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EIAR ATTACHMENT 4.1

DRINKING WATER RISK ASSESSMENT

DAWN MEATS IRELAND, GREENHILLS, BEAUPARC, NAVAN, CO. MEATH

REPORT NO:	DWRA_20_9684_R1	DATE:	30th January 2022
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1.0 INTRODUCTION

This report has been prepared on behalf of Dawn Meats Ireland Unlimited Company (also referred to as Dawn Meats (Slane) to accompany an Environmental Impact Statement with regards a planning application for an extension to the existing on-site effluent treatment system and construction of a pipeline to discharge treated effluent to the River Boyne.

This report assesses the potential risk of the planned discharge on drinking water abstractions. A water abstraction point is located at Staleen, approximately 12.7km downstream of the proposed discharge point.

It is noted that Slane Municipal Waste Water Treatment Plant (WWTP), operated by Irish Water, is located within the same catchment as the proposed Dawn Meats (Slane) development, approximately 5km downstream of the proposed discharge point and approximately 7km upstream of the Staleen Water Abstraction Point. Slane WWTP is licenced by the Environmental Protection Agency (EPA), Waste Water Discharge Licence Reg. No. D0257-01.

Dawn Meats (Slane) holds an Industrial Emissions (IE) Licence with the EPA, Registration No. P0811-02.

This risk assessment is divided into two sections;

The first section discusses the level of risk posed to the Staleen Water Treatment Works from a discharge from the proposed Dawn Meats (Slane) waste water treatment system.

The risk from the proposed discharge from Dawn Meats (Slane) has been assessed under four separate headings with an overall risk ranking applied in the conclusion.

1. Level of treatment and capacity of proposed WWTP;
2. Planned future discharge compliance and level of dilution;
3. Receiving waters / abstraction water quality;
4. Impact of discharges during normal and abnormal operation.

The second section, provided in appendix A, relates to the Staleen Water Abstraction Plant and uses the methodology described in guidance documents published by the Environmental Protection Agency (EPA), including the Drinking Water Regulations Guidance "*Risk Screening Methodology for Cryptosporidium*" (Booklet No.4), and the "*Handbook on the Implementation of the Regulations for Water Service Authorities for Public Water Supplies*".

The methodology defined in these guidance documents provides a semi-quantitative risk assessment of the likelihood of cryptosporidium and oocysts in final treated drinking waters. The document provides for an assessment of relevant sources in the upstream catchment of waters intended for abstraction of drinking waters as a whole and assesses the standard of treatment and management at the Water Treatment Works.

2.0 DETAILS OF PROPOSED WWTP AND DRINKING WATER ABSTRACTIONS

2.1 WASTEWATER TREATMENT PLANT DETAILS

Sources and Composition of Wastewaters

Sources of wastewater to the proposed WWTP include the following:

- Factory effluent;
- Domestic effluent;
- Dirty yard drainage (Offal Yard);
- Lairage tank centrate during the closed landspreading period.

Wastewater would primarily comprise of blood and rinsing waters from the slaughter process, with additions of cattle faecal matter arising during slaughter and from the lairage area during the closed landspreading period, human waste from onsite staff welfare facilities and surface water run-off from the offal yard.

Micro-organisms present in wastewaters from slaughtering facilities would include total coliform, faecal coliform and streptococci groups of bacteria. These would be primarily enteric in origin, coming from the intestinal tract of warm-blooded animals. Human waste from staff welfare facilities would also contribute to populations of enteric bacteria.

The parasite *Cryptosporidium parvum* may be present in the faeces of animals and humans. A study by Duffy *et al.*[1] undertaken at slaughtering facilities in Ireland found that Cryptosporidium was present in the faeces of only a small percentage (7.3%) of cattle presented for slaughter, at a level of 25 – 37,500 oocysts per gram. No Cryptosporidium parasites were detected on any of the 288 carcasses sampled over the one-year study period. The study also investigated the presence of Cryptosporidium found in water sources (river and bore-hole) used to wash beef carcasses. The parasite was not detected in bore-hole samples but was found in 24.5% of river water samples at a level of 0.08 – 9 oocysts per litre.

As noted above, Cryptosporidium may also be present in human waste. Human waste from staff facilities at the Dawn Meats (Slane) facility have been calculated to account for only 1.1 – 1.3% of the total wastewater generated onsite (based upon the P.E. figure of 30 l/person/day for offices and/or factories without a canteen as per EPA guidance document[2]).

It would be considered that there would be a low risk of Cryptosporidium arising from wastewaters generated at the Dawn Meats site, owing to the small volume of wastewaters faecal in origin, the low incidence of Cryptosporidium in cattle and given that waters are sourced either from the onsite wells or mains water.

[1] Duffy, G., McEvoy, J., Moriarty, E.M. and Sheridan, J.J. (2003). *A Study of Cryptosporidium Parvum in Beef.* The National Food Centre, Teagasc.
[2] EPA (1999). *Wastewater Treatment Manuals – Treatment Systems for Small Communities, Business, Leisure Centres and Hotels*.

Proposed Wastewater Treatment Process

The proposed development would allow for Primary Treatment – Stage 2 and Biological Treatment – Stage 3 of wastewaters generated at the Dawn Meats (Slane) site.

The proposed amendments to the approved effluent treatment process includes for alterations to the approved effluent treatment plant and a new treated effluent rising main to a proposed outfall at the River Boyne. This would consist of a new control and DAF building, revised sizing of approved tanks, replacing approved clarifier and sand filter with membrane bioreactor (MBR) and UV filter, and installation of a new Drum Screen, DAF unit, sludge volute dewatering unit and odour treatment system.

