

Non-technical Summary

Updated 28 November 2012

Staunton Foods Ltd operates on a site that it wholly owns to the south of the village of Timoleague in West Cork. The approximately 2.2 hectare site lies south of the head of Courtmacsherry Bay and is bounded to the east and south east by the Spital Stream, to the north and west by public roads and to the south by farmland (see Drawing No 210138-01 – Ownership Plan; Drawing No 210138-02 – Site Plan; Drawing No 210138-03 – Location Map; and Drawing No 210138-04 – Services Plan in Attachment No B.2). Approximately 0.57 hectares of the site are occupied by buildings and plant supporting the slaughter of pigs and the production of fresh, frozen and cured pork (bacon) and pudding products for domestic and export markets. The activity is a British Retail Consortium (Issue 5) approved production facility and also holds Bord Bia Pigmear Quality Assurance Scheme approval; a HACCP system is in operation. The activity operates under the Department of Agriculture, Fisheries and Food Certificate of Approval No. 380 issued under the European Communities (Food and Feed Hygiene) Regulations 2009 (S.I. No. 432 of 2009).

The activity operates Monday to Friday inclusive. Hours of operation are as follows:

Boning 07.00 – 18.00

Slaughter 08.00 – 18.00

Pudding production 08.00 – 18.00

Lairage 06.00 – 18.00

Collection/deliveries 06.00 – 00.00

Cleaning 08.00 – 00.00

Pigs are delivered so that they spend minimal time in the lairage before slaughter. Carcasses are broken down into primal cuts and are either frozen or held in chills for dispatch as fresh product. Blood is collected, some is retained on site for the production of puddings; the remainder goes off-site for rendering.

Hard and soft offals, and other wastes controlled by DAFF, are taken off-site by permitted hauliers for rendering. Wastewater Treatment Plant (WWTP) organic wastes are taken off-site by permitted hauliers for anaerobic digestion or landspreading by licensed contract facilities. All other wastes are segregated on site and sent off-site for recovery/recycling as far as possible. Minimal wastes are sent to landfill.

All production areas, truck wash areas and liquid storage areas are drained to effluent. Liquid wastes are collected and treated in the on-site wastewater treatment plant (WWTP). Final treated effluent is discharged to the adjacent Spital Stream under the conditions of Discharge Licence No. WP (W) 06/03 issued by Cork Co. Council. An assessment (Nov 2012) of the impact of the discharge's Biological Oxygen Demand (BOD) on the Spital Stream" concluded that the Staunton's discharge is having a negligible impact on freshwater and estuarine water quality at the current licensed discharge limits"

Metering of high water consumption plant and production areas is in place to minimise water use and the generation of wastewater. Surface water run-off from roofs and areas of hard standing, where there is no risk of environmental pollution, are collected and drained to the Spital Stream adjacent to the eastern and south-eastern site boundary.

The sources of energy used on site are light diesel fuel oil stored in a bunded oil tank on site; LPG; and mains electricity. There is a diesel-powered stand-by generator on site for emergency use.

Refrigeration is controlled from a refrigeration plant room, regularly serviced by a specialist contractor. The principal refrigerant used is ammonia in a closed-loop system, with glycol and freon in additional specific areas (see Schematic "Refrigerant types" in Attachment No D.3).

Staunton Foods operates a regular preventative maintenance programme to minimise risk of any malfunction that may cause environmental impact.

See Attachment No B.2 for Drawing No 210138-01 – Ownership Plan, with the boundary of the activity marked in blue; Drawing No 210138-02 – Site Plan, with the boundary of the site for which this Licence application is being made outlined in red; Drawing No 210138-03 – Location Map, showing details of buildings, roads, rivers, canals, railway lines, overhead power cables, public and private wells within 500 metres of the site boundary; and Drawing No 210138-04 – Services Plan, showing details of all underground services, existing and planned, within 250 metres of the site boundary.

