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OUTLINE CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

MEATH COUNTY COUNCIL
Date Recd
05-03-21 21424
Ref

Meath County Fire
19 MAR 2021
and Rescue Service

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

REPORT NO:	Outline CEMP_21_9317	**DATE:** **REVISED:**	27th April 2020 08th February 2021
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1.0 INTRODUCTION

Panther Environmental Solutions Ltd. was commissioned by the applicant, Dawn Meats Ireland Unlimited Company (also referred to as Dawn Meats (Slane) in this report), to compile an Outline Construction Environmental Management Plan (CEMP) for the proposed development comprising of alterations to an existing approved waste water treatment plant (WWTP) development (Planning Ref: LB180300) at the Dawn Meats facility at Painestown, Beauparc, Navan, Co. Meath, and the construction of a proposed treated effluent rising main discharge from the Dawn Meats facility at Painestown, to the River Boyne at Ardmulchan, Co. Meath.

1.1 PURPOSE OF THE CEMP

The purpose of this outline CEMP is to communicate key environmental obligations that apply to all site personnel, sub-contractors and visitors to the site, while carrying out construction activities as part of the proposed development. The outline CEMP defines the approach to environmental management at the proposed development site, outlining the work practices, construction procedures and responsibilities to be undertaken during the construction phase. Compliance with the outline CEMP, the procedures, work practices and controls would be mandatory and must be adhered to by all personnel and sub-contractors employed during the construction phase. The CEMP outlines, where necessary, the control measures that are required to avoid, minimise or mitigate potential effects on the environment and surrounding area. This document has been prepared based upon the information provided during the planning stage, supplied by the client, Dawn Meats (Slane), and their representatives, with respect to the proposed development. The outline CEMP would be reviewed and updated as appropriate upon planning approval and as necessary throughout the construction phase.

1.2 LIVE DOCUMENT

The CEMP is a "live" document and would be reviewed and updated as necessary throughout the construction phase.

1.3 COMMUNICATION

Upon planning approval, Dawn Meats (Slane) would appoint a construction works contractor to the proposed development. This outline CEMP would be communicated to all site personnel during site inductions and briefings. All site personnel would be responsible for undertaking their work in an environmentally sustainable manner and would be encouraged to provide feedback and comments on environmental performance at the site and suggestions for improvement. The construction works contractor would appoint a Project Manager to the proposed development. Any environmental issues, accidents or incidents would be reported to the Project Manager as soon as possible, who in turn would inform the client.

The main project communications would comprise of structured reporting arrangements and meetings between the applicant and the construction works contractor. Site meetings would be undertaken on a weekly basis, with environmental performance included within the meeting agenda. The CEMP would also be discussed at these meetings, including the effectiveness of the CEMP and potential environmental improvements.

2.0 PROJECT DESCRIPTION

2.1 LOCATION

The location of the proposed WWTP compound is within the Dawn Meats (Slane) site, within the townland of Painestown, while the proposed treated effluent rising main would be located within the townlands of Painestown, Seneschalstown, Dollardstown, Hayestown-Carryduff Little and Ardmulchan. A location map of the proposed development is included in **Figure 2.1** below. The proposed development would be located mainly within a rural, farming area predominantly comprised of pasture land and hedgerows. Small rural settlements and farmyard complexes exist in the area.

Access to the Dawn Meats (Slane) facility is via Windmill Road, a local road linking to the L1010 road. Access for the proposed rising main works would be via the Yellow Furze road, the L1600 road and the local road running under Stackallen Railway Bridge from the L1600.

Figure 2.1: Location of Proposed Development at Navan, Co. Meath.

2.2 PLANNING CONTEXT

The applicant is applying for planning permission to Meath County Council for a development consisting of the following at Painestown, Beauparc, Co. Meath:

a) Demolition of an existing storage building (17.50 m^2) and construction of a new single-storey industrial type building to enclose the DAF unit granted planning permission under planning reference LB180300 and to provide new enclosed chemical store and control room (total floor area 119 m^2).

b) Install a new sludge press at intake to WWTP, change aeration tank to anoxic tank, install 2no additional aeration tanks, and alteration to perimeter berm to increase the footprint of WWTP by 539 m^2 to that granted planning permission under planning reference LB180300.

c) Treated wastewater rising main from the site of the proposed development to a new discharge point at the River Boyne (distance 7.2km), where pipeline shall be laid along a section of Windmill Road, the L1013, Yellow Furze Road, the L1600 (Boyne Rd), and the unnamed local road leading from the L1600 to the private lands abutting the River Boyne at the discharge point.

An Environmental Impact Assessment Report (Ref. EIAR_21_9317) has been prepared for the project to assess the potential impacts of the proposed development upon the environment and recommends mitigation measures where required. As good environmental practice, this CEMP has been prepared, to ensure construction works would be undertaken in an environmentally sensitive manner. Mitigation measures outlined within the Environmental Report, where relevant, have been incorporated within this document.

The following sections outline the planning policies relevant to the proposed development and the protection of the environment.

National Policies

A number of documents have been published in relation to the Government's commitment to sustainable development, including the *National Spatial Strategy 2002-2020* and the *Sustainable Development: A Strategy for Ireland 1997.*

Regional Policies

The Regional Planning Guidelines for the Greater Dublin Area (GDA) 2010-2022, which includes the counties of Meath, Kildare and Wicklow, outlines the long-term spatial planning strategy for the area. As part of the guidelines, a number of policies relating to the protection of the environment were outlined, as per Table 2.1 below.

Table 2.1: Regional Policies Relevant to the Protection of the Environment and the Proposed Development

POLICY REFERENCE	POLICY
GIP2 – Natural Heritage	To protect and conserve the natural environment, in particular nationally important and EU designated sites such as SPA, candidate SAC and proposed NHAs, protected habitats and species, and habitats and species of local biodiversity value. This policy also includes new or extended ecological sites that are notified or designated in the lifetime of the RPGs. Appropriate measures to protect Natura 2000 sites should be identified at the initial stages of all planning processes and included as a material consideration in order to inform future development.
GIP3 – River Basins	To ensure alignment between the core objectives of the Water Framework Directive, (including River Basin Management Plans and Programmes of Measures affecting the Greater Dublin Area) and other related plans such as County Development Plans and related Local Area Plans; Habitat and Species Protection Plans under the Habitats Directive, Water Services Investment Programme, Nitrates Action Programme; and Flood Management Plans.
GIP6 – Green Infrastructure	To ensure the protection, enhancement and maintenance of the natural environment and recognize the health benefits as well as the economic, social, environmental and physical value of green spaces through the development of an integration of Green Infrastructure (GI) planning and development in the planning process.

Local Policies

Local planning policies are detailed in the Meath County Development Plan, 2013-2019. A number of polices relate to the protection of the environment and are relevant to the proposed development, summarised as follows:

Table 2.2: Summary of Local Policies Relevant to the Protection of the Environment and the Proposed Development

POLICY REFERENCE	AREA
WS POL 2	To protect and develop, in a sustainable manner, the existing groundwater sources and aquifers in the county and to control development in a manner consistent with the proper management of these resources.
WS POL 20	To ensure through the implementation of the River Basin Management Plans and their associated programmes of measures, and any other associated legislation, the protection and improvement of all drinking water, surface water and ground waters throughout the county
WS POL 22	To continue efforts to improve water quality under the Local Government (Water Pollution) Act 1977, as amended and by implementing the measures outlined under the Nitrates Directive (91/676/EEC) and complying with the requirements of the Surface Water Legislation Environment Objectives (Surface Waters) Regulations 2009 and other relevant regulations.
WS POL 25	To protect, maintain and improve the natural character of the watercourses and rivers in the county Meath.
WS POL 26	To seek the continued improvement of water quality, bathing facilities and other recreational opportunities in the coastal, estuarine and surface waters in the County.
WM POL 1	To adopt the provisions of the waste management hierarchy and implement policy in relation to the county's requirements under the current or any subsequent waste management plan. All prospective developments in the county will be expected to take account of the provisions of the regional waste management plan and adhere to the requirements of the Plan...
WM POL 7	To encourage the recycling of construction and demolition waste and the reuse of aggregate and other materials in future construction projects.
WM POL 11	To ensure that hazardous waste is addressed through an integrated approach of prevention, collection, and recycling and encourage the development of industry led producer responsibility schemes for key waste streams
PC POL 1	To seek to preserve and maintain air and noise quality in the county in accordance with good practice and relevant legislation.
CSA SP 2	To ensure that features of Meath's natural heritage and green infrastructure that provide ecosystem services are protected; that biodiversity is conserved and where possible enhanced…
NH POL 1	To protect, conserve, and seek to enhance the County's biodiversity
NH POL 2	To promote measures to protect biodiversity in the development management process by creating / improving habitats, where possible.
NH POL 5	To permit development on or adjacent to designated Special Areas of Conservation, Special Protection Areas, National Heritage Area or those proposed to be designated over the period of the plan, only where an assessment carried out to the satisfaction of the Meath County Council, in consultation with National Parks and Wildlife Service, indicates that it will have no significant adverse effect on the integrity of the site.

POLICY REFERENCE	AREA
NH POL 6	To have regard to the views and guidance of the National Parks and Wildlife Service in respect of proposed development where there is a possibility that such development may have an impact on a designated European or National site or a site proposed for such designation.
NH POL 8	To seek to ensure that development does not have a significant adverse impact, incapable of satisfactory avoidance or mitigation, on plant, animal or bird species protected by law.
NH POL 9	To consult with the National Parks and Wildlife Service, and take account of any licensing requirements, when undertaking, approving or authorising development which is likely to affect plant, animal or bird species protected by law.
NH POL 10	To promote best practice in the control of invasive species in the carrying out of developments.
NH POL 13	To encourage the retention of hedgerows and other distinctive boundary treatments in rural areas and prevent loss and fragmentation, where possible. Where removal of a hedgerow, stone wall or other distinctive boundary treatment is unavoidable, mitigation by provision of the same type of boundary will be required.
NH POL 14	To promote and encourage planting of native hedgerow species of local provenance.
NH POL 16	To seek to maintain the natural heritage and amenity of the county by promoting the preservation and enhancement of native and semi-natural woodlands, groups of trees and individual trees.

Biodiversity Plans

Ireland's third National Biodiversity Plan 2017–2021, identifies actions towards understanding and protecting biodiversity with a vision that, "*biodiversity and ecosystems in Ireland are conserved and restored, delivering benefits essential for all sectors of society and that Ireland contributes to efforts to halt the loss of biodiversity and the degradation of ecosystems in the EU and globally*".

A number of Local Biodiversity Action Plans have been prepared, including the County Meath Biodiversity Action Plan 2008-2012 and the Draft County Meath Biodiversity Action Plan 2015-2020 which identify the actions required to protect and enhance biodiversity at local level.

2.3 ENVIRONMENTAL BASELINE

The location of the proposed WWTP compound is within the Dawn Meats (Slane) site, within the townland of Painestown, while the proposed treated effluent rising main would be located within the townlands of Painestown, Seneschalstown, Dollardstown, Hayestown-Carryduff Little & Ardmulchan. The proposed development would be located mainly within a rural, farming area predominantly comprised of pasture land and hedgerows. Small rural settlements and farmyard complexes exist in the area. The proposed discharge point would be located within the River Barrow and River Boyne Special Area of Conservation (SAC) (Site Code: 002299) and Special Protection Area (SPA) (Site Code: 004232).

2.3.1 Ecology

As part of the Natura Impact Statement (Ref. NIS_20_9684) and Environmental Impact Assessment Report (Ref. EIAR_21_9317) prepared for a planning application to Meath County Council on behalf of Dawn Meats (Slane), a site characterisation assessment was undertaken on the 28th of February 2020 to examine the ecological context of the development site, by systematically walking the site and boundaries and determining the habitats present. The habitat survey was undertaken in accordance with the standard methodologies outlined in Fossitt's "*A Guide to Habitats in Ireland*", and the Heritage Council guidelines, "*Best Practice Guidance for Habitat Survey and Mapping*", (Smith *et al.*, 2011).

Bird species and signs of mammalian activity and dwellings were also noted. Particular attention was given to the possible presence of habitats and/or species, which are legally protected under Irish and European legislation.

Cognisance was also taken of the findings of the previous site visit, including the proposed rising main route, by Panther Environmental personnel on the 21st of March 2017.

In addition to the site walkover surveys, flora records within 5km of the Dawn Meats site and rising main route for the previous twenty years were reviewed on the National Biodiversity Data Centre (NBDC) website, while fauna records were reviewed for the four 2km squares (N96J, N96P, N97F and N97K) in which the proposed development and proposed rising main route are located.

Habitats and Flora

A total of 17 habitats were identified at the proposed development site and rising main route, which are summarised in the table below. The Environmental Report and Natura Impact Statement (NIS) detail the flora encountered during the site assessment in further detail.

Table 2.3: Summary of Habitats Identified for the Proposed Development Works at the Dawn Meats (Slane) site and Proposed Rising Main Route

HABITAT CLASSIFICATION HIERARCHY		
LEVEL 1	**LEVEL 2**	**LEVEL 3**
F – Freshwater	**FW** – Watercourses	**FW2** – Depositing / lowland rivers
		FW4 – Drainage ditches
G – Grassland and marsh	**GA** – Improved grassland	**GA1** – Improved agricultural grassland
		GA2 – Amenity grassland (improved)
	GS – Semi-natural grassland	**GS2** – Dry meadows and grassy verges
		GS4 – Wet grassland
W – Woodland and scrub	**WD** – Highly modified / non- native woodland	**WD1** – (Mixed) broadleaved woodland
		WD4 – Conifer Plantation
	WS – Scrub / transitional woodland	**WS1** – Scrub
		WS3 – Ornamental/ non-native shrub
	WL – Linear woodland / scrub	**WL1** – Hedgerows
		WL2 – Treelines
B – Cultivated and built land	**BC** – Cultivated land	**BC1** – Arable crops
		BC2 – Horticultural land
	BL – Built land	**BL1** – Stone walls and other stonework
		BL2 – Earth Banks
		BL3 – Buildings and artificial surfaces

According to the NBDC, one protected plant species under the Flora (Protection) Order, 2015 (S.I. No. 356 of 2015), Meadow Barley (*Hordeum secalinum*) was recorded within approximately 5km from the Dawn Meats site and rising main route. However, no protected flora species under the Flora Protection Order or species of conservation significance were noted during the site assessment.

Invasive Species

The NBDC returned records within approximately 5km of the Dawn Meats site and rising main route for the following nine invasive plant species; Black Currant (*Ribes nigrum*), Butterfly-bush (*Buddleja davidii*), Canadian Waterweed (*Elodea canadensis*), Cherry Laurel (*Prunus laurocerasus*), Giant Knotweed (*Fallopia sachalinensis*), Japanese Knotweed (*Fallopia*

japonica), Red Oak (*Quercus rubra*), *Rhododendron ponticum* and Sycamore (*Acer pseudoplatanus*). Four of these invasive species are listed in the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011); Canadian Waterweed, Giant Knotweed, Japanese Knotweed and Rhododendron. However, no invasive species listed in Part 1 of the Third Schedule were noted as present during the onsite assessment.

Fauna (Excluding Bats)

While no fauna was observed at the proposed development site, burrows were noted along some areas of hedgerows, identified as likely Rabbit (*Oryctolagus cuniculus*) and Rat (*Rattus norvegicus*) burrows. No frogs (*Rana temporaria*) or smooth newts (*Lissotriton vulgaris*) were present in any of the freshwater habitats encountered during the walkovers of the proposed rising main route.

However, other fauna typical of that found throughout the rest of Ireland, which would be expected to be found in the general area include Badger (*Meles meles*), Fox (*Vulpes vulpes*), Irish Hare (*Lepus timidus hibernicus*), Red Squirrel (*Sciurus vulgaris*), Grey Squirrel (*Sciurus carolinensis*), Hedgehog (*Erinaceus europaeus*), Pine Marten (*Martes martes*), Stoat (*Mustela erminea hibernica*), Wood Mouse (*Apodemus sylvaticus*) and Pygmy Shrew (*Sorex minutus*). Given that the proposed development is located in close proximity to the Dollardstown Stream and given that the proposed discharge point is located within the River Boyne, it is likely that aquatic fauna such as Otter (*Lutra lutra*) are present within the vicinity.

NBDC records for the previous twenty years for fauna of note within the four 2km squares (N96J, N96P, N97F and N97K) in which the proposed development and proposed rising main route are located include the protected species Otter (*Lutra lutra*) and Badger (*Meles meles*).

Bats

It is likely that bats are present within the area of the proposed development, given the presence of hedgerow / treeline habitat which likely provide suitable foraging and commuting habitats for bats. According to the Bat Conservation Ireland website, the bat species likely to be present in the area include Common Pipistrelle (*Pipistrellus pipistrellus*), Soprano Pipistrelle (*Pipistrellus pygmaeus*), Leisler's Bat (*Nyctalus leisleri*), Brown Long-eared Bat (*Plecotus auritus*) and Daubenton's Bat (*Myotis daubentonii*), while records exist for County Meath for Nathusius' Pipistrelle (*Pipistrellus nathusii*), Natterer's Bat (*Myotis nattereri*) and Whiskered Bat (*Myotis mystacinus*).

The NBDC has records for Leisler's Bat, Common Pipistrelle and Soprano Pipistrelle for the four 2km squares (N96J, N96P, N97F and N97K) in which the proposed development and proposed rising main route are located.

The age and species of trees varies along the route varies and none are scheduled for removal. Some are covered in significant amounts of well-established ivy which has the potential for high bat roost potential. Other trees were identified with both low and medium bat roost potential, given the relatively young age of some trees and in the absence of suitable roost features such as natural holes, cracks / splits in major limbs, loose bark and hollows / cavities in the older trees.

Avifauna

Given the agricultural land use of the surrounding area, it would be expected that common grassland and hedgerow bird species would be present in the area. Bird species noted during the site walkover on 28th February 2020 included the following:

COMMON NAME	SCIENTIFIC NAME	E.U. BIRDS DIRECTIVE	BoCCI* RED LIST	BoCCI* AMBER LIST
Blackbird	*Turdus merula*	-	-	-
Blue Tit	*Parus caeruleus*	-	-	-
Bullfinch	*Pyrrhula pyrrhula*	-	-	-
Buzzard	*Buteo buteo*	-	-	-
Chaffinch	*Fringilla coelebs*	-	-	-
Dunnock	*Prunella modularis*	-	-	-
Great Tit	*Parus major*	-	-	-
Long-tailed Tit	*Aegithalus caudatus*	-	-	-
Mute Swan	*Cygnus olor*	-	-	✓
Pied Wagtail	*Motacilla alba*	-	-	-
Reed Bunting	*Emberiza schoeniclus*	-	-	-
Robin	*Erithacus rubecula*	-	-	✓
Rook	*Corvus frugilegus*	-	-	-
Snipe	*Gallinago gallinago*	-	-	✓
Song Thrush	*Turdus philomelos*	-	-	-
Starling	*Sturnus vulagaris*	-	-	✓
Woodpigeon	*Columba palumbus*	-	-	-
Wren	*Troglodytes troglodytes*	-	-	-

BoCCI (Birds of Conservation Concern in Ireland) List classifies bird species into one of three lists (Red, Amber or Green) based on their conservation status and conservation priority.

None of the bird species are listed under Annex I of the E.U. Birds Directive. No species are red listed under the BoCCI classification, four species, Mute Swan, Robin, Snipe and Starling, are amber listed.

Designated Sites

The majority of the proposed development does not directly impinge on any designated area of conservation, the exception being the location of the proposed rising main discharge point just within the boundary of the River Boyne and River Blackwater SAC (Site Code: 002299) and SPA (Site Code: 004232).

The River Boyne and River Blackwater SAC is designated for the Annex I Habitats Alkaline Fens [7230] and Alluvial Forests [91E0] (which is considered a priority habitat), and the Annex II Species River Lamprey (*Lampetra fluviatilis*) [1099], Atlantic Salmon (*Salmo salar*) [1106] and Otter (*Lutra lutra*) [1355]. The River Boyne and River Blackwater SPA is designated for one special conservation interest, Kingfisher (*Alcedo atthis*) [A229].

No habitats or species listed under Annex I or Annex II of the E.U. Habitats Directive, or species listed under Annex I of the E.U. Birds Directive, were recorded at the site. However,

given the presence of the Dollardstown Stream within close proximity to the proposed development, and given that the proposed outfall would be located at the River Boyne, it is possible that River Lamprey, Atlantic Salmon, Otter and Kingfisher are present within the vicinity.

There are no other designated sites located within the immediate vicinity of the proposed development site. Jamestown Bog Natural Heritage Area (NHA) (Site Code: 001324) is located approximately 14.3km from the site, however, this NHA is located upstream of the proposed development and within a separate sub-catchment.

There are also 11 proposed NHA (pNHA) sites within 15km of the proposed development; Boyne Woods pNHA (Site Code: 001592), Slane Riverbank pNHA (Site Code: 001591), Crewbane Marsh (Site Code: 000553), Balrath Woods (Site Code: 001579), Rossnaree Riverbank (Site Code: 001589), Thomastown Bog (Site Code: 001593), Duleek Commons (Site Code: 001578), Dowth Wetland (Site Code: 001861), King William's Glen (Site Code: 001804), Boyne River Islands (Site Code: 001862) and Mellifont Abbey Woods (Site Code: 001464)

2.3.2 Water Quality

The proposed rising main development would discharge treated effluent into the River Boyne. It is noted that the River Boyne is designated as a Special Area of Conservation (Site Code: 002299) and as a Special Protection Area (Site Code: 004232). Furthermore, the River Boyne is designated as a salmonid water under the European Commission (Quality of Salmonid Waters) Regulations 1988.

The Environmental Protection Agency (EPA) undertake surface water monitoring along the River Boyne. The results for the nearest monitoring stations with available information (as per **Table 2.4**) for the period 1990 – 2018 are summarised in **Figure 2.2** below for indicative purposes.

Table 2.4: EPA monitoring points on the River Boyne within the vicinity of the Proposed Discharge Point

STATION NO.	STATION LOCATION	EASTING	NORTHING	APPROX. LOCATION RELATIVE TO RISING MAIN DISCHARGE POINT
RS07B042010	d/s Broadboyne Br (RHS)	292440	271435	At Discharge Point Location
RS07B042100	Slane Br	296414	273631	5.7km Downstream

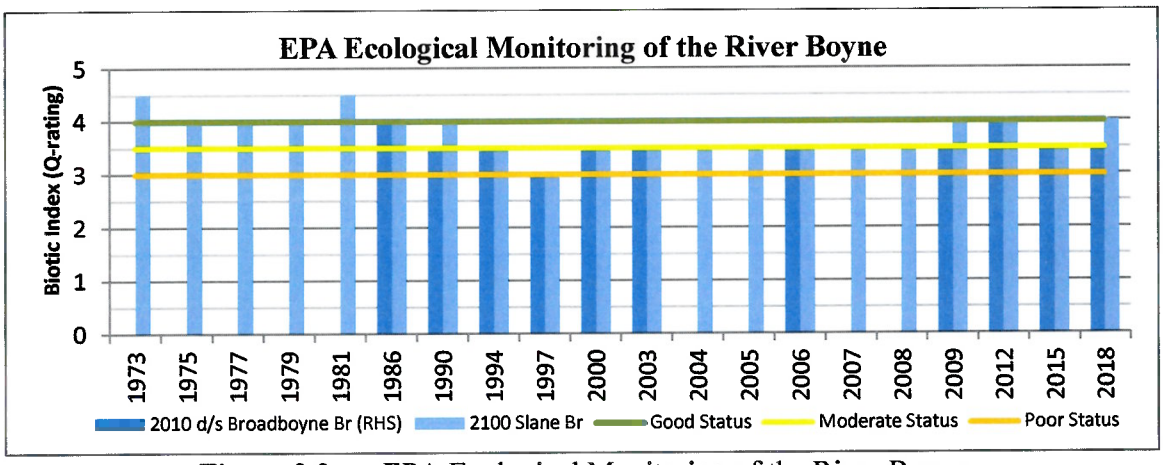

Figure 2.2: EPA Ecological Monitoring of the River Boyne

As can be seen in **Figure 2.2** above, the quality of the River Boyne in the vicinity of the proposed discharge has maintained a moderate status for the majority of the past 15 years. Both EPA monitoring sites achieved good status in 2012, however, only Slane Bridge has returned to good status in the 2018 reporting year.

2.3.3 Soils and Subsoils

The Geological Survey of Ireland's (GSI's) on-line mapviewer indicates that the soils underlying the WWTP site are classified as shallow well drained mineral soils derived mainly from calcareous parent material (**BminSW**). Soils vary along the rising main route and comprise of **Rck, BminDW (x), BminPD** (Mineral soil, poorly drained till chiefly derived from limestone), **A** (alluvial) and **BminSW**.

The GSI on-line webmapper indicates that subsoils underlying the majority of the WWTP compound are absent and that it is mainly underlain by bedrock at, or close to, the surface (**Rck**) surrounded by Carboniferous Limestone till (**TLs**). Subsoils underlying the rising main route comprise of bedrock, at, or close, to surface (**Rck**) at the WWTP compound, Carboniferous Limestone till (**TLs**), alluvium (**A**) underlying the mid-section of the route and glaciofluvial sands and gravels derived from Carboniferous rock underlying the area surrounding the outfall as the Boyne River (**GLs**).

2.4 CONSTRUCTION PROJECT DESCRIPTION

The construction of proposed development would be undertaken by a construction works contractor, who would be appointed upon receipt of planning approval by the applicant, Dawn Meats (Slane), hereafter referred to as "the client". The proposed development would comprise of alterations to an existing approved WWTP development (Planning Ref: LB180300), and the construction of new treated effluent rising main pipeline to a proposed outfall at the River Boyne at Ardmulchan. This CEMP covers the works proposed in the new planning application, in addition to covering the works previously approved under Planning Ref. LB180300.

The Dawn Meats (Slane) facility has an existing WWTP onsite, comprising of a pumping sump, meva screen, slatted tank, drum screening, two HDPE wastewater storage lagoons and a dissolved air flotation (DAF) unit.

The proposed development approved under Planning Reference LB180300 consists of the construction of an extension to the existing WWTP to include a coarse and fine screen, balance tank, sludge tank, sludge press, anoxic tank, aeration tank, clarifier, sand filter, treated effluent pump sump, coagulant storage tank, odour scrubber unit, control building and the relocation of the existing DAF unit, in addition to associated site development works including the construction of an earth berm around the WWTP compound and landscaping activities.

The proposed development as part of the current planning application would comprise of converting the approved aeration tank to an anoxic tank, the construction of two new aeration tanks, including a proposed extension to the compound area and a revised control house footprint to include internal room for the approved relocation of the existing DAF unit. The proposed development would also include the construction of a new treated effluent rising main from the proposed pump sump of the WWTP compound to the proposed outfall to the River Boyne at Ardmulchan.

Further details on the proposed works are included in the following sections. The proposed site layout drawings are included in Appendix A.

A temporary site compound would be established and would be used for plant, equipment and materials storage and construction staff welfare facilities if required. The location of the temporary construction compound would be within the grounds of the existing Dawn Meats (Slane) facility. The temporary site compound would also be used for the storage of fuels and oils required for the various construction plant, in addition to housing waste receptacles.

As part of the construction works for the rising main, a limited section of hedgerow removal may be required at the road boundary of the field adjacent to the River Boyne. However, as the route would primarily follow the local roads, this would be minimal. Following the completion of construction works, reinstatement and landscaping activities would be undertaken, which would include replacement planting using native species.

2.4.1 Construction Schedule

The approximate construction period for the proposed WWTP extension and treated effluent rising main works expected to take approximately eight months. Rising main and the WWTP extension works would be undertaken concurrently.

Hours of operation would be from 7am to 7pm, Monday to Friday.

Construction on the rising main route would be undertaken in phases, with only one working section open at a time. Upon receipt of planning approval, the construction schedule would be finalised at a detailed design stage. The proposed development would include the following main construction activities:

General

- Mobilisation of personnel and equipment to site;
- Designate and establish a temporary site compound, including designated materials storage area, at Dawn Meats (Slane);
- Site inductions and relevant training;
- Erection of health and safety / construction works signage.
- Installation of external lighting;
- If required for greenfield area, establishment of temporary construction access points and routes;
- Site clearance.

WWTP Extension

- Excavation of area for new WWTP plant;
- Stockpiling of topsoil for use in an earth berm and reinstatement / landscaping;
- Construction of bases / plinths for proposed tanks;
- Construction of new balance tank;
- Relocation of DAF unit;
- Construction of new sludge holding tank;
- Construction of anoxic tank and aeration tanks;
- Construction of clarifier tank
- Construction of sand filter unit;
- Replacement of old drum screen with new drum screen;
- Demolition of existing shed building and construction of new control house building;
- Installation of interconnecting pipework.

Treated Effluent Rising Main

- Marking out of buffer zones around surface water drains (with the exception of watercourse crossings);
- Installation of silt control features where appropriate, such as silt fencing;
- Excavation of rising main trench (rising main would be laid approximately 800 – 1,000 mm underground);
- Stockpiling of topsoil for use in reinstatement;
- Laying of pipework.

Reinstatement / Landscaping

- Construction and landscaping of earth berm around the new WWTP compound;
- If established in a greenfield area, removal of temporary construction compound & temporary access routes and reinstatement of temporary construction compound and access routes using stockpiled topsoil;
- Finishing / landscaping of WWTP compound;
- Reinstatement of treated effluent rising main route using stockpiled topsoil;
- Removal of silt control features (once soil stabilisation has taken place).

2.4.2 Main Stages of Construction

Site Clearance and Excavations

As discussed in Section 2.3, the majority of the proposed rising main would be located along local roads, bounded by footpaths, earth banks, stone walls, hedgerows and treelines. Where the pipeline is lain within the road carriageway, excavated material would be disposed of to a licenced waste contractor and the road resurfaced with new material.

During site clearance works in the grass verge and greenfield areas, the top layer of vegetation of the proposed development footprint would be removed and would be either stored for re-use in landscaping activities at the development site upon completion of construction works, or, in the instances of larger vegetation (i.e. shrubs and trees) would be removed from the development site and appropriately disposed of to a licenced waste contractor.

The small section of hedgerow which may require removal would be inspected for the presence of breeding birds prior to any clearance works taking place. Where nests are identified, a qualified ecologist would determine if a licence from the National Parks and Wildlife Services (NPWS) is required, or if it is possible to establish a suitable buffer zone around the active nest.

During excavation works, subsoil and topsoil would be temporarily stored for re-use in landscaping and reinstatement. The excavated subsoil and topsoil from the rising main excavations would be reused in reinstatement, with any excess soils transported offsite by a licenced contractor for disposal at a suitably licenced facility, while all excavated subsoil and topsoil from works at the WWTP compound would be reused for earth berm construction. The storage of excavated material on site would be temporary, until the completion of site reinstatement and landscaping activities.

Site clearance works at the WWTP compound would also involve the demolition of the existing shed building, comprised of blockwork. The associated demolition waste would be transported offsite by a licenced waste haulier to a suitably licenced waste facility.

Archaeological monitoring would be undertaken during excavation works and earth moving activities to ensure that should any archaeological features be present, they would be identified and recorded, and the appropriate course of action taken. A cultural, archaeological and architectural assessment has been included within the Environmental Report (EIAR_21_9317), prepared by Shanarc Archaeology.

Construction of New Tanks and Control House Building

Following site clearance and excavation works, works would commence on the construction of the new proposed tanks and new control house. The pouring of concrete bases and plinths would be supervised at all times. The new tanks would be comprised of glass-lined steel tanks, while the new control house would be constructed of blockwork. Building specifications would be determined at the finalised design stage. Following the construction of the new tanks, works would commence on the installation of interconnecting pipework within the WWTP compound.

Laying of Treated effluent Rising Main

The treated effluent rising main, approximately 7.2 km in length, would leave the Dawn Meats (Slane) site and pass under and along public roadways, and through agricultural lands before discharging to the River Boyne at Ardmulchan, as shown in Appendix A. The proposed treated effluent rising main would have a 150mm diameter (nominal bore), a specification class of PE150 SDR17 (10-BAR) and would be laid at a depth of approximately 800 - 1,000mm below the existing ground levels for the entirety of its length. Granular fill (Clause 503 material) would surround the rising main.

The rising main would incorporate sluice valves, in addition to air valves and cleaning/inspection points.

The lands through which the proposed treated effluent rising main would traverse are primarily along the verge of the road network. The final section of the rising main from the local road to the outfall at the River Boyne is in private ownership, therefore Dawn Meats (Slane) would agree a way-leave with the landowner.

The treated effluent rising main would start at the Dawn Meats site at an elevation of 100m above sea level. As the route travels towards the River Boyne, the topography gradually slopes to an approximate elevation of 50m at Ardmulchan and 20m upon reaching the river bank.

It is proposed to use a combination of open-cut and horizontal directional drilling (HDD) methods, as ground conditions allow. HDD is the preferred option by the developer as it will involve less opening of the public roads. However, the extent of the use of each method cannot be confidently defined for the route until site investigations are complete. Where possible, HDD methods would be used in the vicinity of residences, road crossings / junctions and roadway with little to no grass verge to minimise disturbance to the road structure.

While the proposed treated effluent rising main would cross approximately 45 metres of agricultural land beside the River Boyne, the majority of the rising main route would be lain along the verge of public roads, bordered by ditches, hedgerows and some areas of stone walls.

Prior to the laying of the rising main, a buffer zone around any surface water drains (with the exception of culverted watercourse crossings) would be marked out and the installation of silt control features undertaken where appropriate.

The proposed route also passes under the Stackallen Railway Bridge and would be installed within the existing roadway under the bridge.

Site Reinstatement and Landscaping

The reinstatement and landscaping process shall commence upon completion of construction activities at the proposed development site. As noted previously, where open cut methods are used, only one working section of the rising main would be open at a time, with reinstatement and landscaping works undertaken upon completion of each working section.

Reinstatement and landscaping activities would include the levelling of the development site with stockpiled soil from excavations, the removal of the temporary site compound and temporary access routes, the removal of construction plant, equipment and materials, the

reseeding of exposed soil where required, planting of the new earth berm surrounding the WWTP compound and the replacement planting of native tree and shrub species within areas of hedgerows / treelines which require removal. Reinstatement and landscaping activities would also include the removal of silt control features, once soil stabilisation has taken place.

2.4.3 Construction Working Hours

It is anticipated that construction works would be undertaken during standard construction hours, as follows:

Start	Finish	Days
7am	7pm	Monday – Friday

The hours specified above would be finalised upon appointment of the construction works contractor. It should be noted that there may be times where it is necessary to undertake construction works outside of the times mentioned above, for example concrete pours. In such cases, notification would be given where necessary to the relevant bodies (i.e. local council) and any potentially effected local residents in good time and prior to specified works commencing.

2.4.4 Construction Plant and Equipment

The construction plant and equipment likely to be used during the construction phase of the project are included in the table below. It should be noted that this list is not exhaustive.

Table 2.5: Likely Construction Plant and Equipment Required

ACTIVITY	POSSIBLE PLANT / EQUIPMENT REQUIRED
Site Clearance and Excavations	Tracked Excavator Dumper trucks Bulldozer Graders Rollers
Construction of Aeration Tank	Tracked Excavator JCB Site Dumper Cement Mixer
Site Reinstatement and Landscaping	Tracked Excavator Site Dumper Bulldozer

2.4.5 Temporary Site Compound and Staff Welfare Facilities

It is intended to provide a temporary site compound to be used by the construction works contractor for the storage of all machinery and plant when not in use, dedicated storage for oils and fuels required for construction plant and for the re-fuelling of plant. The temporary site compound may also house, if necessary, a temporary office and staff welfare facilities including a canteen, toilet and first aid supplies.

The location of the temporary construction compound would be within the grounds of the existing Dawn Meats (Slane) facility.

If the compound were to be established on greenfield area within the facility boundary, works to establish the compound would include removing and storing the existing topsoil on site for reinstatement and constructing a new hardcored area by laying a geotextile membrane over the entire compound area to take 200mm of 75mm down broken stone, with 50mm clause 8404 blinding on top.

Portable cabin structures would be used to provide the temporary site office and staff canteen, if required. A storage container would be provided for the storage of construction equipment, tools and materials required for construction. All fuels and oils required would be stored within a designated bunded area, located within the storage container or at an alternative designated location with the temporary site compound.

If required, a mobile welfare unit for sanitary services would be installed at the temporary compound and would be emptied by a licenced contractor on a minimum weekly basis.

The compound would also be the designated location for construction waste receptacles during the project. Waste would be segregated where possible and placed within recycling and general waste skips provided by a licenced waste contractor.

During the construction phase, a portable water supply would be provided via a mobile water tanker, or alternatively a connection to the Dawn Meats groundwater supply would be obtained. Power would be provided using a diesel generator, which would be suitably bunded. Telecommunications would be provided using mobile phones and broadband.

For a greenfield compound and following the completion of construction works, the temporary structures, blinding, hardcore and geotextile would be removed and the area reinstated using the stockpiled topsoil. The topsoil would be broken up and cultivated to create a fine tilt, where any stones and debris greater than 30mm would be removed before re-seeding the area.

2.4.6 Security Arrangements

The construction works contractor would ensure the proposed development site is secured, so as to provide the safety of all potentially affected parties, including staff, contractors, traffic and pedestrians. Only authorised personnel would be allowed onto the development site. The site would be secured by a fence, hoarding or another suitable site barrier system to protect against unauthorised entry. The construction works contractor would implement the appropriate security arrangements, including signing in / out procedures, signage and out-of-hours security.

2.4.7 Health and Safety

All activities undertaken at the proposed development site during the construction phase shall be in accordance with the requirements of the Safety, Health and Welfare at Work Act 2005, as amended, and the Safety, Health and Welfare at Work (Construction) Regulations, 2013. As required by the 2013 regulations, a Health and Safety Plan would be prepared by the construction works contractor, which would address health and safety issues from the design stages through to the completion of construction works. This plan would be updated and reviewed as required as the proposed development progresses.

Prior to works commencing onsite, all site personnel, including sub-contractors, would receive induction training that would incorporate health and safety requirements and good practice. Site induction would be mandatory for all employees, sub-contractors and visitors to the development site. Specific training would be provided, where necessary.

All construction personnel, contractors and visitors to the site would wear the following appropriate Personnel Protective Equipment as a minimum at all times:

- Safety helmet;
- Hi-visibility clothing (coat or vest);
- Safety boots;
- Eye protection where identified for specific activities.

Regular site safety audits would be undertaken throughout the construction phase to ensure the rules and regulations established for the site are complied with at all times.

2.4.8 Construction Method Statement

A preliminary Construction Method Statement would be prepared as part of the planning application. However, prior to works commencing, the appointed construction works contractor would prepare a detailed Construction Method Statement, which would address all construction works required for the proposed development. The construction works contractor would maintain a register of all method statements for the project, in addition to a register of all site personnel trained on the method statements.

2.4.9 Watercourse Crossings

The rising main route would traverse culverted drainage ditches and the Dollardstown Stream. The Dollardstown stream crossing and identified open roadside drainage ditches are outlined in **Figure 2.3** below.

The extent of construction works which would be required for the Dollardstown Stream and drainage crossings have not been fully defined at this stage, however a detailed investigation would be undertaken at the detailed rising main design stage.

Table 2.6: Locations of Watercourse Crossings along Rising Main Route

NO.	WATERCOURSE TYPE / NAME	APPROX. GRID REFERENCE	PROPOSED CROSSING METHOD
1	Dollardstown Stream	N 927 710	Within existing bridge infrastructure

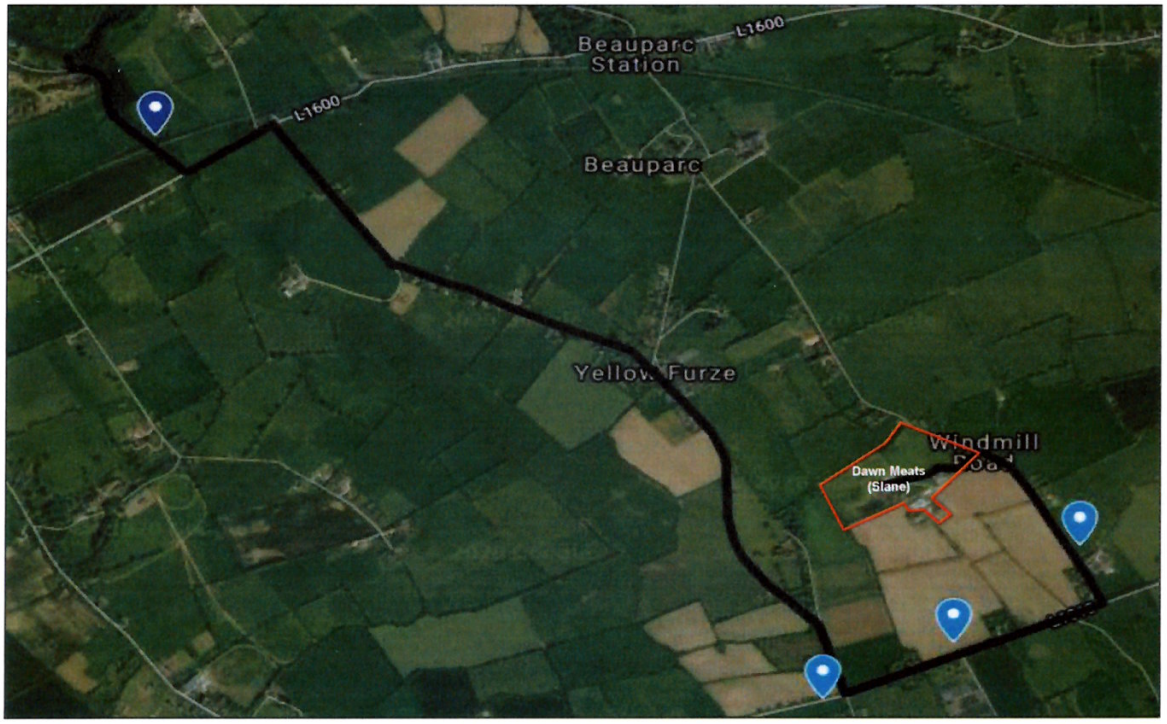

Figure 2.3: Locations of Watercourse Crossings along Rising Main Route

The crossing of open drains or watercourses is not proposed as part of this development. However, if this occurs, horizontal directional drilling would be the preferred option to avoid disturbance of the drainage network.

Where this is not possible, crossings would be undertaken via the dry open cut method. This would involve damming the water flow from the rising main footprint using sandbags to create the seal / dam across the drainage ditch. Pumps would be set up to take the flow from upstream to downstream of the crossing point. A filter would be provided at the pump inlet to prevent the entry of aquatic fauna into the pump, and to limit the potential disturbance to the drainage ditch bed due to sediments. Pumping operations would be supervised at all times. Excavation of the drainage ditch bed would then proceed, with the excavated material stockpiled for later

reinstatement. Following the completion of reinstatement works, including any required drainage bank reinstatement works, the sandbags would be removed.

As with the Dollardstown Stream crossing, a detailed investigation would be undertaken for culverted drainage ditch crossings at the detailed rising main design stage.

Upon appointment and prior to works commencing, the construction works contractor would provide to Inland Fisheries Ireland details of all watercourse crossings, including the grid references and dimensions of the pipeline.

2.4.10 Rising Main Outfall Construction

The outfall for the discharge of the treated effluent rising main into the River Boyne at Ardmulchan would consist of natural stone revetment constructed along the bank of the river on either side of the discharge point. The revetment would be approximately 4m in length and would be formed using large stones that would be placed in position to minimize erosion around the new discharge point, as shown in Figure 2.5 below. Where concrete is required, this would comprise of pre-cast concrete where possible.

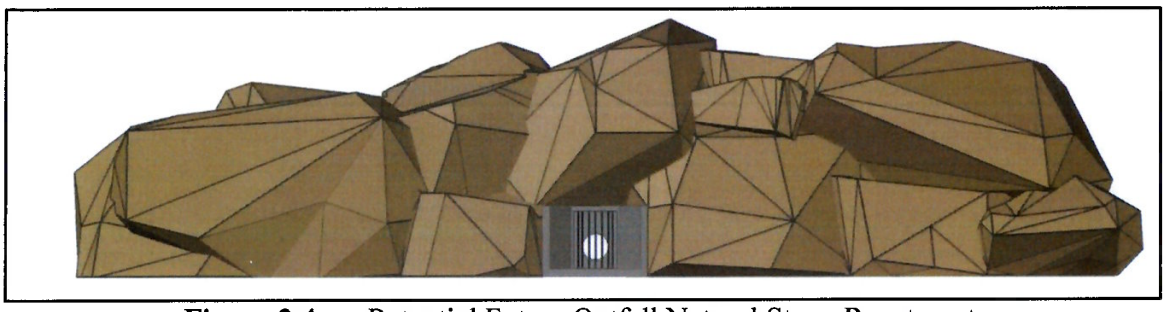

Figure 2.4: Potential Future Outfall Natural Stone Revetment

To minimise any potential impacts upon salmonid fish, outfall works would be undertaken in the July to September period where possible, which would avoid the salmonid spawning season. Should outfall works be required outside the July – September timeframe, works would only commence upon prior agreement with IFI.

It should be noted that the extent of works which would be required for the outfall construction have not been fully defined at this stage. A more detailed investigation would be undertaken at the detailed pipeline design stage.

2.4.11 Traffic Management and Road Reinstatement

An outline Traffic Management Plan for the proposed construction works has been prepared by Finn Design Partnership Ltd. Prior to works commencing along the roadway sections, the construction works contractor would review the outline Traffic Management Plan and revise where necessary, and submit for approval to the Meath County Council Road Engineers for approval. Consultation with the local residents likely to be effected by traffic management works would be undertaken. The traffic management plan would include measures to ensure there would be no impact to school traffic, around the hours of 9am and 3pm. Areas of public road in which the rising main would be installed or required to cross would be fully reinstated in accordance with Meath County Council's requirements.

2.4.12 Potential for Historic Contamination

Construction works for the WWTP extension would take place within an agricultural field at the existing Dawn Meats (Slane) facility, which currently houses two HDPE wastewater storage lagoons (previously the site of a number of contained lagoons), while the rising main route would take place mainly within agricultural fields. As the majority of the proposed development would take place within greenfield areas, it is unlikely that the new WWTP compound and rising main locations would contain contaminated material. However, in the unlikely event contaminated material is encountered during construction works, appropriate measures would be undertaken in compliance with relevant waste legislation, and as outlined in Section 5.6 below. The relevant authorities would be notified where required.

3.0 ENVIRONMENTAL MANAGEMENT

3.1 POLICY STATEMENT

Upon appointment, the construction works contractor would prepare and make available to Dawn Meats (Slane) a copy of their environmental policy. The environmental policy would outline the construction works contractor's commitment to environmental protection and compliance with applicable regulations.

3.2 ENVIRONMENTAL MANAGEMENT SYSTEMS

An Environmental Management System (EMS) would be put in place by the construction works contractor. The EMS would take into account any planning conditions imposed on the site for the construction phase and, in accordance with the relevant guidelines, would be appropriate to the scale of the operation.

The construction works contractor would implement a number of environmental management procedures, including but not limited to the following:

- Awareness and Training;
- Environmental Emergency Response;
- Record Keeping, Auditing and Monitoring;
- Environmental Complaints Procedure;
- Protection of Flora and Fauna;
- Protection of Soil, Groundwater and Surface Water Quality;
- Chemical and Hazardous Material Management;
- Noise Management;
- Dust Management;
- Waste Management.

The CEMP would be updated as necessary to ensure that all measures detailed within the environmental management procedures have been addressed within the CEMP.

3.3 ROLES AND RESPONSIBILITIES

The indicative roles and responsibilities for the relevant site personnel are detailed below.

Project Manager

The Project Manager's responsibilities are as follows:

- Management of the project;
- Implementing the Construction Environmental Management Plan;
- Monitoring the performance of the CEMP and maintaining records to demonstrate compliance with the CEMP and Construction Method Statement;
- Updating the Construction Environmental Management Plan as required;
- Ensuring no deterioration of the environment occurs as a result of the project;
- Co-ordinating the construction teams;
- Implementing the Health and Safety Plan and associated responsibilities;
- Production of construction programmes;
- Maintaining of relevant records and registers;
- Ensuring site personnel receive induction and are provided with the relevant information relating to the protection of the environment during works;
- Dealing with any queries or complaints from the public.
- Maintaining a project diary.

Quality Manager

The Quality Manager would report to the Project Manager. Their responsibilities are as follows:

- Implementing the Construction Environmental Management Plan;
- Management of quality issues relating to the project;
- Co-ordinating the construction teams;
- Ensuring that method statements are in place;
- Implementing the Health and Safety Plan.

Site Engineer

The Site Engineer would report to the Project Manager. Their responsibilities are as follows:

- Ensuring that all aspects of the project comply with the Construction Environmental Management Plan;
- Materials procurement;
- Design of Temporary Works;
- Administration;
- Programming and planning;
- Implementing the Health and Safety Plan;
- Maintaining a project diary.

EHS Officer

The EHS Officer would report to the Project Manager. Their responsibilities are as follows:

- Ensuring the Health and Safety Plan is implemented;
- Ensuring the Construction Environmental Management Plan is being implemented and followed at all times;
- Updating the Construction Environmental Management Plan as required;
- Ensuring all personnel have received safety inductions;
- Investigating any accidents, incidents or near misses;
- Ensuring relevant personnel have received training in environmental issues;
- Undertaking site audits on a regular basis.

All Staff and Sub-contractors

All site personnel and sub-contractors have the following responsibilities:

- Ensuring the requirements of the Construction Environmental Management Plan are followed;
- Co-operate with the Project Manager and EHS Officer in the implementation and development of the CEMP;
- Co-operate as required with site inspections and audits;
- Report all incidents, accidents and near misses to the Project Manager and/or EHS Officer.

3.4 REGULATIONS AND REQUIREMENTS

3.4.1 Legislative Context

The following list of acts and regulations, which is not exhaustive, would be complied with by the construction works contractor throughout the proposed project:

- The Wildlife Act, 1976 and Wildlife (Amendment) Act, 2000;
- European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. No. 477 of 2011) and (Amendment) Regulations, 2015 (S.I. No. 355 of 2015), transposing the Habitats Directive 92/43/EEC (as amended) and Birds Directive 2009/147/EC;
- The Flora (Protection) Order, 2015 (S.I. No. 356 of 2015);
- Planning and Development Regulations, 2001 to 2018;
- The Local Government (Water Pollution) Act, 1977, as amended;
- The Fisheries (Consolidation) Act, 1959, as amended;
- Fisheries (Amendment) Act, 1999;
- European Communities (Quality of Salmonid Waters) Regulations, 1988 (S.I. No. 293 of 1988);
- European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (S.I. No. 272 of 2009);
- Water Framework Directive (2000/60/EC);
- European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010) and 2016 (S.I. No. 366 of 2016);
- Air Pollution Act, 1987;
- Air Quality Standards Regulations, 2011 (S.I. No. 180 of 2011), transposing the Ambient Air Quality and Cleaner Air for Europe (CAFE) Directive (2008/50/EC);
- Planning and Development Act 2000 (S.I. No. 30 of 2000), as amended;
- The EPA Act (Noise) Regulations 1994 (S.I. No. 179 of 1994);
- European Communities (Construction Plant and Equipment) Permissible Noise Levels Regulations, 1988 (S.I. No. 320 of 1988), as amended;
- European Communities (Noise Emission by Equipment for Use Outdoors) Regulations, 2001 (S.I. No. 632 of 2001);
- Council Directive 1999/31/EC on the Landfilling of Waste and Council Directive 2003/33/EC establishing criteria and procedures for the acceptance of waste at landfills;
- Waste Framework Directive 2008/98/EC;
- WEEE Directive 2012/19/EU;
- Waste Management Act 1996 as amended;
- Waste Management (Hazardous Waste) Regulations 1998 (S.I. 163 of 1998) and (Amendment) Regulations 2000 (S.I. 73 of 2000);
- Waste Management (Food Waste) Regulations 2009 (S.I. 508 of 2009);
- European Union (Waste Electrical and Electronic Equipment) Regulations 2014 (WEEE) (S.I. 149 of 2014);

- Litter Pollution Act 1997 and Litter Pollution Regulations 1999 (S.I. 359 of 1999);
- Waste Management (Prohibition of Waste Disposal by Burning) Regulations 2009 (S.I. 286 of 2009), as amended;
- European Communities (Waste Directive) Regulations 2011 (S.I. 126 of 2011), (Amendment) Regulations 2016 (S.I. 315 of 2016), and European Union (Properties of Waste which Render it Hazardous) Regulations 2015 (S.I. 223 of 2015), European Union (Waste Directive) (Recovery Operations) Regulations 2016 (S.I. 372 of 2016).

3.4.2 Relevant Guidelines

The following list guidance documents, which is not exhaustive, would be consulted as relevant by the construction works contractor throughout the proposed project:

- *Environmental Good Practice on Site* (CIRIA, 2015);
- *Control of Water Pollution from Construction Sites; guidance for consultants and contractors* (CIRIA, 2001);
- *Control of Water Pollution from Construction Sites – Guide to Good Practice* (CIRIA, 2002);
- *Guidelines on Protection of Fisheries During Construction Works in and adjacent to Waters* (IFI, 2006);
- *The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads* (National Roads Authority (NRA), 2010);
- *Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes* (NRA, 2006a);
- *Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes* (NRA, 2006b);
- *Guidelines for the Treatment of Bats during the Construction of National Road Schemes* (NRA, 2006c);
- *Bat Mitigation Guidelines for Ireland* (Kelleher and Marnell, 2006);
- *Bats & Lighting: Guidance Notes for Planners, Engineers, Architects and Developers* (Bat Conservation Ireland, 2010);
- *Assessment of dust from demolition and construction 2014* (Institute of Air Quality Management, 2014);
- *Guidelines for the Treatment of Noise and Vibration in National Road Schemes* (NRA, 2004);
- *Code of practice for noise and vibration control on construction and open sites* (British Standard 5228-1, 2009);
- *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects* (DoEHLG, 2006);
- *Eastern-Midlands Waste Management Plan 2015-2021 and Associated Reports.*

3.5 ENVIRONMENTAL AWARENESS AND TRAINING

Prior to works commencing onsite, this outline CEMP and its contents would be communicated to all site personnel, including sub-contractors, as part of induction training. Site induction would be mandatory for all employees, sub-contractors and visitors to the development site.

Specific training would be provided, where necessary, to nominated personnel to address any incidents or emergencies that could have a potential to cause environmental pollution. This training would be provided to staff via toolbox talks, and may address issues such as the following:

- Water Pollution;
- Spill Control;
- Noise Pollution;
- Dust Pollution;
- Waste Management.

3.6 DOCUMENT REVIEW AND UPDATES

To ensure the CEMP remains "fit for purpose", it would be reviewed and updated as necessary throughout the construction phase to ensure that it continues to facilitate efficient and effective delivery of the project environmental commitments for the protection of the environment.

The CEMP would be reviewed to address, for example, the following;

- Any conditions stipulated in the planning approval for the proposed development;
- Any requirements or issues highlighted by prescribed bodies such as Inland Fisheries Ireland and the NPWS;
- To ensure it reflects best practice at the time of construction;
- To ensure it incorporates findings from previous inspections and audits undertaken by the construction works contractor;
- To ensure it incorporates findings and/or recommendations arising from the weekly site meetings between the construction works contractor and applicant/client.

The Project Manager and EHS Officer would be responsible for the review of the CEMP, and would ensure that any revisions to the CEMP are effectively communicated as appropriate to onsite personnel and sub-contractors.

3.7 ENVIRONMENTAL COMMITMENTS

The client recognises that construction works have the potential to adversely impact upon the environment and would therefore ensure that the construction works contractor is committed to the effective implementation of the CEMP. Compliance with the CEMP, including all procedures, work practices and controls, would be mandatory by all personnel and sub-contractors employed during the construction phase.

The CEMP outlines the necessary control measures that are required to avoid, minimise or mitigate potential effects on the environment. This CEMP also incorporates the necessary mitigation measures outlined in the Environmental Report (Ref. EIAR_21_9317) and Natura Impact Statement (Ref. NIS_20_9684) prepared in support of the planning application to ensure that there would be no significant impacts to the environment or to the listed habitats and/or species of the River Boyne and River Blackwater SAC (Site Code: 002299) and SPA (Site Code: 004232).

The construction works contractor would be committed to the implementation of the controls / mitigation measures specified within the following sections:

- Dust Management – Section 5.1;
- Surface Water, Groundwater and Soil Contamination Control – Section 5.2;
- Terrestrial Ecology Protection Protocol – Section 5.3;
- Invasive Species Control – Section 5.4;
- Noise and Vibration Control – Section 5.5;
- Traffic Control – Section 5.6;
- Waste Management Control – Section 5.7;
- Chemicals and Hazardous Materials Management – Section 5.8.

The Project Manager, Quality Manager and EHS Officer would be responsible for the implementation of the CEMP throughout construction works. The Project Manager would be responsible for monitoring the performance of the CEMP and maintaining records to demonstrate compliance with the CEMP and would be assisted by the EHS Officer.

3.8 COORDINATION WITH EXTERNAL ENTITIES

In the event of an environmental incident at the site, the construction works contractor would follow the Emergency Response Plan as appropriate. The construction works contractor would liaise with the relevant third parties as appropriate, which may include the following:

- Emergency Services;
- Meath County Council;
- National Parks and Wildlife Service;
- Inland Fisheries Ireland;
- Environmental Protection Agency.

4.0 ENVIRONMENTAL IMPACTS

4.1 AIR QUALITY IMPACTS

Generally, the primary potential air quality impact or nuisance associated with construction activities is dust. Excavations and earth moving operations may generate quantities of construction dust, particularly in drier weather conditions. The extent of any construction dust generation depends on the nature of the construction dust (soils, sands, gravels, silts etc.) and the construction activity. The potential for construction dust dispersion depends on the local meteorological conditions such as rainfall, wind speed and wind direction. The issue of construction dust dispersion may be exaggerated with vehicles transporting sand/gravels/concrete/etc. to and from the site, having the potential to cause an environmental nuisance to use of the local road.

Dust is normally defined as particulate matter in the size range of 1 - 75μm in diameter, with particles less than 1μm being classified as smoke or fumes. Particles greater than 10μm are associated with public perception and nuisance. Dusts are normally present in the atmosphere at varying levels of concentration and can have a wide variety of man-made and natural origins including:

- Products of combustion from e.g. fires, power stations and motor vehicles;
- Mechanical handling of minerals and allied materials;
- Industrial activities.

Dust particles are dispersed by their suspension and entrainment in airflow. Dispersal is affected by the particle size, shape and density, as well as wind speed and other climatic effects. Smaller dust particles remain airborne for longer, dispersing widely and depositing more slowly over a wider area.

The main potential sources of air borne dust from construction activities are as follows:

- Construction vehicles, construction traffic and haulage routes;
- Excavation works and earth-moving activities;
- Materials (particularly excavated soils) handling, storage and stockpiling.

Construction dust control is a common part of construction management practices. The effect of construction activities on air quality, in particular construction dust, would not be significant following the implementation of standard working practices and the proposed mitigation measures outlined in Section 5.1.

4.2 SURFACE WATER IMPACTS

During construction works, there is potential for water quality deterioration through the potential release of suspended solids during soil disturbance works, the release of hydrocarbons (fuels and oils) and the release of uncured concrete.

Suspended solids could become entrained in surface water run-off and could affect aquatic habitats through deposition. An increase in sediments has the potential to impact upon fish by damaging gravel beds required for spawning, smothering fish eggs and in extreme cases, by interfering with the gills of fish. An increase in suspended solids has the potential to reduce water clarity, which can impact the light penetration of water and may also affect certain behaviours of aquatic fauna such as foraging success. Aquatic flora and fauna could also be impacted upon by an increase in nutrients which are bound to suspended solids. A significant increase in nutrients can result in excessive eutrophication, leading to deoxygenation of waters and subsequent asphyxia of aquatic species.

A potential source of chemical contamination of surface water would be from the release of hydrocarbons (oils, fuels) from construction plant and equipment. Hydrocarbons can affect water quality, potentially resulting in toxic and / or de-oxygenating conditions for aquatic flora and fauna. Pollution could occur in a number of ways, such as neglected spillages, the storage handling and transfer of oil and chemicals and refuelling of vehicles.

Another potential source of contamination of surface water during construction works would be the potential release of uncured concrete. In the event of uncured concrete entering a waterbody, the pH would be altered locally, potentially causing an adverse impact upon aquatic flora and fauna and causing an alteration to the waterbody substrate.

Given the presence of drainage ditches along the proposed development route, crossing of culverted watercourses and the location of the proposed outfall within the River Boyne and given the proximity of the rising main route to the Dollardstown Stream, control measures would be put in place to ensure no deterioration in water quality arises as a result of the construction of the proposed development.

4.3 SOIL AND GROUNDWATER IMPACTS

The main potential impacts upon soil and groundwater during construction works would be the release of potentially polluting substances, such as hydrocarbons and uncured concrete, the stripping of subsoils and soils within the development footprint area and soil compaction due to the movement of heavy machinery. The potential impacts of the release of hydrocarbons and uncured concrete are discussed in Section 4.2 above.

With regards the stripping of soils and subsoils at the development site, excavated subsoils and soils would be reused in the reinstatement and landscaping process where possible. Therefore, there would be no significant impact upon soils due to excavation activities. Specialist machinery (such as tracked machinery) would be used during construction works to minimise the potential compaction of soils and subsoils.

4.4 TERRESTRIAL ECOLOGY IMPACTS

Construction activities have the potential to impact upon terrestrial ecology through destruction and loss of habitat, disturbance due to noise and dust, the potential introduction of invasive species and light pollution.

The construction phase of the development would result in a direct and permanent loss of the existing habitats spoil and bare ground (ED2) and recolonising bare ground (ED3) at the proposed WWTP compound. These habitats are considered modified and of low ecological value. Therefore, the loss of these habitats would not be considered significant.

The proposed rising main would be constructed underground, and therefore would result in a temporary loss of habitat, with a limited footprint. The rising main route would be primarily located within the carriageway and on the verge of local roads. Short areas of agricultural lands at the beginning and end of the route would also be impacted, comprising of pasture and arable crop fields, bounded by hedgerows, treelines and some drainage ditches. The route would also pass through areas of grassy verges and wet grassland. The majority of these habitats can be considered as common to and typical of rural Ireland, and many are considered of low ecological value. Therefore, a minor temporary loss of these habitats would not be considered significant. The rising main route concludes at depositing / lowland rivers (FW2). A negligible loss of habitat would occur due to the proposed outfall of the proposed discharge point

Limited sections of hedgerow / treeline removal would be required as part of the construction of the proposed rising main as the rising main crosses an agricultural field boundary beside the River Boyne. The removal of mature trees would be avoided where possible, and where sections of hedgerows / treelines are removed, they would be replanted using native species.

As it may be necessary to undertake hedgerow / treeline removal works during the bird nesting season, a suitably qualified ecologist would be engaged to carry out inspections for the presence of breeding birds prior to any clearance works taking place. Where nests are present, the ecologist would make a decision as to whether a "Licence to interfere with or destroy the breeding places of any wild animals", is required from the NPWS. Alternatively, the ecologist may establish a suitable buffer zone around an active nest, with removal works rescheduled until chicks have fledged. Where no evidence of nests are found during inspection, hedgerow / treeline removal works must be undertaken within three days of inspection.

The age and species of trees varies along the route varies and none are scheduled for removal. Some are covered in significant amounts of well-established Ivy which has the potential for high bat roost potential. Other trees were identified with both low and medium bat roost potential, given the relatively young age of some trees and in the absence of suitable roost features such as natural holes, cracks / splits in major limbs, loose bark and hollows / cavities in the older trees.

Should amphibians be present within drains in proximity to the pipeline route, there would be no significant potential habitat loss or habitat disturbance due to the nature of rising main works and given that the proposed development site is surrounded by similar agricultural areas with numerous drainage ditches and small streams.

In the event a protected species is encountered during construction or vegetation removal works, an officer of the NPWS would be notified prior to the resumption of construction works.

Dust emissions may arise during construction activities, in particular during earth-moving works, which may have the potential to impact upon photosynthesis, respiration and transpiration processes of flora due to the blocking of leaf stomata and have the potential to cause nuisance to fauna. Given the transient nature of construction works, the potential impact to flora and fauna would not be considered significant.

Construction work has the potential to disturb fauna due to the generation of construction noise. However, construction noise would not be considered to pose a significant risk to fauna owing to the transient nature of works and given that all vehicles where possible would be equipped with mufflers to suppress noise, as is standard practice. Where possible, no construction works would be conducted outside of normal working hours, therefore there would be no disturbance to nocturnal species.

During construction works, there is potential for invasive species to be introduced to the site through the movement of materials, such as soil and stone, and the arrival of construction plant and equipment from an area with invasive species. Materials containing invasive species such as Japanese Knotweed are considered "controlled waste" and, as such, there are legal restrictions on their handling and disposal. Under Regulation 49(7) of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011), it is a legal requirement to obtain a license to move "vector materials" listed in the Third Schedule, Part 3. Under Regulation 49(2) of the aforementioned regulations, it is an offence to plant, disperse, allow or cause to disperse, spread or otherwise cause to grow in any place any plant which is included in Part 1 of the Third Schedule.

There would be no significant import of materials with the potential to contain invasive flora species. Soils excavated during construction works would be stockpiled and re-used for site levelling and landscaping, therefore no importation of topsoil or subsoil would be required as part of the development works. Any stone required would be sourced locally where possible and would be inspected for the presence of invasive species by the construction works contractor.

Artificial lighting has the potential to negatively impact upon nocturnal species, particularly bat species, as illumination can impact upon their roosting sites, commuting routes and foraging areas. While some bat species, such as Leisler's bats (*Nyctalus leisleri*), may take advantage of prey concentrating around light sources, other bat species are sensitive to lighting and will avoid artificially lit up areas. Measures, as outlined in Section 5.3, would therefore be implemented by the construction works contractor to reduce the potential impact of light pollution.

The potential impacts of construction works upon aquatic flora and fauna due to a potential deterioration in water quality are discussed in Section 4.2 above.

4.5 NOISE IMPACTS

Construction noise, while inherently noisy and disruptive, is temporary in duration. It is anticipated that the construction of the proposed development would take approximately eight months to complete. The works involving heavy machinery for the purposes of excavation, the preparation of tank and building foundations and passing construction traffic usually cause the most disturbances to nearby residents.

Generally, the type of works involved at this development site would include the following:

- Excavation/Levelling: Excavator, dump truck & dozer.
- Foundations: Excavations, cement mixers & concrete vibrators.
- General Construction: Masonry construction, services, drainage and surfacing etc.

With regards the construction of the treated effluent rising main, it should be noted that construction would be phased along the route and therefore, it is anticipated that potential noise nuisance would not be sustained for longer than one week at any individual location.

There are currently no published Irish guidance documents relating to permissible noise levels that may be generated during the construction phase of a project. However, the National Road Authority (NRA) has published the document "*Guidelines for the Treatment of Noise and Vibration in National Road Schemes*", 2004. This document provides a useful reference for assessing construction noise of the proposed development. The NRA considers that the noise levels provided in the table below are typically deemed acceptable.

Days / Times	$L_{Aeq\ (1hr)}$ dB	$L_{pA\ (max)slow}$ dB
Monday to Friday (07:00 to 19:00hrs)	70	80
Monday to Friday (07:00 to 22:00hrs)	60	65
Saturday (08:00 to 16:30hrs)	65	75
Sundays and Bank Holidays (08:00 to 16:30hrs)	60	65

Additional measures, such as noise barriers may be required for works within 20m of residences along the rising main route.

4.6 TRAFFIC IMPACTS

Access to the Dawn Meats (Slane) facility is via Windmill Road, a local road linking to the L1010 road. Access for the proposed rising main works would be via the Yellow Furze road, the L1600 road and the local road running under Stackallen Railway Bridge from the L1600.

Construction works have the potential to impact upon traffic volumes in the area, which may subsequently impact upon the generation of noise and dust emissions. Traffic impacts may arise via the following:

- Delivery of construction plant and equipment to the site;
- Delivery of raw materials to the site;
- Vehicle movements from staff, sub-contractors and site visitors travelling to and from the site;
- Vehicle movements associated with waste removal at the site.

4.7 WASTE MANAGEMENT IMPACTS

It is anticipated that the following categories of waste may be generated during the construction of the project:

WASTE TYPE	EWC CODE	ORIGIN
Concrete	17 01 01	Waste concrete may arise due to surplus concrete from pouring activities.
Bricks	17 01 02	Damaged / defected brick waste may arise during the construction of structures at the WWTP compound.
Mixture of Concrete, Bricks, Tiles and Ceramics	17 01 07	As detailed in 17 01 01 and 17 01 02 above.
Wood	17 02 01	Wood waste may arise in small volumes during construction works, including building and shuttering works, due to damaged / defected wood, off-cuts and surplus wood.
Plastic	17 02 03	Plastic waste may arise due to damaged / defected products.
Metals (including alloys)	17 04 01 - 07	Waste metal may arise due to damaged / defected metal, off-cuts and surplus metal.
Soils and Stones	17 05 04	Excavated soils and stones waste would arise during site excavations and earth-moving activities. It is estimated that approximately 500m^3 of excess soils would arise following reinstatement works.
Bituminous mixtures, coal tar and tarred products	17 03	Waste may arise due to surplus material from tarring of road sections.
Biodegradable waste	20 02 01	Limited volumes of green waste will be generated during the removal of hedgerows and treelines during rising main works.

The temporary site compound, which would house the site office and staff welfare facilities, would generate limited amounts of waste, including the following:

- Paper and cardboard – EWC 15 01 01 and EWC 20 01 01;
- Biodegradable / food waste – EWC 20 01 08;
- Plastics – EWC 15 01 02 and EWC 20 01 39;
- Metals – EWC 20 01 40;
- Mixed municipal waste – EWC 20 03 01;
- Sanitary waste – EWC 20 03 04.

Other waste materials which may arise during construction works in small volumes include:

- Waste Oils and Liquid Fuels – EWC 13 02 and EWC 13 07;
- Waste from Electrical and Electronic Equipment – EWC 16 02;
- Batteries – EWC 16 06.

Wastes from EWC fractions EWC 13 02, EWC 13 07 and EWC 16 06 may be hazardous.

Throughout the construction phase, wastes generated would be managed by the construction works contractor in order of priority in accordance with Section 21A of the Waste Management Act 1996, as amended, as per the waste hierarchy below.

Figure 4.1: The Waste Hierarchy

4.8 NATURA 2000 SITE IMPACTS

The majority of the proposed development does not directly impinge on any designated area of conservation, the exception being the location of the proposed rising main discharge point just within the boundary of the River Boyne and River Blackwater SAC (Site Code: 002299) and SPA (Site Code: 004232).

It is not considered that the proposed development site, including the rising main route, would contain the habitats for which the River Boyne and River Blackwater SAC has been designated. No areas of woodland or fen habitats occur within the proposed development footprint, therefore the proposed development does not contain any habitats with potential links to Alluvial Forests [91E0] or Alkaline Fens [7230].

Given that the proposed outfall would be located at the River Boyne, it is possible that River Lamprey, Atlantic Salmon, Otter and Kingfisher would be present within the vicinity of the proposed development footprint. While the construction of the proposed outfall would take place along the bank of the River Boyne, the majority of the footprint would be located within the field comprised of wet grassland, with a negligible loss of river habitat. Therefore, there would be no significant impact upon these qualifying interests due to habitat loss or habitat fragmentation.

The potential disturbance on protected species due to construction noise would not be considered significant, given the nature and scale of the proposed development and the transient nature of construction works. The potential disturbance on protected habitats and species due to dust during the construction phase would not be considered significant, given the transient nature of construction works, the scale of the proposed development and given the limited extent of groundworks in close proximity to the designated sites.

Activities as part of the construction of the development would not have the potential to cause a significant impact upon designated sites due to invasive species. There would be no significant import of materials with the potential to contain invasive flora species. Soils excavated during construction works would be stockpiled and re-used for site levelling and site landscaping, therefore no importation of topsoil or subsoil would be required as part of the development works.

The proposed development would be hydrologically connected to the River Boyne and River Blackwater SAC and SPA, given that the proposed rising main would be located in close proximity to the Dollardstown Stream (a tributary of the River Boyne) and given that the proposed outfall would be located at the River Boyne.

During the construction phase of projects, a deterioration in water quality can arise through the release of uncured concrete, the release of suspended solids during soil disturbance works and the release of hydrocarbons (fuels and oils).

Construction works would last approximately eight months in duration, and would be confined to the proposed development footprint. While the risk of water quality deterioration due to the proposed development would be considered low, given the nature and scale of the development, the potential for construction works to impact upon the SAC and SPA sites cannot be ruled out in entirety. Therefore, control measures are required to ensure that there would be no potential significant impacts to the listed habitats and species of the River Boyne and River Blackwater SAC and SPA. These control measures are detailed in Section 5.2.

5.0 ENVIRONEMNTAL MITIGATION MEASURES

5.1 DUST MANAGEMENT

The following dust control measures would be implemented by the construction works contractor for the duration of the construction of the proposed development:

- Cognisance would be taken of the guidelines published by the Institute of Air Quality Management (IAQM), "*Assessment of dust from demolition and construction 2014*";
- Material handling systems and site stockpiling of materials would be designed and laid out to minimise exposure to wind;
- Prolonged storage of materials onsite would be avoided;
- Where possible, the storage of materials, such as stockpiled excavated soils, would be located as far as possible from adjacent residential properties;
- A 15kph speed limit would be implemented for all traffic onsite to reduce the potential for dust generation;
- When transporting materials to and from the site, vehicles would be fitted with covers where possible to prevent material loss;
- Public roads outside the site would be regularly inspected for cleanliness and cleaned as necessary. A road sweeper would be used where required;
- Any un-surfaced roads would be restricted to essential construction site traffic only;
- While the natural recolonisation of exposed areas of soil during reinstatement activities is preferred, re-seeding would be undertaken where required to promote the rapid stabilisation of soils;
- Regular visual inspections would be undertaken around the proposed site boundary to monitor the effectiveness of dust control measures.

Should additional dust control measures be required, for instance during particularly dry weather, dust suppression measures would be undertaken, including the following:

- Water misting plant, such as bowsers and sprays would be used as required and where necessary;
- Wheel-wash facilities would be provided for vehicles exiting the site to reduce the level of dust travelling offsite;
- Where practicable, stockpiles of excavated soils and exposed surfaces would be dampened down via misting plant.

5.2 SURFACE WATER, GROUNDWATER AND SOIL CONTAMINATION CONTROL

The implementation of control measures for dust and materials storage and handling would reduce the potential for a deterioration in water quality. These measures are outlined in Sections 5.1 above and 5.8 below. The following control measures shall be implemented by the construction works contractor for the protection of surface water and groundwater quality:

- The construction works contractor would adhere to standard construction best practice, taking cognisance of the Construction Industry Research and Information Association (CIRIA) guidelines "*Control of Water Pollution from Construction Sites; guidance for consultants and contractors*" 2001 and "*Control of Water Pollution from Construction Sites – Guide to Good Practice*", 2002;
- Cognisance would be taken of the 2016 guidelines published Inland Fisheries Ireland, "*Guidelines on Protection of Fisheries During Construction Works in and adjacent to Waters*";
- Daily visual inspections would be undertaken of watercourses during construction works;
- A 6m buffer zone would be maintained around all watercourses (with the exception of watercourse crossings), where feasible;
- Provision of silt control features where appropriate, such as silt fencing;
- Silt fencing (comprising of a porous filter fabric which detains sediment) would be provided at places where the rising main comes within close proximity to any other watercourses. Silt fencing would remain in place until the completion of construction works;
- Additional silt fencing would be placed adjacent to storage areas of stockpiled soil, until such time as the excavated soil has been used in landscaping / re-instatement works or removed offsite by a licenced waste contractor;
- Silt control features would be inspected on a daily basis and maintained as appropriate;
- Areas of stockpiled soil would be covered or alternatively, graded, to avoid ponding or water saturation;
- All construction plant machinery and equipment would be maintained in good working order and regularly inspected;
- Excavations and earth-moving activities would be planned outside periods of heavy rainfall, to limit the potential for suspended solids to become entrained within surface water run-off;
- Should water be encountered during excavation works, water would be pumped to a constructed silt control feature, such as a settlement pond or detention pond. A filter would be provided at the pump inlet and, where required, dewatering bags or silt fences would be used at the outlet to retain any potential silt entrained in the water. Pumping operations would be supervised at all times;
- Where possible, surface water run-off would be diverted from areas of bare / exposed ground;
- The temporary site compound would be used for the storage of all machinery and plant when not in use, the re-fuelling of plant and the storage of all associated oils and fuels for plant;

- Spill kits, adequately stocked with spill clean-up materials such as booms and absorbent pads, would be readily available onsite;
- A self-contained mobile welfare unit for sanitary services would be located at the temporary site compound and would be emptied by a licenced contractor on a regular basis;
- The construction works contractor would ensure the relevant site personnel are trained in spill control and water pollution control;
- It is not envisaged that vehicle wheel wash facilities would be required. However, in particularly dry weather, additional dust control measures may be required, including the provision of a wheel wash facility. Should a wheel wash facility be required, it would be located at an area isolated from any watercourses. The associated run-off would be collected via a settling pond;
- Particular care would be taken during the construction of the discharge point outfall. Plant operation within the River Boyne or the Dollardstown Stream would be avoided. Mitigation measures specified within this section and in Section 5.8 for suspended solids, concrete and hydrocarbons would be followed;
- To minimise any potential impacts on salmonid fish, outfall works would be undertaken in the July to September period where possible, which would avoid the salmonid spawning season. Should outfall works be required outside the July – September timeframe, works would only commence upon prior agreement with IFI;
- If dry open cut crossings are necessary, the pump used to take the flow from upstream to downstream of the crossing point would be fitted with a filter, to prevent entry of aquatic fauna into the pump and to limit the potential disturbance to the watercourse bed due to sediments. Pumping operations would be supervised at all times;
- Monitoring of receiving water for suspended solids would be undertaken where required;
- In the unlikely event of a suspected deterioration in water quality within any of the watercourses due to construction works at the development site, works would immediately cease, an investigation into the cause undertaken and the relevant NPWS and Inland Fisheries Ireland personnel informed.

Additional controls to reduce the potential impact upon soils include the following:

- Specialist machinery (such as tracked machinery) would be used to minimise the potential compaction of soils;
- Excavated soils would be stockpiled onsite, segregated into topsoil and subsoils, and reused in reinstatement and landscaping activities where possible;
- Any fill and aggregate material required onsite would be sourced from reputable, local quarries.

5.3 TERRESTRIAL ECOLOGY PROTECTION PROTOCOL

It is considered that the implementation of the controls and measures outlined in Sections 5.1 – 5.8 would reduce any potential adverse impacts upon the biodiversity in the area. The following control measures are also recommended to ensure that the proposed construction works would not have any significant impact upon biodiversity:

- All construction works would be confined as far as possible to the development footprint;
- Should a protected fauna species such as Badger (*Meles meles*) or the Common Frog (*Rana temporaria*) be found during the construction phase of the project, an officer of the NPWS would be notified prior to the resumption of construction works;
- As a minimum, the construction work contractor would comply with all legislative provisions relating to hedgerow / tree removal and the protection of birds and bats, and would have regard to reducing impacts on nesting birds;
- Prior to any hedgerow / treeline removal works, the sections required for removal would be inspected by a suitably qualified ecologist for the presence of breeding birds. Where nests are present, the ecologist would make a decision as to whether a "Licence to interfere with or destroy the breeding places of any wild animals", is required from the NPWS. Alternatively, the ecologist may establish a suitable buffer zone around an active nest, with removal works rescheduled until chicks have fledged. Where no evidence of nests are found during inspection, hedgerow / treeline removal works must be undertaken within three days of inspection;
- Where possible, no construction works would be conducted outside of normal working hours, to reduce potential noise disturbance to nocturnal species.

Construction works have the potential to impact upon bat species due to lighting disturbance on commuting and foraging habitat. Therefore, the following measures would be implemented by the construction works contractor:

- Construction works in the hours of darkness, when bats are active (April – October), would be kept to a minimum;
- Lighting of treeline and hedgerow boundaries would be avoided where possible, to ensure that commuting and foraging corridors are maintained;
- Should lighting be required during construction works, it would be of a low height (without compromising safe working conditions) to ensure minimal light spill. Where possible and where practicable to do so, timers or motion sensors would be used;
- Directional lighting would be used where possible, by use of louvres fitted to the lighting;
- White light emitting diode (LED) would be used where possible, which is considered to be a low impact in comparison to other lighting types.

5.4 INVASIVE SPECIES CONTROL

The following controls for the prevention / treatment of invasive flora species would be implemented throughout the construction phase of the development:

- Regular site inspections would be undertaken to ensure that no growth of invasive species has taken place;
- The construction works contractor would ensure that all equipment and plant is inspected for the presence of invasive species and thoroughly washed prior to arriving to, and leaving from, the development site. All construction plant would pass through a wheel-wash system prior to entering or leaving the development site;
- All relevant construction personnel would be trained in invasive flora species (main species of concern) identification and control measures;
- In the unlikely event of an invasive species listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 appearing onsite, works within the immediate vicinity would cease until the invasive plant has been appropriately treated and disposed of to a suitably licenced facility, in accordance with Regulation 49 of the 2011 Regulations;
- Cognisance would be taken of the National Roads Authority's Guidelines on "*The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads*".

5.5 NOISE AND VIBRATION CONTROL

The following noise control measures would be implemented by the construction works contractor for the duration of the construction of the proposed development:

- Cognisance would be taken of the National Roads Authority's "*Guidelines for the Treatment of Noise and Vibration in National Road Schemes*", the British Standard 5228: Part 1 "*Code of practice for Noise Control on Construction and Open Sites*" and the CIRIA 2015 "*Environmental Good Practice on Site*";
- Plant and machinery used on-site would comply with the EC (Construction Plant and Equipment) Permissible Noise Levels Regulations, 1988 (S.I. No. 320 of 1988). All noise producing equipment would comply with S.I. No 632 of 2001 European Communities (Noise Emission by Equipment for Use Outdoors) Regulations 2001;
- All construction activities would take place between 7:00am and 7:00pm, Monday to Friday. Any works which, by necessity, are required to be carried out outside of these times would be notified to the relevant bodies and any potentially effected local residents in good time and prior to specified works commencing;
- Deliveries would be organised to arrive during daytime hours;
- Care would be taken when unloading vehicles to minimise noise disturbance. Materials should be lowered, not dropped, insofar as practicable and safe;
- Regular maintenance would be carried out on all construction equipment, machinery and vehicles;

- Construction plant would be operated in accordance with the operator's instructions;
- Engine and machinery covers would be maintained in good working order and would remain closed whenever machinery is in use;
- Where required, screens or barriers would be installed to shield particularly noisy activities;
- Where practicable, all mechanical plant would be fitted with effective exhaust silences and pneumatic tools fitted with mufflers or silencers;
- Any compressors required would be silenced or of sound reduced models fitted with acoustic enclosures;
- Noisy equipment would be orientated in one direction so that noise would be directed away from noise-sensitive areas;
- Construction plant would be selected, where possible, with low inherent potential for the generation of noise;
- Construction plant would be switched off or throttled back to a minimum when not in use;
- A 15kph speed limit would be implemented for all traffic onsite;
- Staff personnel would be instructed to avoid unnecessary revving of machinery;
- Site personnel would notify the Project Manager in the event equipment or plant becomes defective, resulting in high noise emissions. Any defective plant would be kept out of service until the necessary repairs are undertaken.

5.6 TRAFFIC CONTROL

The construction works contractor would undertake site entrance works to facilitate the access of traffic associated with the proposed development. The construction works contractor would ensure the following:

- A 15kph speed limit would be implemented for all traffic onsite;
- Deliveries to the site would be via suitably contained vehicles, with sheeting and covers where required;
- Materials would not be delivered to the site until required;
- Local roads would be inspected and cleaned as necessary;
- Where possible, large-scale vehicle movements would be timed outside peak hours on the local road network.

5.7 WASTE MANAGEMENT CONTROL

5.7.1 Waste Storage Area

The construction compound would be the main designated location for waste receptacles. Waste would be segregated onsite where possible and placed within the recycling and waste receptacles provided by the waste contractor. The number and size of waste receptacles would be determined following the appointment of the waste contractor. Waste receptacles would be appropriately labelled. Where waste fuels and oils are generated, they would be stored within a bunded container in a designated area of the site compound.

5.7.2 Waste Contractors

The waste contractor(s) appointed for the project would have experience in construction waste management and would be appropriately licenced, holding the relevant waste collection permit and/or waste licences for the types of waste anticipated to be generated during construction works. The waste contractor(s) would be appropriately licenced in compliance with the Waste Management (Collection Permit) Regulations 2007 (S.I. 820 of 2007), as amended (S.I. 87 of 2008), the Waste Management (Facility Permit and Registration) Regulations (S.I. 821 of 2007), as amended (S.I. 86 of 2008).

5.7.3 Waste Minimisation

Where practicable, the construction works contractor would reduce the generation of wastes at source through measures such as the following:

- The efficient ordering and purchasing of materials to reduce surplus materials;
- The correct storage of materials to minimise the generation of damaged materials, for example keeping materials packaged until they are ready to be used and storing materials which are vulnerable to water damage via precipitation under cover and raised above the ground;
- The handling of materials with care, to avoid undue damage;
- The return of uncured concrete to the batching plant where possible;
- The re-use of shutters for concrete works.

Where it is not possible to avoid the generation of wastes, wastes would be sent for recycling or recovery as a priority. The reuse of materials onsite would reduce the requirement for imported material to the site. Inert wastes such as excavated soils, would be used in reinstatement and landscaping activities onsite.

5.7.4 Management of Waste Streams

As mentioned in Section 4.7 above, wastes generated would be managed by the construction works contractor in order of priority in accordance with Section 21A of the Waste Management Act 1996, as amended.

Excavated Soils: Soils arising from excavations would be reused in the reinstatement and landscaping process where possible. Any excess excavated soils would be collected by a licenced waste contractor and either reused for reinstatement / landscaping activities at other sites if suitable or disposed of.

Concrete: Surplus concrete would be returned to the batching plant where possible. Where concrete, blocks and bricks arise from demolition or construction waste, they would be crushed and used for ground-fill material where deemed suitable. Where these materials cannot be reused onsite, they would be diverted for recycling if possible.

Wood: Waste wood would be reused for shuttering where suitable. Wood that is uncontaminated (free from preservatives and paints) would be segregated and recycled.

Metal: Metal is highly recyclable and has a considerable rebate value. Where metal cannot be reused onsite, the majority would be recycled.

Other Recyclables: These include plastic, cardboard and office waste such as paper. Where possible, the different recyclables would be segregated onsite. With regards packaging waste, the construction works contractor would investigate the possibility of returning the packaging to the supplier.

Waste Electrical and Electronic Equipment (WEEE): This waste, if generated, would be stored separately from other waste streams and would be covered pending collection.

Canteen Waste: Canteen waste would include food waste and packaging waste. Designated receptacles would be provided within the canteen to allow for segregation, to include for general waste, recycling and food waste.

Mixed Municipal Waste and Other Non-Recyclable Waste: Wastes not suitable for reuse or recycling would be stored in separate waste receptacles. Prior to removal from site, the EHS Officer or delegate would inspect the receptacles to ensure they contain no recyclable material or materials which can be reused.

Green Waste: This would be generated during site clearance works, with the removal of vegetation. Green waste may be sent for composting if not possible to reuse onsite during landscaping / re-instatement activities.

Sanitary Waste: Sanitary waste from the mobile welfare unit for sanitary services located within the temporary site compound would be collected by a licenced waste contractor on a regular basis.

Hazardous Materials: Small quantities of hazardous waste may be generated onsite, such as waste fuels and oils and batteries. Hazardous waste would be stored separately from non-hazardous waste, would be appropriately labelled and would be stored upon bunds. Hazardous

waste would be managed in accordance with the Waste Management (Hazardous Waste) Regulations 1998 and 2000. The construction works contractor would ensure that the waste contractor is licenced to transport / accept hazardous waste prior to the waste leaving the site. Depending on the type of hazardous material, the waste may be recovered, recycled or disposed of appropriately.

5.7.5 Records

For each waste movement and for each type of waste, the construction works contractor would obtain a signed waste docket from the waste contractor, detailing the weight, type of material, destination of material and whether the material is going for recycling, recovery or disposal. The construction works contractor would retain copies of the waste contractors' relevant waste collection permits and waste licences on file throughout the construction phase.

5.8 CHEMICAL AND HAZARDOUS MATERIALS MANAGEMENT

5.8.1 Concrete

The following controls would be implemented throughout the construction phase:

- The use of pre-cast concrete where possible;
- The delivery and pouring of concrete would be supervised at all times;
- Concrete would be poured directly into the shuttered formwork from the Ready-Mix Truck, reducing the risk of spillage;
- The wash-out of Ready-Mix Truck drums would not be permitted onsite, in the environs of the site, or at a location which could result in a discharge to surface water;
- The disposal of excess uncured concrete would be removed from site by an authorised waste contractor;
- The pouring of concrete would be avoided during periods of expected heavy rainfall.

5.8.2 Hydrocarbons

The following controls for the handling and storage of hydrocarbons would be implemented throughout the construction phase:

- All construction plant machinery and equipment would be maintained in good working order and regularly inspected;
- Any fuels, oils or chemicals would be stored in accordance with the EPA guidance on the storage of materials, in designated bunded areas at the temporary site compound, with adequate bund provision to contain 110% of the largest drum volume or 25% of the total volume of containers;
- Material storage areas would be appropriately labelled and marked;
- The designated area for the storage of hydrocarbons would be inspected on a regular basis;

- Deliveries of fuels and oils to the site would be supervised and records maintained;
- All loading and unloading of hydrocarbons would take place within the bunded area where possible;
- Fuels / oils would be handled and stored with care to avoid spillage or leakage;
- Where appropriate, small construction plant equipment would be placed on drip trays;
- The diesel generator would be suitably bunded;
- Any waste fuel / oils would be collected in bunded containers at designated areas (i.e. temporary construction compound for rising main works) and properly disposed of to an authorised waste contractor;
- Spill kits, adequately stocked with spill clean-up materials such as booms and absorbent pads, would be readily available onsite;
- In the unlikely event of a hydrocarbon spillage, contaminated spill clean-up material would be properly disposed of to an authorised waste contractor;
- The construction works contractor would ensure the relevant site personnel are trained in spillage control;
- Where re-fuelling of construction plant is required to take place onsite, re-fuelling would take place within a bunded area, within the temporary site compound or at a designated location within the site boundary for WWTP works. Under no circumstances would re-fuelling take place within the immediate vicinity of watercourses, including drainage ditches;
- Re-fuelling onsite would only be undertaken by experienced and trained personnel;
- Where construction plant shows signs of hydrocarbon leakage, site personnel would cease the operation of the item in plant in question and notify the Project Manager. Any defective plant would be kept out of service until the necessary repairs are undertaken.

5.8.3 Excavated Materials

This section should be read in conjunction with the dust control measures relating to the storage and handling of spoil outlined in Section 5.1. The following controls for the handling and storage of excavated materials would be implemented throughout the construction phase:

- Spoil would only be stored at the proposed development site temporarily;
- Where possible, spoil would be covered or alternatively, graded, to avoid ponding and water saturation, in addition to minimising exposure to wind;
- Silt fencing would be placed around spoil areas until such time as the excavated soil has been used in landscaping / re-instatement works or removed offsite by a licenced waste contractor;
- Spoil would be used in the reinstatement and landscaping process where possible;
- Reinstatement would be undertaken as soon as possible after excavation and earth-moving works.

5.9 EMERGENCY MANAGEMENT PLAN

An Emergency Response Plan would be prepared for the proposed development by the construction works contractor, which would cover all potential risks, including environmental risks, such as fire, explosion, accidents, spillage and leaks. Designated site personnel would be trained as first aiders and fire marshals, with additional site personnel trained in environmental emergencies such as spill response procedures.

6.0 MONITORING AND AUDITING

6.1 REPORTING AND RECORD KEEPING

The Project Manager, in conjunction with the EHS Officer, would ensure that appropriate, detailed records are maintained during the construction phase of the development. Records of all works associated with the proposed development would be completed by the construction works contractor throughout the construction phase. Environmental records would include waste and site inspection records and where relevant, environmental incident and complaints records. Other records may include Safety Data Sheet records and a copy of the Safety File. Where relevant to the associated works, statutory inspection records would be maintained for such activities as excavations and lifting gear.

Where necessary and as requested by the local authority, copies of relevant construction activity records can be made available.

In the event of an environmental incident occurring at the site with the potential to cause environmental pollution, the Project Manager would notify the client and the relevant third parties, as outlined in Section 3.8, as soon as practicable. Such environmental incidents may include:

- Fire;
- Water pollution event;
- Hydrocarbon or chemical spill;
- Excessive noise;
- Excessive dust.

Any complaints and/or incidents would be reported to the Project Manager. The Project Manager would be responsible for developing and maintaining a register of complaints and a register of incidents, with details on follow-up actions. The Project Manager would notify the client as soon as practicable of any environmental complaint or incident.