Stage 2 would comprise the construction and commissioning of a new screen, new balance tank and sludge holding tank, the relocation of the DAF unit and a proposed extension to the approved control house. The balance tank would provide storage capacity to buffer the effluent composition/loading and balance out flow fluctuations from the plant in order to facilitate the treatment of effluent via the DAF and biological stages at a steady rate. Effluent from the balance tank would gravity feed to the relocated DAF unit. From here, sludge would gravity feed into a sludge transfer tank and would be pumped into the new sludge holding tank. The sludge holding tank would store the DAF sludge and waste biological activated sludge (WAS) from the MBR prior to landspreading off-site.

Effluent from the DAF unit would pump to the anoxic tank to allow for the de-nitrification process through the use of bacteria, which breaks down the nitrate in the effluent waste. In the anaerobic/anoxic tank, denitrification would take place by mixing the food source (DAF out-flow), micro-organisms (return activated sludge) and nitrates (aeration tank effluent). From the anoxic tank, effluent would flow to the biological aeration tanks, where biological breakdown of the effluent takes place. The aeration tanks would be fitted with an air diffuser network and three air blowers, which would run as duty, duty and assist to manage any high loading on the treatment plant from the effluent.

From the aeration tank, effluent would enter the membrane bioreactor (MBR). MBR systems combine activated sludge treatment with a membrane liquid-solid separation process. The membrane component uses low pressure microfiltration or ultrafiltration membranes and eliminates the need for clarification and tertiary filtration.

A UV filtration unit would be installed on the final effluent line prior to the final sump for the treatment of micro-organisms and viruses prior to discharge of final treated effluent. MBR systems deliver high suspended solids and turbidity removal rates which are necessary to allow effective % transmittance rates for UV treatment. The proposed UV unit would be designed to achieve a 3log (99.9%) to 4 log (99.99%) removal rate for cryptosporidium. Treated effluent from the final discharge pump would be pumped to surface water.

Details of the proposed WWTP at Dawn Meats (Slane) are included in **Table 2.1** below.

The facility intends to provide for the discharge of final effluent to the River Boyne. This would necessitate the construction of a rising main from the Dawn Meats (Slane) site to the River Boyne.

Table 2.1: Details of Proposed WWTP

1	Type of treatment (primary, secondary, tertiary)	Tertiary
2	Hydraulic Capacity – Design / As Constructed	400 m^3/day
3	Hydraulic Capacity – Proposed loading	220 m^3/day
4	Hydraulic Capacity – Remaining	180 m^3/day
5	Organic Capacity – Design / As Constructed (P.E.)	28,000
6	Will the capacity be exceeded in the next three years?	No

The treated effluent rising main, approximately 7.2 km in length, would leave the Dawn Meats (Slane) site and will follow alongside the road network under the grass verge, before discharging to the River Boyne at Ardmulchan. The proposed discharge location [E292417, N271406] is approximately 10 meters upstream of the confluence of the Dollardstown River and the River Boyne.

2.2 DOWNSTREAM DRINKING WATER ABSTRACTIONS

A water abstraction point is located at Staleen, approximately 12.7km downstream of the proposed discharge point. This abstraction point is located within Co. Meath, however, the water treatment plant is operated by Louth County Council. Details of the abstraction point are included in Table 2.2.

Table 2.2: Details of Staleen Drinking Water Abstraction Point

Abstraction Code	Agglomeration Served	Abstraction Volume (m^3/day)	Distance Downstream (m)	Type of Treatment	Location
2100PUB1019	Drogheda/East Meath (35000 + East Meath)	28,000	12,700 (approx.)	Coagulation, sedimentation, filtration and disinfection.	301795E, 272201N

3.0 RISK ASSESSMENT

3.1 LEVEL OF TREATMENT AND CAPACITY OF PROPOSED WWTP

The Dawn Meats (Slane) facility currently provides Primary Treatment (flow balancing and removal of solids) at its onsite WWTP. The proposed WWTP development would allow for Primary Treatment – Stage 2 (new flow balancing and emergency storage) and Biological Treatment – Stage 3 of wastewaters, resulting in a treated effluent of high quality. The proposed development would include a UV filtration system which would treat the microbial and viral load of the wastewater.

The proposed WWTP has been designed for a maximum capacity of 400 M^3/day, with an initial expected maximum operating volume of 220 M^3/day.

3.2 DISCHARGE COMPLIANCE AND LEVEL OF DILUTION

The final effluent quality values from Dawn Meats (Slane) to the River Boyne have been based upon the River Boyne's assimilative capacity and current water quality.

An Effluent Dispersion Mixing Zone Analysis was carried out by McCloy Consulting (Document. Ref: M02171-01_WQ01) (Attachment 8.5 of the EIAR) and Assimilative Capacity Assessment was carried out by PES Ltd (AC_20_9684_R2)(Attachment 8.6 of the EIAR) to predict the river's ability to accommodate a treated effluent discharge of Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Molybdate Reactive Phosphorous (MRP), Nitrogen (N), Total Ammonia (TA), Unionised Ammonia (UiA), Total Suspended Solids (TSS) from the Dawn Meats (Slane) facility.

Results from the assessments have concluded that the proposed discharge will not lead to significant adverse impacts to the water quality of the River Boyne. The reports concluded that, in relation to surface-water guidelines, the proposed outfall to the River Boyne is fully compliant with the relevant water quality legislation.