DixonBrosnan

environmental consultants

Project				
Response to Further Information Request from the EPA in relation to BOD for a discharge from Staunton Foods Ltd. at Aghmanister, Timoleague, Co. Cork				
Client		Staunton Foods Ltd.		
Project ref	Report no	Client ref		
1254	1254	PO947-01		
DixonBrosnan The Cedars, Bridewood, Ovens, Co Cork Tel 086 851 1437 carl@dixonbrosnan.com www.dixonbrosnan.com				
Date	Rev	Status	Prepared by	
28/11/12	0	Issue to client	Carl Dixon M.Sc.	
This report and its contents are copyright of DixonBrosnan. It may not be reproduced without permission. The report is to be used only for its intended purpose. The report is confidential to the client, and is personal and non-assignable. No liability is admitted to third parties. ©DixonBrosnan 2012. <small>v180907</small>				

1. Background

As part of an application for an Integrated Pollution Prevention and Control Licence and subsequent to the submission of further information on assimilative capacities (*Response to Further Information Request from the EPA in relation to a discharge from Staunton Foods Ltd. at Aghmanister, Timoleague, Co. Cork, DixonBrosnan, February 2012*) the EPA requested the following information:

In relation to the key parameter of Biological Oxygen Demand (BOD) please assess the impact of SW4-A (Final discharge from the WWTP) on the Spital Stream. In doing so, please determine the resultant BOD concentration in the receiving waters upon discharge at the current licensed limits. Also please clarify how the background concentration of BOD in the receiving water was determined. If ambient monitoring is required to determine background concentration please use a representative number of samples taken at regular intervals.

2. Description of receiving watercourse

Staunton Foods Ltd. hold a license, W.P.(W)6/03 from Cork County Council “to discharge trade effluent or sewage effluent” under the Local Government (Water Pollution) Acts, 1977 & 1990 to release 120m³ daily of treated effluent to the Spital Stream (tidal stream) at Aghmanister, Timoleague, Co. Cork.

The discharge area is located approximately 2-3 meters upstream of the public road bridge located at the northeast corner of Staunton’s facility (See **Figure 1**). This stream is tidal at the discharge point. It appears that at least the lower two-thirds of the streams length adjacent to Staunton’s facility is frequently inundated with tidal waters including the current discharge point.



Figure 1. Northeast corner of Staunton foods plant, with the associated streams, discharge point, pool and 'V' notch.

3. Discharge parameters

As part of the discharge licence it is a requirement that treated wastewater and storm water are tested for various parameters as shown below in **Table 1**.

Table 1. Discharge license W.P.(W) 6/03 - parameters, limits and testing schedule

Parameter	Units	Wastewater limit and frequency of testing	Storm water limit and frequency of testing	Receiving watercourse limit and frequency of testing
BOD	mg/l	10 (annual)		No Limit (monthly)
COD	mg/l	50 (daily)	5 (monthly)	No Limit (monthly)
Total P	mg/l	3 (monthly)		

Ortho P	mg/l			No Limit (monthly)
Ammonia as NH ₃	mg/l	0.5 (quarterly)	0.5 (monthly)	
Total Nitrogen N	mg/l	15 (monthly)		
Nitrate	mg/l			No Limit (monthly)
SS	mg/l	15 (daily)	5 (monthly)	
pH	units	6-9 (daily)	6-8.5 (monthly)	
Detergents	mg/l	5 (quarterly)		
Chlorine, or other disinfectants	mg/l	0.5 (quarterly)		
Oils, fats and grease	mg/l	10 (quarterly)		
D.O	mg/l			No Limit (monthly)
Temperature	Degrees Celsius			21 °C May to October, 10 °C November to April (Monthly)

Background levels of BOD were not previously recorded in the Spital Stream as part of the ongoing monitoring programme.

3. BOD sampling 2012

To determine background BOD levels in the receiving watercourse, BOD levels were recorded at a site upstream of all discharges from the facility. Results are detailed below in **Table 2**. The upstream sampling point is approximately 60 meters upstream of the discharge point and samples were analyzed by Exova Laboratories, Cork. Certificates of analysis are included in **Appendix 3**.

Table 2. BOD results upstream of discharge at SW4-A

Date	Location	BOD mg/l	Tide
22/08/2012	Above Factory	4	High
29/08/2012	Above Factory	<4	Low
05/09/2012	Above Factory	<4	High
03/10/2012	Above Factory	<2	High
10/10/2012	Above Factory	4	Low
17/10/2012	Above Factory	3	High
Mean value ¹		3.5	

¹ Mean value assumes < is ignored i.e. <4 equates to 4

4. Flow data

Due to its tidal nature it is not possible to accurately calculate the dilution available within the receiving water course, as flows will naturally fluctuate with the tidal cycle. However an estimate can be made of the freshwater component of the dilution based on available data.