6.2 ENVIRONMENTAL PERFORMANCE MONITORING

6.2.1 Safety Monitoring

The EHS Officer would be present at the development site during working hours, to ensure activities are undertaken in a safe manner.

6.2.2 Environmental Monitoring

The EHS Officer would be present at the development site during working hours, to ensure activities are undertaken in an environmentally sensitive manner. The EHS Officer would undertake regular site inspections and audits, at least weekly, to monitor the environmental performance of the site and address any potential environmental issues such as dust, litter and noise. Site inspections and audits would include the following:

- Assessment of public access roads;
- Assessment of neighbouring properties;
- Temporary site compound;
- Chemical and hydrocarbon storage area;
- Waste storage area;
- Spoil areas;
- Inspections of drainage ditches within the vicinity of works, the Dollardstown Stream and the River Boyne during construction works within the immediate vicinity.

The EHS Officer would be responsible for maintaining a register of all environmental monitoring and would communicate the site's environmental performance during site meetings.

A qualified ecologist would be engaged to oversee any hedgerow and treeline removal works required during the bird nesting season. Prior to any hedgerow / treeline removal works, the sections required for removal would be inspected by the ecologist for the presence of breeding birds. Where nests are present, the ecologist would determine the best course of action, as outlined in Section 5.3

6.3 MONITORING COMPLIANCE REPORTS

As noted in Section 6.2 above, site inspections and audits would be undertaken by the EHS Officer on a regular basis, at least weekly. These site inspections and audits would monitor the environmental performance of the site.

Where works are determined to be in breach of any specifications outlined within the CEMP, the EHS Officer shall notify the Project Manager, who would raise a non-compliance report and notify the client as soon as practicable. Non-compliance reports may also be raised as a result of an incident or potential incident, the receipt of a complaint or as a result of a regulatory inspection or audit.

The non-compliance report would include details on the nature of the non-compliance, the proposed corrective action required, action taken to prevent recurrence and verification that the corrective actions have been undertaken and the non-compliance has been closed out. Any non-compliances would be discussed at the weekly meetings between the construction works contractor and client.

6.4 PROCEDURES TO REVIEW INSPECTIONS AND STEPS TO ADDRESS NON-COMPLIANCE

The Project Manager would be responsible for reviewing inspections, audits and any arising non-compliances. A review schedule would be decided upon between the construction works contractor and the client upon receipt of planning permission for the project.

The Project Manager would notify the client as soon as practicable of any non-compliances arising during the construction of the proposed development. The Project Manager would be responsible for notifying the relevant third parties where required of non-compliances at the site and would liaise with third parties as necessary as to the outcome of the non-compliance. All non-compliances would be investigated immediately, and the construction works contractor would aim to close out non-compliances as soon as possible. As discussed in Section 6.3, the statuses of any non-compliances would be discussed at the weekly meetings between the construction works contractor and client.

Where it has been determined that revisions to the CEMP are required to ensure recurrence of a non-compliance does not take place, the Project Manager and EHS Officer would make the necessary changes to the CEMP and would ensure that the revisions are effectively communicated as appropriate to onsite personnel and sub-contractors.

7.0 CONCLUSION

This CEMP has been prepared to demonstrate the commitment of the client to environmental management at the proposed development site and outlines the work practices and control measures that would be implemented by the appointed construction works contractor throughout the construction period to ensure that potential environmental impacts are effectively managed, reduced or eliminated.

The CEMP is considered a "live" document and would be reviewed and updated as appropriate upon planning approval and as necessary as construction works progress.

8.0 REFERENCES

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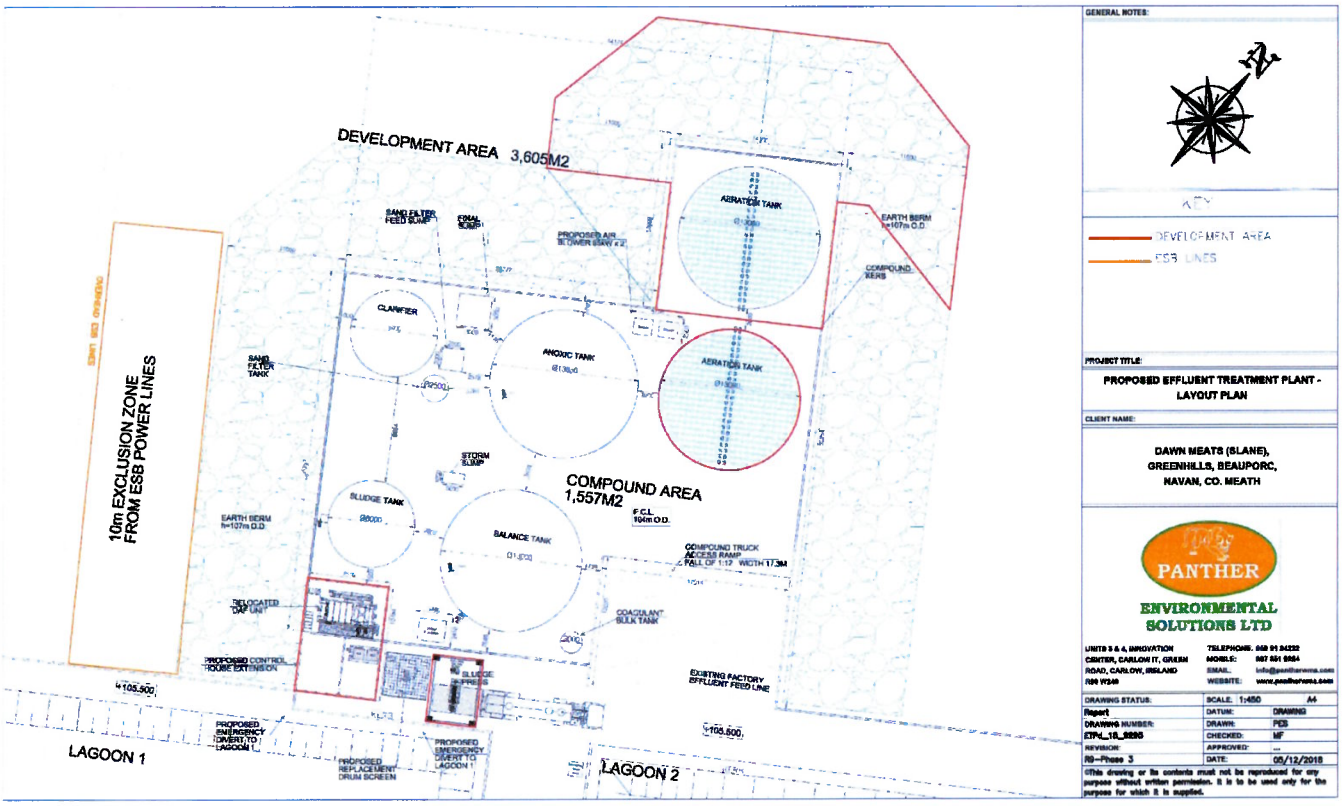
APPENDIX A

PROPOSED DEVELOPMENT LAYOUT


DEVELOPMENT AREA 3,605M2
10m EXCLUSION ZONE FROM ESB POWER LINES
COMPOUND AREA 1,557M2
F.G.L. 104m O.D.
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ANOXIC TANK
CLARIFIER
SAND FILTER TANK
STORM SUMP
SLUDGE TANK
BALANCE TANK
EARTH BERM h=107m O.D.
COMPOUND KERB
COMPOUND TRUCK ACCESS RAMP 1:12 WIDTH 17.3M
COAGULANT SILO TANK
RELOCATED DAF UNIT
PROPOSED CONTROL ROOM EXTENSION
PROPOSED EMERGENCY OVERFLOW TO LAGOON 1
PROPOSED REPLACEMENT DRUM SCREEN
EXISTING FACTORY EFFLUENT FEED LINE
105.500
LAGOON 1
LAGOON 2
GENERAL NOTES:
KEY
DEVELOPMENT AREA
ESB LINES
PROJECT TITLE:
PROPOSED EFFLUENT TREATMENT PLANT - LAYOUT PLAN
CLIENT NAME:
DAWN MEATS (SLANE), GREENHILLS, BEAUPORC, NAVAN, CO. MEATH
PANTHER
ENVIRONMENTAL SOLUTIONS LTD
DRAWING STATUS: Report
SCALE: 1:450
A4
DRAWING NUMBER: ETPL_18_0006
DRAWN: PCS
CHECKED: MF
APPROVED: ---
REVISION: R0—Phase 3
DATE: 05/12/2018
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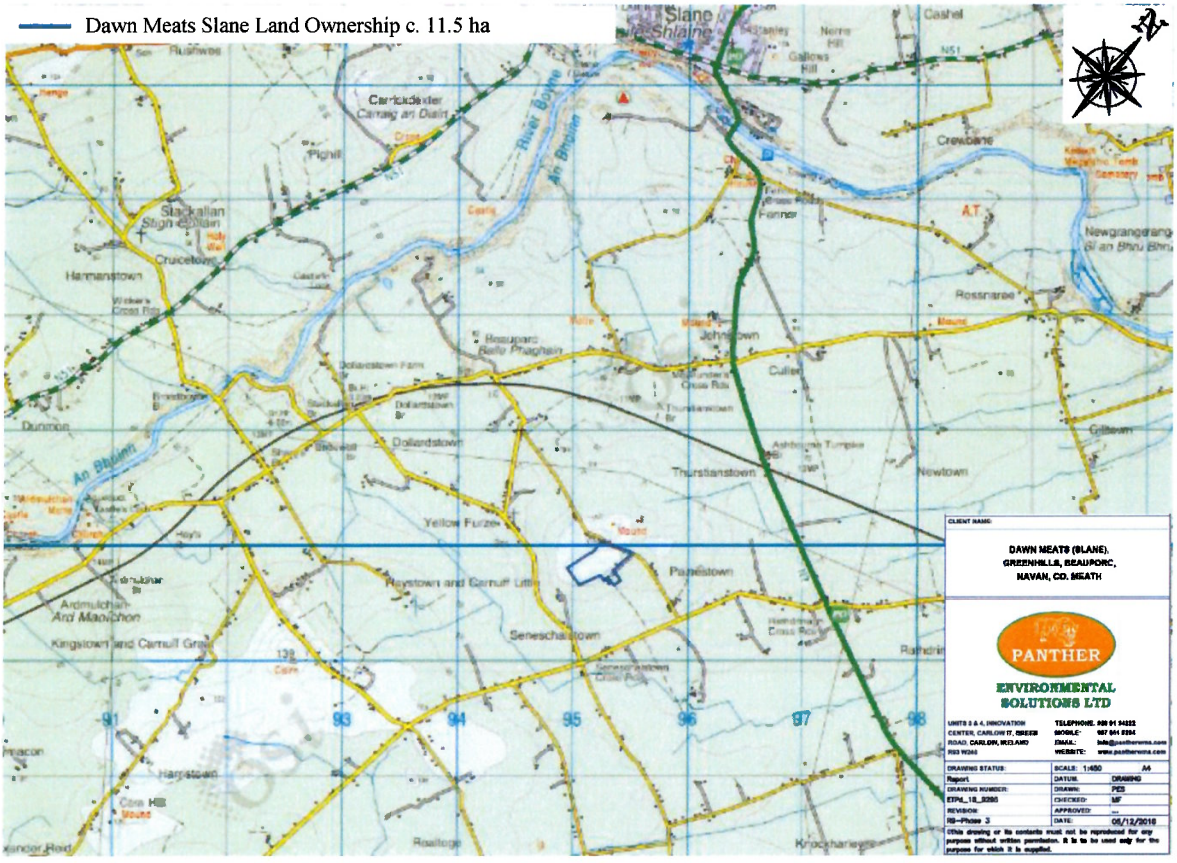
finn
310
ENG
Planning Application
1604
N
O.S. SHEET No. 2378/2440
COPIED UNDER ORDNANCE SURVEY LICENSE No AR0048711
PROPOSED NEW 150MM Ø FOUL SEWER RISING MAIN
DOLLARDSTOWN
01 Foul Sewer Rising Mains
Scale 1:12500

ATTACHMENT 2.0

- DESCRIPTION OF THE DEVELOPMENT -

ATTACHMENT 2.1

- SITE LOCATION MAPS -


Dawn Meats Slane Land Ownership c. 11.5 ha
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Cashel
Carrickdexter
Crewdane
Stackallan
Cruicetown
Harmanstown
Rossnaree
Johnstown
Dunmoe
Dollardstown
Thurstianstown
Newtown
Yellow Furze
Paynestown
Seneschalstown
Kingstown and Carnuff Great
Ardmulchan
Harystown
Knockharlen
91
93
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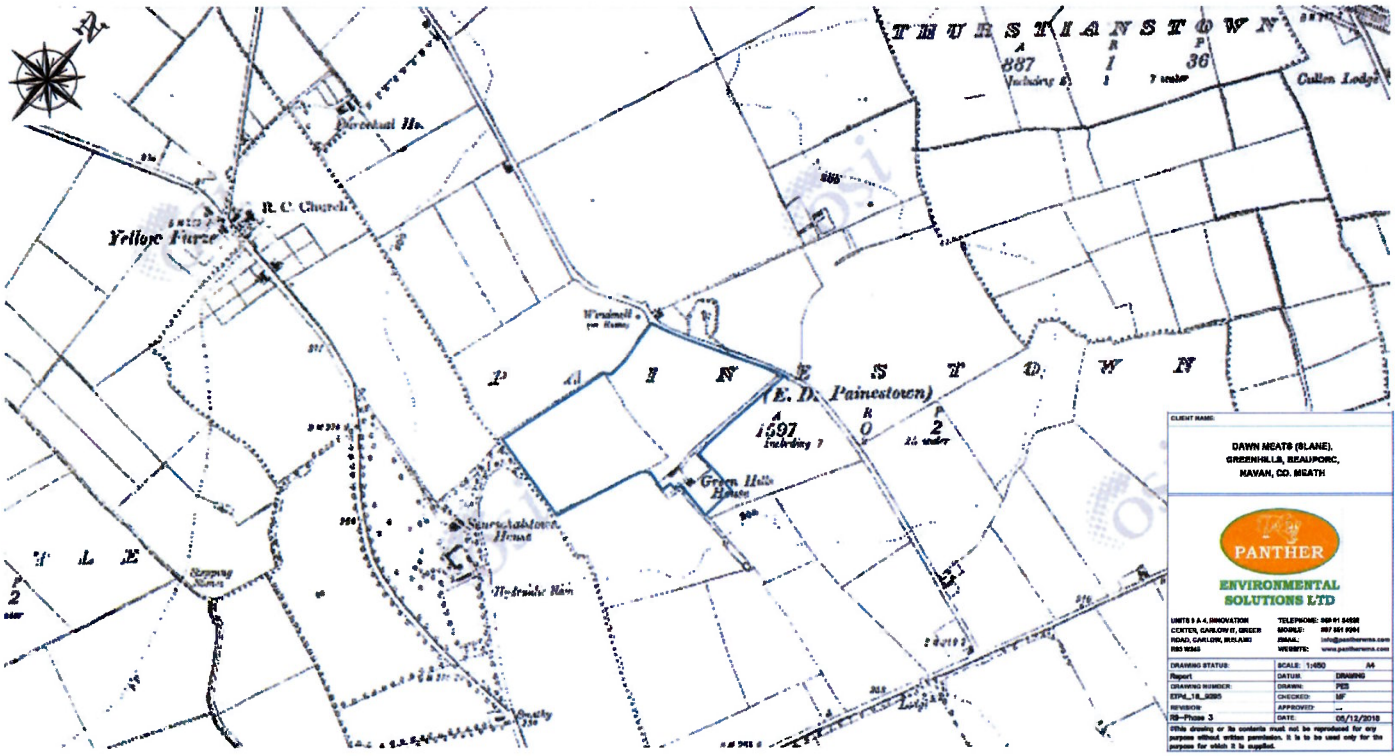
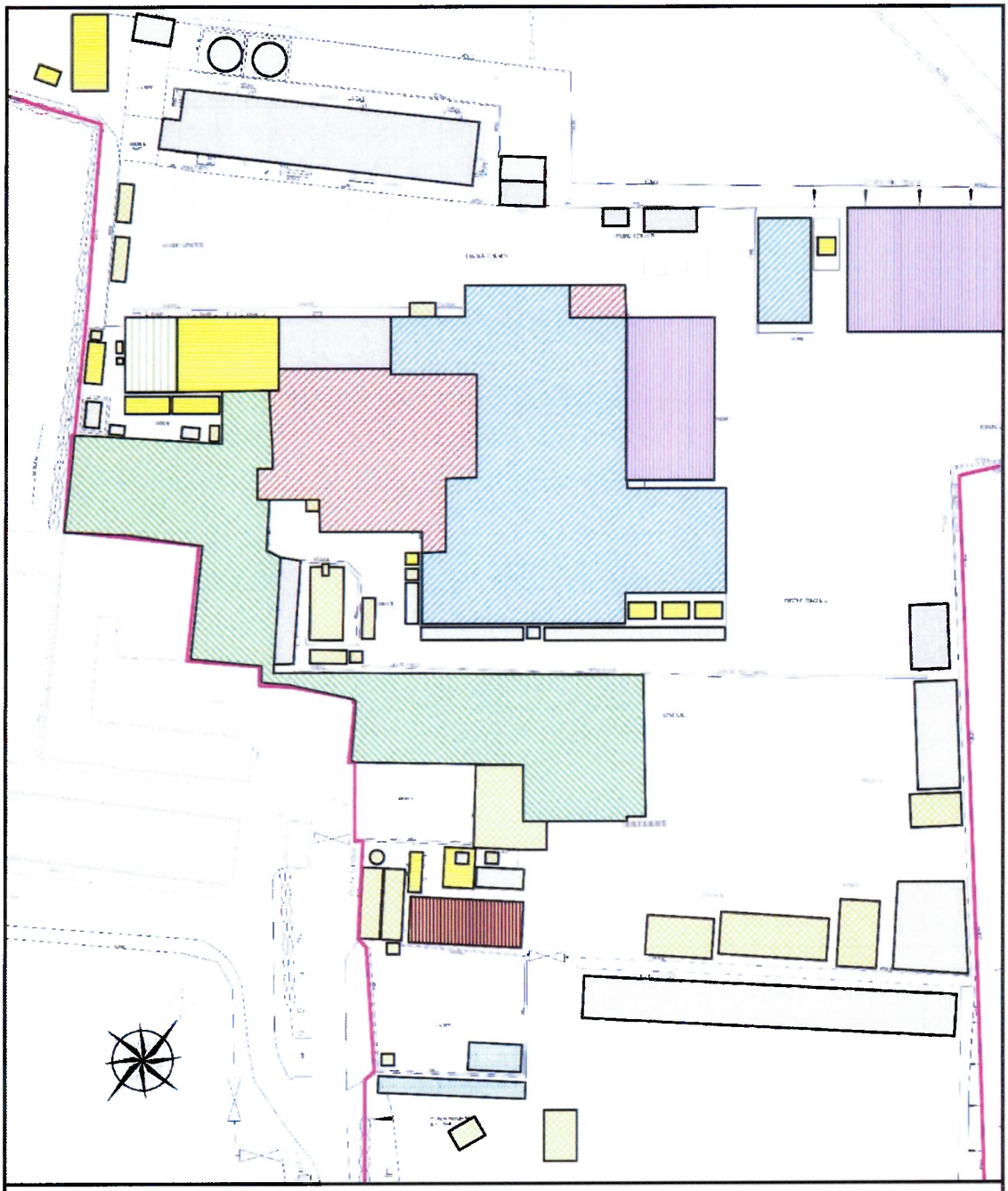
DAWN MEATS (SLANE),
GREENHILLS, BEAUPARC,
NAVAN, CO. MEATH
PANTHER
ENVIRONMENTAL
SOLUTIONS LTD


THURSTIANSTOWN
Cullen Lodge
Yellow Furze
R.C. Church
Wyndmill
PAINESTOWN
(E. D. Painestown)
Green Hills House
Sunnyhill Lawn
Sunnyhill House
Mc Grane Barn
DAWN MEATS (BLANE),
GREENHILLS, BEAUPARC,
NAVAN, CO. MEATH
PANTHER
ENVIRONMENTAL
SOLUTIONS LTD

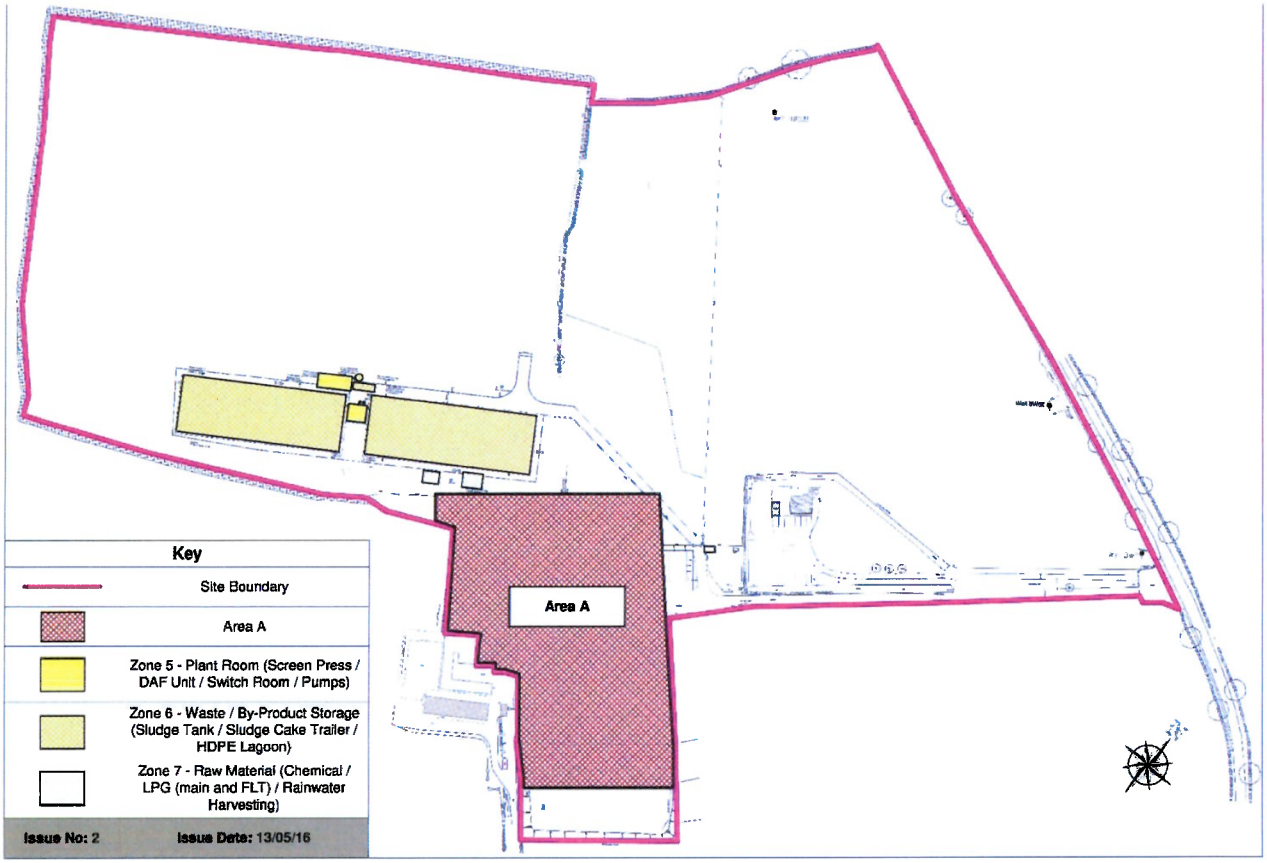
ATTACHMENT 2.2

- EXISTING SITE LAYOUT -

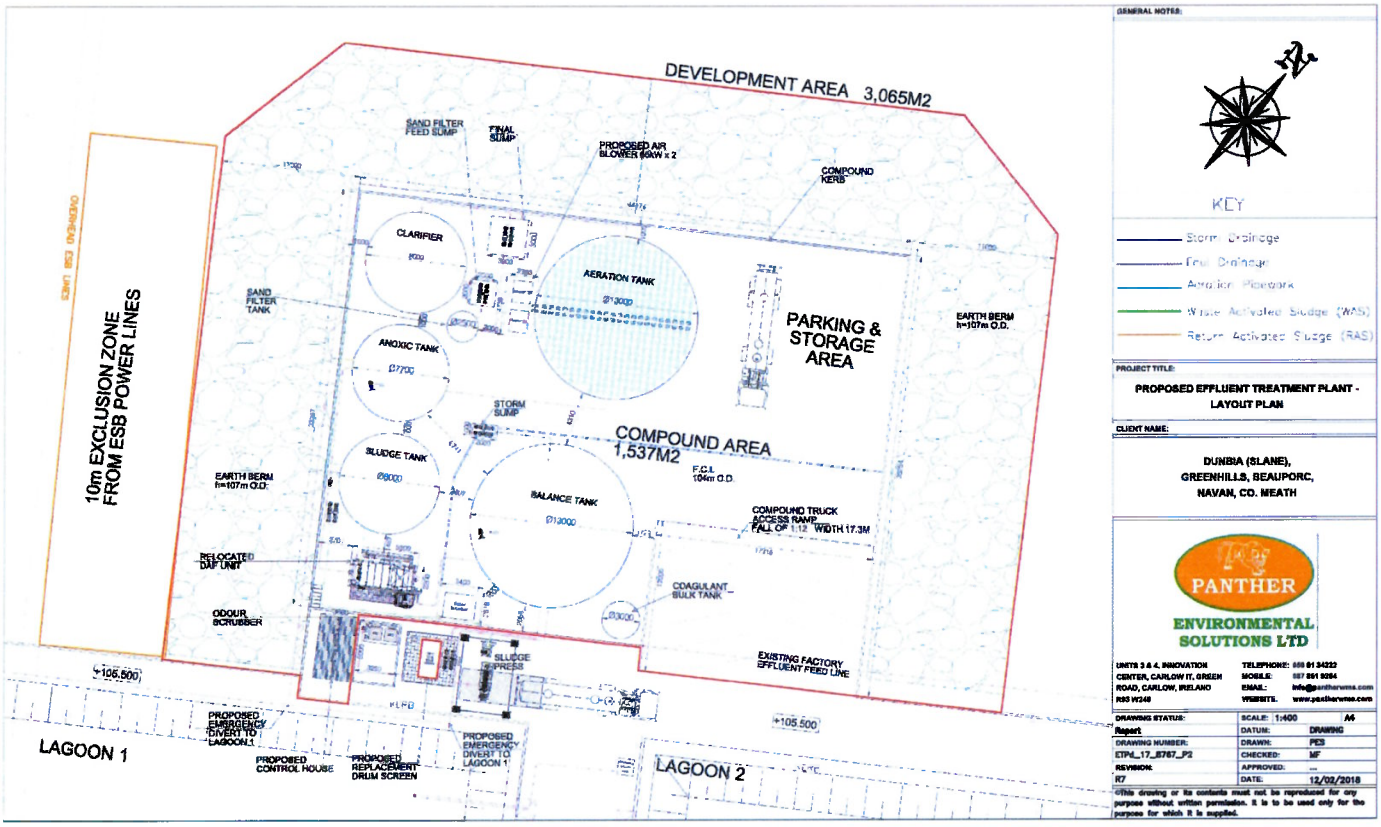


Key:

Zone 1 - Production Area		Zone 5 – Plant Room / Equipment Area		Zone 9 - Lorrywash	
Zone 2 – Chilled Area		Zone 6 – Waste / By-Product Storage		Zone 10 -Workshop	
Zone 3 – Office & Amenity Area		Zone 7 - Raw Material / Packaging / Dolav / Chemical / Oil Storage			
Zone 4 – Lairage Area		Zone 8 – Vehicle Parking		Issue No: 5	Issue Date: 05/05/16


Key
Site Boundary
Area A
Zone 5 - Plant Room (Screen Press / DAF Unit / Switch Room / Pumps)
Zone 6 - Waste / By-Product Storage (Sludge Tank / Sludge Cake Trailer / HDPE Lagoon)
Zone 7 - Raw Material (Chemical / LPG (main and FLT) / Rainwater Harvesting)
Issue No: 2
Issue Date: 13/05/16
Area A

Existing Effluent Plant Layout Approved by Planning (LB180300) – [Not constructed]



ATTACHMENT 2.3

- PROPOSED WWTP LAYOUT -

GENERAL NOTES:
PROJECT TITLE:
PROPOSED EFFLUENT TREATMENT PLANT
OVERALL SITE PLAN
CLIENT NAME:
DAWN MEATS IRELAND,
GREENHILLS, BEAUPARC,
NAVAN, CO. MEATH
PANTHER
ENVIRONMENTAL
SOLUTIONS LTD
DRAWING STATUS:
Report
DRAWING NUMBER:
ETPd_18_9295_P1
REVISION:
R1D
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DATUM:
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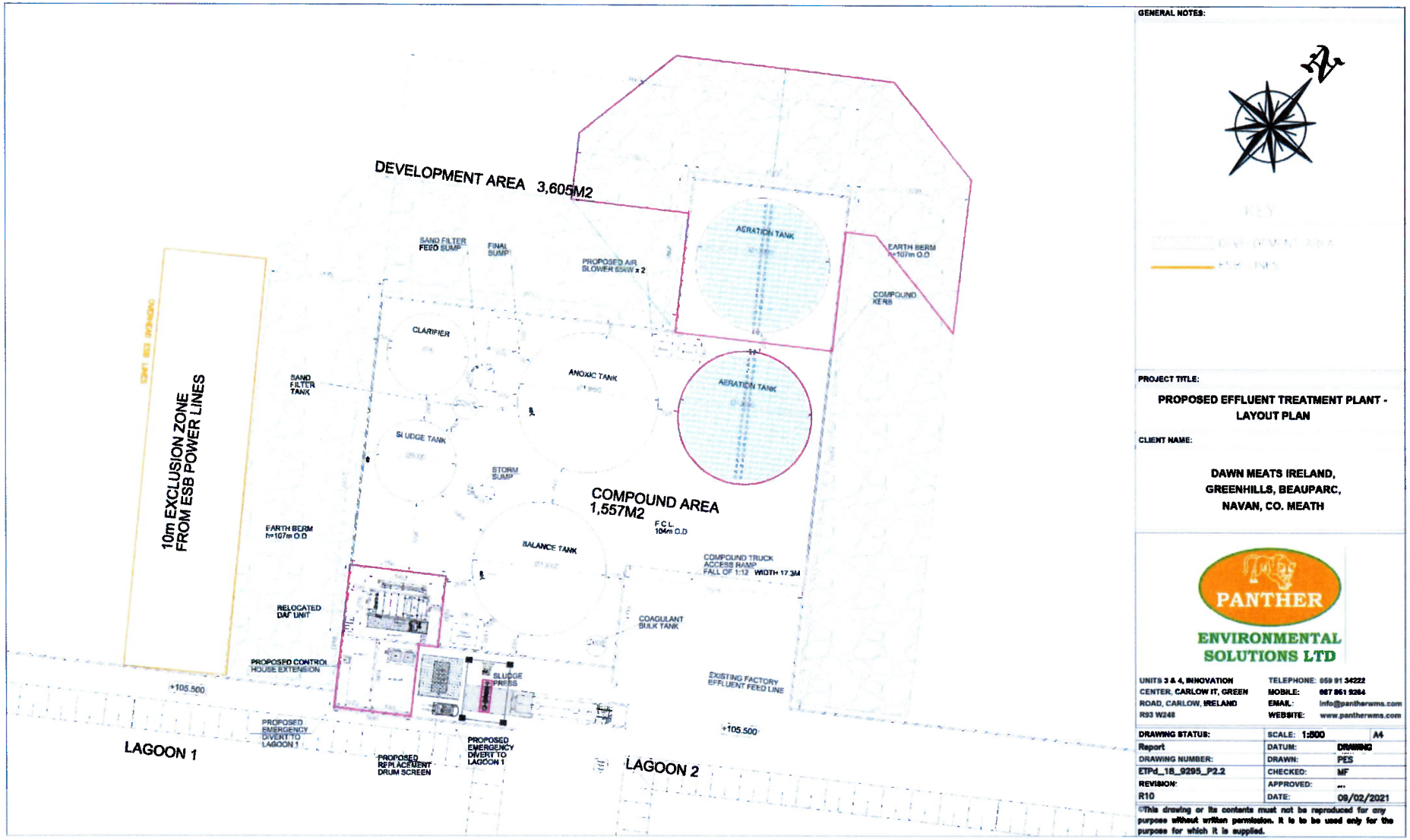
DRAWN:
PES
CHECKED:
MF
APPROVED:
...
DATE:
06/09/2021



GENERAL NOTES:

KEY

PROJECT TITLE:

PROPOSED EFFLUENT TREATMENT PLANT - LAYOUT PLAN

CLIENT NAME:

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

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DRAWING STATUS:	SCALE: 1:500	A4
Report	DATUM:	DRAWING
DRAWING NUMBER:	DRAWN:	PES
ETPd_18_9295_P2.2	CHECKED:	MF
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R10	DATE:	09/02/2021

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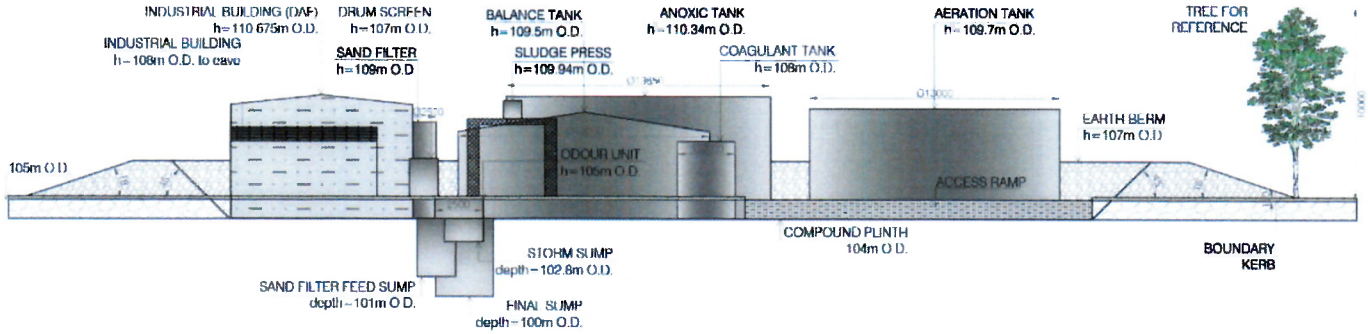

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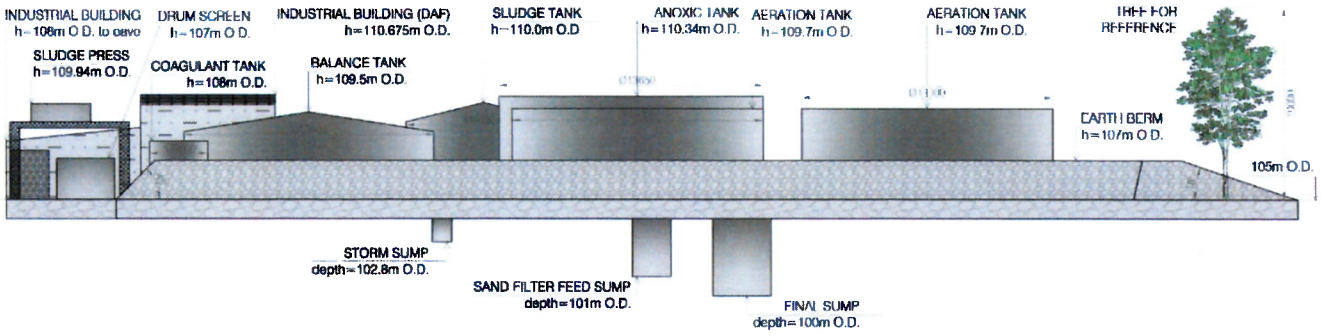

GENERAL NOTES:

PROJECT TITLE:

PROPOSED EFFLUENT TREATMENT PLANT - SW & NW ELEVATIONS

CLIENT NAME:

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DRAWING NUMBER:	DRAWN:	PES
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REVISION:	APPROVED:	...
R10	DATE:	11/02/2021

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ATTACHMENT 2.4

- PROPOSED RISING MAIN ROUTE -

finn
DERION
310
-
Overall Site Layout Plan
ENG
Planning Application
1604
N
O S. SHEET No. 2375/2440
COPIED UNDER ORDNANCE SURVEY LICENSE No. AR0049711
PROPOSED NEW 150MM Ø FOUL SEWER RISING MAIN
DOLLARDSTOWN
01 Foul Sewer Rising Mains
Scale 1 1 2500

ATTACHMENT 6.0

- NOISE ENVIRONMENT -

ATTACHMENT 6.1

- NOISE IMPACT ASSESSMENT -

Panther Environmental Solutions Ltd
Units 3 & 4, Innovation Centre
Institute of Technology
Green Road, Carlow, Ireland
R93 W248

Telephone: 059-9134222

Email: info@pantherwms.com
Website: www.pantherwms.com

ATTACHMENT 6.1

NOISE IMPACT ASSESSMENT

PROPOSED EFFLUENT TREATMENT PLANT UPGRADE

DAWN MEATS IRELAND
GREENHILLS, BEAUPARC
CO. MEATH

2020

REPORT NO:	NA_20_9684	**AUTHOR:**	Martin O'Looney, BSc. Nial Ryan, MSc.
Report Date:	18st March 2020	**REVIEWED:**	Mike Fraher, BSc.

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EXECUTIVE SUMMARY

Dawn Meats Ireland Unlimited Company (also referred to as Dawn Meats (Slane)) proposes amendments to the waste water treatment plant design which attained planning permission at Painestown, Beauparc, Navan, Co Meath, and a new proposed pipeline and discharge to the River Boyne.

This report presents the findings of long term annual baseline monitoring at Dawn Meats (Slane) and a predictive analysis of the impact of the construction and operation of the proposed development on noise sensitive receptors.

Appendix A of this report contains a site location map identifying the nearest noise sensitive locations in each geographical direction from the proposed site and pipeline route.

The predicted noise levels at the nearest noise sensitive locations surrounding the facility have been calculated in accordance with the methodology prescribed in ISO 9613-2:1996 "*Attenuation of Sound during Propagation Outdoors*". The resultant predicted noise levels have been assessed in accordance with the methodology prescribed in BS 4142:2014 "*Methods for Rating and Assessing Industrial and Commercial Sound*".

Maximum construction noise levels at the WWTP would be anticipated to arise from excavator activity and water pumps and general construction noise.

During the construction phase of the proposed WWTP compound, noise arising from the construction works is predicted to range from 38 to 47 L_{Ar30}, 7 dBA below to 2 dBA above the existing day-time background noise levels at the nearest noise sensitive locations. It is predicted that there would be a low to no significant impact on noise sensitive locations as a result of the WWTP construction works.

Along the proposed pipeline route, maximum construction noise has been predicted to result in noise levels of L_{Ar30} 81dB at 5m to L_{Ar30} 75dB at 20m, ranging from 24 to 36 dBA above the existing day-time background noise levels.

As construction noise would occur over a short period, would be managed through appropriate mitigation measures and would result in no permanent change to the existing noise environment of the area, it is considered that there would be a moderate noise impact as a result of proposed construction works along the pipeline route.

Within the WWTP compound, maximum construction has been predicted to be in compliance with the NRA Guidelines limits of 70 dBA daytime (07:00am to 19:00pm) and 60 dBA evening time (19:00pm to 23:00pm). Along the pipeline route at NSL(iv), where the pipeline would pass within 10m of the residence façade, the use of temporary noise barriers would be required in order to comply with the NRA daytime limit of 70 dBA.

It is recommended that guidance on control of noise, as per The National Roads Authority's "*Guidelines for the Treatment of noise and vibration in National Road Schemes*" (2004) and British Standard 5228-1 "*Code of practice for Noise Control on Construction and Open Sites*" be followed during the construction phase.

It is recommended that all construction works be conducted between the hours of 07:00am and 19:00pm Monday to Friday. All works should be timed during the work day so as to minimise noise impacts upon local residents in so far as is possible.

Any works which, by necessity, are required to be carried out outside of these times should be notified to the relevant bodies, i.e. the local council or the EPA, and any potentially affected local residents in good time and prior to specified works commencing.

It is recommended that all onsite workers, hauliers and contractors be informed of noise considerations, both onsite and on local access roads, during the operational and construction phases of the proposed development.

It is recommended that considerations with regard to noise be included in a Construction Environmental Management Plan (CEMP), as per the outline CEMP included in this application, to be prepared by the construction firm prior to beginning works.

At the proposed WWTP, maximum noise levels could arise from the operation of large vehicles, aeration blowers operating at maximum output and general background effluent treatment plant noise.

There would be no operational noise associated with the operation of the pipeline.

A worst case scenario has been assessed for noise arising from the operation phase of the proposed effluent treatment plant. This is principally based on the maximum noise which could occur from the operating of a HGV within the site.

The operational phase worst case scenario assessment has predicted that noise levels from HGV's would range from 11 to 21 dBA below the existing background noise levels. An 'inaudible' noise would typically be 10 dB or more below the measured L_{A90} background noise level at a noise sensitive location.

Therefore, it is predicated that worst case scenario noise arising onsite would be inaudible to very lowly audible above the existing daytime background noise levels at the nearest noise sensitive locations.

However, it should be noted that during evening and night time periods, lorry noise levels would be anticipated to range from 3-4 dBA below background at NSL2 (275m) and NSL3 (335m). Therefore, there would be anticipated to be a slight impact at these locations should lorry activities occur outside of daytime hours.

Maximum equipment noise would also be greater than 10 dBA below the existing evening and night-time background noise levels at receptors. Normal site operational noise at the site would also be expected to be inaudible at the nearest noise sensitive locations.

The principal factors controlling noise from the proposed development are by design, in particular the set-back distance from nearby noise sensitive locations and the construction of an earth berm surrounding the development.

All operational noise from the proposed development has been predicted to be in compliance with the EPA (NG4) daytime, evening and night-time guidance limits.

It is also concluded that Dawn Meats (Slane) would remain in compliance with their EPA IE licenced noise limits.

It is the main conclusion of this report that no significant alteration to the existing noise environment would occur as a result of the proposed development at Greenhills, Beauparc, Co. Meath.

In order to ensure continued good practice in relation to the management of noise at the Dawn Meats (Slane) facility, it is recommended that the existing site Noise Management Programme be updated prior to commissioning of the proposed effluent treatment plant. The draft programme outlined in Appendix C may be used as a starting point, subject to periodic site specific review.

1.0 INTRODUCTION & SCOPE OF WORK

Dawn Meats Ireland Unlimited Company (also referred to as Dawn Meats (Slane)) proposes amendments to the waste water treatment plant design, to include: -

a) Demolition of an existing storage building (17.50 m^2) and construction of a new single-storey industrial type building to enclose the DAF unit granted planning permission under planning reference LB180300 and to provide new enclosed chemical store and control room (total floor area 119 m^2).

b) Install a new sludge press at intake to WWTP, change aeration tank to anoxic tank, install 2no additional aeration tanks, and alteration to perimeter berm to increase the footprint of WWTP by 539 m^2 to that granted planning permission under planning reference LB180300.

c) Treated wastewater rising main from the site of the proposed development to a new discharge point at the River Boyne (distance 7.2km), where pipeline shall be laid along a section of Windmill Road, the L1013, Yellow Furze Road, the L1600 (Boyne Rd), and the unnamed local road leading from the L1600 to the private lands abutting the River Boyne at the discharge point.

...at Painestown, Seneschalstown, Dollardstown, Hayestown-Carryduff Little & Ardmulchan, Navan, Co Meath.

The facility intends to provide for the discharge of final effluent to the River Boyne. This would necessitate the construction of a foul sewer rising main from the Dawn Meats (Slane) site to the River Boyne. The proposed rising main route would be to the north-northwest of the proposed development, as this direction provides the shortest distance to the River Boyne.

Dawn Meats (Slane) is located in a rural location off the N2, approximately 4.5km south of the village of Slane, Co. Meath. The site of the abattoir was originally a farmyard where on-farm slaughter of cattle was undertaken. The facility at Slane, which was previously operating as Newgrange Meats, was acquired by the Dunbia Group in 2001. The facility was then incorporated into the Dawn Meats Group in September 2018.

The topography in the area surrounding the proposed development at Greenhills is generally flat, ranging between 80-100m above sea level with a gentle slope rising to the north-east.

The area is rural in character with residences in the area predominantly linearly aligned along the existing road network. Maps of the proposed site boundary and surrounding noise sensitive locations is provided in Appendix A.

Panther Environmental Solutions Ltd (PES Ltd) was commissioned by Dawn Meats (Slane) to carry out an Environmental Impact Assessment and compile an accompanying Environmental Impact Statement.

In support of an overall Environmental Impact Assessment, the primary aims of this survey were to:

1. Identify noise sensitive locations;
2. Determine the baseline noise levels at the closest NSLs;
3. Predict the impact of the proposed development's construction and operational phases on the noise sensitive receptors.

CONSTRUCTION PHASE NOISE CRITERIA

Construction noise, while inherently noisy and disruptive, is temporary in duration. The works involving "heavy machinery" for the purposes of excavation usually causes the most disturbances to nearby residents.

OPERATIONAL PHASE NOISE CRITERIA

The primary operational sources of noise within the proposed development would be the operation of pumps and aeration equipment at the biological treatment plant.

At present, effluent is screened and pumped to one of two on-site effluent storage lagoons in series. Effluent passes from the first lagoon through a screen and Dissolved Air Flotation (DAF) unit to the second lagoon. Trade effluent is then tankered off-site to a municipal wastewater treatment plant or other suitable waste water treatment facility.

The proposed primary second stage and the biological plant would consist of the following stages:

- Screen
- Balancing Tank,
- Dissolved Air Flotation (DAF) Unit,
- Sludge Tank,
- Sand Filter.
- Anoxic tank,
- Aeration Tank,
- Clarifier,

Screen

The proposed new drum screen would replace the existing drum screen. The new screen (2mm wedge wire) would be capable of receiving 30 M^3 per hour raw effluent. Screenings would be collected in a designated bin and disposed of as CAT 1 waste

Balancing Tank

The proposed Balance Tank (13m diameter x 4.5m high) would have a maximum operating volume of 600 M^3. This would be an over-ground, glass-lined steel tank, with adequate mechanical mixing. The tank would be covered with ventilation provided to an adjacent odour scrubber in order to prevent potential odour emissions.

DAF Unit

A Dissolved Air Flotation treatment unit is currently in place at the site. This would be relocated to within the proposed effluent compound area.

The DAF unit would treat the balanced screened effluent. Solids would be removed from the raw effluent using a chemical programme with a coagulant and flocculent, followed by diffused air.

The DAF unit is designed to accept flows of 25 to 30 M^3 per hour. The aeration system is sized to optimise fat removal and sludge concentration.

Anoxic Tank

The anoxic tank (13.65m x 6.34m high) will have a maximum operating volume of 912 M^3. This will be an over-ground, glass-lined steel tank, with an internal submersible mixer in order to ensure adequate treatment of all inflow.

Anoxic Mixers are used in de-nitrification basins in waste water treatment plants. The process involves the de-nitrification of waste streams through the use of bacteria which breaks down the nitrate in the waste to use as an oxygen source (energy source). This breakdown of nitrate from the waste stream releases oxygen and nitrogen gas (N_2). The oxygen is consumed by the bacteria and the nitrogen gas releases to the atmosphere. The waste stream then has acceptable nitrogen levels so the water can be discharged into the environment (streams, ponds, lakes, etc.).

Aeration Tank

It is proposed to construct one aeration basin, which would have sufficient capacity to treat the effluent currently generated to a high standard. The aeration tanks (13m x 5.7m high) would have a maximum operating volume of 750 M^3 each. These would be over-ground, glass-lined steel tanks, with adequate diffused-bubble aeration/mixing (65 kW) in order to ensure adequate oxygen for the microbial population.

Sludge Tank

A sludge holding tank (250 M^3) would be required to store the DAF sludge and biological activated sludge prior to on-site dewatering and then off-site treatment. This would be an over-ground, glass lined steel tank, with adequate mixing (2.5 Kw/hr submersible mixer). The tank would be covered with ventilation provided to an adjacent odour scrubber in order to prevent potential odour emissions.

Clarifier

The proposed clarifier will act as a settling tank, diameter 8 metres x height 2.5 metres. The purpose of the secondary settlement tank is to:-

- Remove suspended solids.
- Return settled sludge to the aeration tank.

The heavier sludge settles to the bottom of the clarifier while the lighter clear water flows over the weir launder to a pump sump where it will be pumped through the column sand filter.

Sand Filter – Tertiary Treatment

Clarified effluent from the clarifier will be pumped through a column sand filter. This is a simple sand filtration system, 2.5 M diameter x 5 metres height.

The effluent will then gravity feed to a final discharge sump where it would be pumped to surface water using two submersible pumps (duty / stand-by) operated on ultra-sonic float level probe.

Expected dimensions of the final effluent sump would be 3M x 3M x 4M deep = 36 M^3

2.0 NOISE LEGISLATIVE REQUIREMENTS

Planning and Development Act (2000), as amended

Local authorities are responsible for the planning and environmental regulation of any proposed developments. The current planning and environmental regulatory framework requires these developments to comply with the Planning and Development Act (2000) and related regulations.

The local authorities and An Bord Pleanala attach conditions relating to environmental management of these developments to planning permissions granted. Local authorities consider the land use and planning issues associated with the proposed developments in their County Development Plans.

The EPA Act (Noise) Regulations 1994 (Relevant statutory instrument: S.I. No. 179 of 1994)

The relevant part of the Environmental Protection Agency Act 1992 dealing with noise is Part VI, Sections 106 to 108. These Sections deal with the control of noise, the power of local authorities to prevent or limit noise and the issue of noise as a nuisance.

The 1994 Regulations came into effect in July 1994 and outline the procedures for dealing with noise nuisance. The Regulations allow affected individuals, local authorities or the EPA to take action against an activity causing a noise nuisance.

These Regulations replaced the procedures for noise complaints contained in the Local Government (Planning & Development) Act 1963. Companies must show that reasonable care was taken to prevent or limit the noise from their activities.

If the courts decide that a company is responsible for causing a noise nuisance, they can order the company to take measures to reduce, prevent or limit it.

EPA "*Guidance Note on Noise (NG4)*" (2016)

It deals in general terms with the approach to be taken in the measurement and control of noise, and provides advice in relation to the settling of noise ELV's and compliance monitoring. In relation to production facilities and ancillary activities, it is recommended that noise from the activities on site shall not exceed the following noise ELV's at the nearest noise-sensitive receptor:

Divisions	Times	dB(A)
Day	(07:00 to 19:00hrs)	55dB LAr,T
Evening	(19:00 to 23:00hrs)	50dB LAr,T
Night	(23:00 to 07:00hrs)	45dB LAeq,T

The National Roads Authority (NRA) Guidelines for the Treatment of Noise and Vibration in National Road Schemes (2004)

The NRA's guidance document Guidelines for the Treatment of Noise and Vibration in National Road Schemes (2004) is the recognised Irish guidance document for the assessment of road traffic noise. This document sets out the key items that should be included in a noise and vibration assessment for any significant road scheme. As a minimum, it stipulates that the following items should be included:

- A series of noise surveys to quantify the prevailing noise climate at sensitive receptors along the existing and proposed routes
- Preparation and calibration of a suitable noise prediction model;
- Prediction of *Do Minimum and Do Something* noise levels for opening and design years;
- Comparison of predicted *Do Something* noise levels with the design goal and three conditions that must be satisfied before mitigation measures are deemed necessary;
- Specification and assessment of road traffic mitigation measures, where required;
- Assessment and review of construction impacts and mitigation measures;
- Assessment and review of vibration.

This NRA document has been referred to in the consideration of road traffic noise associated with the proposed development. The document also presents maximum permissible noise levels at dwelling facades during construction activities. This provides a useful reference for assessing construction noise of the proposed development.

The National Roads Autho rity (NRA)Guideline Construction Noise Limits

Days/ Times	$L_{Aeq(1hr)}$ dB	$L_{pA\ (max)slow}$ dB
Monday to Friday (07:00 – 19:00hrs)	70	80
Monday to Friday (19:00 – 22:00hrs)	60	65
Saturday (08:00 – 16:30hrs)	65	75
Sundays and Bank Holidays (08:00 – 16:30hrs)	60	65

Dawn Meats (Slane) EPA Industrial Emissions Licence (P0811-02)

The current Dawn Meats (Slane) licence, issued by the EPA, provides for the following conditions in relation to noise;

Condition 4.1 Noise
"*Noise from the installation shall not give rise to sound pressure levels measured at the Noise Sensitive Locations of the installation which exceed the limit value(s).*"

Condition 6.15 Noise
"The licensee shall carry out a noise survey of the site operations not later than two months from the date of grant of this licence and annually thereafter. The noise survey shall pay particular regard to tonal and impulsive noise sources during night time operations. The survey programme shall be undertaken in accordance with the methodology specified in the 'Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)' as published by the Agency."

Condition 6.20
"Where refrigeration trailers are parked at the installation overnight these shall be powered on electricity to minimise noise emissions."

Schedule B.4 Noise Emissions

Daytime dB $L_{Ar,T}$ (30 minutes)	Evening dB $L_{Ar,T}$ (30 minutes)	Night-time dB $L_{Aeq,T}$ (30 minutes)
55	50	45

Note 1: There shall be no clearly audible tonal component or impulsive component in the noise emission from the activity of any noise-sensitive location.

Schedule C.6 Noise Emissions

Location [Note 1]	Measurement	Frequency
RA1 (295177E. 270076N) dwelling east of installation RA2 (29528lE. 270016N) dwelling north of installation RA3 (295651E, 269816N) dwelling north of installation RA4 (295839E, 269504N) dwelling southeast of installation	$L_{Aeq,T}$ L_{A90} L_{A10} 1/3 Octave Band Analysis	Annually
Period	**Minimum Survey Duration**	
Daytime	A minimum of 3 sampling periods at each noise monitoring location [Note3]	
Evening-time	A minimum of 1 sampling period at each noise monitoring location.	
Night-time [Note 2]	A minimum of 2 sampling periods at each noise monitoring location.	

Note 1 Locations shown on Figure 8.1 Noise Monitoring Locations of the Environmental Impact Statement
Note 2 Night-time measurements should be made between 2300 hrs and 0400 hrs, Sunday to Thursday, with 2300 hrs being the preferred start time.
Note 3 Sampling period is to be the time period T stated as per Schedule B.4 Noise Emissions, of this licence. This applies to day, evening and night time periods.

Daytime	Evening-time	Night-time
0700 hrs to 1900 hrs.	1900 hrs to 2300hrs	2300hrs to 0700 hrs

3.0 MEASUREMENT PARAMETERS

The parameters used to assess the noise are as follows:

Leq(30): The noise values recorded continuously at every instant during the 30 minute sampling period are integrated by the noise metre to give a single value that represents the continuous equivalent sound level over the 30 minute period during this survey.

L_{10} and L_{90}: are both statistical noise levels. L_{10} indicates that for 10% of the monitoring period the sound levels were greater than the quoted value. L_{90} indicates that for 90% of the monitoring period, the sound levels were greater than the quoted value. L_{10} is used to express event noise. L_{90} is used to express background noise, usually filtering out loud and intermittent interferences such as traffic noise.

Continuous: noise produced without interruption.

Intermittent: noise that is punctuated with interruptions e.g. equipment operating in cycles or events such as single passing vehicle or aircraft.

Impulsive: a noise of short duration (typically less than one second), the sound pressure of which is significantly higher than the background; brief and abrupt.

Tonal: noise which contains a clearly audible tone i.e. a distinguishable, discrete or continuous note (whine, hiss, hum or screech etc).
For the purpose of this noise assessment, a tonal characteristic incurs a penalty of +5dB(A) in accordance with Section 4.3 of the EPA 2016 IPPC Licensing Guidance Note for Noise in Relation to Scheduled Activities.

In order for a tone or impulsive element to warrant a penalty, it should be clearly noticeable and audible. Situations in which a 5 dB penalty applies include the following:

- The noise contains a distinguishable, discrete continuous note (whine, hiss, screech, hum etc).
- The noise contains distinct impulses (bangs, clicks, clatters, or thumps).
- The noise is irregular enough to attract attention.
- The tonal components are clearly audible and the level in a $1/3^{rd}$ octave band is greater than or equal to the following level in the two adjacent bands;
    - 15dB in low-frequency bands (25Hz to 125Hz);
    - 8dB in middle-frequency bands (160Hz to 400Hz), and;
    - 5dB in high-frequency bands (500Hz to 10,000Hz)

Any tonal noise detected during the daytime (07:00am to 19:00pm) or evening period (19:00pm to 23:00pm) shall incur a penalty of 5 dB(A), and would be considered a non-compliance during the night-time period (23:00pm to 07:00am).

As per top-right-hand corner of each results table, NP indicates no penalty for tonal noise and P indicates a penalty for tonal noise.

The noise measurements were 'A' weighted (to equate to human ear hearing) and the time-weighting 'Fast' was applied.

4.0 BASELINE NOISE ASSESSMENT

Long Term Monitoring Data

As part of the sites IE licence compliance, annual noise monitoring is carried out at the following local noise sensitive receptors. Locations RA1 to RA4 are specifically required to be monitored under the IE licence, and RA5 has been included in the annual monitoring programme since 2017 as agreed with the EPA.

Table 4.1: Annual Noise Monitoring Locations at Dawn Meats (Slane)

Location Ref. No.	Grid Reference (Easting: Northing)	Location Type	Location
RA1	295177: 270076	Noise Sensitive Receptor	House along roadway leading to site, east of site ~300m from the facility.
RA2	295281: 270016	Noise Sensitive Receptor	House along roadway leading to site, north of site ~250m from the facility.
RA3	295651: 269816	Noise Sensitive Receptor	House along roadway leading to site, north of site ~300m from the facility.
RA4	295839: 269504	Noise Sensitive Receptor	House along roadway leading to site, south of site near crossroads~520m from facility.
RA5	295650: 269250	Noise Sensitive Receptor	Houses to southeast of site along L1013 roadway ~500m from the facility.

These locations are shown in a map provided in Appendix A.1 of this report. The results of these annual monitoring surveys are presented in Table 4.1 below.

The following table details the annual monitoring carried out between 2013 and 2019 at noise sensitive receptors in the vicinity of the Dawn Meats (Slane) facility.

Table 4.2: Long Term Annual Noise Results at Dawn Meats (Slane)

Date	Start Time	End Time	Duration [hh:mm]	Period	Location	Description	LAeq,T	LAF_{90}	LAF_{10}
18/12/2013	12:25	14:00	01:35	Day	RA1	House along roadway leading to site, east of site ~300m from site.	63	50	62
18/12/2013	00:23	01:23	01:00	Night	RA1	House along roadway leading to site, east of site ~300m from site.	55	42	46
18/12/2013	09:35	11:05	01:30	Day	RA2	House along roadway leading to site, north of site ~250m from site.	53	47	52
17/12/2013	23:03	00:03	01:00	Night	RA2	House along roadway leading to site, north of site ~250m from site.	45	37	41
17/12/2013	10:35	12:11	01:36	Day	RA3	House along roadway leading to site, north of site ~300m from site.	50	45	52
18/12/2013	00:06	01:12	01:06	Night	RA3	House along roadway leading to site, north of site ~300m from site.	41	39	42
18/12/2013	11:24	12:54	01:30	Day	RA4	House along roadway leading to site, south of site near crossroads~520m from site.	65	46	58
17/12/2013	23:23	00:23	01:00	Night	RA4	House along roadway leading to site, south of site near crossroads~520m from site.	54	33	41
05/02/2015	13:51	15:23	01:32	Day	RA1	House along roadway leading to site, east of site ~300m from site.	52	39	50
06/02/2015	00:38	01:39	01:01	Night	RA1	House along roadway leading to site, east of site ~300m from site.	48	36	43
05/02/2015	12:14	13:46	01:32	Day	RA2	House along roadway leading to site, north of site ~250m from site.	47	37	42
05/02/2015	23:19	00:22	01:03	Night	RA2	House along roadway leading to site, north of site ~250m from site.	40	36	40
05/02/2015	12:05	13:35	01:30	Day	RA3	House along roadway leading to site, north of site ~300m from site.	49	36	53
05/02/2015	23:24	00:30	01:06	Night	RA3	House along roadway leading to site, north of site ~300m from site.	38	32	40
05/02/2015	13:42	15:16	01:34	Day	RA4	House along roadway leading to site, south of site near crossroads~520m from site.	61	39	55
06/02/2015	00:41	01:41	01:00	Night	RA4	House along roadway leading to site, south of site near crossroads~520m from site.	46	27	39

Date	Start Time	End Time	Duration [hh:mm]	Period	Location	Description	LAeq,T	LAF_{90}	LAF_{10}
19/10/2015	13:51	15:21	01:30	Day	RA1	House along roadway leading to site, east of site ~300m from site.	54	36	53
20/10/2015	00:34	01:37	01:03	Night	RA1	House along roadway leading to site, east of site ~300m from site.	48	32	42
19/10/2015	11:58	14:02	02:04	Day	RA2	House along roadway leading to site, north of site ~250m from site.	45	38	44
19/10/2015	23:23	00:23	01:00	Night	RA2	House along roadway leading to site, north of site ~250m from site.	40	38	40
19/10/2015	12:09	13:40	01:31	Day	RA3	House along roadway leading to site, north of site ~300m from site.	44	35	48
19/10/2015	23:27	00:27	01:00	Night	RA3	House along roadway leading to site, north of site ~300m from site.	36	31	36
19/10/2015	14:11	15:55	01:44	Day	RA4	House along roadway leading to site, south of site near crossroads~520m from site.	62	39	55
20/10/2015	01:06	02:06	01:00	Night	RA4	House along roadway leading to site, south of site near crossroads~520m from site.	46	37	41
14/09/2016	10:56	12:26	01:30	Day	RA1	House along roadway leading to site, east of site ~300m from site.	64	55	41
14/09/2016	23:12	00:12	01:00	Night	RA1	House along roadway leading to site, east of site ~300m from site.	50	42	36
14/09/2016	12:37	14:07	01:30	Day	RA2	House along roadway leading to site, north of site ~250m from site.	51	47	39
15/09/2016	00:31	01:32	01:01	Night	RA2	House along roadway leading to site, north of site ~250m from site.	40	38	35
14/09/2016	12:40	14:10	01:30	Day	RA3	House along roadway leading to site, north of site ~300m from site.	44	46	39
15/09/2016	00:31	01:30	00:59	Night	RA3	House along roadway leading to site, north of site ~300m from site.	34	37	31
14/09/2016	10:58	12:28	01:30	Day	RA4	House along roadway leading to site, south of site near crossroads~520m from site.	31	54	44
14/09/2016	23:16	00:16	01:00	Night	RA4	House along roadway leading to site, south of site near crossroads~520m from site.	47	44	37
14/09/2016	14:17	15:47	01:30	Day	RA5	Houses to southeast of site along L1013 roadway ~500m from site	55	59	43
15/09/2016	01:45	02:45	01:00	Night	RA5	Houses to southeast of site along L1013 roadway ~500m from site	41	43	36

Date	Start Time	End Time	Duration [hh:mm]	Period	Location	Description	LAeq,T	LAF_{90}	LAF_{10}
16/08/2017	14:54	16:24	01:30	Day	RA1	House along roadway leading to site, east of site ~300m from site.	51	39	48
16/08/2017	21:23	22:53	01:30	Evening	RA1	House along roadway leading to site, east of site ~300m from site.	57	36	47
17/08/2017	00:24	00:54	00:30	Night	RA1	House along roadway leading to site, east of site ~300m from site.	39	37	40
16/08/2017	11:43	13:14	01:31	Day	RA2	House along roadway leading to site, north of site ~250m from site.	53	44	53
16/08/2017	21:45	22:15	00:30	Evening	RA2	House along roadway leading to site, north of site ~250m from site.	46	33	39
16/08/2017	23:48	00:18	00:30	Night	RA2	House along roadway leading to site, north of site ~250m from site.	38	34	40
16/08/2017	11:00	12:30	01:30	Day	RA3	House along roadway leading to site, north of site ~300m from site.	45	40	48
16/08/2017	21:48	22:18	00:30	Evening	RA3	House along roadway leading to site, north of site ~300m from site.	38	32	41
16/08/2017	23:50	00:20	00:30	Night	RA3	House along roadway leading to site, north of site ~300m from site.	35	32	39
16/08/2017	13:27	15:00	01:33	Day	RA4	House along roadway leading to site, south of site near crossroads~520m from site.	61	41	56
16/08/2017	21:03	21:33	00:30	Evening	RA4	House along roadway leading to site, south of site near crossroads~520m from site.	61	38	48
16/08/2017	23:05	23:45	00:40	Night	RA4	House along roadway leading to site, south of site near crossroads~520m from site.	55	31	43
16/08/2017	12:49	14:19	01:30	Day	RA5	Houses to southeast of site along L1013 roadway ~500m from site.	54	43	59
16/08/2017	20:57	21:27	00:30	Evening	RA5	Houses to southeast of site along L1013 roadway ~500m from site.	53	37	51
16/08/2017	23:01	23:31	00:30	Night	RA5	Houses to southeast of site along L1013 roadway ~500m from site.	55	29	51

Date	Start Time	End Time	Duration [hh:mm]	Period	Location	Description	LAeq,T	LAF90	LAF10
16/10/2018	13:37	15:07	01:30	Day	RA1	House along roadway leading to site, east of site ~300m from site.	54	42	52
16/10/2018	21:06	21:36	00:30	Evening	RA1	House along roadway leading to site, east of site ~300m from site.	53	39	47
17/10/2018	00:36	01:36	01:00	Night	RA1	House along roadway leading to site, east of site ~300m from site.	48	33	41
16/10/2018	11:55	13:26	01:31	Day	RA2	House along roadway leading to site, north of site ~250m from site.	56	45	53
16/10/2018	20:26	20:56	00:30	Evening	RA2	House along roadway leading to site, north of site ~250m from site.	48	37	40
17/10/2018	00:31	01:31	01:00	Night	RA2	House along roadway leading to site, north of site ~250m from site.	42	33	39
16/10/2018	11:46	13:16	01:30	Day	RA3	House along roadway leading to site, north of site ~300m from site.	49	45	52
16/10/2018	20:31	21:01	00:30	Evening	RA3	House along roadway leading to site, north of site ~300m from site.	38	38	40
17/10/2018	01:36	02:36	01:00	Night	RA3	House along roadway leading to site, north of site ~300m from site.	38	36	40
16/10/2018	13:42	15:14	01:32	Day	RA4	House along roadway leading to site, south of site near crossroads~520m from site.	60	42	53
16/10/2018	21:09	21:39	00:30	Evening	RA4	House along roadway leading to site, south of site near crossroads~520m from site.	60	32	46
17/10/2018	23:25	00:25	01:00	Night	RA4	House along roadway leading to site, south of site near crossroads~520m from site.	57	34	41
16/10/2018	15:27	16:57	01:30	Day	RA5	Houses to southeast of site along L1013 roadway ~500m from site.	50	39	54
16/10/2018	21:46	22:16	00:30	Evening	RA5	Houses to southeast of site along L1013 roadway ~500m from site.	44	27	46
16/10/2018	23:20	00:21	01:01	Night	RA5	Houses to southeast of site along L1013 roadway ~500m from site.	40	30	40
22/10/2019	13:49	15:19	01:30	Day	RA1	House along roadway leading to site, east of site ~300m from site.	59	53	44
21/10/2019	21:38	22:08	00:30	Evening	RA1	House along roadway leading to site, east of site ~300m from site.	44	38	32
21/10/2019	23:47	00:18	00:31	Night	RA1	House along roadway leading to site, east of site ~300m from site.	42	37	31

Date	Start Time	End Time	Duration [hh:mm]	Period	Location	Description	LAeq,T	LAF_{90}	LAF_{10}
22/10/2019	12:20	13:50	01:30	Day	RA2	House along roadway leading to site, north of site ~250m from site.	55	48	42
21/10/2019	20:59	21:29	00:30	Evening	RA2	House along roadway leading to site, north of site ~250m from site.	43	39	35
21/10/2019	23:10	23:40	00:30	Night	RA2	House along roadway leading to site, north of site ~250m from site.	49	38	31
22/10/2019	13:13	13:43	00:30	Day	RA3	House along roadway leading to site, north of site ~300m from site.	43	44	40
21/10/2019	20:58	21:28	00:30	Evening	RA3	House along roadway leading to site, north of site ~300m from site.	37	38	33
21/10/2019	23:08	23:38	00:30	Night	RA3	House along roadway leading to site, north of site ~300m from site.	38	37	31
22/10/2019	13:57	15:30	01:33	Day	RA4	House along roadway leading to site, south of site near crossroads~520m from site.	63	57	42
21/10/2019	21:45	22:15	00:30	Evening	RA4	House along roadway leading to site, south of site near crossroads~520m from site.	46	44	35
21/10/2019	23:55	00:25	00:30	Night	RA4	House along roadway leading to site, south of site near crossroads~520m from site.	46	43	33
22/10/2019	15:29	16:59	01:30	Day	RA5	Houses to southeast of site along L1013 roadway ~500m from site	53	55	41
21/10/2019	22:28	22:58	00:30	Evening	RA5	Houses to southeast of site along L1013 roadway ~500m from site	52	42	24
22/10/2019	00:32	01:02	00:30	Night	RA5	Houses to southeast of site along L1013 roadway ~500m from site	31	34	24

4.1 QUIET AREA SCREENING

The location of the development has been screened in order to determine if it is located in an area that could be considered a 'Quiet Area' according to the EPA NG4 Guidance, which states:

The location of the proposed development should be screened in order to determine if it is to be located in or near an area that could be considered a 'Quiet Area' in open country according to the Agency publication Environmental Quality Objectives - Noise in Quiet Areas.

This is achieved using the following checklist:

Table 4.3: Quiet Area Screening Checklist

Screening Question	Answer	
	Yes	No
Is the site >3km away from urban areas with a population >1,000 people?	✓	
Is the site >10km away from urban areas with a population >5,000 people?		✓
Is the site >15km away from urban areas with a population >10,000 people?	✓	
Is the site >3km away from any local industry?		✓
Is the site >10km away from any major industry centre?		✓
Is the site >5km away from any national primary route?		✓
Is the site >7.5km away from any motorway or dual carriageway?	✓	
QUIET AREA?		✓
Other Relevant Comments	Yellow Furze (pop: <1,000) – 0.7 km NW. Slane (pop: 1,349) – 4.25km NE. Navan (pop: 28,158) – 8.0 km E. N2 primary route – 1.35 km NE.	

The proposed development location does not comply with all criteria, as per the above checklist. Therefore, it is considered that the development would not be located within a '*Quiet Area*'.

4.2 AREAS OF LOW BACKGROUND NOISE SCREENING

When an area is not identified as being *a 'Quiet Area'*, the existing background noise levels measured during the environmental noise survey should be examined to determine if they satisfy the following criteria:

- Average Daytime Background Noise Level ≤ 40dB L_{AF90}
- Average Evening Background Noise Level ≤ 35dB L_{AF90}
- Average Night-time Background Noise Level ≤ 30dB L_{AF90}

Noise monitoring has indicated that background L_{AF90} noise levels do not fall below the levels as outlined in Step 3, Chapter 4.4.2 of the EPA *Guidance Note on Noise from Scheduled* Activities (NG4), at any of the monitoring locations.

The following noise levels are averages based upon annual noise monitoring carried out in the vicinity of Dawn Meats (Slane) under the sites IE licence between 2014 and 2019. Background LAF_{90} noise levels at the monitoring locations are generally influenced by traffic on local and surrounding roads and the existing Dawn Meats (Slane) facility.

Table 4.4: Low Background Noise Area Screening Table

Ref	Location	Daytime		Evening		Night-time	
		LAeq, T	LAF_{90}	LAeq, T	LAF_{90}	LAeq,T	LAF_{90}
RA1	House along roadway leading to site, east of site ~300m from site.	57	45	51	38	47	37
RA2	House along roadway leading to site, north of site ~250m from site.	51	44	46	36	42	36
RA3	House along roadway leading to site, north of site ~300m from site.	46	42	38	36	37	35
RA4	House along roadway leading to site, south of site near crossroads ~520m from site.	58	45	56	38	50	36
RA5	Houses to southeast of site along L1013 roadway ~500m from site	53	49	50	35	42	34
Average		**53**	**45**	**48**	**37**	**44**	**36**

On average, background noise levels exceed 40dB L_{AF90} during the daytime period, exceed 35 dB L_{AF90} during the evening period and exceed 30 dB L_{AF90} during the night-time period.

Given the noise monitoring results obtained, it is considered that this area would not be classified as a "Low Background Noise Area". Therefore, the existing Dawn Meats (Slane) licence noise limits are considered to be appropriate for the area.

5.0 PREDICTIVE NOISE ASSESSMENT

The International Standards Authority guidance ISO 9613-2:1996 has been used in the prediction of the propagation of potential noise from the proposed works and development to the nearest noise sensitive receptors. The British Standard BS4142:2014 has been used to assess the potential for noise impact at local noise receptors as a result of the proposed development.

ISO 9613-2:1996

All measurements were taken at 1.2 – 1.5 metres height above local ground level and 1 – 5 metres away from reflective surfaces.

The methodology used in this report is based upon the international standard ISO 9613-2 "*Attenuation of Sound during Propagation Outdoors*". This standard outlines a method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources.

The central formula for this calculation is as follows:

$$A = A_{div} + A_{gr} + A_{bar} + A_{misc}$$

Where

A	is the attenuation due to site conditions
A_{div}	is the attenuation due to the geometrical divergence (distance from source)
A_{gr}	is the attenuation due to the ground effect
A_{bar}	is the attenuation due to a barrier
A_{misc}	is the attenuation due to miscellaneous other effects as appropriate

This attenuation factor is then subtracted from the predicted operational noise at the proposed activity. The resultant figure is the predicted noise from the proposed activity at a given noise sensitive location.

This figure may then be added logarithmically to the existing background noise at the noise sensitive location to attain the predicted noise level if the proposed activity were to begin.

BS 4142:2014

The British Standard EN BS 4142 "*Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas*" provides a method for predicting the likelihood of impact from noisy activities such as industrial activities, quarries and landfills etc.

A correction factor, typically of up to +6dB for tonal elements and +9dB for impulsive elements, may be applied arithmetically to the predicted noise from the proposed activity based upon the character of the noise and its likelihood to cause nuisance. This is termed the 'rating level'.

When making an assessment on the impact of a specific sound, an initial estimation is made by subtracting the measured background sound level from the rating level. Typically, the greater the difference, the greater the magnitude of impact:

- A difference of around +10dB or more is likely to be an indication of a significant adverse impact.
- A difference of around +5dB is likely to be an indication of an adverse impact.
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact.
- Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact.

5.1 SELECTION OF RECEPTOR LOCATIONS FOR PREDICTIVE NOISE

Selected receptor locations are illustrated in maps provided in Appendix A.

WWTP

In order to predict the impact of the construction and operational phases of the proposed amendments to the approved WWTP extension, sample noise-sensitive locations were selected based upon the nearest location within groups of NSL's sharing similar orientation with regard to the proposed site and intervening topography.

Table 5.1: WWTP Predictive Noise Re ceptor Locations

Location Ref. No.	Grid Reference (Easting: Northing)	Location Type	Location
NSL1	295651: 269816	Noise Sensitive Re ceptor	Residences located 500m East of the pro posed site (RA3).
NSL2	295281: 270016	Noise Sensitive Rece ptor	Residences located 275m North of the pro posed site (RA2).
NSL3	294857: 269613	Noise Sensitive Rece ptor	Residences located 335m West / South-West of the proposed site.
NSL4	295839: 269504	Noise Sensitive Rece ptor	Residences located 735m South / South-East of the pro posed site (RA5)
NSL 5	294530: 270014	Noise Sensitive Rece ptor	School located 665m North-West of the proposed site.

Pipe Line

The proposed pipeline would pass along the roadside on the Windmill Road, L1013 road, Yellow Furze road and through the village, L1600 road, and local road leading to the River Boyne. The pipeline route is mapped in Appendix A.

The pipeline will pass close by roadside houses, and the school and church in the village of Yellow Furze. Typical set back distances would be greater than 20m for the majority of residences and structures along the route, however, distances of 5 to 10 metres from the façade may occur, depending on the precise location along the road.

5.2 SOURCE NOISE SPECIFICATIONS & FORMULAE

Construction Noise

The noisiest aspect of the proposed development is likely to be the construction phase of the project. During construction, the noisiest phase is typically excavation and landscaping activities.

The guidance document BS5228-Part 1 2009 "*Code of practice for noise and vibration control on construction and open sites. Noise*" provides typical noise levels for standard construction equipment during typical construction and demolition activities.

The typical noise level of construction is summarised in the following table.

Table 5.2: Construction Plant Noise Levels (Ref: BS5228:2009)

Sound Pressure Level (dBA) @ Octave Band Centre Frequency									
Frequency (Hz)	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dBA**
C2.3 - 22T Excavator (clearing site) @ 1 m	75	88	88	91	93	92	91	86	99
C2.14 - 22T Excavator (excavating) @ 1 m	80	83	89	91	92	90	85	21	97
C2.45 Water Pump 6in @ 1 m	68	73	74	80	82	78	75	61	86
Resultant Noise Level	**81**	**89**	**92**	**94**	**96**	**94**	**92**	**86**	**101**

It should be noted that this resultant noise level is considered a worst case scenario for noise levels expected at the site during construction activities.

Operational Noise

Operational noise at the site would typically be characterised by general motor and noise from air blowers. Occasional noise from agricultural machinery and deliveries would also occur. Large goods vehicles and lorries typically generate noise levels of 78 – 95 dBA, depending on their size.

The following table provides noise levels for the proposed onsite insulated Kaeser Air Blowers, as measured to DIN EN ISO 2151, Figures ± 3dB(A), with sound insulated pipework.

Kaeser Air Blower Operation Noise Levels:

Sound Pressure Level (dBA) @ Octave Band Centre Frequency									
Frequency (Hz)	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dBA**
65kW Blower (Max	74	69	67	69	73	70	67	66	**79**
24kW Blower (Max)	69	58	59	60	63	65	59	56	**72**

Table 5.3: Maximum Operational Noise Level at the Proposed Development

Sound Pressure Level(dBA) @ Octave Band Centre Frequency									
Frequency (Hz)	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dBA**
C.4.19 Truck (idlin g)	72	76	77	83	87	88	82	71	**92**
3 x 65kW Blower (Max)	79	74	72	74	78	75	72	71	**84**
1 x 24kW Blower (Max)	69	58	59	60	63	65	59	56	**72**
ETP Background Noise	53	56	59	48	48	50	44	39	**62**
Resultant Noise Level	**80**	**78**	**79**	**83**	**88**	**88**	**82**	**74**	**93**

Octave readings provided from PES Ltd library data are based upon monitoring conducted on similar equipment, machinery or vehicles and locations which would be in place at the proposed development.

It should be noted that this resultant noise level is considered a worst case scenario for noise levels expected at the proposed development. Normal ETP operational noise levels would be expected to be in the region of 62 dBA (ETP Background Noise), as measured at similar developments of this type.

Relevant Formulae

In order to carry out this predictive analysis, the following attenuation characteristics have been taken into account:

Divergence – A_{div}

The geometrical divergence accounts for the spherical spreading in the free field from the point sound source, causing attenuation due to the inverse square law. Divergence is calculated as follows:

$$A_{div} = 20 \log_{10} (d/d_0) + 11$$

Where:

- d is the distance from the source to the receiver (m)
- d_0 is the reference distance (1 m)
- 11 is a constant relating the sound power level to the sound power level at a reference distance d_0 which is 1 meter from an omnidirectional point source.

Barrier Effect – A_{bar}

The barrier effect was calculated using the Anderson and Kurze calculation as follows:

$$D_Z = 20\log 10 (\Omega/\tanh \Omega) + 5dB$$

Where: $\Omega = (2\pi N)^{1/2}$

And N is the Fresnel number given by: $N = 2\ d / \lambda$

Where: d = is the differential path length

λ = wavelength of the sound

Ground Effect – A_{gr}

Ground attenuation is mainly the result of sound reflected by the ground surface interfering with the sound propagation directly from the source to the receiver. Porous ground, which includes ground covered by grass, trees or other vegetation or farmland, has the effect of reducing the apparent noise level at the receiver.

Ground Effect has been calculated based upon section 7.3.1 of ISO 9613-2, which calculates the combined effect of ground attenuation in the vicinity of the noise source, receiver and intervening ground.

The ground factor G is a constant representing the porosity of the ground in question. Hard ground (roads, ice, water, tamped ground etc.) is given a ground factor of zero. Soft ground (grass, trees, agricultural crops etc.) is given a ground factor of 1. Mixed ground is given a value of between 0 and 1 which is representative of the fraction of the ground that is soft. The area of influence is taken to be 30 times the source or receiver height, with the intervening ground being the remainder.

Miscellaneous – A_{misc}

As parameters relating to weather and atmospheric conditions are extremely variable and would change throughout the year, these have not been included as part of this assessment.

6.0 NOISE MODELLING RESULTS

In order to determine the impact of noise from the facility during construction activities and normal operation at the proposed treatment plant area, the resultant noise levels at noise sensitive receptors from onsite activities have been calculated.

Table 6.1 below summarises the findings of this predictive noise assessment for the main effluent plant compound area. Detailed calculations may be found in Appendix B of this report.

The source construction noise at the proposed biological plant is based upon the operation of one 22 tonne excavator during site clearing and excavation, and an operating water pump within the proposed construction site area.

Operational Noise (Lorries) assesses noise based upon a single lorry idling at the site.

Maximum operation noise takes into account general equipment noise at the proposed effluent facility, noise from a 24kW and three 65kW blowers. It should be noted that blowers operating at their maximum rated output would be a rare occurrence. This is considered to be a worst case scenario for noise which could be generated during operations at the proposed development.

Table 6.1: Predicted Noise Results Summary (dBA) – WWTP

NSL Ref	Location	Construction Noise	Operational Noise - Lorries	Maximum Operational Noise
Source Noise Level (dBA)		**101**	**92**	**84**
NSL1	NSL 500m E	36	24	14
NSL2	NSL 275m N	42	29	19
NSL3	NSL 335m WSW	40	28	18
NSL4	NSL 735m SSE	33	23	14
NSL5	NSL 665m NW	34	19	9

Table 6.2 below summarises maximum noise levels which may be expected at set back distances from the pipeline route. The source construction noise along the pipeline route is based upon the operation of one 22 tonne excavator during site clearing and excavation.

There would be no ongoing noise from the operation of the pipeline along its route. While pipeline integrity testing and washing would occur periodically, these are not inherently noisy activities. Therefore, no operational noise scenario has been included in this assessment.

Table 6.2: Predicted Noise Results Summary (dBA) – PIPELINE ROUTE

NSL Ref	Location	Construction Noise
Source Noise Level (dBA)		101
NR1	NSL @ 5m	76
NR2	NSL @ 10m	70
NR3	NSL @ 20m	64

BS4142:2014 Impact Assessment – WWTP

The methodology outlined in BS4142 requires that predicted noise levels be compared to existing L_{90} figures at noise sensitive locations in order to determine the likely noise impact.

Representative baseline noise levels have been taken as the averages of long term noise monitoring carried out by Dawn Meats (Slane) from the area.

The overall average long term L_{AF90} value for all annual noise monitoring locations has been used to represent the background noise for each noise sensitive location. The overall average long term L_{AF90} value has also been used to represent the baseline noise level for noise sensitive receptors along the pipeline route.

A noise character penalty of +5 has been applied to predicted noise levels containing machine noise. This is to account for distant impulsive noise from operating machinery.

The following table determines the likelihood of construction noise impacts at noise sensitive locations following the BS4142 methodology;

Table 6.3: BS4142 Construction Noise Assessment – WWTP

	Background Noise	Predicted Noise			Difference from Background
Location	Average Daytime L_{AF90}	Predicted Noise	Predicted Penalty	Rating Level ($L_{Ar,T}$)	
NSL1	**45**	36	5	**41**	-4
NSL2	**45**	42	5	**47**	2
NSL3	**45**	40	5	**45**	0
NSL4	**45**	33	5	**38**	-7
NSL5	**45**	34	5	**39**	-6

The following table determines the likelihood of operational noise from lorries onsite causing impacts at noise sensitive locations following the BS4142 methodology;

Table 6.4: Operational Noise Assessment – WWTP Lorries

	Background Noise	Predicted Noise			Difference from Background
Location	Average Daytime L_{AF90}	Predicted Noise	Predicted Penalty	Rating Level ($L_{Ar,T}$)	
NSL1	**45**	24	5	**29**	-16
NSL2	**45**	29	5	**34**	-11
NSL3	**45**	28	5	**33**	-12
NSL4	**45**	23	5	**28**	-17
NSL5	**45**	19	5	**24**	-21

The following table determines the likelihood of maximum operational noise impacts at noise sensitive locations following the BS4142 methodology;

Table 6.5: Maximum Operational Noise Assessment - WWTP

	Background Noise	Predicted Noise			
Location	**Average Day time L_{AF90}**	**Predicted Noise**	**Predicted Penalty**	**Rating Level ($L_{Ar,T}$)**	**Difference from Background**
NSL1	**45**	14	5	**19**	-26
NSL2	**45**	19	5	**24**	-21
NSL3	**45**	18	5	**23**	-22
NSL4	**45**	14	5	**19**	-26
NSL5	**45**	9	5	**14**	-31

BS4142:2014 Impact Assessment – PIPELINE ROUTE

The methodology outlined in BS4142 requires that predicted noise levels be compared to existing L_{90} figures at noise sensitive locations in order to determine the likely noise impact.

Representative baseline noise levels have been taken as the averages of long term noise monitoring carried out by Dawn Meats (Slane) from the area.

A noise character penalty of +5 has been applied to predicted noise levels containing machine noise. This is to account for distant impulsive noise from operating machinery.

The following table determines the likelihood of construction noise impacts at noise sensitive locations following the BS4142 methodology;

Table 6.6: BS4142 Construction Noise Assessment – PIPELINE ROUTE

	Background Noise	Predicted Noise			
Location	**Average Daytime L_{AF90}**	**Predicted Noise**	**Predicted Penalty**	**Rating Level ($L_{Ar,T}$)**	**Difference from Background**
NR1 (5m)	**45**	76	5	**81**	36
NR2 (10m)	**45**	70	5	**75**	30
NR3 (20m)	**45**	64	5	**69**	24

7.0 DISCUSSION

The topography in the area surrounding the proposed development at Greenhills is generally flat, ranging between 80-100m above sea level with a gentle slope rising to the north-east.

The principal factor influencing the mitigation of noise from the proposed effluent treatment operation is its distance from noise sensitive locations. Distance would result in significant attenuation of noise as sound energy reduces by the inverse of the square of distance travelled (inverse square law). The closest noise sensitive location is NSL2, which is 275m from the proposed WWTP plant.

The terrain between the closest noise sensitive locations and the proposed site is composed of mature hedgerows, treelines and grassland. For the purpose of noise attenuation, these surfaces are considered 'porous', whereas made ground would be considered 'reflective'. The combination of these factors would also contribute somewhat to the mitigation of noise from onsite activities.

There are two critical noise control periods of activity associated with the proposed development, construction phase and operational phase, and two critical noise control locations, the proposed main effluent treatment plant compound area and the proposed pipeline route. The potential for noise impact at the closest noise sensitive locations has been discussed below under these headings.

A BS4142 has been completed on the potential noise impacts which may occur as a result of the proposed permission (Planning Ref:191135) from Limerick Co Co to increase the capacity of the piggery from 600 sows to 1000 sows and their progeny and the construction of a new electrical substation.

BS4142 infers that for a given excess of the rating level over the background level, the impacts and potential likelihood of complaints are as follows:

Excess	Likelihood of Complaints	Interpretation of Impact
≥ 10dB	Likely	An indication of a significant adverse impact.
> 5dB	Possible	An indication of an adverse impact.
≤ 5 dB	Unlikely	An indication that it is unlikely that the specific sound source will have an adverse impact or a significant adverse impact.
< 0dB	Very Unlikely	An indication that the specific sound source will have a low impact.

Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.

7.1 CONSTRUCTION PHASE NOISE IMPACT

Construction noise, while inherently noisy and disruptive, is temporary in duration. It is anticipated that the construction of the pipeline and WWTP extension would take approximately 8 months to complete concurrently. The works involving "heavy machinery" for the purposes of excavation, and the preparation of building foundations usually cause the most disturbances to nearby residents.

Construction HGV movement to and from Dawn Meats (Slane) may result in additional noise at noise sensitive locations in the vicinity due to an increase in frequency of movements, however, this would be in the context of existing frequent HGV traffic on the local roads.

Increased traffic noise would be most apparent on roadways adjacent to the pipeline route, although frequency of HGV traffic would be limited by the lower requirement for materials for pipeline construction.

Temporary noise nuisance may occur when earthmoving or excavation works take place at the main WWTP compound and along the route of the pipeline.

Generally, the type of works involved at this site would include the following:

- Excavation/Levelling: Excavator, dump truck & dozer.
- Foundations: Excavations, cement mixers & concrete vibrators.
- General Construction: Masonry construction, services, drainage and surfacing etc.

For construction noise impact prediction purposes, it can be assumed that at any one stage in the construction of this development, several activities occur together. Therefore, it has been assumed that maximum intermittent noise levels of ~ 101 dB LAeq at 1m from the source may occur during the noisiest phase of the construction schedule.

7.1.1 WWTP Construction Phase Noise Impact

The following graph compares the calculated construction noise rating arising from onsite activities (blue) average existing daytime baseline noise at noise sensitive locations (green) and the NRA weekday daytime noise limit (red line), as summarised in section 6.0 above.

As can be seen in Table 6.3 and Figure 7.1, noise from the construction of the main WWTP compound of the development is predicted to result in noise rating levels at noise sensitive locations of 38 to 47 L_{Ar30}. With average background daytime noise levels of 45 L_{AF90}, construction activities at the proposed biological plant would result in noise ranging from 7 dBA below to 2 dBA above the existing background noise level at noise sensitive locations.

It should be noted that these noise levels are considered a worst case scenario, as it assumes that the noisiest operations (i.e. excavation works) are carried out simultaneously. This event would be anticipated to be a rare occurrence and only for short periods of the construction phase.

According to The National Roads Authority's "*Guidelines for the Treatment of noise and vibration in National Road Schemes*" (2004), noise levels at noise sensitive locations of 70 dB(A) L_{Aeq} between daytime hours (07:00-19:00) and 60 dB(A) L_{Aeq} between evening (19:00-22:00 hours) are considered to be acceptable.

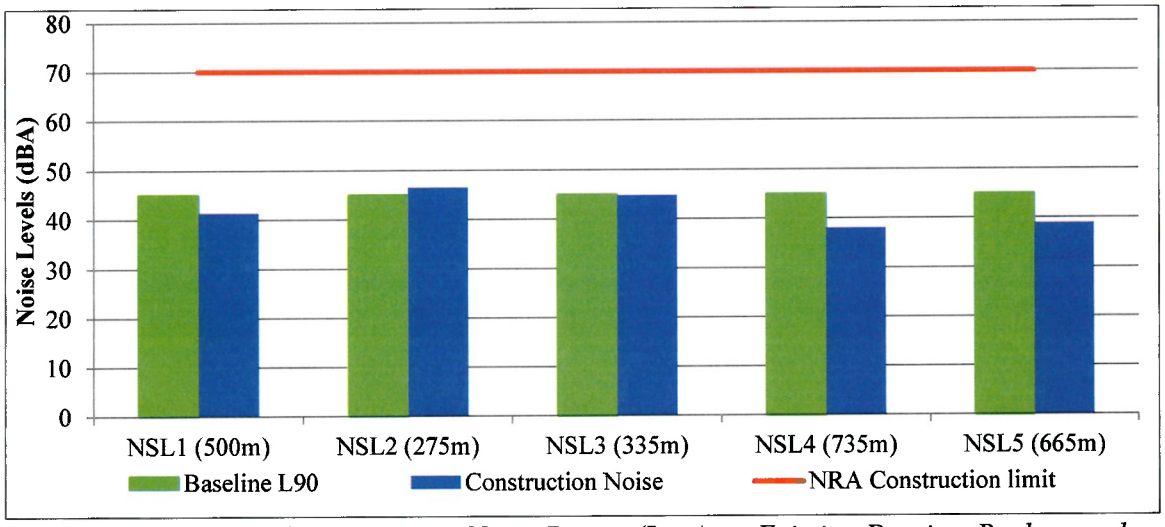


Figure 7.1: *Predicted Construction Noise Rating ($L_{Ar,T}$) vs. Existing Daytime Background Noise (L_{AF90}) – WWTP*

It is anticipated that construction activities would generally be conducted between the hours of 07:00am and 19:00pm Monday to Friday. As can be seen above, predicted noise from the construction phase of the main WWTP compound would not exceed the NRA guidance levels for these periods.

Therefore, it is predicted that there would be a low to no significant impact on noise sensitive locations as a result of the WWTP construction phase of the proposed development, due to the predicted noise levels and limited period of time over which the impact would occur.

It is recommended that guidance on control of noise, as per The National Roads Authority's "*Guidelines for the Treatment of noise and vibration in National Road Schemes*" (2004) and British Standard 5228-1 "*Code of practice for Noise Control on Construction and Open Sites*" be followed during the construction phase.

