Tipperary Cooperative Creamery Limited
Dryer 2 Facility

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Environmental Impact Assessment Report
Non – Technical Summary

June 2017

MRG consulting engineers

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1.0 INTRODUCTION

Tipperary Cooperative Creamery Limited intend to develop a new **"Dryer 2"** facility comprising new milk evaporation and drying facilities at their existing milk processing facility on a site at Station Road, Tipperary Town, Co. Tipperary.

The Tipperary Cooperative Creamery site is located just south of Tipperary Town centre on a developed triangular shaped site bounded to the east by Station Road on the R664 Regional Road connecting the village of Aherlow to the town, to the south by the Waterford – Limerick Rail line and to the north west by the River Ara. The Cooperative's landholding, outlined in red on Figure 1.1 below, also extends to the former hotel site and some further undeveloped lands on the northern side of the River Ara. The total area of the Tipperary Co-Operative Creamery site, as outlined in red extends to c.6.2 ha.

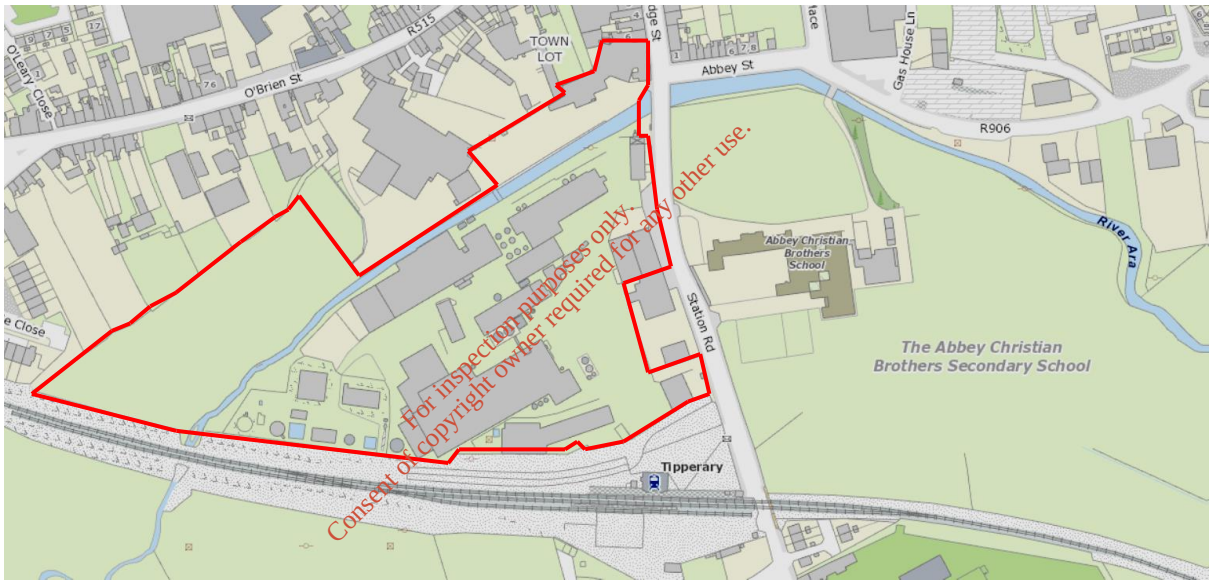


Figure 1.1: *Site location map showing Tipperary Cooperative Creamery lands with developed site bounded by Station Road to east, Waterford-Limerick rail line to south and River Ara to north-west*

Dairy processing has been undertaken at the Station road site since pre 1900. It operated as a milk processing factory, under the name 'The Condensed Milk Company' in 1928, and subsequently as the 'Milk Disposal Company'. The site manufactured condensed milk and butter until 1948 prior to commencing the production of milk powder at the site in 1949.

Tipperary Cooperative Creamery Ltd. was formed in 1972, and having acquired the Station Road facility, installed a new milk powder plant on the site including milk intake, separation, evaporation, drying and packaging facilities and a new effluent treatment plant, boiler house and refrigeration facilities. This coincided with the introduction of bulk milk collection and ensured the continued processing of locally produced milk in Tipperary at that time with the milk for the new drying facilities being sourced from the smaller creameries in the area.

A new cheese production plant including associated storage, cutting and packaging facilities were constructed in 1981 and subsequently extended in 2007.

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Today the Tipperary Cooperative Creamery site on Station Road comprises an integrated dairy processing plant manufacturing a range of products, primarily butter, milk powder and cheese. The current peak daily milk processing capacity of the site is 1.62 million litres of milk per day, which equates to an annual processing capacity for the facility of c.130 million gallons of milk equivalent per annum.

Tipperary Cooperative Creamery have identified the need for further development to secure the future of dairy processing operations at the Station Road site and the development now proposed comprises the construction of a new Dryer Tower Building which will have an overall parapet height in the order of c.32m above ground level and a ground floor area of up to c.1150m^2 . Demolition of some existing structures will be necessary to facilitate the proposed development.

An Environmental Impact Assessment Report (EIAR) has been prepared to accompany the application to Tipperary County Council for planning permission for the subject development. The EIAR describes in detail the need for the subject development, describes the existing and proposed building developments and dairy processing operations on the Station Road site, the planning context of the subject development and alternative options considered for the project. It also assesses the potential environmental impacts of the proposed Dryer 2 development on relevant physical, biological and human environments and identifies mitigation, enhancement and monitoring measures as appropriate. This document comprises the Non–Technical Summary of the Environmental Impact Assessment Report and aims to provide a concise summary of the proposal and its likely environmental effects for the non-technical and non-specialist reader.

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2.0 PLANNING AND DEVELOPMENT CONTEXT

As noted in the Introduction, dairy processing has been undertaken at the Station Road site since pre-1900 and Chapter 2 of the EIAR details the planning history of the existing building developments and dairy processing operations on the site.

The Chapter outlines the National, Regional and Local plans and policies relevant to the subject development including:

- National Spatial Strategy 2002 – 2020
- The Atlantic Gateways Initiative
- South-East Regional Planning Guidelines 2010-2022
- Regional Spatial and Economic Strategy
- South Tipperary County Development Plan 2009 – 2015 (As Varied)
- Tipperary Town and Environs Development Plan 2013 – 2019

The proposed development was considered as appropriate, in the context of the above plans and policies.

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The Tipperary Cooperative Creamery site is designated within Land Use Zoning Map A of the Tipperary Town and Environs Development Plan (2013-2019) as lands zoned for General Industry (GI).

The Development Plan also identifies a proposed Radial Interconnector Route to the south of the town from the Limerick Road Roundabout to the Emly Road continuing on to the junction of Bridge Street. This route is indicated on Transportation Map 5 in page 25 of the Development Plan and the route passes through the southern part of the Tipperary Cooperative Creamery lands on the northern bank of the River Ara. Policy INF 5: Protection of Reservation Corridors states that *'It is the policy of the Council to ensure that the reservation corridor for the Proposed Radial Interconnector Route and the Northern Inner Relief Route remains free from development'*. The proposed development is located within the existing developed Tipperary Cooperative Creamery site on the southern side of the River Ara and will not impact on the reservation corridor identified in the Development Plan

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3.0 DESCRIPTION OF DEVELOPMENT

The existing Tipperary Cooperative Creamery facility at Station Road comprises an integrated dairy processing plant manufacturing a range of products, primarily butter, milk powders and cheese.

The main dairy processing activities undertaken on the site comprise milk intake, separation, evaporation, drying/powder production, cheese production and butter production. Wastewater from the process and associated cleaning operations is discharged to the existing onsite wastewater treatment plant for treatment prior to discharge to the public sewer. An outline description of each of the main dairy processing activities is included below.

(i) Milk Intake

The Milk Intake facility at the Station Road site was constructed following Tipperary Cooperative Creamery's acquisition of the site in 1972 and coincided with the introduction of bulk milk collection. Raw milk from dairy farms in the locality, as well as milk derivatives including primarily buttermilk, but also some skim milk and whey which have been partly processed at other dairy processing facilities, are delivered to the Tipperary Cooperative Creamery site in articulated road tankers and are received at the milk intake facility where the milk is offloaded, cooled, tested and piped into the appropriate storage silos on the site. The peak daily intake capacity of the Station Road facility, at times of peak milk production, is c.1.62 million litres (c.356,00 gallons) per day comprising c. 1.27 million litres of whole milk and c.0.35 million litres of buttermilk. In practice the facility will only be capable of operating at or close to this peak daily capacity for a limited number of days per annum given the requirement for regular scheduled cleaning and maintenance operations at each of the facilities which contribute to this peak capacity and the variation in availability of milk for processing throughout the year.

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(ii) Separation

The Separation Plant was also installed following Tipperary Cooperative Creamery's acquisition of the site in 1972. Any whole milk not intended for use in cheese production, is piped from the storage silos to the separation plant, where the milk is separated into cream and skim milk.

(iii) Evaporation

There are two evaporation plants currently located within the Tipperary Cooperative Creamery facility, one (Evaporator No. 1) installed following the Cooperative's acquisition of the site in 1972 and the second (Evaporator No. 2) added in 1993. Following the separation process outlined above, the skim milk is piped to one of the two evaporation plants where a significant portion of the water content is removed in the evaporation process, to produce a skim milk concentrate.

Buttermilk, a by-product of butter production, undergoes a similar evaporation process, to produce buttermilk concentrates. Currently, at peak milk intake periods, approximately one third of the evaporation capacity on the site is

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allocated to buttermilk concentration and two thirds to skim milk concentration. During these periods approximately two thirds (67%) of the skim milk concentrate generated in the two evaporation plants on the site is dispatched from the site without further processing due to the lack of adequate drying capacity to facilitate it's use for powder production.

Outside of peak milk periods, a proportion of the whey generated in the cheese plant, also goes through an evaporation process, having first been pre-concentrated in the RO Plant, as outlined below, to facilitate it's use in the manufacture of whey powders.

Condensate generated in the evaporation process comprises primary and secondary condensate. The primary condensate which accounts for approximately one third of the total volume of condensate is used as boiler feed water. A proportion of the secondary condensate from Evaporator No. 1 is used for utilities including chill water, boiler top-up and evaporator seals. The remaining secondary condensate from the two Evaporators is discharged to the River Ara in accordance with the IE Licence.

(iv) Drying/Powder Production

There are three existing dryers currently located at the Tipperary Cooperative Creamery facility at Station Road. These include the two older small 'Rodgers' box dryers, with limited production capacity, located at the western end of the butter factory building which were installed when the plant initially commenced powder production under the Condensed Milk Company in the 1950's and the larger An-hydro Spray Dryer (Dryer No. 1) which was installed in the new purpose built powder plant developed by Tipperary Cooperative Creamery after they acquired the facility in 1972. Only one of the existing Rodgers Dryers is currently operational and included on the current IE Licence. Given the age and limited production capacity of this Dryer it is only used occasionally and the majority of powder production now takes place in Dryer No. 1. Skim milk and buttermilk concentrates are piped into this plant where they are dried in the dryer and the powder packaged in the adjoining packaging plant prior to dispatch. As previously noted above, currently two thirds of the skim milk concentrate generated on site at peak milk capacity is exported from the site without further processing due to the lack of adequate drying capacity to facilitate its use in powder production.

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(v) Butter Production

The cream, separated from the skim milk in the separation process outlined above is piped to the butter plant, located in the original protected creamery building, where it is pasteurised and churned to produce butter. The butter is then packaged for dispatch from the plant. Buttermilk, produced as a by-product of the butter making process, is further processed on the site to produce buttermilk powder as outlined above.

(vi) Cheese Production

The cheese factory was constructed in 1980 and subsequently extended in 2007. Raw whole milk is piped to the cheese plant and following preservative treatment and the addition of starter cultures and rennet enzymes, which

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contribute to the cheese making process, whey is drained from the cheese curd which is then salted, pressed, cut and packed for dispatch. The whey, a by-product of the process is collected and pre-concentrated in an RO (Reverse Osmosis) Plant, to facilitate it's dispatch from site as whey concentrate. At off peak periods, when residual capacity is available in Evaporator No. 2 and Dryer No. 1, up to 50% of the whey is retained on site to facilitate it's further processing in the manufacture of whey powders.

(vii) Wastewater Treatment Plant

Wastewater generated from the milk processing activities on the Tipperary Cooperative Creamery site, primarily from clean in place (CIP) washing processes associated with the delivery tankers, intake lines, separation plant, storage silos, evaporators and butter plant is currently collected via the existing process drainage infrastructure and treated at the existing activated sludge wastewater treatment plant on site before discharging to the municipal wastewater treatment plant via the public sewer for further treatment. The onsite wastewater treatment plant was constructed in 1974. Domestic wastewaters generated at staff welfare and canteen facilities discharge directly to the public sewer.

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Tipperary Cooperative Creamery Ltd. have taken a strategic decision to invest in additional evaporation and drying facilities at the Station Road site and have identified the proposed new Dryer 2 Facility as the appropriate development to provide the quality of manufacturing environment, facilities, production capacities and operational flexibility to enable them to continue to compete in an evolving dairy processing market since the removal of milk quotas in 2015, and thereby secure the future of dairy processing for Tipperary Town. The development will increase the evaporation and drying/powder production capacities on the site and therefore permit the company to undertake further processing of a higher proportion of these products and move towards the production of a larger proportion of the higher value milk powders.

The proposed development comprises the construction of a new Dryer Tower Building and associated works. The scope of works will include:

- Enabling Works including establishment of Contractor's Compound within former Hotel site on northern side of River Ara;
- Demolition of existing former butter store to the south of proposed building to facilitate construction, external circulation and access around new building;
- Partial demolition of the existing powder store within the footprint of the new building;
- Removal of disused fuel storage tanks and associated bund structure and canopy over;
- Building Works including the construction of a new Dryer Tower Building with an overall parapet height in the order of c.32.5m above ground level and a ground floor area of c.1150m^2.

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- Alterations and upgrade to existing surface water drainage infrastructure to facilitate construction of and connections from new building;

- Alterations and upgrade of process and foul drainage infrastructure to facilitate construction of and connections from new building;

- Upgrade of existing wastewater treatment plant to cater for additional flow rate generated by the Dryer 2 Facility and to improve the quality of treated effluent discharged to the public sewer;

- Decommissioning of existing Rodgers Dryers.

A more detailed description of each of the above elements of the works is provided EIAR.

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4.0 ALTERNATIVES CONSIDERED

As part of the EIA process the developer is obliged to consider alternatives to the proposed development and the relative environmental impacts of same.

This Chapter of the EIAR outlines the alternative options considered by Tipperary Cooperative Creamery. These included alternative scale and locations of development within the site.

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5.0 ENVIRONMENTAL IMPACT ASSESSMENT

5.1 Human Beings

The existing Tipperary Cooperative Creamery site at Station Road, within which the proposed development will take place, is located on lands designated within Land Use Zoning Map A of the Tipperary Town and Environs Development Plan (2013-2019) as lands zoned for General Industry (GI). Existing lands to the north of the River Ara, which are also in the ownership of Tipperary Cooperative Creamery, but are physically separated by the River from the existing operational creamery site are zoned Town Centre and include the former hotel site and associated car-park and the undeveloped marshy lands to the west of same.

The population of Tipperary Town has declined slightly over the course of both the last two census and was recorded at 4,214 persons based on the preliminary results of the most recent 2016 census. While unemployment levels both nationally and in the South East Region have reduced significantly over the past five years it is noticeable that rates for the South East Region (9.3% - Q1 2017 – NQHS) are still significantly higher than the national average (6.7%).

Tipperary Cooperative Creamery are one of the larger employers in Tipperary Town and currently employ 107 personnel at the plant. There is also significant indirect employment associated with milk suppliers/farmers and delivery drivers for the milk processed at the plant as well as other sectors of the local economy which would be dependent on the agricultural sector.

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The main impact of the subject development will be short-term employment during the construction stage of the development for about 120 personnel, and long term employment for an additional 8 staff as well as dairy farmers, delivery drivers and other ancillary services which will benefit from the increase in processing capacity at the plant.

No significant impact will occur due to land use during the construction and operation phases of the development nor will there be any impact on amenities or tourism in the area. Compliance with relevant health and safety and environmental legislation will mitigate any impacts on the health and safety of construction and operational personnel and local residents.

5.2 Biodiversity

The Biodiversity Chapter of the Environmental Impact Assessment Report (EIAR) addresses potential impacts of the proposed Dryer 2 development on Terrestrial and Aquatic Ecology. It also considers potential impacts of the proposed development on the Natura 2000 network of sites (European sites known as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

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Terrestrial Ecology

Wetland Surveys Ireland Ltd. were engaged by OES Environmental Services, on behalf of Tipperary Cooperative Creamery Ltd., to undertake an ecological impact assessment for the proposed 'Dryer 2' development on terrestrial flora and fauna.

Their terrestrial ecological impact assessment identified two nationally important sites (pNHA's) and five internationally important sites (SAC's) within the vicinity of the proposed development, only one of which, the Lower Suir SAC is hydraulically connected to the site. The habitats within and adjacent to the creamery site comprise buildings and artificial surfaces, small areas of grassland habitat, and a lowland river.

Those habitats that occur within the proposed development site boundary are of low ecological value (buildings and artificial surfaces, amenity grassland, and dry meadows and grassy verges). The proposed demolition and construction works are confined to those buildings and artificial surfaces that occur within the site and therefore the habitats likely to be impacted are of no ecological importance. The River Ara that forms the northern boundary of the operational Tipperary Cooperative Creamery site and is the only ecologically sensitive receptor in proximity to the proposed development. The river provides habitat for species of conservation concern such as grey wagtail and possibly kingfisher, bats, and otter. No plant species of conservation concern are likely to occur in proximity to the proposed development. The invasive species, Japanese Knotweed, occurs on the northern riverbank of the River Ara.

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Through the implementation of specific mitigation measures identified in the EIAR, including the preparation of a CEMP (Construction and Environmental Management Plan) for the project and the appointment of an Ecological Clerk of Works to monitor the works, it was concluded that considering the characteristics of the proposed development site and the low ecological value of those habitats directly impacted, it was predicted that the development will have a temporary imperceptible adverse impact on the biodiversity value of the proposed development site. The off-site impacts on flora, terrestrial habitats, birds and mammals will also constitute an imperceptible adverse impact of short term duration. Considering the nature and scale of the proposed development, no impacts of significance are foreseen during the operational phase of the proposed development.

Aquatic Ecology

Conservation Services – Ecological & Environmental Consultants were engaged by OES Consulting, on behalf of Tipperary Cooperative Creamery Ltd, to undertake an assessment of the impact of the Dryer 2 development on aquatic ecology.

The Aquatic Ecology Assessment assesses all watercourses which are marked on EPA mapping of streams and which are within 0.5km down gradient from any part of the proposed development site where works will be carried out. The potentially affected watercourse is the Ara River, which flows along the northern boundary of the existing Tipperary Coperative Creamery site and which flows to join the Aherlow River c.20km downstream of Tipperary Town. From the Ara confluence, the Aherlow River flows for c.6km to its confluence with the River Suir c.6km upstream of Cahir.

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General catchment information including fishery value, ecological importance/value and water quality for the Suir, Aherlow and Ara River catchments are presented in the Aquatic Ecological Report.

A general assessment of salmonid and lamprey habitat quality was carried out for c. 5km adjacent to and downstream of the proposed development site. Salmonid and Lamprey habitat quality was assessed and the value of each river section for salmonid and lamprey spawning, as a nursery area for juvenile salmonids and lamprey larvae, and as an area for adult salmonids, was estimated. Results of the assessment, including photographs, along each of the six sections of the Ara River downstream of the site are included in the Aquatic Ecological Report.

Biological water quality assessment was carried out at four locations including immediately upstream and downstream of the Tipperary Cooperative Creamery site and the Tipperary Town Municipal Waste Water Treatment Plant.

Conservation Services – Ecological & Environmental Consultants identify detailed mitigation and enhancement measures to minimise impacts of the Dryer 2 development on aquatic ecology.In particular, with respect to potential construction stage impacts, their assessment notes that substantial mitigation by avoidance has already been applied following the relocation of the new Dryer Tower building to the south east and the retention of the northern half of the existing powder warehouse, the dispatch bay and store which will isolate the proposed development from the River. These will eliminate building and pavement works previously proposed directly adjacent to and along the river bank and therefore significantly reduce the potential construction stage impacts on the river. Furthermore it is no longer intended to provide the temporary footbridge access over the River Ara between the former hotel site and the construction site during the construction stage of the works, again avoiding significant potential impacts on the river.

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Through the implementation of specific mitigation measures identified in the EIAR, including the preparation of a CEMP (Construction and Environmental Management Plan) for the project and the appointment of an Ecological Clerk of Works to monitor the works, it was concluded that the residual negative impact of the proposed development on aquatic flora, fauna and habitats will be insignificant.

Protected Sites – Habitats Directive Appropriate Assessment Screening

Conservation Services – Ecological & Environmental Consultants were engaged by OES Consulting, on behalf of Tipperary Cooperative Creamery Ltd, to undertake an Habitats Directive Appropriate Assessment Screening report as part of the 'Appropriate Assessment' process for the Dryer 2 development. The assessment considers potential impacts of the proposed development on the Natura 2000 network of sites (European sites known as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs). The Habitats Directive Appropriate Assessment Screening Report concludes, on the basis of the assessment outlined above, that the proposed development will have no potential impact on Natura 2000 sites.

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5.3 Soils, Geology, Hydrology and Hydrgeology

This Chapter of the Environmental Impact Assessment Report (EIAR) considers the impact of the proposed development on soils, geology, hydrogeology and hydrology including water quality and resources during the construction and operational phases of the project.

The Tipperary Cooperative Creamery site comprises an established brownfield site and the underlying shallow soils/subsoils therefore generally comprise made ground. The underlying rock comprises carboniferous limestone of the Suir Limestone formation. As already identified in the Aquatic Ecology section above the River Ara flows along the north western boundary of the site. It rises in low lying lands west of the village of Lattin and flows through Tipperary Town and Bansha before converging with the River Aherlow at Tankerstown, c.20km downstream of the site. The River Aherlow subsequently discharges to the River Suir north of Cahir.

The new Dryer 2 structure will be supported on piled foundations on the underlying limestone bedrock. There will be no significant bulk excavation associated with the Dryer 2 Facility and all substructure works, including pile caps, ground beams and ground floor slab will be completed within the zone of existing made ground. On this basis there should be no significant impacts on soils and geology associated with this project.

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Mitigation measures have been proposed to ensure the protection of surface waters and groundwater during both the constructional and operational phases of the project. Both erosion and sediment entrainment in surface water run-off during demolition and construction works are considered the most significant risks to surface water during the construction stage of the project. Implementation of the appropriate mitigations measures identified in the EIAR should reduce this risk to a minimum. On this basis it is considered that there should be no significant impacts on surface water from the construction of the Dryer 2 Facility.

Treated condensate from the two existing evaporators at Tipperary Cooperative Creamery is currently discharged directly to the River Ara at a licensed emission point in accordance with the plants Industrial Emission Licence. The proposed installation of a third dryer will increase the volume of treated condensate to be discharged and this will be included on a revised IE Licence for the facility, subject to the approval of the EPA.

The Report on Assessment of Impact on Surface Waters, prepared by OES, and included as an attachment to the EIAR, concludes the following on the basis of a comprehensive evaluation of the potential impacts of the proposed increase in the volume of treated condensate discharged to the River Ara following completion of the Dryer 2 project:

(i) The proposal has been assessed in the context of the available assimilative capacity in the River Ara system and takes account of the cumulative impacts of other sources including Tipperary uWWTP. The findings of the assessment confirm:

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- There is sufficient Assimilative Capacity within the River Ara to accept discharges from Tipperary under the proposed amendment;

- Discharges can be made in full compliance with the Surface Water Regulations (S.I. 272 of 2009).

When evaluated in the context of other sources, the cumulative assessment shows that:

- The cumulative discharge from Tipperary Co-Op and the Tipperary uWWTP can be accommodated without utilising all of the available Assimilative Capacity in the river system at the point of discharge;

- Point discharges represent a minor influence on water quality in the overall catchment. Other improvement measures within the wider catchment (further implementation of the Nitrates Directive and actions for achievement of Water Framework Directive commitments) should lead to further improvement in water quality across the river system.

(ii) The assessment of impact on the receiving environment is based on a series of Emission Limit Values (ELV'S) for each parameter, which in terms of the operation of the proposed new Dryer-2 facility, are established as absolute limit values. The design of the upgrade works has been to ensure Best Available Technology (BAT) in terms for both treatment methods used and quality of the treated process waters – all parameters are lower than their respective BAT ELV's and fully compliant with BAT.

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Internal target values are set at lower levels to reflect the typical fluctuations in inlet loadings to the Dryer-2 facility within the plant throughout daily and weekly production cycles. This ensures that the upper end of the range of concentrations remains within ELV and therefore fully compliant under all normal and non-routine processing operations at the site.

The findings of the assessment confirm:

There is sufficient Assimilative Capacity within the River Ara to accept discharges from the Tipperary Co-Op SW-2 surface water discharge point.

Discharges can be made in full compliance with the Surface Water Regulations (S.I. 272 of 2009). Compliance is assured under a worst-case assessment basis as resultant concentrations for the parameters assessed are well below the relevant target values and leave significant reserve capacity in the river to assimilate potential discharges from other sources in the catchment.

When evaluated in the context of other sources, the (cumulative) assessment shows that:

- The cumulative discharge from Tipperary Co-Op and the Tipperary uWWTP can be accommodated without utilising all of the available Assimilative Capacity in the river system at the point of discharge;

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- Improvements in the on-site treatment of wastewater proposed under the current application will reduce the mass loadings to sewer, and consequently the mass loadings on the Tipperary town wastewater treatment plant with a consequent reduction in overall loadings to the River Ara;

- Point discharges represent a minor influence on water quality in the overall catchment. Other improvement measures within the wider catchment (further implementation of the Nitrates Directive and actions for achievement of Water Framework Directive commitments) should lead to further improvement in water quality across the Aherlow river system;

- The discharges amount to less than 3% of the 95%ile flow in the Aherlow and <1% in the River Suir and therefore can have only limited influence on the overall water quality within the larger Suir river system. Therefore, the AC assessment ensures that ample capacity exists to facilitate additional population growth and developments within the catchment;

It is noted that the screening for Appropriate Assessment has concluded that current or proposed discharges will not have any negative effects on the qualifying interests of the designated Natura 2000 sites within a 15km radius of the plant. Accordingly, a Natura Impact Assessment is not required.

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Wastewater generated from the milk processing activities on the Tipperary Cooperative Creamery site does not currently discharge to the River Ara, but is treated at the activated sludge waste water treatment plant (WWTP) on site before discharging to the public sewer for further treatment. The existing treatment plant is designed to treat 870m^3 of effluent per day with a treated effluent quality of 60mg/litre BOD and 90mg/litre suspended solids. Domestic wastewaters generated at staff welfare and canteen facilities discharge directly to the public sewer. Tipperary Cooperative Creamery intend to procure a specialist wastewater treatment plant contractor to design, construct and commission an upgrade of the existing waste water treatment plant to cater for the additional effluent treatment capacity required and to significantly improve the quality of treated effluent discharged to the public sewer. This will be included on the revised IE Licence.

The majority of water for processing and washing operations at Tipperary Cooperative Creamery is abstracted via the borehole on the site. While there will be an overall increase in the volume of water required for both processing/CIP operations following completion of the proposed development, the availability of suitably treated water from the Evaporator 3 for use as Process/CIP, will result in a net reduction in the actual maximum volume of water which needs to be sourced from the onsite well. This is considered a positive impact of the subject development.

A Stage 1 Flood Risk Assessment completed for the subject development concluded that there are no flooding or surface water management issues associated with the proposed development.

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5.4 AIR AND NOISE

This Chapter of the Environmental Impact Assessment Report (EIAR) considers the impacts of noise, air emissions and odours, as appropriate, from the subject development on the surrounding environment and on any sensitive receptors in the vicinity of the site.

The impacts of noise, vibration and dust from the construction stage of the development are also considered.

Air Impact Assessment

Envirocon Ltd., a specialist air quality consultancy practice, were engaged by OES Consulting, on behalf of Tipperary Cooperative Creamery, to undertake an Air Quality Impact Assessment for the proposed Dryer 2 Facility.

A detailed air quality impact modelling study was undertaken using a sophisticated industry standard air dispersion model to evaluate the impact of air emissions from the proposed dryer expansion programme at the Tipperary Co-Op manufacturing facility in Tipperary Town on the local air quality. The study examined the planned dryer expansion programme at the facility, 'With Development', compared to the existing production, 'No Development' scenario, for both boiler plant and the dryer emissions. The predicted impacts were examined in relation to compliance with the relevant National Air Quality Standards (NAQS).

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Overall, the results of the modelling study demonstrate that there will be no significant impact on the health of the local community or surrounding environment due to the projected change in the boiler and dryer stack emissions occurring as a result of the proposed dryer expansion programme planned at the Tipperary Co-Op facility. The planned installation of the new dryer plant and removal of the Rogers Dryer will result in a reduction in the overall impact of particulate emissions from the facility.

The assessment of the operation of the existing WWTP and proposed upgrade measures to improve effluent discharge quality indicates that the potential for malodours from the site to be detected beyond the facility boundary are very low and unlikely to cause a significant impact at the houses or private properties.

Noise Impact Assessment

The Noise & Vibration Impact Assessment prepared by OES Consulting for the subject development, and included as an attachment to the EIAR, includes an assessment of the impact of noise associated with the operational phase of the development on the existing noise environment.

There will be a number of new noise sources associated with the proposed development although the majority of these will be located internally. There will be a new exhaust duct outlet on the roof of the new dryer building and a new air inlet on the outer wall. The existing Anhydro Dryer (Dryer 1) will remain while the Rodgers Dryer will be decommissioned. There will be two duty and standby blowers fitted with acoustic hoods associated with the WWTP upgrade.

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Based on distance attenuation alone, the exhaust/inlet of the new Dryer and blowers will not result in elevation of ambient noise levels above existing background at the nearest NSLs with the attenuators in place. The attenuators and acoustic hoods will ensure that the cumulative impact does not exceed the existing impact of the plant. Furthermore, the blowers will be screened by existing structures at the WWTP. The potential tones associated with the blowers should dissipate quickly provided they are also screened by the proposed tanks at the WWTP.

The facility is licensed by the EPA, however the license will be reviewed as a result of the Proposed Development and therefore the limits and current conditions are subject to change. The facility is not located in a quiet area or an area of low background noise as defined in NG4 therefore the following typical limits are likely to apply at NSLs:

- ➢ Daytime (07.00 to 19.00 hrs) – 55LAr,T
- ➢ Evening (19.00 to 23.00 hrs) – 50LAr,T
- ➢ Night time (23.00 to 07.00 hrs) 45LAeq,T

The following conditions are also likely to apply:

During daytime and evening periods rigorous efforts should be made to avoid clearly audible tones and implusive noise at all sensitive locations.

A penalty of 5 dB for tonal and/or implusive elements is to be applied to the daytime and evening measured LAeq values to determine the appropriate rating level (LAr,T).

During the night time period no tonal or implusive noise from the facility should be clearly audible or measurable at any NSL.

In addition to the foregoing recommended license limit values, the noise from the licensed facility shall not be so loud, so continuous, so repeated, of such duration or pitch and it should not occur at such times as to give reasonable grounds for annoyance.

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On the basis of their assessment OES conclude that the proposed development is expected to comply with the above limits and conditions based on the data provided by the Dryer and WWTP designers.

Through the implementation of specific mitigation measures identified in the EIAR, including the preparation of a CEMP (Construction and Environmental Management Plan) for the project it is concluded that noise from the construction stage of the development should not have a significant impact on the local environment.

5.5 CLIMATE

The only significant potential impact on micro-climate on the receiving environment in the vicinity of the subject development is the possibility of a change in the extent of shadows cast by the new Dryer Tower building on areas outside the boundaries of the Tipperary Cooperative Creamery site.

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In order to facilitate an assessment of the potential impact of shadows cast by the new Dryer Tower building, studies were prepared identifying shadows cast by the tower shortly after sunrise, shortly before sunset and around mid-day at the Spring Equinox, Summer Solstice, Autumn Equinox and Winter Solstice and these are presented in this Chapter of the EIAR.

Overall, it is concluded on the basis of the Shadow Study Assessment detailed in the EIAR, that shadows cast by the tower, throughout the year, will not have a significant impact on properties or open space beyond the boundaries of the Tipperary Cooperative Creamery site, given the limited extent of properties affected, the limited proportion of times when sun will be shining and the limited duration over which shadows will be cast on each property. There will be no significant impact on the residential amenity of any property.

5.6 LANDSCAPE AND VISUAL IMPACT

In order to facilitate an assessment of the potential visual impact of the proposed Dryer 2 development, photomontages showing existing and proposed views of the site have been generated from eleven viewpoints in the vicinity of the site and town. These are presented in this Chapter of the EIAR.

The visual impact of the proposed development will mainly result from changing the massing of buildings within the site. However, given the significant number of other tall buildings, tanks and other infrastructure within the development site, the introduction of a new large-scale element in the form of the new Dryer 2 structure, will have no significant impact on either the visual amenity of the protected structure located towards the front of the site or on the overall visual impact of the site.

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5.7 MATERIAL ASSETS

This Chapter of the EIAR considers impacts on Material Assets including traffic and waste.

The current parking provision on site is adequate to cater for the additional staff and visitor numbers likely to be generated by the propose development. With regard to impact of any additional traffic on the public road network, the level of traffic generated by the relatively small number of additional staff is negligible in the context of overall existing traffic in Tipperary Town and no impacts of any significance are envisaged

The increase in the number of HGV movements during peak milk supply periods is estimated at 20no. total inward movements to the site and a further 20no. movements outward from the site per 24hr day. The resultant increase in the number of movements to and from the site per hour however is only one or two movements in each direction, with most of these movements taking place outside of the normal morning and evening peak traffic times, including school traffic times, in Tipperary Town between 8am and 9am and between 4pm and 6pm. It is concluded therefore that the increase in the levels of HGV traffic post development of the Dryer

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2 facility is at a very low level with negligible potential for impact on current traffic flows on the public road network.

Current HGV traffic to and from the Tipperary Co-Op site does not have an impact of significance on the flow of traffic through the Bridge Street/ Abbey Street/ Station Road junction. Given that the projected increase in numbers of HGV vehicles entering and leaving the Tipperary Co Op site post development of the Dryer 2 facility generally comprises of 1no. or 2no. additional movements per hour in each direction and outside of certain peak hours as noted above, the impact of post development HGV traffic on this junction will be negligible.

Impacts of traffic generated by the construction of the development will be mitigated by use of the adjacent vacant former hotel site which contains considerable parking accommodation as formerly developed and utilised by the hotel operation. The relatively early morning commencement of normal workday operations by construction contractors will mitigate any potential impacts of construction related traffic accessing the site on current traffic levels.

The partial demolition and reconstruction of the existing building will generate waste including surplus spoil, demolition waste, packaging and surplus construction materials. There will be no additional solid waste generated by the completed facility. There will be a minor increase in the volume of waste sludge generated at the Wastewater treatment plant.

Arrangements for the sorting, collection and recycling/disposal of all demolition and construction waste generated during the construction phase of the Dryer 2 development will be detailed in the Construction & Environmental Management Plan prepared for the project. All demolition and construction waste will be sorted on site by the Contractor prior to collection and recycling/disposal off site by a licensed waste contractor. The additional waste sludge will be handled and removed from site by the current licensed contractor.

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5.8 CULTURAL HERITAGE

Dairy processing has taken place at the Tipperary Cooperative Creamery site on Station Road since the early 1900's and there are extensive buildings, structures and plant which have been developed on the site since that time. These include the original creamery building, which is a protected structure, and is located a short distance behind the existing 1970s reception building at the entrance to the site. This building will be unaffected by the construction of the Dryer 2 Facility towards the rear of the site, but given its presence on the site, and that a number of existing structures will need to be demolished to facilitate the proposed development, John Cronin Associates, a multi-disciplinary consultancy with expertise in the areas of conservation, archaeology and planning were engaged by MRG Consulting Engineers to prepare an assessment of the impact of the proposed development on historically and architecturally significant buildings within the site.

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With respect to potential residual impacts on archaeology, the Cultural Heritage Assessment concludes that the brown-field developed nature of the proposed development site shows there is little potential for the survival of unrecorded archaeological features and artefacts. The northern part of the site lies in close proximity to the River Ara and geotechnical trial-holing in the area has shown the terrain here to be 'made ground'. It is likely that previous intensive ground works for the construction of the buildings proposed for demolition would have impacted on any potential sub-surface archaeological features and artefacts. The proposed development by Tipperary Co-operative Creamery Ltd. will have no material or visual impacts on the archaeological significance or historic character of any recorded monument in the wider area.

The proposed development involves demolition of three structures within the rear (west) portion of the existing Co-op site. The Cultural Heritage Assessment concludes that only one of these structures has any architectural quality: the butter store, an early twentieth-century structure of some architectural and industrial heritage interest but with extensive alteration to the interior and no protected status. A comprehensive measured survey and photographic survey of this building before its demolition should be undertaken to preserve it by record.

It further concludes that the height and massing of the new building will not radically alter the scale of the site overall visually - it will be far enough away from the protected front building to mean that this original creamery structure will continue to be the visual focus of the campus from the public road.

There will be a minor visual alteration to views of the historic buildings on the site from the public realm but this is not considered negative. The proposed development may in fact improve the visual amenity of the site by obscuring cluttered infrastructure in the backdrop to the protected creamery building.

No material or visual impacts to any protected structures and places of cultural heritage significance in the immediate vicinity of the creamery site is foreseen as a result of the proposed development.

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5.9 CUMULATIVE IMPACTS AND INTERACTIONS

This section of the Environmental Impact Assessment Report (EIAR) examines potential interactions between the potential impacts of the proposed development on the environment and examines any potential cumulative impact associated with such interactions.

There is a significant inter-relationship between Biodiversity and Water with any significant impact on water quality likely to lead to a corresponding impact on aquatic ecology. These potential interactions and associated mitigation measures are addressed in detail, as appropriate, in the relevant sections of this EIAR.

There is also an inter-relationship between Landscape & Visual Impact and Cultural Heritage given any potential visual impact of the subject development on the cultural heritage of the site. These potential interactions are addressed in detail, as appropriate, in the relevant sections of this EIAR.

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Any significant negative impacts on any aspect of the environment is likely to have an inter-relationship with Population and Human Health. Since no significant negative impacts of the project have been identified for any aspect of the environment there should be no significant negative interactions with Population and Human Health.

No significant cumulative impacts associated with the above interactions have been identified.

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Tipperary Cooperative Creamery Limited
Dryer 2 Facility

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Environmental Impact Assessment Report

June 2017

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Revision Control Table

For & On Behalf of MRG Consulting Engineers Limited				
Rev.	**Status**	**Prepared By**	**Checked By**	**Date**
0	Planning Issue	K. Harty	C. Sheehy	21.06.2017

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Attachment A – Ecological Assessment – Terrestrial Ecology

Attachment B – Ecological Assessment – Aquatic Ecology

Attachment C – Appropriate Assessment Screening Report

Attachment D – Surface Waters Impact Assessment

Attachment E – IGSL Site Investigation Report

Attachment F – Flood Risk Assessment

Attachment G – Air Impact Assessment

Attachment H – Noise Impact Assessment

Attachment J – Traffic Impact Assessment

Attachment L – Cultural Heritage Assessment

Attachment M – Correspondence

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1.0 INTRODUCTION

1.1 General

Tipperary Cooperative Creamery Limited intend to develop a new **"Dryer 2"** facility comprising new milk evaporation and drying facilities at their existing milk processing facility on a site at Station Road, Tipperary Town, Co. Tipperary.

The Tipperary Cooperative Creamery site is located just south of Tipperary Town centre on a developed triangular shaped site bounded to the east by Station Road on the R664 Regional Road connecting the village of Aherlow to the town, to the south by the Waterford – Limerick Rail line and to the north west by the River Ara. The Cooperative's landholding, outlined in red on Figure 1.1 below, also extends to the former hotel site and some further undeveloped lands on the northern side of the River Ara. The total area of the Tipperary Co-Operative Creamery site, as outlined in red extends to c.6.2 ha.

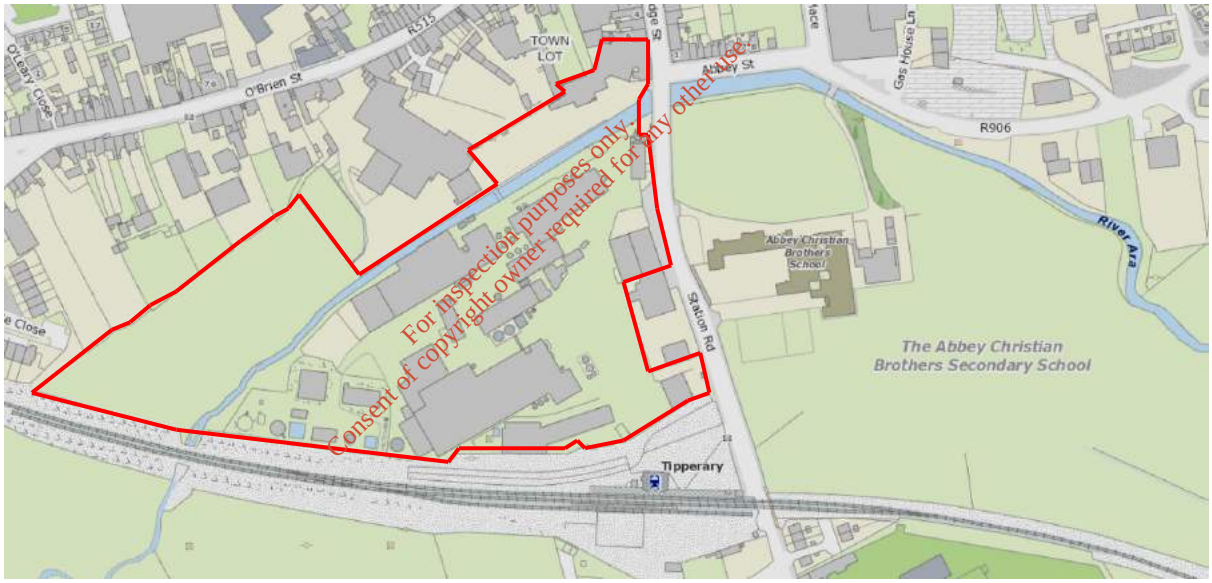


Figure 1.1: *Site location map showing Tipperary Cooperative Creamery lands with developed site bounded by Station Road to east, Waterford-Limerick rail line to south and River Ara to north-west*

The proposed development will comprise a new building to accommodate the new plant systems and installations which incorporate modern technologies in evaporation and drying to produce milk powders in a high care manufacturing environment. MRG Consulting Engineers Limited have been engaged by Tipperary Co-Operative Creamery Limited to prepare a Planning Application and associated Environmental Impact Statement for this development.

This document comprises the Environmental Impact Assessment Report prepared by MRG Consulting Engineers Limited on behalf of Tipperary Cooperative Creamery for the subject 'Dryer 2' development. It addresses the potential impacts of the construction and operational phases of the development on the receiving environment.

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1.2 Overview of Tipperary Cooperative Creamery Limited

Tipperary Cooperative Creamery is a farmer/shareholder owned Cooperative Society with a share register of over 1800 shareholders, whose interests are represented by an Advisory Committee comprising 92 members and a Board of Directors comprising 12 Directors. Tipperary Cooperative Creamery was established in 1908 and commenced operations from a new creamery constructed at O'Brien Street in Tipperary Town the following year. Over the years it has developed, through amalgamations with and acquisitions of other enterprises, to become a successful and diverse cooperative entity with operations extending across the dairy processing, agri-trading and retail grocery sectors. These include:

- Tipperary Cooperative Creamery milk processing operations at Station Road in Tipperary Town including cheese, butter and powder production;
- Fairgreen Ingredients Ltd., a subsidiary of Tipperary Co-op, which specialises in the manufacture of processed cheese and formatted cheese;
- Tippagral, a cheese packaging and distribution business based in the Burgundy region of France, acquired by Tipperary Co-op in 1990;
- Hardware stores providing hardware, DIY and agricultural supplies located in Tipperary Town, Borrisoleigh and Gooldscross (Cashel);
- Retail supermarket located at Kickham Place in Tipperary Town, acquired by the Co-op in 1990 and launched as Tipperary Co-op Supervalu in 1997.

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Dairy processing has been undertaken at the Station road site since pre 1900. The original creamery building, included in the Tipperary Town Record of Protected Structures (RPS ref.100) was first constructed and managed by the Condensed Milk Company in 1898 before being taken into state ownership by the Dairy Disposal Company in 1928. The site manufactured condensed milk and butter until 1948 prior to commencing the production of milk powder at the site in 1948/9.

Tipperary Cooperative Creamery Ltd. acquired the Dairy Disposal Company's interests in the Tipperary area, including the Station Road facility in 1972 and installed a significant new milk powder plant on the site including milk intake, separation, evaporation, drying and packaging facilities and a new effluent treatment plant, boiler house and refrigeration facilities. This coincided with the introduction of bulk milk collection and ensured the continued processing of locally produced milk in Tipperary at that time.

A new cheese production plant including associated storage, cutting and packaging facilities were constructed on the Station Road site in 1981 and subsequently extended in 2007.

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Today the Tipperary Cooperative Creamery site on Station Road comprises an integrated dairy processing plant manufacturing a range of products, primarily butter, milk powders and cheese. The current peak daily milk processing capacity of the site is c.1.62 million litres of milk per day which equates to a theoretical annual processing capacity for the facility of c.591 million litres (c.130 million gallons) of milk equivalent per annum.

1.3 Need for the Project

1.3.1 Milk Production Levels

The introduction of the EU Milk Quota regime in 1984 significantly curtailed Irish milk production for over 30 years until the regime was finally abolished by the EU in 2015. As a consequence, during that period the regime had a significant impact on the Irish dairy industry's ability to achieve milk production levels appropriate to a country with such vast dairy potential. The abolition of quotas in April 2015 led to an EU production increase of 2.2% for the 2015 calendar year, with deliveries increasing in 19 of the 28 EU Member States. In 2015 Ireland experienced the highest rate of growth in milk output volume among EU Member States, at 13.3%, including 16.6% for the April to December period. Additional milk processing capacity is required to cater for the increase in milk production.

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1.3.2 Food Harvest 2020

In 2010, the Irish dairy industry, given the proposed abolition of the EU Milk Quota regime in 2015, set itself the ambitious target, under the Food Harvest 2020 Programme, of increasing milk production by 50% by 2020. This was to be achieved by increasing the 2008/2009 average annual milk production of 5 billion litres to 7.5 billion by 2020. While progress to date was constrained pending the abolition of the quota regime until 2015, significant progress has already been made in the steps necessary to meet the target, including:

- The average annual milk yield per cow has increased to in excess of 5,000 litres per cow and is projected to have increased by 15% in 2020 from 2008/2009 levels (from c. 4600 litres/annum to c. 5285 litres/annum).

- In combination with the above increase in annual milk yield per cow, it was estimated that an increase of c. 300,000 to 350,000 in the national dairy herd would be required to achieve the targeted 2.5 billion litre increase in annual production. By late 2015, c.150,000 cattle had been added to the national herd and it was anticipated that a modest 2% year on year growth should achieve the required target of c.330,000 additional cattle by 2020.

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1.3.3 Food Wise 2025

In 2015, the Department of Agriculture, Food and the Marine published **Food Wise 2025**, the Report of the 2025 Agri Food Strategy Committee, which superseded Food Harvest 2020 and was intended to set out a cohesive, strategic plan for the development of the Irish agri-food sector over the following decade . The document identified that opportunities would arise as a result of significant population growth and greater access to international markets. In addition, the Committee recognised that the increased pressure on global agricultural resources and the environment will offer potential further growth opportunity for the Irish agri-food and fisheries sector.

Food Wise 2025 harnessed the collective wisdom, foresight and knowledge of leading industry stakeholders and set a course for the industry of smarter greener growth over the decade up to 2025. It foresaw a sector that acts more strategically and achieves a competitive critical mass in the international marketplace while targeting more quality conscious consumers who will recognise and reward Ireland's food producers for their sustainable production and high quality produce.

The long-term vision as set out in the Report is of 'Local Roots Global Reach' based on the continued development of the sector where efficient and environmentally-friendly production delivers sustainable export growth on global markets. The Committee anticipated that achieving this vision would benefit primary producers, processors and the food manufacturing sector, as well as the wider economy.

On the basis of available data and by taking the actions identified in the Report, the Committee set the following growth projections, which it believes are achievable by 2025:

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- Increasing the value of Irish agri-food exports by 85% to €19 billion;
- Increasing value added in the agri-food, fisheries and wood products sector by 70% to in excess of €13 billion;
- Increasing the value of Primary Production by 65% to almost €10 billion;
- The creation of an additional 23,000 direct jobs in the agri-food sector all along the supply chain from primary production to high valued added product development.

1.3.4 Export Performance and Prospects – Irish Food, Drink and Horticulture 2016 - 2017 – Bord Bia.

Bord Bia, the Irish Food Board, prepare and publish an annual report which details the export performance of the Irish Food and Drink sector over the preceding 12 months and the prospects for the industry over the years ahead, including a detailed sectoral analysis for each of the key industry sectors including Dairy Products and Ingredients. Key figures identified for the Dairy Products and Ingredients sector in the 2016/2017 Report include:

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- **€3.38 million** – the estimated value of dairy exports, an increase of 2%;
- **50%** rise in the value of dairy exports from 2010 (€2.25bn) to 2015 (€3.38bn);
- Ireland exports dairy products to **155** markets worldwide;
- Exports to international markets are worth an estimated **€1.66 billion**, or **49%** of dairy exports;
- **The top 5 markets** are the UK, China, the Netherlands, Germany & the United States;
- According to the European Commission Medium Term Outlook Irish milk production is expected to grow over **40%** over the next decade.

The report confirms that Irish milk supplies were over 5% or 300 million litres higher for the first ten months of 2016 following on from the 13% increase recorded in 2015. This reflects an 8% rise in the dairy breeding herd and excellent grass growing conditions particularly in mid-season.

For the year, it estimated that the value of Irish dairy and ingredients exports increased by around 2% from €3.31 to €3.38 billion. This was driven by an increase in volumes on the back of an expanded dairy industry and higher exports of specialised dairy nutritional powders.

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With respect to export markets, the report acknowledges that the UK remains a key market accounting for around a quarter of Irish dairy exports. A decline of over 10% was recorded in the value of UK exports in 2016 to an estimated €840million. The value of trade was affected by the weaker value of sterling relative to the euro. Exports to other EU markets were also lower by almost 6% at some €880million. However, significantly the value of exports to International Markets grew by an estimated 19% to €1.66billion, accounting for 49% of total exports compared to just 41% in 2015. Asia led the way with 31% growth in exports to account for over 23% of total dairy exports. Higher trade was also recorded to both Africa and North America. This Distribution of Dairy Products & Ingredients exports, as % of export value, as identified in the Report is presented in Figure 1.2 below.

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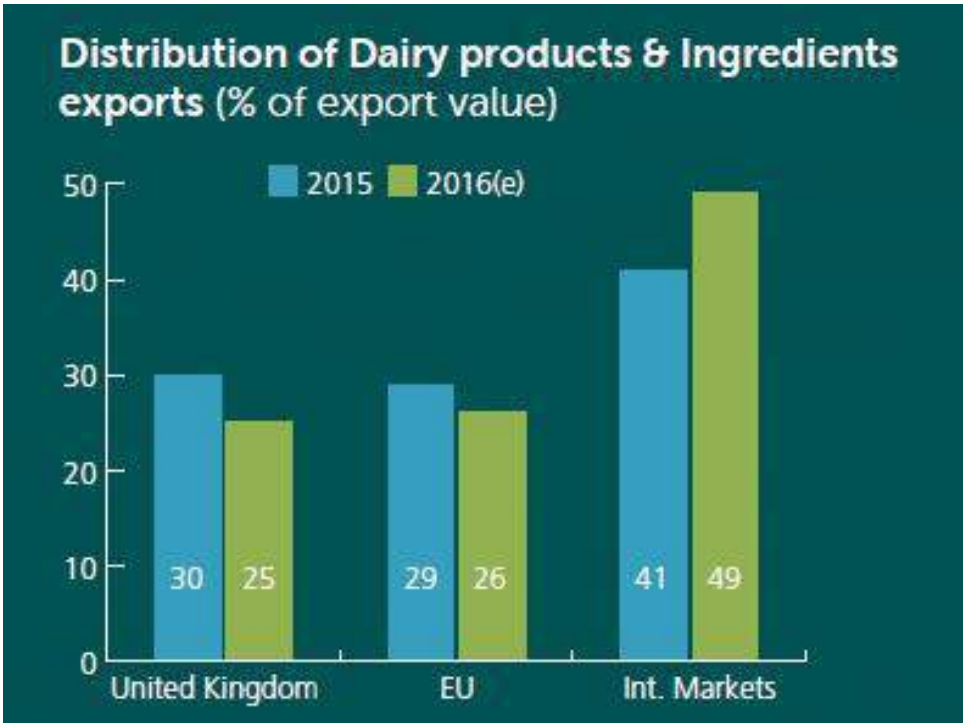


Fig. 1.2: Distribution of Dairy Products & Ingredients exports, as % of export value

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The Report identifies the strongest performing categories as specialised nutritional dairy powders while whey, whole milk powder and yogurt also recorded growth. Higher unit values coupled with steady volumes and a rise in demand, particularly from Asian markets were identified as driving the growth shown in the market for specialised nutritional dairy powders.

1.3.5 EU Agricultural Outlook – Prospects for the EU Agricultural Markets and Income 2016-2026

The above Report, published jointly by the Directorate – General for Agriculture and Rural Development and the Joint Research Centre (JRC) of the European Commission, and presents the medium-term outlook for the major EU agricultural commodity markets and agricultural income for the period 2016 to 2026. As detailed in the Report, it is based on information available at the end of September 2016 for agricultural production and on an agro-economic model used by the European Commission.

The Report projected that, after one year of stagnation in 2015, world demand for milk and dairy products is expected to resume growing, although at a slower pace than in the previous decade. This is also due to the slow down in population growth, including in China. However, the increase of income in developing countries, urbanisation and a growing middle class population remain the main drivers of a consumption pattern change towards more dairy proteins in the diet. World consumption of milk and dairy products is expected to grow annually by 1.8% over

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the next decade and per capita consumption to increase from 110 kg of milk equivalent to 120 kg of milk equivalent in that period.

China will remain the main importer of dairy products, absorbing around 15% of world trade by 2026. While Chinese imports of whole milk powder are not expected to reach the exceptional levels achieved in 2014, by contrast the country is expected to increase imports of skim milk powder for its domestic production of fresh dairy products and whey, mainly for infant formula.

The EU is expected to become the leading world exporter of dairy products by 2026, just in front of New Zealand, with world import demand expected to drive an increase in milk production in the EU of 0.8% per year on average. Although the EU exports only a small share of its milk production (c.11% in 2016), exports are expected to strongly support production expansion in the next decade. Close to half of additional milk availabilities, around 7 million tonnes of milk equivalent, is expected to be exported, mainly in the form of powders and by 2026 skim milk powder, whole milk powder and whey could represent close to 70% of EU dairy product exports, as indicated in the graph in Fig. 1.3 below.

Skim milk powder exports have tripled since 2009, and reached a record level of 690,000 tonnes of milk equivalent in 2015, 50% of EU production. The share of EU exports of same in world trade reached 30%, while in 2006 it was below 10%. By 2026, exports of skim milk powder are expected to grow to 950,000 tonnes of milk equivalent per annum.

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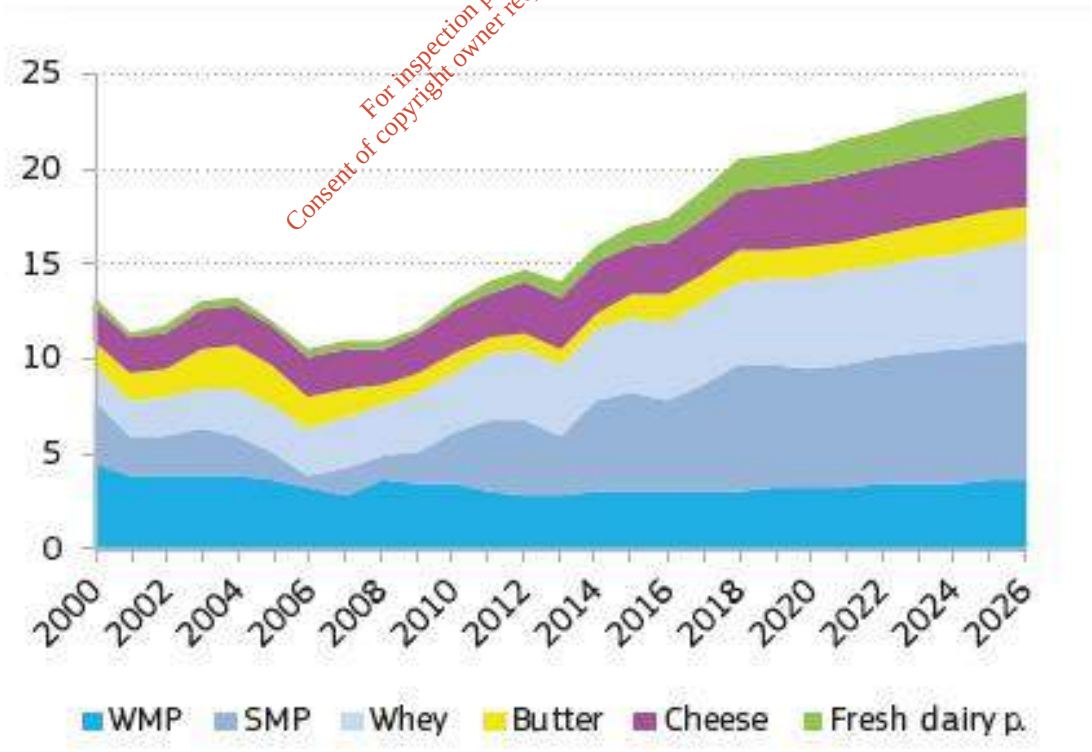


Fig. 1.3: EU Dairy Product Exports 2000 to 2026

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Compared to whole milk powder, a larger share of skim milk powder is also used domestically within the EU, notably to produce fresh dairy products (yogurt and dairy desserts), ice cream, bakery, fat-filled milk powders and infant formula as well as in sport and nutritional food. The Report suggests that over the next decade this domestic use could also expand, supported by sustained demand for fat-filled milk powders, especially for the west African market.

Fat-filled milk powders are well adopted to countries with high temperatures and have a longer shelf life than whole milk powders. In addition, except in crisis times, they are often cheaper than whole milk powders because palm oil costs less than dairy fat. Gira estimated world production in 2015 at close to 900,000 t, half of it being produced by the EU, mainly by Ireland and the Netherlands. The main destination of EU products is western Africa, especially Nigeria and Senegal. Without accounting for a change in consumption patterns, population growth in this region will drive a significant increase in demand for this product, thus a higher use of skim milk powder within the EU for the elaboration of such products. Driven by this rising demand, EU skim milk powder production is expected to reach 2 million t by 2026.

Whey is a by-product of cheese production that in the past was disposed of as waste. Roughly speaking, for 5 t of cheese, 1 t of whey powder can be produced. In the past decade, with the increasing market opportunities for whey, whey collection increased significantly and it can be assumed that all the whey available for processing is now already collected. Therefore, whey production development is limited by increases in cheese production. As EU is the largest cheese producer it is also the world's leading whey supplier. The EU produces 60 % of world whey in the form of whey powder, whey protein concentrates, whey protein isolates and demineralised whey – the use of liquid whey is now very small and limited to feed use. This particularity attracted various foreign investments in Europe, especially from China and New Zealand, focusing on the production of infant formula, of which whey is one of the main components. Whey powder is the main whey product produced in the EU (60 %). It has the lowest protein content estimated at 13 %, while the protein content of whey isolates can reach more than 90 %. More than half of whey powder was still used for feed in 2016, however the downward trend of whey for feed use will continue and by 2026 it is expected that less than 45 % of whey will be used in feed processing. This will increase whey availabilities for the processing of higher value added products, for instance ice cream, confectionery, chocolate and infant formula. Fast growing sectors such as sport, senior and clinical nutrition use whey with higher protein concentration. Whey powder production is projected to increase to 2.3 million t by 2026. With half of it going for exports, the EU share in world market is expected to stabilise at around 20 %. The main EU customer of whey powder is China, followed by Indonesia, Malaysia and Thailand. These countries use the whey powder to produce infant formula locally. Infant formula is also a lucrative export market for the EU of 3.7 million EUR in 2015.

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While the projected increase in total EU milk production is reflected in most Member States, the magnitude can substantially differ. About 75 % of the EU's expected total milk supply increase between 2016 and 2026 (+13.0 million tonnes) will be realised in five Member States, namely Germany, Ireland, the UK, France and the Netherlands as illustrated in Fig. 1.4 below. Over that period, Ireland is expected to show the highest percentage growth (+41 %) and Germany the largest volume increase (+3.4 million t). The Netherlands, Czech Republic and Belgium exhibit a moderate supply increase in the range of 6 to 12 % while Poland, Italy, Spain and Denmark show slower growth.

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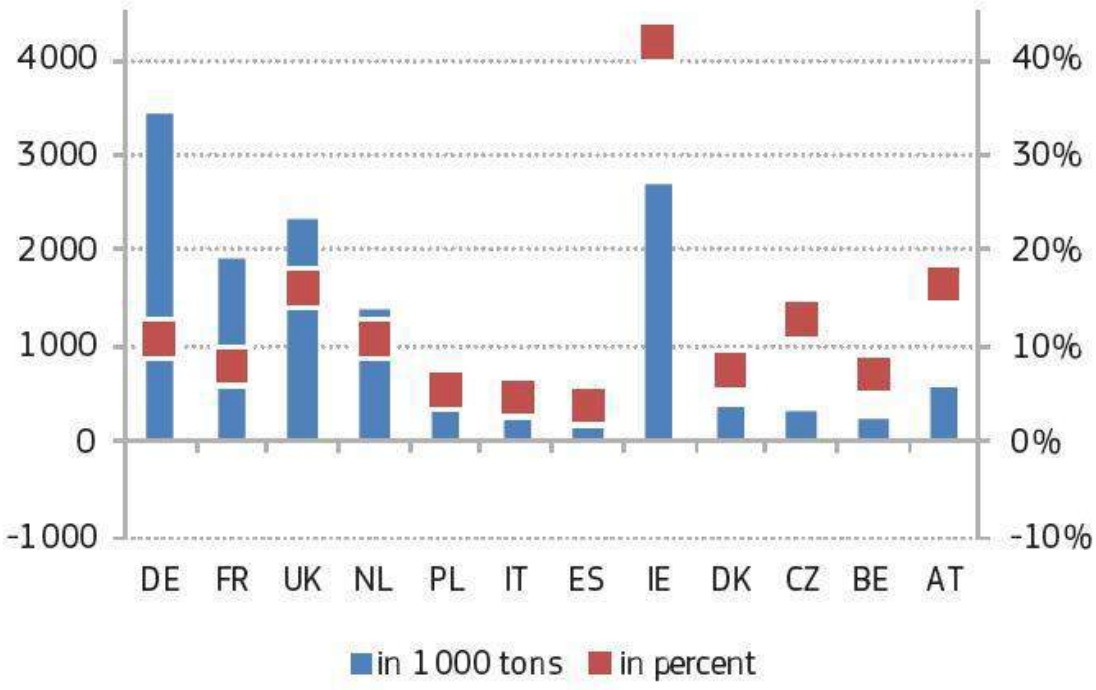


Fig. 1.4: Projected Increase in Milk Supply 2016 – 2026 across EU Member States

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These differences reflect variations in yield growth, dairy herd evolution, competitiveness and environmental constraints. Above average yield growth rates are projected for Ireland, Spain and the Czech Republic, even in Member States where the level of milk yield is currently already high. With the exception of Ireland, where cow numbers are projected to continue to grow, a decline in the size of the dairy herd is projected across the EU. Changes in the size of the herd are a combination of the net exit rate of dairy farms and the average increase in herd size per farm. This process of structural change varies across and within Member States and is likely to be influenced by the initial farm size distribution, farmer age distribution and geographical characteristics (e.g. areas with natural handicaps).

1.3.6 Tipperary Cooperative Creamery Strategy

Given the opportunities presented by the abolition of the EU Milk Quota regime in 2015, the projected growth in EU and particularly Irish dairy products as identified in the above publications, the opportunity to increase the value of dairy products currently exported from the site due to the lack of available evaporation and drying facilities and in order to secure the future of dairy processing operations at their Station Road site, at strategic decision has been taken by Tipperary Cooperative Creamery to invest in additional evaporation and drying facilities at the site.

Subject to a grant of planning permission and the appropriate review to the existing IE Licence it is intended that the project will be completed in late 2018 to facilitate commissioning ahead of the 2019 peak milk processing season which runs from March to May.

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1.4 Project Overview

In order to facilitate the required increase in the production of skim milk, butter milk and whey powder to implement the strategy outlined in Section 1.3.6 above, Tipperary Cooperative Creamery intend to install additional evaporation and drying facilities at their existing processing plant at Station Road in Tipperary Town. These facilities will be integrated into the existing dairy processing operations at the plant. The existing waste water treatment plant will be upgraded to cater for the additional wastewater generated by the new facilities and to improve the quality of treated effluent discharged to the municipal treatment plant for further treatment.

Both the existing and proposed processing operations are described in further detail in Chapter 3 of this EIAR.

1.5 Timing of the Project

It is intended that the new evaporation and drying facilities will be fully operational for the commencement of the peak milk production season in March 2019, and on this basis the following schedule is intended for the delivery of the project:

- June 2017 – Planning Application and associated sub-threshold EIAR to be submitted to Tipperary County Council.
- Subject to the appropriate Planning Approval from Tipperary County Council, it is anticipated that construction of the project would commence in October 2017 and be completed by October 2018.
- Installation and Commissioning of the main process plant installations would commence in August 2018 and be completed by January 2019.

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1.6 Governing Legislation and Statutory Requirements

1.6.1 Environmental Impact Assessment

The subject project has been screened for Environmental Impact Assessment.

The proposed development falls within the scope of an Annex II Project of European Communities Directive 2011/92/EU (as amended by 2014/52/EU) - Project Type 7(c) – Manufacture of Dairy Products.

The appropriate threshold specified in Schedule 5 of the Planning & Development Regulations 2001-2015 for installations for the manufacture of dairy products requiring the preparation of a mandatory EIS is 50 million gallons of milk equivalent per annum.

For extensions to existing developments, Schedule 5 of the Planning & Development Regulations 2001-2015 prescribe that an Environmental Impact Statement should be submitted with Planning Applications for developments which would result in an increase in size greater than:

- 25 per cent, or

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- An amount equal to 50 per cent of the appropriate threshold, whichever is the greater.

The current peak daily processing capacity of the facility is 1.62 million litres or c.356,350 gallons of milk per day. This equates to a theoretical annual processing capacity of 130 million gallons of milk equivalent per annum calculated on the basis of the peak daily capacity operating over 365 days per year.

While this annual equivalent milk processing capacity forms the basis on which the thresholds are calculated in determining a requirement for a mandatory EIS it is noted that in practice the facility will only be capable of operating at or close to this peak daily capacity for a limited number of days per annum given the requirement for regular scheduled cleaning and maintenance operations and the variation in availability of milk for processing throughout the year. In the Irish dairy sector there is a significant variation in the volumes of milk available for processing across the year, with a peak to trough ratio in the order of 6.25 between the peak milk supply in the month of May and that available for processing in the lowest month of January. This effectively reduces the actual volume of milk available for processing on an annual basis to c.60% of the theoretical volume calculated on the basis of the peak daily supply.

One of the primary aims of the project will be to facilitate the further processing of all dairy intermediate products currently produced on site to produce higher value milk powders. The proposed project includes for the provision of a third evaporator (Evaporator No. 3) and a second spray dryer (Dryer No. 2) This will increase the overall peak daily processing capacity of the facility from 1.62 million litres to 1.97 million litres or 433,350 gallons per day. This equates to a theoretical annual processing capacity of c.158.2 million gallons of milk equivalent per annum calculated on the basis of the peak daily capacity operating over 365 days per year.

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An increase of 25 per cent of the existing net peak processing capacity of c.130.0 million gallons of milk equivalent per annum is 32.5 million gallons.

As outlined above, the appropriate threshold specified in Schedule 5 of the Planning & Development Regulations 2001-2015 for installations for the manufacture of dairy products is 50 million gallons of milk equivalent per annum. 50 per cent of the appropriate threshold is therefore an increase of 25 million gallons per annum.

On this basis, the appropriate criteria for assessing the requirement for the submission of an Environmental Impact Statement with the Planning Application for the subject development would be an increase in excess of 32.5 million gallons of milk equivalent per annum.

The actual increase in net peak processing capacity is from 130.0 to 158.2 million gallons of milk equivalent per annum, an increase of 28.2 million gallons per annum. This is therefore slightly below the above threshold of 32.5 million gallons per annum.

On this basis, a mandatory EIS is not required for the subject development.

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However, given that the project is only slightly below the relevant threshold, its proximity to the River Ara and associated potential impacts on surface water and aquatic ecology and that an EIS has not been required or prepared for previous developments on the subject site, following pre-planning consultation with Tipperary County Council it has been agreed that an Environmental Impact Assessment Report would be prepared for the subject development and included with the Planning Application submitted to the Planning Authority.

1.6.2 Industrial Emissions Directive

Tipperary Cooperative Creamery facility at Station Road in Tipperary Town is currently operating under an Industrial Emissions Licence (IEL) P0801-01, originally issued as an Integrated Pollution Control Licence (IPCL) by the EPA in April 2008, and subsequently amended to an IE Licence by the Authority in December 2013, under the new Directive on Industrial Emissions (Integrated Pollution Prevention and Control) (Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control).

The IEL specifies permitted Emission Limit Values (ELV's) for a range of air, water and noise emissions from the plant.

Tipperary Cooperative Creamery will be obliged to apply to the EPA for a revised IEL to include the proposed development.

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1.6.3 Habitats Directive Appropriate Assessment

An Appropriate Assessment (AA) is an evaluation of the potential impacts of a plan or project on the conservation objectives of Natura 2000 sites, and the development, where necessary/possible, of mitigation or avoidance measures to preclude negative effects. The requirement for AA is laid down in Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Flora and Fauna – the 'Habitats Directive' which was transposed into Irish law by the European Communities (Natural Habitats) Regulations, SI 94/1997.

There are four distinct stages to undertaking an AA as outlined in current EU and National Parks and Wildlife Service (NPWS) guidance:

1. Appropriate Assessment Screening;
2. Appropriate Assessment;
3. Assessment of Alternatives in cases where significant impact cannot be prevented;
4. Where no alternatives exist, an assessment of compensatory issues in the case of projects or plans which can be considered to be necessary for imperative reasons of overriding public interest (IROPI)

Stage 1 above, Appropriate Assessment Screening, determines whether appropriate assessment is necessary by examining:

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1. Whether a plan or project can be excluded from AA requirements because it is directly connected with or necessary to the management of a Natura 2000 site.

2. Whether the project will have a potentially significant effect on Natura 2000 sites, either alone or in combination with other projects or plans, in view of the sites' conservation objectives.

A Habitats Directive Appropriate Assessment Screening report has been prepared in respect of the subject development and is included as an attachment to this EIAR. The Habitats Directive Appropriate Assessment Screening Report concludes, on the basis of the assessment, that the proposed development will have no potential impact on Natura 2000 sites. On this basis, a Natura Impact Statement is not required to be prepared for the subject development.

1.6.4 Trade Effluent Discharge Licence

The subject development does not require a trade effluent discharge licence as the discharge of treated effluent from the facility is covered under the IEL.

1.6.5 COMAH Regulations

The Chemicals Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015 (S.I. No. 209 of 2015) (the "COMAH Regulations"), implement the Seveso III Directive (2012/18/EU). The purpose of the COMAH Regulations is to lay down rules for the prevention of major accidents involving dangerous substances, and to seek to limit as far as possible the consequences for human health and the environment of such accidents, with the overall objective of providing a high level of protection in a consistent and effective manner. The proposed development does not fall under these Regulations.

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1.6.6 Fire Safety Certification and Disability Access Certification

A Fire Safety Certificate and Disability Access Certificate will be required for the subject development, and the relevant applications will be submitted to the Building Control Authority in respect of same.

1.7 Environmental Impact Assessment Methodology

1.7.1 Environmental Impact Assessment Report

It is noted that Directive 2011/92/EU, on the assessment of the effects of certain public and private projects on the environment, and which codified the original Environmental Impact Assessment Directive 85/337/EEC and subsequent amendments to same, has now been amended by Directive 2014/52/EU. In its Article 2, Directive 2014/52/EU provides that Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with the Directive by 16th May 2017.

Circular Letter PL 1/2017, which was issued by the Department of Housing, Planning, Community and Local Government on the 15th May 2017 sets out procedures that may be followed by Planning Authorities and An Bord Peanala (Competent Authorities) in the case of applications for permission submitted after 16th May 2017.

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It notes that an outline of the key amendments required on foot of Directive 2014/52/EU is identified in the public consultation document issued by the Department on 2nd May 2017 and advises:

> "*In respect of applications for planning permission or other development consent received on or after 16 May 2017 falling within the scope of Directive 2011/92/EU, or within the scope of Directive 2014/52/EU, competent authorities are advised to consider applying the requirements of Directive 2014/52/EU by way of administrative provisions in advance of the transposition of Directive 2014/52/EU into Irish law*"

To assist competent authorities for planning consent, where they decide such applications will be dealt with under Directive 2014/52/EU, Circular PL 1/2017 draws particular attention to the following key provisions of that Directive (referred to as the 2014 Directive).

Environmental Impact Assessment:

1. This is redefined in the 2014 Directive as a process, which includes the responsibility of the developer to prepare an Environmental Impact Assessment Report (EIAR), and the responsibility of the Competent Authority to provide reasoned conclusions following the examination of the EIAR and other relevant information. Environmental Impact Assessment Report (EIAR)

2. Where EIA is required the developer must prepare an EIAR (previously EIS).

3. The information to be provided by the developer is set out in Article 5(1)(a) to (e) of the 2014 Directive. This is the least information which should be provided.

4. The developer is required also to submit any additional information specified in a new Annex IV in the 2014 Directive where this information is relevant to the specific characteristics of the project, or type of project, and to the environmental features likely to be affected. This may include relevant demolition works.

5. The EIAR must include a description of the reasonable relevant alternatives studied by the developer and an indication of the main reasons for the option chosen.

6. The EIAR must be prepared by "competent experts". The competency of experts will be a matter for the Competent Authority.

7. Where the Competent Authority has issued a scoping opinion, the EIAR must be based on that opinion.

8. The EIAR must take into account "current knowledge" and "methods of assessment".

Competent Authority Environmental Impact Assessment:

9. The assessment must identify, describe and assess appropriately the direct and indirect significant effects on the project on the factors set out in Article 3(1)(a) to (e) of the 2014 Directive.

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10. Article 3(1)(a) to (e) contains significant amendments to the 2011 Directive. New factors in the 2014 Directive include “population and human health” (replacing “human beings”), “biodiversity” with particular attention to species and habitats protected under the Habitats and Birds Directives (replacing “flora and fauna”), and “land”. It should be noted that consideration of “climate” should include “climate change”.

11. Consideration of significant effects must include expected effects deriving from vulnerability of the project to risks of major accidents and/or disasters, where relevant to the project.

12. The Competent Authority must have, or have access, as necessary, to sufficient expertise to examine the EIAR. This will be a matter for each Competent Authority.

13. The Competent Authority may seek supplementary information in order to reach a reasoned conclusion on the significant effects on the environment.

Competent Authority Decision:

14. A decision to grant development consent must incorporate, at least, the reasoned conclusion in relation to the significant effects on the environment.

15. The reasoned conclusion must take into account results of the examination of the EIAR and any supplementary information received through consultations with Prescribed Bodies and the public, and any transboundary consultations.

16. A decision to grant must incorporate a description of any features of the project envisaged to avoid, prevent or reduce and, if possible, offset significant adverse effects on the environment.

17. Where appropriate, a decision to grant must include monitoring measures.

18. Monitoring conditions must be proportionate to the nature, location and size of the project and the significance of its effects on the environment. Monitoring conditions should not be used as a general means of gathering environmental information.

19. A decision to refuse must state reasons for refusal.

The Circular states that the Department is in the process of urgently drafting the required amendments to the Planning and Development Act 2000, as amended, and the Planning and Development Regulations 2001-2015 to provide for the transposition of the Directive into the Irish planning code. The Department is also in the process of updating the March 2013 “Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment” to provide practical guidance on legal and procedural issues arising from the requirement to undertake EIA in accordance with Directive 2014/52/EU.

It is noted that the Environmental Protection Agency is revising the Guidelines on the information to be contained in Environmental Impact Statements and the Advice Notes on Current Practice (in the preparation of Environmental Impact

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Statements to reflect the new EIA Directive. A draft of the revised Guidelines was issued for Public Consultation in September 2015 but the EPA has advised that the new Guidelines will not be formally issued until after the transposition of the new Directive into National Legislation.

On the basis of the above, and pending transposition of the new EIA Directive into Irish Legislation and the issue of the revised Guidelines by the EPA, the Methodology adopted for the preparation of the Environmental Impact Assessment Report for the subject development has been based on the Draft Guidelines and, to include for the information referred to under Article 5(1)(a) to (e) of EU Directive 2014/52/EU and to submit any additional information specified in the new Annex IV in the 2014 Directive where same is relevant.

1.7.2 Scoping of the Environmental Impact Assessment Report

The scope of the proposed Dryer 2 Project including the information to be contained in an Environmental Impact Statement for the subject development was discussed with the Planning Authority, including representatives from the environmental, water services and district engineers departments of Tipperary County Council on 18th January 2017 and a Scoping Document was subsequently issued to the Planning Authority on 8th February 2017. The document provided an outline description of the Station Road site including existing developments and current milk processing operations on the site. It included an outline description of the proposed project and was intended to establish the content and scope of the matters which it was intended to address in the Environmental Impact Statement in order to facilitate the Planning Authority in considering an application for Planning Permission for the subject development. It is noted that at that stage the scope of the development included the complete demolition of the powder store, dispatch bay and store. The location of the building and associated scope of demolition works was subsequently amended as outlined below. On 17th February 2017 the Planning Authority confirmed that the Scoping Document had been reviewed by the Planning, Environmental and Water Services Sections of the Authority and advised that it was considered that the scope of issues to be addressed in the proposed EIA had been addressed in the document. The Scoping document was also issued to a number of other bodies as identified in Section 1.7.4 below.

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Subsequent to the initial scoping of the EIA as outlined above, a number of amendments were made to the scope of the project in order to reduce potential impacts of the development. These included:

- The capacity of new Dryer Installation was reduced from 4.0 tonnes per hour to c.3.2 tonnes per hour.
- The footprint of the main Dryer Tower was moved south east c.10m and north east c.17m so that it now overlapped the southern half of the existing Powder Store.
- Only the southern half of the existing Powder Store, which falls within the footprint of the new building would now be demolished. The northern half of the existing building would be retained.
- The project no longer required the demolition of the existing Dispatch Bay which would be retained.

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- The project no longer included the construction of the new single storey Loading Bay/Dock Leveller Facilities.

- Omission of new powder silo accommodation and bagging facilities accommodation on upper floors at eastern end of new building would reduce the overall length of main building above existing Powder Store Roof level.

- The project now included the proposed de-commissioning of the existing Rodgers Dryers located in the building to the south west of the existing protected structure.

- The relocation of the building to the south east and retention of rear half of powder store behind same would isolate the proposed development from the adjacent River Ara and eliminate the works previously proposed directly adjacent to and along the river bank. This would reduce potential construction stage impacts on the River.

- It was no longer intended to provide a temporary footbridge access over the River Ara between the former hotel site and the construction site.

The above amendments to the scope of the project were outlined to and reviewed with the Planning Authority, including representatives from the environmental, water services and district engineers departments of Tipperary County Council at a meeting on 12th May 2017. Given that the proposed amendments comprised items which would not increase potential impacts of the subject development it was considered the scope of the EIA as originally proposed would not be amended.

The scope of the Assimilative Capacity Assessment that would be completed as part of the assessment of impact of the subject development on surface waters was also subsequently discussed and agreed with the Environmental Section of Tipperary County Council.

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1.7.3 Consultation with Planning Authority

As outlined in Section 3.7.2 above, pre-application consultation meetings were held with the Planning Authority, including representatives from the environmental, water services and district engineers departments of Tipperary County Council, as appropriate, with respect to the scope of the subject development and associated environmental impact assessment.

1.7.4 Consultation with Agencies

The Scoping Document for the Environmental Impact Assessment for the subject development, issued to Tipperary Co. Co. was also subsequently issued to the following bodies who were invited to respond with any observations they may have:

- Environmental Protection Agency

- National Parks and Wildlife Service

- Inland Fisheries Ireland

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- Development Applications Unit – Department of Arts, Heritage and the Gaeltacht
- Office of Public Works
- Department of Agriculture, Food and the Marine
- The Heritage Council
- National Roads Authority
- Geological Survey of Ireland
- An Taisce

Responses were received from the following bodies:

- Inland Fisheries Ireland;
- Transport Infrastructure Ireland;
- An Taisce.

Copies of the response are included in Attachment M of this EIAR, and are addressed, where appropriate in the relevant sections of this EIAR.

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1.7.5 Public Consultation

Given the developed nature of the existing Tipperary Cooperative Creamery site, that the proposed development comprises an extension to existing milk processing operations on the site and the conclusions of the EIAR with respect to potential impacts on local residents, no separate public consultation was completed in respect of the subject development. However, there will be adequate opportunity for the public to engage through the normal planning process.

1.7.6 Specialist Consultants

The overall co-ordination of the EIA process and preparation of this Environmental Impact Assessment Report was completed by Kevin Harty of MRG Consulting Engineers Limited who has over 30 years of experience in the design and construction of dairy and similar industrial projects and over 10 years of experience in the preparation of Environmental Impact Assessments/Statements/Reports.

The following specialist consultants were engaged to provide specialist advice, baseline surveys and impact assessments with respect to the subject development. The relevant experience of each consultant is detailed, as appropriate in their individual reports.

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EIAR Study	Consultant
Terrestrial Ecology	Wetland Surveys Ireland Limited, Bell Height, Kenmare, Co. Kerry.
Aquatic Ecology	Conservation Services, Tullaha, Glenflesk, Killarney, Co. Kerry
Habitats Directive Appropriate Assessment Screening Report	Conservation Services, Tullaha, Glenflesk, Killarney, Co. Kerry
Geotechnical Investigations	IGSL Limited, M7 Business Park, Naas, Co. Kildare
Impact on Surface Waters	OES Consulting, Anfield House, Baldonnell Business Park, Naas Road, Dublin 22
Flood Risk Assessment	MRG Consulting Engineers Limited, 4 Day Place, Tralee, Co. Kerry
Air Impact Assessment	Envirocon Ltd., Old Road, Kilcarn Bridge, Navan, Co. Meath
Noise Impact Assessment	OES Consulting, Anfield House, Baldonnell Business Park, Naas Road, Dublin 22
Traffic Impact Assessment	MRG Consulting Engineers Limited, 4 Day Place, Tralee, Co. Kerry

Table 1.1: Specialist Consultants

1.8 EIA Limitations

No significant limitations were experienced in the preparation of the EIAR for the subject development. However, the following are noted:

- The detailed design of the process installation has not been fully completed. However, where appropriate conservative or 'worst case' scenarios have been adopted where more detailed information was not available.

- The detailed design of the proposed WWTP Upgrade has not been completed. The final specification of the WWTP Upgrade and associated emissions from same will be agreed with Irish Water and the EPA as part of the revised EI Licence Application.

The above are not considered to affect the validity of the EIAR and it is concluded that no significant environmental impact will arise from the subject development.

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2.0 PLANNING & DEVELOPMENT CONTEXT

2.1 Planning History of Tipperary Cooperative Creamery Site

As noted in the Introduction, dairy processing has been undertaken at the Station Road site since pre-1900 and some of the existing buildings on the site preceded the requirement for planning permission, which came into effect in 1964, and Tipperary Cooperative Creamery's subsequent acquisition of the site in 1972. Developments completed on the site since 1972, and for which permission was sought by and granted to Tipperary Cooperative Creamery are included in Table 2.1 below:

Ref.	TCC Planning Ref.	Description of Development	Date Granted
1.	72580224	Erection of Extension to Milk Powder Factory	14.12.1972
2.	73580276	Erection of Treatment Plant	10.01.1974
3.	77580434	Erection of New Office Block	20.09.1977
4.	79580511	Erection of Cheese Factory	08.11.1979
5.	82580642	Improvement to Front Entrance	15.07.1982
6.	93581098	Extension to Evaporator Building	18.03.1993
7.	94581168	Erection of New Bagging Building to accommodate Powder Filling Machine	21.03.1995
8.	06581714	Extension to Cheese Factory	03.03.2007

Table 2.1: Schedule of Planning Applications at Tipperary Cooperative Creamery Site

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In October 2016 Tipperary Cooperative Creamery received planning permission from Tipperary County Council for a development comprising the upgrade of the existing Dryer 3 building. The works included replacement of the existing pitched roof structure with a raised flat roofed structure together with alteration and refurbishment works to the building interior. The Dryer 3 building adjoins the existing butter plant building which is a Protected Structure ref. RPS ID No. 100. Tipperary Cooperative Creamery have now decided not to proceed with this development.

2.2 Planning & Development Context for Subject Development

2.1.1 National Context

National Spatial Strategy 2002 – 2020
(Department of Environment, Heritage & Local Government, 2002)

The National Spatial Strategy, 2002-2020, (NSS) was intended to provide a planning framework for the delivery of balanced social, economic and physical development between the regions of Ireland. It provided a spatial structure based on 'Gateway' cities, 'hubs', towns, villages and rural areas, each of which have complementary roles within the structure.

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The NSS established a framework within which strategically placed large urban centres, essentially the cities, were to be strengthened in order to drive their wider regional economies. Larger towns or hubs as well as other key county towns, villages and rural areas had particular roles identified for them in the NSS.

The NSS particularly noted that the rapid growth of the main cities and surrounding regions of Cork, Galway, Limerick and Waterford pointed to their possible role in driving the development of their hinterlands and their combined potential to provide a strong counterbalance to Dublin capable of acting at the national and international levels, both individually and collectively. The NSS emphasised that a process of strengthening the critical mass of these existing gateways of Cork, Limerick, Galway and Waterford both individually and collectively, to complement Dublin's successful national spatial role, offered the most immediate prospects of establishing more balanced patterns of development over the initial years of the Strategy.

Tipperary Town is located within the area identified as having a 'Strengthening Role' within the national spatial context, as indicated on the Map in Fig.2.1. This role is to support and build linkages between the 'Gateways' of Cork, Galway, Limerick-Shannon and Waterford in order to provide critical mass in these areas to counterbalance the influence of Dublin.

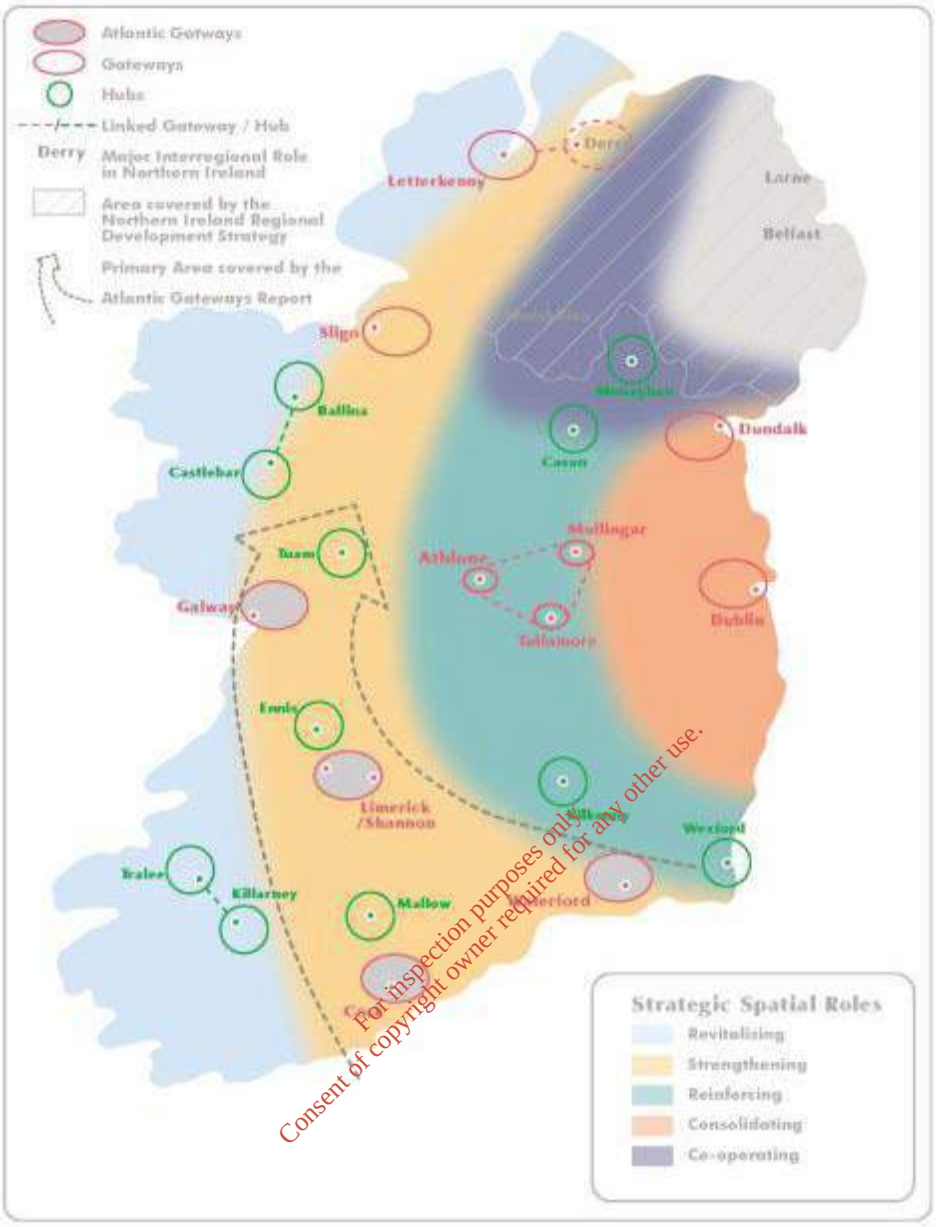
The initial consultation process in relation to a new National Planning Framework (NPF), entitled Ireland 2040 – Our Plan, which will act as the successor to the NSS and be the Government's strategic 20 year plus framework for the development of Ireland to 2040 has recently been concluded. It is anticipated that a draft NPF will be finalised for submission to Government in Q2 2017, after which it will be published for public consultation, with a view to its conclusion by the end Autumn 2017.

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The Atlantic Gateways Initiative – Achieving Critical Mass
(Department of Environment, Heritage & Local Government, 2006)

The Atlantic Gateways Initiative was intended to support the NSS and explore the concept of how linkages between the four 'Gateway' cities of Cork, Galway, Limerick/Shannon and Waterford could present prospects for Ireland to develop the type of critical mass present in the Dublin region, to complement it and lead the drive towards more balanced regional development across the western and southern parts of the island of Ireland, complementing the dynamic east coast corridor between Dublin and Belfast. Tipperary Town is well positioned in this respect with the N24 National Primary Route and the Waterford-Limerick Rail Line forming key east-west transport corridors linking two of the 'Atlantic Gateway' cities of Limerick and Waterford both passing through the town.

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Fig. 2.1: National Spatial Strategy 2002-2020 – Gateways and Hubs

2.1.2 Regional Context

South-East Regional Planning Guidelines 2010-2022

The South-East Regional Planning Guidelines 2010-2022 were adopted by the South-East Regional Authority in July 2010 to cover the counties of Carlow, Kilkenny, the southern part of County Tipperary, Waterford (City and County) and Wexford. The South-East Regional Authority was subsequently dissolved in 2014 and its functions and responsibilities transferred to the Southern Regional Assembly.

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The Guidelines set out a series of recommendations to local authorities, which are linked to and support national investment priorities and are designed to strengthen integrated approaches to policy making and planning at a local level, in line with regional and national planning frameworks. The South-East Regional Planning Guidelines 2010-2022 continue to have effect until a Regional Spatial and Economic Strategy is prepared and adopted by the Southern Regional Assembly as outlined below

Regional Spatial and Economic Strategy

Arising under the Local Government Reform Act 2014 the Southern Regional Assembly has assumed a number of new functions. Chief among these new responsibilities is the preparation of a Regional Spatial and Economic Strategy (RSES) for the Southern Region. The RSES is a link between the forthcoming National Planning Framework, the City and County Development Plans and the Local Economic and Community Plans. Through this process the Assembly is centrally involved in the formulation of policies geared towards achieving a greater dispersal of economic growth and development throughout the region.

To ensure that all local authority development plans are consistent with the RSES and relevant national policy, draft plans or proposed variations to development plans are referred by the Local Authority to the Regional Assembly. Following the preparation of a new draft development plan, or a proposed variation to an existing development plan, the Regional Assembly will consider if the draft is consistent with the RSES and can issue formal recommendations to the relevant local authority where necessary.

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The Assembly is a prescribed body under the Planning Acts. This means that it must be consulted on certain strategic infrastructural proposals. When assessing any such proposals the Assembly has regard to the general welfare, strategic planning and sustainable development requirements of the region. In practise this means it takes into account the physical, economic, social, demographic, infrastructural and environmental situation of the region. Under the Act the Assembly must seek to protect or improve the region's environment, its heritage, amenity and cultural resources. As outlined above, the South-East Regional Planning Guidelines 2010-2022 continue to have effect until a Regional Spatial and Economic Strategy is prepared and adopted by the Southern Regional Assembly.

2.1.3 South Tipperary County Development Plan 2009-2015 (As Varied)

Tipperary County Council was established on the 1st June, 2014, following a decision in 2011 by the Department of Environment, Community and Local Government (DECLG) to amalgamate North and South Tipperary County Councils.

County Tipperary has at present two County Development Plans, comprising:

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- Variation No. 2 of the South Tipperary County Development Plan 2009-2015, adopted by Tipperary County Council in December 2015.

- Variation No. 2 of the North Tipperary County Development Plan 2010-2016, adopted by Tipperary County Council in December 2015.

Currently both Plans (as varied) should be read together until such time as a single County Development Plan is prepared for the county. Under Section 11(B)(1) of the Planning and Development Act 2000, (as amended), the Council cannot commence the review of the North and South Tipperary County Development Plans and the preparation of a new, single County Development Plan, until the new Regional Spatial and Economic Strategy (RSES) for the Southern Region, as outlined above, has been made by the Southern Regional Assembly.

2.1.4 Tipperary Town and Environs Development Plan 2013-2019

The current active Tipperary Cooperative Creamery site at Station Road is designated within Land Use Zoning Map A of the Tipperary Town and Environs Development Plan (2013-2019) as lands zoned for General Industry (GI). Map 7 of the Development Plan identifies lands zoned for both light industry and general industry land use in the current Development Plan. Policy ECON 1: Zoning of land for Employment Uses relates to this designated zoning and states that:

"It is the policy of the Planning Authority to ensure that sufficient lands are zoned to facilitate various types of employment generating industries at appropriate locations having particular regard to small startup industries and new businesses requiring easy access to strategic route corridors."

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The Plan also designates the site within an area designated as Flood Zone A and B which is covered by Policy INF 20: Flood Risk Assessment which states:

"The Planning Authority will require development proposals within Flood Zone A and Flood Zone B to comply with the recommendations of Section 5.3 of the Strategic Flood Risk Assessment. Applications will be required to satisfy the requirements of the Development Management Justification Test and be accompanied by a comprehensive Stage 3 Flood Risk Assessment for proposals in an area at risk of flooding, adjoining same or where cumulative impacts may result in a flood risk elsewhere, in low lying areas and in areas adjacent to streams."

The site is located outside of the Architectural Conservation Area for the town but is bordered to the north and east by a Zone of Archaeological Potential.

There is one protected structure recorded within the north east of the Tipperary Co-Op site. This is the Barn-style twelve-bay double-height creamery building built c. 1900. Protection of this building is an important consideration for any developments at the Tipperary Cooperative Creamery site under Policy AH 1:

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It is the policy of the Council to conserve and protect buildings, structures and sites contained in the Record of Protected Structures that are of special interest and to ensure any development is appropriate and sensitively undertaken. In assessing development proposals the Council will, where applicable, have regard to the Architectural Heritage Protection Guidelines for Planning Authorities and any relevant Conservation and Management Plans.

The Council, will proactively work with developers/applicants to facilitate the appropriate reuse/redevelopment of Protected Structures. The Planning Authority will resist;

(a) Demolition of protected structures, in whole or part,

(b) Removal or modification of features of architectural importance,

(c) Development that would adversely affect the setting of a protected structure

There are no protected monuments within the Tipperary Cooperative Creamery site.

Strategic Development Site 2, designated within the Town Plan as an employment use is located on the southern boundary of the site. This site comprises 1.43 ha and is traversed by the Waterford – Limerick Railway Line. The plan states that any future proposals for this site will be required to protect the residential amenities of the adjacent residential properties and shall not encroach on the operation of the Railway Line.

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2.3 Compatibility of the Proposed Development

It is considered that the Dryer 2 development, as proposed is consistent with the policies and objectives established in the above Plans.

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3.0 DESCRIPTION OF DEVELOPMENT

3.1 Site Description

3.1.1 Site Location

The existing Tipperary Cooperative Creamery Limited milk processing plant is located just south of Tipperary Town centre on a triangular shaped site bounded to the east by Station Road on the R664 Regional Road connecting the village of Aherlow to the town, to the south by the Waterford – Limerick Rail line and to the north west by the River Ara.

The N24 Waterford to Limerick Road which runs through the centre of Tipperary Town via Main Street is located approximately 200m to the north of the site.

The Tipperary Cooperative Creamery landholding also extends to the lands to the north of the river including the vacant former hotel site and the undeveloped lands on the western side of same, neither of which are currently used as part of the existing operational dairy processing facility.

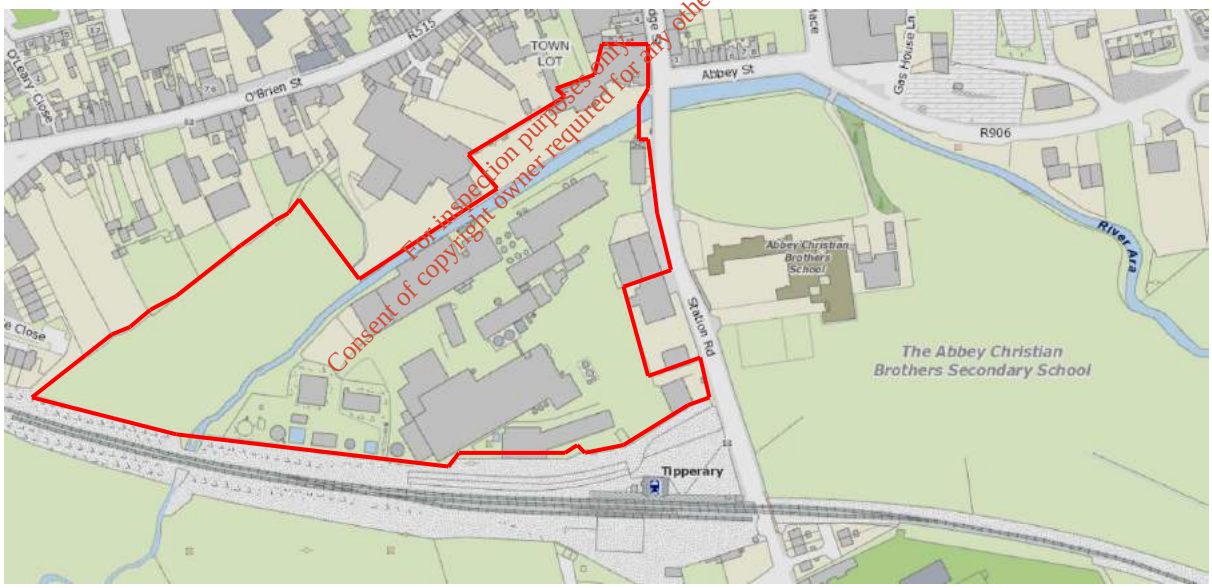


Figure 3.1: *Site location map showing Tipperary Cooperative Creamery lands with developed site bounded by Station Road to east, Waterford-Limerick rail line to south and River Ara to north-west*

3.1.2 Site Area

The total area of the Tipperary Co-Operative Creamery site, including the lands to the north of the river, extends to c.6.2 ha.

3.1.3 Existing Use

Today the Tipperary Cooperative Creamery site on Station Road comprises an integrated dairy processing plant manufacturing a range of products, primarily butter, milk powders and cheese. Processing, in the various sections of the plant may be

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undertaken on a 24 hour basis, depending on the supply and quality of milk, market demands and time of year. The facility does not have any defined shutdown period, with processing operations occurring at the facility 365 days a year. The facility currently has peak daily processing capacity in the order of c.1.62 million litres of milk per day. This equates to a theoretical annual processing capacity of 591.3 million litres (c.130 million gallons) of milk equivalent per annum calculated on the basis of the peak daily capacity operating over 365 days per year.

While this annual equivalent milk processing capacity forms the basis on which the thresholds are calculated in determining a requirement for a mandatory Environmental Impact Assessment Report (EIAR) it is noted that in practice the facility will only be capable of operating at or close to this peak daily capacity for a limited number of days per annum given the requirement for regular scheduled cleaning and maintenance operations at each of the three facilities which contribute to this peak capacity and the variation in availability of milk for processing throughout the year. In the Irish dairy sector there is a significant variation in the volumes of milk available for processing across the year, with a peak to trough ratio in the order of 6.25 between the peak milk supply in the month of May and that available for processing in the lowest month of January. This effectively reduces the actual volume of milk available for processing on an annual basis to c.60% of the theoretical volume calculated on the basis of the peak daily supply.

3.1.4 Adjoining Land Uses

Adjoining land uses comprise commercial premises and undeveloped marshland on the north western bank of the Ara River, a school and associated playing fields on the eastern side of Station Road and railway station, former railway yard and undeveloped lands to the south of the rail line. The closest existing residential properties are located along Bridge Street and Abbey Street to the north east of the site and along O'Brien Street to the north.

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3.1.5 Site Access

Access to the Tipperary Cooperative Creamery site is via the existing vehicular entrance off Station Road, which forms the eastern boundary of the site, and which is part of the R644 Regional Route connecting the village of Aherlow, c.5km south of the site to Tipperary Town at it's junction with the N24 Waterford-Limerick National Primary Route, c.150m north of the site entrance.

3.1.6 Topography

The Tipperary Cooperative Creamery site is relatively level with existing ground levels in the range 86.3 to 87.3m over the majority of the site.

3.1.7 Geology

The Tipperary Cooperative Creamery site comprises an established brownfield site and the underlying shallow soils/subsoils therefore generally comprise made ground.

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The underlying rock comprises carboniferous limestone of the Suir Limestone formation.

3.1.8 Hydrogeology

The underlying aquifer has been classified as an RKd (regionally important aquifer – Karstified (diffuse)) and the GSI Classification for this bedrock aquifer unit indicates it is capable of supplying regionally important abstractions (e.g. Large public water supplies), or 'excellent' yields (>400m3/d). Groundwater flow occurs predominantly through sand and gravel grains, through solutionally-enlarged fissures. Although no hydrogeological data is available, transmissivity is expected to be high in the pure limestones but storage will be low. The groundwater vulnerability is described as moderate.

Tipperary Cooperative Creamery currently abstract water from a single abstraction well on the site.

3.1.8 Hydrology

The River Ara, which flows along the north western boundary of the site, rises in low lying lands west of the village of Lattin and flows through Tipperary and Bansha before converging with the River Aherlow at Tankerstown, c.16km downstream of the site. The River Aherlow subsequently discharges to the River Suir 2 km north of Cahir.

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3.2 Description of Existing Building Developments on Site

Dairy processing has been undertaken at the Station Road site since pre-1900. Some of the existing buildings on the site therefore preceded the requirement for planning permission which came into effect in 1964, and Tipperary Cooperative Creamery's subsequent acquisition of the site in 1972. These include:

- The original creamery building (former Condensed Milk Factory) constructed in 1898, which is included on the Tipperary Town record of Protected Structures (RPS Ref.100). This building is used for butter production.

- Subsequent alterations and an upward extension to the rear of the above building completed around the mid 1930's, which accommodates two smaller dryer installations used for milk powder production. Planning permission for significant alterations and an upgrade of this building was recently granted by Tipperary Co. Co. (Planning Ref. 16/600690).

- A two storey limestone industrial building constructed to the south of the original creamery building around 1930 which has previously been used for butter storage but is no longer required.

- Single storey two bay building on Station Road along the eastern boundary of the site currently used as a workshop and for packaging.

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- The former McMahon's Stores buildings adjacent to the Irish Rail lands along the southern boundary of the site currently used for storage.

Developments completed since Tipperary Cooperative Creamery's acquisition of the site in 1972 include:

- Planning Ref. 72580224 – Erection of Extension to Milk Powder Factory: This development included the construction of a new Powder Plant (including Evaporator and Dryer), Milk Intake Facility, Separation Plant, Laboratory, Boilerhouse/Utilities Building and Packaging/Warehouse/Dispatch facilities.

- Planning Ref. 73580276 – Erection of Treatment Plant: This comprised the construction of a new activated sludge wastewater treatment plant to facilitate the treatment of process wastewater on site following the completion of the above development.

- Planning Ref. 77580434 – Erection of New Office Block: This comprised the construction of a new Administration Building on Station Road adjacent to the main entrance to the site.

- Planning Ref. 79580511 – Erection of Cheese Factory – This comprised the construction of a new manufacturing facility for continental cheese production on the site.

- Planning Ref. 93581098 – Extension to Evaporator Building – This comprised an extension to the Powder Plant to facilitate the installation of a second evaporator.

- Planning Ref. 94581168 – Erection of New Bagging Building – This comprised a further extension to the Powder Plant to facilitate the installation of a new powder filling machine.

- Planning Ref. 06581714 – Extension to Cheese Factory – This comprised an extension to the Cheese Factory to facilitate the provision of additional cutting, packing, storage and dispatch facilities.

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3.3 Description of Existing Dairy Processing Operations

The existing Tipperary Cooperative Creamery facility at Station Road comprises an integrated dairy processing plant manufacturing a range of products, primarily butter, milk powders and cheese.

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The main dairy processing activities undertaken on the site comprise milk intake, separation, evaporation, drying/powder production, cheese production and butter production.

Wastewater from the process and associated cleaning operations is discharged to the existing onsite wastewater treatment plant for treatment prior to discharge to the public sewer.

A process diagram identifying the main dairy processing operations and typical associated capacities at peak milk intake is presented in Figure 3.3.1. An outline description of each of the main dairy processing activities is included below.

3.3.1 Milk Intake

The Milk Intake facility at the Station Road site was constructed following Tipperary Cooperative Creamery's acquisition of the site in 1972 and coincided with the introduction of bulk milk collection. Raw milk from dairy farms in the locality, as well as milk derivatives including primarily buttermilk, but also some skim milk and whey which have been partly processed at other dairy processing facilities, are delivered to the Tipperary Cooperative Creamery site in articulated road tankers and are received at the milk intake facility where the milk is offloaded, cooled, tested and piped into the appropriate storage silos on the site. The peak daily intake capacity of the Station Road facility, at times of peak milk production, is c.1.62 million litres (c.356,00 gallons) per day comprising c. 1.27 million litres of whole milk and c.0.35 million litres of buttermilk. As noted above, in practice the facility will only be capable of operating at or close to this peak daily capacity for a limited number of days per annum given the requirement for regular scheduled cleaning and maintenance operations at each of the facilities which contribute to this peak capacity and the variation in availability of milk for processing throughout the year.

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3.3.2 Separation

The Separation Plant was also installed following Tipperary Cooperative Creamery's acquisition of the site in 1972. Any whole milk not intended for use in cheese production, is piped from the storage silos to the separation plant, where the milk is separated into cream (c.9.5%) and skim milk (90.5%). At peak milk intake, c.874,000 litres of whole milk per day are separated in this manner, generating c. 83,000 litres of cream for use in butter production and c. 791,000 litres of skim milk for further processing on the site.

3.3.2 Evaporation

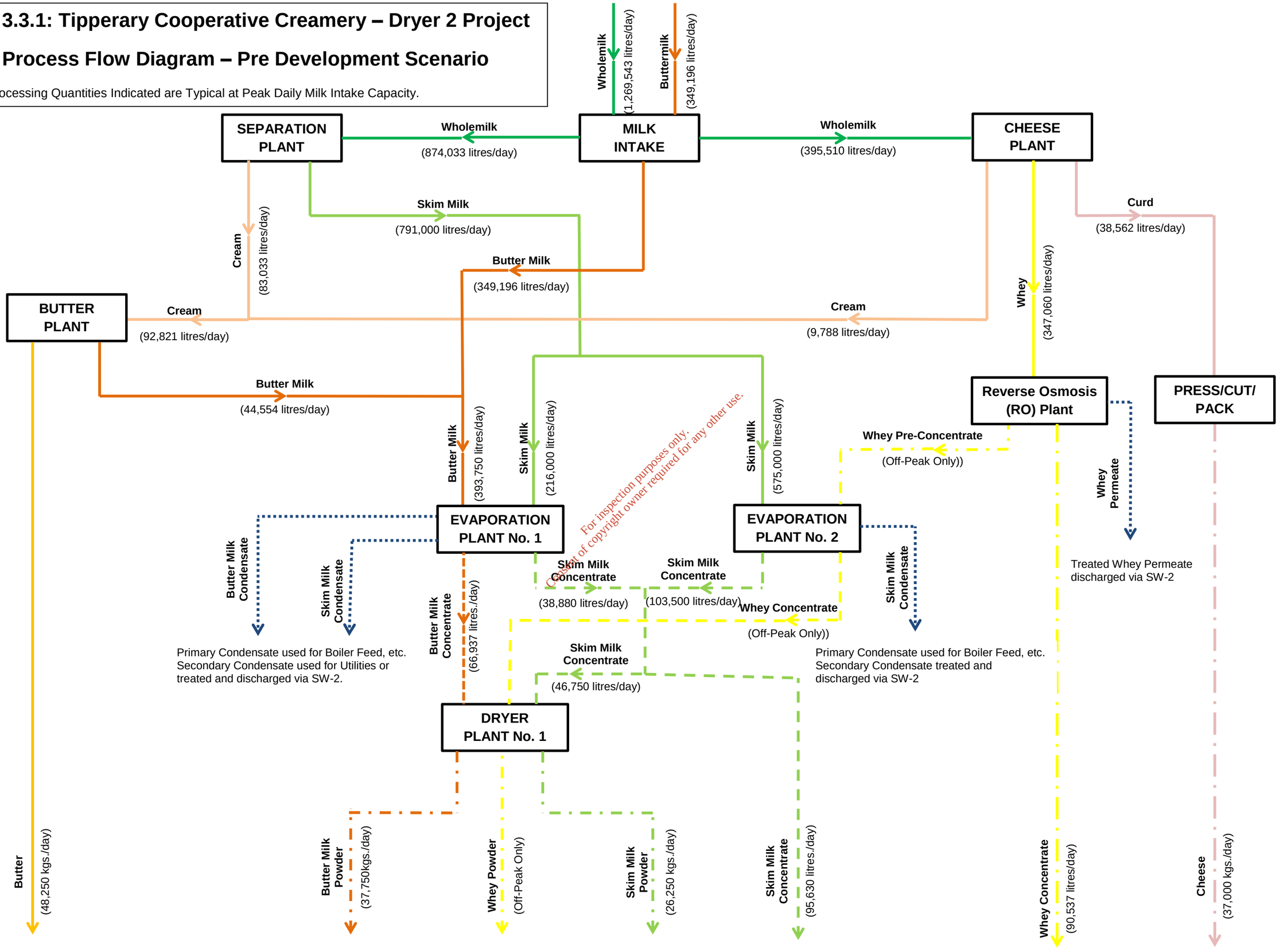
There are two evaporation plants currently located within the Tipperary Cooperative Creamery facility, one (Evaporator No. 1) installed following the Cooperative's acquisition of the site in 1972 and the second (Evaporator No. 2) added in 1993. Following the separation process outlined above, the skim milk, which has a solids content of c.6% is piped to one of the two evaporation plants where a significant portion of the water content (c.82%) is removed in the evaporation process, to produce a skim milk concentrate with a solids content of c. 50%.

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Fig. 3.3.1: Tipperary Cooperative Creamery – Dryer 2 Project

Process Flow Diagram – Pre Development Scenario

Note: Processing Quantities Indicated are Typical at Peak Daily Milk Intake Capacity.



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Buttermilk, a by-product of butter production, undergoes a similar evaporation process, to produce buttermilk concentrates. Currently, at peak milk intake periods, approximately one third of the evaporation capacity on the site is allocated to buttermilk concentration and two thirds to skim milk concentration. During these periods approximately two thirds (67%) of the skim milk concentrate generated in the two evaporation plants on the site is dispatched from the site without further processing due to the lack of adequate drying capacity to facilitate it's use for powder production.

Outside of peak milk periods, a proportion of the whey generated in the cheese plant, also goes through an evaporation process, having first been pre-concentrated in the RO Plant, as outlined below, to facilitate it's use in the manufacture of whey powders.

Condensate generated in the evaporation process comprises primary and secondary condensate. The primary condensate which accounts for approximately one third of the total volume of condensate is used as boiler feed water. A proportion of the secondary condensate from Evaporator No. 1 is used for utilities including chill water, boiler top-up and evaporator seals. The remaining secondary condensate from the two Evaporators is discharged to the River Ara via emission point SW-2 in accordance with the IE Licence.

3.3.4 Drying/Powder Production

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There are three existing dryers currently located at the Tipperary Cooperative Creamery facility at Station Road. These include the two older small 'Rodgers' box dryers, with limited production capacity, located at the western end of the butter factory building which were installed when the plant initially commenced powder production under the Condensed Milk Company in the 1950's and the larger An-hydro Spray Dryer (Dryer No. 1) which was installed in the new purpose built powder plant developed by Tipperary Cooperative Creamery after they acquired the facility in 1972. Only one of the existing Rodgers Dryers is currently operational and included on the current IE Licence. Given the age and limited production capacity of this Dryer it is only used occasionally and the majority of powder production now takes place in Dryer No. 1. Skim milk and buttermilk concentrates are piped into this plant where they are dried in the dryer and the powder packaged in the adjoining packaging plant prior to dispatch. Dryer No. 1 has a powder production capacity of 3.2 tonnes per hour, and at peak milk intake c.60% of this is allocated to butter milk powder production and the remaining c.40% to skim milk powder production. At peak milk intake capacity the plant would typically generate c.37.75 tonnes of butter milk powder and c.26.25 tonnes of skim milk powder per day. As previously noted above, currently two thirds of the skim milk concentrate generated on site at peak milk capacity is exported from the site without further processing due to the lack of adequate drying capacity to facilitate its use in powder production.

3.3.5 Butter Production

The cream, separated from the skim milk in the separation process outlined above, and supplemented by a small volume of cream generated in the cheese plant, is piped to the butter plant, located in the original protected creamery building, where it

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is pasteurised and churned to produce butter. The butter is then packaged for dispatch from the plant. Buttermilk, produced as a by-product of the butter making process, and which comprises c.48% of the original volume of cream used in the process, is further processed on the site to produce buttermilk powder as outlined above. Currently the facility can typically produce up to c.48.25 tonnes of butter per day at peak milk intake capacity.

3.3.6 Cheese Production

The cheese factory was constructed in 1980 and subsequently extended in 2007. Raw whole milk is piped to the cheese plant and following preservative treatment and the addition of starter cultures and rennet enzymes, which contribute to the cheese making process, whey is drained from the cheese curd which is then salted, pressed, cut and packed for dispatch. At peak processing capacity the plant produces c.37.0 tonnes of chees per day. The whey, a by-product of the process, and which comprises c.87.75% of the original volume of whole milk used in the process, is collected and pre-concentrated in an RO (Reverse Osmosis) Plant, to facilitate it's dispatch from site as whey concentrate. At off peak periods, when residual capacity is available in Evaporator No. 2 and Dryer No. 1, up to 50% of the whey is retained on site to facilitate it's further processing in the manufacture of whey powders. The level of pre-concentration applied to the whey in the RO Plant depends on whether it is intended for dispatch as whey concentrate or for further processing on site to produce whey powder. Whey to be dispatched from site as whey concentrate has its solids content increased from c. 6 to 23%, with a corresponding reduction in volume of c.74%. However, whey intended to be used on site in the manufacture of whey powder is only pre-concentrated to a solids content of c.14% with further concentration completed in the evaporation process. Treated whey permeate generated in the RO plant is discharged to the River Ara via emission point SW-2 in accordance with the IE Licence.

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3.3.7 Wastewater Treatment Plant

Wastewater generated from the milk processing activities on the Tipperary Cooperative Creamery site, primarily from clean in place (CIP) washing processes associated with the delivery tankers, intake lines, separation plant, storage silos, evaporators and butter plant is currently collected via the existing process drainage infrastructure and treated at the existing activated sludge wastewater treatment plant on site before discharging to the municipal wastewater treatment plant via the public sewer for further treatment. The onsite wastewater treatment plant was constructed in 1974. Domestic wastewaters generated at staff welfare and canteen facilities discharge directly to the public sewer.

3.4 Description of Proposed Development

3.4.1 Background to Development

Tipperary Cooperative Creamery Ltd. have identified the proposed new Dryer 2 Facility as the appropriate development to provide the quality of manufacturing environment, facilities, production capacities and operational flexibility to enable them

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to continue to compete in an evolving dairy processing market since the removal of milk quotas in 2015, and thereby secure the future of dairy processing for Tipperary Town. In particular the following key aspects of the existing operation and proposed development were considered:

- As detailed above, two thirds of the skim milk concentrates currently produced at Tipperary Cooperative Creamery during peak milk periods are currently dispatched from site without further processing due to the lack of adequate drying capacity to facilitate their use in powder production. The development of the new 'Dryer 2' facility will increase the evaporation and drying/powder production capacities on the site and therefore permit the company to undertake further processing of a higher proportion of these products and move towards the production of a larger proportion of the higher value milk powders.

- Similarly, at peak milk intake all of the whey concentrate generated by the cheese plant needs to be exported from the site without further processing due to the unavailability of both evaporation and drying capacity to facilitate its use in the manufacture of whey powder. The development of the new 'Dryer 2' facility will increase the evaporation and drying/powder production capacities on the site and therefore permit the company to undertake further processing of the whey concentrate and move towards the production of a larger proportion of the higher value whey powders.

- The existing dryer facilities at Tipperary Cooperative Creamery comprise two smaller 'Rodgers' dryers, located within the extension to the original creamery building which were installed when the Condensed Milk Company commenced powder production on the site in the 1950s and the larger An-hydro Spray Dryer (Dryer No. 1) installed following Tipperary Cooperative Creamery's acquisition of the site in 1972, and these facilities are therefore over 60 and 40 years old respectively. The development of the new Dryer 2 Facility will provide Tipperary Cooperative Creamery Ltd. with a modern state of the art powder production facility meeting the increasing standards of manufacturing environment required by existing and prospective customers in a developing market for high quality dairy products.

- The additional drying/powder production capacity will also facilitate Tipperary Cooperative Creamery in accepting higher volumes of skim milk, whey and buttermilk concentrates, which have already been partly processed at other milk processing facilities, and completing the processing of same to produce higher value milk powders.

- The additional drying/powder production capacity will facilitate Tipperary Cooperative Creamery to decommission the two smaller existing 'Rodgers' driers, which as noted above, were installed when the Condensed Milk Company commenced powder production on the site in the 1950s and are now over 60 years old.

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- The development of the Dryer 2 Facility takes advantage of the existing infrastructural and milk supply set-up at the Station Road site which Tipperary Cooperative Creamery have developed since they acquired the Station Road facility over the past 45 years.

3.4.2 Scope of Building/Civil Works

The proposed development comprises the construction of a new Dryer Tower Building and associated works. The scope of works will include:

- Enabling Works including establishment of Contractor's Compound within former Hotel site on northern side of River Ara;
- Demolition of existing former butter store to the south of proposed building to facilitate construction, external circulation and access around new building;
- Partial demolition of the existing powder store within the footprint of the new building;
- Removal of disused fuel storage tanks and associated bund structure and canopy over;
- Building Works including the construction of a new Dryer Tower Building with an overall parapet height in the order of c.32.5m above ground level and a ground floor area of c.1150m^2.
- Alterations and upgrade to existing surface water drainage infrastructure to facilitate construction of and connections from new building;
- Alterations and upgrade of process and foul drainage infrastructure to facilitate construction of and connections from new building;
- Upgrade of existing wastewater treatment plant to cater for additional flow rate generated by the Dryer 2 Facility and to improve the quality of treated effluent discharged to the public sewer;
- Decommissioning of existing Rodgers Dryers.

A more detailed description of each of the above elements of the works is provided below.

3.4.3 Enabling/Temporary Works

Ref. Drawing Nos. 116020-205

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The proposed development will include the following enabling/temporary works which will be completed prior to commencement of the main construction works detailed in Sections 3.4.5 to 3.4.7 below:

- Establish temporary construction Contractor's Compound within the vacant former hotel site on northern side of River Ara. This site has been purchased by Tipperary Cooperative Creamery Limited but does not currently form part of the existing operational site. Enabling works to the compound will include any necessary remedial works to existing carpark surfacing and boundary walls to ensure that any surface water run-off from the compound is contained and collected to the existing surface water drainage infrastructure serving the carpark.

3.4.4 Demolition/Partial Demolition Works

Ref. Drawing Nos. 116020-206 & 207

A number of existing structures will require demolition/partial demolition to facilitate the construction of the new Dryer 2 Facility. These include:

- Southern half existing single storey warehouse (powder store) building;
- Former Butter Store Building;
- Existing disused fuel tanks and associated bund structure and canopy over.

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3.4.5 New Building Construction

Ref. Drawing Nos. 116020-211, 212, 213, 221-225, 231-233

The scope of building works associated with the construction of the New Dryer Tower will include:

- Substructure works including piled foundations, pile caps, ground beams and ground floor slab to Dryer 2 building;
- Dryer 2 building superstructure including reinforced concrete walls to the main production areas and reinforced concrete framing to plant/utilities accommodation. Intermediate floors required to provide access to process plant and equipment will be of a combination of reinforced concrete and steel construction, as appropriate. External walls will be clad in composite metal insulated panelling and the roof will comprise a flat membrane roof construction supported on a steel roof structure.
- Internal finishes to Dryer 2 building including floor, wall and ceiling finishes, and doors to the process/production areas to the appropriate high

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specification required to provide the high care hygienic environment required for the production of milk powders;

- Mechanical and electrical installations and commissioning;

- Dryer 2 building equipment installation, fit-out and commissioning including new evaporator and dryer systems described in section 3.5. below.

3.4.6 Surface Water Drainage Infrastructure

Ref. Drawing Nos. 116020-202, 221

Surface water run-off from the existing roofs and circulation areas is collected via the existing surface water sewer infrastructure within the site and discharges directly to the River Ara via a number of licensed emission points on the northern boundary of the site. Surface water from the main parking areas passes through a Class I Bypass Separator prior to discharge. Cooling water, which is potable water which has not come into contact with milk or other organic substances, is also discharged directly to the River Ara. Treated condensate, generated as a by-product of the evaporation process for milk and milk derivatives on site is also discharged directly to the River Ara following treatment. All of these emission points are licensed under Tipperary Cooperative Creameries IPPC Licence.

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The footprint of the proposed Dryer Tower Building and associated external works currently comprises existing buildings and paved surfaces and on this basis there will be no significant change to the total volumes of surface water collected from roofs and paved areas as a consequence of the construction of the new Dryer Tower. However, a number of amendments to the existing surface water drainage infrastructure will be required to facilitate the construction of the Dryer Tower. These include:

- Decommissioning of surface water drainage collecting roof drainage from existing buildings which are being demolished;

- Diversion of existing surface water drainage infrastructure serving other areas where they pass under the footprint of the new buildings;

- Installation of new surface water drainage infrastructure to collect roof drainage from new buildings and connection of same to existing system;

- Installation of new surface water drainage infrastructure including gullies, etc. to serve external circulation and hardstanding areas around new buildings and discharge via new hydrocarbon interceptor to existing system.

3.4.7 Foul/Process Drainage Infrastructure

Ref. Drawing Nos. 116020-202,221

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Wastewater generated from the milk processing activities on the Tipperary Cooperative Creamery site is currently collected via the existing process drainage infrastructure and treated at the existing activated sludge waste water treatment plant on site before discharging to the public sewer for further treatment. Domestic wastewaters generated at staff welfare and canteen facilities discharge directly to the public sewer.

Details of proposed upgrade works to the wastewater treatment plant are detailed in Section 3.6 below.

A number of alterations and upgrades will also be required to the existing foul/process drainage to facilitate the proposed Dryer 2 Facility. These include:

- Diversion of any existing foul/process drainage lines which pass under footprint of new buildings;
- Collection of process effluent from new building and connection to existing system to facilitate transfer to wastewater treatment plant;
- Collection of treated condensate from new building and connection to existing system for discharge to River Ara;
- Collection of domestic wastewater from toilet areas, etc. within new building and connection to existing system for discharge to public sewer.

