:

- WWTP process units and storm water bypass.
- A small control building with: welfare facilities, process monitoring control panel, storage.

### 3.2 PROCESS DESCRIPTION

Details of the treatment process are summarised in **Table 3.1** below. Outline asset information, where available is also provided. A Process and Instrumentation Diagram which was taken from the original application is provided in **Appendix B**.

**Table 3.1 – Process Unit Descriptions**

Unit	Description	Outline Asset Information
Inlet to WWTP	The sewage flows to site via gravity in a 225mm diameter PVC pipe.	225mm Ø
Storm Water Process Bypass	There is an overflow located at the inlet manhole upstream of the inlet screen. The storm water overflows into a storm holding tank.	
Storm Water Tank	The storm holding tank is located directly beside the inlet screen. It consists of a decommissioned oxidation ditch. The storm flows are fed back into the pump sump when adverse weather conditions have ceased as indicated by the caretaker however this information is not visible on the certificate Process and Instrumentation Diagram.	
Inlet Pumping Station	The inlet pumping station is located after the inlet screen. It pumps the sewerage into the SBR system when the fill phase is required. The pump sump must also provide adequate storage to retain influent flows while the SBR cycle is active. The pumping rate is indicated on Certificate documents as 42.2m <sup>3</sup> /hr.	Volume: 4.68m <sup>3</sup>
Balance Tank	There is also a 34.26m <sup>3</sup> balance tank which also can take flows from the inlet pumping station. From the P&ID this balance tank overflows to the storm tank/oxidation ditch and it is emptied to the Drain Pump (downstream of sand filter) and returned by pump to the inlet pumping station for forwarding to the SBR. The balance tank is used to supplement the volume of the SBR during high flows.	Volume: 34.26m <sup>3</sup>
Sequencing Batch Reactor	The Sequencing Batch Reactor (SBR) process is the main treatment provided on site and is a form of activated sludge treatment. The onsite process employs a 5 stage cycle: fill, react, settle, empty and rest. There is an aerator and a D.O. probe within the unit to provide aeration and ensure the dissolved oxygen levels are maintained. The unit dimensions were not measured however measurements were supplied from site drawings supplied by the caretaker. The working volume of the SBR unit is 734.6m <sup>3</sup> .	Volume: 734.6m <sup>3</sup>

Unit	Description	Outline Asset Information
Equalisation Tank	Effluent from the SBR unit flows to the equalisation tank. This tank has a working capacity of 337.5m <sup>3</sup> . The equalisation tank is in place to ensure adequate storage and controlled flow to downstream sand filter treatment, given the nature of the upstream SBR.	Volume: 337.5m <sup>3</sup>
Sand Filter	Effluent is pumped from the equalisation tank to the sand filter with an emergency overflow from the filter back to the equalisation tank. Backwashing is completed from a backwash tank. Treated effluent is used for backwashing. The sand within the filter is replaced during the annual service.	
Ozone Vessel Reactor	Ozone treatment occurs on the effluent within an ozone reactor vessel located downstream of the sand filter. An ozone generator is located on site.	
Effluent Discharge	Effluent is discharged into the receiving water located directly beside the site. The effluent discharge pipe size is unknown however it is estimated to be 150mm.	
Sludge Storage	Sludge is stored onsite in the existing old clarifier. Decant from the tank is pumped to the inlet pumping station controlled by a manual valve operation. The volume of the sludge holding tank is 34.68m <sup>3</sup> .	Volume: 34.68m <sup>3</sup>

### 3.3 REVIEW OF TREATMENT CAPACITY

Basic hydraulic and organic loading calculations are provided in **Appendix C**. Where possible additional process capacity calculations have been completed. The estimated capacities of the process units along with the overall estimated capacity of the WWTP are summarised in **Table 3.2**.

**Table 3.2 – Summary of Estimated Capacity for Major Process Units**

Process Unit	Capacity	Comments
Balance Tank	7.5 hrs at DWF	The balance tank is used as a buffer to store sewage during the operating cycles of the SBR and feed this sewage back into the SBR when required. The balance tank has a working capacity of 34.26m <sup>3</sup> . This equates to 7.5 hours at DWF.
Sequencing Batch Reactor	Unknown	The capacity of the process unit was estimated to be 1500 PE based on information supplied in the original application certificate. The original final effluent quality design standards and organic loading used are not known.
Sludge Storage	Sufficient	Sludge is stored in an old clarifier unit onsite. The sludge is removed twice a week to Oldtown WWTP. There is approximately 19,000 litres removed per tankering.
Overall WWTP Capacity	Unknown	It was not possible to determine the capacity of the SBR treatment process as no design information was available.

### 3.4 REVIEW OF CURRENT OPERATIONS

A site visit was undertaken on the 26<sup>th</sup> of March between RPS and representatives from the Local Authority. Photos from the site visits are presented in **Appendix D**. A high level summary of observations for each major process unit, including identifying any concerns with asset or equipment condition is provided in **Table 3.3**.

**Table 3.3 – Process and Condition Observations from Site Visits**

Process Unit	Observations from Site Visit
Inlet Screen	No issues identified.
Pump Sump	No issues identified.
Storm Water Tank	No issues identified.
Sequencing Batch Reactor	No issues identified
Equalisation Tank	No issues identified
Sand Filter	No issues identified.
Sludge Storage	No issues identified.

**Table 3.4** provides a general review of operations and any identified issues or risks. The following elements have been assessed:

- **Flow Management** – the ability of the site to manage process (flow to treatment) flows in dry-weather and storm flow conditions
- **Asset Condition** – identification of any known or potential issues with mechanical, electrical equipment and instrumentation, or any known or potential issues with including structural concerns with the major process units
- **Process Performance** – any observations as to the potential efficacy of the treatment process including identification of any known or potential issues.
- **Site Operations** – a review of sludge management and any other general issues that require excessive manual intervention
- **General Site Observations** – any general major issues including Security, Health and Safety, Power Supply, and Site Access Issues.