It is recommended that all construction works be conducted between the hours of 07:00am and 19:00pm Monday to Friday. Any works which, by necessity, are required to be carried out outside of these times should notified to relevant bodies, i.e. the local council or the EPA, and any potentially affected local residents in good time and prior to specified works commencing.

7.1.2 Pipe Line Construction Noise Impact

The following graph compares the calculated noise rating arising from pipeline construction activities (blue), average existing daytime baseline noise at noise sensitive locations (green) and the NRA weekday daytime noise limit (red line), as summarised in section 6.0 above.

It is anticipated that the highest noise levels which would be generated during the construction phase of the proposed pipeline would be from the excavation along the route. It is anticipated that pipeline construction works may occur within 5 to 20 metres of residences.

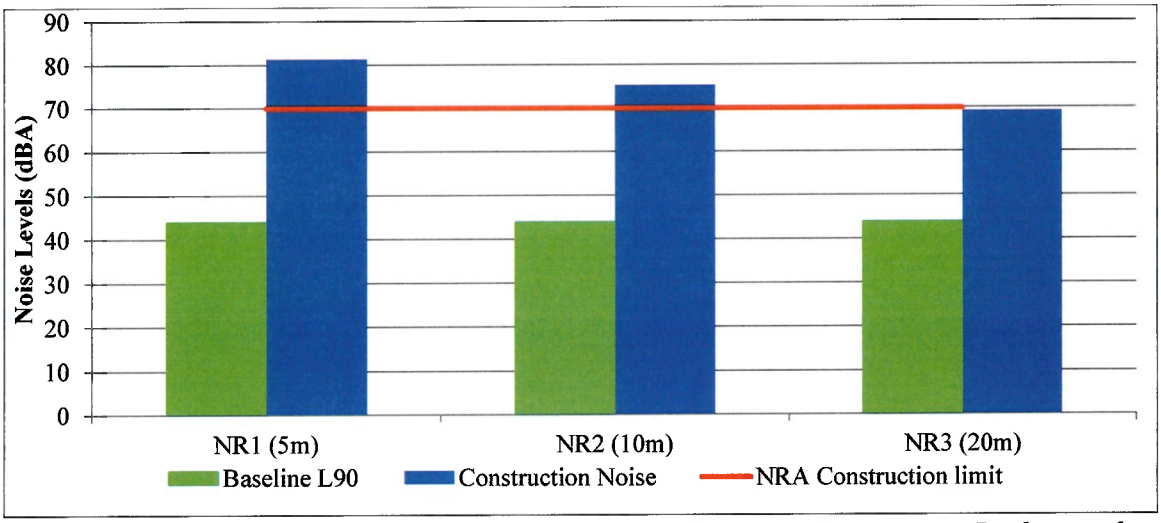


Figure 7.2: *Predicted Construction Noise Rating ($L_{Ar,T}$) vs. Existing Daytime Background Noise (L_{AF90}) – PIPELINE*

As can be seen in Tables 6.6 and figure 7.2 above, noise from the construction of the pipeline phase of the development is predicted to result in noise levels at noise sensitive locations of 81 L_{Ar30} at 5 metres to 69 L_{Ar30} at 20 metres. With an average background noise level of 45 L_{AF90}, construction activities at the proposed pipeline would be 24 to 36 dBA above the existing background noise level at noise sensitive locations.

As stated above, these noise levels are considered to be a worst case scenario and represent the maximum likely noise from excavation activities. However, such noise generating activities would occur over a short period of time.

Therefore, depending on distance from works, it is predicted that there would be a major to moderate impact to noise sensitive locations as a result of the pipeline construction phase of the proposed development. The Pipe Line construction noise is predicted to fall above the NRA Guidelines limits of 70 dBA daytime and 60 dBA evening time.

It is recommended that guidance on control of noise, as per The National Roads Authority's "*Guidelines for the Treatment of noise and vibration in National Road Schemes*" (2004) and British Standard 5228-1 "*Code of practice for Noise Control on Construction and Open Sites*" be followed during the construction phase.

It is recommended that all construction works be conducted between the hours of 07:00am and 19:00pm Monday to Friday.Any works which, by necessity, are required to be carried out outside of these times should be notified to relevant bodies, i.e. the local council or the EPA, and any potentially effected local residents in good time and prior to specified works commencing.

Where practical and safe to use, it is recommended that temporary noise barriers are erected around anticipated noisy activities, such as excavation, along the pipeline route. Where houses are likely to be occupied during the day, the use of acoustic screens and huts should be considered during high noise generating activities which are expected to occur over extended periods of the work day.

Therefore, it is predicted that there would be a moderate impact on noise sensitive locations as a result of the pipeline construction phase of the proposed development, due to the limited period of time over which the impact would occur and proposed mitigation.

7.2 OPERATIONAL NOISE IMPACT ASSESSMENT

The following graph compares the calculated noise rating arising from onsite WWTP activities from lorries (light blue), maximum equipment noise (dark blue), average existing daytime (light green), evening (green) and night-time (dark green) baseline noise at noise sensitive locations and the EPA Guidance / IE licence daytime (gold line), evening (blue line) and night-time (black line) noise limits, as summarised in section 6.0 above.

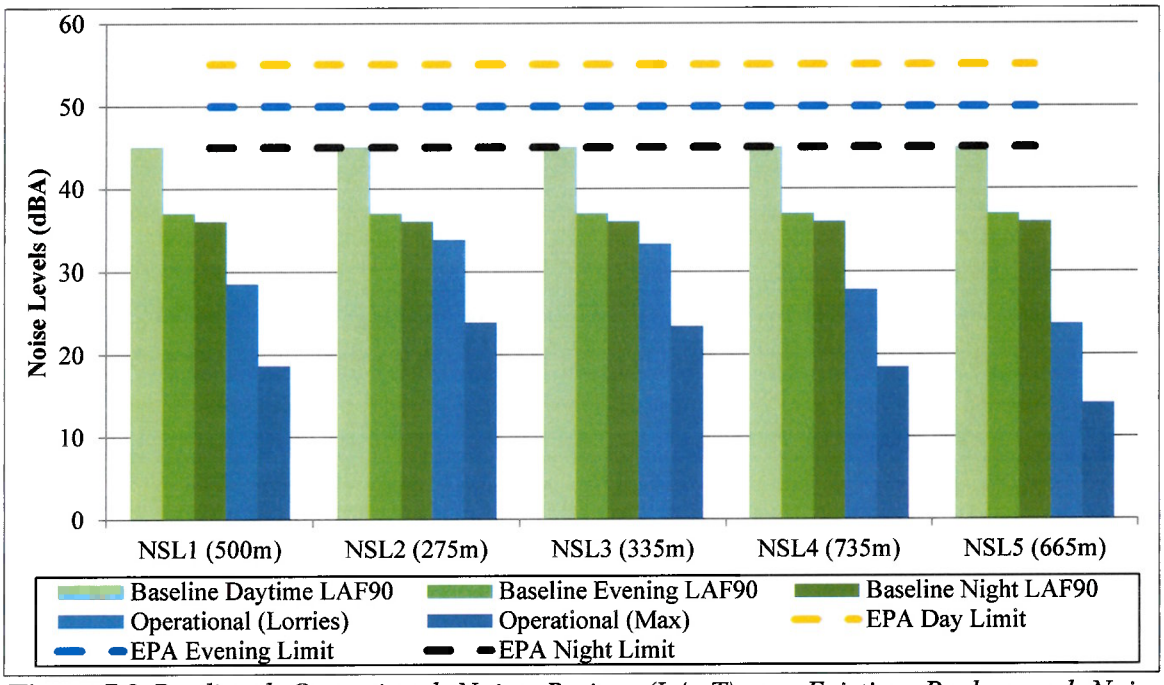


***Figure 7.3:** Predicted Operational Noise Rating (LAr,T) vs. Existing Background Noise (LAF90) – WWTP*

Predicted Maximum Operational Noise – WWTP

In order to predict the highest likely risk of impact from the operation of the proposed effluent treatment plant during its operational phase, noise sources likely to contribute to the highest noise levels onsite at any one time were included in this assessment. The mitigation of noise from the treatment plant compound would principally be by design, including set-back distance from receptors and, in particular, screening of the compound area by the proposed earth berm.

As can be seen in Tables 6.4 and 6.5 above, the principal noise sources which would account for the maximum noise levels at the facility would be vehicles onsite, general background noise from pumps and particularly aeration blowers operating at maximum output.

These are considered the worst case scenario for noise as a result of the operation of the proposed development. Vehicles would only be operating within the treatment plant area for limited periods of the day and aeration blowers are selected and designed to operate within the centre of their power range (rather than maximum output).

It should also be noted that the frequency of vehicles operating in the vicinity of the proposed effluent plant would be significantly reduced from the existing daily removal of effluent tankers 7 to 8 times per day. Collection of a maximum of 15 tonnes of dewatered sludge would be expected to occur once per day.

Under the BS4142 criteria, a rated noise level from the proposed development, which is greater than 10 dBA below the existing background noise level, would to be masked by other dominant local noise sources and would be inaudible at the exterior of the closest noise sensitive locations.

As can be seen in Table 6.4 and Figure 7.2 above, noise from lorries operating within the WWTP area are predicted to result in noise levels ranging from 24 to 34 L_{Ar30} at noise sensitive locations. Noise levels would range from 11 to 21 dBA below existing baseline daytime noise levels, and therefore would not be anticipated to cause a significant nuisance under the BS4142 criteria.

However, it should be noted that during evening and night time periods, lorry noise levels would be anticipated to range from 3-4 dBA below background at NSL2 (275m) and NSL3 (335m). Therefore, there would be potential for a low impact at these locations should lorry activities occur outside of daytime hours.

It is recommended that all lorry operators be informed of site noise controls as part of the existing environmental management system, to keep high revs to a minimum and to keep to the onsite speed limits.

As can be seen in Table 6.5 and Figure 7.2 above, at maximum operational noise levels, it is predicted that resulting noise levels at noise sensitive locations would range from 14 L_{Ar30} to 24 L_{Ar30} at sensitive receptor locations

With average daytime background noise levels of 45 L_{AF90}, Maximum Operational Noise at the proposed biological plant would be between 21 to 31 dBA below the existing background noise level at noise sensitive locations. Maximum equipment noise would also be greater than 10 dBA below the existing evening and night-time background noise levels at receptors.

The operation of blowers at maximum output is considered to be an unlikely event, as the equipment would be sized to ensure operation at normal, mid-range outputs. However, this assessment has determined that maximum noise from the air blowers would not cause an impact at noise sensitive locations when operating at maximum power.

As onsite equipment would normally operate at noise levels well below these predicted levels, it is anticipated that normal operations at the facility would be unlikely to cause a noise impact at local receptors.

The EPA "*Guidance Note on Noise (NG4)*" (2016) recommends the following limits for noise from facilities at noise sensitive locations;

Divisions	Times	dB(A)
Day	(07:00 to 19:00hrs)	55dB LAr,T
Evening	(19:00 to 23:00hrs)	50dB LAr,T
Night	(23:00 to 07:00hrs)	45dB LAeq,T

The Dawn Meats (Slane) facility operates under licence limits for noise which are based upon these NG4 guidance limits.

In this worst case scenario, it is predicted that maximum noise arising from the proposed development would be in compliance with daytime, evening and night time guidance limits at the nearest noise sensitive locations and existing facility EPA IE licence limits.

Therefore, it is predicted that in the worst case scenario for operational noise at the proposed development, there would be no impact at these noise sensitive locations. The proposed development noise would result in no additional noise impact in the surrounding area.

8.0 CONCLUSIONS

- There are two critical noise control periods of activity associated with the proposed development, construction phase and operational phase, and two critical noise control locations, the proposed main effluent treatment plant compound area and the proposed pipeline route.

- It is the main conclusion of this report that no significant alteration to the existing noise environment would occur as a result of the proposed development at Greenhills, Beauparc, Co. Meath.

- Maximum construction noise at the proposed WWTP compound has been predicted to result in noise levels of 38 to 47 dBA L_{Ar30} at the nearest noise sensitive locations, ranging from 7 dBA below to 2 dBA above the existing day-time background noise levels.

- It is predicted that there would be a low to no significant impact on noise sensitive locations as a result of the WWTP construction.

- All construction noise at the at the proposed WWTP compound has been predicted to be in compliance with NRA Guidelines limits for construction works.

- Maximum construction noise along the proposed pipeline route has been predicted to result in noise levels of L_{Ar30} 81dB at 5m to L_{Ar30} 75dB at 20m, ranging from 24 to 36 dBA above the existing day-time background noise levels.

- Depending on distance from works, it is predicted that there would be a major to moderate impact to noise sensitive locations as a result of the pipeline construction and noise mitigation should be implemented.

- As construction noise would occur over a short period, would be managed through appropriate mitigation measures and would result in no permanent change to the existing noise environment of the area, it is considered that there would be a moderate noise impact as a result of proposed construction works along the pipeline route.

- Maximum noise during the operation of the effluent plant would occur as a result of lorries at the site, which has been predicted to result in noise levels of 24 to 34 dBA L_{Ar30}, ranging

from 11 to 21 dBA below existing baseline daytime noise level at the nearest noise sensitive locations.

- Therefore, lorries operating within the effluent plant area would not be anticipated to cause a noise nuisance under the BS4142 criteria.

- The operation of onsite aeration equipment at maximum has been predicted to result in noise levels of 14 to 24 dBA L_{Ar30}, ranging from 21 to 31 dBA below existing day-time background noise levels.

- There would be anticipated to be noise impact as a result of maximum equipment noise at the proposed effluent plant.

- All operational noise from the proposed development has been predicted to be in compliance with the EPA (NG4) daytime, evening and night-time guidance limits.

- It is also concluded that Dawn Meats (Slane) would remain in compliance with their EPA IE licenced noise limits.

9.0 RECOMMENDATIONS

- It is recommended that guidance on control of noise, as per The National Roads Authority's "*Guidelines for the Treatment of noise and vibration in National Road Schemes*" (2004) and British Standard 5228-1 "*Code of practice for Noise Control on Construction and Open Sites*" be followed during the construction phase.

- It is recommended that all construction works be conducted between the hours of 07:00am and 19:00pm Monday to Friday. All works should be timed during the work day so as to minimise noise impacts upon local residents in so far as is possible.

- Where residences are likely to be occupied during the day, the use of acoustic screens and huts should be considered during high noise generating activities which may be expected to occur over extended periods of the work day.

- It is recommended that considerations with regard to noise be included in a Construction Environmental Management Plan (CEMP) to be prepared by the construction firm prior to beginning works.

- In order to ensure continued good practice in relation to the management of noise at the Dawn Meats (Slane) facility, it is recommended that the existing site Noise Management Programme be updated prior to commissioning of the proposed effluent treatment plant. The draft programme outlined in Appendix C may be used as a starting point, subject to site specific review.

10.0 REFERENCES

ISO 9613-2:1996 "*Attenuation of Sound during Propagation Outdoors*".

EN BS 4142:2014 "*Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas*".

The National Roads Authority's "*Guidelines for the Treatment of noise and vibration in National Road Schemes*" (2004)

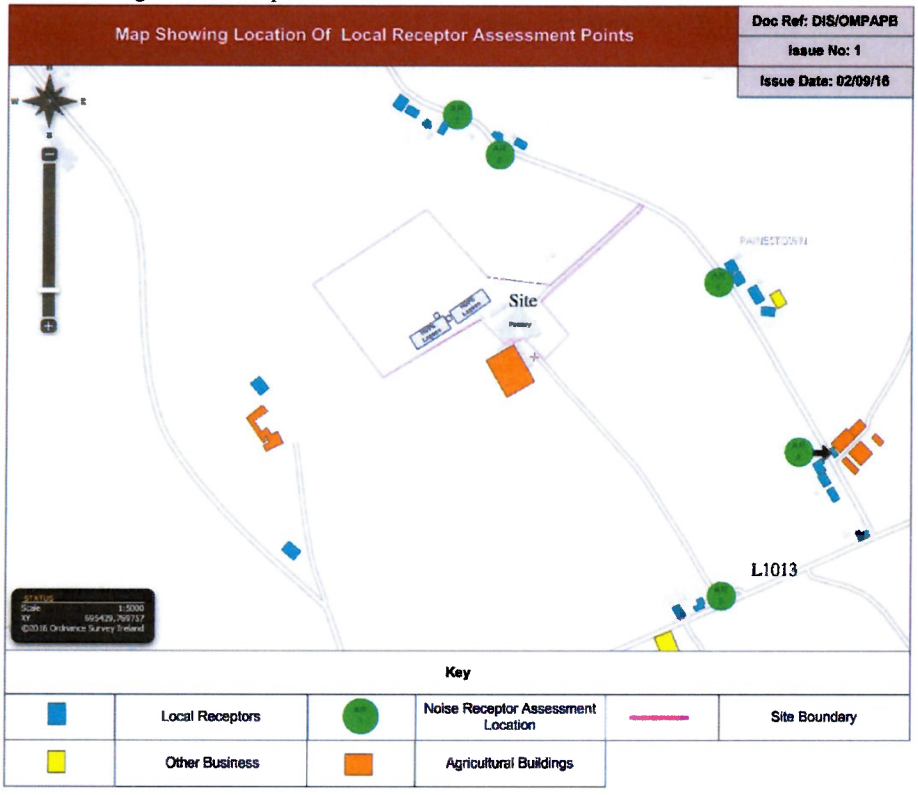
EN BS 5228-1:2009 "*Code of practice for noise and vibration control on construction and open sites*"

Grant S. Anderson and Ulrich J. Kurze, "*Outdoor Sound Propagation*," Chpt. 5 in Noise and Vibration Control Engineering – Principals and Applications, edited by L.L. Beranek and I.L. Vér, (John Wiley & Sons, NY, NY 1992).

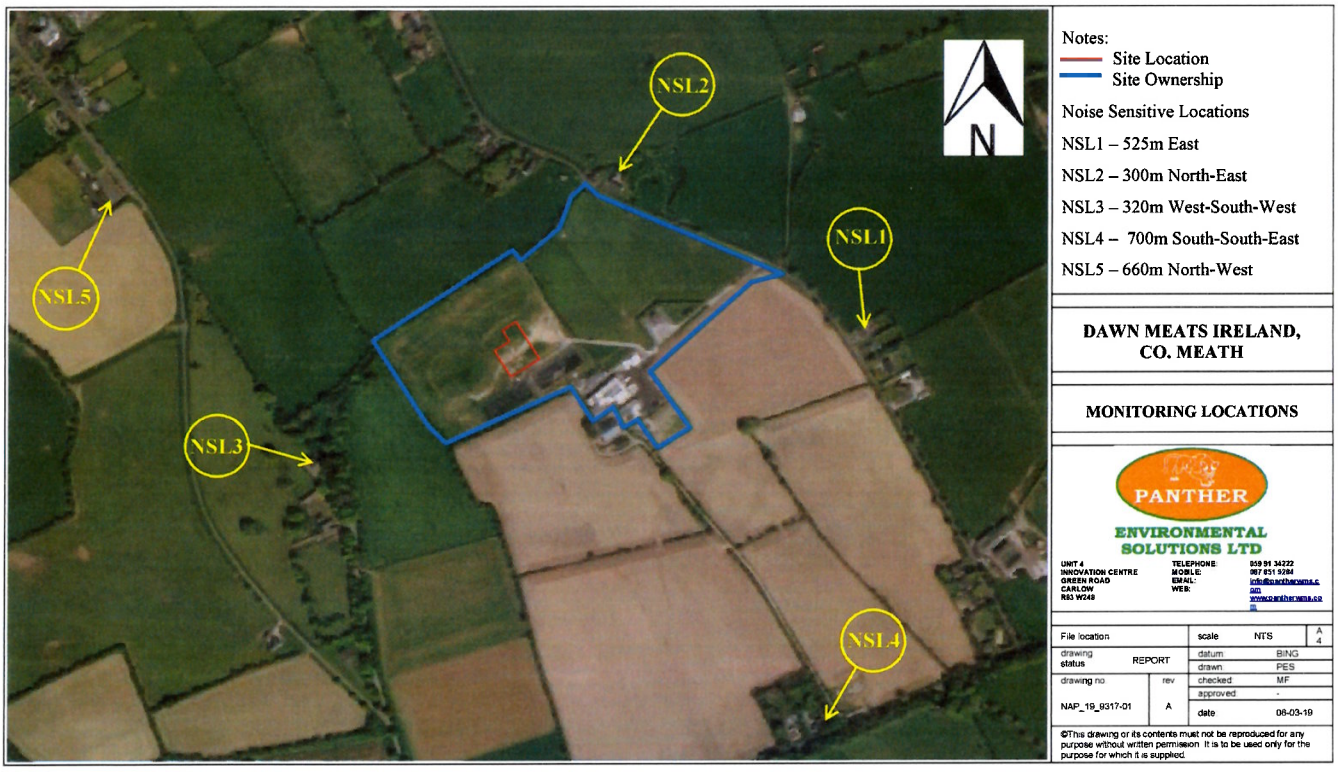
APPENDIX A

- SITE BOUNDARY AND NOISE SENSITIVE LOCATIONS -

Appendix A.1: Annual Noise Monitoirng Locations Map



Appendix A.2: Predictive Noise Sensitive Receptor Map - WWTP



Appendix A.3: Predictive Noise Sensitive Receptor Map – Pipeline Route

Notes:

Proposed Pipe Line

DAWN MEATS IRELAND, CO. MEATH

PIPE LINE NOISE MONITORING LOCATIONS

PANTHER ENVIRONMENTAL SOLUTIONS LTD

UNIT 4
INNOVATION CENTRE
GREEN ROAD
CARLOW
R93 W248

TELEPHONE: 059 91 34222
MOBILE: 087 651 8284
EMAIL: info@pantherems.ie
WEB: www.pantherems.ie

File location		scale	NTS
drawing status	REPORT	datum	BING
		drawn	PES
drawing no.	rev	checked	MF
		approved	-
NAP_19_8317-02	A	date	06-03-19

A4

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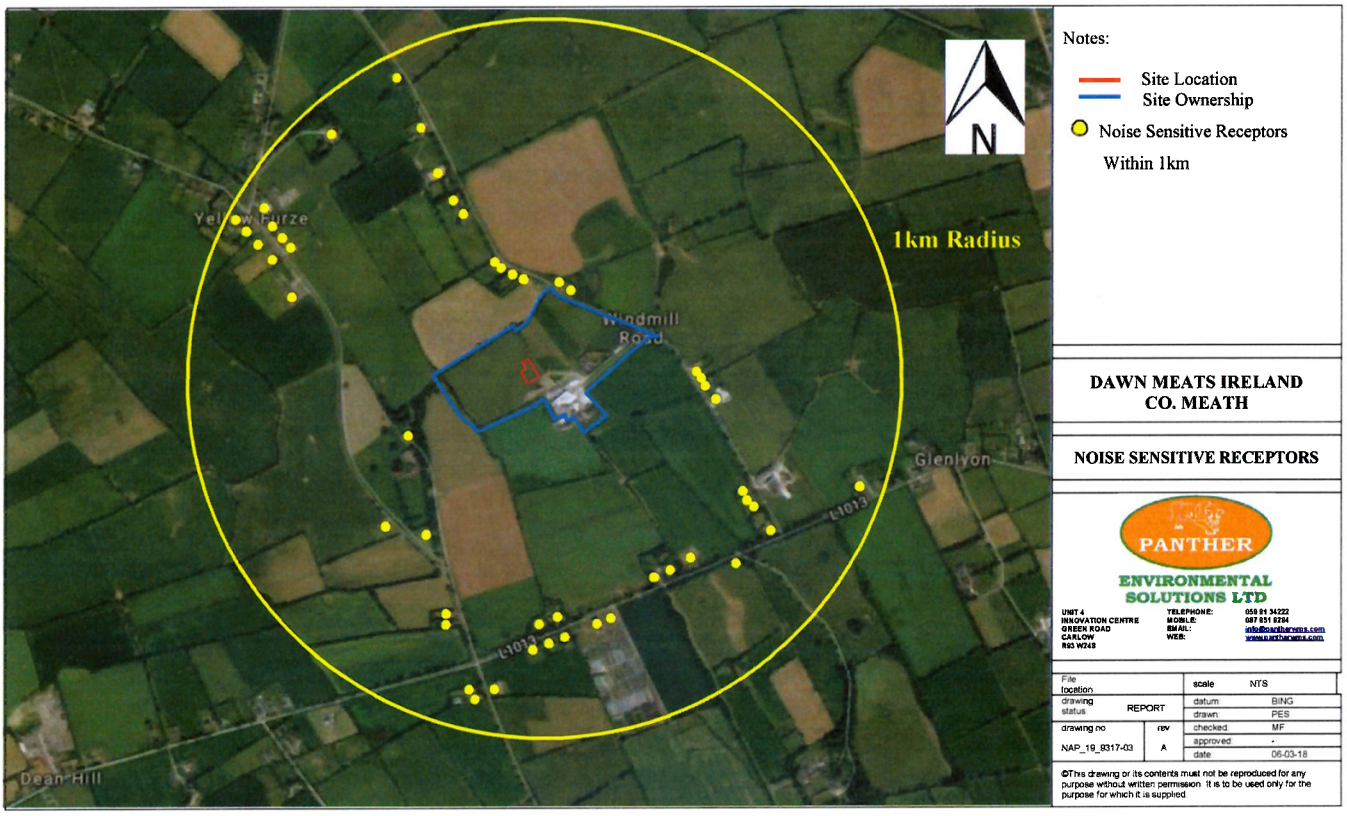
Appendix A.4: Noise Sensitive Receptor Map (1km) - WWTP



APPENDIX B

- NOISE PREDICTION CALCULATIONS -

B1: Noise Attenuation Calculations WWTP

B1.1 Diver gence Attenuation WWTP

DivergenceCalculation - NSL1									
d		**500**		**d_0**		**1**			
Frequency (Hz)	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dB**
A_{div}	65	65	65	65	65	65	65	65	74
Where:	Adiv = the attenuation due to divergence (Adiv = 20 log10 (d/d_0))+11)								
	d = the distance from the source to the receiver (m)								
	d_0 = the reference distance (1 m)								
	d_0 which is 1 meter from an omnidirectional pont source.								

Div ergenceCalculation - NSL2									
d		**275**		**d_0**		**1**			
Frequency (Hz)	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dB**
A_{div}	60	60	60	60	60	60	60	60	69
Where:	Adiv = the attenuation due to divergence (Adiv = 20 log10 (d/d_0))+11)								
	d = the distance from the source to the receiver (m)								
	d_0 = the reference distance (1 m)								

Divergence Calculation- NSL3									
d		**335**		**d_0**		**1**			
Frequency (Hz)	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dB**
A_{div}	62	62	62	62	62	62	62	62	71
Where:	Adiv = the attenuation due to divergence (Adiv = 20 log10 (d/d_0))+11)								
	d = the distance from the source to the receiver (m)								
	d_0 = the reference distance (1 m)								

Divergence Calculation - NSL4									
d		**735**		**d_0**		**1**			
Frequency (Hz)	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dB**
A_{div}	68	68	68	68	68	68	68	68	77
Where:	Adiv = the attenuation due to divergence (Adiv = 20 log10 (d/d_0))+11)								
	d = the distance from the source to the receiver (m)								
	d_0 = the reference distance (1 m)								
	d_0 which is 1 meter from an omnidirectional point source.								

Divergence Calculation - NSL5									
d		**665**		**d_0**		**1**			
Frequency (Hz)	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dB**
A_{div}	67	67	67	67	67	67	67	67	76
Where:	Adiv = the attenuation due to divergence (Adiv = 20 log10 (d/d_0))+11)								
	d = the distance from the source to the receiver (m)								
	d_0 = the reference distance (1 m)								
	d_0 which is 1 meter from an omnidirectional point source.								

B1.2 Barrier Attenuation WWTP

Barrier Attenuation Calculation - NSL1								
dss (m)	16	**dsr (m)**	485	**d_{direct} (m)**	500	**h (m)**	3	
f(Hz)	63	125	250	500	1000	2000	4000	8000
λ (m)	5.46	2.75	1.38	0.69	0.34	0.17	0.09	0.04
d	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53
N	5.84	2.94	1.48	0.74	0.36	0.18	0.09	0.05
Ω	6.05	4.30	3.04	2.15	1.51	1.07	0.76	0.54
Dz/Abar	16	13	10	7	4	3	1	1
Where:	dss = distance from noise source to top of barrier (m)							
	dsr = distance from noise receiver to top of barrier (m)							
	d_{direct} = shortest distance between source and receiver (m)							
	h = height of barrier							
	f(Hz) = centre of third octave band frequency							
	λ (m) = wavelength at centre of third octave band frequency							
	d = differential path length (dss+dsr-d_{direct})							
	N = the Fresnel Number (N = 2 d / λ)							
	Ω = is the coefficient of attenuation due to the sound barrier							
	Dz / A_{bar} = is the attenuation due to the barrier							

Barrier Attenuation Calculation - NSL2								
dss (m)	16	**dsr (m)**	260	**d_{direct} (m)**	275	**h (m)**	3	
f(Hz)	63	125	250	500	1000	2000	4000	8000
λ (m)	5.46	2.75	1.38	0.69	0.34	0.17	0.09	0.04
d	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51
N	5.60	2.82	1.41	0.71	0.35	0.17	0.09	0.04
Ω	5.93	4.21	2.98	2.11	1.48	1.05	0.74	0.53
Dz/Abar	15	12	10	7	4	3	1.41	1
Where:	dss = distance from noise source to top of barrier (m)							
	dsr = distance from noise receiver to top of barrier (m)							
	d_{direct} = shortest distance between source and receiver (m)							
	h = height of barrier							
	f(Hz) = centre of third octave band frequency							
	λ (m) = wavelength at centre of third octave band frequency							
	d = differential path length (dss+dsr-d_{direct})							
	N = the Fresnel Number (N = 2 d / λ)							
	Ω = is the coefficient of attenuation due to the sound barrier							
	Dz / A_{bar} = is the attenuation due to the barrier							

Barrier Attenuation Calculation - NSL3								
dss (m)	30	**dsr (m)**	305	**d_{direct} (m)**	335	**h (m)**	3	
f(Hz)	63	125	250	500	1000	2000	4000	8000
λ (m)	5.46	2.75	1.38	0.69	0.34	0.17	0.09	0.04
d	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
N	3.10	1.56	0.78	0.39	0.19	0.10	0.05	0.02
Ω	4.41	3.13	2.22	1.57	1.10	0.78	0.55	0.39
Dz/Abar	13	10	7	5	3	2	0.82	0
Where:	dss = distance from noise source to top of barrier (m)							
	dsr = distance from noise receiver to to pof barrier (m)							
	d_{direct} = shortest distance between source and receiver (m)							
	h = height of barrier							
	f(Hz) = centre of third octave band frequency							
	λ (m) = wave lengthat centre of third octave band frequency							
	d = differential path length (dss+dsr-d_{direct})							
	N = the Fresnel Number (N = 2 d / λ)							
	Ω = is the coefficient of attenuation due to the sound barrier							
	Dz / A_{bar} = is the attenuation due to the barrier							

Barrier Attenuation Calculation - NSL4								
dss (m)	30	**dsr (m)**	705	**d_{direct} (m)**	735	**h (m)**	1	
f(Hz)	63	125	250	500	1000	2000	4000	8000
λ (m)	5.46	2.75	1.38	0.69	0.34	0.17	0.09	0.04
d	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
N	0.91	0.46	0.23	0.12	0.06	0.03	0.01	0.01
Ω	2.39	1.70	1.20	0.85	0.60	0.42	0.30	0.21
Dz/Abar	8	5	3	2	1	0	0.25	0
Where:	dss = distance from noise source to top of barrier (m)							
	dsr = distance from noise receiver to top of barrier (m)							
	d_{direct} = shortest distance between source and receiver (m)							
	h = height of barrier							
	f(Hz) = centre of third octave band frequency							
	λ (m) = wavelength at centre of third octave band frequency							
	d = differential path length (dss+dsr-d_{direct})							
	N = the Fresnel Number (N = 2 d / λ)							
	Ω = is the coefficient of attenuation due to the sound barrier							
	Dz / A_{bar} = is the attenuation due to the barrier							

Barrier Attenuation Calculation - NSL5								
dss (m)	7	**dsr (m)**	659	**d_{direct} (m)**	665	**h (m)**	3	
f(Hz)	63	125	250	500	1000	2000	4000	8000
λ (m)	5.46	2.75	1.38	0.69	0.34	0.17	0.09	0.04
d	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
N	13.46	6.78	3.40	1.70	0.84	0.42	0.21	0.11
Ω	9.19	6.52	4.62	3.27	2.29	1.62	1.15	0.82
Dz/Abar	15*	15*	13	10	7	5	2.95	2
Where:	dss = distance from noise source to top of barrier (m)							
	dsr = distance from noise receiver to top of barrier (m)							
	d_{direct} = shortest distance between source and receiver (m)							
	h = height of barrier							
	f(Hz) = centre of third octave band frequency							
	λ (m) = wavelength at centre of third octave band frequency							
	d = differential path length (dss+dsr-d_{direct})							
	N = the Fresnel Number (N = 2 d / λ)							
	Ω = is the coefficient of attenuation due to the sound barrier							
	Dz / A_{bar} = is the attenuation due to the barrier							

B2: Predicted Noise Levels WWTP

B2.1: Predicted Construction Noise Calculation WWTP

Predicted Noise Calculation - NSL1									
Frequency (Hz)	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dBA**
Source dBA	81	89	92	94	96	94	92	86	101
A_{div}	65	65	65	65	65	65	65	65	
A	65	65	65	65	65	65	65	65	
NSL dBA	**16**	**24**	**27**	**29**	**31**	**29**	**27**	**21**	**36**
								Result	**36**

Predicted NoiseCalculation - N SL2									
Frequency (Hz)	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dBA**
Source dBA	81	89	92	94	96	94	92	86	101
A_{div}	60	60	60	60	60	60	60	60	
A	60	60	60	60	60	60	60	60	
NSL dBA	**21**	**29**	**32**	**34**	**36**	**35**	**32**	**26**	**42**
								Result	**42**

Predicted Noise Calculation -N SL3									
Frequency (Hz)	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dBA**
Source dBA	81	89	92	94	96	94	92	86	101
A_{div}	62	62	62	62	62	62	62	62	
A	62	62	62	62	62	62	62	62	
NSL dBA	**20**	**28**	**31**	**32**	**34**	**33**	**31**	**24**	**40**
								Result	**40**

Predicted Noise Calculation -NS L4									
Frequency (Hz)	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dBA**
Source dBA	81	89	92	94	96	94	92	86	101
A_{div}	68	68	68	68	68	68	68	68	
A	68	68	68	68	68	68	68	68	
NSL dBA	**13**	**21**	**24**	**26**	**27**	**26**	**24**	**18**	**33**
								Result	**33**

Predicted Noise Calculation - NSL5									
Frequency (Hz)	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dBA**
Source dBA	81	89	92	94	96	94	92	86	101
A_{div}	67	67	67	67	67	67	67	67	
A	67	67	67	67	67	67	67	67	
NSL dBA	**14**	**22**	**25**	**27**	**28**	**27**	**25**	**18**	**34**
								Result	**34**

B2.2: Predicted Maximum Operational Noise Calculation - Lorries WWTP

Predicted Noise Calculation - NSL1									
Frequency (Hz)	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dBA**
Source dBA	72	76	77	83	87	88	82	71	92
A_{div}	65	65	65	65	65	65	65	65	
A_{bar}	16	13	10	7	4	3	1	1	
A	81	78	75	72	69	68	66	66	
NSL dBA	**-9**	**-2**	**3**	**11**	**18**	**21**	**16**	**5**	**24**
								Result	**24**

Predicted Noise Calculation - NSL2									
Frequency (Hz)	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dBA**
Source dBA	72	76	77	83	87	88	82	71	92
A_{div}	60	60	60	60	60	60	60	60	
A_{bar}	15	12	10	7	4	3	1	1	
A	75	72	69	67	64	62	61	61	
NSL dBA	**-3**	**4**	**8**	**16**	**23**	**26**	**21**	**10**	**29**
								Result	**29**

Predicted Noise Calculation - NSL3									
Frequency (Hz)	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dBA**
Source dBA	72	76	77	83	87	88	82	71	92
A_{div}	62	62	62	62	62	62	62	62	
A_{bar}	13	10	7	5	3	2	1	0	
A	74	71	69	66	64	63	62	62	
NSL dBA	**-3**	**4**	**9**	**17**	**23**	**25**	**20**	**9**	**28**
								Result	**28**

Predicted Noise Calculation - NSL4									
Frequency (Hz)	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dBA**
Source dBA	72	76	77	83	87	88	82	71	92
A_{div}	68	68	68	68	68	68	68	68	
A_{bar}	8	5	3	2	1	0	0	0	
A	76	74	72	70	69	69	69	68	
NSL dBA	**-4**	**2**	**6**	**13**	**18**	**19**	**13**	**2**	**23**
								Result	**23**

Predicted Noise Calculation- NSL5									
Frequency (Hz)	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dBA**
Source dBA	72	76	77	83	87	88	82	71	92
A_{div}	67	67	67	67	67	67	67	67	
A_{bar}	15	15	13	10	7	5	3	2	
A	82	82	81	78	75	72	70	69	
NSL dBA	**-11**	**-7**	**-3**	**5**	**12**	**16**	**12**	**2**	**19**
								Result	**19**

B2.3: Predicted Maximum Equipment Noise Calculation WWTP

Predicted N oise Calculation - NSL1									
Frequency (Hz)	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dBA**
Source dBA	79	74	72	74	78	75	72	71	84
A_{div}	65	65	65	65	65	65	65	65	
A_{bar}	16	13	10	7	4	3	1	1	
A	81	78	75	72	69	68	66	66	
NSL dBA	**-1**	**-4**	**-2**	**2**	**9**	**8**	**6**	**5**	**14**
								Result	**14**

Predicted Noise Calculation - NSL2									
Frequency (Hz)	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dBA**
Source dBA	79	74	72	74	78	75	72	71	84
A_{div}	60	60	60	60	60	60	60	60	
A_{bar}	15	12	10	7	4	3	1	1	
A	75	72	69	67	64	62	61	61	
NSL dBA	**4**	**2**	**3**	**7**	**14**	**13**	**11**	**10**	**19**
								Result	**19**

Predicted Noise Calculation - NSL3									
Frequency (Hz)	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dBA**
Source dBA	79	74	72	74	78	75	72	71	84
A_{div}	62	62	62	62	62	62	62	62	
A_{bar}	13	10	7	5	3	2	1	0	
A	74	71	69	66	64	63	62	62	
NSL dBA	**5**	**3**	**4**	**8**	**14**	**12**	**10**	**9**	**18**
								Result	**18**

Predicted Noise Calculation - NSL4									
Frequency (Hz)	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dBA**
Source dBA	79	74	72	74	78	75	72	71	84
A_{div}	68	68	68	68	68	68	68	68	
A_{bar}	8	5	3	2	1	0	0	0	
A	76	74	72	70	69	69	69	68	
NSL dBA	**3**	**0**	**1**	**4**	**9**	**6**	**3**	**2**	**14**
								Result	**14**

Predicted Noise Calculation - NSL5									
Frequency (Hz)	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dBA**
Source dBA	79	74	72	74	78	75	72	71	84
A_{div}	67	67	67	67	67	67	67	67	
A_{bar}	15	15	13	10	7	5	3	2	
A	82	82	81	78	75	72	70	69	
NSL dBA	**-3**	**-9**	**-9**	**-4**	**3**	**3**	**2**	**2**	**9**
								Result	**9**

B3: Noise Attenuation Calculations PIPELINE

B3.1 Divergence Attenuation PIPELINE

DivergenceCalculation - NR1									
d		5		d_0		1			
Frequency (Hz)	63	125	250	500	1k	2k	4k	8k	dB
A_{div}	25	25	25	25	25	25	25	25	34
Where:	Adiv = the attenuation due to divergence (Adiv = 20 log10 (d/d_0))+11)								
	d = the distance from the source to the receiver (m)								
	d_0 = the reference distance (1 m)								

Divergence Calculation- NR2									
d		10		d_0		1			
Frequency (Hz)	63	125	250	500	1k	2k	4k	8k	dB
A_{div}	31	31	31	31	31	31	31	31	40
Where:	Adiv = the attenuation due to divergence (Adiv = 20 log10 (d/d_0))+11)								
	d = the distance from the source to the receiver (m)								
	d_0 = the reference distance (1 m)								

Divergence Calculation - NR3									
d		20		d_0		1			
Frequency (Hz)	63	125	250	500	1k	2k	4k	8k	dB
A_{div}	37	37	37	37	37	37	37	37	46
Where:	Adiv = the attenuation due to divergence (Adiv = 20 log10 (d/d_0))+11)								
	d = the distance from the source to the receiver (m)								
	d_0 = the reference distance (1 m)								

B4: Predicted Noise Levels PIPELINE

B4.1: Predicted Construction Noise Calculation PIPELINE

Predicted Noise Calculation - NR1									
Frequency (Hz)	63	125	250	500	1k	2k	4k	8k	dBA
Source dBA	81	89	92	94	96	94	92	86	101
A_{div}	25	25	25	25	25	25	25	25	
A	25	25	25	25	25	25	25	25	
NSL dBA	56	64	67	69	71	69	67	61	76
								Result	76

Predicted Noise Calculation - NR2									
Frequency (Hz)	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dBA**
Source dBA	81	89	92	94	96	94	92	86	101
A_{div}	31	31	31	31	31	31	31	31	
A	31	31	31	31	31	31	31	31	
NSL dBA	**50**	**58**	**61**	**63**	**65**	**63**	**61**	**55**	**70**
								Result	**70**

Predicted Noise Calculation - NR3									
Frequency (Hz)	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dBA**
Source dBA	81	89	92	94	96	94	92	86	101
A_{div}	37	37	37	37	37	37	37	37	
A	37	37	37	37	37	37	37	37	
NSL dBA	**44**	**52**	**55**	**57**	**59**	**57**	**55**	**49**	**64**
								Result	**64**

APPENDIX C

- NOISE MANAGEMENT PROGRAMME -

D1 NOISE MANAGEMENT

D1.1 BACKGROUND

The following section addresses the potential impact of noise emanating from the proposed development.

Noise sources at the proposed effluent treatment plant would be similar to other similar plants. The noise from the plant would predominantly be limited to that arising from aerators/blowers and transfer pumps.

The proposed noise mitigation measures, as per **Table D1** below, would minimise potential noise from the operation of the activity at noise sensitive locations surrounding the premises due to the inclusion of landscaped barriers, low noise rated equipment and noise mitigation materials. The new structures would be well integrated into the existing complex.

The applicant is required to remain in compliance with the existing IE licence requirements for noise.

D1.2 STANDARD OF CONTROL

In the case of noise, pollution is considered in terms of causing environmental harm or offence to the sense of hearing, i.e. causing annoyance to people who live in the area or are there for some other reason, through exposure to noise.

The point at which 'pollution' in the form of offence to the sense of hearing is occurring, is taken to be the point at which there is 'reasonable cause for annoyance'.

The need to "prevent" noise emissions is, in certain situations, less relevant for noise than for some other pollutants. Noise does not accumulate on the installation or in the environment permanently like some pollutants. In other words, when the installation ceases operations, the original noise climate may be restored.

The aim should be, wherever feasible, to ensure that proposed additions to existing plant or activities do not significantly add to the overall ambient level. In some cases, however, this may be unreasonable or beyond BAT (best available technology).

The aim of planning conditions is to achieve 'no reasonable cause for annoyance' to persons beyond the boundary of the premises, i.e. sensitive receptors, in so far as is possible. For many businesses, environmental noise will not be an issue but for others it will need to be considered and controlled.

In the case of effluent treatment plants, it should be remembered that it is not only the level of noise that can cause annoyance, but sometimes the source itself or the time of day or night, as illustrated in the examples below:

- Clattering, banging or knocking;
- Tonal noise, with distinctive notes, hums or whines from fans, motors etc.;
- The time the noise occurs (noise is often more annoying at night or during leisure times);

- Noise that is perceived as unnecessary.

Many noise problems can be prevented by good management, consideration and ensuring a good standard of maintenance of any equipment. The hierarchy for control should be to:

1. ***Prevent*** generation of noise at source by good design and maintenance.
1. ***Minimize or contain noise at source*** by observing good operational techniques and management practice.
2. ***Increase the distance*** between the source and receiver if possible.
3. ***Use physical barriers or enclosures*** to prevent transmission to sensitive receptors.
4. ***Sympathetic timing and control*** of unavoidably noisy operations.

Prevention and minimization

Good design and management can prevent the generation of noise. This can include:

- Selection of plant and equipment that produce less noise;
- Suitable timing of noisy operations;
- Appropriate siting of noisy operations and noise sources at the design stage.

It is far easier to deal with potential noise problems at the design stage of a new installation or extension than an alteration to an existing one. When new equipment is purchased, it is often more effective to purchase quieter equipment, that is slightly more expensive, rather than have to modify it at a later date. Many manufacturers now provide detailed noise information on their products.

D1.4 NOISE MANAGEMENT IN EFFLUENT TREATMENT PLANTS

This section identifies the more common noise problems arising in effluent treatment plants that have the potential to affect people nearby, and offers suggestions for preventing or reducing noise in each case.

In many cases, restricting noisy operations to reasonable times may be sufficient to overcome environmental noise problems. Reasonable times are generally considered to be the normal working day, however, it is understood that certain activities may have to be undertaken outside the normal working day, in which case, additional measures may be required in order to achieve a satisfactory noise climate.

The noise emitted by activities can be reduced considerably by enclosure within insulated structures, such as aerator blowers which are designed with an acoustic enclosure as standard. However, it should be remembered that the effectiveness of any form of building or enclosure as a means of reducing noise can be severely compromised by leaving doors or unguarded vents open.

D1.4.1 Good Operational Practices to Reduce Noise

A written noise policy/ management programme can be helpful in maintaining standards and demonstrating a commitment to good noise management. Such a programme can also be an important tool in staff training.

All staff should be trained on the content of the programme to ensure a commitment to good noise management. A record should be kept of the date and name of person trained and made available for inspection by the licensing authority or environmental health responsible authority.

Methods for monitoring noise should be included in a noise policy i.e. annual noise assessment and site perimeter checks following complaints.

A log book should be kept of any noise monitoring carried out, the findings and any remedial action taken. The log should indicate whether it was routine noise monitoring or the result of a complaint.

Dawn Meats (Slane) have an existing Noise Action Programme operating at the facility.

Location

- Any plant and equipment should be sited, as far as is practicable, to benefit from the noise screening effects of local barriers, such as the lie of the land and buildings, to achieve optimum benefit. Acoustic barriers to absorb noise should also be installed where deemed necessary e.g. the proposed earth berm.

- Orientate noisy equipment in one direction so that noise is directed away from noise-sensitive areas.

- Regular maintenance should be carried out on all equipment and machinery to ensure that noise disturbance from such sources is kept to a minimum.

Operation

Staff, contractors and visitors should be instructed not to raise voices or play radios unnecessarily at night. Pagers or mobile phones may need to be considered for on-site communications.

Hard materials should be lowered on to hard surfaces rather than dropped. The drop height of any bulk material should be reduced as much as possible.

Care should be taken to prevent unnecessary movements of forklifts during unsociable hours. Ensure forklifts and vehicles etc. are well maintained especially exhaust systems and silencers. Site roads/tracks should be maintained in a state of good repair to reduce any noise from the passage of vehicles.

Avoid idling of machines between work periods and revving of engines.

Reduce noise caused by vibrating machinery with rotating parts by proper servicing, balancing and regular maintenance. Lack of maintenance may lead to overheating, resulting in engine covers having to be left open.

Aerator blowers may need to be placed inside buildings, purpose built or proprietary acoustic enclosures. The manufacturer or supplier should be consulted before enclosing any plant since suitable ventilation may be required to prevent overheating.

Reduce noise caused by friction in conveyor rollers, trolleys and other machines by proper lubrication and regular maintenance.

Any testing of emergency generators and alarms should be carried out during the daytime of the normal working week and preferably between 09.00 and 17.00.

The noise level emitted by the alarms must not exceed that required to alert persons working within the site. However, to ensure the response given by call centres is 100%, alarms may also be tested at weekends. The disturbance caused by their testing can be minimized by testing at the same time and day of the week or month etc. If there are problems, local residents should be consulted and timings of testing discussed with them.

Testing should be in accordance with manufacturer or supplier instructions.

Timing of operations

Delivery and collection of chemicals and waste sludge should take place at reasonable times, i.e. during the normal working day, as far as is practicable. Drivers should comply with any speed limits on site and avoid taking empty vehicles over rough ground wherever possible.

D2 NOISE MANAGEMENT PROGRAMME

The Noise Management Programme (NMP) is a core document that is intended to detail operational and control measures appropriate to management and control of noise at the site. The format of the NMP should provide sufficient detail to allow operators and maintenance staff to clearly understand the operational procedures for both normal and abnormal conditions.

A Noise Management Programme (NMP) should be prepared for all processes. The NMP should also include sufficient feedback data to allow site management (and local authority inspectors) to audit site operations. An example of some of the issues to be considered is summarised as follows. More detailed guidance is provided with this document.

- A summary of the site, noise sources and the location of receptors.
- Details of the site management responsibilities and procedures for reporting faults, identifying maintenance needs and complaints procedure.
- Noise critical plant operation and management procedures (e.g. correct use of plant, process, materials, and checks on plant performance, maintenance and inspection).
- Operator training.
- Housekeeping.
- Maintenance and inspection of plant (both routine and emergency response).
- Record keeping – format, responsibility for completion and location of records.
- Emergency breakdown and incident response planning including responsibilities and mechanisms for liaison with the relevant bodies.
- Public relations.

The Noise Management Programme is a living document and should be reviewed following the first annual onsite monitoring assessment occurring after commissioning of the proposed treatment plant, and reviewed as part of the site management system going forward.

The Noise Management System documentation should define the roles of the Effluent Plant Operator / Caretaker and set out templates in relation to the operating of the facility and reporting procedures to be employed.

Relevant requirements of the amended Noise Management Plan should be implemented throughout the site with the existing branched management system in order to share responsibility around the site. The head manager should ensure all works are performed in accordance with the NMP.

Table D1 – Construction & Effluent Plant Commissioning Noise Action Plan Status Table

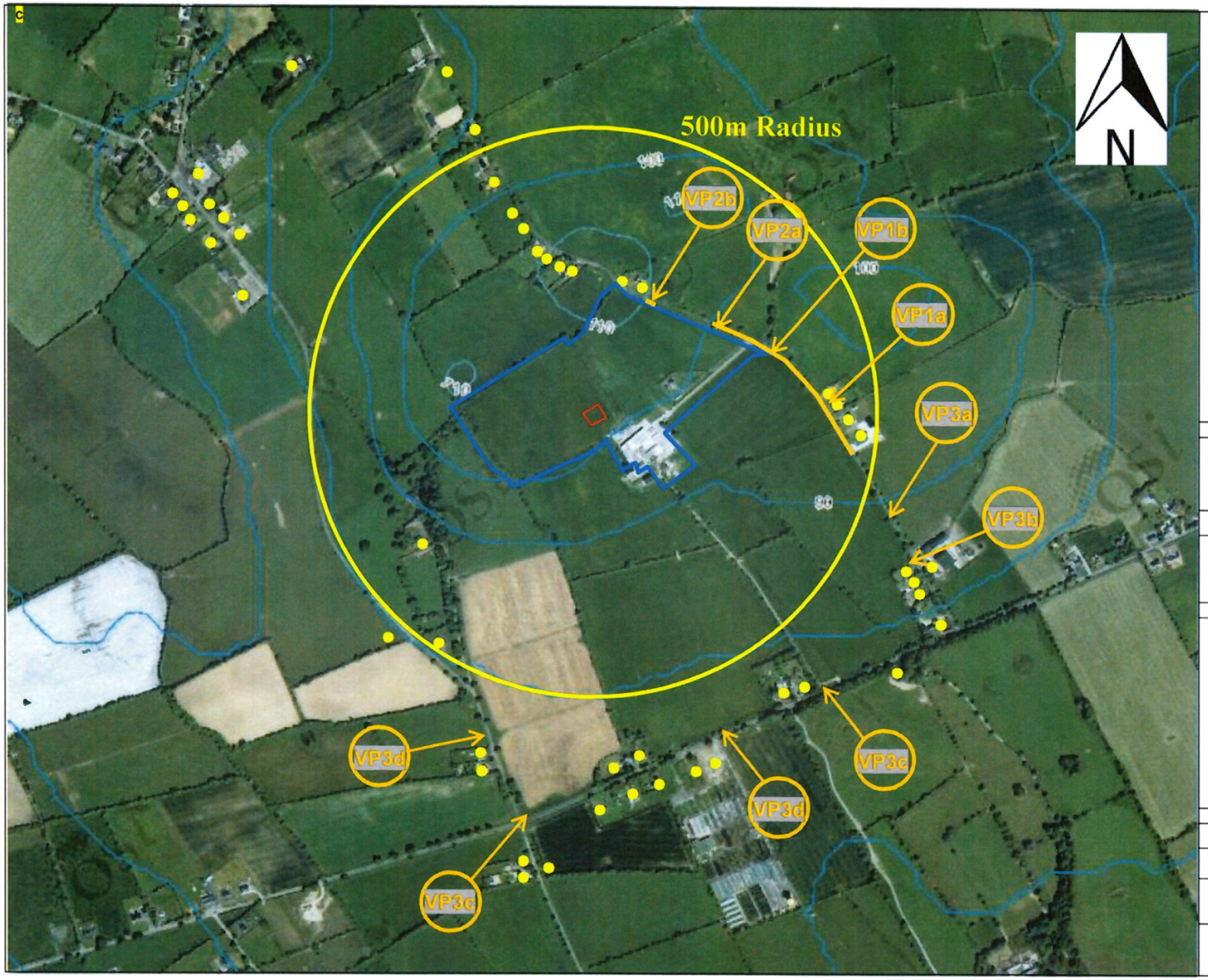
	NOISE SOURCE	SOURCE	ACTION PLAN	MONITORING REQUIRED	REVIEW AND COMMENTS
1	Construction	Construction equipment and machinery	Considerations with regard to noise should be included in a Construction Environmental Management Plan (CEMP) to be prepared by the construction firm prior to beginning works.	Construction Firm to prepare CEMP	As per standard construction noise guidance (Ref. Chapter 11 above)
2	Equipment	Equipment	Consult with supplier regarding noise levels before buying any equipment	As equipment is being purchased	
3	Equipment	Equipment	Maintain equipment to ensure high efficiency.	As per preventative maintenance schedule	
4	Machinery	Machinery	Operate machinery and plant during day-time hours.	Monitor during operation	
5	Employees	Employees/visitors	Inform all employees and visitors of noise awareness.	Monitor on-going, awareness is continuous	
6	Vehicles	Delivery machinery	Delivery and collection times to take place at normal working day hours.	On-going	
7	Vehicles	Vehicles entering and leaving site	Maintain site roads in good condition.	As per preventative maintenance schedule	
8	Site	All areas	Carry out noise monitoring as required under the site IE licence.	As required	
9	Site	All areas	Consult with neighbours as necessary regarding any potential forthcoming noise impact from the proposed facility.	On-going	
10	Site	Effluent Plant	Assess environmental noise once upgraded Effluent Plant is operational during annual noise monitoring	As part of annual noise assessment	
11	All areas	All areas	Update existing Noise Management Plan and associated documentation as required.	As part of annual noise assessment	

ATTACHMENT 7.0

- LANDSCAPE AND VISUAL ENVIRONMENT -

ATTACHMENT 7.1

- VISUAL IMPACT MAPS -



Notes:

- Site Location
- Site Ownership
- Residential Locations Within 1km
- Vantage Point Area
- VP Vantage Points

DAWN MEATS IRELAND
CO. MEATH

VISUAL IMPACT MAP 01

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drawing status:	REPORT	datum:	GSI
		drawn:	PES
drawing no.	rev	checked:	MF
VIP_19_9317-01	A	approved:	-
		date:	06-03-19

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Notes:

- Site Location
- Residential Locations
- Vantage Point Area
- VP Vantage Points

DAWN MEATS IRELAND
CO. MEATH

VISUAL IMPACT MAP 02

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File location:		scale:	NTS
drawing status:	REPORT	datum:	GSI
		drawn:	PES
drawing no.	rev	checked:	MF
VIP_19_9317-02	A	approved:	-
		date:	06-03-19

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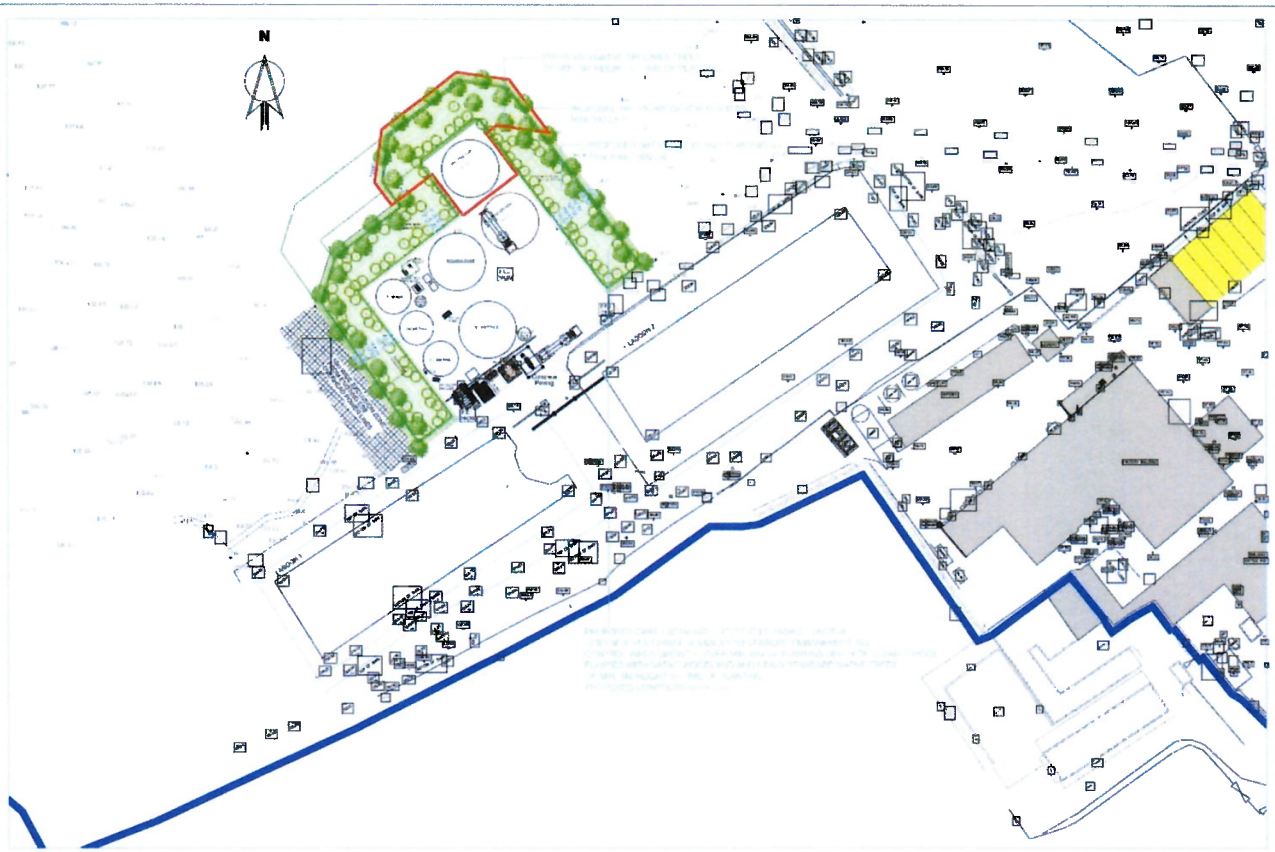
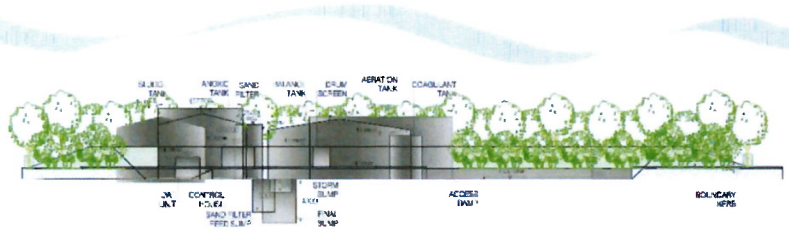


Proposed Landscape Layout



Sectional Elevation showing established planting

finn
DESIGN PARTNERSHIP

005 -

Landscape
Site Layout Plan

ARC

Planning Permission

16-04

ATTACHMENT 8.0

- BIODIVERSITY – TERRESTRIAL ENVIRONMENT -

ATTACHMENT 8.1

- NATURA IMPACT STATEMENT -

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ATTACHMENT 8.1

NATURA IMPACT STATEMENT

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

DATE:	08th March 2020	**AUTHOR:**	Ross Donnelly-Swift, Phd
REPORT NO:	NIS_20_9684	**REVIEWED:**	Martin O'Looney, BSc. Mike Fraher, BSc.

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EXECUTIVE SUMMARY

This report has been prepared by Panther Environmental Solutions Ltd to provide for the assessment of the proposed development comprising of alterations to an existing approved waste water treatment plant (WWTP) development (Planning Ref: LB180300) at the Dawn Meats Ireland Unlimited Compant facility at Greenhills, Beauparc, Navan, Co. Meath, and the construction of a proposed treated effluent rising main discharge from the Dawn Meats (Slane) facility at Greenhills, to the River Boyne at Ardmulchan, Co. Meath.

This report identified the presence of European sites within 15 kilometres of the proposed development and noted that the proposed discharge to the River Boyne would be within the River Boyne and River Blackwater Special Area of Conservation (SAC) (Site Code: 002299) and Special Protection Area (SPA) (Site Code: 004232).

The potential for impacts to European sites as a result of the proposed development such as potential surface water quality impacts, introduction of invasive species, habitat destruction and impacts from noise and dust were considered and the level of risk posed assessed.

During Stage 1 Screening for Appropriate Assessment, it was considered that there may be potential for indirect impacts upon the qualifying interests of the River Boyne and River Blackwater SAC and SPA sites due to a potential deterioration in water quality during the construction and operational phases. Therefore, a Natura Impact Statement was prepared.

Due to the recommended control measures and standard practice during the construction and operational phases, it is considered that there would be no significant risks to the conservation objectives of the habitats and species for which the River Boyne and River Blackwater SAC and SPA have been designated.

It is considered that there would be no significant risk of negative impact, either alone or in combination with other plans or projects, to the integrity of the Natura 2000 network.

1.0 INTRODUCTION

This Natura Impact Statement has been prepared for Dawn Meats Ireland Unlimited Company (also referred to as Dawn Meats (Slane)) by Panther Environmental Solutions Ltd., to accompany an application for planning permission to Meath County Council. Permission is being sought for alterations to an existing approved waste water treatment plant (WWTP) development (Planning Ref: LB180300) at the Dawn Meats facility at Greenhills, Beauparc, Navan, Co. Meath and for the construction of a proposed treated effluent rising main for discharge, approximately 7.2 km in length, from the Dawn Meats facility to the River Boyne at Ardmulchan, Co. Meath.

In parallel with the application for planning permission, an application would be made to the Environmental Protection Agency (EPA) for the review of the site's current Industrial Emissions Licence (P0811-02) and also for a licence to discharge treated trade effluent to surface water.

The principal aim of this study is to assess whether significant effects to European sites (the Natura 2000 network) are likely to occur as a result of this project in accordance with Article 6(3) of the Habitats Directive and the Planning and Development (Amendment) Act, 2001, as amended.

A study was undertaken by Dr Ross Donnelly-Swift of Panther Environmental Solutions Limited (PhD Biosystems Engineering, MSc Environmental Science and BSc (Hons) Biology). This comprised a review of the proposed development, a site visit on the 28th of February 2020 to examine the ecological context of the proposed development, a desk study of the information on European sites within the potential zone of influence of the site and an analysis of the information in the context of the guidance to determine if a Natura Impact Statement is required.

This report has been prepared with regard to;

- DoEHLG (2009) "*Appropriate Assessment of Plans & Projects in Ireland*"
- Environment DG, European Commission (2002) "*Assessment of plans and projects significantly affecting Natura 2000 sites - Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*" Oxford Brookes University, 2001
- Department of the Environment Heritage and Local Government (DoEHLG) Circular Letter SEA 1/08 and NPWS 1/08.
- Department of the Environment Heritage and Local Government (DoEHLG) Circular letter NPWS 1/10 and PSSP 2/10

2.0 LEGISLATIVE CONTEXT

The EU Habitats Directive (92/43/EEC) on the conservation of natural habitats and of wild fauna and flora, as amended by council directive 97/62/EC, 2006/105/EC, and Regulation EC1882/2003 of September 2003, as transposed into Irish law by the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477/11), provides the framework for legal protection for habitats and species of European importance. The Natura 2000 network provides an ecological infrastructure for the protection of sites that are of particular importance for rare, endangered or vulnerable habitats and species within the EU. The Natura 2000 network in Ireland is made up of European Sites which include:

- Special Areas of Conservation (SACs)
- Special Protection Areas (SPAs)

Article 6(3) of the Habitats Directive establishes the requirement for appropriate assessment when planning new developments that might affect a Natura 2000 site. Article 6(3) of the Habitats Directive states;

"*Any plan or project not directly connected with, or necessary to the management of the site, but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site, and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.*"

Stage 1: Screening for Appropriate Assessment
This stage involves an initial screening assessment of the potential impacts of the project, either alone or in combination with other projects, upon a Natura 2000 site. If it can be concluded that there would be no significant impacts upon Natura 2000 sites, the assessment stops at this stage. If not, or if further assessment is required, the assessment proceeds to Stage 2.

Stage 2: Appropriate Assessment / Natura Impact Statement (NIS)
This stage assesses the impact of the project, alone or in combination with other projects or plans, on the integrity of the Natura 2000 site, with respect to the site's conservation objectives, the site's ecological structure and function and its overall integrity. The output of this stage is an NIS, which also includes any mitigation measures required to avoid, reduce or offset negative impacts of the project. If this stage determines that adverse effects on the Natura 2000 site cannot be excluded, then the plan or project should proceed to Stage 3 or be abandoned.

3.0 METHODOLOGY

Stage 1 - Screening

Screening is the first stage in the Appropriate Assessment process, and is carried out to determine whether a Stage 2 Appropriate Assessment and a Natura Impact Statement (NIS) is required. Screening addresses and records the reasoning and conclusions in relation to the first two tests of Article 6(3);

1. Whether a plan or project is directly connected to or necessary for the management of the European (Natura 2000) site; and

2. Whether a plan or project, alone or in combination with other plans or projects, is likely to have significant effects on a European (Natura 2000) site, in view of its conservation objectives.

Screening should be undertaken without the inclusion of mitigation measures. If the effects are deemed to be significant, potentially significant, or uncertain, or if the screening process becomes overly complicated, then the process must proceed to Stage 2 AA and an NIS.

The findings and conclusions of the screening process should be documented, with the necessary supporting evidence and objective criteria. This is of particular importance in the cases where the Appropriate Assessment process ends at the screening stage because the conclusion is that no significant effects are likely.

Following Stage 1 Screening, it was considered that there may be potential for an indirect impact upon the qualifying interests of a European site, therefore, the assessment progressed to Stage 2.

Stage 2 – Natura Impact Assessment

The scope of this assessment follows the appropriate assessment statement methodology as defined within the European Commission guidance document "*Assessment of plans and projects significantly affecting Natura 2000 sites*" (2002), Section 3, Part 2. Guidance from the Department of the Environment, Heritage and Local Government "*Appropriate Assessment of Plans and Projects in Ireland*" (2009) and "*Managing Natura 2000 sites: The provisions of Article 6 of the 'Habitats' Directive*" (2018) have also been used in the preparation of this report. In accordance with this guidance, the following methodology has been used to produce this Natura Impact Statement:

Step 1: Information Required
Identifying the conservation objectives of the Natura 2000 site and the aspects of the project, alone or in combination with other projects or plans, which have the potential to affect those conservation objectives.

This process involves gathering information for the Natura 2000 site, including the conservation objectives of the site, factors contributing to conservation value, aspects sensitive to change and the existing baseline condition of the site. The principal source of information used for Natura 2000 sites, their qualifying interests and conservation objectives is the National Parks and Wildlife Service (NPWS). Information is also required for the

project including the size and scale of the project, the relationship (distance, connectivity etc.) of the project to the Natura 2000 site and the characteristics of existing, proposed or other projects which have the potential to affect the Natura 2000 site.

Step 2: Impact Prediction
This process predicts and identifies the likely impacts of the project on the Natura 2000 site. Potential impacts are identified as; direct and indirect; short or long-term duration; construction, operational or decommissioning; and isolated, interactive and cumulative effects.

Step 3: Conservation Objectives
Once the potential impacts of the project have been predicted and identified, it will be necessary to assess whether these impacts will adversely impact upon the integrity of the Natura 2000 site, as defined by the site's conservation objectives and status of the site. Where it cannot be demonstrated that there will be no adverse impacts upon the Natura 2000 site, mitigation measures must be proposed for the project.

Step 4: Mitigation Measures
Upon the identification of potential impacts, the project will have on the Natura 2000 site (alone or in combination with other projects or plans), mitigation measures will be proposed to eliminate, reduce or offset these negative impacts. Mitigation measures should be considered with preference to the hierarchy of preferred options outlined in the guidance document "*Assessment of plans and projects significantly affecting Natura 2000 sites*".

3.1 METHODOLOGY BACKGROUND

This Appropriate Assessment has been carried with reference to the following guidelines:

- *Appropriate Assessment of Plans and Projects in Ireland. Guidelines for Planning Authorities*. DoEHLG, 2009.
- Circular NPWS 1/10 & PSSP 2/10 Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities
- *Managing Natura 2000 sites – The Provisions of Article 6 of The Habitats Directive 92/43/EEC*. European Commission, 2000.
- Circular L8/08 Water Services Investment and Rural Water Programmes – Protection of Natural Heritage and National Monuments 2 September 2008
- *Assessment of Plans and Projects Significantly Affecting Natura 2000 sites. Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*. European Commission, 2002.
- Commission Notice "Managing Natura 200 sites The provisions of Article 6 of the Habitats Directive 92/43/EEC. European Commission, 21.11.2018
- CIEEM (2016) *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal*, 2nd edition. Chartered Institute of Ecology and Environmental Management, Winchester.

3.2 DESKTOP RESEARCH

Desktop research was carried out to gather information on the ecology of the site and surrounding areas. The locations of the Natura 2000 sites within 15km of The Quay, St. Mullins, Co. Carlow were identified from National Parks and Wildlife Service (NPWS) online map viewer. Other Natura sites beyond 15km were also reviewed and considered for the potential for the project to have a negative effect.

Water quality data from the EPA was reviewed for the assessment of biological and environmental data collected on waterbodies in Ireland (Water Quality in Ireland 2013-2018 (2019))

Information on the characteristics of the Natura 2000 sites within the potential zone of influence was reviewed from the conservation objectives documents, site synopses and Standard Natura 2000 data forms available on the NPWS website.

3.3 SITE SURVEY

A site characterisation assessment was undertaken on the 28th of February 2020 to examine the ecological context of the development site, by systematically walking the site, adjacent land and boundaries and determining the habitats present. The habitat survey was undertaken in accordance with the standard methodology outlined in Fossitt's "*A Guide to Habitats in Ireland*", a hierarchical classification scheme based upon the characteristics of vegetation present. The Fossitt system also indicates when there are potential links with Annex I habitats of the E.U. Habitats Directive (92/43/EEC). Cognisance was also taken of the Heritage Council guidelines, "*Best Practice Guidance for Habitat Survey and Mapping*", (Smith *et al.*, 2011).

Bird species and signs of fauna activity and dwellings were also noted. Particular attention was given to the possible presence of habitats and/or species, which are legally protected under Irish and European legislation and to assessing any potential ecological connectivity with Natura 2000 sites or supplementary or stepping stone habitats of relevance to Natura 2000 sites.

4.0 DESCRIPTION OF PROPOSED DEVELOPMENT AND EXISTING SITE

4.1 MANAGEMENT OF THE NATURA 2000 SITE

This plan is not directly connected with or necessary for the management of any SAC or SPA, therefore, Step 1 of the Appropriate Assessment Screening methodology is not relevant.

4.2 PROPOSED DEVELOPMENT

Dawn Meats (Slane) is a producer and processor of beef products. This site takes in live cattle and produces sides and quarters for further processing at other Dawn Meats sites or direct sale. The site currently has a permitted slaughter rate of 350 head of cattle per day. The facility employs 77 people and slaughtering usually operates Monday to Friday from 7.00am – 5.00pm.

The proposed development would comprise of alterations to an existing approved WWTP development (Planning Ref: LB180300), and the construction of new treated effluent rising main pipeline to a proposed outfall at the River Boyne at Ardmulchan.

The location of the proposed WWTP compound is within the Dawn Meats (Slane) site, within the townland of Painestown, while the proposed treated effluent rising main would be located within the townlands of Painestown, Seneschalstown, Dollardstown, Hayestown-Carryduff Little & Ardmulchan, Navan, Co Meath. A location map of the proposed development is included in Figure 4.1 below. The proposed development would be located mainly within a rural, farming area predominantly comprised of pasture land and hedgerows. Small rural settlements and farmyard complexes exist in the area.

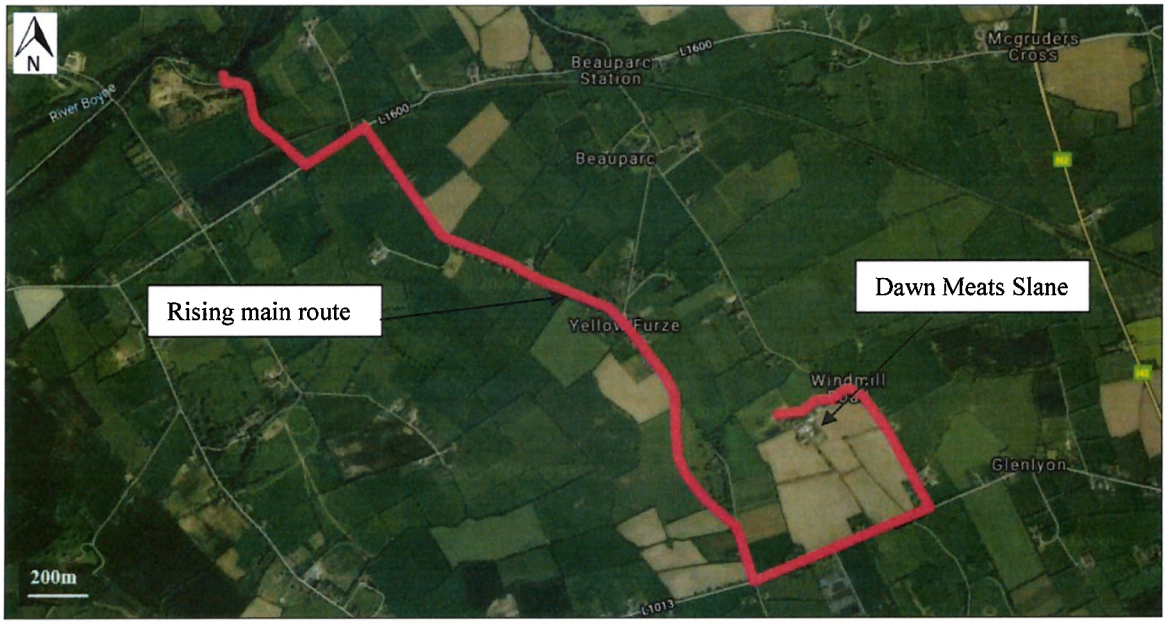

Figure 4.1: Location of Proposed Development at Navan, Co. Meath.

Dawn Meats (Slane) are proposing to extend their existing on-site effluent treatment system to provide for additional treatment to a quality sufficient for discharge to the River Boyne. The discharge of treated effluent to the River Boyne would necessitate the construction of a treated effluent rising main from the Dawn (Slane) facility to the River Boyne at Ardmulchan, Co. Meath.

Currently, the site's WWTP consists of Primary Treatment – Stage 1, comprising of a pumping sump, meva screen, slatted tank and drum screening. Effluent from the production facility, domestic effluent from the onsite buildings, dirty yard drainage and water softener backwash is collected via a network of process drains and passes through a pumping sump and meva screen (<5mm) before being directed to a slatted collection tank. Solid wastes collected from the meva screen are transferred to dolavs and treated as Category 1 waste.

The slatted collection tank allows for the settlement of solids and removal of floating soluble fats. There are also additions from the dewatering of organic fertiliser by-product (lairage/lorry-wash centrate and potentially belly-grass centrate) to this tank. From the slatted tank, effluent is pumped to a drum screen where secondary fine screening (>0.75mm) takes place to remove additional solids from the wastewater. Drum screen solids are collected in dolavs and treated as Category 1 waste.

Wastewater is then discharged to the adjoining HDPE wastewater storage lagoon (Lagoon 2). From Lagoon 2, effluent is pumped to the Dissolved Air Flotation (DAF) Treatment Unit where further solids and fats are removed. The DAF solids are stored in onsite storage tanks for landspreading during the open season (as per the Nitrates Regulations) or transferred to offsite storage awaiting the open season. Once wastewater has been treated by the DAF, wastewater is discharged to the adjoining HDPE wastewater storage lagoon (Lagoon 1) to await collection.

The proposed WWTP development would allow for Primary Treatment – Stage 2 and Biological Treatment – Stage 3.

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 final clarifier prior to landspreading off-site.

Stage 3 would comprise the construction and commissioning of an anoxic tank, two aeration basins, a clarifier and a sand filter. 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 be divided between the two biological aeration tanks, where the biological breakdown of the effluent takes place. The aeration tanks would be fitted with an air diffuser network and three air blowers which run as duty, duty and assist to manage any high loading on the treatment plant from the effluent.

From the aeration tanks, effluent would enter the clarifier, which acts as a settlement tank by removing settleable solids and returning the settled sludge to the aeration tanks. Heavier sludge would settle to the bottom of the clarifier while the lighter clear water would flow over the weir to a pump sump where it would pass through a column sand filter. The sand filter would reduce the suspended solids in the final effluent, which would also lower the COD/BOD level of effluent. Treated effluent from the sand filter would gravity feed to a final discharge pump where it would be pumped to surface water.

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 treated effluent rising main would have a 150mm diameter (nominal bore) and would be laid at a depth of approximately 1,000mm below the existing ground levels for the entirety of its length.

The rising main would incorporate sluice valves and air valves at strategic locations to allow the release of air pockets that may form during the periods when pumping would not be taking place within the rising main. Inspection chambers would also be installed along the rising main at c. 500m intervals.

The cleaning and integrity testing of the rising main pipeline would be undertaken every three years, in accordance with the Dawn Meats (Slane) facility's IE Licence. This would involve the closing of the sluice valve at the end of the pipeline, nearest the outfall, and the power-washing of the line, with wash-water collected by means of a tanker. A CCTV survey of the line would then be undertaken, followed by pressure testing.

An assimilative capacity assessment has been undertaken for the River Boyne for the treated effluent discharge and has concluded that the River Boyne would have sufficient assimilative capacity to accommodate the proposed discharge from the Dawn Meats (Slane) facility.

The assimilative capacity assessment was conducted on the River Boyne in order to determine the risk of negative impacts from a proposed discharge of treated trade effluent from Dawn Meats (Slane). The assessment was undertaken during 95%ile flow conditions, the lowest daily average flow which is equalled or exceeded 95% of the time. It is therefore the low flow which is likely to occur for 5%, or 18 days, of each year. The assimilative capacity assessment was used to predict the river's ability to accommodate treated effluent discharge of BOD_5, Orthophosphate, Nitrogen, Total Ammonia and Suspended Solids from the Dawn Meats (Slane) facility.

Table 4.1 details the proposed treated effluent emissions to the River Boyne, based upon an assimilative capacity assessment of the proposed discharge to the river.

The assimilative capacity assessment has concluded that the proposed discharge of $400M^3$ per day would result in no significant increases in concentrations within the River Boyne. The proposed discharge would not, in and of itself, result in the River Boyne failing to achieve good status and it was concluded that the River Boyne would have sufficient assimilative capacity to accommodate discharges from the Dawn (Slane) facility.

Table 4.1: Proposed Emission Limits discharging to the River Boyne

PARAMETER	UNITS	PROPOSED DISCHARGE
Volume Flow	M^3/Day	400
BOD_5	mg/l O_2	20
COD	mg/l O_2	100
Orthophosphate	mg/l PO_4-P	2
Nitrogen	mg/l N	20
Total Ammonia	mg/l N	5
Suspended Solids	mg/l SS	30

The expected construction timeframe for the proposed WWTP and rising main development would be approximately eight months. Rising main and the WWTP extension works would be undertaken concurrently. Hours of operation would be from 7am to 7pm, Monday to Friday.

A temporary site compound would be established within the Dawn Meats facility area, and would be used for plant, equipment and materials storage and construction staff welfare facilities if required. The temporary site compound would also be used for the storage of fuels and oils required for the various construction plant, in addition to housing waste receptacles.

While the proposed treated effluent rising main would pass within agricultural land within the last c. 50m to the outfall at the River Boyne, the majority of the rising main route would traverse the grassy verge of public roadways, bordered by hedgerows and some areas of stone walls. A limited section of hedgerow removal (approximately 5m in total) would be required as the rising main traverses the boundary to the field adjacent to the river. However, if required, this sections would be replanted following the completion of construction works.

Rising main works would entail the earth movements adjacent to drainage ditches located beside the road. When working beside drainage ditches measures must be taken to prevent sedimentation from entering the watercourse. Prior to the laying of the rising main, a buffer zone around surface water drains (with the exception of watercourse crossings) would be marked out and the installation of silt control features undertaken where appropriate.

The Dollardstown Stream and other minor drains are culverted beneath the road network along the proposed route. The extent of construction works which would be required for the crossing of culverted watercourses has not been fully defined at this stage, however a detailed investigation would be undertaken at the detailed rising main design stage.

The preferred rising main installation method would be horizontal directional drilling (HDD), where ground conditions allow. Where HDD is not possible, open-cut trenching would be used to install the rising main, with ground reinstated as works progress along the route, using stockpiled topsoil from excavations. While the natural recolonisation of exposed areas of soil is preferred for ecological benefit, re-seeding would be undertaken, where required, to promote the rapid stabilisation of soils.

The outfall for the discharge of the treated effluent rising main into the River Boyne at Ardmulchan would consist of natural stone revetment constructed along the bank of the river on either side of the discharge point. The revetment would be approximately 4m in length and would be formed using large stones that would be placed in position to minimize erosion around the new discharge point. Where concrete is required, this would comprise of pre-cast concrete where possible. The new treated effluent rising main would be located at a level below the low flood level within the river.

4.3 EXISTING ENVIRONMENT

A site characterisation assessment was undertaken on the 28th February 2020 to examine the ecological context of the development site, by systematically walking the site and rising main route and determining the habitats present. The habitat survey was undertaken in accordance with the standard methodology outlined in Fossitt's "*A Guide to Habitats in Ireland*", a hierarchical classification scheme based upon the characteristics of vegetation present. The Fossitt system also indicates when there are potential links with Annex I habitats of the E.U. Habitats Directive (92/43/EEC). Cognisance was also taken of the Heritage Council guidelines, "*Best Practice Guidance for Habitat Survey and Mapping*", (Smith *et al.*, 2011). While the site assessment was undertaken outside the optimal habitat survey period (April to September), it was possible to identify all habitats to Fossitt Level 3.

Bird species and signs of mammalian activity and dwellings were also noted. Particular attention was given to the possible presence of habitats and/or species, which are legally protected under Irish and European legislation.

The proposed route of the rising main will follow alongside the road network with footpaths, buildings and carparks all classified as BL3 habitat. The dominant habitats alongside the road network route are hedgerows (WL1), treelines (WL2) earth banks (BL2), dry meadows and grassy verges (GS2) and drainage ditches (FW4).

The flora found in WL1 include Ash (*Fraxinus excelsior*), Blackthorn (*Prunus spinosa*), Beech (*Fagus sylvatica*), Sycamore (*Acer pseudoplatanus*), Yew (*Taxus baccata*), Elder (*Sambucus nigra*), Hawthorn (*Crataegus monogyna*), Oak (*Quercus* spp.), Snowberry (*Symphoricarpos albus*), Bramble (*Rubus fruticosus*) Ivy (*Hedera helix*) with Buttercup (*Ranunculus* spp.), Cleavers (*Galium aparine*), Lords-and-ladies (*Arum maculatum*), Nettle (*Urtica dioica*), Primrose (*Primula vulgaris*), Violet (*Viola* spp.), Hart's Tongue Fern (*Asplenium scolopendrum*), Common Polypody (*Polypodium vulgare*) and Dwarf Male Fern (*Dryopteris oreades*).

The flora found in WL2 include Ash (*Fraxinus excelsior*), Blackthorn (*Prunus spinosa*), Beech (*Fagus sylvatica*), Blue Spruce (*Picea pungens*), Crab Apple (*Malus sylvestris*), Elm (*Ulmus* sp.), Hawthorn (*Crataegus monogyna*), Horse-chestnut (*Aesculus hippocastanum*), Lime (*Tilia* spp.),Oak (*Quercus* spp.), Scot's Pine (*Pinus sylvestris*), Sycamore (*Acer pseudoplatanus*) and Willow (*Salix* spp.).

The flora found in BL2 are grasses such as Annual Meadow-grass (*Poa annua*) and flowering plants such as Lesser Celandine (*Ficaria verna*), Cow Parsley (*Anthriscus sylvestris*), Nettle (*Urtica dioica*), Cleavers (*Galium aparine*), Speedwell (*Veronica* spp.), Groundsel (*Senecio vulgaris*), Winter Heliotrope (*Petasites fragrans*), Herb-Robert (*Geranium robertianum*). Other flora found in GS2 include Cock's-foot (*Dactylis glomerata*), Couch-grass (*Elytrigia*

repens), Nettle (*Urtica dioica*), Hogweed (*Heracleum sphondylium*), Vetch (*Vicia* spp.) and Common Figwort (*Scrophularia nodosa*)

With regards aquatic habitats, the proposed rising main route would run alongside drainage ditches (FW4) habitat and would come in close proximity to the Dollardstown Stream, which can be considered depositing / lowland rivers (FW2) habitat. The proposed discharge point would be located at the River Boyne, which is also considered as FW2 habitat. Flora encountered within or immediately adjacent FW2 and FW4 habitats include Common duckweed (*Lemna minor*), Hemlock Water Dropwort (*Oenanthe crocata*), Lesser Celandine (*Ficaria verna*), Willowherb (*Epilobium* spp.) Marsh Marigold (Caltha palustris), Meadow Buttercup (*Ranunculus acris*), Opposite-leaved Golden-saxifrage (Chrysosplenium oppositifolium), Water-cress (Rorippa nasturtium-aquaticum) and Yellow Iris (Iris pseudacorus).

Sections of stone walls and other stonework (BL1) habitat are present along the route one section of stone wall approximately 330m along the boundary with agricultural grassland with Ivy (*Hedera helix*) and Moss (*Bryophyta*). Lichen is also found here. Another section of BL1 is along the boundary with the Dollardstown River.

Behind the boundary hedges are tillage fields, classed as arable crops (BC1) and horticultural land (BC2) habitats. The BC1 habitat mainly comprises of planted cereal crops. The BC2 habitat mainly comprises of agricultural grasslands for grazing animals.

Along the road network are areas of amenity grassland (improved) (GA2) with Daffodil *(Narcissus)* present among species of grass. Also present are small sections of ornamental/non-native shrub (WS4) habitat with Leyland cypress, (*Cupressus* × *leylandii*) and Mexican orange blossom (*Choisya ternate*).

The rising main route would traverse areas of wet grassland (GS4) habitat, at the last section of the pipeline prior to the outfall to the River Boyne. This habitat comprises of various grasses and rushes (*Juncus* spp.), in addition to many of the flora species encountered in the improved agricultural grassland (GA1) habitats.

Limited areas of mixed broadleaved woodland (WD1), conifer plantation (WD4) and scrub (WS1) were identified adjacent the proposed rising main route. Flora of the WD1 habitat includes Alder (*Alnus glutinosa*), Ash (*Fraxinus excelsior*), Beech (*Fagus sylvatica*), Blackthorn (*Prunus spinosa*), Hazel (*Corylus avellana*), Horse-chestnut (*Aesculus hippocastanum*), Oak (*Quercus* spp.) and Willow (*Salix* spp.), Species found in WD4 include Sitka Spruce (*Picea sitchensis*) while the WS1 habitat mainly comprised of Ash, Hawthorn and Gorse (*Ulex europaeus*). Ground and field flora were similar to that encountered in the GS2 habitat.

Generally, the habitats identified during the onsite assessments were of low to medium ecological value. No rare species or invasive flora species of concern were recorded within the proposed development footprint and immediate vicinity.

The habitats identified as per the Fossitt habitat classification scheme for the proposed development works are summarised in Table 4.2 below. A photo log is included as Appendix B.

Table 4.2: Summary of Habitats Identified for the Proposed Development Works at the Dawn Meats (Slane) site and Proposed Rising Main Route

HABITAT CLASSIFICATION HIERARCHY		
LEVEL 1	**LEVEL 2**	**LEVEL 3**
F – Freshwater	**FW** – Watercourses	**FW2** – Depositing / lowland rivers
		FW4 – Drainage ditches
G – Grassland and marsh	**GA** – Improved grassland	**GA1** – Improved agricultural grassland
		GA2 – Amenity grassland (improved)
	GS – Semi-natural grassland	**GS2** – Dry meadows and grassy verges
		GS4 – Wet grassland
W – Woodland and scrub	**WD** – Highly modified / non- native woodland	**WD1** – (Mixed) broadleaved woodland
		WD4 – Conifer Plantation
	WS – Scrub / transitional woodland	**WS1** – Scrub
		WS3 – Ornamental/ non-native shrub
	WL – Linear woodland / scrub	**WL1** – Hedgerows
		WL2 – Treelines
B – Cultivated and built land	**BC** – Cultivated land	**BC1** – Arable crops
		BC2 – Horticultural land
	BL – Built land	**BL1** – Stone walls and other stonework
		BL2 – Earth Banks
		BL3 – Buildings and artificial surfaces

Given the agricultural land use of the surrounding area, it would be expected that common grassland and hedgerow bird species would be present in the area. Bird species noted during the site walkovers on the 28th February included Blackbird (*Turdus merula*), Song Thrush (*Turdus philomelos*), Robin (*Erithacus rubecula*), Pied Wagtail (*Motacilla alba*), Dunnock (*Prunella modularis)*, Starling (*Sturnus vulagaris*), Reed Bunting (*Emberiza schoeniclus*), Snipe (*Gallinago gallinago*), Chaffinch (*Fringilla coelebs*), Great Tit (*Parus major*), Blue Tit (*Parus caeruleus*), Long-tailed Tit (*Aegithalus caudatus*), Wren (*Troglodytes troglodytes*), Woodpigeon (*Columba palumbus*), Rook (*Corvus frugilegus*) and Buzzard (*Buteo buteo*). Mute Swan (*Cyngus olorwas*) recorded along the River Boyne, within the vicinity of the proposed discharge point. None of the bird species recorded are listed under Annex I of the E.U. Birds Directive.

While no fauna were observed at the proposed development site, burrows were noted along some areas of hedgerows, identified as likely Rat (*Rattus norvegicus*) burrows. No frogs (*Rana temporaria*) or smooth newts (*Lissotriton vulgaris*) were present in any of the freshwater habitats encountered during the walkovers of the proposed rising main route.

However, other fauna typical of that found throughout the rest of Ireland, which would be expected to be found in the general area include Bat species, Badger (*Meles meles*), Fox (*Vulpes vulpes*), Irish Hare (*Lepus timidus hibernicus*), Red Squirrel (*Sciurus vulgaris*), Grey Squirrel (*Sciurus carolinensis*), Hedgehog (*Erinaceus europaeus*), Pine Marten (*Martes martes*), Stoat (*Mustela erminea hibernica*), Wood Mouse (*Apodemus sylvaticus*) and Pygmy Shrew (*Sorex minutus*). Given that the proposed development is located in close proximity to the Dollardstown Stream, and given that the proposed discharge point is located within the River Boyne, it is likely that aquatic fauna such as Otter (*Lutra lutra*) are present within the vicinity.

Flora and fauna records were reviewed on the National Biodiversity Data Centre (NBDC) website for the proposed development site and vicinity. Only one protected plant species under the Flora (Protection) Order, 2015 (S.I. No. 356 of 2015), Meadow Barley (*Hordeum secalinum*) was recorded within approximately 5km from the Dawn Meats site and rising main route, while nine invasive plant species have been recorded; Black Currant (*Ribes nigrum*), Butterfly-bush (*Buddleja davidii*), Canadian Waterweed (*Elodea canadensis*), Cherry Laurel (*Prunus laurocerasus*), Giant Knotweed (*Fallopia sachalinensis*), Japanese Knotweed (*Fallopia japonica*), Red Oak (*Quercus rubra*), *Rhododendron ponticum* and Sycamore (*Acer pseudoplatanus*). Four of these invasive species are listed in the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011); Canadian Waterweed, Giant Knotweed, Japanese Knotweed and Rhododendron.