4.1 Direct flow measurements

Flow rates and dilution ratios within the Spital stream are measured by Staunton Foods Ltd. at the sharp crested weir downstream of the discharge point in 2010. The available data is detailed below in **Table 3**. Table 3. Flow rates and dilution ratios

Date	Flow rate m3/s
19/8/2010	0.0279
21/9/2010	0.031
5/8/2009	0.043
7/9/2009	0.047
12/8/2008	0.043
3/9/2008	0.040
Mean	0.039 m3/s

It is noted however that this data is based on a very small number of measurements and thus provides a very approximate estimate of flow in the receiving watercourse.

4.2 Long term flow data from alternative catchments

There are no long-term rated flow stations on the Spital Stream. The closest rivers for which long term flow data are available are the Bandon and Argideen rivers and relevant data for these catchments are detailed below in **Tables 4 and 5**. These rivers have quite different characteristics to the stream under consideration; however in the absence of long term flow data from the Spital Stream extrapolation from nearest catchments for which data is available is considered a valid means of estimating flow.

Table 4. Flow data for Bandon River (www.opw.ie/hydro/index.asp)

GENERAL STATION DETAILS			
Station Name: Curranure	Station No: 20002	Watercourse: Bandon	NGR: W 529 571
Catchment Area (km ²): 431	Catchment: Bandon	Gauge Type: L/AR	Datum: Poolbeg

SUMMARY HYDROMETRIC STATISTICS	STATION HISTORY
Annual Average Rainfall (mm) ¹ : 1603	Period of Continuous Hardcopy Records: 1974 to 2005
Est'd Annual Losses (mm) ¹ : 486	Period of Digitised Record: 1975 to 2005
Mean Annual Flow (m ³ /s): 15.039 (Data derived for the period 1975 to 2004)	

Note 1 : Data extracted from the Environmental Protection Agency publication 'Hydrological Data', July 1997

DURATION PERCENTILES							
Flows equalled or exceeded for the given percentage of time (m ³ /s) (Data derived for the period 1975 to 2004)							
1%	5%	10%	50%	80%	90%	95%	99%
79.8	47.3	35.1	9.44	3.06	1.89	1.33	0.84
Levels equalled or exceeded for the given percentage of time (mAOD Poolbeg) (Data derived for the period 1975 to 2005)							
1%	5%	10%	50%	80%	90%	95%	99%
8.28	7.96	7.82	7.42	7.20	7.13	7.09	7.04

Table 5. Flow data for Argideen River (www.hydronet.epa.ie)

Station Information					
Station Number	20006	Station Name	CLONAKILTY WW D_S	River/Lake	ARGIDEEN
Station Status	Active Primary	Type of Gauge	Data Logger	Owner	Cork County Council
Easting	140399	Northing	44436	RBD name	South Western RBD
Records Start	06.12.1977	Records Cease	27.07.2000	Data Available	Water Level and Flow

Hydrometric Information			
Rating Standard	Good	Catchment Size	77.6 km ²
Estimated Long Term 95%-Tile	0.180 m ³ /s	Estimated Long Term Dry Weather Flow	0.01 m ³ /s
Long Average Rainfall (1961-1990)	1464 mm/annum	Staff Gauge Zero History	27.066 OD (P) (since 05.02.2001) 27.067 OD (P) (since 15.03.1994) 27.066 OD (P) (since 27.05.1987) 27.073 OD (P) (since 03.02.1987) 27.069 OD (P) (since 15.01.1986) 27.071 OD (P) (since 31.01.1979) 26.912 OD (P) (since 13.03.1978) 26.912 OD (P) (since 01.11.1977)

Mean flow calculated from daily means at 2.71m³/s.

4.3 Bandon and Argideen catchment – unit area flows

The 95% flows and mean river flow at the Curranure flow station on the Bandon River are 1.33 m³/s and 15.04 m³/s respectively. The total area discharging through this point is 431 km². (Source: www.opw.ie). Thus the unit area 95% flow is 0.0031 m³/s/km² and the mean unit area flow is 0.035 m³/s/km².

The 95% flows and mean river flow at the Clonakilty WW flow station on the Argideen River are 0.18 m³/s and 2.71 m³/s respectively. The total area discharging through this point is 77.6 km². (Source: www.epa.ie) Thus the unit area 95% flow is 0.0023 m³/s/km² and the unit area mean flow is 0.035 m³/s/km².