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3.4.8 Wastewater Treatment Plant Upgrade

Ref. Drawing Nos. 116020-241 and 242

The existing on site wastewater treatment plant (WWTP) was originally installed in 1974 (Tipperary Co. Co. Planning Ref. 73580276) following Tipperary Cooperative Creamery's acquisition of the Station Road facility in 1972 and the expansion of milk powder production at the plant. The plant was subsequently upgraded to cater for the additional effluent generated by the Cheese Factory in 1979. The treatment method comprises an activated sludge system (biological treatment) and solids removal through clarification. Effluent from each of the cream, butter, milk powder and cheese processing areas on site are conveyed via the existing effluent drainage infrastructure, outlined above, to an underground sump from where they are pumped forward to the WWTP balance tank. The balance tank facilitates the mixing of waste streams from the various sections of the plant providing a consistent effluent quality to be pumped forward to the main treatment system. The balanced effluent is then pumped forward for pre-treatment via dissolved air floatation (DAF) which removes fats and some solids, before passing to the bio-tower for further treatment. The effluent then passes to two aeration basins where the main biological treatment takes place. The treated effluent from the aeration basins gravitates to two existing clarifiers where secondary treatment, involving the removal of any remaining solids from the liquid fraction of treated effluent, takes place prior to discharge to the public sewer. Waste sludge from the system is pumped to a sludge holding tank, prior to

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being pumped to a decanter for dewatering and the sludge cake from the decanter is then conveyed to a skip for removal off site. The existing treatment plant is designed to treat 870m^3 of effluent per day with a treated effluent quality of 60mg/litre BOD and 90mg/litre suspended solids.

In order to facilitate the new Dryer 2 development and the associated net increase in effluent that will be discharged to the treatment plant, the capacity of the existing plant will need to be increased to cater an increase in mean effluent throughput. up to c.1300m^3 per day when fully operational. Tipperary Cooperative Creamery intend to procure a specialist wastewater treatment plant contractor to design, construct and commission an upgrade of the existing waste water treatment plant to cater for the additional effluent treatment capacity required and to significantly improve the quality of treated effluent discharged to the public sewer.

The upgraded treatment plant will be designed to cater for a peak flow rate of 1500m^3 per day, providing a margin of 200m^3 over the mean effluent throughput capacity identified to cater for the new Dryer 2 Facility, and to achieve a treated effluent quality of 25mg/litre BOD and 35mg/litre suspended solids, a significant improvement on current treated effluent quality standards outlined above.

The scope of the upgrade to the existing WWTP to cater for the additional effluent capacity and achieve the higher quality standards for the treated effluent will include the following:

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(i) Inlet Screening and Balancing

The capacity of the existing balance tank will be increased in order to cater for the larger effluent volume and an extended storage period of up to 24 hours prior to pumping forward to the DAF. All effluent entering the tank will pass through a new 6mm inlet screen.

(ii) Diffused Air Floculation (DAF)

The existing DAF unit will be replaced with a new unit which will facilitate the pre-treatment of the effluent in order to achieve a 30-40% reduction in BOD/COD prior to the main biological treatment in the plant.

(iii) Pumping Station

Following balancing and pre-treatment, the effluent will enter a pump sump equipped with duty and standby submersible pumps and level switches to facilitate the transfer of effluent to the main treatment process.

(iv) Biological Treatment

The existing equipment in the aeration tank will be replaced with a modern aeration system to facilitate the main biological treatment of the effluent.

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(v) Secondary Treatment

A new Clarifier, c.8.5m diameter, complete with scraper bridge and scum removal system will be installed as the final stage treatment in the process.

(vi) Control System

A new PLC system will be installed to efficiently control the operation of the entire upgraded WWTP

(vii) Treated Effluent Discharge Pipeline

The existing outfall pipeline which conveys the treated effluent from the WWTP to its discharge point to the public sewer on Station Road via the existing bridge crossing over the Ara River and a manhole in the former hotel car-park, will be replaced with a new line to facilitate a new raised crossing further downstream from the existing.

It is intended, subject to a grant of permission from the Planning Authority, that the existing Tipperary Cooperative Creamery Limited Industrial Emissions Licence will be reviewed with the EPA to include the additional discharge from the subject development.

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3.4.9 Water Supply Infrastructure

The majority of water for processing and washing operations (CIP – Clean in Place) at Tipperary Cooperative Creamery is abstracted via the borehole on the site. Currently at peak processing capacity c.1375m^3 of water per day is abstracted on this basis. The water is treated with biocide prior to use. A small proportion of the water for processing and CIP operations is sourced from the secondary condensate from Evaporator No. 1. The plant also has a metered mains water connection to the town supply but this represents only a small proportion of overall water demand on the site. Water for feeding the boilers is sourced from primary condensate from the two evaporators. Fire hydrants on the site are connected to the public supply and there is also a static water storage tank for fire-fighting purposes on site which is also connected to the public supply.

The condensate generated by the new Evaporator No. 3 following treatment in the proposed RO polisher, as detailed in Section 3.5.1, is of a suitable quality to facilitate it's use for processing and washing operations. Therefore, although the overall quantity of water required for processing and washing operations will increase following installation of the new evaporator and dryer, the use of treated condensate from Evaporator No. 3 will reduce the quantity of water which needs to be abstracted from the on-site well for this purpose by the order of 50m^3, leading to a net reduction in the volume of water abstracted from the well on a daily basis at peak processing capacity.

The existing supply infrastructure will be extended to supply the new building. Appropriate provision will also be made for water supply for fire-fighting requirements in accordance with the requirements of Tipperary Co. Co. Fire Services.

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3.5 Description of Proposed Dairy Processing Systems

As outlined in the background to the proposed development included in Section 3.4.1 above the construction of the new Dryer 2 Facility is intended to increase the evaporation and drying/powder production capacity on the site and therefore permit Tipperary Cooperative Creamery to undertake further processing of a higher proportion of the whey and skim milk concentrates generated on the site and move towards the production of a larger proportion of the higher value milk powders. In order to facilitate this, the new building is designed to accommodate the new plant and equipment installations and associated process operations outlined below. These will be fully integrated into the existing dairy processing operations at the Tipperary Cooperative Creamery site on Station Road and the existing milk intake, separation, packaging and dispatch facilities described in Section 3.3 above are adequate to cater for the additional milk processing capacity associated with the proposed development. A revised process flow diagram showing the new Evaporator No.3 and Dryer No. 2 integrated into the existing operations is included in Fig. 3.5.1.

3.5.1 New Evaporator System

Prior to drying, the product (skim milk or whey) needs to undergo an evaporation process in order to concentrate the liquid and increase its solids content. This takes place in an Evaporation Plant, where c. 85% of the water content is removed and the solids content increased from an initial solids content of c.9% to a final concentration of c.50% total solids. As outlined in Section 3.3.2 above there are currently two evaporation plants located within the Tipperary Cooperative Creamery facility at Station Road, one installed following the Cooperative's acquisition of the site in 1972 (Evaporator No. 1) and the second added in 1993 (Evaporator No. 2).

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In order to facilitate the concentration of the additional skim milk and whey volumes associated with the new Dryer installation, the scope of the Dryer 2 project includes the installation of a third evaporation plant (Evaporator No. 3) within the new building with the capacity to generate the same volume of concentrates per hour that can be processed in the new Dryer. The proposed evaporator will therefore have a processing capacity of c.34,000 kg of skim milk, whole milk or whey per hour, which equates to c.657,000 litres per day, based on a 20 hour production cycle and 4 hour cleaning cycle. The proposed evaporator system will comprise:

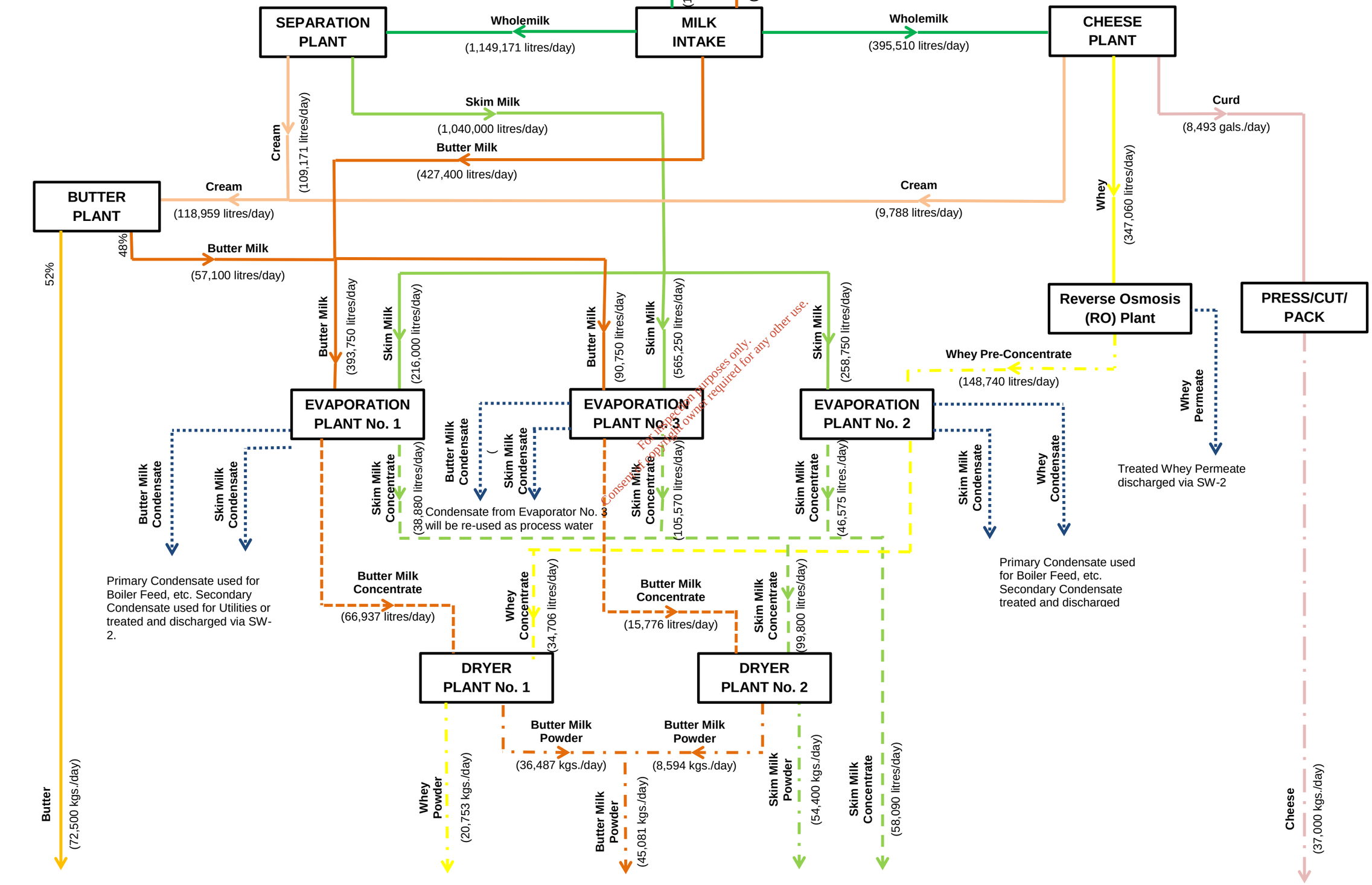
- Pre-heater to pre-heat the raw product (skim milk or whey) to the appropriate temperature;
- Two stage MVR Evaporator;
- RO Plant to treat and polish the evaporator condensate.

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Fig. 3.5.1: Tipperary Cooperative Creamery – Dryer 2 Project

Process Flow Diagram – Post Development Scenario

Note: Processing Quantities Indicated are Typical at Peak Daily Milk Intake Capacity.



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The raw product (skim milk or whey) will be pumped from the appropriate storage silos on site to the new Evaporator plant. The product will first be preheated to the appropriate temperature before passing through the evaporator where the product is heated via a heat exchanger to evaporate the solvent (water) and concentrate the product prior to drying. The evaporated solvent (water vapour) contains approximately the same amount of thermal energy as that used to heat the liquid, but at a lower pressure and temperature level. The proposed evaporator will comprise an MVR (Mechanical Vapour Recompression) type evaporator. In conventional thermally heated evaporators, which generally use steam to heat the evaporator, much of the thermal energy content transferred to the vapour stream is lost or only partially re-used in the process. In comparison, the use of mechanical vapour recompression technology, where a mechanically operated compressor recompresses practically the complete vapour from the process from a lower evaporation pressure and temperature level to the heating pressure required for the process. In this way its thermal energy is re-used for heating and does not have to be condensed without being re-used. The system therefore uses considerably less energy than a conventional thermally heated plant. Following evaporation the concentrate is pumped to the dryer or holding tank, as appropriate. The vapour condensate passes through the RO (Reverse Osmosis) Plant to treat and polish the water prior to discharge/re-use elsewhere on the site.

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3.5.2 New Spray Dryer

As outlined in Section 3.3.3 above, there are currently three dryer installations located at the Tipperary Cooperative Creamery facility at Station Road, these comprise the two smaller 'Rodgers' dryers, located within the extension to the original creamery building which were installed when the Condensed Milk Company commenced powder production on the site in the 1950s and the larger An-hydro Spray Dryer installed following Tipperary Cooperative Creamery's acquisition of the site in 1972. The two older 'Rodgers' dryers are now over 60 years old, have very limited processing capacity (c.0.5 tonnes per hour), require significant maintenance and would require a significant upgrade to the building where they are located if they are to be retained for powder production in order to comply with modern hygiene standards. Tipperary Cooperative Creamery were granted planning permission by Tipperary County Council in October 2016 (Planning Reg. No. 16/600690) to complete such an upgrade to the existing building. However, given the age and limited capacity of the existing dryers, and significant costs associated with the upgrade Tipperary Cooperative Creamery have reconsidered the option of upgrading the building and decided to de-commission the existing dryers as part of the scope of the new project and to transfer any production operations currently carried out in the existing 'Rodgers' dryers to the new Dryer.

The proposed new Dryer Installation will comprise:

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- Dryer Feed System including pre-heater to pre-heat the concentrate to the appropriate temperature prior to drying, feed tanks, pumps and associated pipelines;
- Dryer Air Supply System including gas fired air heater, filters, fans, etc.;
- Spray Dryer with capacity to produce up to 3.2 tonnes of powder per hour including dryer chamber, integral fluid bed, etc;
- External Fluid Bed;
- Dryer Cyclone System;
- Dryer Bag Filter System.

Following the evaporation process described above, the concentrate will be pumped to the dryer feed/balance tanks, and then pass through a pre-heater and filters as they are being pumped to the top floor of the Dryer Tower where a high pressure nozzle atomisation system will spray the product into the dryer. Fresh air for the main air supply to the dryer is drawn in through the external wall of the building, pre-filtered and heated to the required temperature by means of a gas-fired air heater before entering the dryer. Once the atomized product comes into contact with the hot air in the upper part of the drying chamber, drying takes place rapidly as the material passes down through the chamber before the product passes into the integral fluid bed towards the bottom of the chamber where further hot air is added and the second stage of the drying process takes place. The powder then falls from the dryer chamber into the external fluid bed below, where further hot air is introduced and the third and final stages of the drying process take place. The product is then cooled to the appropriate temperature for transport and storage before dropping through a sifter into a pneumatic powder transport system which will transfer the powder to the existing powder storage silos and packaging facilities.

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Following the drying process, the process air, which will still contain product particles initially passes through a pair of cyclones which remove a significant proportion of these retained particles before passing into a bag-filter where removal of the remaining fines takes place. Product fines collected in the cyclones and bag-filter are conveyed separately back into the system. The filtered air is then ducted to the emission point located on the roof of the building.

3.6 Construction Methodology

3.6.1 Project Management and Construction & Environmental Management Plan

Construction of the project will be managed by a full time independent site based Project Management Team appointed by Tipperary Cooperative Creamery Ltd. and they will co-ordinate all aspects of the detailed design and construction of the project.

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It is intended to prepare a detailed Construction & Environmental Management Plan (CEMP) for the development. The CEMP is intended as a guidance document for the construction phase of the project, and will identify for the Project Management Team and Contractors, the key planning and environmental constraints and associated mitigation measures which need to be implemented in order to ensure that the project can be delivered in a manner which complies with the relevant statutory obligations and environmental best practice.

The CEMP will include sections specifically addressing each of the relevant environmental attributes considered in this Environmental Impact Statement including:

- Soils, Hydrology, Geology and Hydrogeology including Storm Water Management, Sediment & Erosion Control and Water Quality;
- Ecology including Terrestrial Ecology and Aquatic Ecology;
- Air, dust, noise and vibration;
- Waste Management;
- Health and Safety.

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The CEMP will be prepared by the Project Management Team, in consultation with the relevant specialist consultants and statutory bodies such as IFI, NPWS, EPA and Tipperary Co. Co., as appropriate, prior to commencement of any demolition and construction works on site. It will adopt, as appropriate, all relevant mitigation measures, including monitoring, identified in this Environmental Impact Assessment Report and associated specialist reports attached to same. It will also identify the arrangements to be put in place to monitor the implementation and effectiveness of the mitigation measures.

3.6.2 Building/Civil Engineering Works and associated Construction Methodologies

The main building/civil engineering works for the project will be completed by a Building & Civil Engineering Contractor with the appropriate experience and expertise in managing the construction and delivery of projects of similar type, scale and complexity. These works will comprise the following:

- Enabling Works including site establishment and demolition of existing former butter store, drainage diversions, etc. required to facilitate the works. Temporary construction compounds will be established within both the former hotel site (construction parking and site office accommodation) and in the

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vicinity of the building works (to separate the construction works from the operational Tipperary Cooperative Creamery site, and facilitate material laydown and equipment assembly). Demolition works will be undertaken by Contractors with the appropriate experience and in accordance with a project specific Demolition and Construction Waste Management Plan (DCWMP) which will form part of the CEMP prepared for the project. The partial demolition of the existing Powder Store necessary to facilitate the construction of the new building falling within the footprint of same will be co-ordinated with and completed in conjunction with the construction of the new building in order to facilitate the temporary support and transfer of loads from the retained section of the roof of the existing building;

- Building substructure including piling, reinforced concrete pile-caps and ground beams, substructure drainage, in-situ concrete and masonry rising walls, radon membrane and ground floor slab. Piling will comprise continuous flight auger (CFA) piles designed and installed by a specialist sub-contractor. Bulk and trench excavation will be undertaken using conventional mechanical excavators and all surplus excavated material will be removed and disposed of in accordance with the project specific DCWMP. Following cutting down of piles and concrete blinding of the underlying formation, fixing/placing of steel reinforcement, shuttering and in-situ concrete to the ground beams and pile caps will be completed by experienced tradesmen in accordance with the detailed designs and specifications prepared for the project. Excavations will be backfilled with approved granular fill, placed by mechanical excavator and compacted in layers using a vibrating roller. In-situ concrete and masonry rising walls and columns will be completed to ground floor level and following the laying of the underlying granular sub-base, sand blinding, radon barrier and perimeter insulation, as appropriate, the in-situ concrete ground floor slab will be formed.

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- The building superstructure includes reinforced concrete walls to the main production areas and reinforced concrete framing to plant/utilities and other ancillary accommodation. Intermediate floors, required to provide access and support to process plant, utilities and equipment will be of a combination of reinforced concrete and steel construction, as appropriate. External walls will be clad in composite metal insulated panelling and the roof will comprise a flat roof membrane supported on a steel roof structure. The in-situ elements will be formed using modern shuttering systems appropriate to the scale and height of the building and to provide the necessary temporary support and safe access to the elements under construction. Steel reinforcement will be fixed and in-situ concrete placed by tradesmen with the appropriate expertise in accordance with the detailed design and specification for the project. Structural steelwork will be supplied, fabricated and erected by an approved structural steel sub-contractor. Blockwork will similarly be executed by tradesmen with the appropriate experience. A tower crane and mobile cranes will be used as appropriate to facilitate the safe delivery of materials from ground level to the required area of the works.

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- Installation/application of the internal finishes and fittings including floor, wall and ceiling finishes, doors, etc. to the process/production areas to the high specification required to provide the high care hygienic environment appropriate to the production of milk powders will be completed by specialist approved sub-contractors will the appropriate expertise in the supply and installation of such materials in similar environments;

- Non-process mechanical and electrical installations including internal drainage installations, sanitary ware, non-process HVAC, power supplies, lighting installations, etc., will be completed by specialist sub-contractors with the appropriate experience and expertise.

- All of the above works will be designed, detailed and specified in accordance with relevant design standards and statutory regulations by an experienced design team engaged directly by Tipperary Cooperative Creamery.

- Construction of the building and civil works will be executed in accordance with the detailed designs and specifications and all relevant statutory legislation, regulations and permits relevant to the works including the Building Control (Amendment) Regulations, Health, Safety & Welfare at Work (Construction) Regulations, Planning Permission, Fire Safety Certificate, DAC Certificate and the project specific CEMP prepared for the Works.

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3.6.3 Process Systems Installation

The fabrication, installation and commissioning of the main process system installations will be undertaken by the equipment suppliers and specialist contractors with the appropriate experience and expertise. The main process equipment including evaporator, dryer chamber, etc. will be fabricated on site and lifted into position using a large mobile crane.

3.7 Sustainability/Energy

Chapter 2 of the European Communities (Energy Performance of Buildings) Regulations SI 666 of 2006 applies to Alternative Energy Applications in Large Buildings. A large building is defined in the Regulations as a building with a total useful floor area in excess of 1000 m2. The regulations apply to the design of a Large Building for which a planning application has been made or a planning notification is published on or after 1st January 2007. On this basis these Regulations apply to the subject development.

A person who commissions the construction of a Large New Building has to ensure that “due consideration has been given to the technical, environmental and economic feasibility of installing Alternative Energy Systems “ and also “that the use of such system has been taken into account as far as practicable in the design”.

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The following measures have been already implemented in the operation of the existing facilities and/or will be implemented on the detailed design of the subject development in respect of sustainability and energy efficiency:

- Tipperary Cooperative Creamery generate steam for their processes in on site steam boilers. In 2011 the on site boilers were converted from Heavy Fuel Oil (H.F.O.) to Natural Gas, which represents a significant improvement in efficiencies and reduction in atmospheric emissions.

- The new boiler to replace existing Boiler No. 3 will burn natural gas.

- The new thermoheater for Dryer No. 2 will burn natural gas.

- The SEAI Energy Efficient Design (EED) methodologies will influence the detailed design of the project in order to minimise energy usage and reduce operating costs for the completed installation.

- It is proposed to optimise the recovery of treated condensate from Evaporator No. 3 for re-use in process and washing operations on site. This will reduce the actual water demand from the existing on-site well.

- As outlined above, the proposed evaporator will comprise an MVR (Mechanical Vapour Recompression) type evaporator. In conventional thermally heated evaporators, which generally use steam to heat the evaporator, much of the thermal energy content transferred to the vapour stream is lost or only partially re-used in the process. In comparison, the use of mechanical vapour recompression technology, where a mechanically operated compressor recompresses practically the complete vapour from the process from a lower evaporation pressure and temperature level to the heating pressure required for the process. In this way its thermal energy is re-used for heating and does not have to be condensed without being re-used. The system therefore uses considerably less energy than a conventional thermally heated plant.

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3.7 Project Schedule

It is intended that the new evaporation and drying facilities will be fully operational for the commencement of the peak milk production season in April 2019, and on this basis the following schedule is intended for the delivery of the project:

- June 2017 – Planning Application and associated sub-threshold EIAR to be submitted to Tipperary County Council.

- Subject to the appropriate Planning Approval from Tipperary County Council, it is anticipated that construction of the project would commence in October 2017 and be completed by October 2018.

- Installation and Commissioning of the main process plant installations would commence in August 2018 and be completed by January 2019.

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4.0 ALTERNATIVES CONSIDERED

4.1 Introduction

Given the opportunities presented by the abolition of the EU Milk Quota regime in 2015, the projected growth in EU and particularly Irish dairy products as identified in Section 1.3 of this EIAR, the opportunity to increase the value of dairy products currently exported from the site due to the lack of available drying facilities and in order to secure the future of dairy processing operations at their Station Road site, a strategic decision has been taken by Tipperary Cooperative Creamery to invest in additional evaporation and drying facilities at the Station Road site.

A number of alternatives were considered by Tipperary Cooperative Creamery prior to selecting the development described in Chapter 3 of the EIAR as the preferred option for the development. These are outlined below together with an outline of the relative environmental impacts of each option.

4.2 'Do Nothing' Option

As outlined in Section 3.4.1 of this EIAR, two thirds of the skim milk concentrates currently produced at Tipperary Cooperative Creamery during peak milk periods are currently dispatched from site without further processing due to the lack of adequate drying capacity to facilitate their use in powder production. Similarly, during peak milk processing periods all of the whey concentrate generated from the cheese plant has to be exported from the site due to the lack of evaporation and drying capacity to facilitate the production of whey powder. This prevents Tipperary Cooperative Creamery from optimising the value of these products through the production of the higher value powder products.

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The lack of additional evaporation and drying capacity also prevents Tipperary Cooperative Creamery from taking advantage of the opportunities presented by the additional volumes of milk available for processing following the abolition of milk quotas in 2015.

On the basis of the above, retention of the current processing capacities could impact on the overall capacity of Tipperary Cooperative Creamery to compete with other similar dairy processors and affect the future viability of dairy processing operations in Tipperary Town.

In terms of relative environmental impacts compared to the subject development, these are addressed in detail in the relevant impact assessments included in Chapter 5 of this EIAR, where the impacts of the subject development are compared to the environmental impacts of the existing development.

In the event that the lack of investment in additional processing facilities was to result in the eventual closure of the existing plant this would be likely to have significant impacts in terms of employment and the economy of Tipperary Town.

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4.3 Retention and Upgrade of Existing Dryer 3 Building

The existing Dryer facilities at Tipperary Cooperative Creamery include two existing 'Rodgers' box dryers located within the three storey building to the rear of the protected creamery structure on the site. As previously noted these Dryers were installed when the facility originally commenced powder production in the 1950's, have limited powder production capacity and are now over 60 years old. Only one of these dryers is currently operational and included on the IE Licence. The facility is only used occasionally due to the age of the facility and poor manufacturing environment.

In July 2016, in order to supplement the existing Drying capacity on the site, Tipperary Cooperative Creamery applied for Planning Permission to upgrade the existing building to a more modern manufacturing environment and the powder handling facilities, etc. associated with these existing Dryers. Planning permission (Ref. 11600690) to complete this development was granted by Tipperary County Council in October 2016. However Tipperary Cooperative Creamery have subsequently reviewed this option and concluded it does not represent an appropriate and viable solution to the inadequate evaporation and drying facilities on the site and have decided not to proceed with this option. On this basis subject to a grant of permission for the Dryer 2 development, they are prepared to forfeit permission Ref. 11600690 and to de-commission the existing Dryers.

In terms of relative environmental impacts, the most significant difference in impact between this and the subject Dryer 2 development considered in the Air Impact Assessment, which identifies that there will in fact be a net reduction in particle omissions for the proposed 3.2 tonne Dryer 2 development compared to the retention of the existing operational Rodgers Dryer. The proposed Dryer 2 development is also located more remotely from the existing protected structure and will have less visual impact on same.

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4.4 Original Proposed Dryer 2 Development

As outlined in Section 1.7.2 of this EIAR, the scope of the proposed Dryer 2 development originally included the installation of a 4 tonne/hour Dryer and included the complete demolition of the powder store, dispatch bay and store. This had been the subject of a previous planning application to Tipperary Co. Co. in August 2016 (Planning Ref. 11600790). This application was subsequently withdrawn, to facilitate further consultation with the Planning Authority with respect to EIA and had been the subject of the EIA Scoping document submitted to the Planning Authority in February 2017. The location of the building and associated scope of demolition works was subsequently amended as outlined below in order to reduce potential impacts of the subject development:

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- The capacity of new Dryer Installation was reduced from 4.0 tonnes per hour to c.3.2 tonnes per hour.

- The footprint of the main Dryer Tower was moved south east c.10m and north east c.17m so that it now overlapped the southern half of the existing Powder Store.

- Only the southern half of the existing Powder Store, which falls within the footprint of the new building would now be demolished. The northern half of the existing building would be retained.

- The project no longer required the demolition of the existing Dispatch Bay which would be retained.

- The project no longer included the construction of the new single storey Loading Bay/Dock Leveller Facilities.

- Omission of new powder silo accommodation and bagging facilities accommodation on upper floors at eastern end of new building would reduce the overall length of main building above existing Powder Store Roof level.

- As noted above, the project now included the proposed de-commissioning of the existing Rodgers Dryers located in the building to the south west of the existing protected structure.

- The relocation of the building to the south east and retention of rear half of powder store behind same would isolate the proposed development from the adjacent River Ara and eliminate the works previously proposed directly adjacent to and along the river bank. This would reduce potential construction stage impacts on the River.

- It was no longer intended to provide a temporary footbridge access over the River Ara between the former hotel site and the construction site.

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The most significant change in environmental impact associated with this amendment comprises the mitigation by avoidance highlighted in the Aquatic Impact Assessment. The relocation of the tower and retention of the northern half of the existing powder store isolates the proposed development from the adjacent River Ara and eliminates works previously proposed adjacent to the river. This will reduce potential construction stage impacts on the river. The Aquatic Ecology Assessment also highlighted the omission of the temporary bridge as avoiding significant potential impacts on the river.

The reduction in Dryer capacity will also reduce potential air and noise emissions from the subject development.

The relocation and slight reduction in size (footprint) of the Dryer Tower will reduce the visual impact and potential shadows cast by the development beyond the boundary of the site.

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4.5 Alternative Site Location

The option of locating the subject development on an alternative site was not considered on the basis of the existing established milk intake, separation, storage and packaging facilities on the site and that the development is intended to facilitate the further processing of milk and whey concentrates already generated on the existing Tipperary Cooperative Creamery site.

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5.1 POPULATION AND HUMAN HEALTH

5.1.1 Introduction

This Section of the Environmental Impact Assessment Report (EIAR) considers the potential impacts, if any, of the proposed 'Dryer 2' development on human beings. As a key inhabitant of the environment in which the project will be developed, ultimately any effects of the project on the environment have the potential to impinge on human beings either directly or indirectly. Direct effects might include such aspects as air quality, water quality and noise while indirect effects could include archaeological heritage and flora and fauna. Accordingly, the impact of the development on human beings is addressed not just in this section of the EIAR but throughout the document under separate section headings which deal with each aspect of the environment. Aspects which will be specifically addressed in this section include:

- Land Use and Zoning
- Economic Impacts including Population and Employment
- Health & Safety Issues and Nuisance
- Affects on Amenities

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5.1.2 Receiving Environment

5.1.2.1 Land Use and Zoning

The existing Tipperary Cooperative Creamery site at Station Road, within which the proposed development will take place, is located on lands designated within Land Use Zoning Map A of the Tipperary Town and Environs Development Plan (2013-2019) as lands zoned for General Industry (GI). Existing lands to the north of the River Ara, which are also in the ownership of Tipperary Cooperative Creamery, but are physically separated by the River from the existing operational creamery site are zoned Town Centre and include the former hotel site and associated car-park and the undeveloped marshy lands to the west of same. These Zonings are shown in Fig. 5.1.1 taken from Land Use Zoning Map A of the Town Development Plan. The Tipperary Town and Environs Development Plan (2013-2019) indicates that development on lands zoned for town centre development should comprise of mixed use developments comprising a combination of retail, office, service, community and /or residential uses.

The Development Plan also identifies a proposed Radial Interconnector Route to the south of the town from the Limerick Road Roundabout to the Emly Road continuing on to the junction of Bridge Street. This route is indicated on Transportation Map 5 in page 25 of the Development Plan and the route passes through the southern part of the Tipperary Cooperative Creamery lands on the northern bank of the River Ara.

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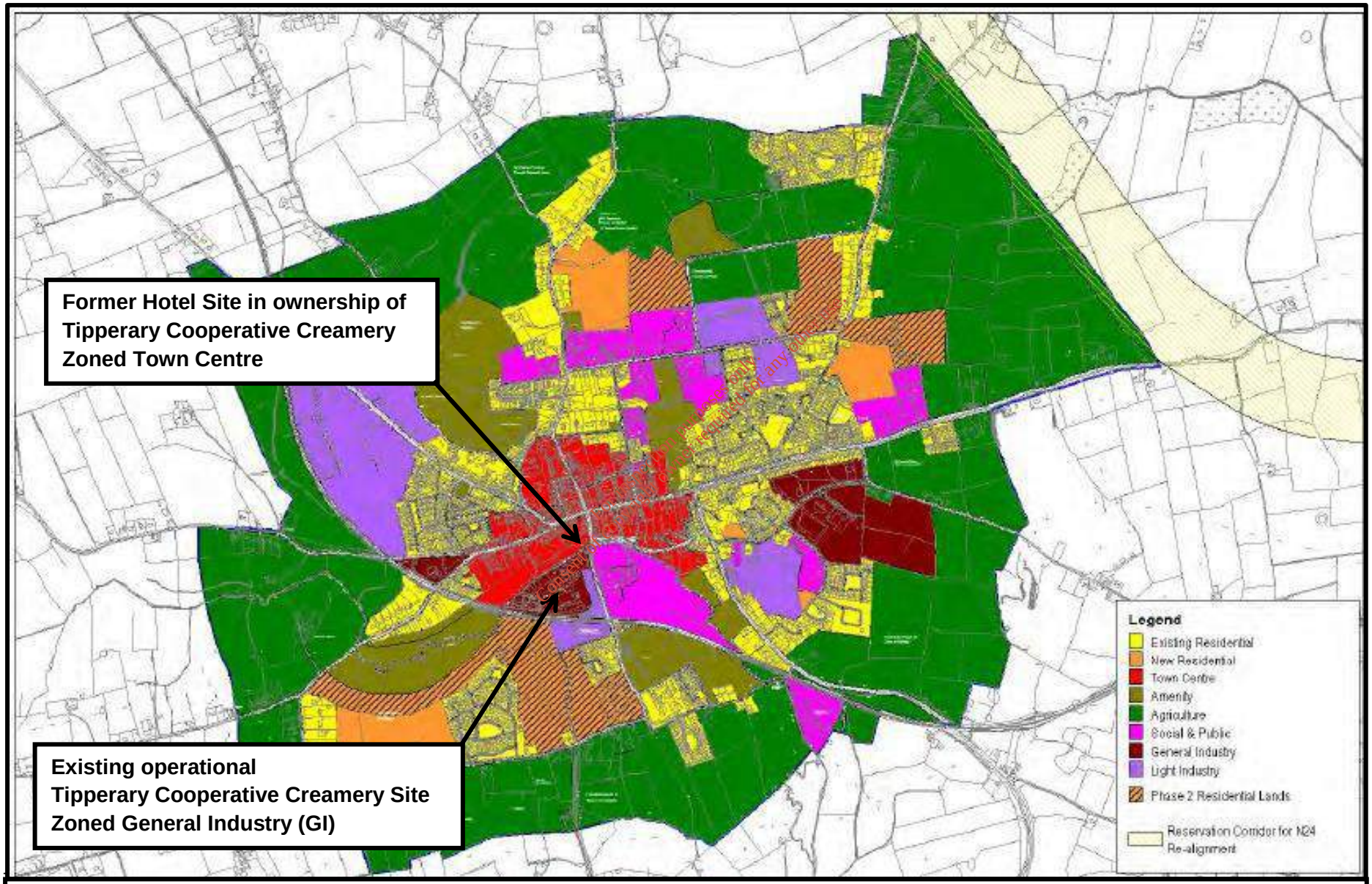


Fig. 5.1.1 – Tipperary Town and Environs Development Plan (2013-2019) Land Use Zoning Map A

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Policy INF 5: Protection of Reservation Corridors of the Development Plan states that *'It is the policy of the Council to ensure that the reservation corridor for the Proposed Radial Interconnector Route and the Northern Inner Relief Route remains free from development'*.

5.1.2.2 Population

The Tipperary Cooperative Creamery site at Station Road is located within Tipperary Town and therefore the population statistics for both the town and county are relevant to the demographic for the facility and are presented in the Table below.

Functional Area	Year			% Change	
	2016 (Prelim.)	2011	2006	2011-2016 (Prelim.)	2006-2011
County Tipperary	159,553	158,754	149,244	+0.5%	+6.4%
Tipperary Town	4,214	4,322	4,415	-2.5%	-2.1%

Table 5.1.1: Population Statistics (CSO)

5.1.2.3 Employment

South Tipperary is located in the South East Region, which also includes the Counties of Carlow, Kilkenny, Wexford and Waterford. The latest employment figures from the Quarterly National Household Survey (QNHS) for Q1 2017 are presented in Table 5.1.2 below. The Quarterly National Household Survey (QNHS) is a large-scale, nationwide survey of households in Ireland. It is designed to produce quarterly labour force estimates that include the official measure of employment and unemployment in the state. The survey began in September 1997, replacing the annual April Labour Force Survey. There has been a significant improvement in employment statistics in both the Republic of Ireland and the South East Region over the past number of years. Nationally unemployment peaked at 15.0% in 2012 and this has reduced significantly to 6.7% in Q1 2017, including a reduction of 1.7% over the previous 12 months. In the South East Region unemployment fell from a peak of 20.1% in Q1 2012 to 9.3% in Q1 2017, including a reduction of 3.2% over the past 12 months. However, it is noticeable that the unemployment rate in the Southeast Region is still significantly higher than the rate for the Republic of Ireland as a whole.

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Region	Labour Force	In Employment	Unemployed	Unemployment Rate	Annual Change
South-East Region	236,200	214,300	21,900	9.3%	-3.2%
Republic of Ireland	2,191,400	2,045,100	146,200	6.7%	-1.7%

Table 5.1.2: QNHS Employment Statistics (Q1 – 2017)

Tipperary Cooperative Creamery are one of the larger employers in Tipperary Town and currently employ 107 personnel at the plant. There is also significant indirect

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employment associated with milk suppliers/farmers and delivery drivers for the milk processed at the plant as well as other sectors of the local economy which would be dependent on the agricultural sector.

5.1.2.4 Health and Safety

Tipperary Cooperative Creamery currently comply with all relevant Health and Safety procedures, regulations and legislation relevant to the operation of their dairy processing facility.

5.1.2.5 Amenities

The Tipperary Town & Environs Development Plan 2013-2019 identifies amenity areas within the Plan boundary to include the Tipperary Hills (including the Famine Graveyard & Pitch and Putt Facility) to the north of the town centre and the amenity zoned lands flanking the Ara River and the Railway line at Collegeland to the south of the town centre. The proposed Dryer 2 development is located within the existing operational Tipperary Cooperative Creamery site and has no immediate amenity value.

The River Ara which bounds the site is a tributary of the River Aherlow which forms part of the Lower Suir SAC. The fishery value of these rivers is addressed in the Biodiversity Chapter of this EIAR.

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5.1.3 Potential Construction Stage Impacts on Human Beings

5.1.3.1 Land Use and Zoning

In order to facilitate the construction of the proposed development, and given the limited availability of free space within the existing operational creamery site and the need to maintain creamery operations during the construction of the project, it is intended to use the former hotel carpark on the northern side of the River Ara, which is owned by Tipperary Cooperative Creamery, for temporary site accommodation and materials storage during the construction of the works. These facilities will be temporary in nature and will be removed following the completion of construction works. They will therefore not impact on the subsequent development of these lands for the uses compatible with the Town Centre Zoning specified in the Development Plan.

5.1.3.2 Population

There will be economic benefits for the town and surrounding businesses during the construction of the project including accommodation, building materials and turnover in local shops and restaurants.

5.1.3.3 Employment

There is likely to be of the order of up to 100 personnel employed at the site during the course of the construction stage of the project and a significant portion of these are likely to be from the locality.

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5.1.3.4 Health and Safety

Health and Safety during the construction of the works will be managed through the appointment of the appropriate project supervisors for the design and construction stages of the project in accordance with the Health, Safety & Welfare at Work (Construction) Regulations and through the engagement of competent and experienced contractors to undertake the works.

5.1.3.5 Amenities

The construction works will have no impact on the amenity value of the Tipperary Hills and River Ara walks identified in the Tipperary Town & Environs Development Plan 2013-2019. Potential construction stage impacts on the Lower Suir SAC are addressed in the Biodiversity Chapter of this EIAR.

5.1.4 Potential Operational Impacts on Human Beings

5.1.4.1 Land Use and Zoning

The proposed 'Dryer 2' development primarily comprises the construction of a new Dryer Tower building, partially within the footprint of existing buildings on the site, which will be demolished to facilitate it's construction, and within the existing developed Tipperary Cooperative Creamery site. It is therefore compatible with the specified General Industry Zoning for the site specified in the Development Plan.

Similarly, since the development is located within the existing developed Tipperary Cooperative Creamery site on the southern side of the River Ara it will not impact on the reservation corridor for the proposed Radial Interconnector Route identified in the Development Plan.

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5.1.4.2 Population

The retention and strengthening of dairy processing operations at Tipperary Cooperative Creamery in Tipperary Town will support the ongoing employment of existing personnel and recruitment of additional operatives required to operate the new plant. The development will therefore assist in the maintenance and potential growth of population levels in the town, compared to the possibility of any population reduction that might be associated with existing personnel having to relocate from the town in the event that dairy operations were to cease at the plant and they couldn't secure suitable alternative employment in the region. On this basis the operational phase of the development is considered to have a positive impact on the population of the town.

5.1.4.3 Employment

The new evaporation and drying facilities located within the development will operate over a 24 hour period (including cleaning operations) and it is anticipated that up to 8

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additional personnel will be employed by Tipperary Cooperative Creamery to facilitate the operation of the new plant. Additional drivers will also be employed to facilitate the delivery of the additional milk intake associated with the development. The development will also secure the overall future of the existing employees at Tipperary Cooperative Creamery.

5.1.4.4 Health and Safety

The proposed development including the Dryer Tower building, infrastructure and associated plant installations will be designed, installed and maintained in accordance with all relevant statutory regulations, codes of practice, legislation and best industry practice. Tipperary Cooperative Creamery will operate the new facility in accordance will all relevant statutory legislation and regulations and in accordance with the revised Industrial Emissions Licence issued by the EPA to include the operation of the new facility.

5.1.4.5 Amenities

The operation of the new facility will have no impact on the existing amenities identified in the Tipperary Town & Environs Development Plan 2013-2019.

Potential operational impacts on the Lower Suir SAC are addressed in the Biodiversity Chapter of this EIAR.

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5.1.5 Mitigation Measures

5.1.5.1 Construction Stage Mitigation Measures

The following mitigation measures will be implemented to reduce any construction stage impacts on Human Beings:

- No significant impacts have been identified for land use and zoning during the construction stage of the project and therefore no specific mitigation measures are required.

- Contractors will be encouraged, where appropriate to source materials, food and lodgings for site personnel and other services locally in order to benefit the local population and economy during the construction stage of the project.

- Similarly, contractors will be encouraged to engage local sub-contractors and personnel with the appropriate skills and experience, during the construction stage of the project.

- As identified above, Health and Safety during the construction of the works will be managed through the appointment of the appropriate project supervisors for the design and construction stages of the project in accordance with the Health, Safety & Welfare at Work (Construction) Regulations and through the engagement of competent and experienced contractors to undertake the works.

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- No significant impacts have been identified for amenities during the construction stage of the project and therefore no specific mitigation measures are required.

- Further mitigation measures are identified in the Biodiversity, Hydrology, Air & Noise and other chapters of this EIAR, as appropriate, to ensure the construction stage of the project will not have a negative impact on the human environment.

5.1.5.2 Operational Stage Mitigation Measures

The following mitigation measures will be implemented to reduce any operational stage impacts on Human Beings:

- No significant impacts have been identified for land use and zoning during the operational stage of the project and therefore no specific mitigation measures are required.

- As identified above the proposed development including the Dryer Tower building, infrastructure and associated plant installations will be designed, installed and maintained in accordance with all relevant statutory regulations, codes of practice, legislation and best industry practice. Tipperary Cooperative Creamery will operate the new facility in accordance will all relevant statutory legislation and regulations and in accordance with the revised Industrial Emissions Licence issued by the EPA to include the operation of the new facility in order to ensure there are no operational impacts on the human environment.

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- No significant impacts have been identified for amenities during the operational stage of the project and therefore no specific mitigation measures are required.

- Further mitigation measures are identified in the Biodiversity, Hydrology, Air & Noise and other chapters of this EIAR, as appropriate, to ensure the operational stage of the project will not have a negative impact on the human environment.

5.1.6 Residual Impacts

It is considered that the project will have a positive short term construction stage and long term operational stage benefit to the local economy and employment levels.

Otherwise, significant impacts identified, and the mitigation measures identified in this and other chapters of the EIAR, it is considered that there will be no significant further construction or operational stage impacts for human beings.

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5.2 BIODIVERSITY

5.2.1 Introduction

This Section of the Environmental Impact Assessment Report (EIAR) addresses potential impacts of the proposed Dryer 2 development on Terrestrial and Aquatic Ecology. It also considers potential impacts of the proposed development on the Natura 2000 network of sites (European sites known as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

5.2.2 Terrestrial Ecology

Wetland Surveys Ireland Ltd. were engaged by OES Environmental Services, on behalf of Tipperary Cooperative Creamery Ltd., to undertake an ecological impact assessment for the proposed 'Dryer 2' development on terrestrial flora and fauna. The objectives of the assessment were:

- To carry out a desktop study in order to determine the previously recorded terrestrial biodiversity of the area;
- To carry out a baseline terrestrial flora and fauna survey of the development site and surroundings;
- Evaluate the biodiversity value of the development site and surroundings;
- To predict and assess the potential direct, indirect, and cumulative impacts of the proposed development on terrestrial flora and fauna;
- To propose mitigation measures in the construction and operation phase of the development so as to minimise potential impacts on terrestrial flora and fauna.

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A complete copy of Wetland Survey Ireland Ltd.'s Report "*TIPPERARY CO-OPERATIVE MILK DRYING FACILITY AND WASTE WATER TREATMENT UPGRADES - Ecological Assessment - Terrestrial Ecology"* is included as Attachment A to this EIAR.

5.2.2.1 Receiving Environment – Terrestrial Ecology

A detailed baseline description of the terrestrial ecology of the site and environs including designated sites, habitats and vegetation, plant species, invasive alien species, birds and mammals is provided in the above Report. On the basis of their evaluation of the receiving environment, Wetland Surveys Ireland Ltd concluded the following with respect to terrestrial ecology:

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- The nearest nationally important designated site, Bansha Woods pNHA, is located c.3km south east of the proposed development site. Greenane Marsh pNHA is the only other nationally designated site with 5km of the subject development.

- The nearest internationally important designated site is the River Suir cSAC, which is located some 5.5km south of the site at its closest point, and which is hydraulically linked to the site via the Ara River, which forms the northern boundary of the site, and discharges to the Aherlow River (part of the River Suir cSAC, c.16km downstream of the site.

- Four other internationally important sites, the Lower River Shannon SAC, the Galtee Mountains SAC, the Moanour Mountains SAC and the Philipston Marsh SAC are located within 15km of the subject development but none of these are hydraulically connected to the site.

- The habitats within and adjacent to the creamery site comprise buildings and artificial surfaces, small areas of grassland habitat, and a lowland river.

- Those habitats that occur within the proposed development site boundary are of low ecological value (buildings and artificial surfaces, amenity grassland, and dry meadows and grassy verges).

- The proposed demolition and construction works are confined to those buildings and artificial surfaces that occur within the site and therefore the habitats likely to be impacted are of no ecological importance.

- The River Ara that forms the northern boundary of the operational Tipperary Cooperative Creamery site and is the only ecologically sensitive receptor in proximity to the proposed development.

- The river provides habitat for species of conservation concern such as grey wagtail and possibly kingfisher, bats, and otter.

- No plant species of conservation concern are likely to occur in proximity to the proposed development.

- The invasive species, Japanese Knotweed, occurs on the northern riverbank of the River Ara.

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5.2.2.2 Potential Construction Stage Impacts on Terrestrial Ecology

The following potential impacts of the Dryer 2 development at Tipperary Cooperative Creamery on terrestrial ecology were identified:

Designated Sites:

- There are no potential impacts on either the Bansha Woods pNHA or the Greenane Marsh pNHA.

- The Lower River Suir SAC, although located >5km from the site, is hydrologically connected to the proposed development site via the River Ara. Japanese Knotweed has been recorded along the banks of the River Ara in proximity to the proposed development. In the absence of appropriate mitigation and controls, the introduction or spread of invasive species could have detrimental effects on downstream habitats of conservation value within the SAC.

- Works associated with the construction of the dryer tower building, waste water treatment upgrade and demolition/decommissioning of existing buildings may, in the absence of appropriate mitigation, potentially lead to the run-off of harmful pollutants into the river and therefore have indirect consequences on habitats and species that occur downstream due to deterioration in water quality.

- Potential indirect effects on terrestrial features of the cSAC (or terrestrial habitats and species of conservation concern elsewhere downstream) are not foreseen.

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Habitats and Flora

- The footprint of the proposed development will be confined to existing built up areas and therefore will not result in the direct loss of any semi – natural habitat.

- The affected habitat is of low ecological value (buildings and artificial surfaces). Considering the low ecological value and sensitivity of other terrestrial habitats in the surroundings indirect impacts of significance are not foreseen.

- A potential impact associated with the construction of the proposed development, in the absence of suitable controls, is the introduction or spread of invasive species such as Japanese knotweed (*Fallopia japonica*) which occurs along the river adjacent to the operational creamery site. Should such species become established then it could have a detrimental effect on native flora and fauna within habitats downstream of the proposed development.

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- No in-stream works, or works in close proximity to the River Ara are proposed as the footprint of demolition and construction works are removed from the river.

Fauna - General:

- It is considered that those habitats directly impacted by the footprint of the proposed development (buildings and artificial surfaces) at the creamery site do not support fauna species of conservation concern and therefore impacts on fauna due to works at this location are not foreseen.

- However, habitats that occur in proximity to the proposed development are likely to support faunal species of conservation concern including riparian birds (kingfisher and grey wagtail), otter, and bat species.

Fauna – Riparian Birds:

- There is an absence of suitable breeding sites within the proposed development and therefore direct impacts on breeding sites are not foreseen.

- Potential disturbance is unlikely due to the existing background noise levels at the site.

- Bird species resident in the area are likely to be accustomed to significant levels of noise and therefore impacts of significance are not foreseen.

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Fauna – Otter:

- There is an absence of suitable breeding sites along the River Ara in close proximity to the Co-op site and therefore direct impacts on breeding sites are not foreseen.

- The river provides suitable commuting and foraging habitat and otter may frequent this stretch of the river. The demolition and construction works proposed within the Co-op site are unlikely to give rise to significant disturbance as otter in the area are likely to be accustomed to high levels of background noise in the area.

- Noise and vibration generated during the construction phase, including demolition works may potentially lead to the disturbance of commuting/ foraging otter along this section of the River Ara during the construction phase.

- No in-stream works or works in close proximity to the River Ara are proposed.

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Fauna – Bats:

- Works associated with the proposed development are not expected to directly impact on any bat roosts.

- Disturbance from noise, light, and vibration associated with demolition and construction works may impact on locally occurring bat species during the construction / demolition phase of the project. However, bats that occur amongst suitable habitat in the surroundings are likely to be accustomed to relatively high background noise levels and therefore any disturbance impacts are likely to be minor and temporary in duration.

- The level of bat activity in the area is not expected to be affected in the long term.

5.2.2.3 Potential Operational Impacts on Terrestrial Ecology

Designated Sites:

- There are no potential operational impacts on either the Bansha Woods pNHA or the Greenane Marsh pNHA.

- There are no potential operational impacts on the Lower River Shannon SAC, the Galtee Mountains SAC, the Moanour Mountains SAC or the Philipston Marsh SAC given that none of these are hydraulically connected to the site.

- Potential indirect effects on terrestrial features of the Lower River Suir cSAC, or on terrestrial habitats and species of conservation concern elsewhere downstream are not foreseen.

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Habitats and Flora

- The footprint of the proposed development will be confined to existing built up areas and therefore will not result in the permanent direct loss of any semi – natural habitat during the operational phase of the development.

- The affected habitat is of low ecological value (buildings and artificial surfaces). Considering the low ecological value (buildings and artificial surfaces) and lack of sensitivity of other terrestrial habitats in the surroundings indirect operational impacts of significance are not foreseen.

Fauna - General:

- It is considered that those habitats directly impacted by the footprint of the proposed development (buildings and artificial surfaces) at the creamery site

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do not support fauna species of conservation concern and therefore indirect operational impacts of significance on fauna are not foreseen.

Fauna – Riparian Birds:

- There is an absence of suitable breeding sites within the proposed development and therefore indirect impacts on breeding sites are not foreseen.
- Potential disturbance is unlikely due to the existing background noise levels at the site.
- Bird species resident in the area are likely to be accustomed to significant levels of noise and therefore impacts of significance are not foreseen.

Fauna – Otter:

- There is an absence of suitable breeding sites along the River Ara in close proximity to the Co-op site and therefore direct impacts on breeding sites are not foreseen.
- The river provides suitable commuting and foraging habitat and otter may frequent this stretch of the river. The operational phase of the development is unlikely to give rise to significant disturbance as otter in the area are likely to be accustomed to existing high levels of background noise in the area.

Fauna – Bats:

- The level of bat activity in the area is not expected to be affected in the long term.

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5.2.2.4 Proposed Mitigation and Enhancement Measures – Terrestrial Ecology

Wetland Surveys Ireland Ltd. identify appropriate mitigation and enhancement measures to minimise impacts of the Dryer 2 development on terrestrial ecology and these are presented in their Report "*TIPPERARY CO-OPERATIVE MILK DRYING FACILITY AND WASTE WATER TREATMENT UPGRADES - Ecological Assessment - Terrestrial Ecology"* included as Attachment A to this Environmental Impact Assessment Report.

As detailed in Section 1 of this EIAR it intended to prepare a detailed Construction & Environmental Management Plan (CEMP) for the Dryer 2 development. The CEMP is intended as a guidance document for the construction phase of the project, and will identify for the Project Management Team and Contractors, the key planning and environmental constraints and associated mitigation measures which need to be implemented in order to ensure that the project can be delivered in a manner which complies with the relevant statutory obligations and environmental best practice.

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The CEMP will include sections specifically addressing each of the relevant environmental attributes considered in this EIAR including:

- Soils, Hydrology, Geology and Hydrogeology including Storm Water Management, Sediment & Erosion Control and Water Quality;
- Ecology including Terrestrial Ecology and Aquatic Ecology;
- Air, Dust, Noise and Vibration;
- Waste Management;
- Health and Safety.

The CEMP will be prepared by the Project Management Team, in consultation with the relevant specialist consultants and statutory bodies such as IFI, NPWS, EPA and Tipperary Co. Co., as appropriate, prior to commencement of any demolition and construction works on site. It will adopt, as appropriate, all relevant mitigation measures, including monitoring, identified in this EIAR and associated specialist reports attached to same. It will also identify the arrangements to be put in place to monitor the implementation and effectiveness of the mitigation measures.

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It is intended that all relevant and appropriate mitigation measures identified in Wetland Survey Ireland Ltd.'s Report "*TIPPERARY CO-OPERATIVE MILK DRYING FACILITY AND WASTE WATER TREATMENT UPGRADES - Ecological Assessment - Terrestrial Ecology*" will be fully integrated into the detailed Construction & Environmental Management Plan prepared for the project. These include:

- Appointment of an Ecological Clerk of Works with the appropriate experience and expertise to regularly visit the site and monitor the implementation and effectiveness of the relevant mitigation measures;
- Any riparian habitats that occur in proximity to the proposed works will be protected from accidental damage;
- During construction, all site works (including machinery movements, storage of excavated and demolition materials, etc.) will be confined as far as possible to the development footprint and designated contractor compound.
- The spread and introduction of invasive species and noxious weeds will be avoided by adopting appropriate mitigation measures as per guidance issued by the NRA (2010). These measures will be detailed in the CEMP. Any invasive plant material noted on site will be removed off site and disposed of at appropriate licensed waste disposal facility. Any invasive species found to occur within 15m of working areas will require a specialist method statement for its eradication to avoid the spread of invasive species, this will ensure compliance with the European Communities (Birds and Natural Habitats) Regulations 2011 [S.I. No. 477 of 2011]. The presence of non-native species

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and requirement for actions will be confirmed by the Ecological Clerk of Works.

- Any limited vegetation clearance required (such as the river corridor) should take place outside of the bird breeding season (March to August, inclusive) in order to protect nesting birds. In the event that clearance is required during the breeding season, a survey for nesting birds will be undertaken prior to felling taking place to ensure that no nesting birds are impacted.

- Prior to commencement of works pre-construction surveys for the presence of bats at existing built structures (that may be impacted by proposed development) that could provide suitable roost sites will be undertaken. In the unlikely event of a bat roost being identified then appropriate measures will be taken to ensure its protection with reference to BCI (2010) and NRA (2005). In the event that direct damage to the roost is unavoidable, then a derogation license from NPWS will be sought and work will be undertaken in compliance with any conditions attached.

The Project Management Team and Contractors will be obliged to take cognisance of the CEMP, when planning and undertaking the construction of the permitted development. Implementation of the CEMP and associated mitigation measures will be monitored by the Project Management Team, on a daily basis, with input from specialist consultants as appropriate.

The obligation for all Contractors, including their subcontractors and employees, to take cognisance of and comply with the requirements of the CEMP will be a Condition of Contract for all Contractors appointed to undertake work on the project.

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5.2.2.5 Cumulative Impacts – Terrestrial Ecology

Wetlands Surveys Ireland Ltd. conclude, considering the characteristics of the proposed development and the potential impacts on terrestrial ecology, that the potential for cumulative impacts is negligible and no significant cumulative impacts on biodiversity are foreseen.

5.2.2.6 Residual Impacts – Terrestrial Ecology

Wetlands Surveys Ireland Ltd conclude, assuming the full implementation of the mitigation measures outlined in their Report, that the following residual impacts will apply:

Considering the characteristics of the proposed development site and the low ecological value of those habitats directly impacted, it is predicted that the development will have a temporary imperceptible adverse impact on the biodiversity value of the proposed development site.

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- The off-site impacts on flora, terrestrial habitats, birds and mammals will also constitute an imperceptible adverse impact of short term duration.

- Considering the nature and scale of the proposed development, no impacts of significance are foreseen during the operational phase of the proposed development.

5.2.3 Aquatic Ecology

Conservation Services – Ecological & Environmental Consultants were engaged by OES Consulting, on behalf of Tipperary Cooperative Creamery Ltd, to undertake an assessment of the impact of the Dryer 2 development on aquatic ecology. The aims of the assessment were:

- To assess the present fishery value, invertebrate fauna, aquatic flora, water quality, habitat value and general ecological condition of streams/rivers potentially affected by the proposed development and provide baseline data against which future changes can be assessed;

- To assess the general status of the streams/rivers from an ecological and fisheries perspective in the context of their wider catchment based on survey data, published sources, EPA data, and on consultation with Inland Fisheries Ireland and NPWS;

- To assess the potential impact of the proposed development on water quality and aquatic flora and fauna;

- To assess any ex situ impact on qualifying interests of the Lower River Suir Special Area of Conservation;

- To recommend mitigation measures where negative impacts are predicted.

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A complete copy of Conservation Services – Ecological & Environmental Consultants Aquatic Ecological Report is included as Attachment B to this Environmental Impact Assessment Report. Full details of the methodology used to undertake the assessment are presented in the Aquatic Ecological Report.

5.2.3.1 Receiving Environment - Aquatic Ecology

The Aquatic Ecology Assessment assesses all watercourses which are marked on EPA mapping of streams and which are within 0.5km down gradient from any part of the proposed development site where works will be carried out. The potentially affected watercourse is the Ara River, which flows along the northern boundary of the existing Tipperary Coperative Creamery site and which flows to join the Aherlow River c.20km downstream of Tipperary Town. From the Ara confluence, the Aherlow River flows for c.6km to its confluence with the River Suir c.6km upstream of Cahir.

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General catchment information including fishery value, ecological importance/value and water quality for the Suir, Aherlow and Ara River catchments are presented in the Aquatic Ecological Report.

A general assessment of salmonid and lamprey habitat quality was carried out for c. 5km adjacent to and downstream of the proposed development site. The assessment consisted of walking and/or wading the entire channel length. The assessed channel was demarcated into six habitat sections, as indicated in Fig. 5.2.1 below based on:

(i) Stream width and depth;

(ii) Substrate type, i.e. relative dominance of large rocks, cobble, gravel, sand, mud etc.;

(iii) Flow type, i.e. relative dominance of riffle, glide and pool in the sampling area;

(iv) Dominant bank-side vegetation;

(v) In-stream vegetation;

(vi) Degree of shade by bank-side vegetation

Salmonid and Lamprey habitat quality was assessed, taking into account the environmental features listed above. Based on these observations and more detailed criteria outlined in the Aquatic Ecological Report, the value of each river section for salmonid and lamprey spawning, as a nursery area for juvenile salmonids and lamprey larvae, and as an area for adult salmonids, was estimated on a scale of None/ Poor/ Fair/ Good/ Very Good/ Excellent.

Results of the assessment, including photographs, along each of the six sections of the Ara River downstream of the site are included in the Aquatic Ecological Report in Attachment B.

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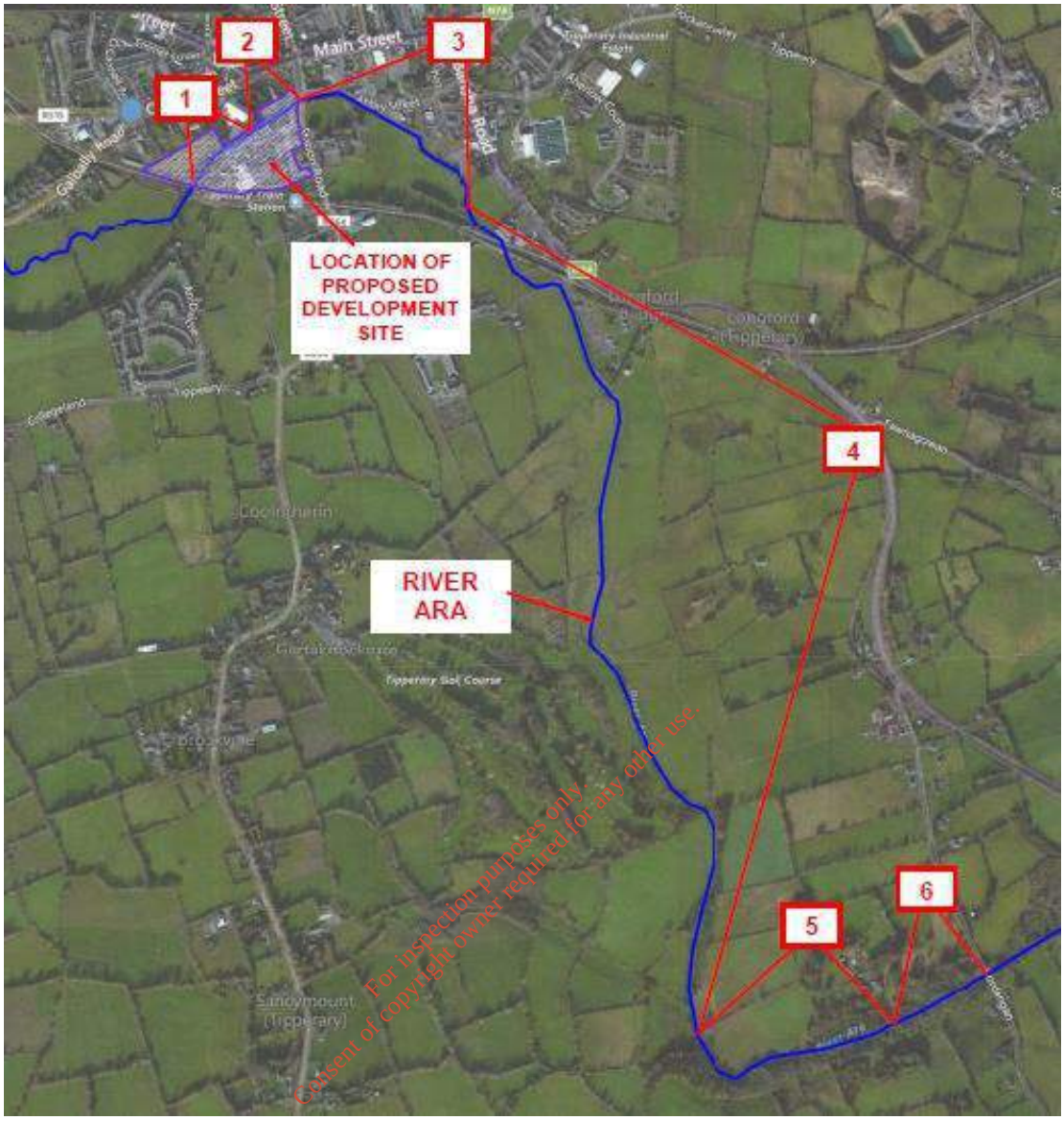


Fig. 5.2.1: Location of Habitat Assessment Sections of River Ara

Biological water quality assessment was carried out at four locations as indicated on Fig. 5.2.2 below. These included:

- Ara River immediately upstream of proposed development site;
- Ara River immediately downstream of Tipperary Cooperative Creamery;
- Ara River c.1 km downstream of Tipperary Cooperative Creamery and immediately upstream on Tipperary Town WWTP;
- Ara River downstream of Tipperary Town WWTP.

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Full details of the methodology used for the biological sampling and assessment, and results of the assessments are presented in the Aquatic Ecological Report. They are summarized in Table 5.2.1 below.

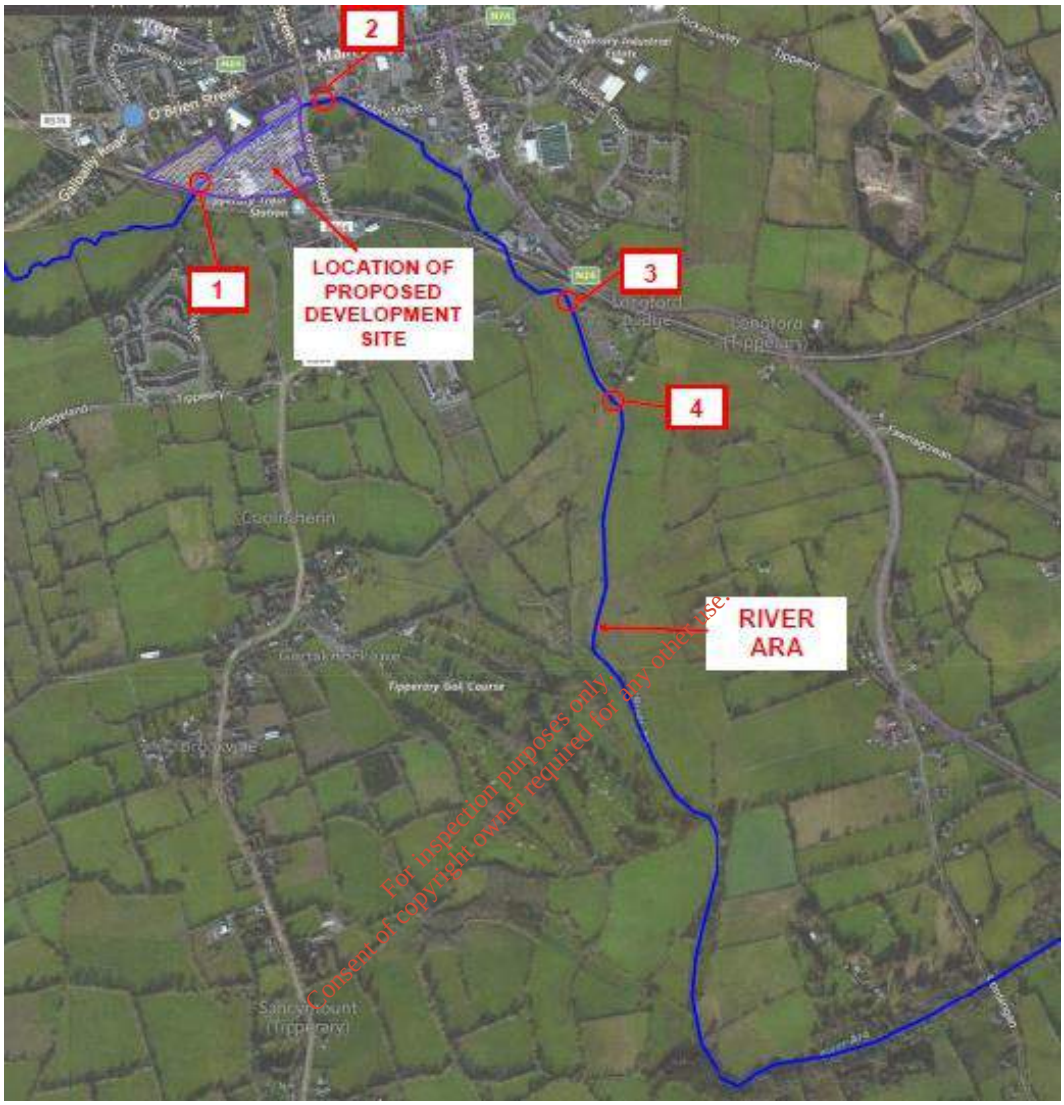


Fig. 5.2.2: Locations of Biological Assessment Sites on River Ara

Site Code	Location	Q-Rating	Water Framework Directive Ecological Quality	Quality Status
1	Ara River immediately upstream of proposed development site	Q3-4	Moderate	Slightly Polluted
2	Ara River immediately downstream of Tipperary Cooperative Creamery	Q3	Poor	Moderately Polluted
3	Ara River c.1 km downstream of Tipperary Cooperative Creamery and immediately upstream on Tipperary Town WWTP	Q3	Poor	Moderately Polluted
4	Ara River downstream of Tipperary Town WWTP	Q2-3	Poor	Moderately Polluted

Table 5.2.1: Summary of Biological Water Quality Data

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5.2.3.2 Potential Impacts - Aquatic Ecology

Construction Phase Impacts:

The Aquatic Ecological Report identifies the following Pre-Mitigation Potential Aquatic Environmental Impacts during the demolition and construction phases of the proposed development:

- Pollution of streams/rivers with suspended solids;
- Pollution of watercourses with nutrients due to ground disturbance during construction;
- Pollution of streams/rivers with other substances associated with the demolition, decommissioning & construction processes;
- Introduction or spread of invasive non-native aquatic species during construction;

A more detailed description of each of the above potential construction stage impacts and the associated harmful effects on aquatic ecology in the absence of appropriate mitigation measures is presented in the Aquatic Ecological Report.

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Operational Phase Impacts:

The Aquatic Ecological Report identifies the following Pre-Mitigation Potential Aquatic Environmental Impacts during the operational phase of the proposed development:

- Pollution of streams/rivers with surface runoff contaminated with liquid milk/milk by-products;
- Pollution of streams/rivers with surface runoff contaminated with petrochemicals;
- Potentially significant negative impacts on biological water quality, aquatic flora and fauna and particularly on salmonid fish due to elevated levels of BOD, ortho-phosphate and ammonia due to the increased volume of treated condensate being discharged to the River Arar.

Impacts on Freshwater Aquatic Qualifying Interests of Natura 2000 site:

Section 5.3.3 of the Aquatic Ecological Report examines potential pre-mitigation impacts of the development on the qualifying interests of the River Suir cSAC. No significant potential direct/in-situ impacts or indirect/ex-situ impacts on any of the qualifying interests of the cSAC which include Freshwater Pearl Mussel, White-clayed Crayfish, Sea Lamprey, Brook Lamprey, Twaite Shad, Atlantic Salmon and Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation.

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5.2.3.3 Mitigation & Enhancement Measures - Aquatic Ecology

Conservation Services – Ecological & Environmental Consultants identify detailed mitigation and enhancement measures to minimise impacts of the Dryer 2 development on aquatic ecology as outlined below.

In particular, with respect to potential construction stage impacts, their assessment notes that substantial mitigation by avoidance has already been applied following the relocation of the new Dryer Tower building to the south east and the retention of the northern half of the existing powder warehouse, the dispatch bay and store which will isolate the proposed development from the River. These will eliminate building and pavement works previously proposed directly adjacent to and along the river bank and therefore significantly reduce the potential construction stage impacts on the river. Furthermore it is no longer intended to provide the temporary footbridge access over the River Ara between the former hotel site and the construction site during the construction stage of the works, again avoiding significant potential impacts on the river.

Construction Phase:

Detailed construction stage mitigations measures are recommended in the Aquatic Ecological Report to address the potential construction stage impacts of the project identified above and will be implemented as follows:

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(i) Reduction and Prevention of Suspended Solids Pollution

- In accordance with Inland Fisheries Ireland Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016): The level of suspended solids in any discharges to fisheries waters as a consequence of construction works shall not exceed 25mg/l, nor result in the deposition of silts on gravels or any element of the aquatic flora and fauna. The appropriate control measures will be put in place as outlined below to ensure compliance with these guidelines.

- Runoff and surface erosion control is more effective and less expensive than sediment control with sediment control ponds only. It will be necessary to intercept and treat all surface water drainage from the proposed demolition/construction areas and the proposed construction compound areas to remove suspended solids, cementitious material and hydrocarbons before releasing it the River Ara.

- Eroded sediments will be retained on site with erosion and sediment control structures such as sediment traps, silt fences, sediment control ponds or if necessary a mobile ‘Siltbuster’ or similar equivalent specialist treatment system.

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- Before earthworks, demolition or construction commence (i.e. before they are needed) erosion control and sediment control measures must be in place and functioning.

- Demolished building material will be stored away from nearby water sources in a segregated area, prior to waste collection. Any contaminated building waste or soil, particularly around the fuel storage area and bund structure, will be segregated from other waste demolition materials and will be stored within temporary bunded storage areas.

- Other building waste which may contain fine particulate matter and cementitious material will be protected from rain using polyethylene sheeting or stored in a roofed area or stored in temporary bunded storage areas.

- Temporary stockpiles of fine materials such as sand will be covered with polyethylene sheeting.

- Demolition waste will be removed from site regularly by appropriate licensed waste disposal contractors for off-site treatment/recycling /disposal as appropriate. Non-hazardous building waste will be disposed to on-site skips for removal by a licensed waste disposal contractor.

- Dust suppression methods may be implemented to reduce the generation of dust and fine particles. Inland Fisheries Ireland requires that water abstraction for dust suppression shall only take place from watercourses identified and agreed with IFI. Abstraction points shall be screened so as to ensure that fish and aquatic plants are not removed from waters in the abstraction process.

- To avoid generation of suspended solids instream works in the River Ara will be avoided. The new pipeline support structure crossing the river does not require any instream works.

- Any dewatering of open trenches etc. will be discharged to a settlement pond to remove suspended solids before being released to surface waters.

- At locations where excavated materials are stored, drains will surround and intercept surface runoff from materials mounds and distribute this water to the controlled drainage system in place.

- Appropriate mitigation measures will be implemented to ensure significant risks of suspended solids contamination of streams/rivers will not occur during the construction phase. Permission on the undertaking of any construction activities in the immediate vicinity of the river between the end of September and the end of April will be sought from Inland Fisheries Ireland prior to commencement of the appropriate works.

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(ii) Reduction and Prevention of other Demolition & Construction Generated Pollution:

- Demolished building material will be stored a minimum of 50m away from the river in a segregated area, prior to waste collection. Any contaminated building waste of soil, particularly around the fuel storage area and bund structure, will be segregated from other waste demolition materials and will be stored within temporary bunded storage areas.

- Other building waste which may contain fine particulate matter and cementitious material will be protected from rain using polyethylene sheeting or stored in a roofed area or stored in temporary bunded storage areas.

- Prior to removal of the bund structure, the bund will be cleaned and contaminated run-off will be collected and safely disposed of by an appropriate licensed contractor. The demolished bund structure will be inspected carefully and if present, contaminated waste material will be segregated and disposed by the appropriate licensed waste disposal company.

- All tanks on site will be properly labelled showing their contents and capacities. The bund and tanks facilities will be checked on a regular basis to ensure any leaks or drips are fixed to prevent loss and pollution. Drainage from bunded areas will be diverted for collection and safe disposal by appropriate contractors.

- Any spillages will be cleaned up and disposed of correctly.

- In the unlikely event that soil material is contaminated by accidental spillages it will be isolated and contained until appropriate waste classification can be carried out, followed by approved disposal and treatment off-site. Training in emergency response procedures for such occurrences will be provided to all site personnel.

- Spill kits will be retained on site to ensure that any spillages or leakages are dealt with immediately. Material Safety Data sheets will be maintained and located on site in the event that a spillage occurs.

- An emergency plan to deal with accidental spillage will be drafted and kept on site during the construction period.

- Raw or uncured waste concrete will be disposed of by removal from the site.

- Before release to the environment, wash down water from exposed aggregate surfaces, cast-in-place concrete and from concrete trucks will be treated to a level which will ensure that total suspended solids in discharges to surface waters (including drains) will not exceed 25mg/l. Furthermore wash out water will not be released to the environment until it has reached a neutral pH.

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- Only the chute of the concrete delivery truck will be cleaned on site, using the smallest volume of water necessary. Concrete trucks will be directed back to their batching plant for washout.

- Clearly visible signs will be placed in prominent locations close to concrete pour areas, stating that washout of concrete lorries is not permitted on the site.

- The arrangements for concrete deliveries to the site will be discussed with suppliers before commencement of work, agreeing routes, prohibiting on-site washout and discussing emergency procedures.

- So as to avoid spillage, concrete will not be transported around the site in open trailers or dumpers and where possible concrete will be pumped directly into the shuttered formwork from the delivery truck.

- Concrete pours will be avoided where prolonged periods of heavy rain are forecast and covers will be available for freshly placed concrete to avoid the surface washing away in heavy rain.

- Fuels, lubricants and hydraulic fluids for equipment used on the construction site, as well as any solvents, oils, and paints will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to codes of practice (Enterprise Ireland BPGCS005).

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- Fuelling and lubrication of equipment will be carried out in a specially bunded area.

- Oil booms and oil soakage pads will be kept on site to deal with any accidental spillage.

- Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling.

- All pumps using fuel or containing oil will be locally and securely bunded when situated within 25m of waters or when sited such that taking account of gradient and ground conditions there is the possibility of discharge to waters.

(iii) Mitigation of pollution of watercourses with nutrients due to ground disturbance:

- As much of the potential nutrient input to streams during ground disturbance is associated with suspended soil particles, the measures outlined in (i) above apply equally to prevention of nutrient inputs to streams.

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(iv) Method Statement/Environmental Operating Plan:

As detailed in Section 1 of this EIAR it intended to prepare a detailed Construction & Environmental Management Plan (CEMP) for the Dryer 2 development. The CEMP is intended as a guidance document for the construction phase of the project, and will identify for the Project Management Team and Contractors, the key planning and environmental constraints and associated mitigation measures which need to be implemented in order to ensure that the project can be delivered in a manner which complies with the relevant statutory obligations and environmental best practice.

The CEMP will include sections specifically addressing each of the relevant environmental attributes considered in this Planning Stage Engineering & Environmental Report including:

- Soils, Hydrology, Geology and Hydrogeology including Storm Water Management, Sediment & Erosion Control and Water Quality;
- Ecology including Terrestrial Ecology and Aquatic Ecology;
- Air, dust, noise and vibration;
- Waste Management;
- Health and Safety.

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The CEMP will be prepared by the Project Management Team, in consultation with the relevant specialist consultants and statutory bodies such as IFI, NPWS, EPA and Tipperary Co. Co., as appropriate, prior to commencement of any demolition and construction works on site. It will adopt, as appropriate, all relevant mitigation measures, including monitoring, identified in this EIAR and associated specialist reports attached to same. It will also identify the arrangements to be put in place to monitor the implementation and effectiveness of the mitigation measures.

It is intended that all relevant and appropriate construction stage mitigation measures identified in Conservation Services – Ecological & Environmental Consultants Aquatic Ecological Report will be fully integrated into the detailed Construction & Environmental Management Plan prepared for the project.

The Project Management Team and Contractors will be obliged to take cognisance of the CEMP, when planning and undertaking the construction of the permitted development. Implementation of the CEMP and associated mitigation measures will be monitored by the Project Management Team, on a daily basis, with input from specialist consultants as appropriate.

The obligation for all Contractors, including their subcontractors and employees, to take cognisance of and comply with the requirements of the

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CEMP will be a Condition of Contract for all Contractors appointed to undertake work on the project.

(v) Ecological Clerk of Works:

- An Ecological Clerk of Works (ECoW) will be employed who will make at least weekly site visits for the duration of the construction works and more frequently at start-up and during critical construction events such as concrete pours as outlined below.

- The ECoW will also be the liaison for the purposes of consulting environmental bodies including the NPWS and IFI. The ECoW will be responsible for carrying out regular audits of the EOP on behalf of the proposed developer. In addition, the ECoW will be the primary person involved in the developer's monitoring role. The ECoW will be delegated sufficient powers under the construction contract so that he/she will be able to instruct the contractor to stop works and to direct the carrying out of emergency mitigation/clean-up operations.

- The ECoW will maintain a register indicating whether all mitigation measures have been carried out satisfactorily. This register will be signed off by the Project team's site foreman.

Separate from the on-going monitoring carried out by the contractor as part of the CEMP, the ECoW shall carry out the inspection/ monitoring regime described below on behalf of the employer. The results will be stored in the ECoW's monitoring file and will be available for inspection/ audit by the Client, NPWS or IFI staff. The main elements of the inspection/ monitoring regime are as follows:

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- Project team inspection of surface water treatment measures on a daily basis with the results to be included within the weekly monitoring file to be audited by the ECoW;

- Daily visual inspection of the watercourses in proximity to the works by the project team with the results to be included within the weekly monitoring file to be audited by the ECoW;

- Wheel wash facilities shall be inspected on a weekly basis.

- Stockpiles shall be monitored on a daily basis by the project team while being filled or emptied and otherwise on a weekly basis, with the results to be included within the weekly monitoring file to be audited by the ECoW.

- Control measures for works at or near water bodies shall be inspected on a daily basis by the project team with the results to be included within the weekly monitoring file to be audited by the ECoW.

- Concrete operations at or near watercourses shall be supervised by the ECoW and designated chute washing out facilities shall be

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inspected on a daily basis by the project team with the results to be included within the weekly monitoring file to be audited by the ECoW..

- Inspection of attenuation ponds, their release systems and other attenuation features such as silt traps etc.

- The Project CEMP monitoring results shall be audited on a frequent basis (weekly at a minimum).

In the unlikely event, given the robust mitigation and enhancement measures to be implemented on the project, of a release of sediment to a watercourse causing a plume, this shall immediately be investigated by the ECoW or the Project Team, as appropriate and the following procedure shall be followed:

- The relevant NPWS and IFI staff shall be notified immediately.

- The discharge generating the sediment discharge shall be stopped immediately.

- The contractor will be required to take immediate action and to implement measures to ensure that such discharges do not re-occur.

- Works shall not recommence until appropriate corrective measures to avoid any repetition are put in place. Such measures shall be agreed with the ECoW following consultation with the NPWS and IFI and shall be in accordance with the requirements of these control measures.

- Where the discharge is from one of the control measures associated with the works, the controlled discharge shall not recommence until written consent is received from the ECoW.

- Where the ECoW considers that the risk of a sediment release is high, he/ she will inform the Project team and the contractor and request protective action to be taken. Where the contractor does not take immediate action the ECoW will instruct the Project Team to take action and same willl be reported to the Contract Manager and the Project Team manager.

- The ECoW will be delegated powers under the contract sufficient for these instructions to be issued and for an instruction to stop works or carry out emergency works.

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Operational Phase:

Detailed construction stage mitigations measures are recommended in the Aquatic Ecological Report to address the potential operational stage impacts of the project identified above and will be implemented as follows:

(i) Mitigation of impact of waste water discharge:

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- Mitigation measures associated with the discharge of treated condensate to the River Ara and treated effluent to the Irish Water Urban Waste Water Treatment Plant are fully addressed in Section 5.3.6 of this EIAR.

(ii) Mitigation of pollution of watercourses with contaminated water draining paved and roofed areas:

- Separate surface water collection systems will be installed for surface water draining from roofs and paved areas.

- Surface water from roofs of the proposed Dryer Building will discharge via rainwater downpipes and the independent collection system before discharging to the existing surface water collection system on site and subsequently discharging to the River via the existing licensed surface water discharge SW-1.

- Surface water run-off from new and reinstated paved areas around the proposed building and demolished structures will be collected via road gulleys and the separate independent collection system and will pass through a Class I Bypass Separator before discharging to the existing surface water collection system on site and subsequently discharging to the River via the existing licensed surface water discharge SW-1.

- The design of the above Bypass Separator will be in accordance with the recommendations of CIRIA Report No. 142 and the appropriate cleaning, inspection and maintenance regime will be implemented in accordance with the manufacturers recommendations to ensure the unit continues to function effectively through the operational phase of the project.

- Fuels, lubricants and hydraulic fluids for equipment used at the facility, as well as any solvents, oils, chemicals and paints will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and stored in appropriately bunded areas.

(iii) Mitigation of potential pollution of surface waters by effluent from process area:

- There are no additional milk delivery, intake or storage facilities proposed as part of the proposed development and the appropriate mitigation measures are currently in place at the existing facilities to contain, collect and discharge any accidental spillages to the on-site waste water treatment plant.

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- Existing effluent storage tanks, pump sumps, etc. are of water retaining reinforced concrete construction and have the appropriate monitoring devices, alarms and controls.

- Existing fuel, effluent, liquid milk or milk product storage tanks comply with current regulations and are appropriately bunded.

(iv) Mitigation of habitat loss:

- One of the most effective methods of minimising loss of stream and riparian habitat during developments is the establishment of Leave Strips (riparian buffer zones). Leave strips are the areas of land and vegetation adjacent to watercourses that are to remain in an undisturbed state, throughout and after the development process (Chilibeck *et al* 1992). Leave strips are valuable not only because riparian vegetation is a vital component of a healthy stream ecosystem, but because this vegetation acts as an effective screen/barrier between the stream and the development area, intercepting runoff and acting as an effective filter for sediment and pollutants from the development area. The strip of riparian vegetation between the existing creamery river wall and the river will be retained and left undisturbed. Likewise the strip of riparian vegetation adjoining the proposed construction compound will be left undisturbed.

The appropriate detailed operational mitigation measures will be integrated into the detailed design of the wastewater treatment plant, foul and surface water drainage infrastructure and operational procedures, as appropriate, for the Dryer 2 development.

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5.2.3.4 Monitoring

To monitor the proposed development during construction, a biological and chemical monitoring system will be put in place on potentially affected sections of the River Ara. Monitoring of surface water discharges from the construction/demolition site should also be carried out. As a minimum the monitoring system will measure Q-values, B.O.D., suspended solids, turbidity, pH, molybdate reactive phosphorus & pH on the River Ara upstream and downstream of the proposed development. Monitoring of discharges should include suspended solids, pH and visual assessment for hydrocarbons. Details of monitoring including monitoring site locations, variables to be monitored, frequency of monitoring etc. will be agreed in advance with Inland Fisheries Ireland.

As Good ecological water quality is not at present being achieved either upstream or downstream of the proposed development, biannual (spring and autumn) biological Q-rating assessment will be carried out at Sites 1, 2, 3 & 4 (see section 3.3.1 above) by operatives that have formally intercalibrated their Q-rating analysis with EPA. This monitoring will continue until good ecological status is consistently achieved upstream and downstream of the development, or as otherwise agreed with the EPA.

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5.2.3.5 Residual Impact

The Aquatic Ecological Report concludes that if the mitigation measures specified are implemented in full, the residual negative impact of the proposed development on aquatic flora, fauna and habitats will be insignificant.

5.2.4 Habitats Directive Appropriate Assessment Screening

5.2.4.1 Introduction

An Appropriate Assessment (AA) is an evaluation of the potential impacts of a plan or project on the conservation objectives of Natura 2000 sites, and the development, where necessary/possible, of mitigation or avoidance measures to preclude negative effects. The requirement for AA is laid down in Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Flora and Fauna – the 'Habitats Directive' which was transposed into Irish law by the European Communities (Natural Habitats) Regulations, SI 94/1997.

There are four distinct stages to undertaking an AA as outlined in current EU and National Parks and Wildlife Service (NPWS) guidance:

1. Appropriate Assessment Screening;
2. Appropriate Assessment;
3. Assessment of Alternatives in cases where significant impact cannot be prevented;
4. Where no alternatives exist, an assessment of compensatory issues in the case of projects or plans which can be considered to be necessary for imperative reasons of overriding public interest (IROPI)

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Stage 1 above, Appropriate Assessment Screening, determines whether appropriate assessment is necessary by examining:

1. Whether a plan or project can be excluded from AA requirements because it is directly connected with or necessary to the management of a Natura 2000 site.
2. Whether the project will have a potentially significant effect on Natura 2000 sites, either alone or in combination with other projects or plans, in view of the sites' conservation objectives.

Appropriate Assessment Screening for a plan or project comprises the following:

1. Description of plan or project
2. Identification of relevant Natura 2000 sites, and compilation of information on their qualifying interests and conservation objectives

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3. Assessment of likely effects – direct, indirect and cumulative – undertaken on the basis of available information as a desk study or field survey or primary research as necessary

4. Screening Statement with conclusions

Conservation Services – Ecological & Environmental Consultants were engaged by OES Consulting, on behalf of Tipperary Cooperative Creamery Ltd, to undertake an Habitats Directive Appropriate Assessment Screening report as part of the 'Appropriate Assessment' process for the Dryer 2 development.

A copy of the Appropriate Assessment Screening Report prepared by Conservation Services – Ecological & Environmental Consultants for the subject development is included as Attachment C to the EIAR.

5.2.4.2 Description of Development

The Appropriate Assessment Screening Report, as required, provides a description of the project which is consistent with that described in Section 2 of the EIAR.

5.2.4.3 Identification of Relevant Natura 2000 sites, and Compilation of Information on their Qualifying Interests and Conservation Objectives

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The Appropriate Assessment Screening Report identifies five Natura 2000 sites situated within a 15km radius of the proposed development. These are:

1. The Lower River Suir Special Area of Conservation (SAC) (Site Code 002137);

2. The Lower River Shannon Special Area of Conservation (SAC) (Site Code 002165);

3. Galtee Mountains Special Area of Conservation (SAC) (Site Code 000646);

4. Moanour Mountain Special Area of Conservation (SAC) (Site Code 0022257);

5. Philipstown Marsh SAC (Site Code 001847).

These are identified on Fig. 5.2.3.

It concludes that these are the only Natura 2000 sites which could potentially be affected by the proposed development.

Links to view the NPWS Site Synopses and Conservation Objectives for each of the above sites.

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The Qualifying Interests for each of the sites are listed in the Appropriate Assessment Screening Report.

The Conservation Objectives of the five potentially affected Natura 2000 sites can be summarised as: To maintain or restore the favourable conservation condition of the habitats and species for which the Natura sites have been selected (i.e. the qualifying interests).

In the case of the Lower River Shannon SAC detailed objectives have been presented in NPWS (2012) for each of the qualifying interest species and habitats.

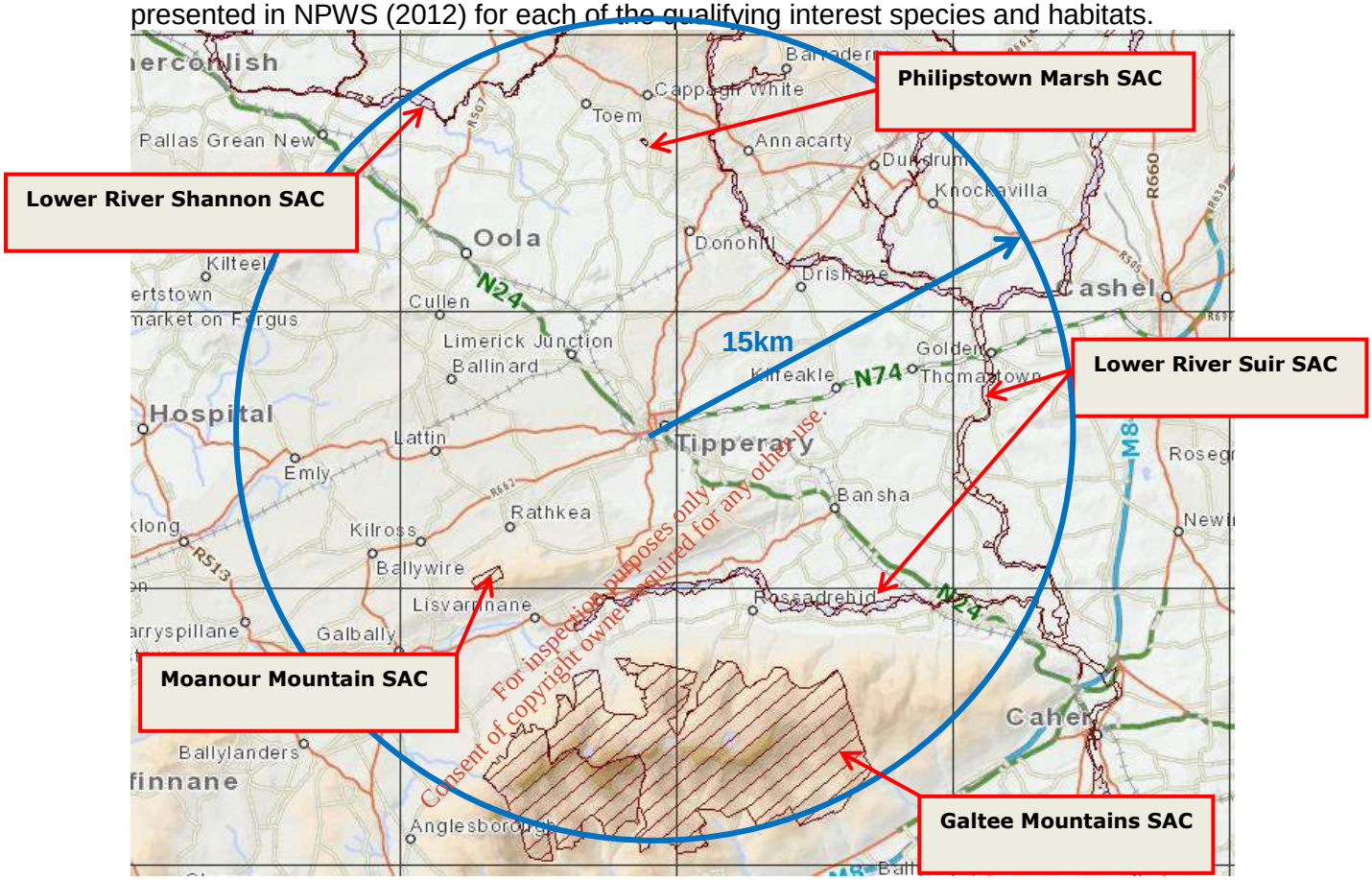


Figure 5.2.3: Natura 2000 Sites within 15km of Tipperary Cooperative Creamery site

5.2.4.4 Assessment of Likely Effects – Direct, Indirect and Cumulative

If a plan or project is likely to undermine any of the sites' conservation objectives, it must be considered likely to have a significant effect on that site.

NPWS guidelines state: "*It is important that the NIS applies the precautionary principle and the focus of the statement should be on demonstrating objectively, with supporting evidence, that there will be no adverse effects on the integrity of the Natura 2000 site. Where this cannot be demonstrated, adverse effects must be assumed and the Statement must reflect that*." The need to apply the precautionary principle in making any key decisions in relation to the tests of AA has been

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confirmed by European Court of Justice case law. Therefore, where significant effects are likely, uncertain or unknown at screening stage, full Appropriate Assessment will be required.

Subject to the precautionary principle, a significant impact constitutes any impact which alone or cumulatively could:

1. Prevent a qualifying interest Annex II species from maintaining itself on a long-term basis as a viable component of its natural habitats.

2. Result in a reduction in the natural range of a qualifying interest Annex II species in the foreseeable future.

3. Reduce the habitat of a qualifying interest Annex II species to below the level where it can maintain its population on a long-term basis.

4. Reduce the natural range of a qualifying interest Annex I habitat.

5. Threaten the long-term existence of the specific structure and functions which are necessary for the long-term maintenance of a qualifying interest Annex I habitat.

6. Threaten the favourable conservation status of the typical species of a qualifying interest Annex I habitat.

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The Source-Pathway-Receptor (S-P-R) conceptual model for environmental management risk assessment provides a systematic means of determining and evaluating the nature, effect and extent of exposure a vulnerable receptor may experience in relation to a particular hazard. For a risk to exist there must be a source (or hazard or pressure), a pathway, and a receptor (or target) (Daly, 2004). An environmental hazard is an event, or continuing process, which if realised will lead to circumstances having the potential to degrade, directly or indirectly, the quality of the environment (Royal Society, 1992).

The Habitats Directive Appropriate Assessment Screening Report concludes that no pathway is evident for impact on qualifying interests of any the five SACs under consideration other than downstream transport of polluting substances by surface waters. It notes that the entire demolition and construction site and construction compound are in close proximity to the River Ara.

The Habitats Directive Appropriate Assessment Screening Report provides a description of potential impacts of the proposed development on the Ara River as follows:

(i) Pollution of Streams/Rivers with Suspended Solids

In the absence of adequate mitigation any element of the proposed demolition process which will generate fine particles and any element of the proposed construction which involves excavation or placement of excavated materials has potential for suspended solids contamination of surface waters.

Harmful effects include:

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- Suspended sediment due to runoff of soil from construction areas, or due to disturbance of fine sub-surface sediments in the course of instream construction and excavation, can have severe negative impacts on invertebrate and plant life and on all life stages of salmonid fish.

- Suspended sediment can settle on spawning areas, infill the intragravel voids and smother the eggs and alevins (newly hatched fish) in the gravel.

- Bed Load (coarse material transported along the bottom of the stream) and settled sediments can infill pools and riffles, reducing the availability and quality of rearing habitat for fish.

- Suspended sediment can reduce water clarity and visibility in the stream, impairing the ability of fish to find food items.

- Settled sediments can smother and displace aquatic organisms such as macroinvertebrates, reducing the amount of food items available to fish.

- Increased levels of sediment can displace fish out of prime habitat into less suitable areas (Chilibeck et al 1992).

- Suspended solids can abrade or clog the gills of salmonid fish. It takes a high concentration of solid wastes to clog a fish gill and cause asphyxiation, but only a little to cause abrasions and thus permit the possibility of infections (Solbe 1988).

- Silt has been identified in the scientific literature as a serious threat to Margaritifera; the I.U.C.N. Red Data Book states that in the U.K. Margaritifera is 'threatened by siltation' and in North America 'accelerated siltation from land development could endanger them in future' (Wells et al 1983); Valovirta (1989) cites increase in the silt load of rivers as a reason for the decline of Margaritifera in Finland. Hendelberg (1960) and Young and Williams (1983) also implicate silt in damaging or eliminating Margaritifera populations. As juvenile Margaritifera are fully buried in the sand and gravel of the river bed they are more vulnerable to siltation. 'Any siltation of the river bed results in a rapid decrease in the oxygen content of the interstitial water and death of the juveniles living there.' (Buddensiek *et al* 1993)

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The Habitats Directive Appropriate Assessment Screening Report notes in this regard that mitigation by avoidance has been applied. The relocation of the building to the south east and retention of the northern half of the powder store will isolate the proposed development from the adjacent River Ara and eliminate the works previously proposed directly to and along the river bank. This will reduce the potential construction stage impacts on the river. Furthermore it is no longer intended to provide a temporary footbridge access over the River Ara between the former hotel site and the construction site.

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(ii) Pollution of Watercourses with Nutrients due to Ground Disturbance during Construction

The Habitats Directive Appropriate Assessment Screening Report notes that the main potential sources of nutrient inputs to freshwater due to ground disturbance are nutrients adsorbed or chemically bound to eroded suspended solids.

Several studies in the United States have found increases in both nitrogen and phosphorus export into streams following ground disturbance, particularly in association with organic particles (Golladay & Webster 1988; Likens et al 1970). Busman *et al* (2002) found that "phosphorus in soils is almost entirely associated with soil particles. When soil particles are carried to a river or lake, phosphorus will be contained in this sediment. Phosphate in soils is associated more with fine particles than coarse particles. When soil erosion occurs, more fine particles are removed than coarse particles, causing sediment leaving a soil through erosion to be enriched in phosphorus". It is therefore concluded that in the context of the proposed development the main potential source of nutrient enrichment of surface waters due to soil disturbance will be nutrients associated with eroded soil particles.

(iii) Pollution of Streams/Rivers with other Substances associated with The Demolition, Decommissioning & Construction Processes:

The Habitats Directive Appropriate Assessment Screening Report notes that the potential exists for a range of serious pollutants to enter watercourses during the demolition, decommissioning and construction processes. It identifies the following substances which could have deleterious effects on fish, plants and invertebrates if allowed to enter watercourses:

- Fuels, lubricants and hydraulic fluids from equipment used on the development site;
- Hydrocarbons potentially released during removal of the fuel storage tanks and the bunded area;
- Contamination from hazardous waste material deriving from improper decommissioning of buildings, or incorrect storage of contaminated waste material;
- Contamination from hazardous waste material deriving from incorrect storage of contaminated waste material;
- Contamination from hazardous waste material in runoff deriving from erosion of contaminated soils;
- Raw or uncured concrete and grouts;

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- Wash down water from exposed aggregate surfaces, cast-in-place concrete and from concrete trucks;

- Cementous material generated during the demolition process, and

- Concrete, bentonite, grout and other cement-based products are highly alkaline and corrosive and can have significant negative effects on surface water quality.

Cement-based products generate very fine, highly alkaline silt (pH 11.5) that can physically damage fish by burning their skin and blocking their gills. The alkaline silt can also smother vegetation and the bed of watercourses and can mobilise pollutants such as heavy metals by altering the water's pH.
The main hydrocarbons of concern are the petrochemical derived group, which includes petrol, fuel oils, lubricating oils and hydraulic fluids. In unmodified form these are liquid, virtually insoluble and lighter than water. Some hydrocarbons, such as bitumen and heavy fuel oil, become heavier than water when affected by naturally occurring bacteria and can then be treated as sediments. Some hydrocarbons exhibit an affinity for sediments and thus become entrapped in deposits from which they are only released by vigorous erosion or turbulence (Luker & Montague 1994). EIFAC (Svobodova et al 1993) states that “a sensory assessment is preferred to toxicological analysis in determining the highest admissible amounts of oil and oil products that can be present in water; on this basis the highest admissible concentrations are in the range of 0.002 to 0.025 mg per litre”.

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The Habitats Directive Appropriate Assessment Screening Report identifies the following harmful effects:

- The prevention of gaseous exchange at the water surface, leading to reduced dissolved oxygen in the underlying water (Solbe 1988);

- In the case of turbulent waters the oil becomes dispersed as droplets into the water. In such cases, the gills of fish can become mechanically contaminated and their respiratory capacity reduced (Svobodova *et al* 1993), and

- Oil products or their combustion products may contain various highly toxic substances, such as benzene, toluene, naphthenic acids, xylene and PAHs (polyaromatic hydrocarbons) which are to some extent soluble in water; these penetrate into the fish and can have a direct toxic effect. It is generally agreed that the lighter oil fractions (including kerosene, petrol, benzene, toluene and xylene) are much more toxic to fish than the heavy fractions (heavy paraffins and tars) (Svobodova *et al* 1993).

The Habitats Directive Appropriate Assessment Screening Report notes in this regard that mitigation by avoidance has been applied. The relocation of the building to the south east and retention of the northern half of the

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powder store will isolate the proposed development from the adjacent River Ara and eliminate the works previously proposed directly to and along the river bank. This will reduce the potential construction stage impacts on the river. Furthermore it is no longer intended to provide temporary footbridge access over the River Ara between the former hotel site and the construction site.

(iv) Pollution of Streams/Rivers with Surface Runoff from Completed Development

The Habitats Directive Appropriate Assessment Screening Report identifies the main pollutants of concern as:

- Liquid milk/ milk by-products. These are considered in (v) below.
- Petrochemicals. These have already been considered in (iii) above.

(v) Potential Impact of Discharge

The Habitats Directive Appropriate Assessment Screening Report notes that most of the wastewater from the existing creamery and from the proposed development is/will be pre-treated onsite before being piped to the Tipperary Town WWTP. It is proposed that condensate from the existing and proposed evaporators will continue to be treated on site and discharged to the River Ara at the site. Therefore for the purposes of the Habitats Directive Appropriate Assessment Screening Report the only trade discharge to be considered is the discharge of treated condensate to the River Ara. The products being dried (Skim, Butter, Whole Milk, Whey etc.) can impact on the quality of the condensate produced at the plant. However the proposed treatment of the condensate discharge by a reverse osmosis plant with a maximum discharge concentration of 0.15mg/l ortho-Phosphate and a maximum discharge of 1,000m³/day will ensure that the proposed development will not result in a significant adverse impact on biological water quality, aquatic flora and fauna and particularly salmonid fish.

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The proposed development includes the upgrade of the existing Waste Water Treatment Plant (WWTP) with a new balance tank and clarifier to cater for the additional flow rate generated by the new Dryer 2 Facility and to improve the quality of treated effluent discharged to the public sewer.

The Habitats Directive Appropriate Assessment Screening Report notes that the assessment of the potential impacts on chemical water quality, specifically BOD, Ammonia and Ortho Phosphate (refer to Section 5.3.6 and Attachment D of this EIAR) indicates that downstream concentrations for these parameters will comply with the chemical quality objectives for 'Good Status' rivers in the 2009 Surface Water Quality Regulations. Impact on chemical and ecological status of the Aherlow River (Lower River Suir SAC)

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19km further downstream will therefore be insignificant as this far downstream any ammonia and B.O.D. would be fully eliminated. Furthermore, an orthophosphate concentration compliant with the requirement of the surface water regulations in the Ara River at the Tipperary Co-Op discharge point cannot elevate the orthophosphate concentration above the compliant level in the SAC channel c.19km downstream.

(vi) Potential Impact on Qualifying Interests of Potentially Affected SACs

The potential impact on each of the qualifying interest Annex II Species and Annex I Habitats in each of the five potentially affected SACs is addressed in detail in Sections 2.3.6 to 2.3.10 of the Habitats Directive Appropriate Assessment Screening Report. These sections conclude that there are no potential direct/in-situ impacts and no potential indirect/ex-situ impacts for any of the qualifying interest Annex II Species or Annex I Habitats of the five potentially affected SACs considered.

5.2.4.4 Screening Statement with Conclusions

The Habitats Directive Appropriate Assessment Screening Report concludes, on the basis of the assessment outlined above, that the proposed development will have no potential impact on Natura 2000 sites.

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5.3 SOILS, GEOLOGY, HYDROLOGY AND HYDROGEOLOGY

5.3.1 Introduction

This section of the Environmental Impact Assessment Report (EIAR) considers the impact of the proposed development on soils, geology, hydrogeology and hydrology including water quality and resources during the construction and operational phases of the project. The following aspects will be considered:

- Impacts on Soils, Hydrology, Geology and Hydrogeology including groundwater;
- Impact of Discharges to Surface Waters;
- Process and foul effluent treatment and discharge;
- Potable water supply;
- Flood Risk.

A description of the Existing Environment, Impacts of the Proposed Development, Mitigation and Enhancement Measures and Residual Impacts in the context of the construction stage and general operational stage impacts of the subject development on Soils, Hydrology, Geology and Hydrogeology are considered in Sections 5.3.2 to 5.3.5 respectively below.

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Geotechnical Investigations for the subject development were completed by IGSL Ltd. in June/July 2016 and a copy of their Geotechnical Report is included as Attachment E to the EIAR. The results of these investigations are summarised in Section 5.3.2.2 (Description of Existing Environment – Soils below).

Tipperary Cooperative Creamery Ltd. engaged OES Consulting to undertake an assessment of the impact of the proposed new Dryer Facility development on surface waters. A complete copy of the Report prepared by OES Consulting for the assessment is included in Attachment D of this EIAR. This is considered in more detail in Section 5.3.6.

As outlined in the Description of Development, the scope of the project includes an upgrade to the existing WWTP and this is considered in Section 5.3.7.

Water Supply is addressed in Section 5.3.8.

A Flood Risk Assessment – Stage 1 Flood Risk Identification Report (FRA) has been prepared by MRG Consulting Engineers Limited for the subject development in accordance with the requirements of Tipperary Town and Environs Development Plan (2013-2019) and a copy is included as Attachment F to this EIAR. This is considered in Section 5.3.9.

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5.3.2 Description of Existing Environment

The receiving environment has been sub-divided for the purposes of this Environmental Impact Assessment Report into relevant sections concerning geology, soils, hydrogeology and hydrology, as the characteristics, though linked, have different risks from development.

5.3.2.1 Geology

The Geological Survey of Ireland (GSI) database indicates that the Tipperary Cooperative Creamery site straddles the boundary between two bedrock formations, comprising pale cross-bedded oolitic limestone from the Suir Limestone Formation over most of the developed site, and dark shaly charty limestone from the Athassel Limestone Formation over the northern section of the site. The Dryer 2 development is located close to the boundary of these two formations as shown on the GSI 1:100,000 bedrock geology mapping. The geotechnical investigations completed for the project in May/June 2016 identified the bedrock underlying the site as medium to strong fine grained limestone with some minor solution (karst) weathering. Bedrock was encountered between c. 10m and 16m below existing ground level.

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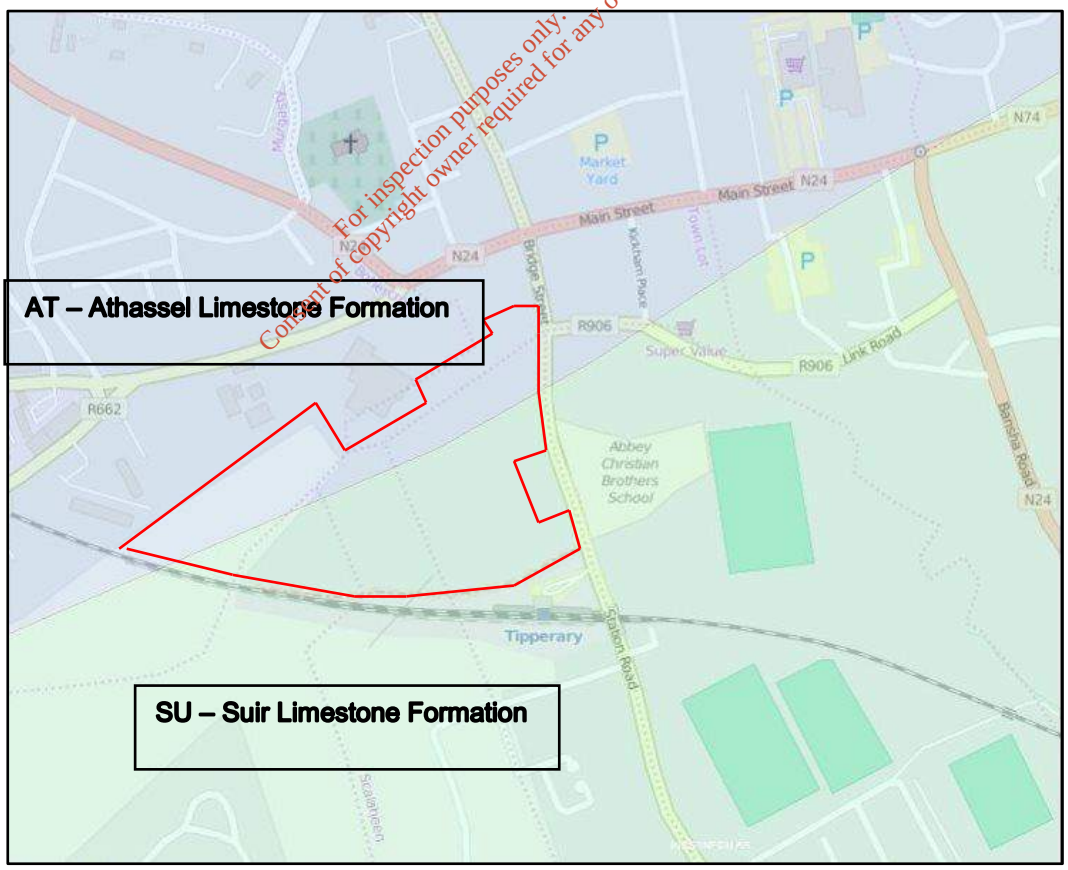


Fig. 5.3.1: Bedrock Geology – Source GSI

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5.3.2.2 Soils

The soils and subsoils over the developed Tipperary Cooperative Creamery Site and former hotel site to the north of the Rover Ara are identified on the Teagasc Maps as predominantly made ground.

Geotechnical Investigations completed by IGSL Ltd. in 2016 for the Dryer 2 and Dryer 3 projects at Tipperary Cooperative Creamery. The scope of the investigations included three cable percussion boreholes. Rotary core drilling was carried out at two of these locations and at two additional locations to establish rock horizon and recover representative cores. Six exploratory trial pits were excavated to expose existing structural foundations and record relevant details. A programme of laboratory testing was completed to confirm geotechnical soil and rock parameters. A copy of the IGSL Geotechnical Report detailing the findings of their investigations is included as Attachment E to this EIAR.

The stratification pattern is summarised as follows in the IGSL Report :

MADE GROUND: in excess of 2.00 metres noted in the boreholes but probably deeper closer to the river where rock armour has also been placed.

Stiff brown gravelly CLAY/Dense Clayboound sandy GRAVEL is noted below the fill and continuing to bedrock. A zone of fine silt/sand is present in one borehole (BH03) from 8.10 to 11.20 metres. SPT values indicate that this zone is medium dense.

LIMESTONE bedrock encountered at depths between 10.20 and 16.00 meteres, with a thin upper weathered horizon.

Ground water noted in the boreholes at about 5.00 meteres BGL. Moderate inflow with standing level at about 3.50 metres. This may be consistent with the water level in the River Ara.

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5.3.2.3 Hydrogeology

The underlying aquifer has been classified as an RKd (regionally important aquifer – Karstified (diffuse)) and the GSI Classification for this bedrock aquifer unit indicates it is capable of supplying regionally important abstractions (e.g. Large public water supplies), or ‘excellent’ yields (>400m3/d). Groundwater flow occurs predominantly through sand and gravel grains, through solutionally-enlarged fissures. Although no hydrogeological data is available, transmissivity is expected to be high in the pure limestones but storage will be low. The groundwater vulnerability is described as moderate.

Tipperary Co-operative Creamery site is located within the Tipperary Groundwater body. The Tipperary Groundwater body report states that:

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"Groundwater flow in this aquifer will be through karstic conduits and enlarged fissures close to the surface. Flow in the karstified systems tends to be conduit flow along the fault zones. Where there are poor aquifers offset against the groundwater body due to faulting, this will retard the flow of groundwater to the central area where most discharge is expected to occur, via baseflow to the Suir and the Multeen Rivers".

Tipperary Cooperative Creamery currently abstract water from a single abstraction well on the site.

A GSI well search was undertaken to investigate if there was any domestic or public drinking groundwater sources in the vicinity of the site.

5.3.2.4 Hydrology

The Tipperary Cooperative Creamery facility at Station Road in Tipperary Town is located within the catchment of the River Ara. The River Ara rises in low lying lands west of the village of Lattin and converges with the River Shroughnagowneen at Ballynahow 4 kilometres upstream of Tipperary Town.

The River Ara then flows through the town of Tipperary and the village of Bansha before converging with the River Aherlow at Tankerstown, approximately 12 kilometres downstream of the Tipperary Cooperative Creamery facility.The River Aherlow subsequently discharges to the River Suir 2 kilometres north of Cahir.

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5.3.3 Impact of Proposed Development

The construction stage and general operational stage impacts of the proposed Dryer 2 development on soils, geology, hydrology and hydrogeology are considered below.

5.3.3.1 Construction Phase Impacts

The following impacts for the demolition and construction phases of the Dryer 2 development have been identified:

- Surface water degradation in the River Ara from the accidental spillage of oils and fuels from vehicles and machinery, or during the demolition of the southern section of the warehouse and other buildings, in particular the removal of fuel storage tanks and the bunded area;

- Risk of increased silt content to the local water source, with dust and fine particles arising during the demolition and construction of buildings, the movement of vehicles around the construction area, as well as run-off from the demolition and construction site containing cement and other particles into the local water source;

- Possibility of destabilising the river bank during demolition and construction phases leading to an increase in the pollution load of the River Ara by increasing sediment loading;

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- Soil degradation due to spillage of fuels and lubricants from machinery, contamination from hazardous waste material deriving from improper decommissioning of buildings, or incorrect storage of contaminated waste material;

- The movement of vehicles and machinery can cause soil compaction;

- Soil erosion may occur due to the increase of surface runoff;

- Demolition dust and fine particles can also deteriorate the soil quality and the incorrect disposal of waste material can have a negative impact on the soil composition;

- While the proposed development will be commissioned on made-ground, there is still the possibility of groundwater pollution due to accidental spillage, dust, surface run-off containing concretes and demolition material.

5.3.3.2 Operational Phase Impacts

It is considered that the continued operation of the development will have negligible or no variation to the hydrogeology, soils or geology of the site. Following construction of the dryer tower, the new evaporator and dryer installations and associated infrastructure will be installed, commissioned, tested and maintained preventing any leaks in the system.

The main hydrological impacts associated with the operational phase of the Dryer 2 development will be the discharge of treated condensate to the River Ara. This is addressed separately in Section 5.3.6 below.

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5.3.4 Proposed Mitigation and Enhancement Measures

The following mitigation measures will be implemented for the control of pollution and general protection of soils, groundwater and surface water during the construction and operational stages of the project:

5.3.4.1 Construction Phase Mitigation and Enhancement Measures

- Demolished building material will be stored away from nearby water sources in a segregated area, prior to waste collection. Any contaminated building waste, particularly around the fuel storage area and bund structure, will be segregated from other waste demolition materials and will be stored within temporary bunded storage areas. Demolition waste will be removed from site regularly by appropriate waste disposal contractors for off-site treatment/ recycling/disposal.

- Prior to removal of the bund structure, the bund will be cleaned and contaminated run-off will be collected and safely disposed of by appropriate

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contractor. The demolished bund structure will be inspected carefully and if present, contaminated waste material will be segregated and disposed by the correct waste disposal company.

- Dust suppression methods shall be implemented to reduce the generation of dust and fine particles that could increase solid content in the nearby river. Cement debris will be captured in settlement ponds preventing entry to local water source.

- Control of both erosion and sediment entrainment in runoff will be a key undertaking during the demolition and construction phase of the project. It will be necessary to ensure that the risk of potential washout of fines to surface water is minimised. Contamination of watercourses with silt will be prevented by managing materials which have potential to give rise to siltation at source.

- The issue of accidental spillage of hydrocarbons, such as diesel and lubrication oil during refuelling of plant machinery, is a potential risk during the demolition and construction phase. Refuelling of vehicles and equipment will occur within a designated re-fuelling area consisting of concrete hardstanding with drainage directed to an oil/water interceptor. A purpose designed, removable, drip tray will be provided beneath connection points to catch any residual oil during filling and disconnection of the flexible tanker hose. The drip tray will be regularly emptied into an appropriately contained area and disposed of off-site by a specialist licensed contractor. Fuel/oil deliveries should be supervised by a designated person.

- All machinery will be maintained in good working order, free from leakage of fuel or hydraulic fluid. Oil booms and oil soakage pads will be maintained on-site and on all operated machinery to enable a rapid and effective response to any accidental spillage or discharge.

- All tanks on site will be properly labelled showing their contents and capacities. The bund and tanks facilities will be checked on a regular basis to ensure any leaks or drips are fixed to prevent loss and pollution. Drainage from bunded areas will be diverted for collection and safe disposal by appropriate contractors.

- All oils and hydrocarbons required for the project will be stored in a bunded area with provisions of adequate spill retention capacity (a minimum of 110% tank capacity). The integrity and watertightness of the bunds will be monitored regularly. The design (volume and construction) of all bunds will conform to standard bunding specifications. The retention capacity of bunded areas will be as follows:-

    - 110% of the capacity of the largest tank or drum to be stored within the bunded area; and

    - 25% of the total volume of substance which could be stored within the bunded area.

- Any spillages will be cleaned up and disposed of correctly.

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- In the unlikely event that soil material is contaminated by accidental spillages it will be solated and contained until appropriate waste classification can be carried out, followed by approved disposal and treatment off-site. Training in emergency response procedures for such occurrences will be provided to all site personnel.

- Spill kits will be retained on site to ensure that any spillages or leakages are dealt with immediately. Material Safety Data sheets will be maintained and located on site in the event that a spillage occurs.

- An emergency plan to deal with accidental spillage will be drafted and kept on site during the construction period.

- Wet concrete will be manufactured at an offsite batching plant and where necessary transported to the required route area by Ready Mix Trucks during construction works. The pouring of concrete shall be carried out by a dedicated pump operation and will be strictly supervised to ensure quality control, safe working operation and no impact on the environment due to accidental spillage. Surplus concrete will be returned to batch plant after completion of a pour.

- The transport of concrete in Ready Mix Trucks will be strictly controlled to ensure the safe passage of the material while on route, with particular attention given to spillage. All transport deliveries shall be carried out strictly within the permitted truck carrying capacity and no allowance will be permitted for exceeding the carrying specification of the lorry.

- As the proposed construction development phase will take place on pre-existing made ground, there are minimal risks to groundwater quality. However, as the groundwater is described as moderate vulnerability, the following mitigation measures will be in place: development of settlement pond to contain the runoff of soil and sediment generated from movement of machinery and demolition and construction of the proposed development.

- The settlement pond can prevent an increase of the pollution load as solid particles shall settle to the bottom of the pond prior to discharging the river. This water can be used as a method of dust suppression to further reduce the movement of dust and fine particles into nearby water sources.

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As detailed in Section 1 of this EIAR it intended to prepare a detailed Construction & Environmental Management Plan (CEMP) for the Dryer 2 development. The CEMP is intended as a guidance document for the construction phase of the project, and will identify for the Project Management Team and Contractors, the key planning and environmental constraints and associated mitigation measures which need to be implemented in order to ensure that the project can be delivered in a manner which complies with the relevant statutory obligations and environmental best practice.

The CEMP will include sections specifically addressing each of the relevant environmental attributes considered in this EIAR including:

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- Soils, Hydrology, Geology and Hydrogeology including Storm Water Management, Sediment & Erosion Control and Water Quality;
- Ecology including Terrestrial Ecology and Aquatic Ecology;
- Air, dust, noise and vibration;
- Waste Management;
- Health and Safety.

The CEMP will be prepared by the Project Management Team, in consultation with the relevant specialist consultants and statutory bodies such as IFI, NPWS, EPA and Tipperary Co. Co., as appropriate, prior to commencement of any demolition and construction works on site. It will adopt, as appropriate, all relevant mitigation measures, including monitoring, identified in this Planning Stage Engineering & Environmental Report and associated specialist reports attached to same.

The Project Management Team and Contractors will be obliged to take cognisance of the CEMP, when planning and undertaking the construction of the permitted development. Implementation of the CEMP and associated mitigation measures will be monitored by the Project Management Team, on a daily basis, with input from specialist consultants as appropriate.

The obligation for all Contractors, including their subcontractors and employees, to take cognisance of and comply with the requirements of the CEMP will be a Condition of Contract for all Contractors appointed to undertake work on the project.

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5.3.4.2 Operational Phase Mitigation and Enhancement Measures

The OES Report notes that the Tipperary Cooperative Creamery site is currently licensed by the Environmental Protection Agency and final ELV's to be adopted will be subject to their assessment and agreement. Details of the emissions and discharges associated with the proposed dryer will be submitted to the Agency as part of an application for a review of the site's IE Licence Register No P0801-02. Tipperary Co-Op will monitor the treatment system performance internally to ensure that it is working effectively and will also monitor the quality of the final condensate discharge on a continuous basis.

Regular maintenance and inspection of the new dryer tower and associated equipment will minimise any potential impacts to hydrogeology, soils and geology of the site. Similarly, regular maintenance and monitoring of the upgraded WWTP will minimise any potential impacts to hydrogeology, soils and geology of the site.

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5.3.5 Residual Impacts on Soils, Geology and Hydrology

The new support structure will be supported on piled foundations on the underlying limestone bedrock. There will be no significant bulk excavation associated with the Dryer 2 Facility and all substructure works, including pile caps, ground beams and ground floor slab will be completed within the zone of existing made ground. On this basis there should be no significant impacts on soils and geology associated with this project.

Mitigation measures have been proposed to ensure the protection of surface waters and groundwater during both the constructional and operational phases of the project. Both erosion and sediment entrainment in surface water run-off during demolition and construction works are considered the most significant risks to surface water during the construction stage of the project. Implementation of the appropriate mitigations measures identified above should reduce this risk to a minimum. On this basis it is considered that there should be no significant impacts on surface water from the construction of the Dryer 2 Facility.

5.3.6 Assessment of Impact on Surface Waters

5.3.6.1 Introduction

Tipperary Cooperative Creamery Ltd. engaged OES Consulting to undertake an assessment of the impact of the proposed new Dryer Facility development on surface waters. A complete copy of the Report prepared by OES Consulting for the assessment is included in Attachment D of this EIAR. The scope of the assessment included the potential for likely and significant impacts on the receiving surface water environment, specifically:

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- Determine the impacts on the River Ara based on utilisation of the available assimilative capacity at the point of discharge, after current licensed discharges from the site and comparison of the predicted resultant downstream concentrations of the various parameters against the relevant water quality standards for those parameters under the European Communities Environmental Objectives (Surface Waters) Regulations 2009;

- Taking account of other existing and planned developments which may generate discharges to the River Ara, including the Tipperary Town Urban Waste Water Treatment Plant (uWWTP);

- Evaluate the likely needs of the potential future discharges within the catchment, having regard to the Tipperary County Development Plan 2014 and the Tipperary Electoral Area Local Area Plan 2011;

- Undertake Cumulative Assessment to include the proposed development and other developments.

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Their assessment comprised a desk based study of the proposed development involving a review of available geotechnical and hydrological information on the site and surrounding areas including that available from the following sources:

- Geological Survey Ireland (GSI) public mapping system – www.gsi.ie
- Water Quality Monitoring Data for River Ara - Tipperary Co Council/EPA
- Environmental Protection Agency (EPA) Envision public viewer – www.epa.ie
- Hydrometric Data River Ara - Environmental Protection Agency (EPA)
- IGSL Geotechnical Investigations Report 2016, included as an attachment to the EIAR
- Industrial Emissions (IE) Licence for Tipperary Cooperative Creamery Limited (Reg. No. P0801-01)
- 2016 Annual Environmental Report (AER) Data for Tipperary Cooperative Creamery Limited (submitted to EPA via EDEN Portal)
- Waste Water Discharge Authorisation (WWDA) for Tipperary Town uWWTP (Reg. No. D0146-01)
- 2016 AER Data for Tipperary Town uWWTP

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5.3.6.2 Background Catchment Information

Section 2 of the OES Report includes detailed background catchment information with respect to the subject catchment including River Basin Management Requirements, Ecological Designations and Receiving Water Quality. These are detailed below:

(i) River Basin Management Requirements

The Tipperary Co-Op facility is located in the South Eastern River Basin District (SERBD), and under the Water Framework Directive (WFD) the Aherlow Water Management Unit Action Plan (2009-2015) has been developed for Tipperary Town and surrounding areas. It provides details of the ecological and physiochemical status of the waterways within the Aherlow catchment area, the plan includes the pressures/risks of the catchment as well as the WFD Objective target Dates.