**Table 3.4 – Review of Current Site Operations**

Category	Element	Comments
<b>Flow Management</b>	Flow to Treatment	The sewer network is indicated as foul on in the Certificate however the caretaker suspects there is infiltration and it has been assessed as a combined sewer. There is an SWO in place prior to the inlet screen. The storm water is held in a storm holding tank where it is transferred back into the pump sump. Storm flows are not reported to impact the WWTP.
<b>Asset Condition</b>	Process Units	There were no issues identified with the process unit's on site.
	MEICA	There were no issues identified with the MEICA on site.
<b>Process Performance</b>	Treatment Performance	Limited effluent data representing annual averages is available in <b>Section 4, Table 4.3</b> . The effluent data indicates very good effluent treatment results. There is good removal of BOD and Orthophosphate and there is nearly total nitrification occurring within the plant.  The treatment reduces the biological load to below the theoretical standards required by the WAC. It reduces the Total Nitrogen and Total Phosphorous in the effluent to below 15mg/l and 2mg/l respectively as stated in the application information.
	Process Control and Monitoring	The process is automated. There is flow monitoring. There is process monitoring. There are remote alarms.
	Chemical Use	Ferric dosing is used onsite in the treatment process.
<b>Site Operations</b>	Manual Intervention Required	There is no significant manual intervention required.
	Sludge Management	There are no sludge removal records on the Irish Water sludge removal database.
<b>Site Considerations</b>	Health and Safety	There are no health and safety concerns onsite.
	Site Access	There is adequate sludge tanker access onsite.
	Security	The site is surrounded by concrete post and tennis wire fencing approximately 1.8 – 2.0m high which is lower than the Irish Water security specification however it provides a good level of security for the site. There is a lockable gate upon entrance to the site.
	General Site Considerations	No issues identified.
	Flood Risk	The caretaker did not indicate there were any previous incident of site flooding.

## 4 EFFLUENT DISCHARGE IMPACT TO RECEIVING WATERS

### 4.1 DESIGNATION OF RECEIVING WATERS

The Garristown 1 WWTP discharges to the DELVIN\_010 River. The designation of the receiving waters is outlined in **Table 4.1**, below.

**Table 4.1 – WFD Status of Receiving Waterbody**

Designation
WFD Status – Poor
WFD Risk Status – At risk Identified As Under Pressure 2017
Fresh Water Pearl Mussel Designated Catchment: No
Available Dilution
95 <sup>th</sup> Percentile Flows – 31:1 Mean Flows – 166:1

### 4.2 ASSESSMENT OF IMPACT OF WWTP DISCHARGE

#### 4.2.1 Overview of WAC Assessment Methodology

To assess the potential impact of the wastewater effluent discharge to the receiving waterbody a Waste Assimilative Capacity (WAC) calculation was completed to assess the waterbody’s capacity to receive the effluent discharge without causing significant deterioration to water quality as per the Water Framework Directive (WFD). The calculation inputs and outputs are summarised below. The detailed WAC Calculation can be found in **Appendix E**.

**Table 4.2 – Summary of WAC Calculation Inputs and Outputs**

Parameters Assessed	Calculation Inputs	Calculation Outputs
Biological Oxygen Demand	River/Stream flows (95%-ile and mean)	Two scenarios are assessed for the receiving waterbody: <ol style="list-style-type: none"> <li>1. The 95<sup>th</sup> percentile receiving waterbody flows with 95%-ile allowable downstream calculation</li> <li>2. The mean receiving waterbody flows with mean allowable downstream calculation</li> </ol> The following is outputted: <ol style="list-style-type: none"> <li>a) Theoretical Allowable Effluent Discharge Limits (Table 4.3)</li> <li>b) Resultant Downstream Concentration in Receiving Water (Table 4.4)</li> <li>c) % of Waste Assimilative Capacity used by WWTP including allowance for upstream background concentrations (Table 4.4)</li> </ol>
Ammonia	Effluent data Upstream nominal background data	
Orthophosphate	Allowable downstream concentration (95%-ile and mean)	

It has been assumed that the receiving waters will achieve good water status upstream of the discharge from the agglomeration. Therefore the following notional background concentrations have been used for the receiving waterbody:

BOD: 0.260 mg/L	NH <sub>3</sub> -N: 0.008 mg/L	Ortho-P: 0.005 mg/L
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The WAC calculation will determine which of the following three categories the discharge would fall into:

<b><u>No Evidence of Impact</u></b>	<b><u>Potential Impact</u></b>	<b><u>Higher Potential Impact</u></b>
All parameters are below 90% of the waste assimilative capacity	Indication that at least one parameter is over 90% of Waste Assimilative Capacity of the Receiving Waterbody	At least one parameter is in excess of 100% of the Waste Assimilative Capacity

#### 4.2.2 Effluent Target and Level of Treatment Required for Certificate Sites

For NCAP sites, the proposed effluent target will be based on the allowable effluent concentration as determined by the Mean Flow scenario in the WAC Calculation. Where the effluent is discharged into a waterbody that has been identified as a Fresh Water Pearl Mussel sensitive catchment, the effluent concentration will be determined by the 95<sup>th</sup> percentile flow scenario.

A minimum of primary treatment is required regardless of the calculation outcome, with secondary treatment required as a minimum where the available dilution at the 95<sup>th</sup> percentile flows is less than 400:1.

#### 4.2.3 WAC Assessment

The WAC calculation was completed using effluent data provided by Irish Water from 2014-2016. The data provided represented annual averages. Individual sample results were not available for analysis. For reference the number of data points used to complete the WAC calculation has also been provided. As part of the NCAP assessment, the WAC calculations were completed for all agglomerations in Autumn 2017. Updated effluent data from 2017 has been provided for comparison.

**Table 4.3** summarises the effluent data used to complete the WAC assessment and the theoretical allowable effluent concentration of the target parameters.

**Table 4.3 – Analysis of Allowable Effluent Quality**

Data Set	BOD (mg/l)	Ammonia (mg/l)	Ortho Phosphate (mg/l)
Effluent Data Used for WAC Calculation Average of 2014-2016 Results	0.7	0.0	0.1
Updated Effluent Results 2017 for Comparison	1	<0.03 – 0.07	<0.03 – 0.09
Available Data Points to Complete WAC Assessment (maximum 3)	2.0	1	1
Allowable Effluent Concentration (95 <sup>th</sup> percentile Flows)	74.6	4.2	2.2
Allowable Effluent Concentration (Mean Flows)	206.8	9.5	5.0

The calculated theoretical resultant concentrations in the receiving waterbody downstream of the WWTP are summarised in **Table 4.4**. This calculation is based on the average effluent data presented in the **Table 4.3**. The waste assimilative capacity (%) has been calculated assuming notional upstream concentrations as outlined above.