Fauna records for the previous twenty years were reviewed on the NBDC website for the three 2km squares (N96P, N97F and N97K) in which the proposed development and proposed rising main route are located. The bird species of note include the Kingfisher (*Alcedo atthis*) and Mallard (*Anas platyrhynchos*). Mammals of note include the protected species Otter (*Lutra lutra*) and Badger (*Meles meles*). Also of note is European Eel (Anguilla anguilla).

4.3.1 Additional Information on Water Quality

The proposed rising main development would discharge treated effluent into the River Boyne. It is noted that the River Boyne is designated as a Special Area of Conservation (Site Code: 002299) and as a Special Protection Area (Site Code: 004232). Furthermore, the River Boyne is designated as a salmonid water under the European Commission (Quality of Salmonid Waters) Regulations 1988.

The Environmental Protection Agency (EPA) undertake surface water monitoring along the River Boyne. The results for the nearest monitoring stations with available information (as per Table 4.3) for the period 1990 – 2015 are summarised in Figure 4.2 below for indicative purposes.

Table 4.3: EPA monitoring points on the River Boyne within the vicinity of the Proposed Discharge Point

STATION NO.	STATION LOCATION	EASTING	NORTHING	APPROX. LOCATION RELATIVE TO RISING MAIN DISCHARGE POINT
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

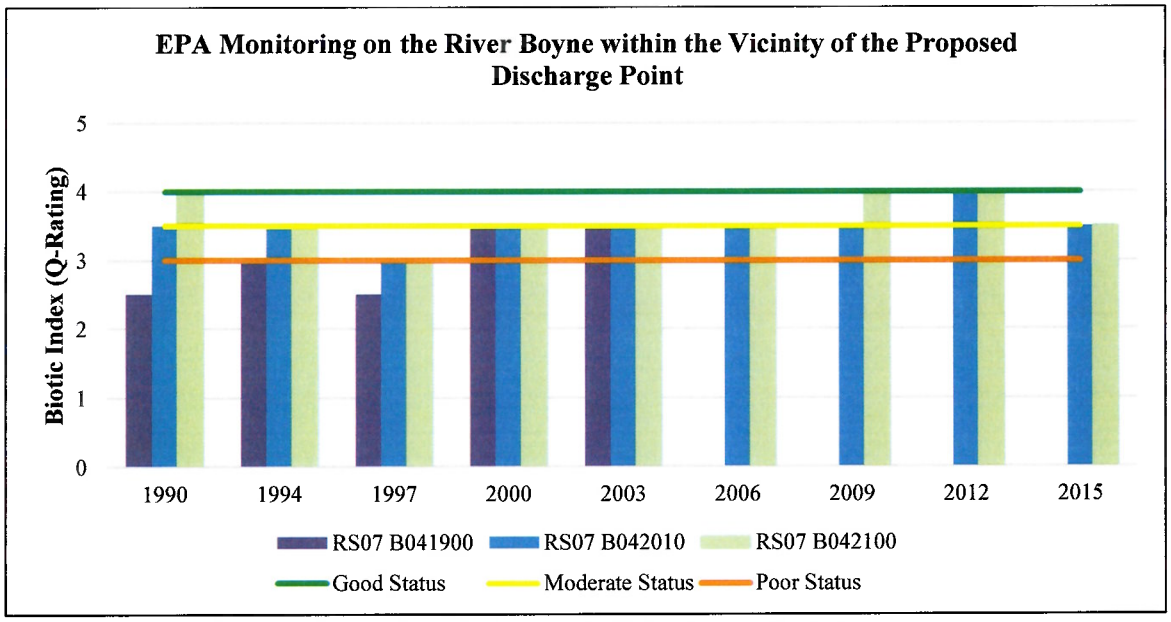

Figure 4.2: EPA Ecological Monitoring of the River Boyne

As can be seen in Figure 4.2 above, the River Boyne is mainly achieving a water quality status of Q3-4 (moderate) in recent years at the monitoring stations located at (RS07B042010) and downstream (RS07B042010) of the proposed discharge point. Both monitoring sites achieved a good status (Q4) in 2012, however they returned to moderate status (Q3-4) in the 2015 reporting year. The monitoring station upstream (RS07B041900) of the proposed discharge point achieved a water quality status ranging from Q2-3 (poor) to Q3-4 (moderate).

5.0 NATURA 2000 SITES

In assessing the zone of influence of this project upon European sites, the following factors must be considered:

- Potential impacts arising from the project
- The location and nature of European sites
- Pathways between the development and European sites

There is no standard radius that can be used to select which European sites are to be analysed. This can only be determined by looking at the zone of influence of the project at hand. A rule of thumb often used is to include all European sites within a distance of 15km. One Special Area of Conservation (SAC) and one Special Protection Area (SPA) sites occur within 15km of the proposed development and are shown in the following table:

SITE NAME	DESIGNATION	SITE CODE	DISTANCE
River Boyne and River Blackwater	SAC	002299	Rising Main discharges to River Boyne within SAC
River Boyne and River Blackwater	SPA	004232	Rising Main discharges to River Boyne within SPA

Maps detailing European sites within 2km and 15km of the proposed site are included as Appendix A below.

For this assessment, both the River Boyne and River Blackwater SAC and SPA sites were considered to be within the zone of influence of the proposed development, due to hydrological connectivity and proposed works taking place within the SAC and SPA sites.

5.1 RIVER BOYNE AND RIVER BLACKWATER SAC (SITE CODE: 002299)

This site comprises the freshwater element of the River Boyne as far as the Boyne Aqueduct, the Blackwater as far as Lough Ramor and the Boyne tributaries including the Deel, Stoneyford and Tremblestown Rivers. The underlying geology is Carboniferous Limestone for the most part, with areas of Upper, Lower and Middle well represented. In the vicinity of Kells Silurian Quartzite is present while close to Trim are Carboniferous Shales and Sandstones. The site is a SAC selected for the following habitats and species listed on Annex I / II of the E.U. Habitats Directive:

ANNEX I HABITATS	
CODE	DESCRIPTION
7230	Alkaline Fens
91E0	Alluvial Forests*

** denotes a priority habitat*

ANNEX II SPECIES

CODE	COMMON NAME	SCIENTIFIC NAME
1099	River Lamprey	*Lampetra fluviatilis*
1106	Atlantic Salmon	*Salmo salar*
1355	Otter	*Lutra lutra*

The conservation objectives for the SAC site are to maintain or restore the favourable conservation condition of the qualifying interests. An excerpt from the SAC's site synopsis is included below.

Alkaline fen habitat is concentrated in the vicinity of Lough Shesk, Freehan Lough and Newtown Lough. Open water is usually fringed by Bulrush (*Typha latifolia*), Common Club-rush (*Scirpus lacustris*) or Common Reed (*Phragmites australis*), and this last species also extends shorewards where a dense stand of Great Fen-sedge (*Cladium mariscus*) frequently occurs. This in turn grades into a sedge and grass community (*Carex* spp. and Purple Moor-grass, *Molinia caerulea*), or one dominated by Black Bog-rush (*Schoenus nigricans*). An alternative aquatic/terrestrial transition is a floating layer of vegetation, normally based on Bogbean (*Menyanthes trifoliata*) and Marsh Cinquefoil (*Potentilla palustris*). Diversity of plant and animal life is high in the fen. Plants of interest include Narrow-leaved Marsh-orchid (*Dactylorhiza traunsteineri*), Fen Bedstraw (*Galium uliginosum*), Cowbane (*Cicuta virosa*), Frogbit (*Hydrocharis morsus-ranae*) and Least Bur-reed (*Sparganium minimum*). Also notable is the abundance of aquatic stoneworts (*Chara* spp.). The rare plant Round-leaved Wintergreen (*Pyrola rotundifolia*), listed in the Red Data Book, occurs around Newtown Lough. This site represents its only occurrence in Co. Meath.

Wet woodland fringes many stretches of the Boyne. The Boyne River Islands are a small chain of three islands situated 2.5km west of Drogheda. The islands are covered by dense thickets of willow (*Salix* spp.) woodland, including the following: Osier (*S. viminalis*), Crack Willow (*S. fragilis*), White Willow (*S. alba*), Purple Willow (*Salix purpurea*) and Rusty Willow (*S. cinerea* subsp. *oleifolia*). A small area of Alder (*Alnus glutinosa*) woodland is found on soft ground at the edge of the canal in the north-western section of the islands. Along other stretches of the rivers of the site Rusty Willow scrub and pockets of wet woodland dominated by Alder have become established, particularly at the river edge of deciduous woodland. Ash (*Fraxinus excelsior*) and Downy Birch (*Betula pubescens*) are common in the latter, and the ground flora is typical of wet woodland with Meadowsweet (*Filipendula ulmaria*), Wild Angelica (*Angelica sylvestris*), Yellow Iris (*Iris pseudacorus*), horsetails (*Equisetum* spp.) and Greater Tussock-sedge (*Carex paniculata*).

The dominant habitat along the edges of the river is freshwater marsh, with the following species commonly occurring: Yellow Iris, Creeping Bent (*Agrostis stolonifera*), Canary Reed-grass (*Phalaris arundinacea*), Marsh Bedstraw (*Galium palustre*), Water Mint (*Mentha aquatica*) and Water Forget-me-not (*Myosotis scorpioides*). In the vicinity of Dowth, Fen Bedstraw (*Galium uliginosum*), a scarce species, is common in this vegetation. Swamp Meadow-grass (*Poa palustris*), an introduced plant, has spread into the wild along the Boyne approximately 5km south-west of Slane. It is a rare species listed in the Red Data Book, and has been recorded among freshwater marsh vegetation on the banks of the Boyne in this site. The secondary habitat associated with the marsh is wet grassland, with species such as Tall Fescue (*Festuca arundinacea*), Silverweed (*Potentilla anserina*), Creeping Buttercup (*Ranunculus repens*), Meadowsweet and Meadow Vetchling (*Lathyrus pratensis*) well represented. Strawberry Clover (*Trifolium fragiferum*), a plant generally restricted to coastal

locations, has been recorded at Trim. At Rossnaree on the River Boyne, the rare Round-Fruited Rush (*Juncus compressus*) is found.

Along much of the Boyne and its tributaries are found areas of deciduous woodland on the steeper slopes above the floodplain marsh or wet woodland vegetation. East of Curley Hole the woodland has a natural appearance with few conifers. Broadleaved species include oaks (*Quercus* spp.), Ash, willows, Hazel (*Corylus avellana*), Sycamore (*Acer pseudoplatanus*), Holly (*Ilex aquifolium*), Horse-chestnut (*Aesculus hipposcastanum*) and the shrubs Hawthorn (*Crataegus monogyna*), Blackthorn (*Prunus spinosa*) and Elder (*Sambucus nigra*). Southwest of Slane and in Dowth, some more exotic tree species such as Beech (*Fagus sylvatica*), and occasionally Lime (*Tilia cordata*), are seen. The coniferous trees Larch (*Larix* sp.) and Scots Pine (*Pinus sylvestris*) also occur. The woodland ground flora includes Barren Strawberry (*Potentilla sterilis*), Enchanter's-nightshade (*Circaea lutetiana*) and Ground-ivy (*Glechoma hederacea*), along with a range of ferns. Variation occurs in the composition of the canopy - for example, in wet patches alongside the river, White Willow and Alder form the canopy.

Other habitats present along the Boyne and Blackwater include lowland dry grassland, improved grassland, reedswamp, weedy waste ground, scrub, hedge, drainage ditch and canal. In the vicinity of Lough Shesk, the dry slopes of the morainic hummocks support grassland vegetation which, in some places, is partially colonised by Gorse (*Ulex europaeus*) scrub. Those grasslands which remain unimproved for pasture are species-rich, with Common Knapweed (*Centaurea nigra*), Creeping Thistle (*Cirsium arvense*) and Ribwort Plantain (*Plantago lanceolata*) commonly present. Fringing the canal alongside the Boyne south-west of Slane are areas with Reed Sweet-grass (*Glyceria maxima*), Great Willowherb (*Epilobium hirsutum*) and Meadowsweet.

The Boyne and its tributaries form one of Ireland's premier game fisheries. Atlantic Salmon use the tributaries and headwaters as spawning grounds. Although this species is still fished commercially in Ireland, it is considered to be endangered or locally threatened elsewhere in Europe and is listed on Annex II of the Habitats Directive. Atlantic Salmon run the Boyne almost every month of the year. The Boyne is most important as it represents an eastern river which holds large three-sea-winter fish from 20-30 lb. The Blackwater is a medium sized limestone river which is still recovering from the effects of the arterial drainage scheme of the 1970s. Salmon stocks have not recovered to the numbers that existed pre-drainage. The Deel, Riverstown, Stoneyford and Tremblestown Rivers are all spring-fed, with a continuous high volume of water.

This site is also important for populations of two other species listed on Annex II of the E.U. Habitats Directive which it supports, River Lamprey, which is present in the lower reaches of the Boyne River, and Otter, which can be found throughout the site. The site also supports many more of the mammal species occurring in Ireland, including the Irish Red Data Book species Pine Marten, Badger and Irish Hare. Common Frog, another Red Data Book species, also occurs within the site. All of these animals, with the addition of the Stoat and Red Squirrel, which also occur within the site, are protected under the Wildlife Act, 1976.

Whooper Swans winter regularly at several locations along the Boyne and Blackwater Rivers. Known sites are at Newgrange, near Slane, Wilkinstown and River Blackwater from Kells to Navan. The birds use a range of feeding sites but roosting sites are not well known. The population is substantial, certainly of national, and at times international, importance.

Intensive agriculture is the main land use along the site. Much of the grassland is in very large fields and is improved. Silage harvesting is carried out. The spreading of slurry and fertiliser poses a threat to the water quality of this salmonid river and to the lakes. In the more extensive agricultural areas sheep grazing is carried out.

Fishing is a main tourist attraction on the Boyne and Blackwater. Fishing stands and styles have been erected in places. The Eastern Regional Fishery Board have erected fencing along stretches of the river as part of their salmonid enhancement programme. In 1969 an arterial dredging scheme commenced on the river system and disrupted angling for 18 years. The dredging altered the character of the river completely and resulted in many areas in very high banks. The main channel from Drogheda upstream to Navan was left untouched, as were a few stretches on the Blackwater. Ongoing maintenance dredging is carried out along stretches of the river system where the gradient is low. This is extremely destructive to salmonid habitat in the area. Drainage of the adjacent river systems also impacts on the many small wetland areas throughout the site. The River Boyne is a designated Salmonid Water under the E.U. Freshwater Fish Directive.

The site supports populations of several species listed on Annex II of the E.U. Habitats Directive, and habitats listed on Annex I of this Directive, as well as examples of other important habitat types. Although the wet woodland areas appear small there are few similar examples of this type of alluvial wet woodland remaining in the country. The semi-natural habitats, particularly the strips of woodland which extend along the river banks, and the marsh and wet grasslands, increase the overall habitat diversity and add to the ecological value of the site, as does the presence of a range of Red Data Book plant and animal species and the presence of nationally rare plant species.

5.2 RIVER BOYNE AND RIVER BLACKWATER SPA (SITE CODE: 004232)

The River Boyne and River Blackwater SPA is a long, linear site that comprises stretches of the River Boyne and several of its tributaries. It includes the following river sections: the River Boyne from the M1 motorway bridge, west of Drogheda, to the junction with the Royal Canal, west of Longwood, Co Meath; the River Blackwater from its junction with the River Boyne in Navan to the junction with Lough Ramor in Co. Cavan; the Tremblestown River/Athboy River from the junction with the River Boyne at Kilnagross Bridge west of Trim to the bridge in Athboy, Co. Meath; the Stoneyford River from its junction with the River Boyne to Stonestown Bridge in Co. Westmeath; the River Deel from its junction with the River Boyne to Cummer Bridge, Co. Westmeath. The site includes the river channel and marginal vegetation.

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

SPECIAL CONSERVATION INTERESTS		
CODE	**COMMON NAME**	**SCIENTIFIC NAME**
A229	Kingfisher	*Alcedo atthis*

The conservation objectives for the SPA site are to maintain or restore the favourable conservation condition of the bird species listed as a Special Conservation Interest for this SPA. An excerpt from the site synopsis for the River Boyne and River Blackwater SPA is included below.

Most of the site is underlain by Carboniferous limestone but Silurian quartzite also occurs in the vicinity of Kells and Carboniferous shales and sandstones close to Trim.

A survey in 2010 recorded 19 pairs of Kingfisher (based on 15 probable and 4 possible territories) in the River Boyne and River Blackwater SPA. A survey conducted in 2008 recorded 20-22 Kingfisher territories within the SPA. Other species which occur within the site include Mute Swan, Teal, Mallard, Cormorant, Grey Heron, Moorhen, Snipe and Sand Martin.

The River Boyne and River Blackwater Special Protection Area is of high ornithological importance as it supports a nationally important population of Kingfisher, a species that is listed on Annex I of the E.U. Birds Directive.

6.0 ASSESSMENT OF LIKELY EFFECTS: STAGE 1 SCREENING

6.1 DISTURBANCE TO PROTECTED HABITATS AND SPECIES

The majority of the development does not directly impinge on any part of a Natura 2000 site, the exception being the location of the proposed rising main discharge point just within the boundary of the SAC and SPA.

It is not considered that the proposed development site, including the rising main route, would contain the habitats for which the River Boyne and River Blackwater SAC has been designated. No areas of woodland occur within the proposed development footprint. While areas of woodland (WD1 and WD4) exist within the vicinity of the rising main route, these are considered to be modified, comprising of planted conifer and a mixture of non-native and native deciduous trees. Therefore, it is not considered that these areas have any potential links to Alluvial Forests [91E0]. No fen habitats are present at the Dawn Meats (Slane) site or along the proposed rising main route, therefore the proposed development site does not contain any habitat which would have potential links to Alkaline Fens [7230].

While drainage ditches are located along the rising main route, given their limited size and extent, it is not considered that this habitat would support the aquatic qualifying interests of the River Boyne and River Blackwater SAC and SPA. Given that the proposed outfall would be located at the River Boyne, it is possible that River Lamprey, Atlantic Salmon, Otter and Kingfisher would be present within the vicinity of the proposed development footprint. While the construction of the proposed outfall would take place along the bank of the River Boyne, the majority of the footprint would be located within the field comprised of wet grassland, with a negligible loss of river habitat. Therefore, there would be no significant impact upon these qualifying interests due to habitat loss or habitat fragmentation.

The potential disturbance on protected species due to operational noise would not be considered significant, given the considerable distance of the Dawn Meats (Slane) facility from the designated sites and given the nature and scale of the proposed development. While there would be increased noise emissions during the construction phase of the development, these would not be considered to pose a significant risk owing to the transient nature of works and the scale of the proposed development.

The potential disturbance on protected habitats and species due to dust during the construction phase would not be considered significant, given the transient nature of construction works, the scale of the proposed development and given the limited extent of groundworks in close proximity to the designated sites. It is not considered that the operation of the development would have the potential to significantly impact upon air quality within the area, given that wastewaters currently generated at the site are transported to a municipal WWTP for treatment, where carbon dioxide and nitrous oxides would be generated and released to atmosphere. Therefore, the proposed development would result in the release of carbon dioxide and nitrous oxide emissions occurring at the Dawn Meats (Slane) site as opposed to the municipal WWTP, and consequently, would not result in a significant overall increase of either carbon dioxide or nitrous oxide emissions to the atmosphere.

It is therefore considered that the proposed development would not result in any significant risk to the protected habitats and species of the River Boyne and River Blackwater SAC and SPA due to habitat fragmentation or loss, disturbance or reduction in species density.

6.2 INVASIVE SPECIES

Under Regulation 49(2) of the European Communities (Birds and Natural Habitats) Regulations 2011, save in accordance with a licence granted under paragraph (7), any person who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow in any place specified in relation to any plant which is included in Part 1 of the Third Schedule shall be guilty of an offence.

Materials containing invasive species such as Japanese Knotweed are considered "controlled waste" and, as such, there are legal restrictions on their handling and disposal. Under Regulation 49(7) of the European Communities (Birds and Natural Habitats) Regulations 2011, it is a legal requirement to obtain a license to move "vector materials" listed in the Third Schedule, Part 3.

Nine invasive flora species have been recorded by the NBDC within approximately 5km of the Dawn Meats site and rising main route, four of which are listed in Part 1 of the Third Schedule; Canadian Waterweed, Giant Knotweed, Japanese Knotweed and Rhododendron. However, no invasive species of concern were noted as present during the site walkover.

The risk of invasive species being introduced onto the site during the construction phase of the project is considered to be low, with no significant import of materials with the potential to contain invasive flora species. Soils excavated during construction works would be stockpiled and re-used for site levelling and site landscaping, therefore no importation of topsoil or subsoil would be required as part of the development works.

A limited section of hedgerow / treeline removal would be required as part of the construction of the rising main. The hedgerow would be replanted if necessary using native species.

Therefore, it is considered that there would be no significant risk to protected habitats and species as a result of invasive species from the proposed development.

6.3 POTENTIAL IMPACTS ON WATER QUALITY

During the construction phase of projects, a deterioration in water quality can arise through the release of uncured concrete, the release of suspended solids during soil disturbance works and the release of hydrocarbons (fuels and oils).

Construction works would last approximately eight months in duration and would be confined to the proposed development footprint. The construction of the proposed WWTP extension would take place within the existing Dawn Meats (Slane) site, with no surface water features within the immediate vicinity of the WWTP footprint. While the risk of water quality deterioration due to the proposed development would be considered low given the nature and scale of the development, the potential for construction works to impact upon the River Boyne and River Blackwater SAC and SPA cannot be ruled out in entirety, given that watercourse crossings would occur over culverted drains and the Dollardstown Stream, and given that the proposed outfall would be constructed at the River Boyne. It is therefore considered that control measures would need to be implemented during the construction phase to ensure there is no adverse impact upon the SAC and SPA sites.

The primary potential impact upon the River Boyne during the operational phase of the proposed development would be a deterioration in water quality arising from the proposed discharge of treated effluent to the River Boyne at Ardmulchan, Co. Meath.

There would be no anticipated impact upon the River Boyne and River Blackwater SAC and SPA due to stormwater discharges from the site, given that the proposed development would not result in any changes to the current stormwater run-off system within the current facility area and there are no anticipated changes to existing storm discharges from the facility, or green-field runoff rates within the proposed footprint of the development. Storm-water falling within the proposed WWTP compound area would be collected and diverted to the balance tank and would pass through the treatment system. Discharge volumes would continue to be limited by the plant treatment capacity and limits proscribed within any agreed discharge licence.

As discussed in Section 4.1, the proposed treated effluent emission values have been calculated based upon current water quality in the River Boyne and the river's assimilative capacity. The assimilative capacity assessment determined, assuming a theoretically clean river, that the proposed discharge would not result in the River Boyne failing to achieve good status. The assessment concluded that the River Boyne would have sufficient assimilative capacity to accommodate discharges from the Dawn Meats (Slane) facility.

An increase in sediments has the potential to adversely impact upon fish, which consequently would impact upon fish consumers such as Otter and Kingfisher. An increase in sediments can also increase the level of nutrients (which are bound to the suspended solids) in the water, which can result in excessive eutrophication, leading to deoxygenation of waters. However, the proposed final effluent value for Suspended Solids would be 30mg/l at a flow of 400 M3/day, resulting in only 0.11% of the headspace of the River Boyne being consumed. Therefore, no negative impacts would be anticipated for the discharge of suspended solids.

As the river would have sufficient assimilative capacity for the Dawn Meats (Slane) discharges, there would be no anticipated negative impacts upon the E.U. Habitats Directive Annex I habitats Alkaline Fens [7230] and Alluvial Forests [91E0], the Annex II species River Lamprey [1099], Salmon [1106], and Otter [1335] or upon the E.U. Birds Directive Annex I species Kingfisher [A229].

While it is considered that the proposed discharge of treated effluent to the River Boyne would not have any significant impacts upon the River Boyne and River Blackwater SAC and SPA, measures would need to be implemented to ensure that the proposed treated effluent meets the proposed emission limit values.

6.4 SCREENING CONCLUSION

In order for an effect to occur, there must be a pathway between the source and the receptor (the SAC and SPA). Where a pathway does not exist, an impact cannot occur. A pathway exists between the proposed development and the River Boyne and River Blackwater SAC and SPA (Site Codes 002299 and 004232), given that the proposed rising main outfall and the discharge of treated effluent would take place within the SAC and SPA sites.

As detailed above, it is considered that the proposed development would not result in any significant risk to the protected habitats and species of the River Boyne and River Blackwater SAC or SPA due to habitat fragmentation or loss, disturbance, reduction in species density or due to the potential introduction of invasive species

However, the assessment has determined that during both the construction and operational phases, the proposed development has the potential to impact upon the qualifying interests of the River Boyne and River Blackwater SAC and SPA due to a potential deterioration in water quality. Therefore, a Natura Impact Statement is required.

7.0 ASSESSMENT OF LIKELY EFFECTS: STAGE 2 APPROPRIATE ASSESSMENT

Describe the significant effects, if any, on the relevant European site which have occurred, which are occurring or which can reasonably be expected to occur as a result of the project or plan (alone or in combination).

The proposed development has the potential to impact upon the qualifying interests of the River Boyne and River Blackwater SAC and SPA due to a potential deterioration in water quality.

During construction works, there is potential for water quality deterioration through the release of suspended solids during soil disturbance works. Suspended solids could become entrained in surface water run-off and could affect aquatic qualifying interests through deposition. Nutrients can be bound in suspended solids, therefore, a significant increase in suspended solids can result in excessive eutrophication, leading to the deoxygenation of waters and subsequent asphyxia of aquatic species. An increase in sediments has the potential to impact upon fish species by damaging gravel beds required for spawning, smothering fish eggs and in extreme cases, by interfering with the gills of fish. An increase in suspended solids also has the potential to reduce water clarity, which can impact the light penetration of water and may also affect certain behaviours of aquatic fauna such as foraging success.

A potential source of chemical contamination would be from the release of hydrocarbons (oils, fuels) from construction plant and equipment. Hydrocarbons can affect water quality, potentially resulting in toxic conditions for aquatic flora and fauna. Oil films on the water surface can disrupt oxygen diffusion from the atmosphere, resulting in de-oxygen of waters.

Another potential source of contamination would be the release of uncured concrete. In the event of uncured concrete entering a waterbody, the pH would be altered locally, potentially leading to the death of aquatic flora and fauna and an alteration to the waterbody substrate.

The BREF document for Slaughterhouses and Animals By-Products Industries note that generated wastewaters at slaughterhouses typically have a high organic strength, owing to the high BOD (biochemical oxygen demand) and COD (chemical oxygen demand) properties of blood and animal by-products. Additionally, wastewaters from slaughtering facilities and meat processing facilities generally have a high suspended solids and nutrient content (phosphorous and nitrogen).

Organic pollution to rivers can occur when high organic wastewaters are insufficiently treated and discharged to waterbodies. When a high organic load enters a waterbody, the growth of bacteria and other micro-organisms increase significantly in response to the available food supply. The rapid break down of organic compounds by bacteria and micro-organisms results in the deoxygenation of the water. Where significant organic pollution takes place, the river can become uninhabitable for aquatic flora and fauna due to the lack of required oxygen.

Bacteria also break down the protein content of the wastewater into various nitrogen compounds including nitrate, nitrite, ammonia and ammonium. Depending on the concentration, these compounds can have further impacts upon water quality and aquatic flora and fauna. For example, the compound ammonia (NH_3) is considered toxic to freshwater fish at low concentrations.

The potential impacts of an increase in suspended solids and oils and fats, which may also be generated in wastewater, are discussed above.

Aquatic flora and fauna could also be impacted upon by an increase in the nutrients nitrogen and phosphorous. A significant increase in nutrients (particularly phosphorous for freshwater bodies), could result in excessive eutrophication, whereby an increase in nutrients results in the significant growth of aquatic plants, particularly algae (EPA, 2015). As plant growth increases, oxygen depletion occurs due to increased photosynthesis and through the decomposition of plant organic material. The increase in plant growth can also limit the availability of sunlight.

The tables below briefly outline the occurrence of the qualifying interests of the River Boyne and River Blackwater SAC and SPA in relation to the proposed development, taking cognisance of the NPWS "*Conservation Objectives: River Boyne and River Blackwater SPA 004232*", and "*Conservation Objectives: River Boyne and River Blackwater SAC 002299*", in addition to Volumes 1, 2 and 3 of the 2013 NPWS Reports, "The *Status of EU Protected Habitats and Species in Ireland*".

The following tables also outline which of the qualifying interests and special conservation interests may be impacted upon by a potential deterioration in water quality from the proposed development.

RIVER BOYNE AND RIVER BLACKWATER SAC		
QUALIFYING INTEREST	**OCCURRENCE / ASSESSMENT**	**POTENTIAL IMPACT**
[7230] Alkaline Fens	The proposed development is located within the current known distribution and favourable reference range of this qualifying interest (NPWS, 2013a). No alkaline fens habitat was identified during the site assessment. Should alkaline fens be located in close proximity downstream of the proposed discharge point, there would be a potential risk of water quality deterioration due to the proposed discharge of treated effluent and the potential release of suspended solids, hydrocarbons and uncured concrete during construction works.	Yes
[91E0] Alluvial Forests*	The proposed development is located within the current known distribution and favourable reference range of this qualifying interest (NPWS, 2013a). No alluvial forests habitat was identified within the footprint of the proposed development. Should alluvial forests be located in close proximity downstream of the proposed discharge point, there would be a potential risk of water quality deterioration due to the proposed discharge of treated effluent and the potential release of suspended solids, hydrocarbons and uncured concrete during construction works.	Yes
[1099] River Lamprey (*Lampetra fluviatilis*)	River lamprey are an anadromous species, with adults living at sea and migrating to freshwater for spawning in March and April. The adult fish die after spawning. The fertilised eggs hatch within days, with the larvae burrowing into fine sediment where they filter feed for a number of years before transforming into adult fish. The young river lamprey then migrate downriver to estuarine waters. River and brook lamprey are indistinguishable as larvae. The mature adult forms are distinguishable on the basis of body size. Lamprey surveys have necessarily focussed on juvenile lamprey. Consequently, the vast majority of available data relates to "*Lampetra* sp." and cannot be assigned to one species or the other. The proposed development is located within the current known distribution and favourable reference of these qualifying interests (NPWS, 2013b). The SAC site synopsis notes that river lamprey are present within the lower reaches of the River Boyne. The report by O'Connor (2006) noted that the surveys undertaken in 2005 confirmed that significant populations of river/brook lampreys occur throughout the River Boyne catchment, with the highest densities of lamprey larvae recorded on the Lower Boyne at Slane Bridge, approximately 5.6km downstream from the proposed discharge point. Lamprey were recorded as present during the 2005 surveys at sampling locations both upstream and downstream of the proposed discharge point.	Yes

RIVER BOYNE AND RIVER BLACKWATER SAC		
QUALIFYING INTEREST	**OCCURRENCE / ASSESSMENT**	**POTENTIAL IMPACT**
	It is therefore possible that river lamprey are present within the vicinity of the proposed development. River lamprey may be adversely impacted upon by sedimentation and water pollution. Therefore, there is potential for the proposed development to have an impact upon this qualifying interest due to a potential deterioration in water quality due to the proposed discharge of treated effluent and the potential release of suspended solids, hydrocarbons and uncured concrete during construction works.	
[1106] Atlantic Salmon (*Salmo salar*)	Atlantic Salmon use rivers to reproduce and as nursery areas. Eggs are deposited during winter in river gravels. The eggs hatch into alevins in spring, which in turn develop into fry. The fry feed for the summer and autumn, gradually becoming parr. Fry and parr feed primarily upon invertebrates. The Irish population generally comprises fish that spend two winters in freshwater before going to sea in spring as smolts. Adults spend 1-3 years at sea, feeding upon crustaceans and fish as they migrate to feeding grounds in the North Atlantic. The majority of Irish fish spend one winter at sea before returning to their natal rivers, mainly during the summer, as grilse. The proposed development is located within the current known distribution and favourable reference range of this qualifying interest (NPWS, 2013b). The River Boyne is designated as a Salmonid Water EC (Quality of Salmonid Waters) Regulations (S.I. no. 293 of 1988). Fish surveys were undertaken by IFI in 2016 (Kelly *et al.*, 2017) at two tributaries of the River Boyne, the Athboy River and the River Blackwater. Sampling was undertaken at two locations on the Athboy River, only one of which recorded Salmon as present, with the minimum density recorded noted to have declined in comparison to previous years. No salmon was recorded as present at any of the four sampling locations on the River Blackwater. In 2013, the River Boyne was sampled near its source at Edenderry (Kelly *et al.*, 2015), however no salmon were recorded as present. Atlantic Salmon, particularly juveniles and spawning beds, are sensitive to sedimentation and water pollution. Therefore, there is potential for the proposed development to have an impact upon this qualifying interest due to a potential deterioration in water quality due to the proposed discharge of treated effluent and the potential release of suspended solids, hydrocarbons and uncured concrete during construction works.	Yes
[1355] Otter (*Lutra lutra*)	Otters have two basic requirements: aquatic prey and safe refuges where they can rest. Otters are opportunistic predators with a broad and varied diet. In freshwater areas, a variety of fish will be taken, while crayfish and frogs can be important locally or seasonally.	Yes

RIVER BOYNE AND RIVER BLACKWATER SAC		
QUALIFYING INTEREST	**OCCURRENCE / ASSESSMENT**	**POTENTIAL IMPACT**
	The proposed development is located within the current known distribution and favourable reference range of Otter (NPWS, 2013b). The SAC site synopsis notes that otter is found throughout the site, while the NBDC has records for otter within the vicinity of the proposed development. The National Otter Survey of Ireland 2010/12 (Reid *et al.*, 2013) report noted that the occurrence of otter within survey sites for the eastern river basin district was 52.3%.While no evidence of otter (including spraints and tracks) were recorded during the site assessment, it is probable that otter are within the vicinity of the proposed development, in particular within the vicinity of the proposed discharge point at the River Boyne. A significant impact on water quality could indirectly impact upon this qualifying interest by causing a reduction in prey populations and availability. Therefore, there is potential for the proposed development to have an impact upon this qualifying interest due to a potential deterioration in water quality due to the proposed discharge of treated effluent and the potential release of suspended solids, hydrocarbons and uncured concrete during construction works.	

RIVER BOYNE AND RIVER BLACKWATER SPA		
SPECIAL CONSERVATION INTEREST	**OCCURRENCE / ASSESSMENT**	**POTENTIAL IMPACT**
[A229] Kingfisher (*Alcedo atthis*)	The NBDC has records for Kingfisher within the vicinity of the proposed development site. A report on the distribution and abundance of Kingfisher within six SAC sites (Cummins *et al.*, 2010) indicates that the location of the proposed discharge point is located within / within close proximity to two probable kingfisher territories, within which nine kingfisher sightings over the course of three visits, one current/probable/possible nest and one not current/unknown nest were recorded. A significant impact on water quality could indirectly impact upon this qualifying interest by causing a reduction in prey populations and availability. Therefore, there is potential for the proposed development to have an impact upon this qualifying interest due to a potential deterioration in water quality due to the proposed discharge of treated effluent and the potential release of suspended solids, hydrocarbons and uncured concrete during construction works.	Yes

8.0 MITIGATION MEASURES

This assessment has determined that the proposed development has the potential to impact upon the River Boyne and River Blackwater SAC and SPA due to a potential deterioration in water quality during the construction and operational phases. As discussed in Section 7, it is considered that the proposed development has the potential to impact upon the following qualifying interests / special conservation interests of the River Boyne and River Blackwater SAC SPA:

- [7230] Alkaline Fens
- [91E0] Alluvial Forests
- [1099] River Lamprey
- [1106] Atlantic Salmon
- [1355] Otter
- [A229] Kingfisher

8.1 CONSTRUCTION PHASE

The following mitigation measures would be employed during the construction phase to ensure that there would be no significant impacts to the listed habitats or species, as listed above, of the River Boyne and River Blackwater SAC and SPA due to a potential deterioration in water quality:

- Daily visual inspections would be undertaken of watercourses during construction works;
- A 6m buffer zone would be maintained around all watercourses (with the exception of watercourse crossings), where feasible;
- Provision of silt control features where appropriate, such as silt fencing;
- Silt fencing (comprising of a porous filter fabric which detains sediment) would be provided along the boundary of the 6m buffer zone along the Dollardstown River, and at places where the rising main comes within close proximity to any other watercourses. Silt fencing would remain in place until the completion of construction works;
- Additional silt fencing would be placed adjacent to storage areas of stockpiled soil, until such time as the excavated soil has been used in landscaping / re-instatement works or removed offsite by a licenced waste contractor;
- Silt control features would be inspected on a daily basis and maintained as appropriate;
- Where spoil is generated, this would only be stored temporarily and away from surface waters. Where possible, spoil would be covered or alternatively, graded to avoid ponding or water saturation;
- Excavations and earth-moving activities would be planned outside periods of heavy rainfall, to limit the potential for suspended solids to become entrained within surface water run-off;
- Should water be encountered during excavation works, water would be pumped to a constructed silt control feature, such as a settlement pond or detention pond. A filter would be provided at the pump inlet and, where required, dewatering bags or silt

fences would be used at the outlet to retain any potential silt entrained in the water. Pumping operations would be supervised at all times;

- All construction plant machinery and equipment would be maintained in good working order and regularly inspected;
- The temporary site compound would be used for the storage of all machinery and plant when not in use, the re-fuelling of plant and the storage of all associated oils and fuels for plant;
- Any fuels, oils or chemicals would be stored in accordance with the EPA guidance on the storage of materials, in designated bunded areas at the temporary site compound, with adequate bund provision to contain 110% of the largest drum volume or 25% of the total volume of containers;
- The designated area for the storage of hydrocarbons would be inspected on a regular basis;
- Deliveries of fuels and oils to the site would be supervised;
- All loading and unloading of hydrocarbons would take place within the bunded area where possible;
- Fuels / oils would be handled and stored with care to avoid spillage or leakage;
- Where appropriate, small construction plant equipment would be placed on drip trays;
- The diesel generator would be suitably bunded;
- Any waste fuel / oils would be collected in bunded containers at designated areas (i.e. temporary construction compound for rising main works) and properly disposed of to an authorised waste contractor;
- Spill kits, adequately stocked with spill clean-up materials such as booms and absorbent pads, would be readily available onsite;
- In the unlikely event of a hydrocarbon spillage, contaminated spill clean-up material would be properly disposed of to an authorised waste contractor;
- Where re-fuelling of construction plant is required to take place onsite, re-fuelling would take place within a bunded area, within the temporary site compound or at a designated location within the site boundary for WWTP works. Under no circumstances would re-fuelling take place within the immediate vicinity of watercourses, including drainage ditches;
- Re-fuelling onsite would only be undertaken by experienced and trained personnel;
- Where construction plant shows signs of hydrocarbon leakage, site personnel would cease the operation of the item in plant in question. Any defective plant would be kept out of service until the necessary repairs are undertaken;
- The use of pre-cast concrete where possible;
- The delivery and pouring of concrete would be supervised at all times;
- Concrete would be poured directly into the shuttered formwork from the Ready-Mix Truck, reducing the risk of spillage;
- The wash-out of Ready-Mix Truck drums would not be permitted onsite, in the environs of the site, or at a location which could result in a discharge to surface water;

- The disposal of excess uncured concrete would be removed from site by an authorised waste contractor;
- The pouring of concrete would be avoided during periods of expected heavy rainfall;
- It is not envisaged that vehicle wheel wash facilities would be required. However, in particularly dry weather, additional dust control measures may be required, including the provision of a wheel wash facility. Should a wheel wash facility be required, it would be located at an area isolated from any watercourses. The associated run-off would be collected via a settling pond;
- Particular care would be taken during the construction of the discharge point outfall. Plant operation within the River Boyne or the Dollardstown Stream would be avoided. Mitigation measures specified above for suspended solids, concrete and hydrocarbons would be followed;
- To minimise any potential impacts on salmonid fish, outfall works would be undertaken in the July to September period where possible, which would avoid the salmonid spawning season. Should outfall works be required outside the July – September timeframe, works would only commence upon prior agreement with IFI;
- For crossing or works within watercourses cognisance would be taken of the IFI's "*Guidelines on Protection of Fisheries During Construction Works in and adjacent to Waters*";
- Monitoring of receiving water for suspended solids would be undertaken where required;
- In the unlikely event of a suspected deterioration in water quality within any of the watercourses due to construction works at the development site, works would immediately cease, an investigation into the cause undertaken and the relevant NPWS and Inland Fisheries Ireland personnel informed;
- The construction work contractor would prepare a detailed Construction Environmental Management Plan (CEMP) for all construction activities, in line with the Outline CEMP prepared as part of this application. The CEMP would describe how construction work would be undertaken in an environmentally sensitive manner and would include measures for the protection of water quality such as the implementation of silt control features.

In addition to the above measures, the construction works contractor would take cognisance of the following guidelines:

- CIRIA, 2001: *Control of Water Pollution from Construction Sites; guidance for consultants and contractors*;
- CIRIA, 2002: *Control of Water Pollution from Construction Sites – Guide to Good Practice*;
- IFI, 2016: *Guidelines on Protection of Fisheries During Construction Works in and adjacent to Waters.*

8.2 OPERATIONAL PHASE

The design of the proposed WWTP and final effluent quality have been based upon the intention to discharge to the River Boyne.

Should planning consent be granted for a discharge to the River Boyne, a review of the Dawn Meats facility's current IE Licence would be required to be submitted to the Environmental Protection Agency (EPA) for approval. Proposed emission limit values would be assessed by the EPA, and once agreed, would be specified within the amended licence.

Dawn Meats (Slane) would be required to undertake scheduled monitoring of the discharge for parameters specified by the EPA in the revised licence. This monitoring would ensure that treated effluent quality would remain high, and that any slight increases in parameter results would be identified and addressed prior to the potential for impact upon the River Boyne.

As part of the site's IE Licence review, it would be required that the integrity of the proposed rising main would be tested every three years. This would reduce the potential for any leakages due to any potential damage or weaknesses within the pipeline in its lifetime.

9.0 IN-COMBINATION EFFECTS

The following plans and projects were reviewed and considered for in-combination effects with the proposed development:

- Meath County Development Plan 2013-2019;
- Meath Local Economic and Community Plan 2016 – 2021;
- Proposed and permitted developments in the area available on the Meath County Council planning system.

The existing Dawn Meats (Slane) facility is located in the townland of Painestown, approximately 4.5km south of Slane and 8.5km east of Navan, while the rising main would pass through the townlands of Painestown, Seneschalstown, Dollardstown, Hayestown-Carryduff Little & Ardmulchan, Navan, Co Meath. Residential, commercial and retain premises are located within close proximity to the proposed development.

There are a number of EPA IPPC/IE licenced facilities and waste licenced facilities located within 15 km of the Dawn Meats (Slane) facility and proposed rising main, as summarised in Tables 9.1 and 9.2 below.

Table 9.1: EPA licenced facilities within 15km of the Dawn Meats (Slane) site and proposed treated effluent rising main

LICENCE NO.	LICENSEE NAME	LICENCE TYPE (FIRST SCHEDULE OF EPA ACT, 1992, AS AMENDED)	APPROX. DISTANCE FROM SITE / PROPOSED RISING MAIN
P0917-01	Mr. Ivan Reynolds	6.1.0 Intensive Agriculture	4.9km South-East
P0887-01	Mr. David Murray	6.1.0 Intensive Agriculture	6.4km South-East
P0456-01	Marry Pig Farms Limited	6.2.0 Intensive Agriculture	6.8km South
P0951-01	Mr. Dermot Crinion	6.1.0: Intensive Agriculture	7.2km North-East
P0490-01	Navan Carpets Limited	8.5.0 Wood, Paper, Textiles and Leather	7.4km South-West
P0211-01	Sherlock Brothers Limited	12.2.0: Surface Coatings	8.3km South-West
P0516-04	Boliden Tara Mines Designated Activity Company	1.3.0 Minerals and other materials	8.4km South-West
P0431-02	Perma Pigs Limited	6.2.0: Intensive Agriculture	8.5km North-East
P0172-01	Irish Country Meats (Sheepmeat) Meath	7.4.0: Food and Drink	8.7km South-West
P0583-01	Xtratherm Limited	5.3.0 Chemicals	9.2km West
P0030-05	Irish Cement Limited	10.1.0 Cement	10km East
P0822-01	Cooksgrove Limited	7.4.1 Food and Drink	10.2km South-East
P0618-02	Broomfield Pig Farm Limited	6.2.0: Intensive Agriculture	10.4km North-East

Table 9.2: EPA waste licenced facilities within 15 km of the Dawn Meats (Slane) site and proposed treated effluent rising main

LICENCE NO.	LICENSEE NAME	APPROX. DISTANCE FROM SITE / PROPOSED RISING MAIN
W0140-04	Starrus Eco Holdings Limited	2km East
W0146-02	Knockharley Landfill Limited	3km South-East
W0131-02	Advanced Environmental Solutions (Ireland) Limited	6.2km West
W0286-01	The Recycling Village Limited	9.9km East
W0167-03	Indaver Ireland Limited	10.9km East
W0219-01	Organic Gold (Marketing) Limited	9.5km North-West

Three Waste Water Treatment Plants (WWTPs) discharge treated effluent into the River Boyne within the vicinity of the proposed discharge point; Navan WWTP (Discharge Licence D0059-01), Slane WWTP (Discharge Licence D0257-01) and Donore WWTP (Discharge Licence D0251-01), located approximately 4.3km upstream, 5km downstream and 14km downstream from the proposed discharge point respectively.

Continued implementation of the Water Framework Directive would result in achieving, or maintaining, improvements to water quality in the Boyne Catchment. Developments such as this proposed development could act in combination with existing environmental pressures on the Boyne Catchment, including: agriculture, anthropogenic, domestic and urban waste water, urban run-off and industry.

It is considered that the likely risks of combination effects would occur through the vector of water emissions. In the 2017 Annual Environmental Reports (AERs) for Navan WWTP, Slane WWTP and Donore WWTP, all three were noted to be operating within their design capacity. Navan WWTP and Donore WWTP were noted as being compliant with the Emission Limit Values (ELVs) set within their discharge licences. While Slane WWTP reported exceedances for orthophosphate, the AER notes that there was no observable negative impact upon water quality or upon the Water Framework Directive status. Of the facilities listed in Tables 9.1 and 9.2 above, only one site, Boliden Tara Mines Designated Activity Company, discharges treated effluent to the River Boyne. The 2017 AER notes that emissions to water were in full compliance with the site's ELVs.

Proposed emission values for the Dawn Meats (Slane) treated effluent discharge have been calculated based upon current water quality in the River Boyne and the assimilative capacity. Therefore, it is considered that there would be a low risk of significant in-combination impacts upon water quality.

As discussed in Sections 6, 7 and 8 above, it is considered that there would be no significant risk to the River Boyne and River Blackwater SAC and SPA or any other European site, owing to the design, scale and nature of the proposed development and the proposed mitigation measures. As there are no anticipated significant risks from the proposed development and given the nature of activities and distances of other facilities in the area, it is considered that there would be no cumulative water, noise or air impacts which would pose a significant risk to designated habitats or species.

10.0 CONCLUSION

It is not anticipated that the proposed development, subject to recommended mitigation measures, by itself or in combination with other developments, would impact negatively upon the Natura 2000 network during the site preparation or operational phases of the project.

The proposed development would discharge treated effluent into the River Boyne, and as such part of the development would be located within the River Boyne and River Blackwater SAC and SPA sites. However, it is considered that there would be no potential risk of significant impacts upon the qualifying interests of the River Boyne and River Blackwater SAC and SPA sites, due to the proposed mitigation measures to be employed.

It is the conclusion of this Natura Impact Assessment that, subject to recommended mitigation measures, there would be no potential for significant impacts on the Natura 2000 network as a result of the proposed development and the design and operational measures to be employed. This conclusion refers to the development by itself or in combination with other developments.

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APPENDIX A

PROTECTED SITES AND PROPOSED DEVELOPMENT LOCATION

Notes

Rising Main Route
= SAC
= SPA

Project Title:

Protected Sites Map

Client Name:

DAWN MEATS

PANTHER ENVIRONMENTAL SOLUTIONS LTD
UNITS 3 & 4
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GREEN ROAD
CARLOW
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Report	Datum:	EPA Envision	
Drawing Number:	Drawn:	NR	
	Checked:	MF	
Revision:	Approved:	-	
R0	Date:	07/12/2018	

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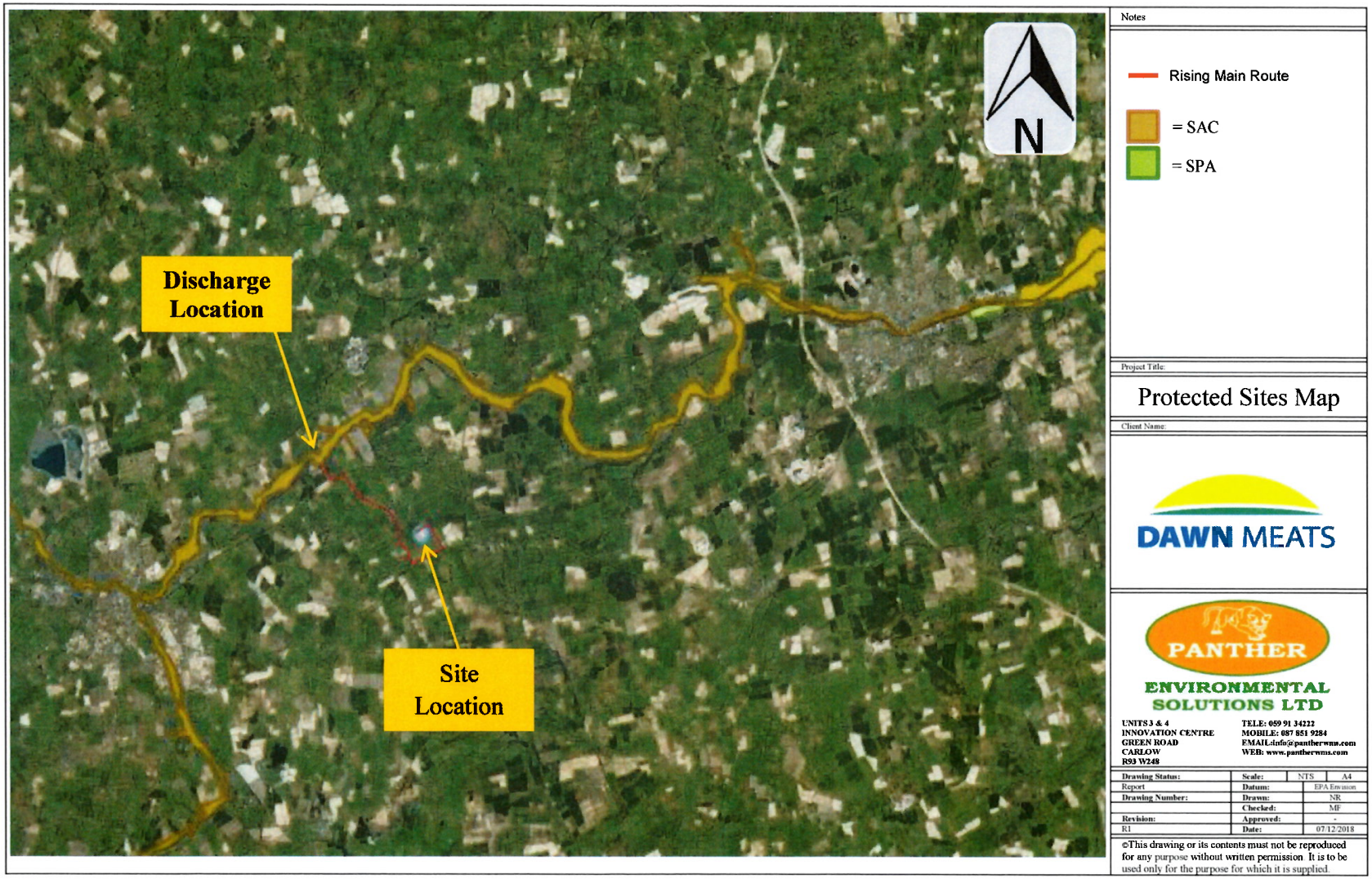
N
Discharge Location
Site Location
Notes
Rising Main Route
= SAC
= SPA
Project Title:
Protected Sites Map
Client Name:
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PANTHER
ENVIRONMENTAL SOLUTIONS LTD
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APPENDIX B

PHOTO LOG

Plate 1: Area of wet grassland (GS4) and River Boyne (FW2) habitat.

Plate 2: Example of treelines (WL2) and BL2 habitat and along the proposed rising main route.

Plate 3: Drainage ditches (FW4), hedgerows (WL1) and GS2 habitat.

Plate 4: Area of scrub (WS1) with BL3 and WL2 habitats in background.

Notes:

**DAWN MEATS IRELAND,
NAVAN,
CO. MEATH**

**APPENDIX B
PHOTO LOG**

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		drawn: PES	
drawing no.	rev	checked: MF	
AA_20_9684	A	approved: -	
		date: 08/03/2020	

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Plate 5: Example of wet grassland (GS4) and GS2 habitat

Plate 6: Example of GA1 habitat at Dawn Meats

Plate 7: Example of amenity grassland (GA2) and buildings and artificial surfaces (BL3) habitat

Plate 7: Section of BL1 habitat adjacent GA1 habitat.

Notes:

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		date:	08/03/2020

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Plate 9: A section of the Dollardstown River, identified as FW2 habitat.

Notes:

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ATTACHMENT 8.2

- CONSULTATION CORRESPONDENCE -

8.2.1 CORRESPONDENCE WITH INLAND FISHERIES IRELAND

Consultation Request Letter to Inland Fisheries Ireland (email dated 2nd March 2017)

From: Andrew Kennedy
Sent: 02 March 2017 14:34
To: Noel McGloin
Cc: Denver Willis
Subject: Dunbia Slane

Noel,

Thank you for returning my call yesterday.
In summary, Dunbia Slane slaughter cattle in their factory in Beauparc.
We semi treat the waste waters and then send them off site to Navan and Ringsend treatment plants for final treatment.
The sludge goes to farmland for land spreading.
This is not viable from an economic or a sustainable viewpoint.
We are planning to develop a full Waste Water Treatment Plant at our Slane site with the final treated water discharged to the river Boyne from a pipeline running from our factory to the Boyne at the area where the Dollardstown river joins the Boyne.
We have agreed terms with the relevant landowners for way leaves through their farms.
The design of the treatment plant and the applications to both the Council and the EPA are now starting.
As an interested stakeholder I would appreciate any input/suggestions from yourselves.
I would also appreciate if you could let me have the names and contact details for any fishing clubs that use the Boyne in this area.

Regards
Andrew Kennedy

Andrew Kennedy
Managing Director
Dunbia Ltd

o: Kilbeggan
t: +353 (0)579369005
m: +353 (0)862470169
ip: 39005
e: andrew.kennedy@dunbia.com

Inland Fisheries Ireland Response (email dated 20th March 2017)

From: Noel McGloin
Sent: 20 March 2017 13:29
To: 'Andrew Kennedy'
Cc: Francis Carolan; Kevin O'Brien
Subject: RE: Dunbia Slane

Dear Andrew

Inland Fisheries Ireland (IFI) is a Statutory Body established on the 1st July 2010 .Under section 7(1) of the Inland Fisheries Act 2010 (No. 10 of 2010) *the principal function of IFI is the protection, management and conservation of the inland fisheries resource.* Under section 7(3) of the IFI Act it is stated that *without prejudice to subsection (1), IFI shall in the performance of its functions have regard to(g) the requirements of the European Communities (Natural Habitats) Regulations 1997 (S.I. No. 94 of 1997) and the need for the sustainable development of the inland fisheries resource (including the conservation of fish and other species of fauna and flora habitats and the biodiversity of inland water ecosystems),(h) as far as possible, ensure that its activities are carried out so as to protect the national heritage (within the meaning of the Heritage Act 1995).*

The EU Water Framework Directive (2000/60/EC) entered into force in December 2000 requires the protection of the ecological status of river catchments – this encompasses water quality and requires the conservation of habitats for ecological communities. One of the primary objectives of the Directive is to establish a framework which prevents further deterioration and protects and enhances the status of aquatic ecosystems. Protection of aquatic ecosystems requires that river systems be protected on a catchment basis.

Article 5 of the 2009 Surface Water Regulations requires that a public authority, in performance of its functions, shall not undertake those functions in a manner that knowingly causes or allows deterioration in the chemical or ecological status of a body of surface water. Also article 28(2) of the said Regulations states that a surface water body whose status is determined to be less than good shall be restored to at least good status not later than the end of 2015 and any water body of good status should remain at least this status.

This proposed discharge will be flowing to the main channel of the River Boyne. This is currently at *moderate* status and should have been improved to at least *good* status by the end of 2015. The River Boyne contains stocks of Atlantic Salmon, Brown Trout, eels and lamprey. Therefore we would also like an Appropriate Assessment and/or EIS (if relevant) to be carried out in order to ensure that there sufficient information with regard to the potential effects of this application on the aquatic environment .

Of further concern to us is the mechanism of the construction of the pipeline, especially when crossing watercourses. I am attaching a copy of our relevant guidelines for your information.

On enquiry, the local angling club is Broadboyne Anglers. I will forward you contact details (when accessed) as soon as I can.

Please contact me if further information is required.

Kind regards

Noel

Noel McGloin
Senior Fisheries Environmental Officer
Inland Fisheries Ireland - Dublin

Iascach Intire Eireann
Inland Fisheries Ireland

Telephone: +353 (0) 1 8842688

EMail: noel.mcgloin@fisheriesireland.ie
Web: www.fisheriesireland.ie

3044 Lake Drive, City West, Dublin 24, IRELAND. **D24 Y265**

Help Protect Ireland's Inland Fisheries

Call 1890 34 74 24 to report illegal fishing, water pollution or invasive species.

8.2.2 CORRESPONDENCE WITH DEVELOPMENT APPLICATIONS UNIT (DAU)

Consultation Request Letter to DAU (email dated 3rd May 2017)

From: Lorraine Wyse
Sent: 03/05/2017 15:46
To: Manager DAU
Subject: Planning Application Consultation _Natura Impact Statement_ Proposed Development by Dunbia (Slane), at Greenhills, Beauparc, Navan, Co. Meath.

Dear Sir/Madam,

Panther Environmental Solutions Limited have been requested by Dunbia (Slane) to prepare a Natura Impact Statement as required under the Habitats Directive, and in response to Meath County Council, with regards a planning application for an extension to the existing on-site effluent treatment system and proposed treated effluent discharge to the River Boyne at Dollardstown, Co. Meath. The construction phase of the development, as well as cumulative impacts with other developments in the area will also be addressed.

While it is understood that the National Parks and Wildlife Service will be consulted during the planning application process, we would welcome any comments or observations which the Development Applications Unit may have in relation to the proposed development in the preparation of documents for the application.

It is noted that any further comments/observations made during consideration of the planning application, once made, would also be considered as part of relevant assessments.

Dunbia (Slane) is a producer and processor of beef products. This site takes in live cattle and produces sides and quarters for further processing at other Dunbia Group sites or direct sale. Dunbia (Slane) holds an Industrial Emissions (IE) Licence with the Environmental Protection Agency (EPA), Registration No. P0811-01.

The facility is located in the townland of Painestown, approximately 4.5km south of Slane and 8.5km east of Navan, Co. Meath. The site is located, at its closest, approximately 3.1km south of the River Boyne. The site location is shown in the location map included.

The Dunbia (Slane) facility currently provides Primary Treatment – Stage 1 (flow balancing and removal of solids) at its onsite Waste Water Treatment Plant (WWTP) for wastewaters generated at the facility, followed by the transfer of wastewaters via road tankers to municipal WWTPs for further treatment. The sludges generated during treatment are transferred offsite for landspreading (undertaken in accordance with the Nitrate Regulations).

Dunbia (Slane) are proposing to extend their existing on-site effluent treatment system to provide for additional treatment to a quality sufficient for discharge to the River Boyne. 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. This is intended to replace the requirement for further treatment at municipal WWTPs.

Following treatment, Dunbia (Slane) proposes to discharge the treated effluent to the River Boyne. This would involve the construction of an underground pipeline, approximately 3.65km in length, from the Dunbia (Slane) facility to the River Boyne at Dollardstown, Co. Meath. The proposed pipeline would commence at the proposed new build effluent treatment plant on the Dunbia site and travel in an approximate north-west direction to the River Boyne, passing through the townlands of Painestown, Yellow Furze and Dollardstown. The proposed pipeline route is shown in the location map provided, however, this may be subject to change prior to the application being formally made.

Emission limits for effluent entering the River Boyne would be based upon an assimilative capacity assessment undertaken on the River Boyne, which would be required to be agreed with the EPA. Prior to any discharge occurring from the site, an application for review of the site's current IE licence would be required to be approved with the EPA.

It is noted that the River Boyne is designated as a Special Area of Conservation (Site Code: 002299) and as a Special Protection Area (Site Code: 004232).

We would welcome any comments or observations which the Development Applications Unit may have to highlight any particular concerns in relation to the proposed development.

Best Regards,
Lorraine

Lorraine Wyse
Panther Environmental Solutions Ltd
Unit 4, Innovation Centre
Institute of Technology
Carlow, Ireland
R93 W248
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DAU Response (email dated 6th June 2017)

An Roinn Ealaíon, Oidhreachta,
Gnóthaí Réigiúnacha, Tuaithe agus Gaeltachta

Department of Arts, Heritage,
Regional, Rural and Gaeltacht Affairs

Our Ref: **G Pre00112/2017** *(Please quote in all related correspondence)*

06 June 2017
Lorraine Wyse
Panther Environmental Solutions Ltd
Unit 4, Innovation Centre
Institute of Technology
Carlow

Via email to lorraine@pantherwms.com

Re: Pre-planning consultation - Natura Impact Statement for Proposed Development by Dunbia (Slane) at Greenhills, Beauparc, Navan, Co. Meath.

A chara

On behalf of the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, I refer to correspondence received in connection with the above.

Nature Conservation

This Department notes that this proposed development will involve a new effluent discharge from a WWTP into the River Boyne which is designated as the River Boyne and River Blackwater Special Area of Conservation (SAC) designated under the EC Habitats Directive (Council Directive 92/43/EEC) and Special Protection Area (SPA) designated under the EC Birds Directive (Directive 2009/147 EC).

This Department notes that the discharge will be licenced by the EPA and that a NIS will be produced. With regard to the NIS, and emission limits depending on assimilative capacity, please note that water quality should be assessed in terms of the needs of the qualifying interests (QIs) of the SAC and SPA and, in the case of fauna QIs such as otter and kingfisher, also of their prey species.

Site-specific, as opposed to generic, conservation objectives are now available for some sites. Each conservation objective for a qualifying interest is defined by a list of attributes and targets and are often supported by further documentation. Where these are not available for a site, such as with the River Boyne and Blackwater SAC and SPA, an examination of the attributes that are used to define site-specific conservation objectives for the same QIs in other sites can be usefully used to ensure the full ecological implications of a proposal for a site's conservation objective and its integrity are analysed and assessed. For example the River Barrow and River Nore SAC may provide some guidance in this regard.

The level of detail provided means the route of the pipeline is not very clear so it is hard to determine if it is to be along roads or across country. It should be noted that there is a large tufa spring in a field upstream of Stackallen Bridge and any pipe laying in the vicinity of this may negatively impact on it. This Department notes that the pipeline route may change. Therefore in order to adequately assess the project it would be necessary to assess all the options which may be chosen.

The location of the discharge appears to be in a wooded area denoted as the Boyne Woods pNHA (site code 001592); the site synopsis for the Boyne Woods pNHA is attached below and please note references to rare plants. In addition badgers may well be present in the wooded areas.

Please find below some general scoping comments for EIS and appropriate assessment screening/appropriate assessment and for licencing requirements which may assist.

EIS

Ecological Survey

With regard to scoping for an EIS for a proposed development, in order to assess impacts on biodiversity, fauna, flora and habitats, an ecological survey should be carried out of the site of the proposed development site including the route of any access roads, pipelines or cables etc. to survey the habitats and species present. Where ex-situ impacts are possible survey work may be required outside of the development sites. Such surveys should be carried out by suitably qualified persons at an appropriate time of the year depending on the species being surveyed for. The EIS should include the results of the surveys, and detail the survey methodology and timing of such surveys. It is expected by this Department that in any survey methodology used that best practice will be adhered to and if necessary non Irish methodology adapted for the Irish situation. The EIS should cover the whole project, including construction, operation and, if applicable, restoration or decommissioning phases. Alternatives examined should also be included in the EIS. Inland Fisheries Ireland should be consulted with regard to fish species if applicable. For

information on Geological and Geomorphological sites the Geological Survey of Ireland should be consulted.

Baseline data

With regard to the scope of baseline data, details of designated sites can be found at http://www.npws.ie/. For flora and fauna the data of the National Parks and Wildlife Service (NPWS) should be consulted at http://www.npws.ie/ . Where further detail is required on any information on the website http://www.npws.ie/ , a data request form should be submitted. This can be found at https://www.npws.ie/sites/default/files/general/Data%20request%20form.doc . Other sources of information relating to habitats and species include that of the National Biodiversity Data Centre (www.biodiversityireland.ie), Inland Fisheries Ireland (www.fisheriesireland.ie), BirdWatch Ireland (www.birdwatchireland.ie) and BatConservation Ireland (www.batconservationireland.org). Data may also exist at a County level within the Planning Authority

Impact assessment

The impact of the development on the flora, fauna and habitats present should be assessed. In particular the impact of the proposed development should be assessed, where applicable, with regard to:

- Natura 2000 sites, i.e. Special Areas of Conservation (SAC) designated under the EC Habitats Directive (Council Directive 92/43/EEC) and Special Protection Areas designated under the EC Birds Directive (Directive 2009/147 EC),
- Other designated sites, or sites proposed for designation, such as Natural Heritage Areas and proposed Natural Heritage Areas, Nature Reserves and Refuges for Fauna or Flora, designated under the Wildlife Acts 1976 to 2012,
- Species protected under the Wildlife Acts including protected flora,
- 'Protected species and natural habitats', as defined in the Environmental Liability Directive (2004/35/EC) and European Communities (Environmental Liability) Regulations, 2008, including Birds Directive – Annex I species and other regularly occurring migratory species, and their habitats (wherever they occur) and Habitats Directive – Annex I habitats, Annex II species and their habitats, and Annex IV species and their breeding sites and resting places (wherever they occur),
- Important bird areas such as those identified by Birdlife International,
- Features of the landscape which are of major importance for wild flora and fauna, such as those with a "stepping stone" and ecological corridors function, as referenced in Article 10 of the Habitats Directive.
- Other habitats of ecological value in a national to local context (such as those identified as locally important biodiversity areas within Local Biodiversity Action Plans and County Development Plans).

- Red data book species,
- and biodiversity in general.

Reference should be made to the National Biodiversity Plan and any relevant County Biodiversity Plan. Any losses of biodiverse habitat associated with this proposed development (including access roads and cabling) such as woodland, scrub, hedgerows and other habitats should be mitigated for.

In order to assess the above impacts it may be necessary to obtain hydrological and/or geological data. In particular any impact on water table levels or groundwater flows may impact on wetland sites some distance away. The EIS should assess cumulative impacts with other plans or projects if applicable. Where negative impacts are identified suitable mitigation measures should be detailed if appropriate. As EU Member States have to report every 6 years on the National resource of habitats and species listed under the Habitats Directive it is important that any impact on such habitats and species both inside and outside of Natura 2000 sites is recorded.

Alien invasive species

The EIS should also address the issue of invasive alien plant and animal species, such as Japanese Knotweed, and detail the methods required to ensure they are not accidentally introduced or spread during construction. Information on alien invasive species in Ireland can be found at http://invasives.biodiversityireland.ie/ and at http://invasivespeciesireland.com/ .

Hedgerows and protected species

Hedgerows form important wildlife corridors and provide areas for birds to nest in. In addition badger setts may be present. If suitable trees are present bats may roost there and they use hedgerows as flight routes. Hedgerows also provide a habitat for woodland flora. Where a hedgerow forms a townland or other historical boundary it is usually an old hedgerow. Such hedgerows will contain more biodiversity than a younger hedgerow. Hedgerows should be maintained where possible. The EIS should provide an estimate of the length of hedgerow that will be lost, if any. Where trees or hedgerows have to be removed there should be suitable planting of native species in mitigation. Where possible hedgerows and trees should not be removed during the nesting season (i.e. March 1st to August 31st). Bird's nests can only be intentionally destroyed under licence issued under the Wildlife Acts of 1976 to 2012.

Bats

Bat roosts may be present in trees, buildings and bridges. Bat roosts can only be destroyed under licence under the Wildlife Acts and a derogation under the Birds and

Natural Habitats Regulations and such a licence would only be given if suitable mitigation measures were implemented. Where so called bat friendly lighting is proposed as mitigation then it should be proven to work as mitigation.

Rivers and Wetlands

Wetlands are important areas for biodiversity. Any watercourse or wetland impacted on should be surveyed for the presence of protected species and species listed on Annexes II and IV of the Habitats Directive. These species could include otters (*Lutra lutra*), which are protected under the Wildlife Acts and listed on Annexes II and IV of the Habitats Directive, Salmon (*Salmo salar*) and Lamprey species listed on Annex II of the Habitats Directive, and White-clawed Crayfish (*Austropotamobius pallipes*) which are protected under the Wildlife Acts and listed on Annex II of the Habitats Directive, Frogs (*Rana temporaria*) and Newts (*Trituris vulgaris*) protected under the Wildlife Acts and Kingfishers (*Alcedo atthis*) protected under the Wildlife Acts and listed on Annex I of the Birds Directive (Council Directive 79/409 EEC). One of the main threats identified in the threat response plan for otter is habitat destruction (see http://www.npws.ie/sites/default/files/publications/pdf/2009_Otter_TRP.pdf).

In addition a 10m riparian buffer on both banks of a waterway is considered to comprise part of the otter habitat. Therefore any proposed development should be located at least 10m away from the waterway.

A suitable riparian habitat should be left along each watercourse. Construction work should not be allowed impact on water quality and measures should be detailed in the EIS to prevent sediment and/or fuel runoff from getting into watercourses which could adversely impact on aquatic species. Flood plains, if present, should be identifie in the EIS and left undeveloped to allow for the protection of these valuable habitats and provide areas for flood water retention. If applicable the EIS should take account of the guidelines for Planning Authorities entitled "The Planning System and Flood Risk Management" and published by the Department of the Environment, Heritage and Local Government in November 2009.

IFI should be consulted with regard to impacts on fish species and the applicant may find it useful to consult their publication entitled "Planning for watercourses in the urban environment" which can be downloaded from their web site at http://www.fisheriesireland.ie/fisheries-management-1/86-planning-for-watercourses-inthe-urban-environment-1 .

Water quality

Ground and surface waters quality should be protected during construction and operation of the proposed development and if applicable the applicant should ensure that adequate

sewage treatment facilities are or will be in place prior to any development. The applicant should also ensure that adequate water supplies are present prior to development.

Green Infrastructure

From a biodiversity point of view it is important to take note of the EU Green Infrastructure Strategy. Further information on this can be found at http://ec.europa.eu/environment/nature/ecosystems/docs/green_infrastructure_broc.pdf . Care should be taken to ensure that green infrastructure involves greening existing infrastructure rather than adding built infrastructure to existing biodiversity corridors. With regard to waterways, the applicant may find it useful to consult the IFI publication entitled "Planning for watercourses in the urban environment" which can be downloaded from their web site at http://www.fisheriesireland.ie/fisheries-management-1/86-planning-for-watercourses-in-the-urban-environment-1 .

CMPs

Complete project details including construction management plans (CMPs) need to be provided in order to allow an adequate assessment to be undertaken. Applicants need to be able to demonstrate that CMPs and other such plans are adequate and effective mitigation, supported by scientific information and analysis, and that they are feasible within the physical constraints of the site. The positions, locations and sizes of construction infrastructure and mitigation, such as settlement ponds, disposal sites and construction compounds, may significantly affect European sites, other designated sites, habitats, and species in their own right and could have an effect for example on drainage, water quality, habitat loss, and disturbance. If these are undetermined at time of the assessment, all potential effects of the development on the site are not being considered. If applicants are not in a position to decide the exact location and details of these at time of application, then they need to consider the range of options that may be used in their assessment so that all issues are covered.

Appropriate Assessment

Guidance

Guidance on AA is available in the Departmental guidance document on Appropriate Assessment, which is available on the NPWS web site at http://www.npws.ie/sites/default/files/publications/pdf/NPWS_2009_AA_Guidance.pdf and in the EU Commission guidance entitled "Assessment of plans and projects significantly affecting Natura 2000 sites. Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC" which can be downloaded from http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/natura_2000

_assess_en.pdf . However CJEU and Irish case law has clarified some issues and should also be consulted.

Conservation objectives

In order to carry out the appropriate assessment screening, and/or prepare the Natura Impact Statement (NIS), information about the relevant Natura 2000 sites including their conservation objectives will need to be collected. Details of designated sites and species and conservation objectives can be found on http://www.npws.ie/. Site-specific, as opposed to generic, conservation objectives are now available for some sites. Each conservation objective for a qualifying interest is defined by a list of attributes and targets and are often supported by further documentation. Where these are not available for a site, an examination of the attributes that are used to define site-specific conservation objectives for the same QIs in other sites can be usefully used to ensure the full ecological implications of a proposal for a site's conservation objective and its integrity are analysed and assessed. It is advised, as per the notes and guidelines in the site-specific conservation objectives, that any reports quoting conservation objectives should give the version number and date, so that it can be ensured and established that the most up-to-date versions are used in the preparation of Natura Impact Statements and in undertaking appropriate assessments.

Where further detail is required on any information on the website http://www.npws.ie/ , a data request form should be submitted. This can be found at https://www.npws.ie/sites/default/files/general/Data%20request%20form.doc .

Cumulative and ex situ impacts

A rule of thumb often used is to include all Natura 2000 sites within a distance of 15km. It should be noted however that this will not always be appropriate. In some instances where there are hydrological connections a whole river catchment or a groundwater aquifer may need to be included. Similarly where bird flight paths are involved the impact may be on an SPA more than 15 km away.

Other relevant Local Authorities should be consulted to determine if there are any projects or plans which, in combination with this proposed development, could impact on any Natura 2000 sites.

Water and wastewater

If this development is not on mains sewerage then impacts from wastewater, including cumulative impacts, on groundwater and any nearby surface waters or wetland habitats should be assessed. In addition if it is not on mains water supply then impacts, including cumulative impacts, relating to water abstraction should be assessed. This may require

hydrogeological information. Where connection will be to existing infrastructure the impact of the demand for additional potable water, waste water treatment, and additional surface runoff should be assessed.

Alien invasive species

If the proposed development is adjacent to a Natura 2000 site and involves construction, landscaping or a garden, care should be taken to ensure that no terrestrial or aquatic invasive species are used which could impact negatively on these sites. Information on alien invasive species in Ireland can be found at http://invasives.biodiversityireland.ie/ and at http://invasivespeciesireland.com/ .

CMPs

Complete project details including construction management plans (CMPs) need to be provided in order to allow an adequate appropriate assessment to be undertaken. Applicants need to be able to demonstrate that CMPs and other such plans are adequate and effective mitigation, supported by scientific information and analysis, and that they are feasible within the physical constraints of the site. The positions, locations and sizes of construction infrastructure and mitigation, such as settlement ponds, disposal sites and construction compounds, may significantly affect European sites, designated sites, habitats, and species in their own right and could have an effect for example on drainage, water quality, habitat loss, and disturbance. If these are undetermined at time of the assessment, all potential effects of the development on the site are not being considered. If applicants are not in a position to decide the exact location and details of these at time of application, then they need to consider the range of options that may be used in their assessment so that all issues are covered. The CMP should also include methods to ensure invasive alien species are not introduced or spread. This Department understands that it may not be possible to have final pipeline route details until a grid connection agreement is given. However, if applicants are not in a position to decide the exact location and details at time of application, then they need to consider the range of options that may be used in their assessment so that all issues are covered

Licences

Where there are impacts on protected species and their habitats, resting or breeding places, licences may be required under the Wildlife Acts or derogations under the Habitats Regulations. In particular bats and otters are strictly protected under annex IV of the Habitats Directive and a copy of Circular Letter NPWS 2/07 entitled "Guidance on Compliance with Regulation 23 of the Habitats Regulations 1997 – strict protection of certain species/applications for derogation licences" can be found on the Departmental web site at http://www.npws.ie/sites/default/files/general/circular-npws-02-07.pdf . It

should be noted however that this Regulation has been replaced by SI 477 of 2011 and that section 53 is the relevant section.

In addition licences will be required if there are any impacts on other protected species or their resting or breeding places, such as on protected plants, badger setts or birds nests. Where possible hedges and trees should not be removed during the nesting season (i.e. March 1st to August 31st). Bird's nests can only be intentionally destroyed under licence issued under the Wildlife Acts of 1976 to 2012.

In order to apply for any such licences or derogations as mentioned above the results of a survey should be submitted to the National Parks and Wildlife Service of this Department. Such surveys are to be carried out by appropriately qualified person/s at an appropriate time of the year. Details of survey methodology should also be provided. Such licences should be applied for in advance of planning to avoid delays and in case project modifications are necessary.

Should this survey work take place well before construction commences, it is recommended that an ecological survey of the development site should take place immediately prior to construction to ensure no significant change in the baseline ecological survey has occurred. If there has been any significant change mitigation may require amendment and where a licence has expired, there will be a need for new licence applications for protected species.

The above observations and recommendations are based on the papers submitted to this Department on a pre-planning basis and are made without prejudice to any observations the Minister may make in the context of any consultation arising on foot of any development application referred to the Minister, by a planning authority, in her role as statutory consultee under the Planning and Development Act 2000, as amended.

You are requested to send further communications to this Department's Development Applications Unit (DAU) at manager.dau@ahg.gov.ie (team monitored); if this is not possible, correspondence may alternatively be sent to:

The Manager
Development Applications Unit (DAU)
Department of Arts, Heritage and the Gaeltacht
Newtown Road
Wexford
Y35 AP90

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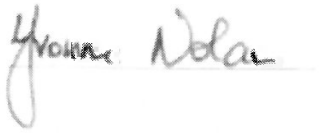

Yvonne Nolan,
Development Applications Unit

Consultation Request Letter to DAU (email dated 21st December 2018)

From: Lorraine (Panther Environmental Solutions Ltd.)
Sent: Friday 21 December 2018 14:25
To: Manager Dau <Manager.Dau@chg.gov.ie>
Subject: Planning Application Consultation - Proposed Development by Dawn Meats (Slane), Co. Meath

Dear Sir / Madam,

Panther Environmental Solutions Limited have been requested by Dawn Meats (Slane) to prepare an Environmental Impact Assessment Report (EIAR) and Natura Impact Statement as required under the Habitats Directive with respect to an application for planning permission to Meath County Council for the construction of alterations to an existing approved effluent plant development (Planning Ref: LB180300) at Painestown, Beauparc, Navan, Co. Meath, and construction of new treated effluent rising main pipeline to a proposed outfall at River Boyne. The construction phase of the development, as well as cumulative impacts with other developments in the area will also be addressed.

The Development Applications Unit was previously consulted on the 3rd of May 2017, in relation to the planning application submitted for the construction of an extension to the existing waste water treatment plant at Painestown, Beauparc, Navan, Co. Meath (Planning Ref: LB180300), and a response received on the 6th of June 2017 (Ref. G Pre 00112/2017). At the time of the LB180300 application, the applicant intended to provide for the discharge of final effluent to the River Boyne, however, this did not form part of the proposed development as a feasible pipeline route had yet to be determined. The EIAR and associated documents for the previous planning application included a preliminary assessment on the potential risks arising from such a future development.

A potential final effluent rising main route has now been determined, subject to final agreement with the relevant landowners, and thus is included as part of the new planning application to Meath County Council.

While it is understood that the National Parks and Wildlife Service will be consulted during the planning application process, we would welcome any comments or observations which the Development Applications Unit may have in relation to the proposed development in the preparation of documents for the application.

It is noted that any further comments/observations made during consideration of the planning application, once made, would also be considered as part of relevant assessments.

Dawn Meats (Slane) is a producer and processor of beef products. This site takes in live cattle and produces sides and quarters for further processing at other Dawn Meats sites or direct sale. The site holds an Industrial Emissions (IE) Licence with the Environmental Protection Agency (EPA), Registration No. P0811-02.

The facility is located in the townland of Painestown, approximately 4.5km south of Slane and 8.5km east of Navan, Co. Meath, while the proposed treated effluent rising main would be located within the townlands of Painestown, Seneschalstown, Dollardstown and Ardmulchan. The site location and proposed rising main route is shown in the location map included.

The Dawn Meats (Slane) facility currently provides Primary Treatment – Stage 1 (flow balancing and removal of solids) at its onsite Waste Water Treatment Plant (WWTP) for wastewaters generated at the facility, followed by the transfer of wastewaters via road tankers to municipal WWTPs for further treatment. The sludges generated during treatment are transferred offsite for landspreading (undertaken in accordance with the Nitrate Regulations).

The currently approved development (Planning Ref: LB180300) 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. This is intended to replace the requirement for further treatment at municipal WWTPs.

Following treatment, Dawn Meats (Slane) proposes to discharge the treated effluent to the River Boyne. This would involve the construction of an underground rising main pipeline, approximately 3.65km in length, from the Dawn Meats (Slane) facility to the River Boyne at Dollardstown, Co. Meath. The proposed pipeline would commence at the proposed new build wastewater treatment plant on the Dawn Meats (Slane) site and travel in an approximate north-west direction to the River Boyne, passing through the townlands of Painestown, Seneschalstown, Dollardstown and Ardmulchan. The proposed pipeline route is shown in the location map provided, however, this may be subject to change prior to the application being formally made.

Emission limits for treated effluent entering the River Boyne would be based upon an assimilative capacity assessment undertaken on the River Boyne, which would be required to be agreed with the EPA. Prior to any discharge occurring from the site, an application for review of the site's current IE licence would be required to be approved with the EPA.

It is noted that the River Boyne is designated as a Special Area of Conservation (Site Code: 002299) and as a Special Protection Area (Site Code: 004232).

We would welcome any comments or observations which the Development Applications Unit may have to highlight any particular concerns in relation to the proposed development.

Best Regards,
Lorraine

PANTHER ENVIRONMENTAL SOLUTIONS LTD
Lorraine Wyse
059 9134222
lorraine@pantherwms.com
www.pantherwms.com
Units 3 & 4, Innovation Centre
Institute of Technology
Green Road
Carlow,Ireland

DAU Response (email dated 13th February 2019)

An Roinn Cultúir,
Oidhreachta agus Gaeltachta
Department of Culture,
Heritage and the Gaeltacht

Our Ref: G **Pre00007/2019**
(Please quote in all related correspondence)

13 February 2019

Lorraine Wyse,
Panther Environmental Solutions Ltd
Units 3 & 4, Innovation Centre
Institute of Technology
Green Road
Carlow
Via email: lorraine@pantherwms.com

Re: Environmental Impact Assessment Report (EIAR) and Natura Impact Statement for proposed planning application for the construction of alterations to an existing approved effluent plant development (Planning Ref: LB180300) and the construction of new treated effluent rising main pipeline to a proposed outfall at River Boyne in Painestown, Beauparc, Navan, County Meath

A chara

On behalf of the Department of Culture, Heritage and the Gaeltacht, I refer to correspondence received in connection with the above.

Outlined below are heritage-related observations/recommendations of the Department under the stated heading.

Archaeology

Given the high archaeological potential of the general area and the proximity of the development to the River Boyne this Department recommends that your clients engage the services of a suitably qualified archaeologist to carry out appropriate archaeological assessment of the proposed route way and to describe details of the construction plans for the pipeline. There should be a description of all archaeological impacts and likely impacts should planning permission be granted for the development. The assessment report should also include details of the proposed mitigation of any such impacts.

Should you have any further details or information concerning the route of the waste-water pipeline please do not hesitate to contact the Department.

The above observations/recommendations are based on the papers submitted to this Department on a pre-planning basis and are made without prejudice to any observations that the Minister may make in the context of any consultation arising on foot of any

Aonad na nIarratas ar Fhorbairt, Bóthar an Bhaile Nua, Loch Garman, Y35 AP90
Development Applications Unit, Newtown Road, Wexford, Y35 AP90
manager.dau@chg.gov.ie
www.chg.gov.ie

development application referred to the Minister, by the planning authority/ies, in her/his role as statutory consultee under the Planning and Development Act, 2000, as amended.

You are requested to send further communications to this Department's Development Applications Unit (DAU) at manager.dau@chg.gov.ie (team monitored); if this is not possible, correspondence may alternatively be sent to:

The Manager
Development Applications Unit (DAU)
Department of Culture, Heritage and the Gaeltacht
Newtown Road
Wexford
Y35 AP90

Is mise, le meas

Sinéad O' Brien
Development Applications Unit

ATTACHMENT 8.3

- PHOTO LOG -

Plate 1: Area of wet grassland (GS4) and River Boyne (FW2) habitat.

Plate 2: Example of treelines (WL2) and BL2 habitat and along the proposed rising main route.

Plate 3: Drainage ditches (FW4), hedgerows (WL1) and GS2 habitat.

Plate 4: Area of scrub (WS1) with BL3 and WL2 habitats in background.

Notes

DAWN MEATS (SLANE),
NAVAN,
CO. MEATH

APPENDIX B
PHOTO LOG

PANTHER
ENVIRONMENTAL SOLUTIONS LTD

UNITS 3 & 4
INNOVATION CENTRE
GREEN ROAD
CARLOW

TELEPHONE
MOBILE
EMAIL
WEB

		scale: N/A	A4
drawing status: REPORT		date: N/A	
		drawn: PBR	
drawing no: AA 20 9884	rev: A	checked: MF	
		approved: -	
		date: 04/09/2020	

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Plate 5: Example of wet grassland (GS4) and GS2 habitat

Plate 6: Example of GA1 habitat at Dawn Meats

Plate 7: Example of amenity grassland (GA2) and buildings and artificial surfaces (BL3) habitat

Plate 7: Section of BL1 habitat adjacent GA1 habitat.

Notes

DAWN MEATS (SLANE),
NAVAN,
CO. MEATH

APPENDIX B
PHOTO LOG

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Plate 9: A section of the Dollardstown River, identified as FW2 habitat.

Notes

DAWN MEATS (SLANE),
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ATTACHMENT 8.4

- FULL LIST OF RECORDED FLORA -

Habitat	Common Name	Scientific Name	DAFOR Classification
Improved agricultural grassland (GA1)	Rye grasses	*Lolium* spp.	D
	Buttercup	*Ranunculus* spp.	O
	Clover	*Trifolium* spp.	O
	Common Chickweed	*Stellaria media*	O
	Dandelion	*Taraxacum* spp.	O
	Dock	*Rumex* spp.	O
	Grasses (various)	-	O
	Greater Plantain	*Plantago major*	O
	Ribwort Plantain	*Plantago lanceolata*	O
	Nettle	*Urtica dioica*	R
	Red Dead-nettle	*Lamium purpureum*	R
	Creeping Thistle	*Cirsium arvense*	R
Amenity grassland (improved) (GA2)	Grasses (various)	-	D
	Daffodil	*Narcissus*	R
	Groundsel	*Senecio vulgaris*	R
	Speedwell	*Veronica* spp.	R
Dry meadows and grassy verges (GS2)	Grasses (various)	-	A
	Butterbur	*Petasites hybridus*	O
	Buttercup	*Ranunculus* spp.	O
	Cleavers	*Galium aparine*	O
	Clover	*Trifolium* spp.	O
	Cow Parsley	*Anthriscus sylvestris*	O
	Dandelion	*Taraxacum* spp.	O
	Dock	*Rumex* spp.	O
	Herb-Robert	*Geranium robertianum*	O
	Hogweed	*Heracleum sphondylium*	O
	Ivy	*Hedera helix*	O
	Nettle	*Urtica dioica*	O
	Speedwell	*Veronica* spp.	O
	Thistle	*Cirsium* spp.	O
	Vetch	*Vicia* spp.	O
	Bramble	*Rubus fruticosus*	R
	Ferns	-	R
	Lesser Celandine	*Ficaria verna*	R
	Mosses (various)	-	R
Wet grassland (GS4)	Grasses (various)	-	A
	Rushes (various)	*Juncus* spp.	F
	Bramble	*Rubus fruticosus*	O
	Buttercup	*Ranunculus* spp.	O
	Cleavers	*Galium aparine*	O
	Clover	*Trifolium* spp.	O

Habitat	Common Name	Scientific Name	DAFOR Classification
	Dandelion	*Taraxacum* spp.	O
	Nettle	*Urtica dioica*	O
	Ribwort Plantain	*Plantago lanceolata*	O
	Thistle	*Cirsium* spp.	O
Hedgerows (WL1)	Ash	*Fraxinus excelsior*	A
	Hawthorn	*Crataegus monogyna*	A
	Blackthorn	*Prunus spinosa*	A
	Bramble	*Rubus fruticosus*	A
	Buttercup	*Ranunculus* spp.	O
	Cleavers	*Galium aparine*	O
	Common Polypody	*Polypodium vulgare*	R
	Cow Parsley	*Anthriscus sylvestris*	O
	Dandelion	*Taraxacum* spp.	O
	Dog-rose	*Rosa canina agg.*	O
	Dwarf Male Fern	*Dryopteris oreades*	O
	Elder	*Sambucus nigra*	O
	Hart's Tongue Fern	*Asplenium scolopendrum*	O
	Gorse	*Ulex europaeus*	O
	Herb-Robert	*Geranium robertianum*	O
	Holly	*Ilex aquifolium*	O
	Hogweed	*Heracleum sphondylium*	O
	Ivy	*Hedera helix*	O
	Nettle	*Urtica dioica*	O
	Primrose	*Primula vulgaris*	R
	Speedwell	*Veronica* spp.	O
	Thistle	*Cirsium* spp.	O
	Lesser Celandine	*Ficaria verna*	O
	Lords-and-ladies	*Arum maculatum*	R
	Oak	*Quercus* spp.	O
	Snowberry	*Symphoricarpos albus*	R
	Sycamore	*Acer pseudoplatanus*	O
	Vetch	*Vicia* spp.	R
	Violet	*Viola* spp	R
	Yew	*Taxus baccata*	R
Treelines (WL2)	Ash	*Fraxinus excelsior*	A
	Beech	*Fagus sylvatica*	F
	Blue Spruce	*Picea pungens*	R
	Bramble	*Rubus fruticosus*	O
	Crab Apple	*Malus sylvestris*	R
	Dandelion	*Taraxacum* spp.	O
	Dog-rose	*Rosa canina agg.*	O

Habitat	Common Name	Scientific Name	DAFOR Classification
	Elder	*Sambucus nigra*	O
	Elm	*Ulmus* sp.	R
	Gorse	*Ulex europaeus*	O
	Hawthorn	*Crataegus monogyna*	O
	Herb-Robert	*Geranium robertianum*	O
	Horse-chestnut	*Aesculus hippocastanum*	R
	Ivy	*Hedera helix*	O
	Lime	*Tilia* spp.	R
	Nettle	*Urtica dioica*	O
	Oak	*Quercus* spp.	F
	Thistle	*Cirsium* spp.	O
	Willow	*Salix* spp.	O
Mixed broadleaved woodland (WD1)	Alder	*Alnus glutinosa*	O
	Ash	*Fraxinus excelsior*	O
	Beech	*Fagus sylvatica*	O
	Blackthorn	*Prunus spinosa*	O
	Butterbur	*Petasites hybridus*	O
	Hazel	*Corylus avellana*	O
	Herb-Robert	*Geranium robertianum*	O
	Horse-chestnut	*Aesculus hippocastanum*	O
	Ivy	*Hedera helix*	O
	Oak	*Quercus* spp.	O
	Willow	*Salix* spp.	O
Conifer plantation (WD4)	Sitka Spruce	*Picea sitchensis*	D
Scrub (WS1)	Hawthorn	*Crataegus monogyna*	A
	Ash	*Fraxinus excelsior*	F
	Bramble	*Rubus fruticosus*	F
	Ragwort	*Senecio jacobaea*	O
	Willow	*Salix* sp	O
	Sycamore	*Acer pseudoplatanus*	R
Ornamental/non-native shrub (WS4)	Leyland cypress	*Cupressus × leylandii*	O
	Mexican orange blossom	*Choisya ternate*	R
Arable crops (BC1)	Planted crops	-	D
	Dandelion	*Taraxacum* spp.	R
	Grasses (various)	-	R
	Speedwell	*Veronica* spp.	R
Horticultural land (BC2)	Flax	*Linum usitatissimum*	D
	Buttercup	*Ranunculus* spp.	O
	Clover	*Trifolium* spp.	O

Habitat	Common Name	Scientific Name	DAFOR Classification
	Common Chickweed	*Stellaria media*	O
	Daisy	*Bellis perennis*	O
	Dandelion	*Taraxacum* spp.	O
	Dock	*Rumex* spp.	O
	Fumitory	*Fumaria* sp.	O
	Groundsel	*Senecio vulgaris*	O
	Ribwort Plantain	*Plantago lanceolata*	O
	Thistle	*Cirsium* spp.	O
Depositing / lowland rivers (FW2) & Drainage ditches (FW4)	Common duckweed	*Lemna minor*	O
	Hemlock Water Dropwort	*Oenanthe crocata*	O
	Water-cress	*Rorippa nasturtium-aquaticum*	O
	Willowherb	*Epilobium* spp.	O
	Yellow Iris	*Iris pseudacorus*	O
	Lesser Celandine	*Ficaria verna*	O
	Meadow Buttercup	*Ranunculus acris*	R
	Marsh Marigold	*Caltha palustris*	R
	Opposite-leaved Golden-saxifrage	*Chrysosplenium oppositifolium*	R
Stone walls and other stonework (BL1)	Ivy	*Hedera helix*	F
	Moss	*Bryophyta*	O
Earth banks (BL2)	Annual Meadow-grass	*Poa annua*	O
	Cleavers	*Galium aparine*	O
	Cock's-foot	*Dactylis glomerata*	R
	Common Figwort	*Scrophularia nodosa*	R
	Couch-grass	*Elytrigia repens*	F
	Cow Parsley	*Anthriscus sylvestris*	O
	Groundsel	*Senecio vulgaris*	O
	Herb-Robert	*Geranium robertianum*	O
	Hogweed	*Heracleum sphondylium*	O
	Nettle	*Urtica dioica*	O
	Speedwell	*Veronica* spp.	O
	Vetch	*Vicia* spp.	O
	Winter Heliotrope	*Petasites fragrans*	O
Buildings and artificial surfaces (BL3)	-	-	-

ATTACHMENT 9.0

- BIODIVERSITY – AQUATIC ENVIRONMENT -

ATTACHMENT 9.1

- HYDROLOGICAL ASSESSMENT -

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ATTACHMENT 9.1

HYDROLOGICAL ASSESSMENT OF PROPOSED DISCHARGE TO WATERCOURSE

2020

DAWN MEATS IRELAND
GREENHILLS, BEAUPARC,
NAVAN, CO MEATH

Date: **Revised:**	17th March 2020 09th February 2021	**Prepared By:**	Martin O'Looney, BSc
Report number:	AC_20_9684	**Checked:**	Mike Fraher, BSc

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EXECUTIVE SUMMARY

An assimilative capacity assessment was conducted on the River Boyne, during 95%ile flow conditions, to predict the ability of the watercourse to accommodate treated effluent discharge of BOD_5, orthophosphate, nitrogen, ammonia and suspended solids from Dawn Meats.