The current plan runs from 2009 to 2015 and is currently under review, the revised plans are not due to be published until second half of 2017, and will run from 2017 to 2021.

A target of 'Good Ecological Status' has been assigned to the River Aherlow in the Water Management Unit Action Plan (WMU).

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(ii) Ecological Designations

The River Suir is a designated Special Area of Conservation (SAC) (assigned Site Code 002137), draining a large proportion of North and South County Tipperary. The SAC encompasses the River Aherlow. One branch of the River Suir SAC commences in the River Aherlow 3 kilometres south of the facility and east of the village of Lisvarrinane and extends over the entire watercourse.

The River Suir is assigned SAC status on the basis of the presence of alluvial wet forests and old sessile oak woodland, both priority habitats listed on Annex I of the E.U. Habitats Directive. The Suir is also selected as a SAC for floating river vegetation, tidal mudflats, Atlantic salt meadows, Mediterranean salt meadows and Hydrophilous tall herb fringe communities, all habitats listed on Annex I of the E.U. Habitats Directive.

The site is also selected for the following species listed in Annex II of the Directive: Freshwater Pearl Mussel, White-clawed Crayfish, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad, Salmon, Otter and Yew *Taxus baccata* woodland. The SAC is noted as supporting a number of protected bird species including Greylag Goose and Lapwing and other bird species such as Greenland Whitefronted Goose, Golden Plover, Whooper Swan and Kingfisher.

Maintaining the nutrient balance within the watercourses discharging to the SAC, forms an integral part of ensuring species diversity is not impacted.

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(iii) Receiving River Water Quality

Historically, water quality monitoring has been undertaken on the River Ara by South Tipperary County Council and the EPA as part of routine monitoring and also in the implementation of SI No. 258/1998-Local Government (Water Pollution) Act, 1977 (Water Quality for Phosphorous) Regulations, 1998.

These Regulations have now been revoked by S.I. 272 of 2009 European Communities Environmental Objectives (Surface Waters) Regulations which drive the implementation of the Water Framework Directive.

The current water quality objective for the River Aherlow is to achieve 'Good Ecological Status' by 2021. The 2021 timescale was assigned to allow sufficient time to upgrade WWTP's within the catchment.

The Water Unit Action Plan for the Aherlow River describes the current ecological status for the River Ara is 'poor' and the physiochemical status is 'moderate'. It is noted the river classification is based upon a one out all out system, whereby if one monitoring point returns a 'poor' classification, the entire water course is assigned that status. It is noted that the status of the Ara improves to 'Moderate' downstream of Tipperary Town.

Biological monitoring (Q Rating) and physiochemical monitoring of the River Ara is undertaken at monitoring points upstream (Point Reference: 16A030100) and downstream (Point Reference: 16A030300) of the Tipperary

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Cooperative Creamery facility. It is noted that the downstream monitoring point is below the built-up area of Tipperary Town.

The most recent biological monitoring (2008) has reported a Q3 (poor) status both upstream and downstream of the Tipperary Cooperative Creamery facility. The Q rating of the river improves to Q3-4 (moderate) and then to Q4 (good) further downstream. The locations of all monitoring points are provided as Attachment 1, Figure 2.

Physiochemical Water Quality results recorded by the EPA on the River Ara upstream of Tipperary Cooperative Creamery for the period from January 2014 to December 2016, including mean BOD, ammonia, orthophosphate and nitrate concentrations, are presented in Table 1 below alongside the means standards presented in Table 2 against the mean standards set out for a 'Good' status river in S.I. No. 272 of 2009 European Communities Environmental Objectives (Surface waters) Regulations 2009.

Parameter	2014-2016 Mean (mg/l)	Mean Surface Water Targets S.I. 272 of 2009
BOD	0.785	1.50
Ammonia (as N)	0.035	0.065
Orthophosphate (as P)	0.048	0.035

Table 5.3.1: Physiochemical Water Quality Results for River Ara (Upstream of Tipperary Cooperative Creamery – Br SE Shronell – Station Code 16A03-0100).

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5.3.6.3 Discharges within the Catchment

Section 3 of the OES Report on Assessment of Impact on Surface Waters (included as Attachment D to this EIAR) provides details of existing discharges to the River Ara from the Tipperary Cooperative Creamery site as well as existing and other potential discharges to the River from other sources which need to be considered in the context of potential cumulative impacts with the subject development. These are outlined below:

(i) **Existing Discharges to River Ara from Tipperary Cooperative Creamery**

Tipperary Co-Op discharge surface water runoff, treated condensate and cooling water to surface water. All of the discharge points from the site are included in the facility's IE licence.

Emission point reference SW-2 relates to the discharge of evaporated condensate to the River Ara. This emission point is subject to continuous monitoring in respect of volume and quality. The current discharge at SW-2 is monitored, as per Schedule C: Control and Monitoring of the IE Licence. Flow, pH, temperature and conductivity are monitored continuously, with COD, Suspended Solids, Total Nitrogen, Ammonia measured daily and Orthophosphate and Total Phosphorous weekly. Oils, fats and grease is a monthly discharge monitoring requirement.

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The current IE Licence Limit values (ELV's) for emission point SW-2 are shown on Table 2.

Parameter	Existing ELV
Volume	29 m^3/hr.
	696 m^3/day
Temperature	25°C
pH	6-9
Toxicity	5TU
Parameter/Units	**mg/l**
BOD	5
COD	100
Suspended Solids	5
Total Nitrogen (as N)	20
Ammonia (as N)	0.1
Molybdate Reactive Phosphate	0.5
Total Phosphorous (as P)	1
Oils, Fats and Greases	15

Table 5.3.2: Current Emission Limit Values at SW-2

The remaining discharges (emission point references SW-1, SW-3, SW-4 and SW-5) from the site are associated with surface water runoff (from roof and yard areas) due to rainfall and cooling water. It is noted that the surface water from the carpark areas of the site passes through a Class 1 oil water separator, prior to discharge to the River Ara.

The on-site waste water treatment plant currently discharges treated wastewater to the municipal sewer, via emission point SE-1, and is subjected to further treatment at the Tipperary Town WWTP located at Longford, on the Bansha Road, Tipperary Town. This plant is operated by Irish Water.

A summary of mean physiochemical water quality data for the River Ara is presented on Table 5.3.3 below in comparison with the mean quality standards specified under European Communities Environmental objectives (Surface waters) Regulations 2009, for 'Good' status rivers. The data was provided by Tipperary County Council and covers a three year period from January 2014 to December 2016.

As identified in Table 5.3.3 below, the mean concentrations of BOD are below the regulatory value at all monitoring points. Mean ammonia concentrations are below the regulatory requirement at three of the locations, however marginally exceeds the value at the monitoring point located downstream of Tipperary Town.

In the case of orthophosphate, in river results exceed the annual mean value for 'Good' status at all monitoring points, and upstream of all point source emissions, which indicates that the predominant source of phosphate is from diffuse sources, with agriculture and unsewered properties accounting for an estimated 95% of total phosphorus inputs to the catchment (Source: Aherlow Water Management Unit Action Plan).

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Parameter/ Monitoring Station	16A030100	16A030300	16A030400	16A030600	S.I. 272 of 2009 Surface Water Regulations
Ammonia (mg/l)	0.036	0.069	0.054	0.037	0.065
Ortho-P (mg/l)	0.045	0.063	0.079	0.076	0.035
BOD (mg/l)	1.3	1.4	1.3	1.0	1.6
Comment/ Location	Upstream TCC	Downstream TCC	Downstream TWWTP	WFD Surv. Site	

Table 5.3.3: Summary of Mean Physiochemical Water Quality Data for River Ara

(ii) **Other Discharges to River Ara – Actual & Potential Existing Discharges**

The South-Eastern River Basin Management Plan identifies discharges (or pressures) within it's Plan area as arising from a number of sources. These include agriculture (diffuse), wastewater and industrial discharges (point), water from unsewered properties, forestry and discharges from landfills, quarries/mines and contaminated lands. The following discharges have been identified in the OES Report in the context of the current assessment:

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Other Actual Discharges to the River Ara – Tipperary Town WWTP

The Tipperary Town wastewater treatment plant is operated by Irish Water (IW) and is licensed by the EPA under a Wastewater Discharge Authorisation (WWDA) Reg. No. D0146-01.

Discharges of treated wastewater from the plant are made at a location downstream of both Tipperary Co-Op and Tipperary Town, and the receiving water quality information used in this assessment takes account of those discharges.

The plant has a capacity, expressed as population equivalent (PE), of 9,800. The WWTP provides tertiary treatment. The plant consists of an activated sludge process, in an oxidation
ditch and includes screening, grit removal and phosphorus removal.

According to data presented in the 2016 AER, discharges from the WWTP plant show a high degree of compliance with the current WWDA.

Stricter emission limit values (ELV's) are specified within WWDA D0146-01 to assist in the attainment of Good Status within the river by 31st December 2021. The proposed ELVs of 2.5mg/l for BOD, 0.1mg/l for orthophosphate and 0.15mg/l for ammonia shall apply from 31st December 2019.

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Other Potential Existing Discharges to River Ara

A review the '*Three Rivers Project'* report (M.C. O'Sullivan and Co. Ltd (MCOS), July 2013) which discusses the Ara in terms of agricultural inputs refers to "*>66% of farms having inadequate farm-yard manure (FYM) systems. Some with large storage deficits with 25% of those farms having deficits greater than 450m3. A number of yards in the catchment using clay lined lagoons for storage of slurry and FYM, and these structures were deemed unacceptable. These added greatly to the storage deficit problem in the catchment.*" Slurry spreading at inappropriate times was also considered a contributing factor to water pollution in the catchment. It was concluded that a large proportion of the farmyards surveyed could improve their current farmyard management resulting in a reduced risk of nutrient loss from yards.

Urban runoff can be contaminated with pollutants and impact on surface water quality through direct discharges. Runoff from Tipperary Town could contain dangerous substances arising from the combustion of hydrocarbon fuels. Such toxins can persist in waters and sediments over time.

Overflows from sewer networks, leaking from defective underground pipes or seepage from containment areas can also lead to surface water pollution.

(iii) **Future Development Potential within Ara Catchment**

In order to evaluate the potential for additional future discharges to be made within the Ara catchment, the OES Report undertook a review of the South Tipperary County Development Plan (STCDP) 2009 – 2015.

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5.3.6.3 Impact Assessment

(i) Assessment Methodology

The proposed development includes the installation of a third evaporator and associated RO polisher, which will increase the volume of treated condensate to be discharged to the River Ara at SW-2 by 304m^3 per day, in addition to the existing licensed volume of 696m^3 per day, resulting in a total maximum daily treated condensate discharge to the River from the three evaporators of 1000m^3 per day. Section 4 of the OES Report on Assessment of Impact on Surface Waters provides a detailed assessment of the assimilative capacity of the River Ara to for the pollutants of concern which are discharged from the site. Both the impact of the existing discharge from SW-2, based on the currently licensed emissions from that emission point, and of the proposed discharge following the completion of the subject development, based on the revised maximum daily treated condensate discharge rate outlined above were considered. The assessment also takes account of the cumulative impact of other sources including the Tipperary Town uWWTP. Full details of the methodology used to determine the assimilative capacity of the river for each pollutant of concern are detailed in the OES Report. The output of the

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calculation of assimilative capacity is the total mass of the relevant pollutant that can safely be discharged to a watercourse.

In addition, an assessment (mass balance) was undertaken to establish the maximum downstream concentration of the pollutants of concern and specifically those specified in S.I. No. 272 of 2009 – European Communities Environmental Objectives (Surface Water) Regulations 2009. Again the methodology (mixing model) used to calculate the mass balance for the discharge is detailed in the OES Report. The output for this assessment for each parameter returns the resultant downstream concentration in the receiving waterbody for that parameter, after the proposed discharges have been made. This resultant concentration can then be compared against target values specified in the Surface water Regulations (S.I.272 of 2009) to determine if the resultant concentration downstream of the discharge will comply with the Regulations.

In assessing the impact of the discharge against the requirements of EC Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272 of 2009), the target level to be achieved in the River Ara is the 'Good' Status 95%-ile concentration value for the relevant parameters - BOD, Ammonia, and Orthophosphate.

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Parameter	Environmental Quality Standard (EQS) (mg/l)
BOD	2.60
Ammonia (as N)	0.14
Ortho P	0.075
Nitrate	2.70
Suspended Solids	25.0

Table 5.3.4: Target Standards for 'Good' Status River

Although no target concentrations are identified for Nitrate and Suspended Solids in SI 272 of 2009, both have been included in the impact assessment of the dryer plant discharge. Nitrate, a nutrient in surface water systems, is used to assess the ecological status of a water body.

The criteria used to assess nitrate target concentration in Table 5.3.4 above has been derived for high and good status surface waters (Source: 2012 EPA Integrated Water Quality Report – South East Ireland). Mean and 95%ile nitrate target standard for high and good status waters has been developed as 1.8mg/l and 2.7mg/l NO3-(as N) respectively.

In the case of suspended solids, the River Ara does not fall within the scope (i.e. is not listed in Schedule I) of the European Communities (Quality of Salmonid Waters) Regulations 1988 (S.I. 293 of 1988). However, the River Aherlow is included in the Regulations. The Quality of Salmonid Waters Regulations set the only legislative benchmark for which suspended solids can be assessed against. Irrespective of the non-inclusion of the River Ara within Schedule I, given that the Ara is a tributary of the Aherlow the target concentration of 25 mg/l for suspended solids set out in the Quality of Salmonid Waters is used in this assessment.

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(ii) Assimilative Capacity

The assimilative capacity of the River Ara at the proposed discharge point was calculated using the method described above and is tabulated below. It should be noted that the calculated Assimilative Capacity takes account of upstream contributing factors to the water quality of the River Ara including diffuse agricultural sources and the Lattin Agglomeration (WWDA No. A0506-01), located approximately 7.7km west of Tipperary Co-Op. The remaining assimilative capacity **after** the impact of upstream discharges has been calculated on this basis.

Background water quality data was obtained from EPA datasets (16A03-0100: Shronell Bridge) and additional information was provided by Tipperary County Council.

Parameter	2014 – 2016 Mean (mg/l)	EQS (mg/l)
BOD	0.785	2.60
Ammonia (as N)	0.035	0.14
Orthophosphate (as P)	0.048*	0.075
Nitrate	1.40	2.70
Suspended Solids	12.5	25.0

Table 5.3.5: Mean Physiochemical Water Quality Results for River Ara (Upstream of Tipperary Cooperative Creamery – Br SE of Shronell (Station Code 16A03-0100)

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The OES Report on Assessment of Impact on Surface Waters notes that owing to elevated levels of Ortho–P in the river, which are likely due to the range of diffuse pressures on the catchment upstream of that point, and entirely outside of the control of Tipperary Cooperative Creamery, it is considered reasonable to use the adjusted mean background concentration for that parameter – i.e. 0.030mg/l - (Ref: *Guidance, Procedures and Training on the Licensing of Discharges to Waters and to Sewer for Local Authorities issued by the Water Services Training Group - Water Services Training Group (WSTG))* as agreed with Tipperary County Council.

The adjusted mean background concentration used is the mid-point between High and Good status (mean standard) (i.e for Ortho P = (0.025 + 0.035)/2 = 0.03mg/l).

The mean background concentrations for all other parameters used in the Assimilative Capacity Assessment is based on the mean of actual monitoring data.

As noted above, predicted nitrate and suspended solid concentrations are also included in the assessment.

Hydrometric data for the River Ara was obtained from the Carrowclogh hydrometric station (Code: 16047) and the 95%-ile flow value was calculated and agreed with the EPA Hydrometric Section as 0.05 m3/sec.

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The available assimilative capacity based on the above input data is shown on Table 5.3.6 below.

Parameter	Assimilative Capacity (kgs/day)
BOD	7.84
Ammonia (as N)	0.46
Orthophosphate (as P)	0.21*
Nitrate (as N)	5.61
Suspended Solids	54.00

Table 5.3.6: River Ara – Available Assimilative Capacity
(* - Available Assimilative Capacity based on adjusted mean background concentration for Ortho-P of 0.03mg/l as detailed above).

(iii) Current Impact – River Ara

The current impact of discharges from SW-2 has been calculated based on the currently licensed emissions from that emission point (Ref. Table 5.3.2 above).

The OES Report on Assessment of Impact on Surface Waters notes that the assessment is made on a conservative basis – i.e. worst case – using the maximum licensed concentration for each parameter, at maximum licensed flows. Under typical operating conditions, actual concentrations and flows are lower, thereby reducing the overall level of actual mass emissions from SW-2.

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The resultant downstream concentration for each of the relevant parameters under the current discharge regime has been calculated using the mixing model formula detailed in the OES Report on Assessment of Impact on Surface Waters and is tabulated on Table 5.3.7 below.

Again, it is emphasised that the resultant downstream concentration is based on an extreme worst case scenario where the site is discharging at its limit - both in terms of ELV's and flow during low river flow (95%-ile). In practice, these conditions are unlikely to be met - and then only for relatively short periods – as 95% of all flow data are above the value used to calculate the resultant downstream concentration.

Parameter	Predicted Concentration @ 95%ile flow (mg/l)	*95%ile Target Concentration (mg/l)	Compliant
BOD	1.35	<2.60	Yes
Ammonia(as N)	0.044	<0.14	Yes
Orthophosphate	0.054	<0.075	Yes
Nitrate	1.90	<2.70	Yes[1]
Suspended Solids	11.5	<25.0	Yes[2]

Table 5.3.7: Predicted Maximum Downstream Concentration in River Ara under <u>Current Discharge</u>
1. Nitrate target concentration has been derived for high and good status surface waters (source 2012 EPA Integrated Water Quality Report –Monaghan Louth 2011). Mean and 95%ile nitrate target standard of for good status waters has been developed as 1.8mg/l and 2.7mg/l NO3 (as N) respectively.
2. European Communities (Quality of Salmonid Waters) Regulations 1988 (S.I. 293 of 1988)

Notwithstanding the extreme worst case basis for the assessment, on the basis of the above, the existing discharges are well within and fully compliant

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with the requirements of both the EC Environmental Objectives (Surface waters) Regulations 2009 and EC (Quality of Salmonid Waters) Regulations 1988 and accordingly do not cause a significant environmental impact.

(iv) Predicted Impact – River Ara

The proposed Dryer 2 development will give rise to additional treated condensate discharges to the River Ara of up to 304m^3/day, bringing the overall maximum daily discharge from SW-2 to 1,000m^3/day. To facilitate the calculation of downstream concentration levels for the revised flows proposed revised ELV's for SW-2 , shown on Table 5.3.8, were used to determine the potential impact associated with additional discharges from the site after installation of the proposed new dryer facility.

Parameter	Existing ELV
Volume	42 m^3/hr.
	1000 m^3/day
Temperature	25^{o}C
pH	6-9
Toxicity	5TU
Parameter/Units	**mg/l**
BOD	5
COD	100
Suspended Solids	5
Total Nitrogen (as N)	20
Ammonia (as N)	0.1
Molybdate Reactive Phosphate	0.15
Total Phosphorous (as P)	1
Oils, Fats and Greases	15

Table 5.3.8: Proposed Emission Limit Values at SW-2

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The proposed Emission Limit Values at SW-2 included in Table 5.3.8 above are similar to the values included on the current Tipperary Cooperative Creamery IE Licence, with the volume amended to reflect the additional discharge and with an anticipated reduction in the permitted ELV for Orthophosphate from 0.5mg/l to 0.15 mg/l. It is noted that the final ELV's will be specified by the Agency as part of the IE Licence review.

The resultant downstream concentration for each of the relevant parameters under the proposed discharge regime following completion of the subject development has been calculated using the mixing model formula detailed in the OES Report on Assessment of Impact on Surface Waters and is tabulated on Table 5.3.9 below

Parameter	Predicted Concentration @ 95%ile flow (mg/l)	*95%ile Target Concentration (mg/l)	Compliant
BOD	1.57	<2.60	Yes
Ammonia(as N)	0.084	<0.14	Yes
Orthophosphate	0.056	<0.075	Yes
Nitrate	2.08	<2.70	Yes[1]
Suspended Solids	11.1	<25.0	Yes[2]

Table 5.3.9: Predicted Maximum Downstream Concentration in River Ara under Proposed Discharge

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1. Nitrate target concentration has been derived for high and good status surface waters (source 2012 EPA Integrated Water Quality Report –Monaghan Louth 2011). Mean and 95%ile nitrate target standard of for good status waters has been developed as 1.8mg/l and 2.7mg/l NO3 (as N) respectively.
2. European Communities (Quality of Salmonid Waters) Regulations 1988 (S.I. 293 of 1988)

Again, the OES Report on Assessment of Impact on Surface Waters notes that the predicted downstream concentrations have been calculated at the 95%ile flow condition in the river and therefore is a conservative assessment and represents worst case. Flows greater than the 95%ile together with normal discharges from the site, which are significantly lower than limit values used in the calculations, will significantly reduce the resultant concentration levels in the River Ara even further.

The OES Report on Assessment of Impact on Surface Waters reviews the impact of the proposed development on surface water quality for each of the relevant parameters as follows:

BOD

The predicted BOD concentration in the River Ara downstream of the Tipperary Co-Op discharge has been calculated as 1.57mg/l, which is significantly below the 95%ile concentration target value for BOD – 2.6mg/l.

It is noted that the resultant BOD concentration in the Ara –calculated on a worst case basis – is 61% of the relevant water quality standard for the parameter.

The proposed BOD ELV can therefore be accommodated whilst remaining compliant with the requirements of S.I. No. 272 of 2009 European Communities Environmental objectives (Surface waters) Regulations 2009, and accordingly not cause a significant environmental impact.

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Orthophosphate

The OES Report on Assessment of Impact on Surface Waters notes, as outlined previously, that Owing to elevated levels of Ortho–P in the river, which are likely due to the range of diffuse pressures on the catchment upstream of that point, and entirely outside of the control of Tipperary Cooperative Creamery, it is considered reasonable to use the adjusted mean background concentration for that parameter – i.e. 0.030mg/l - as agreed with Tipperary County Council

The predicted orthophosphate concentration in the River Ara downstream of the Tipperary Co-Op discharge has been calculated on this basis as 0.056mg/l, which is below the 95%ile concentration target value for Ortho-P – 0.075mg/l. It is noted that the resultant Ortho P concentration in the Ara – calculated on a worst-case basis – is 75% of the relevant water quality standard for the parameter.

The proposed orthophosphate ELV can therefore be accommodated whilst remaining compliant with the requirements of S.I. No. 272 of 2009 European Communities Environmental objectives (Surface waters) Regulations 2009, and accordingly not cause a significant environmental impact.

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It is noted that the proposed development will not result in an increase in the P-load discharged to the Ara River as Ortho-P will reduce from the current licenced level in accordance with stricter ELVs being applied post development.

Ammonia

The predicted ammonia concentration of 0.084 mg/l in the River Ara downstream of the Tipperary Co-Op discharge has demonstrated that the ammonia load from the proposed discharge point will not result in an exceedance of the 95%ile concentration (0.14 mg/l) target value at the 95%ile flow condition.

It is noted that the resultant Ammonia concentration in the Ara –calculated on a worst case basis – is 60% of the relevant water quality standard for the parameter.

The proposed ammonia ELV can therefore be accommodated whilst remaining compliant with the requirements of S.I. No. 272 of 2009 European Communities Environmental objectives (Surface waters) Regulations 2009, and accordingly not cause a significant environmental impact.

Nitrate

The predicted nitrate concentration in the River Ara downstream of the Tipperary Co-Op discharge has been calculated as 2.08 mg/l, which is below the 95%ile concentration target value for nitrate – 2.70 mg/l.

It is noted that the resultant Nitrate concentration in the Ara –calculated on a worst case basis – is 77% of the relevant water quality standard for the parameter.

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In conclusion, the proposed nitrate ELV can therefore be accommodated whilst meeting water quality objectives for the river, and accordingly not cause a significant environmental impact.

Suspended Solids

The predicted suspended solids (SS) concentration in the River Ara downstream of the Tipperary Co-Op discharge has been calculated as 11.1 mg/l, which is significantly below the 95%ile concentration target value for SS – 25 mg/l.

It is noted that the resultant Suspended Solids concentration in the Ara – calculated on a worst case basis – is 44% of the relevant water quality standard for the parameter.

The proposed Suspended Solids ELV can be accommodated in the River Ara whilst remaining fully compliant with the requirements of the EC (Quality of Salmonid Waters) Regulations 1989 and accordingly not cause a significant environmental impact.

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(v) Predicted Impact – Cumulative Impact

The proposal will give rise to an increased discharge of treated condensate to the River Ara at the existing emission point SW-2 and the resultant downstream concentrations for the primary water quality parameters have been calculated and presented in Table 5.3.7 above.

In order to assess the potential for impact of the proposed new condensate discharge on water quality downstream of the Tipperary Town WWTP, discharges from the town plant have been assessed using the resultant water quality parameters after the proposed new dryer has been installed.

Owing to the likely timescales for construction and commissioning of the new dryer, it is considered reasonable that the assessment is made in the context of the 2020 limit values specified in the Tipperary Town WWTP discharge authorisation.

The results of the assessment are presented in Table 5.3.10 below.

Water Quality Parameter	Downstream Tipp Coop after Dryer (mg/l)	Downstream Tipperary Town WWTP after Dryer mg/l	Water Quality Target (mg/l)	Compliant (Y/N)
BOD	1.577	1.860	2.6	Yes
Ammonia	0.084	0.105	0.14	Yes
Ortho P	0.056	0.070	0.075	Yes

Table 5.3.10: Assessment of Resultant Water Quality after Tipperary Town WWTP Discharges

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Based on the results of assessment, water quality in the River Ara after discharges from the Tipperary Cooperative Creameries site, after installation of the proposed new dryer together with discharges from the Tipperary Town WWTP, will be fully compliant with the water quality target values specified for 'Good' Status rivers under the 2009 Surface Waters Regulations.

It is further noted that the proposed dryer installation will result in a decrease in the loading of BOD, Ortho P and Ammonia to the Tipperary Town WWTP due to improvements in treatment on site.

This will further ensure that the proposed dryer installation will not have significant direct or indirect impacts on water quality in the River Ara.

(vi) Predicted Impact – River Aherlow

The River Ara joins the Aherlow River approximately 12km downstream of the proposed discharge point at Tankerstown. The Aherlow in turn joins the Suir 2 kilometres north of Cahir, approximately 18km further downstream of Tipperary Co-Op.

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In order to quantify the impact of the discharge from the site, a comparison was made to the 95%ile flow rate in the River Aherlow. It was determined from the Tipperary WWDA that the 95%ile flow rate in the Aherlow downstream of its confluence with the Ara, is 0.7 m3/s.

The maximum proposed discharge from the Tipperary Co-Op facility represents 2% of the 95%ile flow and therefore is considered to have an insignificant impact on the River Aherlow. The contribution is significantly lower during the period around the mean flow.

(vii) Predicted Impact – River Suir

The River Ara joins the Aherlow River approximately 12km downstream of the proposed discharge point at Tankerstown. The Aherlow in turn joins the Suir 2 kilometres north of Cahir, approximately 18km further downstream of Tipperary Co-Op.

It is noted that the Suir is known to support populations of Annex I species downstream of the facility and therefore the potential impact on this watercourse from the Tipperary Co-Op site has been considered.

In order to quantify the impact of the discharge from the site, a comparison was made to the 95%ile flow rate in the Suir. It was determined from the EPA Hydrotool that the flow rate in the Suir where it converges with the River Aherlow is 3.36m^3/s.

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The maximum discharge from the Tipperary Co-Op facility represents 0.3% of the 95%ile flow and therefore is considered to have an insignificant impact on the River Suir, given that at maximum discharge from the site, approximately 290 dilutions are available.

Furthermore, discharges at this level and given the available dilutions, will not compromise the ability of the Aherlow/Suir system to accommodate **significant** additional discharges in the future, over and above those minor additional inputs envisaged through projected increases in population to 2022.

As set out above, significant residual assimilative capacity remains within the downstream river system after both the proposed mass emissions from Tipperary Co-Op and Tipperary urban WWTP have been taken into account. Based on this conservative assessment, there is significant residual assimilative capacity to allow for other discharges to be made, while maintaining compliance with the water quality standards *Good* status values the parameters covered under the Surface Water Quality Regulations 2009.

The assessment demonstrates that the discharges from Tipperary Co-Op, can be accommodated within the catchment without impacting adversely on the future developments within the Tipperary Town urban settlement or on capacity of the Tipperary Town WWTP to discharge to the River Ara.

5.3.6.4 Conclusion of Report on Assessment of Impact on Surface Waters

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The Report on Assessment of Impact on Surface Waters prepared by OES concludes the following on the basis of a comprehensive evaluation of the potential impacts of the proposed increase in the volume of treated condensate discharged to the River Ara from 696 m^3/day to 1000 m^3/day following completion of the Dryer 2 project:

(i) The proposal has been assessed in the context of the available assimilative capacity in the River Ara system and takes account of the cumulative impacts of other sources including Tipperary uWWTP. The findings of the assessment confirm:

- There is sufficient Assimilative Capacity within the River Ara to accept discharges from Tipperary under the proposed amendment;
- Discharges can be made in full compliance with the Surface Water Regulations (S.I. 272 of 2009).

When evaluated in the context of other sources, the cumulative assessment shows that:

- The cumulative discharge from Tipperary Co-Op and the Tipperary uWWTP can be accommodated without utilising all of the available Assimilative Capacity in the river system at the point of discharge;
- Point discharges represent a minor influence on water quality in the overall catchment. Other improvement measures within the wider catchment (further implementation of the Nitrates Directive and actions for achievement of Water Framework Directive commitments) should lead to further improvement in water quality across the river system.

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(ii) The assessment of impact on the receiving environment is based on a series of Emission Limit Values (ELV'S) for each parameter, which in terms of the operation of the proposed new Dryer-2 facility, are established as absolute limit values. The design of the upgrade works has been to ensure Best Available Technology (BAT) in terms for both treatment methods used and quality of the treated process waters – all parameters are lower than their respective BAT ELV's and fully compliant with BAT.

Internal target values are set at lower levels to reflect the typical fluctuations in inlet loadings to the Dryer-2 facility within the plant throughout daily and weekly production cycles. This ensures that the upper end of the range of concentrations remains within ELV and therefore fully compliant under all normal and non-routine processing operations at the site.

The findings of the assessment confirm:

There is sufficient Assimilative Capacity within the River Ara to accept discharges from the Tipperary Co-Op SW-2 surface water discharge point.

Discharges can be made in full compliance with the Surface Water Regulations (S.I. 272 of 2009). Compliance is assured under a worst-case

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assessment basis as resultant concentrations for the parameters assessed are well below the relevant target values and leave significant reserve capacity in the river to assimilate potential discharges from other sources in the catchment.
When evaluated in the context of other sources, the (cumulative) assessment shows that:

- The cumulative discharge from Tipperary Co-Op and the Tipperary uWWTP can be accommodated without utilising all of the available Assimilative Capacity in the river system at the point of discharge;
- Improvements in the on-site treatment of wastewater proposed under the current application will reduce the mass loadings to sewer, and consequently the mass loadings on the Tipperary town wastewater treatment plant with a consequent reduction in overall loadings to the River Ara;
- Point discharges represent a minor influence on water quality in the overall catchment. Other improvement measures within the wider catchment (further implementation of the Nitrates Directive and actions for achievement of Water Framework Directive commitments) should lead to further improvement in water quality across the Aherlow river system;
- The discharges amount to less than 3% of the 95%ile flow in the Aherlow and <1% in the River Suir and therefore can have only limited influence on the overall water quality within the larger Suir river system. Therefore, the AC assessment ensures that ample capacity exists to facilitate additional population growth and developments within the catchment;
- Screening for Appropriate Assessment has concluded that current or proposed discharges will not have any negative effects on the qualifying interests of the designated Natura 2000 sites within a 15km radius of the plant. Accordingly, a Natura Impact Assessment is not required.

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5.3.7 Existing Process & Foul Effluent Discharge

5.3.7.1 Existing Process & Foul Effluent Discharge

As detailed in Section 3.5 of this EIAR, wastewater generated from the milk processing activities on the Tipperary Cooperative Creamery site does not currently discharge to the River Ara, but is treated at the activated sludge waste water treatment plant (WWTP) on site before discharging to the public sewer for further treatment. The existing treatment plant is designed to treat 870m^3 of effluent per day with a treated effluent quality of 60mg/litre BOD and 90mg/litre suspended solids.

Domestic wastewaters generated at staff welfare and canteen facilities discharge directly to the public sewer.

5.3.7.2 Impact of Proposed Development

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As detailed in Section 3.6 of this EIAR, in order to facilitate the new Dryer 2 Facility and the associated net increase in effluent that will be discharged to the treatment plant, the capacity of the existing plant will need to be increased to cater for a mean effluent throughput of 1300m^3 per day. The scope of the Dryer 2 Facility includes an upgrade to the existing WWTP on this basis.

5.3.7.3 Proposed Mitigation Measures

Tipperary Cooperative Creamery intend to procure a specialist wastewater treatment plant contractor to design, construct and commission an upgrade of the existing waste water treatment plant to cater for the additional effluent treatment capacity required and to significantly improve the quality of treated effluent discharged to the public sewer. The upgraded treatment plant will be designed to cater for a peak flow rate of 1500m^3 per day, providing a margin of 200m^3 over the mean effluent throughput capacity identified to cater for the new Dryer 2 Facility, and to achieve a treated effluent quality of 25mg/litre BOD and 35mg/litre suspended solids, a significant improvement on current treated effluent quality standards outlined above. The scope of the upgrade will include new inlet screen, increase in capacity of balance tank, pumping station, replacement DAF, installation of new aeration system, new clarifier and control system. A more detailed description of each of these items is included in Section 3.6.3.

5.3.7.4 Residual Impacts

On the basis of the proposed upgrade to the WWTP outlined above, it is concluded that while the Dryer 2 Facility, and associated upgrade of the WWTP, will increase the volume of treated effluent discharged to the public sewer, there will be a significant improvement in the quality of the effluent discharged on current treated effluent quality standards.

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5.3.8 Water Supply

5.3.8.1 Existing Water Usage

The majority of water for processing and washing operations (CIP – Clean in Place) at Tipperary Cooperative Creamery is abstracted via the borehole on the site. Currently at peak processing capacity c.1375m^3 of water per day is abstracted on this basis. The water is treated with biocide prior to use. A small proportion of the water for processing and CIP operations is sourced from the secondary condensate from Evaporator No. 1. The plant also has a metered mains water connection to the town supply but this represents only a small proportion of overall water demand on the site. Water for feeding the boilers is sourced from primary condensate from the two evaporators. Fire hydrants on the site are connected to the public supply and there is also a static water storage tank for fire-fighting purposes on site which is also connected to the public supply.

5.3.8.2 Impact of the Proposed Development on Water Usage

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The condensate generated by the new Evaporator No. 3 following treatment in the proposed RO polisher, as detailed in Section 3.5.1, is of a suitable quality to facilitate it's use for processing and washing operations. Therefore, although the overall quantity of water required for processing and washing operations will increase following installation of the new evaporator and dryer, the use of treated condensate from Evaporator No. 3 will reduce the quantity of water which needs to be abstracted from the on-site well for this purpose by the order of $50m^3$, leading to a net reduction in the volume of water abstracted from the well on a daily basis at peak processing capacity. This is considered a positive impact in the context of the subject development.

The existing supply infrastructure will be extended to supply the new building. Appropriate provision will also be made for water supply for fire-fighting requirements in accordance with the requirements of Tipperary Co. Co. Fire Services.

5.3.8.3 Mitigation Measures

On the basis of the net reduction in water demand from the on-site well following completion of the subject development no additional mitigation measures are proposed.

5.3.9 Flooding

5.3.9.1 Existing Environment

The Zoning Map for Tipperary Town included in Appendix B and referenced in the Tipperary Town & Environs Development Plan 2013 - 2019 shows the location of the development as being within the existing built up area with an industrial zoning. The Zoning Map also indicates that part of the development area as being within 'Flood Zone A' of the Ara River, which flows through the town.

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Flood maps for the Suir CFRAM study were published in January 2015. Contrary to that map attached to the Development Plan, this map indicates that the area of the subject development is outside of the Flood Zones of the Ara River, with adjacent flood zones shown on the north bank of the Ara River and further west at Scalaheen on the opposite side of the railway line.

5.3.9.2 Impact of Development

A Flood Risk Assessment – Stage 1 Flood Risk Identification Report (FRA) has been prepared by MRG Consulting Engineers Limited for the subject development in accordance with the requirements of Tipperary Town and Environs Development Plan (2013-2019) and a copy is included as Attachment F to this EIAR.

The conclusions of the FRA were as follows:

a) That the primary source of flood risk to the development is the Ara River which runs flows from west to east along the boundary of the Tipperary Co-Operative site. A review of the topography of the area shows that in the event of flooding and overspill of the river channel, Abbey Street and lands

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to west of the site, which are at a lower level than the Tipperary Co-Operative site would act as the flow path for flood waters.

b) It would appear that the area designated as being susceptible to flooding as indicated on the Tipperary Town & Environs Development Plan 2013-2019, which takes in a part of the Tipperary Co-Operative site was based on the preliminary CFRAM mapping, which used large scale contour mapping. The flood mapping has since been updated following topographical surveying of the Ara river channel and the adjoining lands and subsequent hydraulic modelling of flood flows along the river. The 2015 Suir CFRAM study mapping is more reflective of levels on the ground and provides a more accurate picture of the flood zones adjacent the subject site.

c) The 2015 Suir CFRAM study mapping indicates that the Tipperary Co-Operative site is outside of Flood Zones A & B of the Ara River. The ground levels of the development site when compared to the predicted flood levels indicated on the 2015 Suir CFRAM study mapping at the indicate that the floor level of Dryer 2 at 86.95mAOD is approximately 350mm above the 0.1% AEP (1 in 1000 year) event.

d) Historic and anecdotal evidence also indicates that the Tipperary Co-Operative site is outside of the flood zones of the Ara River.

e) The subject development does not increase the amount of surface water runoff draining to the Ara River and as such there is no increase in the risk of fluvial flooding resulting from the proposed development.

f) The subject development does not result in any loss of flood plain storage for the Ara River nor alters any flow paths for flood waters.

g) A certain amount of resilience against a future rise in river levels resulting from climate change has been incorporated into the Tipperary Co-Operative site through the provision of a full length concrete upstand kerb along the northern boundary of the new development. Furthermore, with regard to the subject development, it is proposed to raise the floor level of Dryer 2 by 200mm to 86.95mAOD, which is above adjoining yard levels.

h) The Stage 1 FRA concluded that there are no flooding or surface water management issues relating to the development that would warrant further investigation under any Stage 2 or Stage 3 Flood Risk Assessment.

5.3.9.3 Mitigation Measures

On the basis of the conclusion of the Stage 1 FRA, that there are no flooding or surface water management issues relating to the development that would warrant

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further investigation under any Stage 2 or Stage 3 Flood Risk Assessment, no additional mitigation measures are proposed.

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5.4 AIR AND NOISE

5.4.1 Introduction

This section of the Environmental Impact Assessment Report (EIAR) considers the impacts of noise, air emissions and odours, as appropriate, from the subject development on the surrounding environment and on any sensitive receptors in the vicinity of the site.

The impacts of noise, vibration and dust from the construction stage of the development are also considered.

5.4.2 Air Quality Impact Assessment

5.4.2.1 Introduction

Envirocon Ltd., a specialist air quality consultancy practice, were engaged by OES Consulting, on behalf of Tipperary Cooperative Creamery, to undertake an Air Quality Impact Assessment for the proposed Dryer 2 Facility. A complete copy of their report *"AIR QUALITY IMPACT OF PROPOSED DRYER EXPANSION PROGRAMME – TIPPERARY CO-OPERATIVE CREAMERY LTD, CO. TIPPERARY"* is included as Attachment G to this EIAR.

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The Scope of the Air Quality Impact Assessment completed by Envirocon and detailed in their Report included as Attachment G to the EIAR included:

- A review of existing and proposed boiler emissions from the facility pre and post development of the Dryer 2 Facility, in order to identify the existing and proposed emission characteristics for use in air quality dispersion modelling.

- A review of existing and proposed dryer emissions from the facility pre and post development of the Dryer 2 Facility, in order to identify the existing and proposed emission characteristics for use in air quality dispersion modelling.

- The ADMS5 air quality dispersion model was used to predict ground level concentrations within the area around the Tipperary Co-Op facility. This is an advanced air quality model that is suitable for modelling complex industrial sources with buildings and numerous emission sources and is approved for use by the EPA. The air quality prediction modelling study was carried out in accordance with the Air Dispersion Modelling Guidance Note (AG4) published by the EPA. The Envirocon Report provides a detailed description of the air quality modelling study undertaken to predict concentrations of Nitrogen Oxides and Particulates in the locality of the Tipperary Co-Op facility. The ADMS5 air quality model was used to determine the pattern of predicted ground level concentrations for both the existing pre-development and the proposed post-development scenarios. Predicted concentrations based on

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the planned operation of the existing and proposed new dryer plant and boiler plant were compared with the corresponding short-term and long-term National Air Quality Standards (NAQS), specified in the Air Quality Standards Regulations 2011 ;

- A review of odour abatement measures which have been implemented at the existing wastewater treatment plant and any potential impacts of the proposed treatment plant upgrade on same.

5.4.2.2 Existing Environment

The main existing air emissions from the Tipperary Cooperative Creamery site are those associated with the steam boilers, thermal fluid heater and the dryers. As noted in the Introduction to the Envirocon Report, the facility is currently operating under an Industrial Emissions Licence (IEL) (P0801-01) issued by the Environmental Protection Agency in April 2008 and this Licence specifies air emission limit values for the boilers, thermoheaters and dryers.

These existing air emissions are considered below:

(i) Existing Boiler Plant/Thermoheaters

The 3 existing boilers are housed in the boiler building which is located within the central part of the Tipperary Co-Op facility. The boilers are dual-fuel and normally burn natural gas but in the unlikely event of an interruption in the supply of gas to the facility, the boilers can burn low-sulphur gas oil (British Standard 2869 Class D oil). The current steam demand for the facility can be met by Boiler No 1 firing at high load and Boiler 2 or 3 running at low to medium load during the peak production period and on hot-standby during the winter period. Boiler No 1 has a steam generating capacity of 18 tonne/h. Two boilers run on load for most of the summer peak production period. There is also a small boiler or Thermoheater, with a capacity of 1.8 MW, which burns gas oil and is installed to heat air for the existing dryer plant. This small boiler has an exhaust stack discharging from the northern side of the dryer building. The small capacity of this boiler results in very low exhaust emissions compared to the main steam boilers. Fuel consumption information for the boilers and emission characteristics for the exhaust stacks were supplied by Tipperary Co-Op. This information (Table 5.4.1) is based on the exhaust stack measurements obtained from manual sampling programmes and boiler manufacturer performance data when the units are fired on natural gas and, in the case of Thermoheater No 1 burning gas oil.

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Source and Stack Designation Reference No.	Ht (m)[a]	Diam (m)	T (oC)	Exhaust Volume (Nm3/h)[b]	Exit Velocity (m/s)
Boiler No 1 – A1-1	22.1	0.76	235	14,850	16.9
Boiler No 2 – A1-2	22.1	0.76	150	9,280	8.5
Boiler No 3– A1-3	18.0	0.80	210	11,000	10.7
Niro Thermoheater No 1 – A1-4	25.0	0.40	240	2,750	11.4
Total				**37,880**	

Table 5.4.1: Emission characteristics of the existing boiler plant stacks
Note: (a) height above ground level. (b) Wet discharge conditions (3%O_2/15% Moisture).

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The rate of Nitrogen Oxides emissions from the boiler and thermoheater stack within the Tipperary Co-Op facility depends on the type of fuel burnt and combustion conditions within the burner zone of the boiler. Formation of NO_x in the flue gas is a complex process as it is due not only to the amount of combustion air available and the chemistry of the fuel being used but also to the temperature within the flame area. Over 95% of the total nitrogen oxides (NO_x) in the exhaust gas from industrial boilers is typically emitted as nitric oxide (NO) with the remainder emitted as nitrogen dioxide (NO_2). For natural gas firing, all NO_x generated is thermal NO_x as the amount of nitrogen in the fuel is negligible. The NO_x forms in the zone downstream of the burner where the combustion air is mixed.

Source and Stack Designation Reference No.	Emission Limit Values			
	NOx (mg/Nm3)	Exhaust Volume (Nm3/h)[a]	NOx (Kg/h)	NOx g/s
Boiler No 1 – A1-1	200	12,310	2.46	0.68
Boiler No 2 – A1-2	200	7,450	1.49	0.41
Boiler No 3– A1-3	200	9,350	1.87	0.52
Thermo Heater No.1 – A1-4 [b]	250	2,350	0.59	0.16

Table 5.4.2: NOx (as NO2) emission limit values

Note: (a) Exhaust ELV at Reference Condition 3%O_2/Dry. (b) Thermoheater A1-4 burns gas oil.

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The maximum NOx emission rate for each of the boilers and existing thermoheater (Table 2) was calculated from the hourly exhaust flow with the boilers units running at full load. The maximum permitted NOx concentrations in the exhaust of 200 mg/Nm3 specified in the IPPC Licence was used for Boilers No 1, 2 and 3 and a value for burning gas oil of 250 mg/Nm3 was used for the existing thermoheater emissions.

The Air Quality Impact Assessment completed Envirocon (Attachment G of this EIAR) uses the above data as input to the Air Quality Model to predict the short-term (hourly) and long Term NO_2 impacts for the existing boilers (Boilers No. 1 and 2) and Thermoheater No. 1, and these were modelled at full load with no seasonal change in operating conditions. The predicted NO2 concentrations were then compared with the NAQS values specified in the Air Quality Standards Regulations 2011. The results of the air quality modelling study are presented as ground level concentration contours, based on the maximum or 'worst-case' emissions from the boiler plant. Predicted values are the maximum percentile or average statistic obtained at each receptor within the modelled area over the 4 discrete climatological data-sets for County Tipperary.

The predicted hourly NO_2 Predicted Environmental Concentration (PEC) value (combination of impact from the boilers/thermoheater + annual background NO_2) is given in Figure 4 of the Envirocon Report. The contour plot shows the predicted 99.8 percentile of hourly NO_2 ground level concentrations based on the emission scenario where boilers 1 and 2 burn

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natural gas and the small thermoheater runs on gas oil. NO_x emission concentration used in the model was 200 mg/Nm_3 for natural gas and 250 mg/Nm_3 for gas oil and the emission rate for each boiler is based on full load. The highest 99.8 percentile of hourly NO_2 concentrations beyond the boundary is about 35µg/m^3 and this level occurs within 100m of the Southern boundary. This maximum hourly NO_2 PEC value is 18% of the NAQS.

The predicted annual average NO_2 ground level concentration pattern is 17 µg/m^3 beyond the facility boundary, based on continuous emissions throughout the year from the 2 boilers and the thermoheater. The predicted long-term concentrations include an annual background level of 11 µg/m^3. This maximum annual average PEC is 42.5 % of the annual NAQS value of 40 µg/m^3.

(ii) Existing Process Plant

There are currently two operational dryer plants installed at the Tipperary Cooperative Creamery facility, the c.3-tonne Anhydro-Spray Dryer and the much smaller 0.35 tonne Rogers Dryer. Emissions from the Anhydro dryer are discharged from a stack (A2-1) located on the roof of the Spray Dryer building with a height of 23m above ground level. Particulate and exhaust flow measurements undertaken in 2013-2015 give current operating conditions (Table 5.4.3). The PM emissions are based on the current permitted limit value in the IEL schedule of 50 mg/Nm_3. However, recent measurements carried out demonstrate that the maximum PM concentrations have been consistently below 35 mg/Nm_3. The Rogers Dryer plant is installed at the western end of the butter factory plant with emissions discharged from a 20m exhaust stack (A2-2). This smaller exhaust stack is located approximately 45m to the NE of stack A2-1.

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PM emissions from the 3 boilers and thermoheater are insignificant compared to those from the process exhaust stack. Burning natural gas in industrial boilers produces negligible particulate matter in the flue gas compared to burning fuel oil or solid fuel.

Emission Stack	Particulate Conc. (mg/Nm^3)	Particulate Emission (kg/h)	Particulate Emission (g/s)	Emission Stack	Particulate Conc. (mg/Nm^3)	Particulate Emission (kg/h)
Dryer No 1 (A2-1)	23	1.6	85,000	23.6	75	15
Rogers Dryer (A2-2)	20	0.8	35,000	9.7	80	25

Table 5.4.3A: Emission Characteristics from Existing Dryer Stacks

Emission Stack	Particulate Conc. (mg/Nm^3)	Particulate Emission (kg/h)	Particulate Emission (g/s)
Dryer No 1 (A2-1)	50	4.25	1.18
Rogers Dryer (A2-2)	50	1.75	0.49

Table 5.4.3B: Emission Rates of Total Particulates (PM) from Existing Dryer Stacks

As with the boilers/thermoheater, the Air Quality Impact Assessment completed by Envirocon (Attachment G of this EIAR) uses the above data as

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input to the Air Quality Model to calculate the daily average PM emission rates from the existing dryer stacks. It should be noted that the predicted PM concentrations are based on the facility operating at maximum capacity and do not take account of the significant variations in milk intake and associated operating capacity across the year, which would significantly reduce emission levels outside of these peak periods.

The predicted daily particulate concentrations due to maximum emissions from the Anhydro (A2-1) and Rogers Dryer (A2-2) exhaust stack are shown in Figure 5 of the Envirocon Report, expressed as the 90.4 percentile over an annual period. The predicted Process Contribution (PC) levels are calculated on the assumption that all of the PM is emitted as PM10 size material and emissions from the stacks are at the IEL emission limit value of 50 mg/Nm3. The results indicate that the maximum predicted concentration is 28 µg/m3 and this occurs near the northern boundary. When a background level of 14 µg/m3 is included, the maximum Predicted Environmental Concentration (PEC) value is 42 µg/m3 or 84% of the daily NAQS concentration of 50 µg/m3 even where a conservative modelling approach is applied.

The maximum PC annual average PM10 level due to the emissions from the 2 dryers is 9 µg/m3 beyond the facility boundary as shown in Figure 6. The maximum PEC annual PM10 concentration near the northern boundary, including a background average of 14 µg/m3, is 23 µg/m3 or 57% of the annual NAQS value of 40 µg/m3.

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(iii) Odour Assessment of Existing WWTP

The Air Quality Impact Assessment also includes an Odour Assessment of the existing WWTP. The Assessment notes that the current IEL provides air emission limit values for the boilers and dryer exhausts with no other air emission exhaust points specified. However, the IEL specifies in Condition 5.2 that "*No emissions, including odours, from the activities carried on at the site shall result in an impairment of, or an interference with amenities or the environment beyond the installation boundary or any other legitimate uses of the environment beyond the installation boundary.*"

In 2011-12 a programme was undertaken by Tipperary Co-Op to reduce odorous emisisons from the WWTP, especially from the Bio-Tower, that resulted in occasional strong odours being detected beyond the boundary. As part of the measures implemented, the Bio-tower was enclosed and the headspace foul air from the Dissolved Air Flotation (DAF)/Balance Tanks and the sludge dewatering equipment were covered to control and reduce emissions. Two odour abatement exhaust systems were installed to treat the headspace air extracted from these areas of the WWTP. The Assessment concludes, on the basis of the measures which have been implemented, that the potential for odours to be detected beyond the site boundary is very low.

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5.4.2.3 Impact of Proposed Development

(i) Operational Impacts

The Dryer 2 Facility includes a number of elements which may potentially impact on air emissions from the Tipperary Cooperative Creamery site. These include:

- The new Dryer 2 installation will increase the powder drying capacity of the plant from 3.5 tonnes per hour to 6.4 tonnes per hour;
- The existing operational Rodgers Dryer will be decommissioned;
- A new thermoheater will be installed to provide hot air to the new dryer;
- The company is proposing to replace one of the existing steam boilers. There are currently three boilers used to generate steam, consisting of two 8.5 MW and a 10MW unit that normally burn natural gas. In the event of an interruption in the supply of gas to the facility the boilers can burn gas-oil;
- The existing wastewater treatment plant will be upgraded to facilitate the treatment of the additional volume of effluent associated with the new dryer and to improve the quality of treated effluent discharged to the public sewer.

The impact of the above on the existing air emissions from the site and associated air quality are addressed in the Air Quality Impact Assessment (Attachment G of this EIAR) and are summarised below:

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(i) Proposed Boiler Plant/Thermoheater Emissions

The new boiler to replace the existing Boiler No. 3 will have a gross generating capacity of 11.8MW and burn only natural gas. It will have a steam generating capacity of 18,000 kg/h to meet future steam demand. Information obtained from the manufacturer gives an exhaust flow of 12,200 Nm3/h (STP Reference 3%O2/Dry) with a rated exhaust temperature of 140oC (Table 5.4.4). This boiler will run as the primary boiler with either Boiler No 1 or 2 running at low-medium load during the peak production period. During the winter period, the Boiler No 3 is likely to run at medium load with one of the existing boilers on hot-standby.

Parameter	Value
Stack Height (m)	19.7
Exhaust Volume (Nm3/h)	14,350
Exhaust Temperature (oC)	140
Actual Exhaust Volume (m3/s - at steam generation T)	6
Exhaust Stack Diameter (m)	0.8
Exit Velocity (m/s)	12.0
NOx (as NO2) Emission Limit Concentration (mg/Nm3)	200
NOx (as NO2) Emission rate (g/s)	0.8

Table 5.4.4: Emission Characteristics of New Boiler Exhaust Stack

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Following the installation of the new boiler, the revised emission characteristics for the boiler/thermoheater installations on the Tipperary Cooperative Creamery site are presented in Table 5.4.5 below:

Source and Stack Designation Reference No.	Ht (m)[a]	Diam (m)	T (oC)	Exhaust Volume (Nm3/h)[b]	Exit Velocity (m/s)
Boiler No 1 – A1-1	22.1	0.76	235	14,850	16.9
Boiler No 2 – A1-2	22.1	0.76	150	9,280	8.5
Boiler No 3– A1-3 (New)	19.7	0.80	140	14,350	12.0
Niro Thermoheater No 1 – A1-4	25.0	0.40	240	2,750	11.4
Niro Thermoheater No 2 – A1-5	34.3	0.46	80	4,500	9.7
Total				**45,730**	

Table 5.4.5: Emission characteristics of the proposed boiler plant stacks

Note: (a) height above ground level. (b) Wet discharge conditions (3%O_2/15% Moisture).

The revised Emission Limit Values are presented in Table 5.4.6 below:

Source and Stack Designation Reference No.	Emission Limit Values			
	NOx (mg/Nm3)	Exhaust Volume (Nm3/h)[a]	NOx (Kg/h)	NOx g/s
Boiler No 1 – A1-1	200	12,310	2.46	0.68
Boiler No 2 – A1-2	200	7,450	1.49	0.41
Boiler No 3– A1-3 (New)	200	12,200	2.44	0.68
Thermo Heater No.1 – A1-4 [b]	250	2,350	0.59	0.16
Thermo Heater No.2 – A1-5	200	3,825	0.76	0.21

Table 5.4.6: NOx (as NO2) emission limit values

Note: (a) Exhaust ELV at Reference Condition 3%O_2/Dry. (b) Thermoheater A1-4 burns gas oil.

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For the existing boilers, the exhaust discharge flows and exit velocities are based on the IEL emission limit values. The existing thermoheater is likely to continue to be fired with gas oil. However, the new thermoheater for the new 3.2-tonne dryer (A1-5) will burn natural gas.

As per the existing scenario, the Air Quality Impact Assessment completed by Envirocon (Attachment G of this EIAR) uses the above data as input to the Air Quality Model to predict the short-term (hourly) and long Term NO_2 impacts for the proposed boilers (Boilers No. 1 and 3) and two Thermoheaters, and these were modelled at full load with no seasonal change in operating conditions. The predicted NO2 concentrations were then compared with the NAQS values specified in the Air Quality Standards Regulations 2011.

The predicted 99.8 percentile of hourly NO2 ground level concentrations due to the combined emissions of NOx from Boiler No 1 and 3 on natural gas and the 2 thermoheaters running continuously on full load, including the background NO2 level of 11 µg/m3 is given in Figure 7 of the Envirocon Report. The maximum 99.8 percentile hourly concentration beyond the facility boundary is predicted to be 55 µg/m3 and this maximum level occurs within

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100m of the Northern boundary of the facility. This maximum 99.8 percentile value is equivalent to 27.5% of the hourly NAQS.

The maximum annual average concentration due to emissions from the Boiler No 1 and 3 and the 2 thermoheaters at full load, including a background NO2 concentration of 11 µg/m3 is 17 µg/m3. This predicted maximum annual level is 42.5% of the annual NAQS of 40 µg/m3 (Figure 8 of Enercon Report).

(ii) Proposed Process Plant Emissions

As part of the proposed development, the existing operational Rogers Dryer will be decommissioned with Dryer No 1 continuing to operate with no modification in particulate abatement or operation. The exhaust stack for the proposed 3.2-tonne dryer will be located on top of the new dryer building that will be constructed next to the western end of the existing dryer building. This building has a planned roof height of 31.6m and the stack will have a minimum height above the roof of 2m and an exit diameter of 1.4m. The design exhaust air flow is calculated to be 84,000 Nm3/h (actual flow 100,000 m3/h), giving an exit velocity from the stack of 18 m/s. Exhaust air from the new dryer plant will pass through a baghouse containing high efficiency bag filters, resulting in low particulate concentrations in the exhaust gas of below 20 mg/Nm3. The corresponding mass emission rate for PM is calculated to be <0.5 g/s at maximum dryer output.

The revised total particulate (PM) emission characteristics and rates for the process exhaust stacks following the commissioning of the new dryer installation and the de-commissioning of the existing operational Rodgers Dryer are presented in Tables 5.4.7A and 5.4.7B below:

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Emission Stack	Particulate Conc. (mg/Nm^3)	Particulate Emission (kg/h)	Particulate Emission (g/s)	Emission Stack	Particulate Conc. (mg/Nm^3)	Particulate Emission (kg/h)
Dryer No. 1 (A2-1)	23	1.6	85,000	23.6	75	15.0
Dryer No. 2 (3.2 T.)	33	1.4	84,000	18.8	52	18.0

Table 5.4.7A: Emission Characteristics from Proposed Process Exhaust Stacks

Emission Stack	Particulate Conc. (mg/Nm^3)	Particulate Emission (kg/h)	Particulate Emission (g/s)
Dryer No 1 (A2-1)	50	4.25	1.18
Dryer No. 2 (3.2 Tonne)	20	1.68	0.47

Table 5.4.7B: Emission Rates of Total Particulates (PM) from Proposed Exhaust Stacks

The modelled daily particulate concentrations due to emissions from the existing Anhydro dryer and the new 3.2-tonne dryer are shown in Figure 9 of the Envirocon Report based on the daily 90.4 percentile value. These results

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are for a worst-case scenario where emissions from both dryer stacks are continuous over the year at the maximum discharge rate for A2-1 of 50 mg/Nm3 with particulate emissions from the 3.2-tonne dryer at 20 mg/Nm3. All PM emissions are assumed to be within the PM10 size fraction. The results indicate that the maximum predicted daily 90.4 percentile occurs close to the northern boundary. The highest predicted daily concentration over the 4-years modelled is 25 µg/m3. When a background level of 14 µg/m3 is included the maximum daily PEC is 39 µg/m3, or 78% of the daily NAQS value of 50 µg/m3 (Figure 10 of Envirocon Report).

The predicted maximum annual average PM10 concentration due to combined emissions from the Anhydro and 3.2-tonne dryer exhausts give a similar concentration pattern compared to the existing scenario, with the highest levels near the northern boundary (Figure 11 of Envirocon Report). The maximum annual average due to the emissions from the 2 dryers is 7.5 µg/m3 beyond the boundary. This gives a reduction in predicted PM10 concentrations of 17% compared to the predicted annual average based on the existing emission scenario. The corresponding PEC value is 21.5 µg/m3, or 54% of the NAQS value of 40 µg/m3 (Figure 12 of Envirocon Report).

Overall, the results of the modelling study demonstrate that there will be no significant impact on the health of the local community or surrounding environment due to the projected change in the boiler and dryer stack emissions occurring as a result of the proposed dryer expansion programme planned at the Tipperary Co-Op facility. The planned installation of the new dryer plant and removal of the Rogers Dryer will result in a reduction in the overall impact of PM10 emissions from the facility.

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(iii) Assessment of Potential Odours from Upgraded WWTP

The assessment of the operation of the existing WWTP and proposed upgrade measures to treat the additional effluent generated by the new facility and to improve effluent discharge quality indicates that the potential for malodours from the site to be detected beyond the facility boundary are very low and unlikely to cause a significant impact at the houses or private properties. The measures being proposed should ensure that Tipperary Co-Op complies with Condition 5.2 of the existing IEL and prevent an “impairment of, or an interference with amenities or the environment beyond the installation boundary” due to emissions from the WWTP.

(ii) Construction Stage Impacts

The main construction stage impacts on air quality would be those associated with comprise the following:

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- Dust generation associated with the demolition of the existing building structures required to facilitate the construction of the new Dryer Tower.

- Dust generation during the construction of the proposed development.

5.4.2.4 Mitigation and Enhancement

(i) Operational Phase

The following mitigation measures have been implemented to minimise the impacts of the subject development:

- The existing operational Rodgers Dryer and the second Rodgers Dryer, which is not currently operational, nor included on the existing IEL, will both be de-commissioned as part of the proposed development. This will eliminate the air emissions associated with the existing Dryer and therefore contribute to an improvement in air quality.

- Tipperary Cooperative Creamery will be obliged to apply for a revised Industrial Emissions Licence to include for the operation of the new evaporation and drying facility. This Licence will specify air emission limit values for the boilers, thermoheaters and dryers that will be operational on the site following the construction and commissioning of the subject development. Tipperary Cooperative Creamery will be obliged under the terms of the License to monitor the performance of these installations to ensure they are operated and maintained in accordance with the conditions of the IEL.

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(ii) Construction Phase

The Construction and Environmental Management Plan (CEMP) for the Dryer 2 development will include appropriate mitigation measures to control and monitor the incidence of dust generation and fugitive dust emissions during the demolition and construction phases of the project.

5.4.2.5 Residual Impacts

Subject to the implementation of the mitigation measures outlined above it is concluded that neither the construction nor operational stages of the subject development should have a negative impact on air quality.

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5.4.3 Noise Impact Assessment

5.4.3.1 Introduction

OES Consulting were engaged by Tipperary Cooperative Creamery to undertake a noise and vibration impact assessment for the proposed Dryer 2 Facility at Tipperary Cooperative Creamery. A complete copy of their Report *"Noise & Vibration Impact Assessment – Proposed new Dryer Building & Upgrades to WWTP"* is included as Attachment H to this Environmental Impact Assessment Report (EIAR)for the project.

The scope of their assessment included:

- Characterisation of the Receiving Environment through a desk-based review of past monitoring data for the site and supplementary surveys completed at additional noise sensitive locations in 2016 and 2017.

- Prediction of construction noise associated with the demolition and construction works, in accordance with BS 5228: Part 1: 2009 + A1:2014: Noise and Vibration Control on Construction and Open Sites, and assessment of impacts of construction noise at relevant noise sensitive locations.

- Prediction of operational noise levels from point sources including new equipment installed as part of the Dryer 2 Facility, and assessment of operational noise impacts at relevant noise sensitive locations.

- Identification of appropriate mitigation and enhancement measures which might be implemented to reduce the impacts of noise during the construction and operational phases of the development.

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5.4.3.2 Existing Environment

The Noise & Vibration Impact Assessment Report prepared by OES for the subject development and included as Attachment J to this EIAR, notes that the Tipperary Cooperative Creamery facility is a busy processing plant with typically numerous noise sources present. The main sources audible externally within the site include both fixed and transient noise sources. Fixed sources include the cream separator, milk pumps at the milk intake area, agitators in the milk silos, the Anhydro dryer exhaust stack, extraction fans on the roof of the cheese plant, cooling towers, steam raising plant and cooling fans associated with air and liquid cooling systems and pumps associated with the WWTP. Transient sources mainly include mobile sources on site such as delivery trucks and forklifts. Due to the local topography, on-site source heights and screening, the main distinguishable sources heard at off-site NSLs (Noise Sensitive Locations) are the existing Anhydro dryer and extract emissions points from the roof of the cheese plant.

Limits and conditions related to noise from the Tipperary Cooperative Creamery facility are set in the current IE license (P0801-01) at the boundaries as follows:

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In accordance with Condition 4.5 of the licence "noise from the installation shall not give rise to sound pressure levels (Leq,T) measured at the boundary of the installation which exceed the limit value(s)."

In accordance with Schedule B.4 of the licence, "noise from the installation shall not give rise to sound pressure levels measured at boundary locations which exceed the limit value of 55 dB(A) by day and 45 dB(A) by night. In addition, there shall be no clearly audible tonal or impulsive noise component in the noise emission from the activity at the boundary to the installation."

Ambient noise monitoring has been conducted annually at a number of boundary locations around the Tipperary Cooperative Creamery site since 2010 and also at two NSLs (NSL1 & NSL2) in the immediate vicinity of the facility since 2012. These past annual noise surveys have been conducted in accordance with best practice and guidance notes produced by the EPA that were applicable at the time of the surveys.

In 2016, the locations of both NSL1 and NSL2 were moved slightly from the grounds of the CBS School to Abbey St (NSL1) and from lands to the west of the facility to Arravale Close (NSL2) as the revised locations are closer to residential development, and therefore more representative of the impact of noise from the facility at such properties.

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Additional supplementary surveys at the above two NSLs and at an extra NSL to the south of the facility at Garryskillane have been completed in June 2016 and in April and May 2017.

All of the above monitoring locations are indicated in Fig. 5.4.1 below.

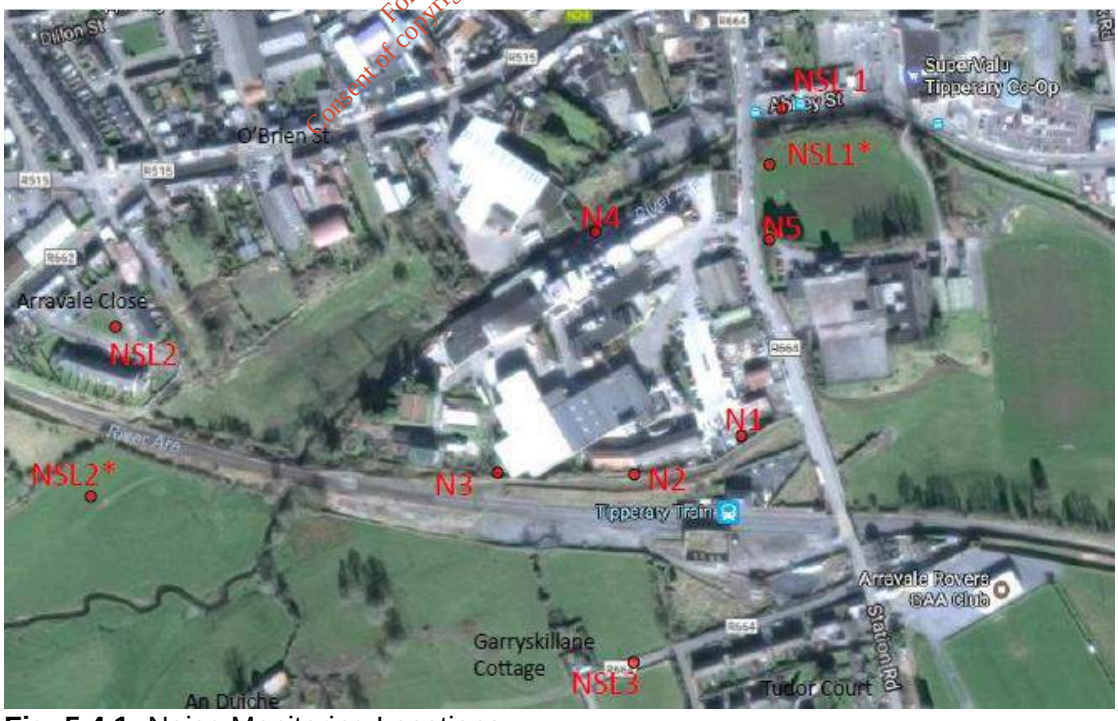


Fig. 5.4.1: Noise Monitoring Locations

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Full details of the results of these surveys are presented in the OES Noise Impact Assessment Report included as Attachment J to this EIAR.

Summary results for the monitoring completed at the boundary locations (2010-2014 & 2016) and at the original locations of NSL1 and NSL 2 (2012-2014), marked with an asterisk on Fig. 5.4.1 above, are presented in Table 5.4.8 below.

Monitoring Location	Night-time $L_{Aeq,t,LA90,t*}$	Day-time $L_{Aeq,t,LA90,t*}$
N1	50,47	53,50
N2	48,46	49,46
N3	50,48	55,52
N4	57,56	59,56
N5	56,50	56,52
NSL1**	49,46	56,52
NSL2**	40,37	48,38

Table 5.4.8: Historical Results Summary for Boundary Locations (2010-2014 & 2016 and NSLs (2012-2014)

* Time t = 30 mins at boundary locations and 15 mins at NSLs

** 2012-2014 results only for original NSL1 and NSL2 locations – 2016 results in Tables 5.4.9 and 5.4.10 below.

The Assessment notes that the boundary locations are dominated by facility related noise with extraneous noise input from traffic on the local roads.

The OES Assessment concludes, on the basis of the historical monitoring results presented in Table 5.4.8, that the facility is not in compliance with the limits set at the boundary. However, it also notes that the current license was issued prior to the publication of the latest EPA Guidance Note NG4 (Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities) published in January 2016 and, therefore it considers, on the basis of this latest guidance, that it is more appropriate that the limits stated in the license apply at NSLs.

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The LA90 is used to assess compliance at NSL1 due to its proximity to Station Road and associated extraneous traffic influences at this location. Table 5.4.8 above indicates that the arithmetic average of LA90 values from 2012-2014 during the night time was just above the limit value. This was due to the LA90 recorded in 2013 which was 51dB. The exceedance in 2013 was not likely to be due to the plant as this level would not be expected from the existing continuous sources on site. Furthermore, in this regard, the LA90 values recorded in 2012 and 2014 were below 45 dB. It is likely that extraneous continuous or semi-continuous sources such as traffic or alarms from nearby retail increased the LA90 in 2013 particularly if the night time measurement was taken early in the night in the case of the former source.

In summary, the Assessment concludes that historic monitoring at NSL1 and NSL2 indicates that the facility is in compliance with the limits specified. Additionally, the most recent monitoring in 2016 at the revised locations for NSL1 and NSL2 also indicate compliance.

Summary results for the supplementary monitoring completed in 2016 and 2017 at the revised locations of NSL1 and NSL2 and at the additional NSL3 are presented in Tables 5.4.9, 5.4.10 and 5.4.11 overleaf. Logged results and 1/3 octave band spectra are included in the OES Report in Attachment J.

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The facility is not located in a quiet area or an area of low background sound. Accordingly, the noise attributed solely to on-site activities, expressed as a freefield value at any NSL, should not generally exceed the values given below in the latest EPA Guidance document, NG4:

- Daytime (07:00 to 19:00hrs) – 55dB LAr,T;
- Evening (19:00 to 23:00hrs) – 50dB LAr,T;
- Night-time (23:00 to 07:00hrs) – 45dB LAeq,T.

LAr,T is a rating level which includes a penalty for tonal or impulsive noise where present (refer to Section 3.0 for further definition). The above limits are considered appropriate for the site location.

The results of monitoring at NSL1, 2 and 3 indicate that the facility is in compliance with the limit values set out in NG4. The sound from the facility at NSLs is continuous, steady and distinguishable but it is not tonal or impulsive in nature. Accordingly, the LA90,t values presented in Tables 5.4.9, 5.4.10 and 5.4.11 best represent facility related sound at NSLs. The facility has been operational for a long time and is part of the fabric or background of the locality.

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Period	Start/End Time	Duration (mins)	$L_{Aeq,t}$	LA10,t	$L_{A90,t}$	L_{AFmax}	Description of Ambient Noise Environment
Day	2016-10-10 17.00 – 17.15	15	65	68	53	83	Traffic sound predominant. Facility continuous sources faintly audible and masked by traffic. LA90 representative of facility sources but is also influenced by traffic.
Day	2016-10-10 17.16 – 17.31	15	66	67	53	91	
Day	2016-10-10 17.31 – 17.46	15	63	66	52	76	
Evening	2017-04-27 21.14 – 21.44	30	60	64	49	77	Traffic sound predominant. Facility sources audible. LA90 most representative of facility sources although it is influenced by traffic. Alarm from nearby retail unit sounded towards the end of measurement #2.
Evening	2017-04-27 21.45 – 22.15	30	60	64	50	77	
Night	2016-10-10 23.40 – 23.55	15	50	49	43	71	Constant background traffic audible from N24 with passing intermittent cars in Station Road. Facility continuous sources audible. LA90 representative of facility sources and also some input from distant traffic.
Night	2016 -10-10 23.56 -00.11	15	51	51	45	71	

Table 5.4.9: Summary Results for Supplementary Monitoring at relocated NSL1 (Abbey Street) 2016/2017

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Period	Start/End Time	Duration (mins)	$L_{Aeq,t}$	LA10,t	$L_{A90,t}$	L_{AFmax}	Description of Ambient Noise Environment
Day	2016-10-10 18.01 – 18.16	15	51	53	45	68	Steady sound from facility low but audible. L_{AF} 44.3 dB in lulls in extraneous sources. Other sources include road traffic on nearby roads, airplanes overhead, crows cawing, people talking, children playing, passing cars within Arravale Close. Potential tones at high frequency due to extraneous sources.
Day	2016-10-10 18.16 – 18.31	15	57	55	45	84	
Day	2016-10-10 18.31 – 18.46	15	56	57	46	76	
Evening	2016-06-27 21.01 – 21.31	30	47	49	41	69	The plant was clearly audible at this location as a steady background noise source. Extraneous sources included children playing close by and traffic on the R662. During lulls in extraneous source the LAF was approx. 41dB. The L_{A90} value is most representative of plant noise over the 30 minutes.
Evening	2017-04-27 20.08 – 20.38	30	48	50	42	72	Facility sound audible continuously in background. Children playing causes significant increase in L_{Aeq} during measurement #2. L_{A90} best represents plant noise.
Evening	2017-04-27 20.38 – 21.08	30	55	52	43	90	
Night	2016-06-27 23.18-23.48	30	45	46	41	63	The facility was clearly audible during at this location and varied with an increase in level at 23.33. Once extraneous sources were removed the L_{Aeq} is calculated at 43.2 dB. Plant noise varied between 39 - 43 dB(A).
Night	2016-06-27/28 23.51 - 00.21	30	44	45	41	61	As above, the facility was clearly audible.
Night	2016-10-10 23.00 – 23.15	15	46	48	45	56	Steady sound from the facility audible but low. L_{AF} in lulls of extraneous noise <45 dB. Extraneous Noise: Road traffic on local roads and car movements in Arravale Close.
Night	2016-10-10 23.15 – 23.30	15	44	46	42	56	
Night	2017-04-28 00.14 – 00.44	30	42	43	39	58	Facility continuous sources audible. Occasional passing car on the Galbally Road.
Night	2017-04-28 00.45 – 01.15	30	42	43	41	54	

Table 5.4.10: Summary Results for Supplementary Monitoring at relocated NSL2 (Arravale Close) 2016/2017

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Period	Start/End Time	Duration (mins)	$L_{Aeq,t}$	LA10,t	$L_{A90,t}$	L_{AFmax}	Description of Ambient Noise Environment
Day	2016-06-27 12.39 – 13.09	30	55	56	51	82	Facility noise predominant; intermittent and frequent traffic on Station Road and R664 to east audible but plant noise predominant. Meter cross-gradient; breeze westerly. Cars and a horse and cart passing the meter influenced the LAeq value. Facility noise is generally steady but can increase/decrease during a 30 minute interval as shown in the logging contained in Attachment 5 of OES Report. This is most likely due to the Anhydro dryer changing loads. The LA90 value is most representative of plant noise for 30 minute reading although it did fluctuate from 48 – 53 dB(A) approx. Slight breeze up to 2m/sec.
Day	2016-06-27 13.10 – 13.40	30	53	55	49	75	The facility was predominant during this reading. Extraneous sources included birds tweeting and occasional cars passing the meter. Facility noise fluctuated as noted above. The LA90 value is most representative of plant noise over the 30 minutes. Breeze was up to 7 m/sec at times.
Evening	2017-04-27 19.00 – 19.30	30	54	53	47	77	Intermittent passing cars, continuous birdsong and an alarm increased the LAeq at this location during the evening. Facility noise was steady and continuous and is represented by the LA90 values recorded.
Evening	2017-04-27 19.30 – 20.00	30	56	54	48	80	
Night	2017-05-17 01.03 – 01.33	30	46	48	43	63	The facility continuous sources were the main sources affecting this location at night time. Wind speeds increased slightly with occasional cars on Station Road and residents parking at nearby dwellings audible. The LA90 value is most representative of facility steady sources.
Night	2017-05-17 01.33 – 02.03	30	46	48	43	53	

Table 5.4.9: Summary Results for Supplementary Monitoring at NSL3 (Garryskillane) 2016/2017

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5.4.3.3 Impact of Development

(i) Construction Stage Impacts

The Noise & Vibration Impact Assessment prepared by OES Consulting for the subject development includes an assessment of the impact of noise associated with the demolition and construction works on the existing noise environment. Prediction of construction noise associated with the demolition and construction works has been conducted as described in BS 5228: Part 1: 2009 + A1:2014, Noise and Vibration Control on Construction and Open Sites. According to this standard, a number of factors such as site location, existing ambient noise levels, duration of site operations, hours of work and attitude of the site operator are likely to affect considerations of acceptability of site noise. Details of the duration of the works and typical activities envisaged were provided by the engineering design team. The equipment likely to be used was selected from sources in BS5228. However, the exact equipment used will be determined by the successful contractor taking account of mitigation measures recommended in the Noise & Vibration Impact Assessment Report and in the Construction and Environmental Management Plan (CEMP) to be prepared for the project.

The assessment concludes that the construction phase will elevate ambient noise levels as assessed at the nearest NSL to the west, Arravale Close. The daytime noise is likely to be masked by traffic however night time work will be required on occasion and the potential elevation in ambient noise levels is likely to be more perceptible to local residents as other sources diminish at night time. The effect of construction noise at night time is deemed to be temporarily slightly significant adverse. Additional mitigation measures will be implemented to minimise construction noise impact and hence potential effect on NSLs.

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(ii) Operational Stage Impacts

The Noise & Vibration Impact Assessment prepared by OES Consulting for the subject development includes an assessment of the impact of noise associated with the operational phase of the development on the existing noise environment.

There will be a number of new noise sources associated with the Proposed Development however the majority of these will be located internally. There will be a new exhaust duct outlet on the roof of the new dryer building and a new air inlet on the outer wall. The height of the new dryer building will be 118.87m OD while the dryer exhaust will be 120.75m OD. The existing dryer stack is approx. 110.7m OD. The existing Anhydro Dryer will remain while the Rodgers Dryer will be decommissioned.

Sound power values are not available at this early stage in the design process as not all equipment has been fully specified. The designers of the Dryer have provided an approximation of sound pressure levels (SPL) of 80 dB(A) at 1m from the roof outlet with a 3m attenuator in place. The air inlet is rated at 75 dB(A) at 1m also with a 3m attenuator. Typically, the sound from the Dryer outlet will be distinguishable but not tonal in nature.

There will be two duty and standby blowers fitted with acoustic hoods associated with the WWTP upgrade. The SPL associated with each proposed new blower at the

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WWTP is 75 dB(A) at 1m. Blowers can exhibit potential tones at mid to high frequencies.

Based on distance attenuation alone, the exhaust/inlet of the new Dryer and blowers will not result in elevation of ambient noise levels above existing background at the nearest NSLs with the attenuators in place. The attenuators and acoustic hoods will ensure that the cumulative impact does not exceed the existing impact of the plant. Furthermore, the blowers will be screened by existing structures at the WWTP. The potential tones associated with the blowers should dissipate quickly provided they are also screened by the proposed tanks at the WWTP.

The facility is licensed by the EPA, however the license will be reviewed as a result of the Proposed Development and therefore the limits and current conditions are subject to change. The facility is not located in a quiet area or an area of low background noise as defined in NG4 therefore the following typical limits are likely to apply at NSLs:

- ➢ Daytime (07.00 to 19.00 hrs) – 55LAr,T
- ➢ Evening (19.00 to 23.00 hrs) – 50LAr,T
- ➢ Night time (23.00 to 07.00 hrs) 45LAeq,T

The following conditions are also likely to apply:

During daytime and evening periods rigorous efforts should be made to avoid clearly audible tones and implusive noise at all sensitive locations.

A penalty of 5 dB for tonal and/or implusive elements is to be applied to the daytime and evening measured LAeq values to determine the appropriate rating level (LAr,T).

During the night time period no tonal or implusive noise from the facility should be clearly audible or measurable at any NSL.

In addition to the foregoing recommended license limit values, the noise from the licensed facility shall not be so loud, so continuous, so repeated, of such duration or pitch and it should not occur at such times as to give reasonable grounds for annoyance.

On the basis of their assessment OES conclude that the proposed development is expected to comply with the above limits and conditions based on the data provided by the Dryer and WWTP designers.

5.4.3.4 Mitigation & Enhancement

(i) Construction Phase

The OES Noise & Vibration Impact Assessment Report notes that there is no published Irish guidance relating to the maximum permissible noise levels that may be generated during the construction phase of a project. However, BS5228:2009 lists applicable noise level thresholds, depending upon existing ambient levels, and these

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are presented in Table 12 of their Report. The Report concludes that Category A threshold values can be applied to the subject development based on the ambient noise levels recorded during the baseline surveys. These comprise threshold values of 45 dB for night-time periods (23:00-07:00), 55 dB for evening and weekends and 65 dB for daytime (07:00 to 19:00) and Saturdays (07:00-13:00). During the daytime, the predicted onsite demolition work is predicted to be less than 63dB(A) at Arravale Close and therefore it is unlikely that the guidance in BS5228:2009 will be exceeded during the daytime. Evening time work is also unlikely to exceed the threshold value for Cat. A locations. However the Report predicts that night time work is likely to exceed the threshold value and recommends the following mitigation measures to be implemented in order to minimise the impact and/or perceived effect of same:

- Use of CFA (Continuous Flight Auger) piling to support the building foundations – this non-displacement system of piling is vibration free and significantly less noisy than the installation of driven piles.

- During the construction phase all equipment will be required to comply with noise limits set out in EC Directive 2000/14/EC and the 2005/88/EC amendment on the approximation of the laws of the Member States relating to the noise emission in the environment by equipment for use outdoors. The directive covers equipment such as compressors, welding generators, excavators, dozers, loaders and dump trucks.

- Account will also be taken of mitigation measures set out in Section 8 of BS5228: Part 1: 2009 +A1:2014 – Noise Control on Construction and Open Sites. This section identifies measures such as substitution, modification, use of enclosures and siting of equipment in order to minimise impact. Screening by existing buildings will be used for stationary equipment.

- A Noise Construction Management Plan will be developed to minimise night time work and timing will be agreed with the Planning Authority to ensure it is carried out in a timely and efficient manner.

- A site representative will be appointed for matters related to noise and vibration.

- Where possible. 24 hr pre-notification of affected neighbours will be completed by phone and text. Responses/queries from neighbours will be addressed.

- Any complaints received will be thoroughly investigated.

- A written complaints log will be maintained by the site manager. This will at a minimum record the name of the complainant, date and time of the complaint and a record of the details of the complaint including the date and time of when the effect was observed. This will ensure that the concerns of local residents who may be affected by site activities are considered during the management of activities at the site.

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- Monitoring of typical levels of noise will be conducted during critical periods at sensitive locations to ensure that excessive levels above the threshold value for daytime are addressed immediately.

- Suitable mitigation measures taken at the time of excessive noise/complaints such as restricting the use of noisy equipment during the early hours will be taken.

As detailed in Section 1 of this EIAR it intended to prepare a detailed Construction & Environmental Management Plan (CEMP) for the Dryer 2 development. The CEMP is intended as a guidance document for the construction phase of the project, and will identify for the Project Management Team and Contractors, the key planning and environmental constraints and associated mitigation measures which need to be implemented in order to ensure that the project can be delivered in a manner which complies with the relevant statutory obligations and environmental best practice.

The CEMP will include sections specifically addressing each of the relevant environmental attributes considered in this EIAR including:

- Soils, Hydrology, Geology and Hydrogeology including Storm Water Management, Sediment & Erosion Control and Water Quality;

- Ecology including Terrestrial Ecology and Aquatic Ecology;

- Air, dust, noise and vibration;

- Waste Management;

- Health and Safety.

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The CEMP will be prepared by the Project Management Team, in consultation with the relevant specialist consultants and statutory bodies such as IFI, NPWS, EPA and Tipperary Co. Co., as appropriate, prior to commencement of any demolition and construction works on site. It will adopt, as appropriate, all relevant mitigation measures, including monitoring, identified in this EIAR and associated specialist reports attached to same. It will also identify the arrangements to be put in place to monitor the implementation and effectiveness of the mitigation measures.

It is intended that all relevant and appropriate mitigation measures identified in The OES Consulting Noise & Vibration Impact Assessment Report (Attachment H) will be fully integrated into the detailed Construction & Environmental Management Plan prepared for the project.

The Project Management Team and Contractors will be obliged to take cognisance of the CEMP, when planning and undertaking the construction of the permitted development. Implementation of the CEMP and associated mitigation

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measures will be monitored by the Project Management Team, on a daily basis, with input from specialist consultants as appropriate.

The obligation for all Contractors, including their subcontractors and employees, to take cognisance of and comply with the requirements of the CEMP will be a Condition of Contract for all Contractors appointed to undertake work on the project.

(ii) Operational Phase

The OES Noise & Vibration Impact Assessment Report recommends the following Operational Phase mitigation measures:

- The limits and conditions as set out in Section 5.4.3.3(ii) above will form part of the specification of works for the Dryer and WWTP designers. Attenuators are specified for the air inlet and outlet exhaust for the proposed new Dryer and acoustic hoods for WWTP blowers. It is recommended that these be implemented. The limits will apply cumulatively with existing sources.

- It is recommended that the blowers be screened from NSLs with existing or proposed structures at the WWTP.

- Prior to final commissioning of the Dryer and the blowers, a Noise Survey will be conducted. This will be undertaken by a competent person and will include monitoring locations at NSLs 1-3. Additional measures will be implemented where necessary before the new plant is fully commissioned.

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5.4.3.5 Residual Impacts

Subject to the implementation of the mitigation measures outlined above it is concluded that neither the construction nor operational stages of the subject development should have a negative impact on the existing noise environment.

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5.5 CLIMATE

5.5.1 Description of Existing Environment

Mean climatalogical data for the 30 year period from 1981 to 2010 for the closest meteorological station which is located at Shannon Airport approx. 60km north west of the subject development is summarised in the table below.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
TEMPERATURE (degrees C)													
mean daily max	8.8	9.2	11.1	13.3	16.0	18.3	19.8	19.6	17.7	14.3	11.1	9.0	14.0
mean daily min	3.2	3.2	4.5	5.7	8.2	10.9	12.9	12.7	10.8	8.2	5.5	3.6	7.4
mean temp.	6.0	6.2	7.8	9.5	12.1	14.6	16.4	16.2	14.2	11.2	8.3	6.3	10.7
absolute max.	14.8	15.5	18.3	23.5	27.2	30.2	30.6	29.8	26.1	22.3	17.6	15.3	30.6
absolute min.	11.2	-5.5	-5.8	-2.3	0.2	3.6	6.7	4.4	1.7	-2.0	-6.6	11.4	11.4
RELATIVE HUMIDITY (%)													
mean at 0900UTC	87.1	87.0	85.0	79.8	76.3	76.8	80.0	82.1	84.7	87.0	88.9	88.4	83.6
mean at 1500UTC	80.5	74.6	70.5	64.4	63.3	65.1	68.0	68.2	69.2	75.2	80.5	83.1	71.9
SUNSHINE (hours)													
mean daily duration	1.6	2.3	3.2	5.1	5.8	5.2	4.5	4.5	3.9	2.9	2.0	1.4	3.5
greatest daily duration	8.1	10.2	11.0	13.6	15.6	15.8	15.7	14.4	12.2	10.1	8.3	7.1	15.8
mean no days with no sun	9.2	6.4	5.7	2.4	1.9	2.0	2.4	2.3	2.9	5.5	7.8	11.1	59.8
RAINFALL (mm)													
mean monthly total	102.3	76.2	78.7	59.2	64.8	69.8	65.9	82.0	75.6	104.9	94.1	104.0	977.6
greatest daily total	38.2	29.4	28.1	40.2	25.0	40.6	39.5	51.0	52.3	36.9	26.9	41.2	52.3
WIND (knots)													
mean monthly speed	10.3	10.2	10.0	9.0	8.9	8.5	8.5	8.2	8.4	9.2	9.1	9.4	9.1
max. gust	75	80	65	62	59	51	52	55	62	71	66	83	83
mean no. days with gales	1.7	0.9	0.8	0.3	0.2	0.1	0.0	0.1	0.1	0.6	0.7	1.2	6.7
WEATHER (mean no. of days with..)													
snow or sleet	2.3	2.3	1.4	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.3	8.0
snow lying at 0900UTC	0.6	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.9
hail	3.6	3.3	3.4	2.2	1.2	0.1	0.1	0.1	0.3	0.9	1.1	2.4	18.6
thunder	0.9	0.5	0.4	0.3	0.5	0.5	0.8	0.4	0.2	0.4	0.4	0.5	5.7
fog	3.3	2.0	2.1	1.9	1.5	1.4	1.4	2.0	2.9	2.9	3.9	4.2	29.6

Table 5.5.1: Mean and Extreme Climatic Values for Shannon Airport (1981 – 2010)

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5.5.2 Potential Impacts on Climate

The only significant potential impact on micro-climate on the receiving environment in the vicinity of the subject development is the possibility of a change in the extent of shadows cast by the new Dryer Tower building on areas outside the boundaries of the Tipperary Cooperative Creamery site.

In order to facilitate an assessment of the potential impact of shadows cast by the new Dryer Tower building, studies were prepared identifying shadows cast by the tower shortly after sunrise, shortly before sunset and around mid-day at the Spring Equinox, Summer Solstice, Autumn Equinox and Winter Solstice and these are presented in Figures 5.5.1 to 5.5.4 respectively. Shadows cast by existing significant

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structures within the Tipperary Cooperative Creamery site (coloured blue) and representative building structures on the western side of Bridge Street and southern side of O'Brien Street (coloured black) are shown shaded grey on Figures 5.5.1 to 5.5.4, while shadows cast by the new Dryer Building structure are shown shaded yellow to facilitate an assessment of the impact of the subject development. These are reviewed below:

Spring Equinox:

Table 5.5.1 above indicates the mean daily sunshine duration during the month of March at 3.2 hours per day. Daylight length at the Spring Equinox is c. 12.25 hours, so there is only c.26% chance of conditions being appropriate to cast shadows at any given time.

Fig. 5.5.1A indicates that in the event that conditions are appropriate, the shadows cast by the Dryer Tower at 07.37 hours, c. one hour after sunrise would extend beyond the boundary of the Tipperary Cooperative Creamery site into open space at the rear of two commercial properties on O'Brien. It is noted that neither of these comprise residential open space and that the duration that the shadow cast over any section of a property will be limited as the shadow will move in an easterly direction as the orientation of the sun relative to each property continues to change.

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Fig. 5.5.1B indicates that by 12.40 hours, the length of shadow cast by the tower will have reduced significantly as the sun rises in the sky and moves to a more southerly location relative to the tower. At this stage the shadows cast by the tower only extend a short distance beyond the boundary of the site into a hard landscaped area around a large commercial premises off O'Brien Street.

Fig. 5.5.1C indicates that by c. one hour before sunset, the length of the shadows will have again increased as level of the sun reduces in the sky to the west, and that the shadow would extend as short distance beyond the Tipperary Cooperative Creamery boundary on Station Road. However, as indicated by the grey shading, much of this area would already be in shade due to existing buildings within the site closer to that boundary.

Fig. 5.5.1D shows a combined image for the three previous images. It is reasonable to conclude that the shadow cast during the course of the day can be interpolated between the positions shown.

Overall, it is concluded that shadows cast by the tower, around the time of the Spring Equinox (Feb to April) will not have a significant impact on properties or open space beyond the boundaries of the Tipperary Cooperative Creamery site, given the limited extent of properties affected, the limited proportion of times when sun will be shining and the limited duration over which shadows will be cast on each property.

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Summer Solstice:

Table 5.5.1 indicates the mean daily sunshine duration during the month of June at 5.2 hours per day. Daylight length at the Summer Solstice is c. 16.75 hours, so there is a slightly higher c.31% chance of conditions being appropriate to cast shadows at any time.

Figs. 5.5.2 A to C indicate the corresponding shadow extents c. shortly after sunrise, around mid-day and shortly before sunset at the Summer Solstice. The orientation of the shadows near sunrise and sunset extend much further west and east respectively, given the earlier and later times at which these occur. The mid-day shadow however is shorter than at the Spring Equinox due to the higher position of the sun in the sky and does not extend beyond the boundary of the site. Shadows cast by the tower at this time of year are likely to fall predominantly within the site and should therefore not have a significant impact on private property or public space beyond the boundaries of the site.

Autumn Equinox:

Table 5.5.1 indicates the mean daily sunshine duration during the month of September at 3.9 hours per day. Daylight length at the Autumn Equinox is c. 12.25 hours, so there is only c.32% chance of conditions being appropriate to cast shadows at that time.

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Figs. 5.5.3 A to C indicate the corresponding shadow extents c. shortly after sunrise, around mid-day and shortly before sunset at the Autumn Equinox. These are very similar to the Spring Equinox, which is to be expected. On this basis, it is again concluded that shadows cast by the tower, around the time of the Autumn Equinox (August - October) will not have a significant impact on properties or open space beyond the boundaries of the Tipperary Cooperative Creamery site, given the limited extent of properties affected, the limited proportion of times when sun will be shining and the limited duration over which shadows will be cast on each property.

Winter Solstice:

Table 5.5.1 indicates the mean daily sunshine duration during the month of December at 1.4 hours per day. Daylight length at the Autumn Equinox is c. 7.7 hours, so there is only c.18% chance of conditions being appropriate to cast shadows at that time.

Figs. 5.5.4 A to C indicate the corresponding shadow extents c. shortly after sunrise, around mid-day and shortly before sunset at the Winter Solstice. As to be expected, the longest shadows are produced at this time of year, and extend beyond the boundaries of the site as far as O'Brien Street to the north and Bridge Street to the east after sunrise and before sunset. However, as illustrated in Figs. 5.5.5 A to C, at these times both of these streets will be predominantly in shadow already from the

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existing buildings along the southern and western sides of these streets respectively. On this basis it is concluded that shadows cast by the tower, around the time of the Winter Solstice (November- January) will not have a significant impact on properties or open space beyond the boundaries of the Tipperary Cooperative Creamery site.

5.5.3 Mitigation and Enhancement

The relocation of the proposed Dryer 2 Building to the south will have reduced the extent of shadows cast by the building outside of the site boundary to the north of development by a similar distance, given that the building is of a similar height to that previously proposed.

5.5.4 Residual Impacts

Overall, it is concluded on the basis of the Shadow Study Assessment detailed above, that shadows cast by the tower, throughout the year, will not have a significant impact on properties or open space beyond the boundaries of the Tipperary Cooperative Creamery site, given the limited extent of properties affected, the limited proportion of times when sun will be shining and the limited duration over which shadows will be cast on each property. There will be no significant impact on the residential amenity of any property.

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Shadow Study: Spring Equinox

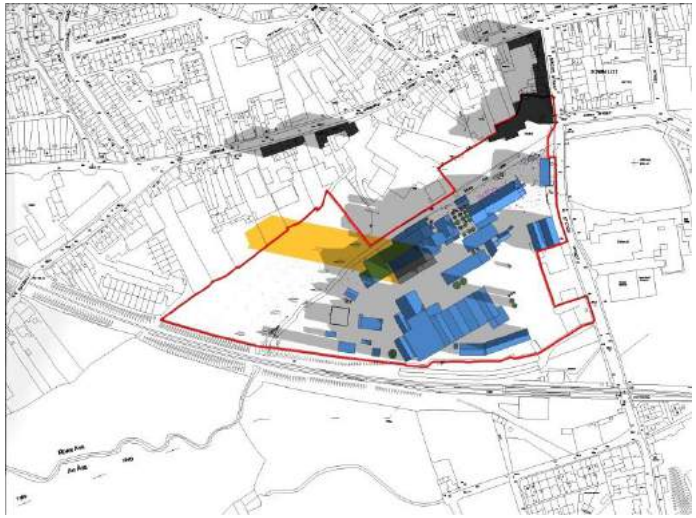


Fig 5.5.1A: 20th March 2017 - 07.37hrs



Fig 5.5.1B: 20th March 2017 - 12.40hrs



Fig 5.5.1C: 20th March 2017 - 17.42hrs



Fig 5.5.1D: 20th March 2017 - Combined Image

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Shadow Study: Summer Solstice



Fig 5.5.2A: 21st June 2017: 05.13hrs



Fig 5.5.2B: 21st June 2017: 12.34hrs

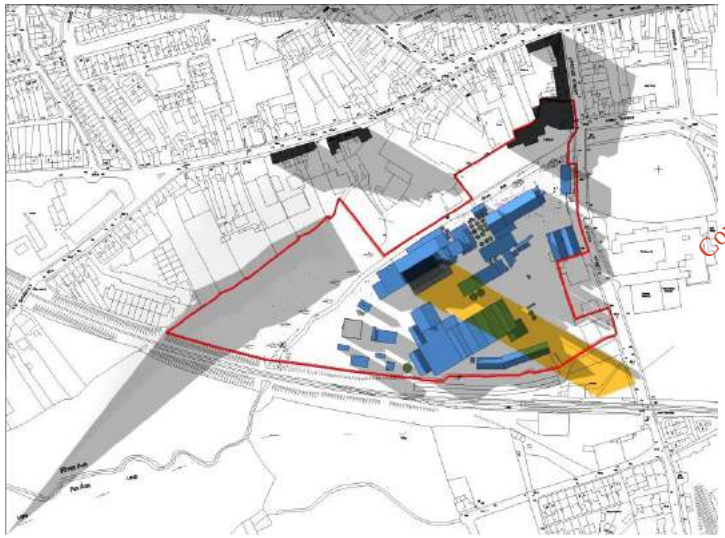


Fig 5.5.2C: 21st June 2017: 19.55hrs

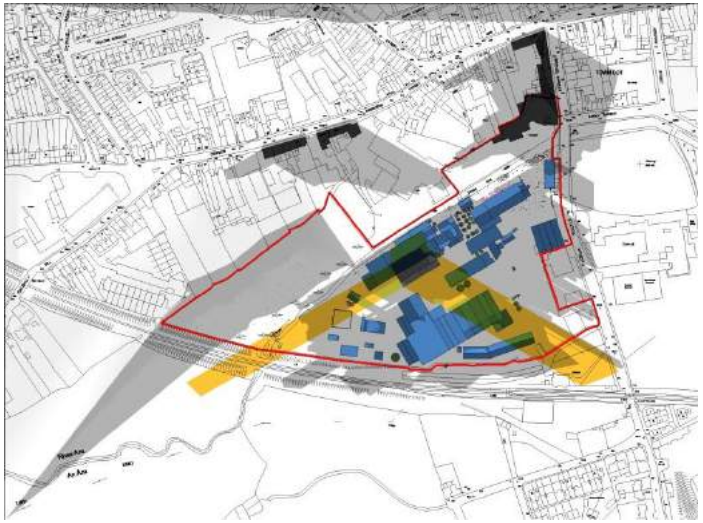


Fig 5.5.2D: Combined Image

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Shadow Study: Autumn Equinox



Fig 5.5.3A: 21st September 2017: 07.20hrs



Fig 5.5.3B: 21st September 2017: 12.25hrs



Fig 5.5.3C: 21st September 2017: 17.30hrs



Fig 5.5.3D: 21st September 2017: Combined Image

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Shadow Study: Winter Solstice

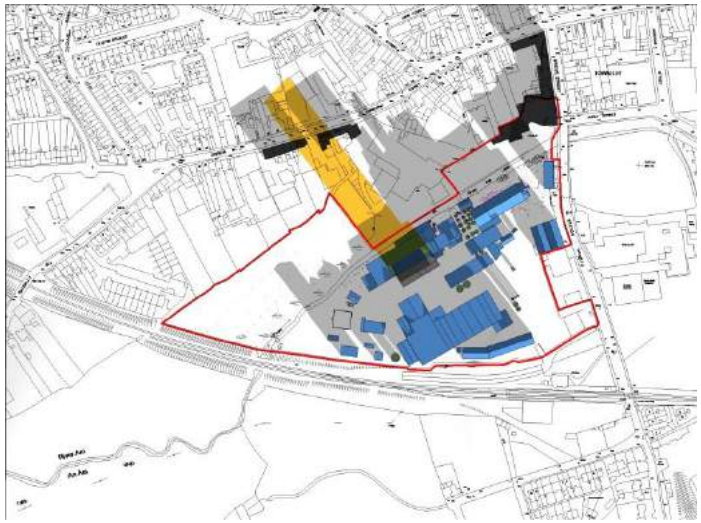


Fig 5.5.4A: 21st December 2017 - 09.44hrs



Fig 5.5.4B: 21st December 2017: 13.05hrs



Fig 5.5.4C: 21st December 2017 – 15.16hrs



Fig 5.5.4D: 21st December 2017: Combined Image

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5.6 LANDSCAPE AND VISUAL IMPACT

5.6.1 Existing Environment

The existing Tipperary Cooperative Creamery Site at Station Road is an industrial site with a relatively modern administration building, built in the late 70's, fronting the public road, a much older gable ended single storey creamery building, which is a protected structure to the rear of same, a later gable ended three storey extension behind, and further more modern industrial process buildings and tanks beyond.

The protected part of the original creamery building was constructed c.1900 (1898) and was appraised by the National Inventory of Architectural Heritage in 2005 as follows:

> *This fine example of industrial architecture demonstrates that the utilitarian nature of a structure does not mean a compromise in design and detailing. Much significant fabric has been retained to this building, which has been in continuous use since its construction. The use of corrugated-iron, together with ridge cresting and particularly the dramatic Diocletian window, adds interest to the structure.*

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Around the early 1930s, the gabled three-storey building was added to the rear (south-west) half of the original building, which was also altered having additional upper-level windows inserted, the roof-cladding and rainwater goods replaced. This raised building shared the original footprint of the Condensed Milk Company structure but raised its pitched roof a full storey above that of the double-height creamery building. The roof is still clad with fibre-reinforced, corrugated cement sheeting and has a raised, steel-framed roof-light at the apex. The cast-concrete (corrugated steel-clad to north-east gable) walls have regularly-spaced, steel-framed windows to the upper floor level while extraneous structures from 1972 and later are attached to the lower floor levels. Although this extant gabled expansion of the original Condensed Milk Company factory was visible on a historic photograph from c. 1935, it remained a later addition to the site which only shared a limited level of the attention paid to architectural detail seen in the original building.

In order to facilitate an assessment of the potential visual impact of the proposed Dryer 2 development currently proposed by Tipperary Cooperative Creamery Ltd. at their site on Station Road, photomontages have been generated from a number of viewpoints in the vicinity of the site and town. The viewpoints selected are identified on the map in Fig. 5.6.1 and are listed in Table 5.6.1 below.

Existing views of the Tipperary Cooperative Creamery Site are presented in Figs. 5.6.2, 5.6.4, 5.6.6, 5.6.8, 5.6.10, 5.6.12, 5.6.14, 5.6.16 and 5.6.18, with a corresponding photomontage showing the view from each of these viewpoints post development of the Dryer 2 project presented in Figs. 5.6.3, 5.6.5, 5.6.7, 5.6.9, 5.6.11, 5.6.13, 5.6.15, 5.6.17 and 5.6.19.

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Viewpoint Ref.	Location	Distance (Dryer 2)
Viewpoint No. 1	Tipperary Cooperative Creamery Front Entrance on Station Road	160m
Viewpoint No. 2	Station Road at Pedestrian Crossing to South of Front Entrance	175m
Viewpoint No. 3	Kickham Street	310m
Viewpoint No. 4	Abbey Street	295m
Viewpoint No.5	Garbally Road	920m
Viewpoint No.6	Garryskillane Villas Road (1)	275m
Viewpoint No. 7	Garryskillane Villas Road (2)	255m
Viewpoint No.8	An Duiche	305m
Viewpoint No. 9	Arravale Close	305m
Viewpoint No. 10	O'Brien Street (1)	200m
Viewpoint No. 11	O'Brien Street (2)	165m

Table 5.6.1: Existing and Post Development Photomontage Viewpoint Locations

The existing views of the Tipperary Cooperative Creamery site from each of these viewpoints are considered below:

Viewpoint No. 1 – Existing View
(Ref. Fig. 5.6.2)

This viewpoint is from Station Road directly outside the front entrance to the Tipperary Cooperative Creamery site. This viewpoint offers the most prominent view of the protected creamery building, with the later three storey building behind also clearly visible. The southern elevation of the more modern administration building, constructed in the late 1970's, is visible to the right of this view. Other existing modern metal clad industrial building structures to the milk in-take, Evaporation and Dryer buildings, large vertical tanks and silos and flues from the boiler house are all clearly visible to the rear of the earlier gable fronted structures. Views of the protected structure quickly diminish as one moves north or south along Station Road from this viewpoint. Views are obstructed by the existing administration building and tanks as one moves north towards Bridge Street, while as one moves south views of most of the protected structure will be obstructed by other buildings along Station Road as identified for Viewpoint 2 below.

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Viewpoint No. 2 – Existing View
(Ref. Fig. 5.6.4)

This viewpoint is taken from Station Road, c. 200m south of Viewpoint No. 1 above. As noted above, views of the protected creamery building quickly diminish as one moves north or south away from the entrance on Station Road, and at this viewpoint are limited to sections of the ridge roof light visible over the roof of the Packaging/Workshop building towards the right of the viewpoint. The second floor windows and pitched roof of the three storey dryer building behind are visible towards the centre of the viewpoint as are many of the other later industrial building structures and tanks/silos to the left of same.

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Viewpoint No. 3 - Existing View
(Ref. Fig. 5.6.6)

This viewpoint is taken from the eastern side of Kickham Street, c. 60m north of it's junction with Abbey Street. The view is dominated by on and off-street parking in the foreground, the rear elevations of buildings along Bridge Street and Abbey Street and some trees planted to the rear of same. Views of the Tipperary Cooperative Creamery site are limited to the tops of some tanks/silos and very small sections of the tops of the three storey gable and the evaporator tower.

Viewpoint No. 4 – Existing View
(Ref. Fig. 5.6.8)

This viewpoint is taken from the southern side of Abbey Street, just east of it's junction with Kickham Street and close to the existing bridge and gated entrance to the grounds of the Abbey School. Although views of the Tipperary Cooperative Creamery site from Abbey Street are generally restricted by the trees and vegetation around the boundaries of the school site, the site can be seen from this viewpoint through the break in the trees at the gate. The masonry walls, bridge, metal gate and railings, trees and riverside vegetation dominate the foreground from this viewpoint with the upper sections of some of the buildings and tanks on the Tipperary Cooperative Creamery site visible over the gate and wall in the distance towards the centre of the view.

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Viewpoint No. 5 – Existing View
(Ref. Fig. 5.6.10)

This viewpoint is taken from the R662 Regional Road (Garbally Road), to the south west of the town, c. 700m from it's junction with O'Brien Street/Emly Road and would represent views available to traffic as it approaches the town along this route. Sections of the Tipperary Cooperative Creamery plant including existing Evaporator and Dryer buildings are visible among the trees in the distance.

Viewpoint No. 6 – Existing View
(Ref. Fig. 5.6.12)

This viewpoint is taken from Garryskillane Road, just west of it's junction with Station Road, looking across the railway yard towards the Tipperary Cooperative Creamery site. Much of the site is screened by the railway station and other derelict railway buildings/structures. Some tanks and the boilerhouse flues are visible to the left of the station building and the second floor windows and roof of the three storey creamery building are visible to the right of the station building.

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Viewpoint No. 7 – Existing View
(Ref. Fig. 5.6.14)

This viewpoint is also taken from Garryskillane Road, c.50m further west than Viewpoint No. 6 above. From this point, views of parts of the Tipperary Cooperative Creamery site are screened by the derelict former railway building in the foreground. The upper levels of the Evaporator and Dryer buildings and a number of tanks/silos are visible over the derelict railway building and the western part of the cheese plant can be seen to the left of same.

Viewpoint No. 8 – Existing View
(Ref. Fig. 5.6.16)

This viewpoint is taken from a field to the north of the An Duiche residential housing estate south west of the Tipperary Cooperative Creamery site. From this point most of the site is screened by intervening trees with only the upper sections of a number of the taller buildings and tanks visible over the trees.

Viewpoint No. 9 – Existing View
(Ref. Fig. 5.6.18)

This viewpoint is taken from within the Arravale Close residential estate to the west of the Tipperary Cooperative Creamery site. From this viewpoint most of the site is screened by the houses on the left within the estate and by the trees along the estate boundary to the rear of the houses.

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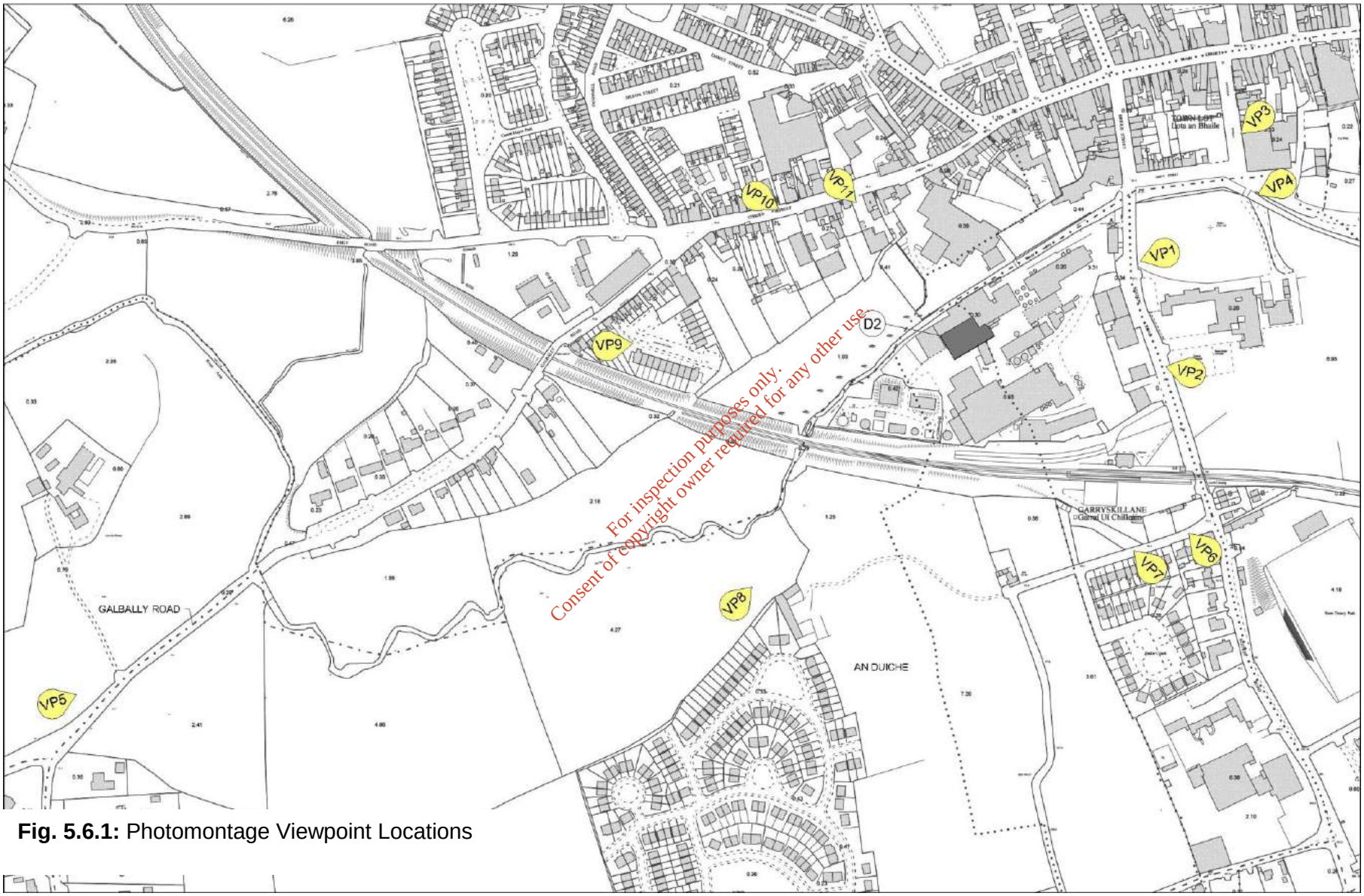
Viewpoint No. 10 – Existing View
(Ref. Fig. 5.6.20)

This viewpoint is taken from close to Vaughan's Public House on the northern side of O'Brien Street looking south towards the Tipperary Cooperative Creamery site. As can be seen from the photomontage, views of the site from O'Brien Street are substantially screened by existing properties along the southern side of the street.

Viewpoint No. 11 – Existing View
(Ref. Fig. 5.6.22)

This viewpoint is taken from close to Moorehaven Garden Centre on the northern side of O'Brien Street looking south towards the Tipperary Cooperative Creamery site. Similar to Viewpoint 10 above, which was taken from a point futher west along O'Brien Street, as can be seen from the photomontage, views of the site from O'Brien Street are substantially screened by existing properties along the southern side of the street.

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Fig. 5.6.1: Photomontage Viewpoint Locations

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5.6.2 Impact of Proposed Development

The proposed development will see the demolition of the southern section of the existing warehouse building, former butter store building and existing fuel storage tanks and associated bund and canopy roof over. None of these structures are clearly visible from any of the existing viewpoints considered above as they are screened by either taller buildings within the site or buildings/vegetation outside of the site. Their demolition will therefore not impact on these existing views.

The visual impact of the construction of the new Dryer 2 building from each of the viewpoints is considered below:

Viewpoint No. 1 – Post Development View
(Ref. Fig. 5.6.3)

The upper levels of the new Dryer 2 building are clearly visible over the milk intake structure and to the left of the existing Dryer/Evaporator buildings from this viewpoint. However, given the significant number of other existing tall buildings, tanks and other infrastructure within the development site, it is considered that the introduction of a new large scale element here will have no significant impact on the existing historic character or visual amenity of the situated site. It's massing and perceived height are similar to the buildings and tanks in front of it. The finish and elevational treatment of the building will be similar.

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Viewpoint No. 2 – Post Development View
(Ref. Fig. 5.6.5)

This viewpoint is taken from Station Road, c. 100m south of Viewpoint No. 1 above. As noted for the existing view, views of the protected creamery building quickly diminish as one moves north or south away from the Tipperary Cooperative Creamery entrance on Station Road, and at this viewpoint are limited to sections of the ridge roof light visible over the roof of the Packaging/Workshop building towards the right of the viewpoint.

The Dryer 2 building is clearly visible towards left of the centre of this viewpoint. The impact of the addition of the Dryer 2 building is not considered significant. It is consistent in terms of perceived height with the existing Evaporator/Dryer buildings and tanks to the right of it and the two storey Raymond Kelly Monumental Works building to the left of the view.

Viewpoint No. 3 - Post Development View
(Ref. Fig. 5.6.7)

This viewpoint is taken from the eastern side of Kickham Street and as previously noted existing views of the Tipperary Cooperative Creamery site from this viewpoint

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are limited to the tops of some tanks/silos and very small sections of the tops of the three storey gable and the evaporator tower. The visual impact of the new Dryer 2 building structure to this view is not considered significant. It does not significantly break the skyline established by the trees and roofs of the buildings along Bridge Street and Abbey Street.

Viewpoint No. 4 – Post Development View
(Ref. Fig. 5.6.9)

This viewpoint is taken from the southern side of Abbey Street, just east of it's junction with Kickham Street and close to the existing bridge and gated entrance to the grounds of the Abbey School. As previously noted, although views of the Tipperary Cooperative Creamery site from Abbey Street are generally restricted by the trees and vegetation around the boundaries of the school site, the site can be seen from this viewpoint through the break in the trees at the gate. It is considered that the addition of the new building structure does not significantly alter the visual impact of the existing industrial buildings and tanks visible on the Tipperary Cooperative Creamery site from this viewpoint.

Viewpoint No. 5 – Post Development View
(Ref. Fig. 5.6.11)

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This viewpoint is taken from the R662 Regional Road (Garbally Road), to the south west of the town, c. 700m from it's junction with O'Brien Street/Emly Road and would represent views available to traffic as it approaches the town along this route. As previously identified, sections of the Tipperary Cooperative Creamery plant including the existing Evaporator and Dryer buildings are visible among the trees in the distance from this viewpoint and these will be replaced with views of the higher Dryer 2 structure. Although it will appear taller than the existing structures, it still does not significantly break the skyline established by the existing trees and vegetation to the right and left of it, and therefore the overall visual impact is not considered significant.

Viewpoint No. 6 – Post Development View
(Ref. Fig. 5.6.13)

This viewpoint is taken from Garryskillane Road, just west of it's junction with Station Road, looking across the railway yard towards the Tipperary Cooperative Creamery site. The upper levels of the new Dryer 2 building structure is clearly visible from this viewpoint and does break the skyline. However, given the industrial zoning of the site, the presence of other industrial buildings and structures in the view and the limited increase in perceived height above the existing station building to the right the overall visual impact is not considered significant.

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Viewpoint No. 7 – Post Development View
(Ref. Fig. 5.6.15)

This viewpoint is also taken from Garryskillane Road, c.50m further west than Viewpoint No. 6 above. From this viewpoint, the upper levels of the new Dryer 2 building structure are clearly visible above the existing Cheese Plant and former McMahons Store buildings to the right of the view. The new building clearly breaks the skyline and its perceived height is higher than the existing Evaporator/Dryer buildings and tanks/silos on the site which are visible over the derelict railway structure towards the centre of the view. However, given the zoning and presence of these other tall industrial structures on the site and the derelict building in the foreground, the overall visual impact of the addition of the Dryer 2 structure is not considered significant.

Viewpoint No. 8 – Post Development View
(Ref. Fig. 5.6.17)

This viewpoint is taken from a field to the north of the An Duiche residential housing estate south west of the Tipperary Cooperative Creamery site. From this point most of the site is screened by intervening trees with only the upper sections of a number of the taller buildings and tanks currently visible over the trees. The new Dryer 2 building structure will be clearly visible towards the centre of the view. However, it does not break the skyline established by the existing trees and powerline, and given the industrial zoning of the site, the overall visual impact is not considered significant.

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Viewpoint No. 9 – Post Development View
(Ref. Fig. 5.6.19)

This viewpoint is taken from within the Arravale Close residential estate to the west of the Tipperary Cooperative Creamery site. From this viewpoint most of the site is screened by the houses on the left within the estate and by the trees along the estate boundary to the rear of the houses. As indicated in the photomontage, the proposed Dryer 2 building structure will be similarly screened by existing properties and trees and will not be visible from this viewpoint.

Viewpoint No. 10 – Post Development View
(Ref. Fig. 5.6.21)

As noted for the existing photomontage from this viewpoint, views of the Tipperary Cooperative Creamery site, including the proposed Dryer 2 development, from O'Brien Street are substantially screened by existing buildings and structures along the southern side of the street. The proposed building will not be visible from this viewpoint.

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Viewpoint No. 11 – Post Development View

(Ref. Fig. 5.6.23)

As noted for the existing photomontage from this viewpoint, views of the Tipperary Cooperative Creamery site, including the proposed Dryer 2 development, from O'Brien Street are substantially screened by existing buildings and structures along the southern side of the street. However, as demonstrated in this photomontage, there will be limited views of the existing site and proposed Dryer 2 development available at gaps between existing buildings along the southern side of the street. Given the limited views available, the industrial zoning and presence of other tall buildings and structures on the site, and that the proposed building will be set back from and not be visible over existing buildings on O'Brien Street, the visual impact where views will be available is not considered significant.

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Fig. 5.6.2: View Point No. 1 - Station Road Front Entrance - Existing (Dist. Approx. 270m)



Fig. 5.6.3: View Point No. 1 - Station Road Front Entrance - Post Development

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Fig. 5.6.4: Viewpoint No. 2 - Station Road at Pedestrian Crossing to South of Front Entrance Existing (Dist. Approx. 270m)

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Fig. 5.6.5: Viewpoint No. 2 - Station Road at Pedestrian Crossing to South of Front Entrance – Post Development

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Fig. 5.6.6: Viewpoint No. 3 - Kickham Street - Existing (Dist. Approx. 250m)

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Fig. 5.6.7: Viewpoint No. 3 - Kickham Street - Post Development

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Fig. 5.6.8: Viewpoint No. 4 - Abbey Street – Existing (Dist. Approx. 240m)



Fig. 5.6.9: Viewpoint No. 4 - Abbey Street – Post Development

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Fig. 5.6.10: Viewpoint No. 5 - Garbally Road - Existing (Dist. approx. 900m)



Fig. 5.6.11: Viewpoint No. 5 - Garbally Road - Post Development

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Fig. 5.6.12: Viewpoint No. 6 - Garryskillane Villas Road (1) – Existing (Dist. Approx. 270m)



Fig. 5.6.13: Viewpoint No. 6 - Garryskillane Villas Road (1) – Post Development

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Fig. 5.6.14: Viewpoint No. 7 - Garryskillane Villas Road (2) -Existing (Dist. Approx. 295m)

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Fig. 5.6.15: Viewpoint No. 7 - Garryskillane Villas Road (2) – Post Development

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Fig. 5.6.16: Viewpoint No. 8 - An Duiche - Existing (Dist. approx. 280m)



Fig. 5.6.17: Viewpoint No. 8 - An Duiche - Post Development

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Fig. 5.6.18: Viewpoint No. 9 - Arravale Close - Existing (Dist. Approx. 285m)



Fig. 5.6.19: Viewpoint No. 9 - Arravale Close - Post Development (New Dryer building in background screened by buildings and trees shown in dashed outline)

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Fig. 5.6.20: Viewpoint No. 10 – O'Brien Street

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Fig. 5.6.21: Viewpoint No. 10 – O'Brien Street

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Fig. 5.6.22: Viewpoint No. 11 – O'Brien Street



Fig. 5.6.23: Viewpoint No. 11 – O'Brien Street

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5.6.3 Mitigation and Enhancement

The following mitigation measures have been implemented to reduce the visual impact of the subject development:

- As outlined in the Introduction to this EIAR, Tipperary Cooperative Creamery no longer intend to proceed with the development permitted under 16/600756 comprising the upgrade of the existing Dryer 3 building adjoining the protected structure towards the front of the site. This will remove the cumulative visual impact on views of the site should Tipperary Cooperative Creamery have proceeded with both developments as originally proposed.

- A contrasting horizontal band of darker cladding has been added towards the top of the wall cladding to the new Dryer 2 structure in order to reduce the visual impact of the plain clad structure.

5.6.4 Cumulative Impacts

As noted above, Tipperary Cooperative Creamery no longer intend to proceed with the development permitted under 16/600756 comprising the upgrade of the existing Dryer 3 building adjoining the protected structure towards the front of the site. This will remove the cumulative visual impact on views of the site should Tipperary Cooperative Creamery have proceeded with both developments as originally proposed.

No other significant building developments are currently planned within or in the vicinity of the Tipperary Cooperative Creamery site which would have potential cumulative visual impacts with the subject development.

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5.6.5 Residual Impacts

The visual impact of the proposed development will mainly result from changing the massing of buildings within the site. However, given the significant number of other tall buildings, tanks and other infrastructure within the development site, the introduction of a new large-scale element in the form of the new Dryer 2 structure, will have no significant impact on either the visual amenity of the protected structure located towards the front of the site or on the overall visual impact of the site.

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5.7 MATERIAL ASSETS

5.7.1 Introduction

This section of the Environmental Impact Assessment Report (EIAR) considers impacts on Material Assets relevant to the subject development including traffic and waste.

MRG Consulting Engineers Limited have prepared a Report on Traffic, Access and Parking for the proposed Dryer 2 Project, a copy of which is included as Attachment J to the EIAR.

5.7.2 Traffic

5.7.2.1 Existing Environment

(i) Existing Road Network

Tipperary Town itself is located on the N24 (Waterford – Limerick) National Primary Route which enters the town from the southeast along the Bansha Road to its junction with the N74 (Tipperary Town – Cashel) National Secondary Route, then runs west along Main Street before turning north west onto Church Street at its junction with O'Brien Street (R515 – Emly Road). The town is connected to the Cork- Dublin M8 Motorway via the N24 at Cahir, c.20km south east of the town and via the N74 at Cashel c.20km to the east. It is connected to the M7 Limerick- Dublin Motorway via the N24 c.35km to the north west of the town.

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The existing Tipperary Cooperative Creamery site is located just south of Tipperary Town centre, and is bounded to the east by Station Road on the R664 Regional Road which connects the village of Aherlow to the town. The R664 connects to the N24 via Bridge Street at Main Street c.200m to the north of the site entrance on Station Road.