Should the planning consent application for this rising main and discharge be accepted, proposed emission limits would be required to be agreed with the Environmental Protection Agency (EPA). Prior to any discharge occurring from the Dawn Meats site, an application for review of the site's current IE licence (Registration No. P0811-02) would be required to be approved with the EPA.

There is a high level of dilution in the receiving waters (River Boyne):

Boyne 95%ile flow for the proposed discharge point:	4.8 M^3/s =	414,720 M^3/day
Proposed maximum discharge volume:		400.0 M^3/day

This would result in a dilution of 1 in 1,037 at maximum effluent flow during 95%ile low flow conditions in the River Boyne.

It should be noted that the proposed discharge point is located at a significant distance, approximately 12.7km upstream, from the Staleen water abstraction point. Furthermore, a number of small streams and tributaries (including the Thurstiantown, Castleparks and Graigs streams), join the River Boyne downstream of the proposed discharge point. The considerable distance and the addition of waters from tributaries would significantly dilute the proposed discharge further.

3.3 RECEIVING WATERS / ABSTRACTED WATER QUALITY

The section of the River Boyne from the proposed discharge point to Slane town is classified a river waterbody WFD status as moderate for the 2015-2020 period, while the section of the River Boyne from Slane town to Staleen Water Abstraction Point is classified as good.

There are three EPA water quality monitoring stations located between the proposed Dawn Meats (Slane) discharge point to the Staleen Water Abstraction Point. The stations and locations relative to the proposed discharge location are included in **Table 3.1** below.

Table 3.1: EPA monitoring points on the River Boyne within the vicinity of Staleen Water Abstraction Point (Source:http://www.epa.ie/qvalue/webusers/HAResults.asp#BOYNE)

Station No.	Station Location	National X	National Y	Approx. Location Relative to Staleen Water Abstraction
RS07B041900	2km d/s Navan (LHS)	288493	269122	5.2km Upstream
RS07B042010	d/s Broadboyne Br (RHS)	292440	271435	At Discharge Point Location
RS07B042100	Slane Br	296414	273631	5.7km Downstream

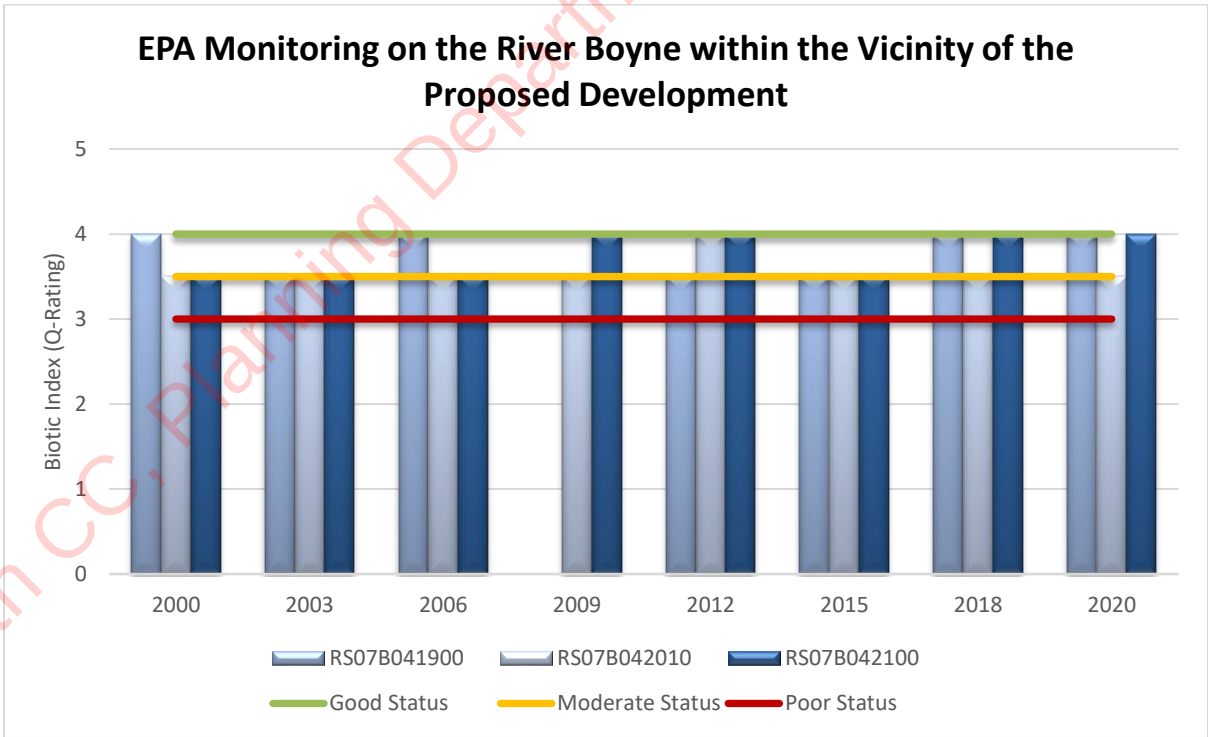


Figure 3.1: EPA Ecological Monitoring of the River Boyne at Stations 1900, 2010 and 2100

As can be seen in **Figure 3.1** above, the River Boyne is mainly achieving a water quality status of Q4 (Good) to Q3-4 (Moderate) in recent years at the monitoring stations located upstream and downstream of the proposed discharge point.