**Table 4.4 - Downstream Surface Water Quality and Waste Assimilative Capacity Used**

Flow Scenario	Parameter	BOD	Ammonia	Ortho Phosphate
95 <sup>th</sup> Percentile Flows	Calculated Downstream Concentration in Receiving Waterbody After Wastewater Effluent Discharge (mg/l)	0.3	0.010	0.010
	Allowable Resultant Concentration in Receiving Waterbody after Discharge (mg/l)	2.6	0.14	0.075
	% of Available Waste Assimilative Capacity Used	1	0	4
Mean Flows	Calculated Downstream Concentration in Receiving Waterbody After Wastewater Effluent Discharge (mg/l)	0.260	0.010	0.010
	Allowable Resultant Concentration in Receiving Waterbody after Discharge (mg/l)	1.5	0.065	0.035
	% of Available Waste Assimilative Capacity Used	0	0	2
WAC Assessment Conclusion		No Evidence of Impact to Receiving Waterbody		

#### 4.2.3.1 WAC Assessment Conclusion

The WAC assessment indicates that the discharge is likely to have no evidence of impact on the receiving waterbody. This is as a result of the excellent effluent data sample results, however this is based on a low number of effluent samples.

#### 4.2.3.2 Statement on Ability of WWTP To Achieve Effluent Target

Currently the recommended effluent target for certificate WWTPs will be predominantly based on the WAC Calculation from the Mean Flow Scenario as outlined in **Table 4.3**. As the available dilution is less than 400:1, a minimum of secondary treatment is required and this is provided as part of the treatment process. The current process is more than sufficient to achieve the relevant effluent targets.

### 4.3 SMALL STREAM RISK ASSESSMENT

A small stream risk assessment was completed for the site. Garristown WWTP discharges into the Delvin, tributary of Garristown River. Upstream of the discharge the SSRS was 1.6 indicating that the watercourse is At Risk, while downstream of the SSRS was 0.8 indicating that the watercourse at this location is also At Risk.

There is no significant change in SSRS risk from upstream to downstream and therefore, there is no apparent impact on the macroinvertebrate community from the discharge. A full copy of the report is provided **Appendix F**.

### 4.4 STORM WATER OVERFLOW

There are no identified Storm Water Overflows within the WWTP. The process flow diagram which was located in the control building onsite did not display an emergency overflow from the pump sump or from the storm holding tank. It is recommended that this issue be investigated and amended if there is in fact an SWO located onsite.



## 5 CONCLUSIONS & RECOMMENDATIONS

### 5.1 CONCLUSIONS

The following conclusions are presented from this Site Assessment Report:

<b>Impact to Receiving Waterbody Water Quality</b>	<b>No Evidence of Impact</b> to Receiving Water Body
<b>Site Intervention Recommendation</b>	No Intervention Required At This Time

The above conclusions are based on the information summarised in **Table 5.1 and Table 5.2.**

**Table 5.1 – Summary of Impact to Receiving Waterbody**

Parameters Assessed	Traffic Light Risk	Conclusion
WAC Assessment		The WAC calculation indicates that there no impact to the receiving water body.
Effluent Data Availability		There is less than sufficient effluent data available for the WAC calculation to be completed. There is only 2 data points available for BOD and one data point available for each Ammonia and Orthophosphate.
SSRS		The SSRS indicates that there is no apparent impact from the WWTP discharge on the stream.
Storm Water Overflow		Not applicable.

**Table 5.2 - Summary of WWTP Site Assessment Elements**

Element	Traffic Light Risk	Conclusion
Flow Management		There is a process bypass in place prior to the inlet screen. The storm water is held in a storm tank and re-joins the plant at the pump sump. The caretaker did not note infiltration as an issue onsite.
Asset Condition		There are no issues identified with the asset conditions.
Process Performance		Based on the effluent data points there is no risk of not achieving the desired effluent quality. According to the certificate information the SBR is oversized for the current population and there is no risk of over population of the plant in the near future.
General Operations		No issues identified.
General Site Considerations		There is adequate space onsite for sludge tanker access.

The risk has been assessed qualitatively based on the following criteria:

RED	AMBER	GREEN
IMPACT or RISK Confirmed	Impact or Risk Unconfirmed but suspected	No identified issues

## 5.2 RECOMMENDATIONS

- Investigate the possibility of an emergency overflow located at either the pump sump or the oxidation ditch and add the additional information to this Site Assessment Report.



# Appendix A

2017 Census Data PE Calculation


## National Certificate of Authorisation Programme (NCAP)

### Review of 2017 Census Data PE Estimates

#### Current and Future PE Forecasts

<b>Agglomeration #</b>	<b>A0110</b>
<b>Name</b>	<b>Garristown</b>
<b>County</b>	<b>Fingal</b>

#### Review of Current Domestic PE (Connected and Non-Connected)

Total Number of Properties	146
Total Connected	120
Total Not Connected (with IAS)	9
Total Not Connected (no IAS)	0
Unknown Properties	4
Temporarily Absent	0
Holiday Homes	2
Other Vacant Dwellings	10

Occupancy per Property	3.26
------------------------	------

Current Connected PE	411.2
Current Unconnected PE	29.4
Vacant Dwellings PE	32.63

*IAS = Individual or Appropriate System*

#### Review of Commerical, Institutional and Industrial PE

Commerical PE	42
Hospital	0
Nursing Home	0
Net Education	33
Tourism	0
Other Institutions	0
Sub-Total Commerical and Non-Institutional	75

Non IPC (Section 16) Licensed PE	0
IPC Licensed PE	0
Sub Total Industrial	0

#### Current PE

Current Domestic PE	411.2
Current Commerical PE	74.9
Current Industrial PE	0
Current PE	487

*The maximum value of either Net Education + Other Institutions or Tourism has been used.*

*Vacant dwellings are not included*

#### Future Design PE Calculation

Growth Rate	0.63%
Headroom Allowance	10%

Population Growth Period	10	30
Future Domestic PE	437.8	496.4
Future Commerical PE	79.7	90.4
Sub-Total	517.5	586.8
Unconnected Properties PE	29.4	29.4
Other Vacant Dwellings PE	32.6	32.6
Total PE for Headroom Allowance	579.5	648.8
Total PE with Headroom Allowance	637.5	713.7
Industrial PE	0	0
Total Estimated PE	637.5	2011.3

Unconnected Properties included in Future Growth  
Vacant dwellings included in Future Growth  
Sum of Domestic, Commerical and Unconnected + Vacant

No growth accounted for in Industrial

<b>Design PE</b>	<b>637</b>	<b>714</b>
------------------	------------	------------

Including for headroom allowance

#### Change Summary

No alterations have been made to estimated non-domestic PE loadings.