Final effluent quality figures for the discharge from the Dawn Meats facility have been selected in accordance with the design of the effluent treatment plant and EPA guidance BREF for the Slaughtering and Food & Drink Industries.

The 95-percentile flow is the lowest daily average flow which is equalled or exceeded 95% of the time. It is therefore the low flow which is likely to occur for 5%, or 18 days, of each year.

It has been concluded that the River Boyne would have sufficient assimilative capacity to accommodate discharges of up to 400 M^3 from the Dawn Meats facility.

The following table summarises the existing background quality of the watercourse, the legislated limits and surface-water objectives downstream of the proposed discharge location, the proposed final effluent quality from the facility and the resultant concentration within the River Boyne due to the discharge.

RIVER BOYNE

Parameter	Units	Background Quality	Legislated Quality	Pro posed Discharge Quality	Predicted Levels Post Discharge (mg/l)	% Headroom Utilised
BOD_5	mg/l O_2	1.31	2.6	20.0	1.33	1.4%
Orthophosphate	mg/l PO_4-P	0.031	0.075	2.0	0.033	4.3%
Nitrogen	mg/l N	2.85	3.00	20.0	2.87	11.33%
Total Ammonia	mg/l N	0.036	0.14	5.0	0.041	4.62%
Suspended Solids	mg/l SS	8.6	25.0	30.0	8.66	0.13%

As can be seen from the above table, a discharge from the proposed biological treatment plant at 400 M^3 per day would not result in a significant deterioration in the existing quality of the River Boyne.

The discharge from the Dawn Meats facility would not result in the River Boyne failing to achieve good status, based upon average EPA water quality results between 2016 and 2019.

This assessment has predicted that, under receiving water 95-percentile flow conditions, the River Boyne would have adequate assimilative capacity for the proposed discharge of 400M^3/day.

Therefore, it is concluded that the River Boyne would have sufficient assimilative capacity to accommodate discharges from the Dawn Meats facility.

1.0 INTRODUCTION

Dawn Meats Ireland Unlimited Company (also referred to as Dawn Meats (Slane)) is a producer and processor of beef products. This site takes in live cattle and produces sides and quarters for further processing at other Dawn Meats Group sites or direct sale.

Dawn Meats (Slane) is located in a rural location off the N2, approximately 4.5km south of the village of Slane, Co. Meath. The site of the abattoir was originally a farmyard where on-farm slaughter of cattle was undertaken. The facility at Slane, which was previously operating as Newgrange Meats, was acquired by the Dunbia Group in 2001. The facility was then incorporated into the Dawn Meats Group in September 2018.

Panther Environmental Solutions Ltd was requested by Dawn Meats to undertake an assimilative capacity assessment of the River Boyne, in relation to a proposed effluent treatment plant extension and discharge to the river from the site.

This report presents details of the works and calculations undertaken to determine the assimilative capacity of the receiving watercourse.

2.0 BACKGROUND INFORMATION FOR RECEIVING WATERCOURCES

2.1 CATCHMENT INFORMATION

The River Boyne is located within the River Boyne catchment (River Code 07B04). The catchment topography generally falls in a northerly direction from hills in Painestown (155m OD) and Kingstown and Carnuff Great (100m OD) to the River Boyne (30 OD).

The River Boyne rises at Trinity Well, Newberry Hall, near Carbury, County Kildare, and flows for approximately 112km before reaching the Irish Sea.

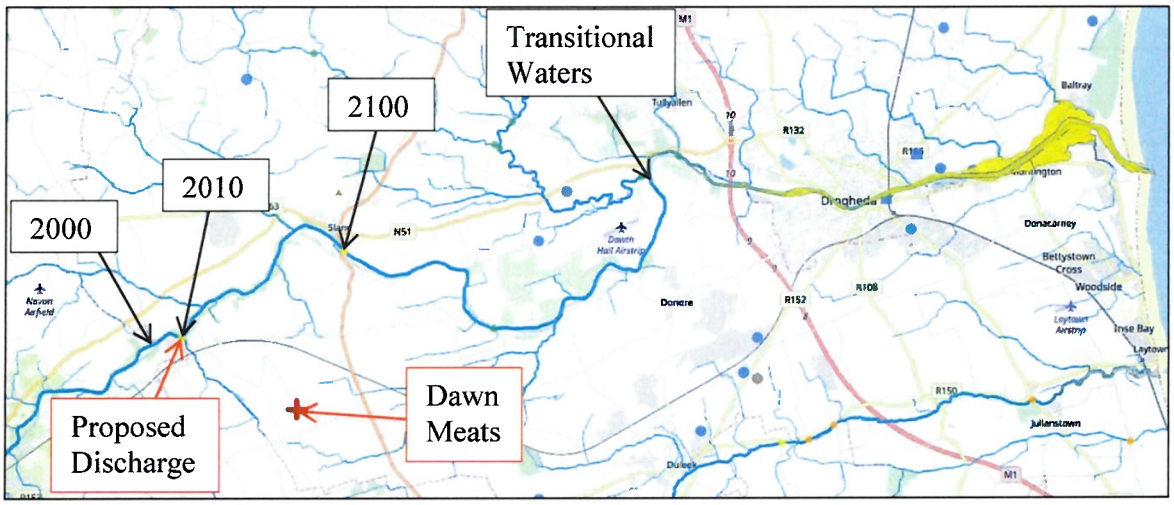


***Figure 2.1**: Site Location and Proposed Discharge Point*

The proposed main route would follow the local road network to the River Boyne. The proposed discharge location [E292417, N271406] is approximately 10 meters upstream of the

confluence of the Dollardstown River and the River Boyne, which is approximately 750m downstream of the Broadboyne Bridge, EPA station code 2000, [E291858, N271311].

The EPA monitoring station number 2010 "d/s Broadboyne Br (RHS)" [E292447, N271437], ecological monitoring only, is located in the vicinity of the proposed discharge and the outflow from the Dollardstown Stream.

The next EPA monitoring station downstream is number 2100 "Slane Bridge" [E296399, N273644], downstream of the Slane municipal WWTP, and is approximately 5.67km downstream of the proposed discharge.

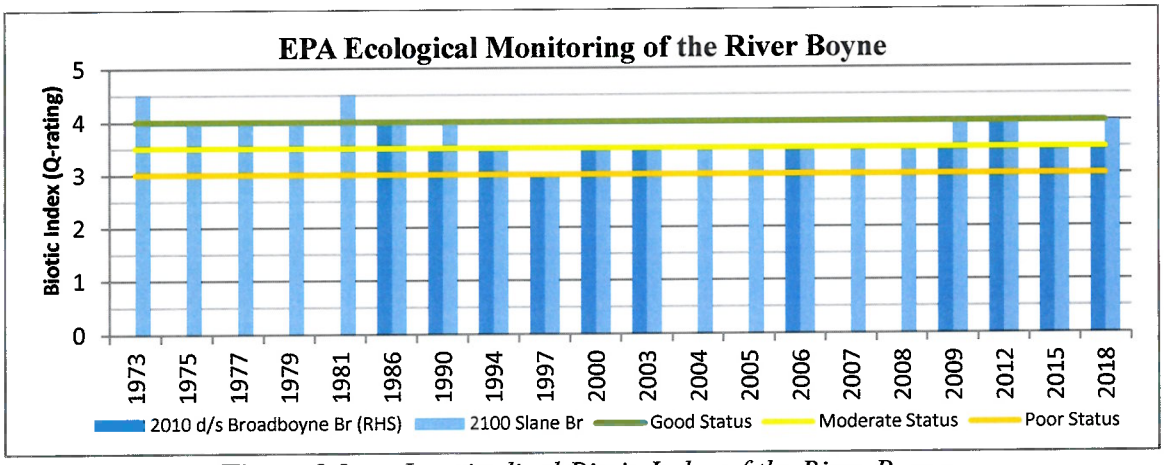


Figure 2.2: *Longitudinal Biotic Index of the River Boyne*

As can be seen in the above graph, the quality of the River Boyne in the vicinity of the proposed discharge has maintained a moderate status for the majority of the past 15 years. Both EPA monitoring sites achieved good status in 2012, however, only Slane Bridge has returned to good status in the 2018 reporting year.

The River Boyne has been classified as being at risk of not achieving good status between Navan town and Slane Bridge.

The River Boyne, main channel, is designated as a salmonid water under the European Commission (Quality of Salmonid Waters) Regulations 1988.

The River Boyne and River Blackwater are designated as a Special Area of Conservation (SAC code: 002299) for Alkaline fen and alluvial forest habitats and the species river lamprey *Lampetra fluviatilis*, salmon *Salmo salar*, and otter *Lutra lutra*. The site is also a Special Protection Area (SPA code: 004232) for the Kingfisher *Alcedo atthis*.

The Slane Agglomeration Wastewater Treatment Plant (Discharge Licence: D0257-01) [E295890, N274260] comprises of two separate treatment systems. The first system has a design capacity of 1500 p.e. and consists of preliminary treatment (screening,) secondary treatment (aeration and followed by settlement). The second system has a design capacity of 750 p.e. which consists of primary settlement, Rotating Biological Contactor followed by settlement. The outflows from both systems combine prior to discharge. At present, the plant is operating below its design capacity of 2,250 p.e.

Navan UWWTP (D0059) discharges to the River Boyne [E 288954, N 269554], approximately 4.6km upstream of the proposed discharge location. Slane UWWTP (D0257) discharges to the River Boyne [E296247, N273851], approximately 5.4 kilometres downstream of the proposed discharge location.

The Staleen Water Treatment Works is located downstream of the proposed discharge location [E303375, N273095], and provides coagulation, sedimentation, filtration and disinfection treatment. The water abstraction point is located at Staleen (Abstraction Code: 2100PUB1019) [E301795, N272201], approximately 12.7 kms downstream of the proposed discharge point.

2.2 FLOWS IN THE RECEIVING WATERCOURSES

The Water Services Training Group (WSTG) "*Technical Guidance Manual*" (Aug 2011) states that;

"The EPA, in conjunction with the Western River Basin District, has developed a 'Flow Estimating Tool'/ "Hydrotool": The tool can be used to provide estimated 95%ile flows for ungauged river catchments. This on-line facility allows the user to pick a site and estimate flows based on recorded flows from the nearest appropriate gauged site.

This method of calculating flows should be used in preference to on-site flow measurements where data is not readily available. However, the Flow Estimating Tool is not appropriate for use in some circumstances such as in karst limestone areas. In such cases, on-site measurement may be required."

The WSTG Guidance (Aug 2011) also states that;
"Allowable discharge limits should be based on the 95%ile concentration [receiving water] quality standard at the 95%ile [receiving water] flow"

The EPA HydroTool is currently in the process of being updated. The EPA Office of Environmental Assessment were contacted to source an updated 95%ile flow rate from the closest hydrometric gauge c. 4 km downstream at Slane Castle. Consultation with the EPA is included in Appendix D of this report.

Table 2.1: Flow Data for the River Boyne

Watercourse	**95-Percentile Flow (M^3/s)**
River Boyne Slane Castle Hydrometric Gauge (07012)	4.8

2.3 BACKGROUND WATER QUALITY OF RECEIVING WATERCOURSES

Records of ambient water quality testing for the River Boyne, Broadboyne Bridge station code 2000, were requested from the EPA. Analysis results from 20th January 2016 to 05th December 2019 were provided for the closest physico-chemical monitoring station upstream of the proposed discharge location, Broadboyne Bridge, EPA station code 2000. It is noted that monitoring results for 2019 have not as yet been validated, and should be treated as such. A copy of the analysis results are presented in Appendix B – Watercourse Monitoring Results.

The average results of monitoring on the River Boyne have been used to represent the typical chemical water quality of these watercourse.

The figures used to demonstrate the existing water quality of the watercourses is displayed below in Table 2.2.

Table 2.2: Background Water Quality Values for Receiving Watercourse

Paramdter	Parameter	EPA Testing 2016 –2019
BOD_5	mg/l O2	1.31
Orthophosphate	mg/l PO4-P	0.031
Nitrogen	mg/l N	2.85
Total Ammonia	mg/l N	0.036
Suspended Solids	mg/l SS	8.6

2.4 DISCHARGE CONCENTRATIONS AND LEGISLATIVE LIMITS

2.4.1 Proposed Final Effluent Quality at Dawn Meats (Slane) Facility

The proposed final effluent quality from the Dawn Meats (Slane) facility is summarised in the following table.

Table 2.3: Proposed Effluent Discharge Limits

Parameter	Units	Proposed limits	2005 Slaughter Industry BREF	2017 Food& Drink BREF
BOD_5	mg/l O_2	20	10 - 40	<20
Orthophosphate	mg/l PO_4-P	2.0	–	–
Nitrogen	mg/l N	20	15 – 40	2 – 20
Total Ammonia	mg/l N	5.0	–	–
Suspended Solids	mg/l SS	30	5 – 60	4 – 65
Flow Rate	M^3/day	400	–	–

2.4.2 Water Quality Standards of Receiving Watercourses as per Legislation

Legislated water quality standards for Irish surface waters are summarised in the following table.

Table 2.4: Maximum Permissible Concentrations Downstream from Discharge

Parameter	Units	Legislated River Conc^{n}.	Legislation
BOD_5	mg/l O_2	2.6	Surface Waters Objectives Regs (SI 272 of 2009)
Orthophosphate	mg/l PO_4-P	0.075	Surface Waters Objectives Regs (SI 272 of 2009)
Nitrogen	mg/l N	3.0	Surface Water Regs (SI 294 of 1989) (Revoked)
Total Ammonia	mg/l N	0.14	Surface Waters Objectives Regs (SI 272 of 2009)
Suspended Solids	mg/l SS	25	Salmonid Waters Regs (SI 293 of 1988)

3.0 ASSIMILATIVE CAPACITY ASSESSMENT RESULTS

Using the River Boyne flow rate, background water quality information, proposed final effluent quality figures and the legislated river water quality standards as presented in Sections 2.2, 2.3, and 2.4 respectively, an assimilative capacity of the River Boyne has been carried out for the 95-percentile flow. The results of this assessment are summarised below and detailed calculation examples are provided in Appendix C.

The calculations were carried out on the basis of an average daily effluent discharge volume of 400 M^3/day.

3.1 ASSIMILATIVE CAPACITY RESULTS FOR THE RIVER BOYNE

River Boyne		Characteristics of Watercourse			Proposed Effluent	400 M^3 Effluent Flow Scenario		
						Mass Balance		Headroom
Parameter	**Unit**	**Existing Level in Stream**	**Downstream Legislated Limits**	**Available Assimilative Capacity (kg/day)**	**Discharge Concentration**	**Rise in Levels due to Discharge**	**Predicted Levels Post Discharge**	**% Headroom Utilised**
BOD_5	mg/l O_2	1.31	2.6	533	20	0.018	1.332	1.40%
Orthophosphate	mg/l PO_4-P	0.031	0.075	18	2	0.0019	0.0325	4.28%
Nitrogen	mg/l N	2.85	3.00	60	20	0.017	2.871	11.33%
Total Ammonia	mg/l N	0.036	0.14	43	5	0.005	0.041	4.62%
Suspended Solids	mg/l SS	8.6	25.0	6,785	30	0.021	8.659	0.13%

4.0 DISCUSSION

An assessment of the River Boyne has been undertaken to predict the assimilative capacity of the watercourse to accommodate proposed treated effluent discharge flows from the Dawn Meats facility.

As can be seen from Table 2.3 above, proposed final effluent quality values have been selected in accordance with the EPA guidance BREF for the Slaughtering and Food & Drink Industries.

Background water quality for the River Boyne was determined from EPA historic sampling datasets, the average of which were used to represent the typical water quality in the watercourse.

As can be seen from table 2.2 above, the existing average background concentration of all parameters are within relevant water quality standard limits. Therefore, there is available assimilative capacity within the Boyne Rivers which may be sufficient to accommodate the proposed discharge.

Using flow data obtained from the EPA, the 95-percentile flow was estimated to be 4.8 M^3/s for the River Boyne at the proposed discharge location.

An assimilative capacity assessment was carried out on the River Boyne based upon the proposed discharge parameters detailed in table 2.3 above.

Resultant parameter concentrations within the River Boyne were calculated based upon a discharge of 400 M^3 per day of treated effluent.

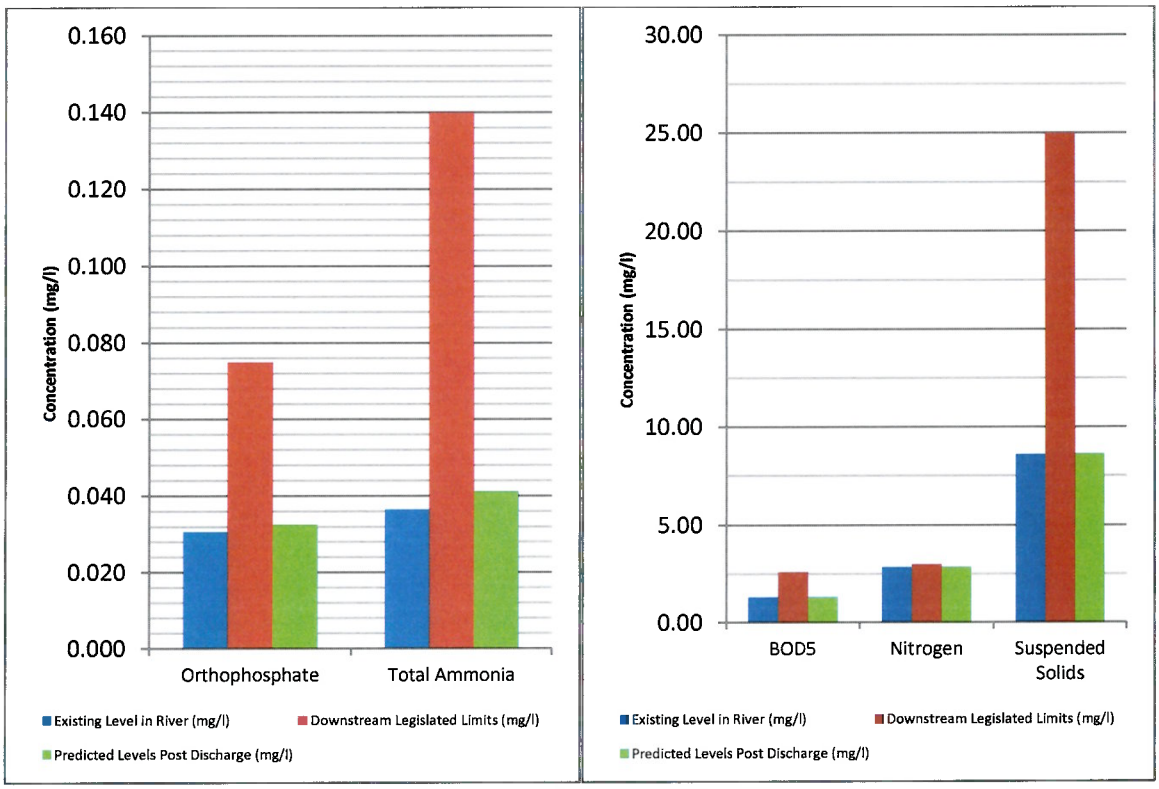


***Figure 4.1**: Assimilative Capacity Results for the River Boyne at 400 M3/day*

As can be seen in figure 4.1 above, the planned discharge would have no significant effect upon the existing quality of the River Boyne, with no significant increase in the concentration of any parameter considered in this assessment.

Percentage headroom utilisation would range from 0.13% for Suspended Solids to 11.33% for Total Nitrogen. This is significantly below the recommended rule of thumb of 25% headroom utilisation threshold for new discharges as outlined in WSTG guidance.

In 2018, the River Boyne in the vicinity of the proposed discharge location was classified as being of "moderate quality status" under the Surface Water Regulations (SI 272 of 2009). Under the Surface Water Regulations classification system, a waterbody is classified based upon the lowest score attained for any of the determining parameter. (River Waterbody: Q-rating, BOD, orthophosphate, ammonia, temperature, pH, heavy metals and priority substances)

Based upon monitoring data provided by the EPA and the above online dataset, this moderate status classification was based upon 2018 monitoring for ecology, BOD and orthophosphate at Broadboyne Br (station code 2000) and d/s Broadboyne Br RHS (station code 2010). Slane Bridge (station code 2100) was classified as being of good status in 2018 due to ecological and BOD monitoring. EPA physico-chemical monitoring in 2019 was in compliance with the Surface Water Regulations (SI 272 of 2009) "good quality status".

This assimilative capacity assessment has determined that the planned discharge from the Dawn Meats (Slane) facility would not result in the River Boyne failing to achieve good status, based upon average EPA monitoring results.

Therefore, it is considered that the River Boyne would have sufficient assimilative capacity to accept a discharge of 400 M^3 per day of effluent from the Dawn Meats (Slane) facility.

5.0 CONCLUSIONS

The existing average background concentrations of all parameters assessed for the River Boyne were found to be in compliance with relevant water quality standard limits.

The River Boyne is classified as being of moderate status in the vicinity of the proposed discharge point, however EPA 2018 monitoring has shown that physico-chemical parameters are in compliance with a "good status" classification.

The planned future discharge would have no significant effect upon the existing quality of the River Boyne, with no significant increase in the concentration of any parameter considered in this assessment.

Percentage headroom utilisation would range from 0.13% for Suspended Solids to 11.33% for Total Ammonia.

The planned future discharge from the Dawn Meats (Slane) facility would not result in the River Boyne failing to achieve good status, based upon average EPA monitoring results.

6.0 REFERENCES

WSTG, (Aug 2011). "Guidance, Procedures and Training on the Licensing of Discharges to Surface Waters, Groundwater and to Sewer for Local Authorities: Volume 1 – Technical Guidance Manual." Water Services Training Group, Monastery Road, Roscrea, Co. Tipperary.

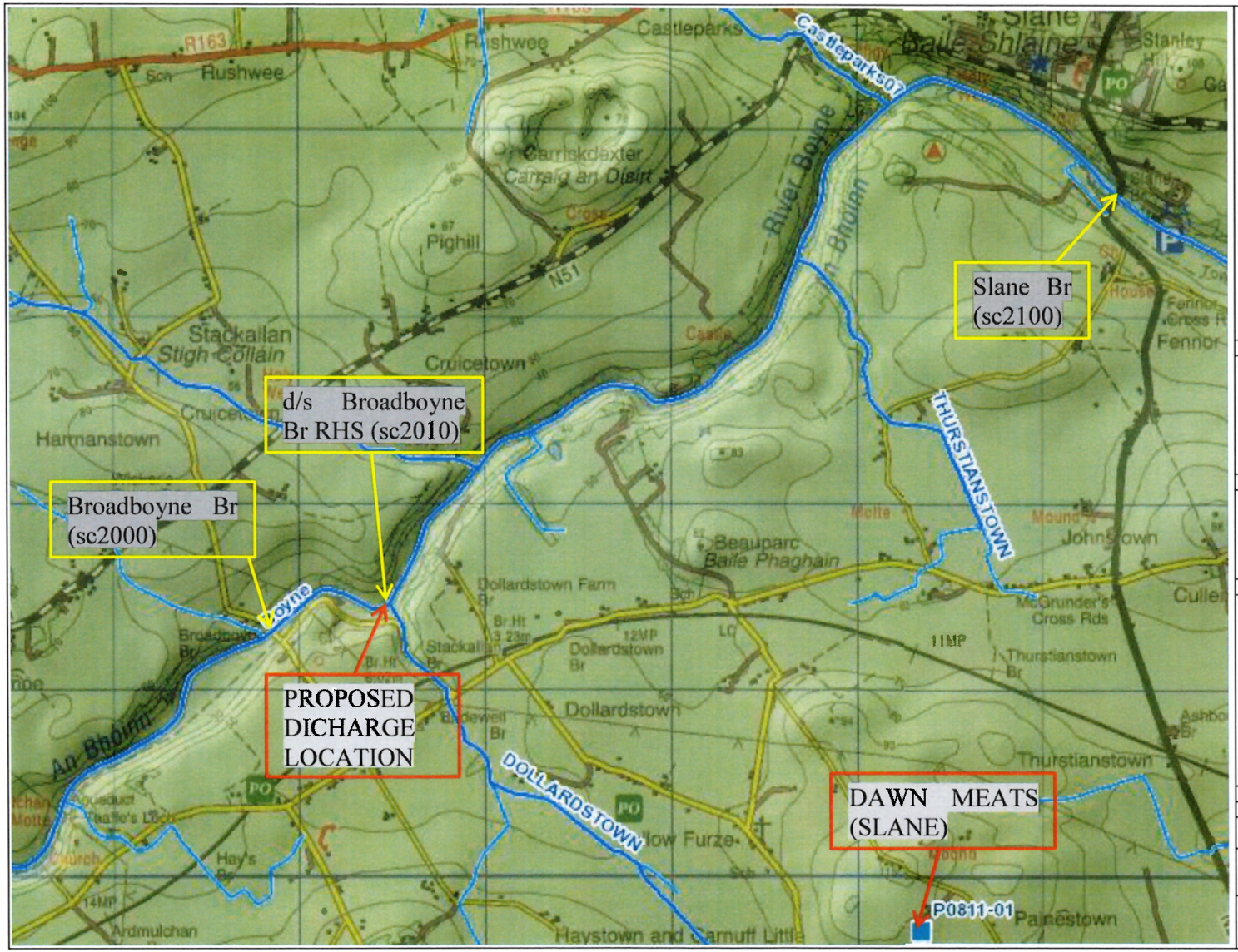
EPA Ireland (Environmental Protection Agency), 2001. "*Parameters of Water Quality: Interpretation and Standards.*" Environmental Protection Agency, Wexford.

European Communities Environmental Objectives (Surface Waters) Regulations (S.I. No. 272 of 2009)

European Communities (Quality of Salmonid Waters) Regulations (S.I. No. 293 of 1988)

European Communities (Quality of Surface Water Intended For The Abstraction of Drinking Water) Regulations (S.I. No. 294 of 1989)

APPENDIX A
- MONITORING LOCATION MAP -



Notes:

N

Dawn Meats (Slane)
Co. Meath

Monitoring Locations

PANTHER
ENVIRONMENTAL SOLUTIONS LTD
UNITS 3 & 4
INNOVATION CENTRE
GREEN ROAD
CARLOW
R93 W248
TELEPHONE: 059 91 34222
MOBILE: 087 851 9284
EMAIL: info@pantherwms.com
WEB: www.pantherwms.com

File location:		scale:	NTS
drawing status: REPORT		datum:	EPA
		drawn:	PES
drawing no.	rev	checked:	MF
P_18_9295_AC	R0	approved:	-
		date:	11-012-18

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APPENDIX B
- LABORATORY RESULTS FOR WATERCOURSES -

Appendix B – Laboratory Results for Receiving Watercourses

Table B.1: EPA monitoring results for the River Boyne (Broadboyne Br – station code 2000) [2013 to 2019]

Parameter	Unit	Average	Maximum	Minimum	Count
pH	pH units	8.2	8.5	7.8	70
Temperature	°C	11.6	21.8	4.7	40
BOD5	mg/l O2	1.31	4.0	0.7	69
COD	mg/l O2	-	-	-	-
Total Phosphorous	mg/l P	-	-	-	-
Orthophosphate	mg/l PO4-P	0.0307	0.1100	0.0100	69
Total Ammonia	mg/l N	0.0365	0.1300	0.0030	69
Nitrogen	mg/l N	2.85	4.31	0.50	29
Nitrate	mg/l NO3-N	2.02	4.10	0.77	40
Suspended Solids	mg/l SS	8.64	52.00	4.00	36
Chloride	mg/l Cl	22.13	30.90	16.30	40
FOG	mg/l	-	-	-	-

EPA Monitoring Dataset (Broadboyne Br)

StationFullCode	Station_Name	Samp_Code	Samp_Date	Prm_Desc	Unit_Code	Meas_Result	LimitOfDetection	Results
07B04-2000	Broadboyne Br	16-00147	20/01/2016	Ammonia-Total (as N)	mg/l	0.06	0.02	0.06
07B04-2000	Broadboyne Br	16-01228	15/02/2016	Ammonia-Total (as N)	mg/l	0.039	0.02	0.039
07B04-2000	Broadboyne Br	16-02884	21/03/2016	Ammonia-Total (as N)	mg/l	0.023	0.02	0.023
07B04-2000	Broadboyne Br	16-04858	18/04/2016	Ammonia-Total (as N)	mg/l	0.022	0.02	0.022
07B04-2000	Broadboyne Br	16-06216	09/05/2016	Ammonia-Total (as N)	mg/l	0.01	0.02	0.02
07B04-2000	Broadboyne Br	16-07738	08/06/2016	Ammonia-Total (as N)	mg/l	0.048	0.02	0.048
07B04-2000	Broadboyne Br	16-0606	15/06/2016	Ammonia-Total (as N)	mg/l	0.059		0.059
07B04-2000	Broadboyne Br	16-0669	05/07/2016	Ammonia-Total (as N)	mg/l	0.042		0.042
07B04-2000	Broadboyne Br	16-11468	20/07/2016	Ammonia-Total (as N)	mg/l	0.01	0.02	0.02
07B04-2000	Broadboyne Br	16-0738	02/08/2016	Ammonia-Total (as N)	mg/l	0.015		0.015
07B04-2000	Broadboyne Br	16-12792	17/08/2016	Ammonia-Total (as N)	mg/l	0.026	0.02	0.026
07B04-2000	Broadboyne Br	16-0819	25/08/2016	Ammonia-Total (as N)	mg/l	0.079		0.079
07B04-2000	Broadboyne Br	16-0878	07/09/2016	Ammonia-Total (as N)	mg/l	0.077		0.077
07B04-2000	Broadboyne Br	16-0891	12/09/2016	Ammonia-Total (as N)	mg/l	0.041		0.041
07B04-2000	Broadboyne Br	16-0916	19/09/2016	Ammonia-Total (as N)	mg/l	0.02		0.02
07B04-2000	Broadboyne Br	16-13649	29/09/2016	Ammonia-Total (as N)	mg/l	0.043	0.02	0.043
07B04-2000	Broadboyne Br	16-15961	25/10/2016	Ammonia-Total (as N)	mg/l	0.01	0.02	0.02
07B04-2000	Broadboyne Br	16-18569	14/11/2016	Ammonia-Total (as N)	mg/l	0.041	0.02	0.041
07B04-2000	Broadboyne Br	16-1076	17/11/2016	Ammonia-Total (as N)	mg/l	0.029		0.029
07B04-2000	Broadboyne Br	16-1088	21/11/2016	Ammonia-Total (as N)	mg/l	0.089		0.089
07B04-2000	Broadboyne Br	16-19395	07/12/2016	Ammonia-Total (as N)	mg/l	0.024	0.02	0.024
07B04-2000	Broadboyne Br	16-1206	12/12/2016	Ammonia-Total (as N)	mg/l	0.067		0.067
07B04-2000	Broadboyne Br	17-00560	26/01/2017	Ammonia-Total (as N)	mg/l	0.043	0.02	0.043
07B04-2000	Broadboyne Br	17-02290	16/02/2017	Ammonia-Total (as N)	mg/l	0.01	0.02	0.02
07B04-2000	Broadboyne Br	17-0124	27/02/2017	Ammonia-Total (as N)	mg/l	0.066		0.066

StationFullCode	Station_Name	Samp_Code	Samp_Date	Prm_Desc	Unit_Code	Meas_Result	LimitOfDetection	Results
07B04-2000	Broadboyne Br	17-03783	23/03/2017	Ammonia-Total (as N)	mg/l	0.13	0.02	0.13
07B04-2000	Broadboyne Br	17-05491	06/04/2017	Ammonia-Total (as N)	mg/l	0.01	0.02	0.02
07B04-2000	Broadboyne Br	17-0260	19/04/2017	Ammonia-Total (as N)	mg/l	0.009		0.009
07B04-2000	Broadboyne Br	17-0304	04/05/2017	Ammonia-Total (as N)	mg/l	0.01		0.01
07B04-2000	Broadboyne Br	17-06631	25/05/2017	Ammonia-Total (as N)	mg/l	0.01	0.02	0.02
07B04-2000	Broadboyne Br	17-08777	08/06/2017	Ammonia-Total (as N)	mg/l	0.01	0.02	0.02
07B04-2000	Broadboyne Br	17-0456	14/06/2017	Ammonia-Total (as N)	mg/l	0.08		0.08
07B04-2000	Broadboyne Br	17-0508	05/07/2017	Ammonia-Total (as N)	mg/l	0.022		0.022
07B04-2000	Broadboyne Br	17-11840	31/07/2017	Ammonia-Total (as N)	mg/l	0.01	0.02	0.02
07B04-2000	Broadboyne Br	17-12053	10/08/2017	Ammonia-Total (as N)	mg/l	0.01	0.02	0.02
07B04-2000	Broadboyne Br	17-0646	21/08/2017	Ammonia-Total (as N)	mg/l	0.003		0.003
07B04-2000	Broadboyne Br	17-0707	20/09/2017	Ammonia-Total (as N)	mg/l	0.017		0.017
07B04-2000	Broadboyne Br	17-16200	28/09/2017	Ammonia-Total (as N)	mg/l	0.04	0.02	0.04
07B04-2000	Broadboyne Br	17-0790	12/10/2017	Ammonia-Total (as N)	mg/l	0.029		0.029
07B04-2000	Broadboyne Br	17-18679	25/10/2017	Ammonia-Total (as N)	mg/l	0.022	0.02	0.022
07B04-2000	Broadboyne Br	17-0858	26/10/2017	Ammonia-Total (as N)	mg/l	0.041		0.041
07B04-2000	Broadboyne Br	17-18794	23/11/2017	Ammonia-Total (as N)	mg/l	0.085	0.02	0.085
07B04-2000	Broadboyne Br	17-19982	14/12/2017	Ammonia-Total (as N)	mg/l	0.066	0.02	0.066
07B04-2000	Broadboyne Br	18-00010	18/01/2018	Ammonia-Total (as N)	mg/l	0.1	0.02	0.1
07B04-2000	Broadboyne Br	18-01854	08/03/2018	Ammonia-Total (as N)	mg/l	0.079	0.02	0.079
07B04-2000	Broadboyne Br	18-02495	13/03/2018	Ammonia-Total (as N)	mg/l	0.033	0.02	0.033
07B04-2000	Broadboyne Br	18-04192	12/04/2018	Ammonia-Total (as N)	mg/l	0.037	0.02	0.037
07B04-2000	Broadboyne Br	18-06060	01/05/2018	Ammonia-Total (as N)	mg/l	0.01	0.02	0.02
07B04-2000	Broadboyne Br	18-08015	15/06/2018	Ammonia-Total (as N)	mg/l	0.01	0.02	0.02
07B04-2000	Broadboyne Br	18-10331	11/07/2018	Ammonia-Total (as N)	mg/l	0.01	0.02	0.02
07B04-2000	Broadboyne Br	18-12253	14/08/2018	Ammonia-Total (as N)	mg/l	0.01	0.02	0.02
07B04-2000	Broadboyne Br	18-13901	27/09/2018	Ammonia-Total (as N)	mg/l	0.01	0.02	0.02

StationFullCode	Station_Name	Samp_Code	Samp_Date	Prm_Desc	Unit_Code	Meas_Result	LimitOfDetection	Results
07B04-2000	Broadboyne Br	18-16373	24/10/2018	Ammonia-Total (as N)	mg/l	0.021	0.02	0.021
07B04-2000	Broadboyne Br	18-18054	20/11/2018	Ammonia-Total (as N)	mg/l	0.045	0.02	0.045
07B04-2000	Broadboyne Br	18-18840	05/12/2018	Ammonia-Total (as N)	mg/l	0.082	0.02	0.082
07B04-2000	Broadboyne Br	19-01976	21/02/2019	Ammonia-Total (as N)	mg/l	0.031	0.02	0.031
07B04-2000	Broadboyne Br	19-0111	27/02/2019	Ammonia-Total (as N)	mg/l	0.025		0.025
07B04-2000	Broadboyne Br	19-0191	29/03/2019	Ammonia-Total (as N)	mg/l	0.0075	0.015	0.015
07B04-2000	Broadboyne Br	19-04279	09/04/2019	Ammonia-Total (as N)	mg/l	0.01	0.02	0.02
07B04-2000	Broadboyne Br	19-0278	30/04/2019	Ammonia-Total (as N)	mg/l	0.028		0.028
07B04-2000	Broadboyne Br	19-07544	20/06/2019	Ammonia-Total (as N)	mg/l	0.01	0.02	0.02
07B04-2000	Broadboyne Br	19-0448	27/06/2019	Ammonia-Total (as N)	mg/l	0.0075	0.015	0.015
07B04-2000	Broadboyne Br	19-0484	17/07/2019	Ammonia-Total (as N)	mg/l	0.0075	0.015	0.015
07B04-2000	Broadboyne Br	19-13431	12/09/2019	Ammonia-Total (as N)	mg/l	0.01	0.02	0.02
07B04-2000	Broadboyne Br	19-0742	31/10/2019	Ammonia-Total (as N)	mg/l	0.026		0.026
07B04-2000	Broadboyne Br	19-0763	19/11/2019	Ammonia-Total (as N)	mg/l	0.034		0.034
07B04-2000	Broadboyne Br	19-0789	22/11/2019	Ammonia-Total (as N)	mg/l	0.026		0.026
07B04-2000	Broadboyne Br	19-0835	29/11/2019	Ammonia-Total (as N)	mg/l	0.032		0.032
07B04-2000	Broadboyne Br	19-0916	05/12/2019	Ammonia-Total (as N)	mg/l	0.026		0.026
07B04-2000	Broadboyne Br	16-00147	20/01/2016	BOD - 5 days (Total)	mg/l	0.5	1	1
07B04-2000	Broadboyne Br	16-01228	15/02/2016	BOD - 5 days (Total)	mg/l	1	1	1
07B04-2000	Broadboyne Br	16-02884	21/03/2016	BOD - 5 days (Total)	mg/l	0.5	1	1
07B04-2000	Broadboyne Br	16-04858	18/04/2016	BOD - 5 days (Total)	mg/l	0.5	1	1
07B04-2000	Broadboyne Br	16-06216	09/05/2016	BOD - 5 days (Total)	mg/l	1.5	1	1.5
07B04-2000	Broadboyne Br	16-07738	08/06/2016	BOD - 5 days (Total)	mg/l	1.4	1	1.4
07B04-2000	Broadboyne Br	16-0606	15/06/2016	BOD - 5 days (Total)	mg/l	1.5		1.5
07B04-2000	Broadboyne Br	16-0669	05/07/2016	BOD - 5 days (Total)	mg/l	1.01		1.01
07B04-2000	Broadboyne Br	16-11468	20/07/2016	BOD - 5 days (Total)	mg/l	0.5	1	1
07B04-2000	Broadboyne Br	16-0738	02/08/2016	BOD - 5 days (Total)	mg/l	1.79		1.79

StationFullCode	Station_Name	Samp_Code	Samp_Date	Prm_Desc	Unit_Code	Meas_Result	LimitOfDetection	Results
07B04-2000	Broadboyne Br	16-12792	17/08/2016	BOD - 5 days (Total)	mg/l	0.5	1	1
07B04-2000	Broadboyne Br	16-0819	25/08/2016	BOD - 5 days (Total)	mg/l	3.3		3.3
07B04-2000	Broadboyne Br	16-0878	07/09/2016	BOD - 5 days (Total)	mg/l	1.32		1.32
07B04-2000	Broadboyne Br	16-0891	12/09/2016	BOD - 5 days (Total)	mg/l	1.66		1.66
07B04-2000	Broadboyne Br	16-0916	19/09/2016	BOD - 5 days (Total)	mg/l	1.66		1.66
07B04-2000	Broadboyne Br	16-13649	29/09/2016	BOD - 5 days (Total)	mg/l	0.5	1	1
07B04-2000	Broadboyne Br	16-15961	25/10/2016	BOD - 5 days (Total)	mg/l	0.5	1	1
07B04-2000	Broadboyne Br	16-18569	14/11/2016	BOD - 5 days (Total)	mg/l	1.2	1	1.2
07B04-2000	Broadboyne Br	16-1076	17/11/2016	BOD - 5 days (Total)	mg/l	1.37		1.37
07B04-2000	Broadboyne Br	16-1088	21/11/2016	BOD - 5 days (Total)	mg/l	1.69		1.69
07B04-2000	Broadboyne Br	16-19395	07/12/2016	BOD - 5 days (Total)	mg/l	0.5	1	1
07B04-2000	Broadboyne Br	16-1206	12/12/2016	BOD - 5 days (Total)	mg/l	1.01		1.01
07B04-2000	Broadboyne Br	17-00560	26/01/2017	BOD - 5 days (Total)	mg/l	0.5	1	1
07B04-2000	Broadboyne Br	17-02290	16/02/2017	BOD - 5 days (Total)	mg/l	0.5	1	1
07B04-2000	Broadboyne Br	17-0124	27/02/2017	BOD - 5 days (Total)	mg/l	2.52		2.52
07B04-2000	Broadboyne Br	17-03783	23/03/2017	BOD - 5 days (Total)	mg/l	2.5	1	2.5
07B04-2000	Broadboyne Br	17-05491	06/04/2017	BOD - 5 days (Total)	mg/l	0.5	1	1
07B04-2000	Broadboyne Br	17-0260	19/04/2017	BOD - 5 days (Total)	mg/l	1.02		1.02
07B04-2000	Broadboyne Br	17-0304	04/05/2017	BOD - 5 days (Total)	mg/l	1.07		1.07
07B04-2000	Broadboyne Br	17-06631	25/05/2017	BOD - 5 days (Total)	mg/l	0.5	1	1
07B04-2000	Broadboyne Br	17-08777	08/06/2017	BOD - 5 days (Total)	mg/l	1	1	1
07B04-2000	Broadboyne Br	17-0456	14/06/2017	BOD - 5 days (Total)	mg/l	0.5	1	1
07B04-2000	Broadboyne Br	17-0508	05/07/2017	BOD - 5 days (Total)	mg/l	1.53		1.53
07B04-2000	Broadboyne Br	17-12053	10/08/2017	BOD - 5 days (Total)	mg/l	0.5	1	1
07B04-2000	Broadboyne Br	17-0646	21/08/2017	BOD - 5 days (Total)	mg/l	0.98		0.98
07B04-2000	Broadboyne Br	17-0665	24/08/2017	BOD - 5 days (Total)	mg/l	0.66		0.66
07B04-2000	Broadboyne Br	17-0707	20/09/2017	BOD - 5 days (Total)	mg/l	1.32		1.32

StationFullCode	Station_Name	Samp_Code	Samp_Date	Prm_Desc	Unit_Code	Meas_Result	LimitOfDetection	Results
07B04-2000	Broadboyne Br	17-16200	28/09/2017	BOD - 5 days (Total)	mg/l	1.9	1	1.9
07B04-2000	Broadboyne Br	17-0790	12/10/2017	BOD - 5 days (Total)	mg/l	0.87		0.87
07B04-2000	Broadboyne Br	17-18679	25/10/2017	BOD - 5 days (Total)	mg/l	1	1	1
07B04-2000	Broadboyne Br	17-0858	26/10/2017	BOD - 5 days (Total)	mg/l	1.64		1.64
07B04-2000	Broadboyne Br	17-18794	23/11/2017	BOD - 5 days (Total)	mg/l	4	1	4
07B04-2000	Broadboyne Br	17-19982	14/12/2017	BOD - 5 days (Total)	mg/l	1.1	1	1.1
07B04-2000	Broadboyne Br	18-00010	18/01/2018	BOD - 5 days (Total)	mg/l	2	1	2
07B04-2000	Broadboyne Br	18-01854	08/03/2018	BOD - 5 days (Total)	mg/l	1.1	1	1.1
07B04-2000	Broadboyne Br	18-02495	13/03/2018	BOD - 5 days (Total)	mg/l	0.5	1	1
07B04-2000	Broadboyne Br	18-04192	12/04/2018	BOD - 5 days (Total)	mg/l	1	1	1
07B04-2000	Broadboyne Br	18-06060	01/05/2018	BOD - 5 days (Total)	mg/l	1.1	1	1.1
07B04-2000	Broadboyne Br	18-08015	15/06/2018	BOD - 5 days (Total)	mg/l	0.5	1	1
07B04-2000	Broadboyne Br	18-10331	11/07/2018	BOD - 5 days (Total)	mg/l	1.2	1	1.2
07B04-2000	Broadboyne Br	18-12253	14/08/2018	BOD - 5 days (Total)	mg/l	0.5	1	1
07B04-2000	Broadboyne Br	18-13901	27/09/2018	BOD - 5 days (Total)	mg/l	0.5	1	1
07B04-2000	Broadboyne Br	18-16373	24/10/2018	BOD - 5 days (Total)	mg/l	0.5	1	1
07B04-2000	Broadboyne Br	18-18054	20/11/2018	BOD - 5 days (Total)	mg/l	0.5	1	1
07B04-2000	Broadboyne Br	18-18840	05/12/2018	BOD - 5 days (Total)	mg/l	1.3	1	1.3
07B04-2000	Broadboyne Br	19-01976	21/02/2019	BOD - 5 days (Total)	mg/l	0.5	1	1
07B04-2000	Broadboyne Br	19-0111	27/02/2019	BOD - 5 days (Total)	mg/l	0.97		0.97
07B04-2000	Broadboyne Br	19-0191	29/03/2019	BOD - 5 days (Total)	mg/l	1.13		1.13
07B04-2000	Broadboyne Br	19-04279	09/04/2019	BOD - 5 days (Total)	mg/l	0.5	1	1
07B04-2000	Broadboyne Br	19-0278	30/04/2019	BOD - 5 days (Total)	mg/l	1.3		1.3
07B04-2000	Broadboyne Br	19-07544	20/06/2019	BOD - 5 days (Total)	mg/l	1.7	1	1.7
07B04-2000	Broadboyne Br	19-0448	27/06/2019	BOD - 5 days (Total)	mg/l	1.43		1.43
07B04-2000	Broadboyne Br	19-0484	17/07/2019	BOD - 5 days (Total)	mg/l	1.61		1.61
07B04-2000	Broadboyne Br	19-13431	12/09/2019	BOD - 5 days (Total)	mg/l	1.1	1	1.1

StationFullCode	Station_Name	Samp_Code	Samp_Date	Prm_Desc	Unit_Code	Meas_Result	LimitOfDetection	Results
07B04-2000	Broadboyne Br	19-0742	31/10/2019	BOD - 5 days (Total)	mg/l	1.71		1.71
07B04-2000	Broadboyne Br	19-0763	19/11/2019	BOD - 5 days (Total)	mg/l	1.85		1.85
07B04-2000	Broadboyne Br	19-0789	22/11/2019	BOD - 5 days (Total)	mg/l	0.78		0.78
07B04-2000	Broadboyne Br	19-0835	29/11/2019	BOD - 5 days (Total)	mg/l	1.83		1.83
07B04-2000	Broadboyne Br	19-0916	05/12/2019	BOD - 5 days (Total)	mg/l	1.02		1.02
07B04-2000	Broadboyne Br	16-00147	20/01/2016	Chloride	mg/l	18.4	2	18.4
07B04-2000	Broadboyne Br	16-01228	15/02/2016	Chloride	mg/l	17.9	2	17.9
07B04-2000	Broadboyne Br	16-02884	21/03/2016	Chloride	mg/l	19	2	19
07B04-2000	Broadboyne Br	16-04858	18/04/2016	Chloride	mg/l	17.2	2	17.2
07B04-2000	Broadboyne Br	16-06216	09/05/2016	Chloride	mg/l	20.6	2	20.6
07B04-2000	Broadboyne Br	16-07738	08/06/2016	Chloride	mg/l	21.4	2	21.4
07B04-2000	Broadboyne Br	16-11468	20/07/2016	Chloride	mg/l	20.5	2	20.5
07B04-2000	Broadboyne Br	16-12792	17/08/2016	Chloride	mg/l	21.9	2	21.9
07B04-2000	Broadboyne Br	16-13649	29/09/2016	Chloride	mg/l	18.8	2	18.8
07B04-2000	Broadboyne Br	16-15961	25/10/2016	Chloride	mg/l	19.4	2	19.4
07B04-2000	Broadboyne Br	16-18569	14/11/2016	Chloride	mg/l	19.5	2	19.5
07B04-2000	Broadboyne Br	16-19395	07/12/2016	Chloride	mg/l	20	2	20
07B04-2000	Broadboyne Br	17-00560	26/01/2017	Chloride	mg/l	20.1	2	20.1
07B04-2000	Broadboyne Br	17-02290	16/02/2017	Chloride	mg/l	19.9	2	19.9
07B04-2000	Broadboyne Br	17-03783	23/03/2017	Chloride	mg/l	18.7	2	18.7
07B04-2000	Broadboyne Br	17-05491	06/04/2017	Chloride	mg/l	18.6	2	18.6
07B04-2000	Broadboyne Br	17-06631	25/05/2017	Chloride	mg/l	22.5	2	22.5
07B04-2000	Broadboyne Br	17-08777	08/06/2017	Chloride	mg/l	25.3	2	25.3
07B04-2000	Broadboyne Br	17-11840	31/07/2017	Chloride	mg/l	22.5	2	22.5
07B04-2000	Broadboyne Br	17-12053	10/08/2017	Chloride	mg/l	22.2	2	22.2
07B04-2000	Broadboyne Br	17-16200	28/09/2017	Chloride	mg/l	18.2	2	18.2
07B04-2000	Broadboyne Br	17-18679	25/10/2017	Chloride	mg/l	17.9	2	17.9

StationFullCode	Station_Name	Samp_Code	Samp_Date	Prm_Desc	Unit_Code	Meas_Result	LimitOfDetection	Results
07B04-2000	Broadboyne Br	17-18794	23/11/2017	Chloride	mg/l	16.3	2	16.3
07B04-2000	Broadboyne Br	17-19982	14/12/2017	Chloride	mg/l	22.3	2	22.3
07B04-2000	Broadboyne Br	18-00010	18/01/2018	Chloride	mg/l	23.1	2	23.1
07B04-2000	Broadboyne Br	18-01854	08/03/2018	Chloride	mg/l	29.4	2	29.4
07B04-2000	Broadboyne Br	18-02495	13/03/2018	Chloride	mg/l	24.2	2	24.2
07B04-2000	Broadboyne Br	18-04192	12/04/2018	Chloride	mg/l	21.3	2	21.3
07B04-2000	Broadboyne Br	18-06060	01/05/2018	Chloride	mg/l	21.6	2	21.6
07B04-2000	Broadboyne Br	18-08015	15/06/2018	Chloride	mg/l	22.9	2	22.9
07B04-2000	Broadboyne Br	18-10331	11/07/2018	Chloride	mg/l	27.7	2	27.7
07B04-2000	Broadboyne Br	18-12253	14/08/2018	Chloride	mg/l	27.6	2	27.6
07B04-2000	Broadboyne Br	18-13901	27/09/2018	Chloride	mg/l	30.4	2	30.4
07B04-2000	Broadboyne Br	18-16373	24/10/2018	Chloride	mg/l	30.9	2	30.9
07B04-2000	Broadboyne Br	18-18054	20/11/2018	Chloride	mg/l	27.6	2	27.6
07B04-2000	Broadboyne Br	18-18840	05/12/2018	Chloride	mg/l	25.6	2	25.6
07B04-2000	Broadboyne Br	19-01976	21/02/2019	Chloride	mg/l	24.8	2	24.8
07B04-2000	Broadboyne Br	19-04279	09/04/2019	Chloride	mg/l	23	2	23
07B04-2000	Broadboyne Br	19-07544	20/06/2019	Chloride	mg/l	23.3	2	23.3
07B04-2000	Broadboyne Br	19-13431	12/09/2019	Chloride	mg/l	22.8	2	22.8
07B04-2000	Broadboyne Br	16-00147	20/01/2016	Nitrate (as N)	mg/l	2.4	0.2	2.4
07B04-2000	Broadboyne Br	16-01228	15/02/2016	Nitrate (as N)	mg/l	2.3	0.2	2.3
07B04-2000	Broadboyne Br	16-02884	21/03/2016	Nitrate (as N)	mg/l	2.8	0.2	2.8
07B04-2000	Broadboyne Br	16-04858	18/04/2016	Nitrate (as N)	mg/l	2	0.2	2
07B04-2000	Broadboyne Br	16-06216	09/05/2016	Nitrate (as N)	mg/l	2.1	0.2	2.1
07B04-2000	Broadboyne Br	16-07738	08/06/2016	Nitrate (as N)	mg/l	1.6	0.2	1.6
07B04-2000	Broadboyne Br	16-11468	20/07/2016	Nitrate (as N)	mg/l	0.81	0.2	0.81
07B04-2000	Broadboyne Br	16-12792	17/08/2016	Nitrate (as N)	mg/l	1.4	0.2	1.4
07B04-2000	Broadboyne Br	16-13649	29/09/2016	Nitrate (as N)	mg/l	1.4	0.2	1.4

StationFullCode	Station_Name	Samp_Code	Samp_Date	Prm_Desc	Unit_Code	Meas_Result	LimitOfDetection	Results
07B04-2000	Broadboyne Br	16-15961	25/10/2016	Nitrate (as N)	mg/l	1.5	0.2	1.5
07B04-2000	Broadboyne Br	16-18569	14/11/2016	Nitrate (as N)	mg/l	1.5	0.2	1.5
07B04-2000	Broadboyne Br	16-19395	07/12/2016	Nitrate (as N)	mg/l	1.9	0.2	1.9
07B04-2000	Broadboyne Br	17-00560	26/01/2017	Nitrate (as N)	mg/l	2.3	0.2	2.3
07B04-2000	Broadboyne Br	17-02290	16/02/2017	Nitrate (as N)	mg/l	2	0.2	2
07B04-2000	Broadboyne Br	17-03783	23/03/2017	Nitrate (as N)	mg/l	2.7	0.2	2.7
07B04-2000	Broadboyne Br	17-05491	06/04/2017	Nitrate (as N)	mg/l	3	0.2	3
07B04-2000	Broadboyne Br	17-06631	25/05/2017	Nitrate (as N)	mg/l	1.4	0.2	1.4
07B04-2000	Broadboyne Br	17-08777	08/06/2017	Nitrate (as N)	mg/l	1.4	0.2	1.4
07B04-2000	Broadboyne Br	17-11840	31/07/2017	Nitrate (as N)	mg/l	1.2	0.2	1.2
07B04-2000	Broadboyne Br	17-12053	10/08/2017	Nitrate (as N)	mg/l	0.77	0.2	0.77
07B04-2000	Broadboyne Br	17-16200	28/09/2017	Nitrate (as N)	mg/l	1.4	0.2	1.4
07B04-2000	Broadboyne Br	17-18679	25/10/2017	Nitrate (as N)	mg/l	2.2	0.2	2.2
07B04-2000	Broadboyne Br	17-18794	23/11/2017	Nitrate (as N)	mg/l	2.4	0.2	2.4
07B04-2000	Broadboyne Br	17-19982	14/12/2017	Nitrate (as N)	mg/l	2.5	0.2	2.5
07B04-2000	Broadboyne Br	18-00010	18/01/2018	Nitrate (as N)	mg/l	2.2	0.2	2.2
07B04-2000	Broadboyne Br	18-01854	08/03/2018	Nitrate (as N)	mg/l	2.6	0.2	2.6
07B04-2000	Broadboyne Br	18-02495	13/03/2018	Nitrate (as N)	mg/l	2.7	0.2	2.7
07B04-2000	Broadboyne Br	18-04192	12/04/2018	Nitrate (as N)	mg/l	2.5	0.2	2.5
07B04-2000	Broadboyne Br	18-06060	01/05/2018	Nitrate (as N)	mg/l	2.3	0.2	2.3
07B04-2000	Broadboyne Br	18-08015	15/06/2018	Nitrate (as N)	mg/l	1.6	0.2	1.6
07B04-2000	Broadboyne Br	18-10331	11/07/2018	Nitrate (as N)	mg/l	1.2	0.2	1.2
07B04-2000	Broadboyne Br	18-12253	14/08/2018	Nitrate (as N)	mg/l	0.96	0.2	0.96
07B04-2000	Broadboyne Br	18-13901	27/09/2018	Nitrate (as N)	mg/l	1.3	0.2	1.3
07B04-2000	Broadboyne Br	18-16373	24/10/2018	Nitrate (as N)	mg/l	1.5	0.2	1.5
07B04-2000	Broadboyne Br	18-18054	20/11/2018	Nitrate (as N)	mg/l	2.1	0.2	2.1
07B04-2000	Broadboyne Br	18-18840	05/12/2018	Nitrate (as N)	mg/l	4.1	0.2	4.1

StationFullCode	Station_Name	Samp_Code	Samp_Date	Prm_Desc	Unit_Code	Meas_Result	LimitOfDetection	Results
07B04-2000	Broadboyne Br	19-01976	21/02/2019	Nitrate (as N)	mg/l	3.4	0.2	3.4
07B04-2000	Broadboyne Br	19-04279	09/04/2019	Nitrate (as N)	mg/l	3.2	0.2	3.2
07B04-2000	Broadboyne Br	19-07544	20/06/2019	Nitrate (as N)	mg/l	2	0.2	2
07B04-2000	Broadboyne Br	19-13431	12/09/2019	Nitrate (as N)	mg/l	2.3	0.2	2.3
07B04-2000	Broadboyne Br	16-00147	20/01/2016	ortho-Phosphate (as P) - unspecified	mg/l	0.034	0.01	0.034
07B04-2000	Broadboyne Br	16-01228	15/02/2016	ortho-Phosphate (as P) - unspecified	mg/l	0.035	0.01	0.035
07B04-2000	Broadboyne Br	16-02884	21/03/2016	ortho-Phosphate (as P) - unspecified	mg/l	0.035	0.01	0.035
07B04-2000	Broadboyne Br	16-04858	18/04/2016	ortho-Phosphate (as P) - unspecified	mg/l	0.021	0.01	0.021
07B04-2000	Broadboyne Br	16-06216	09/05/2016	ortho-Phosphate (as P) - unspecified	mg/l	0.013	0.01	0.013
07B04-2000	Broadboyne Br	16-07738	08/06/2016	ortho-Phosphate (as P) - unspecified	mg/l	0.005	0.01	0.01
07B04-2000	Broadboyne Br	16-0606	15/06/2016	ortho-Phosphate (as P) - unspecified	mg/l	0.037		0.037
07B04-2000	Broadboyne Br	16-0669	05/07/2016	ortho-Phosphate (as P) - unspecified	mg/l	0.037		0.037
07B04-2000	Broadboyne Br	16-11468	20/07/2016	ortho-Phosphate (as P) - unspecified	mg/l	0.031	0.01	0.031
07B04-2000	Broadboyne Br	16-0738	02/08/2016	ortho-Phosphate (as P) - unspecified	mg/l	0.024		0.024
07B04-2000	Broadboyne Br	16-12792	17/08/2016	ortho-Phosphate (as P) - unspecified	mg/l	0.018	0.01	0.018
07B04-2000	Broadboyne Br	16-0819	25/08/2016	ortho-Phosphate (as P) - unspecified	mg/l	0.046		0.046
07B04-2000	Broadboyne Br	16-0878	07/09/2016	ortho-Phosphate (as P) - unspecified	mg/l	0.06		0.06
07B04-2000	Broadboyne Br	16-0891	12/09/2016	ortho-Phosphate (as P) - unspecified	mg/l	0.043		0.043
07B04-2000	Broadboyne Br	16-0916	19/09/2016	ortho-Phosphate (as P) - unspecified	mg/l	0.043		0.043
07B04-2000	Broadboyne Br	16-13649	29/09/2016	ortho-Phosphate (as P) - unspecified	mg/l	0.042	0.01	0.042
07B04-2000	Broadboyne Br	16-15961	25/10/2016	ortho-Phosphate (as P) - unspecified	mg/l	0.034	0.01	0.034
07B04-2000	Broadboyne Br	16-18569	14/11/2016	ortho-Phosphate (as P) - unspecified	mg/l	0.04	0.01	0.04
07B04-2000	Broadboyne Br	16-1076	17/11/2016	ortho-Phosphate (as P) - unspecified	mg/l	0.044		0.044
07B04-2000	Broadboyne Br	16-1088	21/11/2016	ortho-Phosphate (as P) - unspecified	mg/l	0.045		0.045
07B04-2000	Broadboyne Br	16-19395	07/12/2016	ortho-Phosphate (as P) - unspecified	mg/l	0.039	0.01	0.039
07B04-2000	Broadboyne Br	16-1206	12/12/2016	ortho-Phosphate (as P) - unspecified	mg/l	0.069		0.069
07B04-2000	Broadboyne Br	17-00560	26/01/2017	ortho-Phosphate (as P) - unspecified	mg/l	0.05	0.01	0.05

StationFullCode	Station_Name	Samp_Code	Samp_Date	Prm_Desc	Unit_Code	Meas_Result	LimitOfDetection	Results
07B04-2000	Broadboyne Br	17-02290	16/02/2017	ortho-Phosphate (as P) - unspecified	mg/l	0.031	0.01	0.031
07B04-2000	Broadboyne Br	17-0124	27/02/2017	ortho-Phosphate (as P) - unspecified	mg/l	0.047		0.047
07B04-2000	Broadboyne Br	17-03783	23/03/2017	ortho-Phosphate (as P) - unspecified	mg/l	0.068	0.01	0.068
07B04-2000	Broadboyne Br	17-05491	06/04/2017	ortho-Phosphate (as P) - unspecified	mg/l	0.011	0.01	0.011
07B04-2000	Broadboyne Br	17-0260	19/04/2017	ortho-Phosphate (as P) - unspecified	mg/l	0.05		0.05
07B04-2000	Broadboyne Br	17-0304	04/05/2017	ortho-Phosphate (as P) - unspecified	mg/l	0.005	0.01	0.01
07B04-2000	Broadboyne Br	17-06631	25/05/2017	ortho-Phosphate (as P) - unspecified	mg/l	0.005	0.01	0.01
07B04-2000	Broadboyne Br	17-08777	08/06/2017	ortho-Phosphate (as P) - unspecified	mg/l	0.005	0.01	0.01
07B04-2000	Broadboyne Br	17-0456	14/06/2017	ortho-Phosphate (as P) - unspecified	mg/l	0.03		0.03
07B04-2000	Broadboyne Br	17-0508	05/07/2017	ortho-Phosphate (as P) - unspecified	mg/l	0.005	0.01	0.01
07B04-2000	Broadboyne Br	17-11840	31/07/2017	ortho-Phosphate (as P) - unspecified	mg/l	0.03	0.01	0.03
07B04-2000	Broadboyne Br	17-12053	10/08/2017	ortho-Phosphate (as P) - unspecified	mg/l	0.019	0.01	0.019
07B04-2000	Broadboyne Br	17-0646	21/08/2017	ortho-Phosphate (as P) - unspecified	mg/l	0.037		0.037
07B04-2000	Broadboyne Br	17-0707	20/09/2017	ortho-Phosphate (as P) - unspecified	mg/l	0.044		0.044
07B04-2000	Broadboyne Br	17-16200	28/09/2017	ortho-Phosphate (as P) - unspecified	mg/l	0.031	0.01	0.031
07B04-2000	Broadboyne Br	17-0790	12/10/2017	ortho-Phosphate (as P) - unspecified	mg/l	0.036		0.036
07B04-2000	Broadboyne Br	17-18679	25/10/2017	ortho-Phosphate (as P) - unspecified	mg/l	0.023	0.01	0.023
07B04-2000	Broadboyne Br	17-0858	26/10/2017	ortho-Phosphate (as P) - unspecified	mg/l	0.061		0.061
07B04-2000	Broadboyne Br	17-18794	23/11/2017	ortho-Phosphate (as P) - unspecified	mg/l	0.11	0.01	0.11
07B04-2000	Broadboyne Br	17-19982	14/12/2017	ortho-Phosphate (as P) - unspecified	mg/l	0.034	0.01	0.034
07B04-2000	Broadboyne Br	18-00010	18/01/2018	ortho-Phosphate (as P) - unspecified	mg/l	0.031	0.01	0.031
07B04-2000	Broadboyne Br	18-01854	08/03/2018	ortho-Phosphate (as P) - unspecified	mg/l	0.02	0.01	0.02
07B04-2000	Broadboyne Br	18-02495	13/03/2018	ortho-Phosphate (as P) - unspecified	mg/l	0.005	0.01	0.01
07B04-2000	Broadboyne Br	18-04192	12/04/2018	ortho-Phosphate (as P) - unspecified	mg/l	0.005	0.01	0.01
07B04-2000	Broadboyne Br	18-06060	01/05/2018	ortho-Phosphate (as P) - unspecified	mg/l	0.005	0.01	0.01
07B04-2000	Broadboyne Br	18-08015	15/06/2018	ortho-Phosphate (as P) - unspecified	mg/l	0.005	0.01	0.01
07B04-2000	Broadboyne Br	18-10331	11/07/2018	ortho-Phosphate (as P) - unspecified	mg/l	0.005	0.01	0.01

StationFullCode	Station_Name	Samp_Code	Samp_Date	Prm_Desc	Unit_Code	Meas_Result	LimitOfDetection	Results
07B04-2000	Broadboyne Br	18-12253	14/08/2018	ortho-Phosphate (as P) - unspecified	mg/l	0.005	0.01	0.01
07B04-2000	Broadboyne Br	18-13901	27/09/2018	ortho-Phosphate (as P) - unspecified	mg/l	0.005	0.01	0.01
07B04-2000	Broadboyne Br	18-16373	24/10/2018	ortho-Phosphate (as P) - unspecified	mg/l	0.016	0.01	0.016
07B04-2000	Broadboyne Br	18-18054	20/11/2018	ortho-Phosphate (as P) - unspecified	mg/l	0.021	0.01	0.021
07B04-2000	Broadboyne Br	18-18840	05/12/2018	ortho-Phosphate (as P) - unspecified	mg/l	0.032	0.01	0.032
07B04-2000	Broadboyne Br	19-01976	21/02/2019	ortho-Phosphate (as P) - unspecified	mg/l	0.005	0.01	0.01
07B04-2000	Broadboyne Br	19-0111	27/02/2019	ortho-Phosphate (as P) - unspecified	mg/l	0.036		0.036
07B04-2000	Broadboyne Br	19-0191	29/03/2019	ortho-Phosphate (as P) - unspecified	mg/l	0.018		0.018
07B04-2000	Broadboyne Br	19-04279	09/04/2019	ortho-Phosphate (as P) - unspecified	mg/l	0.005	0.01	0.01
07B04-2000	Broadboyne Br	19-0278	30/04/2019	ortho-Phosphate (as P) - unspecified	mg/l	0.019		0.019
07B04-2000	Broadboyne Br	19-07544	20/06/2019	ortho-Phosphate (as P) - unspecified	mg/l	0.021	0.01	0.021
07B04-2000	Broadboyne Br	19-0448	27/06/2019	ortho-Phosphate (as P) - unspecified	mg/l	0.0075	0.015	0.015
07B04-2000	Broadboyne Br	19-0484	17/07/2019	ortho-Phosphate (as P) - unspecified	mg/l	0.0075	0.015	0.015
07B04-2000	Broadboyne Br	19-13431	12/09/2019	ortho-Phosphate (as P) - unspecified	mg/l	0.016	0.01	0.016
07B04-2000	Broadboyne Br	19-0742	31/10/2019	ortho-Phosphate (as P) - unspecified	mg/l	0.042		0.042
07B04-2000	Broadboyne Br	19-0763	19/11/2019	ortho-Phosphate (as P) - unspecified	mg/l	0.046		0.046
07B04-2000	Broadboyne Br	19-0789	22/11/2019	ortho-Phosphate (as P) - unspecified	mg/l	0.036		0.036
07B04-2000	Broadboyne Br	19-0835	29/11/2019	ortho-Phosphate (as P) - unspecified	mg/l	0.046		0.046
07B04-2000	Broadboyne Br	19-0916	05/12/2019	ortho-Phosphate (as P) - unspecified	mg/l	0.043		0.043
07B04-2000	Broadboyne Br	16-00147	20/01/2016	pH	pH units	8	2	8
07B04-2000	Broadboyne Br	16-01228	15/02/2016	pH	pH units	8.1	2	8.1
07B04-2000	Broadboyne Br	16-02884	21/03/2016	pH	pH units	8.2	2	8.2
07B04-2000	Broadboyne Br	16-04858	18/04/2016	pH	pH units	8.2	2	8.2
07B04-2000	Broadboyne Br	16-06216	09/05/2016	pH	pH units	8.4	2	8.4
07B04-2000	Broadboyne Br	16-07738	08/06/2016	pH	pH units	8.1	2	8.1
07B04-2000	Broadboyne Br	16-0606	15/06/2016	pH	pH units	8.26		8.26
07B04-2000	Broadboyne Br	16-0669	05/07/2016	pH	pH units	8.43		8.43

StationFullCode	Station_Name	Samp_Code	Samp_Date	Prm_Desc	Unit_Code	Meas_Result	LimitOfDetection	Results
07B04-2000	Broadboyne Br	16-11468	20/07/2016	pH	pH units	8.2	2	8.2
07B04-2000	Broadboyne Br	16-0738	02/08/2016	pH	pH units	8.39		8.39
07B04-2000	Broadboyne Br	16-12792	17/08/2016	pH	pH units	8.2	2	8.2
07B04-2000	Broadboyne Br	16-0819	25/08/2016	pH	pH units	7.75		7.75
07B04-2000	Broadboyne Br	16-0878	07/09/2016	pH	pH units	7.96		7.96
07B04-2000	Broadboyne Br	16-0891	12/09/2016	pH	pH units	8.03		8.03
07B04-2000	Broadboyne Br	16-0916	19/09/2016	pH	pH units	8.09		8.09
07B04-2000	Broadboyne Br	16-13649	29/09/2016	pH	pH units	8.2	2	8.2
07B04-2000	Broadboyne Br	16-15961	25/10/2016	pH	pH units	8.3	2	8.3
07B04-2000	Broadboyne Br	16-18569	14/11/2016	pH	pH units	8.2	2	8.2
07B04-2000	Broadboyne Br	16-1076	17/11/2016	pH	pH units	8.14		8.14
07B04-2000	Broadboyne Br	16-1088	21/11/2016	pH	pH units	8.33		8.33
07B04-2000	Broadboyne Br	16-19395	07/12/2016	pH	pH units	8.2	2	8.2
07B04-2000	Broadboyne Br	16-1206	12/12/2016	pH	pH units	8.2		8.2
07B04-2000	Broadboyne Br	17-00560	26/01/2017	pH	pH units	8.2	2	8.2
07B04-2000	Broadboyne Br	17-02290	16/02/2017	pH	pH units	8.3	2	8.3
07B04-2000	Broadboyne Br	17-0124	27/02/2017	pH	pH units	8.06		8.06
07B04-2000	Broadboyne Br	17-03783	23/03/2017	pH	pH units	8.1	2	8.1
07B04-2000	Broadboyne Br	17-05491	06/04/2017	pH	pH units	8.3	2	8.3
07B04-2000	Broadboyne Br	17-0260	19/04/2017	pH	pH units	8.22		8.22
07B04-2000	Broadboyne Br	17-0304	04/05/2017	pH	pH units	8.34		8.34
07B04-2000	Broadboyne Br	17-06631	25/05/2017	pH	pH units	8.4	2	8.4
07B04-2000	Broadboyne Br	17-08777	08/06/2017	pH	pH units	8.3	2	8.3
07B04-2000	Broadboyne Br	17-0456	14/06/2017	pH	pH units	8.09		8.09
07B04-2000	Broadboyne Br	17-0508	05/07/2017	pH	pH units	8.26		8.26
07B04-2000	Broadboyne Br	17-11840	31/07/2017	pH	pH units	8.4	2	8.4
07B04-2000	Broadboyne Br	17-12053	10/08/2017	pH	pH units	8.4	2	8.4

StationFullCode	Station_Name	Samp_Code	Samp_Date	Prm_Desc	Unit_Code	Meas_Result	LimitOfDetection	Results
07B04-2000	Broadboyne Br	17-0646	21/08/2017	pH	pH units	8.25		8.25
07B04-2000	Broadboyne Br	17-0665	24/08/2017	pH	pH units	8.25		8.25
07B04-2000	Broadboyne Br	17-0707	20/09/2017	pH	pH units	8.46		8.46
07B04-2000	Broadboyne Br	17-16200	28/09/2017	pH	pH units	8.3	2	8.3
07B04-2000	Broadboyne Br	17-0790	12/10/2017	pH	pH units	8.27		8.27
07B04-2000	Broadboyne Br	17-18679	25/10/2017	pH	pH units	8.1	2	8.1
07B04-2000	Broadboyne Br	17-0858	26/10/2017	pH	pH units	8.02		8.02
07B04-2000	Broadboyne Br	17-18794	23/11/2017	pH	pH units	8	2	8
07B04-2000	Broadboyne Br	17-19982	14/12/2017	pH	pH units	8	2	8
07B04-2000	Broadboyne Br	18-00010	18/01/2018	pH	pH units	8.1	2	8.1
07B04-2000	Broadboyne Br	18-01854	08/03/2018	pH	pH units	8.2	2	8.2
07B04-2000	Broadboyne Br	18-02495	13/03/2018	pH	pH units	8.1	2	8.1
07B04-2000	Broadboyne Br	18-04192	12/04/2018	pH	pH units	8.2	2	8.2
07B04-2000	Broadboyne Br	18-06060	01/05/2018	pH	pH units	8.2	2	8.2
07B04-2000	Broadboyne Br	18-08015	15/06/2018	pH	pH units	8.3	2	8.3
07B04-2000	Broadboyne Br	18-10331	11/07/2018	pH	pH units	8.3	2	8.3
07B04-2000	Broadboyne Br	18-12253	14/08/2018	pH	pH units	8.2	2	8.2
07B04-2000	Broadboyne Br	18-13901	27/09/2018	pH	pH units	8.2	2	8.2
07B04-2000	Broadboyne Br	18-16373	24/10/2018	pH	pH units	8.2	2	8.2
07B04-2000	Broadboyne Br	18-18054	20/11/2018	pH	pH units	8.1	2	8.1
07B04-2000	Broadboyne Br	18-18840	05/12/2018	pH	pH units	8	2	8
07B04-2000	Broadboyne Br	19-01976	21/02/2019	pH	pH units	8.2	2	8.2
07B04-2000	Broadboyne Br	19-0111	27/02/2019	pH	pH units	8.14		8.14
07B04-2000	Broadboyne Br	19-0191	29/03/2019	pH	pH units	8.18		8.18
07B04-2000	Broadboyne Br	19-04279	09/04/2019	pH	pH units	8.3	2	8.3
07B04-2000	Broadboyne Br	19-0278	30/04/2019	pH	pH units	8.08		8.08
07B04-2000	Broadboyne Br	19-07544	20/06/2019	pH	pH units	8.4	2	8.4

StationFullCode	Station_Name	Samp_Code	Samp_Date	Prm_Desc	Unit_Code	Meas_Result	LimitOfDetection	Results
07B04-2000	Broadboyne Br	19-0448	27/06/2019	pH	pH units	8.08		8.08
07B04-2000	Broadboyne Br	19-0484	17/07/2019	pH	pH units	8.17		8.17
07B04-2000	Broadboyne Br	19-13431	12/09/2019	pH	pH units	8.3	2	8.3
07B04-2000	Broadboyne Br	19-0742	31/10/2019	pH	pH units	8.01		8.01
07B04-2000	Broadboyne Br	19-0763	19/11/2019	pH	pH units	8.12		8.12
07B04-2000	Broadboyne Br	19-0789	22/11/2019	pH	pH units	8.09		8.09
07B04-2000	Broadboyne Br	19-0835	29/11/2019	pH	pH units	8.04		8.04
07B04-2000	Broadboyne Br	19-0916	05/12/2019	pH	pH units	8.17		8.17
07B04-2000	Broadboyne Br	16-00147	20/01/2016	Temperature	Â°C	6.1		6.1
07B04-2000	Broadboyne Br	16-01228	15/02/2016	Temperature	Â°C	5.4		5.4
07B04-2000	Broadboyne Br	16-02884	21/03/2016	Temperature	Â°C	7.8		7.8
07B04-2000	Broadboyne Br	16-04858	18/04/2016	Temperature	Â°C	9.3		9.3
07B04-2000	Broadboyne Br	16-06216	09/05/2016	Temperature	Â°C	14.6		14.6
07B04-2000	Broadboyne Br	16-07738	08/06/2016	Temperature	Â°C	18.3		18.3
07B04-2000	Broadboyne Br	16-11468	20/07/2016	Temperature	Â°C	21.8		21.8
07B04-2000	Broadboyne Br	16-12792	17/08/2016	Temperature	Â°C	18.2		18.2
07B04-2000	Broadboyne Br	16-13649	29/09/2016	Temperature	Â°C	14.7		14.7
07B04-2000	Broadboyne Br	16-15961	25/10/2016	Temperature	Â°C	9.3		9.3
07B04-2000	Broadboyne Br	16-18569	14/11/2016	Temperature	Â°C	9.7		9.7
07B04-2000	Broadboyne Br	16-19395	07/12/2016	Temperature	Â°C	8.6		8.6
07B04-2000	Broadboyne Br	17-00560	26/01/2017	Temperature	Â°C	6.4		6.4
07B04-2000	Broadboyne Br	17-02290	16/02/2017	Temperature	Â°C	6.9		6.9
07B04-2000	Broadboyne Br	17-03783	23/03/2017	Temperature	Â°C	6.7		6.7
07B04-2000	Broadboyne Br	17-05491	06/04/2017	Temperature	Â°C	10.3		10.3
07B04-2000	Broadboyne Br	17-06631	25/05/2017	Temperature	Â°C	18.5		18.5
07B04-2000	Broadboyne Br	17-08777	08/06/2017	Temperature	Â°C	15.9		15.9
07B04-2000	Broadboyne Br	17-11840	31/07/2017	Temperature	Â°C	17.6		17.6

StationFullCode	Station_Name	Samp_Code	Samp_Date	Prm_Desc	Unit_Code	Meas_Result	LimitOfDetection	Results
07B04-2000	Broadboyne Br	17-12053	10/08/2017	Temperature	Â°C	16.6		16.6
07B04-2000	Broadboyne Br	17-16200	28/09/2017	Temperature	Â°C	13.1		13.1
07B04-2000	Broadboyne Br	17-18679	25/10/2017	Temperature	Â°C	11.7		11.7
07B04-2000	Broadboyne Br	17-18794	23/11/2017	Temperature	Â°C	8		8
07B04-2000	Broadboyne Br	17-19982	14/12/2017	Temperature	Â°C	5.1		5.1
07B04-2000	Broadboyne Br	18-00010	18/01/2018	Temperature	°C	4.7		4.7
07B04-2000	Broadboyne Br	18-01854	08/03/2018	Temperature	°C	4.9		4.9
07B04-2000	Broadboyne Br	18-02495	13/03/2018	Temperature	°C	7.2		7.2
07B04-2000	Broadboyne Br	18-04192	12/04/2018	Temperature	°C	8.4		8.4
07B04-2000	Broadboyne Br	18-06060	01/05/2018	Temperature	°C	10.7		10.7
07B04-2000	Broadboyne Br	18-08015	15/06/2018	Temperature	°C	17		17
07B04-2000	Broadboyne Br	18-10331	11/07/2018	Temperature	°C	20.7		20.7
07B04-2000	Broadboyne Br	18-12253	14/08/2018	Temperature	°C	18.2		18.2
07B04-2000	Broadboyne Br	18-13901	27/09/2018	Temperature	°C	13.4		13.4
07B04-2000	Broadboyne Br	18-16373	24/10/2018	Temperature	°C	11.2		11.2
07B04-2000	Broadboyne Br	18-18054	20/11/2018	Temperature	°C	7.7		7.7
07B04-2000	Broadboyne Br	18-18840	05/12/2018	Temperature	°C	7.3		7.3
07B04-2000	Broadboyne Br	19-01976	21/02/2019	Temperature	Â°C	9.8		9.8
07B04-2000	Broadboyne Br	19-04279	09/04/2019	Temperature	Â°C	9.8		9.8
07B04-2000	Broadboyne Br	19-07544	20/06/2019	Temperature	Â°C	16.2		16.2
07B04-2000	Broadboyne Br	19-13431	12/09/2019	Temperature	Â°C	15.5		15.5
07B04-2000	Broadboyne Br	16-0606	15/06/2016	Total Nitrogen	mg/l	3.01		3.01
07B04-2000	Broadboyne Br	16-0669	05/07/2016	Total Nitrogen	mg/l	2.1		2.1
07B04-2000	Broadboyne Br	16-0738	02/08/2016	Total Nitrogen	mg/l	1.56		1.56
07B04-2000	Broadboyne Br	16-0819	25/08/2016	Total Nitrogen	mg/l	2.48		2.48
07B04-2000	Broadboyne Br	16-0878	07/09/2016	Total Nitrogen	mg/l	2.6		2.6
07B04-2000	Broadboyne Br	16-0891	12/09/2016	Total Nitrogen	mg/l	2.35		2.35

StationFullCode	Station_Name	Samp_Code	Samp_Date	Prm_Desc	Unit_Code	Meas_Result	LimitOfDetection	Results
07B04-2000	Broadboyne Br	16-0916	19/09/2016	Total Nitrogen	mg/l	2.49		2.49
07B04-2000	Broadboyne Br	16-1076	17/11/2016	Total Nitrogen	mg/l	2.79		2.79
07B04-2000	Broadboyne Br	16-1088	21/11/2016	Total Nitrogen	mg/l	3.63		3.63
07B04-2000	Broadboyne Br	16-1206	12/12/2016	Total Nitrogen	mg/l	2.62		2.62
07B04-2000	Broadboyne Br	17-0124	27/02/2017	Total Nitrogen	mg/l	3.58		3.58
07B04-2000	Broadboyne Br	17-0260	19/04/2017	Total Nitrogen	mg/l	2.96		2.96
07B04-2000	Broadboyne Br	17-0304	04/05/2017	Total Nitrogen	mg/l	2.2		2.2
07B04-2000	Broadboyne Br	17-0456	14/06/2017	Total Nitrogen	mg/l	0.5		0.5
07B04-2000	Broadboyne Br	17-0508	05/07/2017	Total Nitrogen	mg/l	2.04		2.04
07B04-2000	Broadboyne Br	17-0646	21/08/2017	Total Nitrogen	mg/l	1.41		1.41
07B04-2000	Broadboyne Br	17-0707	20/09/2017	Total Nitrogen	mg/l	1.62		1.62
07B04-2000	Broadboyne Br	17-0790	12/10/2017	Total Nitrogen	mg/l	2.41		2.41
07B04-2000	Broadboyne Br	17-0858	26/10/2017	Total Nitrogen	mg/l	3.2		3.2
07B04-2000	Broadboyne Br	19-0111	27/02/2019	Total Nitrogen	mg/l	3.87		3.87
07B04-2000	Broadboyne Br	19-0191	29/03/2019	Total Nitrogen	mg/l	4.15		4.15
07B04-2000	Broadboyne Br	19-0278	30/04/2019	Total Nitrogen	mg/l	4.17		4.17
07B04-2000	Broadboyne Br	19-0448	27/06/2019	Total Nitrogen	mg/l	3.59		3.59
07B04-2000	Broadboyne Br	19-0484	17/07/2019	Total Nitrogen	mg/l	2.31		2.31
07B04-2000	Broadboyne Br	19-0742	31/10/2019	Total Nitrogen	mg/l	3.6		3.6
07B04-2000	Broadboyne Br	19-0763	19/11/2019	Total Nitrogen	mg/l	4.31		4.31
07B04-2000	Broadboyne Br	19-0789	22/11/2019	Total Nitrogen	mg/l	3.62		3.62
07B04-2000	Broadboyne Br	19-0835	29/11/2019	Total Nitrogen	mg/l	3.63		3.63
07B04-2000	Broadboyne Br	19-0916	05/12/2019	Total Nitrogen	mg/l	3.97		3.97

APPENDIX C
- ASSIMILATIVE CAPACITY CALCULATIONS -

C1 Assimilative Capacity of Receiving Watercourses

Mass Balance Equation – Calculations based on Proposed Discharge Licence Limits

Using the mass balance approach (as detailed in WSTG document Volume 1 – Technical Guidance Manual, Aug 2011) the resultant concentration in a receiving watercourse due to a discharge is calculated as follows:-

Mass Balance = $T = \frac{(F \times C) + (f \times c)}{(F + f)}$

Where,

T = resultant concentration due to the discharge (mg/l).

F = 95-percentile flow in receiving water (m^3/s).

C = mean background concentration in receiving water (mg/l).

f = maximum discharge flow (m^3/s).

c = maximum concentration in the discharge (mg/l).

This method is applied to the 95-percentile receiving water flow in this assessment.

Table C1: Example of Mass Balance Calculation for the River Boyne [BOD_5]

GIVEN;		**Units**	**400 M^3 Discharge**
Watercourse 95%ile Flow	(Table 2.1 of this Report)	m^3/s	4.8
Background Watercourse Concentration	(Table 2.2 of this Report)	mg/l	1.31
Rate of Effluent discharge	(Table 2.3 of this Report)	m^3/day	400
Effluent Concentration	(Table 2.3 of this Report)	mg/l	20.0
Water Quality Limit in Watercourse	(Table 2.4 of this Report)	mg/l	2.6
CALCULATION			
Watercourse %ile Flow	= %ile Flow(m^3/s)*86.4*1000 =	l/day	414,720,000
Watercourse Load	= %Flow (l/day)*BG Concn (mg/l) =	mg/day	544,845,913
Rate of Effluent Discharge	= Rate of Discharge (m^3/day)*1000 =	l/day	400,000
Effluent Load	= Rate of Discharge (l/day)*Effluent Concn (mg/l) =	mg/day	8,000,000
Combined Flow	=%Flow Watercourse (l/day) + Rate of discharge (l/day) =	m^3/day	415,120,000
Combined Load	= Watercourse Load (mg/day) + Effluent Load (mg/day) =	mg/day	552,845,913
Combined Concentration	= Combined Load (mg/day) / Combined Flow (l/day) =	mg/l	1.3318
Increase in Concentration	= Combined Concentration (mg/l) – Background Watercourse Concentration (mg/l) =	mg/l	0.0180
Available Assimilative Capacity	[(Cmax – Cback) x F x 86.4]	kg/day	533.4261
% Headroom Utilised	= [(Ccomb - Cback) * 100] / (Cmax - Cback) =	%	1.40%

APPENDIX D
- CONSULTATIONS -

Martin (Panther Environmental Solutions Ltd.)

Subject: FW: River Boyne - EPA Flow Data

From: Rebecca Quinn <R.Quinn@epa.ie>
Sent: 26 October 2020 17:34
To: Martin (Panther Environmental Solutions Ltd.) <martin@pantherwms.com>
Subject: RE: River Boyne - EPA Flow Data

Hello Martin,

In relation to your queries on the 95%tile flow estimate for the Boyne at 07012 Slane Castle –

Do the revised flow prediction figures take into account global warming and drought conditions in the River Boyne catchment?
The estimate is derived from hydrometric data obtained for the station 07012 Slane Castle between 01/10/1987 and 30/09/2018. So in that sense it would take into account low flow periods in that date range. However, no it does not take into account future climate change scenarios.

Are there projected figures available (e.g. for the next 10 years) which take these factors into account?

At present there are no agreed metrics by which we can provide a projected estimate of the 95%tile flow or any percentile flow that will take climate change into account. Work is being done (the Met Eireann funded Climate Services Translate Project has recently begun work investigating this issue) to get agreement on how this should be approached in the future, an interim approach has also to be agreed but as yet no specific approach has been adopted.

Hope this clarifies the situation.

Regards,

Rebecca

Rebecca Quinn
Scientific Officer
Environmental Protection Agency
Office of Environmental Assessment
McCumiskey House
Richview
Clonskeagh Road
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From: Martin (Panther Environmental Solutions Ltd.) <martin@pantherwms.com>
Sent: 23 October 2020 12:39
To: Rebecca Quinn <R.Quinn@epa.ie>

Cc: Mike Fraher (Panther Environmental Solutions Ltd.) <mike.fraher@pantherwms.com>
Subject: FW: River Boyne - EPA Flow Data

Hello Rebecca,

You previously provided 95%ile flow data for 07012 Slane Castle on the River Boyne prior to revised estimates being published, as per the email thread below.
This was used to compete an assimilative capacity assessment of a proposed discharge of treated effluent to the River Boyne.

As part of a pre-planning meeting, the Council have asked for additional information on the flow data being used for this assessment.

Do the revised flow prediction figures take into account global warming and drought conditions in the River Boyne catchment?
Are there projected figures available (e.g. for the next 10 years) which take these factors into account?

Do not hesitate to get in contact should you have any queries.

Best Regards,
Martin

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Please consider the environment before printing this e-mail

From: Rebecca Quinn <R.Quinn@epa.ie>
Sent: 08 March 2019 09:30
To: Martin (Panther Environmental Solutions Ltd.) <martin@pantherwms.com>
Subject: RE: River Boyne Flow Data

Hello Martin,

I have looked at the data from HydroTool for the estimated flow duration curve for station 07012 Slane Castle. The estimated 95%tile flow value from this flow duration curve was 3.88m3/s. This was based on all the daily mean flow data available at the time (1940 to 2005) the HydroTool model was developed in 2008/2009.

A revised estimate of the 95%tile flow was derived from flow duration curve analysis using daily mean flow data available from the OPW website http://waterlevel.ie/hydro-data/home.html . The revised 95%tile flow estimate is 4.8m3/s. This revised value was derived using only daily mean flow data post the Boyne arterial drainage scheme and therefore only data from hydrometric years 01/10/1987 to 30/09/2018 were used. This will be the published estimated 95%tile for 07012 Slane Castle when all the revised estimates are published later this year.

If you have any further queries on this please get back to me.

Regards,

Rebecca Quinn
Scientific Officer
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Office of Environmental Assessment
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Richview
Clonskeagh Road
Dublin 14
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Download Local Authority/EPA hydrometric data from HydroNet

From: Rebecca Quinn
Sent: 06 March 2019 10:18
To: 'Martin (Panther Environmental Solutions Ltd.)' <martin@pantherwms.com>
Subject: RE: River Boyne Flow Data

Martin,

The estimated 95%tile for 07012 Slane Castle (E 294980 N 274000) is 4.8m^3/s.

Regards,

Rebecca Quinn
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Environmental Protection Agency
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Tel: 00353 (0) 1 2680136
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Download Local Authority/EPA hydrometric data from HydroNet

ATTACHMENT 9.2

- DRINKING WATER RISK ASSESSMENT -

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ATTACHMENT 9.2

DRINKING WATER RISK ASSESSMENT

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

REPORT NO:	DWRA_20_9684	**DATE:**	17th March 2020
AUTHOR:	Martin O'Looney, BSc. Lorraine Wyse, BSc.	**REVIEWED:**	Mike Fraher, BSc.