EPA comments on the most recent monitoring results for the River Boyne are as follows; "*Five of the fourteen stations on the Boyne were in satisfactory condition when assessed in 2020 (0400, 0800, 0900, 2100 and 2200). One site declined in quality, Kinnafad Bridge (0300), which is now of poor ecological status. All other sites were of moderate ecological status*."

It should be noted that Slane WWTP discharges to the River Boyne approximately 5.7km downstream of the proposed discharge point and approximately 7km upstream of the Staleen Water Abstraction Point. In accordance with their Waste Water Discharge Licence (Reg. No. D0257-01), monitoring is undertaken bi-annually for pH, BOD, COD, Suspended Solids, Total Ammonia and Orthophosphate and continuously for flow. During 2020, the average hydraulic loading of the plant was 300 m^3/day and one non-compliance was reported for exceedances in orthophosphate (provided within the 2020 Annual Environmental Report). A Drinking Water Risk Assessment was undertaken by Slane WWTP in 2015, which concluded that there was a low risk to drinking water quality.

3.4 IMPACT OF DISCHARGES DURING NORMAL AND ABNORMAL OPERATIONS

Abstracted water at Staleen undergoes the following treatment:

- Coagulation;
- Sedimentation;
- Filtration;
- Disinfection.

The abstraction for Drogheda / East Meath is located on the River Boyne, approximately 12.7km downstream of the proposed Dawn Meats (Slane) discharge point.

The treated final effluent quality values proposed for Dawn Meats (Slane) have been based upon the River Boyne's assimilative capacity and current water quality. The mixing zone modelling assessment concluded that, in relation to surface-water guidelines, the proposed outfall to the River Boyne is fully compliant with the relevant water quality legislation.

As part of the proposed development, effluent would be directed from the MBR to a UV filtration system. The proposed UV unit would be designed to achieve a 3log (99.9%) to 4 log (99.99%) removal rate for cryptosporidium.

As noted in Section 3.2, there would be considerable dilution of the discharge given the discharge volume, the 95%ile flow of the River Boyne and the distance (approximately 12.7km) from the proposed discharge point to Staleen Water Abstraction Point.

Therefore, it is considered that the risk to the Drogheda / East Meath abstraction point would be low during normal operations of the proposed WWTP.

Abnormal conditions at the proposed WWTP may include the following:

- A sudden increase in incoming flow, which could arise during a period of very heavy rainfall (dirty water run-off from yard) coinciding with peak production;
- Shock loads from the production process (high BOD or cleaning chemical concentration);
- Incidents involving exceeded emission limit values;
- Plant malfunction resulting in incomplete treatment of wastewaters;
- Overflows and leaks;
- Firewater entering the WWTP system.

Dawn Meats (Slane) would ensure that contact details are readily available for the appropriate personnel at Drogheda / East Meath (Staleen) plant in the unlikely event of significant discharges which could have potential to impact upon drinking water quality.

The following table outlines the control measures, infrastructural and operational, which are currently in place at the site or which would be implemented as part of the proposed WWTP development.

Table 3.2: Control measures for potential abnormal conditions at the proposed WWTP

Potential Abnormal Condition	Control Measures	
	Infrastructural Measures	**Operational Measures**
Sudden increase in incoming flow which could arise during a period of very heavy rainfall (dirty water run-off from yard) coinciding with peak production	• Proposed balance tank would be maintained at 50% capacity as is standard practice and would alleviate the impacts of sudden flows. • If the sensor trigger level is exceeded, SCADA system would automatically divert wastewater to the exiting HDPE lined lagoons via the proposed emergency influent divert pipework.	• The WWTP would have a SCADA system in place, which would alert the WWTP operator of physical (i.e. flow, pressure, temperature) and chemical (i.e. pH, turbidity, Dissolved Oxygen) changes, which may indicate plant malfunction.
Shock load from the production process (high BOD or cleaning chemical concentration)	• The balance tank would buffer the effluent composition / loading and would feed the biological stages at a steady rate. • If the sensor trigger level is exceeded, SCADA system would automatically divert wastewater to the exiting HDPE lined lagoons via the proposed emergency influent divert pipework. • All chemicals are stored in designated areas within bunds. • A chemical spill kit is located within the cleaning chemical storage area.	• The WWTP would have a SCADA system in place, which would alert the WWTP operator of physical (i.e. flow, pressure, temperature) and chemical (i.e. pH, turbidity, Dissolved Oxygen) changes, which may indicate plant malfunction. • Factory supervisors would notify the WWTP operator of any known or potential shock loads as soon as possible. • All staff are trained in spillage response procedure. • Bund integrity testing is undertaken every three years and visual inspection checks are undertaken regularly.
Incidents involving exceeded emission limit values	• If the sensor trigger level is exceeded, SCADA system would automatically divert wastewater to the exiting HDPE lined lagoons via the proposed emergency final effluent divert pipework. • Wastewaters would be temporarily stored in the lagoons until the WWTP is operating as normal,	• Continuous monitoring on the treated effluent discharge would be undertaken for indicator parameters. • In the event of an exceedance, an investigation would be undertaken to identify and resolve the issue.