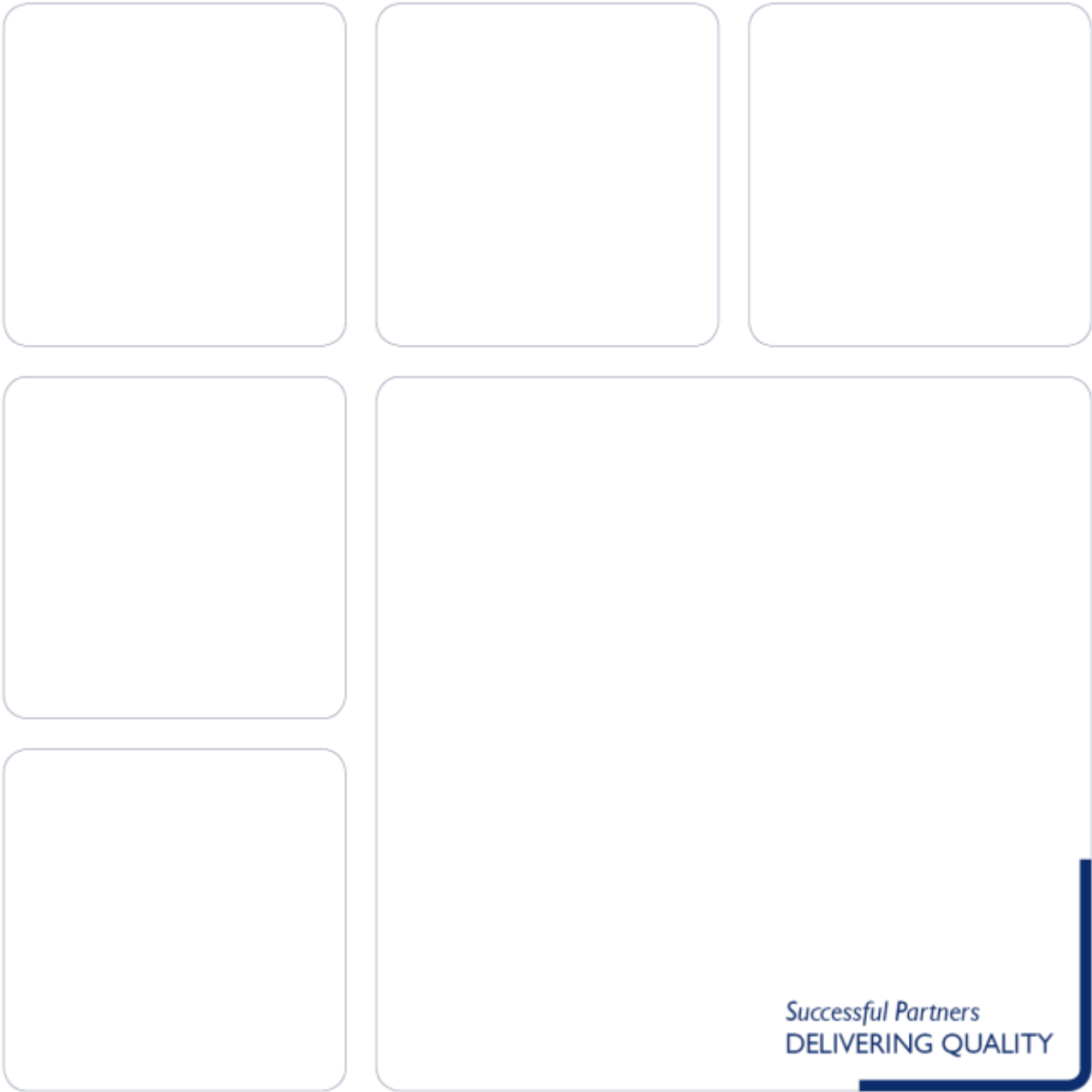
No alterations have been made to the estimated number of occupied domestic homes which are or are not connected to the WWTP.

No changes have been made to the estimated unoccupied and holiday homes in the agglomeration.