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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.

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[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.

Stage 2 would comprise of a new screen, balance tank and sludge holding tank and the relocation of the site's existing Dissolved Air Flotation (DAF) unit. 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 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 (W.A.S.) from the final clarifier prior to landspreading off-site.

Stage 3 would comprise of an anoxic tank, an aeration basin, a clarifier and a sand filter. 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 tank, where the biological breakdown of the effluent takes place. The aeration tank would be fitted with an air diffuser network and two air blowers which run as duty, assist to manage any high loading on the treatment plant from the effluent.

From the aeration tank, effluent would enter the clarifier, which acts as a settlement tank by removing settleable solids and returning the settled sludge to the aeration tank. Heavier sludge would settle to the bottom of the clarifier while the lighter clear water would flow over the weir to a pump sump where it would pass through a column sand filter. The sand filter would reduce the suspended solids in the final effluent, which would also lower the COD/BOD level of effluent. Treated effluent from the sand filter would gravity feed to a final discharge pump where it would be pumped to surface water.

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

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

The rising main route would be to the north-northwest of the proposed development, as this direction provides the shortest distance to the River Boyne. The proposed discharge location [E292417, N271406] is approximately 10 meters upstream of the confluence of the Dollardstown River and the River Boyne.

The proposed effluent plant has been designed with the potential for future discharge of final effluent to surface water in mind.

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 sand filtration system, which would reduce the microbial content of the wastewaters by filtering and retaining micro-organisms from the treated effluent.

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.

The assimilative capacity assessment (included as Attachment 9.1 of the EIS), was undertaken during 95%ile flow conditions, the lowest daily average flow which is equalled or exceeded 95% of the time. It is therefore the low flow which is likely to occur for 5%, or 18 days, of each year. The assimilative capacity assessment was used to predict the river's ability to accommodate treated effluent discharge of BOD_5, Orthophosphate, Nitrogen, Total Ammonia and Suspended Solids from the Dawn Meats (Slane) facility.

The assessment concluded that the River Boyne would have sufficient assimilative capacity to accommodate discharges from the Dawn Meats (Slane) facility and consequently, the planned discharge would not have a significant impact upon the River Boyne.

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 2010-2015 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. These include Broadboyne Bridge, Slane Bridge and Ford S of Broc Ho. The stations and locations relative to Staleen Water Abstraction Point 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
2010	d/s Broadboyne Br (RHS)	292440	271435	12.7km upstream (at proposed discharge point)
2100	Slane Br	296414	273631	7km upstream
2150	Ford S of Broc Ho	300003	271834	2km upstream

According to the results of EPA surface water quality monitoring during the 2004-2015 period, the Broadboyne Bridge and Slane Bridge monitoring locations returned Q-Value results of Q3-4, indicating a moderate water quality status, while a Q4 result was returned for the Ford S of Broc Ho monitoring location, indicating a good water quality status. Q-Value results from the 1973-2015 period for the three monitoring locations are summarised in Figure 3.1 below.

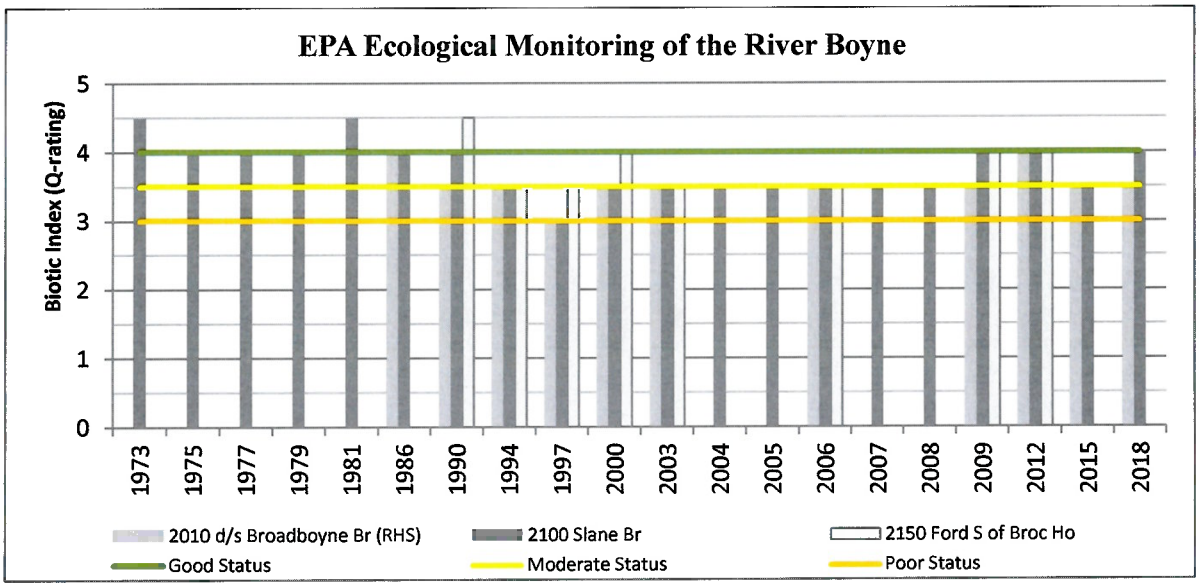

Figure 3.1: EPA Ecological Monitoring of the River Boyne at Stations 2010, 2100 and 2150

As can be seen in Figure 3.1, the quality of the River Boyne at the three monitoring stations has maintained a moderate status for the majority of monitoring over the past 15 years. The Ford S of Broc Ho station, the closest monitoring station to the Staleen Water Abstraction Point, achieved good status for monitoring in 2009 and 2012. The Broadboyne Bridge and Slane Bridge stations were moderate status in 2012, however only Slane Bridge returned to good status in the 2018 reporting year.

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 2017, the average hydraulic loading of the plant was 254 m^3/day and nine non-compliances were reported for exceedances in orthophosphate (provided within the 2017 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 assimilative capacity assessment concluded that the River Boyne would have sufficient assimilative capacity to accommodate discharges from the Dawn Meats (Slane) facility and consequently, discharges would not have a significant impact upon the River Boyne.

As part of the proposed development, clarified effluent would be directed to a sand filtration system, comprising a simple column sand filter, 2.5m in diameter and 5m height. While the sand filter serves to reduce the suspended solids in the final effluent, this would also reduce the microbial content of the wastewaters by filtering and retaining micro-organisms from the treated effluent. Sand filtration is estimated to remove enteric bacteria by over 90%[3] with the World Health Organisation estimating that 99% of larger parasites and between 50-90% of enteric viruses are removed[4].

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[3] Rajala, R.L., Pulkkanen, M.P, Pessi, M. and Heinonen-Tanski, H. (2003). Removal of microbes from municipal wastewater effluent by rapid sand filtration and subsequent UV irradiation. *Water Science & Technology*, 47(3), pp. 157-162. And
Koivunen, J., Siitonen, A. and Heinonen-Tanski, H. (2003). Elimination of enteric bacteria in biological-chemical wastewater treatment and tertiary filtration units. *Water Research*, 37, pp. 690-698.

[4] World Health Organisation, (2002). *Managing Water in the Home: Accelerated Health Gains from Improved Water Supply.*

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 required, wastewater would be diverted to the exiting HDPE lined lagoons via the proposed emergency influent and final effluent 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 required, wastewater would be diverted 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.	• 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	• Where required, treated effluent would be recirculated to the WWTP for further treatment or stored within the existing HDPE lagoons pending treatment.	• Regular monitoring on the treated effluent discharge would be undertaken (to be agreed with the EPA as part of the licence review). • In the event of an exceedance, an investigation would be undertaken to identify and resolve the issue. • 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 required, wastewater would be diverted to the exiting HDPE lined lagoons via the proposed emergency influent and final effluent divert	• 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.

Potential Abnormal Condition	Control Measures	
	Infrastructural Measures	**Operational Measures**
	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	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	• The WWTP would be designed for a capacity of 500 M^3, however, it would operate at a maximum of 400 M^3. • 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 required, wastewater would be diverted to the existing 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.	• 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. • 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	• In the event of a fire onsite, firewater would enter the wastewater drainage system and collect in the slatted tank, from where it would be diverted to HDPE Lagoon 2. • The HDPE Lagoon 2 would have sufficient capacity to contain generated firewater, with a 3,750 M^3 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.

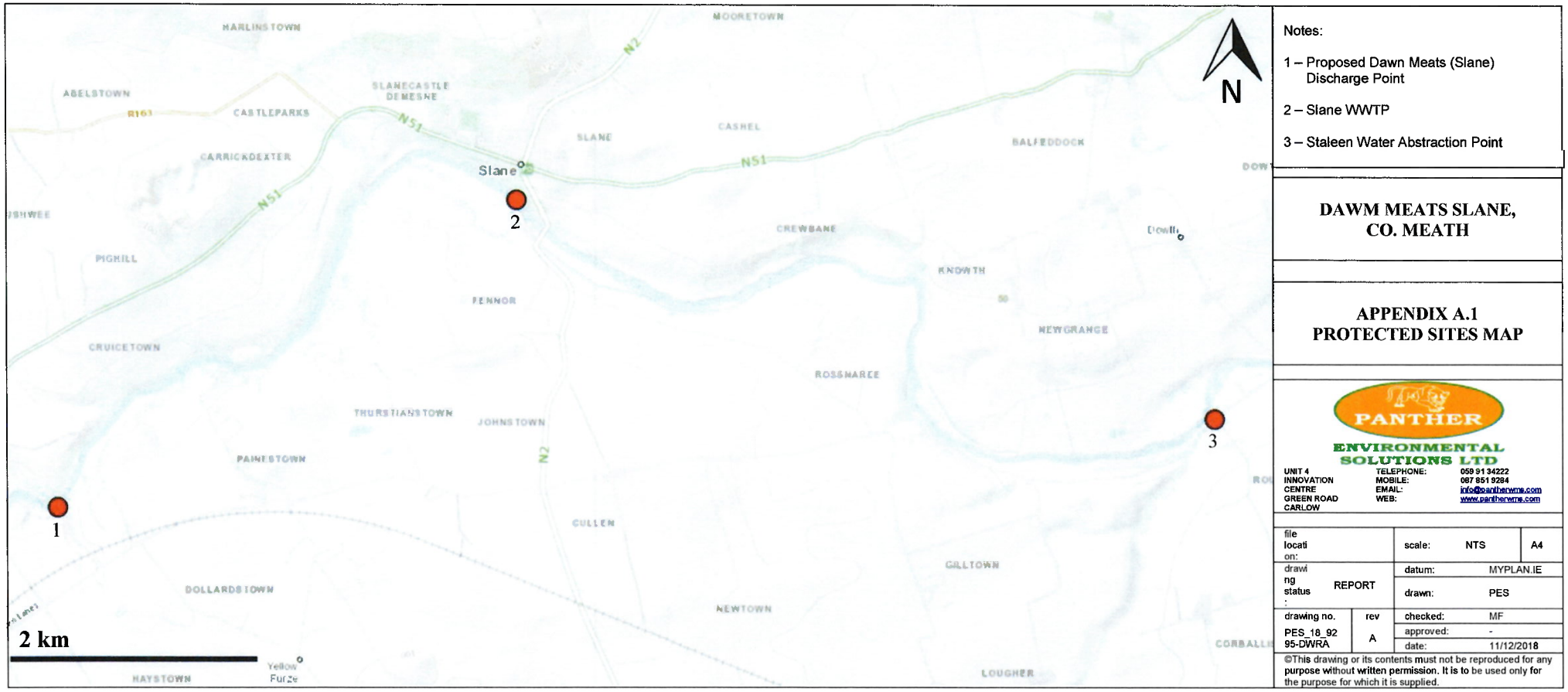
Dawn Meats (Slane) would ensure that contact details for personnel at the Drogheda / East Meath plant are readily available, and in the unlikely event of discharges with the potential to impact drinking water quality, personnel would be contacted as soon as possible.

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

PANTHER ENVIRONMENTAL SOLUTIONS LTD
UNIT 4 INNOVATION CENTRE GREEN ROAD CARLOW
TELEPHONE: 059 91 34222
MOBILE: 087 851 9284
EMAIL: info@pantherwms.com
WEB: www.pantherwms.com

file location:		scale: NTS	A4
drawing status:	REPORT	datum: MYPLAN.IE	
		drawn: PES	
drawing no.	rev	checked: MF	
PES_18_9295-DWRA	A	approved: -	
		date: 11/12/2018	

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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

ATTACHMENT 10.0

- LAND - SOILS, GEOLOGY AND HYDROLOGY -

ATTACHMENT 10.1

- HYDROGEOLOGICAL MAPS, TRIAL PIT LOGS &IRISH GEOLOGICAL HERITAGE -

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APPENDIX A

GSI Webmapping

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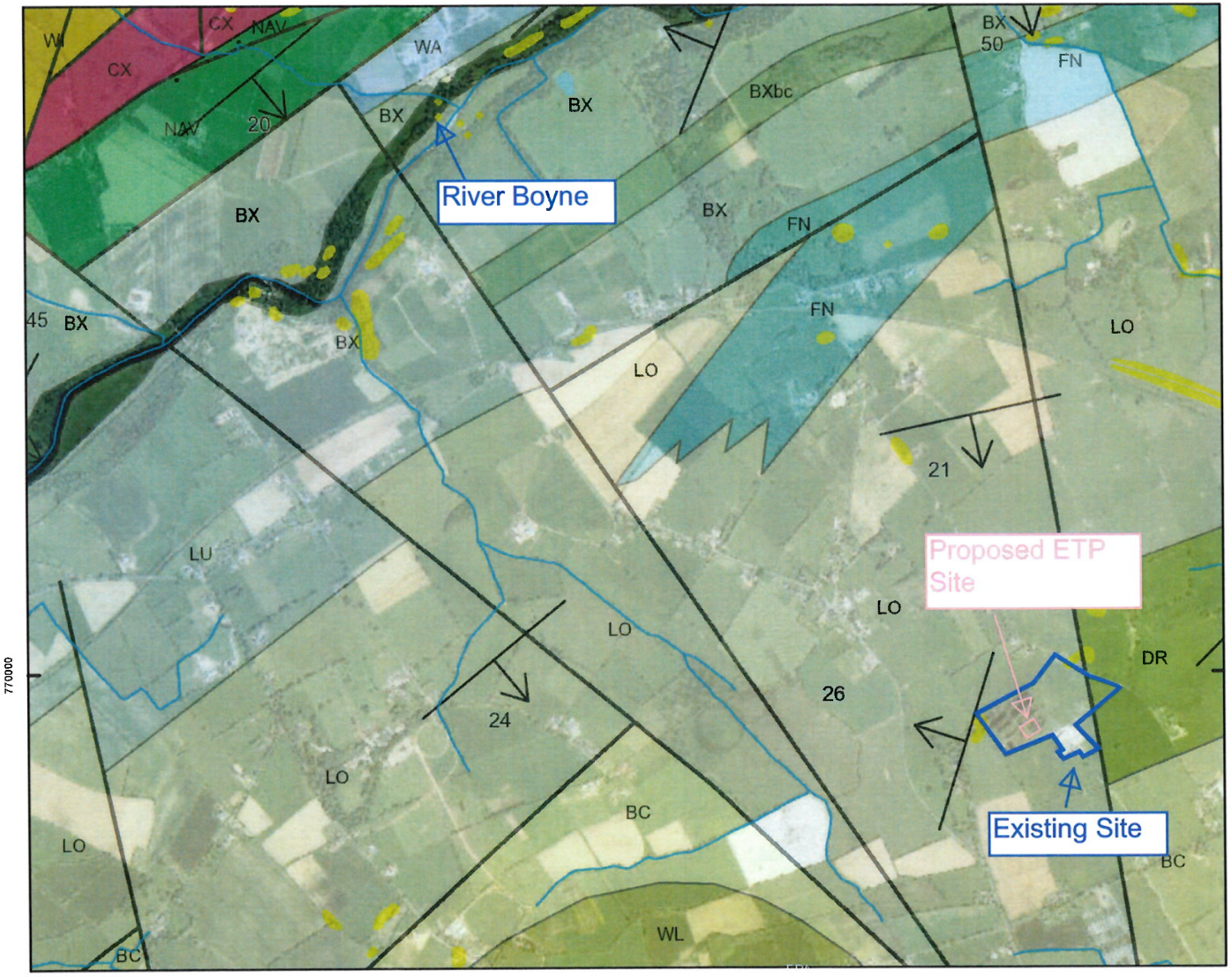
Figure 1 - Bedrock Geology and Structural Geology



Legend

Bedrock Structure

- EPA River Segments
- EPA Lake Segment
- Structrual Symbol Labels

Bedrock Structure Symology

- Bedding or main foliation, old GSI data
- Contorted bedding or main foliation, old GSI data
- First foliation parallel to bedding
- Foliation trend, Thorr and Rosses Granite
- Horizontal Bedding
- Horizontal first generation fold axis
- Horizontal second generation fold axis
- Strike and Dip of Bedding, right way up
- Strike and Dip of Bedding, way up unknown
- Strike and Dip of First Foliation
- Strike and Dip of Foliation
- Strike and Dip of Second Foliation
- Strike and Dip of overturned Bedding
- Strike and plunge of first generation fold axis
- Strike and plunge of second generation fold axis
- Strike and plunge of third generation fold axis
- Strike of Shear fabric
- Strike of vertical Bedding
- Strike of vertical First Foliation

Bedrock Stratigraphy

- Boundary of Igneous Intrusion
- Dyke
- Unconformity
- Formation lines
- Boundary of dolomization
- Outer limit of metamorphic aureole
- Outer limit of higher grade aureole
- Lithological Boundary
- Shear Zone Boundary
- Ghost line
- Coal seam/Tertiary dolorite dyke
- Metadolerite sheet/...,Limit of granite sheeting(Ox Mountains)
- 3Z

Bedrock Structure

- 10A0-2
- 10A1-1
- Anticline S1
- 10A2-1
- Anticline F2
- Anticline F3
- Anticline F4
- Anticline F5
- 10S0-2
- 10S1-1
- Syncline S1
- 10S2-1
- Syncline S2
- Syncline S3
- Syncline S5
- 11F1-2
- 11S1-1
- Early Slide
- 11S2-1
- 11S2-2
- 11T1-2
- 11T2-2
- Outcrop

Scale: 1:25,000

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0 0.175 0.35 0.7 mi

0 0.275 0.55 1.1 km

Map Centre Coordinates (ITM) 693,524 770,719

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Figure 2 - Teagasc Soils Map

Legend

Teagasc Soils

- AminDW - Deep well drained mineral (Mainly acidic)
- AminPD - Mineral poorly drained (Mainly acidic)
- AminPDPT - Peaty poorly drained mineral (Mainly acidic)
- AminSW - Shallow well drained mineral (Mainly acidic)
- AminSP - Shallow poorly drained mineral (Mainly acidic)
- AminSPPT - Shallow peaty poorly drained mineral (Mainly acidic)
- AminSRPT - Shallow, rocky, peaty/non-peatymineral complexes (Mainly acidic)
- BminDW - Deep well drained mineral (Mainly basic)
- BminPD - Mineral poorly drained (Mainly basic)
- BminPDPT - Peaty poorly drained mineral (Mainly basic)
- BminSW - Shallow well drained mineral (Mainly basic)
- BminSP - Shallow poorly drained mineral (Mainly basic)
- BminSPPT - Shallow peaty poorly drained mineral (Mainly basic)
- BminSRPT - Shallow, rocky, peaty/non-peatymineral complexes (Mainly basic)
- BktPt - Blanket peat
- FenPt - Fen peat
- RsPt - Raised Peat
- Cut - Cutover/cutaway peat
- AlluvMIN - Alluvial (mineral)
- AlluvMRL - Alluvial (marl)
- Lac - Lacustrine type soils
- Scree - Scree
- AeoUND - Aeolian undifferentiated
- MarSands - Marine sand and gravel
- MarSed - Marine/estuarine sediments
- Made - Made ground
- Water - Water
- Unclass

Scale: 1:25,000

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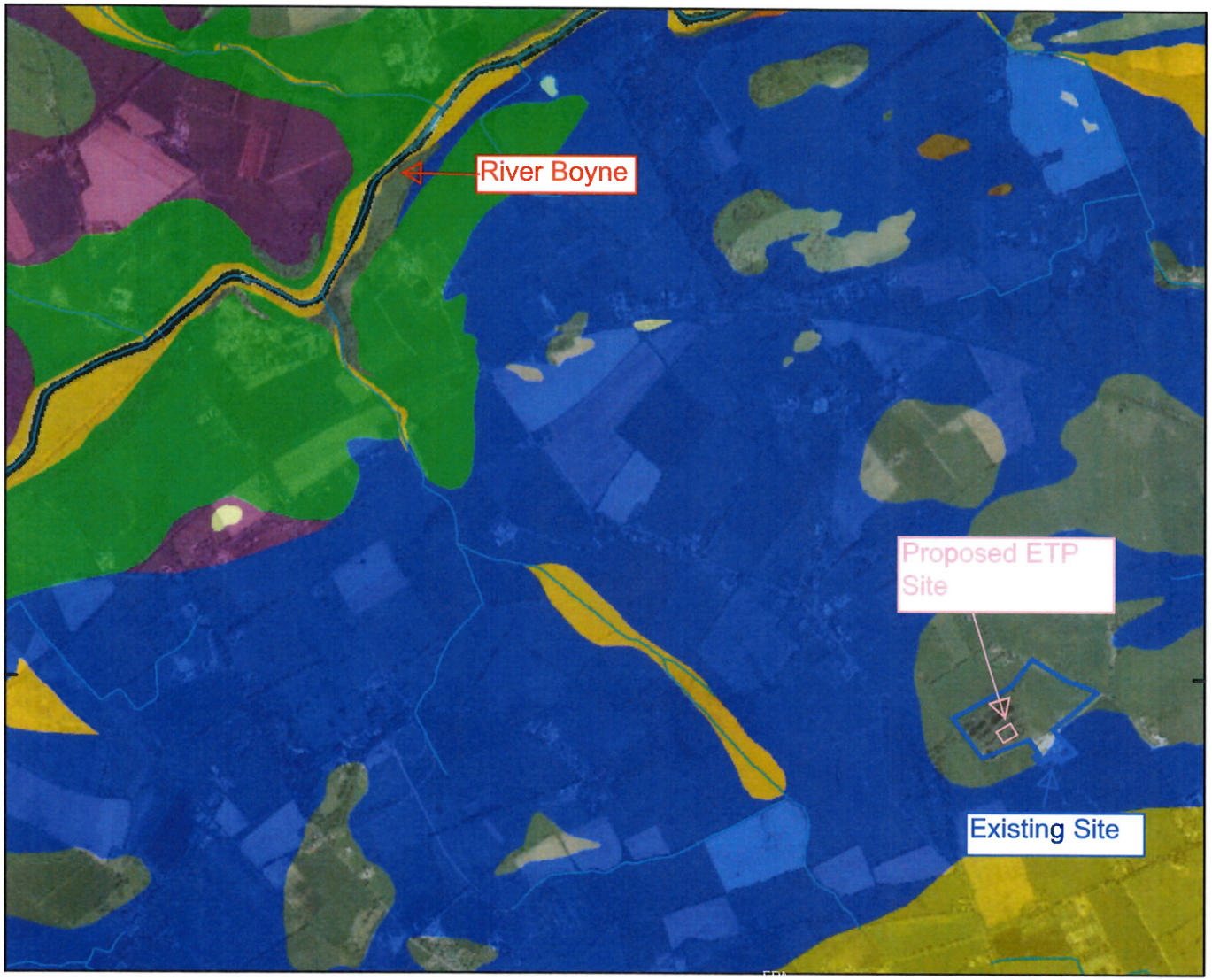
Figure 3 - Teagasc Subsoil Map



Legend

EPA River Segments

EPA Lake Segment

Teagasc Subsoils

- A - Alluvium
- Ac - Alluvium (clayey)
- Ag - Alluvium (gravelly)
- Asi - Asi
- BktPt - Blanket peat
- FenPt - Fen peat
- RsPt - Raised peat (intact)
- Cut - Cutover raised peat
- AcEsk - Esker comprised of gravels of acidic reaction
- BasEsk - Esker comprised of gravels of basic reaction
- GBi - Gravels derived from basic igneous rocks
- GCh - Gravels derived from cherts
- GCSs - Gravels derived from Cambrian sandstones
- GCSsS - Gravels derived from Cambrian sandstones and shales
- GDCSs - Gravels derived from Devonian and Carboniferous sandstones
- GDSs - Gravels derived from Devonian sandstones
- GLPDSs - Gravels derived from Lower Palaeozoic and Devonian sandstones
- GLPS - Gravels derived from Lower Palaeozoic shales
- GLPSs - Gravels derived from Lower Palaeozoic sandstones
- GLPSsS - Gravels derived from Lower Palaeozoic sandstones and shales
- GLs - Gravels derived from limestones
- GNSSs - Gravels derived from Namurian sandstones and shales
- GMp - Gravels derived from metamorphic rocks
- GGr - Gravels derived from granites
- GQz - Gravels derived from quartzites
- Rck - Bedrock outcrop or subcrop
- KaRck - Karstified bedrock outcrop or subcrop
- Scree - Scree
- L - Lacustrine sediments
- Lc - Lacustrine clays
- Ls - Lacustrine sands
- Lsi - Lacustrine silts
- Mrl - Lake marl
- MGs - Marine gravels and sands (often raised)
- Mbs - Marine beach sands
- Msi - Marine silts
- Mc - Marine clays
- Mesc - Estuarine silts and clays
- Marsh - Marsh
- TdMr - Tidal marsh
- Aeo - Aeolian sediments
- Ws - Windblown sands
- Wsd - Windblown sands in dunes
- Made - Made ground
- IrSTAv - Irish Sea Till derived from acid volcanic rocks
- IrSTCSsS - Irish Sea Till derived from Cambrian sandstones and shales
- IrSTDSs - Irish Sea Till derived from Devonian sandstones
- IrSTLPSsS - Irish Sea Till derived from Lower Palaeozoic sandstones and shales
- IrSTLs - Irish Sea Till derived from limestones
- TAv - Till derived from acid volcanic rocks
- TBi - Till derived from basic igneous rocks
- TCh - Till derived from cherts
- TCSsCh - Till derived from Carboniferous sandstones and cherts
- TCSsS - Till derived from Cambrian sandstones and shales
- TDCSs - Till derived from Devonian and Carboniferous sandstones
- TDCSsS - Till derived from Devonian and Carboniferous sandstones and shales
- TDSs - Till derived from Devonian sandstones
- TGr - Till derived from granites
- TLPDSs - Till derived from Lower Palaeozoic and Devonian sandstones
- TLPS - Till derived from Lower Palaeozoic shales
- TLPSs - Till derived from Lower Palaeozoic sandstones
- TLPSsS - Till derived from Lower Palaeozoic sanstones and shales
- TLs - Till derived from limestones
- TMp - Till derived from metamorphic rocks
- TNSSs - Till derived from Namurian sandstones and shales
- TNCSSs - Till derived from Namurian and Carboniferous sandstones and shales
- TQz - Till derived from quartzites

Water

Scale: 1:25,000

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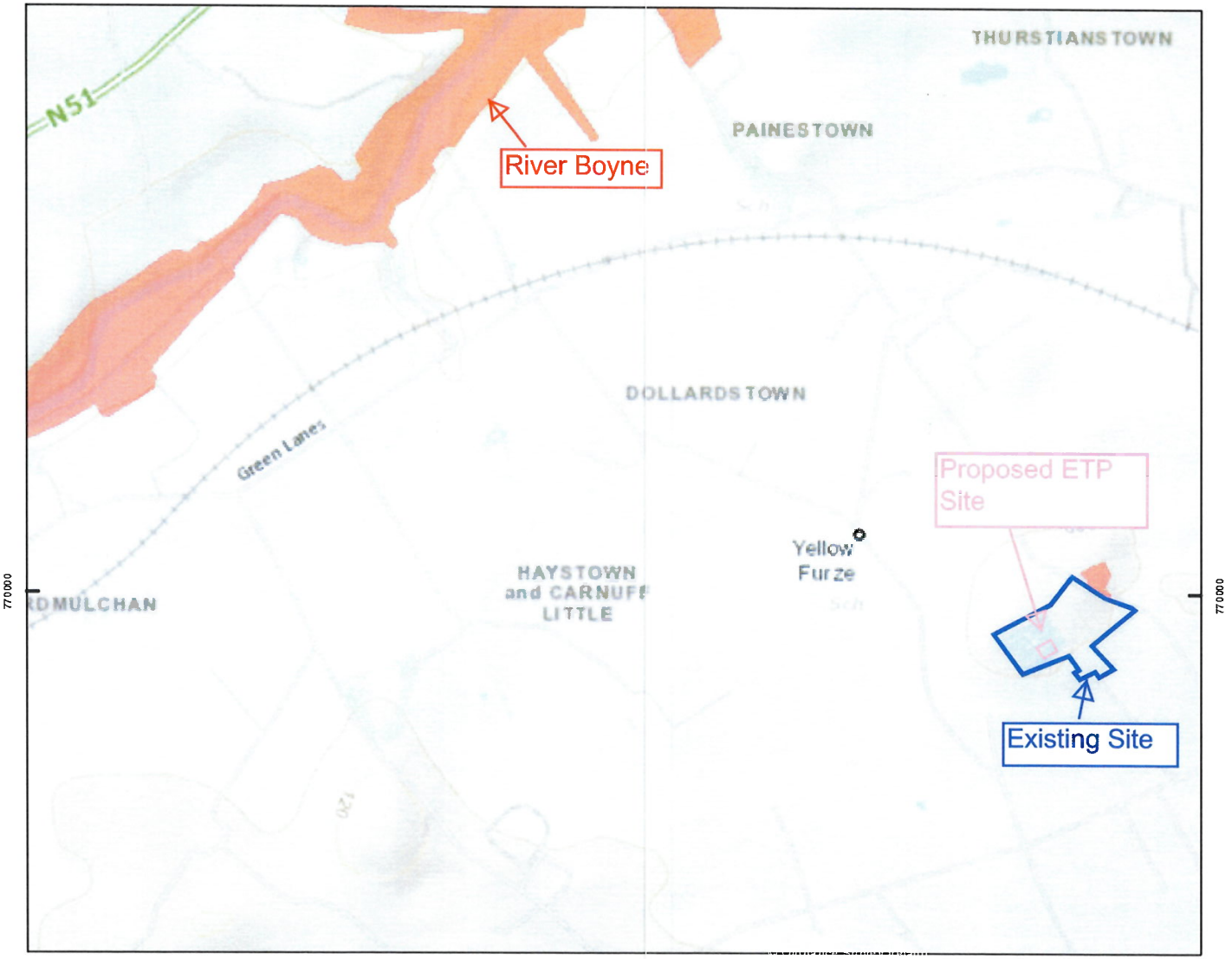
Figure 4 -Geological Heritage



Legend

- Heritage Site Audited Boundaries
- Heritage Sites Unaudited Boundaries

Scale: 1:25,000

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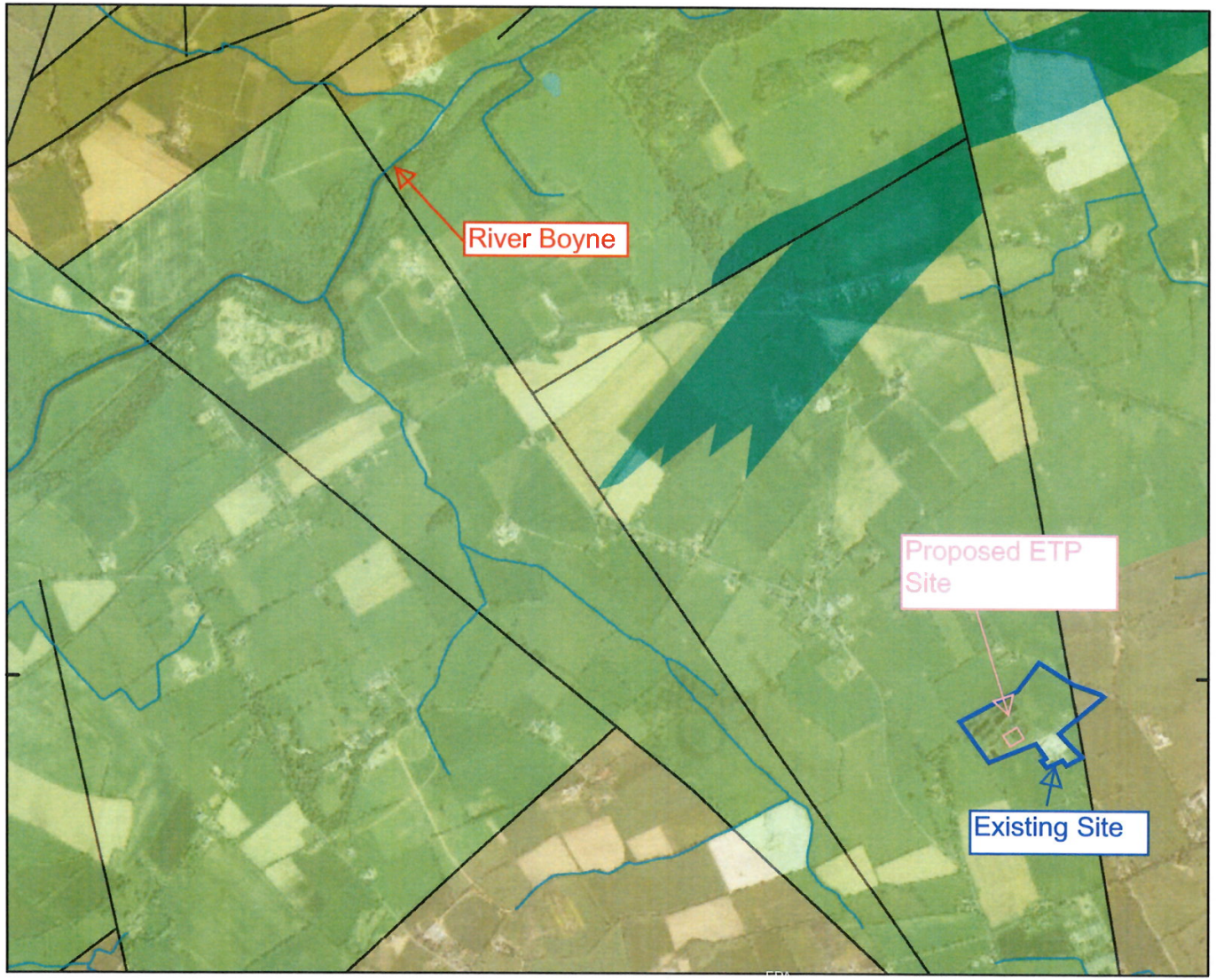
Figure 5 - Aquifer Map



Legend

- EPA River Segments
- EPA Lake Segment
- Bedrock Aquifer Faults

Gravel Aquifer

- Locally Important Gravel Aquifer
- Regionally Important Gravel Aquifer

Bedrock Aquifer

- Rkc - Regionally Important Aquifer - Karstified (conduit)
- Rkd - Regionally Important Aquifer - Karstified (diffuse)
- RK - Regionally Important Aquifer - Karstified
- Rf - Regionally Important Aquifer - Fissured bedrock
- Lm - Locally Important Aquifer - Bedrock which is Generally Moderately Productive
- Lk - Locally Important Aquifer - Karstified
- Ll - Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones
- Pl - Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones
- Pu - Poor Aquifer - Bedrock which is Generally Unproductive
- Lake

Scale: 1:25,000

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0 0.275 0.55 1.1 km

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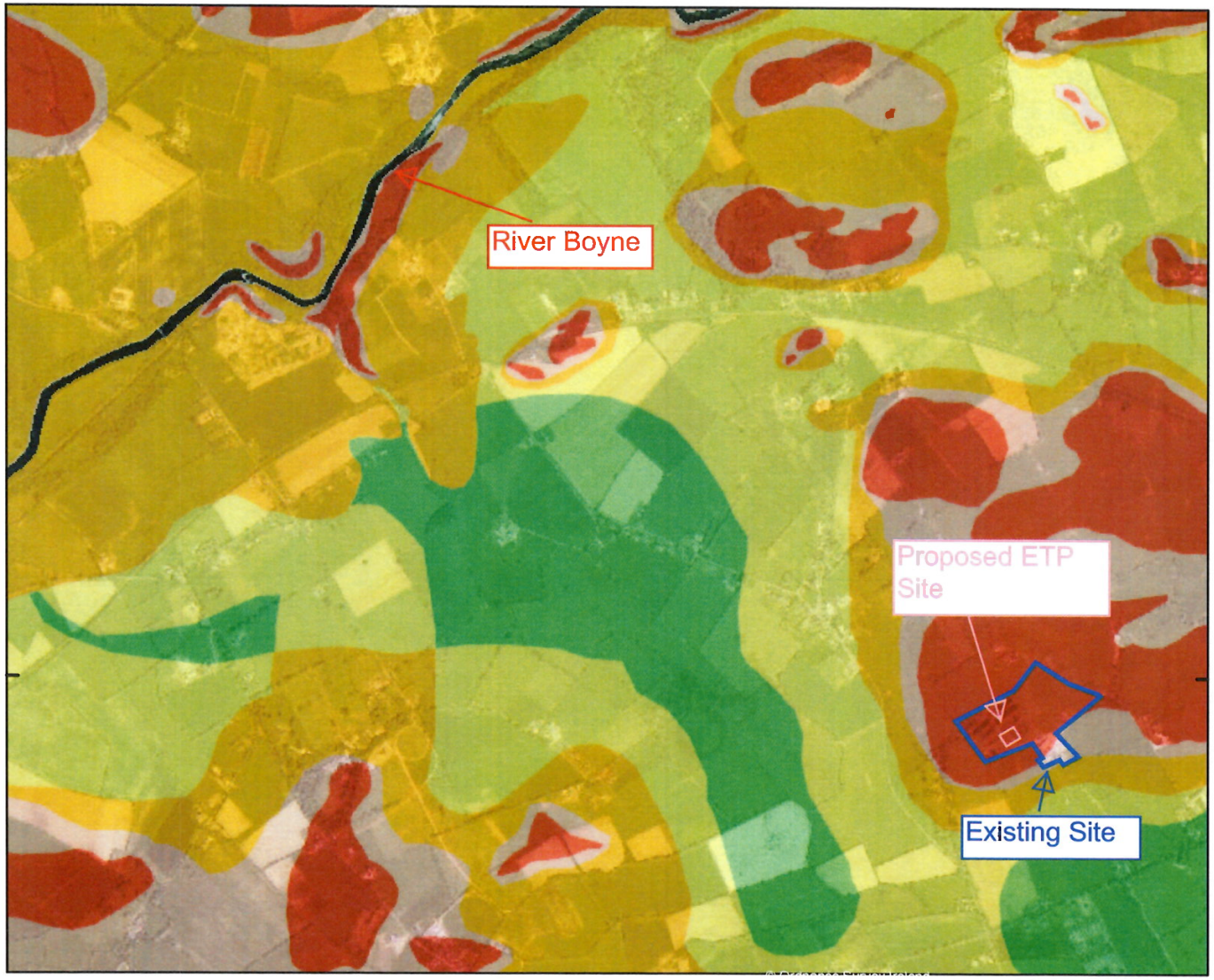
Figure 6 - Groundwater Vulnerability Map



Legend

Groundwater Vulnerability

- X - Rock at or near surface or Karst
- E - Extreme
- H - High
- M - Moderate
- L - Low
- W - Water

Scale: 1:25,000

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0 0.275 0.55 1.1 km

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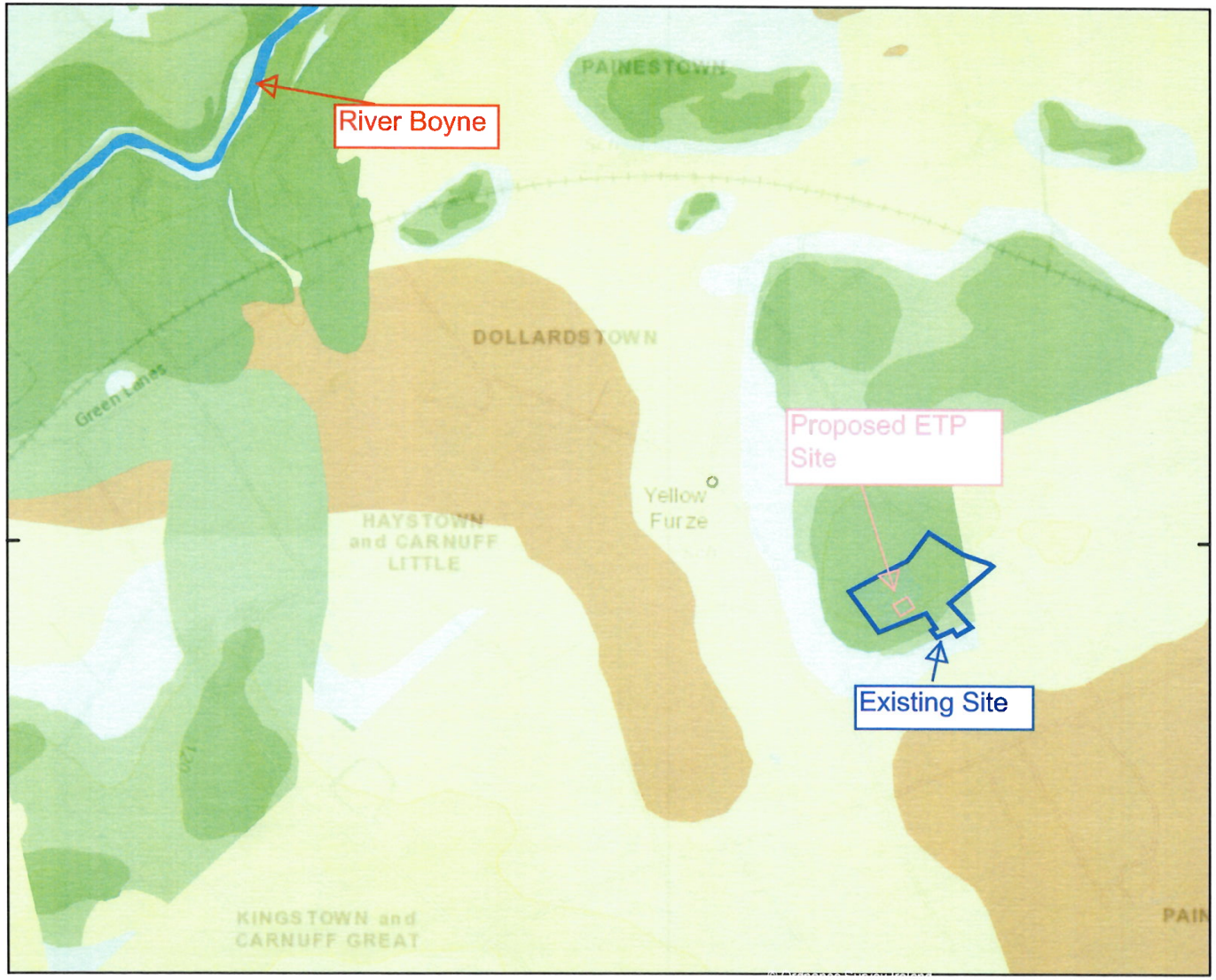
Figure 7 - Recharge Map



Legend

Groundwater Recharge (mm/yr)

- 0 mm
- 1-50 mm
- 51-100 mm
- 101-150 mm
- 151-200 mm
- 201-250 mm
- 251-300 mm
- 301-350 mm
- 351-400 mm
- 401-450 mm
- 451-500 mm
- 501-550 mm
- 551-600 mm
- 601-700 mm
- 701-800 mm
- 801-900 mm
- 901-1000 mm
- 1001-1400 mm
- 1401-2000 mm
- Water

Scale: 1:25,000

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N W E S

0 0.175 0.35 0.7 mi

0 0.275 0.55 1.1 km

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APPENDIX B

Trial Pit Logs

Geotechnical & Environmental Services
Campus Innovation Centre,
Green Rd.,
Carlow.

Ph: 059-9130314
Fax: 059-9140499

Trial Hole

TH1

Sheet 1 of 1

Method:	Date:	Site:
Excavation	16/01/07	Greenhills, Beauparc, Navan, Co. Meath

Dia.mm:	Coords:	G.L.mO.D.	Client:
			Dunbia Slane

Soil Samples		Water& Progress	Depth (m)	Description of Strata	Legend
Type test	Depth				
			-0.00m		
				Light Brown Slightly Sandy Clay Topsoil	
			-0.50		
			-0.60		
				Stiff Slightly Gravelly Silty Clay	
			-1.00		
			-1.30		
				End of Trial Hole	
			-1.50		
			-2.00		
			-2.50		
			-3.00		
			-3.50		
			-4.00		
			-5.00		

Remarks:

Logged by:	Scale:	End Casing Depth:	Job No:
EF	1/25		07-08

Geotechnical & Environmental Services
Campus Innovation Centre,
Green Rd.,
Carlow.

Ph: 059-9130314
Fax: 059-9140499

Trial Hole

TH2

Sheet 1 of 1

Method:	Date:	Site:
Excavation	16/01/07	Greenhills, Beauparc, Navan, Co. Meath

Dia.mm:	Coords:	G.L.mO.D.	Client:
			Dunbia Slane

Soil Samples		Water& Progress	Depth (m)	Description of Strata	Legend
Type test	Depth				
			-0.00m		
				Light Brown Sandy Clay Topsoil	
			-0.40		
			-0.50	Brown Gravelly Clay in angular fragments with Cobbles	
			-1.00		
			-1.40		
			-1.50	End of Trial Hole	
			-2.50		
			-3.00		
			-3.50		
			-4.00		
			-5.00		

Remarks:
1. Trial Hole groundlevel 1.2m below base of wetland system.

Logged by:	Scale:	End Casing Depth:	Job No:
EF	1/25		07-08

Geotechnical & Environmental Services
Campus Innovation Centre,
Green Rd.,
Carlow.

Ph: 059-9130314
Fax: 059-9140499

Trial Hole

TH3

Sheet 1 of 1

Method:	Date:	Site:
Excavation	09/01/07	Greenhills, Beauparc, Navan, Co. Meath

Dia.mm:	Coords:	G.L.mO.D.	Client:
			Dunbia Slane

Soil Samples Type test	Soil Samples Depth	Water& Progress	Depth (m)	Description of Strata	Legend
			0.00m		
				Light Brown Sandy Crumb Clay Topsoil (grass rootlets to 0.1m).	
			0.40		
			0.50	Stiff Brown Gravelly Clay in angular fragments with some Cobbles	
			1.00		
			1.20		
		Water ingress @ 1.5m	1.50	Black and Brown Shale Rock	
			2.00		
			2.50		
				End of Trial Hole	
			3.00		
			3.50		
			4.00		
			5.00		

Remarks:
1. Trial Hole groundlevel 1.5m below base of wetland system.

Logged by:	Scale:	End Casing Depth:	Job No:
EF	1/25		07-08

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Campus Innovation Centre,
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Fax: 059-9140499

Trial Hole

TH4

Sheet 1 of 1

Method:	Date:	Site:
Excavation	09/01/07	Greenhills, Beauparc, Navan, Co. Meath

Dia.mm:	Coords:	G.L.mO.D.	Client:
			Dunbia Slane

Soil Samples Type test	Soil Samples Depth	Water& Progress	Depth (m)	Description of Strata	Legend
			-0.00m		
			-0.50	Slightly Sandy Light Brown Topsoil (tree rootlets to 0.1m–0.2m).	
			-0.60		
			-1.00	Stiff Light Brown Silty Gravelly Clay in Stiff angular fragments.	
			-1.50		
			-1.60		
			-2.00	Black and Brown Shale Rock	
			-2.50	End of Trial Hole	
			-3.00		
			-3.50		
			-4.00		
			-5.00		

Remarks:
1. Trial Hole groundlevel 1.2m below base of wetland system.

Logged by:	Scale:	End Casing Depth:	Job No:
EF	1/25		07–08

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APPENDIX C

Irish Geological Heritage

MEATH - COUNTY GEOLOGICAL SITE REPORT

NAME OF SITE	**Painestown Quarry**		
Other names used for site			
IGH THEME:	IGH 8 (Lower Carboniferous)		
TOWNLAND(S)	Painestown		
NEAREST TOWN	Slane		
SIX INCH MAP NUMBER	26		
NATIONAL GRID REFERENCE	295350 270000 = N 9535 7000		
1:50,000 O.S. SHEET NUMBER	43	**1/2 inch Sheet No.**	13

Outline Site Description
A disused quarry now heavily vegetated.

Geological System/Age and Primary Rock Type
Lower Carboniferous (Viséan) thin to medium bedded limestone and shale of the Loughshinny Formation.

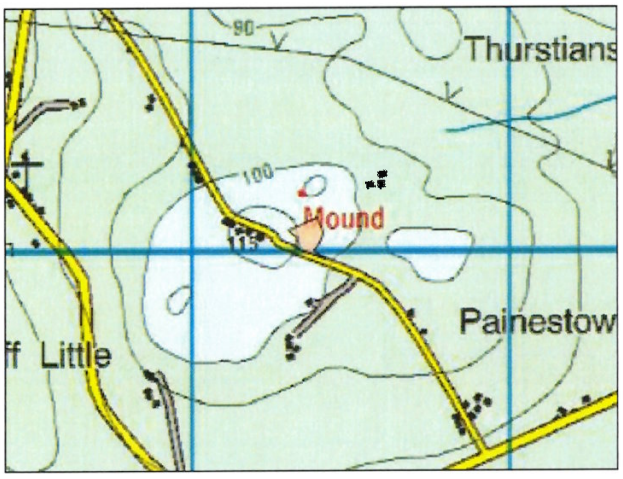
Main Geological or Geomorphological Interest
This disused quarry has cut into thinly bedded limestone and shale, which displays a series of angular, zig-zag folds called chevron folds. These occur when pressure is exerted on thinly bedded sequences of alternating rocks, where one rock type (limestone) is competent and the other (shale) is incompetent. These features are also found in the same rock formation along the coast at Loughshinny.

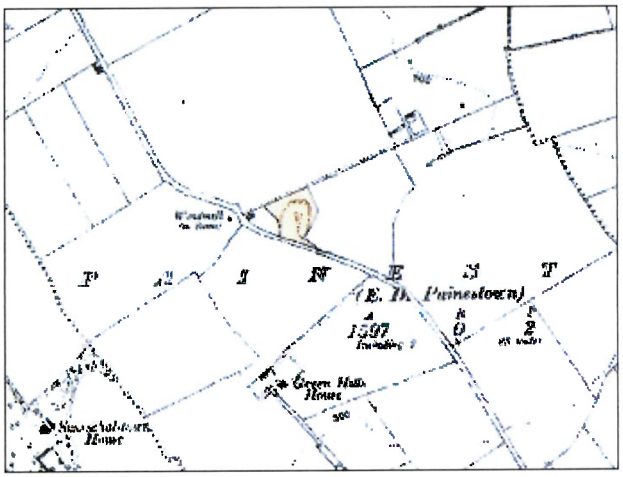
Site Importance
This is a spectacular and easily accessible example of chevron folds, which could make an excellent teaching locality. It complements the example of coastal geology at Loughshinny. It should become a County Geological Site.

Management/promotion issues
This site is found just off a third class road and is on private agricultural land, which is occasionally used for grazing cattle. Access to the site is through a farm gate along the road. This is not suitable for general promotion without suitable arrangements being made with the landowner. Only one exposed face still remains within the old quarry as the rest of the site has been filled in. It is important to keep this last face exposed and if possible, relatively free of vegetation cover.

Left: Exposed quarry face displaying excellent examples of chevron folding.
Right: A closer look at the zig-zag shaped folds. The limbs of the folds usually form at a 45°- 60° angle, as seen here at Painestown.

Painestown Quarry





MEATH - COUNTY GEOLOGICAL SITE REPORT

NAME OF SITE	**Boyne Valley**		
Other names used for site	Boyne Terraces		
IGH THEME:	IGH 7 (Quaternary)		
TOWNLAND(S)	Numerous		
NEAREST TOWN	Navan, Slane, Drogheda		
SIX INCH MAP NUMBER	18, 19, 20, 25, 26		
NATIONAL GRID REFERENCE	298000 273000 = N 98 73		
1:50,000 O.S. SHEET NUMBER	42, 43	**1/2 inch Sheet No.**	13

Outline Site Description
River valley.

Geological System/Age and Primary Rock Type
Quaternary deposits, channels and terraces of a relict glaciofluvial system.

Main Geological or Geomorphological Interest
The Boyne Valley is a characteristic glacially modified lowland valley formed during the last Ice Age (before c. 10,000 years ago). It is characterised by hummocky topography and steep sided valley walls that have cut into the surrounding landscape. Features within the valley include suites of glaciofluvial and delta terraces. These are significant linear shelves generally subparallel to the meanders along the rock gorge. The terraces were formed by the meandering of the river after the channel had been deepened by large volumes of glacial meltwater. The Boyne Valley is complimented by many glacial meltwater channels, which feed into the Boyne system from either side.

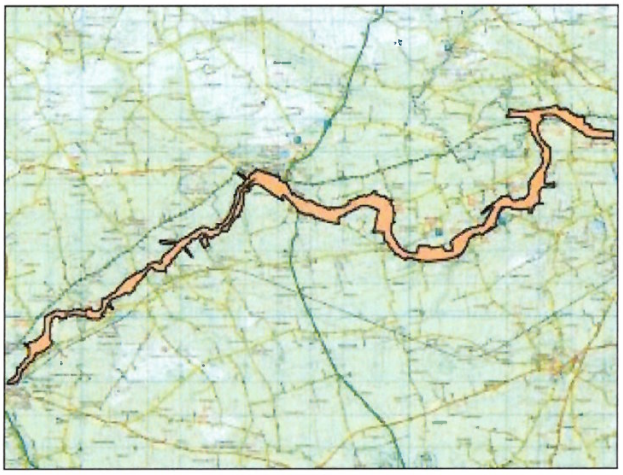
Site Importance
This is a nationally important example of a glacially derived valley, with easily accessible features along both sides of the Boyne River. It is an excellent teaching locality and is commonly used by the public for recreational purposes (walking, canoeing, etc). Many of the important glacial features detailed above already lie within the Boyne Woods NHA (01592) and the River Boyne SAC (02299).

Management/promotion issues
This is a well maintained stretch of the River Boyne with many sites along its banks detailing significant sections of Ireland's history. The addition of signage would greatly enhance people's awareness of this area's equally significant geological history.

Above: The Boyne Valley, beside Slane. This broad, flat, steep sided glacial valley represents a period in Meath's geological history, when the land was dominated by massive, slow moving ice sheets and the large volume of erosive meltwater they generated.

Top: A delta terrace (terrace or slope left behind by an ancient meandering river channel).
Middle: The River Boyne with its steep sided wooded banks (commonly used for recreational sports such as kayaking).
Bottom: Digital elevation model (DEM) illustrating the pronounced glacially derived valley that is cut into the Meath landscape.

Boyne Valley



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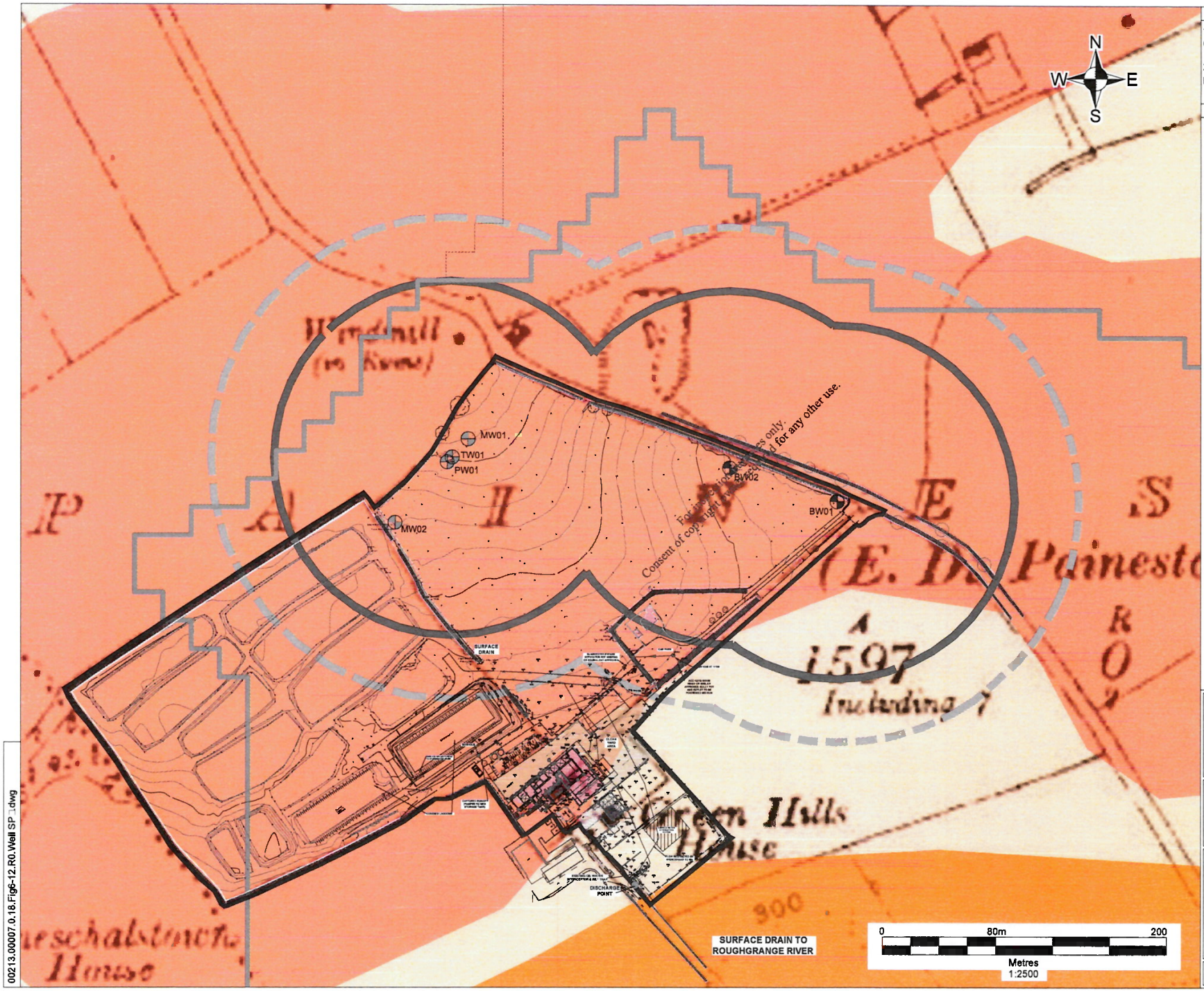
APPENDIX D

SLR Well Source Protection Zones



NOTES

1. Ordnance Survey Ireland Licence No. SU 0000714 (c) Ordnance Survey Ireland □ Government of Ireland

2. Based on Digital 25 inch OSI Mapping No. 2440 provided by Ordnance Survey Ireland

LEGEND

- DUNBIA (SLANE) LAND OWNERSHIP (C. 11.5 HA)
- PROPOSED OUTER SOURCE PROTECTION □ONE (SO) 170M RADIUS
- PROPOSED INNER SOURCE PROTECTION □ONE (S1) 125M RADIUS FOR TRAVEL TIME T100 DAYS
- VULNERABILITY ROCK NEAR SURFACE OR KARST - □
- VULNERABILITY E□TREME - E
- VULNERABILITY HIGH - H
- SURFACE WATER CATCHMENT
- BW02 E□ISTING SUPPLY WELLS (BW01 □ BW02)
- MW01 TEST AND MONITORING WELLS (2014)

dunbia
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www.slrconsulting.com

DUNBIA (SLANE)
ENVIRONMENTAL IMPACT STATEMENT
PAINESTOWN, NAVAN, CO. MEATH
WELL SOURCE PROTECTION □ONES

FIGURE 6.12

Scale: 1:2,500 @ A3
Date: SEPTEMBER 2014

00213.00007.0.18.Fig6-12.R0.Well SP □.dwg

EPA Export 04-06-2016:01:18:01

ATTACHMENT 10.2

- IECE MAPS & CONCEPTUAL SITE MODEL -

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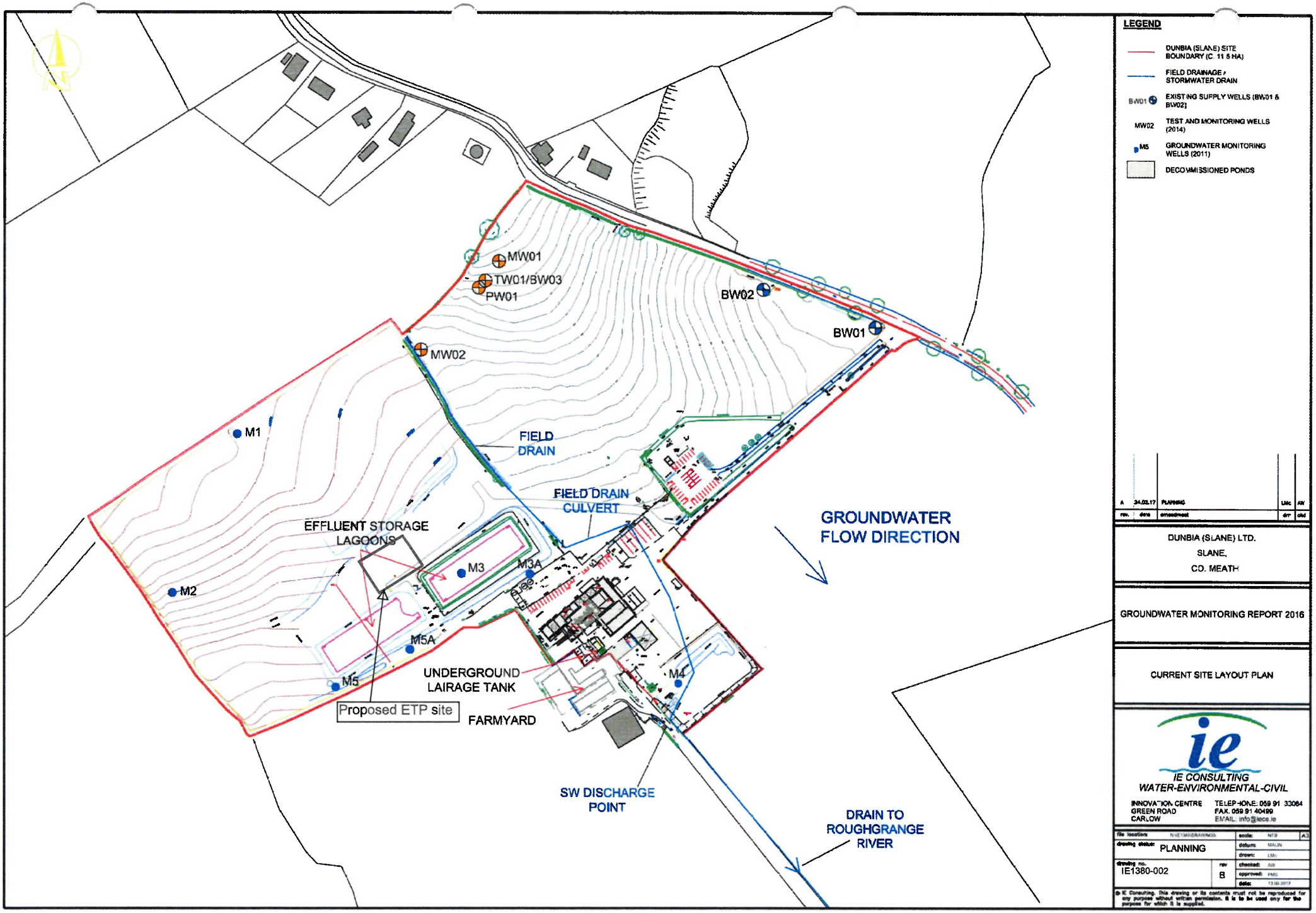
IE CONSULTING
WATER-ENVIRONMENTAL-CIVIL

Project Title: EIS Soils, Geology and Hydrogeology					
Project Address: Painestown, Slane, Co. Meath					
Client: Dunbia (Slane) Ltd.					
Dwg. Title: Site Location Map					
Dwg. Scale:	Date:	Dwg. No.:	Job No.:	Revision:	Dwg. By:
1:40,000 @ A4	16/3/17	IE1380-001	IE1380	C	AW



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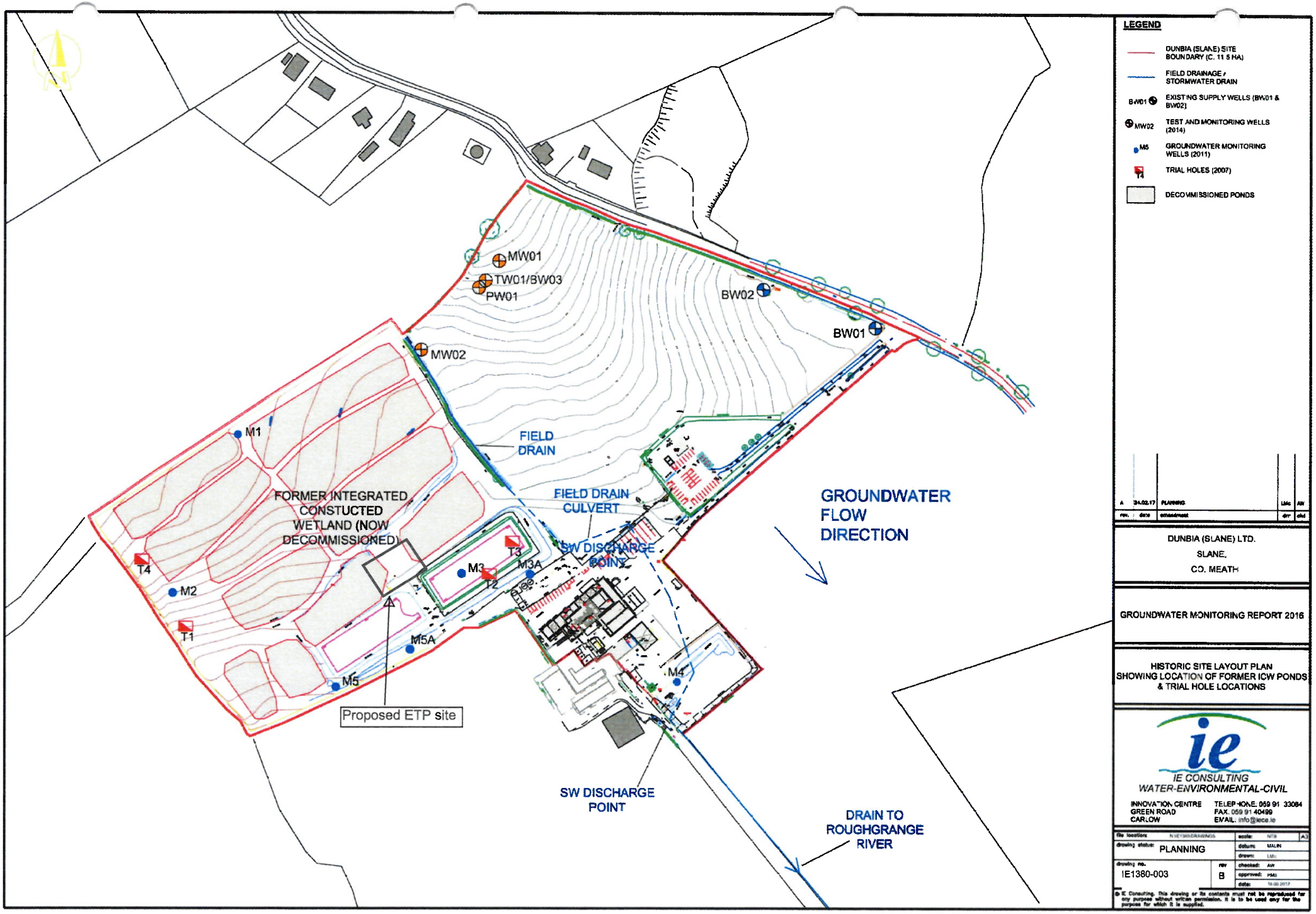

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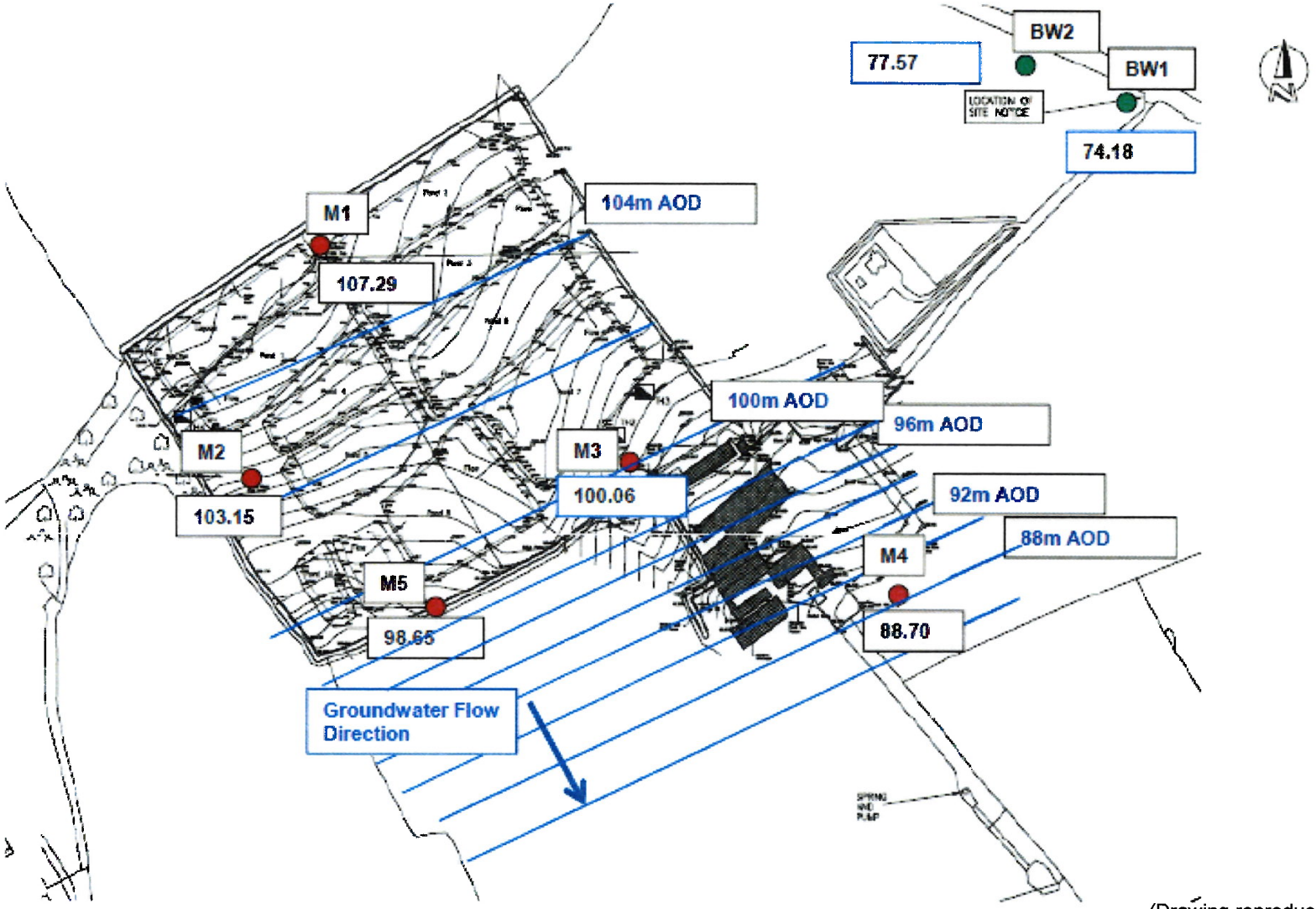

(Drawing reproduced from AWN, 2013)

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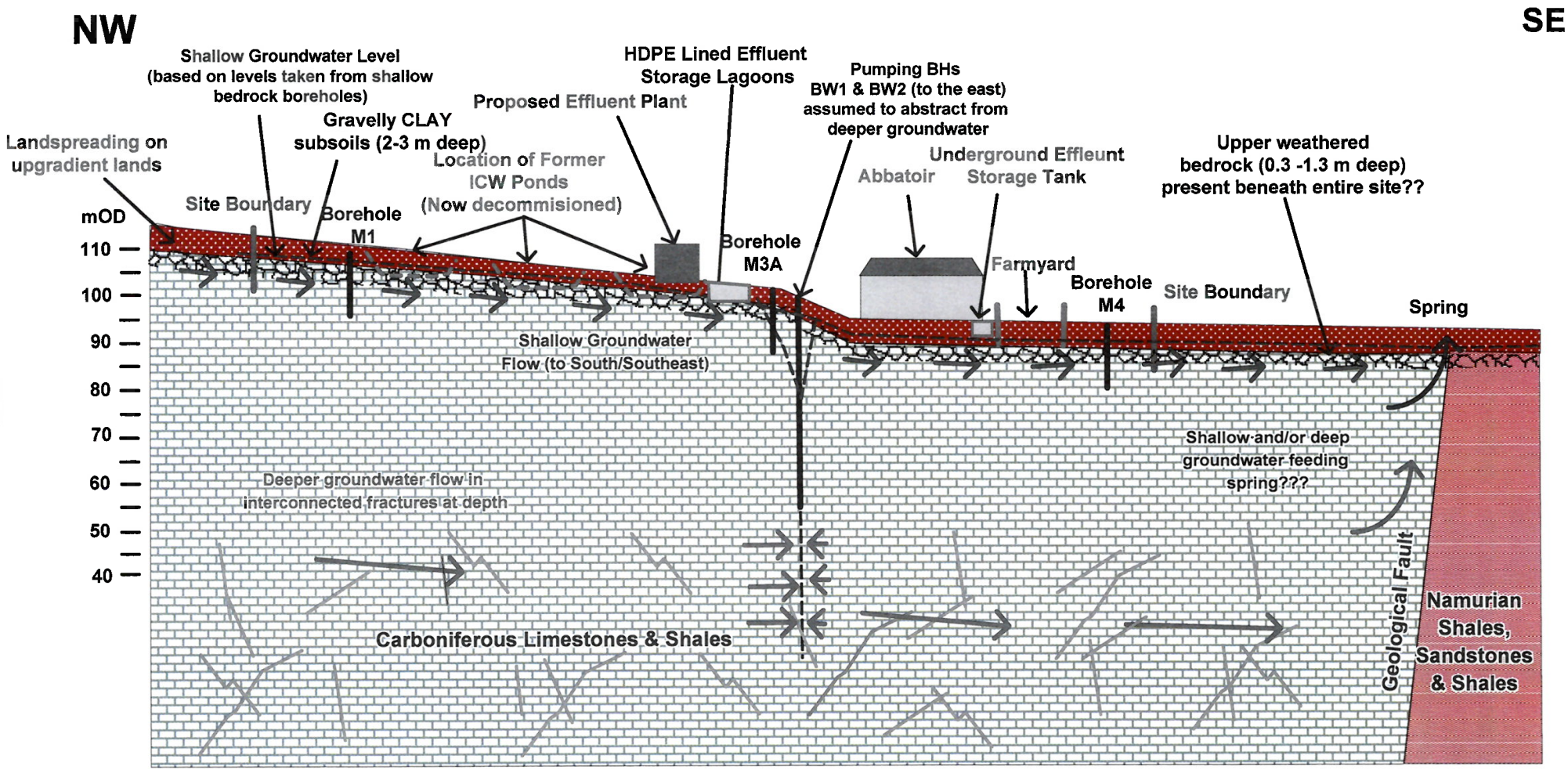
WATER-ENVIRONMENTAL-CIVIL

Project Title: EIS Soils, Geology and Hydrogeology					
Project Address: Painestown, Slane, Co. Meath					
Client: Dunbia (Slane) Ltd.					
Dwg. Title: Groundwater Contour Map 29/4/13					
Dwg. Scale:	Date:	Dwg. No.:	Job No.:	Revision:	Dwg. By:
NTS	10//3/17	IE1380-004	IE1380	A	AW



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IE CONSULTING
WATER-ENVIRONMENTAL-CIVIL

Project Title: EIS Soils, Geology and Hydrogeology					
Project Address: Painestown, Slane, Co. Meath					
Client: Dunbia (Slane) Ltd.					
Dwg. Title: Conceptual Site Model					
Dwg. Scale:	Date:	Dwg. No.:	Job No.:	Revision:	Dwg. By:
NTS	16/3/17	IE1380-005	IE1380	B	AW

ATTACHMENT 13.0

- MATERIAL ASSETS -
- UTILITIES & TRANSPORT NETWORK -

consulting engineers

NRB

Transportation Assessment Report

for

Construction of Pipeline & Wastewater Treatment Plant

for

DAWN Meats – Slane

Greenhills, Beauparc, Navan,

Co. Meath,

FINAL ISSUE

1st Floor, Apollo Building, Dundrum Road, Dundrum, Dublin 14
Tel: +353 1 292 1941, E-mail: info@nrb.ie, Web: www.nrb.ie

Registered in Ireland No. 491679

NR3 consulting engineers

Contents

Page	Section	Description
2	--	Executive Summary
3	1.0	Introduction
6	2.0	Development Proposals & Existing Road Conditions
9	3.0	Vehicular Trip Generation Assignment and Distribution
12	4.0	Traffic Impact - Traffic Capacity Analysis
15	5.0	Conclusions

Appendices.....

A	Proposed Route of Pipe Laying Works (For Reference)
B	Raw Traffic Survey Data
C	Traffic Surveys, Trip Distribution & Network Traffic Flow Diagrams
D	PiCADY Junction Capacity Model Output – Existing Windmill Rd/L1013
E	PiCADY Junction Capacity Model Output – Existing L1013 Crossroads
F	PiCADY Junction Capacity Model Output – T Junction at Yellow Furze
G	PiCADY Junction Capacity Model Output – Existing Yellow Furze/L1600 T Junc

EXECUTIVE SUMMARY

NRB Consulting Engineers Ltd were appointed to address the Traffic & Transportation issues associated with the construction of a Wastewater Treatment Plan and associated Sewer Pipe-laying for DAWN Meats - Slane, Greenhills, Beauparc, Navan, Co. Meath.

The site is long established and the proposed works when operational will, in reality, result in reduced traffic demand. The completed works will remove existing traffic volumes associated with current de-sludging and decanting operations when the pipeline and wastewater treatment plant is installed. This Report addresses the traffic impact associated with the construction of the wastewater treatment plant in tandem with the sewer laying works along the route as illustrated herein as ***Appendix A***.

This Transportation Assessment Report (TA) has been prepared to address the Traffic and Transportation issues associated with the construction works, the capacity of the existing road network and the impact of the temporary very small increases in traffic locally. The Report has been prepared in accordance with TII's Traffic & Transportation Assessment Guidelines and addresses the worst case traffic impact of the proposal with both construction operations proceeding.

Comprehensive classified turning movement surveys of the existing affected roads and junctions were carried out during the weekday AM and PM Peak Hours in 2020. These surveys, undertaken in the normal school term, formed the basis of the study. We have utilised adjacent permanent TII Traffic Counters on the N2 to apply 'Covid Factors' to the survey data, and this represents industry standard practice during pandemic times.

The analysis includes the effects of the existing traffic on the local roads and assesses the impact during the traditional peak commuter peaks periods in accordance with Traffic & Transportation Assessment Guidelines.

The Transportation Assessment confirms that the road network and the affected junction capacities are more than adequate to accommodate the worst case traffic associated with the operations. It should be acknowledged that the completion of the works, and the operation of an on-site treatment plant will result in less traffic on the local roads, as in future there will be no requirement to remove bulk sludge for off-site treatment.

Based on our studies, we believe that there are no adverse traffic/transportation capacity or operational issues associated with the construction operations that would prevent planning permission being granted by Meath County Council.

1.0 INTRODUCTION

1.1 This Transportation Assessment (TA) has been prepared by NRB Consulting Engineers Ltd and addresses the Traffic/ Transportation issues arising from the proposed construction of the Dawn Meats - Slane wastewater treatment plant and the associated public road pipe-laying works.

1.2 The DAWN Meats – Slane plant is long established in the area and in these terms has very well established traffic generation characteristics in its own right. The proposed works when complete will actually result in reduced traffic as it will mean that waste will no longer have to be regularly removed off-site by heavy goods vehicles for onward treatment. A site location plan for the DAWN site, together with details of the local road Junctions within the Network Area of Influence, is included below as ***Figure 1.1***;

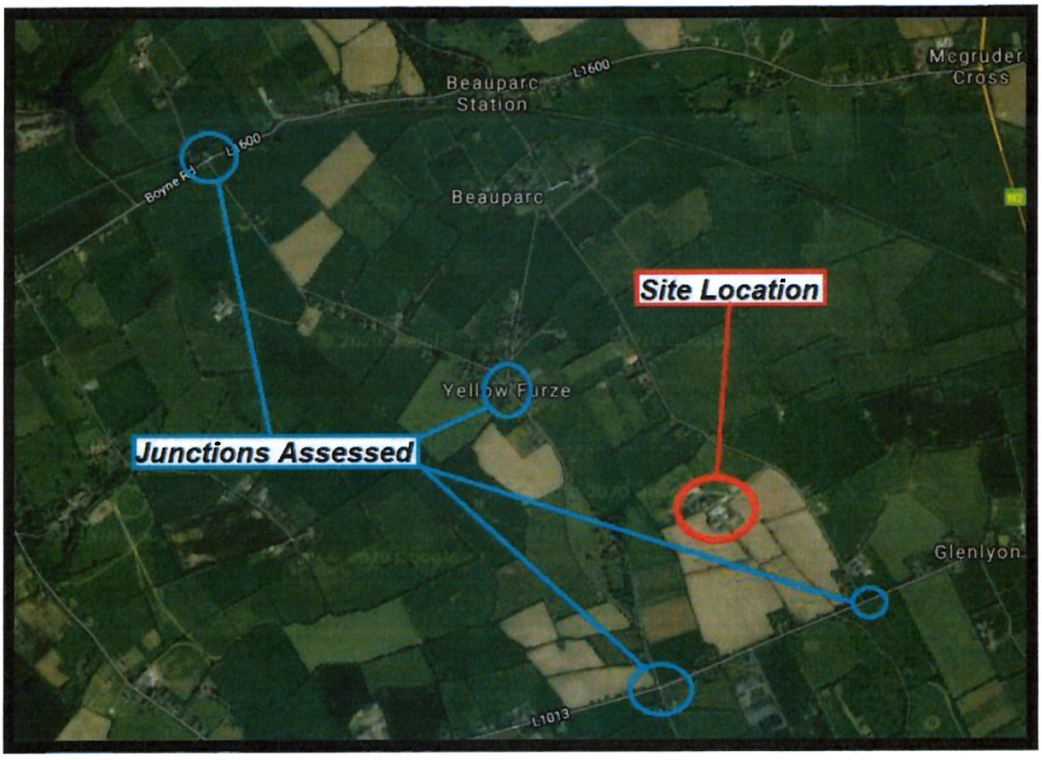


Figure 1.1 - Site Location

1.3 In describing the Receiving Environment and the Roads Environment during the construction works, this report addresses the following aspects of the proposed development:

- Relatively Small Scale of the construction traffic volume in the context of the local road network (Reflected in the very Low Traffic Volume Projections associated with the Construction Works),
- Location of the development within a long established lightly trafficked local road network adjacent the N2 National Road,
- Traffic & Transportation impact,
- Capacity of the Existing Road Network,
- Adequacy of Capacity and safety of the existing roads and junctions locally, within the area of influence.
- Impact upon the adjacent affected junctions locally as per ***Figure 1.1***.

1.4 A review of the Road Safety Authority (RSA) online collision database indicates that there are no significant accidents on the affected stretches of road network surrounding the site. There have been a few 'minor' accidents locally as per the illustration below but the statistics are expected to be unaffected by the proposed works.

1.5 An extract from the RSA on-line collisions record is included below as ***Figure 1.2***.

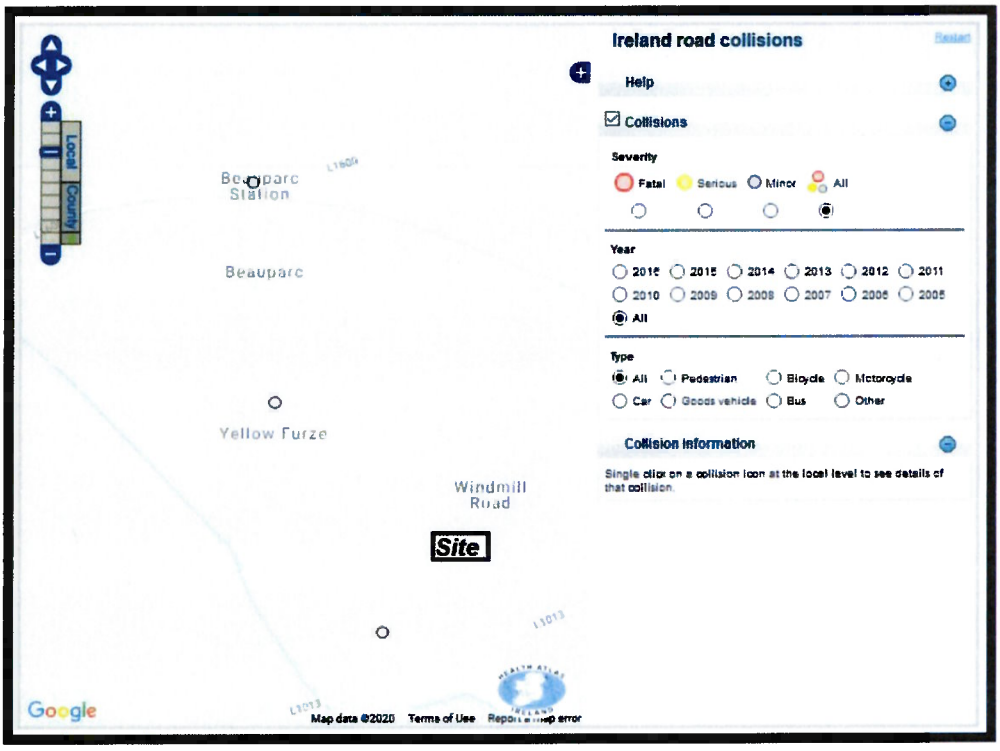


Figure 1.2 - Extract from RSA On-Line Record of Traffic Collisions

1.6 The Recommendations contained within this Transportation Assessment are based on the following sources of information and industry-standard practices; -

- TII Traffic & Transport Assessment Guidelines,
- Recent Traffic Survey Data, supplemented by TII Traffic Census Data,
- Relevant Design Guidance,
- Predicted Construction Traffic AADT Volumes provided by the Consulting Engineer for the Project,
- Our experience in assessing the impact of Developments of this Nature, and
- Site Visits and Observations.

1.7 The Report has been prepared in accordance with the requirements of the TII's Traffic & Transport Assessment Guidelines. These are the professional Guidelines used to assess the impact of developments on public roads.

2.0 DEVELOPMENT PROPOSALS & EXISTING ROAD CONDITIONS

2.1 The development consists of the construction of a Wastewater Treatment Plant on the site of DAWN Meats - Slane and also the construction of the associated outfall pipe to the River Boyne as detailed on the Engineers Drawings enclosed as ***Appendix A***, with an annotated extract included below as ***Figure 2.1*** for ease of reference. The site compound for the works will be within the DAWN Site.

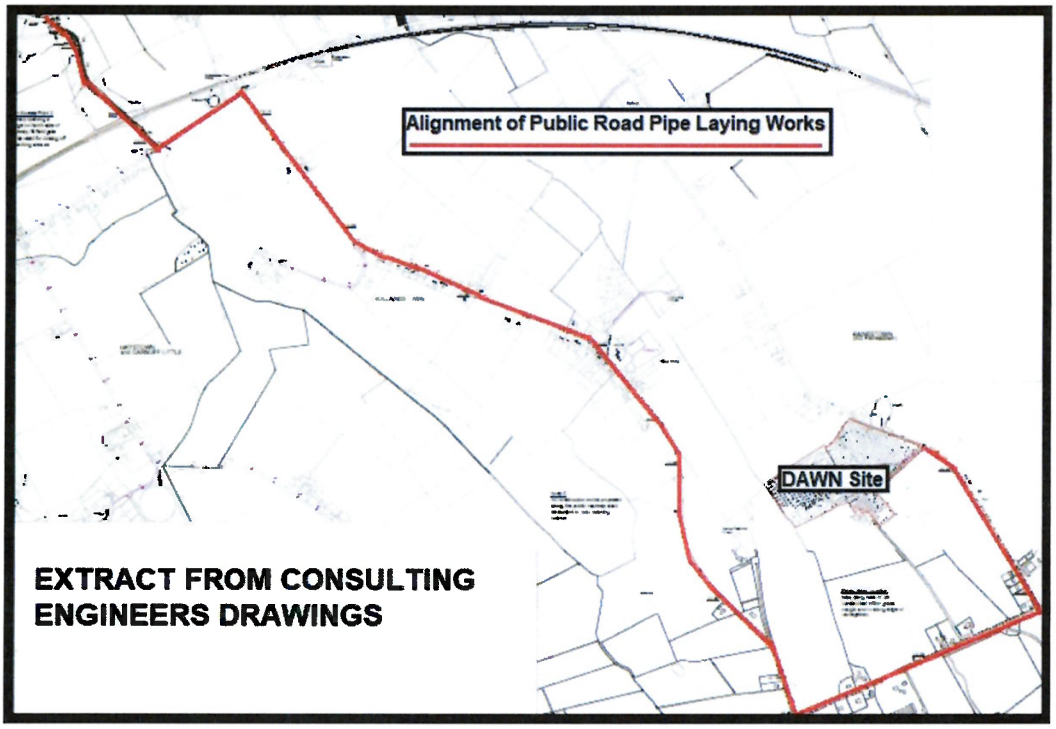


Figure 2.1 – Annotated Extract from Engineers Drawings (Appendix A)

2.2 It is proposed to locate the Site Compound on the DAWN Site, accessible via the L1303 via the adjacent N2. The works compound and DAWN is located approximately 1.3km west of the N2, and in these terms is considered ideal in terms of the import of the expected small volumes of materials, machinery and construction staff. The location is illustrated below as ***Figure 2.2***

Figure 2.2 – Location of DAWN Site & Proximity to N2

2.3 The junction of the N2 and the L1303 takes the form of a large capacity priority junction with the provision of a dedicated right turn lane. The form of junction will ensure that the small volumes of construction related traffic will have easy & safe access to the construction compound from the N2. An image of the junction is included below as ***Figure 2.3***

Figure 2.3 – N2/L1303 Boyne Rd (looking south)

2.4 The local roads surrounding the site are traditional and rural in nature, all consisting of single carriageway roads bounded by established hedgerows. Each of the affected roads are classified as Local Roads (with the "L" designation), and are all subject to an 80kph speed restriction. Whilst there is an 80kph designation, the speeds are self-regulating in terms of the undulating and rural nature of the carriageways. In terms of the capacity of the local roads, ultimately these have a theoretical traffic or link capacity of approximately 800-1,000 PCUs per direction per hour. The existing flows on the local roads need to be considered in this context.

2.5 The L1600 Boyne Road is orientated in an E-W direction and, in addition to the L1303, it can serves as a secondary or backup route from the N2 to the area. The L1600 currently carries a weekday AM Peak Hour 2-way flow of approximately 165 PCUs & a weekday PM Peak Hour 2-Way flow of approximately 171 PCUs. In these terms, it is clearly lightly trafficked in terms of its theoretical link capacity as illustrated above.

2.6 The local road past Yellow Furze, linking the L1600 to the L1013 to the south, carries a weekday AM Peak Hour 2-way flow of approximately 40 PCUs & a weekday PM Peak Hour 2-Way flow of approximately 45 PCUs. In these terms, it is clearly very lightly trafficked indeed.

2.7 The L1013 to the south, which will serve as the primary access from the N2, is also orientated in an E-W direction. It has a primary high quality access to/from the N2 by way of a large capacity Priority Junction (with Right Turn Ghost Island). It currently carries a weekday AM Peak Hour 2-way flow of approximately 90 PCUs & a weekday PM Peak Hour 2-Way flow of approximately 155 PCUs. In these terms, it is also considered lightly trafficked in terms of its theoretical link capacity as illustrated above.

2.8 Of course, the capacity of any road or link is ordinarily determined by the capacity of terminal junctions, and the capacity of junctions is therefore addressed in more detail within the main body of this report.

3.0 VEHICULAR TRIP GENERATION, ASSIGNMENT & DISTRIBUTION

3.1 The Trip Rate Information Computer System (TRICS) database is ordinarily used to ascertain vehicular trip generation associated with the use of any particular site. This represents industry standard practice for Transportation Assessments in Ireland, in the assessment of traditional commercial developments. In this case, an assessment of construction traffic impact is required, and an alternative traffic generation calculation methodology is used to quantify the traffic generated by the construction operations.