Potential Abnormal Condition	Control Measures	
	Infrastructural Measures	**Operational Measures**
	or alternatively, wastewaters would be tankered to a municipal WWTP	• The EPA and other relevant authorities would be notified as soon as possible. • A Corrective Action procedure is in place as part of the site's Environmental Management System (EMS).
Plant malfunction resulting in incomplete treatment of wastewater	• If the sensor trigger level is exceeded, SCADA system would automatically divert wastewater to the exiting HDPE lined lagoons via the proposed emergency final effluent divert pipework. • Wastewaters would be temporarily stored in the lagoons until the WWTP is operating as normal, or alternatively, wastewaters would be tankered to a municipal WWTP	• The WWTP would have a SCADA system in place, which would alert the WWTP operator of physical (i.e. flow, pressure, temperature) and chemical (i.e. pH, turbidity, Dissolved Oxygen) changes, which may indicate plant malfunction. • A Maintenance Programme is in place onsite as part of the EMS. • All plant and equipment is routinely calibrated as per manufacturer's specifications. •
Overflows and leaks	• All spills within the WWTP Compound would be diverted to the Balance Tank and Lagoon 1. • The WWTP would be designed for a capacity of 500 M3, however, it would operate at a maximum of 400 M3. • Proposed balance tank would be maintained at 50% capacity as is standard practice. • High level liquid alarms would be installed on the WWTP tanks. • If the sensor trigger level is exceeded, SCADA system would automatically divert	• The WWTP would have a SCADA system in place, which would alert the WWTP operator of flow / pressure changes, which may indicate overflows or leaks. • All staff are trained in spillage response procedure. • An Emergency Response Procedure and Maintenance Programme are in place onsite as part of the EMS. • Integrity testing on bunds and pipelines is undertaken every three years. Bunds are visually inspected on a regular basis.

Potential Abnormal Condition	Control Measures	
	Infrastructural Measures	**Operational Measures**
	wastewater to the exiting HDPE lined lagoons via the proposed emergency influent and final effluent divert pipework. • All chemicals are stored in designated areas within bunds. • A chemical spill kit is located within the cleaning chemical storage area. • All waste and animal by-product materials are stored in sealed containers prior to transfer offsite, reducing the potential of leaks to the WWTP drainage system.	• All skips and trailers storing waste or animal by-products are checked daily as part of the environmental checklist. • The site ensures all relevant waste and animal by-product contractors are aware of the necessity of sealed containers.
Firewater entering the WWTP system	• A Firewater Risk Assessment is currently in place at the site in accordance with the current EPA IE licence, • In the event of a fire onsite the Emergency Response Procedure would be implemented at the site. • Firewater would enter the wastewater drainage systems and collect in the slatted tank, from which it would be diverted to HDPE Lagoon 2. • The HDPE Lagoon 2 would have sufficient capacity to contain generated firewater, with a 3,750 M3 available capacity.	• An Emergency Response Procedure and Maintenance Programme are in place onsite as part of the EMS. • Integrity testing on bunds and pipelines is undertaken every three years. Bunds are visually inspected on a regular basis.

3.5 CRYPTOSPORIDIUM RISK ASSESSMENT

A Cryptosporidium Risk Assessment has been prepared with regards the Staleen Water Abstraction Point. This assessment has been based upon the risk assessment methodology outlined in the EPA's guidance documents, "*Drinking Water Regulations Guidance Booklet No.4*", and the "*Handbook on the Implementation of the Regulations for Water Service Authorities for Public Water Supplies*". The Cryptosporidium Risk Assessment is included in Appendix B.

4.0 OVERALL RISK AND RECOMMENDATIONS

Based upon the assessment in Section 3, the overall risk from the planned future Dawn Meats (Slane) discharge to the Drogheda / East Meath (Staleen) water abstraction plant would be considered to be low.

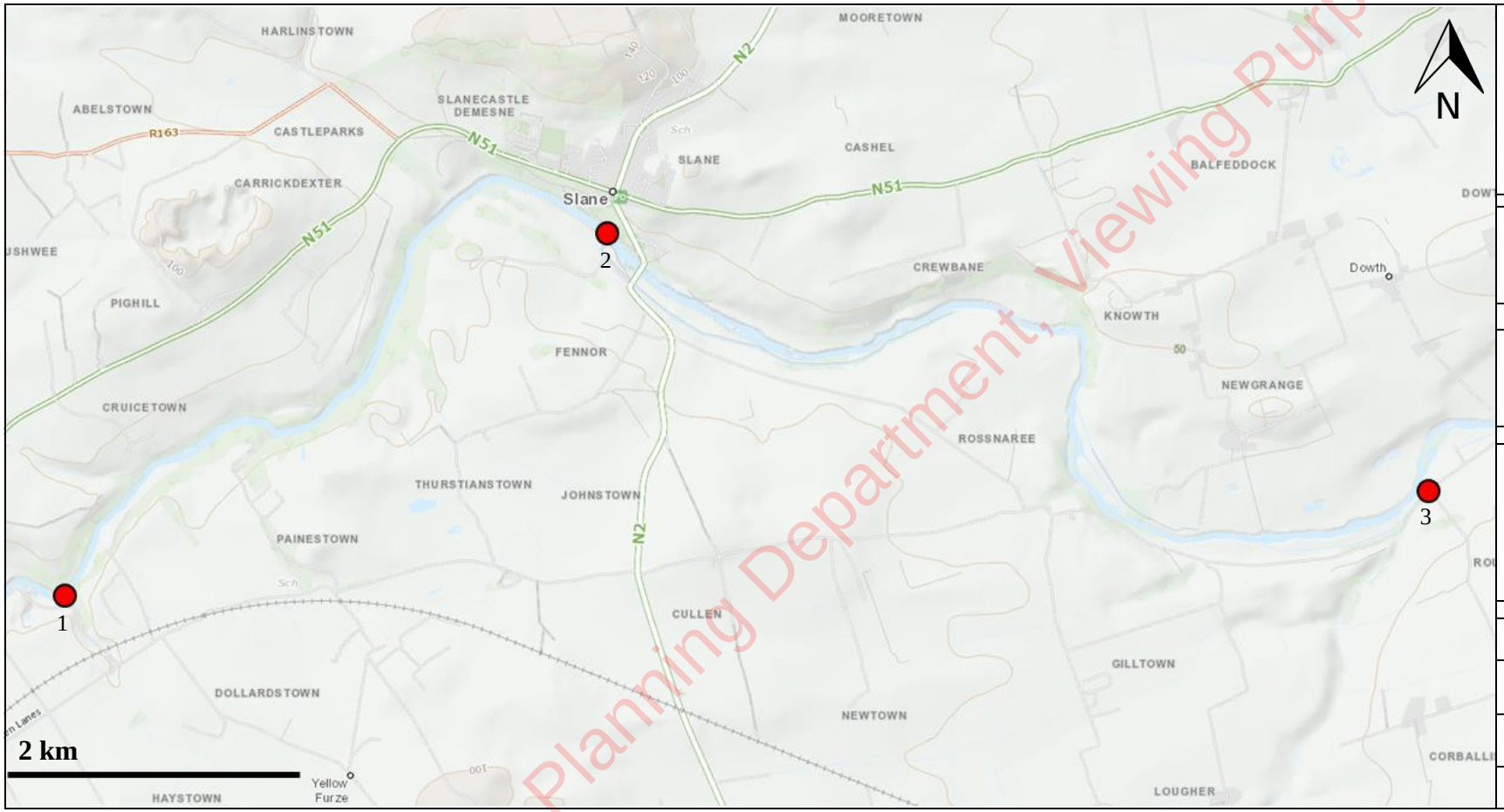
Dawn Meats (Slane) would ensure that contact details for personnel at the Drogheda / East Meath plant are readily available, and in the unlikely event of discharges with the potential to impact drinking water quality, personnel would be contacted as soon as possible.