Based on the above, the average of the 95% unit flows for these two catchments is 0.0027 m³/s/km² and the average of the mean unit flows for these two catchments is 0.035 m³/s/km².

4.4 Extrapolated flows in the Spital Stream

The total catchment area discharging through the Spital discharge point is 10.25 km² (Source map: www.wfdireland.ie). Using the average unit flow values calculated above, the extrapolated 95% flow in the Spital Stream would be **0.027 m³/s** and the extrapolated mean flow would be **0.36 m³/s**.

5. Calculations of downstream concentrations for BOD

Mass balance equations may be used to determine the concentration of a parameter in a watercourse downstream of its discharge. A typical equation is as follows:

$$T = (FC + fc) / (F + f)$$

where T = downstream pollutant concentration

F = upstream river flow

C = background pollutant concentration

f = effluent flow

c = effluent pollutant concentration

Table 6. Projected increase in BOD downstream at 95% flow and mean flow, using the maximum licensed effluent concentration, mean background values upstream of the discharge point (2012 monitoring) and the licensed maximum effluent flow. It is noted that the equation used to calculate these values does not take tidal influences into account.

PARAMETER	River flow	MEAN EFFLUENT FLOW m ³ /s	Discharge limit 10mg/l	RIVER FLOW m ³ /s	MEAN BACKGROUND CONC mg/l	D/S CONC mg/l	Change
BOD	Mean flow	0.0014	10	0.36	3.50	3.525	0.025
BOD	95% flow	0.0014	10	0.027	3.50	3.820	0.320

Table 7. Projected increase in BOD downstream at 95% flow and mean flow using the mean monthly effluent concentration 2011 (Appendix 1) mean background values upstream of the discharge point (2012 monitoring) and mean effluent flow as measured in 2011 (Appendix 1). It is noted that the equation used to calculate these values does not take tidal influences into account.

PARAMETER	River flow	MEAN EFFLUENT FLOW m ³ /s	EFFLUENT CONC mg/l	RIVER FLOW m ³ /s	MEAN BACKGROUND CONC mg/l	D/S CONC mg/l	Change
BOD	Mean flows	0.00117	3.43	0.36	3.5	3.5	0
BOD	95% flow	0.00117	3.43	0.027	3.5	3.496	-0.004

6. Surface Water Regulations

The Local Government (Water Pollution) Act 1977 (Water Quality Standards for Phosphorus) Regulations 1998 (S.I. No. 258 of 1998) and the Water Quality (Dangerous Substances) Regulations 2001 (S.I. No. 12 of 2001) were revoked by the European Communities Environmental Objectives (Surface Waters) Regulations 2009. These regulations specify requirements for key physio-chemical parameters at 95% and mean flows with respect to high or good status for rivers as detailed below in **Table 8**

Table 8. Limits for high and good status at mean and 95% flows.

Parameter	Mean flow		95%ile flow	
	High status	Good status	High status	Good status
BOD (mg O ₂ /l)	≤1.3	≤1.5	≤2.2	≤2.6
Total Ammonia (mg N/l)	≤0.040	≤0.065	≤0.090	≤0.140
Ortho-phosphate (mg P/l)	≤0.025	≤0.035	≤0.045	≤0.075

7. Conclusions

The results noted above indicate that due to the high levels of BOD in the stream upstream of the discharge point, the calculated downstream level for BOD breaches the limit for Good Status based on the current licensed limits of 10mg/l BOD and a maximum discharge of 120m³/day (0.0014m³/s). It is noted that the increase in BOD provided by Staunton's facility is small at 0.025 mg/l at mean flow and 0.320mg/l at the 95% flow.

If the actual mean flow figure for the Staunton's discharge for 2011 (0.00117 m³/s) is used with the actual recorded mean figure for discharged BOD for 2011 (3.43 mg/l) the background concentration does not increase at mean flows and decreases slightly (-0.004 mg/l) at 95% flows. Based on the above

it can be concluded that the Stauntons discharge is having a minimal impact on freshwater and estuarine water quality at the current licensed discharge limits.

It is noted that the stream at the discharge point is tidal. Calculations were made previously using the EPA model for transitional waters (**Appendix 2**). The concentration of BOD in the estuary receiving waters was calculated at 4.99 mg/l a slight decrease of -0.01 mg/l over the background level of 5mg/l.