3.2 An assessment of the worst case daily traffic volumes associated with both the pipe laying works (on the public roads) and the waste water treatment plant (within DAWN Meats) has been undertaken and this is illustrated below as ***Figure 3.1***

Construction Activity	Movements Generated	
	LGV	HGV
Extension to WWTP (Phase 1)	40	20
Rising Main Pipeline	60	40

Table 3-1: Annual Average Daily Traffic (Construction Traffic)

Figure 3.1 Daily Traffic Volumes Generated by Construction Operations

3.3 Through the use of standard vehicle conversion factors to convert vehicle types to Passenger Car Units ('Car Equivalents'), we have utilised this information to quantify the traffic generated by both construction projects. In this case, a Light Goods Vehicle (LGV) is equivalent to 1 PCU and a Heavy Goods Vehicle to 2 PCUs for assessment purposes. This is illustrated below as ***Table 3.2*** and ***Table 3.3***.

Table 3.2 – Total Traffic Generated by Waste Water Treatment Plant Works (PCUs)

Network Period	Arrivals (PCUs)	Departures (PCUs)
24 Hr AADT	100	100
Weekday AM Peak Hr*	13	13
Weekday PM Peak Hr*	13	13

Table 3.3 – Total Traffic Generated by Pipe Laying Works (PCUs)

Network Period	Arrivals (PCUs)	Departures (PCUs)
24 Hr AADT	140	140
Weekday AM Peak Hr*	18	18
Weekday PM Peak Hr*	18	18

* *Industry Standard Method of Calculating Weekday Peak Hr is to Divide 24Hr AADT by 10 - We have Divided by 8 for Robustness, giving higher Peak Hr Flow Volumes for Assessment Purposes.*

3.4 These volumes of traffic have then been applied to the established road network and the resultant impact considered. The assessment is undertaken in accordance with the Guidelines in the context of the demonstrably low levels of traffic generated by the proposed construction operations.

Assignment/Distribution - Future Year Traffic

3.5 We have used hand assignment techniques based on the observed patterns, with the worst case traffic assigned to the roads based on the observed established traffic patterns.

3.6 The standard methodology applied was to firstly ascertain the base background traffic conditions for both the weekday AM and weekday PM Commuter Peak periods. We then used the TII Project Appraisal Guidelines Unit 5.3 (Travel Demand Projections Table 5.3.2) to establish worst case projected construction year 2022 on the local road network. (We selected 2022, however an earlier or indeed a later start to the construction will not have any material impact upon the conclusions).

3.7 The worst case traffic based on a combination of the content of ***Table 3.2*** and ***Table 3.3*** above was then applied in order to establish Construction Year Traffic Conditions for both the pipeline works and WWTP occurring in tandem. This is all included in the calculations included herein as ***Appendix C***.

3.8 It should be noted that we have selected the construction year of 2022 as being reasonable and appropriate, however, in our experience varying this by 1-2 years will have no significant impact upon the conclusions of the study. In addition, given the favourable results reported in this study, if required to apply higher background traffic conditions for any reason we would not anticipate any changes whatsoever to the conclusions.

3.9 In light of the covid pandemic, we have used historic and publicly available TII Traffic Census Data from the nearby N2 Ashbourne/Slane to establish 'normal' non-covid pandemic traffic conditions on the local network. In essence, we applied a 'Covid Factor' to the surveyed AM & PM flows through this exercise, and this accords with normal accepted practice during these emergency times. This is as set out in ***Appendix C*** (Page 1).

3.10 Normal traffic growth factors for future year assessments were calculated from data obtained in the TII Travel Demand Projections Unit 5.3, which provides the recommended method of predicting future year traffic growth on Roads. Calculations of the relevant growth factors are included in ***Table 3.4*** below (based on tabulated 'medium growth' in the Meath Area).

Table 3.4 - Traffic Growth Rates, TII Travel Demand Projections Unit 5.3

Year	to Year	Table 5.5.1:
2020	2022	1.022

3.11 The resulting Traffic Flow Projections and Figures within ***Appendix C*** allowed the assessment of impact of the construction operations to be undertaken.

4.0 TRAFFIC IMPACT - THRESHOLD ASSESSMENT/TRAFFIC CAPACITY ANALYSIS

4.1 The Institution of Highways and Transportation (IHT) Guidelines for Traffic Impact Assessment and the TII Traffic and Transport Assessment Guidelines sets out a methodology for assessment of developments of this nature and determining whether further assessment is indeed required.

4.2 This TII Traffic and Transport Assessment Guidelines normally requires a **Threshold Assessment** of the impact on the local roads to be provided in order to determine whether further more detailed modelling and assessment of particular critical junctions is necessary. However, in this case, given the very lightly trafficked nature of the local roads even a small increase in traffic related to construction activities can have a significant Net Effect.

4.3 For robustness we have therefore undertaken an assessment of the worst case traffic capacity impact, with junction capacity modelling undertaken for each of the 4 local junctions within the network area of influence of the construction works;

- The Windmill Rd/L1013 T-Junction near DAWN Meats,
- The L1013/Yellow Furze Rd Crossroads to the west,
- The T-Junction at Yellow Furze, and
- The L1600 Boyne Road T-Junction nearest the site compound,

4.4 Clearly the WWTP Works at Dawn Meats is a fixed site as a construction traffic destination, however the pipelaying contract works will move throughout the programme as the piping progresses. In this regard, we have undertaken an assessment of the progression of the pipe contract works in 5 separate locations (referred to herein as 'Scenarios') in order to determine the worst case traffic demands at each junction. Traffic to and from the works sites will originate to/from the dedicated site compound at the Dawm Meats Plant.

4.5 The scenarios considered are;

- **Scenario A** – WWTP works at DAWN & Pipelaying on Windmill Rd.,
- **Scenario B** – WWTP works at DAWN & Pipelaying on L1013,
- **Scenario C** – WWTP works at DAWN & Pipelaying South of Yellow Furze
- **Scenario D** – WWTP works at DAWN & Pipelaying North of Yellow Furze
- **Scenario E** – WWTP works at DAWN & Pipelaying on the L1600.

4.6 The entire assessment is included herein as Appendix C. A summary showing the worst case traffic conditions at each of the local junctions is below as Table 4.1

Table 4.1 – Total Traffic Generated by Pipe Laying Works (PCUs)

Network Junction	Total WorstCase Predicted Traffic Flow Through Junctim									
	Scenario A		ScenarioB		Scenario C		ScenarioD		ScenarioE	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Windmill Rd/L1013	271	253	270	252	270	252	270	252	270	252
L1013 Crossroads	182	194	183	194	218	229	218	229	218	229
T Junction Yellow Furze	42	47	42	47	42	47	77	82	77	82
L1600/Yellow Furze T Junc	216	242	216	242	216	242	216	242	251	277

4.7 The assessment demonstrates that ***Scenario E*** unsurprisingly represents the worst case in traffic terms at each of the network junctions. Therefore a junction capacity assessment for Scenario E at each junction has been undertaken.

4.8 We have used the TII-approved software package 'Junctions 9' PICADY' (**P**riority **I**ntersection **C**apacity and **D**elay**Y**) software package (as part of the TRL Package 'Junction 9') to assess the capacity of each of the junctions. PiCADY produces results based on a ratio of flow to capacity (RFC) and period mean-maximum queue length. An RFC greater that 1.00 indicates that a junction is operating at or above capacity, with 0.85 considered to be the optimum RFC value. We have appended the detailed computer simulation model results (PiCADY Outputs) of the junction modelling for the proposed site access in ***Appendix D, E, F and G***. Summaries of the results of the modelling is included below.

Windmill Rd/L1013 T-Junction

4.9 The detailed simulation output is included as ***Appendix D***, and a summary of the results is reproduced below as ***Table 4.2***

Table 4.3 - Junctions9 PiCADY Summary Results, Windmill Rd/L1013 T-Junction

Modelled Scenario	*Period Mean Max Q (PCUs)*	*Period Max RFC*
2022 Construction Year AM Peak	<1	0.11
2022 Construction Year PM Peak	<1	0.10

L1013 Crossroads Junction

4.10 The detailed simulation output is included as ***Appendix E***, and a summary of the results is reproduced below as ***Table 4.4***

Table 4.4 - Junctions9 PiCADY Summary Results, L1013 Crossroads Junction

Modelled Scenario	*Period Mean Max Q (PCUs)*	*Period Max RFC*
2022 Construction Year AM Peak	<1	0.07
2022 ConstructionY ear PM Peak	<1	0.08

T-Junction at Yellow Furze

4.11 The detailed simulation output is included as ***Appendix F***, and a summary of the results is reproduced below as ***Table 4.5***

Table 4.5 - Junctions9 PiCADY Summary Results, Yellow Furze T Junction

Modelled Scenario	Period Mean Max Q (PCUs)	Period Max RFC
2022 Construction Year AM Peak	<1	0.02
2022 Construction Year PM Peak	<1	0.01

L1600 Boyne Rd T-Junction (North of Yellow Furze)

4.12 The detailed simulation output is included as ***Appendix G***, and a summary of the results is reproduced below as ***Table 4.6***

Table 4.6 - Junctions9 PiCADY Summary Results, Boyne Rd T-Junction North of Yellow Furze

Modelled Scenario	Period Mean Max Q (PCUs)	Period Max RFC
2022 Construction Year AM Peak	<1	0.07
2022 Construction Year PM Peak	<1	0.7

Conclusion – Modelling Above

4.13 The results of the modelling above clearly shows that all of the affected junctions will have significantly more than adequate capacity to accommodate the worst case traffic associated with both construction projects progressing in tandem. All of the RFCs are **way below** the theoretical optimum capacity of 0.85 and no queuing whatsoever is anticipated.

5.0 CONCLUSIONS

5.1 This Transportation Assessment Report assesses the traffic and transportation impact associated with the construction of a pipelaying contract and a wastewater treatment plant (WWTP) running in tandem, associated with the DAWN Meats – Slane Plant in Co Meath.

5.2 This Report has been prepared in accordance with the TII Traffic & Transport Assessment Guidelines, and it provides for an onerous and robust assessment of the impact of the construction traffic associated with the contracts.

5.3 The impact of the traffic on the local roads has been modelled and assessed, based on a comprehensive new classified vehicle turning movement survey undertaken for the purposes of this study, during normal school period, factored using industry standard methods to reflect non-Covid 19 Pandemic times.

5.4 This report assessed the WWTP and the Pipelaying in tandem, assessing the worst case traffic at each junction associated with the entire length of the Pipe Laying works.

5.5 The assessment demonstrates that the construction traffic will have an absolutely negligible impact upon the established local traffic conditions and can easily be accommodated on the road network without any capacity concerns arising.

5.6 It should be remembered that, whilst there will be a very small increase in traffic conditions locally during the construction works, the construction of the WWTP will result in a medium and long term improvement in traffic conditions locally, as large tanker vehicles will no longer be required to export effluent from the site for off-site treatment.

5.7 It is considered that there are no significant Operational Traffic Safety or Road Capacity issues that prevent a positive determination of the application by Meath County Council.

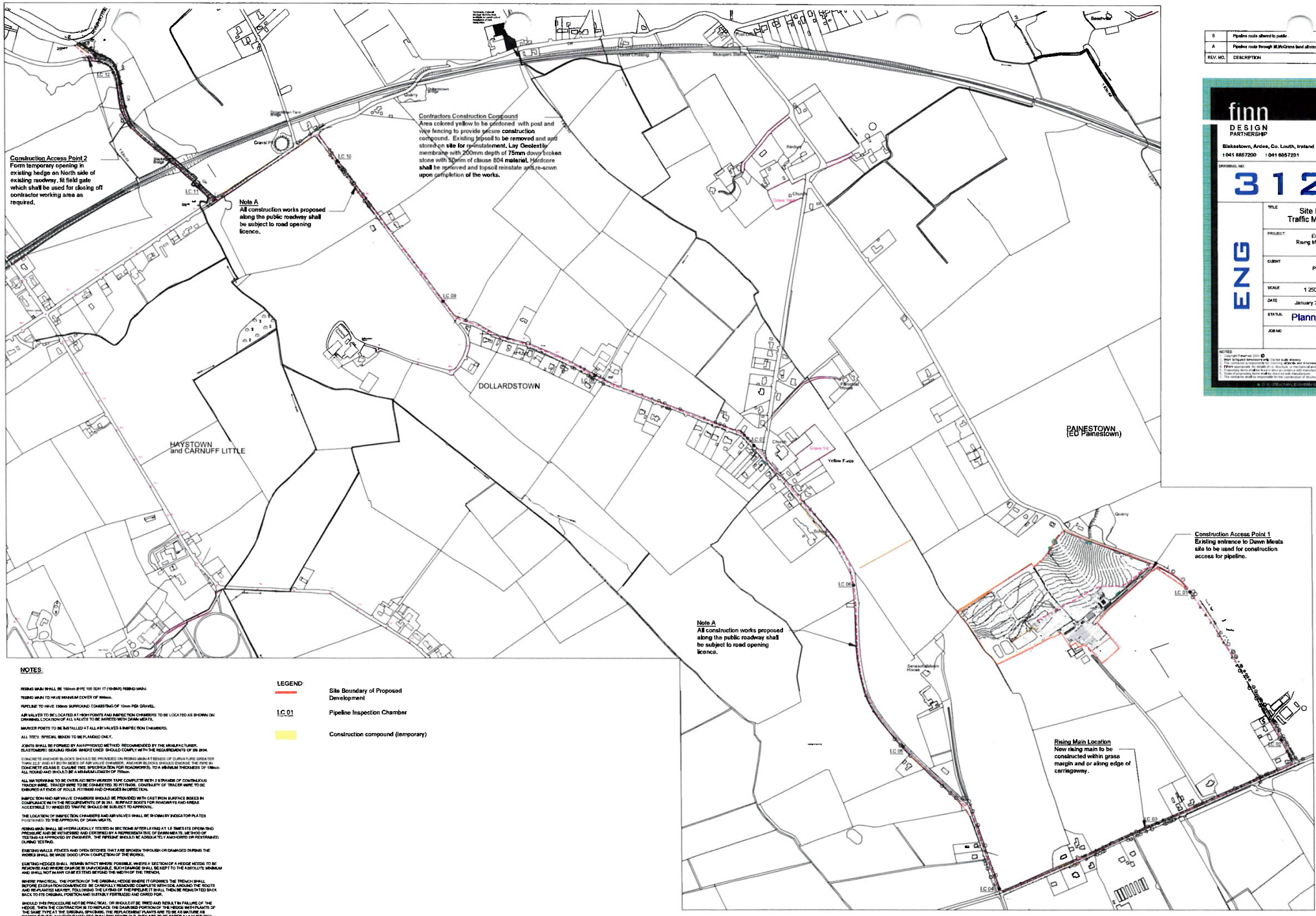
APPENDICES - CONTENT

A	Proposed Route of Pipe Laying Works (For Reference)
B	Raw Traffic Survey Data
C	Traffic Surveys, Trip Distribution & Network Traffic Flow Diagrams
D	PiCADY Junction Capacity Model Output – Existing Windmill Rd/L1013
E	PiCADY Junction Capacity Model Output – Existing L1013 Crossroads
F	PiCADY Junction Capacity Model Output – T Junction at Yellow Furze
G	PiCADY Junction Capacity Model Output – Existing Yellow Furze/L1600 T Junc

NRB consulting engineers

APPENDIX A

Proposed Route of Pipe Laying Works (For Reference)



REV. NO.	DESCRIPTION	DATE	INITIALS
B	Pipeline route altered to public .	17th April 2020	T.Finn
A	Pipeline route through M.McGrane land altered	11th Feb 2019	T.Finn

finn DESIGN PARTNERSHIP
CREATIVE & INNOVATIVE
Blakestown, Ardee, Co. Louth, Ireland
t 041 6857200 f 041 6857201 e info@finn.ie w www.finn.ie

DRAWING NO: 312 REV. NO: B

ENG

TITLE: Site Location Plan
Traffic Management Plan

PROJECT: Extension to WWTP &
Rising Main Pipeline to River Boyne

CLIENT: Dawn Meats Slane
Painstown, Beauparc
Co Meath

SCALE	1:2500	DRAWN	T.Finn
DATE	January 2019	CHECKED	-

STATUS: Planning Application

JOB NO: 1604

NOTES
Copyright Finn+ed 2009 ©
1. Work to figured dimensions only. Do not scale drawing.
2. The contractor is responsible for checking all levels and dimensions on site and shall refer all discrepancies to the Architect
3. Where appropriate for details of c.i. structure or mechanical and electrical details, see Engineers drawings.
4. This drawing is to be read in conjunction with all relevant specification and schedules.
5. Copies of the planning permission shall be obtained and strictly complied with.
6. The contractor shall be responsible for the coordination of structure, finishes and services.

NOTES:

RISING MAIN SHALL BE 150mm Ø PE 100 SDR 17 (10-BAR) RISING MAIN.

RISING MAIN TO HAVE MINIMUM COVER OF 900mm.

PIPELINE TO HAVE 150mm SURROUND CONSISTING OF 10mm PEA GRAVEL.

AIR VALVES TO BE LOCATED AT HIGH POINTS AND INSPECTION CHAMBERS TO BE LOCATED AS SHOWN ON DRAWING. LOCATION OF ALL VALVES TO BE AGREED WITH DAWN MEATS.

MARKER POSTS TO BE INSTALLED AT ALL AIR VALVES & INSPECTION CHAMBERS.

ALL TEE'S SPECIAL BENDS TO BE PLANNED ONLY.

JOINTS SHALL BE FORMED BY AN APPROVED METHOD RECOMMENDED BY THE MANUFACTURER. ELASTOMERIC SEALING RINGS WHERE USED SHOULD COMPLY WITH THE REQUIREMENTS OF BS 2494.

CONCRETE ANCHOR BLOCKS SHOULD BE PROVIDED ON RISING MAIN AT BENDS OF CURVATURE GREATER THAN 22.5° AND AT BOTH SIDES OF AIR VALVE CHAMBER. ANCHOR BLOCKS SHOULD ENCASE THE PIPE IN CONCRETE (CLASS E, CI.NAME 1992, SPECIFICATION FOR ROADWORKS). TO A MINIMUM THICKNESS OF 150mm ALL ROUND AND SHOULD BE A MINIMUM LENGTH OF 750mm.

ALL WATERMAINS TO BE OVERLAID WITH MARKER TAPE COMPLETE WITH 2 STRANDS OF CONTINUOUS TRACER WIRE. TRACER WIRE TO BE CONNECTED TO PITTMOR. CONTINUITY OF TRACER WIRE TO BE ENSURED AT ENDS OF ROLLS. FITTINGS AND CHAMBERS IN DIRECTION.

INSPECTION AND AIR VALVE CHAMBERS SHOULD BE PROVIDED WITH CAST IRON SURFACE BOXES IN COMPLIANCE WITH THE REQUIREMENTS OF BS 534. SURFACE BOXES FOR ROADWAYS AND AREAS ACCESSIBLE TO WHEELED TRAFFIC SHOULD BE SUBJECT TO APPROVAL.

THE LOCATION OF INSPECTION CHAMBERS AND AIR VALVES SHALL BE SHOWN BY INDICATOR PLATES POSITIONED TO THE APPROVAL OF DAWN MEATS.

RISING MAIN SHALL BE HYDRAULICALLY TESTED IN SECTIONS AFTER LAYING AT 1.5 TIMES SITE OPERATING PRESSURE AND BE WITNESSED AND CERTIFIED BY A REPRESENTATIVE OF DAWN MEATS. METHOD OF TESTING AS APPROVED BY ENGINEER. THE PIPELINE SHOULD BE ADEQUATELY ANCHORED OR RESTRAINED DURING TESTING.

EXISTING WALLS, FENCES AND OPEN DITCHES THAT ARE BROKEN THROUGH OR DAMAGED DURING THE WORKS SHALL BE MADE GOOD UPON COMPLETION OF THE WORKS.

EXISTING HEDGES SHALL REMAIN INTACT WHERE POSSIBLE, WHERE A SECTION OF A HEDGE NEEDS TO BE REMOVED AND WHERE DAMAGE IS UNAVOIDABLE, SUCH DAMAGE SHALL BE KEPT TO THE ABSOLUTE MINIMUM AND SHALL NOT IN ANY CASE EXTEND BEYOND THE WIDTH OF THE TRENCH.

WHERE PRACTICAL, THE PORTION OF THE ORIGINAL HEDGE WHERE IT CROSSES THE TRENCH SHALL BEFORE EXCAVATION COMMENCES BE CAREFULLY REMOVED COMPLETE WITH SOIL AROUND THE ROOTS AND REPLANTED NEARBY, FOLLOWING THE LAYING OF THE PIPELINE IT SHALL THEN BE REINSTATED BACK BACK TO ITS ORIGINAL POSITION AND SUITABLY FERTILIZED AND CARED FOR.

SHOULD THIS PROCEDURE NOT BE PRACTICAL, OR SHOULD IT BE TRIED AND RESULT IN FAILURE OF THE HEDGE, THEN THE CONTRACTOR IS TO REPLACE THE DAMAGED PORTION OF THE HEDGE WITH PLANTS OF THE SAME TYPE AT THE ORIGINAL SPACINGS. THE REPLACEMENT PLANTS ARE TO BE AS MATURE AS POSSIBLE BUT IN ANY EVENT NOT LESS THAN TWO YEARS OLD. THEY ARE TO BE CAREFULLY NURTURED UNTIL A STRONG AND STURDY GROWTH EXISTS.

SHRUBS AND BUSHES OF VALUE WHICH ARE LOCATED ALONG THE LINE OF THE PIPELINE SHALL BE DEALT WITH IN A SIMILAR MANNER TO HEDGES.

ALL HEDGE PLANTS TO BE PLANTED IN AN EXCAVATED PIT OR TRENCH TO GIVE 100MM MINIMUM GROWTH SPACE TO ACCOMMODATE ROOT SPREAD. HEDGEROWS TO BE ESTABLISHED AS DOUBLE STAGGERED ROW. PLANTS TO BE RANDOMLY DISPERSED WITH MIXED SPECIES HEDGEROWS.

LEGEND:

Site Boundary of Proposed Development

I.C 01 Pipeline Inspection Chamber

Construction compound (temporary)

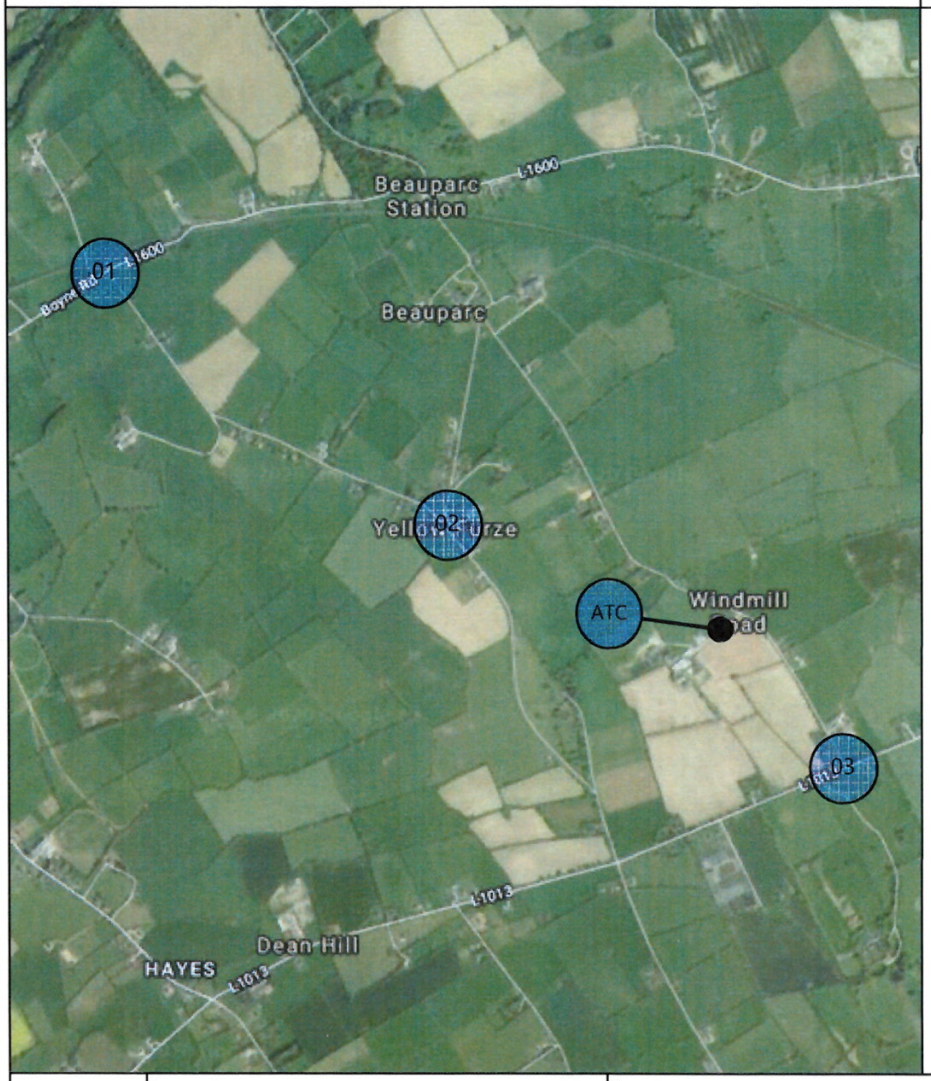
01/02 Site Location - Traffic Management Plan
1:2500

NRB consulting engineers

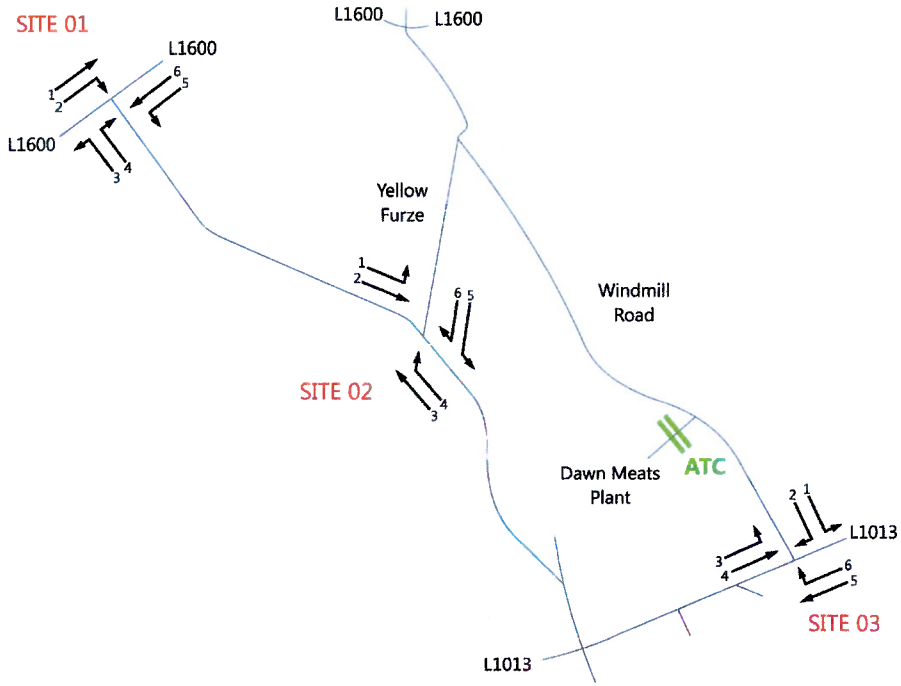
APPENDIX B

Raw Traffic Survey Data Output

Site Locations



Movement Numbering



Job number: TRA/20/123	Job date: November 2020	Drawing No: TRA/20/123-01	traffinomics.ie
Client: NRB Consulting Engineers	Job day: Midweek – School day	***Map – Survey Location***	

TRAFFINOMICS LIMITED

DAWN MEATS, SLANE TRAFFIC COUNTS
MANUAL CLASSIFIED JUNCTION TURNING COUNTS

NOVEMBER 2020
TRA/20/123

SITE: 01

DATE: 11th November 2020

LOCATION: L1600/Yellow Furze Road

DAY: Wednesday

	MOVEMENT 1								MOVEMENT 2								MOVEMENT 3							
TIME	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU
07:30	0	0	25	10	0	1	36	37	0	0	5	0	0	0	5	5	0	0	6	2	0	2	10	12
07:45	0	0	26	5	0	0	31	31	0	0	1	0	0	0	1	1	0	0	1	0	0	0	1	1
08:00	0	0	22	7	1	0	30	31	0	0	1	1	1	0	3	4	0	0	3	0	0	0	3	3
08:15	0	0	23	1	1	0	25	26	0	0	4	0	0	0	4	4	0	0	2	0	0	1	3	4
H/TOT	0	0	96	23	2	1	122	125	0	0	11	1	1	0	13	14	0	0	12	2	0	3	17	20
08:30	0	0	23	2	1	0	26	27	0	0	4	2	0	0	6	6	0	0	0	0	0	0	0	0
08:45	0	0	18	4	1	0	23	24	0	0	6	1	0	0	7	7	0	0	1	4	0	0	5	5
09:00	0	0	16	4	0	1	21	22	0	0	18	1	0	1	20	21	0	0	20	2	0	1	23	24
09:15	0	0	8	1	0	0	9	9	0	0	11	0	0	0	11	11	0	0	22	2	0	0	24	24
H/TOT	0	0	65	11	2	1	79	82	0	0	39	4	0	1	44	45	0	0	43	8	0	1	52	53
P/TOT	0	0	161	34	4	2	201	207	0	0	50	5	1	1	57	59	0	0	55	10	0	4	69	73
								108								21								12

	MOVEMENT 1								MOVEMENT 2								MOVEMENT 3							
TIME	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU
16:00	0	0	6	4	0	0	10	10	0	0	5	0	0	0	5	5	0	0	5	2	0	0	7	7
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H/TOT	0	0	30	14	2	1	47	50	0	0	19	4	0	0	23	23	0	0	15	8	0	0	23	23
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17:30	0	0	11	1	0	0	12	12	0	0	3	1	0	0	4	4	0	0	4	0	0	0	4	4
17:45	0	0	7	0	0	0	7	7	0	0	5	0	0	0	5	5	0	0	4	1	0	0	5	5
H/TOT	0	0	40	4	0	0	44	44	0	0	14	1	0	0	15	15	0	0	16	3	0	0	19	19
18:00	0	0	10	2	0	0	12	12	0	0	5	0	0	0	5	5	0	0	7	0	0	0	7	7
18:15	0	0	3	1	0	0	4	4	0	0	4	0	0	0	4	4	0	0	3	0	0	0	3	3
H/TOT	0	0	13	3	0	0	16	16	0	0	9	0	0	0	9	9	0	0	10	0	0	0	10	10
P/TOT	0	0	83	21	2	1	107	110	0	0	42	5	0	0	47	47	0	0	41	11	0	0	52	52

TRAFFINOMICS LIMITED

DAWN MEATS, SLANE TRAFFIC COUNTS **NOVEMBER 2020**
MANUAL CLASSIFIED JUNCTION TURNING COUNTS **TRA/20/123**

SITE: 01 DATE: 11th November 2020

LOCATION: L1600/Yellow Furze Road DAY: Wednesday

	MOVEMENT 4								MOVEMENT 5								MOVEMENT 6							
TIME	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	2	0	0	8	8
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	3	1	2	25	28
08:00	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	13	2	1	0	16	17
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1	0	0	6	6
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43	8	2	2	55	59
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	3	1	0	15	16
08:45	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	8	4	2	0	14	16
09:00	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	10	3	1	0	14	15
09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	5	1	1	17	19
H/TOT	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	2	0	0	39	15	5	1	60	66
P/TOT	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	2	0	0	82	23	7	3	115	125
								0								1								55

	MOVEMENT 4								MOVEMENT 5								MOVEMENT 6							
TIME	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	7	4	0	30	34
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	6	0	0	18	18
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	4	1	1	29	31
16:45	0	0	1	0	0	0	1	1	0	0	2	0	0	0	2	2	0	0	18	11	1	0	30	31
H/TOT	0	0	1	0	0	0	1	1	0	0	2	0	0	0	2	2	0	0	72	28	6	1	107	114
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	4	2	0	24	26
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	7	2	0	39	41
17:30	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	18	4	0	0	22	22
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	6	0	0	38	38
H/TOT	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	98	21	4	0	123	127
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18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	4	0	0	21	21
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43	7	0	0	50	50
P/TOT	0	0	1	0	0	0	1	1	0	0	3	0	0	0	3	3	0	0	213	56	10	1	280	291

TRAFFINOMICS LIMITED

DAWN MEATS, SLANE TRAFFIC COUNTS **NOVEMBER 2020**
MANUAL CLASSIFIED JUNCTION TURNING COUNTS **TRA/20/123**

SITE: 02 DATE: 11th November 2020

LOCATION: Yellow Furze Village Junction DAY: Wednesday

	MOVEMENT 1								MOVEMENT 2								MOVEMENT 3							
TIME	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU
07:30	0	0	0	0	0	0	0	0	0	0	6	0	0	0	6	6	0	0	5	1	0	1	7	8
07:45	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	3	0	0	0	0	0	0	0	0
08:00	0	0	0	1	0	0	1	1	0	0	0	0	1	0	1	2	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0	0	5	0	0	0	5	5	0	0	0	0	0	1	1	2
H/TOT	0	0	0	1	0	0	1	1	0	0	14	0	1	0	15	16	0	0	5	1	0	2	8	10
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45	0	0	0	1	0	0	1	1	0	0	6	1	0	0	7	7	0	0	1	3	0	0	4	4
09:00	0	0	2	0	0	0	2	2	0	0	24	3	0	1	28	29	0	0	17	2	0	1	20	21
09:15	0	0	0	0	0	0	0	0	0	0	15	0	0	0	15	15	0	0	24	2	0	0	26	26
H/TOT	0	0	2	1	0	0	3	3	0	0	45	4	0	1	50	51	0	0	42	7	0	1	50	51
P/TOT	0	0	2	2	0	0	4	4	0	0	59	4	1	1	65	67	0	0	47	8	0	3	58	61
								2								14								6

	MOVEMENT 1								MOVEMENT 2								MOVEMENT 3							
TIME	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU
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16:15	0	0	0	0	0	0	0	0	0	0	4	1	0	0	5	5	0	0	3	2	0	0	5	5
16:30	0	0	0	0	0	0	0	0	0	0	1	2	0	0	3	3	0	0	6	1	0	0	7	7
16:45	0	0	1	0	0	0	1	1	0	0	3	1	0	0	4	4	0	0	7	3	0	0	10	10
H/TOT	0	0	2	0	0	0	2	2	0	0	12	4	0	0	16	16	0	0	19	8	0	0	27	27
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17:30	0	0	1	0	0	0	1	1	0	0	1	0	0	0	1	1	0	0	2	1	0	0	3	3
17:45	0	0	2	0	0	0	2	2	0	0	2	0	0	0	2	2	0	0	3	1	0	0	4	4
H/TOT	0	0	5	0	0	0	5	5	0	0	6	1	0	0	7	7	0	0	10	5	0	0	15	15
18:00	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	2	0	0	4	0	0	0	4	4
18:15	0	0	2	0	0	0	2	2	0	0	3	0	0	0	3	3	0	0	2	0	0	0	2	2
H/TOT	0	0	2	0	0	0	2	2	0	0	5	0	0	0	5	5	0	0	6	0	0	0	6	6
P/TOT	0	0	9	0	0	0	9	9	0	0	23	5	0	0	28	28	0	0	35	13	0	0	48	48

TRAFFINOMICS LIMITED

DAWN MEATS, SLANE TRAFFIC COUNTS **NOVEMBER 2020**
MANUAL CLASSIFIED JUNCTION TURNING COUNTS **TRA/20/123**

SITE: 02 DATE: 11th November 2020

LOCATION: Yellow Furze Village Junction DAY: Wednesday

	MOVEMENT 4								MOVEMENT 5								MOVEMENT 6							
TIME	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU
07:30	0	0	1	0	0	0	1	1	0	0	1	0	0	0	1	1	0	0	0	1	0	1	2	3
07:45	0	0	1	0	0	0	1	1	0	0	1	0	0	0	1	1	0	0	1	0	0	0	1	1
08:00	0	0	0	0	0	0	1	0	0	0	2	0	0	0	2	2	0	0	4	0	0	0	4	4
08:15	0	0	1	0	0	0	1	1	0	0	0	0	1	0	1	2	0	0	1	0	0	0	1	1
H/TOT	0	0	3	0	0	0	3	3	0	0	4	0	1	0	5	6	0	0	6	1	0	1	8	9
08:30	0	0	3	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45	0	0	2	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
09:00	0	0	5	0	0	0	5	5	0	0	10	0	0	0	10	10	0	0	1	0	0	0	1	1
09:15	0	0	13	1	0	0	14	14	0	0	6	1	0	0	7	7	0	0	0	0	0	0	0	0
H/TOT	0	0	23	1	0	0	24	24	0	0	16	1	0	0	17	17	0	0	1	1	0	0	2	2
P/TOT	0	0	26	1	0	0	27	27	0	0	20	1	1	0	22	23	0	0	7	2	0	1	10	11
								6								4								6

	MOVEMENT 4								MOVEMENT 5								MOVEMENT 6							
TIME	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
16:15	0	0	1	1	0	0	2	2	0	0	1	0	0	0	1	1	0	0	0	1	0	0	1	1
16:30	0	0	3	0	0	0	3	3	0	0	3	1	0	0	4	4	0	0	0	0	0	0	0	0
16:45	0	0	2	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
H/TOT	0	0	6	1	0	0	7	7	0	0	4	1	0	0	5	5	0	0	2	1	0	0	3	3
17:00	0	0	3	0	0	0	3	3	0	0	2	0	0	0	2	2	0	0	1	0	0	0	1	1
17:15	0	0	1	0	0	0	1	1	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
17:45	0	0	0	2	0	0	2	2	0	0	2	0	0	0	2	2	0	0	0	0	0	0	0	0
H/TOT	0	0	4	2	0	0	6	6	0	0	5	0	0	0	5	5	0	0	2	0	0	0	2	2
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
18:15	0	0	2	0	0	0	2	2	0	0	1	1	0	0	2	2	0	0	1	0	0	0	1	1
H/TOT	0	0	2	0	0	0	2	2	0	0	1	1	0	0	2	2	0	0	2	0	0	0	2	2
P/TOT	0	0	12	3	0	0	15	15	0	0	10	2	0	0	12	12	0	0	6	1	0	0	7	7

TRAFFINOMICS LIMITED

DAWN MEATS, SLANE TRAFFIC COUNTS **NOVEMBER 2020**
MANUAL CLASSIFIED JUNCTION TURNING COUNTS **TRA/20/123**

SITE: 03 DATE: 11th November 2020

LOCATION: L1013/Windmill Road DAY: Wednesday

	MOVEMENT 1								MOVEMENT 2								MOVEMENT 3							
TIME	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU
07:30	0	0	1	0	1	0	2	3	0	0	0	1	0	0	1	1	0	0	1	0	0	0	1	1
07:45	0	0	1	1	0	0	2	2	0	0	1	0	0	0	1	1	0	0	1	0	0	0	1	1
08:00	0	0	6	0	3	0	9	12	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
08:15	0	0	1	2	1	0	4	5	0	0	2	0	1	0	3	4	0	0	0	0	0	0	0	0
H/TOT	0	0	9	3	5	0	17	22	0	0	3	1	1	0	5	6	0	0	3	0	0	0	3	3
08:30	0	0	2	0	1	0	3	4	0	0	1	0	0	0	1	1	0	0	2	1	0	0	3	3
08:45	0	0	2	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
09:00	0	0	3	0	0	0	3	3	0	0	2	0	0	0	2	2	0	0	1	0	0	0	1	1
09:15	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	2	0	0	1	0	0	0	1	1
H/TOT	0	0	7	0	1	0	8	9	0	0	5	0	0	0	5	5	0	0	5	1	0	0	6	6
P/TOT	0	0	16	3	6	0	25	31	0	0	8	1	1	0	10	11	0	0	8	1	0	0	9	9
								23								5								5

	MOVEMENT 1								MOVEMENT 2								MOVEMENT 3							
TIME	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU
16:00	0	0	2	1	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2
16:15	0	0	1	0	1	0	2	3	0	0	1	0	0	0	1	1	0	0	2	0	0	0	2	2
16:30	0	0	2	0	0	0	2	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
16:45	0	0	1	3	0	0	4	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
H/TOT	0	0	6	4	1	0	11	12	0	0	1	0	0	0	1	1	1	0	3	0	1	0	5	5
17:00	0	0	6	0	0	0	6	6	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	2
17:15	0	0	1	0	0	0	1	1	0	0	1	0	0	0	1	1	0	0	1	0	0	0	1	1
17:30	0	0	0	0	2	0	2	4	0	0	1	0	0	0	1	1	0	0	1	0	0	0	1	1
17:45	0	0	1	0	0	0	1	1	0	0	3	0	0	0	3	3	0	0	3	0	0	0	3	3
H/TOT	0	0	8	0	2	0	10	12	0	0	5	0	0	0	5	5	0	0	7	0	0	0	7	7
18:00	0	0	2	0	1	0	3	4	0	0	2	0	0	0	2	2	0	0	3	0	1	0	4	5
18:15	0	0	3	0	2	0	5	7	0	0	6	1	1	0	8	9	0	0	2	0	0	0	2	2
H/TOT	0	0	5	0	3	0	8	11	0	0	8	1	1	0	10	11	0	0	5	0	1	0	6	7
P/TOT	0	0	19	4	6	0	29	35	0	0	14	1	1	0	16	17	1	0	15	0	2	0	18	19

TRAFFINOMICS LIMITED

DAWN MEATS, SLANE TRAFFIC COUNTS **NOVEMBER 2020**
MANUAL CLASSIFIED JUNCTION TURNING COUNTS **TRA/20/123**

SITE: 03 DATE: 11th November 2020

LOCATION: L1013/Windmill Road DAY: Wednesday

	MOVEMENT 4								MOVEMENT 5								MOVEMENT 6							
TIME	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU
07:30	0	0	16	2	1	1	20	22	0	0	4	1	0	1	6	7	0	0	1	0	0	0	1	1
07:45	0	0	15	4	0	0	19	19	0	0	13	4	1	0	18	19	0	0	1	0	1	0	2	3
08:00	0	0	19	5	3	0	1	30	0	0	14	2	3	0	19	22	0	0	3	3	3	0	9	12
08:15	0	0	7	0	1	0	8	9	0	0	14	3	1	0	18	19	0	0	2	0	1	0	3	4
H/TOT	0	0	57	11	5	1	74	80	0	0	45	10	5	1	61	67	0	0	7	3	5	0	15	20
08:30	0	0	10	2	2	0	14	16	0	0	7	3	0	0	10	10	0	0	1	3	0	0	4	4
08:45	0	0	11	2	0	1	14	15	0	0	9	2	2	1	14	17	0	0	0	0	0	0	0	0
09:00	0	0	14	1	3	2	20	25	0	0	20	1	1	0	22	23	0	0	1	1	0	0	2	2
09:15	0	0	13	2	1	0	16	17	0	0	7	6	1	0	14	15	0	0	4	2	2	0	8	10
H/TOT	0	0	48	7	6	3	64	73	0	0	43	12	4	1	60	65	0	0	6	6	2	0	14	16
P/TOT	0	0	105	18	11	4	138	153	0	0	88	22	9	2	121	132	0	0	13	9	7	0	29	36
								70								68								20

	MOVEMENT 4								MOVEMENT 5								MOVEMENT 6							
TIME	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU
16:00	0	0	10	4	1	0	15	16	0	0	9	2	3	0	14	17	0	0	1	0	0	0	1	1
16:15	0	0	8	2	2	0	12	14	0	0	21	6	2	1	30	33	0	0	1	0	0	0	1	1
16:30	0	0	15	3	0	0	18	18	1	0	14	6	2	1	24	26	0	0	0	0	0	0	0	0
16:45	0	0	12	2	3	0	17	20	0	0	5	6	0	1	12	13	0	0	4	0	0	0	4	4
H/TOT	0	0	45	11	6	0	62	68	1	0	49	20	7	3	80	89	0	0	6	0	0	0	6	6
17:00	0	0	12	1	1	0	14	15	0	0	15	4	0	0	19	19	0	0	3	0	0	0	3	3
17:15	0	0	13	3	1	0	17	18	0	0	16	3	0	0	19	19	0	0	1	0	0	0	1	1
17:30	0	0	15	1	1	0	17	18	0	0	16	4	0	0	20	20	0	0	0	0	0	0	0	0
17:45	0	0	10	1	0	0	11	11	0	0	12	1	0	0	13	13	0	0	0	0	1	0	1	2
H/TOT	0	0	50	6	3	0	59	62	0	0	59	12	0	0	71	71	0	0	4	0	1	0	5	6
18:00	0	0	4	0	0	0	4	4	0	0	12	2	2	0	16	18	0	0	0	0	3	0	3	6
18:15	0	0	10	0	2	0	12	14	0	0	17	4	0	0	21	21	0	0	2	0	1	0	3	4
H/TOT	0	0	14	0	2	0	16	18	0	0	29	6	2	0	37	39	0	0	2	0	4	0	6	10
P/TOT	0	0	109	17	11	0	137	148	1	0	137	38	9	3	188	199	0	0	12	0	5	0	17	22

TRAFFINOMICS LIMITED

DAWN MEATS, SLANE TRAFFIC COUNTS **NOVEMBER 2020**

MANUAL CLASSIFIED ENTRY/EXIT COUNTS **TRA/20/123**

SITE: ATC Location DATE:

LOCATION: Dawn Meats Access DAY: Wednesday

	ENTRY								EXIT							
TIME	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU
00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0
02:45	0	0	2	0	0	0	2	2	0	0	0	0	0	0	0	0
H/TOT	0	0	3	0	0	0	3	3	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
03:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
H/TOT	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	2
04:00	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0
04:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45	0	0	2	0	0	0	2	2	0	0	0	0	0	0	0	0
H/TOT	0	0	3	0	0	0	3	3	0	0	0	0	0	0	0	0
05:00	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0
05:15	0	0	4	0	0	0	4	4	0	0	0	0	0	0	0	0
05:30	0	0	3	0	0	0	3	3	0	0	0	0	0	0	0	0
05:45	0	0	7	0	0	0	7	7	0	0	1	0	0	0	1	1
H/TOT	0	0	15	0	0	0	15	15	0	0	1	0	0	0	1	1
06:00	0	0	4	0	1	0	5	6	0	0	0	0	0	0	0	0
06:15	0	0	3	0	0	0	3	3	0	0	0	0	1	0	1	2
06:30	0	0	2	0	0	0	2	2	0	0	0	0	0	0	0	0
06:45	0	0	4	0	0	0	4	4	0	0	0	0	0	0	0	0
H/TOT	0	0	13	0	1	0	14	15	0	0	0	0	1	0	1	2
07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15	0	0	1	2	1	0	4	5	0	0	0	0	0	0	0	0
07:30	0	0	1	1	0	0	2	2	0	0	0	2	1	0	3	4
07:45	0	0	1	1	0	0	2	2	0	0	0	1	0	0	1	1
H/TOT	0	0	3	4	1	0	8	9	0	0	0	3	1	0	4	5

TRAFFINOMICS LIMITED

DAWN MEATS, SLANE TRAFFIC COUNTS **NOVEMBER 2020**

MANUAL CLASSIFIED ENTRY/EXIT COUNTS **TRA/20/123**

SITE: ATC Location DATE:

LOCATION: Dawn Meats Access DAY: Wednesday

	ENTRY								EXIT							
TIME	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU
08:00	0	0	2	1	1	0	4	5	0	0	0	1	0	0	1	1
08:15	0	0	2	0	1	0	3	4	0	0	1	0	1	0	2	3
08:30	0	0	5	0	1	0	6	7	0	0	0	0	0	0	0	0
08:45	0	0	0	1	0	0	1	1	0	0	3	0	2	0	5	7
H/TOT	0	0	9	2	3	0	14	17	0	0	4	1	3	0	8	11
09:00	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
09:15	0	0	1	1	0	0	2	2	0	0	1	0	0	0	1	1
09:30	0	0	2	1	2	0	5	7	0	0	1	2	0	0	3	3
09:45	0	0	2	1	3	0	6	9	0	0	1	1	2	0	4	6
H/TOT	0	0	5	3	5	0	13	18	0	0	3	5	2	0	10	12
10:00	0	0	3	0	1	0	4	5	0	0	4	0	2	0	6	8
10:15	0	0	2	0	0	0	2	2	0	0	2	0	1	0	3	4
10:30	0	0	2	1	2	0	5	7	0	0	0	0	1	0	1	2
10:45	0	0	0	1	0	0	1	1	0	0	0	2	0	0	2	2
H/TOT	0	0	7	2	3	0	12	15	0	0	6	2	4	0	12	16
11:00	0	0	1	0	2	0	3	5	0	0	0	0	1	0	1	2
11:15	0	0	1	0	0	0	1	1	0	0	0	0	2	0	2	4
11:30	0	0	1	0	2	0	3	5	0	0	0	0	2	0	2	4
11:45	0	0	0	1	2	0	3	5	0	0	0	0	0	0	0	0
H/TOT	0	0	3	1	6	0	10	16	0	0	0	0	5	0	5	10
12:00	0	0	2	0	1	0	3	4	0	0	2	1	2	0	5	7
12:15	0	0	1	1	1	0	3	4	0	0	0	0	1	0	1	2
12:30	0	0	0	0	0	0	0	0	0	0	2	0	1	0	3	4
12:45	0	0	3	0	1	0	4	5	0	0	2	0	1	0	3	4
H/TOT	0	0	6	1	3	0	10	13	0	0	6	1	5	0	12	17
13:00	0	0	1	0	2	0	3	5	0	0	1	0	0	0	1	1
13:15	0	0	2	1	0	0	3	3	0	0	7	3	1	0	11	12
13:30	0	0	1	0	0	0	1	1	0	0	1	0	1	0	2	3
13:45	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
H/TOT	0	0	4	1	2	0	7	9	0	0	10	3	2	0	15	17
14:00	0	0	1	1	2	0	4	6	0	0	1	0	1	0	2	3
14:15	0	0	0	0	1	0	1	2	0	0	2	1	0	0	3	3
14:30	0	0	1	0	1	0	2	3	0	0	4	0	1	0	5	6
14:45	0	0	0	1	0	0	1	1	0	0	5	0	0	0	5	5
H/TOT	0	0	2	2	4	0	8	12	0	0	12	1	2	0	15	17
15:00	0	0	1	0	2	0	3	5	0	0	7	0	3	0	10	13
15:15	0	0	2	0	0	0	2	2	0	0	4	0	0	0	4	4
15:30	0	0	0	0	2	0	2	4	0	0	5	0	1	0	6	7
15:45	0	0	0	1	1	0	2	3	0	0	3	0	0	0	3	3
H/TOT	0	0	3	1	5	0	9	14	0	0	19	0	4	0	23	27

TRAFFINOMICS LIMITED

DAWN MEATS, SLANE TRAFFIC COUNTS **NOVEMBER 2020**

MANUAL CLASSIFIED ENTRY/EXIT COUNTS **TRA/20/123**

SITE: ATC DATE:

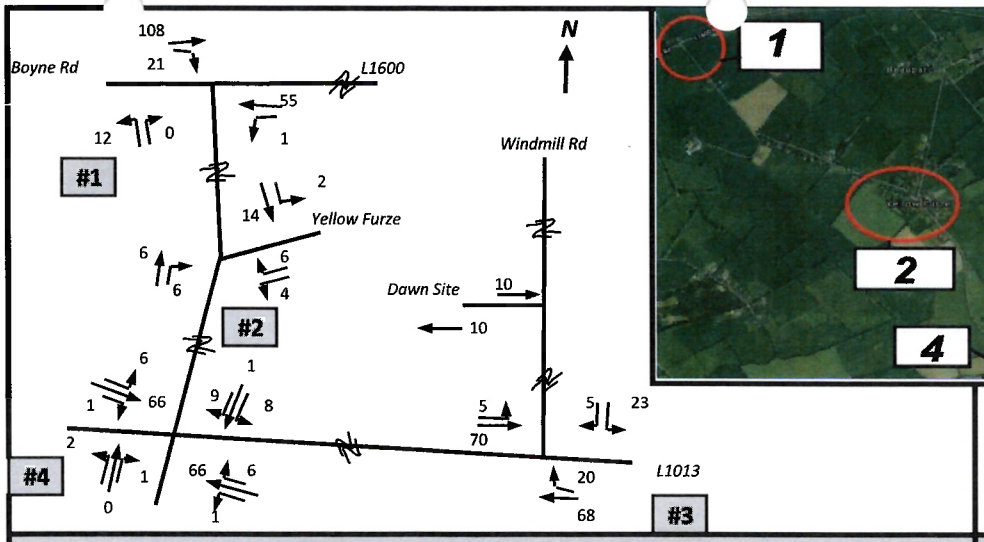
LOCATION: Dawn Meats Access DAY: Wednesday

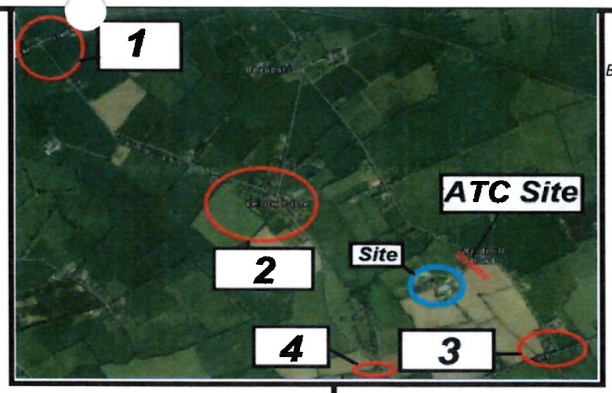
	ENTRY								EXIT							
TIME	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU	PCL	MCL	CAR	LGV	HGV	BUS	TOT	PCU
16:00	0	0	1	0	0	0	1	1	0	0	1	0	1	0	2	3
16:15	0	0	0	0	0	0	0	0	0	0	1	1	3	0	5	8
16:30	0	0	0	0	0	0	0	0	0	0	5	0	0	0	5	5
16:45	0	0	2	0	1	0	3	4	0	0	2	0	0	0	2	2
H/TOT	0	0	3	0	1	0	4	5	0	0	9	1	4	0	14	18
17:00	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	3
17:15	0	0	2	0	1	0	3	4	0	0	0	0	1	0	1	2
17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	3
H/TOT	0	0	2	0	1	0	3	4	0	0	6	0	1	0	7	8
18:00	0	0	0	0	1	0	1	2	0	0	0	0	0	0	0	0
18:15	0	0	0	2	1	0	3	4	0	0	0	0	2	0	2	4
18:30	0	0	1	0	2	0	3	5	0	0	1	0	2	0	3	5
18:45	0	0	0	0	2	0	2	4	0	0	0	0	1	0	1	2
H/TOT	0	0	1	2	6	0	9	15	0	0	1	0	5	0	6	11
19:00	0	0	0	0	1	0	1	2	0	0	1	0	2	0	3	5
19:15	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	4
19:30	0	0	0	0	1	0	1	2	0	0	0	0	0	0	0	0
19:45	0	0	0	0	1	0	1	2	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	3	0	3	6	0	0	1	0	4	0	5	9
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20:15	0	0	0	1	0	0	1	1	0	0	0	0	1	0	1	2
20:30	0	0	0	0	1	0	1	2	0	0	0	1	1	0	2	3
20:45	0	0	0	0	1	0	1	2	0	0	0	1	0	0	1	1
H/TOT	0	0	0	1	2	0	3	5	0	0	0	2	2	0	4	6
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2
21:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2
22:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22:15	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2
22:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23:15	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	2
23:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23:45	0	0	0	0	1	0	1	2	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	1	0	1	2	0	0	2	0	0	0	2	2

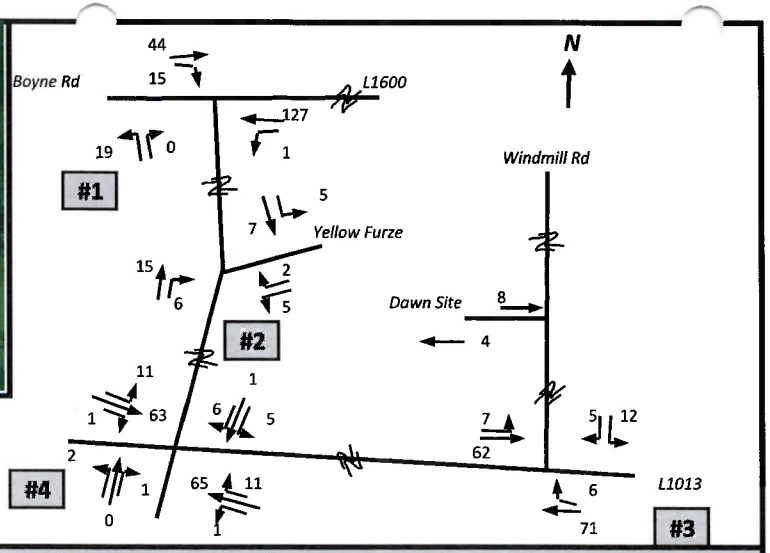
NRB consulting engineers

APPENDIX C

Traffic Surveys, Trip Distribution & Network Traffic Flow Diagrams





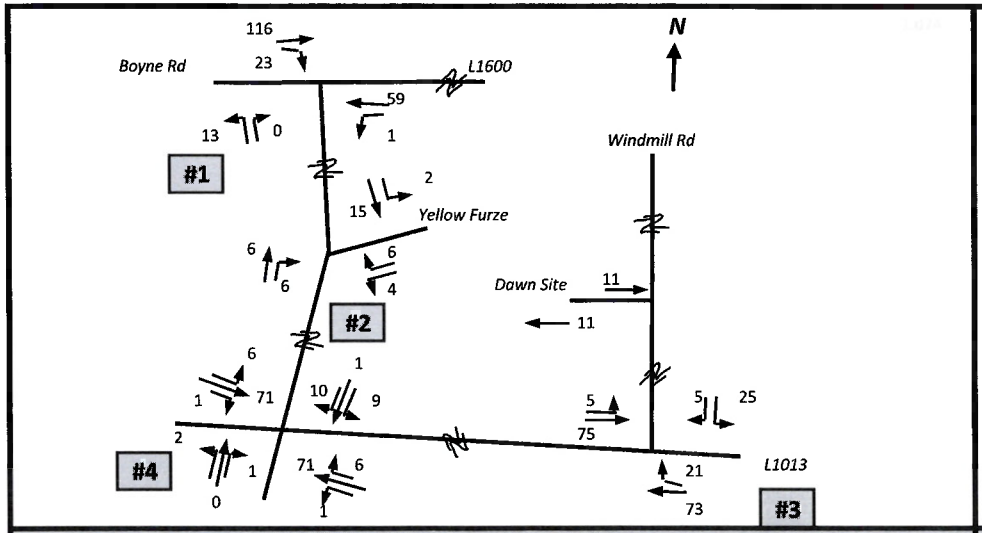


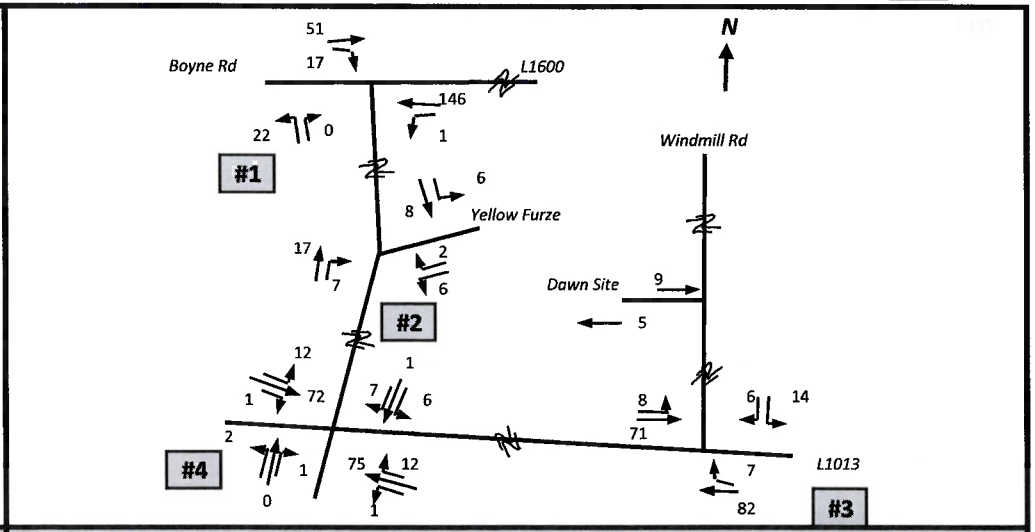
WEEKDAY AM PEAK HOUR 8-9AM

WEEKDAY PM PEAK HOUR 5-6PM

EXISTING AS-SURVEYED TRAFFIC CONDITIONS 2020 (PCUs) NOVEMBER

M7 NRA/TII Counter Data Information	*Wed 11-Nov-20 AM Pk AADT=*	653	AM Covid Factor	*Wed 11-Nov-20 PM Pk AADT=*	654	PM Covid Factor
(N2 Ashbourne/Slane)	*Wed 13-Nov-19 AM Pk AADT=*	701	1.074	*Wed 13-Nov-19 PM Pk AADT=*	753	1.151





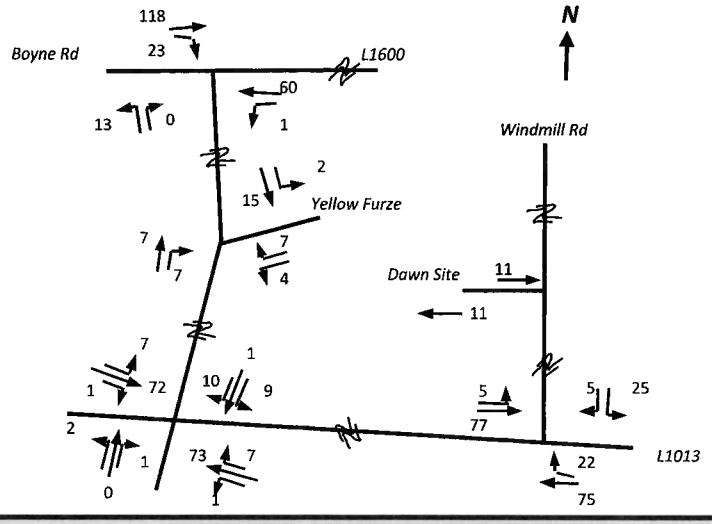
WEEKDAY AM PEAK HOUR 8-9AM

WEEKDAY PM PEAK HOUR 5-6PM

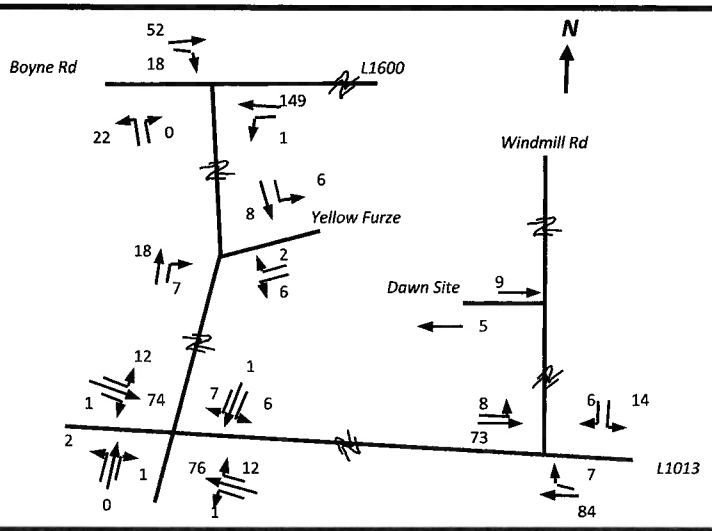
2020 - Factored, Covid-Pandemic-Corrected Traffic Based on Adjacent Census Flows Extracted from TII Database

TII PE·. AG-02017 Project Appraisal Guidelines for National Roads Unit 5.3 (Travel Demand Projections October 2016, Table 5.3.2: Link-Based Growth Rates: Annual Growth Factors) Meath

2020 to 2022 = 1.022
2022 to 2037 = 1.178

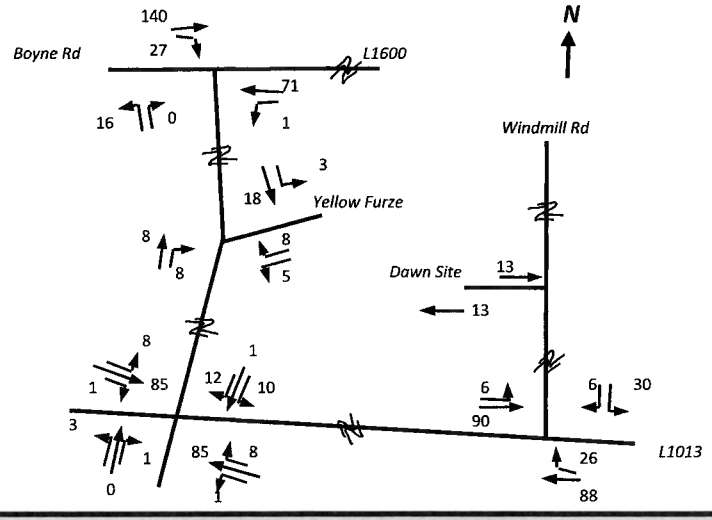


WEEKDAY AM PEAK HOUR 8-9AM

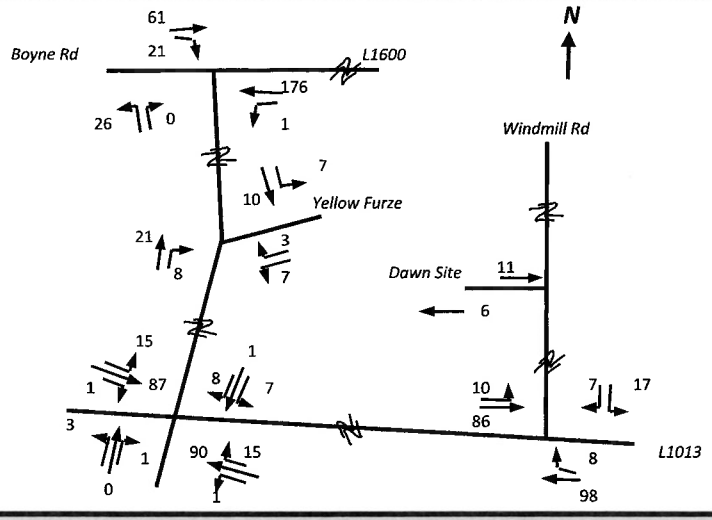


WEEKDAY PM PEAK HOUR 5-6PM

PROJECTED CONSTRUCTION YEAR TRAFFIC CONDITIONS 2022 (PCUs) - WITHOUT CONSTRUCTION TRAFFIC



WEEKDAY AM PEAK HOUR 8-9AM



WEEKDAY PM PEAK HOUR 5-6PM

PROJECTED DESIGN YEAR TRAFFIC CONDITIONS 2037 (PCUs) - WITHOUT CONSTRUCTION TRAFFIC

24 Hr AADT Traffic Volumes Generated by Construction Operations

Construction·Activity¤	Movements·Generated¤		¤
	LGV¤	HGV¤	¤
Extension·to·WWTP·(Phase·1)¤	40¤	30¤	¤
Rising·Main·Pipeline¤	60¤	40¤	¤

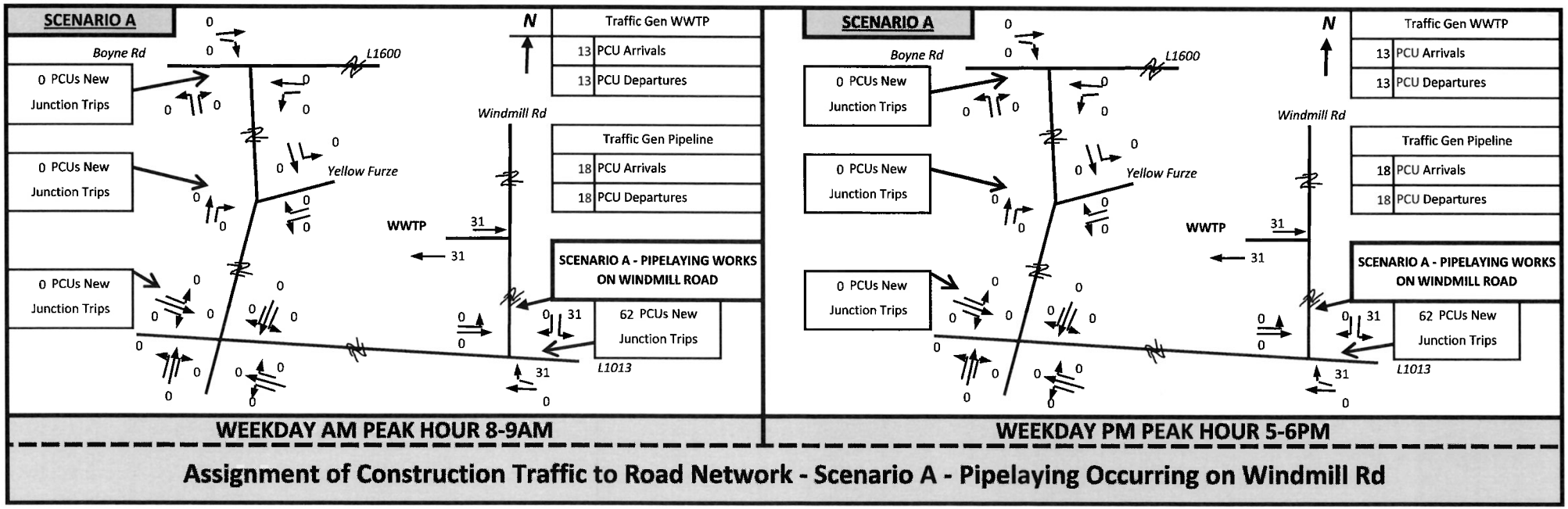
Table·3-1:·Annual·Average·Daily·Traffic·(Construction·Traffic)¶

Converting to PCUS & Commuter Peak Flows.....

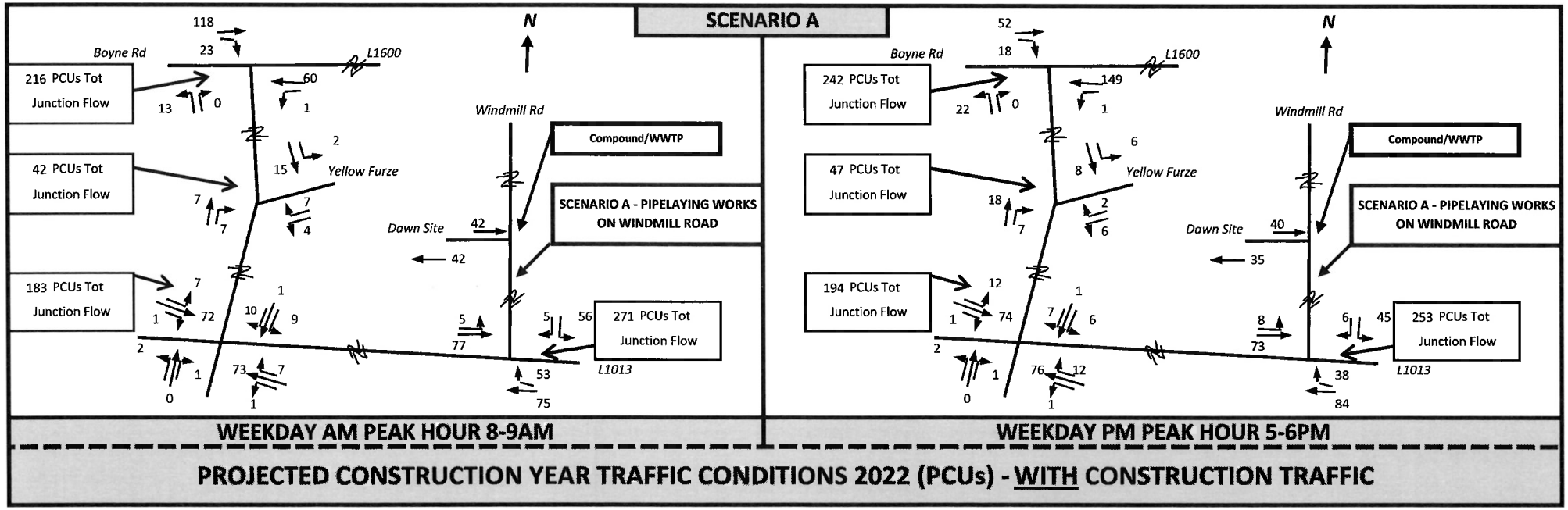
WWTP EXTENSION		
Network Period	Arrivals (PCUs)	Departures (PCUs)
24 Hr AADT	100	100
Weekday AM Peak Hr*	13	13
Weekday PM Peak Hr*	13	13

RISING MAIN PIPELINE		
Network Period	Arrivals (PCUs)	Departures (PCUs)
24 Hr AADT	140	140
Weekday AM Peak Hr*	18	18
Weekday PM Peak Hr*	18	18

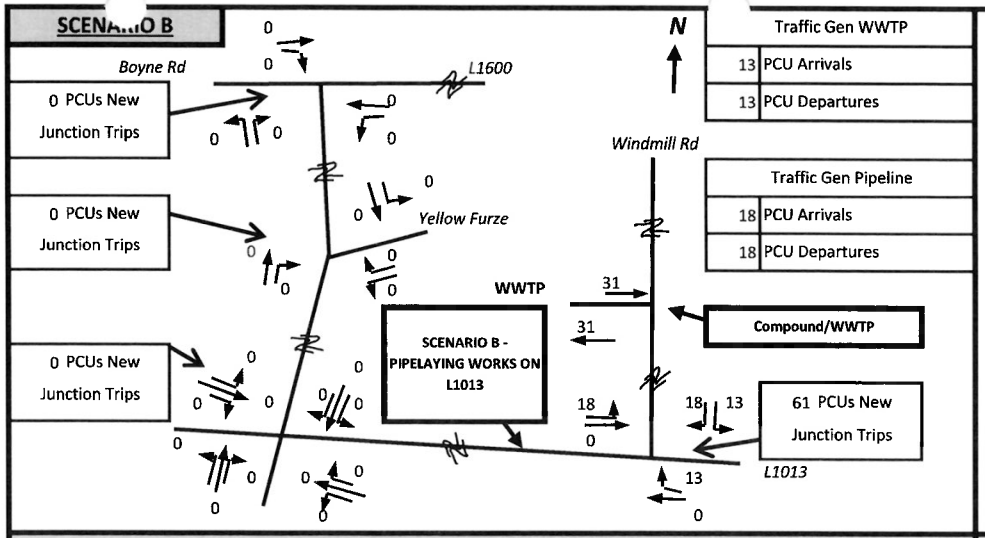
** Industry Standard Method of Calculating Weekday Peak Hr is to Divide 24Hr AADT by 10 - We have Divided by 8 for Robustness, giving higher Peak Hr Flow Volumes*



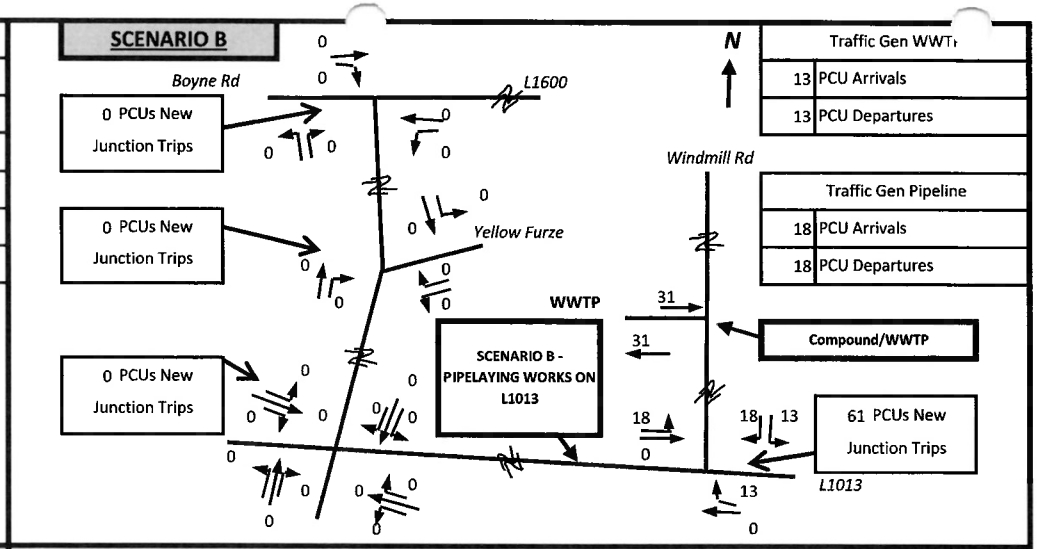
Assignment of Construction Traffic to Road Network - Scenario A - Pipelaying Occurring on Windmill Rd



PROJECTED CONSTRUCTION YEAR TRAFFIC CONDITIONS 2022 (PCUs) - WITH CONSTRUCTION TRAFFIC

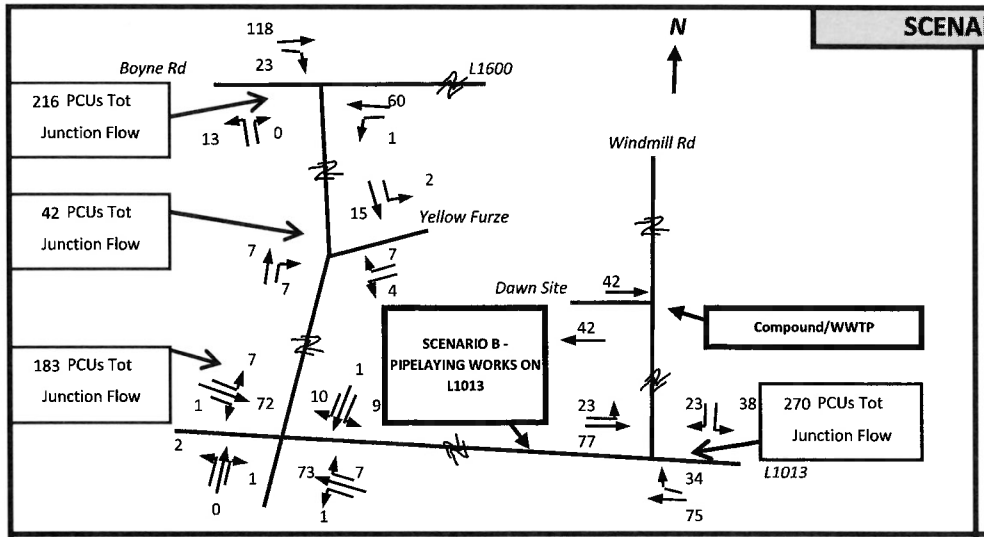


WEEKDAY AM PEAK HOUR 8-9AM

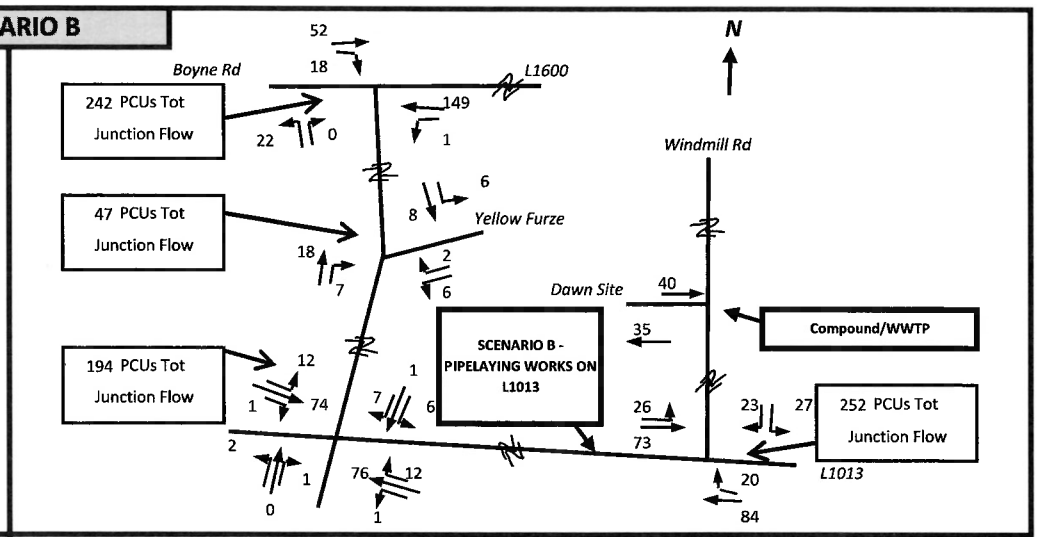


WEEKDAY PM PEAK HOUR 5-6PM

Assignment of Construction Traffic to Road Network - Scenario B - Pipelaying Occurring on Local Road L1013

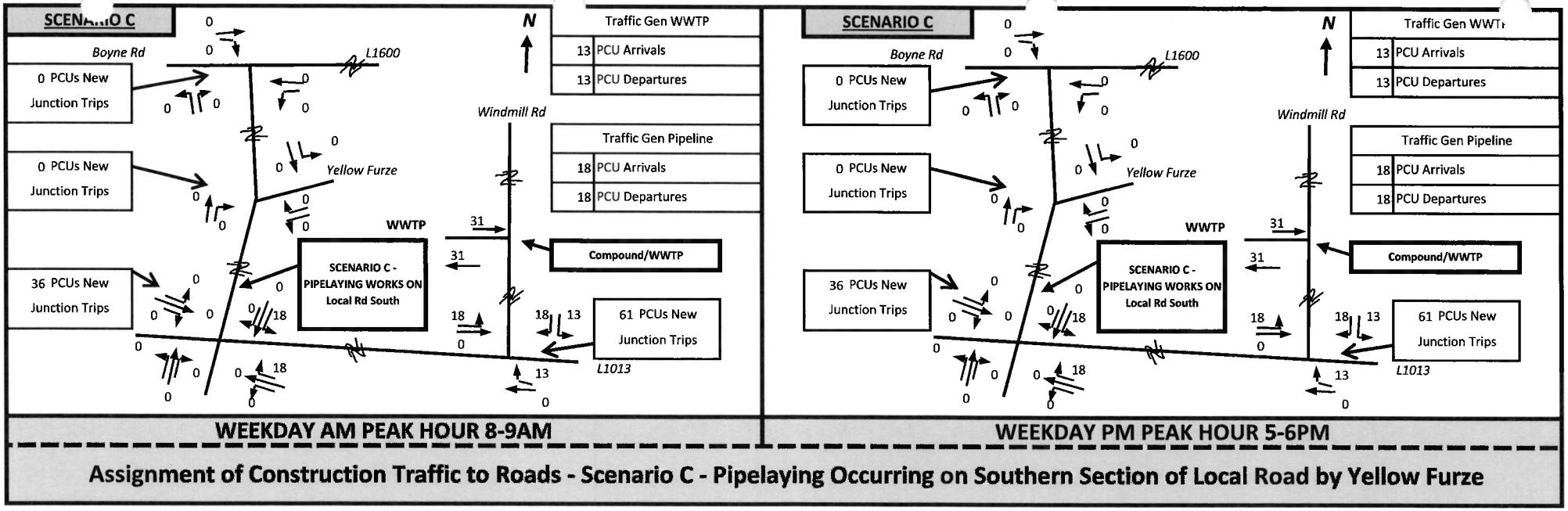


WEEKDAY AM PEAK HOUR 8-9AM

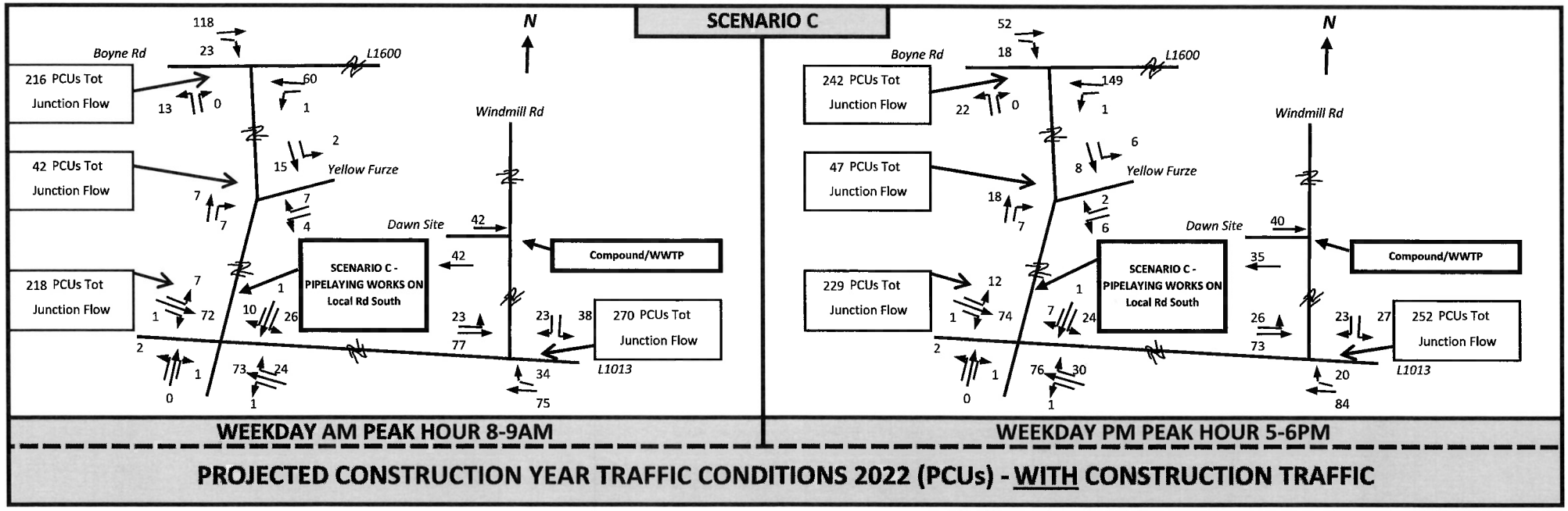


WEEKDAY PM PEAK HOUR 5-6PM

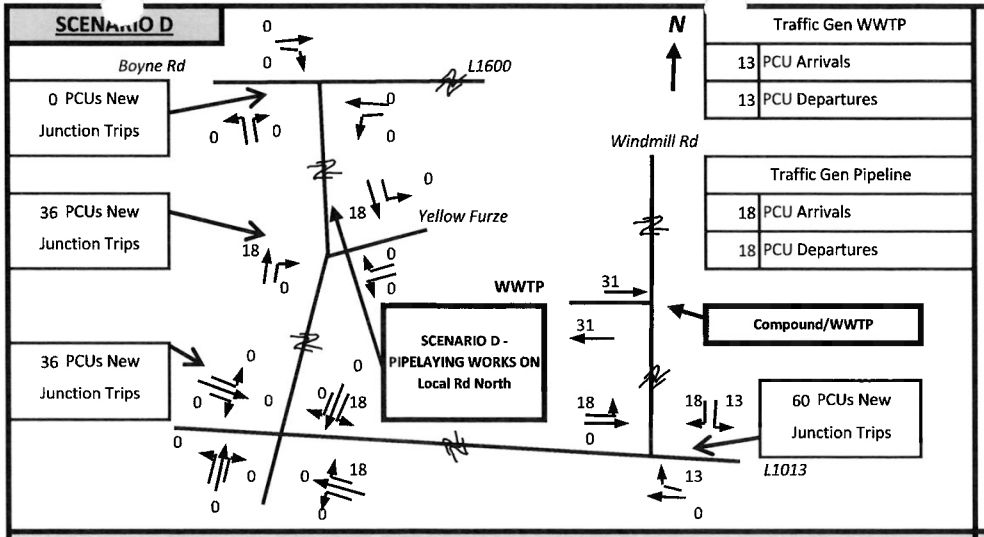
PROJECTED CONSTRUCTION YEAR TRAFFIC CONDITIONS 2022 (PCUs) - WITH CONSTRUCTION TRAFFIC



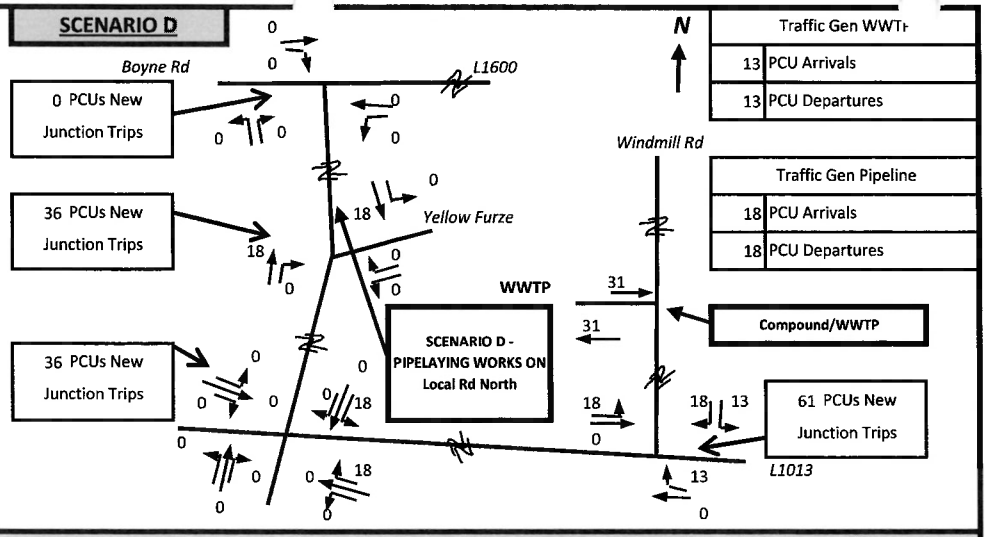
Assignment of Construction Traffic to Roads - Scenario C - Pipelaying Occurring on Southern Section of Local Road by Yellow Furze



PROJECTED CONSTRUCTION YEAR TRAFFIC CONDITIONS 2022 (PCUs) - WITH CONSTRUCTION TRAFFIC

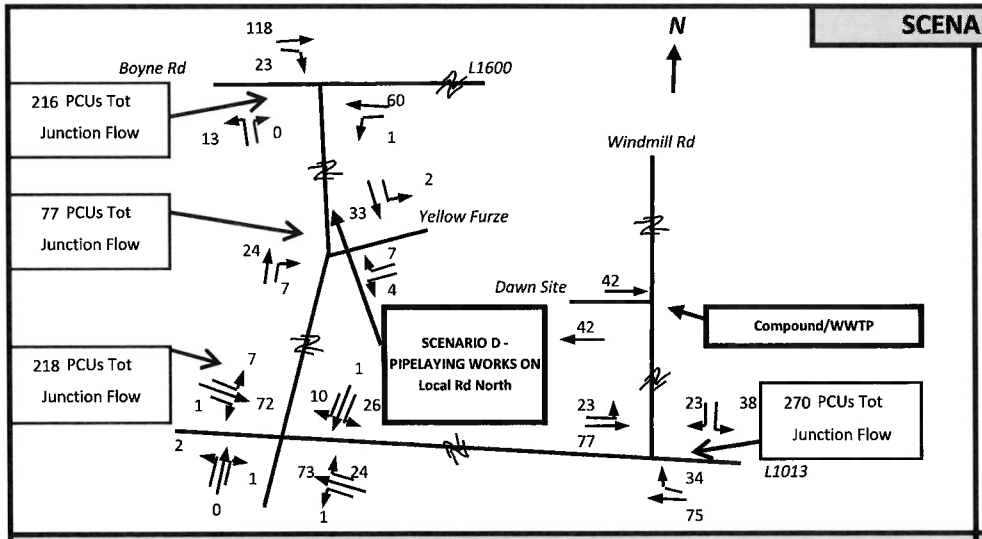


WEEKDAY AM PEAK HOUR 8-9AM

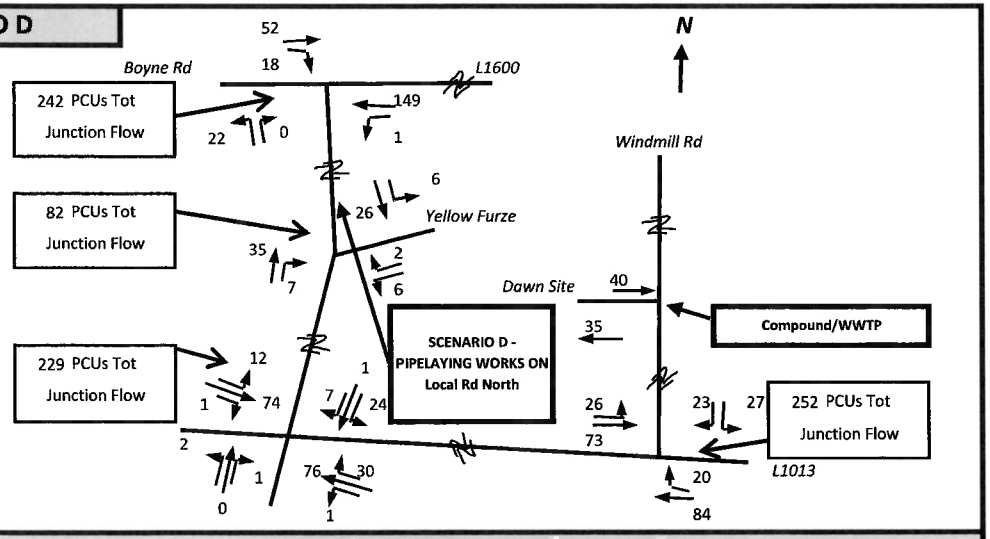


WEEKDAY PM PEAK HOUR 5-6PM

Assignment of Construction Traffic to Roads - Scenario D - Pipelaying Occurring on Northern Section of Local Road by Yellow Furze

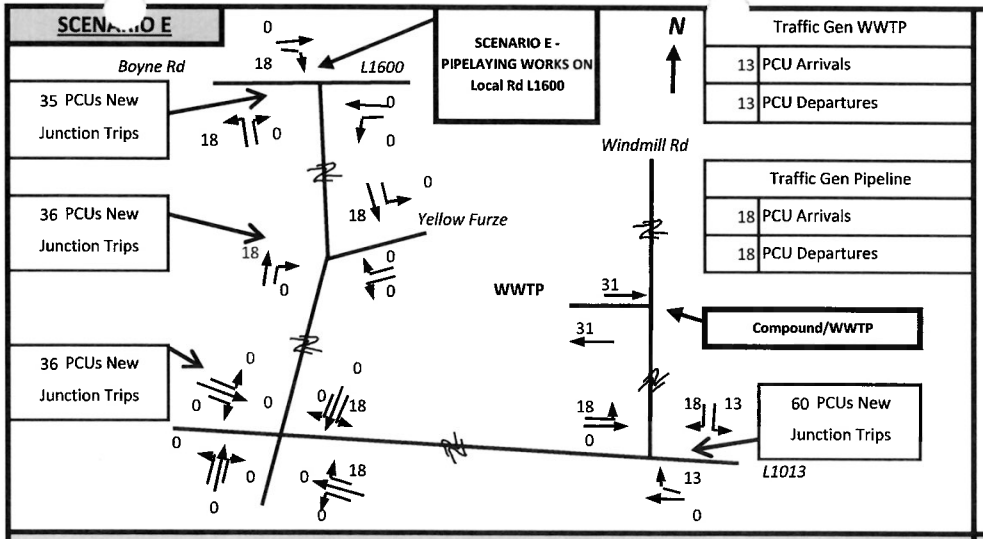


WEEKDAY AM PEAK HOUR 8-9AM

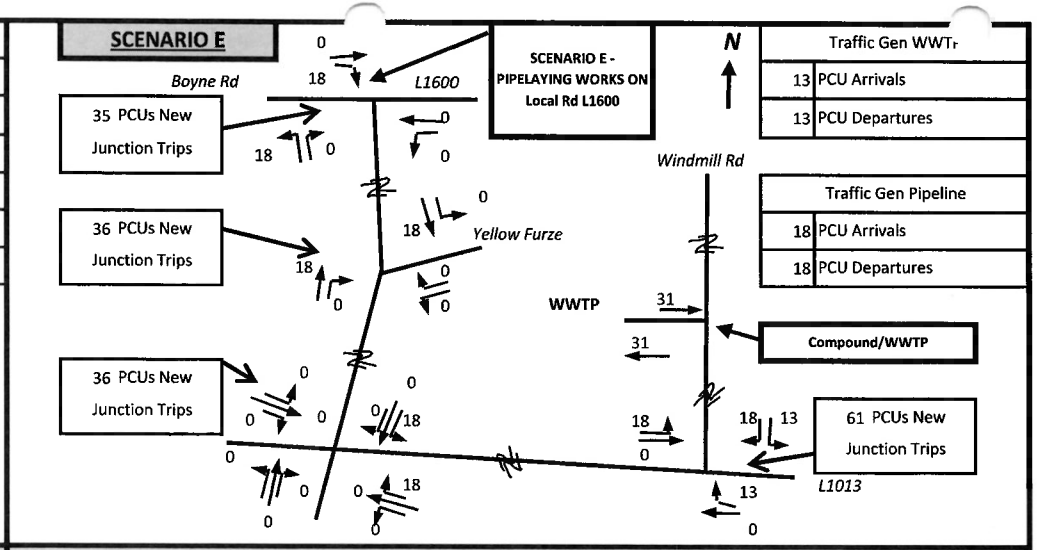


WEEKDAY PM PEAK HOUR 5-6PM

PROJECTED CONSTRUCTION YEAR TRAFFIC CONDITIONS 2022 (PCUs) - WITH CONSTRUCTION TRAFFIC

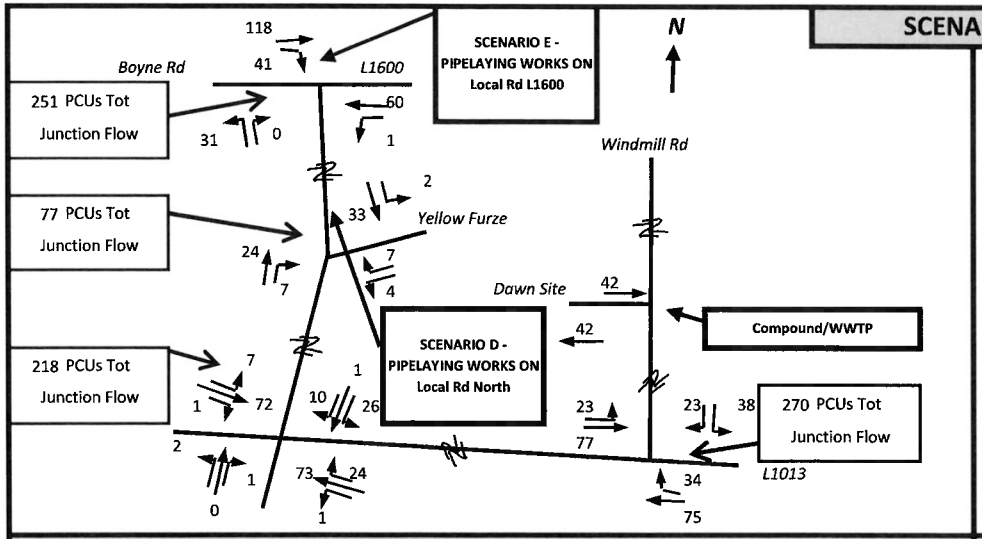


WEEKDAY AM PEAK HOUR 8-9AM

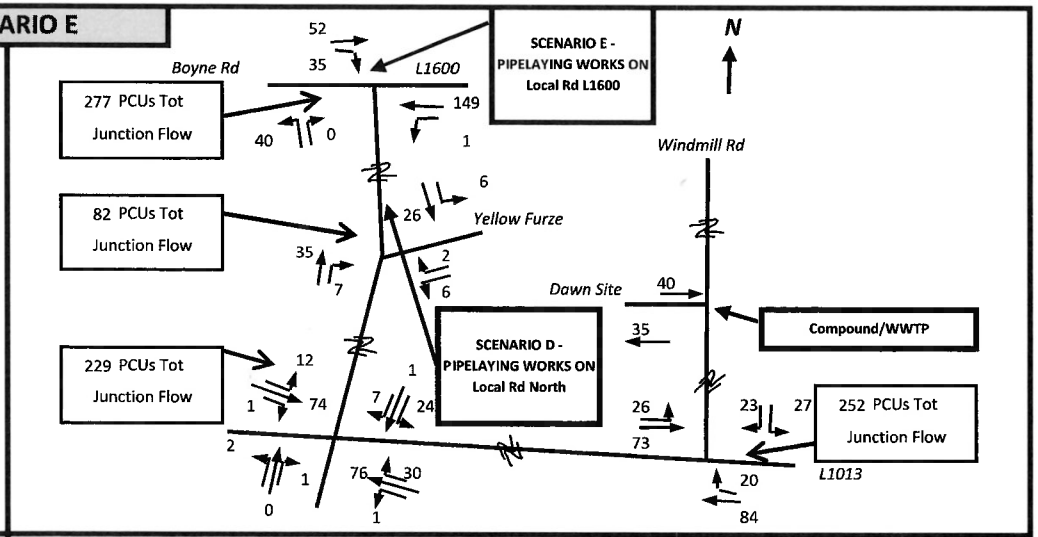


WEEKDAY PM PEAK HOUR 5-6PM

Assignment of Construction Traffic to Roads - Scenario E - Pipelaying Occurring on Local Road L1600



WEEKDAY AM PEAK HOUR 8-9AM



WEEKDAY PM PEAK HOUR 5-6PM

PROJECTED CONSTRUCTION YEAR TRAFFIC CONDITIONS 2022 (PCUs) - WITH CONSTRUCTION TRAFFIC

NRB consulting engineers

APPENDIX D

PiCADY Junction Capacity Model Output
Existing Windmill Rd/L1013

Established T Junction Leading to Dawn Plant
Summary PICADY Results in Order as included herein
(Robust & Worst Case – Being "Scenario E")
SELECTED CONSTRUCTION YEAR 2022

Modelled Scenario	Period Mean Max Q (PCUs)	Period Max RFC
2022 Construction Year AM Peak	<1	0.11
2022 Construction Year PM Peak	<1	0.10

All Results Above are way below the recommended RFC of 0.85 (85% Capacity) and therefore no problems whatsoever are anticipated at the Junction in terms of Capacity or excessive vehicle Queues

NB Any Small Changes to Selected Construction Year 2022 or indeed significantly higher traffic volumes experienced, will clearly have no significant implications in terms of the conclusions of the Study in Light of the Favourable Results.