Table 4.1: Drinking Water Abstraction Point Risk Assessment Summary

Does the assessment identify if any other discharge(s) from the works pose a risk to a drinking water abstraction (includes emergency overflows)?	Yes
What is the overall risk ranking applied by the applicant?	Low
Does the risk assessment consider the impacts of normal operation?	Yes
Does the risk assessment consider the impacts of abnormal operation (e.g. incidents /overflows)?	Yes
Does the risk assessment include control measures for each risk identified?	Yes
Does the risk assessment consider operational control measures e.g. waste water incident notification to drinking water abstraction operator?	Yes
Does the risk assessment include infrastructural control measures?	Yes

APPENDIX A
- LOCATION MAP OF PROPOSED DISCHARGE POINT, SLANE WWTP & STALEEN WATER ABSTRACTION POINT -

APPENDIX A: LOCATION MAP OF PROPOSED DISCHARGE POINT, SLANE WWTP AND STALEEN WATER ABSTRACTION POINT



Notes:

1 – Proposed Dawn Meats (Slane) Discharge Point

2 – Slane WWTP

3 – Staleen Water Abstraction Point

DAWM MEATS SLANE, CO. MEATH

APPENDIX A.1 PROTECTED SITES MAP

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		date: 11/12/2018	

APPENDIX B
- CRYPTOSPORIDIUM RISK ASSESSMENT -

The Cryptosporidium Risk Assessment was prepared for the Staleen Water Abstraction Point, following the methodologies described in guidance documents published by the EPA, including the Drinking Water Regulations Guidance "*Risk Screening Methodology for Cryptosporidium*" (Booklet No.4), and the "*Handbook on the Implementation of the Regulations for Water Service Authorities for Public Water Supplies*".

Slane WWTP, operated by Irish Water, includes the Cryptosporidium Risk Assessment for Staleen as part of their annual environmental reporting requirements under the plant's Waste Water Discharge Licence (Reg. No. D0257-01) conditions. The Cryptosporidium Risk Assessment included within Slane WWTP's 2015 Annual Environmental Report is detailed below.

The scores for each section are totalled in the yellow boxes and summarised in the table below. A summary of the scores for each section is included below.

Surface Water Catchment Risk Scores	**Section Score**	**Total Score**
Section 1 - Animals within the Catchment		31
Section 2 - Agricultural Practices within the Catchment		26
Section 3 - Discharges to the Catchment/Water Source		18
Section 4 - Water Source Type		8
Section 5 - Catchment Inspections		6
Section 6 - Raw Water Intake Management for Abstractions		-2
Total Surface Water Catchment Risk Score		87
Surface Water - Treatment and Supply Risk Score		
Section 7 - Water Treatment Processes		-10
Section 8a - Treatment Works Monitoring of Coagulation and Filtration		5
Section 8b - Treatment Works Monitoring of Coagulation and Filtration		-1
Section 8c - Treatment Works Monitoring of Coagulation and Filtration		-14
Section 8d - Treatment Works Monitoring of Coagulation and Filtration		0
Section 8e - Treatment Works Monitoring of Coagulation and Filtration		0
Section 8f - Treatment Works Monitoring of Coagulation and Filtration		0
Section 9 - Rapid Gravity and Pressure Filter Works Performance		8
Section 10 - Treatment Works Operation		3
Total Surface Water - Treatment and Supply Risk Score		9
Surface Water Risk Assessment Score		78
Population		75000
Population Weighting Factor (0.4 x log10(population))		1.9500245
Final Weighted Risk Assessment Score		**152**
Water Supply Risk Classification		**VERY HIGH RISK**