# Appendix B

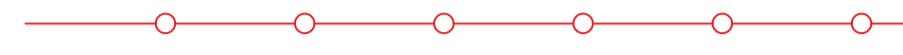
Site Layout



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**LEGEND:**

BOUNDARY FENCE



PROCESS LINE



SBR BALANCE TANK PROCESS

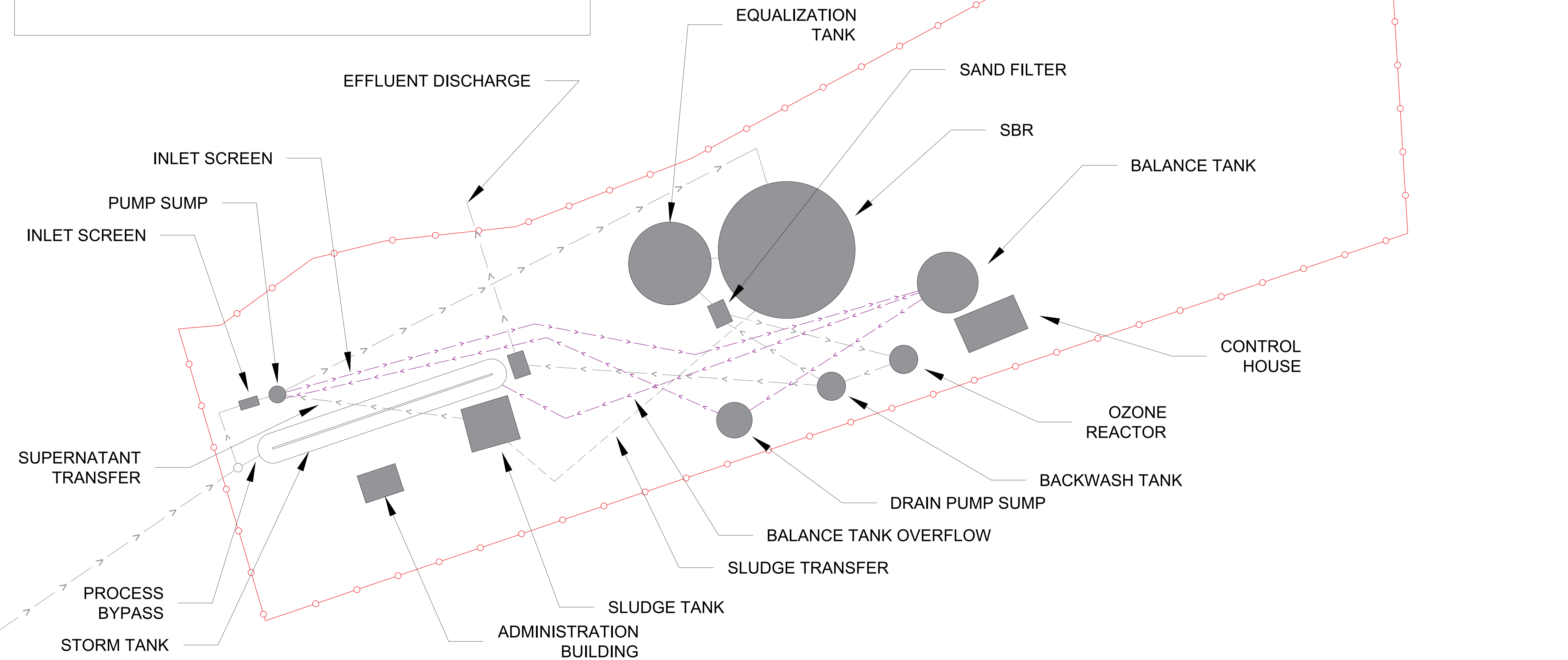


SLUDGE TRANSFER



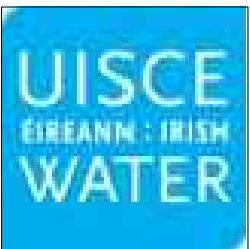
ACCESS GATE  
(INDICATIVE  
LOCATION)

ACCESS ROAD  
(INDICATIVE  
LOCATION)



R:\M\GW0256 - NCAP - Site Assessments\0. Drawings\SA\Fingath\MGW0256\AS\A0110 Garristown.dwg

Client



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(ii) All Levels refer to Ordnance Survey Datum, Malin Head.

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No.	Date	By	App	Amendment / Issue
A01	24.09.18	CG	MMcG	APPROVAL ISSUE



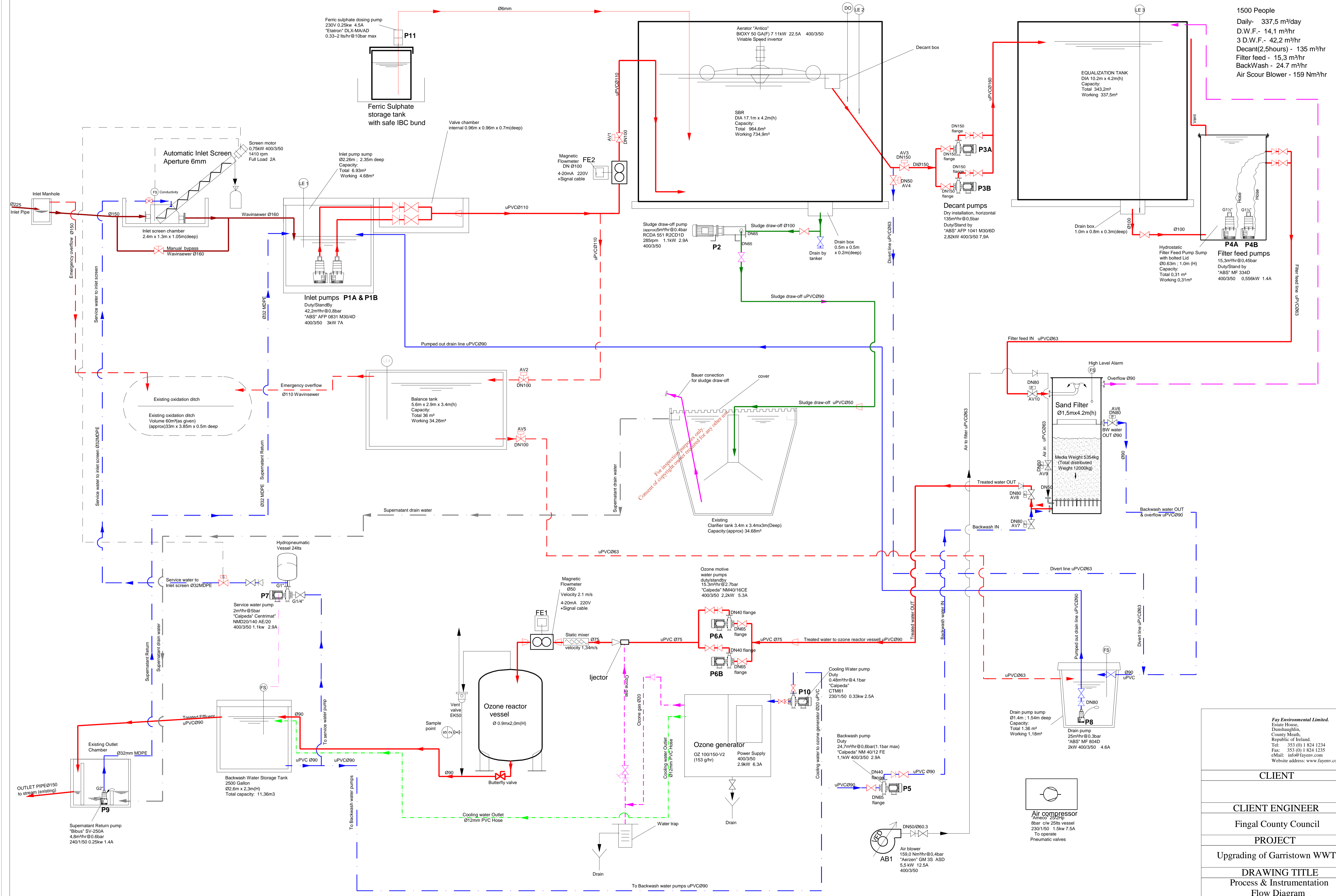
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Drawn CG	Checked TL	Approved MMcG	Date Sep '18	Scale Not To Scale @ A1 @ A3
Project <b>NATIONAL CERTIFICATE OF AUTHORISATION PROGRAMME</b>				
Title SITE LAYOUT GARRISTOWN WWTP				
Job No. MGW0256	File Ref. MGW0256 A0110	Drg. No. A0110-01	Rev. A01	