The Bridge Street/Abbey Street/Station Road T- Junction is located to the north of the Tipperary Co Operative Creamery site entrance on Station Road. The majority of both the HGV and other traffic heading to the Tipperary Co Op site comes through this junction either coming south along Bridge Street from its junction with the N24 at Main Street and straight through the junction, or coming west along Abbey Street from its junction with the N24 at the Bansha Road to turn left at the junction onto Station Road. Similarly, the majority of HGV traffic leaving the Tipperary Co Op site goes through this junction either heading north/straight through the junction to Bridge Street or turning right at the junction to head east along Abbey Street.

The current layout of this existing T- junction is such that the available turning radii between Abbey Street and Bridge Street/Station Road are somewhat

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constrained. In particular it is noted that the turning movement of HGV's turning left onto Abbey Street from Bridge Street can be restricted by vehicles queuing on the Abbey Street approach to the junction resulting in some potential for traffic disruption on Bridge Street. However, it is noted that such movements are not associated with or relevant to HGV traffic travelling to or from the Tipperary Co Op site.

Right turning HGV movements from Station Road to Abbey Street appear to operate satisfactorily in the presence of queuing traffic on the Abbey Street approach to the junction. Similarly left turning HGV movements from Abbey Street onto Station Road appear to operate satisfactorily although there is a potential risk of some restriction to this movement being caused by the presence of traffic in the northbound lane on Station Road. It would appear however that the junction stop line on the Abbey Street approach and the availability of good sightlines between Abbey Street and Station Road mitigates this risk and that traffic flows generally operate satisfactorily between Abbey Street and Station Road.

(ii) Access to the Site

All vehicular access and exit movements to and from the Tipperary Co-Operative Creamery site are via the main entrance on Station Road. Inward and outward movements of all vehicles including HGV's, cars and light commercial vehicles is controlled by security barriers which are set back a distance of approximately 20 metres from the near carriageway edge on Station Road. HGV deliveries and dispatches are recorded at a weighbridge facility located within the site.

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Pedestrian access to the site for staff and visitors is via reception facilities contained in the Office and Administration Building located on Station Road at the north side of the vehicular entrance. Pedestrian access for authorised staff is also provided at an access controlled gate located to the south side of the Office/Administration Building.

(iii) Car Parking Facilities

The main car park facility serving the Tipperary Co-Operative Creamery plant is located at the western end of the site as shown on Drawing No. 116020- 02 enclosed. The car park contains 76 no. spaces and is available for staff and for use by maintenance contractors visiting the site. A set down area for HGV's is provided at the north end of this car park which can accommodate up to 10 no. trucks, trailers or containers.

A further 10 no. car parking spaces are provided within the site in the vicinity of the site entrance with 8 no. of these spaces provided at the front of the Butter Plant Building and the remaining 2 no. provided adjacent to the entrance at its northern side.

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There are also some car spaces provided external to the site comprising an off-road visitor car park on the southern side of the site entrance on Station Road and some roadside perpendicular car spaces on Station Road in front of the Packaging/Workshop Building immediately to the south of the visitor car park. There are 14 no. spaces provided in the visitor car park and a further 10 no. spaces provided in the roadside parking area.

The total car parking provision for staff and visitors is thus 110 no. spaces.

(iv) Existing Staff Details and Parking Provision

The total no. of staff and management personnel currently employed at the Tipperary Co Operative site is 107 no. of which approximately 20% comprise management and administration staff with the remaining 80% comprising staff involved in production, quality control and plant maintenance activities. The breakdown of staff and management numbers involved in shift work and normal day working hours across a 24 hour/full day period is summarised as follows:

Day workers normally working between 8.00am and 6.00pm: 71no.

Shift workers working from 6.00am to 2.00pm: 13no.

Shift workers working from 2.00pm to 10.00pm: 13no.

Shift workers working from 10.00pm to 6.00am: 10no.

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The car parking provision for manufacturing facilities required under the Tipperary Town Plan 2013 is 0.5 spaces per member of staff. On this basis the no. of spaces required would be 0.5(71 + 13) = 42 no. spaces. The actual parking provision of 110no. spaces satisfies this criteria in full.

Check surveys by MRG in relation to daily car park usage during the months of April and May 2016 indicate a general maximum usage of approx. 70% or 60 no. spaces of the total 86 no. car spaces available for staff and external contractors. The resulting spare parking capacity is therefore in the order of 26 no. spaces. Survey checks on the usage of the 14 no. spaces in the visitor car park indicate that this car park is generally filled to between 50% and 75% by visitor traffic on a daily basis.

The above surveys indicate that parking provision at the plant is adequate for current staff and maintenance contractors with a general spare capacity in the order of 25 spaces. It is also evident that the visitor car park is adequately sized for the level of visitor traffic generated by the plant on a daily basis.

(v) Existing Heavy Goods Vehicular (HGV) Traffic

The number of inward and outward HGV movements to and from the Tipperary Co- Operative Creamery site per day varies depending on the available supply of milk, market demands and time of year. Processing

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activity at the plant is generally undertaken on a 24hour basis, 365 days a year.

HGV traffic primarily comprises articulated road tankers (capacity c.22,500 litres) delivering whole milk, buttermilk and some liquid milk derivatives to the site and collecting partly processed liquid milk derivatives (whey, buttermilk and skim milk concentrates) from the site and a smaller proportion of articulated trucks collecting cheese and milk powder products from the site. There would also be a small amount of HGV movements associated with the delivery of packaging, fuel, etc. and the collection of waste.

Based on site records, the maximum number of HGV's entering the creamery site per day/24hour period at times of peak milk supply is 89 no. vehicles. The number of HGV's exiting the site over the same 24 hour period was also recorded at 89 no. vehicles. This would be consistent with the current peak processing capacity of the plant, identified as c.1.62 million litres of wholemilk/buttermilk per day, which equates to a total of 72 articulated tanker deliveries based on a capacity of 22,500 litres per tanker. The remaining movements would be those associated with articulated trucks collecting cheese and powder products, waste and delivery of packaging and other miscellaneous materials. It is noted that the number of HGV's entering the site during the off-peak milk supply period dropped to approximately 15no. vehicles per day.

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A breakdown of the maximum no. of inward and outward HGV movements to and from the site over a 24hour day during the peak milk supply period based on site records is contained in Table 5.7.1 below. This table indicates that HGV movements occur from 01.00am in the morning to 10.00pm in the evening. No vehicles were recorded entering or leaving the site between 10.00pm and 01.00 am. The table also indicates the following information in relation to HGV movements per hour:

- The peak period for HGV deliveries to site is from 9.00am to 4.00pm each day which is consistent with the cycle of morning milk collection from milk suppliers. The table shows that the current total no. of HGV movements entering and leaving the site per hour between 9.00am and 4.00pm is in the range 10 no. to 17no. movements per hour, and that in excess of 50% of both entry and exit movements occur during this 7 hour period.

- Directly either side of this peak period the total number of HGV movements per hour entering and leaving the site between 8am and 9.00am is indicated at 6no. movements and between 4.00pm and 5.00pm is indicated at 9no. movements.

- Outside of the above periods there are movements per hour in the range 11no. to 14no. in the early morning period between 5.00am and 7.00am.

- Before 5.00am in the morning and after 5.00pm in the evening, the numbers of movements per hour reduce significantly with a maximum rate of 5no. movements per hour indicated between 7.00pm and 8.00pm.

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A check count on HGV traffic movements to and from the site between 7.00am and 7.00pm was carried out on the 4th August 2016. The number of HGV's entering the site was recorded at 57no. versus 67no. indicated in the table above. The no. of HGV's leaving the site was recorded at 56no. versus 68no. indicated in the table above. The nos. of movements per hour were found to be consistent with the pattern of movements in the table above with a concentration of movements through the late morning and early afternoon hours. Overall, the count results of the 4th August 2016 were consistent with the HGV traffic levels indicated in the table above taking into account that the table above relates to peak milk supply period and that the recent count reflects some drop off in HGV traffic levels as peak milk supply wanes heading into the Autumn months, and would be in the order of c.80% of peak volumes.

Times of HGV Entry & Exit to/from the TCC Site over 24 hour day	No. of HGV's entering the Site.	No. of HGV's leaving the Site.
0.00-1.00	0	0
1.00-2.00	1	1
2.00-3.00	1	1
3.00-4.00	2	2
4.00-5.00	0	0
5.00-6.00	7	4
6.00-7.00	5	6
7.00-8.00	8	6
8.00-9.00	1	5
9.00-10.00	10	6
10.00-11.00	6	6
11.00-12.00	6	8
12.00-13.00	7	6
13.00-14.00	4	6
14.00-15.00	8	6
15.00-16.00	9	8
16.00-17.00	4	5
17.00-18.00	2	4
18.00-19.00	2	2
19.00-20.00	3	4
20.00-21.00	2	2
21.00-22.00	1	1
22.00-23.00	0	0
23.00-24.00	0	0
Total No. of Movements over 24hour day	**89**	**89**

Table 4.7.1 : HGV Traffic Movements /Day during Peak Milk Supply Period

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5.7.2.2 Impacts of Dryer 2 Development on Traffic

(i) Post Development Staff Details and Parking Provision

The projected increases in staff levels as a result of the development of the Dryer 2 facility are relatively small reflecting the fact the new dryer plant is largely an automated plant system. Also, arrangements for milk intake within the plant and for dispatch of final product from the plant will remain largely in line with current arrangements.

The increases in staffing levels post development of the Dryer 2 Facility across shift work hours and during normal day working hours over a 24hour/full day period is summarised in Table 5.7.2 below.

Table 4.7.2 indicates a maximum of 6no. additional staff on site during daytime hours post-development of the Dryer 2 facility with. The no. of additional car parking spaces required based on the Tipperary Town Plan 2013 requirement of 0.5spaces per member of staff would thus be 3no. spaces. The no. of additional spaces already provided on site is 26no. as outlined above in Section 3.2 thus confirming that parking provision for additional staff is fully satisfied.

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Working Hours	Current Staff No.	Additional Staff Post Dryer 2 Development	Total Staff Post Dryer 2 Development
Day workers normally working between 8.00am and 6.00pm	71no.	5no.	76no.
Shift workers working from 6.00am to 2.00pm	13no.	1no.	14no.
Shift workers working from 2.00pm to 10.00pm	13no.	1no.	14no.
Shift workers working from 10.00pm to 6.00am	10no.	1no.	11no.
Total	107no.	8no.	115no.

Table 5.7.2: Current and Post Development Staff Nos.

(ii) Post Development Heavy Goods Vehicular (HGV) Traffic

The development of the new Dryer 2 Facility will lead to an increase in the levels of HGV traffic to and from the site, directly related to the increase in peak daily milk processing capacity of the site. The peak daily processing capacity of the site will increase in 1.62 million to 1.97 million litres of milk per day, an increase of c.350,000 litres of milk per day. On the basis of a articulated tanker capacity of c.22,500 litres per delivery, this would require an additional 16 deliveries per day. Assuming a similar proportional increase in non-tanker HGV traffic, the overall peak increase in HGV movements entering and leaving the site per day is likely to be 20 vehicles in each direction.

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A breakdown of the projected increase in HGV traffic entering and leaving the Tipperary Co- Operative Creamery site post-development of the Dryer 2 Facility is presented in the table below. The breakdown indicates that the maximum increase in movements per hour is 2no. additional movements entering the site and 2no. movements leaving the site. The total no. of additional HGV movements over a 24hour day is 20no. movements entering the site and 20no. movements leaving the site as outlined above. There is 1no. additional HGV movement entering the site between 8.00am and 9.00am and 1no. additional movement leaving the site between 4.00pm and 5.00pm.

Times of HGV Entry & Exit to/from the TCC Site over 24 hour day	No. of HGV's entering the Site.			No. of HGV's leaving the Site.		
	Current no. based on review of weighbridge records	Post Dev. Change	Post Dev. Total	Current no. based on review of weighbridge records	Post Dev. Change	Post Dev. Total
0.00-1.00	0	0	0	0	0	0
1.00-2.00	1	0	1	1	0	1
2.00-3.00	1	+1	2	1	0	1
3.00-4.00	2	0	2	2	+1	3
4.00-5.00	0	+1	1	0	0	0
5.00-6.00	7	+1	8	4	+1	5
6.00-7.00	5	+1	6	6	+1	7
7.00-8.00	8	+1	9	6	+1	7
8.00-9.00	1	+1	2	5	+1	6
9.00-10.00	10	0	10	6	+1	7
10.00-11.00	6	+2	8	6	+2	8
11.00-12.00	6	+2	8	8	0	8
12.00-13.00	7	+2	9	6	+2	8
13.00-14.00	4	+2	6	6	+2	8
14.00-15.00	8	+2	8	6	+2	8
15.00-16.00	9	0	9	8	+2	10
16.00-17.00	4	+1	5	5	0	5
17.00-18.00	2	+1	3	4	+1	3
18.00-19.00	2	0	2	2	+1	3
19.00-20.00	3	+1	4	4	0	4
20.00-21.00	2	+1	3	2	+1	3
21.00-22.00	1	0	1	1	+1	2
22.00-23.00	0	0	0	0	0	0
23.00-24.00	0	0	0	0	0	0
Total No. of Movements	**89no.**	**+20no.**	**119no.**	**89no.**	**+20no.**	**119no.**

Table 4.7.3: Pre and Post Development HGV Traffic

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(iii) Impacts of Increase in Cars and Light Commercial Traffic

Car and light commercial traffic is generated by staff and visitors to the Tipperary Co-Operative Creamery site. There is no change of any significance in the level of visitor traffic to the site envisaged post development of the Dryer 2 Facility. The increase in staff levels at the Tipperary Co-Operative Creamery site post development of the Dryer 2 Facility is estimated at 6no. personnel working during daytime hours with 2no. further personnel working during shiftwork hours outside of normal daytime working hours. The additional parking requirement in respect of additional staff is estimated at 4no. spaces based on current levels of car park usage at the site. There is currently an estimated spare capacity of 26no. car spaces within the site for use by staff and by visiting contractors to the site which will fully satisfy the requirement for any additional parking spaces as a result of the proposed development.

With regard to impact of any additional traffic on the public road network, the level of traffic generated by the relatively small number of additional staff is negligible in the context of overall existing traffic in Tipperary Town and no impacts of any significance are envisaged. The following points are also noted with regard to traffic generated by staff;

- Post development of Dryer 2, it is estimated that 34% of staff (39no.) will be employed on a shiftwork basis arriving and departing from site at times outside of normal morning starting and evening finishing times, thus avoiding impact on normal morning and evening peak traffic levels in Tipperary Town.

- Of the 66% of staff (76no.) employed on daytime work hours post development of Dryer 2, over 50no. staff will be engaged in production related activity, mainly operating between the hours of 8.00am and 5.00pm. Management and administration staff mainly operate between the hours of 8.30am and 6.30pm. The varying starting and finishing times of employees and management working daytime hours mitigates impacts on morning and evening traffic levels in the town.

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(iv) Impacts of Increase in HGV Traffic

Traffic currently generated by the plant operation at Tipperary Co-Operative Creamery comprises deliveries by heavy goods vehicles of whole milk, butter milk and milk derivatives for processing at the plant, packaging and of fuel and other goods required for the operation and maintenance of the plant. Products manufactured at the plant including milk powders, concentrates, butter and cheese are also dispatched from the creamery site by heavy goods vehicles. There are also some HGV dispatches from the site related to disposal of sludge from the on-site wastewater treatment plant. Records of the numbers of HGV movements to and from the site during peak milk supply

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periods indicate movements of up to 89no. inward and 89no. outward per 24 hour day.

The impact on the existing road network in and around Tipperary Town of HGV traffic generated by operations at the Tipperary Co Operative Creamery site during peak milk supply periods is assessed as low impact taking the following into account

- HGV traffic to and from the site is distributed across 21hours with peak numbers of movements to and from the site in the relatively low range of 10no. to 17no. movements per hour occurring during early morning hours before 8.00am and through later morning and early afternoon hours after 9.00am and before 4.00pm each day. The peak HGV traffic to and from the site thus avoids normal morning and evening peak traffic in Tipperary Town, including school traffic, between 8am and 9am and between 4pm and 6pm.

- HGV traffic delivering milk to the creamery site is dispersed across the various national and regional routes which converge on Tipperary Town.

- Traffic count data for the N24 recorded immediately to the south of Tipperary Town indicates annual average daily traffic (AADT) levels for 2016 of 6329no. vehicles providing some evidence of the relatively low contribution to traffic levels in Tipperary Town by HGV traffic generated at the Tipperary Co Operative Creamery site.

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Table 5.7.3 provides a breakdown of the projected additional HGV traffic to and from the Tipperary Co-Operative Creamery site post development of the proposed Dryer 2 Facility. The increase in the number of HGV movements during peak milk supply periods is estimated at 20no. total inward movements to the site and a further 20no. movements outward from the site per 24hr day. The resultant increase in the number of movements to and from the site per hour however is only one or two movements in each direction, with most of these movements taking place outside of the normal morning and evening peak traffic times, including school traffic times, in Tipperary Town between 8am and 9am and between 4pm and 6pm. It is concluded therefore that the increase in the levels of HGV traffic post development of the Dryer 2 facility is at a very low level with negligible potential for impact on current traffic flows on the public road network.

(v) Impacts on existing Bridge Street/Abbey Street/Station Road Junction

As detailed above, the Bridge Street/Abbey Street/Station Road T- Junction is located to the north of the Tipperary Co Operative Creamery site entrance on Station Road and the current layout of this existing T- junction is such that the available turning radii between Abbey Street and Bridge Street/Station Road are somewhat constrained. In particular it was noted that the turning

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movement of HGV's turning left onto Abbey Street from Bridge Street can be restricted by vehicles queuing on the Abbey Street approach to the junction resulting in some potential for traffic disruption on Bridge Street. However, it was also noted that such movements are not associated with or relevant to HGV traffic travelling to or from the Tipperary Co Op site.

Based on the foregoing, current HGV traffic to and from the Tipperary Co-Op site does not have an impact of significance on the flow of traffic through the Bridge Street/ Abbey Street/ Station Road junction. Given that the projected increase in numbers of HGV vehicles entering and leaving the Tipperary Co Op site post development of the Dryer 2 facility generally comprises of 1no. or 2no. additional movements per hour in each direction and outside of certain peak hours as noted above, the impact of post development HGV traffic on this junction will be negligible.

It is noted that the current Tipperary Town and Environs Development Plan (2013-2019) identifies a proposed Radial Interconnector Route to the south of the town from the Limerick Road Roundabout to the Emly Road continuing on to the junction of Bridge Street. This route is indicated on Transportation Map 5 in page 25 of the Development Plan and the route passes through the southern part of the Tipperary Cooperative Creamery lands on the northern bank of the River Ara. Policy INF 5: Protection of Reservation Corridors states that *'It is the policy of the Council to ensure that the reservation corridor for the Proposed Radial Interconnector Route and the Northern Inner Relief Route remains free from development'*. The proposed development is located within the existing developed Tipperary Cooperative Creamery site on the southern side of the River Ara and will not impact on the reservation corridor identified in the Development Plan. The proposal to use the former hotel car-park for temporary site accommodation and materials storage during the construction of the works will not impact on the future use of this area for the radial interconnector route.

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It is considered that the eventual development of the above Radial Interconnector Route will provide an excellent opportunity to address any existing issues at the existing Abbey Street/Bridge Street/Station Road junction.

(vi) Impacts of Traffic Generated by Construction of the Development

Construction works in connection with the proposed Dryer 2 Facility shall generate additional traffic over a nominal anticipated construction period of 12 to 14months. Car and light commercial vehicle traffic shall be generated by construction workers travelling to and from work and by delivery of materials to site. Delivery of construction materials and disposal of waste materials shall also generate HGV traffic.

It is proposed that the site of the former Royal Hotel Building including associated former car park and yard areas, all located adjacent to the

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Tipperary Co- Operative Creamery site on the north side of the River Ara shall be used to accommodate construction related parking and temporary office facilities for the duration of the construction of the proposed development. Potential impact on town traffic is substantially mitigated based on the following:

The hotel site formerly accommodated a substantial car park facility with over 50 car spaces available. It is estimated that an additional 15no. car spaces could be provided on the site to facilitate construction parking.

Construction work will commence by 8.00am on working days minimising any impact on normal morning traffic levels in the town.

With regard to impacts on late afternoon/evening traffic of construction traffic leaving the site, traffic leaving the site will have to queue within the site before entering any traffic streams thus limiting impacts to within the site where there is considerable queueing length.

With regard to HGV traffic, the numbers of deliveries by HGV vehicles per day would in general be very low and of insignificant impact. It is also proposed that most HGV would as far as reasonably practicable be scheduled to avoid peak traffic flows in the town.

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4.7.1.2 Residual Impacts of Dryer 2 Development on Traffic

The development of the new Dryer 2 Facility on the Tipperary Co-Operative Creamery site will result in an increase in peak production capacity from c.1.62 million litres per day to c.1.97 million litres of milk per day. The increase in production will generate additional HGV traffic involved in the delivery of milk and various supplies to the site and in the dispatch of product and waste materials from the site. The projected increase in numbers of HGV vehicles entering and leaving the Tipperary Co Op site post development of the Dryer 2 Facility will comprise of up to 2no. additional movements per hour in each direction and outside of certain peak hours resulting in negligible impact on the existing public road network.

An increase in staffing levels comprising 8no. additional personnel is proposed post development of the Dryer 2 Facility with 5no. of the additional personnel assigned to daytime working hours and 1no. additional staff assigned to each of 3no. 8hour shifts over a 24hour day. The maximum no. of additional staff personnel on site at same time will be thus be 6no. comprising 5no. daytime staff and 1no. of the shiftwork staff. There is sufficient spare parking capacity on site to cater for the additional staff numbers. Given that the projected increase in staffing numbers is relatively minor in comparison to the current overall staffing level of 107no personnel at the site, the impact of any additional vehicle traffic generated will be minimal.

Impacts of traffic generated by the construction of the development will be mitigated by use of the adjacent vacant former hotel site which contains considerable parking accommodation as formerly developed and utilised by the hotel operation. The relatively early morning commencement of normal workday operations by

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construction contractors will mitigate any potential impacts of construction related traffic accessing the site on current traffic levels.

5.7.3 Waste

5.7.3.1 Existing Environment

The predominant waste produced at Tipperary Cooperative Creamery comprises de-watered sludge from the waste water treatment plant process. Following de-watering the sludge is transferred by centrifuge from the de-watering building to a covered articulated trailer. Once filled (c. one trailer per week) the trailer is collected by a licensed Contractor and transported to a composting facility or for spreading on land for agriculture, depending on the time of year, all in accordance with the facilities EPA Licence.

Waste packaging, predominantly cardboard, is compacted and collected by licensed hauliers for delivery to licensed recovery facilities. Non-hazardous wastes, not suitable for recovery, are collected by licensed hauliers for disposal at licensed waste facilities. Any hazardous waste generated at the site, is segregated, labelled and dispatched with the appropriate documentation for transport to authorised waste management facilities. All of the wastes generated at Tipperary Cooperative Creamery are consistent with the activities undertaken at the facility and no waste is recovered or disposed of onsite.

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5.7.3.2 Impact of Dryer 2 Development on Waste

The partial demolition and reconstruction of the existing building will generate waste including surplus spoil, demolition waste, packaging and surplus construction materials.

There will be no additional solid waste generated by the completed facility.

There will be a minor increase in the volume of waste sludge generated at the Wastewater treatment plant.

5.7.3.3 Mitigation

Arrangements for the sorting, collection and recycling/disposal of all demolition and construction waste generated during the construction phase of the Dryer 2 development will be detailed in the Construction & Environmental Management Plan prepared for the project. All demolition and construction waste will be sorted on site by the Contractor prior to collection and recycling/disposal off site by a licensed waste contractor.

The additional waste sludge will be handled and removed from site by the current licensed contractor.

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5.8 CULTURAL HERITAGE

5.8.1 Introduction

Dairy processing has taken place at the Tipperary Cooperative Creamery site on Station Road since the early 1900's and there are extensive buildings, structures and plant which have been developed on the site since that time. These include the original creamery building, which is a protected structure, and is located a short distance behind the existing 1970s reception building at the entrance to the site. This building will be unaffected by the construction of the Dryer 2 Facility towards the rear of the site, but given its presence on the site, and that a number of existing structures will need to be demolished to facilitate the proposed development, John Cronin Associates, a multi-disciplinary consultancy with expertise in the areas of conservation, archaeology and planning were engaged by MRG Consulting Engineers to prepare an assessment of the impact of the proposed development on historically and architecturally significant buildings within the site. The scope of their assessment comprised:

- an examination of the geographic and historic context of the site
- a description and appraisal of the existing building structures
- an assessment of the impacts of the proposed development on the significant items of cultural heritage associated with the site
- conclusions and recommendations for how best to mitigate any impacts

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A complete copy of their Cultural Heritage Assessment Report is included as Attachment L to this Planning Stage Engineering and Environmental Report.

5.8.2 Existing Environment

The historic and legal context of the subject site, as gathered by John Cronin Associates during desk-based assessment, is detailed in Section 2 of the attached Cultural Heritage Assessment Report. Principal data sources consulted included:

- Tipperary Town and Environs Development Plan 2013-2019 to determine the protected status of the site;
- The National Inventory of Architectural Heritage (NIAH) to provide information on the architectural heritage resource;
- The digitised catalogue of the National Library of Ireland;

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- Ordnance Survey of Ireland's online map-viewer to chart the early twentieth-century layout and appearance of the site;

- The Sites and Monuments Record (SMR) and the Record of Monuments and Places (RMP)for County Tipperary for the assessment of the known archaeological resource;

- The Database of Irish Excavation Reports (www.excavations.ie).

- The 2008 Tipperary Co-Op centenary publication *Celebrating a Century of Successful Co-operation,* as well as William Jenkins' book *Tipp Co-op, Origin and Development* as documentary sources for the historic background of the creamery site.

There are no recorded archaeological sites located within the subject site; furthermore, the development site is situated outside the zone of archaeological potential outlined for Tipperary Town. The nearest archaeological monument is the site of the Augustinian Friary situated to the east of the subject site. The brown-field developed nature of the proposed development site shows there is little potential for the survival of unrecorded archaeological features and artefacts. The northern part of the site lies in close proximity to the River Ara and geotechnical trial-holing in the area has shown the terrain here to be 'made ground'. It is likely that previous ground works on site would have impacted on any potential sub-surface archaeological features and artefacts.

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Whilst the wider urban landscape context reveals a long history of settlement activity in the area, the development site lies outside the historic town core and beyond the projected line of the medieval town defences. Although Thomas states that there may have been 'suburbs' in this area (Thomas 1992,194) it is likely that the developments of the last century would have directly impacted on this potential archaeological resource.

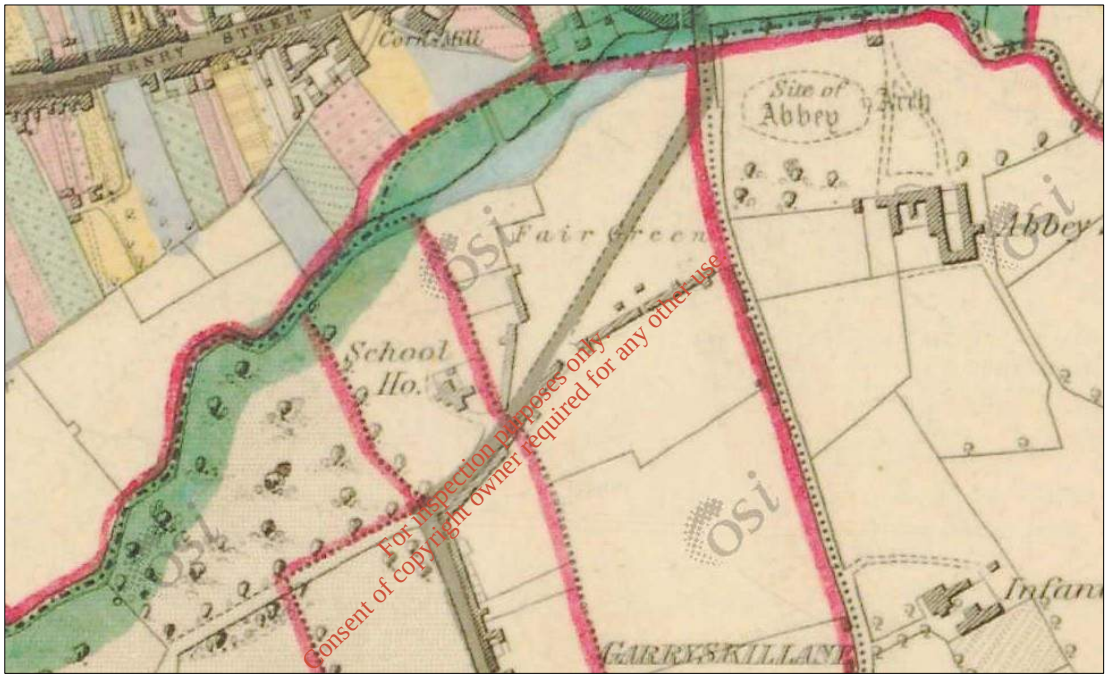
The Report establishes the historic origins and development of the Tipperary Cooperative Creamery site on the basis of an examination of cartographic sources and the two publications relating to the Co-Op identified above. The cartographic sources examined included the 1st edition of the 6-inch OS maps (surveyed and published in the 1830s-40s) and the 25-inch OS maps (surveyed and published 1887-1913). There were no unrecorded structures of archaeological or architectural significance noted on the footprint of the proposed development during the inspection of these sources.

The 1st edition Ordnance Survey map surveyed in 1840 illustrates part of the Tipperary Co-op site as a 'Fair Green' (Fig. 4.8.1). This was an area of commonage where weekly cattle markets were held up to and throughout the 19th century. A pathway is indicated leading from Bridge Lane and crossing the fair green from north-east to south-west. A school house is located in the middle portion of the site with rows of vernacular cottages adjacent to the pathway. The south-western portion of

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the site is shown to be part of the Scalaheen estate and planted with trees. The site of the Augustinian Abbey (RMP: TS067-004001) is illustrated immediately east of the Co-op site and the Abbey school (RMP: TS067-004005), which was originally founded in 1680 lies to the south of same. The Ara River delineates the site boundary to the north with the south side of the site giving way to enclosed farmland and the grounds of Scalaheen house.

By the time of the 2nd edition OS survey of 1904 (Fig. 4.8.2), the Waterford-Limerick Junction railway line has been constructed which, together with the Railway station, now defines the southern boundary of the subject site. The Fair Green is now confined to the southern portion of the site and the 'Consensed Milk Factory' occupies the northern part of the site.



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Fig. 5.8.1: Extract from 1st Edition OS Map (published 1843) centred on subject site

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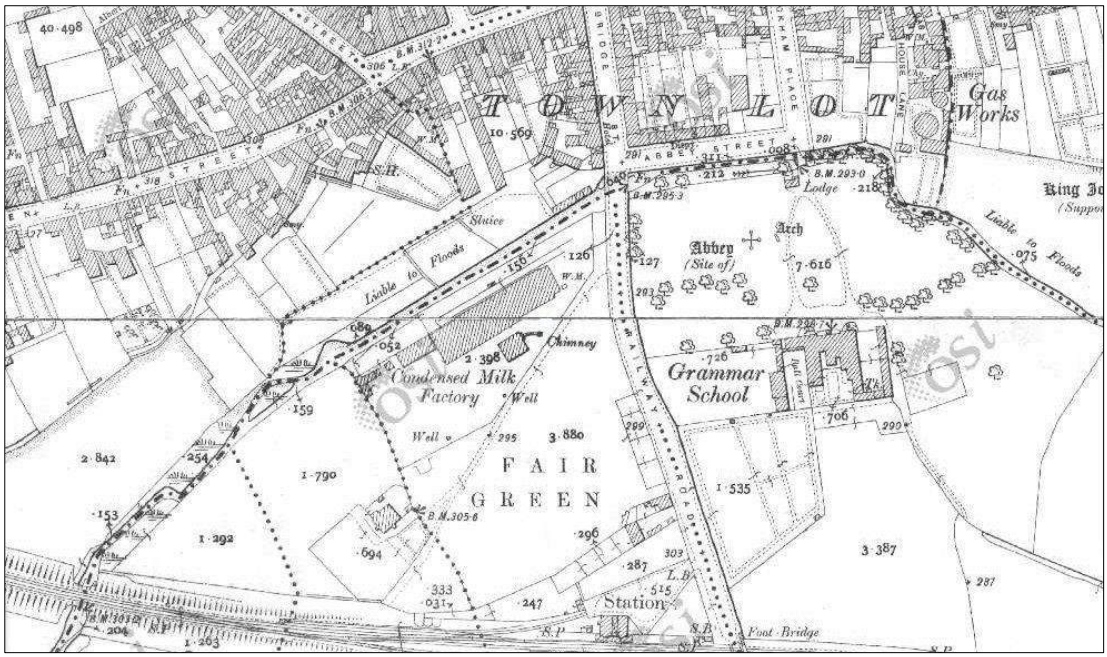


Fig. 5.8.2: Extract from 2nd Edition OS Map (surveyed 1904; published 1906

The original creamery building, shown on the above 2nd Edition OS Map, and which is included on the Tipperary Town Record of Protected Structures (RPS ref. 100) was first constructed by the Condensed Milk Company, chaired by Sir Thomas Cleeve, in 1898.

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"The Condensed Milk Company, the largest proprietary dairy company in Ireland built the present factory building on the site and it commenced operation in 1898. At the time, it was a considerable structure being 300' long, 60' in width and 44' high with the building and plant it held costing £30,000."

(text adapted from Tipperary Co-operative Creamery Ltd., 2008)

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Fig. 5.8.3: Original Condensed Milk Factory (photograph taken c.1900)

The original front section of the creamery building behind the present reception structure was described as part of its listing on the Record of Protected Structures (RPS ref. 100) within the *2013-2019 Tipperary Town and Environs Development Plan*:

> *Barn-style twelve-bay double-height creamery building built c. 1900 with single-storey entrance block having seven-bay front elevation and single-bay sides, having gable-fronted porch. Lower square-plan one-bay addition to south elevation.*

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Under the Local Government (Planning and Development) Act, 2000, all Planning Authorities are obliged to keep a 'Record of Protected Structures' of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest. As of the 1st January 2000, all structures listed for protection in current Development Plans, have become 'protected structures'.

The original creamery building has also been surveyed as part of the National Inventory of Architectural Heritage (NIAH reg. **22108100**). The NIAH is a survey of sites of architectural significance which was devised to assist in evaluating structures to be included in the record of protected structures. Listing on the NIAH does not necessarily carry any statutory responsibilities to the owner to protect the site but it does highlight the culturally significant aspects of the structure which ought to be conserved.

The original creamery building (former Condensed Milk Factory) has been described by the NIAH in 2005 as follows:

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Twelve-bay double-height creamery building, built c.1900 [1898], with single-storey entrance block having seven-bay front elevation and single-bay sides, having gable-fronted porch [extended after mid twentieth-century). Lower square-plan single-bay [truck-loading bay] addition [c.2000] to south elevation. Pitched [fibre-cement]… sheeting to roof of main block, with raised vent along apex, …. Fibre-cement tiled pitched and hipped roofs elsewhere, having cresting to porch roof. Pierced scalloped bargeboards to east gable of main block and to gables and eaves of entrance block. Painted corrugated-iron cladding to east gable of main block and to entrance block except for porch. Rendered walls elsewhere. Diocletian window to east gable of main block, with painted metal surround and glazing bars giving arcaded appearance to whole. Square-headed openings elsewhere, with timber casement windows and uPVC to ground floor level, some having painted timber sills, and having timber-framed windows to entrance block with pivoting panes. Painted sheeted felt to canopy of entrance porch, with timber brackets and having dentils to cornice. Timber panelled double-leaf entrance door with over-light. Timber battened door to south elevation with nine-pane over-light. West gable of main block abutted by later twentieth-century block [c.1935].

(DoAH&G, 2005)

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Sometime after the Ordnance Survey 1:2500 map survey of 1904 (Fig. 4.9.2), a detached two storey ten-bay, limestone industrial building was built to the south of the Condensed Milk Factory. (Fig. 5.8.4). The building has a hipped slate roof with clay ridge tiles, one brick chimney with oversailing courses to the southern end and one conical galvanised ventilation chimney to the centre of the ridge. The walls of the building consist of coursed, roughly squared limestone with punch-finished quoin stones and brick dressings to openings. Concrete sills throughout with most original upper-floor windows and ground floor window and door openings blocked up. Smooth cement-based render to rear (west) elevation. Two segmental arch-headed vehicular openings to ground floor, presently blocked up with concrete blocks and no longer accessible from an altered ground level around the building. Steel stairs lead to the upper-level doorway into first-floor offices at the southern end of the building. Concrete window sills appear original and based on architectural style and general creamery history, this building probably dates to the mid-1920s to mid-1930s. The architectural style is reminiscent of railway structures of the early twentieth-century. Some minor elements remain of original historic interior including a simple door and small internal timber staircase but the bulk of the building has been completely lined as an open plan refrigerated store.

Around the early 1930s, a gabled, three-storey building was added to the rear (south-west) half of the original condensed milk factory building, which was also altered having additional upper-level windows inserted, the roof-cladding and rainwater goods replaced. This additional building shared the original footprint of the Condensed Milk Company structure but raised its pitched roof a full storey above that of the double-height creamery building.

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Other more modern buildings and structures have been developed on the site since the facility was acquired by Tipperary Cooperative Creamery Ltd in 1971, and include additional production, warehousing and boilerhouse accommodation (1973), wastewater treatment plant (1974), administration building (1978), cheese factory (1980) and various smaller extensions, tanks, silos and plant.



Fig. 5.8.4: Former Butter Store which will be demolished to facilitate Dryer 2 development

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5.8.3 Impact of Proposed Development

The Dryer 2 development relates to a discrete area of the overall Tipperary Cooperative Creamery site at the north western side of the developed site and remote from the original protected creamery building.

A number of buildings/structures will be demolished to facilitate the development.

These comprise:

- Former Butter Store (Fig. 5.8.4 above)
- Sothern half of existing single storey warehouse building (Fig. 5.8.5)
- Existing fuel storage tanks and associated bund and canopy roof structure over same.

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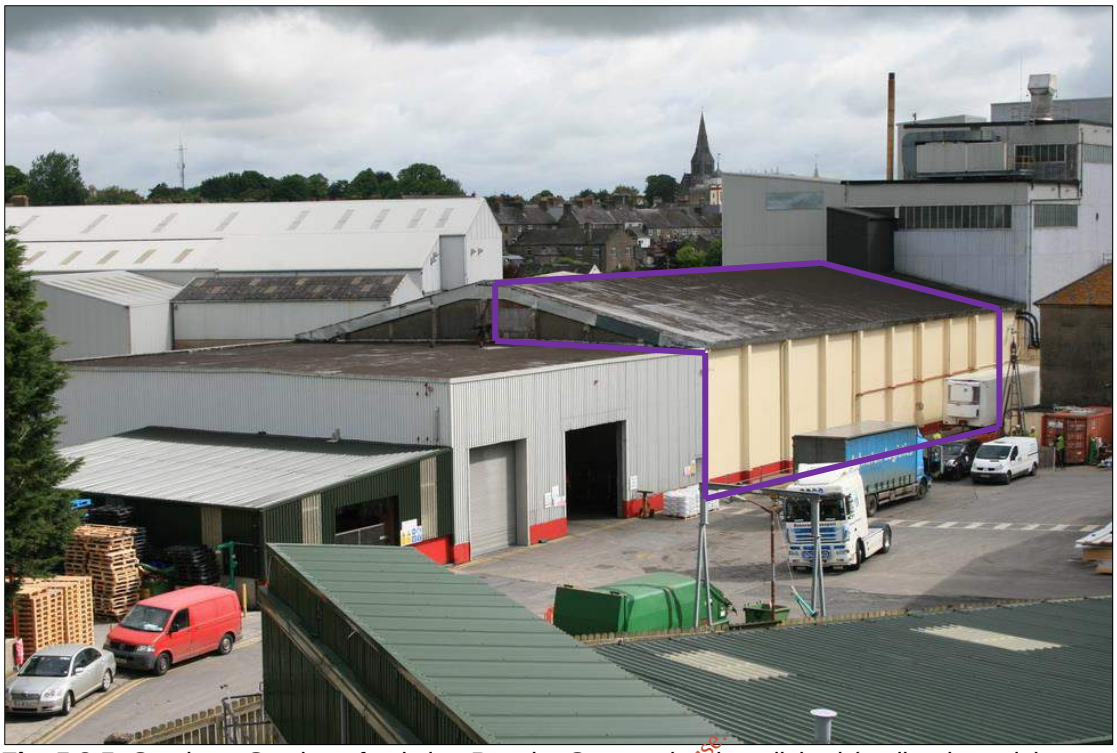


Fig. 5.8.5: Southern Section of existing Powder Store to be demolished (outlined purple).

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The Assessment identifies the following impacts of the Dryer 2 development:

(i) Archaeological Character Impact

The brown-field developed nature of the proposed development site shows there is little potential for the survival of unrecorded archaeological features and artefacts. The northern part of the site lies in close proximity to the River Arra and geo-technical trial-holing in the area has shown the terrain here to be 'made ground'. It is likely that previous intensive ground works for the construction of the buildings proposed for demolition would have impacted on any potential sub-surface archaeological features and artefacts. The proposed development by Tipperary Co-operative Creamery Ltd. will have no material or visual impacts on the archaeological significance or historic character of any recorded monument in the wider area.

(ii) Architectural and Historic Character Impact

The main impact of the proposed construction of Dryer 2 will be demolition of the existing stone-built butter store building, an early twentieth-century structure of some architectural and industrial heritage interest but with extensive alteration to the interior and no protected status. A comprehensive measured survey and photographic survey of this building before its demolition should be undertaken to preserve it by record.

There will be no built heritage impact caused by demolishing the existing open-span concrete-walled powder storage structure on the proposed

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footprint of Dryer 2 and the height and massing of the new building will not radically alter the scale of the site overall visually - it will be far enough away from the protected front building to mean that this original creamery structure will continue to be the visual focus of the campus from the public road.

(iii) Visual Impact

The visual impact of the proposed development will mainly result from changing the massing of buildings within the site. Given the significant number of other existing tall buildings, tanks and other infrastructure within the development site, the introduction of a new large-scale element here will have **no significant impact** on the visual amenity of the protected structure situated towards the eastern frontage of the site (towards Station Road). The proposed Dryer 2 even at its considerable height and massing will not significantly impact further on the visual amenity of the protected original creamery structure as it is far enough away and behind an intensively industrial site.

5.8.4 Mitigation Measures

The Assessment concludes that, given the developed nature of the site, archaeological mitigation measures are not deemed necessary or applicable in this instance.

It recommends that a comprehensive measured survey and photographic survey of the current butter store, before its demolition, should be undertaken to preserve it by record by a suitably qualified person.

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5.8.5 Residual Impacts

(i) Archaeology

With respect to potential residual impacts on archaeology, the Cultural Heritage Assessment concludes that the brown-field developed nature of the proposed development site shows there is little potential for the survival of unrecorded archaeological features and artefacts. The northern part of the site lies in close proximity to the River Ara and geotechnical trial-holing in the area has shown the terrain here to be 'made ground'. It is likely that previous intensive ground works for the construction of the buildings proposed for demolition would have impacted on any potential sub-surface archaeological features and artefacts. The proposed development by Tipperary Co-operative Creamery Ltd. will have no material or visual impacts on the archaeological significance or historic character of any recorded monument in the wider area.

(ii) Architectural Heritage

The proposed development involves demolition of three structures within the rear (west) portion of the existing Co-op site. The Cultural Heritage

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Assessment concludes that only one of these structures has any architectural quality: the butter store, an early twentieth-century structure of some architectural and industrial heritage interest but with extensive alteration to the interior and no protected status. A comprehensive measured survey and photographic survey of this building before its demolition should be undertaken to preserve it by record.

It further concludes that the height and massing of the new building will not radically alter the scale of the site overall visually - it will be far enough away from the protected front building to mean that this original creamery structure will continue to be the visual focus of the campus from the public road.

There will be a minor visual alteration to views of the historic buildings on the site from the public realm but this is not considered negative. The proposed development may in fact improve the visual amenity of the site by obscuring cluttered infrastructure in the backdrop to the protected creamery building.

No material or visual impacts to any protected structures and places of cultural heritage significance in the immediate vicinity of the creamery site is foreseen as a result of the proposed development.

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5.9 INTERACTIONS

5.9.1 Introduction

This section of the Environmental Impact Assessment Report (EIAR) examines potential interactions between the potential impacts of the proposed development on the environment and examines any potential cumulative impact associated with such interactions.

There is a significant inter-relationship between Biodiversity and Water with any significant impact on water quality likely to lead to a corresponding impact on aquatic ecology. These potential interactions and associated mitigation measures are addressed in detail, as appropriate, in the relevant sections of this EIAR.

There is also an inter-relationship between Landscape & Visual Impact and Cultural Heritage given any potential visual impact of the subject development on the cultural heritage of the site. These potential interactions are addressed in detail, as appropriate, in the relevant sections of this EIAR.

Any significant negative impacts on any aspect of the environment is likely to have an inter-relationship with Population and Human Health. Since no significant negative impacts of the project have been identified for any aspect of the environment there should be no significant negative interactions with Population and Human Health.

No significant cumulative impacts associated with the above interactions have been identified.

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ATTACHMENT A

ECOLOGICAL ASSESSMENT

TERRESTRIAL ECOLOGY

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TIPPERARY CO-OPERATIVE MILK DRYING FACILITY AND WASTE WATER TREATMENT UPGRADES

Ecological Assessment - Terrestrial Ecology

May 2017

Prepared for:

Tipperary Co-Operative Creamery Ltd.

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Document Control Sheet

Client	Tipperary Co-Operative Creamery Ltd.
Project Title	Tipperary Co-Operative Milk Drying Facility and Waste Water Treatment Upgrades
Document Title	Ecological Impact Statement
Project Number	WS0526
Document No.	Revised Ecological Assessment May 2017

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Revision	Status	Author	Review	Approved	Date
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002	Rev 001		MCG		26/05/2017
003	Final	BK			29/05/2017
Wetland Surveys Ireland					

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Appendix I: Methods Used in Evaluation of Biodiversity Value and Assessment of Impacts.

Appendix II: Plant species list.

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1 INTRODUCTION

Wetland Surveys Ireland Ltd. were commissioned by Tipperary Co-Operative Creamery Ltd. to determine the potential impacts, of developing a new milk drying facility and waste water treatment (WWTP) upgrades at their creamery site in Tipperary, on terrestrial flora and fauna.

This report presents the factual terrestrial ecology information gathered during the desk study and field study as a description of the existing environment. The potential impacts (direct, indirect and cumulative) of the proposed development on terrestrial ecology present within the site and surroundings are qualitatively assessed in this section. Mitigation measures to be implemented in the construction and operational phases are proposed to minimise identified impacts on terrestrial ecology. Figures referred to in the text are embedded within the report while Appendices that are referred to are presented at the rear of the document.

The potential impacts of the proposed development on the Natura 2000 network of sites (European sites known as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) are assessed in a standalone Appropriate Assessment Screening Report which accompanies the application.

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This section of the EIS was prepared by Dr Patrick Crushell and Mr. Brendan Kirwan, Ecologists with Wetland Surveys Ireland Ltd. Dr. Crushell (BSc Applied Ecology; MSc Environmental Resource Management, PhD Environmental Sciences, MCIEEM) received an honors degree in Applied Ecology from UCC, a Masters degree in Environmental Resource Management from UCD and defended his PhD at Wageningen University, the Netherlands. He is a Full Member of the Chartered Institute of Ecology and Environmental Management (MCIEEM). Dr Crushell has been working in the area of nature conservation and ecological impact assessment for the past fifteen years. Projects that he has been involved in include wetland inventory surveys; evaluation of proposed designated sites; restoration and management of peatland habitats; baseline ecological surveys and impact assessments of various development proposals including road, quarries, wind-farms, waste facilities, arterial drainage schemes, and residential developments; during and post-construction ecological monitoring.

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1.1 OBJECTIVES OF THE TERRESTRIAL ECOLOGY ASSESSMENT

The objectives of the assessment were:

- To carry out a desktop study in order to determine the previously recorded terrestrial biodiversity of the area;
- To carry out a baseline terrestrial flora and fauna survey of the development site and surroundings;
- Evaluate the biodiversity value of the development site and surroundings;
- To predict and assess the potential direct, indirect, and cumulative impacts of the proposed development on terrestrial flora and fauna;
- To propose mitigation measures in the construction and operation phase of the development so as to minimise potential impacts on terrestrial flora and fauna.

1.2 PROJECT DESCRITPION

Tipperary Co-Operative Creamery Ltd. propose the development of a new milk drying facility at the site of their existing milk processing plant and upgrade works to the sites waste water treatment plant; the construction of a new clarifier tank and balance tank to the sites waste water treatment plant, and the decommissioning of the two 'Rogers' dryers at Station Road, Tipperary Town. The development works shall include the following elements:

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1. Demolition works to facilitate construction of a new dryer tower including the demolition of an old butter store building, an existing store building, and the removal of existing fuel storage tanks. The partial demolition of the southern half of the existing powder store (which falls within the footprint of the new dryer tower building) will also be required;
2. Construction of a dryer tower building with a height of 32 metres and a footprint area of ca 1,200m² incorporating an evaporator plant, dryer plant, air heater and heat recovery systems with floors and access platforms provided at various levels within the building to support and facilitate access to the new plant systems;
3. Decommissioning of two existing 'Rodgers' dryers located within the building to the rear of the protected structure;
4. Site works associated with the above development works including drainage works and pavement works. Demolition works will be carried out to facilitate construction of the new dryer tower and loading bay building, including demolition of an existing warehouse building and store buildings, demolition of an old butter store building and removal of existing fuel storage tanks together with bund structure and canopy roof structure over; and
5. An additional secondary settlement tank at the WWTP (final clarifier).

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The new dryer tower and adjoining loading bay building shall be constructed within the footprint of the demolished warehouse and adjoining loading bay and store buildings, the new tower will be constructed further south of the existing buildings so as to minimise impacts on the River Ara. The development works relate to an activity for which a revised Integrated Pollution Prevention and Control License is required.

It is also proposed to use a disused hotel site immediately north of the Tipperary Co-op site as a temporary construction compound.

1.3 STUDY AREA

The proposed demolition / decommissioning and construction works will take place within the existing Tipperary Co-op facility and a disused hotel site to the north-east of the Co-op site. The proposed development site adjoins residential, commercial, and agricultural lands. The proposed development is located outside of and removed from any site designated for nature conservation. The proposed temporary construction compound occurs within a disused hotel site immediately north of the Tipperary Co-op Creamery site.

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2 METHODOLOGY

Data required to carry out the assessment was collected through a combination of a desktop review and field surveys as described further below.

2.1 STATUTORY CONTEXT

This appraisal has consideration to the following legislation:

- Consolidated EIA Directive 2011/92/EU;
- Wildlife Acts 1976-2012;
- The Habitats Directive 92/43/EEC;
- The Birds Directive 2009/147/EC;
- The European Communities (Birds and Natural Habitats) Regulations 2011 [S.I. No. 411 of 2011];
- European Communities (Environmental Impact Assessment) (Agriculture) Regulations 2011 [S.I. No. 456 of 2011];
- European Union (Environmental Impact Assessment and Habitats) Regulations 2011 [S.I. No. 473 of 2011];
- European Union (Environmental Impact Assessment and Habitats) Regulations 2012 [S.I. No. 246 of 2012]; and
- Flora (Protection) Order, 2015.

In addition, in considering the ecological impacts of the proposed development regard was made to the following guidance and information documents:

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- 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)
- DAHG (2011). *Irelands National Biodiversity Plan: Actions for Biodiversity 2011 – 2016*;
- EPA (2002). *Guidelines on the information to be contained in Environmental Impact Statements*;
- EPA (2003). *Advice notes on current practice (in the preparation of Environmental Impact Statements)*;
- Fossitt (2000). *A Guide to Habitats in Ireland*;
- Smith *et al.* (2011). *Best Practice Guidance for Habitat Survey and Mapping in Ireland*.
- NRA (2009). Guidelines for Assessment of Ecological Impacts of National Road Schemes (Revision 2).

2.2 DESKTOP REVIEW

A desktop review was carried out to identify features of ecological importance within the development site and surrounding region. Literature sources consulted are included in the text and listed in the references section of the report. A review of designated sites was carried out as part of the desktop study using data available from the National Parks and Wildlife Service (NPWS).

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2.3 FIELD SURVEY

A multidisciplinary walkover survey of the site was undertaken on the 17th June 2016 to assess the habitats, vegetation, birds, and mammals within the site as described in the following paragraphs. The hotel site to the north-east of the proposed development has been subject to a desktop assessment only.

Target notes were taken relating to habitats, species, and land use encountered during the survey including notes on dominant vegetation, qualitative assessment of plant species diversity, vegetation structure, topography, drainage, disturbance, and management. The habitats encountered on site were classified in accordance with Fossitt (2000). Methods that were followed during the habitat survey and subsequent mapping followed best practice guidance as outlined by Smith *et al*. (2011).

Bird species encountered (seen and heard) during the survey were recorded in a field note book. The abundance of each species and behaviour was also noted. An assessment was made of the sites potential to support bird species of conservation importance that may not have been recorded due to seasonal constraints.

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All mammals recorded during the site visit were noted. The site was also assessed for any evidence of mammal activity. Signs and tracks of mammals are the best way of assessing a site without conducting night surveys. All signs and tracks (Bang and Dahlstrom 2004) were assessed as they were encountered in the field. Suitable mammal habitat within and surrounding the site was also noted.

2.4 EVALUATION OF ECOLOGICAL SIGNIFICANCE

The impact significance is a combined function of the value of the affected feature (its ecological importance), the type of impact and the magnitude of the impact. It is necessary to identify the value of ecological features within the study area in order to evaluate the magnitude and significance of possible impacts.

The method of evaluating ecological significance used in this study is based on guidelines issued by IEEM (2016) and the NRA (2009). The results of the habitat and fauna surveys were evaluated to determine the significance of identified ecological features located in the study area on an importance scale ranging from international - national - county - local. The local scale is approximately equivalent to one 10km square but can be operationally defined to reflect the character of the area of interest. Because most sites will fall within the local importance scale, this is sub-divided into local importance (high value) and local importance (low value).

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The criteria presented in Appendix I have been used in assessing ecological value. In addition to these criteria, the evaluation also considers other factors such as potential ecological value, secondary supporting values where habitats may perform a secondary ecological function, and social values of an ecological feature such as educational, recreational, and economic value.

2.5 ASSESSMENT OF IMPACTS AND IMPACT SIGNIFICANCE

The assessment of impacts is based on guidance offered by the Chartered Institute of Environmental and Ecological Management (CIEEM 2016) with reference to national guidance in NRA (2009), the EPA (2002), and Gittings (1998). Impacts are discussed and assessed in relation to impact type (positive, neutral or negative), character and sensitivity of the affected feature, magnitude, duration, timing and frequency. Criteria for assessing impact type and magnitude are presented in Appendix I. In assessing the magnitude and significance of impacts it is important to consider the value of the affected feature.

2.6 APPROPRIATE ASSESSMENT (HABITATS DIRECTIVE ASSESSMENT)

An Appropriate Assessment Screening Report was also prepared for the project in order to determine the potential for effects on European sites, known as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs). The Appropriate Assessment Screening Report concluded that there is no potential for significant effects on such European sites in the surroundings.

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2.7 SURVEY CONSTRAINTS AND LIMITATIONS

The field survey was undertaken during good weather conditions and at a time when the majority of flowering plants are in flower. Considering the character of the receiving environment and the nature of the project it is felt that the survey is adequate to provide the necessary baseline information to present a comprehensive assessment of impacts on terrestrial ecology.

The site boundary has been subject to revision since the original proposed site layout; as a result of this the hotel site to the north-east of the Coop site has been subject to a desktop survey only. Clearance of land formerly comprising dry meadows and grassy verge vegetation to the north, and north-west of the existing WWTP has since taken place; this area now comprises an exposed hardcore gravel surface. The exposed hardcore area has been assessed through a review of photographs available for the site.

3 BASELINE DESCRIPTION OF EXISTING CONDITIONS

3.1 DESIGNATED SITES

The proposed development site does not lie within any sites designated or under consideration for designation for nature conservation. The nearest site designated for nature conservation is the Bansha Woods proposed Natural Heritage Areas (pNHAs) that occurs ca 3km south-east of the proposed development site at its nearest point (see Table 1). The Bansha Woods pNHA and the Greenane Marsh pNHA are the only designated sites within a 5km radius of the proposed development site. These sites are proposed (p)NHAs as they have not formally gone through the designation process.

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NHAs are sites of national importance due of the presence of species and habitats that are recognised as being important on a national level and are afforded protection under then Wildlife (amendment) Act 2000.

The nearest European site to the creamery facility is the Lower River Suir cSAC which occurs ca 5.5km south of the site at its nearest point. The River Ara forms the northern boundary of the Co-op site and eventually drains to the Aherlow River ca 16km downstream of the Co-op which forms part of the Lower River Suir cSAC.

The Lower River Suir is designated as a candidate Special Area of Conservation (cSAC). Candidate Special Areas of Conservation (cSACs) are sites of international importance due to the presence of listed habitats or species that are of European importance. The Lower River Suir contains excellent examples of a number of Annex I habitats, including the priority habitats alluvial forest and Yew woodland. The site also supports populations of several important animal species; some listed on Annex II of the Habitats Directive or listed in the Irish Red Data Book. The

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presence of two legally protected plants (Flora (Protection) Order 2015) and the ornithological importance of the cSAC add further to the ecological interest and importance of the site. The site is selected for a range of terrestrial and aquatic habitats and species.

The potential effects of the proposed development on aquatic features of the cSAC are addressed in the Aquatic Ecology report and in the accompanying Appropriate Assessment Screening Report.

As illustrated in Figure 1 there are no other designated sites within close proximity to the proposed development that could be potentially impacted.

Protection of candidate SACs in Ireland is required by the EU Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna (92/43/EEC; commonly known as the 'Habitats Directive') which has been transposed into Irish Law through the enacted European Communities (Birds and Natural Habitats) Regulations 2011 (SI 411/11). An Appropriate Assessment Screening Report was separately prepared in order to assess the potential for significant effects on European sites (cSACs and SPAs) in the surroundings.

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Table 1: Designated sites within 5km of the proposed development site.

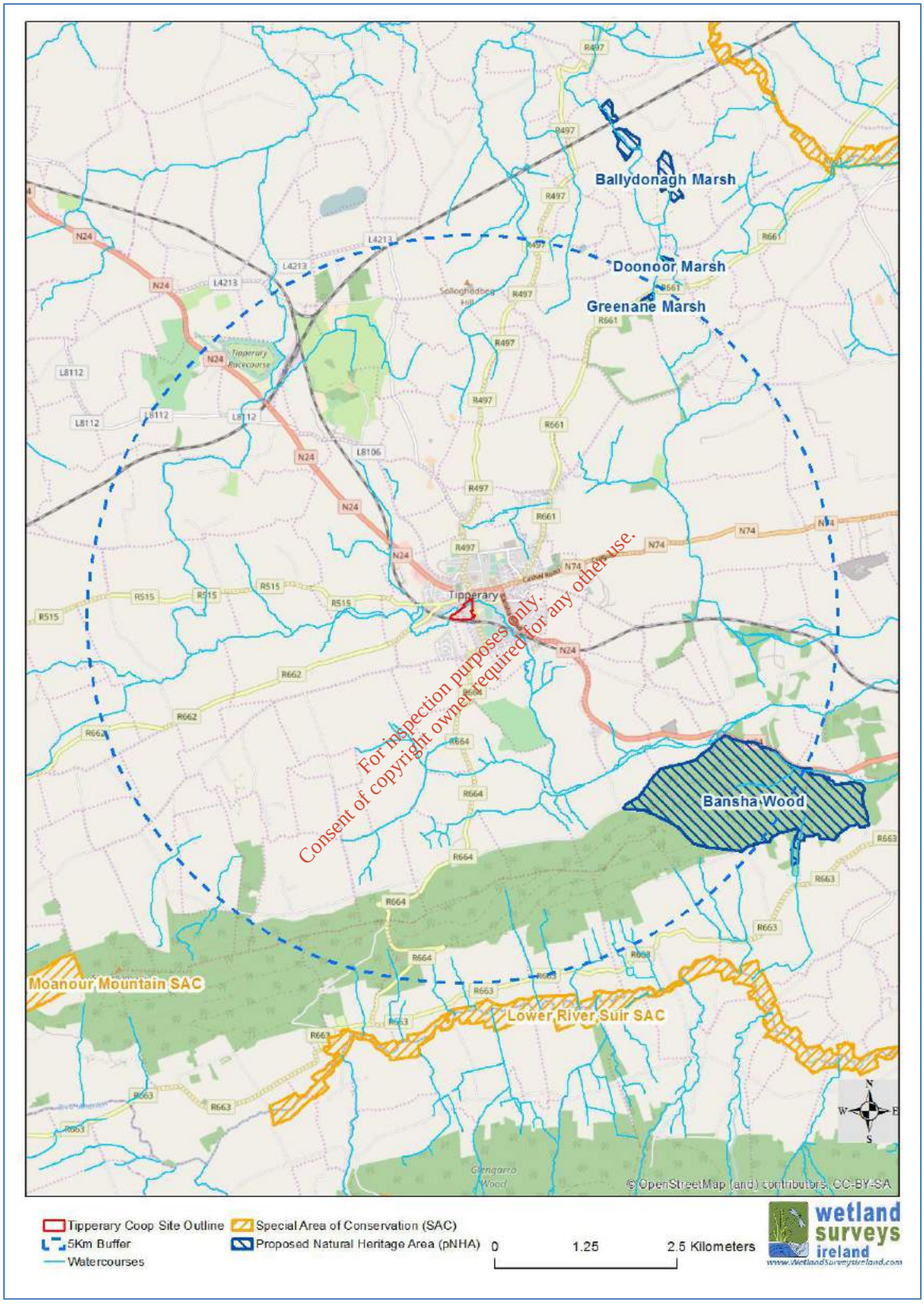
Site Name	Site Description	Distance and direction from site
Bansha Woods pNHA (NPWS Site Code: 2043)	Bansha Wood lies about 4km southeast of Tipperary. It is a block of a large forestry belt running along the northern side of the Glen of Aherlow from Slievenamuck to Bansha. There is a large area of remnant Oak (*Quercus* spp.) woodland which has been mainly cleared and replanted with conifers. Different compartments within the woodland have been planted and cropped at different times, and some have been allowed to regenerate a more natural cover, especially those to the outside.	The pNHA is located ca 3km to the south-east of the Tipperary Co-op site at its nearest point.
Greenane Marsh pNHA (NPWS Site Code: 1984)	Greenane Marsh is situated some 4km northeast of Tipperary in glacial drift over lower limestone. The vegetation has developed into a freshwater marsh with carr woodland that is continuing to develop. The decline of open water on site may in part be due to improved adjacent field drainage, but it is also a natural succession that has been allowed to occur, if somewhat accelerated. The ground is still very wet, Alder (*Alnus glutinosa*) is spreading from the margins into the site, under the tree cover Meadowsweet (*Filipendula*	Greenane Marsh pNHA occurs ca 4.5km north-east of the Tipperary Co-op site at its nearest point. There are no hydrological connections to the pNHA.

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Site Name	Site Description	Distance and direction from site
	ulmaria); Yellow iris (*Iris pseudacorus*) and common reed (*Phragmites australis*) are all very extensive.	
Lower River Suir cSAC (NPWS Site Code: 2137)	Lower River Suir SAC consists of the freshwater stretches of the River Suir immediately south of Thurles, the tidal stretches as far as the confluence with the Barrow/Nore immediately east of Cheekpoint in Co. Waterford, and many tributaries including the Clodiagh in Co. Waterford, the Lingaun, Anner, Nier, Tar, Aherlow, Multeen and Clodiagh in Co. Tipperary. The Suir and its tributaries flow through the counties of Tipperary, Kilkenny and Waterford. The site has been designated for six Annex I habitats and eight Annex II species.	The Lower River Suir cSAC occurs ca 5.5km south (ca 16km downstream) of the proposed development site at its nearest point.

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Figure 1: Designated sites in relation to the proposed development.

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3.2 HABITATS AND VEGETATION

Habitats that occur within and surrounding the existing Tipperary creamery facility are described in the following paragraphs. Habitats are classified according to Fossitt (2000).

A map showing the extent of different habitats in the vicinity of the existing Tipperary Co-op Creamery Plant is presented in Figure 2. The proposed development occurs within the site of the existing operating creamery facility and a disused hotel site immediately north-east of the site.

The creamery site comprises buildings and artificial surfaces (BL3), dry meadows and grassy verges (GS2), exposed sand, gravel or till (ED1), and amenity grassland (GA2). The creamery site is primarily comprised of buildings and artificial surfaces including cheese production plants, butter storage room, car parks, etc.


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Plate 1: Location of the proposed new milk drying facility

An area of dry meadows and grassy verges (GS2) occurs on the south-western part of the site to the east and north-east of the existing WWTP (see Figure 2). This area comprises a wide variety of grasses and broadleaves. The grassland is dominated by grasses Yorkshire Fog (*Holcus lanatus*), Creeping Bent (*Agrostis stolonifera*), sweet vernal grass (*Anthoxanthum odoratum*), and broadleaves red clover (*Trifolium pratense*), white clover (*Trifolium repens*), tormentil (*Potentilla erecta*), yarrow (*Achillea millefolium*), marsh thistle (*Cirsium palustre*), oxeye daisy (*Leucanthemum vulgare*), common knapweed (*Centaurea nigra*), and creeping buttercup (*Ranunculus repens*). Vegetation height within this habitat type ranges from ca 10cm to 40cm. A large area of grassland (dry meadows and grassy verges, GS2), has been recently cleared with a hardcore surface (Exposed sand, gravel or till, ED1) now covering the areas immediately west and north-west of the WWTP.

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Small areas of species poor amenity grassland occur locally throughout the site. These areas are typically dominated by perennial rye grass (*Lolium perenne*), daisy (*Bellis perennis*), plantain (*Plantago lanceolata*), cat's-ear (*Hypochaeris radicata*), and ragwort (*Senecio jacobaea*) (see Plate 2). Vegetation height within this habitat is typically low, ranging from 2cm to 10cm owing to the frequent mowing. Birches (*Betula* spp.) have been planted within some areas of amenity grassland within the site.



Plate 2: Amenity grassland (GA2) occurs in small pockets throughout the site.

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A lowland / depositing river (FW2), the River Ara, occurs along the north-western boundary of the Co-op site (see Plate 3 and Figure 2). The river ranges from 2 to 5m wide along this section. The southern parts of the river occur adjacent to dry meadows and grassy verges on the creamery side with improved pasture on the opposite river bank. This area of improved pasture is subject to flooding following periods of high rainfall. No woody vegetation occurs along either side of the river at the south-western parts of the Co-op site. Large amounts of coltsfoot (*Tussilago farfara*) occur along the river bank at the southern parts of the site.

The river flows to the north-east along the creamery site. Woody vegetation in the form of hedgerows and sparsely occurring trees occurs along the river bank at the northern parts of the site. Large pine trees, sycamore (*Acer pseudoplatanus*), and silver birch trees (*Betula pendula*) occur along the factory side of the river bank with a hedgerow occurring along a stone wall on the opposite side. The hedgerow comprises ash (*Fraxinus excelsior*), willow (*Salix cinerea*), spindle (*Euonymus europaeus*), and immature Leyland Cypress (*Cupressus x leylandii*). Canary reed grass (*Phalaris arundinacea*) occurs along the riverbanks at the northern part of the site.

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The River Ara occurs within the Suir river catchment. The River Ara drains to the Aherlow River ca 16km downstream of the Tipperary creamery site. The Aherlow River forms part of the Lower River Suir cSAC.

A review of photographs and aerial photography has been used to determine those habitats that occur within the hotel site at the north-eastern part of the site. This part of the site comprises buildings and artificial surfaces (BL3) with stone walls defining the site boundary. This area comprises a large car park, disused buildings and sheds. An area of dry meadows and grassy verges (GS2) occurs within the south-western parts of the hotel site with a similar species composition of the dry meadows habitat that occurs within the south-western part of the site. Scattered ash and conifers occur between along a stone wall that divides the River Ara from the hotel site.

A large quantity of Japanese Knotweed (*Fallopia japonica*) was recorded on the northern bank (opposite side to Creamery) of the river (see Figure 2 and Plate 4); the species was not recorded along the southern bank (Creamery side).

Habitats that occur in the site environs comprise buildings and artificial surfaces, amenity grassland, and improved agricultural grassland.

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Plate 3: River Ara forms the northern site boundary.

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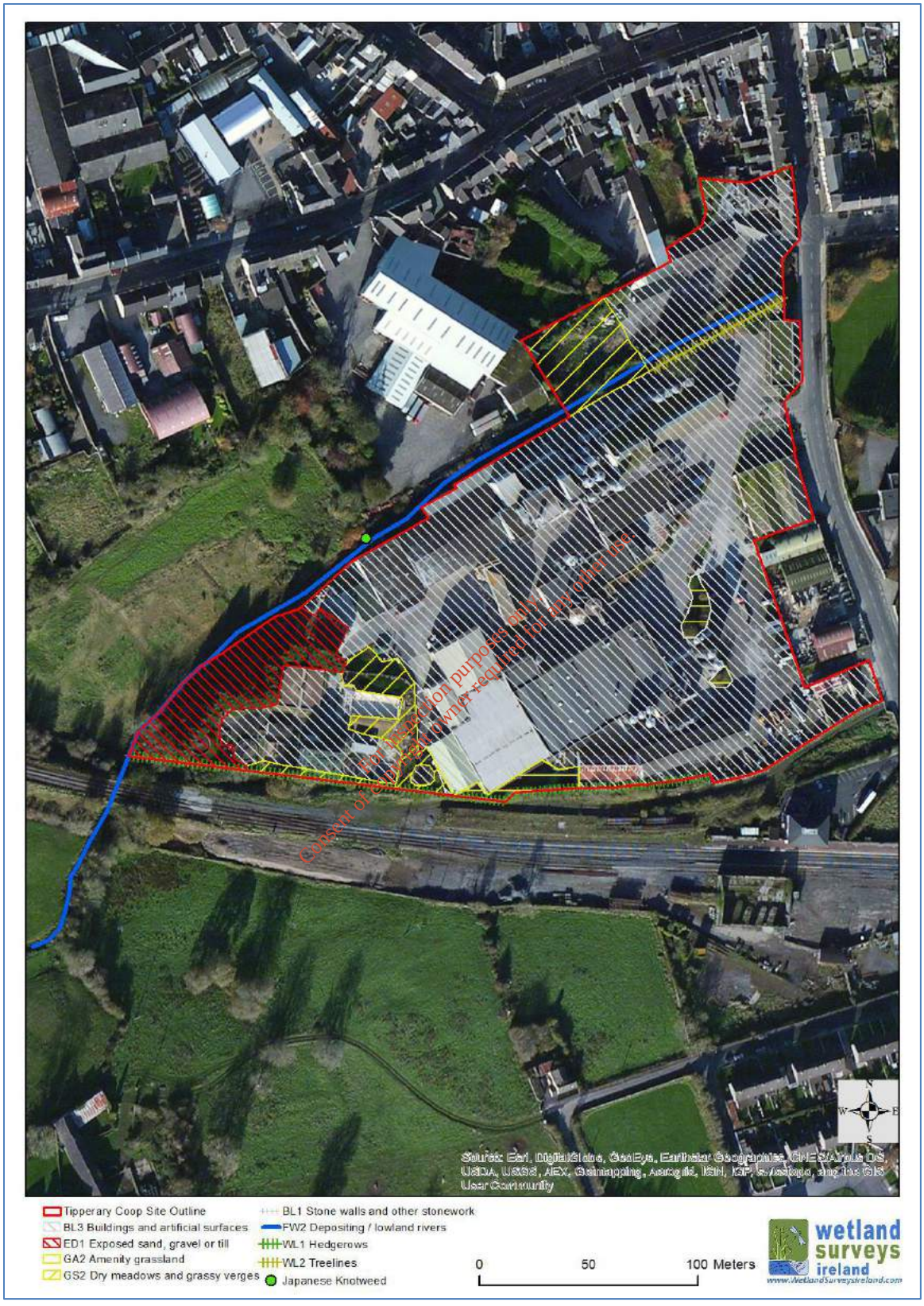


Figure 2: Habitats that occur within the proposed development site overlain on aerial photography.

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3.3 PLANT SPECIES

Common plant species recorded during the field survey are included in the habitat descriptions above and listed in Appendix II.

During the field survey, habitats were also assessed as to their potential suitability for rare or protected plant species with reference to; Preston *et al*. (2002), the Flora Protection Order 2015, Annex II of the EU Habitats Directive, NPWS rare plant database, and the Irish Red Data Book (Curtis and McGough 1988).

Searches of the NPWS Rare Plant Database, The New Atlas of the British & Irish Flora (Preston *et al*. 2002) and the National Biodiversity Data Centre Biodiversity Maps (NBDC 2017) were conducted for any previous records of rare and protected plant species within the 10km square (R83) of the study area. The results of this search are presented in Table 2.

One rare and / or protected plant species has been reported from the 10km square (R83) in which the proposed development site occurs. No rare or protected plant species were recorded during the field survey.

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Table 2: Rare and protected plant species within the 10km squares (R83) of the proposed development site (Source: NBDC 2017)

Common Name	Latin Name	Conservation Status	Likely to occur onsite
Green-winged Orchid	*Orchis morio*	V	Highly unlikely to occur on site due to the land use of the site and an absence of suitable habitat.

V* Vulnerable, Red Status (Curtis and McGough 1988)

3.4 INVASIVE ALIEN SPECIES

No invasive alien species were recorded within the planning boundary of the site. Japanese knotweed (*Fallopia japonica*) was recorded outside the site on the northern river bank. A large volume of knotweed was recorded at one location on the bank of the River Ara, directly opposite the Tipperary Co-op site (ca 4m north of the development site boundary, see Figure 2 and Plate 4).

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Plate 4: Japanese Knotweed immediately north of proposed development.

3.5 BIRDS

Bird species recorded during the site visit are presented in Table 3. All of these species are common and widespread in the area.

A review of species distribution based on winter and summer atlas records (Balmer *et al*. 2013) for the 10km squares (R83) that the proposed development site is situated within was undertaken to further inform the assessment. BirdWatch Ireland and the RSPB Northern Ireland have agreed a red list of priority Bird species of Conservation Concern in Ireland (BoCCI) (Colhoun & Cummins 2013). An assessment of whether species of conservation concern are likely to occur within or interact with the proposed development site was carried out taking into consideration the habitat preferences of individual species and those habitats present within and surrounding the proposed development.

The only part of the proposed development site that comprises habitats with potential to support species of high conservation concern are the riparian habitats along the north-western boundary of the site. Male and female Grey Wagtail (Red listed on BoCCI) were observed and heard calling along the stretches of the River Ara in close proximity to the proposed development site.

Other species of concern that are likely to occur at this location include Kingfisher (Annex I Birds Directive, Amber listed on BoCCI). Kingfisher are likely to use the river corridor for commuting and foraging though it is considered that no suitable Kingfisher nesting habitat occurs in proximity to the Co-op facility.

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Table 3: Conservation status and abundance of bird species recorded during field visit.

Common Name	Latin Name	BoCCI / Annex I	Number observed
Blackbird	*Turdus merula*	Green	3
Great Tit	*Parus major*	Green	1
Grey Wagtail	*Motacilla cinerea*	Red	2
Mistle Thrush	*Turdus viscivorus*	Amber	1
Pied Wagtail	*Motacilla alba yarrellii*	Green	2
Robin	*Erithacus rubecula*	Amber	3
Rook	*Corvus frugilegus*	Green	3
Starling	*Sturnus vulgaris*	Amber	5
Swallow	*Hirundo rustica*	Amber	5
Wood pigeon	*Columba palumbus*	Green	6

3.6 MAMMALS

This section reviews the value of the development site for terrestrial mammal species. No mammals were observed during the June 2016 field survey.

Mammal species that have been recorded from the 10km grid squares (R83) of the proposed development based on records held by the National Biodiversity Data Centre (NBDC 2017) and the National Parks and Wildlife Service (NPWS) are presented in Table 4 below. Some of these species are likely to be recorded from suitable habitat in the vicinity of the development site.

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No suitable badger habitat occurs within or in close proximity to the proposed development. Otter (listed on Annex II and IV of the EU Habitats Directive) are likely to occur along the River Ara. No evidence of otter activity was recorded during field survey though it is considered that the River Ara provides suitable habitat for otter. The banks of the river in proximity to the creamery facility are deemed to be of low potential to support otter breeding sites.

Suitable bat roost habitat occurs within the proposed development site and immediately adjacent to the site. Buildings and other structures within the site may potentially provide roosting opportunities for species such as Common Pipistrelle (*Pipistrellus pipistrellus*) and Soprano Pipistrelle (*Pipistrellus pygmaeus*). However, most of the buildings are in continuous use and provide limited potential as roost sites. Those buildings due for demolition in particular are deemed to be of low potential for bats due to high noise and disturbance levels from their continued use. Disused buildings within the hotel site in the northern parts of the site may potentially provide suitable bat roost potential.

Bat species are likely to occur amongst suitable habitat throughout the study area (hedgerows and watercourses). All bat species are given strict protection under the Wildlife (amendment) Acts (1976-2010) and are listed on Annex IV of the Habitats Directive. Daubenton's Bat (*Myotis daubentonii*) are likely to occur along the River Ara. This species is known to roost in bridges and may roost in proximity to the creamery facility (see Plate 5). Other species that may roost at

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bridges include Whiskered Bats (*Myotis mystacinus*) and Natterer's Bat (*Myotis nattereri*); however neither of these species have previously been reported from the study area (10km Grid Square R83).

Table 4: Mammals of conservation concern present in the 10km square (R83) of the proposed development site. (Source: National Biodiversity Data Centre 2017)

Species	Protected Status	Potential occurrence within proposed development
Otter	Annex II and Annex IV of the EU Habitats Directive Wildlife Act	Likely, otter may use the River Ara immediately adjacent to the creamery site for commuting and foraging.
Badger	Wildlife Act	No, absence of suitable habitat.
Red Squirrel	Wildlife Act	Unlikely, absence of suitable habitat.
Pygmy Shrew	Wildlife Act	Possible, pygmy shrews utilise a variety of habitat types.
Red Fox	Wildlife Act	Unlikely, the site is fenced off from the surrounding areas and foxes are unlikely to access those habitats on site.
Wood Mouse	Annex IV EU Habitats Directive Wildlife Act	Possible, a highly adaptive species that utilises a wide range of habitat types.
Irish Hare	Wildlife Act	No, absence of suitable habitat.
Daubenton's Bat	Annex IV EU Habitats Directive Wildlife Act	Likely, likely to use the River Ara for commuting and foraging. Hedgerow and trees along the river corridor may potentially provide suitable roosting opportunities, bridges immediately adjacent to the site also provide suitable roosting habitat.
Pipistrelle Bat	Annex IV EU Habitats Directive Wildlife Act	Likely, hedgerows immediately north of the proposed development site, treelines and buildings within the creamery site may provide suitable roost sites.
Soprano Pipistrelle Bat	Annex IV EU Habitats Directive Wildlife Act	Likely, hedgerows immediately north of the proposed development site, treelines and buildings within the creamery site may provide suitable roost sites.
Brown Long-eared Bat	Annex IV EU Habitats Directive Wildlife Act	Unlikely, this species prefers sheltered woodlands and wooded gardens for roosting. No significant woodland habitat occurs in proximity to the creamery facility.
Fallow Deer	Invasive species	No, absence of suitable habitat.
Mink	Invasive species	Possible, associated with waterways.
Bank Vole	Invasive species	Possible, associated with waterways and suitable habitat occurs along the River Ara on the north-western boundary of the site.
Rabbit	Invasive species	Unlikely as the proposed development site is fenced off from its surroundings.
Raccoon	Invasive species	No. This record is likely to have been a casual occurrence as raccoons are not known to be established in Ireland.
Grey Squirrel	Invasive species	Unlikely, absence of suitable habitat.

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Plate 5: Bridge in proximity to the northern part of creamery site.

4 RESULTS OF ASSESSMENT (EVALUATION OF RECEIVING ENVIRONMENT)

As outlined above the nearest nationally important designated site is located >3km from the proposed development site. The nearest internationally important designated site is the River Suir cSAC, located some 5.5km south (ca 16km downstream).

The habitats within and adjacent to the creamery site comprise buildings and artificial surfaces, small areas of grassland habitat, and a lowland river. Those habitats that occur within the proposed development site boundary are of low ecological value (buildings and artificial surfaces, amenity grassland, dry meadows and grassy verges).

The proposed demolition / decommissioning and construction works are confined to those buildings and artificial surfaces that occur within the site and therefore the habitats likely to be impacted are of no ecological importance. The River Ara, which forms the northern boundary of the proposed development site, is the only ecologically sensitive receptor in proximity to the proposed development. The river provides habitat for species of conservation concern such as grey wagtail and possibly kingfisher, bats, and otter.

No plant species of conservation concern are likely to occur in proximity to the proposed development. The invasive species, Japanese Knotweed, occurs on the northern riverbank of the River Ara, opposite the proposed development.

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5 ASSESSMENT OF IMPACTS (CONSTRUCTION AND OPERATIONAL)

5.1 DESIGNATED SITES

As outlined above, the footprint of the proposed development is well removed from any site designated for nature conservation. Based on the distance removed and absence of any impact pathway there are no potential impacts on either the Bansha Woods pNHA and the Greenane Marsh pNHA.

As outlined above the Lower River Suir SAC, although located more than 5km from the site, is hydrologically connected to the proposed development site via the River Ara.

Japanese Knotweed has been recorded along the banks of the River Ara in proximity to the proposed development. In the absence of appropriate mitigation and controls, the introduction or spread of invasive species could have detrimental effects on downstream habitats of conservation value.

Works associated with the construction of a dryer tower building, waste water treatment upgrades, and demolition / decommissioning of existing buildings may, in the absence of appropriate mitigation, potentially lead to the run-off of harmful pollutants into the river and therefore have indirect consequences on habitats and species that occur downstream due to deterioration in water quality.

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The potential impacts of the proposed development on water quality and aquatic ecology are addressed in the standalone aquatic ecology report accompanying the application. Based on the conclusions set out in that report, potential indirect effects on terrestrial features of the cSAC (or terrestrial habitats and species of conservation concern elsewhere downstream) are not foreseen.

5.2 HABITATS AND FLORA

The proposed demolition / decommissioning and construction works occur on buildings and artificial surfaces in proximity to those habitats described above. The footprint of the proposed development will be confined to existing built up areas and therefore will not result in the direct loss of any semi – natural habitat.

The affected habitat is of low ecological value (buildings and artificial surfaces). Considering the ecological value and sensitivity of other terrestrial habitats in the surroundings indirect impacts of significance are not foreseen.

A potential impact associated with the construction of the proposed development, in the absence of suitable controls, is the introduction or spread of invasive species such as Japanese

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Knotweed (*Fallopia japonica*) which occurs along the river adjacent to the creamery site. Should such species become established then it could have a detrimental effect on native flora and fauna within habitats downstream of the proposed development.

No in-stream works, or works in close proximity to the River Ara are proposed as the footprint of demolition and construction works are removed from the river.

5.3 FAUNA

It is considered that those habitats directly impacted by the footprint of the proposed development (buildings and artificial surfaces) at the creamery site do not support fauna species of conservation concern and therefore impacts on fauna due to works at this location are not foreseen.

However, as outlined above habitats that occur in proximity to the proposed development are likely to support faunal species of conservation concern including riparian birds (Kingfisher and Grey Wagtail), otter, and bat species.

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Riparian Birds

There is an absence of suitable breeding sites within the proposed development and therefore direct impacts on breeding sites are not foreseen. Bridges and stone walls along the River Ara in proximity to the creamery site provide suitable breeding sites for Grey Wagtail, and male and female Grey Wagtail were recorded in close proximity. The river provides suitable commuting and foraging habitat for kingfisher.

Construction and demolition works are confined to the existing operational Co-op site. Potential disturbance is unlikely due to the background noise levels at the site. Bird species resident in the area are likely to be accustomed to significant levels of noise and therefore impacts of significance are not foreseen.

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Otter

There is an absence of suitable breeding sites along the River Ara in close proximity to the Co-op site and therefore direct impacts on breeding sites are not foreseen. However, the river provides suitable commuting and foraging habitat and otter may frequent this stretch of the river. The demolition and construction works proposed within the Co-op site are unlikely to give rise to significant disturbance as otter in the area are likely to be accustomed to high levels of background noise in the area.

Noise and vibration generated during the construction phase, including demolition works may potentially lead to short term disturbance impacts on foraging / commuting otter along this section of the River Ara. No in-stream works, or works in close proximity to the River Ara are proposed.

Disturbance to bats

Works associated with the proposed development are not expected to directly impact on any bat roosts.

Disturbance from noise, light, and vibration associated with demolition and construction works may impact on locally occurring bat species during the construction / demolition phase of the project. However, bats that occur amongst suitable habitat in the surroundings are likely to be accustomed to relatively high background noise levels and therefore any disturbance impacts are likely to be minor and temporary in duration. The level of bat activity in the area is not expected to be affected in the long term.

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5.4 PROPOSED MITIGATION AND ENHANCEMENT MEASURES

This section sets out the mitigation which will be implemented to mitigate the potential impacts of the proposed development as identified above. The following measures are proposed in order to avoid, minimise or remedy potential adverse impacts associated with the construction phase of the proposed development.

The key approach for minimising risks such as disturbance to wildlife is the appointment of an appropriately experienced Ecological Clerk of Works (ECoW) on site during construction to advise on the detailed implementation of the design approach and ecological mitigation as detailed in the environmental reports and as will be detailed in the Construction and Environmental Management Plan (CEMP). The main need for the appointment of the ECoW is the sensitivity of the river and associated habitats along the north-western boundary of the site.

The role of the ECoW will include:

- Monitoring of construction works and advise on compliance with legislation;

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- Monitoring habitats and species during the course of construction works and effectiveness of mitigation;
- Provision of advice regarding the avoidance and minimisation of potential disturbance to wildlife;
- Provide recommendations on appropriate responses / actions to site specific issues (e.g. identification of previously unrecorded breeding sites during construction works); and
- Liaison with NPWS, IFI and other prescribed authorities, when required.

Specific mitigation measures relating to the potential impacts identified include:

- A detailed Construction and Environmental Management Plan (CEMP) will be prepared prior to the commencement of construction. All mitigation measures relating to ecology will be incorporated into the CEMP.
- Riparian habitats that occur in proximity to proposed works will be protected from accidental damage.
- During construction, all site works (including machinery movements, storage of excavated material etc) will be confined as far as possible to the development footprint.
- The spread and introduction of invasive species and noxious weeds will be avoided by adopting appropriate mitigation measures as per guidance issued by the NRA (2010). These measures will be detailed in the CEMP. Any invasive plant material noted on site will be removed off site and disposed of at appropriate licensed waste disposal facility. Any invasive species found to occur within 15m of working areas will require a specialist method statement for its eradication to avoid the spread of invasive species, this will ensure compliance with the European Communities (Birds and Natural Habitats) Regulations 2011 [S.I. No. 477 of 2011]. The presence of non-native species and requirement for actions will be confirmed by the Ecological Clerk of Works.
- All vegetation clearance required (such as the river corridor) should take place outside of the bird breeding season (March to August, inclusive) in order to protect nesting birds. In the event that clearance is required during the breeding season, a survey for nesting birds will be undertaken prior to felling taking place to ensure that no nesting birds are impacted.
- Prior to commencement of works pre-construction surveys for the presence of bats at existing built structures (that may be impacted by proposed development) that could provide suitable roost sites will be undertaken. In the unlikely event of a bat roost being identified then appropriate measures will be taken to ensure its protection with reference to BCI (2010) and NRA (2005). In the event that direct damage to the roost is unavoidable, then a derogation license from NPWS will be sought and work will be undertaken in compliance with any conditions attached.

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6 CUMULATIVE IMPACTS

Considering the characteristics of the proposed development and the potential impacts on terrestrial ecology; it is considered that the potential for cumulative impacts is negligible and no significant cumulative impacts on biodiversity are foreseen.

7 RESIDUAL IMPACTS

Assuming the full implementation of the mitigation measures outlined above the following residual impacts will apply.

Considering the characteristics of the proposed development site and the low ecological value of those habitats directly impacted, it is predicted that the development will have a temporary imperceptible adverse impact on the biodiversity value of the proposed development site.

The off-site impacts on flora, terrestrial habitats, birds and mammals will also constitute an imperceptible adverse impact of short term duration. Considering the nature and scale of the proposed development, no impacts of significance are foreseen during the operational phase of the proposed development.

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Appendix I

Methods Used in Evaluation of Biodiversity Value and Assessment of Impacts

Table A1: Criteria used in assessing the ecological importance of sites
[Source: Guidelines for Assessment of Ecological Impacts of National Road Schemes (2009)]

Ecological Valuation Scheme(NRA 2009)
International Importance: 'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation. Proposed Special Protection Area (pSPA). Site that fulfills the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended). Features essential to maintaining the coherence of the Natura 2000 Network. Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive. Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or Species of animal and plants listed in Annex II and/or IV of the Habitats Directive. Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971). World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972). Biosphere Reserve (UNESCO Man & The Biosphere Programme). Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979). Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979). Biogenetic Reserve under the Council of Europe. European Diploma Site under the Council of Europe. Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).
National Importance: Site designated or proposed as a Natural Heritage Area (NHA). Statutory Nature Reserve. Refuge for Fauna and Flora protected under the Wildlife Acts. National Park. Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park. Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list. Site containing 'viable areas' of the habitat types listed in Annex I of the Habitats Directive.
County Importance: Area of Special Amenity. Area subject to a Tree Preservation Order. Area of High Amenity, or equivalent, designated under the County Development Plan. Resident or regularly occurring populations (assessed to be important at the County level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list. Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfill the criteria for valuation as of International or National importance. County important populations of species, or viable areas of semi-natural habitats or natural heritage features identified in the National or Local BAP, if this has been prepared. Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county.

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Ecological Valuation Scheme(NRA 2009)
Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.
Local Importance (higher value): Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared; Resident or regularly occurring populations (assessed to be important at the Local level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list. Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality; Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.
Local Importance (lower value): Sites containing small areas of semi-natural habitat that are of some local importance for wildlife; Sites or features containing non-native species that are of some importance in maintaining habitat links.

Notes: SAC = Special Area of Conservation; SPA = Special Protection Area; NHA = Natural Heritage Area; BAP = Biodiversity Action Plan (these have been published for many local authority areas)

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Table A2: Criteria for assessing impact type

Impact type	**Criteria**
Positive impact:	A change is likely to improve the ecological feature in terms of its ecological value.
Neutral	No effect.
Negative (or adverse) impact:	The change is likely to adversely affect the ecological value of the feature.

Table A3: Criteria for assessing impact magnitude

Impact magnitude	**Definition**
No change:	No discernible change in the ecology of the affected feature.
Imperceptible Impact:	A change in the ecology of the affected site, the consequences of which are strictly limited to within the development boundaries.
Minor Impact:	A change in the ecology of the affected site which has noticeable ecological consequences outside the development boundary, but these consequences are not considered to significantly affect the distribution or abundance of species or habitats of conservation importance.
Moderate Impact:	A change in the ecology of the affected site which has noticeable ecological consequences outside the development boundary. These consequences are considered to significantly affect the distribution and/or abundance of species or habitats of conservation importance.
Substantial Impact:	A change in the ecology of the affected site which has noticeable ecological consequences outside the development boundary. These consequences are considered to significantly affect species or habitats of high conservation importance and to potentially affect the overall viability of those species or habitats in the wider area.
Major Impact:	A change in the ecology of the affected site which has noticeable ecological consequences outside the development boundary. These consequences are considered to be such that the overall viability of species or habitats of high conservation importance in the wider area is under a very high degree of threat (negative impact) or is likely to increase markedly (positive impact).

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Appendix II

List of Plant Species Recorded during field survey in proximity to proposed development.

Common Name	Latin Name
Annual Meadow Grass	*Poa annua*
Ash	*Fraxinus excelsior*
Bent	*Agrostis tenuis*
Bramble	*Rubus fruticosus agg.*
Broadleaved dock	*Rumex acetosa*
Canary Reed Grass	*Phalaris arundinacea*
Cat's ear	*Hypochaeris radicata*
Cleavers	*Galium aparine*
Coltsfoot	*Tussilago farfara*
Common Knapweed	*Centaurea nigra*
Common Plantain	*Plantago major*
Creeping Bent	*Agrostis stolonifera*
Creeping Buttercup	*Ranunculus repens*
Daisy	*Bellis perennes*
Dandelion	*Taraxacum officinale*
Elder	*Sambucus nigra*
False Oat Grass	*Arrhenatherum elatius*
Grey Willow	*Salix cinerea*
Herb Robert	*Geranium robertianum*
Hawthorn	*Crataegus monogyna*
Hedge Bindweed	*Calystegia sepia*
Ivy	*Hedera helix*
Japanese Knotweed	*Fallopia japonica*
Leyland Cypress	*Cupressus x leylandii*
Lime Tree	*Tilia x europaea*
Nettle	*Urtica dioica*
Oxeye Daisy	*Leucanthemum vulgare*
Perennial Rye Grass	*Lolium perenne*
Ragwort	*Senecio jacobaea*
Red Clover	*Trifolium pratense*
Ribwort Plantain	*Plantago lanceolata*
Self Heal	*Primula vulgaris*
Silver Birch	*Betula pendula*
Snowberry	*Symphoricarpos albus*
Spindle	*Euonymus europaeus*
Sycamore	*Acer pseudoplatanus*
Tufted Vetch	*Vicia cracca*
White Clover	*Trifolium repens*
White Willow	*Salix alba*
Wild Angelica	*Angelica sylvestris*
Yarrow	*Achillea millefolium*
Yorkshire Fog	*Holcus lanatus*

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ATTACHMENT B

ECOLOGICAL ASSESSMENT

AQUATIC ECOLOGY

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PROPOSED NEW MILK DRYING FACILITY AT TIPPERARY CO-OPERATIVE CREAMERY LTD, COUNTY TIPPERARY

AQUATIC ECOLOGICAL REPORT

8 June 2017



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REPORT PREPARED FOR OES Ltd

by

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Client:	OES Consulting
Project	Aquatic Ecological Report as part of the Planning Application Environmental Report for the proposed development by Tipperary Co-Operative Creamery Ltd. of a new milk drying facility at the site of their existing milk processing plant at Station Road, Tipperary Town
Report No:	16117/2017/F
Date	08/06/17
Status	Final
Prepared by	Bill Quirke BSc, MSc, MCIEEM
Reviewed by	Helena Twomey BA(Mod), PhD

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1 INTRODUCTION

OES Consulting commissioned Conservation Services – Ecological & Environmental Consultants to prepare an Aquatic Ecological Report as part of the Planning Application for the proposed development by Tipperary Co-Operative Creamery Ltd. of a new milk drying facility at the site of their existing milk processing plant at Station Road, Tipperary Town.

The proposed development works include the following elements;

1. Enabling works including the establishment of a temporary Contractor's Compound within the former Hotel site on the northern side of the Ara River
2. Demolition works to facilitate the construction of the new dryer tower including demolition of the old Butter Store building, existing store building on the western side of the existing Dispatch Building and the removal of the existing fuel storage tanks together with bund structure and canopy roof structure.
3. Partial demolition works, comprising the southern half of the existing powder store which falls within the development footprint of the new dryer tower building.
4. Construction of a new dryer tower building c.32 metres in height and a footprint area of up to c.1,200m², incorporating evaporator plant, dryer plant, air heater and heat recovery systems.
5. Provision of an additional Evaporator Plant Installation and commissioning of all associated plant installations;
6. Decommissioning of the two existing 'Rodgers' dryers located within the building to the rear of the protected structure within the central section of the creamery site;
7. Upgrade of the existing Waste Water Treatment Plant (WWTP) with a new balance tank and clarifier to cater for the additional flow rate generated by the new Dryer Facility and to improve the quality of treated effluent discharged to the public sewer
8. Site works associated with the above development works including drainage works and pavement works

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The aims of the assessment are:

- To assess the present fishery value, invertebrate fauna, aquatic flora, water quality, habitat value and general ecological condition of streams/rivers potentially affected by the proposed development and provide baseline data against which future changes can be assessed;
- To assess the general status of the streams/rivers from an ecological and fisheries perspective in the context of their wider catchment based on survey data, published sources, EPA data, and on consultation with Inland Fisheries Ireland and NPWS;
- To assess the potential impact of the proposed development on water quality and aquatic flora and fauna;

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- To assess any ex situ impact on qualifying interests of the Lower River Suir Special Area of Conservation;
- To recommend mitigation measures where negative impacts are predicted, and
- Assessment of potential impact on aquatic mammals, amphibians and birds is included in the terrestrial ecology assessment completed in support of the planning application.

The main legal constraints on the proposed development in relation to aquatic flora, fauna, habitats and fisheries are:

The Local Government (Water Pollution) Act, 1977 (and associated regulations)	Prohibits the entry of unlicensed polluting matter into waters.
European Communities Environmental Objectives (Surface Waters) Regulations 2009	The Regulations give legal status to the criteria and standards to be used for classifying surface waters in accordance with the ecological objectives approach of the Water Framework Directive. The classification of waters is a key step in the river basin management planning process and is central to the setting of objectives and the development of programmes of measures. Waters classified as 'high' or 'good' must not be allowed deteriorate. Waters classified as less than good must be restored to at least good status within a prescribed timeframe. The environmental targets or goals and the programmes of measures to be included in river basin management plans must therefore reflect these requirements.
The Fisheries (Consolidation) Act, 1959 as amended by the Fisheries (Amendment) Act, 1962	Prohibits: 1. The entry of deleterious matter into waters. (Deleterious matter is defined as any substance that is liable to injure fish, their spawning grounds or their food, or to injure fish in their value as human food.) 2. Obstructing the passage of salmon, trout or eels or their smolts and fry 3. Injury or disturbance of the spawn or fry of salmon, trout or eels or to their spawning or nursery areas

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Fisheries (Amendment) Act 1999	Requires the regional fisheries board to have regard for the need for the conservation of fish and other species of fauna & flora habitat and biodiversity of inland fisheries and ecosystems. Under this Act the Regional Fisheries Board has the responsibility to protect and conserve all freshwater fisheries within its area of jurisdiction. It is the stated policy of the Regional Fisheries Boards that "*every river, stream, canal, lake, pond and reservoir must be regarded as constituting and/or supporting a Fishery under the meaning of the Fisheries Acts unless otherwise regarded by the Boards*."
The Freshwater Fish Directive 78/659/EEC as transposed into Irish law under E.C. (Quality of Salmonid Waters) Regulations 1988 (S.I. No. 293 of 1988)	Lays down standards for the quality of designated waters and requirements for monitoring.
The Wildlife Act 1976	Prohibits damage to protected species which includes certain freshwater aquatic species.
The Habitats Directive (92/43/EEC) as transposed into Irish law under the E.C. (Natural Habitats Regulations 1997 (S.I. No. 94 of 1997)	Lists certain species (Annex II) and habitats (Annex I) which require to be protected within SACs. Annex II species include crayfish, salmon, and all three Irish species of Lamprey.
Water Framework Directive (2000/60/EC)	The Water Framework Directive requires the maintenance of good ecological quality in all surface waters, which in the Irish context is generally taken to mean achieving salmonid water quality standards regardless of whether the watercourse is designated under the Salmonid Regulations.
Directive 2004/35/CE of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage	The Environmental Liability Directive specifies that Member States should, inter alia, establish a civil liability regime whereby operators of specified activities which cause environmental damage are financially liable for remedying this damage. The Directive also aims to hold those responsible for certain activities which have caused an imminent threat of environmental damage liable for taking preventive actions.

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2 CONSULTATION

The following have been invited to submit observations and/or recommendation for this assessment:

- Inland Fisheries Ireland
- National Parks & Wildlife Service (Development Applications Unit)

(See Section 3.6 below)

3 METHODOLOGY

3.1 SELECTION OF WATERBODIES AND SITES FOR ASSESSMENT

All watercourses were assessed which are marked on EPA mapping of streams (http://maps.epa.ie/internetmapviewer/mapviewer.aspx) and which are within 0.5km down gradient from any part of the proposed development site where works will be carried out. As O.S. 1:50,000 maps generally include streams/drains which are too small to be useful salmonid habitat, and as general guidelines are presented for procedures at any watercourse crossing, the survey is adequate to ensure that all measures necessary to prevent significant impacts are identified.

The potentially affected watercourse is the Ara River which flows to join the Aherlow River c.20km downstream of Tipperary Town. From the Ara confluence the Aherlow River flows for c.6km to its confluence with the River Suir c.6km upstream of Cahir.

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3.2 HABITAT ASSESSMENT

Habitat assessment was carried out on 10th June 2016.

3.2.1 Field Procedure

A general assessment of salmonid and lamprey habitat quality was carried out for c. 5km adjacent to and downstream of the proposed development site.

Assessment consisted of walking and/or wading the entire channel length. The assessed channel was demarcated into habitat sections based on:

1. Stream width and depth
2. Substrate type, i.e. relative dominance of large rocks, cobble, gravel, sand, mud etc.
3. Flow type, i.e. relative dominance of riffle, glide and pool in the sampling area
4. Dominant bank-side vegetation
5. In-stream vegetation
6. Degree of shade by bank-side vegetation

Salmonid and Lamprey habitat quality was assessed, taking into account the environmental features 1-6 listed above. Based on these observations and more detailed criteria outlined in

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Section 3.2.2 below, the value of each river section for salmonid and lamprey spawning, as a nursery area for juvenile salmonids and lamprey larvae, and as an area for adult salmonids, was estimated on a scale of None/ Poor/ Fair/ Good/ Very Good/ Excellent.

Scale	Assessment
None	The ecologist carrying out the assessment regards it as impossible that the stream could support the species in the relevant life stage
Poor	Unlikely but possible that the stream could support the species in the relevant life stage
Fair	Species life stage likely to be present at low density
Good	Species life stage likely to be present at moderate density
Very Good	Species life stage likely to be present at high density
Excellent	Conditions ideal for the species life stage

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This rating assesses the physical suitability of the habitat; the presence/absence/density of salmonids and/or lamprey at the location will also depend on present and historical water quality and accessibility of the site to the species in question.

Locations for identification of habitat sections were recorded as Irish Grid References using a GPS. Photographs were taken to illustrate the habitat quality.

3.2.2 Criteria Used for Assessment of Salmonid and Lamprey Habitat Quality

Habitat quality for in-stream invertebrate and plant communities, and for fish, and riparian birds and mammals, is primarily a function of 'naturalness' and diversity. The more diverse the stream habitat in terms of substrate, flow rate, depth, riparian vegetation, light conditions etc., the richer the biological community is likely to be, and the more suitable it is likely to be for salmonid fish (trout and salmon).

Assessment of the quality of salmonid spawning habitat, nursery habitat and adult habitat is based on personal expertise developed over a period of 20 years of electrofishing and on published information such as the following:

i. Favourable locations for salmon spawning are likely to occur where the gradient of a river is 3% or less (Mills 1989).

ii. Preferred current velocity for spawning is within the range 25–90 cm s^{-1}, with a water depth in the range 17–76 cm (Hendry & Cragg-Hine 1997).

iii. Typical spawning sites are the transitional areas between pool and riffle where flow is accelerating and depth decreasing, where gravel of suitable coarseness is present and interstices are kept clean by up-welling flow (Peterson 1978, Bjorn & Reiser 1991).

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iv. Salmon fry and parr occupy shallow, fast-flowing water with a moderately coarse substrate with cover (Symons & Heland 1978, Baglinière & Champigneulle 1986).

v. Deep or slow-moving water, particularly when associated with a sand or silt substrate, does not support resident juvenile salmonids (Wankowski & Thorpe 1979, Baglinière & Champigneulle 1986).

vi. Suitable cover for juveniles includes areas of deep water, surface turbulence, loose substrate, large rocks and other submerged obstructions, undercut banks, overhanging vegetation, woody debris lodged in the channel, and aquatic vegetation (Heggenes 1990; Bjorn & Reiser 1991; Haury et al. 1995).

vii. The juxtaposition of habitat types is also important. The proximity of juvenile habitat to spawning gravels may be significant to their utilisation. In addition, adults require holding pools immediately downstream of spawning gravels in which they can congregate prior to spawning. Cover for adult salmon waiting to migrate or spawn can be provided by overhanging vegetation, undercut banks, submerged vegetation, submerged objects such as logs and rocks, floating debris, deep water and surface turbulence (Bjorn & Reiser 1991).

viii. Bjorn & Reiser (1991) suggest that proximity of cover to spawning areas may be a factor in the selection of spawning sites by some salmonid species.

Lamprey habitat preferences change with the stages of their life cycle. They show a preference for gravel-dominated substratum for spawning. After hatching the larvae swim or are washed downstream by the current to areas of sandy silt in still or slow flowing water where they burrow and spend the next few years in tunnels. Lampreys therefore require mainly silt and sand dominated substratum for nursery habitat. Other important environmental characteristics for optimal ammocoete habitat are shallow waters with low water velocity, and the presence of organic detritus and/or plant material. Sub-optimal habitat supporting only a few individuals may consist of a few square centimetres of suitable silt in an open, comparatively high-velocity, boulder-strewn streambed. Spate rivers, with high flow velocities, tend to support fewer ammocoetes because they contain smaller areas of stable sediment (Maitland 2003).

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3.3 BIOLOGICAL WATER QUALITY ASSESSMENT

3.3.1 Biological Sampling Sites

Biological water quality assessment was carried out at 4 locations (see Map 2):

Site Code	Grid Reference	Sampling Date	Location
1	R88755 35418	10/6/16	Ara River immediately upstream of proposed development site
2	R89104 35657	10/6/16	Ara River immediately downstream of proposed development site

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Site Code	Grid Reference	Sampling Date	Location
3	R89785 35127	10/6/16	Ara River c.1km downstream of proposed development and immediately upstream of Tipperary Town WWTP.
4	R89894 34883	10/6/16	Ara River c.1km immediately downstream of Tipperary Town WWTP.

3.3.2 Biological Sampling & Analysis

Invertebrates were sampled using the standard kick sampling method. After field sampling the sample was thoroughly sieved and live sorted for 30 minutes under laboratory conditions. Invertebrates were preserved in 70% alcohol, examined microscopically and identified to the taxonomic level required to calculate Q-ratings by the EPA methodology (McGarrigle *et al* 2002). The preserved samples were archived for future examination or verification. Based on the relative abundance of indicator species, a biotic index (Q-rating) was determined in accordance with the biological assessment procedure used by the Environmental Protection Agency (McGarrigle *et al* 2002 & S.I. No. 258 of 1998) and more detailed unpublished methodology (McGarrigle, Clabby and Lucey pers. comm.) Submerged and emergent aquatic plants were assessed at each site by means of direct observation and recorded as % cover of the substratum.

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Biotic Index	Water Framework Directive Ecological Quality	Quality Status
Q5	High	Unpolluted Waters
Q4-5	High	
Q4	Good	
Q3-4	Moderate	Slightly Polluted Waters
Q3	Poor	Moderately Polluted Waters
Q2-3	Poor	
Q2	Bad	Seriously Polluted Waters
Q1-2	Bad	
Q1	Bad	

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3.4 ASSESSMENT OF SIGNIFICANCE OF POTENTIAL IMPACTS

Impacts are defined on the basis of severity of impact on aquatic species and/or habitats. Species protected under national and European legislation are given special consideration. Because of their amenity, commercial and legal status, salmonid fish (trout and salmon) are given special consideration. Assessment of the importance of a potential impact takes into account not only the ecological considerations in the immediate vicinity of the potential impact, but also geographical and wider catchment considerations. If spawning and nursery habitat of a species are limiting factors in short supply in a particular river system, then impacts on them will have an importance out of proportion with their apparent 'face value'.

If an aspect of a proposed development is judged likely to have a measurable negative effect on salmonid fish populations or any rare or protected species, it would be classified as a significant potential impact. The criteria for assessing the significance of impacts on flora, fauna and fisheries are as follows. (For details of water-body categories see section 3.6.)

TABLE 5.2.1 CRITERIA FOR ASSESSING THE SIGNIFICANCE OF IMPACTS

A Sites				
	Temporary	**Short-term**	**Medium-term**	**Long-term**
Extensive	MAJOR	SEVERE	SEVERE	SEVERE
Localised	MAJOR	MAJOR	SEVERE	SEVERE
B Sites				
	Temporary	**Short-term**	**Medium-term**	**Long-term**
Extensive	MAJOR	MAJOR	SEVERE	SEVERE
Localised	MODERATE	MODERATE	MAJOR	MAJOR
C Sites				
	Temporary	**Short-term**	**Medium-term**	**Long-term**
Extensive	MODERATE	MODERATE	MAJOR	MAJOR
Localised	MINOR	MODERATE	MODERATE	MODERATE

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D Sites				
	Temporary	**Short-term**	**Medium-term**	**Long-term**
Extensive	MINOR	MINOR	MODERATE	MODERATE
Localised	NOT SIGNIFICANT	MINOR	MINOR	MINOR
E Sites				
	Temporary	**Short-term**	**Medium-term**	**Long-term**
Extensive	NOT SIGNIFICANT	NOT SIGNIFICANT	MINOR	MINOR
Localised	NOT SIGNIFICANT	NOT SIGNIFICANT	NOT SIGNIFICANT	NOT SIGNIFICANT

NRA (2006)

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In line with the EPA guidelines (EPA 2002) the following terms are defined when quantifying duration:

Temporary: Up to 1 year

Short-term: From 1 to 7 years

Medium-term: 7 to 15 years

Long-term: 15 – 60 years

Permanent: over 60 years

For the purposes of this report 'localised' impacts on rivers are loosely defined as impacts measurable no more than 250 metres from the impact source. 'Extensive' impacts on rivers are defined as impacts measurable more than 250m from the impact source. Any impact on salmonid spawning habitat or nursery habitat where it is in short supply, would be regarded as an extensive impact as it is likely to have an impact on the salmonid population beyond the immediate vicinity of the impact source.

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3.5 GUIDELINES USED FOR CLASSIFICATION OF IMPORTANCE OF FRESHWATERS

Rating	
A	**Internationally Important** Habitats designated as SACs for Annex II species under the EU Habitats Directive. Major Salmon river fisheries. Major salmonid lake fisheries.
B	**Nationally or Regionally Important** Other major salmonid waters and waters with major amenity fishery value. Commercially important coarse fisheries. Waters with important populations of species protected under the Wildlife Act and/or important populations of Annex II species under the EU Habitats Directive. Waters designated or proposed as Natural Heritage Areas by NPWS.
C	**High Value, locally important** Small water bodies with known salmonid populations or with good potential salmonid habitat, or any population of species protected under the Wildlife Act and/or listed Annex II species under the EU Habitats Directive. Large water bodies with some fisheries value.
D	**Moderate value, locally important** Small water bodies with some coarse fisheries value or some potential salmonid habitat. Any stream with an unpolluted Q-value rating.
E	**Low value** Water bodies with no current fisheries value and no significant potential fisheries value. Habitat diversity low and degraded.

NRA (2006)

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3.6 LIMITATIONS ENCOUNTERED

No significant limitations were encountered.

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4 EXISTING ENVIRONMENT

The River Ara flows c.20km to join the Aherlow River. From the Ara confluence the Aherlow River flows c. 6km to its confluence with the River Suir c.6km upstream of Cahir.

4.1 GENERAL CATCHMENT INFORMATION

4.1.1 River Suir

"The River Suir rises in the Devil's Bit Mountain in County Tipperary and flows south and then north and west to join the Barrow and the Nore at Waterford Harbour. It is 115 miles long and, together with its tributaries, drains a total catchment of 1,394 square miles." (O'Reilly 2002)

4.1.1.1 Fishery Value

"*The Suir is one of Ireland's premier brown trout fisheries. Only a handful of rivers can compare with it in terms of trout density and I doubt if any river can equal it in terms of the overall numbers of trout that it provides and that are available to the angler*." (O'Reilly 2002)

Inland Fisheries Ireland describes the Suir fishery as follows: "*The Suir and its tributaries drain most of county Tipperary. The rivers channel is characterised by a series of shallow and deep glides, interrupted occasionally by shallow riffles. As many of its major tributaries drain large areas of limestone, as does the main river, the Suir has the best characteristics of a chalk stream. This gives it prolific fly hatches and big stocks of trout (with some very large fish). As such this rich river is world renowned for its brown trout fishing.*

Historically the Suir was also renowned for producing large salmon. The rod caught Irish record is still a 57 lb fish taken on the river in 1874 by a Mr. Maher. Written off as a salmon fishery in the past, the situation has changed and over the last few seasons this has become a river where those 'in the know' have gone to seek the bigger Irish salmon. The best of the salmon fishing on the Suir extends downstream from Ardfinnan towards Carrick-on-Suir. The Suir gets some early fish though salmon fishing does not really start until the grilse run in June / July. In August and September the Suir has runs of large grilse and an autumn run some of which are very large fish some of which are believed to be multi spawners." (http://www.fishinginireland.info/salmon/south/suir.htm)

Central Fisheries Board (2006) stated: "*The Suir main channel should be considered an important salmon nursery water. Where suitable habitat was found 1+ salmon numbers were high. Good populations occurred throughout the main channel wherever fast flowing deep riffle zones were present. These pockets of good nursery waters were encountered frequently and thus, over-all, would cover an area that is capable of supporting a lot of salmon parr and so is contributing significantly to the over-all production of salmon smolts in the Suir Catchment*."

Standing Scientific Committee on Salmon (2016) classifies the River Suir as below Conservation Limits for salmon in 2016.

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Conservation of Salmon and Sea Trout (River Suir) Bye-law No. 938, 2015 permits only catch and release in angling for salmon (any size) and sea trout (over 40cm) in the River Suir (including the waters of the Rivers Clodiagh, Lingaun and Blackwater).

4.1.1.2 Ecological Importance

The Lower River Suir is designated as a candidate Special Area of Conservation (Site 2137). This site consists of the freshwater stretches of the River Suir immediately south of Thurles, the tidal stretches as far as the confluence with the Barrow/Nore immediately east of Cheekpoint in Co. Waterford, and many tributaries including the Clodiagh in Co. Waterford, the Lingaun, Anner, Nier, Tar, Aherlow, Multeen and Clodiagh in Co. Tipperary.

The Lower River Suir is designated as a candidate Special Area of Conservation (Site 2137). Seven aquatic species (Annex II) and a single aquatic habitat (Annex I) are listed as qualifying interests of the cSAC.

i. Sea Lamprey (Petromyzon marinus) (Annex II species)

ii. River Lamprey (Lampetra fluviatilis) (Annex II species)

iii. Brook Lamprey (Lampetra planeri) (Annex II species)

iv. Atlantic Salmon (Salmo salar) (Annex II species)

v. Freshwater Pearl Mussel (Margaritifera margaritifera) (Annex II species)

vi. Twaite Shad (Alosa fallax) (Annex II species)

vii. Crayfish (Austropotamobius pallipes) (Annex II species)

viii. Floating river vegetation (Annex I Habitat)

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Freshwater Pearl Mussel (*Margaritifera margaritifera*)

The Freshwater Pearl Mussel is classified as extinct in the main channel of the River Suir by Lucey (1998).

NPWS map of Margaritifera Sensitive Areas - Version 05, February 2013 classifies most of the main channel of the River Suir as “Catchments with pre-1970 live records (extant populations unlikely, but information insufficient to list as 'extinct')”

It is therefore unlikely that Freshwater Pearl Mussel exist in the main channel of the River Suir downstream of the proposed development.

Twaite Shad (*Alosa fallax*)

The normal habitat of this species is the sea – especially coastal waters off the south-west coast of northern Europe. At maturity, the adult fish stop feeding and gather in early summer in the estuaries of slow-flowing rivers where there is easy access from the sea, thereafter moving upstream to spawn in mid-June in the stretches directly above the influence of high

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tides. The eggs take about 4-6 days to hatch, and the young drop quickly downstream in the current to the quieter waters of the upper estuary where they start to feed and grow. Maitland & Campbell (1992). Kurz & Costello (1996) and Aprahamian & Aprahamian (1990) reported that twaite shad spawned at the head of the tide in the R. Nore, R. Suir and R. Barrow. No records have been found for Twaite Shad within the study area, and a significant likelihood of the species occurring here can be ruled out on the basis of the biology of the species.

Sea Lamprey (*Petromyzon marinus*), River Lamprey (*Lampetra fluviatilis*) & Brook Lamprey (*Lampetra planeri*)

A lamprey survey of the River Suir Catchment (O'Connor 2007) assessed six sites on the middle reaches of the Suir River between Golden and Clonmel. *Lampetra* sp. (River/Brook Lamprey) were recorded at all sites investigated. One juvenile sea lamprey was recorded at Ardfinnan and one at Cahir.

Atlantic Salmon (Salmo salar)

See Section 4.1.1.1 above

White-clawed Crayfish (*Austropotamobius pallipes*)

EPA recorded crayfish at 15 of the 22 water quality monitoring sites on the River Suir in 2008 (http://www.epa.ie/qvalue/webusers/), indicating that the species is widespread in the catchment. National Biodiversity Data Centre online mapping shows crayfish as occurring throughout most of the main channel of the River Suir (http://maps.biodiversityireland.ie)

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Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation

Watercourses characterised by submerged or floating-leaved vegetation ("Ranunculion fluitantis and Callitricho-Batrachion vegetation") are listed in Annex I of the Habitats Directive. The definition of watercourses characterised by Ranunculion fluitantis and Callitricho-Batrachion communities is very wide, in practice covering the majority of rivers and streams with aquatic plant communities of note. (Hatton-Ellis & Grieve 2003). "*Floating river vegetation is evident in the freshwater stretches of the River Suir and along many of its tributaries. Typical species found include Canadian Pondweed (Elodea canadensis), Milfoil (Myriophyllum spp.), Fennel Pondweed (Potamogeton pectinatus), Curled Pondweed (P. crispus), Perfoliate Pondweed (P. perfoliatus), Pond Water-crowfoot (Ranunculus peltatus), other Crowfoots (Ranunculus spp.) and the moss Fontinalis antipyretica. At a couple of locations along the river, Opposite leaved Pondweed (Groenlandia densa) occurs. This species is protected under the Flora (Protection) Order, 1999.*" (cSAC Site Synopsis).

4.1.1.3 Water Quality

Following its 2014 round of biological water quality monitoring of the main channel of the River Suir, EPA stated that: "*19 of the 22 stations assessed on the River Suir main channel were*

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found to be in satisfactory condition in 2014. Six of these stations had improved in quality since they were last assessed in 2011. The only decline in quality was at Station 0200, which dropped from moderate to poor quality. At the bridge in Thurles (Station 0600), the river was found to have improved from poor to moderate ecological quality. While still not satisfactory, this result represents a significant improvement, as it is the best result at this location since records began in 1971. The next two stations downstream of Thurles improved from moderate quality in 2011 to good quality in 2014." (http://www.epa.ie/qvalue/webusers/) (See full EPA monitoring data in Appendix 1)

4.1.2 Aherlow River

The River Aherlow rises near the village of Anglesborough in the Galtee Mountains, County Limerick. It flows in a north-easterly direction, around the north end of the Galtee Mountains, until it joins with the River Suir, just a few kilometres north of Cahir in Co. Tipperary.

4.1.2.1 Fishery value

The Aherlow River is of interest to anglers as it holds large numbers of small brown trout (O'Reilly 2002).

In 2010 Inland Fisheries Ireland surveyed a site on the Aherlow River upstream of Killardry Bridge, approximately 4km upstream of the river's confluence with the River Suir. A total of five fish species were recorded; salmon (minimum density 0.0253 per m²) was the most abundant species, followed by brown trout (minimum density 0.0249 per m²), stone loach, roach and three-spined stickleback.

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Inland Fisheries Ireland describes the River Aherlow as: "*a spate river, which runs through the scenic Glen of Aherlow. It holds large numbers of trout up to 20 cm. The best angling sections are regarded in the upper stretches around the Galbally area, and the lower reaches downstream of Cappa Old Bridge*." (http://www.fishinginireland.info/salmon/south/suir.htm)

Central Fisheries Board (2006) found that in general the best of the salmon spawning and nursery habitat in the main channel of the Aherlow River was in the upper reaches of the river and in lower reaches of the main channel. "Good stocks of 1+ salmon were evident at all locations with suitable habitat."

The Aherlow River is a designated salmonid water under the European Communities (Quality of Salmonid Waters) Regulations 1988 (S.I. No. 293, 1988)

4.1.2.2 Ecological value

Freshwater Pearl Mussel (*Margaritifera margaritifera*)

In the Moorkens *et al* (2007) "Freshwater pearl mussel (Margaritifera margaritifera (L)) (1029) Conservation Status Assessment Report", the Aherlow River which forms part of the cSAC is listed under "Special Areas of Conservation (SACs) including but not designated for Margaritifera margaritifera". The only part of the Suir cSAC listed as "designated for Margaritifera margaritifera" is the Clodiagh River (Waterford). Likewise the Clodiagh River (Waterford) is the only section of the Lower River Suir cSAC to which the European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009 apply. As the species is absent from the main channel of the River Suir, and is not a qualifying interest in

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the Aherlow River, the maintenance of the species at favourable conservation status in these sections of the cSAC does not fall within the Conservation Objectives of the cSAC. This is further made clear in European Commission guidelines (European Commission 2000)" which state: *"Where the presence of the Annex I habitat type or Annex II species is deemed to be 'non-significant' for purposes of the format, these should not be considered as included in 'the site's conservation objectives'*." Nevertheless, the species where it occurs remains protected under the Wildlife Act, 1976 and Wildlife (Amendment) Act, 2000.

Prior to 1992 Lucey (pers. comm.) recorded pearl mussels at two sites on the Aherlow River at College Bridge (EPA Site 16A01-600) and Cappa Old Bridge (EPA Site 16A01-800); also survey work during the route selection process for the N24 Pallasgreen to Cahir Natura (2009) recorded two empty Margaritifera shells at Killardry Bridge on the Aherlow River. In the absence of further information, the precautionary principle is applied and it is assumed that the species is still present in the Aherlow River.

Sea Lamprey (*Petromyzon marinus*), River Lamprey (*Lampetra fluviatilis*) & Brook Lamprey (*Lampetra planeri*)

O'Connor (2007) surveyed six sites in the River Aherlow sub-catchment: three on the River Aherlow itself, two on the Ara tributary, and one on the Rossadrehid tributary. Out of the six sites surveyed, five had lampreys present. Brook/river lamprey but no sea lamprey were recorded in the Aherlow system.

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Atlantic Salmon (*Salmo salar*)

In 2010 Inland Fisheries Ireland surveyed a site on the Aherlow River upstream of Killardry Bridge, approximately 4km upstream of the river's confluence with the River Suir; juvenile salmon were the most abundant species recorded.

Central Fisheries Board (2006) found that in general the best of the salmon spawning and nursery habitat in the main channel of the Aherlow River was in the upper reaches of the river and in lower reaches of the main channel. "Good stocks of 1+ salmon were evident at all locations with suitable habitat."

The available evidence indicates that the Aherlow River is a significant salmon spawning and nursery area in the context of the Suir catchment.

White-clawed Crayfish (*Austropotamobius pallipes*)

Biodiversity Ireland (www.biodiversity.ie) maps show widespread records of crayfish in the Aherlow River.

4.1.2.3 Water quality

Following its 2014 round of biological water quality monitoring, EPA stated: "*The biological water quality of the Aherlow River has declined slightly at four of the seven stations assessed in 2014. Three stations, from 0200 downstream of Galbally to 0500 downstream of Lisvarrinane are now in unsatisfactory condition.*" (See full EPA monitoring data in Appendix 1)

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4.1.3 River Ara

The River Ara rises approximately 12km west of Tipperary Town and flows in a south-easterly direction until it joins the River Aherlow approximately 4km north-west of Cahir, County Tipperary.

4.1.3.1 Fishery value

O'Reilly (2002) states that the Ara "*holds good stocks of trout to 12oz and some to 1¾lb. From Bansha upstream to Kilshane it consists of a series of riffles, glides and pools and from Bansha downstream it is a continuous deep glide with some short riffles and a few pools*."

Inland Fisheries Ireland states: "*The River Ara provides angling from above Killshane downstream to its confluence with the River Aherlow. The waters around the Killshane area and downwards are a series of glides, riffles and pools. From the village of Bansha (N24) downstream is a continuous glide, with some riffle areas and few pools. Overall this is an excellent angling stretch. With trout stretching in length up to 28 cm*." (http://www.fishinginireland.info/salmon/south/suir.htm)

In 2010 Inland Fisheries Ireland carried out a fish survey at Ara Bridge, approximately 2.5km south of Bansha. A total of five fish species were recorded. Brown trout (minimum density 0.034 per m²) was the most abundant species, followed by salmon (minimum density 0.0249 per m²), three-spined stickleback, stone loach and eels. Brown trout ranged in length for 6.2 cm to 29.2cm. Four age classes (0+, 1+, 2+ & 3+) were present, accounting for c. 9%, 50%, 35% and 5% of the total trout catch respectively.

With regard to salmon Central Fisheries Board (2006) stated: "*Density estimates for 1+ salmon were between 0 and 0.181 fish/m2. Only the furthest downstream site electrofished showed any signs that this river has the potential to produce salmon. Most, if not all, of the upper to mid reaches of the Ara hold very little capacity to produce* (salmon) *fry or parr. The only suitable habitat is limited to the lower reaches downstream of Bansha. Survey results indicate that 18.32% of all salmonids from this system, were salmon parr indicating a poor salmon presence within this catchment*."

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4.1.3.2 Ecological value

Freshwater Pearl Mussel (*Margaritifera margaritifera*)

There are no records for Freshwater Pearl Mussel in the Ara River. Moorkens *et al* (1992) found no mussels in a 2km section they surveyed in 1991. None of the four EPA water quality monitoring sites has had suitable water quality for Freshwater Pearl Mussels since monitoring began in 1971 (http://www.epa.ie/qvalue/webusers/) (see Appendix 1). Furthermore long sections of this system were drained in the past and the river bed level was lowered significantly along many parts (RPS 2009). It is therefore concluded that there is no significant likelihood of Freshwater Pearl Mussel in the Ara River.