Section 1 - Animals Within the Catchment

Section No.	Pressure Risk Factor	RA Score	Actual Score
1.1	Cattle/calves at less than or equal to one livestock unit per hectare of forage area *	5	10
	Cattle/calves at more than one livestock unit per hectare of forage area*	10	
	No cattle/calves in the catchment	0	
1.2	Sheep/lambs at less than or equal to one livestock unit per hectare of forage area *	5	10
	Sheep/lambs at more than one livestock unit per hectare of forage area *	10	
	No sheep/lambs in the catchment	0	
1.3	Wild or farmed deer in the catchment	2	2
	No wild or farmed deer in the catchment	0	
1.4	Pig farms in the catchment	2	2
	No pig farms in the catchment	0	
1.5	Animals have direct access to water sources including feeder streams	4	4
	Fencing prevents access to water sources including feeder streams	-4	
1.6	High numbers of birds	2	2
1.7	Any other farmed animals or birds	1	1
		Total for Section 1	31

** If density not known assume more than one animal per hectare of forage area.*

Section 2 - Agricultural Practices Within the Catchment

Section No.	Risk Factor	RA Score	Actual Score
2.1	Slurry spraying within the catchment	6	6
2.2	Dung spreading within the catchment	3	3
2.3	Slurry **or** dung stores	3	3
2.4	Sheep pens **or** cattle sheds	6	6
2.5	Lambing **or** calving on the catchment	8	8
2.6	Full compliance with the Good Agricultural Practice Regulations verified by catchment inspection	-6	0
		Total for Section 2	26

Section 3 - Discharges to the Catchment/Water Source

Section No.	Risk Factor	RA Score	Actual Score
3.1	Population equivalent served by individual on-site wastewater treatment systems < 100 PE	4	6
	Population equivalent served by individual on-site wastewater treatment systems > 100 PE	6	
3.2	Population equivalent served by all wastewater works <500	4	8
	Population equivalent served by all wastewater works 500 to 5,000	5	
	Population equivalent served by all wastewater works 5,001 to 20,000	6	
	Population equivalent served by all wastewater works 20,001 to 50,000	7	
	Population equivalent served by all wastewater works > 50,000	8	
3.3	Storm water overflows	2	2
3.4	Section 4 or Integrated Pollution Prevention Control (IPPC) Licence discharge from intensive agricultural activity or agriculturally related discharge	2	2
3.5	All wastewater treatment plants complying with the UWWT Regulations quality standards	-1	0
3.6	All wastewater treatment plants complying with the UWWT Regulations quality standards	-1	0
	UV inactivation at outlet of wastewater treatment plants	-2	
		Total for Section 3	18

Section 4 - Water Source Type

Section No.	Risk Factor	RA Score	Actual Score
4.1	Upland reservoir/lake	2	8
	Lowland long term storage reservoir/lake	4	
	Upland river or stream - bankside storage	5	
	Upland river or stream – direct abstraction	6	
	Lowland river or stream – direct abstraction or bankside storage	8	
		Total for Section 4	8

Section 5 - Catchment Inspections

Section No.	Risk Factor	RA Score	Actual Score
5.1	Catchment inspections carried out at least monthly	-3	6
	Catchment inspections carried out less frequently	6	
5.2	Procedures in place to deal with irregularities on the catchment	-3	0
		Total for Section 5	6

Section 6 - Raw Water Intake Management for Abstractions

Section No.	Risk Factor	RA Score	Actual Score
6.1	No appropriate water quality monitor on intake	3	-2
	Appropriate water quality monitor on intake that is alarmed and connected to telemetry	-2	
	Automatic intake shut down when poor water quality	-4	
	Manual intake shut down when poor water quality	-1	
	No intake shut down when poor water quality	3	
		Total for Section 6	-2

Section 7 - Water Treatment Processes

Section No.	Risk Factor	RA Score	Actual Score
7.1	Simple sand filtration (not slow sand filtration)	8	-10
	Simple sand filtration (**not** slow sand filtration) with UV treatment	6	
	Coagulation followed by DAF/sedimentation and filtration	-10	
	Coagulation followed by DAF/sedimentation and filtration followed by UV treatment	-16	
	Coagulation followed by rapid gravity or pressure filtration (no flotation or sedimentation)	-7	
	Coagulation followed by rapid gravity or pressure filtration (no flotation or sedimentation) followed by UV treatment	-13	
	Slow sand filtration	-9	
	Slow sand filtration followed by UV treatment	-15	
	Membrane Filtration (DWI approved)	-16	
	Membrane filtration (Not DWI approved)	-2	
		Total for Section 7	-10

Section 8 - Treatment Works Monitoring of Coagulation and Filtration

Coagulation			
Section No. 8a	**Risk Management Factor**	**RA Score**	**Actual Score**
8.1	Manual coagulant dose control – not flow proportional	5	5
	Manual coagulant pH control	5	
	Coagulant pH monitored and alarmed	-5	
		Total for Section 8a	5

Section 8 - Treatment Works Monitoring of Coagulation and Filtration

Clarification			
Section No. 8b	**Risk Management Factor**	**RA Score**	**Actual Score**
8.2	Clarified water turbidity monitor/particle counters	-1	-1
	Clarified water turbidity alarm/particle counters	-1	
		Total for Section 8b	-1