**FLOW RATE:**

1500 People  
 Daily- 337,5 m<sup>3</sup>/day  
 D.W.F.- 14,1 m<sup>3</sup>/hr  
 3 D.W.F.- 42,2 m<sup>3</sup>/hr  
 Decant(2,5hours) - 135 m<sup>3</sup>/hr  
 Filter feed - 15,3 m<sup>3</sup>/hr  
 BackWash - 24,7 m<sup>3</sup>/hr  
 Air Scour Blower - 159 Nm<sup>3</sup>/hr



**Fay Environmental Limited.**  
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 Dunshaughlin,  
 County Meath,  
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<b>CLIENT</b>	
<b>CLIENT ENGINEER</b>	
Fingal County Council	
<b>PROJECT</b>	
Upgrading of Garristown WWTW	
<b>DRAWING TITLE</b>	
Process & Instrumentation Flow Diagram	
DRAWING NUMBER	SCALE
DWG-748B-001	NTS
SHEET	REV.
A1	9

9	As Built	08.04.08	E.G	B.F	B.F
REV.	DESCRIPTION	DATE	DRAW	CHECKED	APPROVED



# Appendix C

Process Loadings Review




## Overview of WWTP Loadings: Current and Future

<b>A0110</b>	<b>Garristown</b>	Date	24-Sep-18
		Version	A01
		By	TL

### 1. Review of DWF and PE Loadings

The original certificate PE and 2017 CSO estimated PE are presented in the table below.

	Certificate PE	DWF	2017 CSO	DWF
Total Domestic	288	64.8	412	92.7
Total Non-Domestic	32	7.2	75	16.9
Total Industrial	0	0	0	0.0
<b>Total Load</b>	<b>320</b>	<b>72</b>	<b>487</b>	<b>109.575</b>

	PE	DWF
Total Domestic	412	92.7
Total Commercial	75	16.9
Total Industrial	0	0.0
<b>Total PE</b>	<b>487</b>	<b>109.6</b>

Design Basis

#### Future Design PE:

Population Growth Period	10	years	as agreed with IW 10 years - no land acquisition, 30 years with land acquisition
Headroom	10%	%	as agreed with IW
Domestic Population Growth Rate	0.63%	%	as per IW advised rates
Current Domestic PE	412	PE	
Current Non-Domestic PE	75	PE	
Future Domestic	439	PE	
Future Commercial	80	PE	
Unconnected Properties	29	PE	from available CSO data
Other Vacant Dwellings	32	PE	from available CSO data
Total Domestic PE with Headroom	550	PE	Sum of Future Domestic, Unconnected and Vacant with Growth (%) allowance
Total Commercial PE with Headroom	88	PE	with Growth (%) allowance
Industrial PE	0	PE	industrial PE not included for in headroom calculation
Total Design PE	<b>637.5</b>	PE	

#### 2. Future Design DWF

Future Domestic Estimated DWF 143.4 m<sup>3</sup>/day

#### Estimated Loadings:

	g/ca/day	Current PE	Current PE	Future PE	Future PE
		kg/day	mg/L	kg/day	mg/L
BOD	60	29.2	266.7	38.3	266.7
Suspended Solids	75	36.5	333.3	47.8	333.3
TKN	11	5.4	48.9	7.0	48.9
Ammonium Nitrate (NH <sub>3</sub> -N)	8	3.9	35.6	5.1	35.6
Phosphorous	2.2	1.1	9.8	1.4	9.8

Estimated loadings are as per Scottish Water Design Specification 301.3.1 with the exception of TKN which is estimated using the German ATV Standard (131D)

#### Flow Summary Table

		Current PE	Future PE
<b>DWF</b>	m <sup>3</sup> /day	109.6	143.4
	m <sup>3</sup> /hr	4.6	6.0
<b>3*DWF</b>	m <sup>3</sup> /day	328.7	430.3
	m <sup>3</sup> /hr	13.7	17.9
<b>Formula A</b>	m <sup>3</sup> /day	696.1	921.7
	m <sup>3</sup> /hr	29.0	38.4

### Calculation of Formula A

Formula has been estimated as per Irish Water Inlet Works & Storm Water Treatment Standard (IW-TEC-700-99-02)

Revision 1.0      Amendment 5 (07-July-2016)

= DWF + 1360 PE + 2E

Combined System

Where

**Current PE**

696.1	m3/day
29.0	m3/hr
8.1	L/s

**Future PE**

921.7	m3/day
38.4	m3/hr
10.7	L/s

Population Served P = 412 people

Population of E = 75

Non-Domestic Flows E\*Q = 13.125 m3/day

Q = 0.175 m3/ca\*day

DWF = 109.6 m3/day

550 people

88

15.37 m3/day

0.175 m3/ca\*day

143.4 m3/day

**Existing WWTP Process Unit Capacities**

A0110	Garristown	Date	19-Sep-18
		Version	A01
		By	TL

**Review of DWF and PE Loadings**

Flow Summary Table

		Current PE	Future PE
		487	638
DWF	m3/day	109.6	143.4
	m3/hr	4.6	6.0
3*DWF	m3/day	328.7	430.3
	m3/hr	13.7	17.9
Formula A	m3/day	696.1	921.7
	m3/hr	29.0	38.4

**Total Residence Time in Balance Tank**

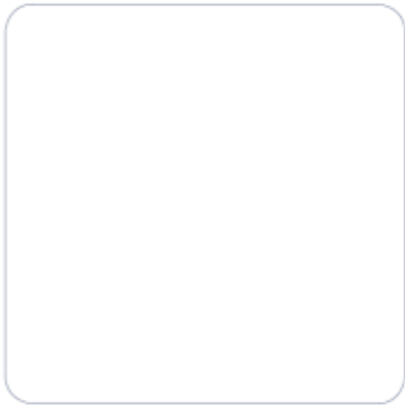
Total Volume       m3

Residence Time (hrs)	Flowrate		
	DWF	3DWF	Formula A
	7.5	2.5	1.2



# Appendix D

Site Photos



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**Appendix D – Site Photos**  
**Garristown WWTP**



The SBR Unit and the Equalisation Unit



Ferric dosing unit



Ozone Reactor Vessel



The SWO at the inlet manhole



The existing oxidation ditch which is now used as a storm holding tank



The inlet screen and the pump sump



# Appendix E

Waste Assimilative Capacity (WAC)  
Calculation


## Waste Assimilative Capacity (WAC) Calculation

WWTP Name	Garristown 1	WAC Assessment	<b>No Evidence of Impact</b>
-----------	--------------	----------------	------------------------------