Sea Lamprey (*Petromyzon marinus*), River Lamprey (*Lampetra fluviatilis*) & Brook Lamprey (*Lampetra planeri*)

O'Connor (2007) surveyed two sites on the River Ara and stated: "*The lower Ara (A4) yielded the highest lamprey catch on this system* (Aherlow catchment) *with 33 lampreys recorded in*

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an area of 5 m2. …The site investigated on the upper Ara (A5) had no lampreys present." Brook/river lamprey but no sea lamprey were recorded in the Ara River system.

Conservation Services recorded Brook/river lamprey in the Ara River c.2km downstream of Bansha (R9706 3193) in 2011.

Atlantic Salmon (Salmo salar)

Central Fisheries Board (2006) stated: "*Density estimates for 1+ salmon were between 0 and 0.181 fish/m2. Only the furthest downstream site electrofished showed any signs that this river has the potential to produce salmon. Most, if not all, of the upper to mid reaches of the Ara hold very little capacity to produce* (salmon) *fry or parr. The only suitable habitat is limited to the lower reaches downstream of Bansha. Survey results indicate that 18.32% of all salmonids, from this system, were salmon parr indicating a poor salmon presence within this catchment*."

White-clawed Crayfish (*Austropotamobius pallipes*)

Biodiversity Ireland (www.biodiversity.ie) maps record crayfish from the lower section of the River Ara at Ara Bridge.

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4.1.3.3 Water quality

Following its 2014 round of biological water quality monitoring, EPA stated: "*The Ara River is in the same condition as in 2011, with poor biological water quality recorded at the two uppermost stations, improving to good condition at the lowest station surveyed*." (See full EPA monitoring data in Appendix 1)

Current WFD Ireland classifications for the Ara River are as follows:

Overall Status	Poor
Macroinvertebrate Status	Poor
General Physico-chemical Status	Moderate
Overall Risk	At Risk
Objective	Restore at least Good status by 2021*

*Extended timescale due to time requirements to upgrade WWTP discharges

http://watermaps.wfdireland.ie/NsShare_Web/ReportViewer.aspx?reportName=rwb_all&layer=subbasin&eu_cd=IE_SE_16_1127

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4.2 ASSESSMENT OF POTENTIALLY AFFECTED WATERS

4.2.1 Habitat Assessment

Habitat sections are shown on Map 1.

4.2.1.1 Habitat Section 1 – Ara River

Location	R88755 35418 to R88859 35516
Length	c.200m
Description	Mostly shallow glide over muddy sand with some large rocks and deeper glide on mud. Large instream stands of *Sparganium erectum*, *Phalaris arundinacea* & *Phragmites australis* in margins. Moderate bankside cover of ash, sycamore, willow, hawthorn and butterbur.

Salmonid Adult Habitat	Good
Salmonid Nursery Habitat	Fair
Salmonid/Lamprey Spawning Habitat	Poor
Lamprey Nursery Habitat	Good
Crayfish	Fair - Good

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Shallow glide and riffle over muddy sand with sparse gravel and cobble



Muddy glide with marginal *Sparganium erectum* and bankside butterbur

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Muddy glide with bankside willow, sycamore & butterbur

4.2.1.2 Habitat Section 2– Ara River

Location	R88859 35516 to R89058 35643
Length	c.200m
Description	Mix of shallow glide and riffle with large rocks and cobble, and deeper muddy glide. River channel confined within constructed concrete/stone river walls along much of the section. Riparian vegetation dominated by Bramble, *Phalaris arundinacea*, Japanese knotweed, Butterbur, Ash & Sycamore. Substantial instream stands of *Sparganium erectum* and *Phalaris arundinacea.*

Salmonid Adult Habitat	Fair - Good
Salmonid Nursery Habitat	Fair
Salmonid/Lamprey Spawning Habitat	Poor
Lamprey Nursery Habitat	Good
Crayfish	Good

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Shallow glide and riffle over muddy substrate with cobble



Shallow riffle and glide



Channel with constructed river wall. Glide with well-developed marginal *Sparganium erectum*



Shallow muddy glide

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Riffle & glide with marginal *Phalaris arundinacea*

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4.2.1.3 Habitat Section 3 – Ara River

Location	R89058 35643 to R89531 35351
Length	c.700m
Description	Predominantly muddy glide with short riffles on muddy rock & cobble, with some pools. Heavily silted substrates throughout. Constructed stone river wall in upstream part of section. Moderate bankside cover of Sycamore, Ash, Butterbur & *Phalaris arundinacea.* Well-developed stands of instream *Sparganium erectum* and *Phalaris arundinacea* with moderate growth of filamentous algae in parts.

Salmonid Adult Habitat	Fair – Good
Salmonid Nursery Habitat	Fair – Good
Salmonid/Lamprey Spawning Habitat	Fair
Lamprey Nursery Habitat	Fair - Good
Crayfish	Fair- Good

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Shallow glide over muddy cobble. Constructed river wall on north bank



Riffle & glide on muddy substrate with cobble

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Riffle and glide with dense bankside butterbur



Muddy pool

4.2.1.4 Habitat Section 4 – Ara River

Location	R89531 35351 to R90150 33255
Length	c.2.75km
Description	Canalised river with poor uniform glide on mud substrate. Bankside with few hawthorn and alder. Bankside dominated by nettle, *Phalaris arundinacea* and Butterbur. Patches of heavy instream filamentous cover with some *Ranunculus* sp. and *Potamogeton natans*. Marginal silts suitable as lamprey nursery habitat.
Salmonid Adult Habitat	Fair - Good
Salmonid Nursery Habitat	Poor
Salmonid/Lamprey Spawning Habitat	Poor
Lamprey Nursery Habitat	Good
Crayfish	Fair

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Uniform glide with dense bankside butterbur



Uniform glide

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Canalised channel with good marginal lamprey nursery silt



Slow glide with *Potamogeton natans* and filamentous algae

4.2.1.5 Habitat Section 5 – Ara River

Location	R90150 33255 to R90634 33140
Length	c.700m
Description	Diverse glide with some riffle on muddy gravel and cobble. Moderate bankside cover of sycamore, alder, ash and laurel
Salmonid Adult Habitat	Good
Salmonid Nursery Habitat	Fair
Salmonid/Lamprey Spawning Habitat	Fair
Lamprey Nursery Habitat	Fair
Crayfish	Fair

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Glide with instream *Ranunculus sp*. and filamentous algae



Glide on muddy substrate

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Shallow riffle on muddy gravel

4.2.1.6 Habitat Section 6 – Ara River

Location	R90634 33140 to R90919 33295
Length	c.350m
Description	Mostly meandering deep glide and pool through mature deciduous woodland with some fast run and shallow glide on muddy gravel and sand. Moderate stands of *Ranunculus* sp. in less shaded sections
Salmonid Adult Habitat	Good
Salmonid Nursery Habitat	Poor
Salmonid/Lamprey Spawning Habitat	Poor
Lamprey Nursery Habitat	Fair
Crayfish	Fair

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Diverse fast glide and run on muddy substrate



Glide on muddy substrate

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Short section of riffle on muddy gravel & sand

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4.2.2 Biological Water Quality

Locations of biological water quality assessment sites are shown on Map 2.

SITE 1 – Upstream of Creamery

The invertebrate community at this site merits a Q-rating of Q3-4 indicating slightly polluted conditions and moderate ecological quality.

INDICATOR GROUP	TAXON	Numbers
Group A - Very Pollution Sensitive	*Ecdyonurus sp.*	4
Group B - Moderately Pollution Sensitive	Limnephilidae	21
	Sericostoma personatum	3
Group C - Moderately Pollution Tolerant	*Potamopyrgus antipodarum*	c.320
	Gammarus duebeni	c.160
	Baetis rhodani	2
	Caenis sp.	11
	Serratella ignita	43
	Polycentropus sp.	1
	Elmidae	23
	Haliplus sp.	1
	Helophorus sp.	2
	Pediciidae	7
	Simuliidae	21
Group D - Very Pollution Tolerant	Erpobdellidae	2
	Glossiphonia complanata	1
	Sphaeriidae	1
Group E - Most Pollution Tolerant	Tubificidae	1
Not assigned to an indicator group	Lumbricidae	1
Instream Plants	*Berula erecta* <5%	

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SITE 2 – Downstream of Creamery

The invertebrate community at this site merits a Q-rating of Q3 indicating moderately polluted conditions and poor ecological quality.

INDICATOR GROUP	TAXON	Numbers
Group A - Very Pollution Sensitive	None recorded	
Group B - Moderately Pollution Sensitive	Limnephilidae	5
Group C - Moderately Pollution Tolerant	*Potamopyrgus antipodarum*	2
	Gammarus duebeni	23
	Hydracarina	2
	Caenis sp.	23
	Polycentropus sp.	1
	Dytiscidae	11
	Elmidae	2
	Gyrinidae	2
	Chironomidae	c.800
	Empididae	1
	Pediciidae	7
	Simuliidae	2
Group D - Very Pollution Tolerant	Erpobdellidae	8
	Helobdella stagnalis	1
	Sphaeriidae	1
	Asellus aquaticus	46
Group E - Most Pollution Tolerant	Tubificidae	5
Not assigned to an indicator group	Lumbricidae	6
Instream Plants	*Phalaris arundinacea* <5%	
	Filamentous algae 30%	
	Bryophytes 10%	

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SITE 3 – Upstream of Tipperary Town Municipal WWTP

The invertebrate community at this site merits a Q-rating of Q3 indicating moderately polluted conditions and poor ecological quality.

INDICATOR GROUP	TAXON	Numbers
Group A - Very Pollution Sensitive	None recorded	
Group B - Moderately Pollution Sensitive	Limnephilidae	4
Group C - Moderately Pollution Tolerant	*Polycoelis sp.*	1
	Bathyomphalos sp.	1
	Bithynia sp.	14
	Planorbis sp.	1
	Valvata sp.	1
	Gammarus duebeni	6
	Serratella ignita	2
	Dytiscidae	7
	Ceratopogonidae	2
	Chironomidae	52
	Simuliidae	36
Group D - Very Pollution Tolerant	Erpobdellidae	10
	Glossiphonia complanata	8
	Helobdella stagnalis	2
	Sphaeriidae	10
	Asellus aquaticus	24
Group E - Most Pollution Tolerant	Tubificidae	5
	Chironomus sp.	5
Not assigned to an indicator group	Lumbricidae	1
	Lumbriculidae	5
Instream Plants	Filamentous algae 100%	

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SITE 4 – Downstream of Tipperary Town Municipal WWTP

The invertebrate community at this site merits a Q-rating of Q2-3 indicating moderately polluted conditions and poor ecological quality.

INDICATOR GROUP	TAXON	Numbers
Group A - Very Pollution Sensitive	None recorded	
Group B - Moderately Pollution Sensitive	Limnephilidae	2
Group C - Moderately Pollution Tolerant	*Bithynia sp.*	9
	Gammarus duebeni	6
	Dytiscidae	1
	Haliplidae	1
	Chironomidae	19
	Muscidae	1
	Pediciidae	1
	Simuliidae	1
Group D - Very Pollution Tolerant	Erpobdellidae	14
	Glossiphonia complanata	4
	Helobdella stagnalis	11
	Sphaeriidae	20
	Asellus aquaticus	33
Group E - Most Pollution Tolerant	Tubificidae	4
	Chironomus sp.	127
Not assigned to an indicator group	Lumbriculidae	1
Instream Plants	Filamentous algae 60%	
	Ranunculus sp. <5%	
	Phalaris arundinacea <5%	

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4.2.2.1 *Summary of Biological Water Quality Data*

Site Code	Location	Q-Rating	**Water Framework Directive Ecological Quality**	**Quality Status**
1	Ara River immediately upstream of proposed development site	Q3-4	Moderate	Slightly Polluted
2	Ara River immediately downstream of proposed development site	Q3	Poor	Moderately Polluted
3	Ara River c.1km downstream of proposed development and immediately upstream of Tipperary Town WWTP.	Q3	Poor	Moderately Polluted
4	Ara River c.1km immediately downstream of Tipperary Town WWTP.	Q2-3	Poor	Moderately Polluted

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4.2.2.2 *Relationship of Biological Water Quality Data with EPA chemical monitoring data*

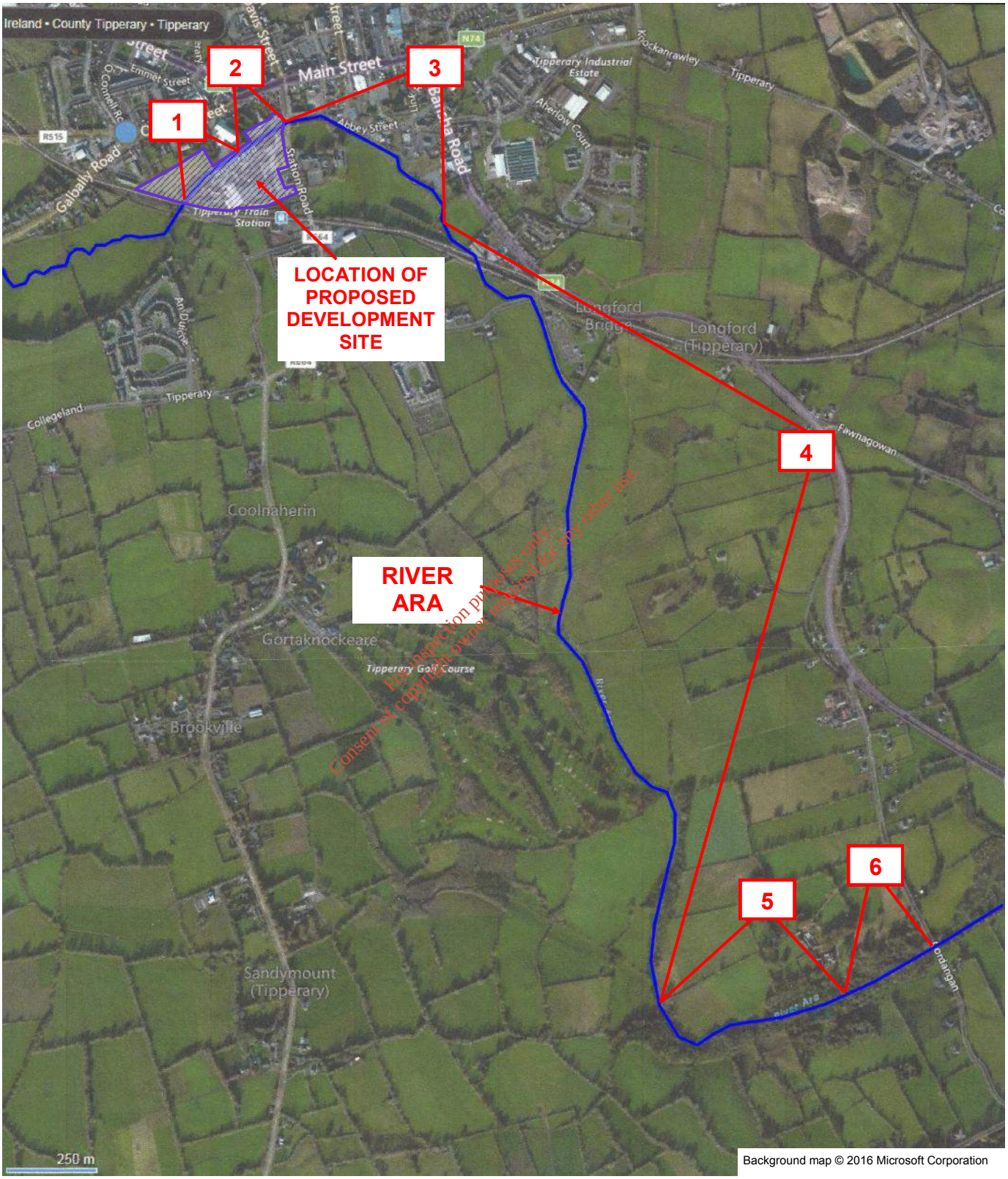
EPA has found a highly significant correlation between ortho-Phosphate and biological Q-ratings over the large number of sites and years for which it has data. (McGarrigle et al 2002). Q4 (Good Ecological Quality) is typically achieved at an annual mean ortho-Phosphate of 0.030 mg/l and at a maximum B.O.D of <3mg/l. This relationship is closely reflected in the ortho-Phosphate and biological Q-rating data from upstream and downstream of Tipperary Town.

	Upstream of Tipperary Town	**Downstream of Tipperary Town**
Mean ortho-Phosphate (EPA monitoring data)	0.047	0.082 mg/l
Biological Q-Rating	Q3-4 (present study)	Q3 (EPA data & present study)
Typical median ortho-Phosphate at measured Q-value	0.045 mg/l	0.070 mg/l

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MAP 1 LOCATION OF HABITAT ASSESSMENT SECTIONS

Locations shown are approximate; for exact locations, see Grid References in text

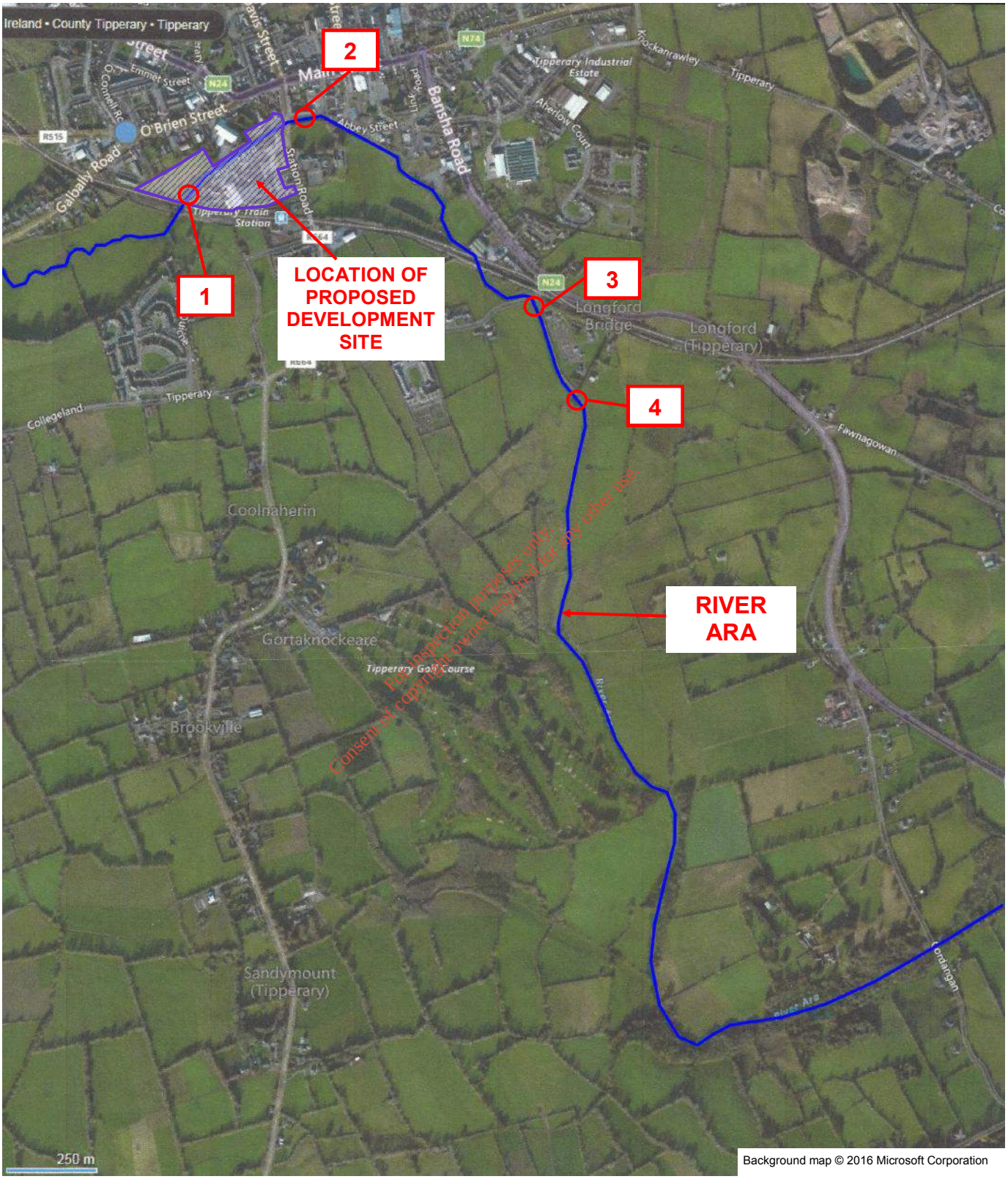


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MAP 2 LOCATION OF BIOLOGICAL ASSESSMENT SITES

Locations shown are approximate; for exact locations, see Grid References in text



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5 POTENTIAL IMPACTS

5.1 DESCRIPTION OF PROPOSED DEVELOPMENT

Tipperary Co-Operative Creamery Ltd. propose the development of a new milk drying facility at the site of their existing milk processing plant at Station Road, Tipperary Town. The proposed development works will include the following elements:

1. Enabling works including the establishment of a temporary Contractor's Compound within the former Hotel site on the northern side of the Ara River
2. Demolition works to facilitate the construction of the new dryer tower including demolition of the old Butter Store building, existing store building on the western side of the existing Dispatch Building and the removal of the existing fuel storage tanks together with bund structure and canopy roof structure over.
3. Partial demolition works, comprising the southern half of the existing powder store which falls within the development footprint of the new dryer tower building.
4. Construction of a new dryer tower building 32 metres in height and a footprint area of up to c.1,200m², incorporating an evaporator plant, dryer plant, air heater and heat recovery systems. With floors and access platforms provided at various levels within the building to support and facilitate access to the new plant systems.
5. Provision of an additional Evaporator Plant
6. Installation and commissioning of all associated plant installations;
7. Decommissioning of the two existing 'Rodgers' dryers located within the building to the rear of the protected structure within the central section of the creamery site;
8. Upgrade of the existing Waste Water Treatment Plant (WWTP) with a new balance tank and clarifier to cater for the additional flow rate generated by the new Dryer 2 Facility and to improve the quality of treated effluent discharged to the public sewer
9. Site works associated with the above development works including drainage works and pavement works

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5.1.1 Demolition Phase

The demolition phase to facilitate the construction of the new dryer tower will involve the demolition of the old Butter Store building, existing store building on the western side of the existing Dispatch Building and the removal of the existing fuel storage tanks together with bund structure and canopy roof structure.

5.1.2 Construction Phase

The construction phase includes the construction of a new dryer tower building 32 metres in height and a footprint area of up to c.1,200m², incorporating an evaporator plant, dryer plant, air heater and heat recovery systems; with floors and access platforms provided at various

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levels within the building to support and facilitate access to the new plant systems. The proposed development also includes enabling works including establishment of a temporary Contractor's Compound within the former Hotel site on northern side of the Ara River .

5.2 AN ASSESSMENT OF THE PRE-MITIGATION POTENTIAL AQUATIC ENVIRONMENTAL IMPACT OF THE PROPOSED DEVELOPMENT DURING THE PERIOD OF DEMOLITION & CONSTRUCTION

As the River Ara flows along the northern boundary of the site, the entire demolition and construction site and construction compound are in close proximity to the River Ara.

While the proposed development will be commissioned on made-ground, there is still the possibility of water pollution due to accidental spillage, dust, surface run-off containing concretes and demolition material.

5.2.1 Pollution of streams/rivers with suspended solids

In the absence of adequate mitigation, any element of the proposed demolition process which will generate fine particles and any element of the proposed construction which involves excavation or placement of excavated materials has the potential for suspended solids contamination of surface waters.

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Harmful effects include:

- Suspended sediment due to runoff of soil from construction areas, or due to disturbance of fine sub-surface sediments in the course of instream construction and excavation, can have severe negative impacts on invertebrate and plant life and on all life stages of salmonid fish.
- Suspended sediment can settle on spawning areas, infill the intragravel voids and smother the eggs and alevins (newly hatched fish) in the gravel.
- Bed Load (coarse material transported along the bottom of the stream) and settled sediments can infill pools and riffles, reducing the availability and quality of rearing habitat for fish.
- Suspended sediment can reduce water clarity and visibility in the stream, impairing the ability of fish to find food items.
- Settled sediments can smother and displace aquatic organisms such as macroinvertebrates, reducing the amount of food items available to fish.
- Increased levels of sediment can displace fish out of prime habitat into less suitable areas (Chilibeck *et al* 1992).
- Suspended solids can abrade or clog the gills of salmonid fish. It takes a high concentration of solid wastes to clog a fish gill and cause asphyxiation, but only a little to cause abrasions and thus permit the possibility of infections (Solbe 1988).
- Silt has been identified in the scientific literature as a serious threat to Margaritifera; the I.U.C.N. Red Data Book states that in the U.K. Margaritifera is 'threatened by siltation' and in North America 'accelerated siltation from land development could

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endanger them in future' (Wells *et al* 1983); Valovirta (1989) cites increase in the silt load of rivers as a reason for the decline of Margaritifera in Finland. Hendelberg (1960) and Young and Williams (1983) also implicate silt in damaging or eliminating Margaritifera populations. As juvenile Margaritifera are fully buried in the sand and gravel of the river bed they are more vulnerable to siltation. 'Any siltation of the river bed results in a rapid decrease in the oxygen content of the interstitial water and death of the juveniles living there.' (Buddensiek *et al* 1993)

In this regard substantial mitigation by avoidance has been applied. The relocation of the proposed dryer tower building to the south east and retention of the northern half of the powder store, will isolate the proposed development from the adjacent Ara River and eliminate the works previously proposed directly to and along the river bank. This will reduce the potential construction stage impacts on the river. Furthermore it is no longer intended to provide a temporary footbridge access over the River Ara between the former hotel site and the construction site, thereby avoiding significant potential impacts on the Ara River.

5.2.2 Pollution of Watercourses with Nutrients due to Ground Disturbance during Construction

The main potential sources of nutrient inputs to freshwater due to ground disturbance are nutrients adsorbed or chemically bound to eroded suspended solids.

Several studies in the United States have found increases in both nitrogen and phosphorus export into streams following ground disturbance, particularly in association with organic particles (Golladay & Webster 1988, Likens et al 1970). Busman *et al* (2002) found that "*phosphorus in soils is almost entirely associated with soil particles. When soil particles are carried to a river or lake, phosphorus will be contained in this sediment. … Phosphate in soils is associated more with fine particles than coarse particles. When soil erosion occurs, more fine particles are removed than coarse particles, causing sediment leaving a soil through erosion to be enriched in phosphorus*". It is therefore concluded that in the context of the proposed development, the main potential source of nutrient enrichment of surface waters due to soil disturbance will be nutrients associated with eroded soil particles.

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5.2.3 Pollution of streams/rivers with other substances associated with the demolition, decommissioning & construction processes

The potential exists for a range of serious pollutants to enter watercourses during the demolition, decommissioning and construction processes. For example any of the following will have deleterious effects on fish, plants and invertebrates if allowed to enter watercourses:

- Fuels, lubricants and hydraulic fluids from equipment used on the development site;
- Hydrocarbons potentially released during removal of the fuel storage tanks and the bunded area;
- Contamination from hazardous waste material deriving from improper decommissioning of buildings, or incorrect storage of contaminated waste material;

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- Contamination from hazardous waste material deriving from incorrect storage of contaminated waste material;
- Contamination from hazardous waste material in runoff deriving from erosion of contaminated soils;
- Raw or uncured concrete and grouts;
- Wash down water from exposed aggregate surfaces, cast-in-place concrete and from concrete trucks, and
- Cementous material generated during the demolition process.

Concrete, bentonite, grout and other cement-based products are highly alkaline and corrosive and can have significant negative effects on surface water quality. Cement-based products generate very fine, highly alkaline silt (pH 11.5) that can physically damage fish by burning their skin and blocking their gills. The alkaline silt can also smother vegetation and the bed of watercourses and can mobilise pollutants such as heavy metals by altering the water's pH.

The main hydrocarbons of concern are the petrochemical derived group, which includes petrol, fuel oils, lubricating oils and hydraulic fluids. In unmodified form these are liquid, virtually insoluble and lighter than water. Some hydrocarbons, such as bitumen and heavy fuel oil, become heavier than water when affected by naturally occurring bacteria and can then be treated as sediments. Some hydrocarbons exhibit an affinity for sediments and thus become entrapped in deposits from which they are only released by vigorous erosion or turbulence (Luker & Montague 1994). EIFAC (Svobodova *et al* 1993) states that "*a sensory assessment is preferred to toxicological analysis in determining the highest admissible amounts of oil and oil products that can be present in water; on this basis the highest admissible concentrations are in the range of 0.002 to 0.025 mg per litre*".

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Harmful effects include:

- The prevention of gaseous exchange at the water surface, leading to reduced dissolved oxygen in the underlying water (Solbe 1988)
- In the case of turbulent waters the oil becomes dispersed as droplets into the water. In such cases, the gills of fish can become mechanically contaminated and their respiratory capacity reduced (Svobodova *et al* 1993).
- Oil products or their combustion products may contain various highly toxic substances, such as benzene, toluene, naphthenic acids, xylene and PAHs (polyaromatic hydrocarbons) which are to some extent soluble in water; these penetrate into the fish and can have a direct toxic effect. It is generally agreed that the lighter oil fractions (including kerosene, petrol, benzene, toluene and xylene) are much more toxic to fish than the heavy fractions (heavy paraffins and tars) (Svobodova *et al* 1993).

In this regard substantial mitigation by avoidance has been applied. The relocation of the proposed dryer tower building to the south east and retention of the northern half of powder store will isolate the proposed development from the adjacent Ara River and eliminate the works previously proposed directly to and along the river bank. This will reduce the potential construction stage impacts on the river. Furthermore it is no longer intended to provide a

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temporary footbridge access over the River Ara between the former hotel site and the construction site, thereby avoiding significant potential impacts on the Ara River.

5.2.4 Introduction or spread of invasive non-native aquatic species during construction

The potential exists for invasive non-native species to be brought onto the construction site on machinery, tools and soil, or for invasive species already present on site to be transported to new locations. When a non-native species displays invasive qualities and is not managed it can potentially:

i. Out-compete native vegetation, affecting plant community structure and habitat for wildlife.

ii. Cause damage to infrastructure including road carriageways, footpaths, walls and foundations.

iii. Result in soil erosion and collapse of river banks through exposure of the soil during winter when plants die back.

iv. Have an adverse effect on landscape quality through a loss of naturalness, aesthetics and regional identity.

(NRA 2010)

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5.3 AN ASSESSMENT OF THE PRE-MITIGATION POTENTIAL OPERATIONAL AQUATIC ENVIRONMENTAL IMPACT OF THE PROPOSED DEVELOPMENT

5.3.1 Pollution of streams/rivers with surface runoff from completed development

The main pollutants of concern are:

- Liquid milk/ milk by-products
- Petrochemicals

5.3.1.1 Liquid milk/ milk by-product

See section 5.3.2 below.

5.3.1.2 Petrochemicals

Potentially polluting petrochemicals include petrol, fuel oils, and lubricating oils which may be stored or leaked from vehicles. In unmodified form these are liquid, virtually insoluble and lighter than water. Some hydrocarbons exhibit an affinity for sediments and thus become entrapped in deposits from which they are only released by vigorous erosion or turbulence (Luker & Montague 1994).

EIFAC (Svobodova *et al* 1993) states that "*a sensory assessment is preferred to toxicological analysis in determining the highest admissible amounts of oil and oil products that can be*

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present in water; on this basis the highest admissible concentrations are in the range of 0.002 to 0.025 mg per litre".

Harmful effects include:

- The prevention of gaseous exchange at the water surface, leading to reduced dissolved oxygen in the underlying water (Solbe 1988).
- In the case of turbulent waters the oil becomes dispersed as droplets into the water. In such cases, the gills of fish can become mechanically contaminated and their respiratory capacity reduced (Svobodova *et al* 1993).
- Oil products may contain various highly toxic substances, such as benzene, toluene, naphthenic acids and xylene which are to some extent soluble in water; these penetrate into the fish and can have a direct toxic effect. It is generally agreed that the lighter oil fractions (including kerosene, petrol, benzene, toluene and xylene) are much more toxic to fish than the heavy fractions (heavy paraffins and tars) reduced. (Svobodova *et al* 1993)

5.3.2 Pre-mitigation Potential Impact of Discharge

Most of the wastewater from the existing creamery and from proposed development is/will be pre-treated onsite before being piped to the Tipperary Town Municipal WWTP. It is proposed that condensate will continue to be treated on site and discharged to the River Ara at the site. Therefore for the purposes of the present report the only trade discharge to be considered is the discharge of treated condensate to the River Ara. The product being dried (Skim, Butter, Whole Milk, Whey etc.) can impact on the quality of the condensate produced at the plant. http://www.epa.ie/licences/lic_eDMS/090151b28045b35c.pdf and cause elevation of B.O.D., ortho-Phosphate and ammonia in receiving waters, with potentially significant negative impacts on biological water quality, aquatic flora and fauna and particularly on salmonid fish.

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5.3.3 Potential pre-mitigation impacts on freshwater aquatic qualifying interests of Natura 2000 site

Qualifying Interest	Observations	Potential Direct / In-situ impacts	Potential Indirect/ Ex-situ Impacts
Freshwater Pearl Mussel *Margaritifera margaritifera*	The only part of the Suir cSAC listed as "designated for *Margaritifera margaritifera*" is the Clodiagh River (Waterford) which is not downstream of the proposed development	No	No
White-clawed Crayfish *Austropotamobius pallipes*	Biodiversity Ireland (www.biodiversity.ie) maps show widespread records of crayfish in the Aherlow River and from the lower section of the River Ara at Ara Bridge. As the closest SAC population is c.19km downstream of the proposed development no significant risk is evident	No	No
Sea Lamprey *Petromyzon marinus/*	O'Connor (2007) recorded no sea lamprey in the Ara or Aherlow Rivers. Nevertheless applying the precautionary principle the closest possible SAC population is c.19km downstream of the proposed development. Therefore no significant risk is evident.	No	No

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Qualifying Interest	Observations	Potential Direct / In-situ impacts	Potential Indirect/ Ex-situ Impacts
Brook Lamprey *Lampetra planeri* /River Lamprey *Lampetra fluviatilis*	O'Connor (2007) surveyed two sites on the River Ara and stated: "The lower Ara (A4) yielded the highest lamprey catch on this system (Aherlow catchment) with 33 lampreys recorded in an area of 5 m^2. …The site investigated on the upper Ara (A5) had no lampreys present." Brook/river lamprey but no sea lamprey were recorded in the Ara River system. O'Connor (2007) surveyed six sites in the River Aherlow sub-catchment: three on the River Aherlow itself, two on the Ara tributary, and one on the Rossadrehid tributary. Out of the six sites surveyed, five had lampreys present. Brook/river lamprey but no sea lamprey were recorded in the Aherlow system. As the closest possible SAC population is c.19km downstream of the proposed development therefore no significant risk is evident.	No	No
Twaite Shad *Alosa fallax*	The normal habitat of this species is the sea – especially coastal waters off the south-west coast of northern Europe. At maturity, the adult fish stop feeding and gather in early summer in the estuaries of slow-flowing rivers where there is easy access from the sea, thereafter moving upstream to spawn in mid-June in the stretches directly above the influence of high tides. The eggs take about 4-6 days to hatch, and the young drop quickly downstream in the current to the quieter waters of the upper estuary where they start to feed and grow. Maitland & Campbell (1992). Kurz & Costello (1996) and Aprahamian & Aprahamian (1990) reported that twaite shad spawned at the head of the tide in the R. Nore, R. Suir and R. Barrow. No records have been found for Twaite Shad in the Aherlow River section of the SAC and a significant likelihood of the species occurring here can be ruled out on the basis of the biology of the species.	No	No

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Qualifying Interest	Observations	Potential Direct / In-situ impacts	Potential Indirect/ Ex-situ Impacts
Atlantic Salmon *Salmo salar* (only in fresh water)	In 2010 Inland Fisheries Ireland surveyed a site on the Aherlow River upstream of Killardry Bridge, approximately 4km upstream of the river's confluence with the River Suir; juvenile salmon were the most abundant species recorded. Central Fisheries Board (2006) found that in general the best of the salmon spawning and nursery habitat in the main channel of the Aherlow River was in the upper reaches of the river and in lower reaches of the main channel. "Good stocks of 1+ salmon were evident at all locations with suitable habitat." The available evidence indicates that the Aherlow River is a significant salmon spawning and nursery area in the context of the Suir catchment. Regarding the Ara River Central Fisheries Board (2006) stated: "Density estimates for 1+ salmon were between 0 and 0.181 fish/m2. Only the furthest downstream site electrofished showed any signs that this river has the potential to produce salmon. Most, if not all, of the upper to mid reaches of the Ara hold very little capacity to produce (salmon) fry or parr. The only suitable habitat is limited to the lower reaches downstream of Bansha. Survey results indicate that 18.32% of all salmonids, from this system, were salmon parr indicating a poor salmon presence within this catchment." As the closest possible SAC population is c.19km downstream of the proposed development no significant risk is evident.	No	No

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Qualifying Interest	Observations	Potential Direct / In-situ impacts	Potential Indirect/ Ex-situ Impacts
Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation	Watercourses characterised by submerged or floating-leaved vegetation ("Ranunculion fluitantis and Callitricho-Batrachion vegetation") are listed in Annex II of the Habitats Directive. The definition of watercourses characterised by Ranunculion fluitantis and Callitricho-Batrachion communities is very wide, in practice covering the majority of rivers and streams with aquatic plant communities of note (Hatton-Ellis & Grieve 2003). Species characteristic of the habitat type include Callitriche sp., and Potamogeton sp. (European Environment Agency www.eunis.eea.europa.eu/habitats-factsheet.jsp). As the closest possible SAC location of this habitat population is c.19km downstream of the proposed development no significant risk is evident.	No	No

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6 MITIGATION MEASURES

6.1 MITIGATION OF THE POTENTIAL AQUATIC IMPACT OF THE PROPOSED DEVELOPMENT DURING THE PERIOD OF CONSTRUCTION

6.1.1 Reduction and prevention of suspended solids pollution

i. In accordance with Inland Fisheries Ireland Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016): The level of suspended solids in any discharges to fisheries waters as a consequence of construction works shall not exceed 25mg/l, nor result in the deposition of silts on gravels or any element of the aquatic flora and fauna.

ii. Runoff and surface erosion control is more effective and less expensive than sediment control with sediment control ponds only. It will be necessary to intercept and treat all surface water drainage from the proposed demolition/ construction area and the proposed construction compound area to remove suspended solids, cementitious material and hydrocarbons before releasing it the River Ara.

iii. Eroded sediments will be retained on site with erosion and sediment control structures such as sediment traps, silt fences, sediment control ponds or if necessary a mobile 'Siltbuster' or similar equivalent specialist treatment system. Sediment ponds and grit/oil interceptors will be placed towards the end of drainage channels but sufficiently well back from the receiving river to avoid any possibility of inundation by the river in flood conditions.

iv. Before earthworks, demolition or construction commence (i.e. before they are needed) erosion control and sediment control measures must be in place and functioning.

v. Demolished building material will be stored away from nearby water sources in a segregated area, prior to waste collection. Any contaminated building waste of soil, particularly around the fuel storage area and bund structure, will be segregated from other waste demolition materials and will be stored within temporary bunded storage areas.

vi. Other building waste which may contain fine particulate matter and cementitious material will be protected from rain using polyethylene sheeting or stored in a roofed area or stored in temporary bunded storage areas.

vii. Temporary fills or stockpiles will be covered with polyethylene sheeting.

viii. Demolition waste will be removed from site regularly by appropriate waste disposal contractors for off-site treatment/recycling/disposal. Non-hazardous building waste will be disposed to on-site skips for removal by a licensed waste disposal contractor.

ix. Dust suppression methods may be implemented to reduce the generation of dust and fine particles. Inland Fisheries Ireland requires that water abstraction for dust suppression shall only take place from watercourses identified and agreed with IFI. Abstraction points shall be screened so as to ensure that fish and aquatic plants are not removed from waters in the abstraction process.

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x. To avoid generation of suspended solids instream works in the River Ara will be avoided.

xi. Any dewatering of open trenches etc. will be discharged to a settlement pond to remove suspended solids before being released to surface waters.

xii. At locations where excavated materials are stored, drains will surround and intercept surface runoff from materials mounds and distribute this water to the controlled drainage system in place.

xiii. Appropriate mitigation measures will be implemented to ensure significant risks of suspended solids contamination of streams/rivers will not occur during the construction phase, however permission on the undertaking of construction activities between the end of September and the end of April will be sought from Inland Fisheries Ireland prior to commencement of construction.

6.1.2 Reduction and prevention of other demolition & construction generated pollution

i. Demolished building material will be stored at least 50m away from the river in a segregated area, prior to waste collection. Any contaminated building waste of soil, particularly around the fuel storage area and bund structure, will be segregated from other waste demolition materials and will be stored within temporary bunded storage areas.

ii. Other building waste which may contain fine particulate matter and cementitious material will be protected from rain using polyethylene sheeting or stored in a roofed area or stored in temporary bunded storage areas.

iii. Prior to removal of the bund structure, the bund will be cleaned and contaminated run-off will be collected and safely disposed of by appropriate contractor. The demolished bund structure will be inspected carefully and if present, contaminated waste material will be segregated and disposed by the correct waste disposal company.

iv. All tanks on site will be properly labelled showing their contents and capacities. The bund and tanks facilities will be checked on a regular basis to ensure any leaks or drips are fixed to prevent loss and pollution. Drainage from bunded areas will be diverted for collection and safe disposal by appropriate contractors.

v. Any spillages will be cleaned up and disposed of correctly.

vi. In the unlikely event that soil material is contaminated by accidental spillages it will be isolated and contained until appropriate waste classification can be carried out, followed by approved disposal and treatment off-site. Training in emergency response procedures for such occurrences will be provided to all site personnel.

vii. Spill kits will be retained on site to ensure that any spillages or leakages are dealt with immediately. Material Safety Data sheets will be maintained and located on site in the event that a spillage occurs.

viii. An emergency plan to deal with accidental spillage will be drafted and kept on site during the construction period.

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ix. Raw or uncured waste concrete will be disposed of by removal from the site.

x. Before release to the environment, wash down water from exposed aggregate surfaces, cast-in-place concrete and from concrete trucks will be treated to a level which will ensure that total suspended solids in discharges to surface waters (including drains) will not exceed 25mg/l. Furthermore wash out water will not be released to the environment until it has reached a neutral pH.

xi. Only the chute of the concrete delivery truck will be cleaned on site, using the smallest volume of water necessary. Concrete trucks will be directed back to their batching plant for washout.

xii. Clearly visible signs will be placed in prominent locations close to concrete pour areas, stating that washout of concrete lorries is not permitted on the site.

xiii. The arrangements for concrete deliveries to the site will be discussed with suppliers before commencement of work, agreeing routes, prohibiting on-site washout and discussing emergency procedures.

xiv. So as to avoid spillage, concrete will not be transported around the site in open trailers or dumpers and where possible concrete will be pumped directly into the shuttered formwork from the delivery truck.

xv. Concrete pours will be avoided where prolonged periods of heavy rain are forecast and covers will be available for freshly placed concrete to avoid the surface washing away in heavy rain.

xvi. Fuels, lubricants and hydraulic fluids for equipment used on the construction site, as well as any solvents, oils, and paints will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to codes of practice (Enterprise Ireland BPGCS005).

xvii. Fuelling and lubrication of equipment will be carried out in a specially bunded area.

xviii. Oil booms and oil soakage pads will be kept on site to deal with any accidental spillage.

xix. Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling.

xx. All pumps using fuel or containing oil will be locally and securely bunded when situated within 25m of waters or when sited such that taking account of gradient and ground conditions there is the possibility of discharge to waters.

xxi. Sites for use as storage areas, machinery depots, site offices, or the disposal of spoil will be located as far as is practicable from watercourses. In general any site which is at least 50m from the nearest watercourse may be chosen. Storage of soils will not be carried out in any location where runoff can occur into watercourses.

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6.1.3 Mitigation of pollution of watercourses with nutrients due to ground disturbance

As much of the potential nutrient input to streams during ground disturbance is associated with suspended soil particles, the measures outlined in Section 6.1.1 above apply equally to prevention of nutrient inputs to streams.

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6.1.4 Method Statement / Environmental Operating Plan

The Project Team will draw up a Method Statement (MS)/Environmental Operating Plan (EOP) which includes detailed mitigation measures. This method statement will be strictly adhered to by the contractor involved in the works. The method statement will detail how these mitigation measures will be monitored for effectiveness by the Project team which will include on-going consultation with IFI throughout all phases of the works. A mechanism for reporting of pollution incidents will be agreed in advance between the contractor(s) and the developer.

Before works commence on site, the Project Team will be required to prepare an Environmental Operating Plan (EOP) which will incorporate all of the avoidance and mitigation measures. In addition, the Project Team will consult with the NPWS and IFI in relation to the final detail of the Plan and shall include their requirements in this regard.

Before earthworks commence on site, and before they are needed - erosion control and sediment control measures must be in place and functioning and must be inspected and approved by the Ecological Clerk of Works (ECoW).

6.1.5 Ecological Clerk of Works

- An Ecological Clerk of Works (ECoW) will be employed who will make at least weekly site visits for the duration of the construction works and more frequently at start-up and during critical construction events such as concrete pours as outlined below.
- The ECoW will also be the liaison for the purposes of consulting environmental bodies including the NPWS and IFI. The ECoW will be responsible for carrying out regular audits of the EOP on behalf of the proposed developer. In addition, the ECoW will be the primary person involved in the developer's monitoring role. The ECoW will be delegated sufficient powers under the construction contract so that he/she will be able to instruct the contractor to stop works and to direct the carrying out of emergency mitigation/clean-up operations.
- The ECoW will maintain a register indicating whether all mitigation measures have been carried out satisfactorily. This register will be signed off by the Project team's site foreman.

Separate from the on-going monitoring carried out by the contractor as part of the EOP, the ECoW shall carry out the inspection/ monitoring regime described below on behalf of the employer. The results will be stored in the ECoW's monitoring file and will be available for inspection/ audit by the Client, NPWS or IFI staff. The main elements of the inspection/ monitoring regime are as follows:

- Project team inspection of surface water treatment measures on a daily basis with the results to be included within the weekly monitoring file to be audited by the ECoW;
- Daily visual inspection of the watercourses in proximity to the works by the project team with the results to be included within the weekly monitoring file to be audited by the ECoW;
- Wheel wash facilities shall be inspected on a weekly basis.

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- Stockpiles shall be monitored on a daily basis by the project team while being filled or emptied and otherwise on a weekly basis, with the results to be included within the weekly monitoring file to be audited by the ECoW.
- Control measures for works at or near water bodies shall be inspected on a daily basis by the project team with the results to be included within the weekly monitoring file to be audited by the ECoW.
- Concrete operations at or near watercourses shall be supervised by the ECoW and designated chute washing out facilities shall be inspected on a daily basis by the project team with the results to be included within the weekly monitoring file to be audited by the ECoW..
- Inspection of attenuation ponds, their release systems and other attenuation features such as silt traps etc.
- The Project EOP monitoring results shall be audited on a frequent basis (weekly at a minimum).

Where the ECoW or the Project Team has carried out an investigation of a release of sediment to a watercourse causing a plume, the following procedure shall be followed:

- The relevant NPWS and IFI staff shall be notified immediately.
- The discharge generating the sediment discharge shall be stopped immediately.
- The contractor will be required to take immediate action and to implement measures to ensure that such discharges do not re-occur.
- Works shall not recommence until appropriate corrective measures to avoid any repetition are put in place. Such measures shall be agreed with the ECoW following consultation with the NPWS and IFI and shall be in accordance with the requirements of these control measures.
- Where the discharge is from one of the control measures associated with the works, the controlled discharge shall not recommence until written consent is received from the ECoW.
- Where the ECoW considers that the risk of a sediment release is high, he/ she will inform the Project team and the contractor and request protective action to be taken. Where the contractor does not take immediate action the ECoW will instruct the Project Team to take action and same willl be reported to the Contract Manager and the Project Team manager.
- The ECoW will be delegated powers under the contract sufficient for these instructions to be issued and for an instruction to stop works or carry out emergency works.

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6.1.6 Procedure for contractor

The Project Team will establish contact with Inland Fisheries Ireland and National Parks & Wildlife Service before works commence, and there will be ongoing liaison with these bodies throughout the construction process. The Project Team will be in possession of, and familiar with the contents of "Control of water pollution from construction sites - Guidance for

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consultants and contractors" published by the Construction Industry Research and Information Association (CIRIA 2001) (e-mail enquiries@ciria.org.uk).

6.2 MITIGATION OF POTENTIAL LONG-TERM AQUATIC IMPACT OF THE EXISTENCE OF THE PROPOSED DEVELOPMENT

6.2.1 Mitigation of impact of waste water discharge

In June 2016 the biological water quality assessment indicated that the Ara River is not at present achieving "Good" Ecological Status immediately upstream and immediately downstream of the proposed development (see Section 4.2.2 above). These findings are consistent with EPA biological water quality monitoring results for the Ara River since 2008 (see Appendix 1). The achieving of Good ecological status is a requirement of the Environmental Objectives (Surface Waters) Regulations 2009. The Q-rating macroinvertebrate assessment method, which is the main component of the EPA ecological water quality monitoring, "*mainly reflects the effects of organic pollution (i.e. deoxygenation and eutrophication*" (McGarrigle *et al* 2002). The main potential contaminants in Dairy wastewater are organic matter and nutrients which directly affect the main index of ecological water quality.

The WFD Objective for the Ara River is to restore at least Good status within the next 5 years (i.e. by 2021).

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The biological assessment carried out for the present report assessment recorded a Q-rating of Q3-4 (see Section 4.2.2 above) immediately upstream of the town, and EPA biological monitoring has recorded a biological Q-rating of Q3 c.4.5 km upstream of the town since 2008. Good biological status is therefore not at present being achieved upstream of the town. Biological data from the present study (Q3 rating) (see Section 4.2.2 above) and EPA biological data (see Appendix 1) (Q3 rating) indicate that the Ara River is at present not achieving the good status required by the Surface Waters Regulations (2009) immediately downstream of Tipperary Town. Biological assessment indicates a decline from moderate to poor biological status within Tipperary town and a failure to achieve good status. This decline is also reflected in the mean ortho-Phosphate levels which increase from 0.047 mg/l to 0.082mg/l within the town.

The WFD Ireland objective for the Ara River requires both good biological status and good chemical status to be achieved by 2021. In the context of catchment management this will require (1) pollution inputs to the Ara River upstream of the town to be identified and eliminated and a biological Q-rating status of Q4 or higher to be achieved; (2) pollution inputs within Tipperary Town which are causing a decline in water quality from Q3-4 to Q3 to be identified and at least a Q4 biological status achieved. In the context of such catchment management measures, the proposed discharge of condensate treated by a reverse osmosis plant with maximum discharge concentration of 0.2mg/l ortho-Phosphate and maximum discharge of 1,300m^3/day will not compromise the achieving of the objective of Good Ecological Status in the receiving waters by 2021.

6.2.2 Mitigation of pollution of watercourses with contaminated water draining paved and roofed areas

A sustainable drainage system will be installed for all surface waters draining from hard areas of the proposed development including access roads, car parks, storage areas, roofs etc.. The

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system installed will have a proven capability of achieving and sustaining at least the following pollution reduction in runoff:

- Total Suspended Solids maximum 25mg/l
- Heavy Metals 50 – 80% reduction
- Chemical Oxygen Demand 50% reduction
- Hydrocarbons 90% reduction

Petrol/oil and grit interceptors will be located at outfalls to watercourses. Design of those interceptors will conform to the recommendations of CIRIA Report No. 142 (Luker & Montague 1994).

As virtually all treatment options require proper maintenance in order to function properly, and as some such as oil interceptors can become a source of pollution if not properly maintained, a programme of regular cleaning, maintenance and inspection of the runoff treatment system will be put in place to ensure it functions correctly.

Fuels, lubricants and hydraulic fluids for equipment used at the facility, as well as any solvents, oils, chemicals and paints will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and stored in appropriately bunded areas.

The sustainable drainage system will be designed with a cut-off system to enable any serious spillage of pollutants to be contained within the drainage system and prevented from being released to the River Ara.

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6.2.3 Mitigation of potential pollution of surface waters by effluent from process area

All milk delivery, storage and processing areas will be fully roofed against rain, bunded to contain any accidental spillages, and drained on an impervious surface to a holding tank for piping to the waste treatment facility. The holding tank will have the capacity to contain any potential accidental spillages.

Effluent storage tanks will be of water retaining reinforced concrete construction and will have an interstitial monitoring device with automatic alarms. All USTs will be provided with overfill prevention. Fuel, effluent or liquid milk or milk product storage tanks will comply with current regulations and be adequately bunded.

Best practice must be employed to prevent accidental spillages/leakage at all stages from delivery to shipment of potentially polluting materials. Failsafe spill contingency procedures will be put in place to minimise the risk of accidental emission of materials to prevent their entry into surface water drains and the aquatic environment should spillage occur. Sufficient storage will be provided to ensure that this can be achieved.

6.2.4 Mitigation of habitat loss

One of the most effective methods of minimising loss of stream and riparian habitat during developments is the establishment of Leave Strips (riparian buffer zones). Leave strips are the areas of land and vegetation adjacent to watercourses that are to remain in an undisturbed state, throughout and after the development process (Chilibeck *et al* 1992). Leave strips are

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valuable not only because riparian vegetation is a vital component of a healthy stream ecosystem, but because this vegetation acts as an effective screen/barrier between the stream and the development area, intercepting runoff and acting as an effective filter for sediment and pollutants from the development area. The strip of riparian vegetation between the existing creamery river wall and the river will be retained and left undisturbed. Likewise the strip of riparian vegetation adjoining the proposed construction compound will be left undisturbed.

6.2.5 Prevention of spread of invasive non-native aquatic species during construction and/or operation of the proposed development

The introduction of Alien Invasive Species (AIS) through spoil on machinery must be avoided. To prevent the instruction of AIS, hot power washing of machinery will be carried out before it is introduced to the sites and after site works have been completed before machinery is moved to another site.

6.3 MONITORING

To monitor the proposed development during construction, a biological and chemical monitoring system will be put in place on potentially affected sections of the River Ara. Monitoring of surface water discharges from the construction/demolition site should also be carried out. As a minimum the monitoring system will measure Q-values, B.O.D., suspended solids, turbidity, pH, molybdate reactive phosphorus & pH on the River Ara upstream and downstream of the proposed development. Monitoring of discharges should include suspended solids, pH and visual assessment for hydrocarbons. Details of monitoring including monitoring site locations, variables to be monitored, frequency of monitoring etc. will be agreed in advance with Inland Fisheries Ireland.

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As Good ecological water quality is not at present being achieved either upstream or downstream of the proposed development, biannual (spring and autumn) biological Q-rating assessment will be carried out at Sites 1, 2, 3 & 4 (see section 3.3.1 above) by operatives that have formally intercalibrated their Q-rating analysis with EPA. This monitoring will continue until good ecological status is consistently achieved upstream and downstream of the development.

7 RESIDUAL IMPACT

If the mitigation measures specified in Section 6 above are implemented in full, the residual negative impact of the proposed development on aquatic flora, fauna and habitats will be insignificant.

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APPENDIX 1

EPA BIOLOGICAL WATER QUALITY DATA

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River and Code: **SUIR** **16S02**

Tributary of: Waterford Harbour OS Catchment No: 182

OS Grid Ref of confluence: S 402 215

Date(s) Surveyed: 31/12/1971, 31/12/1974, 31/12/1978, 31/12/1980, 31/12/1982, 31/12/1985, 31/12/1986, 31/12/1988, 31/12/1992, 31/12/1993, 31/12/1996, 12/10/1999, 13/10/1999, 15/10/1999, 8/10/1999, 2/9/2002, 3/9/2002, 4/9/2002, 5/9/2002, 1/9/2005, 2/9/2005, 29/8/2005, 30/8/2005, 31/8/2005, 22/9/2008, 23/9/2008, 24/9/

Biological Quality Ratings (Q Values)

Station Nos.	1971	1974	1978	1980	1982	1985	1986	1988	1992	1993	1996	1999	2002	2005	2008	2011	2014
0025	-	-	-	-	-	-	4	4	4	-	3-4	4	4	4	-	-	-
0050	-	-	-	-	-	-	3-4	3	4	-	-	-	-	-	-	-	-
0100	5	5	5	5	-	4	3-4	3-4	4	-	4	4	3-4	4	4	4	4
0200	-	4	4-5	5	4	-	4	3-4	4	-	3-4	3-4	4	3-4	3-4	3-4	3
0300	3-4	3-4	2-3	3	3	-	3	3	3-4	-	3	3	3	3	3	3-4	3-4
0400	3-4	3-4	3	3	3	3	3	3	3	-	-	-	-	n/s	-	-	-
0500	4-5	4	3-4	3-4	3-4	-	4	4	4	-	3-4	4	4	3-4	4	4	4
0600	2	2	3	3	3	3	3	3	3	-	3	3	3	3	3	3	3-4
0800	-	-	3	3	3-4	3-4	3-4	4	4	-	-	-	-	-	-	-	-
0810	2-3	2	2	3	2-3	3-4	3-4	-	-	-	-	-	-	-	-	-	-
0900	2	2-3	2-3	2-3	3	3	3	3	3-4	-	3-4	3-4	4	3	3	3-4	4
1000	-	-	3-4	3	3	3	3	3	3-4	-	-	-	-	-	-	-	-
1100	-	4	3-4	3-4	3	-	-	3	3-4	-	3	3-4	3-4	3	3	3-4	4
1200	4	4	4	4	3-4	3-4	3-4	3	4	-	3-4	3-4	4	3	4	4	4
1300	5	4	5	5	4-5	4	4	4	4	-	4	4	4-5	3-4	4	4	4
1400	4-5	4-5	4-5	4	4	4	4	4	4	-	4	3-4	4	3-4	4	4	4
1450	-	-	3	3	2-3	-	4	4	-	4	-	-	-	-	-	-	-
1500	4-5	4	4-5	4	4	-	4	4	-	4	4	4	3-4	3-4	4	4	4
1600	4-5	4-5	4	4	-	-	4-5	4	-	4	4	4	3-4	4	4	4	4
1700	4-5	4	4	4	-	-	4-5	3-4	-	4	4	4	4-5	4	4	4	4
1800	-	-	-	4	4	-	4	4	-	3-4	4	4	4	3-4	-	-	-
1930	-	-	-	3-4	3-4	-	3-4	-	-	3-4	3-4	3-4	3-4	4	4	4	4
2000	5	3-4	3-4	3-4	3-4	-	3-4	-	-	3	3-4	3-4	3-4	3-4	4	3-4	4
2100	-	-	3-4	4	3-4	-	3-4	-	-	4	-	-	-	-	-	-	-
2200	5	3-4	4-5	4	-	-	4	4	-	4	4	4	4	4	4	4	4
2300	5	4	4-5	4-5	-	-	4	4	-	4	4	4	4-5	4	4	4	4
2400	5	4	5	5	4	-	4	4	-	4	4-5	4	4	4	4	4	4
2500	-	-	-	4	3-4	-	4	-	-	3-4	-	-	-	-	-	-	-
2510	-	-	-	2-3	2-3	-	-	4	-	-	-	-	-	-	-	-	-
2600	3-4	3	4	4	3-4	-	3-4	3	-	3	2-3	2-3	3-4	3-4	4	4	4
2700	-	3	3-4	4	3-4	-	3-4	3	-	3	3	3	3	3-4	3-4	3-4	4
2750	-	-	-	-	-	-	-	-	-	3	3	3	3-4	3-4	4	4	4
2800	4-5	3-4	2-3	2-3	3	-	3	-	-	-	-	-	-	-	-	-	-
2850	-	-	-	-	-	-	-	3	-	3	3	3	3	3	3	3-4	4

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Assessment: 19 of the 22 stations assessed on the River Suir main channel were found to be in satisfactory condition in 2014. Six of these stations had improved in quality since they were last assessed in 2011. The only decline in quality was at Station 0200, which dropped from moderate to poor quality. At the bridge in Thurles (Station 0600), the river was found to have improved from poor to moderate ecological quality. While still not satisfactory, this result represents a significant improvement, as it is the best result at this location since records began in 1971. The next two stations downstream of Thurles improved from moderate quality in 2011 to good quality in 2014.

Station No.	*Station Location*	*National X*	*Grid Ref. Y*	*Discovery Series No.*	*County Code*
0025	Skehanagh Br	210165	178273	59	TY
0050	Killough Br	0	0	0	TY
0100	Knockanroe Br	213506	177642	60	TY
0200	Knocknageragh Br	213093	172534	60	TY

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0300	Penane Br	212437	169265	60	TY
0400	Loughmore Br	0	0	0	TY
0500	Rossestown Br	213394	162447	60	TY
0600	Br in Thurles	212895	158636	66	TY
0800	Just N of Turtulla Ho (Main channe	0	0	0	TY
0810	Just N of Turtulla Ho (RHS)	0	0	0	TY
0900	Cabragh Br	211242	155876	66	TY
1000	2 km d/s Cabragh Br, Beakstown	0	0	0	TY
1100	Br at Holycross	209054	154131	66	TY
1200	Twoford Bridges	207006	151538	66	TY
1300	Ardmayle Br	205194	145971	66	TY
1400	Camus Br	204633	143106	66	TY
1450	D/s Black Stream (LHS)	0	0	0	TY
1500	Golden Br	201224	138387	66	TY
1600	New Br	200209	134188	66	TY
1700	Br 2 km u/s Cahir	205946	126322	74	TY
1800	Br in Cahir	204978	124774	74	TY
1930	Nr Killeenbutler	205897	122117	74	TY
2000	Br at Ardfinnan	208308	117567	74	TY
2100	Fords nr Ballyveera	0	0	0	TY
2200	Newcastle Br	213040	113658	74	TY
2300	Knocklofty Br	214416	120616	74	WD
2400	SE of Marlfield	217676	121239	74	WD
2500	East Br, Clonmel (RHS)	0	0	0	TY
2510	East Br, Clonmel (LHS)	0	0	0	TY
2600	Sir Thomas Br	223847	122857	75	WD
2700	Kilsheelan Br	228617	123217	75	WD
2750	N of Churchtown	233380	122808	75	WD
2800	Coolnamuck Weir	0	0	0	WD
2850	1.5 km u/s Carrick-on-Suir	238510	121890	75	TY

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River and Code: **AHERLOW** **16A01**

Tributary of: 16S02 SUIR OS Catchment No: 182

OS Grid Ref of confluence: S 035 280

Date(s) Surveyed: 31/12/1971, 31/12/1974, 31/12/1976, 31/12/1977, 31/12/1980, 31/12/1985, 31/12/1988, 31/12/1993, 31/12/1996, 19/8/1999, 20/8/1999, 25/9/2002, 26/9/2002, 22/6/2006, 23/6/2006, 15/9/2008, 8/9/2008, 17/8/2011, 18/8/2011, 4/8/2014

Biological Quality Ratings (Q Values)

Station Nos.	1971	1974	1976	1977	1980	1985	1988	1993	1996	1999	2002	2006	2008	2011	2014
0040	-	-	-	-	-	-	-	4	4	4	4	4	-	-	-
0060	-	-	-	-	-	-	4	4	-	-	-	-	-	-	-
0080	-	-	-	-	-	-	-	-	4-5	4	3-4	4	4	4-5	4
0100	-	-	-	-	4	4	4	4		-	-	-	-	-	-
0160	-	-	-	-	-	-	4	4-5	-	-	-	-	-	-	-
0200	-	-	4	-	4	4	3	4	4	4	3	3-4	4	4	3-4
0300	-	-	-	-	4	4	3-4	4	4	4	4	4	4	4	3-4
0400	-	-	5	-	5	5	4	4	-	-	-	-	-	-	-
0500	-	-	-	-	5	5	4-5	4-5	4	4	4	4	4	4	3-4
0600	-	-	-	-	4	4-5	4	4	4	4	3-4	3-4	-	-	-
0700	-	-	4-5	-	4	5	4	4-5	4	4	4	4	4	4	4
0800	-	-	5	-	4	4	4	4-5	4	4-5	4	4	4	4-5	4-5
0900	4	4	4-5	4	4	4-5	4-5	4	4	4	4	4	4	4-5	4-5

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Assessment: The biological water quality of the Aherlow River has declined slightly at four of the seven stations assessed in 2014. Three stations, from 0200 downstream of Galbally to 0500 downstream of Lisvarrinane are now in unsatisfactory condition.

Station No.	***Station Location***	***National X***	***Grid Ref. Y***	***Discovery Series No.***	***County Code***
0040	Ballymahony Br	179669	121974	73	LK
0060	Br E of Ballyfauskeen Crossroads	0	0	73	LK
0080	Br SW of Keeloges	179796	125045	73	LK
0100	Br SW of Ardrahin	0	0	0	LK
0160	Second Ford d/s 0100	0	0	0	LK

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0200	Galbally Br	181027	127755	74	LK
0300	Stagdale Br	184343	128727	74	TY
0400	New Br	0	0	0	TY
0500	Br u/s College Br	188768	129807	74	TY
0600	College Br	191787	130328	66	TY
0700	Ashgrove Br	195110	129405	74	TY
0800	Cappa Old Br	199349	129333	74	TY
0900	Killardry Br	201667	129489	74	TY

River and Code: **ARA** **16A03**

Tributary of: 16A01 AHERLOW OS Catchment No: 182

OS Grid Ref of confluence: S 002 296

Date(s) Surveyed: 31/12/1971, 31/12/1974, 31/12/1976, 31/12/1979, 31/12/1981, 31/12/1983, 31/12/1985, 31/12/1988, 31/12/1992, 31/12/1996, 6/8/1999, 18/6/2003, 30/5/2006, 21/8/2008, 22/8/2008, 16/8/2011, 4/8/2014

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Biological Quality Ratings (Q Values)

Station Nos.	1971	1974	1976	1979	1981	1983	1985	1988	1992	1996	1999	2003	2006	2008	2011	2014
0100	-	-	-	-	-	-	-	3-4	3	3	3	3-4	3-4	3	3	3
0200	-	4-5	4	3-4	3-4	3-4	3-4	3-4	3-4	3	3-4	3-4	4	-	-	-
0300	2	1	1	1	3	3	2-3	3	3	3	1-2	3	3	3	3	3
0400	1	1	1	1	3	3	3	3	3	-	-	-	-	-	-	-
0440	-	-	-	-	-	-	-	3	3-4	3	3	3-4	4	3-4	3-4	3-4
0500	-	-	-	3-4	3-4	3-4	4	3	3-4	3-4	3	3-4	3-4	-	-	-
0600	2	3	3-4	3-4	3-4	3-4	4	3-4	3	3-4	3	3	3-4	4	4	4
0700	-	-	-	4	4	4	4	4	3-4	3-4	3-4	3-4	3-4	-	-	-

Assessment: The Ara River is in the same condition as in 2011, with poor biological water quality recorded at the two uppermost stations, improving to good condition at the lowest station surveyed.

Station No.	*Station Location*	*National X*	*Grid Ref. Y*	*Discovery Series No.*	*County Code*
0100	Bohereenbuee Br	184792	134548	66	TY
0200	Br just u/s Tipperary	188215	135268	66	TY
0300	1 km d/s Tipperary nr Railway Br	189740	135160	66	TY

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0400	Br nr Cordangan Manor	0	0	0	TY
0440	Br NE of Lacken	192434	133849	66	TY
0500	Bansha Br	195556	133145	66	TY
0600	Ara Br, 2.8 km d/s Bansha	197459	131994	66	TY
0700	Ara Br, u/s Aherlow R confl	199233	130224	66	TY

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ATTACHMENT C

HABITATS DIRECTIVE

APPROPRIATE ASSESSMENT SCREENING REPORT

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DEVELOPMENT BY TIPPERARY CO-OPERATIVE CREAMERY LTD. OF A NEW MILK DRYING FACILITY AT THE SITE OF THEIR EXISTING MILK PROCESSING PLANT AT STATION ROAD, TIPPERARY TOWN

HABITATS DIRECTIVE APPROPRIATE ASSESSEMENT SCREENING REPORT

14 June 2017



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REPORT PREPARED FOR OES Ltd

by

Bill Quirke BSc, MSc, MCIEEM

Helena Twomey BA(Mod), PhD

Conservation Services, Tullaha, Glenflesk, Killarney, Co. Kerry
Tel/Fax 064 6630130 e-mail cs@conservation-services.ie

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Client:	OES Consulting
Project	Habitats Directive appropriate assessment screening report for the proposed development by Tipperary Co-Operative Creamery Ltd. of a new milk drying facility at the site of their existing milk processing plant at Station Road, Tipperary Town
Report No:	16117/AA SR/2017/F
Date	14/06/2017
Status	Final
Prepared by	Bill Quirke BSc, MSc, MCIEEM
Reviewed by	Helena Twomey BA(Mod), PhD

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1. INTRODUCTION

OES Consulting commissioned Conservation Services – Ecological & Environmental Consultants to prepare an Habitats Directive Appropriate Assessment Screening report as part of the 'Appropriate Assessment' process for the proposed development by Tipperary Co-operative Creamery Ltd. of a new milk drying facility at the site of their existing milk processing plant at Station Road, Tipperary Town.

An Appropriate Assessment (AA) is an evaluation of the potential impacts of a plan or project on the conservation objectives of Natura 2000 sites, and the development, where necessary/possible, of mitigation or avoidance measures to preclude negative effects. The requirement for AA is laid down in Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Flora and Fauna – the 'Habitats Directive' which was transposed into Irish law by the European Communities (Natural Habitats) Regulations, SI 94/1997.

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There are four distinct stages to undertaking an AA as outlined in current EU and National Parks and Wildlife Service (NPWS) guidance:

1. Appropriate Assessment Screening
2. Appropriate Assessment
3. Assessment of Alternatives in cases where significant impact cannot be prevented
4. Where no alternatives exist, an assessment of compensatory issues in the case of projects or plans which can be considered to be necessary for imperative reasons of overriding public interest (IROPI)

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2. APPROPRIATE ASSESSMENT SCREENING

Screening determines whether appropriate assessment is necessary by examining:

1. Whether a plan or project can be excluded from AA requirements because it is directly connected with or necessary to the management of a Natura 2000 site.

2. Whether the project will have a potentially significant effect on Natura 2000 sites, either alone or in combination with other projects or plans, in view of the sites' conservation objectives.

Screening involves the following:

i. Description of plan or project

ii. Identification of relevant Natura 2000 sites, and compilation of information on their qualifying interests and conservation objectives

iii. Assessment of likely effects – direct, indirect and cumulative – undertaken on the basis of available information as a desk study or field survey or primary research as necessary

iv. Screening Statement with conclusions

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2.1. DESCRIPTION OF THE PROJECT

Tipperary Co-Operative Creamery Ltd. propose the development of a new milk evaporation & drying facility at the site of their existing milk processing plant at Station Road, Tipperary Town. The proposed development works will include the following elements:

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1. Enabling works including establishment of temporary Contractor's Compound within the former hotel site on the northern side of the Ara River.

2. Demolition works to facilitate construction of the new dryer tower including demolition of the former Butter Store building, existing store building on the western side of the Dispatch Building and the removal of the existing fuel storage tanks together with bund structure and canopy roof structure.

3. Partial demolition works, comprising the southern half of the existing powder store which falls within the development footprint of the new dryer tower building.

4. Construction of a new dryer tower building c.32 metres in height and a footprint area of up to c.1200m², incorporating evaporator plant, dryer plant and air heater. With floors and access platforms provided at various levels within the building to support and facilitate access to the new plant systems.

5. Decommissioning of the two existing 'Rodgers' dryers located within the building to the rear of the protected structure in the central part of the Creamery site.

6. Upgrade of the existing Waste Water Treatment Plant (WWTP) with a new balance tank and clarifier to cater for the additional flow rate generated by the new Dryer 2 Facility and to improve the quality of treated effluent discharged to the public sewer.

7. Site works associated with the above development works including drainage works and pavement works.

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2.1.1. DEMOLITION PHASE

The demolition phase to facilitate the construction of the new dryer tower will involve the demolition of the former Butter Store building and the southern section of the existing powder store and the removal of existing fuel storage tanks together with bund structure and canopy roof structure.

2.1.2. CONSTRUCTION PHASE

The construction phase includes the construction of a new dryer tower building 32 metres in height with a footprint area of up to c.1200m², incorporating evaporator plant, dryer plant and air heater, with floors and access platforms provided at various levels within the building to support and facilitate access to the new plant systems; upgrade of the existing Waste Water Treatment Plant (WWTP) with a new balance tank and clarifier; site works associated with the above development works including drainage works and pavement works and enabling works including the establishment of a temporary Contractor's Compound within the former hotel site on the northern side of the Ara River.

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2.2. IDENTIFICATION OF RELEVANT NATURA 2000 SITES, AND COMPILATION OF INFORMATION ON THEIR QUALIFYING INTERESTS AND CONSERVATION OBJECTIVES

Five Natura 2000 sites are situated within a 15km radius of the proposed development; these are:

1. The Lower River Suir Special Area of Conservation (SAC) (Site Code 002137) (see Maps 1 & 2)

2. The Lower River Shannon Special Area of Conservation (SAC) (Site Code 002165). (See Map 1)

3. Galtee Mountains Special Area of Conservation (SAC) (Site Code 000646). (See Map 1)

4. Moanour Mountain Special Area of Conservation (SAC) (Site Code 0022257). (See Map 1)

5. Philipstown Marsh SAC (Site Code 001847) (See Map 1)

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It is therefore concluded that the only Natura 2000 Sites which could be potentially affected by the proposed development are those listed above.

NPWS site synopses and conservation objectives for each of these Natura sites can be viewed using the following links.

Lower River Suir SAC	
Site Synopsis	**Conservation Objectives**
http://www.npws.ie/sites/default/files/protected-sites/synopsis/SY002137.pdf	http://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002137.pdf

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Lower River Shannon SAC	
Site Synopsis	**Conservation Objectives**
www.npws.ie/sites/default/files/protected-sites/synopsis/SY002165.pdf	www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf

Galtee ~Mountains SAC	
Site Synopsis	**Conservation Objectives**
http://www.npws.ie/sites/default/files/protected-sites/synopsis/SY000646.pdf	http://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000646.pdf

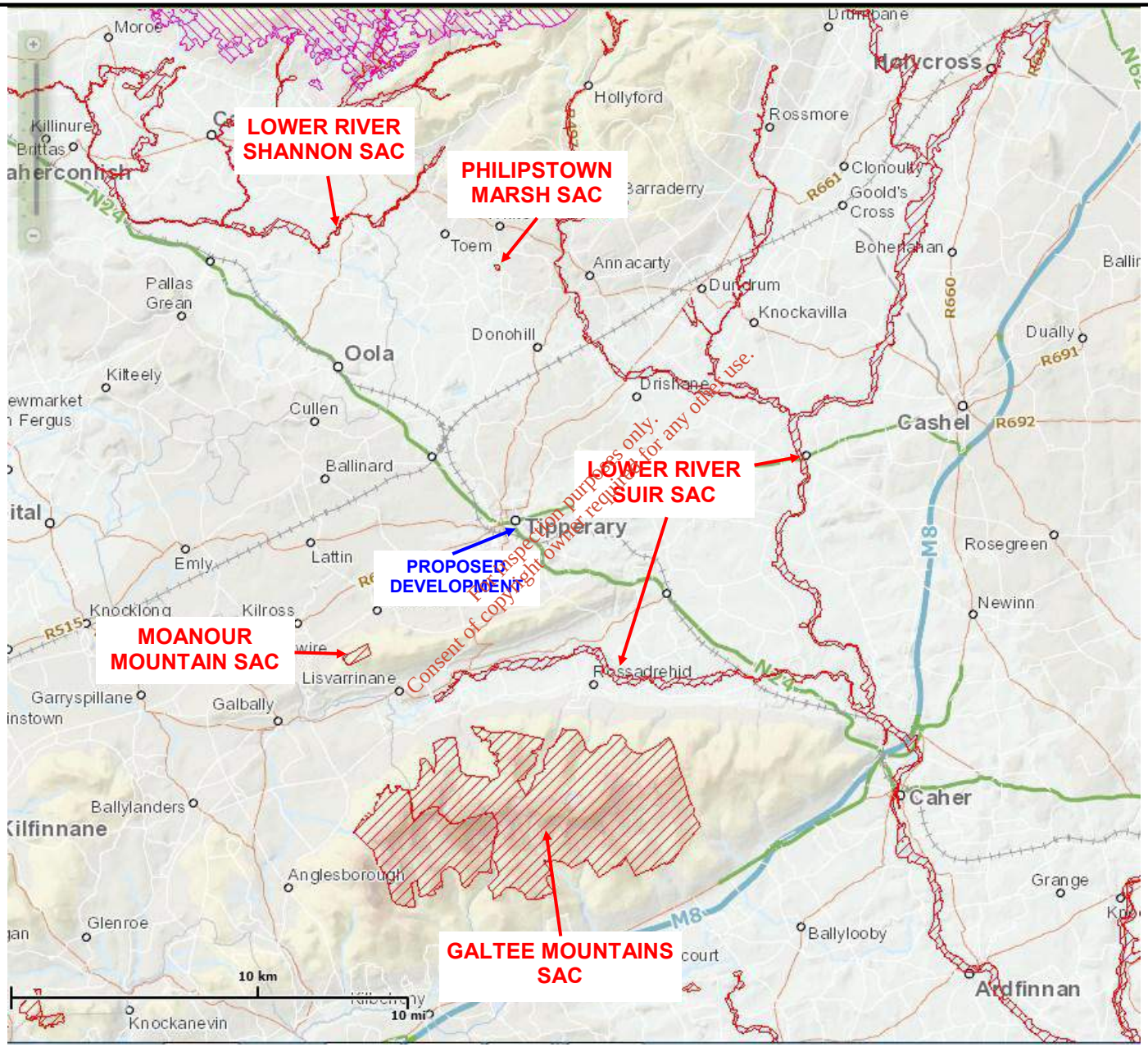
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Moanour Mountain SAC	
Site Synopsis	**Conservation Objectives**
http://www.npws.ie/sites/default/files/protected-sites/synopsis/SY002257.pdf	http://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002257.pdf

Philipstown Marsh SAC	
Site Synopsis	**Conservation Objectives**
https://www.npws.ie/sites/default/files/protected-sites/natura2000/NF001847.pdf	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO001847.pdf

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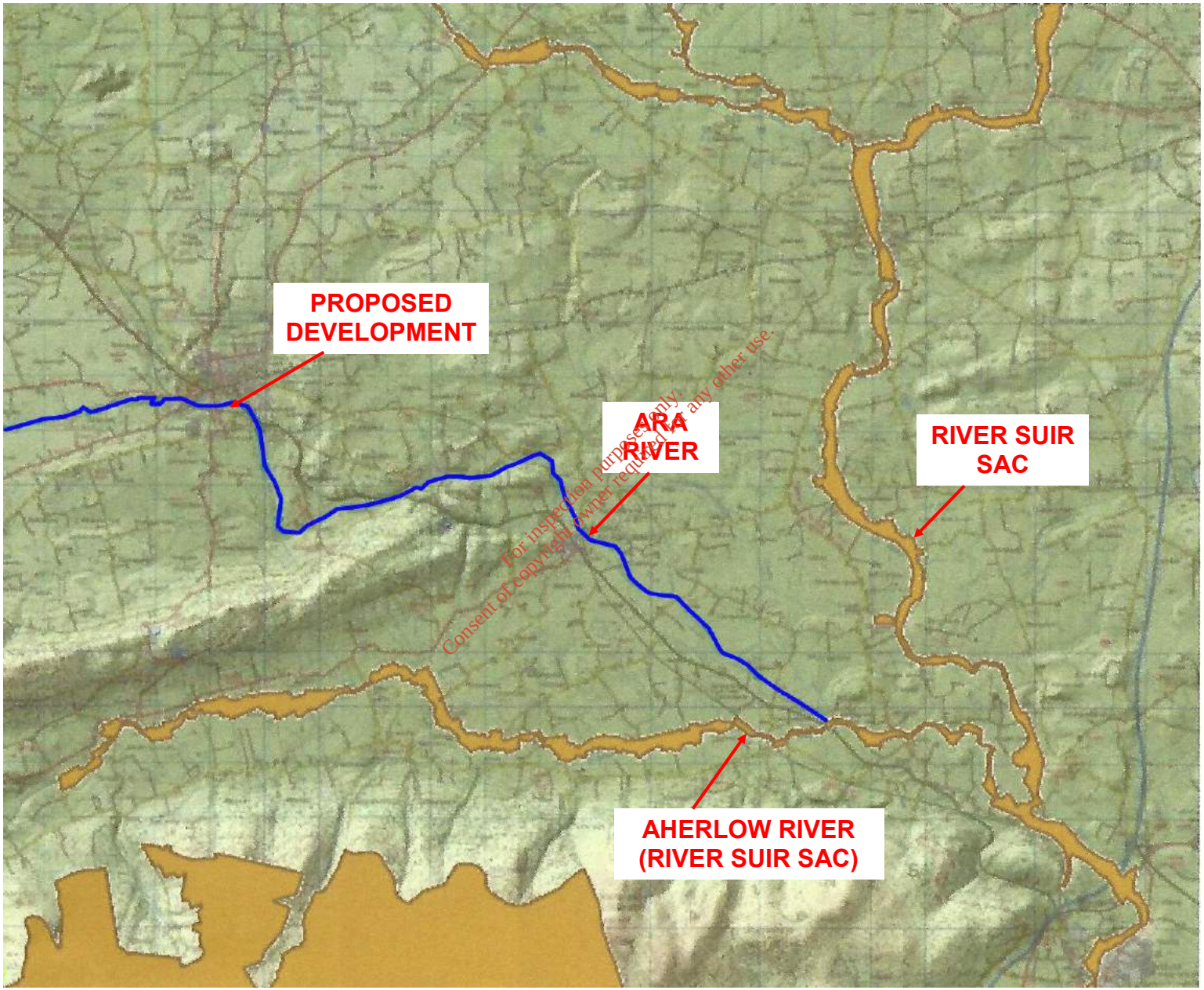
MAP 1 LOCATION OF PROPOSED DEVELOPMENT IN RELATION TO NATURA SITES



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MAP 2 LOCATION OF PROPOSED DEVELOPMENT IN RELATION TO RIVER SUIR SAC



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2.2.1. QUALIFYING INTERESTS

LOWER RIVER SUIR SAC

- Freshwater Pearl Mussel *Margaritifera margaritifera*
- White-clawed Crayfish *Austropotamobius pallipes*
- Sea Lamprey *Petromyzon marinus*
- Brook Lamprey *Lampetra planeri*
- River Lamprey *Lampetra fluviatilis*
- Twaite Shad *Alosa fallax*
- Atlantic Salmon *Salmo salar* (only in fresh water)
- Atlantic salt meadows (Glauco-Puccinellietalia maritimae)
- Otter *Lutra lutra*
- Mediterranean salt meadows (Juncetalia maritimi)
- Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation
- Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles
- *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)
- **Taxus baccata* woods of the British Isles
- Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels

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LOWER RIVER SHANNON SAC

- Freshwater Pearl Mussel *Margaritifera margaritifera*
- Sea Lamprey *Petromyzon marinus*
- Brook Lamprey *Lampetra planeri*
- River Lamprey *Lampetra fluviatilis*
- Atlantic Salmon *Salmo salar* (only in fresh water)
- Sandbanks which are slightly covered by sea water all the time
- Estuaries
- Mudflats and sandflats not covered by seawater at low tide

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- *Coastal lagoons
- Large shallow inlets and bays
- Reefs
- Perennial vegetation of stony banks
- Vegetated sea cliffs of the Atlantic and Baltic coasts
- Salicornia and other annuals colonizing mud and sand
- Atlantic salt meadows (Glauco-Puccinellietalia maritimae)
- Bottlenose Dolphin *Tursiops truncatus*
- Otter *Lutra lutra*
- Mediterranean salt meadows (Juncetalia maritimi)
- Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachionvegetation
- Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)
- *Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicionalbae)

* indicates a priority habitat under the Habitats Directive

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GALTEE MOUNTAINS SAC

- European dry heaths
- Alpine and Boreal heaths
- Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)*
- Blanket bogs (* if active bog)
- Calcareous rocky slopes with chasmophytic vegetation
- Siliceous rocky slopes with chasmophytic vegetation

* indicates a priority habitat under the Habitats Directive

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MOANOUR MOUNTAIN SAC

- Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)*

* indicates a priority habitat under the Habitats Directive

PHILIPSTOWN MARSH SAC

- Transition mires and quaking bogs

2.2.2. CONSERVATION OBJECTIVES

The Conservation Objectives of the five potentially affected Natura 2000 sites can be summarised as: To maintain or restore the favourable conservation condition of the habitats and species for which the Natura sites have been selected (i.e. the qualifying interests) (see Section 2.2.1. above).

In the case of the Lower River Shannon SAC detailed objectives have been presented in NPWS (2012) for each of the qualifying interest species and habitats.

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2.3. ASSESSMENT OF LIKELY EFFECTS – DIRECT, INDIRECT AND CUMULATIVE

If a plan or project is likely to undermine any of the sites' conservation objectives, it must be considered likely to have a significant effect on that site.

NPWS guidelines state: "*It is important that the NIS applies the precautionary principle and the focus of the statement should be on demonstrating objectively, with supporting evidence, that there will be no adverse effects on the integrity of the Natura 2000 site. Where this cannot be demonstrated, adverse effects must be assumed and the Statement must reflect that*." The need to apply the precautionary principle in making any key decisions in relation to the tests of AA has been confirmed by European Court of Justice case law. Therefore, where significant effects are likely, uncertain or unknown at screening stage, full Appropriate Assessment will be required.

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Subject to the precautionary principle, a significant impact constitutes any impact which alone or cumulatively could:

1. Prevent a qualifying interest Annex II species from maintaining itself on a long-term basis as a viable component of its natural habitats.

2. Result in a reduction in the natural range of a qualifying interest Annex II species in the foreseeable future.

3. Reduce the habitat of a qualifying interest Annex II species to below the level where it can maintain its population on a long-term basis.

4. Reduce the natural range of a qualifying interest Annex I habitat.

5. Threaten the long-term existence of the specific structure and functions which are necessary for the long-term maintenance of a qualifying interest Annex I habitat.

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6. Threaten the favourable conservation status of the typical species of a qualifying interest Annex I habitat

The Source-Pathway-Receptor (S-P-R) conceptual model for environmental management risk assessment provides a systematic means of determining and evaluating the nature, effect and extent of exposure a vulnerable receptor may experience in relation to a particular hazard. For a risk to exist there must be a source (or hazard or pressure), a pathway, and a receptor (or target) (Daly, 2004). An environmental hazard is an event, or continuing process, which if realised will lead to circumstances having the potential to degrade, directly or indirectly, the quality of the environment (Royal Society, 1992).

No pathway is evident for impact on qualifying interests of any the five SACs under consideration other than downstream transport of polluting substances by surface waters. The entire demolition and construction site and construction compound are in close proximity to the River Ara.

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There follows a description of the potential impacts of the proposed development on the Ara River:

2.3.1. POLLUTION OF STREAMS/RIVERS WITH SUSPENDED SOLIDS

In the absence of adequate mitigation any element of the proposed demolition process which will generate fine particles and any element of the proposed construction which involves excavation or placement of excavated materials has potential for suspended solids contamination of surface waters.

Harmful effects include:

- Suspended sediment due to runoff of soil from construction areas, or due to disturbance of fine sub-surface sediments in the course of instream construction and excavation, can have severe negative impacts on invertebrate and plant life and on all life stages of salmonid fish.

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- Suspended sediment can settle on spawning areas, infill the intragravel voids and smother the eggs and alevins (newly hatched fish) in the gravel.
- Bed Load (coarse material transported along the bottom of the stream) and settled sediments can infill pools and riffles, reducing the availability and quality of rearing habitat for fish.
- Suspended sediment can reduce water clarity and visibility in the stream, impairing the ability of fish to find food items.
- Settled sediments can smother and displace aquatic organisms such as macroinvertebrates, reducing the amount of food items available to fish.
- Increased levels of sediment can displace fish out of prime habitat into less suitable areas (Chilibeck et al 1992).
- Suspended solids can abrade or clog the gills of salmonid fish. It takes a high concentration of solid wastes to clog a fish gill and cause asphyxiation, but only a little to cause abrasions and thus permit the possibility of infections (Solbe 1988).
- Silt has been identified in the scientific literature as a serious threat to Margaritifera; the I.U.C.N. Red Data Book states that in the U.K. Margaritifera is 'threatened by siltation' and in North America 'accelerated siltation from land development could endanger them in future' (Wells et al 1983); Valovirta (1989) cites increase in the silt load of rivers as a reason for the decline of Margaritifera in Finland. Hendelberg (1960) and Young and Williams (1983) also implicate silt in damaging or eliminating Margaritifera populations. As juvenile Margaritifera are fully buried in the sand and gravel of the river bed they are more vulnerable to siltation. 'Any siltation of the river bed results in a rapid decrease in the oxygen content of the interstitial water and death of the juveniles living there.' (Buddensiek *et al* 1993).

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In this regard mitigation by avoidance has been applied. The relocation of the building to the south east and retention of the northern half of the powder store will isolate the proposed development from the adjacent River Ara and eliminate the works previously proposed directly to and along the river bank. This will

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reduce the potential construction stage impacts on the river. Furthermore it is no longer intended to provide a temporary footbridge access over the River Ara between the former hotel site and the construction site.

2.3.2. POLLUTION OF WATERCOURSES WITH NUTRIENTS DUE TO GROUND DISTURBANCE DURING CONSTRUCTION

The main potential sources of nutrient inputs to freshwater due to ground disturbance are nutrients adsorbed or chemically bound to eroded suspended solids.

Several studies in the United States have found increases in both nitrogen and phosphorus export into streams following ground disturbance, particularly in association with organic particles (Golladay & Webster 1988; Likens et al 1970). Busman *et al* (2002) found that “phosphorus in soils is almost entirely associated with soil particles. When soil particles are carried to a river or lake, phosphorus will be contained in this sediment. Phosphate in soils is associated more with fine particles than coarse particles. When soil erosion occurs, more fine particles are removed than coarse particles, causing sediment leaving a soil through erosion to be enriched in phosphorus”. It is therefore concluded that in the context of the proposed development the main potential source of nutrient enrichment of surface waters due to soil disturbance will be nutrients associated with eroded soil particles.

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2.3.3. POLLUTION OF STREAMS/RIVERS WITH OTHER SUBSTANCES ASSOCIATED WITH THE DEMOLITION, DECOMMISSIONING & CONSTRUCTION PROCESSES

The potential exists for a range of serious pollutants to enter watercourses during the demolition, decommissioning and construction processes. For example any of the following will have deleterious effects on fish, plants and invertebrates if allowed to enter watercourses:

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- Fuels, lubricants and hydraulic fluids from equipment used on the development site;
- Hydrocarbons potentially released during removal of the fuel storage tanks and the bunded area;
- Contamination from hazardous waste material deriving from improper decommissioning of buildings, or incorrect storage of contaminated waste material;
- Contamination from hazardous waste material deriving from incorrect storage of contaminated waste material;
- Contamination from hazardous waste material in runoff deriving from erosion of contaminated soils;
- Raw or uncured concrete and grouts;
- Wash down water from exposed aggregate surfaces, cast-in-place concrete and from concrete trucks;
- Cementous material generated during the demolition process, and
- Concrete, bentonite, grout and other cement-based products are highly alkaline and corrosive and can have significant negative effects on surface water quality.

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Cement-based products generate very fine, highly alkaline silt (pH 11.5) that can physically damage fish by burning their skin and blocking their gills. The alkaline silt can also smother vegetation and the bed of watercourses and can mobilise pollutants such as heavy metals by altering the water's pH.

The main hydrocarbons of concern are the petrochemical derived group, which includes petrol, fuel oils, lubricating oils and hydraulic fluids. In unmodified form these are liquid, virtually insoluble and lighter than water. Some hydrocarbons, such as bitumen and heavy fuel oil, become heavier than water when affected by naturally occurring bacteria and can then be treated as sediments. Some hydrocarbons exhibit an affinity for sediments and thus become entrapped in deposits from which they are only released by vigorous erosion or turbulence (Luker & Montague 1994). EIFAC (Svobodova et al 1993) states that “a sensory assessment is preferred to toxicological analysis in determining the highest

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admissible amounts of oil and oil products that can be present in water; on this basis the highest admissible concentrations are in the range of 0.002 to 0.025 mg per litre".

Harmful effects include:

- The prevention of gaseous exchange at the water surface, leading to reduced dissolved oxygen in the underlying water (Solbe 1988);
- In the case of turbulent waters the oil becomes dispersed as droplets into the water. In such cases, the gills of fish can become mechanically contaminated and their respiratory capacity reduced (Svobodova *et al* 1993), and
- Oil products or their combustion products may contain various highly toxic substances, such as benzene, toluene, naphthenic acids, xylene and PAHs (polyaromatic hydrocarbons) which are to some extent soluble in water; these penetrate into the fish and can have a direct toxic effect. It is generally agreed that the lighter oil fractions (including kerosene, petrol, benzene, toluene and xylene) are much more toxic to fish than the heavy fractions (heavy paraffins and tars) (Svobodova *et al* 1993).

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In this regard mitigation by avoidance has been applied. The relocation of the building to the south east and retention of the northern half of the powder store will isolate the proposed development from the adjacent River Ara and eliminate the works previously proposed directly to and along the river bank. This will reduce the potential construction stage impacts on the river. Furthermore it is no longer intended to provide temporary footbridge access over the River Ara between the former hotel site and the construction site.

2.3.4. POLLUTION OF STREAMS/RIVERS WITH SURFACE RUNOFF FROM COMPLETED DEVELOPMENT

The main pollutants of concern are:

- Liquid milk/ milk by-products

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- Petrochemicals

Liquid milk/ milk by-product

See section 2.3.5 below.

Petrochemicals

See Section 2.3.3 above**.**

2.3.5. POTENTIAL IMPACT OF DISCHARGE

Most of the wastewater from the existing creamery and from the proposed development is/will be pre-treated onsite before being piped to the Tipperary Town WWTP. It is proposed that condensate will continue to be treated on site and discharged to the River Ara at the site. Therefore for the purposes of the present report the only trade discharge to be considered is the discharge of treated condensate to the River Ara. The product being dried (Skim, Butter, Whole Milk, Whey etc.) can impact on the quality of the condensate produced at the plant, however the proposed treatment of the condensate discharge by a reverse osmosis plant with a maximum discharge concentration of 0.15mg/l ortho-Phosphate and a maximum discharge of 1,000m³/day will ensure that the proposed development will not result in a significant adverse impact on biological water quality, aquatic flora and fauna and particularly salmonid fish.

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The proposed development includes the upgrade of the existing Waste Water Treatment Plant (WWTP) with a new balance tank and clarifier to cater for the additional flow rate generated by the new Dryer 2 Facility and to improve the quality of treated effluent discharged to the public sewer.

The assessment of the potential impacts on chemical water quality, specifically BOD, Ammonia and Ortho Phosphate indicates that downstream concentrations for these parameters will comply with the chemical quality objectives for ‘Good Status’ rivers in the 2009 Surface Water Quality Regulations. Impact on chemical and ecological status of the Aherlow River (Lower River Suir SAC) 19km further downstream will therefore be insignificant as this far downstream any ammonia and B.O.D. would be fully eliminated. Furthermore, an

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orthophosphate concentration compliant with the requirement of the surface water regulations in the Ara River at the Tipperary Co-Op discharge point cannot elevate the orthophosphate concentration above the compliant level in the SAC channel c.19km downstream. .

The potential impact on each of the qualifying interest Annex II Species and Annex I Habitats in each of the potentially affected SACs is addressed in Sections 2.3.6 – 2.3.10 below.

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2.3.6. POTENTIAL IMPACTS ON LOWER RIVER SUIR SAC

Qualifying Interest	Observations	Potential Direct / In-situ impacts	Potential Indirect/ Ex-situ Impacts
Freshwater Pearl Mussel *Margaritifera margaritifera*	The only part of the Suir cSAC listed as "designated for *Margaritifera margaritifera*" is the Clodiagh River (Waterford) which is not downstream of the proposed development.	No	No
White-clawed Crayfish *Austropotamobius pallipes*	Biodiversity Ireland (www.biodiversity.ie) maps show widespread records of crayfish in the Aherlow River and from the lower section of the River Ara at Ara Bridge. As the closest SAC population is c.19 km downstream of the proposed development, no significant risk is evident.	No	No
Sea Lamprey *Petromyzon marinus*	O'Connor (2007) recorded no sea lamprey in the Ara or Aherlow Rivers. Nevertheless applying the precautionary principle the closest possible SAC population is c.19 km downstream of the proposed development. Therefore no significant risk is evident.	No	No
Brook Lamprey *Lampetra planeri*/ River Lamprey *Lampetra fluviatilis*	O'Connor (2007) surveyed two sites on the River Ara and stated: "The lower Ara (A4) yielded the highest lamprey catch on this system (Aherlow catchment) with 33 lampreys recorded in an area of 5 m^2. …The site investigated on the upper Ara (A5) had no lampreys present." Brook/river lamprey but no sea lamprey were recorded in the Ara River system. O'Connor (2007) surveyed six sites in the River Aherlow sub-catchment: three on the River Aherlow itself, two on the Ara tributary, and one on the Rossadrehid tributary. Out of the six sites surveyed, five had lampreys present. Brook/river lamprey but no sea lamprey were recorded in the Aherlow system. As the closest possible SAC population is c.19 km downstream of the proposed development, no significant risk is evident.	No	No

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Qualifying Interest	Observations	Potential Direct / In-situ impacts	Potential Indirect/ Ex-situ Impacts
Twaite Shad *Alosa fallax*	The normal habitat of this species is the sea – especially coastal waters off the south-west coast of northern Europe. At maturity, the adult fish stop feeding and gather in early summer in the estuaries of slow-flowing rivers where there is easy access from the sea, thereafter moving upstream to spawn in mid-June in the stretches directly above the influence of high tides. The eggs take about 4-6 days to hatch, and the young drop quickly downstream in the current to the quieter waters of the upper estuary where they start to feed and grow. Maitland & Campbell (1992). Kurz & Costello (1996) and Aprahamian & Aprahamian (1990) reported that twaite shad spawned at the head of the tide in the R. Nore, R. Suir and R. Barrow. No records have been found for Twaite Shad in the Aherlow River section of the SAC and a significant likelihood of the species occurring here can be ruled out on the basis of the biology of the species.	No	No

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Qualifying Interest	Observations	Potential Direct / In-situ impacts	Potential Indirect/ Ex-situ Impacts
Atlantic Salmon *Salmo salar* (only in fresh water)	In 2010 Inland Fisheries Ireland surveyed a site on the Aherlow River upstream of Killardry Bridge, approximately 4 km upstream of the river's confluence with the River Suir; juvenile salmon were the most abundant species recorded. Central Fisheries Board (2006) found that in general the best of the salmon spawning and nursery habitat in the main channel of the Aherlow River was in the upper reaches of the river and in lower reaches of the main channel. "Good stocks of 1+ salmon were evident at all locations with suitable habitat." The available evidence indicates that the Aherlow River is a significant salmon spawning and nursery area in the context of the Suir catchment. Regarding the Ara River, Central Fisheries Board (2006) stated: "Density estimates for 1+ salmon were between 0 and 0.181 fish/m^2. Only the furthest downstream site electrofished showed any signs that this river has the potential to produce salmon. Most, if not all, of the upper to mid reaches of the Ara hold very little capacity to produce (salmon) fry or parr. The only suitable habitat is limited to the lower reaches downstream of Bansha. Survey results indicate that 18.32% of all salmonids, from this system, were salmon parr indicating a poor salmon presence within this catchment." As the closest possible SAC population is c.19 km downstream of the proposed development, no significant risk is evident.	No	No

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Qualifying Interest	Observations	Potential Direct / In-situ impacts	Potential Indirect/ Ex-situ Impacts
Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	No potential impact pathway evident	No	No
Otter *Lutra lutra*	As the closest possible SAC population is c.19 km downstream of the proposed development, no significant risk is evident.	No	No
Mediterranean salt meadows (Juncetalia maritimi)	No potential impact pathway evident	No	No
Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation	Watercourses characterised by submerged or floating-leaved vegetation ("Ranunculion fluitantis and Callitricho-Batrachion vegetation") are listed in Annex II of the Habitats Directive. The definition of watercourses characterised by Ranunculion fluitantis and Callitricho-Batrachion communities is very wide, in practice covering the majority of rivers and streams with aquatic plant communities of note (Hatton-Ellis & Grieve 2003). Species characteristic of the habitat type include Callitriche sp., and Potamogeton sp. (European Environment Agency www.eunis.eea.europa.eu/habitats-factsheet.jsp).	No	No
Old sessile oak woods with Ilex and Blechnum in the British Isles	No potential impact pathway evident	No	No

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Qualifying Interest	Observations	Potential Direct / In-situ impacts	Potential Indirect/ Ex-situ Impacts
*Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno Padion, Alnion incanae, Salicion albae)	As the closest SAC population is c.19 km downstream of the proposed development no significant risk is evident. Even at close proximity it is unlikely that the proposed development would cause any impact on alluvial woodlands.	No	No
**Taxus baccata* woods of the British Isles	No potential impact pathway evident	No	No
Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	No potential impact pathway evident	No	No

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2.3.7. POTENTIAL IMPACTS ON LOWER RIVER SHANNON SAC

Qualifying Interest (In lower River Shannon SAC)	Observations	Potential Direct / In-situ impacts	Potential Indirect/ Ex-situ Impacts
Annex I Habitats		No	No
Sandbanks which are slightly covered by sea water all the time	No potential impact pathway evident	No	No
Estuaries	No potential impact pathway evident	No	No
Mudflats and sandflats not covered by seawater at low tide	No potential impact pathway evident	No	No
*Coastal lagoons	No potential impact pathway evident	No	No
Large shallow inlets and bays	No potential impact pathway evident	No	No
Reefs	No potential impact pathway evident	No	No
Perennial vegetation of stony banks	No potential impact pathway evident	No	No
Vegetated sea cliffs of the Atlantic and Baltic coasts	No potential impact pathway evident	No	No
Salicornia and other annuals colonizing mud and sand	No potential impact pathway evident	No	No
Atlantic salt meadows	No potential impact pathway evident	No	No

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Qualifying Interest (In lower River Shannon SAC)	Observations	Potential Direct / In-situ impacts	Potential Indirect/ Ex-situ Impacts
(Glauco-Puccinellietalia maritimae)			
Mediterranean salt meadows (Juncetalia maritimi)	No potential impact pathway evident	No	No
Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachionvegetation	No potential impact pathway evident	No	No
Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)	No potential impact pathway evident	No	No
*Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicionalbae)	No potential impact pathway evident	No	No
Annex II Species		No	No
Freshwater Pearl Mussel *Margaritifera margaritifera*	No potential impact pathway evident	No	No
Sea Lamprey *Petromyzon marinus*	No potential impact pathway evident	No	No
Brook Lamprey *Lampetra planeri*	No potential impact pathway evident	No	No
River Lamprey *Lampetra fluviatilis*	No potential impact pathway evident	No	No

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Qualifying Interest (In lower River Shannon SAC)	Observations	Potential Direct / In-situ impacts	Potential Indirect/ Ex-situ Impacts
Atlantic Salmon *Salmo salar* (only in fresh water)	No potential impact pathway evident	No	No
Bottlenose Dolphin *Tursiops truncatus*	No potential impact pathway evident	No	No
Otter *Lutra lutra*	No potential impact pathway evident	No	No

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2.3.8. POTENTIAL IMPACTS ON GALTEE MOUNTAINS SAC

Qualifying Interest	Observations	Potential Direct / In-situ impacts	Potential Indirect/ Ex-situ Impacts
European dry heaths	No potential impact pathway evident.	No	No
Alpine and Boreal heaths	No potential impact pathway evident..	No	No
Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)	No potential impact pathway evident.	No	No
Blanket bogs	No potential impact pathway evident.	No	No
Calcareous rocky slopes with chasmophytic vegetation	No potential impact pathway evident.	No	No
Siliceous rocky slopes with chasmophytic vegetation	No potential impact pathway evident.	No	No

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2.3.9. POTENTIAL IMPACTS ON MOANOUR MOUNTAIN SAC

Qualifying Interest	Observations	Potential Direct / In-situ impacts	Potential Indirect/ Ex-situ Impacts
Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)	No potential impact pathway evident.	No	No

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2.3.10. POTENTIAL IMPACTS ON PHILIPSTOWN MARSH SAC

Qualifying Interest	Observations	Potential Direct / In-situ impacts	Potential Indirect/ Ex-situ Impacts
Transition Mires & Quaking Bogs	No potential impact pathway evident.	No	No

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2.4. SCREENING STATEMENT WITH CONCLUSIONS

In order to determine the potential impacts on Natura 2000 sites of the proposed development of a new milk evaporation and drying facility at the Tipperary Co-Operative Creamery Ltd site at Station Road, Tipperary Town, a screening process was undertaken. The conclusion of the screening process is that the proposed development will have no potential impact on Natura 2000 sites.

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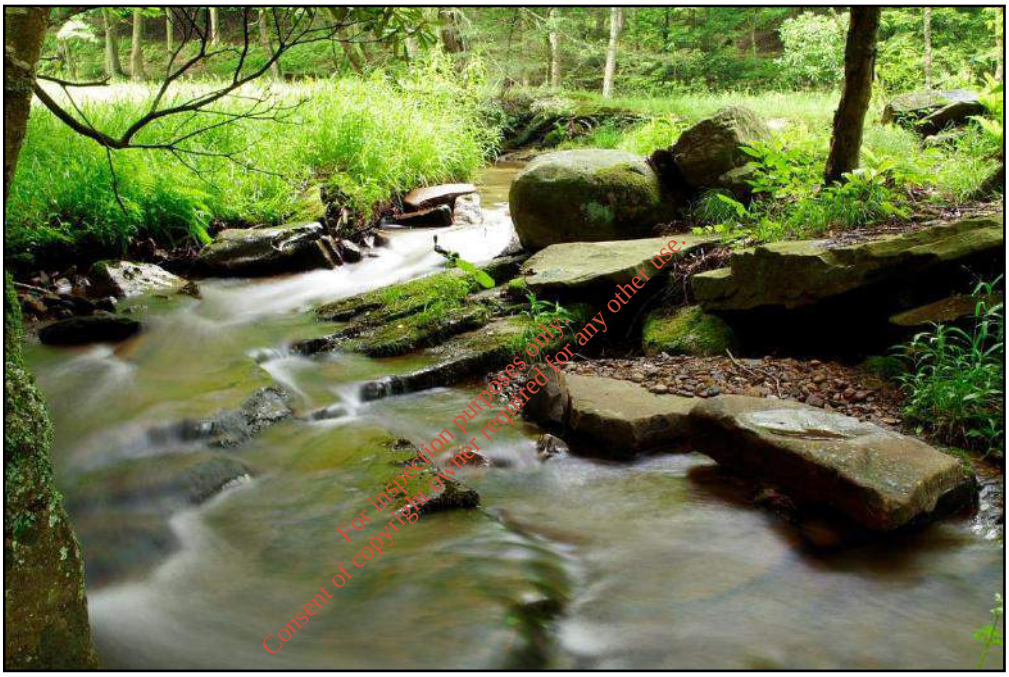
SURFACE WATERS IMPACT ASSESSMENT

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Proposed New Dryer Facility

Report on
Assessment of Impact on Surface Waters

June 2017

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Control Sheet

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Tipperary Co-Operative Creamery Ltd.

Station Road, Tipperary, Co. Tipperary

Proposed New Dryer Facility

Report on Assessment of Impact on Surface Waters

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1. Introduction

Tipperary Co-Operative Creamery Ltd. (TCC) propose the development of a new dryer facility at their Station Road site in Tipperary Town (Appendix 1.1 - Figure 1: Site Location Map).

The proposed development will comprise of the construction of a new building to accommodate a new dryer together with associated infrastructure and services as follows:

- *Construction of a dryer tower building of height 32 metres incorporating evaporator plant, dryer plant, air heater and powder storage silos with floors and access platforms provided at various levels within the building to support and facilitate access to the new plant systems.*
- *Upgrade of the existing Waste Water Treatment Plant (WWTP) with an extension to the balance tank and installation of a new DAF unit and clarifier.*
- *Site works associated with the above development works including drainage works and pavement works.*
- *Demolition works to facilitate construction of the new dryer tower including demolition of a former butter store building, and removal of existing fuel storage tanks together with bund structure and canopy roof structure. The existing powder store will also be partially demolished.*
- *Decommissioning of the existing Rodgers Dryers located in a building to the east of the existing Anhydro Dryer.*

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OES Consulting has been retained by TCC to undertake an assessment of the potential impacts of the proposal on the receiving surface water environment.

This document comprises a report which describes the proposed development, receiving environment and impact on the attributes of the receiving environment due to the construction and operation of the proposed new dryer facility.

The report forms part of an Environmental Impact Assessment Report (EIAR) for the overall development which will accompany the application to Tipperary Co. Council for planning permission.

1.1 Scope

The assessment will assess the potential for likely and significant impacts on the receiving surface water environment, specifically:

a) Determine the impacts on the River Ara based on utilisation of the available assimilative capacity at the point of discharge, after current licensed discharges from the site, and comparison of the predicted resultant downstream concentrations of the various parameters against the relevant water quality standards for those parameters under the European Communities Environmental Objectives (Surface Waters) Regulations 2009;
b) Taking account of other existing and planned developments which may generate discharges to the Rover Ara, including the Tipperary Town Urban Waste Water Treatment Plant (uWWTP);
c) Evaluate the likely needs of the potential future discharges within the catchment, having regard to the Tipperary County Development Plan 2014 and the Tipperary Electoral Area Local Area Plan 2011;

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d) Undertake Cumulative Assessment to include the proposed development and other developments.

1.2 Methodology

A desk based study of the proposed development was conducted which involved reviewing available information held by a range of organisations on the site and surrounding lands.

The following sources were reviewed:

- Geological Survey Ireland (GSI) public mapping system – www.gsi.ie
- Water Quality Monitoring Data for River Ara - Tipperary Co Council/EPA
- Environmental Protection Agency (EPA) Envision public viewer – www.epa.ie
- Hydrometric Data River Ara - Environmental Protection Agency (EPA)
- IGSL Geotechnical Investigations Report 2016, included as an attachment to the Planning Stage Engineering and Environmental Report.
- Industrial Emissions (IE) Licence for Tipperary Cooperative Creamery Limited (Reg. No. P0801-01)
- 2016 Annual Environmental Report (AER) Data for Tipperary Cooperative Creamery Limited (submitted to EPA via EDEN Portal)
- Waste Water Discharge Authorisation (WWDA) for Tipperary Town uWWTP (Reg. No. D0146-01)
- 2016 AER Data for Tipperary Town uWWTP

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2. Background Catchment Information

The Tipperary Co-Op facility at Station Road in Tipperary Town is located within the catchment of the River Ara. The River Ara rises in low lying lands west of the village of Lattin and converges with the River Shroughnagowneen at Ballynahow 4 kilometres upstream of Tipperary Town.

The River Ara then flows through the town of Tipperary and the village of Bansha before converging with the River Aherlow at Tankerstown, approximately 12 kilometres downstream of the Tipperary Cooperative Creamery facility.

The River Aherlow subsequently discharges to the River Suir 2 kilometres north of Cahir.

2.1 River Basin Management Requirements

The Tipperary Co-Op facility is located in the South Eastern River Basin District (SERBD), and under the Water Framework Directive (WFD) the Aherlow Water Management Unit Action Plan (2009-2015) has been developed for Tipperary Town and surrounding areas. It provides details of the ecological and physiochemical status of the waterways within the Aherlow catchment area, the plan includes the pressures/risks of the catchment as well as the WFD Objective Target Dates.

The current plan runs from 2009 to 2015 and is currently under review, the revised plans are not due to be published until second half of 2017, and will run from 2017 to 2021.

A target of 'Good Ecological Status' has been assigned to the River Aherlow in the Water Management Unit Action Plan (WMU), to be achieved by 2021.

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2.2 Ecological Designations

The River Suir is a designated Special Area of Conservation (SAC) (assigned Site Code 002137), draining a large proportion of North and South County Tipperary. The SAC encompasses the River Aherlow. One branch of the River Suir SAC commences in the River Aherlow 3 kilometres south of the facility and east of the village of Lisvarrinane and extends over the entire watercourse.

The River Suir is assigned SAC status on the basis of the presence of alluvial wet forests and old sessile oak woodland, both priority habitats listed on Annex I of the E.U. Habitats Directive. The Suir is also selected as a SAC for floating river vegetation, tidal mudflats, Atlantic salt meadows, Mediterranean salt meadows and Hydrophilous tall herb fringe communities, all habitats listed on Annex I of the E.U. Habitats Directive.

The site is also selected for the following species listed in Annex II of the Directive: Freshwater Pearl Mussel, White-clawed Crayfish, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad, Salmon, Otter and Yew *Taxus baccata* woodland. The SAC is noted as supporting a number of protected bird species including Greylag Goose and Lapwing and other bird species such as Greenland Whitefronted Goose, Golden Plover, Whooper Swan and Kingfisher.

Maintaining the nutrient balance within the watercourses discharging to the SAC, forms an integral part of ensuring species diversity is not impacted.

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It is noted that in the context of the Appropriate Assessment Screening Assessment undertaken as part of the assessment of the current proposal by Conservation Services (May 2017), *"the proposed development will have no potential impact on Natura 2000 sites."*

2.3 Receiving River Water Quality

Historically, water quality monitoring has been undertaken on the River Ara by South Tipperary County Council and the EPA as part of routine monitoring and also in the implementation of SI No. 258/1998-Local Government (Water Pollution) Act, 1977 (Water Quality for Phosphorous) Regulations, 1998.

These Regulations have now been revoked by S.I. 272 of 2009 European Communities Environmental Objectives (Surface Waters) Regulations which drive the implementation of the Water Framework Directive.

The current water quality objective for the River Aherlow is to achieve 'Good Ecological Status' by 2021. The 2021 timescale was assigned to allow sufficient time to upgrade WWTP's within the catchment.

The Water Unit Action Plan for the Aherlow River describes the current ecological status for the River Ara is 'poor' and the physiochemical status is 'moderate'. It is noted the river classification is based upon a one out all out system, whereby if one monitoring point returns a 'poor' classification, the entire water course is assigned that status. It is noted that the status of the Ara improves to 'Moderate' downstream of Tipperary Town.

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Biological monitoring (Q Rating) and physiochemical monitoring of the River Ara is undertaken at monitoring points upstream (Point Reference: 16A030100) and downstream (Point Reference: 16A030300) of the Tipperary Cooperative Creamery facility. It is noted that the downstream monitoring point is below the built-up area of Tipperary Town.

The most recent biological monitoring (2008) has reported a Q3 (poor) status both upstream and downstream of the Tipperary Cooperative Creamery facility. The Q rating of the river improves to Q3-4 (moderate) and then to Q4 (good) further downstream. The locations of all monitoring points are provided as Attachment 1, Figure 2.

Physiochemical Water Quality results recorded by the EPA on the River Ara upstream of Tipperary Cooperative Creamery for the period from January 2014 to December 2016, including mean BOD, ammonia, orthophosphate and nitrate concentrations, are presented in Table 1 below alongside the means standards presented in Table 2 against the mean standards set out for a 'Good' status river in S.I. No. 272 of 2009 European Communities Environmental Objectives (Surface waters) Regulations 2009.

Table 1 Physiochemical Water Quality Results River Ara (Upstream of Tipperary Co-operative Creamery - Br SE of Shronell (Station Code 16A03-0100))

Parameter	2014 – 2016 Mean (mg/l)	Mean Surface Water Targets S.I. 272 of 2009
BOD	0.785	1.50
Ammonia (as N)	0.035	0.065
Orthophosphate (as P)	0.048	0.035

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3. Discharges within the Catchment

3.1 Discharges to River Ara – Tipperary Co-Op

Tipperary Co-Op discharge surface water runoff, treated condensate and cooling water to surface water. All of the discharge points from the site are included in the facility's IE licence.

Emission point reference SW-2 relates to the discharge of evaporated condensate to the River Ara. This emission point is subject to continuous monitoring in respect of volume and quality. The current discharge at SW-2 is monitored, as per Schedule C: Control and Monitoring of the IE Licence. Flow, pH, temperature and conductivity are monitored continuously, with COD, Suspended Solids, Total Nitrogen, Ammonia measured daily and Orthophosphate and Total Phosphorous weekly. Oils, fats and grease is a monthly discharge monitoring requirement.

The current IE Licence Limit values (ELV's) for emission point SW-2 are shown on Table 2.

Table 2 Current Emission Limit Values (SW-2)

Parameter	Existing ELV
Volume	29 m^3/hr
	696 m^3/day
Temperature	25 ^{O}C(Max)
pH	6-9
Toxicity	5 TU
Parameter/Units	mg/l
BOD	5
COD	100
Suspended Solids	5
Total Nitrogen (as N)	20
Ammonia (as N)	0.1
Molybdate Reactive Phosphate	0.5
Total Phosphorous (as P)	1
Oils, Fats and Greases	15

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The remaining discharges (emission point references SW1-5) from the site are associated with surface water runoff (from roof and yard areas) due to rainfall and cooling water. It is noted that the surface water from the carpark areas of the site passes through a Class 1 oil water separator, prior to discharge to the River Ara.

The on-site waste water treatment plant currently discharges treated wastewater to the municipal sewer, via emission point SE-1, and is subjected to further treatment at the Tipperary Town WWTP located at Longford, on the Bansha Road, Tipperary Town. This plant is operated by Irish Water.

A summary of mean physiochemical water quality data for the River Ara is presented on Table 3 in comparison with the mean quality standards specified under European Communities Environmental objectives (Surface waters) Regulations 2009, for 'Good' status rivers. The data was provided by Tipperary County Council and covers a three year period from January 2014 to December 2016.

As identified in Table 3, the mean concentrations of BOD are below the regulatory value at all monitoring points. Mean ammonia concentrations are below the regulatory requirement at

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three of the locations, however marginally exceeds the value at the monitoring point located downstream of Tipperary Town.

In the case of orthophosphate, in river results exceed the annual mean value for 'Good' status at all monitoring points, and upstream of all point source emissions, which indicates that the predominant source of phosphate is from diffuse sources, with agriculture and unsewered properties accounting for an estimated 95% of total phosphorus inputs to the catchment (Source: Aherlow Water Management Unit Action Plan)

Table 3 Summary of Mean Physiochemical Water Quality Data - River Ara

Parameter /Monitoring Station	16A030100	16A030300	16A030400	16A030600	S.I. 272 of 2009 Surface Water Regs.
Ammonia (mg/l)	0.036	0.069	0.054	0.037	0.065
Ortho-P (mg/l)	0.045	0.063	0.079	0.076	0.035
BOD (mg/l)	1.3	1.4	1.3	1.0	1.6
Comment	Note 1 U/S TCC	Note 2 D/S TCC	Note 3 D/S TWWTP	Note 4 WFD. S	

Note 1:.U/S TCC : Upstream of Tipperary Cooperative Creamery
Note 2: D/S TCC: Downstream of Tipperary Cooperative Creamery &Tipperary Town
Note 3: D/S TWWTP: Downstream of Tipperary Town Municipal WWTP
Note 4: WFD S.: Water Framework Directive Surveillance Site

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3.2 Discharges to River Ara – Actual & Potential

The South-Eastern River Basin Management Plan identifies discharges (or pressures) within the Plan area as arising from a number of sources including agriculture (diffuse), wastewater and industrial discharges (point), water from unsewered properties, forestry and discharges from landfills, quarries/mines and contaminated lands.

3.2.1 Actual Discharges

In the context of the current assessment, discharges from urban settlements at Tipperary Town are relevant. The current situation is as follows:

Tipperary Town WWDA

The Tipperary Town wastewater treatment plant is operated by Irish Water (IW) and is licensed by the EPA under a Wastewater Discharge Authorisation (WWDA) Reg. No. D0146-01.

Discharges of treated wastewater from the plant are made at a location downstream of both Tipperary Co-Op and Tipperary Town, and the receiving water quality information used in this assessment takes account of those discharges.

The plant has a capacity, expressed as population equivalent (PE), of 9,800. The WWTP provides tertiary treatment. The plant consists of an activated sludge process, in an oxidation ditch and includes screening, grit removal and phosphorus removal.

According to data presented in the 2016 AER, discharges from the WWTP plant show a high degree of compliance with the current WWDA.

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Stricter emission limit values (ELV's) are specified within WWDA D0146-01 to assist in the attainment of Good Status within the river by 31st December 2021. The proposed ELVs of 2.5mg/l for BOD, 0.1mg/l for orthophosphate and 0.15mg/l for ammonia shall apply from 31st December 2019.

3.2.2 Potential Discharges to River Ara

A review the '*Three Rivers Project*' report (M.C. O'Sullivan and Co. Ltd (MCOS), July 2013) which discusses the Ara in terms of agricultural inputs refers to "*>66% of farms having inadequate farm-yard manure (FYM) systems. Some with large storage deficits with 25% of those farms having deficits greater than 450m^3. A number of yards in the catchment using clay lined lagoons for storage of slurry and FYM, and these structures were deemed unacceptable. These added greatly to the storage deficit problem in the catchment.*" Slurry spreading at inappropriate times was also considered a contributing factor to water pollution in the catchment. It was concluded that a large proportion of the farmyards surveyed could improve their current farmyard management resulting in a reduced risk of nutrient loss from yards.

Urban runoff can be contaminated with pollutants and impact on surface water quality through direct discharges. Runoff from Tipperary Town could contain dangerous substances arising from the combustion of hydrocarbon fuels. Such toxins can persist in waters and sediments over time.

Overflows from sewer networks, leaking from defective underground pipes or seepage from containment areas can also lead to surface water pollution.

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3.3 Proposed new Dryer 2 Facility

The development of the Dryer 2 Facility is required by Tipperary Cooperative Creamery Ltd. to meet the increasing standards of existing and prospective customers and to allow the company to move towards the production of higher value milk powders.

The development will also facilitate an increase in the peak daily processing capacity of the plant, based on a similar range of products to that currently produced, but including a higher proportion of milk powders. The peak daily processing capacity of the facility will increase from c.1.62 million to 1.97 million litres of milk per day.

The development of the Dryer 2 Facility takes advantage of the current infrastructural and milk supply set-up at the Station Road site which Tipperary Co-Op have developed over many years. The development now proposed, and to which the Environmental Impact Assessment Report (EIAR) relates, comprises:

- Demolition works to facilitate construction of the new dryer tower including partial demolition of an existing warehouse building, demolition of an old butter store building and removal of existing fuel storage tanks together with bund structure and canopy roof structure over.
- Construction of a dryer tower building of nominal height 32 metres incorporating evaporator plant, dryer plant, air heater and heat recovery systems and powder storage silos with floors and access platforms provided at various levels within the building to support and facilitate access to the new plant systems;

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- Site works associated with the above development works including drainage works and pavement works;

A detailed description of each of the above elements of the works will be included in the EIAR.

The site is currently licensed by the Environmental Protection Agency under Industrial Emissions (IE) Licence Reg. No P0801-01 and final ELV's to be adopted will be subject to their assessment and agreement.

Details of the emissions and discharges associated with the proposed dryer will be submitted to the Agency as part of an application for a review of the site's IE Licence Register No P0801-02.

3.5 Proposed Upgrade to existing WWTP

Treated effluent from the Tipperary Co-operative Creamery Ltd waste water treatment plant (WWTP) discharge to the public sewer at emission point SE-1 and is subsequently treated more fully at the Irish Waster Tipperary Town waste water treatment plant, prior to discharge to the River Ara downstream of the town. There are no direct discharges to surface water from the onsite treatment plant.

In order to facilitate the proposed amendments to milk processing operations on the site, including an increase to the peak daily processing capacity and the manufacture of a higher proportion of milk powders, the facility is proposing to upgrade the WWTP.

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The proposed upgrade will ensure that wastewater treatment at the site meets the requirement of BAT (Best Available Technologies) both in terms of the treatment processes utilised and the final quality of treated wastewater.

The upgraded treatment system will be designed to treat a maximum process flow rate of 1,500 m^3/day, with a maximum daily discharge to sewer of 1,300m3/day.

The proposed upgrade to the WWTP will involve the installation of :

- *Additional 653m^3 balance tank capacity to accommodate 24-hour storage;*
- *6mm inlet screen on balance tank inlet;*
- *Forward feed pumps (D/D/S) to Dissolved Air Flotation (DAF) Units;*
- *DAF system complete with recycling pumps, poly dosing system and compressor;*
- *pH Correction Systems complete with bunded storage tanks;*
- *Biological treatment system comprising of a lattice of fine bubble air diffusers and supply networks mounted on the cell floor;*
- *Duty/standby rotary lobe blowers, will be installed complete with acoustic hoods and V.S.D. control;*
- *New DO probes with self-cleaning mechanisms, integrated electronics, handrail mounted tilting bracket and transmitter with local LCD indicator;*
- *New Clarifier 8.5m diameter complete with Scraper Bridge and scum removal system;*
- *PLC system and upgraded control panel, and*

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- *Instrumentation required for the process.*

The proposed WWTP upgrade is designed to achieve a stated effluent quality standard of 25mg/l BOD and 35mg/l SS. It is noted that owing to the improved performance standards of the upgraded plant, mass emissions of a number of key parameters will be significantly lower (~ 30% reduction) over current levels.

All discharges from the upgraded plant will be made to the existing sewer discharge point as SE -1 and a formal request to vary the daily flows and mass emissions from the site will be made to the EPA and Irish Water as part of the revision of the current IE licence for the facility

Tipperary Co-Op will monitor the treatment system performance internally to ensure that it is working effectively and will also monitor the quality of the final effluent discharge on a continuous basis in accordance with the requirements of Schedule C of the IE licence.

3.4 Future Development Potential within Ara Catchment

In order to evaluate the potential for additional discharges to be made within the catchment, a review of the South Tipperary County Development Plan 2009 and the Tipperary Town & Environs Development Plan 2013 was undertaken.