Section 8 - Treatment Works Monitoring of Coagulation and Filtration

Rapid gravity and pressure filters			
Section No. 8c	**Risk Management Factor**	**RA Score**	**Actual Score**
8.3	Turbidity meter/particle counter on each filter with alarm on telemetry	-5	-5
	Turbidity meter/particle counter on each filter but no alarm on telemetry	0	
	One turbidity meter/particle counter shared by more than one filter with alarm on telemetry	-2	
	One turbidity meter/particle counter shared by more than one filter but no alarm on telemetry	2	
	No turbidity meters/particle counters monitoring filter performance	10	
8.4	Final water turbidity meter/particle counter with alarm on telemetry	-2	-2
	Final water turbidity meter/particle counter but no alarm on telemetry	2	
	No final water turbidity meter/particle counter	5	
8.5	Continuous residual coagulant monitor on combined filtrate or works outlet with alarm	-5	-5
	Continuous residual coagulant monitor on combined filtrate or works outlet but no alarm	-1	
	No continuous residual coagulant monitor on combined filtrate or works outlet	5	
8.6	Routine discrete monitoring of treated water for turbidity/residual coagulant	-2	-2
	No routine discrete monitoring of treated water for turbidity/residual coagulant	2	
8.7	Turbidity of backwash supernatant monitored when recycled	-2	0
	Turbidity of backwash supernatant not monitored when recycled	2	
		Total for Section 8c	-14

Section 8 - Treatment Works Monitoring of Coagulation and Filtration

Slow Sand Filters			
Section No. 8d	**Risk Management Factor**	**RA Score**	**Actual Score**
8.8	Turbidity meter/particle counter on each filter with alarm on telemetry	-5	0
	Turbidity meter/particle counter on each filter but no alarm on telemetry	0	
	One turbidity meter/particle counter shared by more than one filter with alarm on telemetry	-2	
	One turbidity meter/particle counter shared by more than one filter but no alarm on telemetry	2	
	No turbidity meters/particle counters monitoring filter performance	10	
8.9	Final water turbidity meter/particle counter with alarm on telemetry	-2	0
	Final water turbidity meter/particle counter but no alarm on telemetry	2	
	No final water turbidity meter/particle counter	5	
8.10	Filters matured and filtrate analysed for turbidity, coliforms and *Cryptosporidium* during maturation	-4	0
	Filters matured but no analysis carried out on filtrate	5	
	Filters not matured	15	

Section 8 - Treatment Works Monitoring of Coagulation and Filtration

Membrane Filtration			
Section No. 8e	**Risk Management Factor**	**RA Score**	**Actual Score**
8.11	Plant monitored and alarmed for integrity	-10	0
	Plant monitored for integrity but not alarmed	0	
	Plant not monitored for integrity	10	
8.12	Particle counter used continuously to monitor filter performance	-5	0
		Total for Section 8e	0

Section 8 - Treatment Works Monitoring of Coagulation and Filtration

UV Inactivation			
Section No. 8f	**Risk Management Factor**	**RA Score**	**Actual Score**
8.13	Plant monitored for integrity and correct UV dosage	0	0
	Plant monitored and alarmed for integrity and correct UV dosage	-10	
	Plant neither monitored nor alarmed	10	
8.14	Influent turbidity consistently < 0.2 NTU	-6	0
	Influent turbidity consistently < 1.0 NTU	-3	
	Influent turbidity consistently > 1.0 NTU	-1	
		Total for Section 8f	0

Section 9 - Rapid Gravity and Pressure Filter Works Performance

Item No.	Risk Factor	RA Score	Actual Score
9.1	Final water turbidity increases by more than 50%, excluding normal backwash period or turbidity in the final water >1.0 NTU	4	4
	Treated water turbidity increases by less than 50%, excluding normal backwash period and turbidity in the final water <1.0 NTU	0	
9.2	Media loss from any filter has brought media depth below design level	6	6
	Media depth above minimum design level with audit trail maintained	-2	
9.3	Signs of media cracking on any filter	4	0
9.4	All filters have been drained, inspected and any necessary remedial action taken within last year	-2	0
9.5	Air scour and backwash maintained and operating efficiently as per maintenance manual	-2	-2
		Total for Section 9	8

Section 10 - Treatment Works Operation

Item No.	Risk Factor	RA Score	Actual Score
10.1	Plant with documented management systems that includes procedures and process control manuals	-2	-2
	Process control manuals specific to works available	-1	
	Process control manuals specific to works not available	1	
10.2	Auditable action plans available for dealing with deviations in quality and evidence of implementation of the plan	-1	1
	Auditable action plans not available for dealing with deviations in quality	1	
10.3	Slow start facility on filters operational	-4	4
	No slow start facility on filters, or slow start facility not operational	4	
10.4	Filters run to waste for appropriate period after backwash	-6	4
	Filters run to head of works for a period following backwash	-4	
	Filters not run to waste or head of works for a period following backwash	4	
10.5	Backwash water and/or sludge supernatant **has** to be recycled	2	-2
	Other disposal route available for backwash water and sludge supernatant	-2	
10.6	Water flow through works when operating has not increased by >10% in <30 minutes in last 12 months	-2	-2
	Water flow through works when operating has increased by >10% in <30 minutes in last 12 months	2	
10.7	Flow through works above design flow for >10% of time in last 12 months	4	0
	Flow through works above design flow for ≤10% of time in last 12 months	0	
	Flow through works >130% above design flow for >50% of time in last 12 months	6	
10.8	Filters bypassed during the year	6	0
		Total for Section 10	3