Date Printed	20/09/2018	By:	TL
--------------	------------	-----	----

### Background Information

Agglomeration License	A0110	95% Flow (m3/s)	0.039
Local Authority	Fingal	95% Flow (m3/day)	3370
Name of River	DELVIN_010	Mean Flow (m3/s)	0.210
WFD Water Quality Designation	Poor	Mean Flow (m3/day)	18144
		Data Source:	Not Documented

### WWTP Flows

Population Equivalent	487	Dilution @ 95%ile flows	31.0
Effluent flow (m3/day)	109.6	Dilution @ median flows	166.0

### Assessment of Theoretical Effluent Discharge Limits

Parameter	# Sample Results Available for WAC Calculation	Average Effluent Concentration (mg/l)*	Theoretical Allowable Discharge Limit (95%ile Flows)	Theoretical Allowable Discharge Limit (Mean Flows)
Carbonaceous BOD	2	0.70	74.60	206.80
Ammonia (NH <sub>3</sub> -N)	1	0.00	4.20	9.50
Ortho Phosphate	1	0.10	2.20	5.00

### Assessment of Impact to Receiving Waterbody

#### 95th Percentile River Flows (using the 95th Percentile allowable Water Quality Limits)

Parameter	Upstream Background Concentration (mg/l)	Contribution from Effluent Discharge (mg/l)	Resultant Downstream Concentration (mg/l)	Allowable Concentration in Receiving Waterbody (95%ile mg/l)	% of Available WAC
Carbonaceous BOD	0.260	0.022	0.300	2.60	0.90%
Ammonia Nitrogen (NH <sub>3</sub> -N)	0.008	0.000	0.010	0.14	0.00%
Ortho Phosphate (OP)	0.005	0.003	0.010	0.075	4.00%

#### Median River Flows (using the mean allowable Water Quality Limits)

Parameter	Upstream Background Concentration (mg/l)	Contribution from Effluent Discharge (mg/l)	Resultant Downstream Concentration (mg/l)	Allowable Concentration in Receiving Waterbody (Mean mg/l)	% of Available WAC
Carbonaceous BOD	0.260	0.004	0.260	1.500	0.00%
Ammonia Nitrogen (NH <sub>3</sub> -N)	0.008	0.000	0.010	0.065	0.00%
Ortho Phosphate (OP)	0.005	0.001	0.010	0.035	2.00%

\*if effluent results are not available typical effluent concentration from primary or secondary treatment has been assumed as follows

Effluent Averages By Level of Treatment for 2017 WAC Assessment			
Level of Treatment	BOD	NH <sub>3</sub> -N	Ortho-P
Primary or No Treatment	156.14	26.7	4.37
Secondary	35.97	15.22	4.05
Tertiary	14.62	7.7	2.85

WFD Receptor Waterbody Allowable Concentration		
Parameter	Good Status	High Status
	95%ile mg/l	95%ile mg/l
Carbonaceous BOD	2.60	2.20
Ammonia (NH <sub>3</sub> -N)	0.14	0.09
Ortho Phosphate	0.075	0.045
	Mean mg/l	Mean mg/l
Carbonaceous BOD	1.50	1.30
Ammonia (NH <sub>3</sub> -N)	0.065	0.040
Ortho Phosphate	0.035	0.025

	Exceeding Allowable Concentration
	Within 90% of allowable concentration
	Less than 90% of allowable concentration





# Appendix F

## Small Streams Risk Score Report



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# National Certificate of Authorisation Programme

## SSRS Report for A0110 Garristown WWTP

### Document Control Sheet

Client:	Irish Water		
Project Title:	National Certificate of Authorisation Programme		
Document Title:	National Certificate of Authorisation Programme SSRS Report for A0110 Garristown WWTP		
Document No:	MGW0256Rp0004_A0110_Garristown_SSRS_F01		
Text Pages:	5	Appendices:	0

Rev.	Status	Date	Author(s)		Reviewed By		Approved By	
F01	Draft	18/04/2018	CMcC	<i>Cornel McCaffrey</i>	BW	<i>Bernadette White</i>	MMcG	<i>Michael McGee</i>

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<b>2</b>	<b>METHODOLOGY .....</b>	<b>1</b>
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<b>4</b>	<b>CONCLUSIONS AND RECOMMENDATIONS .....</b>	<b>1</b>

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## 1 INTRODUCTION

The purpose of this report is to present the results from the biological risk assessment undertaken upstream and downstream of the primary discharge of Garristown wastewater treatment plant (WWTP), Co. Dublin. The risk assessment, the Small Streams Risk Score (SSRS), is a system for detecting potential sources of pollution in small streams.

## 2 METHODOLOGY

Fieldwork was undertaken on 26<sup>th</sup> March 2018 by RPS ecologists. A survey was carried out at approximately 10 times the channel width upstream and downstream of the discharge point. A suite of physiochemical parameters were measured at each location including temperature, conductivity and pH using a Hanna HI98129 Combo pH and EC probe. Dissolved oxygen was recorded using a Hach DR900 Multiparameter Portable Colorimeter. Aquatic macroinvertebrates were collected using a standard pond net (mesh size 0.5 mm) and kick-sampling technique. Faunal composition was analysed by the standard SSRS methodology.

## 3 RESULTS

Field data and SSRS calculations for the upstream and downstream survey sites are presented in **Table 4.1** and **Table 4.2**.

Garristown WWTP discharges in to the Delvin tributary of the Garristown River. Upstream of the discharge the SSRS was 1.6 indicating that the watercourse is **At Risk**, while downstream the SSRS was 0.8 indicating that the watercourse at this location is also **At Risk**.

The upstream site scored slightly higher due to the presence of an additional taxon (*Lymnaea*). No Ephemeroptera (mayfly), Plecoptera (stonefly) or Trichoptera (caddisflies) were present at either location indicating that the watercourse is significantly impacted at both sampled locations. The poor community upstream of the discharge indicates that the river is being impacted by catchment pressures other than the WWTP. At the time of the survey potential impacts from agriculture were noted, predominately pasture.

## 4 CONCLUSIONS AND RECOMMENDATIONS

There is no significant change in SSRS risk from upstream to downstream and therefore, there is no apparent impact on the macroinvertebrate community from the discharge.