Junctions 9

PICADY 9 - Priority Intersection Module

Version: 9.0.1.4646 []
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Filename: 2022 AM PM Worst Case.j9
Path: C:\Users\Eoin\NRB Consulting Engineers Ltd\NRB Server - Documents\2020\20-070 Dawn Slane\Calculations\Windmill L1013 Picadys
Report generation date: 13/12/2020 12:32:10

»2022, AM
»2022, P M

Summary of junction performance

	AM				PM			
	Q (PCU)	Delay (s)	RFC	LOS	Q (PCU)	Delay (s)	RFC	LOS
	2022							
Stream B-AC	0.1	7.45	0.11	A	0.1	7.42	0.10	A
Stream C-AB	0.1	6.76	0.06	A	0.0	6.60	0.04	A

Values shown are the highest values encountered over all time segments. Delay is the maximum value of Av. delay per arriving vehicle.

File summary

File Description

Title	(untitled)
Location	
Site number	
Date	09/12/2020
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	NRB-004\Eoin
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Av. delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin

Analysis Options

Calculate Q Percentiles	Calculate residual capacity	RFC Threshold	Av. Delay threshold (s)	Q threshold (PCU)
		0 85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2022	AM	ONE HOUR	07:45	09:15	15
D2	2022	PM	ONE HOUR	16:45	18:15	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2022, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Major road direction	Junction Delay (s)	Junction LOS
1	Windmill Rd/L1013 T Junct	T-Junction	Two-way	2.54	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type
A	L1013 West		Major
B	Windmill Rd to Dawn		Minor
C	L1013 to N2		Major

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Has right turn bay	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
C	7.00			100.0	✓	1.00

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D

Minor Arm Geometry

Arm	Minor arm type	Lane width (m)	Visibility to left (m)	Visibility to right (m)
B	One lane	3.00	90	90

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Junction	Stream	Intercept (PCU/hr)	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
1	B-A	552	0.096	0.243	0.153	0.347
1	B-C	681	0.100	0.252	-	-
1	C-B	632	0.234	0.234	-	-

The slopes and intercepts shown above do NOT include any corrections or adjustments.

Streams may be combined, in which case capacity will be adjusted.

Values are shown for the first time segment only, they may differ for subsequent time segments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2022	AM	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Av. Demand (PCU/hr)	Scaling Factor (%)
A		✓	100	100.000
B		✓	61	100.000
C		✓	109	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A	B	C
From	A	0	23	77
	B	23	0	38
	C	75	34	0

Vehicle Mix

HV %s

		To		
		A	B	C
From	A	0	8	1
	B	8	0	8
	C	1	8	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max delay (s)	Max Q (PCU)	Max LOS
B-AC	0.11	7.45	0.1	A
C-AB	0.06	6.76	0.1	A
C-A				
A-B				
A-C				

Main Results for each time segment

07:45 - 08:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	46	601	0.076	46	0.1	6.998	A
C-AB	26	617	0.042	26	0.0	6.567	A
C-A	56			56			
A-B	17			17			
A-C	58			58			

08:00 - 08:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	55	596	0.092	55	0.1	7.185	A
C-AB	31	615	0.050	31	0.1	6.650	A
C-A	67			67			
A-B	21			21			
A-C	69			69			

08:15 - 08:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	67	589	0.114	67	0.1	7.445	A
C-AB	38	612	0.062	38	0.1	6.761	A
C-A	82			82			
A-B	25			25			
A-C	85			85			

08:30 - 08:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	67	589	0.114	67	0.1	7.448	A
C-AB	38	612	0.062	38	0.1	6.761	A
C-A	82			82			
A-B	25			25			
A-C	85			85			

08:45 - 09:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	55	596	0.092	55	0.1	7.191	A
C-AB	31	615	0.050	31	0.1	6.651	A
C-A	67			67			
A-B	21			21			
A-C	69			69			

09:00 - 09:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	46	601	0.076	46	0.1	7.008	A
C-AB	26	617	0.042	26	0.0	6.571	A
C-A	56			56			
A-B	17			17			
A-C	58			58			

2022, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Major road direction	Junction Delay (s)	Junction LOS
1	Windmill Rd/L1013 T Junct	T-Junction	Two-way	1.99	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	2022	PM	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Av. Demand (PCU/hr)	Scaling Factor (%)
A		✓	99	100.000
B		✓	50	100.000
C		✓	104	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A	B	C
From	A	0	26	73
	B	23	0	27
	C	84	20	0

Vehicle Mix

HV %s

		To		
		A	B	C
From	A	0	8	1
	B	8	0	8
	C	1	8	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max delay (s)	Max Q (PCU)	Max LOS
B-AC	0.10	7.42	0.1	A
C-AB	0.04	6.60	0.0	A
C-A				
A-B				
A-C				

Main Results for each time segment

16:45 - 17:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	38	590	0.064	37	0.1	7.026	A
C-AB	15	616	0.025	15	0.0	6.463	A
C-A	63			63			
A-B	20			20			
A-C	55			55			

17:00 - 17:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	45	586	0.077	45	0.1	7.188	A
C-AB	18	614	0.029	18	0.0	6.522	A
C-A	75			75			
A-B	23			23			
A-C	66			66			

17:15 - 17:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	55	579	0.095	55	0.1	7.418	A
C-AB	22	611	0.036	22	0.0	6.602	A
C-A	92			92			
A-B	29			29			
A-C	80			80			

17:30 - 17:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	55	579	0.095	55	0.1	7.418	A
C-AB	22	611	0.036	22	0.0	6.602	A
C-A	92			92			
A-B	29			29			
A-C	80			80			

17:45 - 18:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	45	586	0.077	45	0.1	7.194	A
C-AB	18	614	0.029	18	0.0	6.522	A
C-A	75			75			
A-B	23			23			
A-C	66			66			

18:00 - 18:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	38	590	0.064	38	0.1	7.036	A
C-AB	15	616	0.025	15	0.0	6.463	A
C-A	63			63			
A-B	20			20			
A-C	55			55			

NRB consulting engineers

APPENDIX E

PiCADY Junction Capacity Model Output
Existing L1013 Crossroads (Leading to Yellow Furze)

Established L1013 Crossroads Junction Leading to Yellow Furze
Summary PICADY Results in Order as included herein
(Robust & Worst Case – Being "Scenario E")
SELECTED CONSTRUCTION YEAR 2022

Modelled Scenario	Period Mean Max Q (PCUs)	Period Max RFC
2022 Construction Year AM Peak	<1	0.07
2022 Construction Year PM Peak	<1	0.08

All Results Above are way below the recommended RFC of 0.85 (85% Capacity) and therefore no problems whatsoever are anticipated at the Junction in terms of Capacity or excessive vehicle Queues

NB Any Small Changes to Selected Construction Year 2022 or indeed significantly higher traffic volumes experienced, will clearly have no significant implications in terms of the conclusions of the Study in Light of the Favourable Results

Junctions 9

PICADY 9 - Priority Intersection Module

Version: 9.0.1.4646 []
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Filename: 2022 AM PM Worst Case.j9
Path: C:\Users\Eoin\NRB Consulting Engineers Ltd\NRB Server - Documents\2020\20-070 Dawn Slane\Calculations\L1013 Junc Leading YF Picadys
Report generation date: 13/12/2020 12:35:02

»2022, AM
»2022, PM

Summary of junction performance

	AM				PM			
	Q (PCU)	Delay (s)	RFC	LOS	Q (PCU)	Delay (s)	RFC	LOS
	2022							
Stream B-ACD	0.0	0.00	0.00	A	0.0	0.00	0.00	A
Stream A-BCD	0.0	6.61	0.04	A	0.1	6.84	0.08	A
Stream D-ABC	0.1	6.74	0.07	A	0.1	6.66	0.06	A
Stream C-ABD	0.0	6.04	0.00	A	0.0	6.13	0.00	A

Values shown are the highest values encountered over all time segments. Delay is the maximum value of Av. delay per arriving vehicle.

File summary

File Description

Title	(untitled)
Location	
Site number	
Date	09/12/2020
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	NRB-004\Eoin
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Av. delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin

Analysis Options

Calculate Q Percentiles	Calculate residual capacity	RFC Threshold	Av. Delay threshold (s)	Q threshold (PCU)
		0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2022	AM	ONE HOUR	07:45	09:15	15
D2	2022	PM	ONE HOUR	16:45	18:15	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2022, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Major road direction	Junction Delay (s)	Junction LOS
1	L1013 Crossroads - Leading to Yellow Furze	Crossroads	Two-way	1.93	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type
A	L1013 to Dawn and N2		Major
B	Local Road S		Minor
C	L1013 West Arm		Major
D	Local Road to Yellow Furze		Minor

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Has right turn bay	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
A	6.00			100.0	✓	1.00
C	6.00			100.0	✓	1.00

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Minor Arm Geometry

Arm	Minor arm type	Lane width (m)	Visibility to left (m)	Visibility to right (m)
B	One lane	3.00	90	90
D	One lane	3.00	90	90

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Junction	Stream	Intercept (PCU/hr)	Slope for A-B	Slope for A-C	Slope for A-D	Slope for B-A	Slope for B-C	Slope for B-D	Slope for C-A	Slope for C-B	Slope for C-D	Slope for D-A	Slope for D-B	Slope for D-C
1	A-D	632	-	-	-	-	-	-	0.245	0.350	0.245	-	-	-
1	B-A	552	0.101	0.254	0.254	-	-	-	0.160	0.363	-	0.254	0.254	0.127
1	B-C	681	0.104	0.264	-	-	-	-	-	-	-	-	-	-
1	B-D, nearside lane	552	0.101	0.254	0.254	-	-	-	0.160	0.363	0.160	-	-	-
1	B-D, offside lane	552	0.101	0.254	0.254	-	-	-	0.160	0.363	0.160	-	-	-
1	C-B	632	0.245	0.245	0.350	-	-	-	-	-	-	-	-	-
1	D-A	681	-	-	-	-	-	-	0.264	-	0.104	-	-	-
1	D-B, nearside lane	552	0.160	0.160	0.363	-	-	-	0.254	0.254	0.101	-	-	-
1	D-B, offside lane	552	0.160	0.160	0.363	-	-	-	0.254	0.254	0.101	-	-	-
1	D-C	552	-	0.160	0.363	0.127	0.254	0.254	0.254	0.254	0.101	-	-	-

The slopes and intercepts shown above do NOT include any corrections or adjustments.

Streams may be combined, in which case capacity will be adjusted.

Values are shown for the first time segment only; they may differ for subsequent time segments

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2022	AM	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Av. Demand (PCU/hr)	Scaling Factor (%)
A		✓	98	100.000
B		✓	3	100.000
C		✓	80	100.000
D		✓	37	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A	B	C	D
From	A	0	1	73	24
	B	1	0	2	0
	C	72	1	0	7
	D	26	1	10	0

Vehicle Mix

HV %s

		To			
		A	B	C	D
From	A	0	8	8	8
	B	8	0	1	1
	C	8	1	0	1
	D	8	1	1	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max delay (s)	Max Q (PCU)	Max LOS
B-ACD	0.00	0.00	0.0	A
A-BCD	0.04	6.61	0.0	A
A-B				
A-C				
D-ABC	0.07	6.74	0.1	A
C-ABD	0.00	6.04	0.0	A
C-D				
C-A				

Main Results for each time segment

07:45 - 08:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-ACD	0	552	0.000	0	0.0	0.000	A
A-BCD	18	619	0.029	18	0.0	6.465	A
A-B	0.75			0.75			
A-C	55			55			
D-ABC	28	615	0.045	28	0.0	6.479	A
C-ABD	0.75	612	0.001	0.75	0.0	5.947	A
C-D	5			5			
C-A	54			54			

08:00 - 08:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-ACD	0	546	0.000	0	0.0	0.000	A
A-BCD	22	617	0.035	22	0.0	6.528	A
A-B	0.90			0.90			
A-C	66			66			
D-ABC	33	611	0.054	33	0.1	6.589	A
C-ABD	0.90	608	0.001	0.90	0.0	5.987	A
C-D	6			6			
C-A	65			65			

08:15 - 08:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-ACD	0	539	0.000	0	0.0	0.000	A
A-BCD	27	615	0.043	27	0.0	6.611	A
A-B	1			1			
A-C	80			80			
D-ABC	41	606	0.067	41	0.1	6.743	A
C-ABD	1	603	0.002	1	0.0	6.042	A
C-D	8			8			
C-A	79			79			

08:30 - 08:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-ACD	0	539	0.000	0	0.0	0.000	A
A-BCD	27	615	0.043	27	0.0	6.611	A
A-B	1			1			
A-C	80			80			
D-ABC	41	606	0.067	41	0.1	6.743	A
C-ABD	1	603	0.002	1	0.0	6.042	A
C-D	8			8			
C-A	79			79			

08:45 - 09:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-ACD	0	546	0.000	0	0.0	0.000	A
A-BCD	22	617	0.035	22	0.0	6.529	A
A-B	0.90			0.90			
A-C	66			66			
D-ABC	33	611	0.054	33	0.1	6.590	A
C-ABD	0.90	608	0.001	0.90	0.0	5.987	A
C-D	6			6			
C-A	65			65			

09:00 - 09:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-ACD	0	552	0.000	0	0.0	0.000	A
A-BCD	18	619	0.029	18	0.0	6.468	A
A-B	0.75			0.75			
A-C	55			55			
D-ABC	28	615	0.045	28	0.1	6.483	A
C-ABD	0.75	612	0.001	0.75	0.0	5.950	A
C-D	5			5			
C-A	54			54			

2022, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Major road direction	Junction Delay (s)	Junction LOS
1	L1013 Crossroads - Leading to Yellow Furze	Crossroads	Two-way	2.16	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	2022	PM	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Av. Demand (PCU/hr)	Scaling Factor (%)
A		✓	120	100.000
B		✓	3	100.000
C		✓	87	100.000
D		✓	32	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A	B	C	D
From	A	0	1	76	43
	B	1	0	2	0
	C	74	1	0	12
	D	24	1	7	0

Vehicle Mix

HV %s

		To			
		A	B	C	D
From	A	0	8	8	8
	B	8	0	1	1
	C	8	1	0	1
	D	8	1	1	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max delay (s)	Max Q (PCU)	Max LOS
B-ACD	0.00	0.00	0.0	A
A-BCD	0.08	6.84	0.1	A
A-B				
A-C				
D-ABC	0.06	6.66	0.1	A
C-ABD	0.00	6.13	0.0	A
C-D				
C-A				

Main Results for each time segment

16:45 - 17:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-ACD	0	548	0.000	0	0.0	0.000	A
A-BCD	33	620	0.053	32	0.1	6.617	A
A-B	0.75			0.75			
A-C	57			57			
D-ABC	24	620	0.039	24	0.0	6.407	A
C-ABD	0.75	606	0.001	0.75	0.0	6.002	A
C-D	9			9			
C-A	56			56			

17:00 - 17:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-ACD	0	542	0.000	0	0.0	0.000	A
A-BCD	39	618	0.063	39	0.1	6.714	A
A-B	0.89			0.89			
A-C	68			68			
D-ABC	29	616	0.047	29	0.1	6.511	A
C-ABD	0.90	601	0.002	0.90	0.0	6.053	A
C-D	11			11			
C-A	67			67			

17:15 - 17:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-ACD	0	533	0.000	0	0.0	0.000	A
A-BCD	48	616	0.078	48	0.1	6.840	A
A-B	1			1			
A-C	83			83			
D-ABC	35	609	0.058	35	0.1	6.656	A
C-ABD	1	595	0.002	1	0.0	6.125	A
C-D	13			13			
C-A	81			81			

17:30 - 17:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-ACD	0	533	0.000	0	0.0	0.000	A
A-BCD	48	616	0.078	48	0.1	6.843	A
A-B	1			1			
A-C	83			83			
D-ABC	35	609	0.058	35	0.1	6.656	A
C-ABD	1	595	0.002	1	0.0	6.125	A
C-D	13			13			
C-A	81			81			

17:45 - 18:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-ACD	0	542	0.000	0	0.0	0.000	A
A-BCD	39	618	0.063	39	0.1	6.716	A
A-B	0.89			0.89			
A-C	68			68			
D-ABC	29	616	0.047	29	0.1	6.515	A
C-ABD	0.90	601	0.002	0.90	0.0	6.056	A
C-D	11			11			
C-A	67			67			

18:00 - 18:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-ACD	0	548	0.000	0	0.0	0.000	A
A-BCD	33	620	0.053	33	0.1	6.626	A
A-B	0.75			0.75			
A-C	57			57			
D-ABC	24	620	0.039	24	0.0	6.414	A
C-ABD	0.75	606	0.001	0.75	0.0	6.003	A
C-D	9			9			
C-A	56			56			

NRB consulting engineers

APPENDIX F

PiCADY Junction Capacity Model Output
Existing T Junction at 'Yellow Furze'

Established T Junction at 'Yellow Furze'
Summary PICADY Results in Order as included herein
(Robust & Worst Case – Being "Scenario E")
SELECTED CONSTRUCTION YEAR 2022

Modelled Scenario	Period Mean Max Q (PCUs)	Period Max RFC
2022 Construction Year AM Peak	<1	0.02
2022 Construction Year PM Peak	<1	0.01

All Results Above are way below the recommended RFC of 0.85 (85% Capacity) and therefore no problems whatsoever are anticipated at the Junction in terms of Capacity or excessive vehicle Queues

NB Any Small Changes to Selected Construction Year 2022 or indeed significantly higher traffic volumes experienced, will clearly have no significant implications in terms of the conclusions of the Study in Light of the Favourable Results.

Junctions 9

PICADY 9 - Priority Intersection Module

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Filename: 2022 AM PM Worst Case.j9
Path: C:\Users\Eoin\NRB Consulting Engineers Ltd\NRB Server - Documents\2020\20-070 Dawn Slane\Calculations\Yellow Furze Picadys
Report generation date: 13/12/2020 12:37:29

»2022, AM
»2022, PM

Summary of junction performance

	AM				PM			
	Q (PCU)	Delay (s)	RFC	LOS	Q (PCU)	Delay (s)	RFC	LOS
	2022							
Stream B-AC	0.0	6.42	0.02	A	0.0	5.83	0.01	A
Stream C-AB	0.0	5.91	0.01	A	0.0	5.90	0.01	A

Values shown are the highest values encountered over all time segments. Delay is the maximum value of Av. delay per arriving vehicle.

File summary

File Description

Title	(untitled)
Location	
Site number	
Date	09/12/2020
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	NRB-004\Eoin
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Av. delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin

Analysis Options

Calculate Q Percentiles	Calculate residual capacity	RFC Threshold	Av. Delay threshold (s)	Q threshold (PCU)
		0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2022	AM	ONE HOUR	07:45	09:15	15
D2	2022	PM	ONE HOUR	16:45	18:15	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2022, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Major road direction	Junction Delay (s)	Junction LOS
1	Yellow Furze T Junction at Local Road	T-Junction	Two-way	1.45	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type
A	Local Road N		Major
B	Minor Road Approach at YF		Minor
C	Local Road S		Major

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Has right turn bay	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
C	7.00			100.0	✓	1.00

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Minor Arm Geometry

Arm	Minor arm type	Lane width (m)	Visibility to left (m)	Visibility to right (m)
B	One lane	3.00	90	90

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Junction	Stream	Intercept (PCU/hr)	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
1	B-A	552	0.096	0.243	0.153	0.347
1	B-C	681	0.100	0.252	-	-
1	C-B	632	0.234	0.234	-	-

The slopes and intercepts shown above do NOT include any corrections or adjustments.

Streams may be combined, in which case capacity will be adjusted.

Values are shown for the first time segment only; they may differ for subsequent time segments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2022	AM	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Av. Demand (PCU/hr)	Scaling Factor (%)
A		✓	35	100.000
B		✓	11	100.000
C		✓	31	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A	B	C
From	A	0	2	33
	B	7	0	4
	C	24	7	0

Vehicle Mix

HV %s

		To		
		A	B	C
From	A	0	1	8
	B	1	0	1
	C	8	1	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max delay (s)	Max Q (PCU)	Max LOS
B-AC	0.02	6.42	0.0	A
C-AB	0.01	5.91	0.0	A
C-A				
A-B				
A-C				

Main Results for each time segment

07:45 - 08:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	8	583	0.014	8	0.0	6.324	A
C-AB	5	626	0.008	5	0.0	5.858	A
C-A	18			18			
A-B	2			2			
A-C	25			25			

08:00 - 08:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	10	581	0.017	10	0.0	6.362	A
C-AB	6	625	0.010	6	0.0	5.878	A
C-A	22			22			
A-B	2			2			
A-C	30			30			

08:15 - 08:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	12	579	0.021	12	0.0	6.417	A
C-AB	8	623	0.012	8	0.0	5.907	A
C-A	26			26			
A-B	2			2			
A-C	36			36			

08:30 - 08:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	12	579	0.021	12	0.0	6.417	A
C-AB	8	623	0.012	8	0.0	5.907	A
C-A	26			26			
A-B	2			2			
A-C	36			36			

08:45 - 09:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	10	581	0.017	10	0.0	6.365	A
C-AB	6	625	0.010	6	0.0	5.881	A
C-A	22			22			
A-B	2			2			
A-C	30			30			

09:00 - 09:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	8	583	0.014	8	0.0	6.324	A
C-AB	5	626	0.008	5	0.0	5.860	A
C-A	18			18			
A-B	2			2			
A-C	25			25			

2022, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Major road direction	Junction Delay (s)	Junction LOS
1	Yellow Furze T Junction at Local Road	T-Junction	Two-way	1.07	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	2022	PM	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Av. Demand (PCU/hr)	Scaling Factor (%)
A		✓	32	100.000
B		✓	8	100.000
C		✓	42	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A	B	C
From	A	0	6	26
	B	2	0	6
	C	35	7	0

Vehicle Mix

HV %s

		To		
		A	B	C
From	A	0	1	8
	B	1	0	1
	C	8	1	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max delay (s)	Max Q (PCU)	Max LOS
B-AC	0.01	5.83	0.0	A
C-AB	0.01	5.90	0.0	A
C-A				
A-B				
A-C				

Main Results for each time segment

16:45 - 17:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	6	636	0.009	6	0.0	5.772	A
C-AB	5	626	0.008	5	0.0	5.852	A
C-A	26			26			
A-B	5			5			
A-C	20			20			

17:00 - 17:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	7	634	0.011	7	0.0	5.796	A
C-AB	6	625	0.010	6	0.0	5.871	A
C-A	31			31			
A-B	5			5			
A-C	23			23			

17:15 - 17:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	9	632	0.014	9	0.0	5.830	A
C-AB	8	624	0.012	8	0.0	5.898	A
C-A	39			39			
A-B	7			7			
A-C	29			29			

17:30 - 17:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	9	632	0.014	9	0.0	5.830	A
C-AB	8	624	0.012	8	0.0	5.898	A
C-A	39			39			
A-B	7			7			
A-C	29			29			

17:45 - 18:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	7	634	0.011	7	0.0	5.799	A
C-AB	6	625	0.010	6	0.0	5.874	A
C-A	31			31			
A-B	5			5			
A-C	23			23			

18:00 - 18:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	6	636	0.009	6	0.0	5.772	A
C-AB	5	626	0.008	5	0.0	5.852	A
C-A	26			26			
A-B	5			5			
A-C	20			20			

NRB consulting engineers

APPENDIX G

PiCADY Junction Capacity Model Output
Existing T-Junction at L1600/Road to 'Yellow Furze'

Established T Junction at L1600/ Road to 'Yellow Furze'
Summary PICADY Results in Order as included herein
(Robust & Worst Case – Being "Scenario E")
SELECTED CONSTRUCTION YEAR 2022

Modelled Scenario	Period Mean Max Q (PCUs)	Period Max RFC
2022 Construction Year AM Peak	<1	0.07
2022 Construction Year PM Peak	<1	0.07

All Results Above are way below the recommended RFC of 0.85 (85% Capacity) and therefore no problems whatsoever are anticipated at the Junction in terms of Capacity or excessive vehicle Queues

NB Any Small Changes to Selected Construction Year 2022 or indeed significantly higher traffic volumes experienced, will clearly have no significant implications in terms of the conclusions of the Study in Light of the Favourable Results.

Junctions 9

PICADY 9 - Priority Intersection Module

Version: 9.0.1.4646 []
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Filename: 2022 AM PM Worst Case.j9
Path: C:\Users\Eoin\NRB Consulting Engineers Ltd\NRB Server - Documents\2020\20-070 Dawn Slane\Calculations\Northern Yellow F L1600 Picadys
Report generation date: 13/12/2020 12:40:02

»2022, AM
»2022, PM

Summary of junction performance

	AM				PM			
	Q (PCU)	Delay(s)	RFC	LOS	Q (PCU)	Delay (s)	RFC	LOS
	2022							
Stream B-AC	0.1	5.83	0.05	A	0.1	6.17	0.07	A
Stream C-AB	0.1	6.33	0.07	A	0.1	6.58	0.06	A

Values shown are the highest values encountered over all time segments. Delay is the maximum value of Av. delay per arriving vehicle.

File summary

File Description

Title	(untitled)
Location	
Site number	
Date	09/12/2020
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	NRB-004\Eoin
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Av. delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin

Analysis Options

Calculate Q Percentiles	Calculate residual capacity	RFC Threshold	Av. Delay threshold (s)	Q threshold (PCU)
		0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2022	AM	ONE HOUR	07:45	09:15	15
D2	2022	PM	ONE HOUR	16:45	18:15	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2022, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Major road direction	Junction Delay (s)	Junction LOS
1	Yellow Furze T Junct	T-Junction	Two-way	1.77	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type
A	L1600 East		Major
B	Minor Road Leading to Yellow Furze		Minor
C	L1600 West		Major

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Has right turn bay	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
C	7.00			100.0	✓	1.00

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Minor Arm Geometry

Arm	Minor arm type	Lane width (m)	Visibility to left (m)	Visibility to right (m)
B	One lane	3.00	90	90

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Junction	Stream	Intercept (PCU/hr)	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
1	B-A	552	0.096	0.243	0.153	0.347
1	B-C	681	0.100	0.252	-	-
1	C-B	632	0.234	0.234	-	-

The slopes and intercepts shown above do NOT include any corrections or adjustments.

Streams may be combined, in which case capacity will be adjusted.

Values are shown for the first time segment only; they may differ for subsequent time segments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2022	AM	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Av. Demand (PCU/hr)	Scaling Factor (%)
A		✓	61	100.000
B		✓	31	100.000
C		✓	159	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A	B	C
From	A	0	1	60
	B	0	0	31
	C	118	41	0

Vehicle Mix

HV %s

		To		
		A	B	C
From	A	0	8	2
	B	8	0	2
	C	2	2	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max delay (s)	Max Q (PCU)	Max LOS
B-AC	0.05	5.83	0.1	A
C-AB	0.07	6.33	0.1	A
C-A				
A-B				
A-C				

Main Results for each time segment

07:45 - 08:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	23	669	0.035	23	0.0	5.683	A
C-AB	31	626	0.050	31	0.1	6.171	A
C-A	89			89			
A-B	0.75			0.75			
A-C	45			45			

08:00 - 08:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	28	667	0.042	28	0.0	5.745	A
C-AB	37	626	0.060	37	0.1	6.239	A
C-A	106			106			
A-B	0.90			0.90			
A-C	54			54			

08:15 - 08:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	34	664	0.051	34	0.1	5.830	A
C-AB	46	626	0.073	46	0.1	6.327	A
C-A	129			129			
A-B	1			1			
A-C	66			66			

08:30 - 08:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	34	664	0.051	34	0.1	5.830	A
C-AB	46	626	0.073	46	0.1	6.329	A
C-A	129			129			
A-B	1			1			
A-C	66			66			

08:45 - 09:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	28	667	0.042	28	0.0	5.748	A
C-AB	37	626	0.060	37	0.1	6.243	A
C-A	106			106			
A-B	0.90			0.90			
A-C	54			54			

09:00 - 09:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	23	669	0.035	23	0.0	5.686	A
C-AB	31	626	0.050	31	0.1	6.177	A
C-A	89			89			
A-B	0.75			0.75			
A-C	45			45			

2022, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Major road direction	Junction Delay (s)	Junction LOS
1	Yellow Furze T Junct	T-Junction	Two-way	1.73	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	2022	PM	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Av. Demand (PCU/hr)	Scaling Factor (%)
A		✓	150	100.000
B		✓	40	100.000
C		✓	87	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A	B	C
From	A	0	1	149
	B	0	0	40
	C	52	35	0

Vehicle Mix

HV %s

		To		
		A	B	C
From	A	0	8	2
	B	8	0	2
	C	2	2	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max delay (s)	Max Q (PCU)	Max LOS
B-AC	0.07	6.17	0.1	A
C-AB	0.06	6.58	0.1	A
C-A				
A-B				
A-C				

Main Results for each time segment

16:45 - 17:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	30	652	0.046	30	0.0	5.899	A
C-AB	26	607	0.044	26	0.0	6.318	A
C-A	39			39			
A-B	0.75			0.75			
A-C	112			112			

17:00 - 17:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	36	647	0.056	36	0.1	6.011	A
C-AB	32	603	0.052	32	0.1	6.426	A
C-A	47			47			
A-B	0.90			0.90			
A-C	134			134			

17:15 - 17:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	44	639	0.069	44	0.1	6.170	A
C-AB	39	597	0.065	39	0.1	6.575	A
C-A	57			57			
A-B	1			1			
A-C	164			164			

17:30 - 17:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	44	639	0.069	44	0.1	6.170	A
C-AB	39	597	0.065	39	0.1	6.575	A
C-A	57			57			
A-B	1			1			
A-C	164			164			

17:45 - 18:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	36	647	0.056	36	0.1	6.012	A
C-AB	32	603	0.052	32	0.1	6.428	A
C-A	47			47			
A-B	0.90			0.90			
A-C	134			134			

18:00 - 18:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	30	652	0.046	30	0.0	5.902	A
C-AB	26	607	0.044	26	0.0	6.324	A
C-A	39			39			
A-B	0.75			0.75			
A-C	112			112			

ATTACHMENT 14.0

- ARCHAEOLOGICAL, ARCHITECTURAL & CULTURAL HERITAGE -

ATTACHMENT G

- ARCHAEOLOGICAL TEST TRENCHING REPORT -

Client: Dawn Meats Ireland UC

Planning Application Ref: LB/180300

License No: 18E0476

August 2018

Prepared by:

Seán Shanahan and Edel Barry

shanarc archaeology

Copies of this report have been presented to:	Dawn Meats Ireland UC, the National Museum of Ireland, the Department of Culture, Heritage and the Gaeltacht and to the Planning Department of Meath County Council
Please Note:	The International and European conventions on the protection of cultural heritage ratified in Ireland have been taken into consideration for the purposes of this report. The National Monuments Acts 1930-2014, the Heritage Act 1995, Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999, The Planning and Development Act 2000 plus amendments, and the most recent EPA guidelines as well as those guidelines issued by the statutory bodies have been consulted in the assembly of this report. These are listed in the reference section of the report. All of the recommendations made within this assessment are based on maps provided by the client at the time of writing. Should any alterations be made to these design drawings, further assessment may be necessary. Recommendations are subject to approval by the National Monuments Service at the Department of Culture Heritage and the Gaeltacht.
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Report Design and Template	Shanarc Archaeology 2018

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Non-Technical Summary

An archaeological impact assessment was undertaken by Shanarc Archaeology Ltd at the site of a proposed wastewater treatment plant at Painestown, Beauparc, Co. Meath, on behalf of Dawn Meats Ireland UC. The assessment was compiled in response to a planning condition (LB/180300, Appendix 1) stipulated by Meath County Council, in granting permission for a development comprising the construction of an effluent treatment plant, an extension to an existing waste water treatment plant, including coarse and fine screen, balance tank, and sludge tank, and site works, including an earthen berm to the perimeter of the extended treatment plant. An archaeological impact assessment, including excavation of test trenches (Excavation Licence No. 18E0476) was undertaken in response to this condition.

The proposed development is situated in the immediate vicinity of two recorded monuments:

- Barrow (ME026-008-), Painestown, situated 0.31km from the proposed development; and
- Ogham stone site (ME026-009-), Sensechalstown, situated 0.49km from the proposed development.

It was considered that the operation and construction phases of the proposed development may impact upon any potential associated sub-surface features related to these monuments within the proposed area of development.

Following an assessment of relevant and readily available archaeological and built heritage records, cartographic and literary sources, a visual inspection of the site and targeted investigation through test trenching, it is concluded that no features or material of archaeological significance were identified within the proposed development area.

1. Introduction

An archaeological impact assessment was undertaken by Shanarc Archaeology Ltd at the site of a proposed wastewater treatment plant at Painestown, Beauparc, Co. Meath, on behalf of Dawn Meats Ireland UC. The assessment was compiled in response to a planning condition (LB/180300), Appendix 1) stipulated by Meath County Council, in granting permission for a development comprising the construction of an effluent treatment plant, an extension to an existing waste water treatment plant, including coarse and fine screen, balance tank, and sludge tank, and site works, including an earthen berm to the perimeter of the extended treatment plant (Figures 2 and 3).

An archaeological impact assessment, including excavation of test trenches (Excavation Licence No. 18E0476) was undertaken in response to this condition. The study also comprises consultation of existing archaeological and built heritage records, a site inspection, and readily available literary and cartographic sources. Proposals are set out for

(i) evaluating the nature and extent of known archaeological remains, and potential sub-surface archaeological remains; and

(ii) Mitigating the potential impact of the development on heritage assets.

1.1 Proposed Development Site

The development site is situated east of the centre of Co. Meath, approximately 7kmsouth of the town of Slane, accessed via the N2 and local road L1013. It is located approximately 13km North, North West of the town of Navan, itself the approximate centre point of the county, and accessed via the regional road R153 and the same local road.

The development site is situated within a gently undulating landscape, which is agricultural in nature, with predominantly rich, free-draining soil. To the north, the land adjacent to the south bank of the River Boyne is hilly and used as rough grazing. The site of the proposed development is on a south-facing gentle slope, enclosed by mature hedgerows.

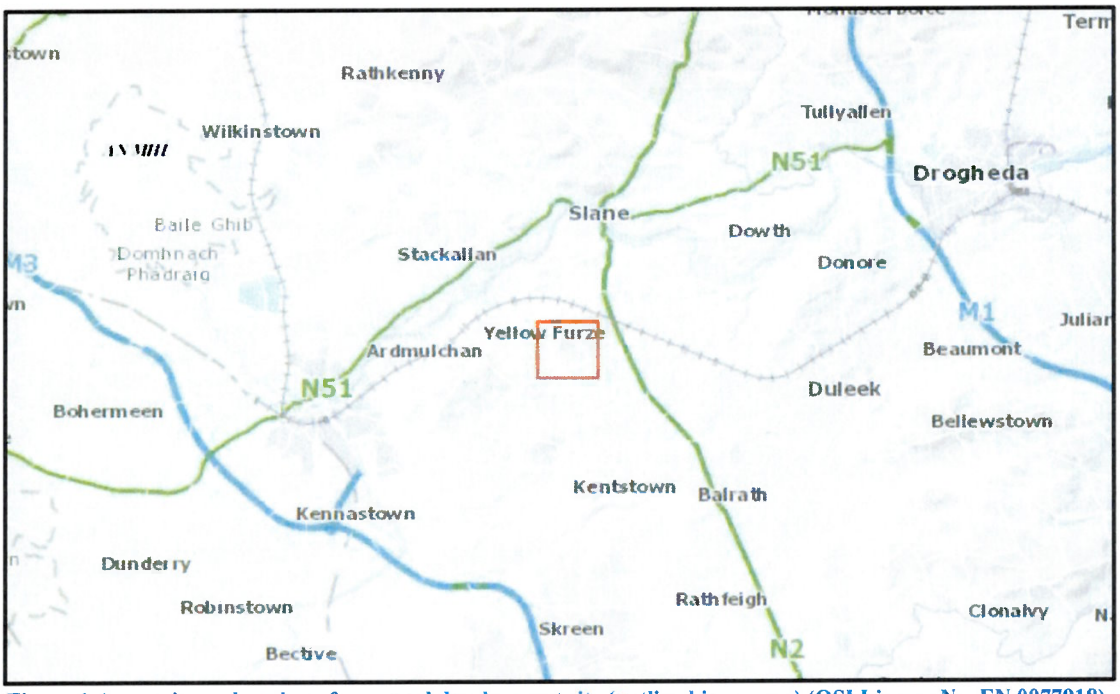

Figure 1 Approximate location of proposed development site (outlined in orange) (OSI License No. EN 0077918)

1.2 Proposed Development

The proposed development comprises the construction of an effluent treatment plant, an extension to an existing waste water treatment plant, including coarse and fine screen, balance tank, and sludge tank, with all associated site works, including an earth berm to the perimeter of the extended treatment plant, and landscaping (Figures 2 and 3).

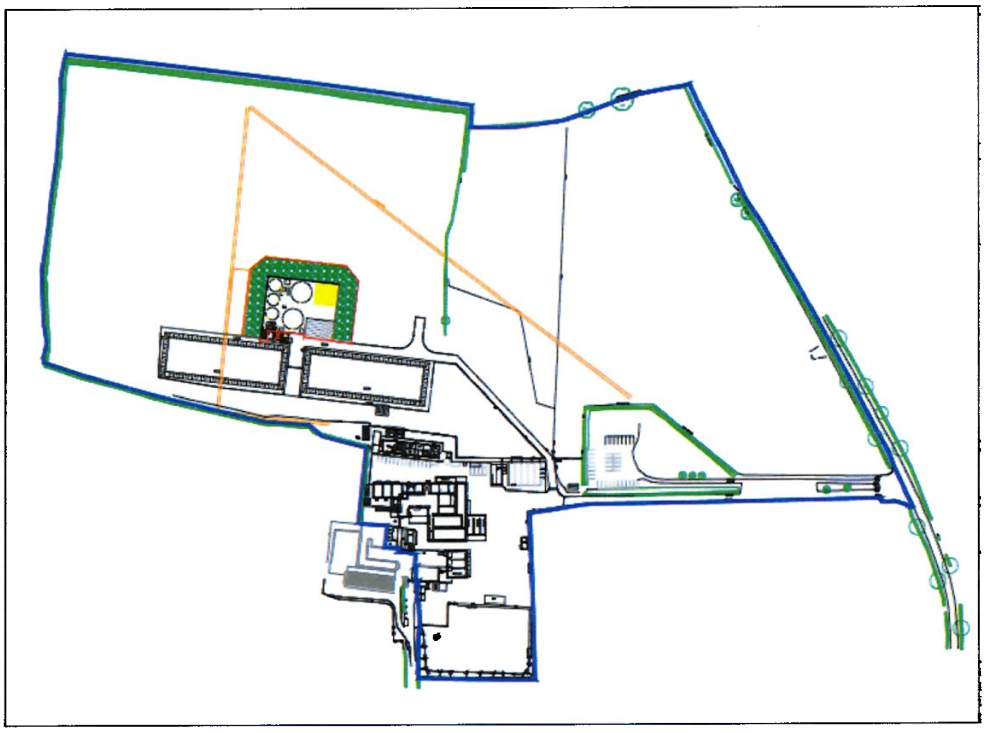

Figure 2Proposed effluent treatment plant – overall site plan

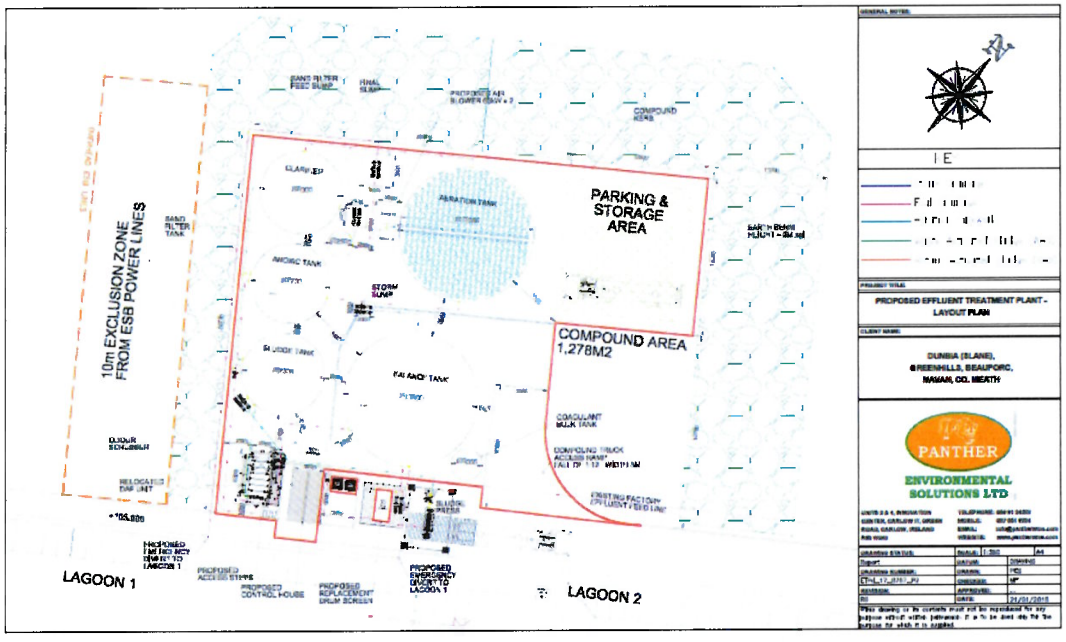

Figure 3 Plan of proposed development

2. Assessment Methodology

2.1 Legislative Protection for Archaeological, Architectural and Industrial Heritage

Ireland has ratified several international and European conventions on the protection of cultural heritage, principally:

- UNESCO World Heritage Convention 1972;
- Charter for the Conservation and Restoration of Monuments and Sites (Venice) 1964;
- European Convention on the Protection of the Archaeological Heritage (Valetta Convention) 1992;
- European Convention on the Protection of the Architectural Heritage (Grenada Convention) 1985;
- European Council Directive on Environmental Impact Assessment (85/337/EEC) 1995 and amending Directive by (97/11/EC) 1997 and (2003/35/EC) 2003.

National legislation protecting cultural heritage sites comprises:

- National Monuments Act 1930, amended 1954, 1987, 1994 and 2004;
- Heritage Act 1995;
- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999; and
- Planning and Development Acts 2000 - 2014.

The following standards and guidelines were also consulted as part of this assessment:

- Frameworks and Principles for the Protection of the Archaeological Heritage (1999), Department of Arts, Heritage, Gaeltacht & the Islands;

- Policy and Guidelines on Archaeological Excavation (1999), Department of Arts, Heritage, Gaeltacht & the Islands;
- The Heritage Council, 2000. Archaeology & Development: Guidelines for Good Practice for Developers (2000), The Heritage Council;
- Guidelines on the information to be contained in Environmental Impact Statements (Draft) (May 2017), Environmental Protection Agency;
- Advice notes on current practice in the preparation of Environmental Impact Statements (2003), Environmental Protection Agency;
- Guidelines for the Assessment of Archaeological Heritage Impacts of National Road Scheme (2005), National Roads Authority; and
- Guidelines for the Assessment of Architectural Heritage Impacts of National Roads Schemes (2005), National Roads Authority.

2.2 Assessment Criteria

Impacts to cultural, archaeological and architectural heritage are generally categorised as one of three types, as described in Table 1.

Table 1 Type of Impact

Type of Effect	Description
Direct	Occurs where an archaeological, architectural or cultural heritage feature, site or structure is physically located within the footprint of the proposed development, resulting in the partial or total removal of that feature or site.
Indirect	Changes to an archaeological, architectural or cultural heritage feature, site or structure, or its setting, caused by off-site effects that are beyond the control of the developer.
Residual	The degree of change to an archaeological, architectural or cultural heritage feature, site or structure, or its setting, that will occur after the proposed mitigation measures have taken effect.
Cumulative	The addition of many small effects to create one larger, more significant, effect.

Type of Effect	Description
None predicted	Occurs where an archaeological, architectural or cultural heritage feature, site or structure is not adversely or positively affected by the proposed development.

The impacts on cultural, archaeological and architectural heritage are assessed in terms of their quality, as described in Table 2.

Table 2 Quality of Impacts

Quality of Impact	Description
Negative	A change that will detract from or permanently remove an archaeological, architectural or cultural heritage feature, site or structure.
Neutral	A change that will not affect an archaeological, architectural or cultural heritage feature, site or structure.
Positive	A change that will improve or enhance the setting of an archaeological, architectural or cultural heritage feature, site or structure.

The level, or significance, of impact is assessed, as described in Table 3.

Table 3 Significance of Impact

Significance of Effect	Description
Imperceptible	An impact on an archaeological, architectural or cultural heritage feature, site or structure, which can be measured, but without noticeable consequences.
Not significant	An impact on an archaeological, architectural or cultural heritage feature, site or structure, which causes noticeable changes, but without noticeable consequences.
Slight	An impact that causes a minor change in the character of the environment, which, although noticeable, does not directly impact or affect the integrity of an archaeological, architectural or cultural heritage feature, site or structure. Such impacts are generally reversible and of relatively short duration.

Significance of Effect	Description
Moderate	An impact that results in a change to an archaeological, architectural or cultural heritage feature, site or structure, which, although noticeable, does not compromises the integrity of the heritage. These effects arise where an archaeological, architectural or cultural heritage feature, site or structure can be incorporated into a modern day development without damage and that all procedures used to facilitate this are reversible.
Potentially significant	An impact to a potential feature/area of archaeological, architectural or cultural heritage that could be significant without mitigation measures being implemented, e.g. potential sub-surface archaeological remains.
Significant	An impact that, by its magnitude, duration or intensity alters the character and/or setting of an archaeological, architectural or cultural heritage feature, site or structure. These effects arise where an aspect or aspects of the archaeological, architectural or cultural heritage are permanently impacted on, leading to a loss of character, integrity and data about the feature/site/structure. Appropriate mitigation is likely to reduce the impact.
Very significant	An impact that, by its magnitude, duration or intensity significantly alters the character and/or setting of an archaeological, architectural or cultural heritage feature, site or structure. These effects arise where an aspect or aspects of the archaeological, architectural or cultural heritage are permanently impacted on, leading to a loss of character, integrity and data about the feature/site/structure. Appropriate mitigation is likely to reduce the impact.
Profound	An impact that completely and irreversibly destroys an archaeological, architectural or cultural heritage feature, site or structure. Mitigation is unlikely to remove adverse effects. Reserved for adverse, negative effects only.

The magnitude of impact is assessed as described in Table 4.

Table 4 Magnitude of Effects

Magnitude of Effects	Description
Extent	The size of the area, the number of sites, and proportion of a population affected by an effect.
Duration	The period of time over which the effect will occur.
Frequency	How often the effect will occur.
Context	Whether the extent, duration or frequency will conform or contrast with established (baseline) conditions.

2.3 Desktop Study

An archaeological desk-based study of existing archaeological records and other relevant cartographic and literary sources was undertaken. A list of all consulted sources is provided in bibliographic form.

2.3.1 National Monuments

Under the National Monuments Act 1930-2004, archaeological sites in the ownership or guardianship of the State or a Local Authority and sites under Preservation Orders are designated as National Monuments. Such sites are offered the highest level of protection under Irish legislation.

2.3.2 Record of Monuments & Places and Sites & Monuments Record

The Record of Monuments and Places (RMP) is a list of archaeological monuments known to the National Monuments Service. There are over 120,000 Recorded Monuments in the RMP. This RMP list is based on the earlier Sites & Monuments Record (SMR) files housed at the National Monuments Service. The SMR was initially based on cartographic, documentary and aerial photographic sources, was revised through fieldwork and forms the basis of the statutory RMP. The record is updated on a constant basis.

2.3.3 Topographical Files

The topographical files of the National Museum of Ireland (NMI) are the national archive of all known antiquities recorded by the NMI. These files relate primarily to artefacts but also include references to monuments and contain a unique archive of records of previous excavations. The NMI's files present a catalogue of objects reported to the institution from

1928-95. The find-spots of artefacts can be an important indication of the archaeological potential of the related or surrounding area. Five artefacts have been recorded in the townlands of Painestown, Dollardstown, Ardmulchan and Haystown and Carnuff Little.

2.3.4 Archaeological Inventory of County Meath

The Archaeological Survey of Ireland was initiated after the National Monuments Act 1930 and remains ongoing. The Archaeological Inventory of County Laois, compiled by Michael J. Moore was published by the Archaeological Survey, Office of Public Works in 1987. It lists 1854 sites, all known archaeological sites from the Neolithic up to approximately 1700AD.

2.3.5 Meath County Development Plan 2013-2019

Each City and County Development Plan is compiled in accordance with the requirements of the Planning and Development Acts 2000 – 2014 and contains lists of national monuments, recorded monuments, a Record of Protected Structures (a list of buildings which cannot be materially altered or demolished without grant of permission under the Act) and Conservation Areas and Architectural Conservation Areas (to protect and enhance the special character of an area). Local Area Plans (LAPs) compiled under the City/County Development Plan are also consulted.

2.3.6 National Inventory of Architectural Heritage

The National Inventory of Architectural Heritage (NIAH) is an ongoing survey within the Department of Arts, Heritage and the Gaeltacht. The work of the NIAH involves identifying and recording the architectural heritage of Ireland, from AD1700 to the present day and includes country houses, churches, mills, bridges and other structures of note. The NIAH survey of County Meath was carried out in 2004, with the exception of Navan town which was published in 2003.

2.3.7 Literary Sources

These are a valuable means of completing the written archaeological and architectural record of an area and gaining insight into the history of the receiving environment. The various sources consulted are listed in the bibliography.

2.3.8 Cartographic Sources

A wide range of maps were consulted, a full list of which is provided in the bibliography. Information gathered from cartographic sources is fundamental to the identification of archaeological and architectural heritage sites and demesne landscapes which are now located based on cartographic records alone. For example, the earliest Ordnance Survey maps date to the late 1830s and 1840s. Much change has occurred in the use and treatment of the landscape in the intervening years, with the destruction rate increasing rapidly during the second half of the 20th century.

2.3.9 Previous Archaeological Investigations

The Excavations Bulletin is both a published annual directory and an on-line database (www.excavations.ie) that provides summary accounts of all the excavations carried out in Ireland from 1970 to 2013. The database provides access to summary descriptions of almost 24,000 reports.

3. Receiving Environment

3.1 Archaeological and Historical Background

The extent of medieval activity within the wider study area is attested to by the number and range of known archaeological monuments within the surrounding landscape.

3.1.1 Prehistoric Period

Mesolithic c. 7000-4000BC

The earliest evidence of human occupation in Ireland can be seen in the remains of Mesolithic hunter-gatherers, who arrived in Ireland c. 7000BC, in the form of flint scatters and shell middens. Much of the activity in this era was riverine, allowing the natural resources furnished by the sea and rivers to be exploited. There is a strong possibility of encountering Mesolithic material at river crossings (O'Driscoll 2017, 44), and the proximity of the proposed line of development to the River Boyne may indicate the presence of evidence of Mesolithic settlement in the area.

Neolithic c. 4000-2500BC

The transition from the Mesolithic to the Neolithic periods is marked by the shift from a hunter-gatherer lifestyle to the introduction of an agricultural economy. Neolithic monuments, evidence of communal funerary and ritual activity, represent a change in burial practices and religion during this era, as well as being emblematic of an increasingly settled style of occupation. *Brú na Bóinne* is a complex of 40 passage graves, enclosures, henges and a cursus at Newgrange, Knowth and Dowth. Recognised as a world heritage site, it is situated approximately 6 km north-east of the survey area.

A site identified as a megalithic passage tomb (ME025-006, NM546) is situated 0.55km from the proposed line of development. During the construction of a house, two stones with megalithic art were recovered adjacent to a low mound, thought to represent the remains of a passage tomb.

Approximately 5km east of the proposed line of development, an excavation (00E0613) in the townland of Newtown revealed a flint scatter, believed to date to the late Neolithic. A transverse arrowhead was also discovered at the site.

Bronze Age c. 2500-800BC

Activity during the Bronze Age is characterised by the introduction of metalworking technology, as is evidenced by changes in material culture as well as the nature of sites and monuments of this era. The first metal artefacts were made of copper, before it was mixed with tin to form bronze. Stone tools continued in production and use. *Fulachta fiadh* are generally associated with this period. Horseshoe- or oval-shaped mounds, formed of burnt stone and charcoal, debris removed from water pits, commonly thought to have been used for cooking, although more recently a range of alternative theories have been proposed, including suggestions that these pits were employed for brewing or for sweat-houses. Despite the ubiquity of this class of monument across the country, there are none in the townlands through which the proposed line of development travels, or those in the immediate vicinity, which is indicative of a lack of archaeological investigation in the area.

In the townland of Ardmulchan a wedge-shaped cist covered by a large capstone, containing cremated remains (ME025-065) was identified in 1959, 0.54km from the proposed line of development.

A cairn, comprising a low circular mound of earth and stones with a diameter of 30m and a central mound with a diameter of 5m has been identified in the townland of Kingstown and Carnuff Great (ME026-007). Thought to have had symbolic importance and have been significant assembly sites, these possible burial monuments are associated with the Neolithic era, with their use continuing into the Bronze Age (O'Sullivan and Downey 2011)

Iron Age c. 800BC-AD500

An inland promontory fort is recorded in the townland of Carrickdexter (ME019-032), comprising a semi-circular area backing onto a 30m-high cliff. This site type is thought to have its origins in the Iron Age, but continued in use into the early medieval period.

An ogham stone (ME026-009) was recovered from the grounds of Seneschals town House in the 1940s and removed to the National Museum. Ogham, a system of strokes across a vertical central line, was the earliest form of writing in Ireland and began to be used from

c.300 AD. The inscription on this example, two lines on the face, read 'MAQI-CAIRATINI AVI INEQAGLAS' (Macalister 1945, 45).

3.12 Historic Era

Early Medieval Period c. AD500-1100

The introduction of Christianity to Ireland occurred during the 5th century A.D., and settlement during this era is represented by the ringfort, alternatively referred to as 'Rath' *'Lios'* or *'dún'* to indicate an earthen bank and exterior ditch enclosing a central area ,or 'cashel' to indicate a stone-walled enclosure. Usually circular or sub-circular and often sited on raised ground, there are over 45,000 currently identified in Ireland, making this the most common site type in the country. Smaller, 'univallate' examples were homesteads for lower ranks of society, while larger bi- or tri-vallate examples were used by lords or wealthy landowners. Several examples of this site type have been identified in the vicinity of the survey area.

A ringfort in the townland of Ardmulchan (ME025-007, NM496) is described as a raised oval area, 38m in diameter, having an external berm and outer scarp. An enclosure at Dollardstown (ME026-001) may have been a ringfort, or alternatively a motte. It comprises a raised area with two berms and remains of earthen banks. A ringfort in the townland of Realtoge (ME06-011) comprised an uneven oval area defined by an earthen bank and external fosse, with a house site defined by an earthen bank against inner edge of bank to east.

Medieval Period c. AD1100-1600

When the Anglo-Normans arrived in 1169, as mercenaries under Dermot Mac Murrough, the landscape changed dramatically, the influx of new settlers signified by the construction of several new types of homesteads, defensive and ecclesiastical sites. Motte-and-bailey defensive settlements, comprising large flat-topped mounds atop which wooden castles were constructed, date to the early years of the Anglo-Norman conquest. An example of this is situated in the townland of Thurstianstown (ME019-047), comprising a grass-covered flat-topped oval mound with an irregular berm enclosing the base. A bank defines the berm from the south to the north-west, which may have constituted a bailey. A second motte (ME025-019) is situated in the townland of Ardmulchan, just over 2km from

the proposed line of development. Again, it is a flat-topped grass-covered earthen mound defined by a bank,

Moated sites were defended farmsteads which characterise Anglo-Norman settlement throughout Ireland; one has been identified in the townland of Reatoge (ME026-012), a rectangular area defined by banks, which are highest at the corners, an external fosse and leat. Later in the Anglo-Norman era, stone tower-houses began to be built. A three-storey tower-house, having a stair tower ad a garderobe tower, is recorded in the townland of Slanecastle Demesne (ME019-033002), which was thought to have been built by the D'Exeter family, who had lost their land by the 17th century (Wilde 1850, 149-50).

In the medieval period, the monastic tradition which had heretofore flourished took on a new form, as several Continental orders were introduced during the 12th century. In the town of Navan, adjacent to the proposed line of development, the Church of St Mary's was confirmed by John de Courcy to the Augustinian canons in 1189. The ecclesiastical settlement is thought to have been founded prior to the Anglo-Norman settlement of the county, as a charter of 1175-84 was witnessed by an abbot.

Several ecclesiastic sites of early date are to be found in the wider survey area. In the townland of Painestown, a Church (ME026-022) was described as being in ruins, with its chancel in poor repair, by Ussher in his visitation of 1622 (Elrington 1864, 64), although Lewis notes that the steeple had been repaired in 1823 (1837). Now visible only as the outline of a rectangular structure,

Ardmulchan Parish Church (ME025-020) is dated to 1232 (Cogan 1862, 70). It was in ruins at the time of Ussher's visitation, although the chancel was undergoing repair. By the time of Dopping's Visitation (1682-5), the parish of Ardmulchan had been united with that of Painestown (Ellison 1971, 33-4). A three-storey bell tower adjoins the west end of the church - O'Neill dates this structure to the 15th century (2002, 17). An example of a sandstone cross slab (ME025-020002) appears on the site, having a raised ringed cross: it is re-used on a doorway in the tower. These cross carved pillar stones are thought to date to the 9th and 10th centuries, indicating an earlier origin for this ecclesiastic site.

Civil parishes were based on the medieval church parish, which preserved the Gaelic *tuath* territorial boundary. Following the Anglo-Norman invasion, the tuath were retained for administrative purposes, and later re-named as parishes or manors.

3.1.3 Medieval – Late Medieval Period

The Down Survey map of 1655 indicates that the land of the parish of Painestown was predominantly owned by James Almer, who held the lands at Dollardstowne and Thenshalstown (Seneschalstown), Thurstianstowne and Rowlandstowne, while Simon Daly held 427 acres of arable pasture in the centre of the parish.

Nineteenth & Twentieth Centuries

From the 18th century, defensive settlements and castles gave way to the construction of country houses, and landed estates with associated demesnes began to develop across the country.

Samuel Lewis describes Painestown as being of good quality land which was employed for tillage and pasture in equal measure. Several demesnes were situated there, including Beauparc, the residence of Gustavus Lambert, Esq., Dollardstown, once the seat of the Meredyth family was by 1837 occupied by a farmer, and Seneschalstown, the property of the Aylmer family, was leased. A Church, described as 'old, but very neat edifice, with a handsome tower' had had a gallery erected and the steeple roofed and repaired in 1823. A 'neat modern structure' was the chapel, and a school, having 30 boys and 12 girls, was situated at Yellow Furze (Lewis 1837).

3.2 Sites and Monuments Record and Record of Monuments and Places

The Record of Monuments and Places lists 8 sites within a 2km radius of the proposed development site. This part of Co. Meath was attractive for settlement due to its fertile land, and proximity to the Boyne River. The nearest RMP site, a barrow in the townland of Painestown (ME026-008), is located at a distance of 0.31km, and an Ogham stone in Seneschalstown (ME026-009-) is situated 0.48km from the development site (Figure 4).

Table 5 Recorded Monuments within a 2km radius of the proposed development

SMR No.	Class	Townland	ITM Ref (E,N)	Proximity
ME026-008	Barrow	Painestown	695254, 770210	0.31km
ME026-009	Ogham Stone	Seneschalstown	694777, 769312	0.48km
ME026-002--	Church	Painestown	694412, 771010	1.28km
ME026-002001-	Tomb – effigal	Painestown	694412, 771010	1.28km

SMR No.	Class	Townland	ITM Ref (E,N)	Proximity
ME026-002002-	Graveyard	Painestown	694400, 771000	1.28km
ME026-002003-	Font	Painestown	694422, 771010	1.28km
ME026-002004-	Architectural Fragment	Painestown	694422, 771010	1.28km
ME019-047-	Motte	Thurstianstown	695183, 771965	1.94km

Figure 4 – Distribution map of sites listed in the Record of Monuments and Places (*red dots*) in close proximity to the proposed development site (*outlined in orange*)

3.3 Cartographic Analysis

A wide range of historic maps were consulted, a full list of which is provided in the bibliography. Relevant extracts are presented from the following historic maps:

- Taylor and Skinner's Map, 1777 (Figure 5);
- Down Survey map of the Barony of Duleek, Eastmeath County 1657 (Figure 6);
- Down Survey map of the Barony of Skreen, Eastmeath County 1657 (Figure 7);
- Down Survey map of the Parish of Painestown (Figure 8);
- First edition Ordnance Survey 6" Map, 1837-43 (Figure 9); and

- 1906-09 edition Ordnance Survey 25" Map, 1906-09 (Figure 10).

Figure 5 Taylor & Skinners Map of Road 'From Slane to Navan and Kells' 1777

Taylor & Skinners 'Maps of the roads of Ireland' was based on a survey undertaken in 1777. Map number 263 covers the area to the north of the survey area, as it traverses the road from Slane to Navan. Haystown Demesne (Ld. 13th of Leighlin & Ferns), Dollardstown Demesne (Meredyth Esq) and Beaupark (Lambert Esq) are all depicted therein. A bridge crossing the Boyne River is shown, which may be the current 'Broad Boyne Bridge'

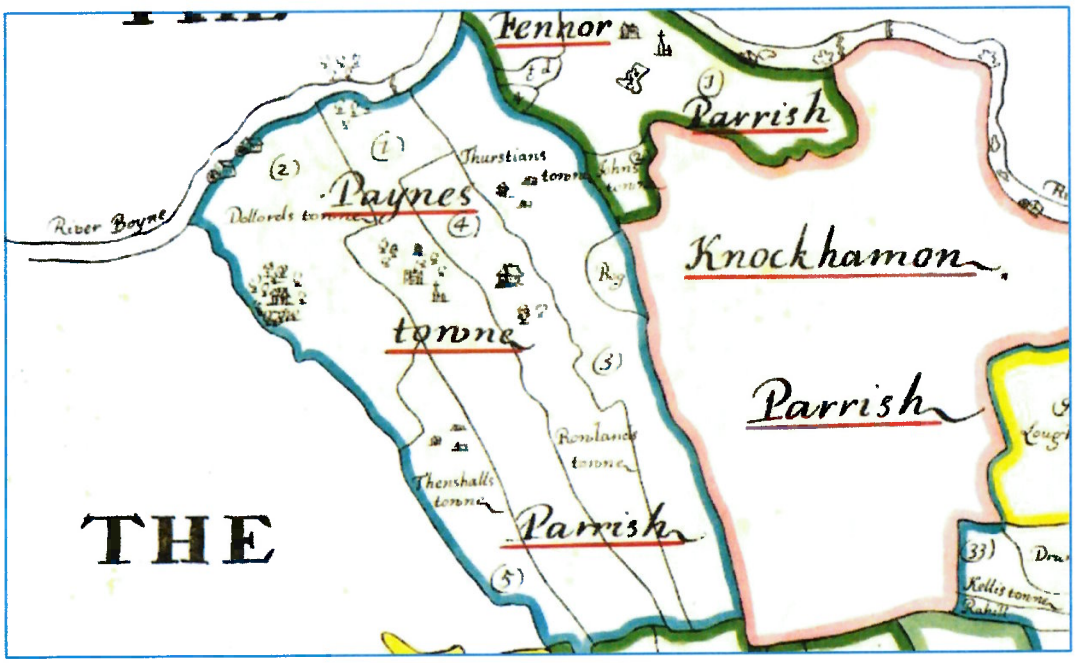

Figure 6 - Down Survey Map of of the Barony of Duleek.

The Down Survey map of the Barony of Duleek shows the parish of 'Paynestonne' with its component townlands of Dollardstonne, Thenshallstonne (now Seneschalstown), Painestown, Ronlanstonne (which appears to have been later absorbed into Painestown), and 'Thurstianstonne' (now Thurstiantown). The more detailed map of the parish of Painestown (Figure 6) indicate that these are a Tuck Mill (to the west) and a Corn mill (to the east) A singe arch bridge is depicted crossing the river from Painestown, which is not extant today, nor is it represented on any of the later maps. A church is shown which probably represents ME026-002, the Church of the parish of Paynestown referred to by Ussher (1622). Just north-west of this is shown a house of large scale, of which no trace is extant and which is not represented on subsequent maps, and also a tower. On the detailed map of Painestown Parish, the tower is marked as 'ruined' and the substantial house is marked as 'a stone house'. It appears to have a tower to one end.

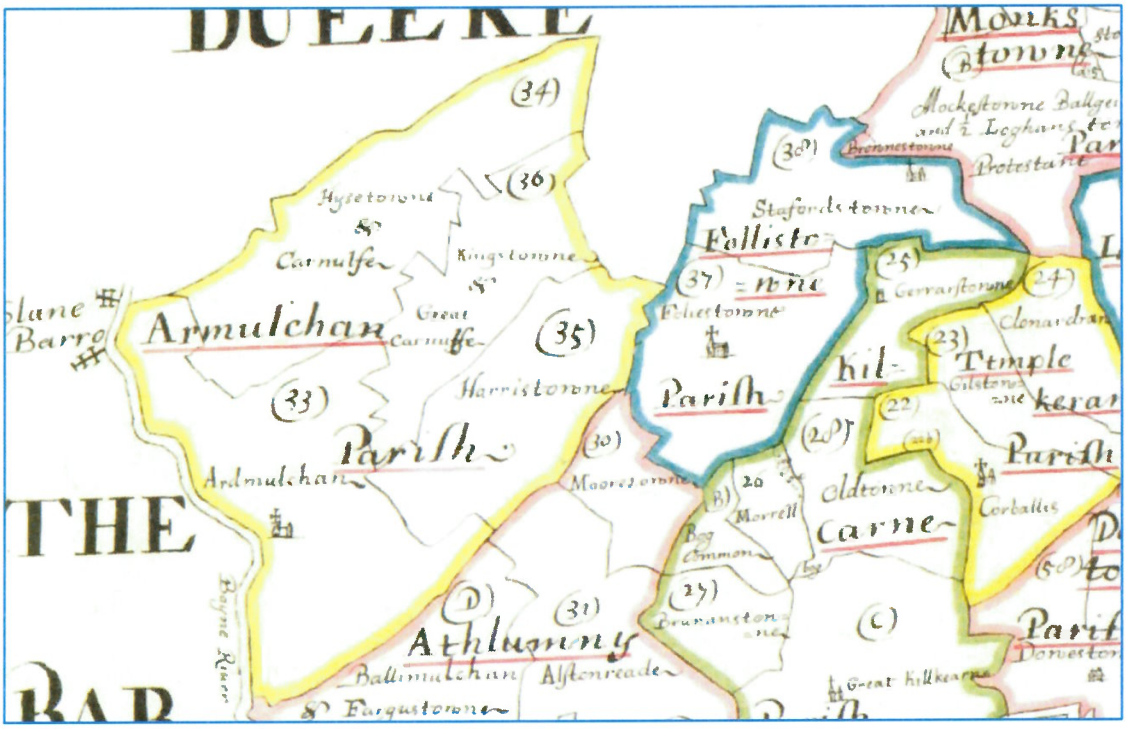

Figure 7 - Down Survey Map of the Barony of Duleek

Figure 8 - Down Survey Map of the Parish of Painestown

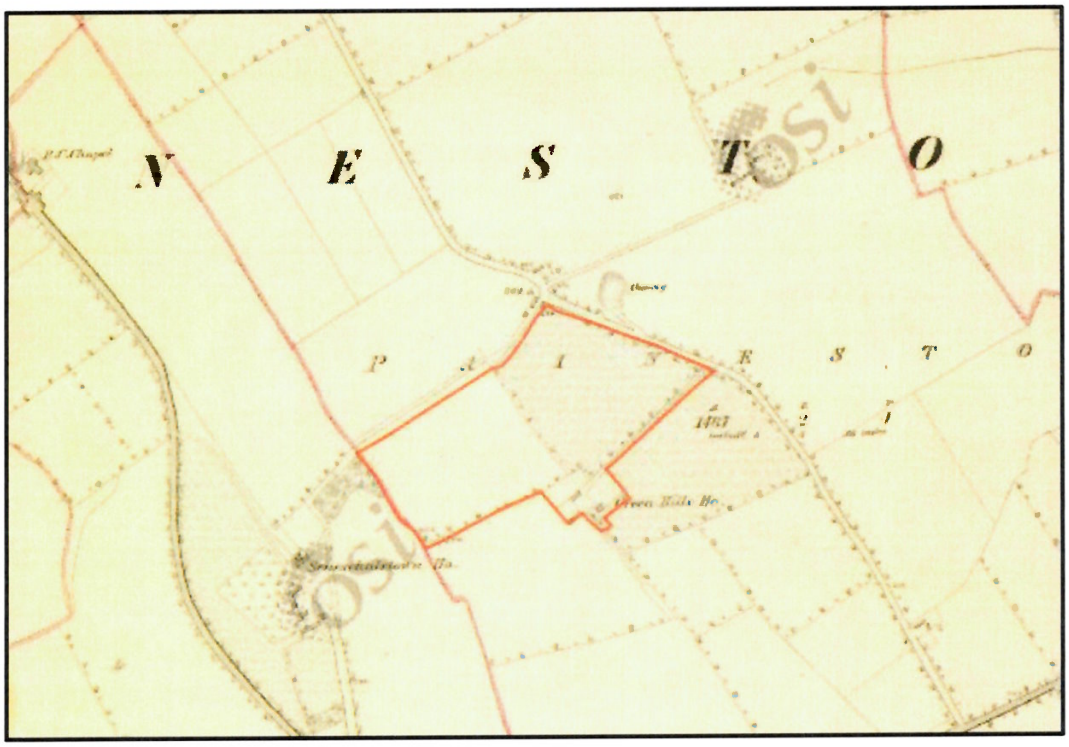

Figure 9 – Hand-coloured 1837-43 first edition OS map showing the outline of the proposed development area (*in red*).

The 1st edition Ordnance Survey Map of the area in which the development is proposed to take place depicts an improved landscape, with field systems enclosed by hedgerows and roads. Shaded grey areas signify the demesne landscape associated with Green Hills House, to the southeast of the proposed development.

The 1906 -1909 editions of the 25" Ordnance Survey Map depict a field system around the village of Yellow Furze, largely similar to that which is in place today. The area of the proposed development site is a field, in agricultural use, situated northeast and possibly associated with Green Hills House.

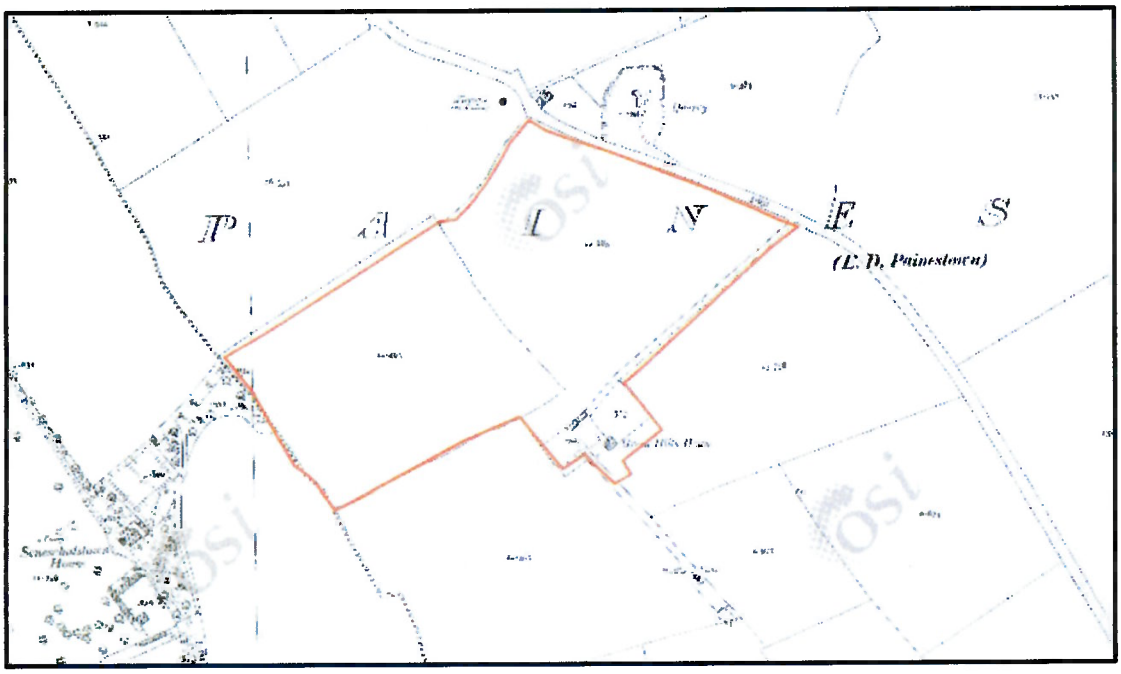

Figure 10 - Approximate location of proposed development (*in orange*) on 1903 third edition OS map

3.4 Toponomy

A townland name may preserve valuable information relating to its archaeology, history, folklore, pervious ownership, topography or land use. Many placenames were anglicised by the Ordnance Survey which begun in the 1830's. Despite some inaccuracies in translation, the Gaelic, Viking, Anglo-Norman and English origins of placenames are generally recognisable.

The townland of Painestown is situated within the civil parish of Painestown, the name of which is derived from Baile Phaghain. Depicted as 'Paynestonne' on the Down Survey maps, it has subsequently been written as 'Painestown' and 'Painestown'. (www.logainm.ie accessed 21 August 2018).

3.5 Previous Archaeological Investigations

A search of the Excavations Bulletin website for previous archaeological investigations within the proposed development area produced no results. Few investigations have been undertaken within the wider vicinity.

Archaeological monitoring (1999:707) of the ground works for the laying of a new gas pipeline from the south of Drogheda to the outskirts of Navan involved the stropping of at 15m wide corridor and the excavation of a trench through 27 townlands, including Painestown. No features of a proven archaeological nature were uncovered as part of this. (Clinton. M, 1999.)

Monitoring of groundworks (2011: 480) in advance of the erection of pylons for a 26km-long ESB line through 18 townlands including Painestown, revealed nothing of archaeological significance (O'Drisceoil, C., 2011).

3.6 Previous Archaeological Finds recorded in Topographical Files

The topographical files held at the National Museum of Ireland identify recorded artefacts that have been reported to the State in accordance with national monuments legislation. The find-spots of artefacts can be an important indication of the archaeological potential of the related or surrounding area.

No finds were recovered within the proposed development site, however there were a number in the surrounding area.

Haystown and Carnuff Little 1981:16 Axehead

Axehead, measuring 12.3cm in length, 3.5cm in maximum thickness, 2.9cm wide at the butt and 6.45cm wide at the cutting edge, in good condition with a finely polished surface, slightly chipped to the body and cutting edge, found in a ploughed field in an area of reclaimed bog land.

Dollardstown:

The topographical files list no archaeological finds from Dollardstown, Co. Meath.

Painestown:

1978:139 Axehead

A large polished stone axehead was acquired in 1978 which had been found 'many years ago in a bog close to a spread of antlers'. Trapezoidal in shape with a flat butt, one side is slightly convex and at roughly a right angle to the butt, while the other side is concave and out splaying, giving the axe a 'bearded' appearance. The cutting edge is worn and

the axe is elliptical in cross section. The maximum length is 15.2cm; maximum width to cutting edge is 8.66cm and 5.8cm to the butt. Maximum thickness is 4.55cm.

1970:6 Ogham Stone
Originally found in Seneschalstown (also known as Painestown) this stone was taken to Seneschalstown House and thence to Piltown House, from where it was acquired by the NMI.

An inscription on the surface reads: 'MAQI – CAIRATINI AVI INEQAGLAS' (Macalister, 1945 46). However an older inscription existed on an edge, which had been battered away, leaving it illegible. The NMI found no evidence of the earlier inscription when the stone was inspected in 1970.

Ardmulchan:
2002:199 Cremated Bone. Found within short cist burial (ME025-065).
1961: 83 Flint Object

3.7 Meath County Development Plan 2013-2019

Meath County Development Plan came into effect on 22 January 2013. It sets out Meath County Councils vision and an overall strategy for the proper planning and sustainable development of the County for the six-year period.

3.7.1 Record of Protected Structures

Meath County Development Plan 2013-2019 lists three protected structure within a 2km radius of the proposed development.

Table 6 Protected Structures in proximity to the proposed development

NIAH/RPS	Class	Townland	ITM Ref (E,N)	Proximity
NIAH:14402603 RPS: MH026- 106	Railway station	Painestown	694241 771440	1.74km

NIAH/RPS	Class	Townland	ITM Ref (E,N)	Proximity
NIAH:14402604 RPS: MH026- 102-105	Terrace of workers' houses	Painestown	694214 771500	1.75km
RPS: MH026-107	Yellow Furze Church	Painestown	694353 770269	0.67km

3.7.2 Conservation Areas

There are no Conservation Areas within or in the immediate vicinity of the proposed development site.

3.7.3 Architectural Conservation Areas

There are no Architectural Conservation Areas within or in the immediate vicinity of the proposed development site.

3.8 National Inventory of Architectural Heritage

The NIAH survey of County Meath was carried out in 2004, with the exception of Navan town, published in 2003. It lists 3 structures within a 2km radius of the proposed development site (Table 6).

4. Archaeological Test-Trenching

In accordance with Excavation Licence No. 18E0476, issued by the Department of Culture, Heritage and the Gaeltacht and as set out in the agreed Method Statement, 6 test trenches, measuring 2 metres in width and approximately 20m in length, were machine-excavated around the area proposed for development (Figure 8). This work was undertaken on 9 August 2018, and the results are presented in Table 7 below. Upon completion the trenches were back filled to protect any archaeological deposits and for personal safety.

Figure 11 Test trench array (in *red*)

4.1 Results of Test Trenching

Table 7 Results of test trenching

Trench No.	Alignment	Dimensions	Depth
1	NW-SE	20mx2m	Max. 1.80m Av. 1.40m
Trench fill made up of mixed made-up ground to an average depth of 1.40m A mid-brown compact sit with huge amounts of rubbish to the NW end, overlay a light brown/orange clay natural, which had frequent small stone inclusions. This stone was soft and brittle, with some dark shale in places. Occasional large pieces of limestone			
Result: Nothing of archaeological significance.			

Trench No.	Alignment	Dimensions	Depth
2	NW-SE	20mx2m	Max.1.80m Min. 0.50m

The fill of trench 2 is similar to that of trench 1, with mixed infilled material and orange stony natural. To the SE end of the trench were frequent inclusions of small black shale stones, while to the north end, large stones of limestone featured. To the NW end of this trench, the natural rises sharply to 50cm below the surface level. The ground is sharply undulating where the previous backfilling of effluent ponds had occurred.
Result: Nothing of archaeological significance.

Trench No.	Alignment	Dimensions	Depth
3	NNE-SSW	20mx2m	Av. 1.40m
Single dirty infill with plastic, concrete and modern rubbish within.			
Result: Nothing of archaeological significance.			

Trench No.	Alignment	Dimensions	Depth
4	NNE-SSW	20mx2m	Av. 1.40m
70-90cm of imported topsoil, comprising mixed mid-brown compact silt with moderate inclusions of small to medium limestone. Beneath this was 50-70cm of mixed clay, appearing to be infill as it contained some modern material including plastics.			
Result: Nothing of archaeological significance.			

Trench No.	Alignment	Dimensions	Depth
5	NNE-SSW	20mx2m	Max. 0.80m
The fill of this trench appears to have been undisturbed, with natural much closer to the surface. The natural rises in the SSW side of the trench, to a depth of 0.40m at the SSW end. A layer of topsoil to a depth of 0.40m in average depth, comprising mid-brown very compact clay silt, with moderate inclusions of small and medium stones. Beneath the topsoil is layer , 0.40m in depth, of mid-brown very compact silty clay, with moderate inclusions of small and medium stone and occasional large stones.			
Result: Nothing of archaeological significance.			

Trench No.	Alignment	Dimensions	Depth
6	NW-SE	20mx2m	1.70m
The topsoil was 0.70m in depth, a compact mid-brown silt with frequent medium and small stones.			

Beneath this was 1.00m of mixed mid-brown clay silt, with inclusions of modern rubbish including wood and concrete. The natural, which is the same as in the other trenches, rises at the NW end of the trench, to 0.60m below the surface.
Result: Nothing of archaeological significance.

4.2 Plates

Plate 1 View from W corner of site, looking SSE, pre-excavation

Plate 2 View from NE to SW of site, pre-excavation

Plate 3 View across Trench 1 looking NW

Plate 4 SW-facing elevation of side of Trench 1

Plate 5 View across Trench 1 towards SE

Plate 6 View across Trench 2 looking NW

Plate 7 SW-facing elevation of side of Trench 2

Plate 8 View across Trench 2, view from SE

Plate 9 Excavation of Trench 3, viw from NNE

Plate 10 SSE facing elevation, side of Trench 3

Plate 11 View from SSW of Trench 3

Plate 12 Excavation of Trench 4, view from NNE

Plate 13 NNW-facing elevation of Trench 4

Plate 14 View across Trench 4, looking NNE

Plate 15 Excavation of Trench 5, view from N

Plate 16 NW-facing elevation of side of Trench 5

Plate 17 View across Trench 5, looking SSW

Plate 18Excavation of Trench 6, view from SE

Plate 19 Trench 6, view from NW

Plate 20 Backfilling of trench 3

5. Conclusion & Recommendations

The proposed development is situated in the immediate vicinity of two recorded monuments:

- Barrow (ME026-008-), Painestown, situated 0.31km from the proposed development; and
- Ogham stone site (ME026-009-), Sensechalstown, situated 0.49km from the proposed development.

It was considered that the operation and construction phases of the proposed development may impact upon any potential associated sub-surface features related to these monuments within the proposed area of development.

Based upon the results of the excavation of archaeological test-trenches, it is concluded that no features or material of archaeological significance were identified within the proposed development area. Extensive test excavation across the proposed development site failed to identify any features or materials of archaeological significance. No evidence of any archaeological remains associated with the barrow (ME026-008--) or the ogham stone site (ME026-009-) were identified.

The material identified during test trenching in this area is consistent with considerable disturbance in the modern era, with frequent inclusions of plastic, wood and concrete waste, and fills of made –up ground as a result of the infilling of previous effluent ponds.

5.1 Archaeological Mitigation Measures

No further archaeological recommendations are proposed. The requirement for archaeological investigation stipulated by Meath County Council, Condition No. 5 Planning Ref. LB/180300is considered to have been addressed.

5.2 Visual Impact Mitigation Measures

The scale of the proposed development may result in a visual impact upon the barrow situated 0.31km to the northeast. This impact will be long-term to permanent in duration. It is therefore recommended in order to minimise the visual impact on the environs of the site, that the development be screened from the surround area by the retention of the

mature hedgerows enclosing the field, and by planting native trees to the north and east.

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Appendix 1 Extract from Notification of Decision

Meath County Council, Dated 15 May 2018 (Pl. Ref. LB/180300)

5. a) The applicant is required to engage the services of a suitably qualified archaeologist (licensed under the National Monuments Act 1930-2004) to carry out pre- development testing at the site where ground disturbance is to take place. No sub surface work shall be undertaken in the absence of the archaeologist without his / her express consent.

a) The archaeologist is required to notify the Department of Culture, Heritage and the Gaeltacht in writing at least four weeks prior to the commencement of site preparations. This will allow the archaeologist sufficient time to obtain a license to carry out the work.

b) The archaeologist shall carry out any relevant documentary research and may excavate test trenches at locations chosen by the archaeologist, having consulted the proposed development plans.

c) Having completed the work, the archaeologist shall submit a written report to the Planning Authority and to the Department of Culture, Heritage and the Gaeltacht for consideration

d) Where archaeological material is shown to be present, avoidance, preservation in situ, preservation by record (excavation) and / or monitoring may be required and the Department of Culture, Heritage and the Gaeltacht will advise the Applicant / Developer with regard to these matters.

e) No site preparation or construction work shall be carried out until after the archaeologist's report has been submitted and permission to proceed has been received in writing from the Planning Authority in consultation with the Department of Culture, Heritage and the Gaeltacht.

Reason: To ensure the continued preservation (either in situ or by record) of places, caves, sites, features or other objects of archaeological interest.