The net contribution of BOD from Staunton's facility is very low. The percentage of the total background level of BOD downstream of the discharge point, attributable to the Staunton's discharge at the maximum licensed levels, equates to 8.38 % at 95% flows to 0.71 % at mean flows.

Based on the above it can be concluded that the Staunton's discharge is having a negligible impact on freshwater and estuarine water quality at the current licensed discharge limits. It is noted that additional dilution will be provided by tidal water movement. As shown in **Appendix 2** the discharge from Staunton's does not result in an increased concentration of BOD in the estuary. Data for 2011 indicates that the facility stayed within its licensed limits and is providing a high quality discharge. Issues with high background BOD levels in the receiving watercourse are related to impacts upstream of the discharge and as such are outside of the applicant's control.

Appendix 1 Discharge data 2011

	Frequency	Flow	Bod
		m ³	mg/l
	Limit	Daily	Annually
		120	10
Month			
Jan		97.36	2.80
Feb		103.85	2.78
Mar		100.1	2.71
April		100.09	2.59
May		98.09	2.57
June		100.95	2.78
July		92.29	4.04
Aug		97.86	4.11
Sept		100.75	4.34
Oct		105.27	4.14
Nov		107.55	4.15
Dec		105.27	4.14
Annual mean		100.79	3.43

Appendix 2 EPA model for transitional waters.

The EPA document (*EO Regulations Review - Simple assimilative capacity model for transitional waters*) provides a means of estimating for a given discharge parameter, the resultant concentration in a receiving waterbody which has freshwater and saltwater inputs. Using the salinity values of the 'open' water and in the vicinity of the discharge, it estimates the flow of dilution water (i.e. seawater and freshwater inputs) within the estuary. This figure is then divided into the mass flow rate of the substance being discharged to calculate its concentration in the receiving waters. It is noted that the EPA Envision Map Viewer indicates that the Argideen Estuary begins approximately 200m downstream of the discharge point. Nonetheless values for the Argideen Estuary where relevant have been used for the purposes of using this model.

The model formula for calculating the flow of available dilution water (Qd) is as follows:

$Qd = (Qe + Qf) So / (So - S)$ where

Qe is the flow rate of licensed discharge (m³/s)

Qf is the flow rate of the river (m³/s)

So is the salinity of the open water

S is the salinity of the water in the vicinity of licensed discharge

Once the value for Qd is established it can be substituted into the following formula to calculate the concentration (C) of a given discharged substance in the receiving water:

$C = Cb + (Ce - Cb) / (1 + (Qd / QL))$ where QL is the maximum flow of the discharged

substance allowable under the licence.

Cb is the background concentration.

Ce is the effluent discharge concentration.

Limits for two physiochemical parameters are included for transitional waters under the European Communities Environmental Objectives (Surface Waters) Regulations 2009. These are BOD and MRP. Based on information on the EPA website EPA's Envision website (<http://maps.epa.ie/InternetMapView/mapviewer.aspx>) and data available from

(<http://www.epa.ie/downloads/data/water/name,30857,en.html>) the following parameters were used in the model.

The relevant data used with the model for BOD is specified below in **Table 1**.

Table 1. Relevant values for use with EPA model (BOD)

Data	Value for phosphorus	Formula symbol
Median Salinity Argideen Estuary (2007-2009)	24.48 psu	S
Salinity of the open water (assumed to be 35psu as per EPA model)	35 psu	S _o
Background BOD concentration (95% ile) (2007-2009)	5 mg/l	C _b
Maximum monthly effluent concentration	4.34 mg/l P	C _e
95% flow rate in the river as calculated from the EPA Hydro-tool (http://watermaps.wfdireland.ie/HydroTool/DataReport.aspx?recordId=8604&reportName=hydroRepUnGauged)	0.031m ³ /s	Q _f
Mean Effluent flow m ³ /s	0.00117 m ³ /s	Q _e
The maximum flow of the discharged substance allowable under the license	0.00139m ³ /s	Q _l

Based on the above, the concentration of BOD in the receiving water was calculated at 4.99 mg/l a minor decrease of 0.01 mg/l over the background level. The limit as specified by the Surface Water Regulations, 2009 is 4 mg/l (95%ile). The background value for the Argideen Estuary is 5 mg/l. Therefore the existing background value and the slightly decreased value downstream of the discharge are in breach of the existing limit. However the discharge from Staunton's does not result in an increased concentration of BOD in the estuary.

Appendix 3 Certificates of analysis