South Tipperary County Development Plan (STCDP) 2009 - 2015

According to the 2016 CSO records for South Tipperary, the rate of population growth in South Tipperary over the period 2011 to 2016 was 619 persons bringing the total population of the South Tipperary area to 85,051 – an increase of 0.7%.

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Growth projections for the period to 2022 show a further increase of 19,432 persons, and core policy objectives include making provision for this increase in population through provision of serviced land for housing and industrial/commercial development.

The STCDP sets out the amount of zoned land/housing units required to accommodate the separate population growth targets for the main towns and villages/rural areas within each of 23 Municipal Districts in the region and provides a clear framework on which the next Local Area Plan review will be based. These tables show clearly how the demands arising from overall projections for population growth will be addressed at the Municipal District Local Area Plan level (See STCDP Appendix 1 – Land Use Matrix).

It is noted that developments within the county will take account of the following elements of STCDP core strategy around protection of the aquatic environment and water quality.

County Development Plan Policy LH8: Inland Waters & Riparian Zones
It is the policy of the Council to protect the ecological status and quality of watercourses. In order to maintain the natural function of existing ecosystems associated with water courses and their riparian zones and to encourage sustainable public access to waterbodies, the Council will require an undisturbed edge or buffer zone to be maintained, where appropriate, between new developments and riparian zones of water bodies.

New development that requires access to ecologically sensitive waters will be directed to locations where access is already available. Any development in a watercourse and/or its

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riparian zone will be required to take appropriate measures to ensure the protection and conservation of habitats that may be impacted on by development proposals.

The relevant sections of the STCDP are extracted below:

Water Quality & Protection

Policy LH12: Water Framework Directive and River Basin Management Plans It is the policy of the Council to protect and improve the county's water resources and support an integrated and collaborative approach to local catchment management in order to ensure the successful implementation of the River Basin Management Plans (or any review thereof).

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4. Assessment of Impact

The proposed new dryer development includes the installation of an new evaporator and RO polisher, which will result in an increase in the volume of treated condensate discharged to the River Ara at SW 2 of 304m^3/day, resulting in a maximum daily condensate flow of 1,000m^3/day.

4.1 Impact Assessment Methodology

The impact assessment methodology is based on a determination of the available assimilative capacity in the River Ara for the pollutants of concern which are discharged from the site. In addition, an assessment (mass balance) was undertaken to establish the maximum downstream concentration of pollutants of concern and specifically those specified in S.I. No. 272 of 2009 European Communities Environmental objectives (Surface waters) Regulations 2009.

The methodology used to determine the assimilative capacity is based on the following:

Assimilative capacity = (Cmax – Cback) x F95 x 86.4 kg/day
Where:
Cmax = maximum permissible concentration (EQS – 95%ile value) (mg/l)
Cback = background upstream concentration (mg/l mean value)
F95 = the 95%ile flow in the river (m3/s)

Note: (60x60x24)/1000 = 86.4

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The output of the calculation of assimilative capacity is the total mass of the pollutant which can be discharged to a watercourse.

In order to work out a mass balance for the discharge, a mixing model is used, this based on the following calculation:

$$C_{final} = \frac{(C_{back} * F_{river}) + (C_{discharge} * F_{discharge})}{(F_{river} + F_{discharge})}$$

Where:

C final = Resultant concentration after discharge (mg/l)
C back = Background (u/s) concentration in river (mg/l)
F river = Flow in River (m3/s)
C discharge = Maximum concentration in discharge (mg/l)
F discharge = Flow of discharge (m3/s)

The output of this assessment for each parameter - C Final - returns the resultant downstream concentration in the receiving waterbody for that parameter, after the proposed discharges are made. The resultant concentration can be compared against the target values set out in the Surface Water Regulations (S.I. 272 of 2009) to determine if discharges will comply with those regulations.

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Assessment Standards

In assessing the impact of the discharge against the requirements of EC Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272 of 2009), the target level to be achieved in the River Ara is the 'Good' Status 95%-ile concentration value for the relevant parameters - BOD, Ammonia, and Orthophosphate.

Table 4 Target Standards for 'Good' Status River

Parameter	Environmental Quality Standard (EQS) (mg/l)
BOD	2.60
Ammonia (as N)	0.14
Ortho P	0.075
Nitrate	2.70
Suspended Solids	25.0

Nitrate and Suspended Solids have also been included in the impact assessment of the dryer plant discharge. Nitrate, a nutrient in surface water systems, is used to assess the ecological status of a water body. Although no target concentration has been identified for nitrate in SI 272 of 2009, the criteria used to assess nitrate target concentration has been derived for high and good status surface waters (Source 2012 EPA Integrated Water Quality Report – South East Ireland). Mean and 95%ile nitrate target standard for high and good status waters has been developed as 1.8mg/l and 2.7mg/l NO3-(as N) respectively.

In the case of suspended solids, the River Ara does not fall within the scope (i.e. is not listed in Schedule I) of the European Communities (Quality of Salmonid Waters) Regulations 1988 (S.I. 293 of 1988). However, the River Aherlow is included in the Regulations. The Quality of Salmonid Waters Regulations set the only legislative benchmark for which suspended solids can be assessed against. Irrespective of the non-inclusion of the River Ara within Schedule I, given that the Ara is a tributary of the Aherlow the target concentration of 25 mg/l for suspended solids set out in the Quality of Salmonid Waters is used in this assessment.

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4.2 Assimilative Capacity

The assimilative capacity (AC) of the River Ara at the proposed discharge point was calculated using the method described above and is tabulated below. It should be noted that the AC takes account of upstream contributing factors to the water quality of the River Ara including diffuse agricultural sources and the Lattin Agglomeration (WWDA No. A0506-01), located approximately 7.7km west of Tipperary Co-Op. The remaining assimilative capacity **after** the impact of upstream discharges has been calculated on this basis.

Background water quality data was obtained from EPA datasets (16A03-0100: Shronell Bridge) and additional information was provided by Tipperary County Council.

Table 5 Mean Physiochemical Water Quality Results River Ara (Upstream of Tipperary Co-operative Creamery - Br SE of Shronell (Station Code 16A03-0100))

Parameter	2014 – 2016 Mean (mg/l)	EQS (mg/l)
BOD	0.785	2.60
Ammonia (as N)	0.035	0.14
Orthophosphate (as P)	0.048*	0.075

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Parameter	2014 – 2016 Mean (mg/l)	EQS (mg/l)
Nitrate (as N)	1.40	2.70
Suspended Solids	12.5	25.0

Owing to elevated levels of Ortho–P in the river, which are likely due to the range of diffuse pressures on the catchment upstream of that point, and entirely outside of the control of Tipperary Cooperative Creamery, it is considered reasonable to use the adjusted mean background concentration for that parameter – i.e. 0.030mg/l - (Ref: *Guidance, Procedures and Training on the Licensing of Discharges to Waters and to Sewer for Local Authorities issued by the Water Services Training Group - Water Services Training Group (WSTG))* as agreed with Tipperary County Council.

The adjusted mean background concentration is the mid-point between High and Good status (mean standard) (i.e for Ortho P = (0.025 + 0.035)/2 = 0.03mg/l).

The mean background concentrations for all other parameters based on mean of actual monitoring data.

Predicted nitrate and suspended solid concentrations are also included in the assessment.

Hydrometric data for the River Ara was obtained from the Carrowclogh hydrometric station (Code: 16047) and the 95%-ile flow value was calculated and agreed with the EPA Hydrometric Section as 0.05 m^3/sec.

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The available assimilative capacity based on the above input data is shown on Table 6 below.

Table 6 River Ara - Available Assimilative Capacity

Parameter	Assimilative Capacity (kgs/day)
BOD	7.84
Ammonia (as N)	0.46
Orthophosphate (as P)	0.21*
Nitrate (as N)	5.61
Suspended Solids	54.00

* - based on adjusted mean background concentration for ortho-P of 0.03mg/l

4.3 Current Impact – River Ara

The current impact of discharges from SW-2 has been calculated based on the currently licensed emissions from that emission point (Table 7).

It is noted that the assessment is made on a conservative basis – i.e. worst case – using maximum licensed concentration for each parameter, at maximum licensed flows.

Under typical operating conditions, actual concentrations and flows are lower, thereby reducing the overall level of actual mass emissions from SW-2.

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Table 7 Current Emission Limit Values (SW-2)

Parameter	Existing ELV
Volume	29 m^3/hr
	696 m^3/day
Temperature	25 ^{O}C(Max)
pH	6-9
Toxicity	5 TU
Parameter/Units	mg/l
BOD	5
COD	100
Suspended Solids	5
Total Nitrogen (as N)	20
Ammonia (as N)	0.1
Molybdate Reactive Phosphate	0.5
Total Phosphorous (as P)	1
Oils, Fats and Greases	15

The resultant downstream concentration for each of the relevant parameters under the current discharge regime has been calculated using the mixing model formula and is tabulated on Table 8 below.

The resultant downstream concentration is based on an extreme worst case scenario where the site is discharging at its limit -both in terms of ELV's and flow during low river flow (95%-ile). In practice, these conditions are unlikely to be met - and then only for relatively short periods – as 95% of all flow data are above the value used to calculate the resultant downstream concentration.

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Table 8 Predicted Maximum Downstream Concentration under Current Discharge

Parameter	Predicted Concentration @ 95%ile flow (mg/l)	*95%ile Target Concentration (mg/l)	Compliant
BOD	1.35	<2.60	Yes
Ammonia(as N)	0.044	<0.14	Yes
Orthophosphate	0.054	<0.075	Yes
Nitrate	1.90	<2.70	Yes[1]
Suspended Solids	11.5	<25.0	Yes[2]

1. Nitrate target concentration has been derived for high and good status surface waters (source 2012 EPA Integrated Water Quality Report –Monaghan Louth 2011). Mean and 95%ile nitrate target standard of for good status waters has been developed as 1.8mg/l and 2.7mg/l NO3 (as N) respectively.
2. European Communities (Quality of Salmonid Waters) Regulations 1988 (S.I. 293 of 1988)

Notwithstanding the extreme worst case basis for the assessment, all existing discharges are well within and fully compliant with the requirements of both the EC Environmental Objectives (Surface waters) Regulations 2009 and EC (Quality of Salmonid Waters) Regulations 1988 and accordingly do not cause a significant environmental impact.

4.4 Predicted Impact – River Ara

The proposed development will give rise to additional flows of 304m3/day, bringing the overall daily discharge from SW-2 to 1,000m^3/day. The proposed ELV's for SW-2 , shown on

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Table 9, were used to determine the potential impact associated with additional discharges form the site after installation of the proposed new dryer facility.

Table 9 Proposed Emission Limit Values (SW-2)

Parameter	Proposed ELV
Volume	42 m^3/hr
	1000 m^3/day
Temperature	25 ^{O}C(Max)
pH	6-9
Toxicity	5 TU
Parameter/Units	mg/l
BOD	5
COD	100
Suspended Solids	5
Total Nitrogen (as N)	20
Ammonia (as N)	0.3
Molybdate Reactive Phosphate	0.15
Total Phosphorous (as P)	1
Oils, Fats and Greases	15

The predicted downstream concentration for Orthophosphate is based on decreasing the current Emission Limit Value (ELV) from 0.5mg/l to 0.15mg/l.

It is noted that final ELV's will be provided by the Agency as part of the IE Licence review.

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Table 10 Predicted Maximum Downstream Concentration under Proposed Discharge

Parameter	Predicted Concentration @ 95%ile flow	*95%ile Target Concentration (mg/l)	Compliant
BOD	1.57	<2.60	Yes
Ammonia(as N)	0.084	<0.14	Yes
Orthophosphate	0.056	<0.075	Yes
Nitrate	2.08	<2.70	Yes[1]
Suspended Solids	11.1	25.0	Yes[2]

1. Nitrate target concentration has been derived for high and good status surface waters (source 2012 EPA Integrated Water Quality Report –Monaghan Louth 2011). Mean and 95%ile nitrate target standard of for high and good status waters has been developed as 1.8mg/l and 2.7mg/l NO3 (as N) respectively.
2. European Communities (Quality of Salmonid Waters) Regulations 1988 (S.I. 293 of 1988)

Again, it is noted that the predicted downstream concentrations have been calculated at the 95%ile flow condition in the river and therefore is a conservative assessment and represents worst case. Flows greater than the 95%ile together with normal discharges from the site, which are significantly lower than limit values used in the calculations, will significantly reduce the resultant concentration levels in the River Ara even further.

Under the new proposed discharge regime from SW-2, the following parameters have been assessed in terms of their impact on surface water quality:

4.4.1 BOD

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The predicted BOD concentration in the River Ara downstream of the Tipperary Co-Op discharge has been calculated as 1.57mg/l, which is significantly below the 95%ile concentration target value for BOD – 2.6mg/l.

It is noted that the resultant BOD concentration in the Ara –calculated on a worst case basis – is 61% of the relevant water quality standard for the parameter.

The proposed BOD ELV can therefore be accommodated whilst remaining compliant with the requirements of S.I. No. 272 of 2009 European Communities Environmental objectives (Surface waters) Regulations 2009, and accordingly not cause a significant environmental impact.

4.4.2 Orthophosphate

Owing to elevated levels of Ortho–P in the river, which are likely due to the range of diffuse pressures on the catchment upstream of that point, and entirely outside of the control of Tipperary Cooperative Creamery, it is considered reasonable to use the adjusted mean background concentration for that parameter – i.e. 0.030mg/l - as agreed with Tipperary County Council (Ref: *Guidance, Procedures and Training on the Licensing of Discharges to Waters and to Sewer for Local Authorities issued by the Water Services Training Group - Water Services Training Group (WSTG)).*

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The predicted orthophosphate concentration in the River Ara downstream of the Tipperary Co-Op discharge has been calculated on this basis as 0.056mg/l, which is below the 95%ile concentration target value for Ortho-P – 0.075mg/l. It is noted that the resultant Ortho P concentration in the Ara – calculated on a worst-case basis – is 75% of the relevant water quality standard for the parameter.

The proposed orthophosphate ELV can therefore be accommodated whilst remaining compliant with the requirements of S.I. No. 272 of 2009 European Communities Environmental objectives (Surface waters) Regulations 2009, and accordingly not cause a significant environmental impact.

It is noted that the proposed development will not result in an increase in the P-load discharged to the Ara River as Ortho-P will reduce from the current licenced level in accordance with stricter ELVs being applied post development.

4.4.3 Ammonia

The predicted ammonia concentration of 0.084 mg/l in the River Ara downstream of the Tipperary Co-Op discharge has demonstrated that the ammonia load from the proposed discharge point will not result in an exceedance of the 95%ile concentration (0.14 mg/l) target value at the 95%ile flow condition.

It is noted that the resultant Ammonia concentration in the Ara –calculated on a worst case basis – is 60% of the relevant water quality standard for the parameter.

The proposed ammonia ELV can therefore be accommodated whilst remaining compliant with the requirements of S.I. No. 272 of 2009 European Communities

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Environmental objectives (Surface waters) Regulations 2009, and accordingly not cause a significant environmental impact.

4.4.4 Nitrate

The predicted nitrate concentration in the River Ara downstream of the Tipperary Co-Op discharge has been calculated as 2.08 mg/l, which is below the 95%ile concentration target value for nitrate – 2.70 mg/l.

It is noted that the resultant Nitrate concentration in the Ara –calculated on a worst case basis – is 77% of the relevant water quality standard for the parameter.

In conclusion, the proposed nitrate ELV can therefore be accommodated whilst meeting water quality objectives for the river, and accordingly not cause a significant environmental impact.

4.4.5 Suspended Solids

The predicted suspended solids (SS) concentration in the River Ara downstream of the Tipperary Co-Op discharge has been calculated as 11.1 mg/l, which is significantly below the 95%ile concentration target value for SS – 25 mg/l.

It is noted that the resultant Suspended Solids concentration in the Ara –calculated on a worst case basis – is 44% of the relevant water quality standard for the parameter.

The proposed Suspended Solids ELV can be accommodated in the River Ara whilst remaining fully compliant with the requirements of the EC (Quality of Salmonid Waters) Regulations 1989 and accordingly not cause a significant environmental impact.

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4.5 Predicted Impact – Cumulative Impact

The proposal will give rise to an increased discharge of treated condensate to the River Ara at the existing emission point SW-2 and the resultant downstream concentrations for the primary water quality parameters have been calculated (Table 9).

In order to assess the potential for impact of the proposed new condensate discharge on water quality downstream of the Tipperary Town WWTP, discharges from the town plant have been assessed using the resultant water quality parameters after the proposed new dryer has been installed.

Owing to the likely timescales for construction and commissioning of the new dryer, it is considered reasonable that the assessment is made in the context of the 2020 limit values specified in the Tipperary Town WWTP discharge authorisation.

The results of the assessment are tabulated on Table 11.

Table 11 Assessment of Resultant Water Quality after Tipperary Town WWTP Discharges

Water Quality Parameter	D/S Tipp Coop after Dryer (mg/l)	D/S Tipperary Town WWTP after Dryer mg/l	Water Quality Target (mg/l)	Compliant (Y/N)

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BOD	1.577	1.860	2.6	Yes
Ammonia	0.084	0.105	0.14	Yes
Ortho P	0.056	0.070	0.075	Yes

Based on the results of assessment, water quality in the River Ara after discharges from the Tipperary Cooperative Creameries site, after installation of the proposed new dryer together with discharges from the Tipperary Town WWTP, will be fully compliant with the water quality target values specified for 'Good' Status rivers under the 2009 Surface Waters Regulations.

It is further noted that the proposed dryer installation will result in a decrease in the loading of BOD, Ortho P and Ammonia to the Tipperary Town WWTP due to improvements in treatment on site.

This will further ensure that the proposed dryer installation will not have significant direct or indirect impacts on water quality in the River Ara.

4.6 Predicted Impact – R. Aherlow

The River Ara joins the Aherlow River approximately 12km downstream of the proposed discharge point at Tankerstown. The Aherlow in turn joins the Suir 2 kilometres north of Cahir, approximately 18km further downstream of Tipperary Co-Op.

In order to quantify the impact of the discharge from the site, a comparison was made to the 95%ile flow rate in the River Aherlow. It was determined from the Tipperary WWDA that the 95%ile flow rate in the Aherlow downstream of its confluence with the Ara, is 0.7 m^3/s.

The maximum proposed discharge from the Tipperary Co-Op facility represents 2% of the 95%ile flow and therefore is considered to have an insignificant impact on the River Aherlow. The contribution is significantly lower during the period around the mean flow.

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4.7 Predicted Impact – R. Suir

The River Ara joins the Aherlow River approximately 12km downstream of the proposed discharge point at Tankerstown. The Aherlow in turn joins the Suir 2 kilometres north of Cahir, approximately 18km further downstream of Tipperary Co-Op.

It is noted that the Suir is known to support populations of Annex I species downstream of the facility and therefore the potential impact on this watercourse from the Tipperary Co-Op site has been considered.

In order to quantify the impact of the discharge from the site, a comparison was made to the 95%ile flow rate in the Suir. It was determined from the EPA Hydrotool that the flow rate in the Suir where it converges with the River Aherlow is 3.36m^3/s.

The maximum discharge from the Tipperary Co-Op facility represents 0.3% of the 95%ile flow and therefore is considered to have an insignificant impact on the River Suir, given that at maximum discharge from the site, approximately 290 dilutions are available.

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Furthermore, discharges at this level and given the available dilutions, will not compromise the ability of the Aherlow/Suir system to accommodate **significant** additional discharges in the future, over and above those minor additional inputs envisaged through projected increases in population to 2022.

As set out above, significant residual assimilative capacity remains within the downstream river system after both the proposed mass emissions from Tipperary Co-Op and Tipperary urban WWTP have been taken into account.

Based on this conservative assessment, there is significant residual assimilative capacity to allow for other discharges to be made, while maintaining compliance with the water quality standards *Good* status values the parameters covered under the Surface Water Quality Regulations 2009.

The assessment demonstrates that the discharges from Tipperary Co-Op, can be accommodated within the catchment without impacting adversely on the future developments within the Tipperary Town urban settlement or on capacity of the Tipperary Town WWTP to discharge to the River Ara.

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5. Conclusion

Tipperary Co-Operative Creamery Limited proposes the development of a new dryer facility at its Station Road facility. Arising from the installation of the proposed dryer facility, the volume of treated condensate requiring discharge will increase by 304 m^3/day, bringing overall condensate discharges to 1,000m^3/day.

A comprehensive evaluation of the potential impacts of the discharge has been undertaken.

The proposal has been assessed in the context of the available assimilative capacity in the River Ara system and takes account of the cumulative impacts of other sources including Tipperary uWWTP. The findings of the assessment confirm:

- There is sufficient Assimilative Capacity within the River Ara to accept discharges from Tipperary under the proposed amendment;

- Discharges can be made in full compliance with the Surface Water Regulations (S.I. 272 of 2009).

When evaluated in the context of other sources, the (cumulative) assessment shows that:

- The cumulative discharge from Tipperary Co-Op and the Tipperary uWWTP can be accommodated without utilising all of the available Assimilative Capacity in the river system at the point of discharge;

- Point discharges represent a minor influence on water quality in the overall catchment. Other improvement measures within the wider catchment (further implementation of the Nitrates Directive and actions for achievement of Water Framework Directive commitments) should lead to further improvement in water quality across the river system.

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The assessment of impact on the receiving environment is based on a series of Emission Limit Values (ELV'S) for each parameter, which in terms of the operation of the proposed new Dryer-2 facility, are established as absolute limit values. The design of the upgrade works has been to ensure Best Available Technology (BAT) in terms for both treatment methods used and quality of the treated process waters – all parameters are lower than their respective BAT ELV's and fully compliant with BAT.

Internal target values are set at lower levels to reflect the typical fluctuations in inlet loadings to the Dryer-2 facility within the plant throughout daily and weekly production cycles. This ensures that the upper end of the range of concentrations remains within ELV and therefore fully compliant under all normal and non-routine processing operations at the site.

The findings of the assessment confirm:

- There is sufficient Assimilative Capacity within the River Ara to accept discharges from the Tipperary Co-Op SW-2 surface water discharge point.

- Discharges can be made in full compliance with the Surface Water Regulations (S.I. 272 of 2009). Compliance is assured under a worst-case assessment basis as resultant concentrations for the parameters assessed are well below the relevant target values and

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leave significant reserve capacity in the river to assimilate potential discharges from other sources in the catchment.

When evaluated in the context of other sources, the (cumulative) assessment shows that:

- The cumulative discharge from Tipperary Co-Op and the Tipperary uWWTP can be accommodated without utilising all of the available Assimilative Capacity in the river system at the point of discharge;

- Improvements in the on-site treatment of wastewater proposed under the current application will reduce the mass loadings to sewer, and consequently the mass loadings on the Tipperary town wastewater treatment plant with a consequent reduction in overall loadings to the River Ara;

- Point discharges represent a minor influence on water quality in the overall catchment. Other improvement measures within the wider catchment (further implementation of the Nitrates Directive and actions for achievement of Water Framework Directive commitments) should lead to further improvement in water quality across the Aherlow river system;

- The discharges amount to less than 3% of the 95%ile flow in the Aherlow and <1% in the River Suir and therefore can have only limited influence on the overall water quality within the larger Suir river system. Therefore, the AC assessment ensures that ample capacity exists to facilitate additional population growth and developments within the catchment;

- Screening for Appropriate Assessment has concluded that current or proposed discharges will not have any negative effects on the qualifying interests of the designated Natura 2000 sites within a 15km radius of the plant. Accordingly, a Natura Impact Assessment is not required.

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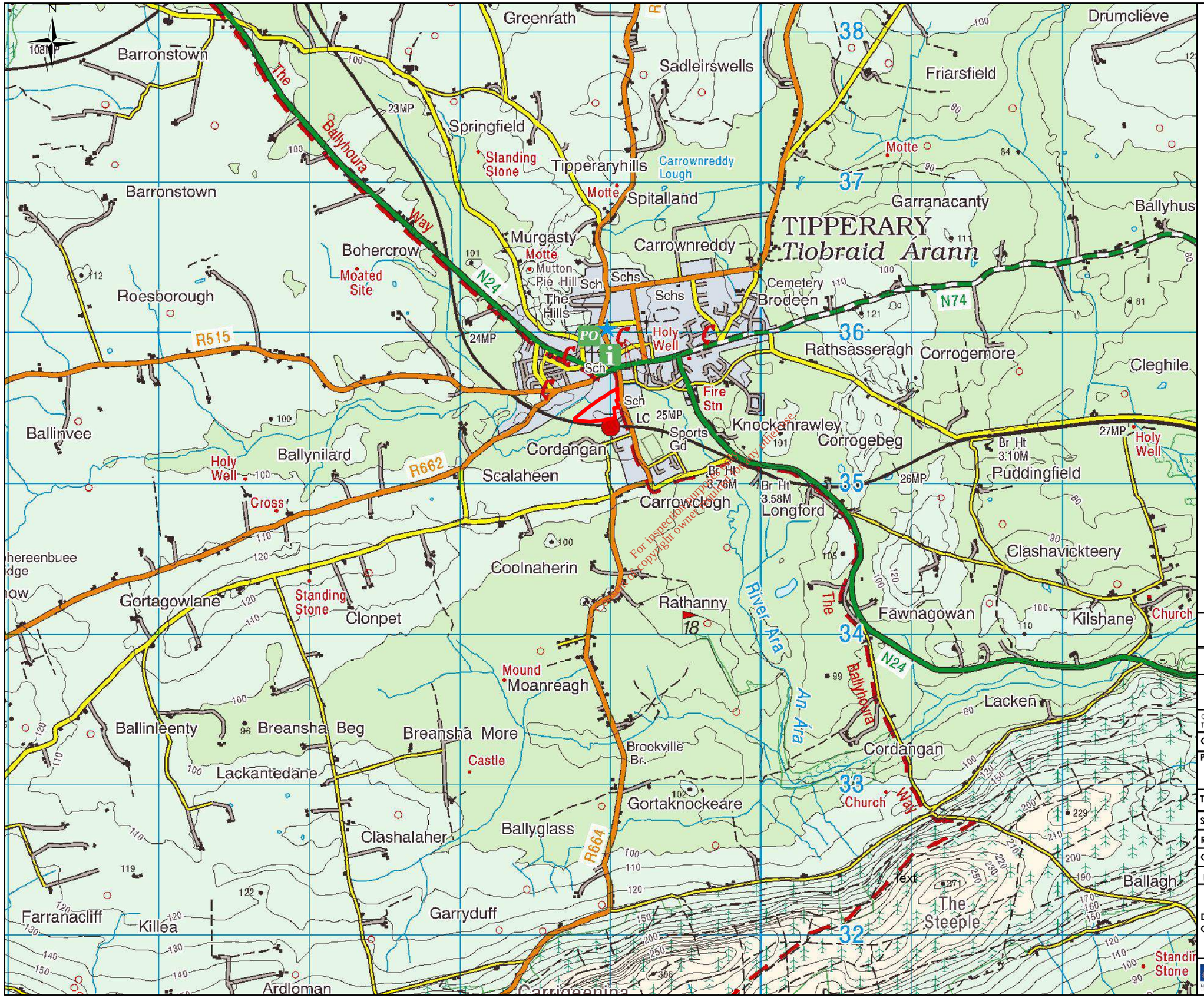
APPENDIX 1

Figure 1 – Site Location Map

Figure 2 – Hydrochemical Monitoring Stations

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0 750 1,500 3,000 Meters

Legend

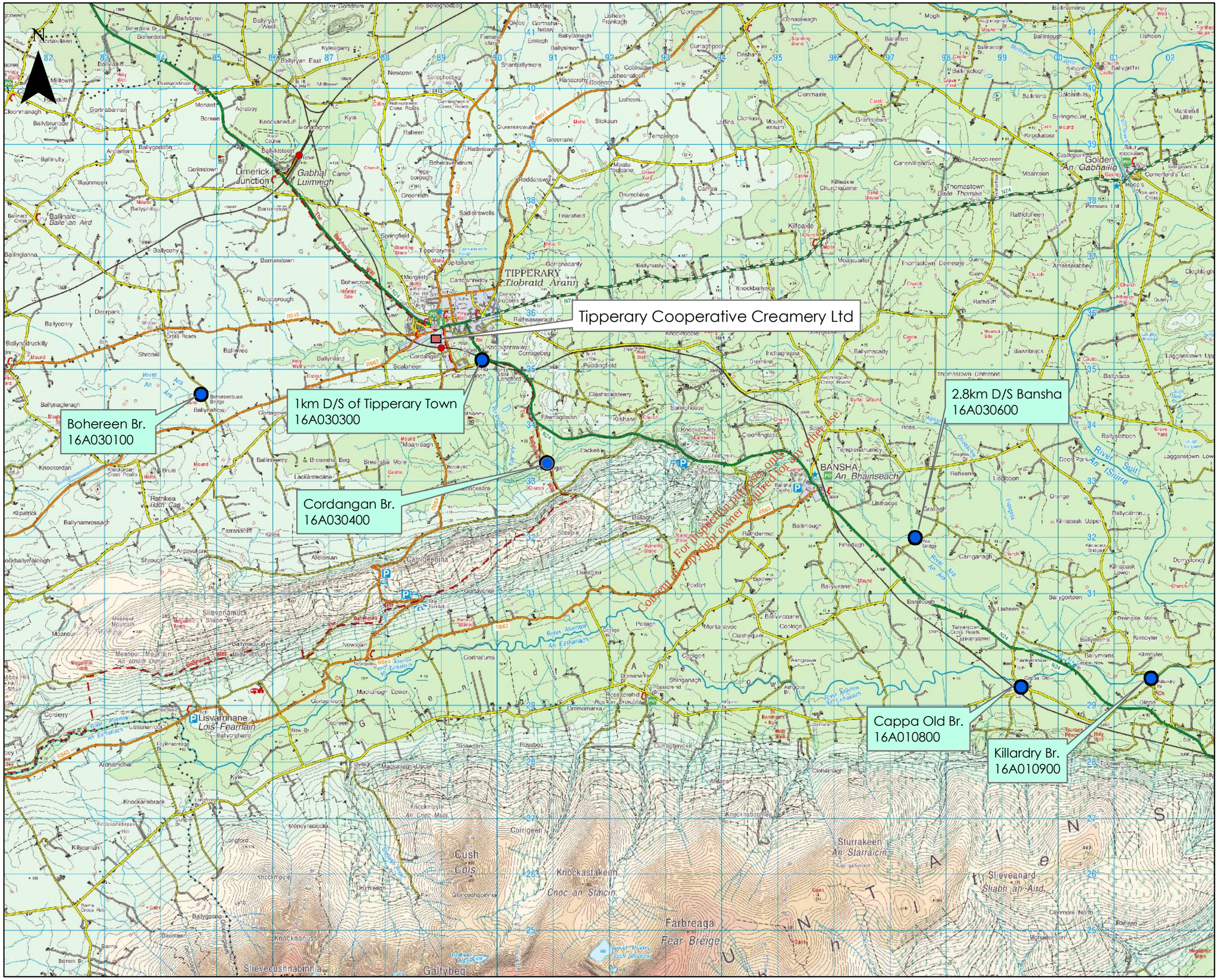
Site Boundary

OES Consulting 2nd Floor, FBD House, Fels Point, Tralee, Co Kerry
T: (066) 7128321 F: (066) 7180061 E: info@oes.ie

Client:	Tipperary Co-Operative Creameries
Project:	Environmental Report on the Assessment of a Proposed New Dryer Development
Title:	Site Location Map
Scale:	1:24,000 @ A3
Ref:	Figure 1
OES Ref:	F-1131-28
Revision:	01
Document Control:	Date: 05/08/2016
	Drawn By: PW
	Checked By: ET
	Approved By: ET

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Legend

- Water Monitoring Station

OES Consulting
2nd Floor
FBD House
Fels Point
Tralee
Co Kerry

Client:	Tipperary Cooperative Creamery Ltd.
Project:	IPPC Licence Review (Attachment E.2.) Assessment on Recieving Surface Water
Map Title:	Water Monitoring Locations
Scale:	1:65,000 @ A3 Paper Size
OES Ref:	Figure 1
Revision:	01
Document Control:	Drawn By: TQ Checked By: EOL Approved By: TQ Date: 06/08/2012

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APPENDIX 2

SE of Shronell Bridge
Hydrochemical Monitoring Data 2014 - 2016

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SE Shronell Br. 16A03-0100
Mean Data 2016 - 2014

	2016	2015	2014	2014-2016 Mean
Ammonia	0.0296	0.033	0.041	0.035
BOD	0.500	0.775	1.080	0.785
Ortho-P	0.041	0.053	0.050	0.048
Nitrate	0.734	1.825	1.648	1.402

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ATTACHMENT E

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GEOTECHNICAL INVESTIGATIONS REPORT

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IGSL Limited

IGSL

TIPPERARY CO-OP
DEVELOPMENT
TIPPERARY TOWN

MRG
Consulting Engineers

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Geotechnical Report

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Ground Investigation & Geotechnical Specialists

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FOREWORD

Notes on Site Investigation Procedure

The following notes should be read in conjunction with the report. Any modifications to the procedures outlined below are indicated in the main text.

GENERAL

The recommendations made and opinions expressed in the Report are based on the "Boring Records, an examination of samples and results of the site and laboratory tests. No responsibility can be held for conditions which have not been revealed by the boreholes, for example, between borehole positions. Whilst the report may express an opinion on a possible configuration of strata both between borehole positions and below the maximum depth of the investigation, this is for guidance only and no liability can be accepted for its accuracy.

CABLE TOOL BORING

Unless otherwise stated the 'Shell and Auger' technique of soft ground boring has been employed. Whilst this technique allows the maximum data to be obtained on strata conditions, a degree of mixing of some layered soils, (e.g. thin layers of coarse and fine granular material) is inevitable. Specific attention is drawn to this factor where evidence of such a condition is available.

DYNAMIC PROBING

It should be noted that as Dynamic Probes do not recover soil samples it is not possible to comment on types of strata encountered or groundwater ingress. Variations in bearing capacities will occur with changes in soil type and it is recommend that probing should be carried out in conjunction with pits, window samples or boreholes.

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GROUND WATER

The ground water conditions entered on the Boring Records are those appertaining at the time of the investigation. The normal rate of boring does not usually permit the recording of an equilibrium water level for any one water strike. Moreover, ground water levels are subject to variations caused by seasonal effects or changes in local drainage conditions. The table of each Boring Record shows the ground water level at the quoted borehole and casing depths, usually at the start of the day's work. The word "none" indicates that ground water was sealed off by the borehole casing.

GAS MONITORING

Unless otherwise stated gas monitoring is carried out using a GA2000 infra red gas detector. The gases monitored for and levels noted are recorded and plotted on the relevant test data sheets. Unless stated otherwise no monitoring is carried out for gas pressure or to calculate gas flow rates.

ROUTINE SAMPLING

Undisturbed samples of predominantly cohesive soils are obtained in a 102mm diameter open-drive sampler, complying with the requirements of the British Standard Code of Practice B.S. 5930. Large disturbed samples of granular soils, or of soils in which undisturbed sampling is not possible or appropriate, are taken from the boring tools and sealed into polythene bags. Small disturbed samples are taken at frequent intervals and sealed into 0.5 kg glass jars or polythene bags for subsequent visual classification. Where encountered in sufficient quantity, samples of groundwater are taken.

Unless otherwise stated in the main text, disturbed soil samples may not be at their natural water content.

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REPORT ON A SITE INVESTIGATION FOR A DEVELOPMENT AT TIPPERARY CO-OP

MRG CONSULTING ENGINEERS

Report No. 19312 **JULY 2016**

I Introduction

A major development is proposed at the existing Tipperary Co-Op facility located in Tipperary Town.

An investigation of sub soil and bedrock conditions in the area of development has been ordered by project consulting engineers, MRG, on behalf of Tipperary Co-Op.

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The programme of the investigation included the construction of three cable percussion boreholes. Rotary core drilling was carried out at two of these locations and at two additional locations to establish rock horizon and recover representative core. Trial pits were opened at each borehole and corehole location to ensure that existing underground services were not damaged.

Six exploratory trial pits were opened using a combination of hand and machine excavation to expose existing structural foundations and record relevant details. These works were located mainly within existing buildings.

All field-work was carried out where appropriate in accordance with BS 5930, Code of Practice for Site Investigations (1999).

A programme of laboratory testing to confirm geotechnical soil and rock parameters was prepared and laboratory testing was carried out at IGSL's accredited laboratory immediately following site operations.

This report presents all factual data pertaining to the project and comments on the findings relative to the future developments.

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II Fieldwork

The site is located at the Tipperary Co-Op facility located in Tipperary Town. The factory lies on the southern bank of The River Ara on what appears to be made up ground. The river bank on the factory side is protected by rock armouring.

The plant is a live and very busy dairy produce facility and strict safety precautions were in force. A preliminary walk over was carried out by MRG and IGSL to establish areas of safe access for boring and drilling plant and to define the location of the foundation pits.

A site location map and a detailed borehole and trial pit layout is enclosed in Appendix V to this report. All exploratory locations were determined by MRG and marked out by site personnel for IGSL. The corehole locations were referenced to National Grid and OD levels established.

a. Boreholes

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The three exploratory holes were bored with conventional 200mm cable-tool methods using a Dando Exploratory Rig. Hand digging and electronic scanning was carried out at each borehole location to ensure that underground services were not damaged. Sand bags were placed around the borehole areas to restrict water leakages to the factory.

Detailed geotechnical records are contained in Appendix I to this report - the records give details of stratification, sampling, in-situ testing and groundwater. Note is also taken of any obstructions to normal boring requiring the use of the heavy chisel for advancement.

Two abortive attempts were made to bore at BH01 and BH01A. Reinforced concrete was noted in both locations with probable underling services. Following instructions from MRG work at this location was abandoned.

At BH02, concrete and some underlying gravel fill extends to 1.40 metres. Soft silty CLAY with some gravel extends from 1.40 to 2.40 metres, stiffer brown sandy gravelly CLAY continues from 2.40 to 5.10 metres. Medium dense water bearing GRAVEL is encountered at 5.10 metres with looser gravelly SAND from 8.10 to 11.20 metres. Dense GRAVEL with cobbles and boulders is present from 11.20 to 12.00 metres. Following a period of heavy duty chiselling on boulders the borehole was terminated at 12.00 metres BGL.

Ground water was noted in association with the GRAVEL stratum at 5.10 metres BGL with standing water level recorded at 3.50 metres on completion of boring.

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Concrete overlies FILL at BH 03, the made ground continues to 2.20 metres. Some mixed gravel / clay soil is noted from 2.20 to 3.20 metres overlying a stratum of firm grey brown SILT / CLAY. Dense fine to coarse sandy GRAVEL is present from 7.20 to 10.60 metres (with a thin band of very gravelly CLAY from 9.00 to 9.50 metres). The borehole was terminated at 10.60 metres on boulder obstruction. Ground water was noted at 5.20 metres and at 7.20 metres in the gravel stratum with water rising to stand at 3.20 metres BGL.

b. Coreholes

A Top-Drive track mounted core drill was mobilised to drill and recover rock core at four locations. An air mist flush was employed with standard triple tube technique. Open Hole Symmetrix Drilling was used in the overburden, with standard penetration tests carried out as required. Diamond core drilling (78 mm diameter) was used in the bedrock, approximately 5.00 metres of rock core was recovered at each location. Core drilling took place beside borehole locations RC01 and RC02 . RC03 and RC05 were rotary only, drilled from surface to bedrock. One hole (RC04) scheduled for inside an existing working building was cancelled.

Core was recovered and placed in timber boxes and returned to IGSL for detailed geotechnical logging. The geotechnical core records are contained in Appendix II to this report. These detail Total Core Recovery (TCR), Solid Core Recovery (SCR), Rock Quality Designation (RQD) and incorporate a Fracture Spacing Log.

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The records indicate overburden comprising gravelly CLAY or coarse sandy GRAVEL. Standard penetration tests were carried out in the overburden at intervals to assess in-situ soil strength. N values are entered on the right hand column of the core logs.

The rock is described as strong to medium strong grey fine grained LIMESTONE fresh to moderately weathered with some core loss and clay infill in places.

Core recovery was generally 100%, however the solution weathering resulted in some 10% core loss in places.

A standpipe has been installed at RC 02 to facilitate long term ground water observation. The standpipe is factory slotted 50mm PVC, sealed from GL to 2.50 metres with bentonite-cement and protected by a flush manhole cover.

Core Drilling Records are summarised as follows:

Ref No.	Overburden	Weathered Limestone	Solid Limestone
RC01	0 – 16.40	16.40 – 16.60	16.60 - 22.40
RC02	0 – 12.60	12.60 – 13.20	13.20 – 18.30
RC03	0 – 11.20	11.20 – 11.40	11.40 – 16.40
RC05	0 – 9.90	9.90 – 10.20	10.20 – 15.30

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Foundation Inspection Trial Pits

Six foundation inspection pits were scheduled. Four pits were to be excavated within an existing building F101 to F104, one additional pit F103A was added in this area.

F105 was omitted due to services concentration and F106 was opened from outside a building to locate foundations. The excavation work was also examined by the client and by a representative of MRG who recorded details as appropriate.
Foundation inspection Pit records with photographs are contained in Appendix III. These records note the stratification at each location and provides dimensions for the exposed foundations.

Trenches were carefully backfilled and reinforced concrete placed and dowelled as per specification.

In addition to the foundation inspection pits, trial pits were also excavated at the exploratory locations to ensure that services were not damaged.

IV Testing

(a) In-Situ :

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Standard penetration tests were carried out at approximate 1.00 metre intervals in the geotechnical boreholes and in the rotary core holes to measure relative in-situ soil strength. N values are noted in the right hand column of the boring and coring records, representing the blow count required to drive the standard sampler 300mm into the soil, following initial seating blows.

The results are summarised as follows:

Stratum	Range of N values	Comment
Upper CLAY (BH2)	17 to 32	Stiff to very Stiff
Upper CLAY (BH3)	10 to 14	Firm to Stiff
GRAVEL (BH2)	16 to 25	Medium Dense
SAND (BH2)	6 to 11	Loose
LOWER GRAVEL (BH2)	37 to >50	Dense to vey Dense
GRAVEL (BH 3)	42 to >50	Dense to very Dense

Tests carried out during the course of rotary drilling also confirm very stiff consistency of cohesive soils and dense to very dense granular material.

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(b) Laboratory :

All geotechnical samples from the boreholes have been returned to the IGSL laboratory for initial visual inspection, a schedule of testing was submitted by IGSL and tests duly carried out. Laboratory data is presented in Appendix IV. Geotechnical testing was carried out by IGSL in it's INAB accredited facility. Chemical testing was carried out by Jones Environmental Ltd.

The geotechnical tests consisted of the following.

a. Classification (Liquid and Plastic Limits)
b. Grading Analysis (Wet sieve/ Hydrometer)
c. Sulphate and pH determination (Jones Environmental)
d. Point Load Tests on Rock

Classification

The cohesive soils from BH02 and BH03 have had liquid and plastic limits determined and results are plotted in the CL Zone of the standard Casagrande Classification Chart. The material is of low plasticity with moisture content ranging from 9.5 to 14%.

Grading

Particle size distribution curves were established for each stratum using wet sieve and hydrometer analysis. The graphed results reflect quite a variation in the stratification. The upper clay stratum is heterogeneous and smoothly graded from the clay to coarse gravel fraction.

The granular stratum at the base of BH03 consists of sandy GRAVEL with up to 10% fines. In BH02, fine sandy slightly gravelly SILT is identified from 8.10 to 11.20 metres.

Sulphate and pH

Two samples were sent for sulphate and pH analysis. Sulphate concentrations (SO_4 2:1 extract) of 0.1011 and 0.0159 g/l were established with an average pH of 9.1. No special precautions are necessary to protect foundation concrete from sulphate aggression. A sulphate design class of DS-1 (ACEC Classification for Concrete) is indicated for concentrations less than 0.5 g/l.

Point Load Tests

Point load test were carried out on sixteen segments of core from the four drill holes. Equivalent UCS values have been established ranging from 28 to 145 MPa with an average UCS of 82 MPa.

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IV: Discussion

The project involves construction of new facilities at Tipperary Co-Op, with demolition of some structures prior to commencement.

An investigation of sub soil and bedrock has been carried out using borehole and rotary core drilling techniques. Examination of existing foundations was also carried out by direct excavation and inspection.

Site restraints associated with a very busy working environment at the plant limited the exploratory locations to a total of five, with cable tool boring at two locations (BH 02 and BH 03) and rotary core drilling at four locations (RC01, RC02, RC03 and RC05).

RC3 and RC5 were located close to the bank of the River Ara. The drilling records indicate that about 2.70 metres of clayey gravel (possibly FILL) overlies dense clay bound sandy GRAVEL / very stiff sandy gravelly CLAY. Bedrock was noted at 11.20 and 9.90 metres BGL in the respective holes.and 5.00 metres of solid core was recovered.

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Standard penetration tests taken during rotary drilling confirm in situ soil strength and values consistently in excess of N=50 indicate very stiff cohesive or dense granular material

Boreholes 1, 2 and 3 (with rotary core drilling at I and 2) were located in a line to the front of the main factory building.

Made ground was noted to a maximum depth of 2.20 metres (BH03) overlying stiff gravelly CLAY and medium dense to dense clayey sandy GRAVEL. This pattern continues to borehole refusal depth at BH03. In BH03 however a stratum of fine sandy silt / silty sand is noted from 8.10 to 11.20 within the coarser deposits.

Rock horizon was established by core drilling at RC1 and RC2 at 16.40 and 12.60 in the respective locations. Cobbles and boulders noted in the rotary holes above the solid rock may represent part of the weathered limestone horizon.

The bedrock has been identified as medium to strong fine grained LIMESTONE with some minor solution (karst) weathering resulting in some core loss.

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Foundations

The stratification pattern can be summarised as follows:

MADE GROUND: in excess of 2.00 metres noted in the boreholes but probably deeper closer to the river where rock armour has also been placed.

Stiff brown gravelly CLAY / Dense Claybound sandy GRAVEL is noted below the fill and continuing to bedrock. A zone of fine silt / sand is present in BH03 from 8.10 to 11.20 metres. SPT values indicate that this zone is medium dense.

LIMESTONE bedrock encountered at depths between 10.20 and 16.00 metres, with a thin upper weathered horizon.

Ground water noted in the boreholes at about 5.00 metres BGL. Moderate inflow with standing level at about 3.50 metres. This may be consistent with the water level in the River Ara.

The composition and compaction of the upper fill is likely to be variable, SPT values of N=11 suggest relative loose condition. The material is regarded as unsuitable as a founding medium unless geotechnically improved by Vibroflotation or similar.

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The main stratum, extending from below the fill to rock head, although somewhat variable in composition is either stiff or dense with in situ tests indicating an allowable bearing pressure of 250 kN/sq.m. for strip or pad foundations. It is likely that founding depths will be in excess of 3.00 metres with the possibility of some ground water ingress and excavation instability.

If deep foundations are to be used then careful inspection of excavated formation will be essential with all made ground, soft or organic material removed prior to concrete.

While a looser fine sand/silt zone was noted in BH03 at 8.20 metres it is unlikely to adversely affect foundations placed at 3.00 to 4.00 metres BGL.

The use of piling techniques to support high column loads will clearly eliminate difficulties associated with deep conventional foundations. Various piling techniques are available and specialist contractors should be consulted to determine the most suitable design. A large diameter pile drilled and socketed into the limestone would be a preferred option.

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Ground Floor Slabs

Construction of ground floor slabs on the existing surface can be considered. Over much of the site the upper fill has been subjected to traffic load and high warehouse and factory load. In situ tests indicate that floor loads of about 75 kN/sq/m. can be accommodated for ground floor slabs.

Placement of a uniform layer of compacted Cl.804 or similar, at least 500mm thick, under new floors will effectively spread load and reduce the possibility of differential movement.

Existing Foundations

Six foundation pits were opened for inspection with formation noted at depths between 0.60 and 1.40 metres with firm sandy gravelly CLAY (possibly FILL) as the founding medium.

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IGSL Ltd/JC
July 2016

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Appendix I Boring Records

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GEOTECHNICAL BORING RECORD

REPORT NUMBER 19312

CONTRACT	Tipperary Co-Operative Creamery Ltd. - Proposed Dryer Upgrade Project	BOREHOLE NO.	BH01
		SHEET	Sheet 1 of 1
CO-ORDINATES	RIG TYPE Dando 2000	DATE COMMENCED	06/06/2016
GROUND LEVEL (m AOD)	BOREHOLE DIAMETER (mm) 200	DATE COMPLETED	07/06/2016
	BOREHOLE DEPTH (m) 1.20		
CLIENT	SPT HAMMER REF. NO.	BORED BY	P.Thomas
ENGINEER MRG	ENERGY RATIO (%)	PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	Reinforced CONCRETE			0.15						
	MADE GROUND (Comprised of clayey gravelly fill)									
1				1.20						
	Obstruction - Possible services End of Borehole at 1.20 m									
2										
3										
4										
5										
6										
7										
8										
9										

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HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS CAT scanned location and hand dug service inspection pit . Erected sand bags around work area as instructed by client.Possible services noted so borehole was abandoned . Moved 0.39m to BH03A

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

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GEOTECHNICAL BORING RECORD

IGSL

REPORT NUMBER 19312

CONTRACT	Tipperary Co-Operative Creamery Ltd. - Proposed Dryer Upgrade Project	BOREHOLE NO.	BH01A
		SHEET	Sheet 1 of 1
CO-ORDINATES	RIG TYPE: Dando 2000	DATE COMMENCED	06/06/2016
GROUND LEVEL (m AOD)	BOREHOLE DIAMETER (mm): 200	DATE COMPLETED	07/06/2016
	BOREHOLE DEPTH (m): 1.20		
CLIENT	SPT HAMMER REF. NO.	BORED BY	P.Thomas
ENGINEER: MRG	ENERGY RATIO (%)	PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	Reinforced CONCRETE			0.30						
	MADE GROUND (Comprised of clayey gravelly fill with cobbles)			1.20						
1	Obstruction - Possible services End of Borehole at 1.20 m									
2										
3										
4										
5										
6										
7										
8										
9										

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HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
1.2	1.2	4	Standing on instructions

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS CAT scanned location and hand dug service inspection pit.Erected sand bags around work area as instructed by client.

Sample Legend

D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

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GEOTECHNICAL BORING RECORD

REPORT NUMBER 19312

CONTRACT	Tipperary Co-Operative Creamery Ltd. - Proposed Dryer Upgrade Project	BOREHOLE NO.	BH02
		SHEET	Sheet 1 of 2
CO-ORDINATES	RIG TYPE: Dando 2000	DATE COMMENCED	13/06/2016
GROUND LEVEL (m AOD)	BOREHOLE DIAMETER (mm): 200	DATE COMPLETED	14/06/2016
	BOREHOLE DEPTH (m): 12.00		
CLIENT	SPT HAMMER REF. NO.	BORED BY	P.Thomas
ENGINEER: MRG	ENERGY RATIO (%)	PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	Reinforced CONCRETE			0.15						
	MADE GROUND (Comprised over concrete over gravelly clay fill)			1.20						
1	Loose brown sandy clayey GRAVEL (Possible fill)			1.40	AA47290	B	1.20		N = 10 (1, 2, 2, 2, 3, 3)	
	Soft brown sandy SILT/ CLAY with gravel									
2				2.40	AA47291	B	2.00		N = 9 (1, 1, 2, 2, 2, 3)	
	Stiff to very stiff brown sandy gravelly SILT/CLAY with cobbles				AA47292	B	3.00		N = 32 (4, 5, 7, 7, 8, 10)	
3										
4					AA47293	B	4.00		N = 17 (3, 3, 3, 4, 4, 6)	
				5.10	AA47294	B	5.00		N = 25 (3, 5, 8, 7, 5, 5)	
5	Medium dense coarse grey/brown fine to coarse sandy GRAVEL with occasional cobbles									
6					AA47295	B	6.00			
									N = 16 (1, 2, 2, 4, 4, 6)	
7					AA47296	B	7.00			
				8.10	AA47297	B	8.00		N = 6 (1, 1, 2, 1, 1, 2)	
8	Loose to medium dense light brown silty SAND with some fine to medium gravel									
9					AA47298	B	9.00			
									N = 11 (1, 0, 1, 2, 3, 5)	

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HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.7	2.9	1.25	
5.2	5.4	0.5	
11.9	12	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
5.10	5.10	No	3.50	20	Moderate

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS CAT scanned location and hand dug service inspection pit.Erected sand bags around work area as instructed by client.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

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GEOTECHNICAL BORING RECORD

REPORT NUMBER 19312

CONTRACT	Tipperary Co-Operative Creamery Ltd. - Proposed Dryer Upgrade Project	BOREHOLE NO.	BH02
		SHEET	Sheet 2 of 2
CO-ORDINATES	RIG TYPE Dando 2000	DATE COMMENCED	13/06/2016
GROUND LEVEL (m AOD)	BOREHOLE DIAMETER (mm) 200	DATE COMPLETED	14/06/2016
	BOREHOLE DEPTH (m) 12.00		
CLIENT	SPT HAMMER REF. NO.	BORED BY	P.Thomas
ENGINEER MRG	ENERGY RATIO (%)	PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
10	Loose to medium dense light brown silty SAND with some fine to medium gravel *(continued)*				AA47299	B	10.00			
11				11.20	AA47300	B	11.00		N = 37 (2, 4, 7, 8, 10, 12)	
	Dense coarse GRAVEL with cobbles and boulders			12.00						
12	End of Borehole at 12.00 m				AA47301	B	12.00		N = 50/75 mm (25, 50)	
13										
14										
15										
16										
17										
18										
19										

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HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.7	2.9	1.25	
5.2	5.4	0.5	
11.9	12	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS CAT scanned location and hand dug service inspection pit.Erected sand bags around work area as instructed by client.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

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GEOTECHNICAL BORING RECORD

REPORT NUMBER 19312

CONTRACT	Tipperary Co-Operative Creamery Ltd. - Proposed Dryer Upgrade Project	BOREHOLE NO.	BH03
		SHEET	Sheet 1 of 2
CO-ORDINATES	RIG TYPE Dando 2000	DATE COMMENCED	15/06/2016
GROUND LEVEL (m AOD)	BOREHOLE DIAMETER (mm) 200	DATE COMPLETED	15/06/2016
	BOREHOLE DEPTH (m) 10.60		
CLIENT	SPT HAMMER REF. NO.	BORED BY	P.Thomas
ENGINEER MRG	ENERGY RATIO (%)	PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	Reinforced CONCRETE			0.13						
	MADE GROUND (Comprised of gravelly clay fill with concrete)									
1				1.20	AA47280	B	1.00		N = 12 (2, 2, 3, 2, 3, 4)	
	Firm brown very sandy very gravelly SILT/CLAY (Possible fill)									
2				2.20	AA47281	B	2.00		N = 17 (2, 3, 5, 5, 3, 4)	
	Medium dense brown sandy clayey fine to coarse GRAVEL (Possibly very gravelly clay)									
3				3.20	AA47282	B	3.00		N = 14 (2, 3, 3, 4, 3, 4)	
	Firm brown sandy SILT/CLAY with some gravel									
4					AA47283	B	4.00		N = 13 (2, 2, 3, 3, 3, 4)	
5					AA47284	B	5.00		N = 10 (1, 2, 2, 2, 3, 3)	
6					AA47285	B	6.00			
									N = 11 (2, 2, 3, 2, 2, 4)	
7				7.20	AA47286	B	7.00			
	Dense grey/brown fine to coarse sandy silty GRAVEL with some cobbles									
8					AA47287	B	8.00		N = 42 (4, 5, 9, 9, 10, 14)	
9				9.00						
	Very stiff brown sandy gravelly CLAY/clayey GRAVEL				AA47288	B	9.00			
				9.50						
	Dense grey/brown fine to coarse sandy silty GRAVEL with some cobbles								N = 50 (5, 8, 8, 8, 9, 25)	

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HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
9.4	9.8	1.25	
10	10.5	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
5.20	5.20	5.60	4.00	20	Moderate
7.20	7.20	No	3.20	20	Moderate

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS CAT scanned location and hand dug service inspection pit.Erected sand bags around work area as instructed by client.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 19312 BH.GPJ IGSL.GDT 12/7/16

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GEOTECHNICAL BORING RECORD

REPORT NUMBER 19312

CONTRACT	Tipperary Co-Operative Creamery Ltd. - Proposed Dryer Upgrade Project	BOREHOLE NO.	BH03
		SHEET	Sheet 2 of 2
CO-ORDINATES	RIG TYPE Dando 2000	DATE COMMENCED	15/06/2016
GROUND LEVEL (m AOD)	BOREHOLE DIAMETER (mm) 200	DATE COMPLETED	15/06/2016
	BOREHOLE DEPTH (m) 10.60		
CLIENT	SPT HAMMER REF. NO.	BORED BY	P.Thomas
ENGINEER MRG	ENERGY RATIO (%)	PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
10	Dense grey/brown fine to coarse sandy silty GRAVEL with some cobbles *(continued)*			10.60	AA47289	B	10.00		N = 50 (5, 6, 8, 8, 9, 25)	
	End of Borehole at 10.60 m									
11										
12										
13										
14										
15										
16										
17										
18										
19										

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HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
9.4	9.6	1.25	
10	10.5	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS CAT scanned location and hand dug service inspection pit.Erected sand bags around work area as instructed by client.

Sample Legend

D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 19312 BH.GPJ IGSL.GDT 12/7/16

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Appendix II Coring Records

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GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 19312

CONTRACT	Tipperary Co-Op Creamery Ltd.
DRILLHOLE NO	RC01
SHEET	Sheet 1 of 3
CO-ORDINATES	189,015.99 E 135,566.60 N
GROUND LEVEL (mOD)	86.50
RIG TYPE	Comacchio
FLUSH	Air/Mist
INCLINATION (deg)	-90
CORE DIAMETER (mm)	78
DATE DRILLED	01/07/2016
DATE LOGGED	05/07/2016
CLIENT	
ENGINEER	MRG
DRILLED BY	IGSL
LOGGED BY	D. O'Shea

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as clayey cobbly gravel				
1												
2												
3												N = 50/245 mm (4, 5, 10, 15, 15, 10)
4												N = 50/180 mm (4, 10, 12, 19, 19)
5												
6												N = 50/190 mm (3, 7, 11, 16, 23)
7									7.20	79.30		
8								SYMMETRIX DRILLING: No recovery, observed by driller as sandy gravelly clay				N = 51/175 mm (7, 11, 15, 16, 20)
9												N = 40 (4, 4, 7, 7, 12, 14)

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REMARKS

Hole cased 0.00-16.60m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
7.60	7.60				Slow

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

IGSL RC FI 10M 19312.GPJ IGSL.GDT 12/7/16

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GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 19312

CONTRACT	Tipperary Co-Op Creamery Ltd.
CO-ORDINATES	189,015.99 E 135,566.60 N
GROUND LEVEL (mOD)	86.50
CLIENT	
ENGINEER	MRG
RIG TYPE	Comacchio
FLUSH	Air/Mist
INCLINATION (deg)	-90
CORE DIAMETER (mm)	78
DRILLHOLE NO	RC01
SHEET	Sheet 2 of 3
DATE DRILLED	01/07/2016
DATE LOGGED	05/07/2016
DRILLED BY	IGSL
LOGGED BY	D. O'Shea

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10								SYMMETRIX DRILLING: No recovery, observed by driller as sandy gravelly clay *(continued)*				N = 48 (3, 4, 9, 10, 12, 17)
11												
12												N = 50/225 mm (5, 10, 15, 16, 19)
13												
14												N = 50/185 mm (4, 12, 19, 19, 12)
15								SYMMETRIX DRILLING: No recovery, observed by driller as cobbly boulders	14.70	71.80		N = 50/60 mm (10, 15, 40, 10)
16									16.40	70.10		
17	16.60	100	81	60				SYMMETRIX DRILLING: No recovery, observed by driller as weathered rock	16.60	69.90		
18	17.60	90	86	60				Strong to medium strong, thickly to thinly bedded, greyish brown to grey, fine-grained LIMESTONE (locally slightly dolomitised, local stylolites), fresh to locally moderately (solution/karst) weathered contributing to coreloss and clay-infill (at 17.47-17.52m, 17.83-17.93m, 18.34-18.40m, 18.91-19.14m, 19.78-19.82m & 21.16-21.22m). Sub-horizontal & locally 30° & 60°, medium to widely spaced, smooth to rough, planar, possibly located along stylolitic fabric / plane of weakness, locally clay-smeared, partly open to tight aperture. Local calcite/dolomite veining.				
19	18.60	90	84	52								
	19.60											

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REMARKS

Hole cased 0.00-16.60m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
7.60	7.60				Slow

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

IGSL RC FI 10M 19312.GPJ IGSL.GDT 12/7/16

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GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 19312

CONTRACT	Tipperary Co-Op Creamery Ltd.	DRILLHOLE NO	RC01
		SHEET	Sheet 3 of 3
CO-ORDINATES	189,015.99 E 135,566.60 N	DATE DRILLED	01/07/2016
GROUND LEVEL (mOD)	86.50	DATE LOGGED	05/07/2016
RIG TYPE	Comacchio		
FLUSH	Air/Mist		
CLIENT		DRILLED BY	IGSL
ENGINEER	MRG	LOGGED BY	D. O'Shea
INCLINATION (deg)	-90		
CORE DIAMETER (mm)	78		

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
20												
	20.60	100	93	88				Strong to medium strong, thickly to thinly bedded, greyish brown to grey, fine-grained LIMESTONE (locally slightly dolomitised, local stylolites), fresh to locally moderately (solution/karst) weathered contributing to coreloss and clay-infill (at 17.47-17.52m, 17.83-17.93m, 18.34-18.40m, 18.91-19.14m, 19.78-19.82m & 21.16-21.22m).				
21		100	96	81				Sub-horizontal & locally 30° & 60°, medium to widely spaced, smooth to rough, planar, possibly located along stylolitic fabric / plane of weakness, locally clay-smeared, partly open to tight aperture. Local calcite/dolomite veining. *(continued)*				
	21.60											
22		100	93	83								
	22.40								22.40	64.10		
23								End of Borehole at 22.40 m				
24												
25												
26												
27												
28												
29												

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REMARKS

Hole cased 0.00-16.60m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
7.60	7.60				Slow

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

IGSL RC FI 10M 19312.GPJ IGSL.GDT 12/7/16

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GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 19312

CONTRACT	Tipperary Co-Op Creamery Ltd.	DRILLHOLE NO	RC02
		SHEET	Sheet 1 of 2
CO-ORDINATES	188,911.34 E 135,504.05 N	DATE DRILLED	30/06/2016
GROUND LEVEL (mOD)	86.62	DATE LOGGED	30/06/2016
CLIENT		DRILLED BY	IGSL
ENGINEER	MRG	LOGGED BY	D. O'Shea
RIG TYPE	Comacchio		
FLUSH	Air/Mist		
INCLINATION (deg)	-90		
CORE DIAMETER (mm)	76		

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as silty clayey gravel				

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REMARKS

Hole cased 0.00-13.20m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike recorded

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
30-06-16	12.00	2.50	12.00	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

IGSL.RC.F1 10M 19312.GPJ IGSL.GDT 12/7/16

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GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 19312

CONTRACT	Tipperary Co-Op Creamery Ltd.	DRILLHOLE NO	RC02
		SHEET	Sheet 2 of 2
CO-ORDINATES	188,911.34 E 135,504.05 N	DATE DRILLED	30/06/2016
GROUND LEVEL (mOD)	86.62	DATE LOGGED	30/06/2016
CLIENT		DRILLED BY	IGSL
ENGINEER	MRG	LOGGED BY	D. O'Shea
RIG TYPE	Comacchio		
FLUSH	Air/Mist		
INCLINATION (deg)	-90		
CORE DIAMETER (mm)	78		

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10								SYMMETRIX DRILLING: No recovery, observed by driller as silty clayey gravel *(continued)*				
11									11.70	74.92		
12								SYMMETRIX DRILLING: No recovery, observed by driller as clayey cobbly gravel	12.60	74.02		
13	13.20							SYMMETRIX DRILLING: No recovery, observed by driller as weathered rock	13.20	73.42		
14	14.20	80	63	28				Strong to medium strong, thickly to thinly bedded, blueish grey, fine-grained LIMESTONE (local stylolites), fresh to locally moderately (solution/karst) weathered contributing to coreloss and clay-infill (at 13.96-14.20m). Sub-horizontal & locally 30° & 60°, medium to widely spaced, smooth to rough, planar, possibly located along stylolitic fabric / plane of weakness, locally clay-smeared, partly open to tight aperture. Local calcite veining.				
15	15.20	100	99	99								
16	16.20	100	92	92								
17	17.20	100	92	92								
18	18.30	100	100	100					18.30	68.32		
19								End of Borehole at 18.30 m				

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REMARKS

Hole cased 0.00-13.20m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike recorded

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
30-06-16	12.00	2.50	12.00	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

IGSL_RC FI 10M 19312.GPJ IGSL.GDT 12/7/16

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GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 19312

CONTRACT	Tipperary Co-Op Creamery Ltd.
CO-ORDINATES	188,951.66 E 135,567.47 N
GROUND LEVEL (mOD)	89.49
CLIENT	
ENGINEER	MRG
RIG TYPE	Comacchio
FLUSH	Air/Mist
INCLINATION (deg)	-90
CORE DIAMETER (mm)	78
DRILLHOLE NO	RC03
SHEET	Sheet 1 of 2
DATE DRILLED	06/07/2016
DATE LOGGED	06/07/2016
DRILLED BY	IGSL
LOGGED BY	D. O'Shea

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-Intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as clayey gravel	2.70	86.79		
3								SYMMETRIX DRILLING: No recovery, observed by driller as silty clayey gravel	4.20	85.29		N = 15 (1, 1, 3, 3, 4, 5)
4								SYMMETRIX DRILLING: No recovery, observed by driller as clayey cobbly gravel				N = 48 (2, 4, 7, 11, 14, 16)
6												N = 50/235 mm (4, 7, 12, 15, 15, 8)
7												N = 50/190 mm (7, 9, 11, 16, 23)
9												N = 50/170 mm (5, 10, 10, 21, 19)

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REMARKS

Hole cased 0.00-11.40m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike recorded

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

IGSL RC FI 10M 19312.GPJ IGSL.GDT 12/7/16

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GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 19312

CONTRACT	Tipperary Co-Op Creamery Ltd.	DRILLHOLE NO	RC03
		SHEET	Sheet 2 of 2
CO-ORDINATES	188,951.86 E 135,567.47 N	DATE DRILLED	06/07/2016
GROUND LEVEL (mOD)	89.49	DATE LOGGED	06/07/2016
CLIENT		DRILLED BY	IGSL
ENGINEER	MRG	LOGGED BY	D. O'Shea
RIG TYPE	Comacchio		
FLUSH	Air/Mist		
INCLINATION (deg)	-90		
CORE DIAMETER (mm)	76		

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-Intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10								SYMMETRIX DRILLING: No recovery, observed by driller as clayey cobbly gravel *(continued)*				N = 50/235 mm (7, 9, 12, 17, 19, 2)
11	11.20								11.20	78.29		
								SYMMETRIX DRILLING: No recovery, observed by driller as weathered rock	11.40	78.09		
12	12.40	83	75	76				Strong to medium strong, thickly to thinly bedded, blueish grey, fine-grained LIMESTONE (local stylolites), fresh to locally moderately (solution/karst) weathered contributing to coreloss and clay-infill (at 12.34-12.44m, 14.84-12.90m).				
		100	98	98				Sub-horizontal & locally 30° & 60°, medium to widely spaced, smooth to rough, planar, possibly located along stylolitic fabric / plane of weakness, locally clay-smeared, partly open to tight aperture. Local calcite veining.				
13	13.40											
		100	90	81								
14	14.40											
		100	84	41								
15	15.40											
		100	100	84								
16	16.40								16.40	73.09		
								End of Borehole at 16.40 m				
17												
18												
19												

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REMARKS

Hole cased 0.00-11.40m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike recorded

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

IGSL RC FI 10M 19312.GPJ IGSL.GDT 12/7/16

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GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 19312

CONTRACT	Tipperary Co-Op Creamery Ltd.
CO-ORDINATES	188,852.68 E 135,502.74 N
GROUND LEVEL (mOD)	86.79
CLIENT	
ENGINEER	MRG
RIG TYPE	Comacchio
FLUSH	Air/Mist
INCLINATION (deg)	-90
CORE DIAMETER (mm)	78
DRILLHOLE NO	RC05
SHEET	Sheet 1 of 2
DATE DRILLED	29/06/2016
DATE LOGGED	30/06/2016
DRILLED BY	IGSL
LOGGED BY	D. O'Shea

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as clayey gravel	1.20	85.59		
1								SYMMETRIX DRILLING: No recovery, observed by driller as sandy gravelly clay	2.70	84.09		
2								SYMMETRIX DRILLING: No recovery, observed by driller as clayey cobbly gravel				N = 41/170 mm (4, 7, 1, 20, 20)
3												
4												N = 50/160 mm (5, 11, 16, 24, 8)
5												
6												N = 25/225 mm (5, 14, 7, 5, 10)
7									7.20	79.59		
8								SYMMETRIX DRILLING: No recovery, observed by driller as gravelly clay				N = 50/160 mm (4, 7, 15, 15, 20)
9												N = 50/80 mm (2, 2, 45, 5)
									9.90	76.89		

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REMARKS

Hole cased 0.00-10.20m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike recorded

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

IGSL RC FI 1004 19312.GPJ IGSL.GDT 12/7/16

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GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 19312

CONTRACT	Tipperary Co-Op Creamery Ltd.	DRILLHOLE NO	RC05
		SHEET	Sheet 2 of 2
CO-ORDINATES	186,852.68 E 135,502.74 N	DATE DRILLED	29/06/2016
GROUND LEVEL (mOD)	86.79	DATE LOGGED	30/06/2016
CLIENT		DRILLED BY	IGSL
ENGINEER	MRG	LOGGED BY	D. O'Shea
RIG TYPE	Comacchio		
FLUSH	Air/Mist		
INCLINATION (deg)	-90		
CORE DIAMETER (mm)	78		

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10	10.20							SYMMETRIX DRILLING: No recovery, observed by driller as weathered rock *(continued)*	10.20	76.59		
11	11.20	100	82	27				Strong to medium strong, thickly to thinly bedded, blueish grey, fine-grained LIMESTONE (local stylolites), fresh to locally moderately (solution/karst) weathered contributing to coreloss and clay-infill (at 10.92-11.05m, 12.20-12.26m).				
12	12.20	100	68	21				Sub-horizontal & locally 30° & 60°, medium to widely spaced, smooth to rough, planar, possibly located along stylolitic fabric / plane of weakness, locally clay-smeared, partly open to tight aperture. Local calcite veining.				
13	13.20	100	95	95								
14	14.20	100	96	90								
15	15.30	100	98	91				End of Borehole at 15.30 m	15.30	71.49		
16												
17												
18												
19												

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REMARKS

Hole cased 0.00-10.20m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike recorded

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	R2 Top	R2 Base	Type

IGSL RC FI 10M 19312.GPJ IGSL.GDT 12/7/16

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RC01 Box 1 of 2



RC01 Box 2 of 2



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RC02 Box 1 of 2



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RC02 Box 2 of 2



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RC03 Box 1 of 2



RC03 Box 2 of 2



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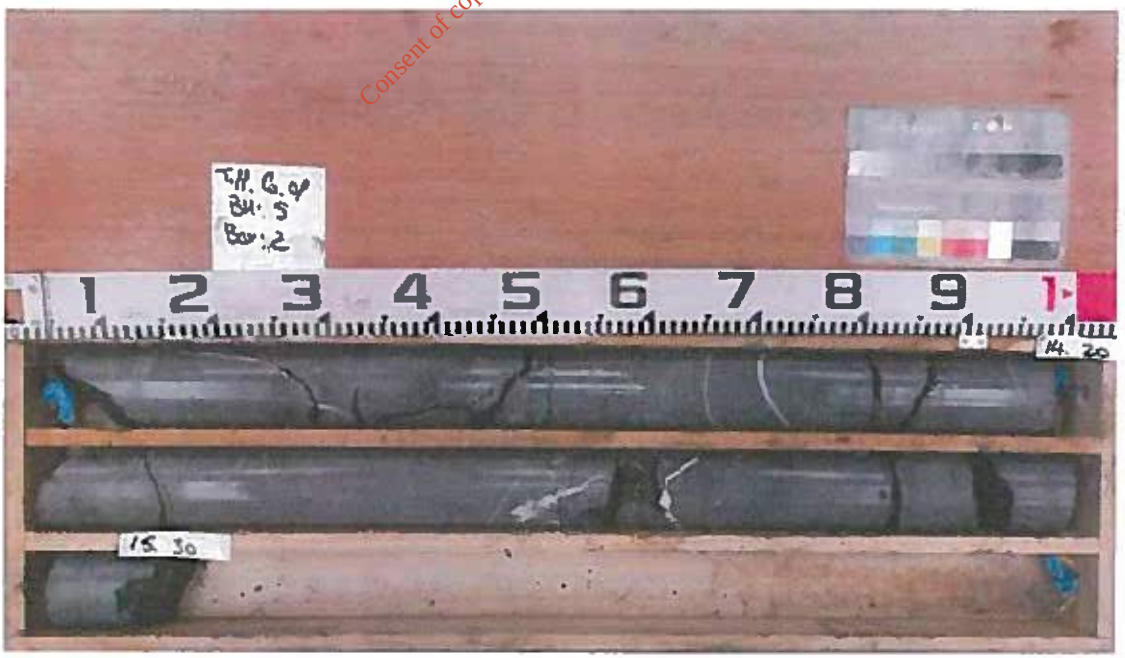
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RC05 Box 1 of 2



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RC05 Box 2 of 2



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Appendix III Foundation Pits

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FOUNDATION INSPECTION PIT RECORD

REPORT NUMBER 19312

CONTRACT	Tipperary Co-op
LOCATION	Tipperary Town
LOGGED BY	J.Clancy
Date of survey	25/5/2016

TRIAL PIT NO. Foundation Pit F101
SHEET Sheet 1 of 1





Summary of ground conditions

from	to	Description	Ground water
0.00	0.10	Reinforced Concrete Slab	
0.10	0.30	Augular Gravel Fill	
0.30	0.48	Concrete	
0.48	0.55	Black Fine gravell SAND(sub-base)	
0.55	1.20	Soft - Firm brown sandy gravelly CLAY	

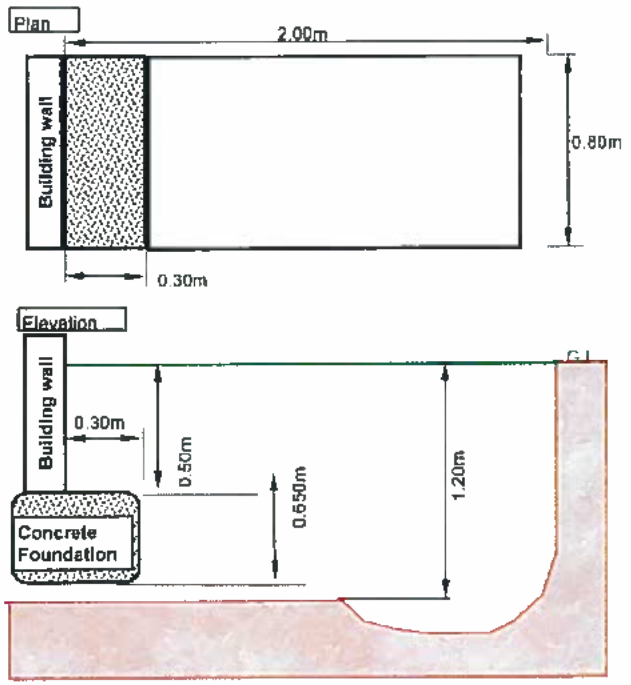
NOTICE:

LOCATION Foundation Pit F101

See attached site map

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DETAIL



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FOUNDATION INSPECTION PIT RECORD

REPORT NUMBER 19312

CONTRACT	Tipperary Co-op
LOCATION	Tipperary Town
LOGGED BY	J.Clancy
Date of survey	25/5/2016

TRIAL PIT NO. Foundation Pit F102
SHEET Sheet 1 of 1





Summary of ground conditions

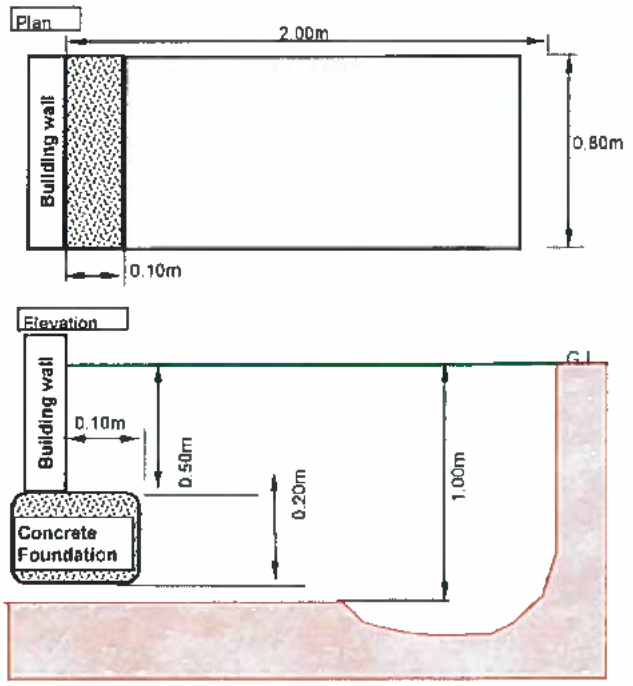
from	to	Description	Ground water
0.00	0.20	Reinforced Concrete Slab	
0.20	0.36	Augular Gravel Fill	
0.36	0.50	Concrete	
0.50	0.70	Black Fine gravell SAND(sub-base)	
0.70	1.00	Soft - Firm brown sandy gravelly CLAY	

NOTICE:

LOCATION Foundation Pit F102

See attached site map

DETAIL



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Consent of copyright owner required for any other use.

EPA Export 15-11-2018:04:00:53

FOUNDATION INSPECTION PIT RECORD

REPORT NUMBER 19312

CONTRACT	Tipperary Co-op
LOCATION	Tipperary Town
LOGGED BY	J.Clancy
Date of survey	25/5/2016

TRIAL PIT NO. Foundation Pit F103
SHEET Sheet 1 of 1





Summary of ground conditions

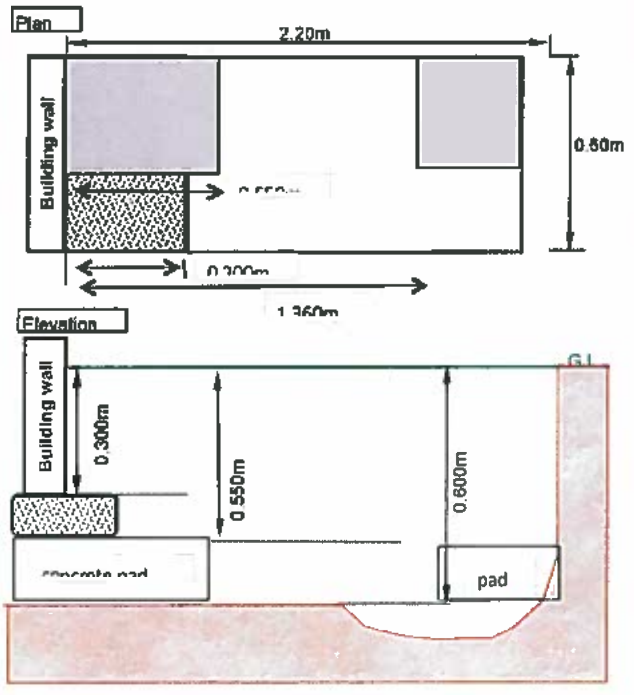
from	to	Description	Ground water
0.00	0.26	Reinforced Concrete Slab	
0.26	0.43	Augular Gravel Fill	
0.43	0.53	Concrete	
0.53	0.60	Soft - Firm brown sandy gravelly CLAY	

NOTICE:

LOCATION Foundation Pit F103

See attached site map

DETAIL



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FOUNDATION INSPECTION PIT RECORD

REPORT NUMBER 19312

CONTRACT	Tipperary Co-op	TRIAL PIT NO.	Foundation Pit F103A
LOCATION	Tipperary Town	SHEET	Sheet 1 of 1
Date of survey	25/5/2016	LOGGED BY	J Clancy



Foundation Pit F103A located on central Column

Summary of ground conditions

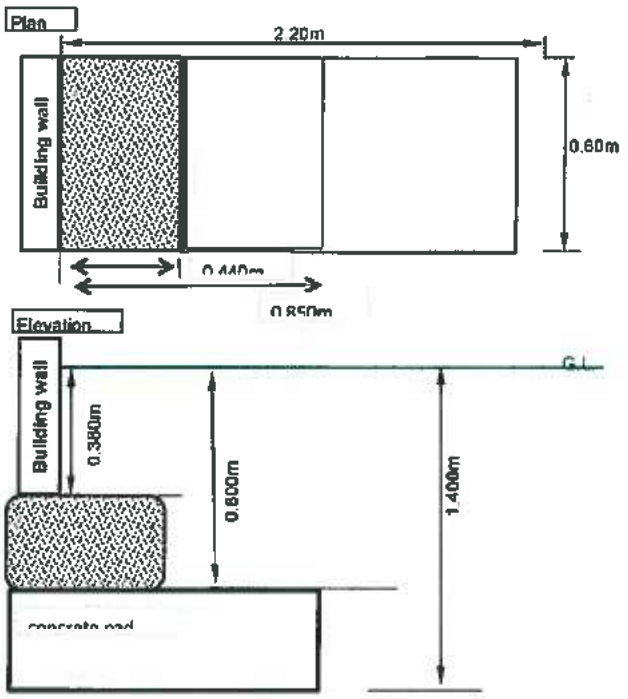
from	to	Description	Ground water
0.00	0.26	Reinforced Concrete Slab	
0.26	0.40	Angular Gravel Fill	
0.40	1.60	Soft - Firm brown sandy gravelly CLAY	
		Very moist from 1.400m	

NOTICE:

LOCATION Foundation Pit F103A

See attached site map

DETAIL



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Consent of copyright owner required for any other use.

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FOUNDATION INSPECTION PIT RECORD

REPORT NUMBER

19312

CONTRACT	Tipperary Co-op
LOCATION	Tipperary Town
LOGGED BY	J.Clancy
Date of survey	25/5/2016

TRIAL PIT NO.	Foundation Pit F104
SHEET	Sheet 1 of 1





Summary of ground conditions

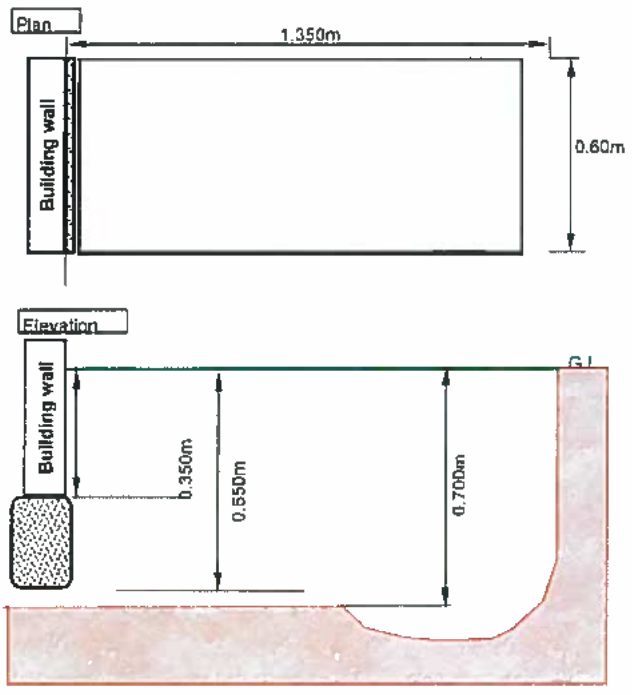
from	to	Description	Ground water
0.00	0.15	Reinforced Concrete Slab	
0.15	0.20	Augular Gravel Fill	
0.20	0.35	Concrete	
0.35	0.45	Black Fine gravell SAND(sub-base)	
0.45	0.70	Soft - Firm brown sandy gravelly CLAY	

NOTICE:

LOCATION Foundation Pit F104

See attached site map

DETAIL



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FOUNDATION INSPECTION PIT RECORD

REPORT NUMBER 19312

CONTRACT: Tipperary Co-op

LOCATION: Tipperary Town

Date of survey: 25/5/2018

TRIAL PIT NO.: Foundation Pit F106

SHEET: Sheet 1 of 1

LOGGED BY: J.Clancy



Summary of ground conditions

from	to	Description	Ground water
0.00	0.40	Reinforced Concrete Slab and Path	
0.40	0.58	Augular Gravel Fill	
0.58	0.60	Uniform size rounded Gravel possible filling for trench	

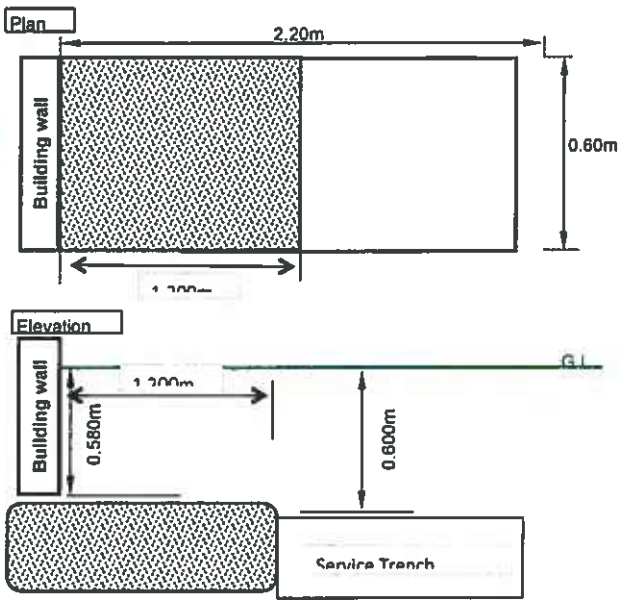
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NOTICE:

LOCATION: Foundation Pit F103A

See attached site map

DETAIL



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Appendix IV Laboratory Data

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IGSL Ltd
Materials Laboratory
Unit J5, M7 Business Park
Newhall, Naas
Co. Kildare
045 846176

Test Report

Determination of Moisture Content, Liquid & Plastic Limits

Tested in accordance with BS1377:Part 2:1990, clauses 3.2*, 4.3, 4.4 & 5.3

Report No. R72949 Contract No. 19312 Contract Name: Tipperary Co-Op Dryer Upgrade Project

Customer MRG, 4 Day Place Tralee, Co Kerry

Samples Received: 23-06-16 Date Tested: 27-06-16

BH/TP	Sample No.	Depth (m)	Lab. Ref	Sample Type	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425µm	Preparation	Liquid Limit Clause	Classification (BS5930)	Description
BH02	AA47292	3.0	A16/2901	B	13	24	13	11	66	WS	4.4	C L	Light brown sandy, slightly gravelly, CLAY
BH03	AA47281	2.0	A16/2897	B	14	28	15	13	43	WS	4.4	C L	Grey/brown sandy gravelly CLAY
BH03	AA47283	4.0	A16/2898	B	9.4	24	12	12	70	WS	4.4	C L	Light brown sandy gravelly CLAY

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Notes: Preparation: WS - Wet sieved; AR - As received; NP - Non plastic
Liquid Limit Clause: 4.3 Cone Penetrometer delinitive method; 4.4 Cone Penetrometer one point method
Sample Type: B - bulk disturbed; U - Undisturbed

Remarks:

NOTE: *Clause 3.2 of BS1377 is a "withdrawn" standard due to publication of ISO17892-1:2014
Opinions and interpretations are outside the scope of accreditation.
The results relate to the specimens tested. Any remaining material will be retained for one month.

IGSL Ltd Materials Laboratory

Persons authorized to approve reports: H Byrne (Laboratory Manager)

Approved by | Date: 07-07-16 | Page: 1 of 1

EPA Export 15-11-2018:04:00:53

TEST REPORT

Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5

(note: Sedimentation stage not accredited)

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	97	
20	96	
14	94	
10	92	
6.3	88	
5	87	
3.35	84	
2	81	
1.18	78	SAND
0.6	73	
0.425	71	
0.3	67	
0.15	57	
0.063	46	SILT/CLAY
0.038	38	
0.027	36	
0.017	32	
0.010	27	
0.007	24	
0.005	22	
0.002	16	

Contract No: 19312 Report No. R73323

Contract: Tipperary Co-Op Dryer Upgrade Project

BH/TP : BH02

Sample No. AA47292 Lab. Sample No. A16/2901

Sample Type: B

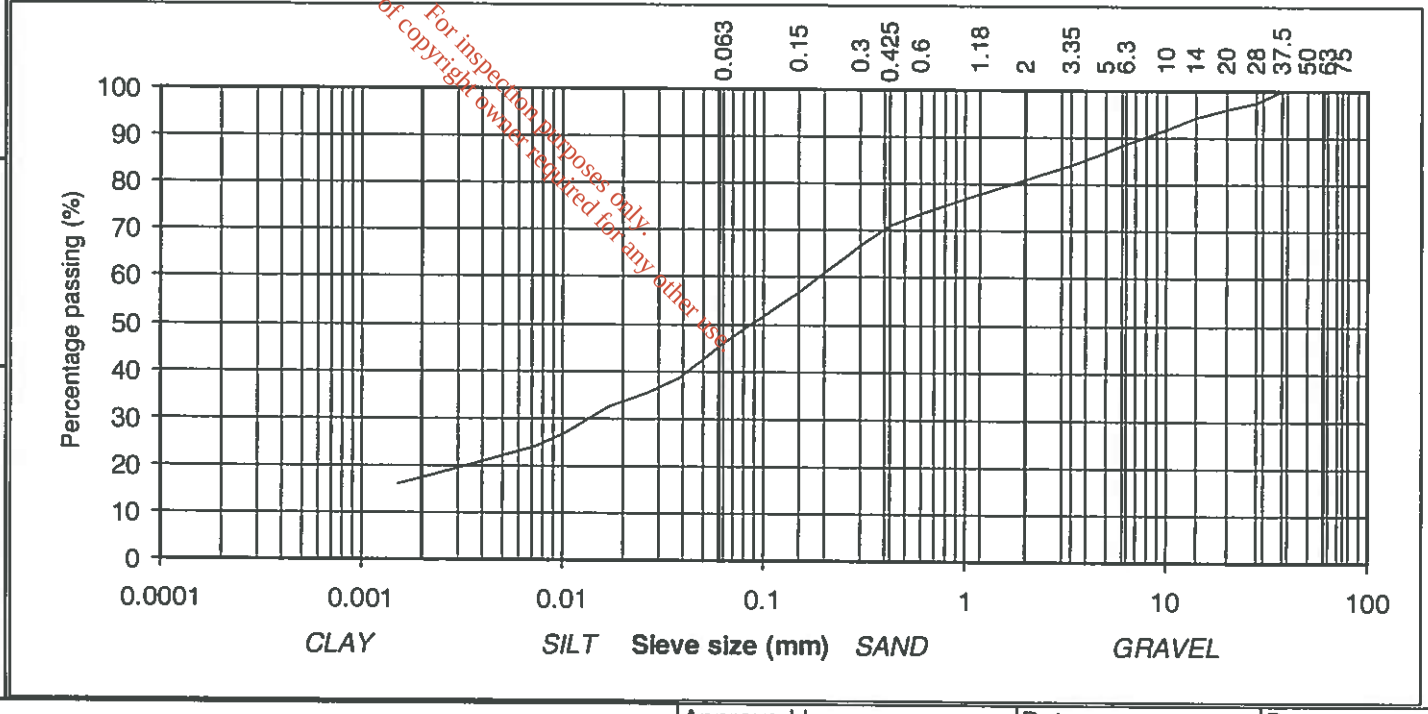
Depth (m) 3.00 Customer: MRG, 4 Day Place Tralee, Co Kerry

Date Received 23-06-16 Date Testing started 27-06-16

Description: Light brown sandy, slightly gravelly, CLAY

Remarks

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IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
H Byrne	08-07-16	1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

EPA Export 15-11-2018:04:00:53

TEST REPORT

Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5

(note: Sedimentation stage not accredited)

particle size	% passing	
75	92	COBBLES
63	92	
50	92	GRAVEL
37.5	89	
28	84	
20	72	
14	58	
10	46	
6.3	33	
5	29	
3.35	27	
2	25	
1.18	24	SAND
0.6	23	
0.425	22	
0.3	20	
0.15	17	
0.063	13	SILT/CLAY

Contract No: 19312 Report No. R73238

Contract: Tipperary Co-Op Dryer Upgrade Project

BH/TP : BH02

Sample No. AA47295 Lab. Sample No. A16/2902

Sample Type: B

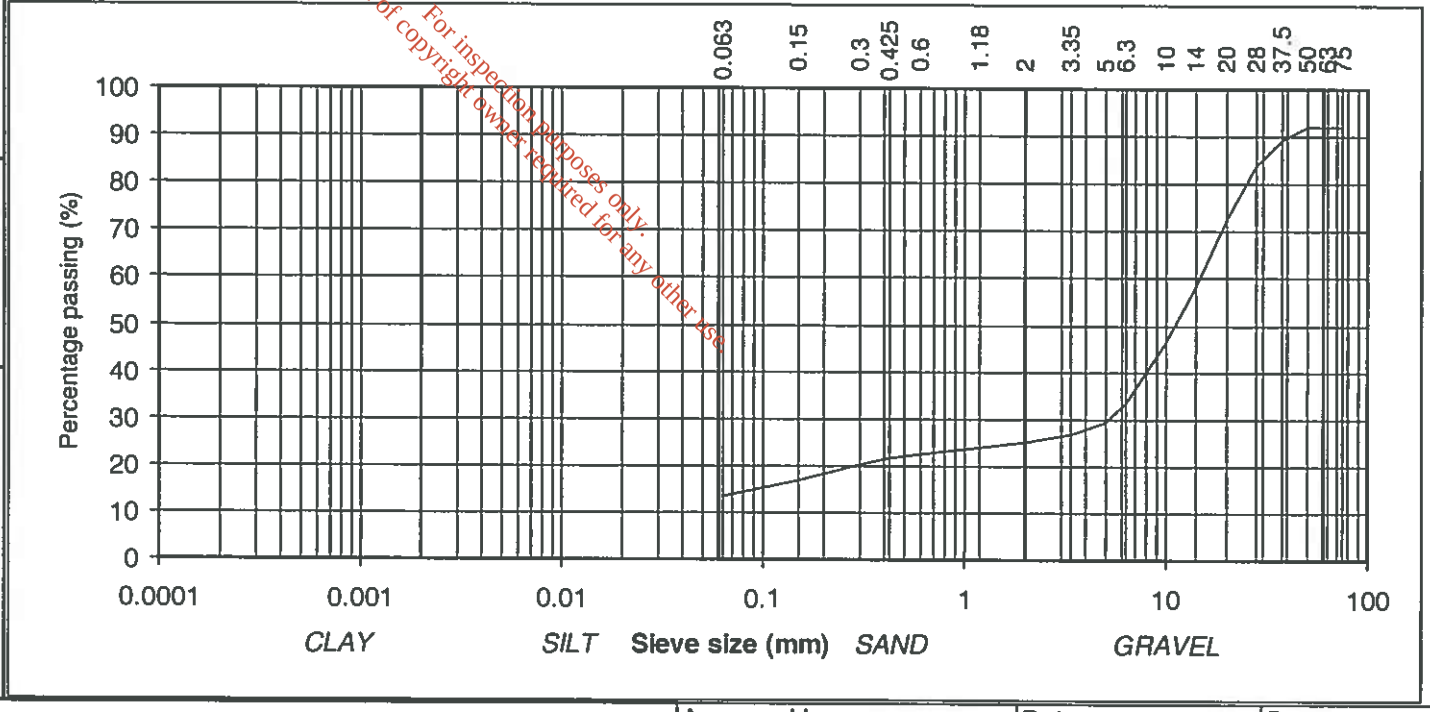
Depth (m) 6.00 Customer: MRG, 4 Day Place Tralee, Co Kerry

Date Received 23-06-16 Date Testing started 27-06-16

Description: Brown clayey/silty, sandy, GRAVEL with some cobbles

Remarks

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IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
HA Byrne	07-07-16	1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

EPA Export 15-11-2018:04:00:53

TEST REPORT

Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5

(note: Sedimentation stage not accredited)

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	100	
20	99	
14	98	
10	97	
6.3	97	
5	96	
3.35	95	
2	93	
1.18	91	SAND
0.6	87	
0.425	84	
0.3	80	
0.15	72	
0.063	33	SILT/CLAY
0.041	19	
0.029	13	
0.019	8	
0.011	6	
0.008	4	
0.005	3	
0.002	1	

Contract No: 19312 Report No. R73153

Contract: Tipperary Co-Op Dryer Upgrade Project

BH/TP : BH02

Sample No. AA47298 Lab. Sample No. A16/2903

Sample Type: B

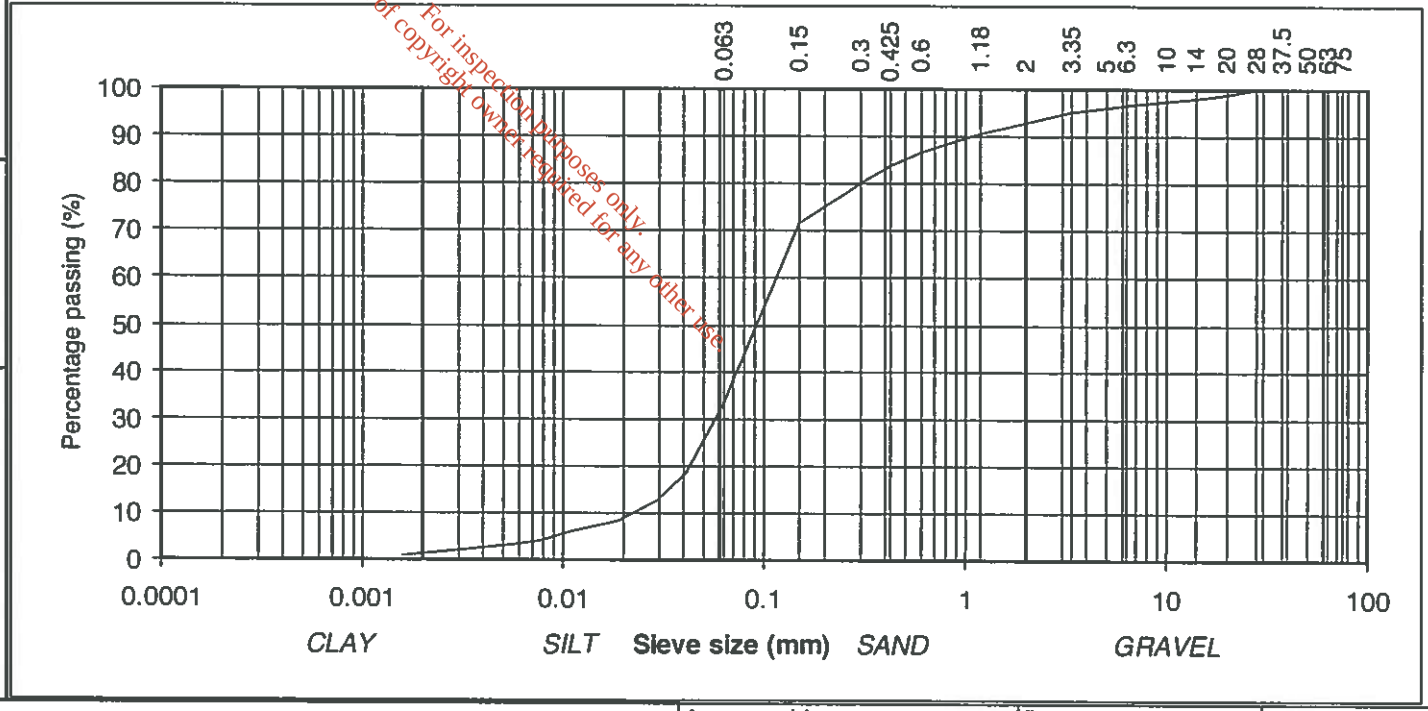
Depth (m) 9.00 Customer: MRG, 4 Day Place Tralee, Co Kerry

Date Received 23-06-16 Date Testing started 27-06-16

Description: Brown sandy, slightly gravelly, SILT/CLAY

Remarks

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IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
H Byrne	05-07-16	1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

EPA Export 15-11-2018:04:00:53

TEST REPORT

Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5

(note: Sedimentation stage not accredited)

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	100	
20	100	
14	99	
10	99	
6.3	98	
5	98	
3.35	97	
2	96	
1.18	95	SAND
0.6	93	
0.425	92	
0.3	91	
0.15	75	
0.063	32	SILT/CLAY
0.041	18	
0.029	13	
0.019	8	
0.011	6	
0.008	5	
0.005	3	
0.002	2	

Contract No: 19312 Report No. R73239

Contract: Tipperary Co-Op Dryer Upgrade Project

BH/TP : BH02

Sample No. AA47301 Lab. Sample No. A16/2904

Sample Type: B

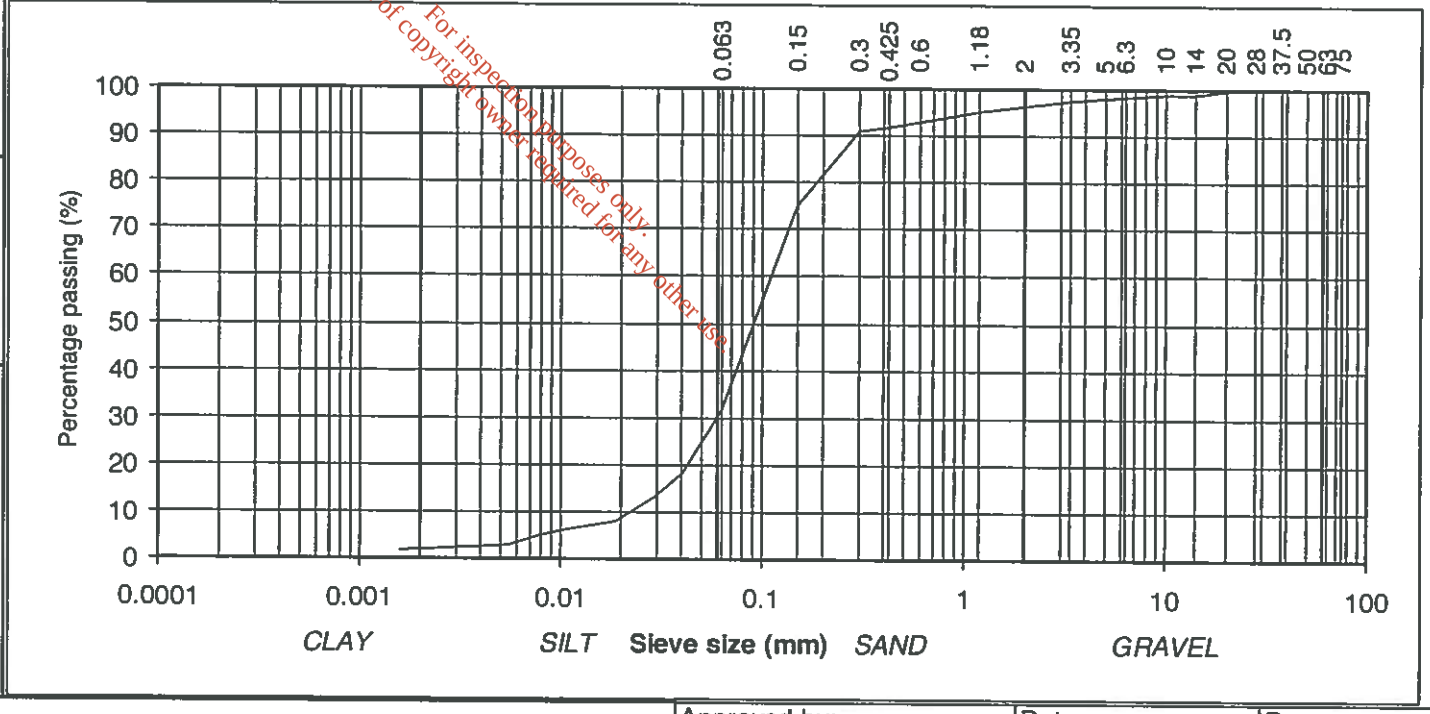
Depth (m) 12.00 Customer: MRG, 4 Day Place Tralee, Co Kerry

Date Received 23-06-16 Date Testing started 27-06-16

Description: Brown sandy, slightly gravelly, SILT/CLAY

Remarks

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IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
H Byrne	07-07-16	1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

EPA Export 15-11-2018:04:00:53

TEST REPORT

Determination of Particle Size Distribution

Tested In accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5

(note: Sedimentation stage not accredited)

particle size	% passing	
75	81	COBBLES
63	81	
50	81	GRAVEL
37.5	75	
28	58	
20	44	
14	30	
10	23	
6.3	16	
5	14	
3.35	11	
2	9	
1.18	7	SAND
0.6	5	
0.425	3	
0.3	2	
0.15	1	
0.063	1	SILT/CLAY

Contract No: 19312 Report No. R73073

Contract: Tipperary Co-Op Dryer Upgrade Project

BH/TP : BH03

Sample No. AA47287 Lab. Sample No. A16/2899

Sample Type: B

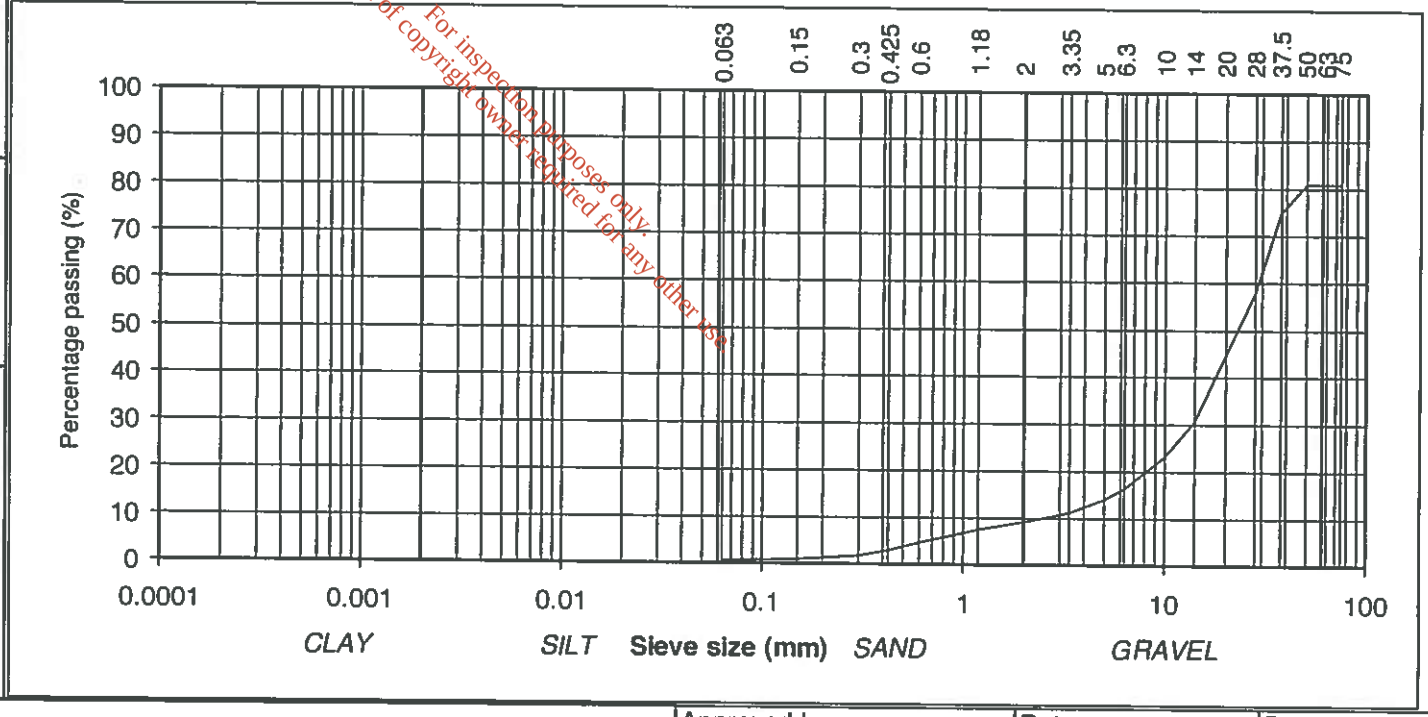
Depth (m) 8.00 Customer: MRG, 4 Day Place Tralee, Co Kerry

Date Received 23-06-16 Date Testing started 27-06-16

Description: Brown slightly clayey/silty, sandy, GRAVEL with some cobbles

Remarks Sample size did not meet the requirements of BS1377

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IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
H Byrne	01-07-16	1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

EPA Export 15-11-2018:04:00:53

TEST REPORT

Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5

(note: Sedimentation stage not accredited)

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	96	
20	91	
14	86	
10	80	
6.3	71	
5	67	
3.35	60	
2	53	
1.18	48	SAND
0.6	41	
0.425	36	
0.3	28	
0.15	17	
0.063	10	SILT/CLAY

Contract No: 19312 Report No. R73074

Contract: Tipperary Co-Op Dryer Upgrade Project

BH/TP : BH03

Sample No. AA47289 Lab. Sample No. A16/2900

Sample Type: B

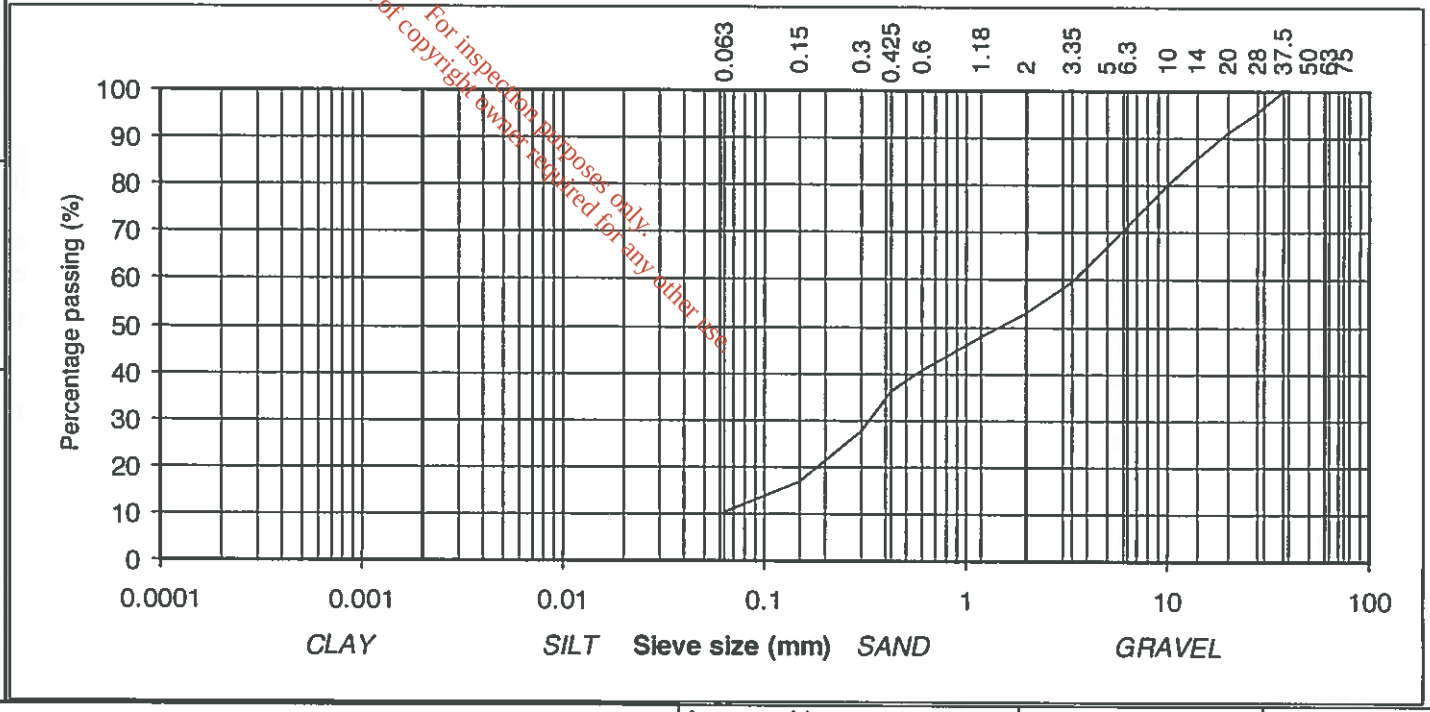
Depth (m) 10.00 Customer: MRG, 4 Day Place Tralee, Co Kerry

Date Received 23-06-16 Date Testing started 27-06-16

Description: Light brown clayey/silty, very sandy, GRAVEL

Remarks

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IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
H Byrne	04-07-16	1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

EPA Export 15-11-2018:04:00:53

Jones Environmental Laboratory

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Tel: +44 (0) 1244 833780
Fax: +44 (0) 1244 833781

IGSL
Unit F
M7 Business Park
Naas
Co Kildare
Ireland

Attention :	Darren Keogh
Date :	12th July, 2016
Your reference :	19312
Our reference :	Test Report 16/10946 Batch 1
Location :	Tipperary Co-Op
Date samples received :	29th June, 2016
Status :	Final report
Issue :	1

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Two samples were received for analysis on 29th June, 2016 of which two were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Phil Sommerton BSc
Project Manager

EPA Export 15-11-2018:04:00:53

Jones Environmental Laboratory

Client Name:	IGSL
Reference:	19312
Location:	Tipperary Co-Op
Contact:	Darren Keogh
JE Job No.:	16/10945

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	1	2									LOD/LOR	Units	Method No.
Sample ID	BH1	BH2											
Depth	2.00	3.00											
COC No / misc													
Containers	J	J											
Sample Date	24/06/2016	24/06/2016											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	29/06/2016	29/06/2016											
Sulphate as SO4 (2:1 Ext) #	0.1011	0.0159									<0.0015	g/l	TM38/PM20
pH #	9.59	8.69									<0.01	pH units	TM73/PM11

Please see attached notes for all abbreviations and acronyms

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(Diametrial) POINT LOAD STRENGTH INDEX TEST DATA

Contract: Tipperary Co-Op Creamery Ltd.
Date of test: 8/7/16

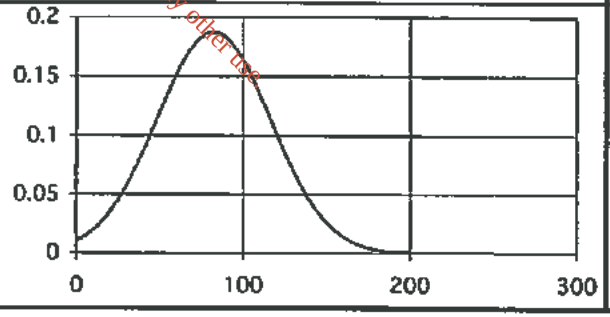
Sample Type: Core
Contract no. 19312

RC No.	Depth m	D (Diameter) mm	P (failure load) kN	F	Is (index strength) Mpa	Is(50) (index strength) Mpa	*UCS MPa	Type	Orienation
RC01	16.7	78	10.0	1.222	1.64	2.01	40	d	//
	18.5	78	8.0	1.222	1.31	1.61	32	d	//
	20.5	78	28.0	1.222	4.60	5.62	112	d	//
	22.3	78	14.0	1.222	2.30	2.81	56	d	//
RC02	14.3	78	36.0	1.222	5.92	7.23	145	d	//
	15.3	78	19.0	1.222	3.12	3.81	76	d	//
	17.0	78	32.0	1.222	5.26	6.42	128	d	//
	18.0	78	26.0	1.222	4.27	5.22	104	d	//
RC03	13.3	78	21.0	1.222	3.45	4.22	84	d	//
	14.3	78	25.0	1.222	4.11	5.02	100	d	//
	15.3	78	19.0	1.222	3.12	3.81	76	d	//
	16.0	78	28.0	1.222	4.60	5.62	112	d	//
RC05	10.5	78	7.0	1.222	1.15	1.41	28	d	//
	12.1	78	16.0	1.222	2.63	3.21	64	d	//
	14.1	78	23.0	1.222	3.78	4.62	92	d	//
	15.2	78	16.0	1.222	2.63	3.21	64	d	//

Statistical Summary Data	Is(50)	UCS*
Number of Samples Tested	16	16
Minimum	1.41	28
Average	4.12	82
Maximum	7.23	145
Standard Dev.	1.70	34
Upper 95% Confidence Limit	7.45	149.04
Lower 95% Confidence Limit	0.78	15.60

Comments:
*UCS taken as k x Point Load Is(50): k= 20

*UCS Normal Distribution Curve



Abbreviations	
i	irregular
a	axial
b	block
d	diametral

approx. orientation to planes of weakness/bedding

U	unknown
P	perpendicular
//	parallel

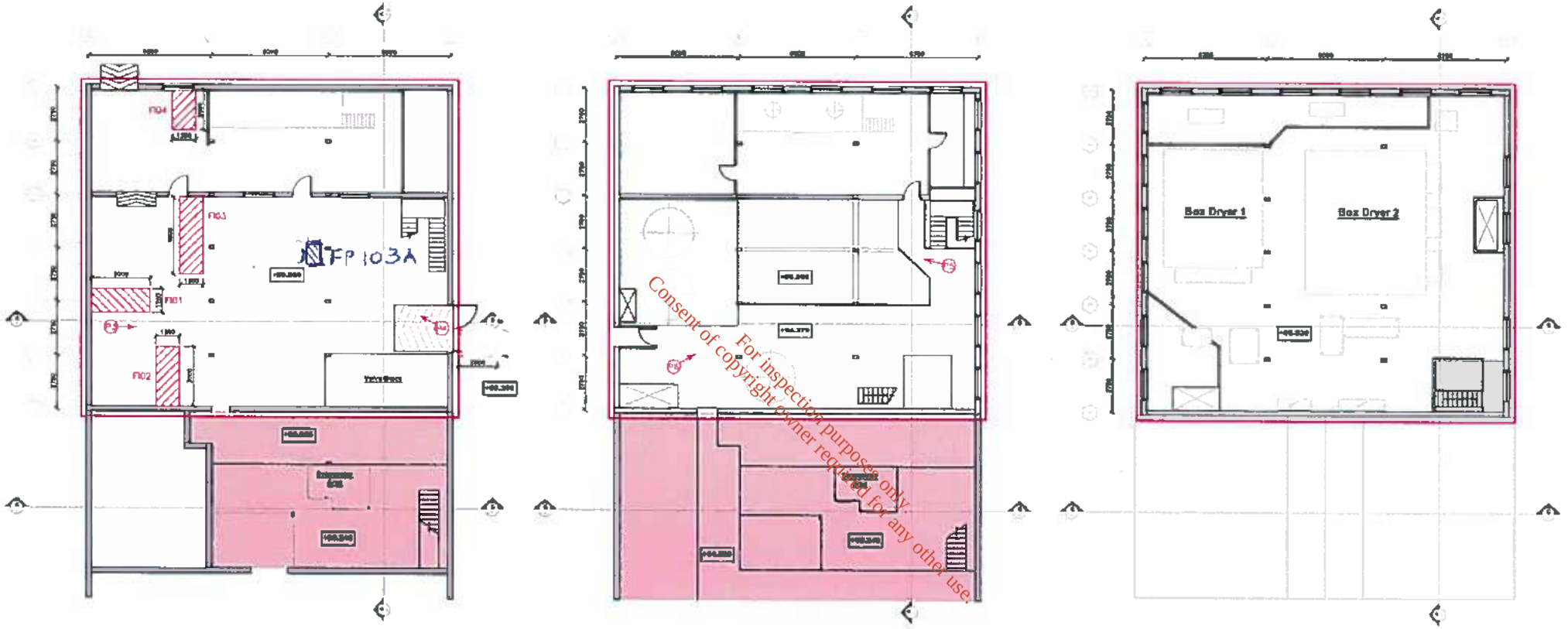
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Appendix V Site Plans

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Plan at +00.000m

Plan at +04.270m

Plan at +08.520m

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Notes:

1. All dimensions are in millimetres or figured dimensions to be taken in preference to scaled dimensions.
2. All levels are in metres and relate to Ordnance Datum Malin Head.
3. Existing building to be maintained in operational dryer upgrade areas in red.

IGSL LTD.
Unit F, M7 Business Park
Naas, Co. Kildare
Phone: 045 846176 Fax: 846187
info@igsl.ie

Legend:

MRG

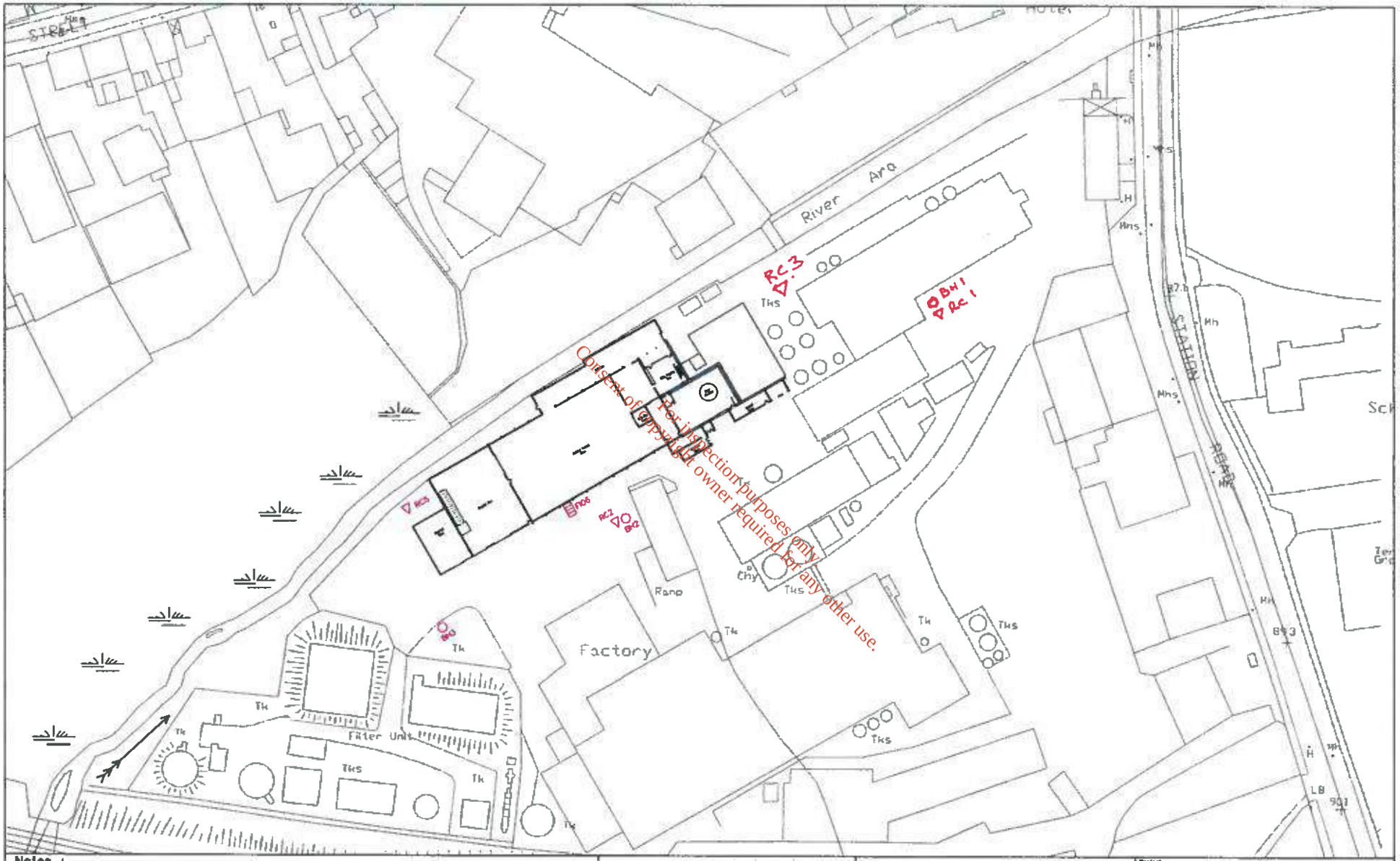
Tipperary Co-Operative Creamery Ltd.
Dryer Upgrade Project
Site Investigations

Floor Plans showing
Internal Site Investigation Locations

Project No. 116020

Drawing No. 116020-SI-02

EPA Export 15-11-2018:04:00:53



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Notes :

1. All dimensions are in millimetres – figured dimensions to be taken in preference to scaled dimensions.
2. All levels are in metres and relate to Ordnance Datum Malin Head.

Revised	1	23.9.2018	CC	CS	
Original	0	23.7.2018	CC	CS	
Revision	Issue	Date	Dsgn. By	Chk'd. By	

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MRG Consulting Engineers Limited trading as Structural Architectural Environmental

Project: Tipperary Co-Operative Creamery Ltd

Drawing: Site Layout

Drawn: C.Collins	Project no. 318003	Drawing no. 318003-01
Date: 23.7.2018	Scale: 1:1000 @ A3	Checked By: CS

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ATTACHMENT F

FLOOD RISK ASSESSMENT

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TIPPERARY CO-OPERATIVE CREAMERY LTD.

DRYER 2 FACILITY

FLOOD RISK ASSESSMENT

STAGE 1 - FLOOD RISK IDENTIFICATION

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JUNE 2017

MRG consulting engineers

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MRG Consulting Engineers **Civil Structural Architectural Environmental**

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Summary Local Area Report from Flood Maps
GSI – Teagasc Subsoils Map

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Revision Control Table

For & On Behalf of MRG Consulting Engineers Limited				
Rev.	**Status**	**Prepared By**	**Checked By**	**Date**
0	Draft Planning Issue	T. Horan	C. Sheehy	June 2016
1	Issued for Planning	T. Horan	C. Sheehy	10.08.2016
2	Revised Planning Issue	T. Horan	C. Sheehy	20.06.2017

Admin/Templates/RCT - Rev 2

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1.0. Introduction

Tipperary Co-Operative Creamery Ltd. intend to apply to Tipperary County Council for planning permission to construct a new dryer facility at their existing milk processing plant at Station Road, Tipperary Town. The development works will also include an upgrade to the existing Waste Water Treatment Plant (WWTP). Demolition of the southern half of the existing powder store, the former butter store and disused tanks and associated bund structure will be required to facilitate the subject development .