Table 4.1: SSRS results upstream location

River:	Delvin Tib of Garristown	River Segment Code:	08_417	Date:	26/03/2018
WWTP Code:	A0110	Agglomeration name:	<b>Garristown</b>	Location:	Upstream
<b>SSRS Score:</b>	<b>1.6</b>	<b>Stream Assessment:</b>	<b>At Risk</b>		
DO (%):	-	Bedrock:		Stream Flow:	Moderate
DO (mg/l):	-	Boulder (>128mm):	20	Clarity:	Slightly Turbid
Temp (°C):	6.8	Cobble (32-128mm):	20	Colour:	None
Conductivity (µS/cm):	709	Gravel (8-32mm):	20	Discharge	Normal
pH:	7.9	Fine Gravel (2-8mm):	20	Slope:	Low
Bank width (cm):	400	Sand (0.25-2mm):	30	Sewage Fungus:	None
Wet width (cm):	200	Silt (<0.25mm):	5	Filamentous Algae:	None
Avg depth (cm):	15	Main land use US:	Pasture	Shading:	Moderate
Depth mud (cm):	2.5	Cattle Access US/DS:	No		
Comments:	Highly channelised, steep high banks.				
Invertebrate Groups		Number of specimens		Relative Abundance	
Group 1: Ephemeroptera		1-5		1	
Group 2: Plecoptera		6-20		2	
Group 3: Trichoptera		21-50		3	
Group 4: G.O.L.D (Gastropoda, Oligochaeta and Diptera)		51-100		4	
Group 5: Asellus		>100		5	
Ephemeroptera	Ab	Plecoptera	Ab	Trichoptera	Ab
Ecdyonurus:		Leuctra:		Hydropsyche:	
Rhitrogena:		Isoperla:		Polycentropus:	
Heptagenia:		Protonemura:		Rhyacophila:	
Ephemerella:		Amphinemura:		Philopotamus:	
Caenis:		Perla:		Limnephilidae:	
Paraleptophlebia:		Dinocras:		Sericostomatidae:	
Ephemera danica:		Other Plecoptera:		Glossosomatidae:	
Other Ephemeroptera:				Leptostomatidae:	
				Other Trichoptera:	
Total No. of Taxa:	0	Total No. of Taxa:	0	Total No. of Taxa:	0
Total Relative Abundance:	0	Total Relative Abundance:	0	Total Relative Abundance:	0
GOLD (Gastropoda; Oligochaeta and Diptera)					
Lymnaea:	1	Lumbriculus:		Simulium:	
Potamopyrgus:		Eiseniella:		Dicronata:	
Planorbis:		Tubificidae:	2	Tipula:	1
Ancylus:		Chironomidae:		Ceratopogonidae:	
Physa:		Chironomus:		Other GOLD:	
Total No. of Taxa:	3				
Total Relative Abundance:	4				
Asellus					
Absent:		Few (1-20):		Common (>20):	Common
SSRS Calculation					
Group 1	0			Total Index Score	4
Group 2	0			Average Index Score	0.8
Group 3	0			SSRS	1.6
Group 4	4				
Group 5	0				

Table 4.2: SSRS results downstream location

River:	Delvin Tib of Garristown	River Segment Code:	08_417	Date:	26/03/2018
WWTP code:	A0110	Agglomeration name:	Garristown	Location:	Downstream
<b>SSRS Score:</b>	<b>0.8</b>	<b>Stream assessment:</b>	<b>At Risk</b>		
DO (%):	-	Bedrock:		Stream Flow:	Moderate
DO (mg/l):	-	Boulder (>128mm):	25	Clarity:	Slightly Turbid
Temp (°C):	6.8	Cobble (32-128mm):	20	Colour:	Slight
Conductivity (µS/cm):	709	Gravel (8-32mm):	20	Discharge:	Normal
pH:	7.9	Fine Gravel (2-8mm):	20	Slope:	Low
Bank width (cm):	600	Sand (0.25-2mm):	20	Sewage Fungus:	None
Wet width (cm):	200	Silt (<0.25mm):	5	Filamentous Algae:	None
Avg. depth (cm):	20	Main land use US:	Pasture	Shading:	Moderate
Depth mud (cm):	2.5	Cattle access US/DS:	No		
Comments:	Highly channelised, steep high banks.				
Invertebrate Groups		Number of specimens		Relative Abundance	
Group 1: Ephemeroptera		1-5		1	
Group 2: Plecoptera		6-20		2	
Group 3: Trichoptera		21-50		3	
Group 4: G.O.L.D (Gastropoda, Oligochaeta and Diptera)		51-100		4	
Group 5: Asellus		>100		5	
Ephemeroptera	Ab	Plecoptera	Ab	Trichoptera	Ab
Ecdyonurus:		Leuctra:		Hydropsyche:	
Rhitrogena:		Isoperla:		Polycentropus:	
Heptagenia:		Protonemura:		Rhyacophila:	
Ephemerella:		Amphinemura:		Philopotamus:	
Caenis:		Perla:		Limnephilidae:	
Paraleptophlebia:		Dinocras:		Sericostomatidae:	
Empemera danica:		Other Plecoptera:		Glossosomatidae:	
Other Ephemeroptera:				Leptostomatidae:	
				Other Trichoptera:	
Total No. of Taxa:	0	Total No. of Taxa:	0	Total No. of Taxa:	0
Total Relative Abundance:	0	Total Relative Abundance:	0	Total Relative Abundance:	0
GOLD (Gastropoda, Oligochaeta and Diptera)					
Lymnaea:		Lumbriculus:		Simulium:	1
Potamopyrgus:		Eiseniella:		Dicronata:	
Planorbis:		Tubificidae:	2	Tipula:	
Ancylus:		Chironomidae:		Ceratopogonidae:	
Physsa:		Chironomus:		Other GOLD	
Total No. of Taxa:	2				
Total Relative Abundance:	3				
Asellus					
Absent:		Few (1-20):		Common (>20):	Common
SSRS Calculation					
Group 1	0				
Group 2	0				
Group 3	0			Total Index Score	2
Group 4	2			Average Index Score	0.4
Group 5	0			SSRS	0.8



**Figure 4-1: Upstream of primary discharge Garristown WWTP**



**Figure 4-2: Downstream of primary discharge Garristown WWTP**



**Figure 4-3: Primary discharge Garristown WWTP**