The Zoning Map for Tipperary Town, included in Appendix B and referenced in the Tipperary Town & Environs Development Plan 2013 - 2019 shows the location of the development as being within the existing built up area with an industrial zoning. The Zoning Map also shows that part of the development area as being within 'Flood Zone A' of the Ara River, which flows through the town. Objective INF 20 of the Local Area Plan requires that all proposals for development within Flood Zone A and B are supported by a site specific Flood Risk Assessment (FRA).

The recommended inclusions in the FRA are outlined in the Department of Environment Heritage and Local Government Guidelines *'The Planning System and Flood Risk Management (2009)'*. In particular Chapter 5 of the guidelines, which notes that at pre-application stage, *'it is the responsibility of the applicant in the first instance to gather relevant information sufficient to identify and assess all sources of flood risk and the impact of drainage from the proposal'.*

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In order to engage with the Planning Authority and comply with the requirements of the Development Plan and the guidelines, we have prepared a Stage 1 FRA for the subject development. The purpose of the FRA is to demonstrate that the development is outside Zone A & B and not at risk of flooding and will not have an adverse impact on flood risk elsewhere.

This Assessment has been carried out in accordance with the recommendations of the guidelines, which include for a three staged approach to carrying out an appraisal of the site, summarised as follows ;

- *Stage 1 - Flood Risk Identification* - Identification of any flooding or surface water management issues related to the development site that may warrant further investigation.
- *Stage 2 – Initial Flood Risk Assessment* – Confirms sources of flooding that may affect the development site. The initial FRA will assess the adequacy of existing information and identify what further studies may be needed to fully address the flooding issues. The requirements for a detailed FRA are scoped during Stage 2.
- *Stage 3 – Detailed Flood Risk Assessment* – Where stages one and two indicate that a development may be subject to a significant flood risk, a detailed flood risk assessment must be carried out. The detailed FRA will normally involve some form of mathematical modelling.

The guidelines recognise that all stages may not be required to complete an FRA for a subject site with the level of detail depending on the risk and with areas where flooding is not a major issue requiring a less detailed approach to the assessment. This report outlines the findings of Stage 1 – Flood Risk Identification for the subject development.

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2.0. Description of Site and Development

The subject development is located within the Tipperary Co-Operative Creamery Ltd. site on Station Road. The overall site of the Production Facility at Tipperary covers an area of approximately 6.2 hectares with the lands outlined in red on Drawing No. 116020-FRA-02, Site Layout Plan included with this planning submission. The lands under the control of the applicant are outlined in blue on Drawing No. 116020-FRA-02.

The development, the subject of this assessment comprises a new dryer facility as outlined above. The location of the development site is outlined in green on Drawing No. 116020-FRA-02. Site Layout Plan included in Appendix A. Surface water from existing roofs and paved areas within the footprint of the development is collected to the existing site surface water drainage system prior to discharge through an existing licensed discharge to the River Ara.

The Tipperary Co-Operative site is bound along its front/eastern boundary by Station Road. The ground profile along the site frontage is generally at or slightly below the road level and then generally flat in the vicinity of the development. The overall Tipperary Co-Operative site topography comprises gently falling ground sloping away from the southern boundary of the site towards the River Ara, which runs along the northern boundary of the site. The finished floor level of the proposed Dryer, existing ground levels in the vicinity of the subject development, River Ara levels and existing levels on Station Road are shown on Drawing No. 116020-FRA-02.

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Dairy processing has been undertaken at the Station Road site since pre 1900. It operated as a milk processing factory, under the name 'The Condensed Milk Company' in 1928, and subsequently as the 'Milk Disposal Company'. The site manufactured condensed milk and butter until 1948 prior to commencing the production of milk powder at the site in 1949.

Tipperary Cooperative Creamery Ltd., formed in 1972, acquired the Station Road facility and subsequently installed a new milk powder plant, effluent treatment plant, boiler house and refrigeration facilities on the site.

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3.0. Stage 1 – Flood Risk Identification

3.1. Indicative Flood Risk Mapping

Table 1.1 of the guidelines advises that for the submission of a planning application for a subject site the applicant should consult Chapters 3 and 5 of the guidelines. Chapter 3 outlines a sequential approach to planning a new development and makes reference to Flood Zones A to C. It also addresses the circumstances under which different types of development are appropriate, and where they need to be more fully justified at a strategic level. The Flood Zones are summarized as follows;

- *Zone A - High Probability of Flooding* – Areas where the probability of flooding from rivers and the sea is greater than 1 in 100 for river flooding or 1 in 200 for coastal flooding.

- *Zone B - Moderate Probability of Flooding* - Areas where the probability of flooding from rivers and the sea is between 1 in 1000 and 1 in 100 for river flooding or between 1 in 1000 and 1 in 200 for coastal flooding.

- *Zone C – Low Probability of Flooding* - Areas where the probability of flooding is less than 1 in 1000 for both river and coastal flooding.

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On a national level the Office of Public Works have established working groups to develop Catchment Flood Risk Assessment and Management Plans (CFRAM) for each of the main River Basins. The Ara River flows through Tipperary Town and is a tributary of the Aherlow River, which subsequently drains to the River Suir and as such Tipperary Town is included in the area of the River Suir CFRAM study. As part of CFRAM programme, flood hazard maps and flood risk management plans are being prepared for each CFRAM area.

Flood maps for the Suir CFRAM study were published in January 2015 and the relevant maps for the subject development are included in Appendix B. Contrary to the Land Use Zoning & Flood Mapping map attached to the Development Plan, this map indicates that the area of the subject development is outside of the Flood Zones of the Ara River, with adjacent flood zones shown on the north bank of the Ara River and further west at Scalaheen on the opposite side of the railway line.

Table 3.1 of the guidelines provides a matrix of vulnerability versus flood zone to illustrate the types of development that would be appropriate to each flood zone and those developments that would require a Justification Test, which is used in developments located in areas of moderate or high flood risk. Developments subject to IPPC licences are classed as ‘highly vulnerable’ and are deemed appropriate in Zones C and subject to a Justification Test for Zones A & B.

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3.2 Screening of Available Information

Chapter 5 of the guidelines and the Tipperary Town & Environments Development Plan outlines that during the pre-application stage of a development it is the responsibility of the applicant to gather relevant information sufficient to identify and assess all sources of flood risk and the impact of drainage from the proposed works as part of a screening process. The following documents have been reviewed under this process in the preparation of this Stage 1 report.

3.2.1 OPW Flood Maps Website

The OPW mapping shows predictive and historic flood areas and the location of benefitting lands. A report generated on the flood maps website for the area of the Tipperary Co-Operative site is included in Appendix B. The 'benefiting land' located adjacent to the Ara River, which encompasses a part of the Tipperary Co-operative site indicates that the lands have benefitted from drainage schemes carried out to alleviate flood risk. Particular flood events recorded on the website are marked by a triangular symbol with events recorded at Abbey Street, Carrowclogh, Bohercrow, Scalaheen, Friarsfield, Sadleirswells and Springfield. Abbey Street is on the opposite side of Station Road to the subject site and is noted as having been subject to flooding on occasions with minutes from Town Council meetings noting remedial works having been carried out which have alleviated this occurrence. The above recorded events do not impact on the Tipperary Co-Operative site.

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3.2.2 Geological Survey of Ireland Website

GSI mapping indicates that the sub soils on site comprise made ground. Areas to the north of the Ara River and west of the railway line show sub soils comprising of alluvium. The alluvium deposits are indicative of the general areas that were subject to flooding in the past. The sub soils map is included in Appendix B

3.2.3 Walkover survey

A walkover survey was undertaken on the 1st July 2016

3.2.4 Local anecdotal knowledge

The production facility where the subject development is located has been in operation under the current ownership since 1972. There is no record of flooding within the site from this date.

3.2.5 Current and historic mapping for the area

Historic "6 inch" mapping (1888-1913) indicate that the lands to the opposite side of the Ara River to the Tipperary Co-Operative site are 'liable to floods'. Further lands liable to flooding are noted at Scalaheen west of the Railway line.

3.2.6 Topographical survey

A topographical survey has been undertaken of the subject development, which also took in that section of the Ara River to the north of the site. Drawing No 116020-FRA-02 included in Appendix A shows the relationship of the development to the levels of the Ara River and adjoining Station Road.

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3.2.7 Tipperary Town & Environs Development Plan Strategic Flood Risk Assessment

A Strategic Flood Risk Assessment was undertaken as part of the preparation of the Tipperary Town & Environs Development Plan 2013 – 2019. The SFRA included for a Land Use Zoning Map & Flood Mapping and also outlined areas of the Town Centre on Map SFRA 5, which are subject to a Justification Test to be carried out in accordance with Section 5.3 of the Development Plan. The mapping included in the SFRA was based on preliminary CFRAM mapping, which used large scale contour mapping in the identification of flood zones along the Ara River. The flood mapping has since been updated following topographical surveying of the Ara river channel and the adjoining lands and subsequent hydraulic modelling of flood flows along the river. The 2015 Suir CFRAM study mapping is more reflective of levels on the ground and is recognised as superseding the earlier published maps providing a more accurate picture of the flood zones adjacent the subject site. A copy of the 2015 Suir CFRAM study mapping showing the Fluvial Flood Extents and the Fluvial Flood Depths for Tipperary Town are included in Appendix B.

3.3 Potential Sources of Flooding

The site of the development is located inland and as such is not subject to Tidal flooding. Inland flooding could impact the site through the following mechanisms ;

3.3.1 Overland Flow (Pluvial flooding)

Occurs when the amount of rainfall exceeds the infiltration capacity of the ground to absorb it. The excess water will flow overland, ponding in natural hollows and low-lying areas or behind obstructions. The flow will eventually enter a piped or natural drainage system.

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The Tipperary Co-Operative site is effectively protected from overland flow from lands uphill from the site by the presence of the railway embankment along the southern boundary of the site. Therefore, any impact from overland flows will be generated by the rainfall that will fall within the site. The area of the subject development overlaps an existing warehouse building and a concrete yard area with runoff collected to the surface water drainage system and as such, there is minimal increase in runoff or in the risk of pluvial flooding resulting from the proposed development. The risk of a pluvial flooding event which might accrue from rainwater falling within the Tipperary Co-Operative site inundating the on-site drainage system will be mitigated by on-site drainage maintenance procedures.

3.3.2 River Flooding (Fluvial)

Occurs when the capacity of a watercourse is exceeded or the channel is blocked or restricted, and excess waters spill out onto low-lying areas.

The CFRAM Map No. 016ARA_EXFCD001_D2 in Appendix B shows a node point ARARI017768 on the River ARA adjacent to the north east corner of the Tipperary Co-Operative site approximately 80m up river from Station Road and 110m down river from the subject development. A further node point ARARI018082J is located at the railway line approximately 120m up river from the western end of the subject development. Indicative flood levels at the node points from the Hydraulic Modelling carried out by the OPW on the River Ara show the following water levels;

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		ARARI017768	ARARI018082J
1 in 10 chance in any given year	-	85.369 mAOD	86.457 mAOD
1 in 100 chance in any given year	-	85.564 mAOD	86.658 mAOD
1 in 1000 chance in any given year	-	85.747 mAOD	86.868 mAOD

Spot levels from the completed topographical survey of the Tipperary Co-Operative site are shown on Drawing No. 116020-FRA-02 included in Appendix A. The proposed ground floor level of the Dryer 2 building is 86.95 mAOD, this level includes for raising the ground floor level of the building by on average 200mm from the current levels. This floor level compares to the entrance level to the Tipperary Co-Operative site of 86.41 mAOD and a level of 86.22 mAOD on the bridge over the River Ara on Station Road.

The overall gradient of the first 150m of the Ara River downstream of the railway line is in the order of 1/400 as far as a low level v-notch weir arrangement midway along the proposed development. In view of the presence of the v-notch weir we have conservatively taken the flood levels immediately upstream of the subject development as being 25% of the difference between the flood levels at the above node points rather than interpolating between node points to get an average flood level for the development site. The following flood levels were then considered ;

1 in 100 chance in any given year	-	86.658 mAOD
1 in 1000 chance in any given year	-	86.589 mAOD

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The proposed floor level is approx. 350mm higher than the 1 in 1000 chance in any given year flood level of 86.589 mAOD and approx. 550mm higher than the 1 in 100 chance in any given year flood level of 86.384 mAOD. It is considered that the floor level provides sufficient freeboard given the previous flood history at the site and given that the ground levels along the river bank on the Tipperary Co-Op site are above predicated flood levels.

The proposed works include for the diversion of the existing outfall pipe from the on-site wastewater treatment plant which currently traverses a disused bridge over the River Ara to discharge to the public sewer within the hotel site on the north side of the river. The outfall pipe may pose an obstruction to flood waters or be damaged in a flood event. A new outfall pipe will be provided along the diversion route crossing over the River Ara at a higher level on a raised gantry above the 1 in 100 year flood level. The diversion will be located alongside a temporary bridge providing construction access to the Dryer 2 facility. A Section 50 application for the temporary bridge works and new gantry will be applied for to the OPW in advance of any construction works. As a further mitigation measure removal of the disused bridge should be considered during the Section 50 process in view of the potential of the bridge to pose an obstruction to flood waters.

In terms of increased fluvial flooding, the subject development does not increase the amount of runoff draining to the Ara River and combined with the evident topography of the site there is no increase in the risk of fluvial flooding resulting from the proposed development.

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3.3.3 Flooding from artificial drainage systems

Occurs when flows entering a storm water sewer system exceed its discharge capacity resulting in flooding at inlets and manholes.

Run-off surface waters from the roofs and paved areas of the facility are collected to the existing site sewer system which drains via licensed discharges to the River Ara. There will be no change to the run off areas as a result of the proposed development. As noted above in respect of pluvial flooding, the risk of any flooding occurring under this mechanism will be mitigated by on-site drainage maintenance procedures.

3.3.4 Groundwater Flooding

Occurs when the water table rises as a result of prolonged rainfall to meet the ground surface and flows out over it.

There is no record of groundwater flooding within the Tipperary Co-Operative facility. The ground water table on the site is below ground level given that the ground was raised during construction of the facility.

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4.0. Conclusions

The following are the conclusions following this Stage 1 Flood Risk Assessment.

(i) In view of the findings of the screening above and taking into account the potential sources of flooding also noted above, it is concluded that the primary source of flood risk to the development is the Ara River which runs flows from west to east along the boundary of the Tipperary Co-Operative site. A review of the topography of the area shows that in the event of flooding and overspill of the river channel, Abbey Street and lands to west of the site, which are at a lower level than the Tipperary Co-Operative site would act as the flow path for flood waters.

(ii) It would appear that the area designated as being susceptible to flooding as indicated on the Tipperary Town & Environs Development Plan 2013-2019, which takes in a part of the Tipperary Co-Operative site was based on the preliminary CFRAM mapping, which used large scale contour mapping. The flood mapping has since been updated following topographical surveying of the Ara river channel and the adjoining lands and subsequent hydraulic modelling of flood flows along the river. The 2015 Suir CFRAM study mapping is more reflective of levels on the ground and provides a more accurate picture of the flood zones adjacent the subject site.

(iii) The 2015 Suir CFRAM study mapping indicates that the Tipperary Co-Operative site is outside of Flood Zones A & B of the Ara River. The ground levels of the development site when compared to the predicted flood levels indicated on the 2015 Suir CFRAM study mapping at the indicate that the floor level of Dryer 2 at 86.95mAOD is approximately 350mm above the 0.1% AEP (1 in 1000 year) event.

(iv) Historic and anecdotal evidence also indicates that the Tipperary Co-Operative site is outside of the flood zones of the Ara River.

(v) The subject development does not increase the amount of surface water runoff draining to the Ara River and as such there is no increase in the risk of fluvial flooding resulting from the proposed development.

(vi) The subject development does not result in any loss of flood plain storage for the Ara River nor alters any flow paths for flood waters.

(vii) A certain amount of resilience against a future rise in river levels resulting from climate change has been incorporated into the Tipperary Co-Operative site through the provision of a full length concrete upstand kerb along the northern boundary of the new development. Furthermore, with regard to the subject development, it is proposed to raise the floor level of Dryer 2 by 200mm to 86.95mAOD.

(viii) In conclusion, it is our opinion that following this Stage 1 FRA, that there are no flooding or surface water management issues relating to the development that would warrant further investigation under any Stage 2 or Stage 3 Flood Risk Assessment.

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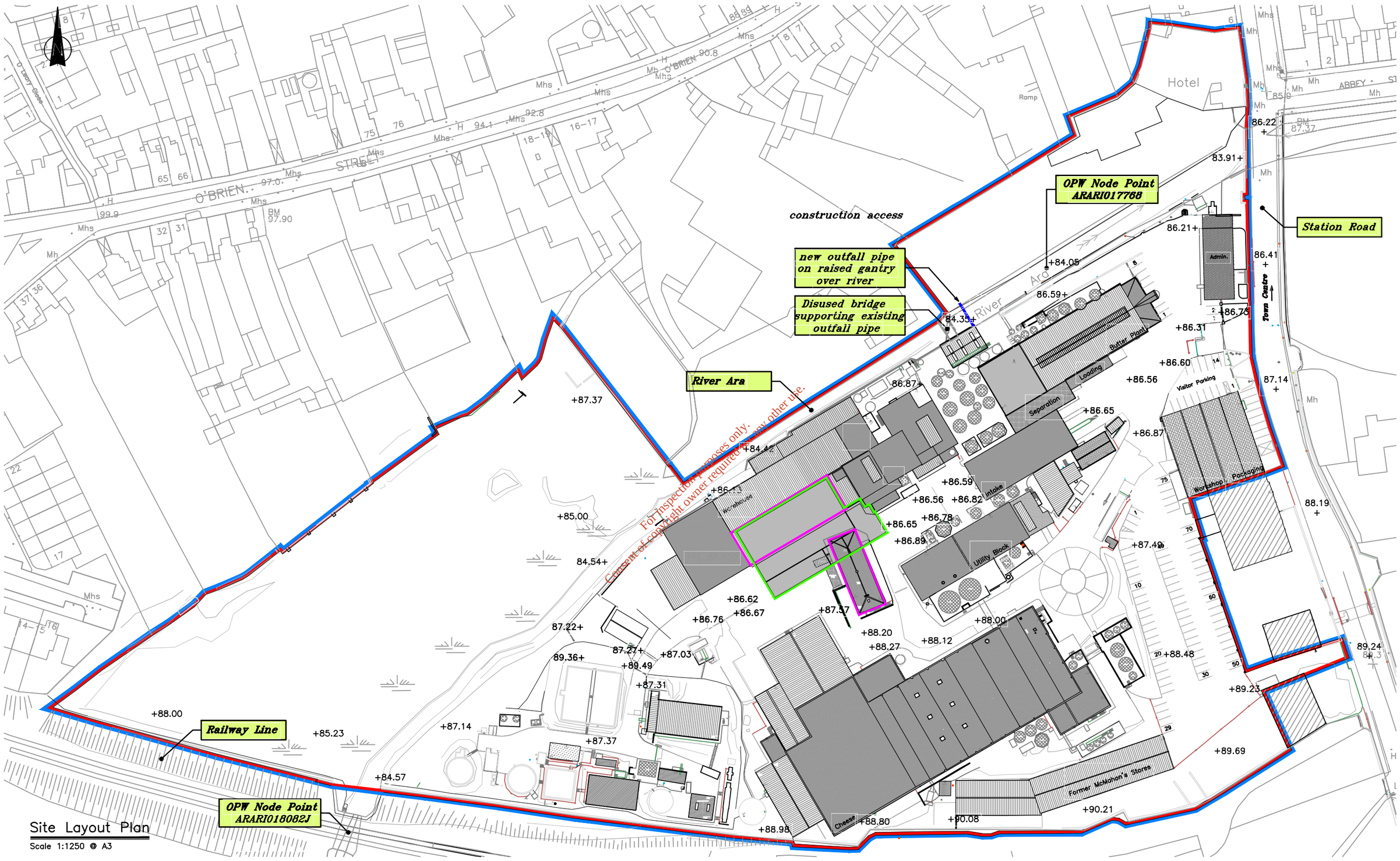
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Appendix A

Drawing No. 116020-FRA-02 Site Layout Plan

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Site Layout Plan

Scale 1:1250 @ A3

Notes

1. All levels are in metres and relate to Ordnance Datum Malin Head.
2. Spot levels denoted thus ..... +83.000
3. Extent of property under ownership of applicant edged thus in blue .....
4. Extent of site to which this planning application relates edged thus in red .....
5. Proposed Dryer 2 Building edged thus in green .....
6. Existing warehouse building & butter store to be demolished edged thus in magenta .....

Issue	Date	Revisions	Drawn	Checked	Approved
1	16.6.17	Issued for planning	TH	CS	CS
0	30.6.16	Original	TH	CS	CS

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MRG Consulting Engineers Limited Civil Structural Architectural Environmental

Project: Tipperary Co-Operative Creamery Ltd.
Dryer 2 Facility

Drawing: Flood Impact Assessment Report
Site Layout Plan

Drawn:	T. Horan	Project No.	116020	Drawing No.	116020-FRA-02
Date:	16.06.17	Scale:	As Shown	Checked By:	C. Sheehy

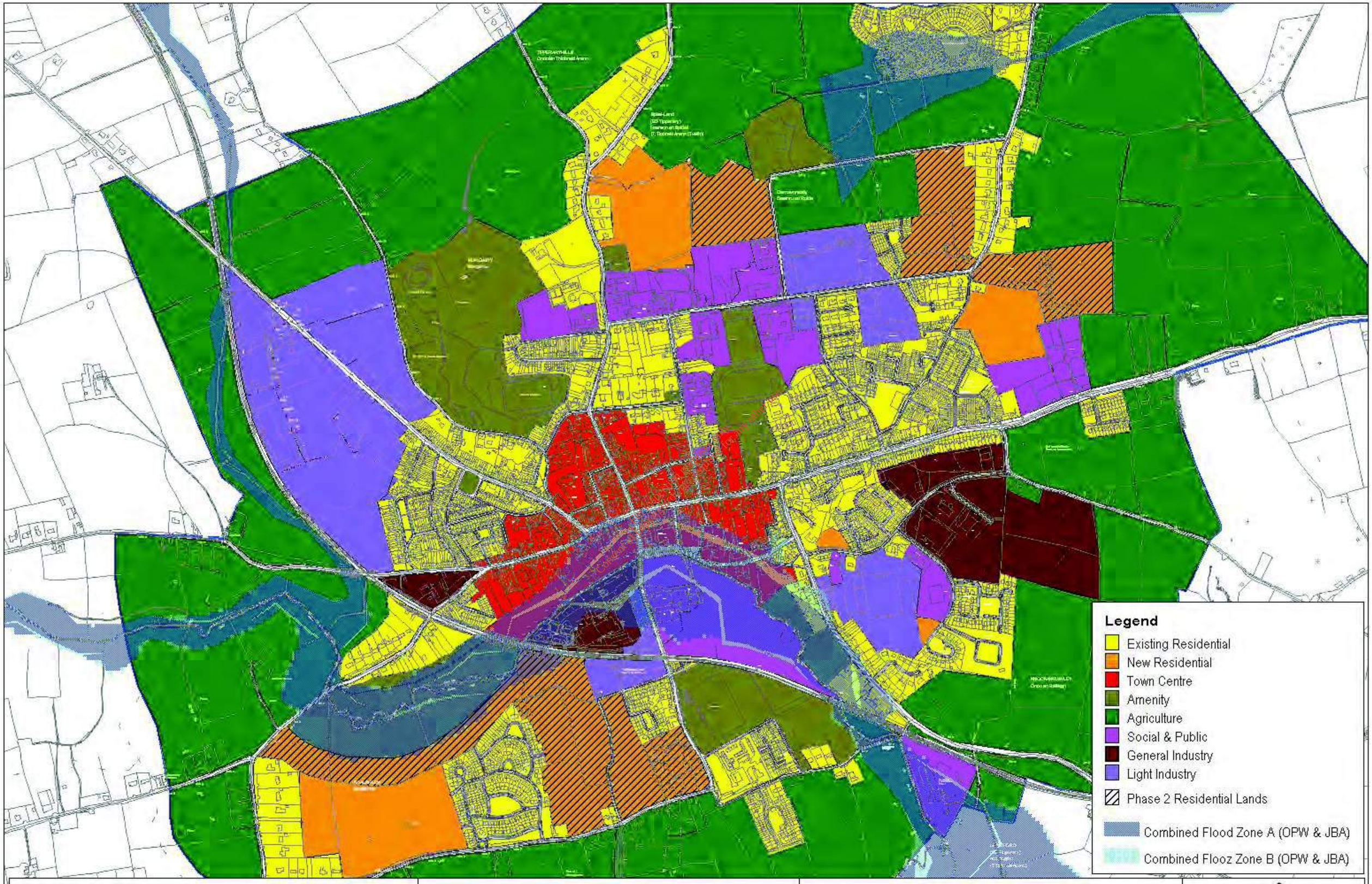
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Appendix B

Land Use Zoning & Flood Mapping 2013
OPW Fluvial Flood Extent Map 2015
OPW Fluvial Flood Depth Map 2015
Summary Local Area Report from Flood Maps
GSI – Teagasc Subsoils Map

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TIPPERARY TOWN & ENVIRONS DEVELOPMENT PLAN 2013 - 2019

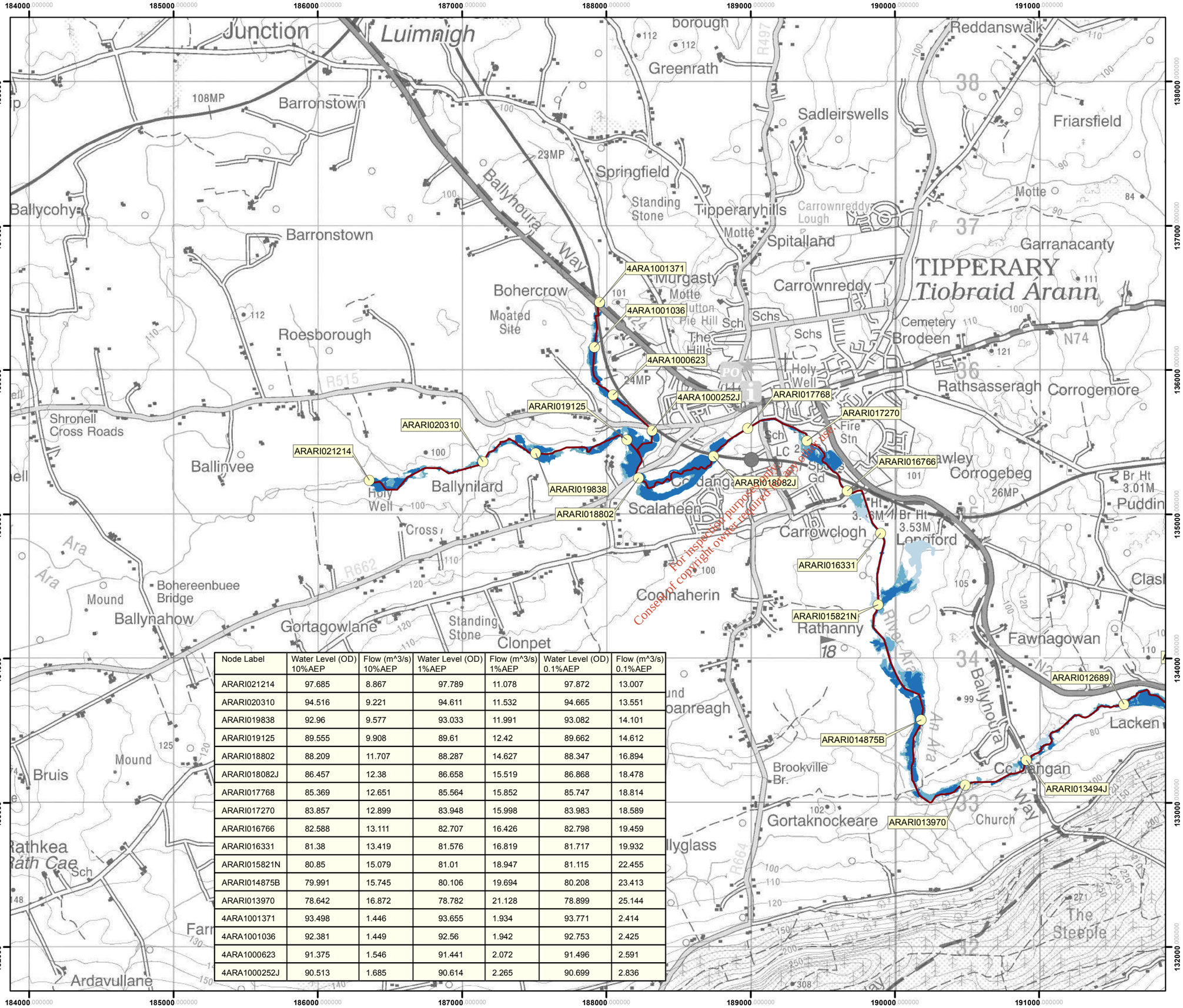
LAND USE ZONING MAP & FLOOD MAPPING

TIPPERARY TOWN COUNCIL & SOUTH TIPPERARY COUNTY COUNCIL APRIL 2013

N

Not to Scale

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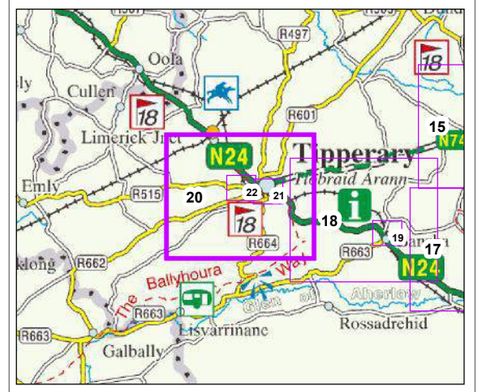


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ARARI019838	92.96	9.577	93.033	11.991	93.082	14.101
ARARI019125	89.555	9.908	89.61	12.42	89.662	14.612
ARARI018802	88.209	11.707	88.287	14.627	88.347	16.894
ARARI018082J	86.457	12.38	86.658	15.519	86.868	18.478
ARARI017768	85.369	12.651	85.564	15.852	85.747	18.814
ARARI017270	83.857	12.899	83.948	15.998	83.983	18.589
ARARI016766	82.588	13.111	82.707	16.426	82.798	19.459
ARARI016331	81.38	13.419	81.576	16.819	81.717	19.932
ARARI015821N	80.85	15.079	81.01	18.947	81.115	22.455
ARARI014875B	79.991	15.745	80.106	19.694	80.208	23.413
ARARI013970	78.642	16.872	78.782	21.128	78.899	25.144
4ARA1001371	93.498	1.446	93.655	1.934	93.771	2.414
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Location Plan:



LEGEND

- 10% AEP Fluvial Extent
- 1% AEP Fluvial Extent
- 0.1% AEP Fluvial Extent
- Modelled River Centreline
- Node Point
- Defended Area
- Flood Storage
- Flood Defence - Embankment
- Flood Defence - Wall
- Gate
- USUIR162723 — Node Label
- xx% AEP — Standard of Protection of Flood Defence

IMPORTANT USER NOTE:

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THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED FOR ANY OTHER PURPOSE.

The Office of Public Works
Jonathan Swift Street
Trim
Co. Meath

Project:
SUIR CFRAM STUDY

Map: **ARA**
FLUVIAL FLOOD EXTENT MAP

Map Type:	EXTENT		
Source:	FLUVIAL		
Map Area:	MPW		
Scenario:	CURRENT		
Drawn by:	E.Laurinaviciute	Date:	21/01/2015
Checked by:	Conor Galvin	Date:	21/01/2015
Approved by:	Gerry Gallagher	Date:	21/01/2015

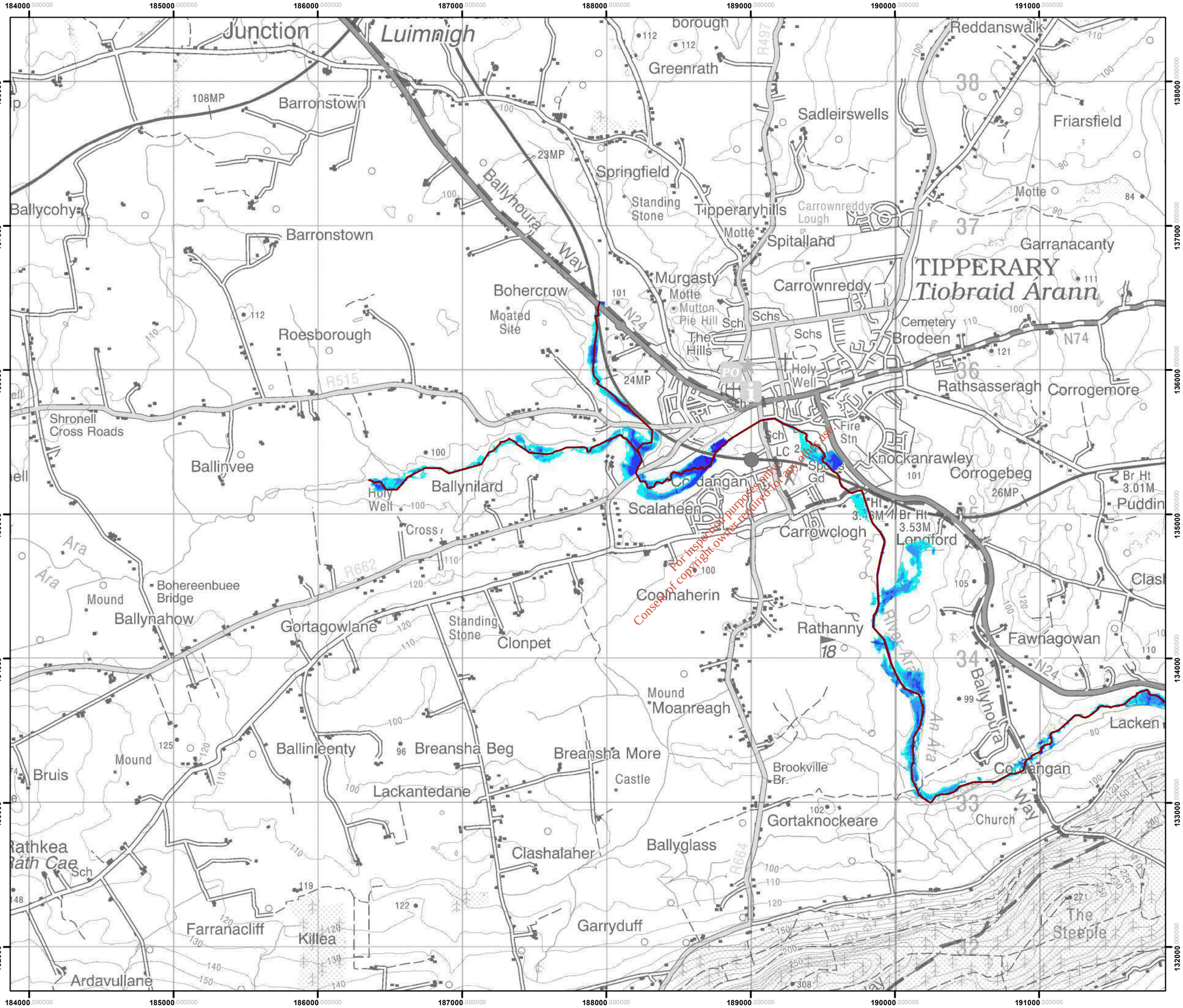
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DRAFT

Sheet 20 of 59 — Revision: 0

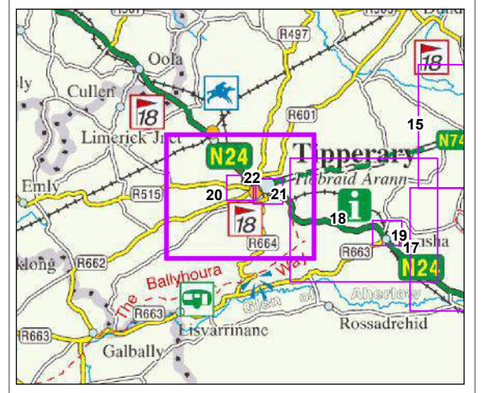
Map Scale: 1:25,000 — Plot Scale: 1:1 @ A3

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Location Plan:



LEGEND

0.1% AEP Fluvial Flood Depth

- 0 - 0.25m
- 0.25 - 0.5m
- 0.5 - 1.0m
- 1.0 - 1.5m
- 1.5 - 2m
- > 2.0m
- Modelled River Centreline

IMPORTANT USER NOTE:

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The Office of Public Works
Jonathan Swift Street
Trim
Co. Meath

Project:
SUIR CFRAM STUDY

Map: **ARA**
FLUVIAL FLOOD DEPTH MAP

Map Type:	DEPTH		
Source:	0.1% AEP FLUVIAL		
Map Area:	MPW		
Scenario:	CURRENT		
Drawn by:	E.Laurinaviciute	Date:	05/02/2015
Checked by:	Conor Galvin	Date:	05/02/2015
Approved by:	Gerry Gallagher	Date:	05/02/2015

Map No.: O16ARA_DPFCD001_D2

DRAFT

Sheet 20 of 59 — Revision: 0

Map Scale: 1:25,000 — Plot Scale: 1:1 @ A3

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OPW National Flood Hazard Mapping

Summary Local Area Report

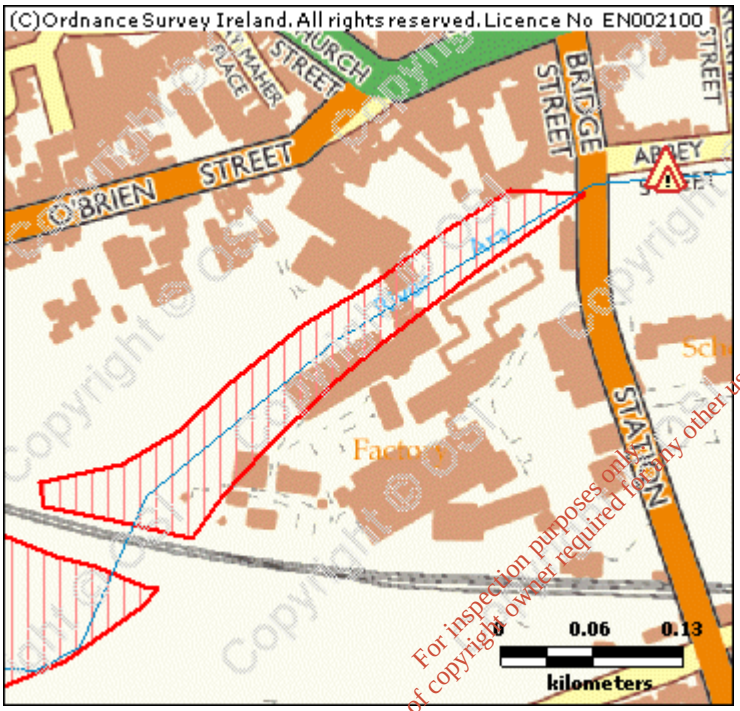
This Flood Report summarises all flood events within 2.5 kilometres of the map centre.

The map centre is in:

County: Tipperary

NGR: R 889 355

This Flood Report has been downloaded from the Web site www.floodmaps.ie. The users should take account of the restrictions and limitations relating to the content and use of this Web site that are explained in the Disclaimer box when entering the site. It is a condition of use of the Web site that you accept the User Declaration and the Disclaimer.



Map Scale 1:5215

Map Legend	
	Flood Points
	Multiple / Recurring Flood Points
	Areas Flooded
	Hydrometric Stations
	Rivers
	Lakes
	River Catchment Areas
	Land Commission *
	Drainage Districts *
	Benefiting Lands *

* Important: These maps do not indicate flood hazard or flood extent. Thier purpose and scope is explained in the Glossary.

9 Results

1. Carrowclogh Tipperary Town Recurring — Start Date:
County: Tipperary — Flood Quality Code:3
Additional Information: Reports (1) More Mapped Information

2. Bohercrow, Tipperary Town Recurring — Start Date:
County: Tipperary — Flood Quality Code:3
Additional Information: Reports (1) Press Archive (25) More Mapped Information

3. Scalaheen Recurring — Start Date:
County: Tipperary — Flood Quality Code:4
Additional Information: Reports (1) More Mapped Information

4. Bohercrow Recurring — Start Date:
County: Tipperary — Flood Quality Code:4
Additional Information: Reports (1) More Mapped Information

5. Springfield/Greenrath Recurring — Start Date:
County: Tipperary — Flood Quality Code:4

Report Produced: 30-Jun-2016 17:13

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Additional Information: Reports (1) More Mapped Information

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6. Brookvale Recurring — Start Date:

County: Tipperary — Flood Quality Code: 4

Additional Information: Reports (1) More Mapped Information

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7. Springfield Tipperary Recurring — Start Date:

County: Tipperary — Flood Quality Code: 4

Additional Information: Reports (1) More Mapped Information

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8. Abbey Street, Tipperary Town Recurring — Start Date:

County: Tipperary — Flood Quality Code: 4

Additional Information: Reports (1) Press Archive (5) More Mapped Information

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9. Bohercrow (Tipperary) Recurring — Start Date:

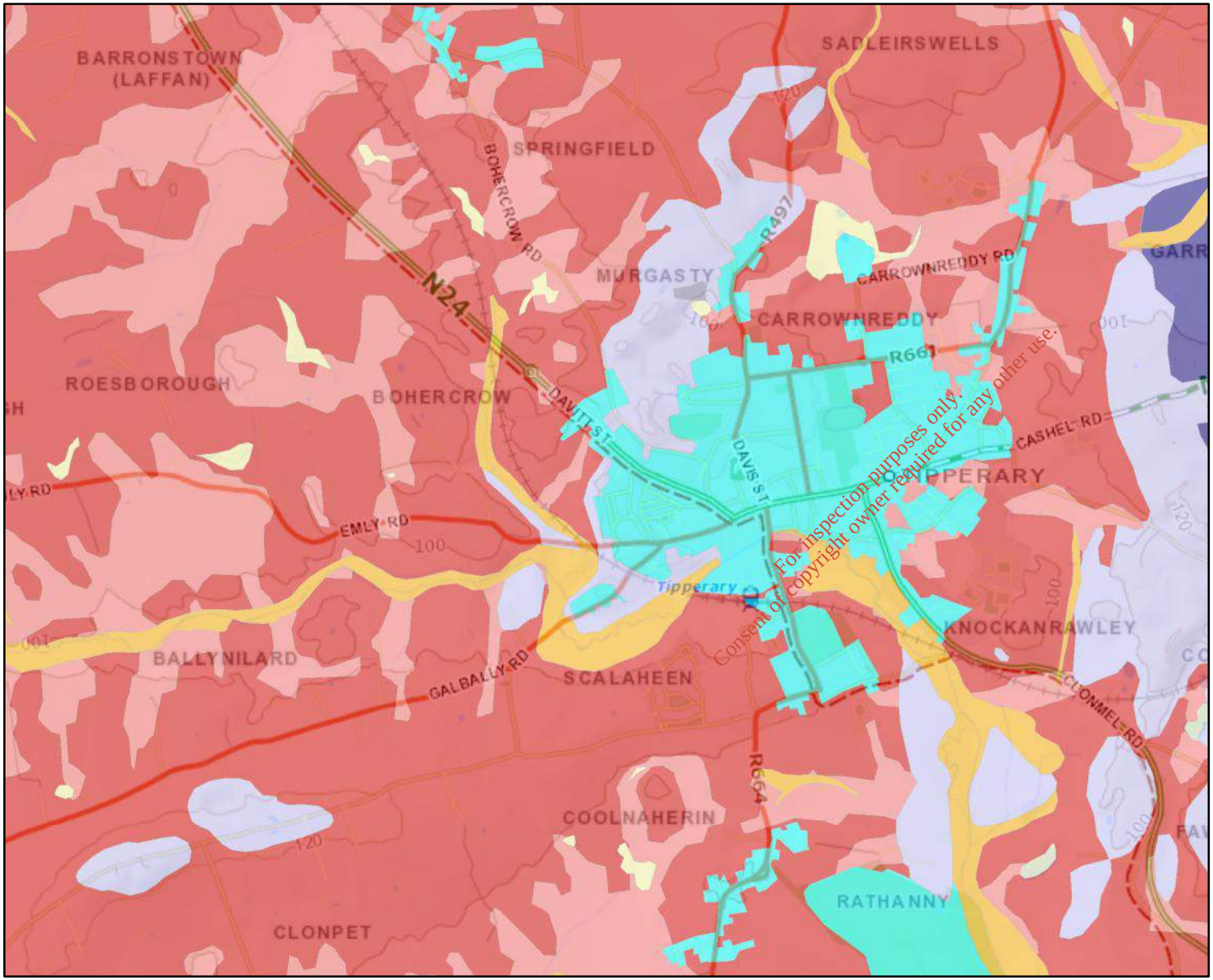
County: Tipperary — Flood Quality Code: 4

Additional Information: Reports (1) More Mapped Information

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Tegasc Subsoils



Legend

Teagasc Soils

- Acid Deep Well Drained Mineral
- Acid Deep Poorly Drained Mineral
- Basic Deep Well Drained Mineral
- Basic Shallow Well Drained Mineral
- Basic Shallow Poorly Drained Mineral
- Mineral Alluvium
- Lacustrine
- Made

OSI Basemap

Scale: 1:25,000

Geological Survey of Ireland

N W E S

0 0.175 0.35 0.7 mi

0 0.275 0.55 1.1 km

Map Centre Coordinates (ITM) 588,358 635,874

Snapshot Date: June 30, 2016

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ATTACHMENT G

AIR IMPACT ASSESSMENT

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AIR QUALITY IMPACT OF PROPOSED DRYER EXPANSION PROGRAMME

TIPPERARY CO-OPERATIVE CREAMERY LTD. CO. TIPPERARY

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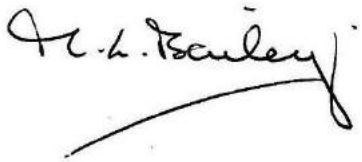
AIR POLLUTION AND ENVIRONMENTAL CONSULTANCY

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e-mail: info@envirocon.ie

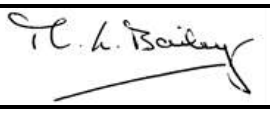
Date: 6TH JUNE 2017 **Report By: Michael L. Bailey**



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AIR QUALITY IMPACT OF PROPOSED DRYER EXPANSION PROGRAMME

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Client	Tipperary Co-Operative Creamery Ltd.
Address	Station Road, Tipperary
Version	Final Report
Circulation	OES – Peadar O'Loughlin, David Heelan
Author	Michael Bailey, M.Sc., B.Sc., Dip. Env. Eng
Company	Envirocon Ltd, Old Road, Kilcarn Bridge, Navan Co. Meath e-mail: info@envirocon.ie, Tel: 046-9074135/086 8071314
	
Date	06/06/2017

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1.0 INTRODUCTION

Tipperary Cooperative Ltd. is planning to expand its production facility in Tipperary town to provide additional processing of milk. The dairy production facility is currently operating under an Industrial Emissions Licence (IEL) (P0801-01)(1) issued by the Environmental Protection Agency in April 2008. This Licence specifies air emission limit values for the boilers, thermoheaters and dryers. A new Dryer plant is planned that will result in an increase from the current maximum powder production rate of 3 tonnes/h to 6.2 tonnes/h. The new dryer building will be located within the same area of the site of the existing powder store warehouse near the north-western boundary and this will require the demolition of part of this building to allow construction of the new dryer and evaporator building.

A new thermoheater will be installed to provide hot air to the new dryer. The company is also proposing to replace the existing Boiler No 3. There are currently 3 boilers used to generate steam, consisting of two 11 MW and a 10MW unit that normally burn natural gas. In the event of an interruption in the supply of gas to the facility the boilers can burn gas-oil.

As part of the environmental assessment reporting for this planned development, Envirocon Ltd. was requested to undertake an air quality impact evaluation exercise. The ADMS5 air quality dispersion model was used to predict ground level concentrations within the area around the Tipperary Co-Op facility. This is an advanced air quality model that is suitable for modelling complex industrial sources with buildings and numerous emission sources and is approved for use by the EPA. The air quality prediction modelling study was carried out in accordance with the Air Dispersion Modelling Guidance Note (AG4) published by the EPA(2).

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The following report provides a detailed description of the air quality modelling study undertaken to predict concentrations of Nitrogen Oxides and Particulates in the locality of the Tipperary Co-Op facility. The ADMS5 air quality model was used to determine the pattern of predicted ground level concentrations. Predicted concentrations based on the planned operation of the existing and proposed new dryer plant and boiler plant were compared with the corresponding short-term and long-term National Air Quality Standards (NAQS), specified in the Air Quality Standards Regulations 2011(3).

As part of the dryer expansion programme, it is also proposed to upgrade the existing effluent treatment plant located within the existing Tipperary Co-Op site to meet future water discharge and sludge treatment requirements. An assessment of the proposed upgrade was undertaken in relation to the potential impact on local air quality, due to odorous emissions arising from the operation of the upgraded WWTP.

2.0 EMISSIONS

2.1 Boiler characteristics

2.1.1 Existing Boiler Plant 'No Development'

The 3 boilers are housed in the boiler building that is located within the central part of the Tipperary Co-Op facility (Figure 1). The boilers are dual-fuel and normally burn natural gas but

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in the unlikely event of an interruption in the supply of gas to the facility, the boilers can burn low-sulphur gas oil (British Standard 2869 Class D oil). The current steam demand for the facility can be met by Boiler No 1 firing at high load and Boiler 2 or 3 running at low to medium load during the peak production period and on hot-standby during the winter period. Boiler No 1 has a steam generating capacity of 18 tonne/h. Two boilers run on load for most of the summer peak production period. There is also a small boiler or Thermoheater, with a capacity of 1.8 MW, which burns gas oil and is installed to heat air for the existing dryer plant. This small boiler has an exhaust stack discharging from the northern side of the dryer building. The small capacity of this boiler results in very low exhaust emissions compared to the main steam boilers.

Fuel consumption information for the boilers and emission characteristics for the exhaust stacks were supplied by Tipperary Co-Op. This information (Table 1) is based on the exhaust stack measurements obtained from manual sampling programmes and boiler manufacturer performance data when the units are fired on natural gas and, in the case of Thermoheater No 1 burning gas oil.

Table 1: Emission characteristics of the existing boiler plant stacks

Source and Stack Designation Reference No.	Ht (m)[a]	Diam (m)	T (°C)	Exhaust Volume (Nm^3/h)[b]	Exit Velocity (m/s)
Boiler No 1 – A1-1	22.1	0.76	235	14,850	16.9
Boiler No 2 – A1-2	22.1	0.76	150	9,280	8.5
Boiler No 3– A1-3	18.0	0.80	210	11,000	10.7
Niro Thermoheater No 1 – A1-4	25.0	0.40	240	2,750	11.4
TOTAL				**37,880**	

Note: (a) height above ground level.(b) Wet discharge conditions (3%O_2/15% Moisture).

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The rate of Nitrogen Oxides emissions from the boiler and thermoheater stack within the Tipperary Co-Op facility depends on the type of fuel burnt and combustion conditions within the burner zone of the boiler. Formation of NO_x in the flue gas is a complex process as it is due not only to the amount of combustion air available and the chemistry of the fuel being used but also to the temperature within the flame area. Over 95% of the total nitrogen oxides (NO_x) in the exhaust gas from industrial boilers is typically emitted as nitric oxide (NO) with the remainder emitted as nitrogen dioxide (NO_2). For natural gas firing, all NO_x generated is thermal NO_x as the amount of nitrogen in the fuel is negligible. The NO_x forms in the zone downstream of the burner where the combustion air is mixed.

Table 2: NO_x(as NO_2) emission limit values

Source and Stack Designation Reference No.	Emission Limit Values			
	NO_x (mg/Nm^3)	Exhaust Volume (Nm^3/h)[a]	NO_x (Kg/h)	NO_x g/s
Boiler No 1 – A1-1	200	12,310	2.46	0.68
Boiler No 2 – A1-2	200	7,450	1.49	0.41
Boiler No 3– A1-3	200	9,350	1.87	0.52
Thermo Htr No 1 – A1-4[b]	250	2,350	0.59	0.16

Note: (a) Exhaust ELV at Reference Condition 3%O_2/Dry. (b) Thermoheater A1-4 burns gas oil.

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The maximum NO_x emission rate for each of the boilers and existing thermoheater (Table 2) was calculated from the hourly exhaust flow with the boilers units running at full load. The maximum permitted NO_x concentrations in the exhaust of 200 mg/Nm^3 specified in the IPPC Licence was used for Boilers No 1, 2 and 3 and a value for burning gas oil of 250 mg/Nm^3 was used for the existing thermoheater emissions.

2.1.2 Proposed Boiler Plant 'With Development'

Table 3: Emission characteristics of New Boiler Exhaust Stack

Parameter	Value
Stack Height (m)	19.7
Exhaust Volume (Nm^3/h)	14,350
Exhaust Temperature (^{o}C)	140
Actual Exhaust Volume (m^3/s - at steam generation T)	6
Exhaust Stack Diameter (m)	0.8
Exit Velocity (m/s)	12.0
NO_x (as NO_2) Emission Limit Concentration (mg/Nm^3)	200
NO_x (as NO_2) Emission rate (g/s)	0.8

Table 4: Emission characteristics of the planned boiler plant stacks

Source	Ht (m)[a]	Diam (m)	T (^{o}C)	Exhaust Volume (Nm^3/h)[b]	Exit Velocity (m/s)
Boiler No 1 – A1-1	22.1	0.76	235	14,850	16.9
Boiler No 2 – A1-2	22.1	0.76	150	9,280	8.5
Boiler No 3– A1-3 (New)	19.7	0.80	140	14,350	12.0
Niro Thermoheater No 1 – A1-4	25.0	0.40	240	2,750	11.4
Niro Thermoheater No 2 – A1-5	34.3	0.46	80	4,500	9.7
TOTAL				**45,730**	

Note: (a) height above ground level (b) Wet discharge conditions (3%O_2/15% Moisture).

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The new boiler to replace the existing Boiler No 3 will have a gross generating capacity of 11.8MW and burn only natural gas. It will have a steam generating capacity of 18,000 kg/h to meet future steam demand. Information obtained from the manufacturer gives an exhaust flow of 12,200 Nm^3/h (STP Reference 3%O_2/Dry) with a rated exhaust temperature of 140^{o}C (Table 3). This boiler will run as the primary boiler with either Boiler No 1 or 2 running at low-medium load during the peak production period. During the winter period, the Boiler No 3 is likely to run at medium load with one of the existing boilers on hot-standby.

Table 5: NO_x (as NO_2) emission limit values

Source	Emission Limit Values			
	NO_x (mg/Nm^3)	Exhaust Volume (Nm^3/h)[a]	NO_x (Kg/h)	NO_x g/s
Boiler No 1 – A1-1	200	12,310	2.46	0.68
Boiler No 2 – A1-2	200	7,450	1.49	0.41
Boiler No 3– A1-3 (New)	200	12,200	2.44	0.68
Thermo Htr No 1 – A1-4	250	2,350	0.59	0.16
Thermo Htr No 2 – A1-5	200	3,825	0.76	0.21

Note: (a) Exhaust ELV at Reference Condition 3%O_2/Dry, Existing Thermoheater A1-4 burns gas oil

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For the existing boilers, the exhaust discharge flows and exit velocities are based on the IEL emission limit values (Table 4). The existing thermoheater is likely to continue to be fired with gas oil. However, the new thermoheater for the 3.2-tonne dryer (A1-5) will burn natural gas (Table 5).

2.2 Process Plant

2.2.1 Existing Dryer Emissions

Table 6: Emission characteristics and emissions rates of total particulates (PM) from the Dryer exhaust stack

Emission Stack	Stack Ht. (m)	Diameter (m)	Exhaust Vol (Nm^3/h)	Exhaust Vol (Nm^3/s)	Exit T. (C)	Exit Vel. (m/s)
Dryer No 1 (A2-1)	23	1.6	85,000	23.6	75	15
Rogers Dryer (A2-2)	20	0.8	35,000	9.7	80	25

Emission Stack	Particulate Conc. (mg/Nm^3)	Particulate Emission (kg/h)	Particulate Emission (g/s)
Dryer No 1: A2-1	50	4.25	1.18
Rogers Dryer A2-2	50	1.75	0.49

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There are 2 dryer plant installed at the facility, the 3-tonne Anhydro-Spray Dryer and the much smaller 0.35 tonne Rogers Dryer. Emissions from the Anhydro dryer are discharged from a stack (A2-1) located on the roof of the Spray Dryer building with a height of 23m above ground level. Particulate and exhaust flow measurements undertaken in 2013-2015 give current operating conditions (Table 6). The PM emissions are based on the current permitted limit value in the IEL schedule of 50 mg/Nm^3. However, recent measurements carried out demonstrate that the maximum PM concentrations have been consistently below 35 mg/Nm^3. The Rogers Dryer plant is installed at the western end of the butter factory plant with emissions discharged from a 20m exhaust stack (A2-2). This smaller exhaust stack is located approximately 45m to the NE of stack A2-1 (Figure 1).

PM emissions from the 3 boilers and thermoheater are insignificant compared to those from the process exhaust stack. Burning natural gas in industrial boilers produces negligible particulate matter in the flue gas compared to burning fuel oil or solid fuel.

2.1.2 Proposed Dryer Emissions 'With Development'

As part of the dryer expansion programme, the Rogers Dryer will be decommissioned with Dryer No 1 continuing to operate with no modification in particulate abatement or operation. The exhaust stack for the proposed 3.2-tonne dryer will be located on top of the new dryer building that will be constructed next to the western end of the existing dryer building (Figure 2). This building has a planned roof height of 31.6m and the stack will have a minimum height above the roof of 2m and an exit diameter of 1.4m (Table 7). The design exhaust air flow is

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calculated to be 84,000 Nm^3/h (actual flow 100,000 m^3/h), giving an exit velocity from the stack of 18 m/s. Exhaust air from the new dryer plant will pass through a baghouse containing high efficiency bag filters, resulting in low particulate concentrations in the exhaust gas of below 20 mg/Nm^3. The corresponding mass emission rate for PM is calculated to be <0.5 g/s at maximum dryer output (Table 7).

Table 7: Total particulate (PM) emission characteristics of proposed process exhaust stacks

Emission Stack	Stack Ht (m)	Diameter (m)	Exhaust vol (Nm^3/h)	Exhaust vol (Nm^3/s)	Exit T. (C)	Exit Vel (m/s)
Dryer No 1 (A2-1)	23	1.6	85,000	23.6	75	15.0
Dryer No 2 (3.2-tonne)	33	1.4	84,000	18.8	52	18.0

Emission Stack	Particulate Conc (mg/Nm^3)	Particulate Emission (kg/h)	Particulate Emission (g/s)
Dryer No 1: A2-1	50	4.25	1.18
Dryer No 2 (3.2-tonne)	20	1.68	0.47

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3.0 AIR QUALITY MODEL REQUIREMENTS

3.1 Introduction

The ADMS5 (Atmospheric Dispersion Modelling System (Version 5.2, December 2016)[4] was used to predict ground level concentrations in the locality of the Tipperary Co-Op. The ADMS5 that developed by CERC (Cambridge Environmental Research Consultants) is a third generation prediction model. It includes methods for detailed building wake assessment and terrain impacts on plume dispersal and also a chemical reaction module for predicting NO_2 concentrations. It has been widely used for air pollution studies in Ireland for a wide range of industrial activities and power plants and is approved by the Environmental Protection Agency.

Information on stack height, diameter, exit velocity and exit temperature given for the existing and planned future scenario (Tables 1 and 4) were input into the ADMS5. Maximum NO_x emissions (Tables 2 and 5) were modelled to predict both the short-term (hourly) and long-term NO_2 impacts. The existing boilers (Boilers No 1 and 2), Thermoheater No 1 were modelled at full load with no seasonal change in operating conditions for the 'existing' modelling scenario. For the 'future' modelling scenario, Boilers No 1 and 3 along with the 2 thermoheaters were modelled at full load and continuous operation. These emission scenarios represent the maximum or 'worst-case' emissions from the combustion plant throughout the year so that the maximum air quality impact can be evaluated.

Maximum continuous daily operation of the dryer plant was also used for calculating the daily average PM emission rates from the existing dryer stacks and the new dryer (Tables 6 and 7). However, peak production takes place during the summer period, whereas during the winter months it is likely that there will be limited production periods with the dryers running for a few hours per day and so emissions will be zero if they are off-line. The daily variation in the number

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of hours of production was also not included and so predicted PM (expressed as PM_{10} in the model) concentrations were based on maximum output.

3.2 Building Wake Effects

The effect of buildings on the dispersion of emission plumes from nearby stacks can have a significant effect on predicted downwind ground level concentrations, under certain weather conditions. The presence of a building creates turbulence around the structure, which may result in the emission plume being caught in this area of turbulence. This zone consists of a recirculating flow region or cavity near the building with a diminishing turbulent wake further downwind. The emission plume entrained in the cavity region will be brought down to ground level near the building and so this can result in a significant increase in predicted ground level concentrations.

Each of the main building structures have an overall SW-NE alignment. The layout of the facility showing the main building structures used in the model was obtained from CAD drawings of the facility. A detailed analysis of the existing building layout within the site (Figure 1) and the addition of the new dryer building (Figure 2) was undertaken. The details of buildings were included in the ADMS5. Preliminary model runs were carried out to assess the effect of allocating certain building structures as the 'main building' in the ADMS5 model.

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The existing dominant building affecting the emission plume from the boilers, thermoheaters and the dryer stacks is the Anhydro Dryer building, with an overall height of 20m and maximum height of 23m. For the rest of the site, the effect of turbulence generated by other buildings with lower roof heights did not significantly alter the predicted concentrations near the facility boundary. The overall length of the existing dryer building, including the cyclone, evaporator and powder store is 102m, aligned along a SW-NE axis, with a width of approximately 24m. Other significant building structures included in the model were the Butter Factory and Store (height 17m 68m long x 21m wide), and the large Cheese Plant (height 10m, 106m long 35m wide). The Boiler Building has a substantially lower roof height of 8m with corresponding dimensions of 51m long and 13m wide. Other buildings within the plant will not to have a significant effect on the building downwash zone of influence near the boundary.

With the planned 3.2-tonne dryer, the maximum height of the 2 dryer buildings will increase to about 32m and result in modification of the current building layout near the NW boundary of the facility. The new dryer/evaporator plant will be housed within a new building that has a gross ground floor dimension of 37 x 21m.

3.3 Climatological Data

Sequential hourly climatological data obtained from Met Eireann[5] for the station at Gurteen, Co Tipperary, near Birr (60km to N) were used in predicting the ground level pollutant concentrations in the locality of the facility. This station was selected as an appropriate inland meteorological station for providing wind conditions for the Co. Tipperary area. The meteorological station at Gurteen is an automatic installation and so only hourly wind speed/direction and temperature data are available at this location. Cloud data are only

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available from manned meteorological stations, which are mainly at airports. Shannon Airport (45km to W) was used in the ADMS5 as cloud cover information is necessary to calculate the degree of heating of the ground by the sun. Atmospheric instability occurs due to heating of the air layers near the ground and this is related to the amount of cloud cover present, coupled with the solar inclination, which is a function of the time of year.

The hourly stability parameters were computed by the ADMS5 from the wind, temperature and cloud cover input data. Four annual data-sets of hourly climatological information for Gurteen and Shannon Airport data combined (2012 -2015) were generated from the data-sets. This allowed for year to year variations in wind speed and direction to be taken into account in the modelling, instead of relying on ground level concentration results for just one year. The wind roses for these 4 years give the frequency of certain wind direction sectors and frequency of wind speed categories associated with these sectors (Figure 3).

3.4 Receptor Grid

A receptor grid with regular spacing of 3600 receptor points (60x60 grid) was used to predict ground level concentrations within the locality. The grid covered an area of 1.3 x 1 km around the site with 22m E-W and 16m N-S receptor spacing. This modelling zone extended over the area where the maximum ground level impact of NO_x and PM emissions from the facility is likely to occur, due to the local effects of building wake near the boundary as the stack emissions disperse from the site.

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3.5 NO_x and NO_2 modelling

As the emission plumes from the boiler plant stacks and thermoheaters disperse downwind, the Nitric Oxide (NO) component emitted is partially converted to NO_2. The rate at which this conversion takes place varies with the degree of solar insolation present and the atmospheric instability conditions and so changes throughout the day and over the year. The conversion rate of NO to NO_2 is generally limited by the level of ozone present. This is normally at a maximum value during the summer, with strong sunshine forming convective cells near the ground resulting in unstable flow conditions.

The ADMS5 model incorporates the reactions between ozone, NO and NO_2 using the simple reaction, which is based on the chemical reactions between ozone, NO and NO_2. This scheme takes account of the photo-chemical reactions, in the conversion process of NO to NO_2 within the emission plume, based on solar radiation and travel time of the pollutant between the emission source and receptor locations. Background concentrations of ozone and NO_x are used to initialise the chemistry scheme in the model. Annual average levels of 22 µg/m^3 and 11 µg/m^3 were also used for NO_2 and NO_x respectively, which are required as input for the chemistry module of the ADMS5. An annual average O_3 concentration of 55 µg/m^3 measured at Glashaboy, Co. Cork (55km to SW) during 2012 was also used to predict the impact of NO_x emissions from the combustion plant on local NO_2 concentrations.

3.6 PM_{10} Background Concentrations

EU Legislation on Air Quality[6] requires Member States to divide their country into 4 zones (A-D), for the purpose of air quality monitoring, reporting, assessment and management. Outside

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of the Dublin and Conurbation and towns with populations greater than 15,000 the remainder of the country is within Zone D. Tipperary Town is within the Zone D (small town/rural) air quality zone classification.

There is no ambient particulate monitoring data for Tipperary Town and so an annual average PM_{10} concentration of 14 µg/m^3 was used as indicative of maximum long-term levels for the town. This value is based on the median observed concentration of the 6 Zone C and D towns reported by the EPA for 2016[7].

The annual background PM_{10} concentration allows an estimate of the maximum impact on local air quality of the predicted PM_{10} due to the emissions from the dryers, or Process Contribution (PC) combined with background concentrations. This cumulative impact gives the Predicted Environmental Concentration (PEC) value, for daily and annual values for comparison with the NAQS, as follows:-

- Daily PEC = 90.4 percentile daily PC + annual background
- Annual PEC = Annual average PC + annual background.

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4.0 PREDICTED IMPACTS

4.1 Introduction

Table 8 National Air Quality Standards

Pollutant	Criteria	(µg/m^3)
Nitrogen Dioxide (NO_2)	Hourly – 99.8% (not to be exceeded more than 18 times per year)	200
	Annual Average	40
Particulates (as PM_{10})	Daily – 90.4% (not to be exceeded more than 35 times per year)	50
	Annual Average	40

Source: Air Quality Standards Regulations 2011 (SI No 180 of 2011)

The predicted NO_2 and PM_{10} concentrations were compared with the NAQS values specified in the Air Quality Standards Regulations 2011 (Table 8). The results of the air quality modelling study are presented as ground level concentration contours, based on the maximum or 'worst-case' emissions from the boiler plant and dryer emission scenarios described in Section 2 above (Figures 4-12). Predicted values are the maximum percentile or average statistic obtained at each receptor within the modelled area over the 4 discrete climatological data-sets for County Tipperary.

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4.2.1 'No Development'

4.2.1.1 Nitrogen Dioxide (NO_2)

Hourly

The predicted hourly NO_2 Predicted Environmental Concentration (PEC) value (combination of impact from the boilers/thermoheater + annual background NO_2) is given in Figure 4. The contour plot shows the predicted 99.8 percentile of hourly NO_2 ground level concentrations based on the emission scenario where boilers 1 and 2 burn natural gas and the small thermoheater runs on gas oil. NO_x emission concentration used in the model was 200 mg/Nm^3 for natural gas and 250 mg/Nm^3 for gas oil and the emission rate for each boiler is based on full load. The highest 99.8 percentile of hourly NO_2 concentrations beyond the boundary is about 35µg/m^3 and this level occurs within 100m of the Southern boundary. This maximum hourly NO_2 PEC value is 18% of the NAQS.

Annual

The predicted annual average NO_2 ground level concentration pattern is 17 µg/m^3 beyond the facility boundary, based on continuous emissions throughout the year from the 2 boilers and the thermoheater. The predicted long-term concentrations include an annual background level of 11 µg/m^3. This maximum annual average PEC is 42.5% of the annual NAQS value of 40 µg/m^3.

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4.2.1.2 Particulates (as PM_{10})

Daily

The predicted daily particulate concentrations due to maximum emissions from the Anhydro (A2-1) and Rogers Dryer (A2-2) exhaust stack are shown in Figure 5, expressed as the 90.4 percentile over an annual period. The predicted Process Contribution (PC) levels are calculated on the assumption that all of the PM is emitted as PM_{10} size material and emissions from the stacks are at the IEL emission limit value of 50 mg/Nm^3. The results indicate that the maximum predicted concentration is 28 µg/m^3 and this occurs near the northern boundary. When a background level of 14 µg/m^3 is included, the maximum Predicted Environmental Concentration (PEC) value is 42 µg/m^3 or 84% of the daily NAQS concentration of 50 µg/m^3 even where a conservative modelling approach is applied.

Annual PM_{10}

The maximum PC annual average PM_{10} level due to the emissions from the 2 dryers is 9 µg/m^3 beyond the facility boundary as shown in Figure 6. The maximum PEC annual PM_{10} concentration near the northern boundary, including a background average of 14 µg/m^3, is 23 µg/m^3 or 57% of the annual NAQS value of 40 µg/m^3.

4.2.2 'With Development'

4.2.2.1 Nitrogen Dioxide (NO_2)

Hourly

The predicted 99.8 percentile of hourly NO_2 ground level concentrations due to the combined emissions of NO_x from Boiler No 1 and 3 on natural gas and the 2 thermoheaters running continuously on full load, including the background NO_2 level of 11 µg/m^3 is given in Figure 7.

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The maximum 99.8 percentile hourly concentration beyond the facility boundary is predicted to be 55 µg/m^3 and this maximum level occurs within 100m of the Northern boundary of the facility. This maximum 99.8 percentile value is equivalent to 27.5% of the hourly NAQS.

Annual

The maximum annual average concentration due to emissions from the Boiler No 1 and 3 and the 2 thermoheaters at full load, including a background NO_2 concentration of 11 µg/m^3 is 17 µg/m^3. This predicted maximum annual level is 42.5% of the annual NAQS of 40 µg/m^3 (Figure 8).

4.2.2.2 Particulates (as PM_{10})

Daily

The modelled daily particulate concentrations due to emissions from the Anhydro dryer and the new 3.2-tonne dryer are shown in Figure 9 based on the daily 90.4 percentile value. These results are for a worst-case scenario where emissions from all both dryer stacks are continuous over the year at the maximum discharge rate for A2-1 of 50 mg/Nm^3 with particulate emissions from the 3.2-tonne dryer at 20 mg/Nm^3. All PM emissions are assumed to be within the PM_{10} size fraction. The results indicate that the maximum predicted daily 90.4 percentile occurs close to the northern boundary. The highest predicted daily concentration over the 4-years modelled is 25 µg/m^3. When a background level of 14 µg/m^3 is included the maximum daily PEC is 39 µg/m^3, or 78% of the daily NAQS value of 50 µg/m^3 (Figure 10).

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Annual PM_{10}

The predicted maximum annual average PM_{10} concentration due to combined emissions from the Anhydro and 3.2-tonne dryer exhausts give a similar concentration pattern compared to the existing scenario, with the highest levels near the northern boundary (Figure 11). The maximum annual average due to the emissions from the 2 dryers is 7.5 µg/m^3 beyond the boundary. This gives a reduction in predicted PM_{10} concentrations of 17% compared to the predicted annual average based on the existing emission scenario. The corresponding PEC value is 21.5 µg/m^3, or 54% of the NAQS value of 40 µg/m^3 (Figure 12).

5.0 ODOUR IMPACTS FROM THE WASTEWATER TREATMENT PLANT

5.1 Introduction

Tipperary Co-Op treat the effluent from the manufacturing process at the on-site WWTP before discharging to the public sewer. The IEL provides air emission limit values for the boilers and dryer exhausts with no other air emission exhaust points specified. However, the IEL specifies in Condition 5.2 that "*No emissions, including odours, from the activities carried on at the site shall result in an impairment of, or an interference with amenities or the environment beyond the installation boundary or any other legitimate uses of the environment beyond the installation boundary.*"

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In 2011-12 a programme was undertaken by Tipperary Co-Op to reduce odorous emisisons from the WWTP, especially from the Bio-Tower, that resulted in occasional strong odours being detected beyond the boundary. As part of the measures implemented, the Bio-tower was enclosed and the headspace foul air from the Dissolved Air Flotation (DAF)/Balance Tanks and the sludge dewatering equipment were covered to control and reduce emissions. Two odour abatement exhaust systems were installed to treat the headspace air extracted from these areas of the WWTP.

5.2 Existing WWTP Odour Assessment

A site visit was carried out in July 2016 to assess the odour potential from various plant components. The WWTP is located at the western end of the Tipperary Co-Op site between the railway line along the southern boundary and the River Ara along the Northern boundary. The nearest house is 150m to the west, with houses approximately 225-250m to the south and a similar distance to the north. The main manufacturing part of the facility extends 225m to the east.

The present treatment process involves the effluent from the cream, butter, milk powder and cheese production arriving by pipe to the WWTP where it is treated in a DAF unit and balance tank to remove sludge. Secondary treatment to lower the organic content (BOD) of the liquor further is carried out in an aeration tank with diffused aeration and the effluent is transferred to the final clarifier and discharged to the public sewer. The sludge from the DAF unit is thickened and stored before being de-watered in centrifuges located in the dewatering building. The dewatered sludge is then transferred to a covered trailer for removal off-site.

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The odour potential in treating dairy effluent is very high due to the pungent malodours present in the process effluent and the low odour detection levels of many of these VOCs creating the odour. To ensure that odours are restricted at the WWTP extensive abatement measures have been undertaken at the site in recent years. This includes replacing surface aeration propeller equipment with a diffused bubble aeration system at the main aeration tank. The Bio-tower has been enclosed along with the DAF unit, Balance Tank and covering the sludge holding tanks and extracting the headspace air to 2 odour abatement units. The sludge dewatering process is carried out using 2 enclosed centrifuges with the air in each unit extracted and also piped to the odour abatement units (Figures 13-18).

The 2 high efficiency odour control units are located near the centre of the WWTP site and consist of a biofiltration bed using a bed of shell media as a highly effective filter media for removal of odorous contaminants in the exhaust air. The pungent air from the Bio-Tower, DAF/Balance tank, sludge holding tanks and dewatering plant is piped to the units where the air enters at the base of the media bed and moves upwards to the surface where it is extracted by fan to an exhaust vent and discharged to the atmosphere. The odour control units operate at a very high design efficiency of >98% for the removal of hydrogen sulphide, ammonia, organo-sulphur compounds and other VOCs.

5.3 Proposed WWTP Upgrade

The proposed dryer expansion programme will result in an increase in the volume of effluent to be treated on-site, arising from the large increase in the dryer processing capacity at the

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facility. The effluent through-put is currently licenced at 792 m^3/day. It is proposed to increase this to 1,300 m^3/day when the new dryer plant is in full production subject to EPA agreement through a review of the existing IEL licence. To meet the necessary effluent quality standards an upgrade of the WWTP is planned to provide treatment capabilities to 1,500 m^3/day. The main aspects of this upgrade are as follows:-

- The existing covered balance tank will be increased in size to cater for the larger quantity of effluent to be treated and provide storage of up to 24 hours.

- A new high efficiency DAF unit will be installed to supplement the existing DAF unit. This unit will be able to achieve a higher reduction in BOD/COD load in the effluent with improved flocculation and pH stabilisation of the sludge than is currently available at the plant. Reduction in BOD and stabilisation of the sludge reduces the potential for malodours occurring downstream in the treatment process.

- The headspace exhaust air from the extended covered balance tank and new DAF unit will be extracted to the existing odour control units for odour removal.

- An additional Secondary Settlement Tank (Final Clarifier) will be constructed in the western part of the WWTP.

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5.4 Odour Impacts

From the assessment of potential odours at the WWTP carried out during the site visit and the type of odour abatement utilised at the site it is evident that the main sources of potential malodours are connected by a pipe network to the 2 odour control units. The proposed larger balance tank will be enclosed along with the new DAF unit with the headspace air exhausted to the existing odour control units. The type of dewatering equipment installed at the WWTP is completely enclosed, with the air exhausted by pipe from the centrifuge to the odour control unit. Finally, the 2 odour control units currently installed operate at a very high odour removal efficiency rate so that the air discharged from the exhaust stacks is normally less than odour detection level.

The potential for odours to be detected beyond the site boundary is very low. Concentrations of malodours such as hydrogen sulphide likely to result in a community nuisance are unlikely with the improvements proposed with the upgrade of the WWTP.

6.0 CONCLUSION

A detailed air quality impact modelling study was undertaken using the ADMS5 air dispersion model to evaluate the impact of air emissions from the proposed dryer expansion programme at the Tipperary Co-Op manufacturing facility in Tipperary Town on the local air quality. The study examined the planned dryer expansion programme at the facility, ‘With Development’, compared to the existing production, ‘No Development’ scenario, for both boiler plant and the dryer emissions. The predicted impacts were examined in relation to compliance with the relevant National Air Quality Standards (NAQS).

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Table 9 gives the maximum ground level concentrations of NO_2 predicted beyond the Tipperary Co-Op facility boundary for the 'No Development' and 'With Development' boiler plant scenarios. The proposed new boiler that will replace the existing Boiler No 3 will have sufficient steam generating capacity along with a second boiler to meet supplementary demand during the peak summer production period. This new boiler will only burn natural gas. The third boiler will run in hot-standby mode during the production period. The other 2 boilers are dual-fuel and burn natural gas as the primary fuel, with low-sulphur gas oil only used as an alternative fuel, in the unlikely event of an interruption in the supply of gas to the facility.

Table 9: Maximum predicted NO_2 concentrations beyond boundary and compliance with NAQS values (µg/m³)

Pollutant	NAQS	'No Development'		'With Development'	
	Limit Value (µg/m³)	Max Predicted Conc. beyond Boundary (µg/m³)	% of NAQS	Max Predicted Conc. beyond Boundary (µg/m³)	% of NAQS
Nitrogen dioxide					
99.8% Hourly	200	24(35)	12.5(18)	44(55)	22(27.5)
Annual	40	6 (17)	15(42.5)	6 (17)	15(42.5)

Note: (i) Air Quality Standards Regulations 2011 (SI No 180 of 2011). Process Contribution (PC) and values in () – Predicted Environmental Concentration [PEC] (Process contribution (PC) + background)

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The predicted hourly and annual NO_2 ground level concentrations are calculated for the PEC (process contribution + background) air quality impact. This is based on an existing annual background NO_2 level of 11 µg/m³ in the locality. The highest hourly 99.8% concentration beyond the site boundary increases by from 18% of the NAQS for the 'No Development' to 27.5% of the NAQS for the 'With Development' maximum emission scenarios. The change in the predicted annual average concentration is also very small and in the order of 1-2% with the 'With Development' annual PEC level 42.5% of the NAQS. The additional impact of NO_x emissions from the new thermoheater located on the roof of the new dryer building is minor.

Table 10: Maximum predicted PM_{10} concentrations beyond boundary and comparison with NAQS values (µg/m³)

Pollutant	NAQS	'No Development'		'With Development'	
	Limit Value (µg/m³)	Max Predicted Conc. beyond Boundary (µg/m³)	% of NAQS	Max Predicted Conc. beyond Boundary (µg/m³)	% of NAQS
PM_{10}					
90.4% Daily	50	28 (42)	56(84)	25(39)	50(78)
Annual Average	40	9.0 (23)	22.5(57)	7.5(21.5)	19(54)

Note: (i) Air Quality Standards Regulations 2011 (SI No 180 of 2011). Values in () – PEC Total (process contribution+ background)

The maximum predicted 90.4% of daily PC concentrations are 56% and 50% of the daily NAQS value for the 'No Development' and 'With Development' emission scenarios respectively (Table 10). These PC values occur close to the northern corner of the facility. The cumulative PEC air quality impact of the proposed dryer development, with an annual background concentration of 14 µg/m³, results in a maximum daily PEC level 78% of the NAQS and an annual PEC value 54% of the NAQS. The predicted change in air quality impact due to the emissions from the

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proposed 3.2-tonne dryer exhaust will result in a reduction in short-term and annual PM_{10} levels beyond the boundary. The modelling results indicate that compared to the existing emission scenario, there will be a 9% decrease in the PC daily 90.4 percentile and 17% decrease in the annual average.

These modelled results are based on a conservative approach, where all the PM is emitted as PM_{10} size material, at a concentration in the flue gas of 50 mg/Nm^3 from the existing an-hydro dryer stack and at 20 mg/Nm^3 from the proposed dryer. Actual emissions are likely to be substantially lower. Each dryer is also assumed to be operating at maximum output on a continuous basis throughout the year. This represents a worst-case maximum emissions scenario for both 'No Development' and 'With Development' scenarios, whereas no production currently takes place during the winter months. The results demonstrate that for both scenarios the highest PEC daily 90.4 percentiles and annual averages are less than the NAQS limit values.

Overall, the results of the modelling study demonstrate that there will be no significant impact on the health of the local community or surrounding environment due to the projected change in the boiler and dryer stack emissions occurring as a result of the proposed dryer expansion programme planned at the Tipperary Co-Op facility. The planned installation of the new dryer plant and removal of the Rogers Dryer will result in a reduction in the overall impact of PM_{10} emissions from the facility.

The assessment of the operation of the existing WWTP and proposed upgrade measures to improve effluent discharge quality indicates that the potential for malodours from the site to be detected beyond the facility boundary are very low and unlikely to cause a significant impact at the houses or private properties. The measures being proposed should ensure that Tipperary Co-Op complies with Condition 5.2 of the existing IEL and prevent an "impairment of, or an interference with amenities or the environment beyond the installation boundary" due to emissions from the WWTP.

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References

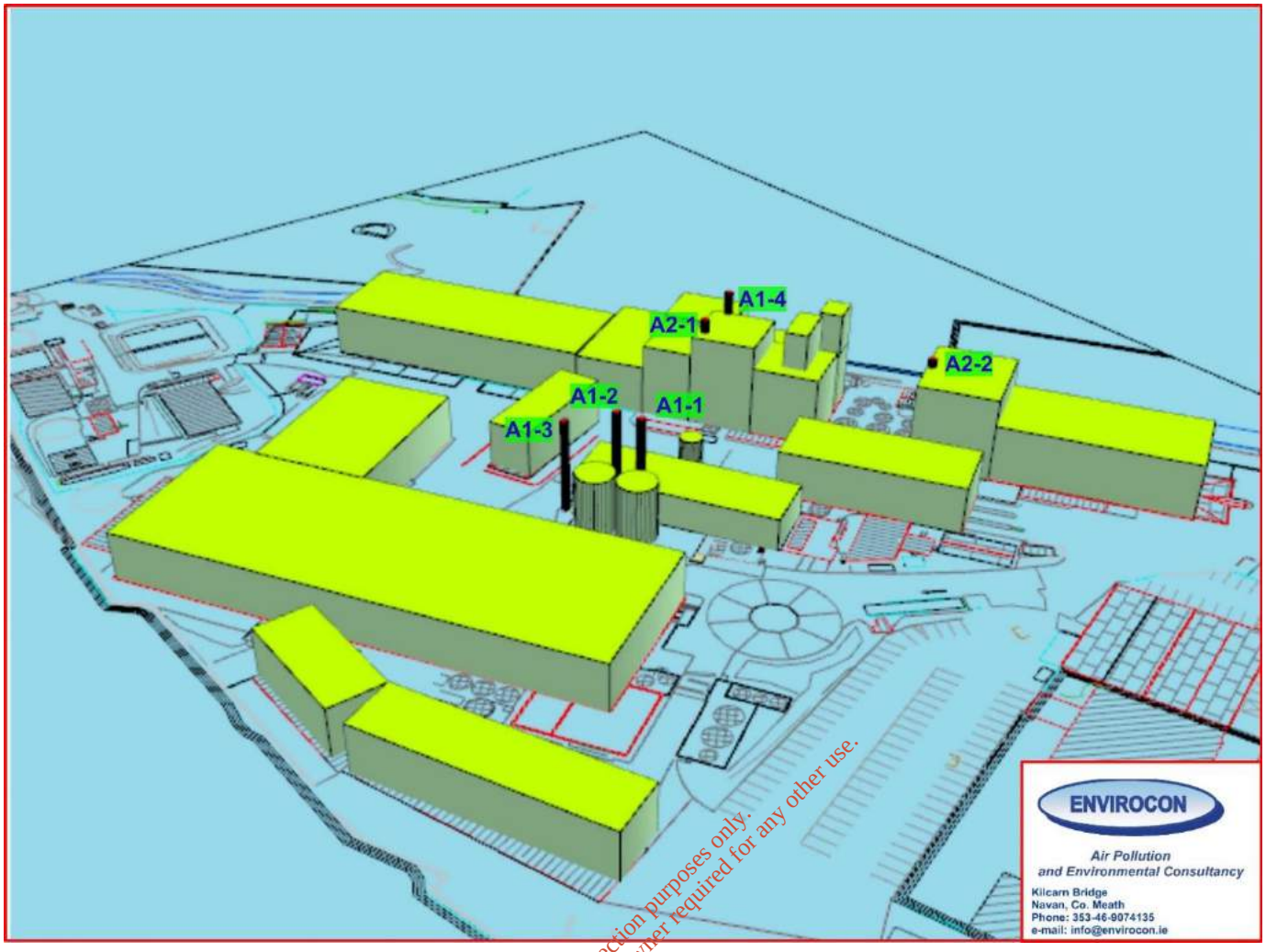
(1) Environmental Protection Agency,2008, IPPC P0801-1, IED Amendment -2013, EPA Wexford
(2) Environmental Protection Agency,2010, Air Dispersion Modelling for Industrial Installations Guidance Note (AG4)
(3) Stationary Office, 2011, Air Quality Standards Regulations 2011 (SI No. 180 of 2011); Dublin
(4) CERC, 2016, ADMS5 Atmospheric Dispersion Modelling System User Guide; Cambridge
(5) Met Eireann, Gurteen Tipperary & Shannon Airport, Hourly raw datasets – 2012-15, Dublin
(6) CEU, 2008, Directive 2008/50/EC of 21 May 2008 on Ambient Air Quality and Cleaner Air for Europe, OJ L152.,
(7) Environmental Protection Agency, 2016, Air Quality in Ireland 2015, EPA Wexford

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FIGURES 1-18

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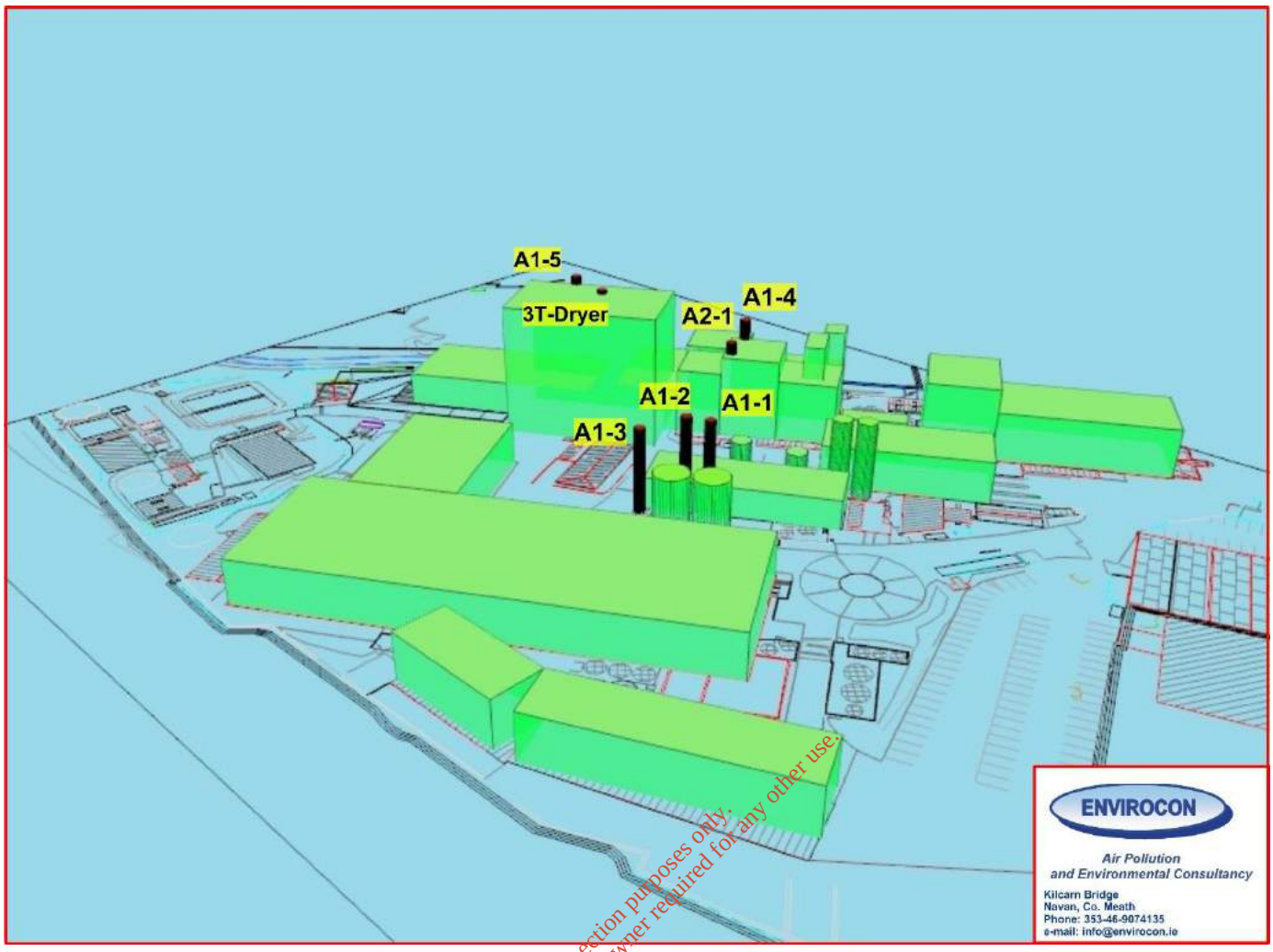
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FIGURE 1: 3D REPRESENTATION OF BUILDINGS AND LOCATIONS OF STACKS USED IN THE ADMS5 MODEL – EXISTING BUILDINGS VIEW FROM SE.

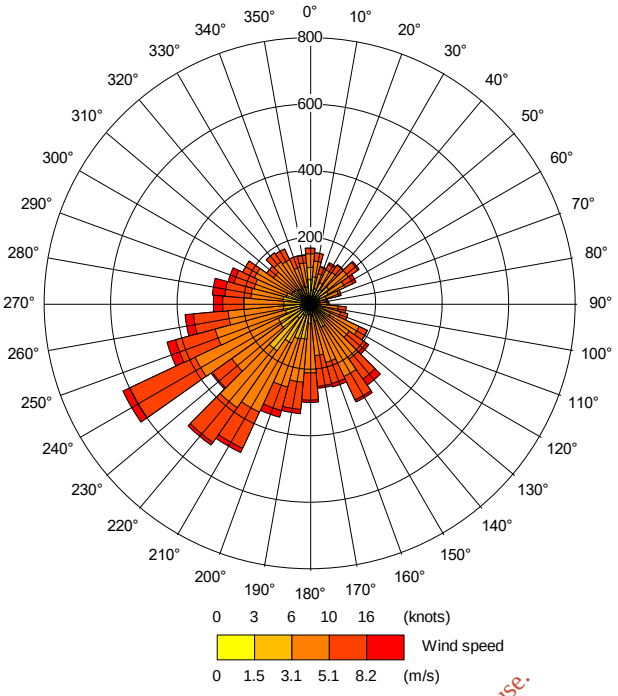
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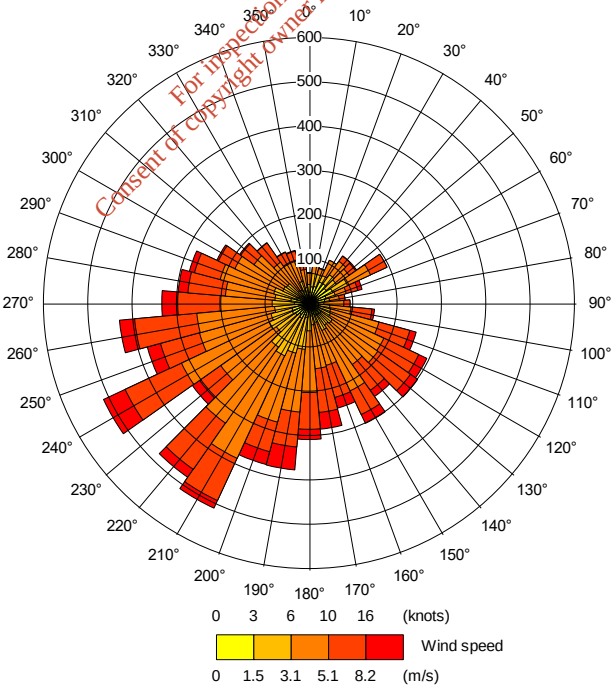
FIGURE 2: 3D REPRESENTATION OF BUILDINGS AND LOCATIONS OF STACKS USED IN THE ADMS5 MODEL – PROPOSED DRYER EXPANSION VIEW FROM SE.

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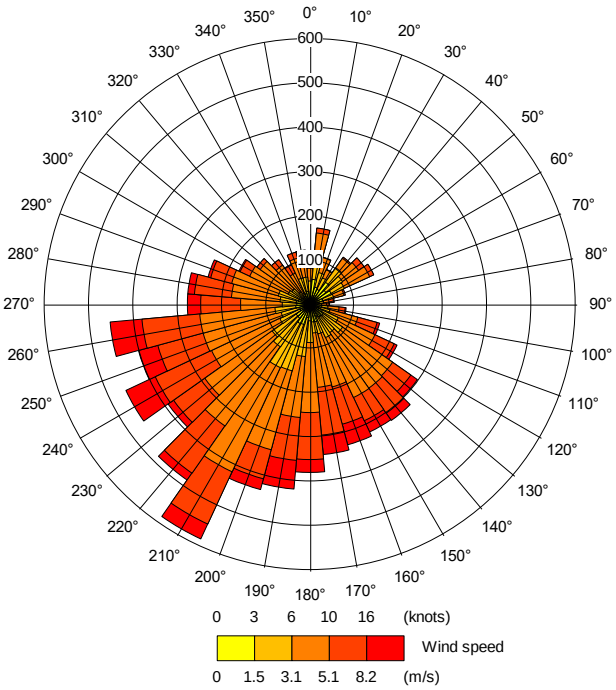
2012

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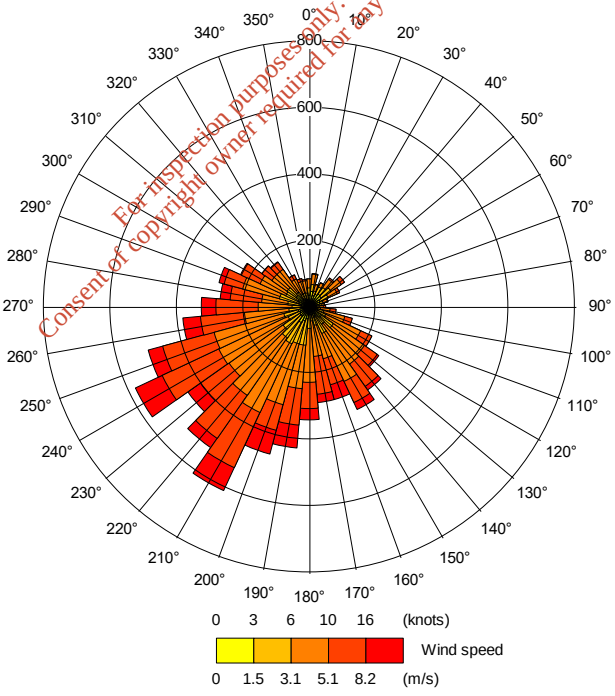


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2014

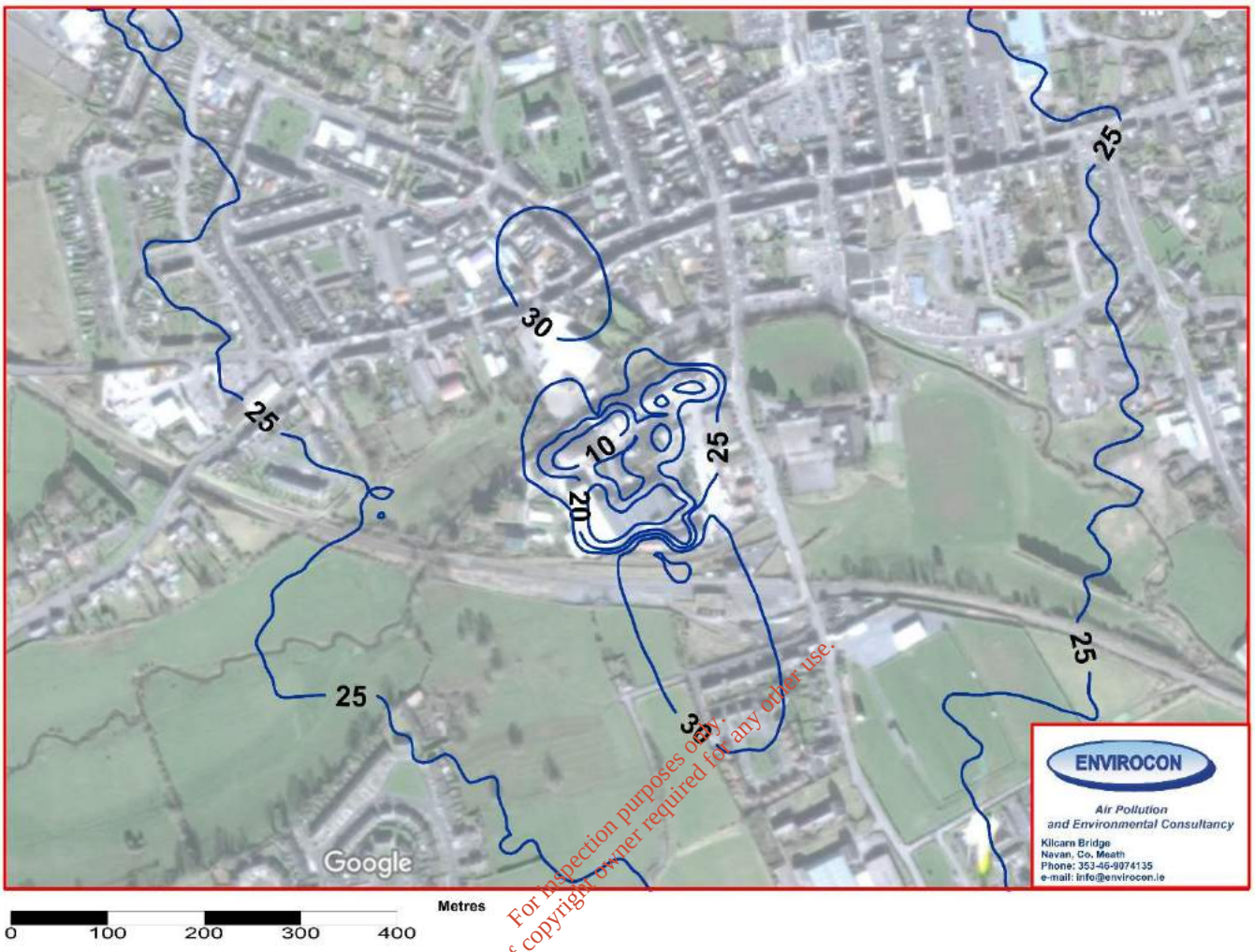


2015

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FIGURE 3: ANNUAL WIND ROSES FOR GURTEEN, CO. TIPPERARY METEOROLOGICAL STATION FOR YEARS 2012-2015
Met Eireann, Dublin (5)

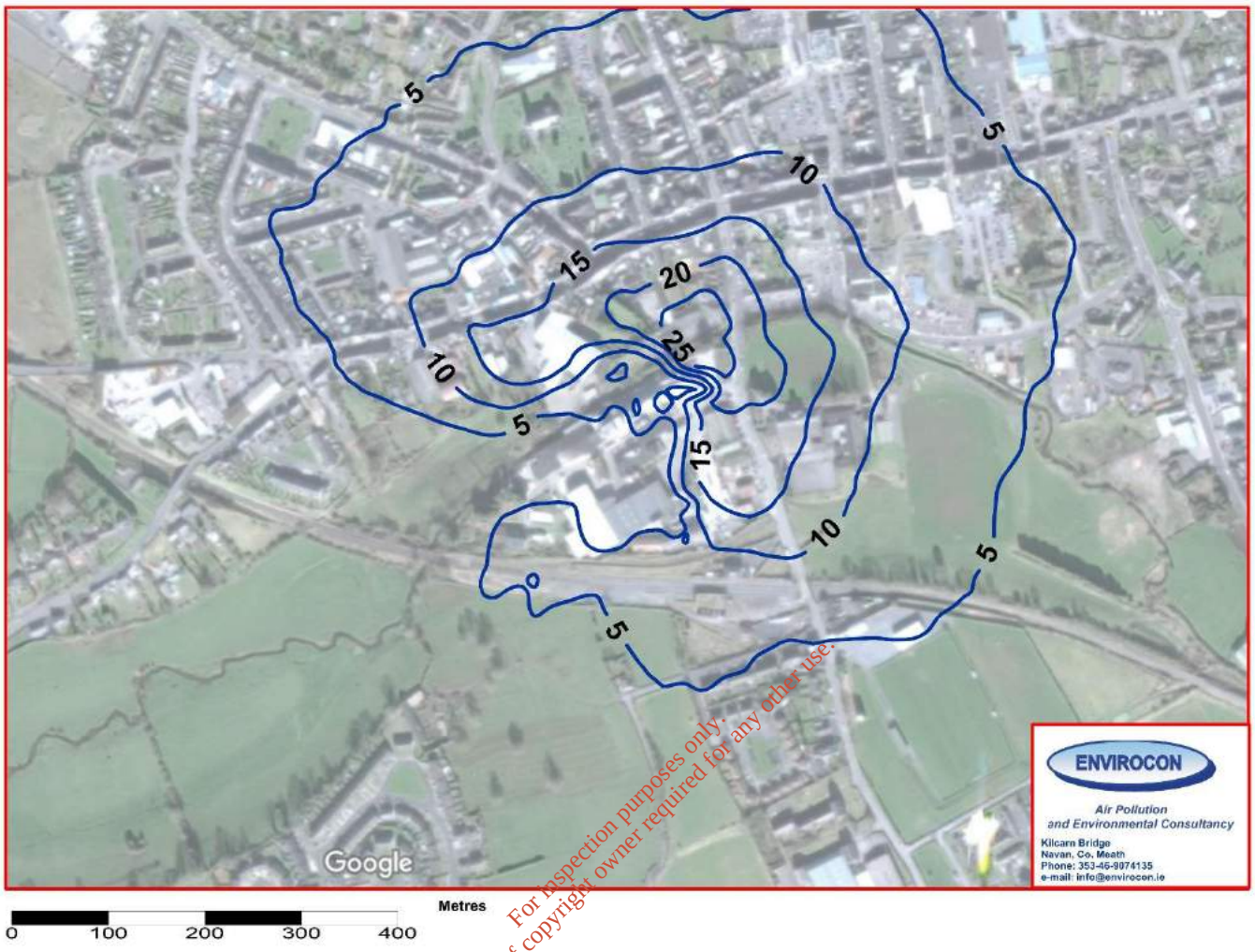
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FIGURE 4: PREDICTED 99.8 PERCENTILE OF HOURLY NO_2 CONCENTRATIONS DUE TO EXISTING EMISSIONS FROM BOILERS NO 1 AND 2 (STACKS A1-1 AND A1-2) AND THE THERMOHEATER (STACK A1-4) (µg/m^3)

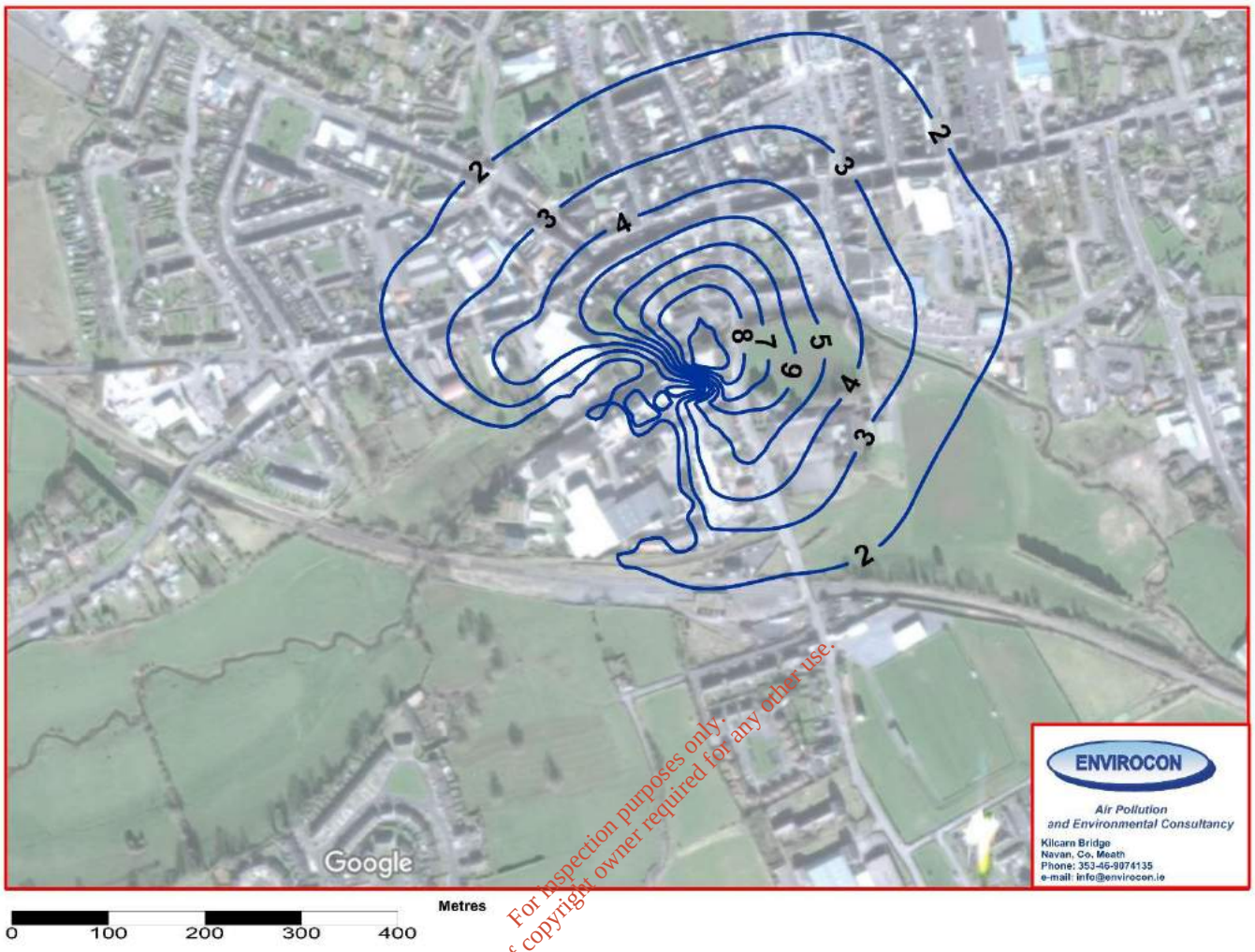
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FIGURE 5: PREDICTED 90.4 PERCENTILE OF DAILY PM_{10} CONCENTRATIONS DUE TO EXISTING EMISSIONS FROM THE AN-HYDRO AND ROGERS DRYERS EXHAUST STACKS (A2-1 AND A2-2) (µg/m^3)

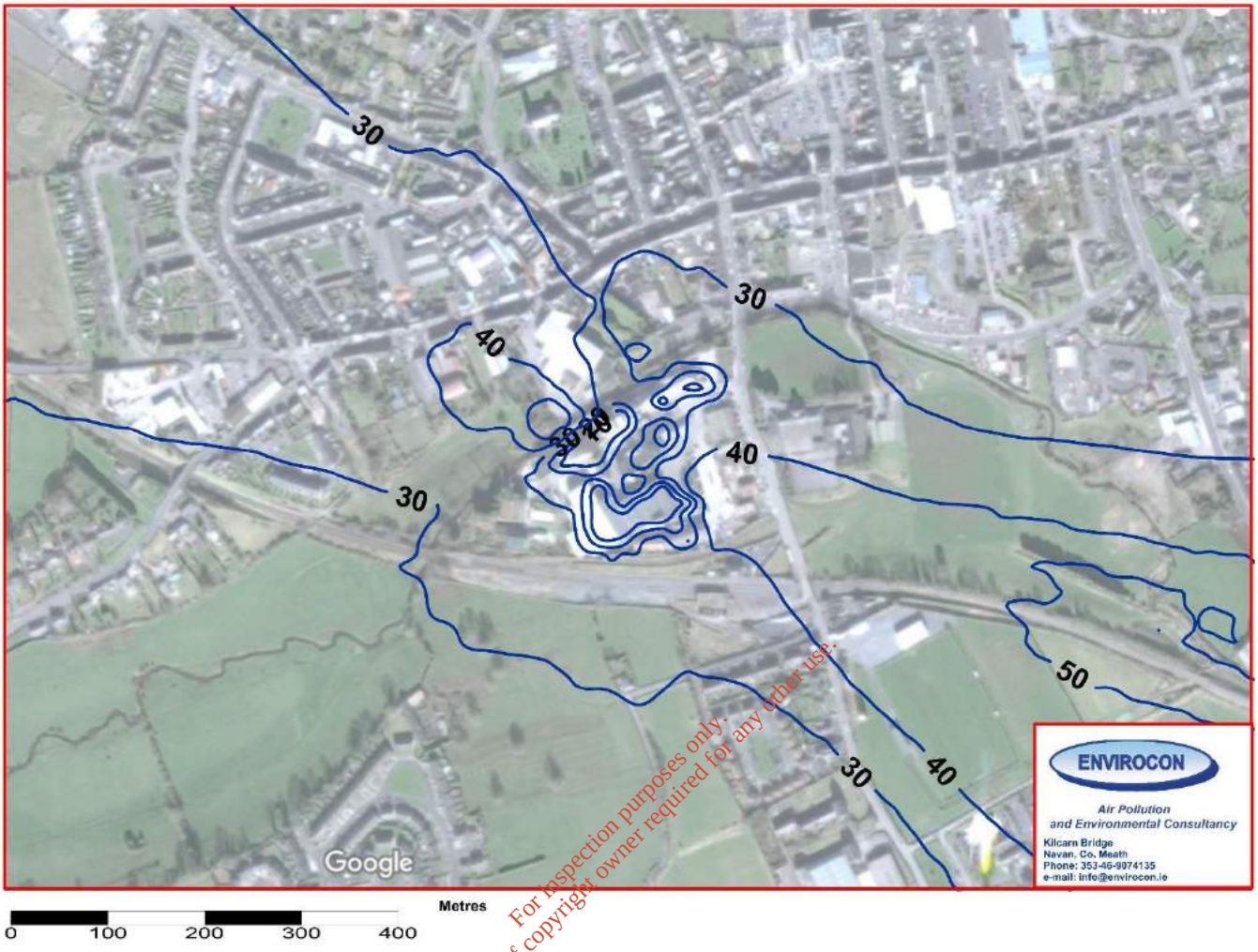
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FIGURE 6: PREDICTED ANNUAL AVERAGE PM_{10} CONCENTRATIONS DUE TO EXISTING EMISSIONS FROM THE AN-HYDRO AND ROGERS DRYERS EXHAUST STACKS (A2-1 AND A2-2) (µg/m^3)

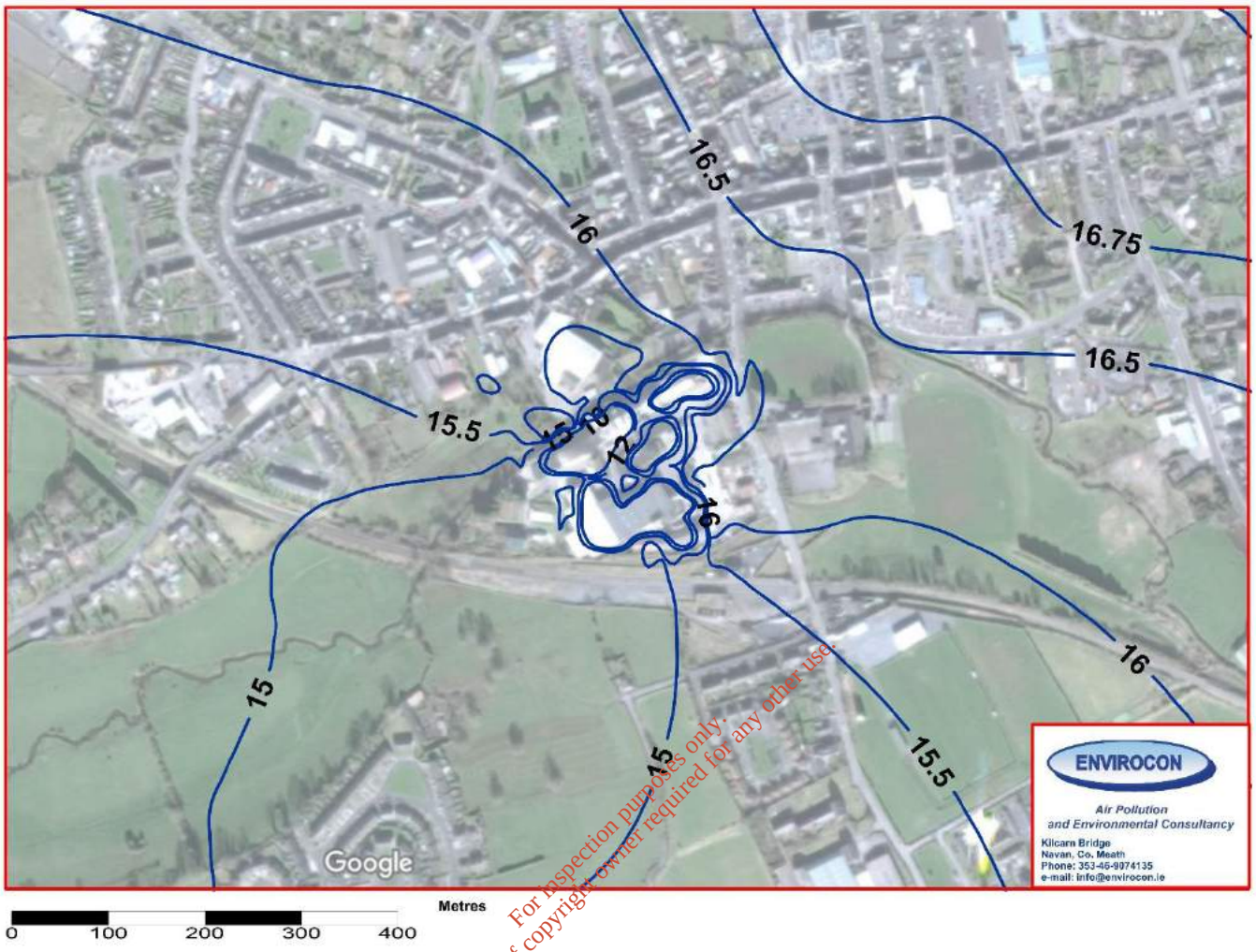
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FIGURE 7: PREDICTED 99.8 PERCENTILE OF HOURLY NO_2 CONCENTRATIONS DUE TO PROPOSED DRYER EXPANSION EMISSIONS FROM BOILERS NO 1 AND 3 (STACKS A1-1 AND A1-3) AND THE THERMOHEATERS (STACK A1-4 AND A1-5) ($\mu g/m^3$)

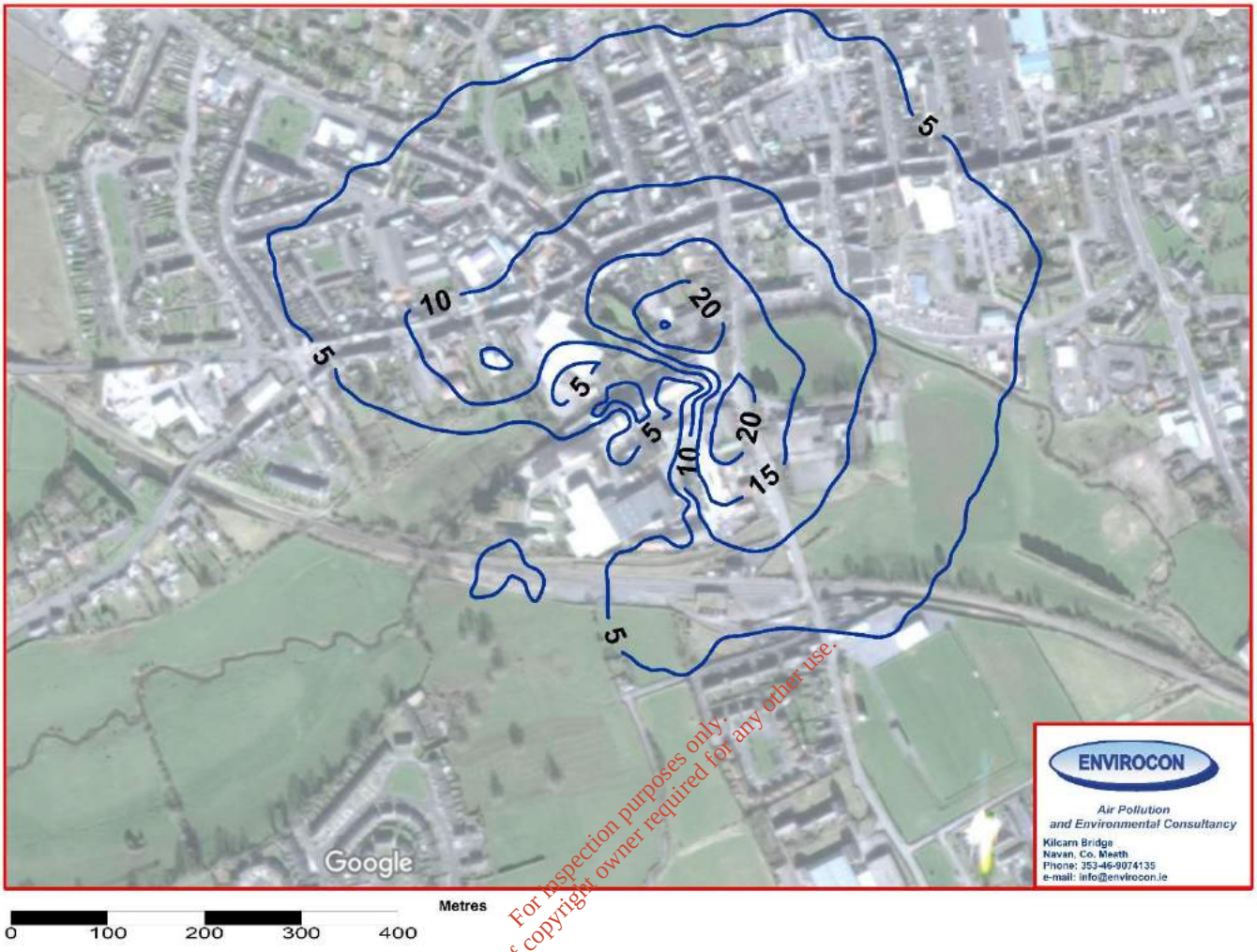
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FIGURE 8: PREDICTED ANNUAL AVERAGE NO_2 CONCENTRATIONS DUE TO PROPOSED DRYER EXPANSION EMISSIONS FROM BOILERS NO 1 AND 3 (STACKS A1-1 AND A1-3) AND THE THERMOHEATERS (STACK A1-4 AND A1-5) (µg/m^3)

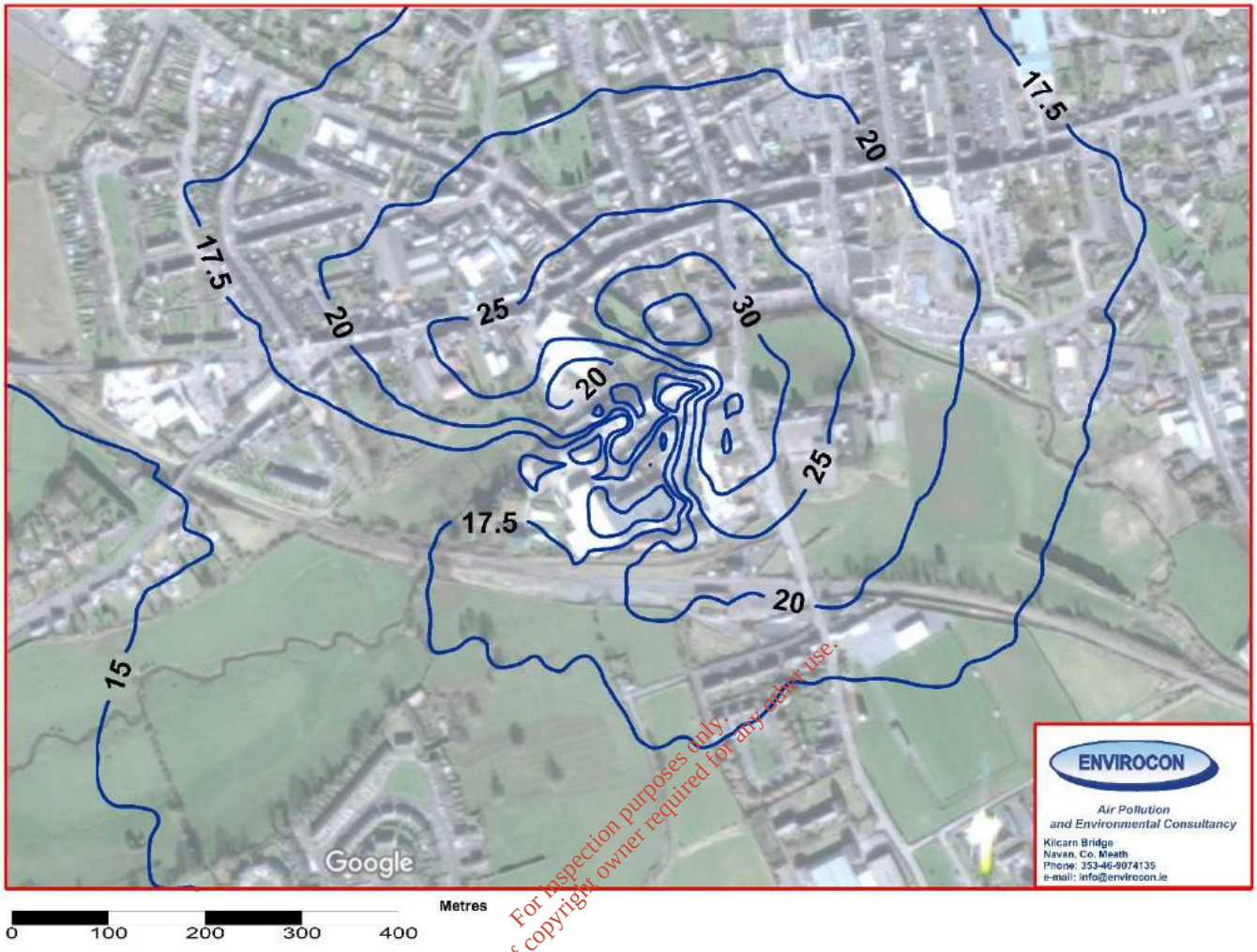
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FIGURE 9: PREDICTED 90.4 PERCENTILE OF DAILY PM_{10} CONCENTRATIONS DUE EMISSIONS FROM EXISTING DRYER EXHAUST STACK (A2-1) AND NEW DRYER ($\mu g/m^3$)

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FIGURE 10: PEC 90.4 PERCENTILE PM_{10} DUE TO EMISSIONS FROM EXISTING DRYER EXHAUST STACK (A2-1) AND NEW DRYER + BACKGROUND PM_{10} ($\mu g/m^3$)

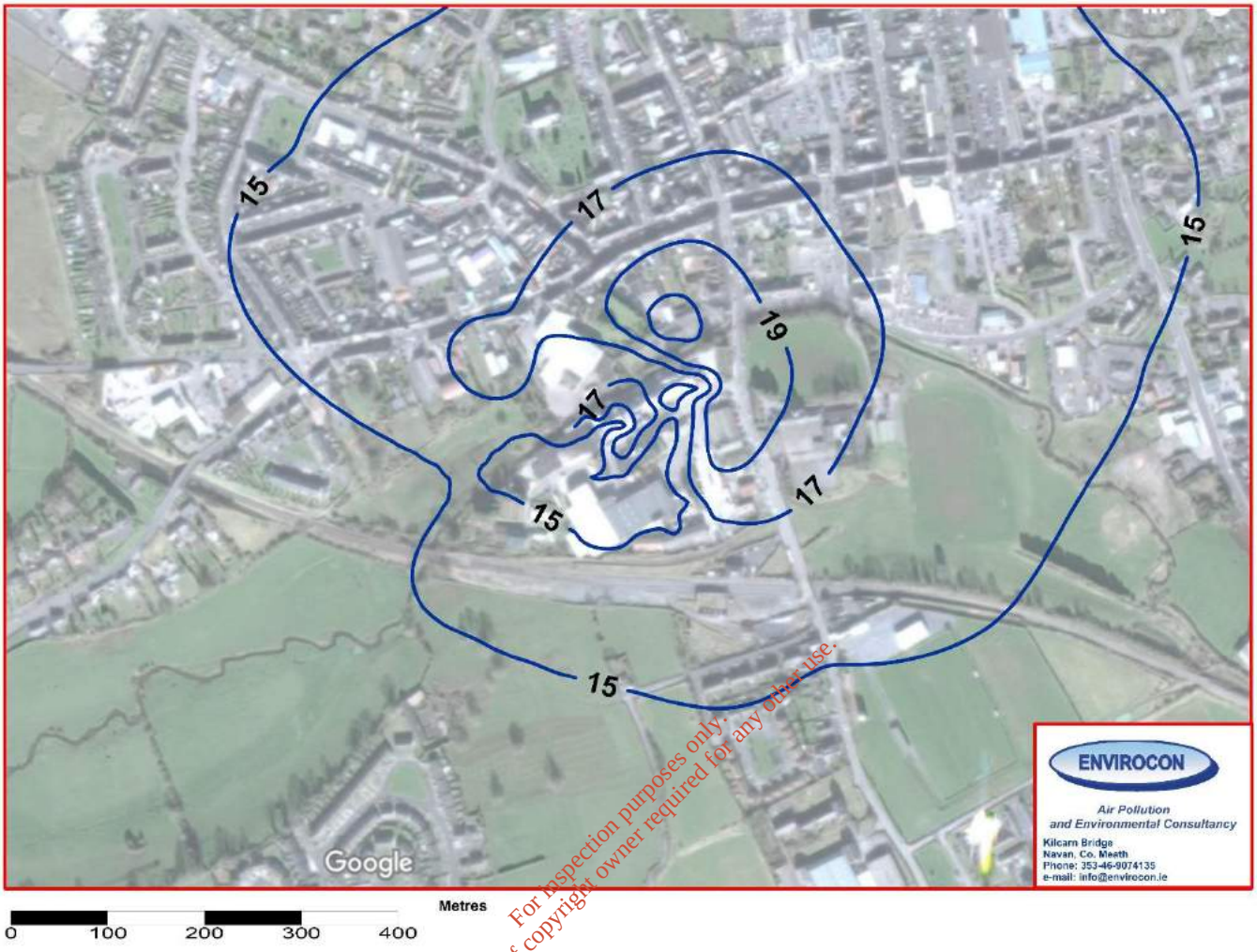
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FIGURE 11: PREDICTED ANNUAL AVERAGE PM_{10} CONCENTRATIONS DUE TO EMISSIONS FROM EXISTING DRYER EXHAUST STACK (A2-1) AND NEW DRYER ($\mu g/m^3$)

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FIGURE 12: PEC PREDICTED ANNUAL AVERAGE PM_{10} DUE EMISSIONS FROM EXISTING DRYER EXHAUST STACK (A2-1) AND NEW DRYER + BACKGROUND PM_{10} ($\mu g/m^3$)

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FIGURE 13: WWTP SITE FROM WESTERN CORNER SHOWING BIOTOWER AND CLARIFER

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FIGURE 14: VIEW TO EAST SHOWING EXISTING DAF AND BALANCE TANK UNIT WITH EXISTING DIFFUSED AERATION TREATMENT TANK IN FOREGROUND

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FIGURE 15: ENCLOSED DAF AND BALANCE TANK WITH HEADSPACE AIR EXTRACTION PIPING TO ODOUR CONTROL UNIT

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FIGURE 16: ODOUR CONTROL UNIT WITH VERTICAL BIOTOWER EXHAUST EXTRACTION PIPE SHOWN ON RIGHT

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FIGURE 17: SLUDGE DEWATERING BUILDING AND COVERED TRAILER FOR DEWATERED SLUDGE

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FIGURE 18: SLUDGE DEWATERING HORIZONTAL CENTRIFUGE

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ATTACHMENT H

NOISE IMPACT ASSESSMENT

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Tipperary Co-operative Creamery Ltd.

Station Road
Tipperary town
Co. Tipperary



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Report on

Noise & Vibration Impact Assessment Proposed new Dryer Building & Upgrades to WWTP

May 2017

ENVIRONMENT ISO 14001:2004 NSAI Certified
HEALTH & SAFETY OHSAS 18001:2007 NSAI Certified
QUALITY ISO 9001:2008 NSAI Certified

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Control Sheet

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This report is produced solely for the benefit of Tipperary Co-operative Creamery and no liability is accepted for any reliance placed on it by any other party unless specifically agreed in writing otherwise. This report refers, within the limitations stated, to the condition of the ambient noise environment at the time of the survey and details provided by project designers. No warranty is given as to the possibility of future changes in the condition of the ambient noise environment or design changes.

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Tipperary Co-operative Creamery

Station Road
Tipperary town, Co. Tipperary

Report on Noise & Vibration Impact Assessment

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Attachments

Attachment 1	Figure 1 Noise Monitoring Locations
Attachment 2	Photolog
Attachment 3	Calibration Certificates
Attachment 4	Historical Results, 2010 - 2016
Attachment 5	1/3 Octave Band Spectra & Logging NSLs 2016 - 2017

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1. Introduction

OES Consulting was commissioned by Tipperary Co-operative Creamery Ltd. (TCC) to undertake a noise and vibration impact assessment with respect to the proposed development of a new milk evaporation and drying facility and associated ancillary infrastructure at its facility located in Tipperary town. The proposed development will comprise of:

1. Construction of a dryer tower building of height 32 metres incorporating evaporator plant, dryer plant, air heater and powder storage silos with floors and access platforms provided at various levels within the building to support and facilitate access to the new plant systems.
2. Upgrade of the existing Waste Water Treatment Plant (WWTP) with an extension to the balance tank and installation of a new DAF unit and clarifier.
3. Site works associated with the above development works including drainage works and pavement works.
4. Demolition works to facilitate construction of the new dryer tower including demolition of a former butter store building, and removal of existing fuel storage tanks together with bund structure and canopy roof structure. The existing powder store will also be partially demolished.
5. Decommissioning of the existing Rodgers Dryers located in a building to the east of the existing Anhydro Dryer.

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Key issues to be addressed in this report include identification and assessment of potential short term construction noise and vibration impacts arising from the demolition and construction phases, potential long term noise impact arising from the new dryer air discharge point and air inlet, new blowers associated with the upgraded WWTP and additional traffic and change in traffic patterns on the local road network resulting in potential additional traffic noise impact.

2. Methodology

This report has been prepared by Siobhan Maher. Qualifications include M.Tech. Environmental Management, B.Sc. Analytical Science, Dip. Acoustics and Noise Control Engineering, MIOA.[1]

2.1 Characterisation of the Receiving Environment

The receiving ambient noise environment has been characterised by both a desk-based review of monitoring data from Annual Noise Surveys from 2010 – 2014 and 2016 and also by supplementary monitoring at additional Noise Sensitive Locations (NSLs) to the facility in 2016 and 2017.

[1] MIOA – Member of Institute of Acoustics

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Desk-based Studies

Ambient noise monitoring is conducted annually at a number of boundary locations since 2010 and also at two NSLs (NSL1 & NSL2) in the immediate vicinity of the facility since 2012. In 2016, the locations of NSL1 & NSL2 were moved slightly from the grounds of the CBS School to Abbey St (NSL1) and from lands to the west of the facility to Arravale Close (NSL2) as these locations are closer to residential development. Refer to Figure 1, Attachment 1. Table 1 below also describes both locations. Past annual noise surveys have been conducted in accordance with best practice and guidance notes produced by the EPA that were applicable at the time of the surveys.

Additional Field Surveys, 2016 & 2017

Additional supplementary surveys at the above NSLs and at an extra NSL to the south at Garryskillane have been completed in June 2016 and in April and May 2017.

Site visits were completed on the following dates and times:

- 27th - 28th June 2016 between 11.00 – 17.00, 21.00 – 24.00 on the former date and between the hours 00.00 – 01.45 on the latter;
- 27th – 28th April 2017 between 18.30 – 24.00 and 0.00 – 02.30 hrs on the latter.
- 16th – 17th May 2017 between 17.45 – 20.15, 23.00 – 24.00 and 00.00 -02.00 on the latter date.

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The sound measurement methodology followed was in accordance with the recommendations of the following:

- International Standards Organisation Document: ISO 1996 Acoustics – Description, Measurement and Assessment of Environmental Noise, Part 1, Basic Quantities and Assessment Procedures (2003) and Part 2 Determination of Environmental Noise Levels (2007),
- The EPA Guidance Note for Noise: License Applications, Surveys and Assessments in Relation to Scheduled Activities, (NG4), revised January 2016, and,
- BS4142:2014 Methods for Rating and Assessing Industrial and Commercial Sound.

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Table 1 Noise Monitoring Locations

Location	Grid Ref.	Description
NSL1	189048E, 135706N	Abbey St. On roadside path opposite terraced houses. (Prior to 2016 this location was within the grounds of the CBS School.)
NSL2	188614E; 135523N	Arravale Close. Monitoring location approx. 166m from the northwestern facility boundary. (Prior to 2016, this location was in a field to the west of the plant.)
NSL3	188985E; 135290N	Approx. 30 m east of Garryskillane Cottage. Approx. 130m south of the southern facility boundary.

The Photolog in Attachment 2 illustrates the monitoring locations. Ambient monitoring was conducted during the day, evening and night time periods for approx. 30 minute events.

The meter was set to log L_{Aeq}, L_{A90}, L_{A10}, L_{Amax} and L_{Amin} over 100 milli-second intervals in order to assist in the later analysis.

Survey personnel noted all primary noise sources contributing to the ambient sound environment. The noise meter was attended at all times. Detailed field notes were recorded during the survey.

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Overall weather conditions prevailing during the surveys were adequate for noise monitoring.

In June 2016, the weather was very calm during the evening (19.00 – 23.00 hrs) and night time (23.00 - 07.00 hrs) surveys with no wind or rain. Slight breezy conditions up to 7m/sec occurred at times during the afternoon of the 27th June although the breeze was <5m/sec during the monitoring period (12.30 – 13.45 hrs). The wind direction was from the east/northeast during the daytime survey. Monitoring was not conducted in the late afternoon due to unsuitable wind conditions. This did not cause difficulties in completing the overall assessment.

Conditions were generally calm and dry during the surveys conducted in April and May 2017. Wind speeds varied between 1.5 and 4m/sec during the April survey and between 2 and 3.6 m/sec during the May survey with lower speeds recorded at night time. Wind direction was from the northwest in April and from the southwest in May 2017.

Sound measurement was carried out using a Type 1 Sound Level Meter NTi XL2 and associated hardware (calibrator, tripod) and software. The monitoring equipment was calibrated before and after use using a Larson Davis acoustical calibrator. The observed drift was <0.1 dB. The sound levels were measured using the A-weighted network, and a fast sampling interval. Un-weighted 1/3

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octave spectra were logged throughout. Wind speed was measured using a portable anemometer. Further details of the monitoring equipment used are set out in Table 2 below.

Table 2 Monitoring Equipment

Instrument Type	Manufacturer	Model Number	Serial Number
Sound Level Meter	NTi	XL2	A2A-08898-E0
Microphone	NTi	MA220	5062
Acoustical Calibrator	NTi/Larson Davis	CAL 200	11728

The Acoustic Calibrators were calibrated to published data as described and recommended by IEC standard Electroacoustics – Sound Calibrators IEC 60942:2003, IEC 90942:1997, BS EN 60942:1998 and BS EN 60942:2003. Attachment 3 contains calibration certs for the equipment used.

2.2 Prediction of Construction Phase Impacts

Prediction of construction noise associated with the demolition and construction works has been conducted as described in BS 5228: Part 1: 2009 + A1:2014, Noise and Vibration Control on Construction and Open Sites. According to this standard, a number of factors such as site location, existing ambient noise levels, duration of site operations, hours of work and attitude of the site operator are likely to affect considerations of acceptability of site noise. Details of the duration of the works and typical activities envisaged were provided by the engineering design team. The equipment likely to be used was selected from sources in BS5228 however, the exact equipment used will be determined by the successful contractor taking account of measures recommended in this report and the Construction and Environmental Management Plan (CEMP) to be prepared for the project.

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2.3 Prediction of Operational Phase Impacts

Point Sources

Noise leves at nearest NSLs are predicted where possible in accordance with the methods set out in ISO9613.-2-Acoustics-Attenuation of Sound During Propagation Outdoors – Part 2 – General Method of Calculation.

Traffic Related Impacts

Pre and post development Heavy Good Vehicle (HGV) movement data prepared by MRG Consulting Engineers was reviewed. On average, an additional 32 HGV movements are expected in a 24 hour period compared to existing movements totalling 178. This equates to a maximum of 2 extra movements in any given hour. This is not considered significant particularly when the urban locational context is taken into account. Traffic noise impact is therefore not considered further in this report.

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2.4 Criteria for Assessment of Noise Impact and Determination of Significance

The following criteria have been used where appropriate to assess noise impacts and effects described in this report:

Table 3 Criteria for Noise Impact Assessment

Criteria for Extent of Noise Impact (dB)	Noise Impact Magnitude	Magnitude Rating
>10	Severe	Very high
5 to 10	Substantial	High
3 to 5	Moderate	Medium
1 to 3	Slight	Low
<1	No impact	Very Low

The above table describes the noise impact i.e. the change in noise levels before and after implementation of a Proposed Development. The table does not however describe whether the change in noise levels is significant. Relying solely on change in noise level is not appropriate because it risks ignoring the context of the noise change. The actual effect on NSLs and hence significance takes account of other relevant factors such as time of day, averaging periods, nature of source, frequency spectra, frequency of occurrence and absolute level. The linking of magnitude of impact to effects and significance is described in Table 4 below. The above assessment procedure is in line with recently published methodologies set out in BS4142:2014 Methods for Rating and Assessing Industrial and Commercial Sound and Institute of Environmental Management and Assessment (IEMA) Guidelines for Environmental Noise Impact Assessment, 2014.

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Table 4 Significance of Effects

Impact Magnitude	Receptor Perception	Significance
Negligible	No discernible effect	Not significant
Slight	Non-intrusive	Less likely to be significant ↓
Moderate	Intrusive	
Substantial	Disruptive	More likely to be significant
Severe	Physically harmful (e.g. sleep disturbance, cardio-vascular effects)	Always significant

3. Definitions

The following definitions apply in this report:

L_{Aeq} is the A – weighted equivalent continuous sound level – the sound level of a steady sound having the same energy as a fluctuating sound over a specified measurement period;

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L_{A10} is the A-weighted noise level which is exceeded for 10% of the specified measurement period. This gives an indication of the upper limit of fluctuating noise such as that from road traffic;

L_{A90} is the A-weighted noise level exceeded for 90% of the measurement period and is useful in providing an indication of the background noise level experienced over the measurement period;

L_{AFmax} is the maximum A-weighted noise level measured during a cycle with a fast time weighting, and,

L_{AFmin} is the minimum A-weighted noise level measured during a cycle with a fast time weighting.

$L_{Ar,T}$ The Rated Noise Level is equal to the L_{Aeq} during a specified time interval (T), plus specified adjustments for tonal character and/or impulsiveness of the sound.

The "A" suffix denotes sound levels that have been "A-weighted" in order to account for the non-linear nature of human hearing to sounds of different frequencies.

Tonal sounds are defined as sounds which cover a range of only a few Hz which contains a clearly audible tone, i.e. distinguishable, discrete or continuous noise (whine, hiss, screech, or hum etc.) are referred to as being 'tonal'.

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A simplified objective method for determining if tones are present is set out in Annex D of ISO 1996-2:2007(E) Acoustics – Description, measurement and assessment of environmental noise, Part 2: Determination of environmental noise levels.

According to the simplified method, an audible tone is normally defined as being greater than or equal to the following values in both adjacent one third octave bands:

- 15dB in low frequency one third octave bands (25Hz to 125Hz);
- 8dB in middle frequency bands (160Hz to 400Hz), and;
- 5dB in high frequency bands (500Hz to 10,000Hz).

1/3 Octave Analysis is defined as frequency analysis of sound such that the frequency spectrum is subdivided into narrower bands of one–third of an octave each in order to objectively determine if a sound is tonal or not. The simplified method has been applied in this report.

All sound levels in this report are expressed in terms of decibels (dB) relative to $2x10^{-5}$ Pa.

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4. Baseline Description of Existing Conditions

Surrounding Area

The TCC facility is located within the southern part of Tipperary town, some 130m to the south of the main thoroughfare through the town (Main St.) and O' Brien Street (R515). The busy primary N24 route from Rosslare to Limerick enters the town from the east some 500m from the facility and runs through Main St. before heading north away from the town. The facility is bounded to the east by Station Road (R664). The Galbally Road or R662 lies some 308m west. The infrequently used Limerick to Waterford railway line lies in close proximity to the southern boundary of the site while the River Ara forms the northern boundary of the operational site. The facility location is urban in nature.

Overall, Tipperary town is more densely developed to the north beyond the main thoroughfare with less development south. In terms of context, the immediate surrounding area of the facility is characterised by a mix of mainly commercial and educational development lying off O' Brien St. and on Station Road with the nearest residential NSLs lying to the south at Garryskillane Cottage (135m) and terraced houses (143m), west at Arravale Close (148m) and east at Abbey St (37m). The nearest point of a large development 'An Duiche' lies some 237m to the southwest. There are a few older dwellings which are used for residential purposes on O' Brien St. however in general the buildings on this street are empty or used mainly for commercial development.

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The local topography can be described as gently undulating. The facility is located in a river valley at a lower elevation (approx. 85m OD) to Main St to the north and NSLs to the west and southwest while the N24 to the east is at a lower elevation. Immediate NSLs to the south at Garryskillane are at a lower or similar ground level to the facility although the land starts to rise up thereafter further south. The elevations of the nearest NSLs, monitoring points and other reference points to the north are described in Table 5 below.

Table 5 Elevation of Surrounding Land/Receptors

Location	mOD
Main St. directly north	100
Main St. at junction with O' Brien St.	84
O' Brien St. junction with Galbally Road	92
Abbey St. (NSL1)	86
Arravale Close (NSL2)	93
Garryskillane Cottage (NSL3)	81
Garryskillane terraced houses	85
Tudor Court	89
An Duiche (northern boundary of estate or boundary closest to facility)	89
An Duiche (south) entrance to estate off Tipperary Road	98
Tipperary Road (west of An Duiche, southwest of facility)	106
N24 directly east	69
Tipperary Excel Centre (north)	108

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On-site Activity/Primary Sources

The TCC site at Station Road comprises of a dairy processing facility and has been in existence since 1898. The facility processes fresh milk and milk derivatives into a range of dairy products, including cheese, milk powders, butter and cream for export and Irish markets.

The primary raw material milk is collected from farms in the area and delivered to the site by road tanker. Once delivered to the site the milk is cooled, tested and stored in agitated silos before going on for further processing. Whole milk is separated into cream and skim milk. The cream undergoes further processing to form butter. Skim milk and buttermilk undergoes further processing through an evaporator and Anhydro spray drier to produce milk powders. Emmental cheese is produced in a modern processing building where whole milk is pasteurised before being inoculated with starter culture of rennet to form curd and whey. The cheese curd is pressed and ripened to produce a distinctive yellow cheese. The whey, a by-product of cheese production undergoes further processing before going to market as either concentrate or whey powder. Since the facility was established, there have been many changes at the plant with respect to the plant processing equipment and services required for the process. A new steam boiler running on natural gas was brought online in 2011.

The facility is a busy processing plant with typically numerous noise sources present. The main sources audible externally within the site include both fixed and transient noise sources. Fixed sources include the cream separator, milk pumps at the milk intake area, agitators in the milk silos, the Anhydro dryer exhaust stack, extraction fans on the roof of the cheese plant, cooling towers, steam raising plant and cooling fans associated with air and liquid cooling systems and pumps associated with the WWTP. Transient sources mainly include mobile sources on site such as delivery trucks and forklifts.

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Due to the local topography, on-site source heights and screening, the main distinguishable source heard off-site at NSLs is the existing Anhydro dryer and extract emissions points from the roof of the cheese plant.

Historical Monitoring Results

In addition to monitoring at NSLs 1 and 2, noise monitoring is regularly conducted at five boundary locations as described in Table 6 below and as indicated on Figure 1, Attachment 1. The locations N1 – N3 changed in 2014 due to safety concerns over proximity to the railway line. Accordingly, the monitoring locations were moved to within the site boundary.

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Table 6 Boundary Noise Monitoring Locations

Location	Irish Grid Co-ordinates Easting; Northing	Description of Location
N1	189083E, 135408N	South eastern boundary.
N2	188860E, 135402N	Southern boundary, close to maintenance storage building.
N3	188654E, 135441N	Southern boundary, close to WWTP
N4	189026E, 135631N	Northern boundary close to river.
N5	189086E, 135571N	Station Road, close to entrance to CBS.

Arithmetically averaged results are presented in Table 7. Full historical results are contained in Attachment 4.

Table 7 Historical Results Summary for Boundary Locations (2010 – 2014 & 2016) & NSLs (2012 – 2014)

Monitoring Location	Night-time $L_{Aeq,t}$, $L_{A90,\ t}$*	Day-time $L_{Aeq,t}$, $L_{A90,\ t}$*
N1	50,47	53,50
N2	48,46	49,46
N3	50,48	55,52
N4	57,56	59,56
N5	56,50	65,57
NSL1**	49,46	56,52
NSL2**	40,37	48,38

**Time t = 30 minutes at boundary locations and 15 minutes at NSLs.*
*** 2012 – 2014 results only for NLSs located in grounds of CBS school and a field west of the facility. Locations were moved closer to NSLs in 2016. Results for monitoring at NSL1 and NSL2 in 2016 are presented in Tables 8 & 9*

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Boundary locations are dominated by facility related noise with extraneous noise input from traffic on the local roads.

Limits and conditions related to noise are set in the current IE license (P0801-01) at the boundaries as follows:

In accordance with Condition 4.5 of the licence ''noise from the installation shall not give rise to sound pressure levels (Leq,T) measured at the boundary of the installation which exceed the limit value(s).''

In accordance with Schedule B.4 of the licence, noise from the installation shall not give rise to sound pressure levels measured at boundary locations which exceed the limit value of 55dB(A) by day and 45dB(A) by night. In addition, there shall be no clearly audible tonal or impulsive noise component in the noise emission from the activity at the boundary to the installation.

As noted in Table 7 the facility is not in compliance with the limits set at the boundary. However the current license was issued prior to the publication of the latest NG4 Guidance and, therefore it is considered more appropriate that the limits stated in the license apply at NSLs. The L_{A90} is used to assess compliance at NSL1 due to its proximity to Station Road and associated

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extraneous traffic influences at this location. Table 7 above indicates that the arithmetic average of L_{A90} values from 2012-2014 during the night time was just above the limit value. This was due to the L_{A90} recorded in 2013 which was 51dB. The exceedance in 2013 was not likely to be due to the plant as this level would not be expected from the existing continuous sources on site. Furthermore, in this regard, the L_{A90} values recorded in 2012 and 2014 were below 45 dB. It is likely that extraneous continuous or semi-continuous sources such as traffic or alarms from nearby retail increased the L_{A90} in 2013 particularly if the night time measurement was taken early in the night in the case of the former source.

In summary, historic monitoring at NSL1 and NSL2 indicates that the facility is in compliance with the limits specified. Additionally, the most recent monitoring in 2016 at the revised locations for NSL1 and NSL2 also indicate compliance. Refer to the discussion below and Tables 8 and 9.

Supplementary Monitoring

Summary results for supplementary monitoring, including the results from the 2016 Annual Survey are set out in Tables 8, 9 and 10 overleaf. Attachment 5 contains logged results and 1/3 octave band spectra.

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The facility is not located in a quiet area or an area of low background sound. Accordingly, the noise attributed solely to on-site activities, expressed as a free-field value at any NSL, should not generally exceed the values given below in NG4:

Daytime (07:00 to 19:00hrs) – 55dB LAr,T;
Evening (19:00 to 23:00hrs) – 50dB LAr,T;
Night-time (23:00 to 07:00hrs) – 45dB LAeq,T.

$L_{Ar,T}$ is a rating level which includes a penalty for tonal or impulsive noise where present (refer to Section 3.0 for further definition). The above limits are considered appropriate for the site location.

The results of monitoring at NSL1, 2 and 3 indicate that the facility is in compliance with the limit values set out in NG4. The sound from the facility at NSLs is continuous, steady and distinguishable but it is not tonal or impulsive in nature. Accordingly, the $L_{A90,t}$ values presented in Tables 8, 9 and 10 best represent facility related sound at NSLs. The facility has been operational for a long time and is part of the fabric or background of the locality.

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Table 8 Summary Results, NSL1 at Abbey Street

Period	Start/End Time	Duration (mins)	$L_{Aeq,t}$	$L_{A10,t}$	$L_{A90,t}$	L_{AFmax}	Description of Ambient Noise Environment
Day	2016-10-10 17.00 – 17.15	15	65	68	53	83	Traffic sound predominant. Facility continuous sources faintly audible and masked by traffic. L_{A90} representative of facility sources but is also influenced by traffic.
Day	2016-10-10 17.16 – 17.31	15	66	67	53	91	
Day	2016-10-10 17.31 – 17.46	15	63	66	52	76	
Evening	2017-04-27 21.14 – 21.44	30	60	64	49	77	Traffic sound predominant. Facility sources audible. L_{A90} most representative of facility sources although it is influenced by traffic. Alarm from nearby retail unit sounded towards the end of measurement #2.
Evening	2017-04-27 21.45 – 22.15	30	60	64	50	77	
Night	2016-10-10 23.40 – 23.55	15	50	49	43	71	Constant background traffic audible from N24 with passing intermittent cars in Station Road. Facility continuous sources audible. L_{A90} representative of facility sources and also some input from distant traffic.
Night	2016 -10-10 23.56 -00.11	15	51	51	45	71	

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Table 9 Summary Results, NSL2 at Arravale Close

Period	Start/End Time	Duration (mins)	$L_{Aeq,t}$	$L_{A10,t}$	$L_{A90,t}$	L_{AFmax}	Description of Ambient Noise Environment
Day	2016 -10-10 18.01 – 18.16	15	51	53	45	68	Steady sound from facility low but audible. L_{AF} 44.3 dB in lulls in extraneous sources. Other sources include road traffic on nearby roads, airplanes overhead, crows cawing, people talking, children playing, passing cars within Arravale Close. Potential tones at high frequency due to extraneous sources.
Day	2016 -10-10 18.16 – 18.31	15	57	55	45	84	
Day	2016 -10-10 18.31 – 18.46	15	56	57	46	76	
Evening	2016-06-27 21:01 – 21:31	30	47	49	41	69	The plant was clearly audible at this location as a steady background noise source. Extraneous sources included children playing close by and traffic on the R662. During lulls in extraneous source the LAF was approx. 41dB. The L_{A90} value is most representative of plant noise over the 30 minutes.
Evening	2017-04-27 20.08 – 20.38	30	48	50	42	72	Facility sound audible continuously in background. Children playing causes significant increase in L_{Aeq} during measurement #2. L_{A90} best represents plant noise.
Evening	2017-04-27 20.38 – 21.08	30	55	52	43	90	
Night	2016-06-27 23:18 – 23.48	30	45	46	41	63	The facility was clearly audible during at this location and varied with an increase in level at 23.33. Once extraneous sources were removed the L_{Aeq} is calculated at 43.2 dB. Plant noise varied between 39 - 43 dB(A).
Night	2016-06-27/28 23:51 – 00:21	30	44	45	41	61	As above, the facility was clearly audible.
Night	2016-10-10 23.00 23.15	15	46	48	45	56	Steady sound from the facility audible but low. L_{AF} in lulls of extraneous noise <45 dB. Extraneous Noise: Road traffic on local roads and car movements in Arravale Close.
Night	2016-10-10 23.15 – 23.30	15	44	46	42	56	
Night	2017-04-28 00.14 – 00.44	30	42	43	39	58	Facility continuous sources audible. Occasional passing car on the Galbally Road.
Night	2017-04-28 00.45 -01.15	30	42	43	41	54	

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Table 10 Summary Results, NSL3 at Garryskillane

Measurement Period	Start/End Time	Duration (mins)	$L_{Aeq,t}$	$L_{A10,t}$	$L_{A90,t}$	L_{AFmax}	Description of Ambient Noise Environment
Day	2016-06-27 12:39 – 13:09	30	55	56	51	82	Facility noise predominant; intermittent and frequent traffic on Station Road and R664 to east audible but plant noise predominant. Meter cross-gradient; breeze westerly. Cars and a horse and cart passing the meter influenced the L_{Aeq} value. Facility noise is generally steady but can increase/decrease during a 30 minute interval as shown in the logging contained in Attachment 5. This is most likely due to the Anhydro dryer changing loads. The L_{A90} value is most representative of plant noise for 30 minute reading although it did fluctuate from 48 – 53 dB(A) approx. Slight breeze up to 2m/sec.
Day	2016-06-27; 13:10– 13:40	30	53	55	49	75	The facility was predominant during this reading. Extraneous sources included birds tweeting and occasional cars passing the meter. Facility noise fluctuated as noted above. The L_{A90} value is most representative of plant noise over the 30 minutes. Breeze was up to 7 m/sec at times.
Evening	2017 -04-27 19.00 – 19.30	30	54	53	47	77	Intermittent passing cars, continuous birdsong and an alarm increased the L_{Aeq} at this location during the evening. Facility noise was steady and continuous and is represented by the L_{A90} values recorded.
Evening	2017-04-27 19.30 – 19.00	30	56	54	48	80	
Night	2017-05-17 01.03 – 01.33	30	46	48	43	63	The facility continuous sources were the main sources affecting this location at night time. Wind speeds increased slightly with occasional cars on Station Road and residents parking at nearby dwellings audible. The L_{A90} value is most representative of facility steady sources.
Night	2017-05-17 01.33 – 02.03	30	46	48	43	53	

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5. Assessment of Impacts

5.1 Construction Phase

The Proposed Development mainly involves the demolition of a former butter store located centrally in the site, partial demolition of the southern portion of the existing powder store warehouse located towards the northern boundary of the site and construction of the new dryer building on the store footprint.

Prediction of construction noise to the nearest NSLs has been conducted as described in BS 5228: Part 1: 2009 + A1:2014, Noise and Vibration Control on Construction and Open Sites. As the construction of the Proposed Development will be subject to a tendering process, the prediction of construction noise can only be an outline of likely sources used. Also, BS5228, from which the noise data is sourced, refers to different power ratings for equipment. During the actual construction, these ratings may vary and therefore the noise levels will vary. Accordingly, there is a degree of uncertainty in the predictions undertaken. The likely worst case activities associated with the dryer works have been assessed in this report.

Enabling Works & Construction

Pending receipt of planning permission, demolition works including the former butter store and southern section of existing powder store is expected to commence in October 2017 and will be completed over a 2 week period. Rock breakers and heavy duty excavators will be used. Additionally, it is anticipated that a number of 20 tonne trucks will be required to remove spoil and demolition waste from the site during this period. It is envisaged that further enabling works such as setting up of the construction site compound will also be completed in October 2017.

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The main dryer building construction is expected to take 12 months to complete and will commence in November 2017. Commissioning and hand-over is expected to occur in late 2018.

The construction programme will require piling for foundations and the use of other potential noisy equipment such as concrete pumps and pneumatic tools. Some stages, including the piling, will require over night and weekend work. The main steps in the Dryer Building construction programme are as follows:

1. Dryer Building Substructure including piling/foundations;
2. Dryer Building Concrete Superstructure;
3. Fabrication of Dryer Chamber and Bag Filter;
4. Installation/positioning of Dryer, Evaporator and Bag Filter;
5. Dryer Building Complete Superstructure and Roof;
6. Dryer Building Finishes;
7. Dryer Building Mechanical Installation;
8. Dryer Building Electrical Installation.

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Table 11 below details typical noise sources that may be in operation at different times and predicted noise levels at the nearest NSL likely to be affected.

Table 11 Likely Noise Levels Arising from the Construction Phase for the Dryer Predicted at Arravale Close NSL

Activity	Source	Activity equivalent continuous sound pressure level L_{Aeq} @ 10m	Predicted $L_{Aeq,t}$ at Arravale Close approx. 260m distant from works
Demolition & Enabling Works (1 month)			**Group Total (dB(A)**
	Likely Equipment to be Used for Demolition of Former Butter Store and Southern Section of Powder Warehouse (2 weeks)		**63**
Breaker Mounted on Excavator	BS5228:1- 2009 Table C1, #9	90	62
Tracked Excavator loading rubble	BS5228:1- 2009 Table C2, #10	85	57
Dump Truck for Removal of Rubble*	BS5228:1- 2009 Table C2, #34	80	52
Piling (1 month)			**Group Total (dB(A)**
	Likely Equipment to be Used for CFA Piling Foundations (1 month)		**56**
Crawler mounted piling rig	BS5228:1- 2009 Table C3, #021	79	51
Tracked Excavator inserting cylindrical metal cage	BS5228:1- 2009 Table C3, #24	74	46
Concrete Pump	BS5228:1- 2009 Table C3, #25	78	50
Tracked Mobile Crane	BS5228:1- 2009 Table C3, #29	70	42

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Table 11 Cont'd

Activity	Source	Activity equivalent continuous sound pressure level L_{Aeq} @ 10m	Predicted $L_{Aeq,t}$ at Arravale Close 260m distant
Hand-held welder	BS5228:1- 2009 Table C3, #31	79	51
Generator for welding	BS5228:1- 2009 Table C3, #32	73	45
Gas Cutter	BS5228:1- 2009 Table C3, #35	68	40
Dryer Concrete Structure (6 months)			**Group Total (dB(A)**
	Likely Equipment to be used for Dryer Concrete Structure (6 months)		**56**
Truck mixer (discharging)	BS5228:1- 2009 Table C4, #18	75	47
Pumping concrete - truck mixer	BS5228:1- 2009 Table C4, #20	80	52
Placing concrete and compaction – (combined truck mixer, tracked crane, poker vibrator)	BS5228:1- 2009 Table C4, #29	80	52
Poker Vibrator	BS5228:1- 2009 Table C4, #33	78	50
Other Stages 6 months			**Group Total (dB(A)**
	Likely Equipment to be used for finishes, mechanical installation		**60**
Poker vibrators (max likely)	BS5228:1- 2009 Table C4, #33	78	50
Electric percussion drills	BS5228:1- 2009 Table D6, #52	78	50

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Table 11 Cont'd

Activity	Source	Activity equivalent continuous sound pressure level L_{Aeq} @ 10m	Predicted $L_{Aeq,t}$ at Arravale Close 260m distant
Hand-held welder	BS5228:1- 2009 Table C3, #31	79	51
Diesel Generator	BS5228:1- 2009 Table C4, #85	66	38
Tower Crane	BS5228:1- 2009 Table C4, #48	76	48
Hand-held circular saw	BS5228:1- 2009 Table C4, #72	79	51
Scaffold Poles and Clips (dismantling)	BS5228:1- 2009 Table D7, #01	80	52
Lifting Platform	BS5228:1- 2009 Table C4, #57	67	39
Site Fork Lift Trucks (idling)	BS5228:1- 2009 Table D7, #96	77	49
Dumper* 7tonne	BS5228:1- 2009 Table C4, #03	76	48
Tracked Crane	BS5228:1- 2009 Table C4, #50	71	43
Lorry, 4Axle*	BS5228:1- 2009 Table C2, #34	80	52

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***Drive by maximum sound pressure level in L_{Amax} (overall level)**

The highest combined noise level prediction for a number of sources is 63 dB(A) at Arravale Close during the demolition stage. This is to be expected due to the nature of this phase although it will be very short in duration and will only occur during daytime hours.

Baseline noise levels for this location indicate that daytime noise levels are likely to range between 50 - 57 dB(A) with ambient noise levels dropping to 45 - 55 dB(A) into the evening and 40 - 45 dB(A) at night. Construction related noise will be masked to a large extent during the daytime due to other extraneous noise sources including traffic. However night time works are likely to be more perceptible as they exceed existing ambient noise levels. The predictions set out in Table 11 above take account of distance attenuation from the nearest construction point and with little screening provided (as Arravale Close is at a higher elevation and second storey windows overlook the site). They do not take account of the duration of sources which may be intermittent nor the fact that all sources are unlikely to be operational at any given time. Therefore the

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magnitude of change in ambient noise levels may not be as high as predicted however it is likely to be elevated by at least 5 decibels above existing ambient night time noise levels thus the magnitude rating of the impact is considered to be potentially medium to high for night time works. As noted previously, the context defines the actual effect and significance of the impact. Night time works are likely to be sporadic and short term in nature however they can be potentially disturbing and annoying. Accordingly, it is considered that the effect on Arravale Close is likely to be temporarily intrusive and slightly significant adverse. Other NSLs to the south, east and north are likely to be more screened from the works by existing facility buildings. Section 5 details mitigation measures and acceptable limits for the construction phase of development.

5.2 Operational Phase

Additional Noise Sources

There will be a number of new noise sources associated with the Proposed Development however the majority of these will be located internally. There will be a new exhaust duct outlet on the roof of the new dryer building and a new air inlet on the outer wall. The height of the new dryer building will be 118.87m OD while the dryer exhaust will be 120.75m OD. The existing dryer stack is approx. 110.7m OD. The existing Anhydro Dryer will remain while the Rodgers Dryer will be decommissioned.

There will be two duty and standby blowers fitted with acoustic hoods associated with the WWTP upgrade.

Sound power values are not available at this early stage in the design process as not all equipment has been fully specified.

The designers of the Dryer have provided an approximation of sound pressure levels (SPL) of 80 dB(A) at 1m from the roof outlet with a 3m attenuator in place. The air inlet is rated at 75 dB(A) at 1m also with a 3m attenuator. Typically, the sound from the Dryer outlet will be distinguishable but not tonal in nature.

The SPL associated with each proposed new blower at the WWTP is 75 dB(A) at 1m. Blowers can exhibit potential tones at mid to high frequencies.

Based on distance attenuation alone, the exhaust/inlet of the new Dryer and blowers will not result in elevation of ambient noise levels above existing background at the nearest NSLs with the attenuators in place. The attenuators and acoustic hoods will ensure that the cumulative impact does not exceed the existing impact of the plant. Furthermore, the blowers will be screened by existing structures at the WWTP. The potential tones associated with the blowers should dissipate quickly provided they are also screened by the proposed tanks at the WWTP.

The facility is licensed by the EPA, however the license will be reviewed as a result of the Proposed Development and therefore the limits and current conditions are subject to change. The facility is not located in a quiet area or

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an area of low background noise as defined in NG4 therefore the following typical limits are likely to apply at NSLs:

- Daytime (07.00 to 19.00 hrs) – 55$L_{Ar,T}$[2]
- Evening (19.00 to 23.00 hrs) – 50$L_{Ar,T}$
- Night time (23.00 to 07.00 hrs) 45$L_{Aeq,T}$

The following conditions are also likely to apply:

> *During daytime and evening periods rigorous efforts should be made to avoid clearly audible tones and implusive noise at all sensitive locations. A penalty of 5 dB for tonal and/or implusive elements is to be applied to the daytime and evening measured L_{Aeq} values to determine the appropriate rating level ($L_{Ar,T}$).*
>
> *During the night time period no tonal or implusive noise from the facility should be clearly audible or measurable at any NSL.*
>
> *In addition to the foregoing recommended license limit values, the noise from the licensed facility shall not be so loud, so continuous, so repeated, of such duration or pitch and it should not occur at such times as to give reasonable grounds for annoyance.*

The Proposed Development is expected to comply with the above limits and conditions based on the data provided by the Dryer and WWTP designers. Regardless, precautionary mitigation measures are outlined in Section 6.2.

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6. Proposed Mitigation and Enhancement Measures (if applicable)

6.1 Construction Phase

There is no published Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. BS5228:2009 lists applicable noise level thresholds, depending upon existing ambient levels, as described in Table 12 overleaf. This table is based upon report E3.2, Table E.1 of BS5228:2009 Part 1.

[2] The rated noise level, equal to the L_{Aeq} during a specified time interval (T), plus specified adjustments for tonal character and/or implusiveness of sound.

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Table 12 Threshold of Significant Effect at Dwellings

Assessment category and threshold value period (L_{Aeq})	Threshold value, in decibels (dB)		
	Category A	Category B	Category C
Night-time (23:00-07:00)	45	50	55
Evening and Weekends	55	60	65
Daytime (07:00-19:00) and Saturday 07:00-13:00)	65	70	75

NOTE 1: A significant effect has been deemed to occur if the total L_{Aeq} noise level, including construction, exceeds the threshold level for the Category appropriate to the ambient noise level.
NOTE 2: If the ambient noise level exceeds the threshold values given, in the table (i.e. the ambient noise level is higher than the above values), then a significant effect is deemed to occur if the total L_{Aeq} noise level for the period increases by more than 3dB due to construction activity.
NOTE 3 Applied to residential receptors only.

A) Cat A: Threshold values to use when ambient noise levels (rounded to nearest 5dB) are less than these values
B) Cat B: Threshold values to use when ambient noise levels (rounded to the nearest 5dB) are the same as Cat A values
C) Cat C: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than Cat A values
D) 19:00-23:00 weekdays, 13:00-23:00 Saturday and 07:00-23:00 Sunday is deemed 'evening and weekend' period.

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Category A threshold values can be applied based on the ambient noise levels recorded during the baseline surveys. During the daytime, the predicted on-site demolition work is predicted to be less than 63dB(A) at Arravale Close and therefore it is unlikely that the guidance in BS5228:2009 will be exceeded during the daytime. Evening time work is also unlikely to exceed the threshold value for Cat A locations. However night time work as described earlier is likely to exceed the threshold value.

Therefore the following mitigation measures will be implemented as good practice in order to minimise impact and/or perceived effect:

- CFA or Continuous Flight Auger piling will be implemented on site. This non-displacement system is vibration free and is less noisy than other piling methods.
- During the construction phase all equipment will be required to comply with noise limits set out in EC Directive 2000/14/EC and the 2005/88/EC amendment on the approximation of the laws of the Member States relating to the noise emission in the environment by equipment for use outdoors. The directive covers equipment such as compressors, welding generators, excavators, dozers, loaders and dump trucks.
- Account will also be taken of mitigation measures set out in Section 8 of BS5228: Part 1: 2009 +A1:2014 - Noise Control on Construction and Open Sites. This section identifies measures such as substitution, modification, use of enclosures and siting of equipment in order to minimise impact. Screening by existing buildings will be used for stationary equipment.
- A Noise Construction Management Plan will be developed to minimise night time work and timing will be agreed with the Planning Authority to ensure it is carried out in a timely and efficient manner.

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- A site representative will be appointed for matters related to noise and vibration.
- Where possible. 24 hr pre-notification of affected neighbours will be completed by phone and text. Responses/queries from neighbours will be addressed.
- Any complaints received will be thoroughly investigated.
- A written complaints log will be maintained by the site manager. This will at a minimum record the name of the complainant, date and time of the complaint and a record of the details of the complaint including the date and time of when the effect was observed. This will ensure that the concerns of local residents who may be affected by site activities are considered during the management of activities at the site.
- Monitoring of typical levels of noise will be conducted during critical periods at sensitive locations to ensure that excessive levels above the threshold value for daytime are addressed immediately.
- Suitable mitigation measures taken at the time of excessive noise/complaints such as restricting the use of noisy equipment during the early hours will be taken.

6.2 Operational Phase

General

The limits and conditions as set out in Section 5.2 of this report will form part of the specification of works for the Dryer and WWTP designers. Attenuators are specified for the air inlet and outlet exhaust for the proposed new Dryer and acoustic hoods for WWTP blowers. It is recommended that these be implemented. The limits will apply cumulatively with existing sources.

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It is recommended that the blowers be screened from NSLs with existing or proposed structures at the WWTP.

Prior to final commissioning of the Dryer and the blowers, a Noise Survey will be conducted. This will be undertaken by a competent person and will include monitoring locations at NSLs 1-3. Additional measures will be implemented where necessary before the new plant is fully commissioned.

7. Summary & Conclusions

The noise impact assessment for the Proposed Development has been completed through site survey, desk-based review of past monitoring conducted for the existing facility and assessment of noise impacts and effects in accordance with recognised standards and guidance.

The ambient noise environment in the vicinity of the existing plant at the nearest NSLs is characterised mainly by sound from the AnHydro plant on site and extraneous sources including traffic on the local road network. The effect of traffic noise is less at NSLs to the south and southwest during the day and at all NSLs at night when plant noise can predominate. The facility is considered to be compliant with typical limits set for NSLs.

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Both the construction and operational phases of the Proposed Development have been assessed.

The construction phase will elevate ambient noise levels as assessed at the nearest NSL to the west, Arravale Close. The daytime noise is likely to be masked by traffic however night time work will be required on occasion and the potential elevation in ambient noise levels is likely to be more perceptible to local residents as other sources diminish at night time. The effect of construction noise at night time is deemed to be temporarily slightly significant adverse. Additional mitigation measures will be implemented to minimise construction noise impact and hence potential effect on NSLs.

The Proposed Development will result in new sources becoming operational on site. However, due to the abatement measures proposed, the new Dryer and WWTP sources will, in addition to existing sources, be compliant with typical limits set at NSLs for day, evening and night.

HGV traffic arising on the local road network as a result of the Proposed Development is considered to be insignificant in terms of noise impact and effect.

Overall, it can be concluded that the Proposed Development will not give rise to significant adverse noise related effects on nearby NSLs provided that the limits and conditions of the IED license are complied with and that the mitigation measures as set out in this report are adhered to.

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8. References

BS5228 Part 1: 2009 +A1:2014: Code of Practice for Noise and Vibration Control on Construction and Open Sites.

BS4142:2014 - Methods for Rating and Assessing Industrial and Commercial Sound.

'Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)' as published by the Environmental Protection Agency, revised January 2016.

Tipperary Co-operative Creamery Ltd, Annual Noise Compliance Report, OES Consulting, 2016.

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Attachment 1 - Maps and Figures

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* Pre 2016

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Attachment 2 – Photo Log

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Plate 01: NSL1



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Plate 02: NSL2



Plate 03: NSL3

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Attachment 3 - Calibration Certificates

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Sonitus Systems

Certificate of Calibration

Issued to:	Certificate Number
Redkite Environmental Ltd Huntersmoon Ballykeane Road Redcross Co. Wicklow	AC16007

Test Date: 14/11/2016
Procedure: TP-ACOCAL-1

Equipment Information

Item Calibrated:	Acoustic Calibrator	**Model:**	CAL200
Make:	Larson Davis (NTi)	**Serial Number:**	11728

Calibration Procedure

The above calibrator was verified in line with the requirements of BS EN 60942:2003. The calibrator was allowed to stablize for a suitable period, as described in the manufacturer's instruction manual, in laboratory conditions. The sound pressure level in the cavity (half-inch) was measured. The operating frequency and signal distortion were also measured.

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Calibration Standards

Description	Serial Number
National Instruments PXI-4461	19C91D2
GRAS 42AA Pistonphone	227947
GRAS 46A0 Pressure Field Microphone	228216

The standards used in this calibration are traceable to NIST and/or other National Measurement Institutes (NMI's) that are signatories of the International Committee of Weights and Measures (CIPM) mutual recognition agreement (MRA).

Signed on behalf of Sonitus Systems:

Paul McDonald

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Sonitus Systems

Calibration Report

Equipment Information

Model: CAL200
Serial Number: 11728

Ambient Conditions

Measurement conditions were within the tolerances defined in BS EN 60942.

Barometric Pressure: 1026 hPa
Temperature: 22.0 °C
Relative Humidity: 41 %

Results

Calibrator Setting	Measured Parameter	Measured Value	Tolerance +/-	Uncertainty +/-
94 dB, 1KHz	Sound pressure level (dB)	93.86	0.4 dB	0.14 dB
	Frequency (Hz)	1000.52	10 Hz	0.25 Hz
	Distortion (%)	0.19	3.0 %	0.3 %
114 dB, 1KHz	Sound pressure level (dB)	113.83	0.4 dB	0.14 dB
	Frequency (Hz)	1000.50	10 Hz	0.25 Hz
	Distortion (%)	0.27	3.0 %	0.3 %

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RESULT: PASS

As public evidence was available, from a testing organization responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, the sound calibrator tested is considered to conform to all the Class 1 requirements of IEC 60942:2003

The manufacturers guidelines concerning free-field correction should be ovserved when using the calibrator.

Notes

1. All measurements were made with the half-inch configuration of the calibrator in place.
2. The measurement uncertainty is reported as a standard uncertainty multiplied by a coverage factor k=2 which, for a normal probabbility distribution, corresponds to a coverage probability of approximately 95%.
3. The given uncertainty corresponds to measured values only and does not relate to the long term stability of the device under test.
4. The user manual for the device under test was obtained from the manufacturer's website.

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Sonitus Systems

Certificate of Calibration

Issued to:	Certificate Number
Redkite Environmental Ltd Huntersmoon Ballykeane Road Redcross Co. Wicklow	AC15002

Test Date: 12/11/2015
Procedure: TP-ACOCAL-1

Equipment Information

Item Calibrated:	Acoustic Calibrator	**Model:**	CAL200
Make:	Larson Davis (NTi)	**Serial Number:**	11728

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Calibration Procedure

The above calibrator was verified in line with the requirements of BS EN 60942:2003. The calibrator was allowed to stablize for a suitable period, as described in the manufacturer's instruction manual, in laboratory conditions. The sound pressure level in the cavity (half-inch) was measured. The operating frequency and signal distortion were also measured.

Calibration Standards

Description	Serial Number	Calibration Date
National Instruments PXI-4461	19C91D2	29-12-2014
GRAS 42AA Pistonphone	227947	31-08-2015
GRAS 46A0 Pressure Field Microphone	228216	15-06-2015

The standards used in this calibration are traceable to NIST and/or other National Measurement Institutes (NMI's) that are signatories of the International Committee of Weights and Measures (CIPM) mutual recognition agreement (MRA).

Signed on behalf of Sonitus Systems:

Paul McDonald

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Sonitus Systems

Calibration Report

Equipment Information

Model: CAL200
Serial Number: 11728

Ambient Conditions

Measurement conditions were within the tolerances defined in BS EN 60942.

Barometric Pressure: 102 hPa
Temperature: 21.7 °C
Relative Humidity: 45 %

Results

Calibrator Setting	Measured Parameter	Measured Value	Tolerance +/-	Uncertainty +/-
94 dB, 1KHz	Sound pressure level (dB)	93.97	0.4 dB	0.14 dB
	Frequency (Hz)	1000.44	10 Hz	0.25 Hz
	Distortion (%)	0.19	3.0 %	0.3 %
114 dB, 1KHz	Sound pressure level (dB)	113.97	0.4 dB	0.14 dB
	Frequency (Hz)	1000.42	10 Hz	0.25 Hz
	Distortion (%)	0.27	3.0 %	0.3 %

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RESULT: PASS

As public evidence was available, from a testing organization responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, the sound calibrator tested is considered to conform to all the Class 1 requirements of IEC 60942:2003

The manufacturers guidelines concerning free-field correction should be ovserved when using the calibrator.

Notes

1. All measurements were made with the half-inch configuration of the calibrator in place.
2. The measurement uncertainty is reported as a standard uncertainty multiplied by a coverage factor k=2 which, for a normal probabbility distribution, corresponds to a coverage probability of approximately 95%.
3. The given uncertainty corresponds to measured values only and does not relate to the long term stability of the device under test.
4. The user manual for the device under test was obtained from the manufacturer's website.

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Manufacturer Calibration Certificate

The following instrument has been tested and calibrated to the manufacturer specifications.
The calibration is traceable in accordance with ISO/IEC 17025 covering all instrument functions.

- Device Type: M2230 consisting of
  - MA220 Serial Number: 5062
  - Capsule Serial Number: 8694

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- Date of Calibration: 15 September 2015

- Results: PASSED
  (for detailed report see next page)

Tested by: M.Frick

Signature:

Stamp:

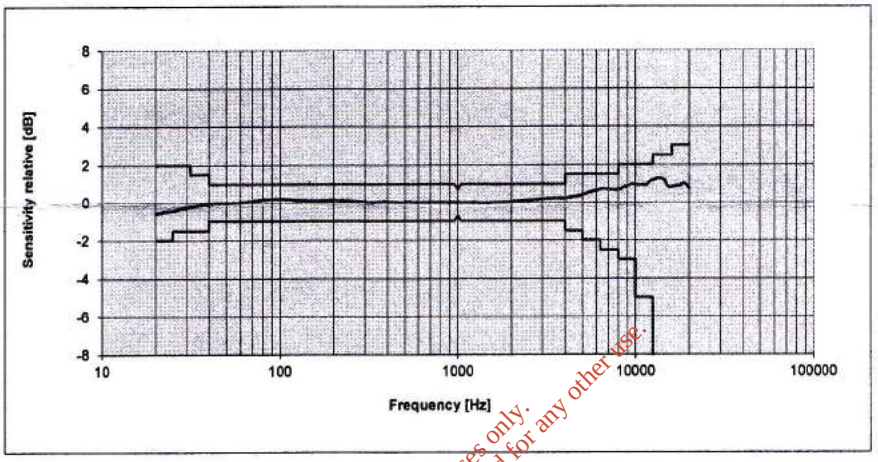
NTi Audio AG
Im alten Riet 102
LI - 9494 Schaan
www.nti-audio.com

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Date: 15 September 2015
Calibration of: M2230 consisting of
MA220 Serial Number: 5062
Capsule Serial Number: 8694

- Detailed Calibration Test Results:

		calibration
System calibration	actual	uncertainty[1]
Sensitivity @ 1 kHz, 114 dBSPL	45.4 mV/Pa	±2.85%
Frequency response	Class 1	acc. IEC 61672



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- Test Conditions:

Temperature:	25.7°C	±0.5 °C
Relative Humidity:	43.4%	±2%
Air Pressure:	95.98 kPa	±0.25 kPa

- Calibration Equipment Used:

- Norsonic Sound Calibrator, Type 1251, S/No. 30930
  Last Calibration: 3. Dec. 2014, Next Calibration: 2. Dec. 2016
  Calibrated by Metas, Switzerland

- NTi Audio FX100, S/No. 11094
  Last Calibration: 17. Aug. 2015, Next Calibration: 16. Aug. 2016
  Calibrated by NTi Audio meeting product specifications

- MTG MV203, S/No. 0630 / Mic Capsule, MK221 S./No. 13164
  Last Calibration: 26. Jun. 2014, Next Calibration: 25. Jun. 2016
  Calibrated by MTG, Germany

[1] The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with the regulations of the GUM.

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Attachment 4 – Historical Results

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Daytime Results

Year	2010			2011			2012			2013			2014			2016		
Monitoring location	LAEQ	LA90	LA10	LAEQ	LA90	LA10	LAEQ	LA90	LA10	LAEQ	LA90	LA10	LAEQ	LA90	LA10	LAEQ	LA90	LA10
N1	52	49	55	47	45	48	53	46	56	55	57	53	50	48	52	59	53	61
N2	56	52	57	46	44	47	47	45	49	56	55	57	44	36	45	45	43	47
N3	54	51	56	55	53	57	52	50	53	52	51	53	54	53	55	63	55	66
N4	59	58	61	58	56	59	60	59	61	61	59	62	57	49	57	60	56	63
N5	67	57	71	64	57	67	61	53	64	62	67	65	68	53	72	67	57	71
NSL1							56	52	58	58	55	60	54	49	56	64	53	67
NSL2							55	36	57	46	41	47	42	38	44	54	45	54

Night time Results

Year	2010			2011			2012			2013			2014			2016		
Monitoring location	LAEQ	LA90	LA10	LAEQ	LA90	LA10	LAEQ	LA90	LA10	LAEQ	LA90	LA10	LAEQ	LA90	LA10	LAEQ	LA90	LA10
N1	45	43	46	49	47	51	53	46	56	51	50	52	48	46	50	52	49	54
N2	46	44	47	47	45	48	47	45	49	62	61	63	42	38	44	42	40	43
N3	43	39	45	55	53	57	52	50	54	52	50	53	51	49	52	48	47	50
N4	54	52	54	57	56	57	59	58	59	59	58	59	56	55	56	55	54	56
N5	54	43	50	56	51	56	58	53	58	56	54	57	51	45	48	60	54	59
NSL1							48	45	51	55	51	57	44	41	47	51	44	49
NSL2							41	35	42	41	39	43	39	36	40	45	44	47

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EPA Export 15-11-2018:04:00:55

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Attachment 5 – 1/3 Octave Band Spectra & Logging

EPA Export 15-11-2018:04:00:55

Cirrus Research plc

Measurement Summary Report

Name	NSL1 Daytime #1
Time	10/10/2016 5:00:30 PM
Duration	00:15:00
Instrument	GO56143, CR:171B

Summary

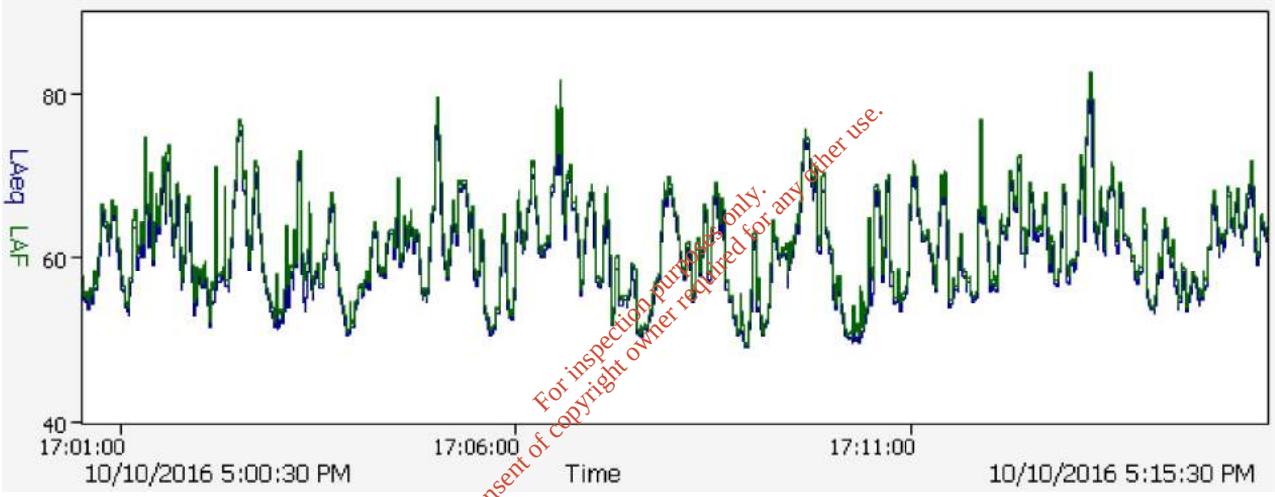
LAeq	64.6 dB
LAE	94.2 dB
LAFMax	82.6 dB

LAF1	74.9 dB
LAF5	69.8 dB
LAF10	67.8 dB
LAF50	59.9 dB
LAF90	53.1 dB
LAF95	51.3 dB
LAF99	50.0 dB

Calibration Information

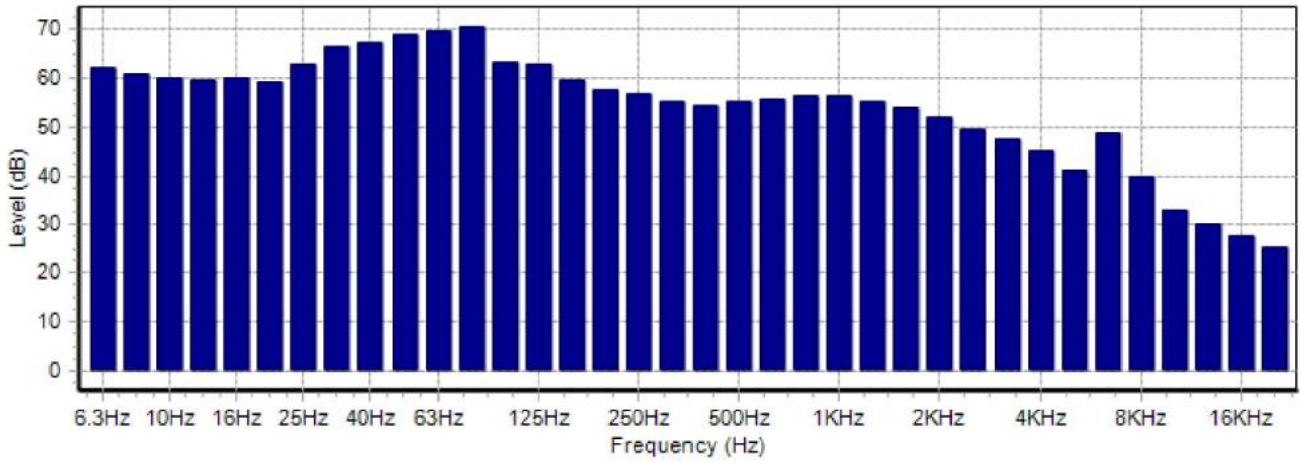
10/9/2016 7:52:32 PM	-0.26 dB
10/10/2016 10:55:10 PM	-0.40 dB

Time History



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Frequency Bands



EPA Export 10-12-2016 14:00:55

Cirrus Research plc

Measurement Summary Report

Name	NSL1 Daytime #2
Time	10/10/2016 5:16:04 PM
Duration	00:15:00
Instrument	GO56143, CR:171B

Summary

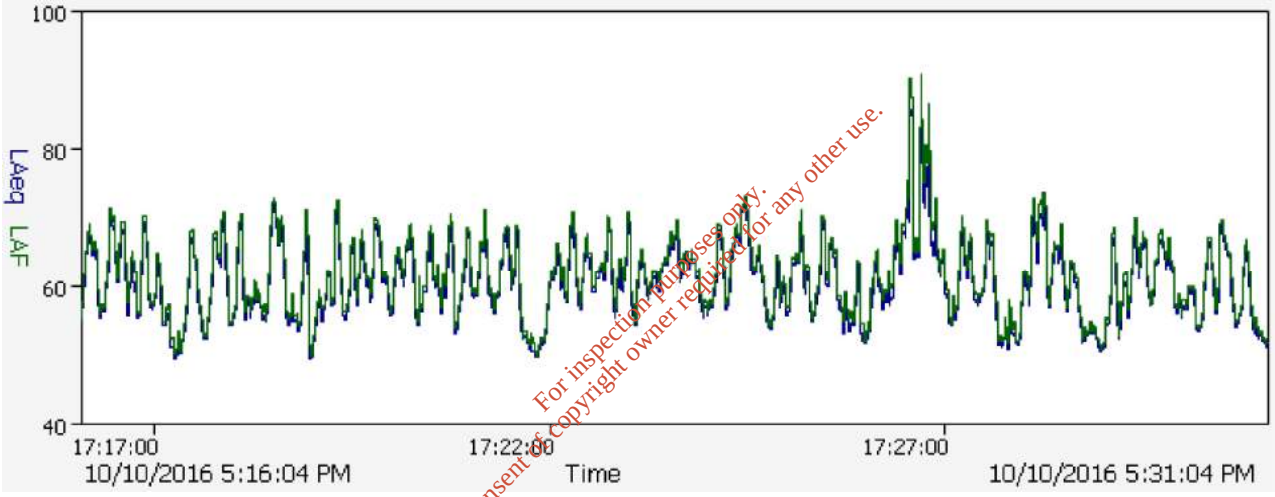
LAeq	65.7 dB
LAE	95.2 dB
LAFMax	90.7 dB

LAF1	72.8 dB
LAF5	69.0 dB
LAF10	67.4 dB
LAF50	59.9 dB
LAF90	53.2 dB
LAF95	51.7 dB
LAF99	49.9 dB

Calibration Information

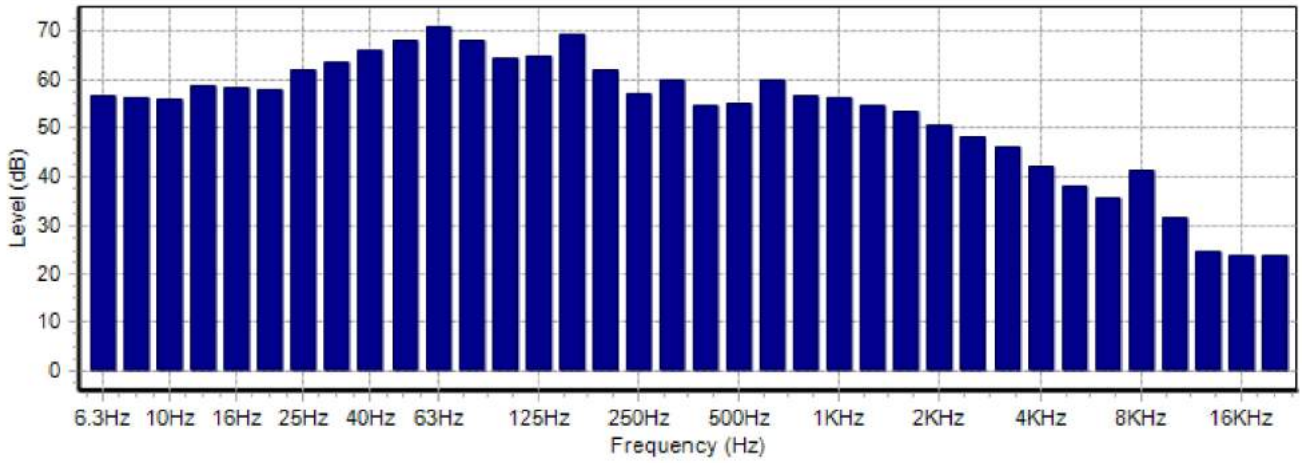
10/9/2016 7:52:32 PM	-0.26 dB
10/10/2016 10:55:10 PM	-0.40 dB

Time History



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Frequency Bands



EPA Export 10/12/2016 4:00:55

Cirrus Research plc

Measurement Summary Report

Name	NSL1 Daytime #3
Time	10/10/2016 5:31:54 PM
Duration	00:15:00
Instrument	GO56143, CR:171B

Summary

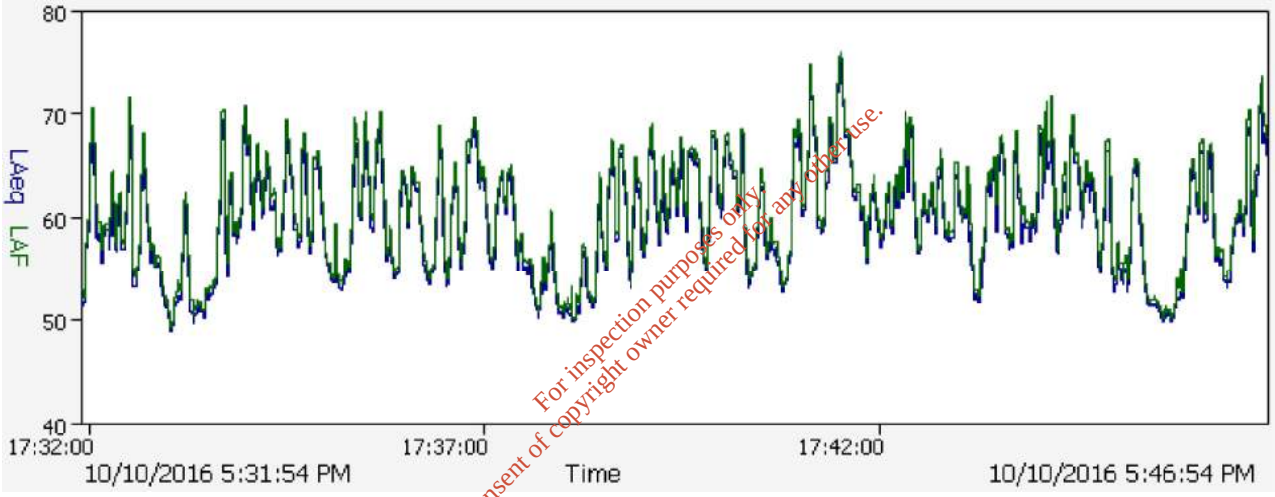
LAeq	62.5 dB
LAE	92.0 dB
LAFMax	75.9 dB

LAF1	70.9 dB
LAF5	67.7 dB
LAF10	66.3 dB
LAF50	59.3 dB
LAF90	52.2 dB
LAF95	51.0 dB
LAF99	49.9 dB

Calibration Information

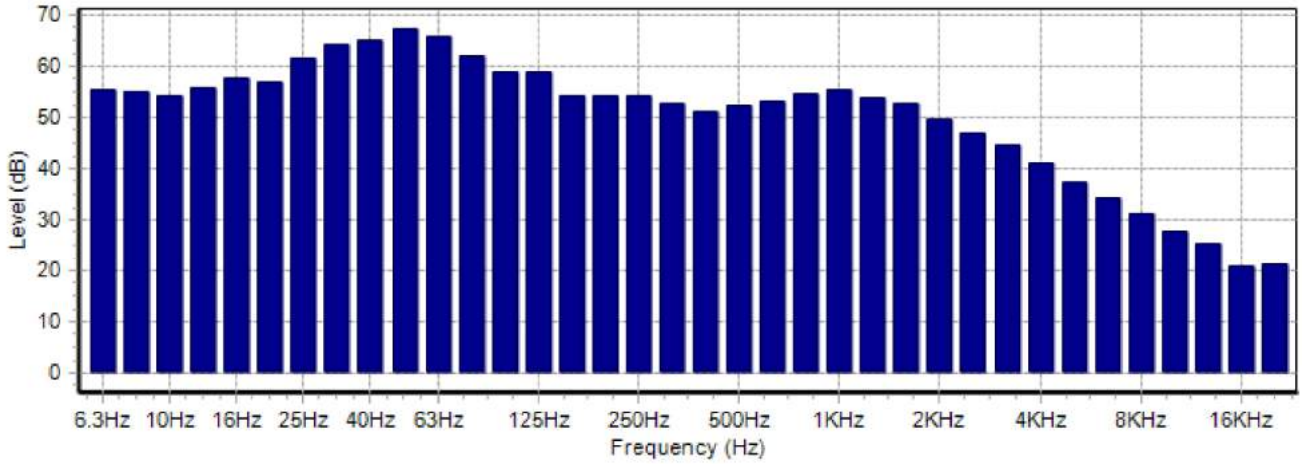
10/9/2016 7:52:32 PM	-0.26 dB
10/10/2016 10:55:10 PM	-0.40 dB

Time History



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Frequency Bands

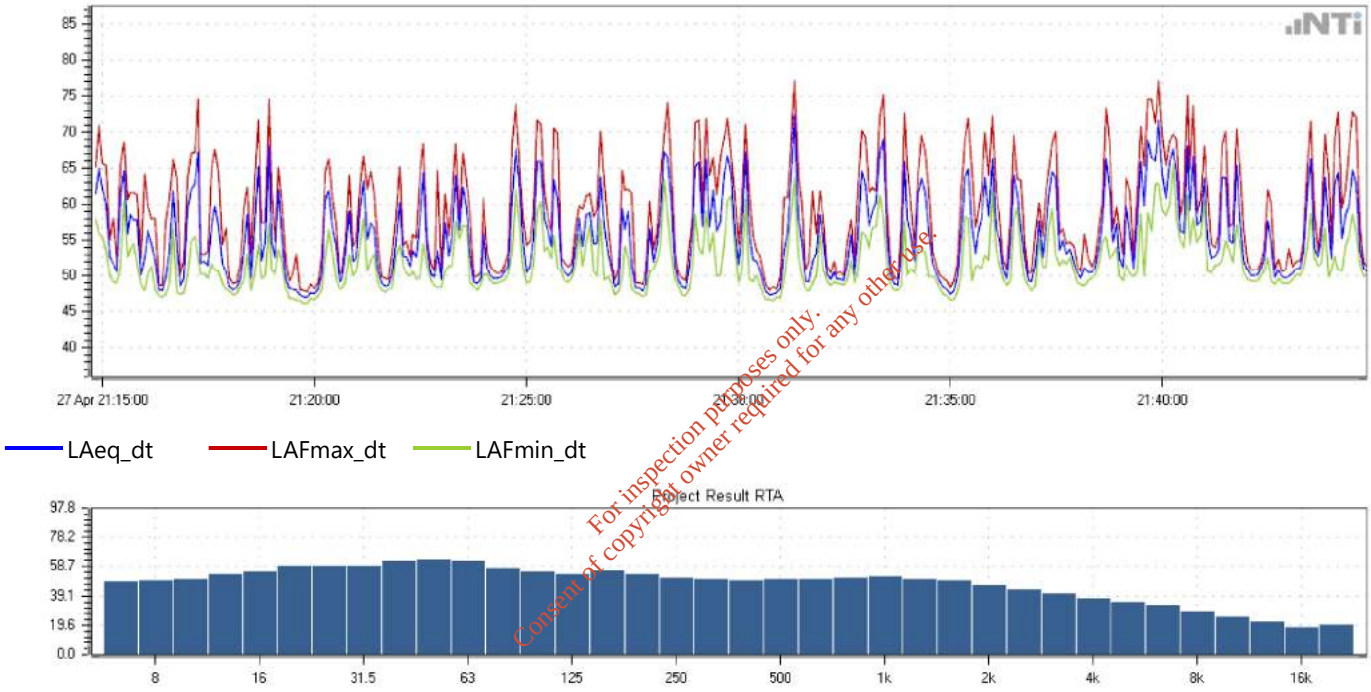


EPA Export 10/12/2016 14:00:55

NSL1 Evening

Start: 2017-04-27 21:14:46

End: 2017-04-27 21:44:46



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Configuration

Device Info:	XL2, SNo. A2A-08898-E0, FW3.12
Mic Type:	NTi Audio M2230, SNo. 5062, User calibrated 2017-04-27 18:34
Mic Sensitivity:	43.6 mV/Pa
Range:	20 - 120 dB
LN based on:	LAeq_dt

Results

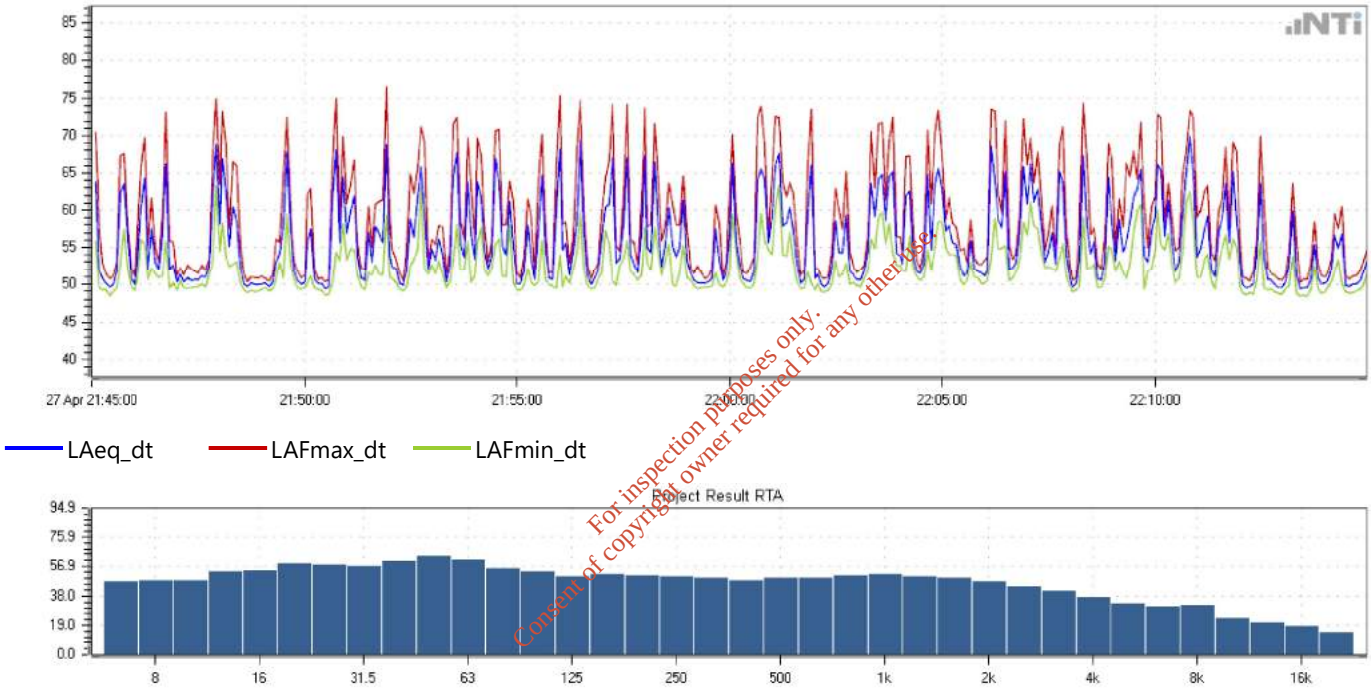
Type	Start Date and Time	Duration	LAeq [dB]	LAFmax [dB]	LAFmin [dB]	L 10.0 % [dB]	L 90.0 % [dB]
Recorded		**00:30:00**	**59.8**	**77.1**	**46.1**		
Project Result		**00:30:00**	**59.8**	**77.1**	**46.1**	**63.7**	**48.8**

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NSL1 Evening

Start: 2017-04-27 21:45:00

End: 2017-04-27 22:15:00



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Configuration

Device Info:	XL2, SNo. A2A-08898-E0, FW3.12
Mic Type:	NTi Audio M2230, SNo. 5062, User calibrated 2017-04-27 18:34
Mic Sensitivity:	43.6 mV/Pa
Range:	20 - 120 dB
LN based on:	LAeq_dt

Results

Type	Start Date and Time	Duration	LAeq [dB]	LAFmax [dB]	LAFmin [dB]	L 10.0 % [dB]	L 90.0 % [dB]
Recorded		**00:30:00**	**59.8**	**76.5**	**48.4**		
Project Result		**00:30:00**	**59.8**	**76.5**	**48.4**	**63.5**	**50.1**

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Cirrus Research plc

Measurement Summary Report

Name	NSL1 Night time #1
Time	10/10/2016 11:40:56 PM
Duration	00:15:00
Instrument	GO56143, CR:171B

Summary

LAeq	50.1 dB
LAE	79.6 dB
LAFMax	71.0 dB

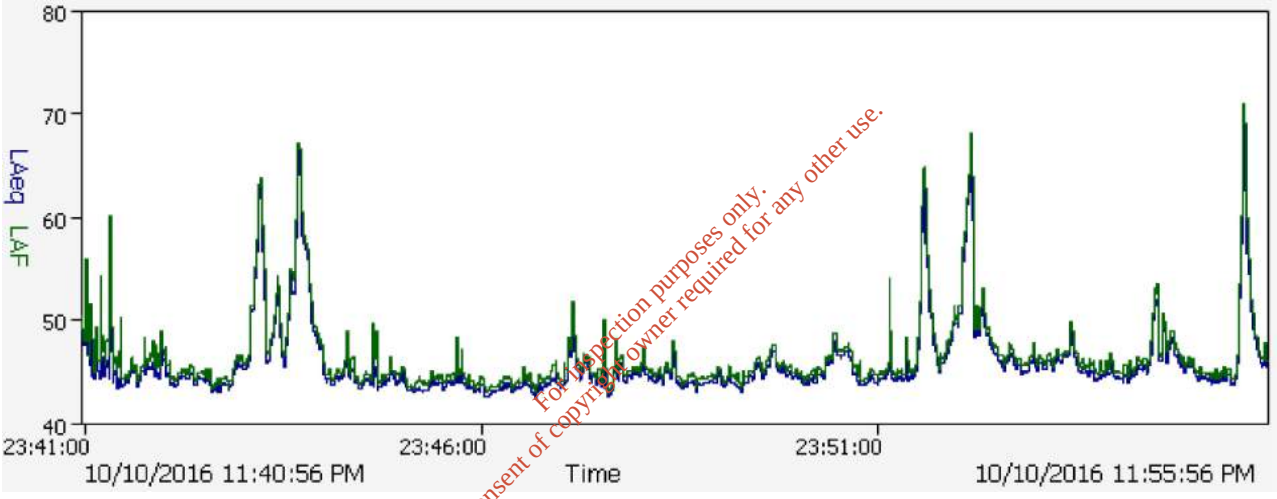
LAF1	62.8 dB
LAF5	52.8 dB
LAF10	48.9 dB
LAF50	44.6 dB
LAF90	43.4 dB
LAF95	43.1 dB
LAF99	42.6 dB

Calibration Information

10/10/2016 10:55:10 PM -0.40 dB

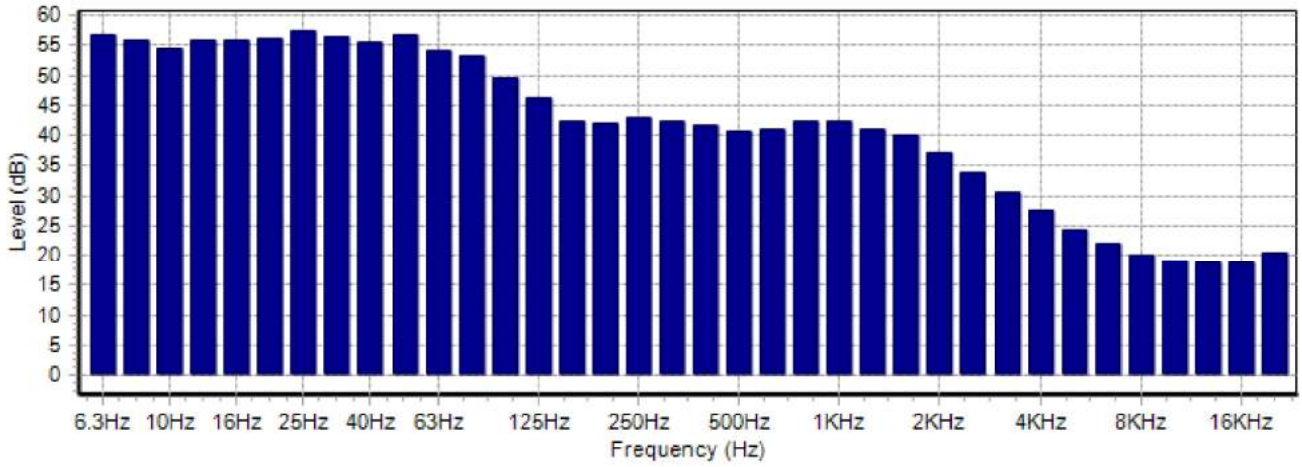
10/11/2016 1:12:04 PM -0.31 dB

Time History



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Frequency Bands



EPA Export 10/11/2016 14:00:56

Cirrus Research plc

Measurement Summary Report

Name	NSL1 Night time #2
Time	10/10/2016 11:56:44 PM
Duration	00:15:00
Instrument	GO56143, CR:171B

Summary

LAeq	50.7 dB
LAE	80.3 dB
LAFMax	71.0 dB

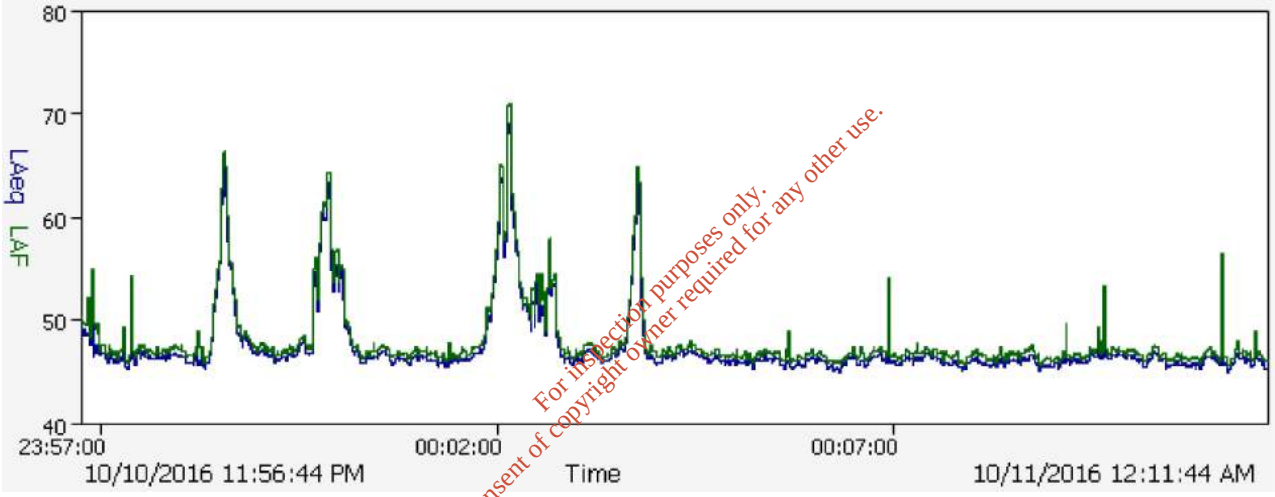
LAF1	63.1 dB
LAF5	55.0 dB
LAF10	50.8 dB
LAF50	46.2 dB
LAF90	45.5 dB
LAF95	45.3 dB
LAF99	44.9 dB

Calibration Information

10/10/2016 10:55:10 PM -0.40 dB

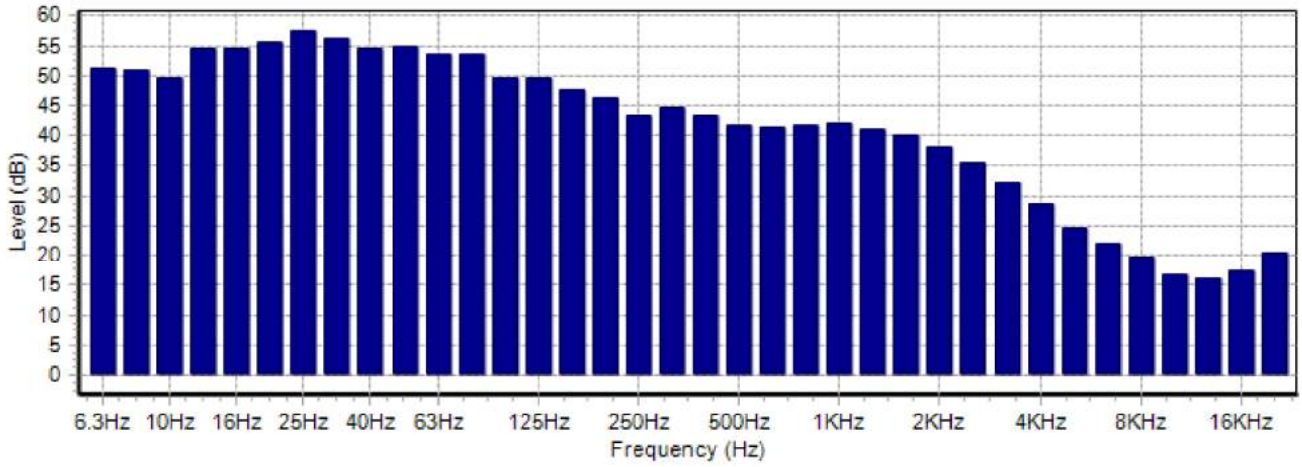
10/11/2016 1:12:04 PM -0.31 dB

Time History



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Frequency Bands



EPA Export 10/11/2016 14:00:56

Cirrus Research plc

Measurement Summary Report

Name	NSL2 Daytime #1
Time	10/10/2016 6:01:07 PM
Duration	00:15:00
Instrument	GO56143, CR:171B

Summary

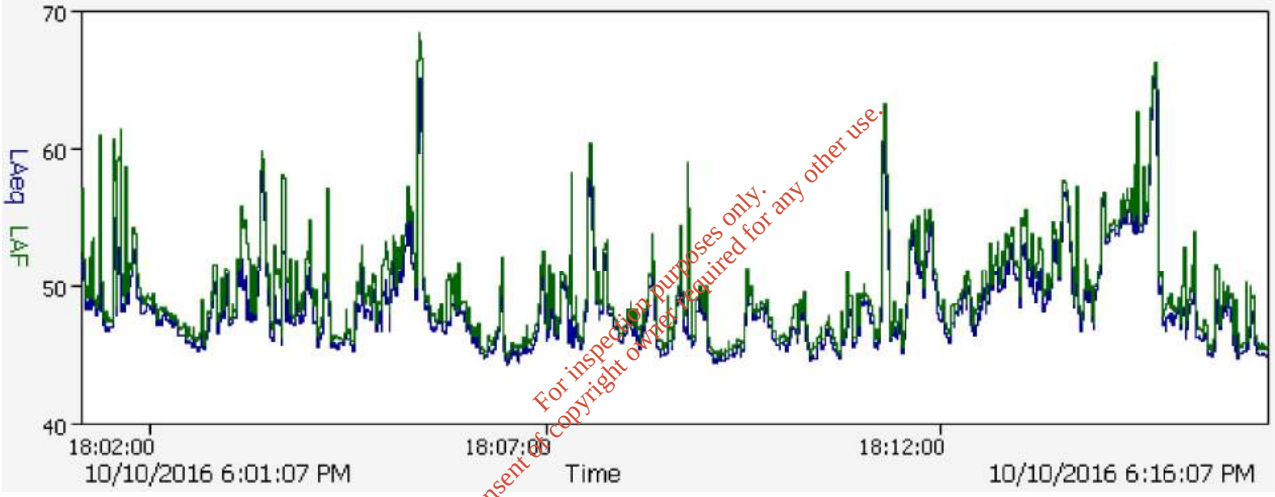
LAeq	50.5 dB
LAE	80.1 dB
LAFMax	68.3 dB

LAF1	60.1 dB
LAF5	54.6 dB
LAF10	52.7 dB
LAF50	47.6 dB
LAF90	45.2 dB
LAF95	44.8 dB
LAF99	44.4 dB

Calibration Information

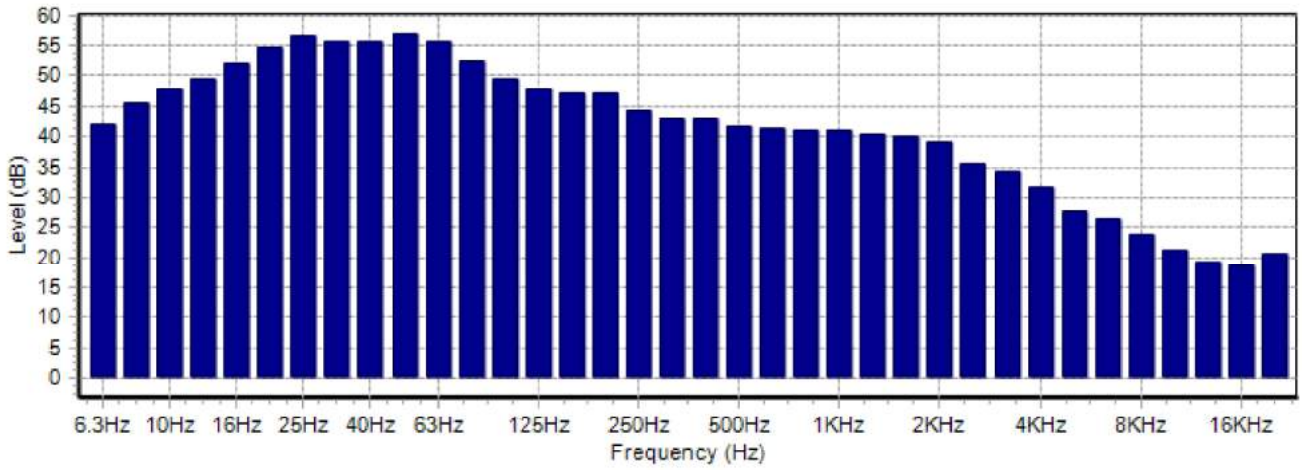
10/9/2016 7:52:32 PM	-0.26 dB
10/10/2016 10:55:10 PM	-0.40 dB

Time History



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Frequency Bands



EPA Export 10/11/2016 14:00:56

Cirrus Research plc

Measurement Summary Report

Name	NSL2 Daytime #2
Time	10/10/2016 6:16:37 PM
Duration	00:15:00
Instrument	GO56143, CR:171B

Summary

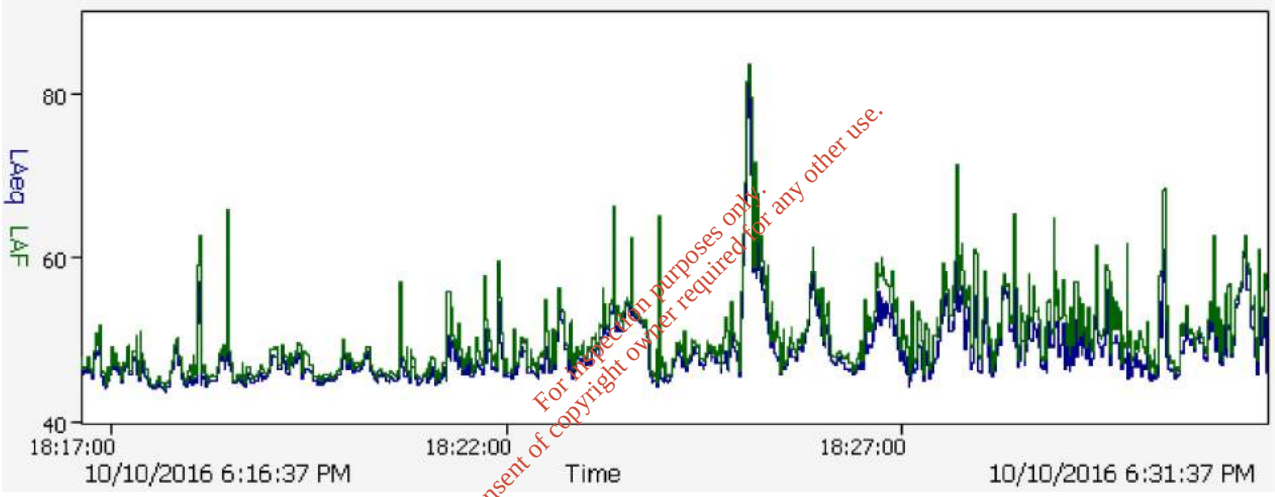
LAeq	56.6 dB
LAE	86.1 dB
LAFMax	83.5 dB

LAF1	62.5 dB
LAF5	55.6 dB
LAF10	53.1 dB
LAF50	47.3 dB
LAF90	45.1 dB
LAF95	44.7 dB
LAF99	44.2 dB

Calibration Information

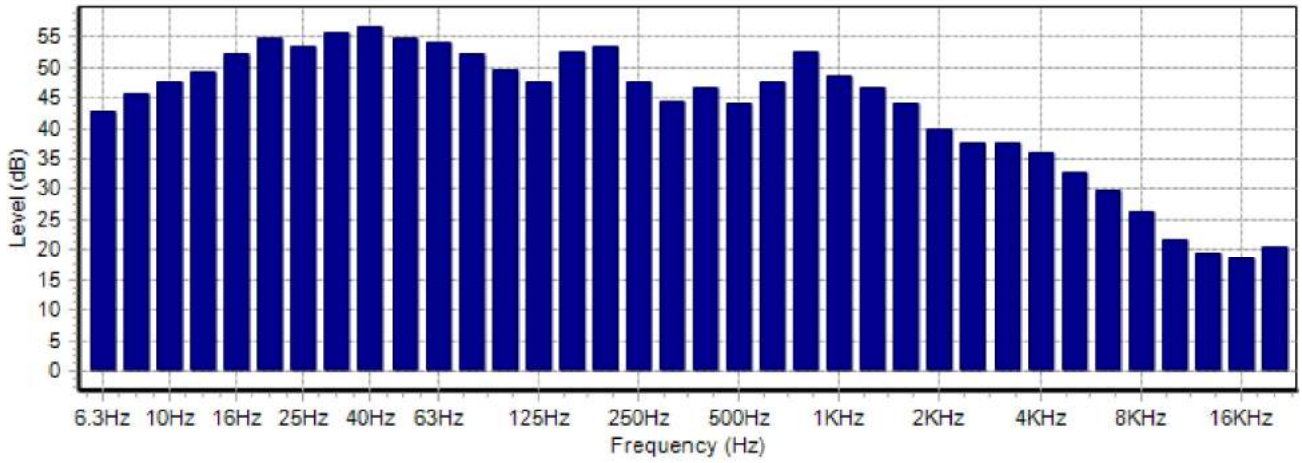
10/9/2016 7:52:32 PM	-0.26 dB
10/10/2016 10:55:10 PM	-0.40 dB

Time History



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Frequency Bands



EPA Export 10/12/2016 14:00:56

Cirrus Research plc

Measurement Summary Report

Name	NSL2 Daytime #3
Time	10/10/2016 6:33:01 PM
Duration	00:15:00
Instrument	GO56143, CR:171B

Summary

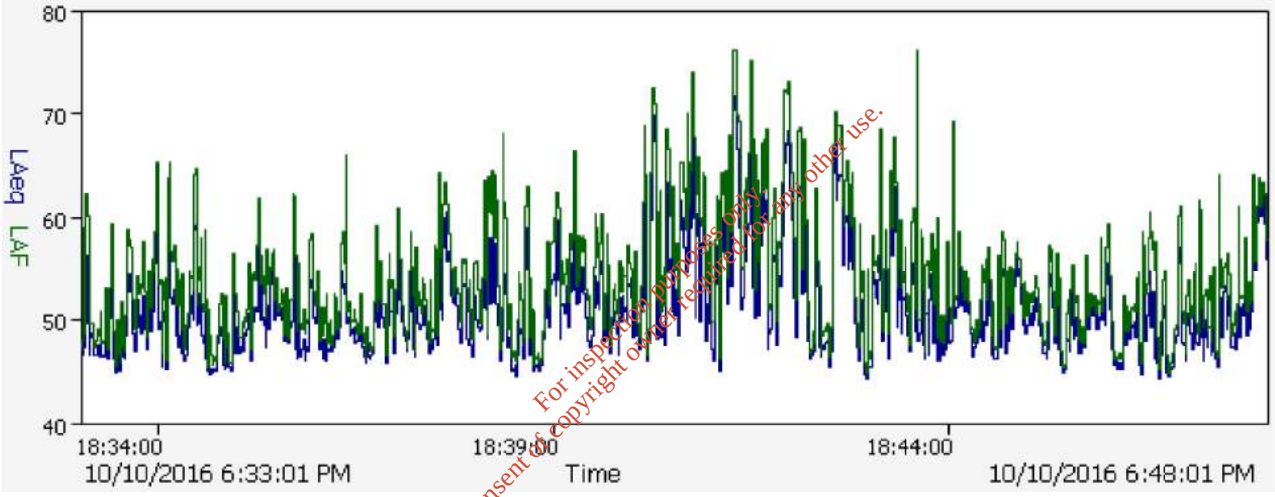
LAeq	55.7 dB
LAE	85.2 dB
LAFMax	76.1 dB

LAF1	67.6 dB
LAF5	61.2 dB
LAF10	57.4 dB
LAF50	49.3 dB
LAF90	45.7 dB
LAF95	45.2 dB
LAF99	44.5 dB

Calibration Information

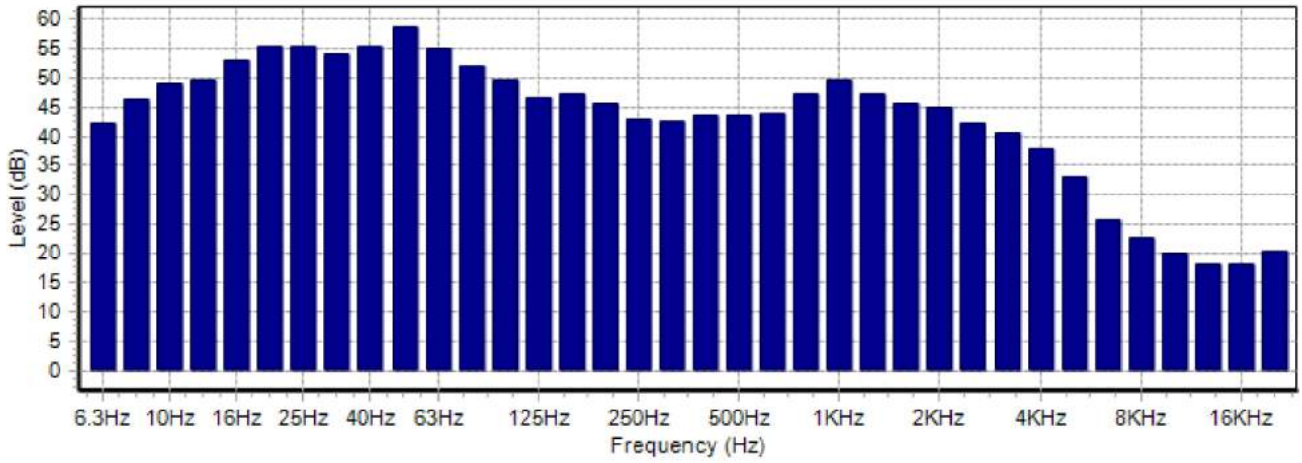
10/9/2016 7:52:32 PM	-0.26 dB
10/10/2016 10:55:10 PM	-0.40 dB

Time History



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Frequency Bands

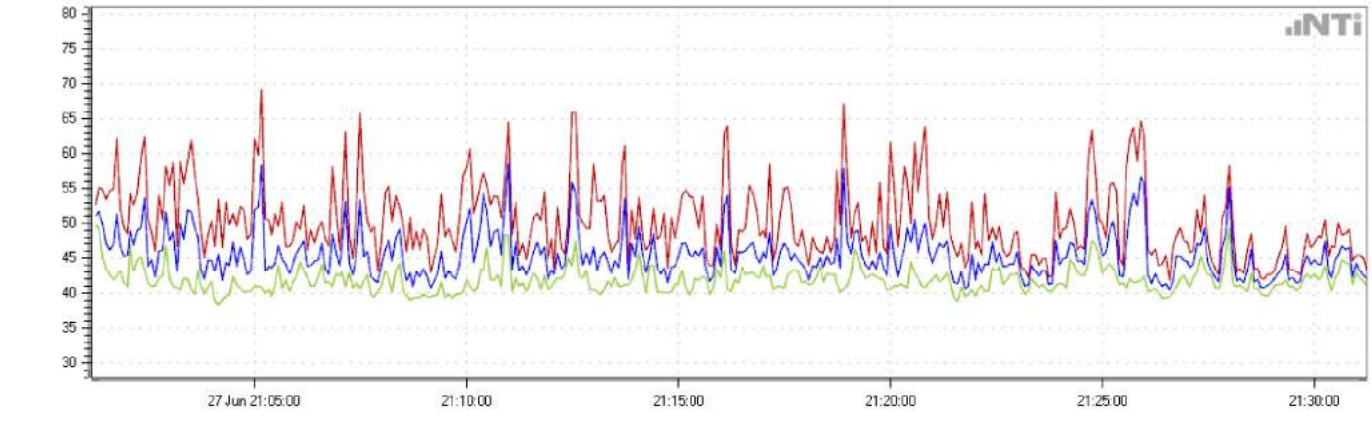


EPA Export 10/12/2016 14:00:56

NSL2 Evening

Start: 2016-06-27 21:01:14

End: 2016-06-27 21:31:14





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Configuration

Device Info:	XL2, SNo. A2A-08898-E0, FW3.03
Mic Type:	NTi Audio M2230, SNo. 5062, User calibrated 2016-06-27 21:00
Mic Sensitivity:	43.8 mV/Pa
Range:	20 - 120 dB
LN based on:	LAeq_dt

Results

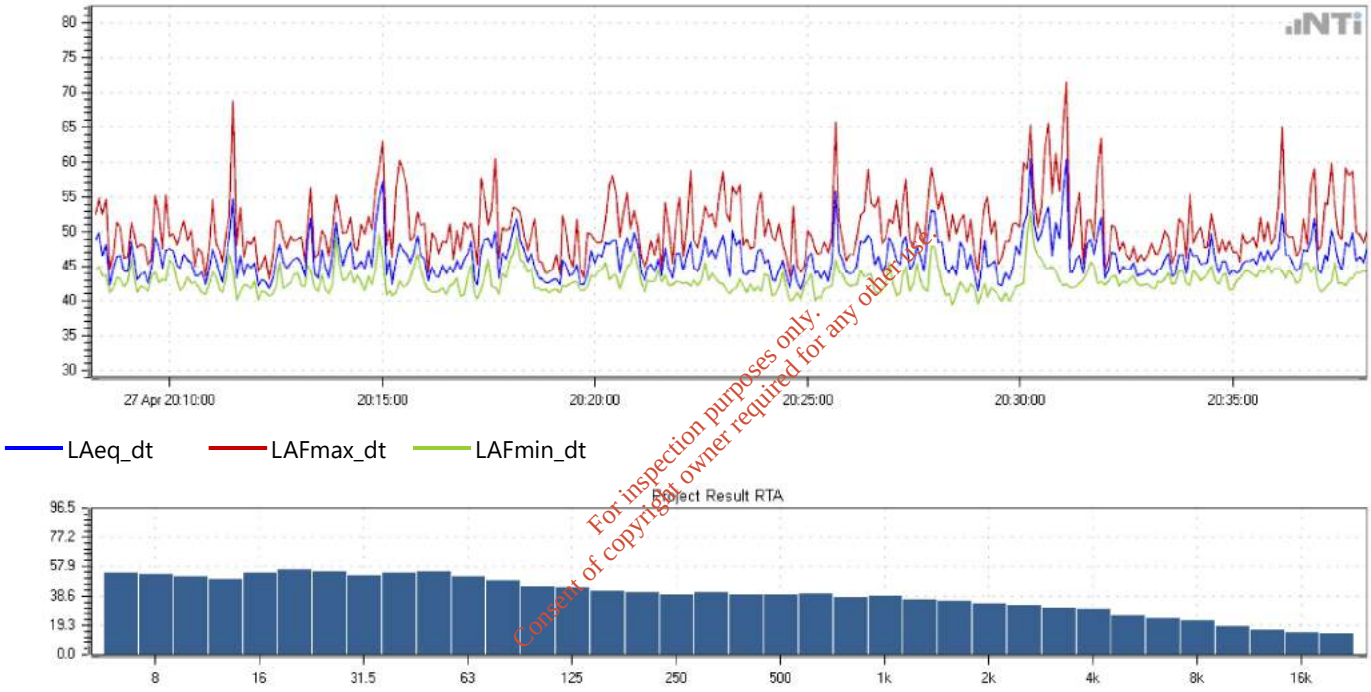
Type	Start Date and Time	Duration	LAeq [dB]	LAFmax [dB]	LAFmin [dB]	L 10.0 % [dB]	L 90.0 % [dB]
Recorded		**00:30:00**	**47.4**	**69.2**	**38.3**		
Project Result		**00:30:00**	**47.4**	**69.2**	**38.3**	**49.2**	**41.1**

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NSL2 Evening

Start: 2017-04-27 20:08:10

End: 2017-04-27 20:38:10



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Configuration

Device Info:	XL2, SNo. A2A-08898-E0, FW3.12
Mic Type:	NTi Audio M2230, SNo. 5062, User calibrated 2017-04-27 18:34
Mic Sensitivity:	43.6 mV/Pa
Range:	20 - 120 dB
LN based on:	LAeq_dt

Results

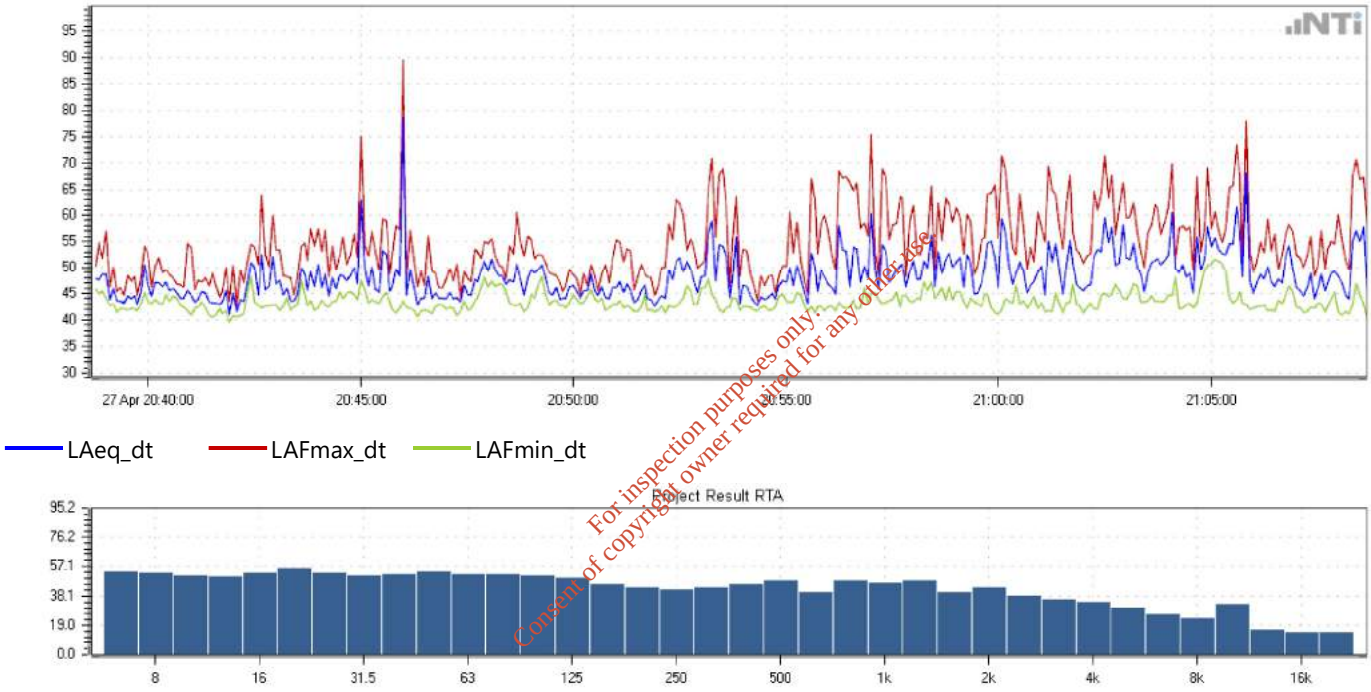
Type	Start Date and Time	Duration	LAeq [dB]	LAFmax [dB]	LAFmin [dB]	L 10.0 % [dB]	L 90.0 % [dB]
Recorded		**00:30:00**	**47.6**	**71.5**	**39.5**		
Project Result		**00:30:00**	**47.6**	**71.5**	**39.5**	**49.6**	**42.4**

For inspection purposes only.
Consent of copyright owner required for any other use.

NSL2 Evening

Start: 2017-04-27 20:38:40

End: 2017-04-27 21:08:40



For inspection purposes only.
Consent of copyright owner required for any other use.

Configuration

Device Info:	XL2, SNo. A2A-08898-E0, FW3.12
Mic Type:	NTi Audio M2230, SNo. 5062, User calibrated 2017-04-27 18:34
Mic Sensitivity:	43.6 mV/Pa
Range:	20 - 120 dB
LN based on:	LAeq_dt

Results

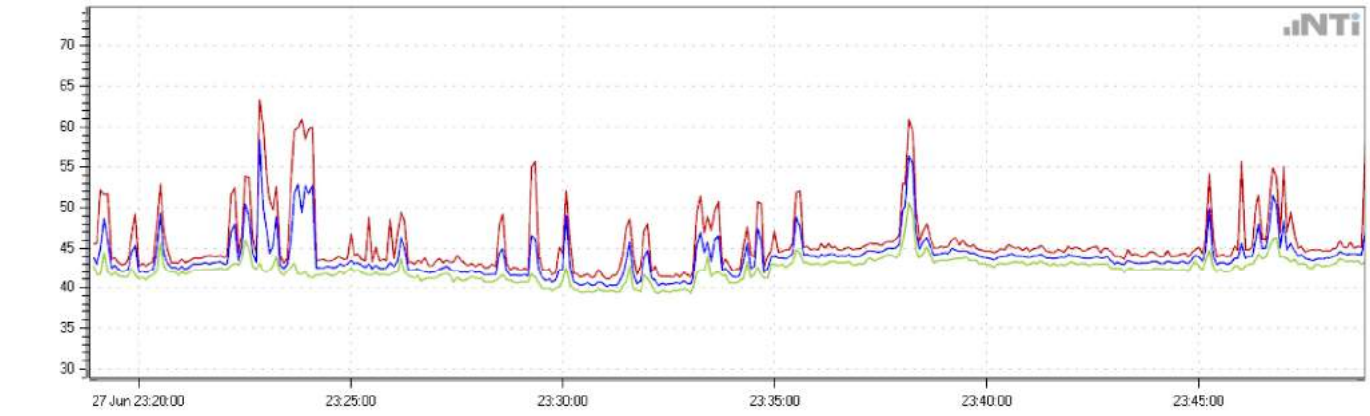
Type	Start Date and Time	Duration	LAeq [dB]	LAFmax [dB]	LAFmin [dB]	L 10.0 % [dB]	L 90.0 % [dB]
Recorded		**00:30:00**	**55.3**	**89.6**	**39.6**		
Project Result		**00:30:00**	**55.3**	**89.6**	**39.6**	**51.6**	**42.8**

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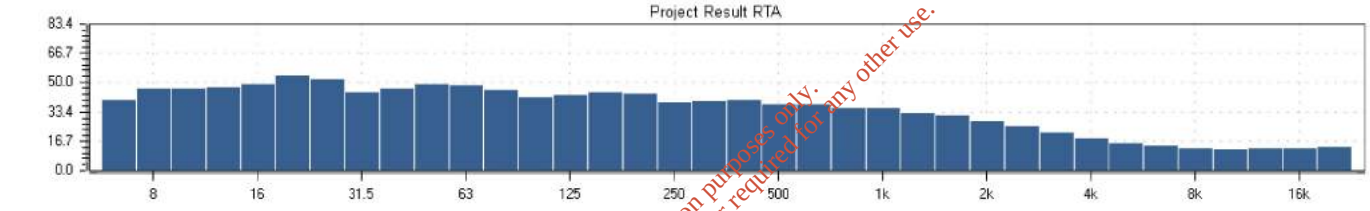
NSL2 Night

Start: 2016-06-27 23:18:54

End: 2016-06-27 23:48:54



LAeq_dt LAFmax_dt LAFmin_dt



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Configuration

Device Info:	XL2, SNo. A2A-08898-E0, FW3.03
Mic Type:	NTi Audio M2230, SNo. 5062, User calibrated 2016-06-27 21:00
Mic Sensitivity:	43.8 mV/Pa
Range:	20 - 120 dB
LN based on:	LAeq_dt

Results

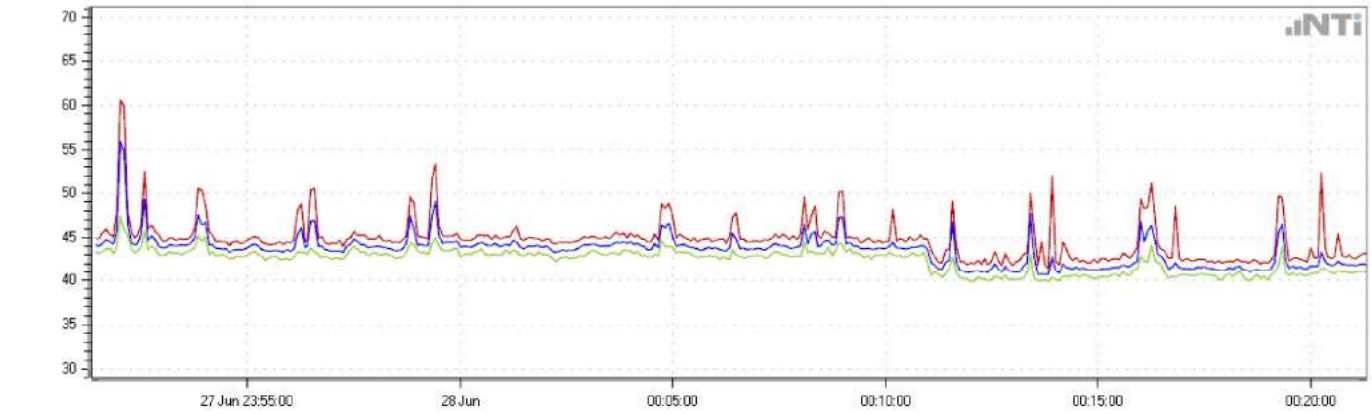
Type	Start Date and Time	Duration	LAeq [dB]	LAFmax [dB]	LAFmin [dB]	L 10.0 % [dB]	L 90.0 % [dB]
Recorded		**00:30:00**	**45.0**	**63.3**	**39.3**		
Project Result		**00:30:00**	**45.0**	**63.3**	**39.3**	**45.6**	**41.3**

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NSL2 Night

Start: 2016-06-27 23:51:20

End: 2016-06-28 00:21:20





For inspection purposes only.
Consent of copyright owner required for any other use.

Configuration

Device Info:	XL2, SNo. A2A-08898-E0, FW3.03
Mic Type:	NTi Audio M2230, SNo. 5062, User calibrated 2016-06-27 21:00
Mic Sensitivity:	43.8 mV/Pa
Range:	20 - 120 dB
LN based on:	LAeq_dt

Results

Type	Start Date and Time	Duration	LAeq [dB]	LAFmax [dB]	LAFmin [dB]	L 10.0 % [dB]	L 90.0 % [dB]
Recorded		**00:30:00**	**44.1**	**60.6**	**39.9**		
Project Result		**00:30:00**	**44.1**	**60.6**	**39.9**	**45.1**	**41.3**

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Measurement Summary Report

Name	NSL2 Night time #1
Time	10/10/2016 11:00:03 PM
Duration	00:15:00
Instrument	GO56143, CR:171B

Summary

LAeq	46.5 dB
LAE	76.0 dB
LAFMax	56.2 dB

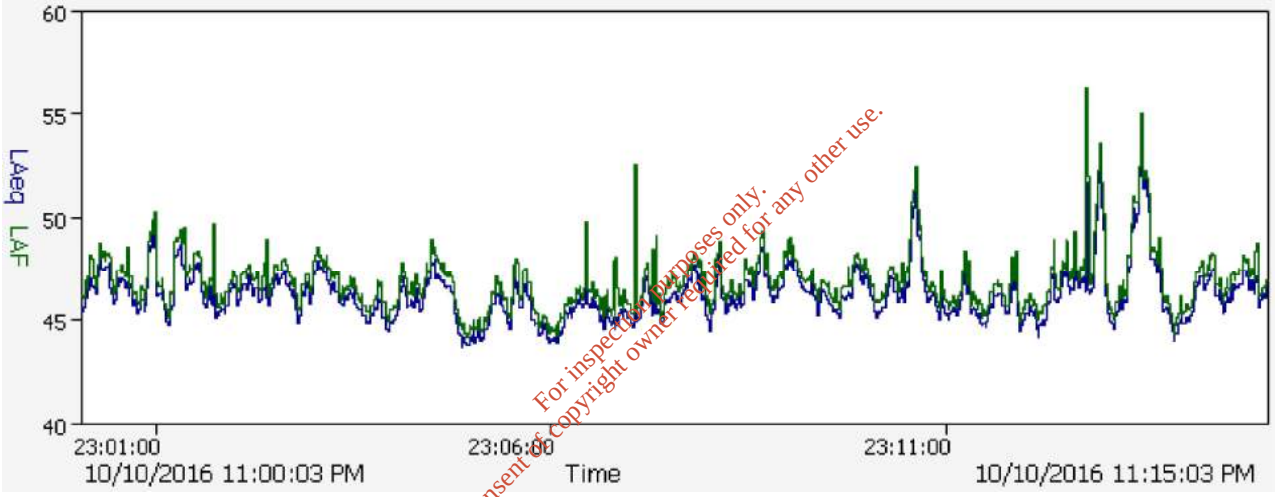
LAF1	51.4 dB
LAF5	48.2 dB
LAF10	47.5 dB
LAF50	46.0 dB
LAF90	44.8 dB
LAF95	44.4 dB
LAF99	43.8 dB

Calibration Information

10/10/2016 10:55:10 PM -0.40 dB

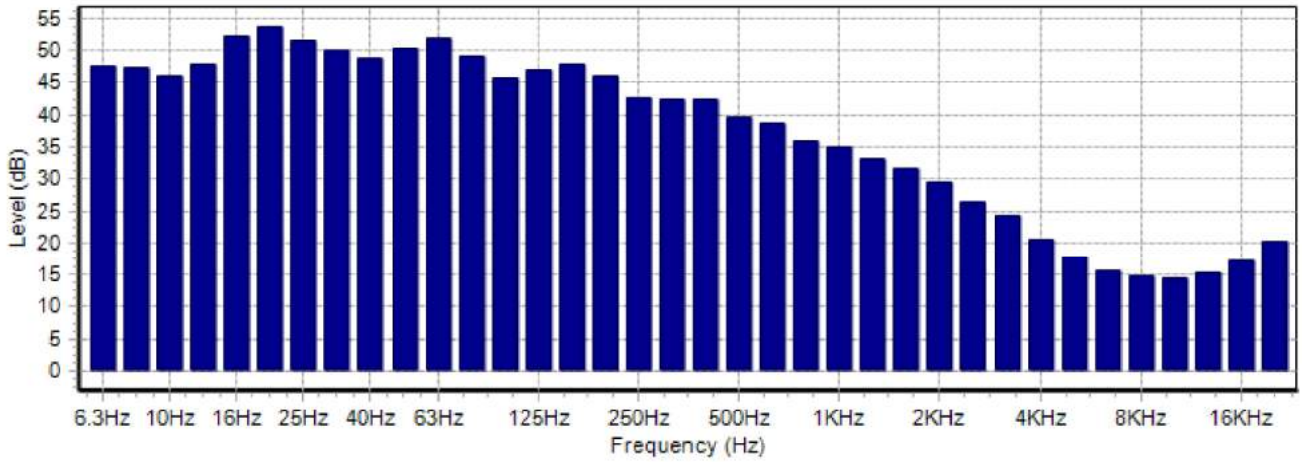
10/11/2016 1:12:04 PM -0.31 dB

Time History



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Frequency Bands



EPA Export 10/11/2016 14:00:56

Cirrus Research plc

Measurement Summary Report

Name	NSL2 Night time #2
Time	10/10/2016 11:15:47 PM
Duration	00:15:00
Instrument	GO56143, CR:171B

Summary

LAeq	44.3 dB
LAE	73.8 dB
LAFMax	55.8 dB

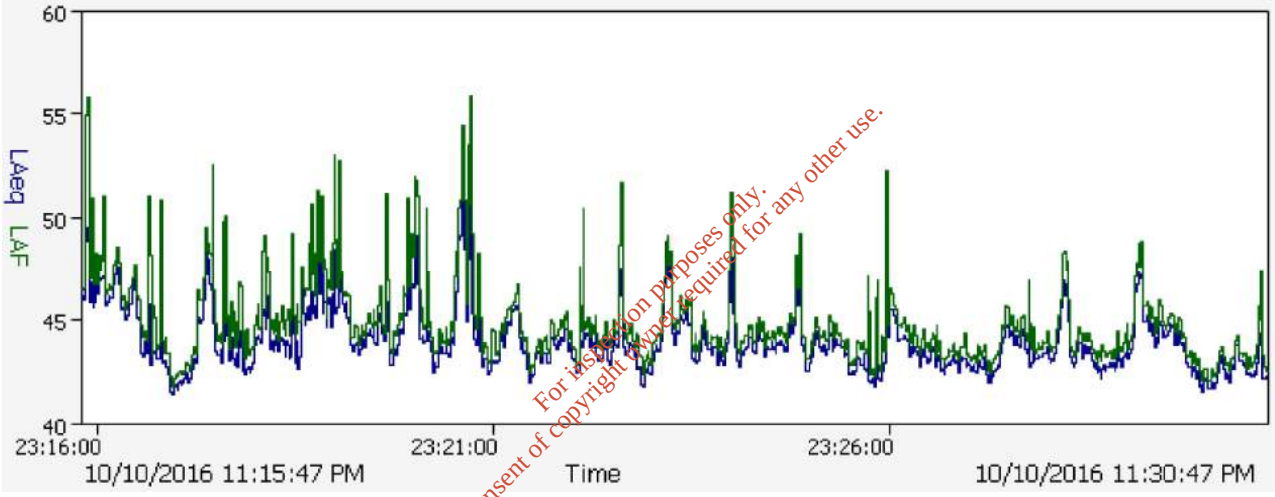
LAF1	49.2 dB
LAF5	46.8 dB
LAF10	45.9 dB
LAF50	43.6 dB
LAF90	42.3 dB
LAF95	42.0 dB
LAF99	41.5 dB

Calibration Information

10/10/2016 10:55:10 PM -0.40 dB

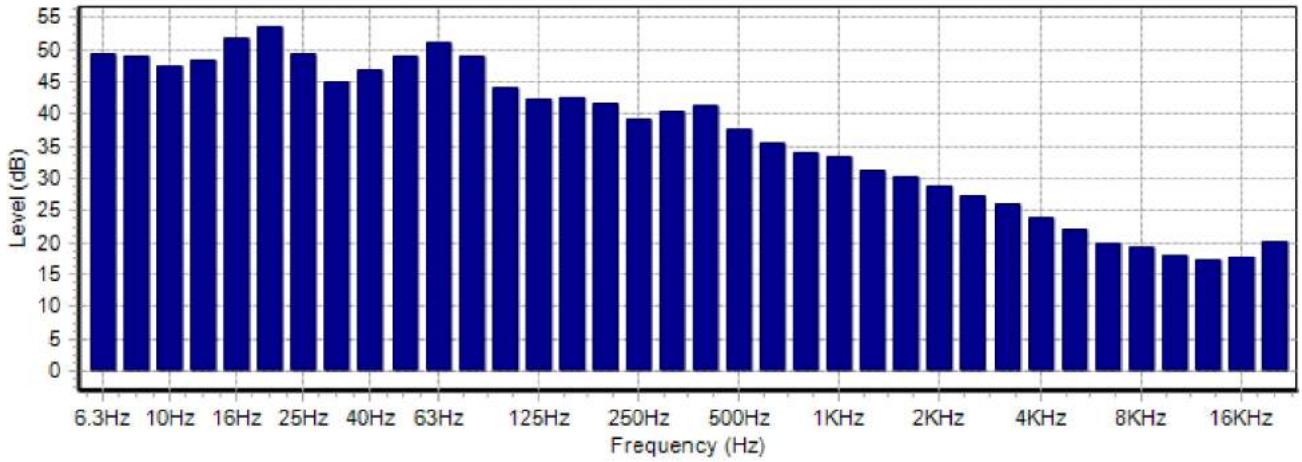
10/11/2016 1:12:04 PM -0.31 dB

Time History



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Frequency Bands

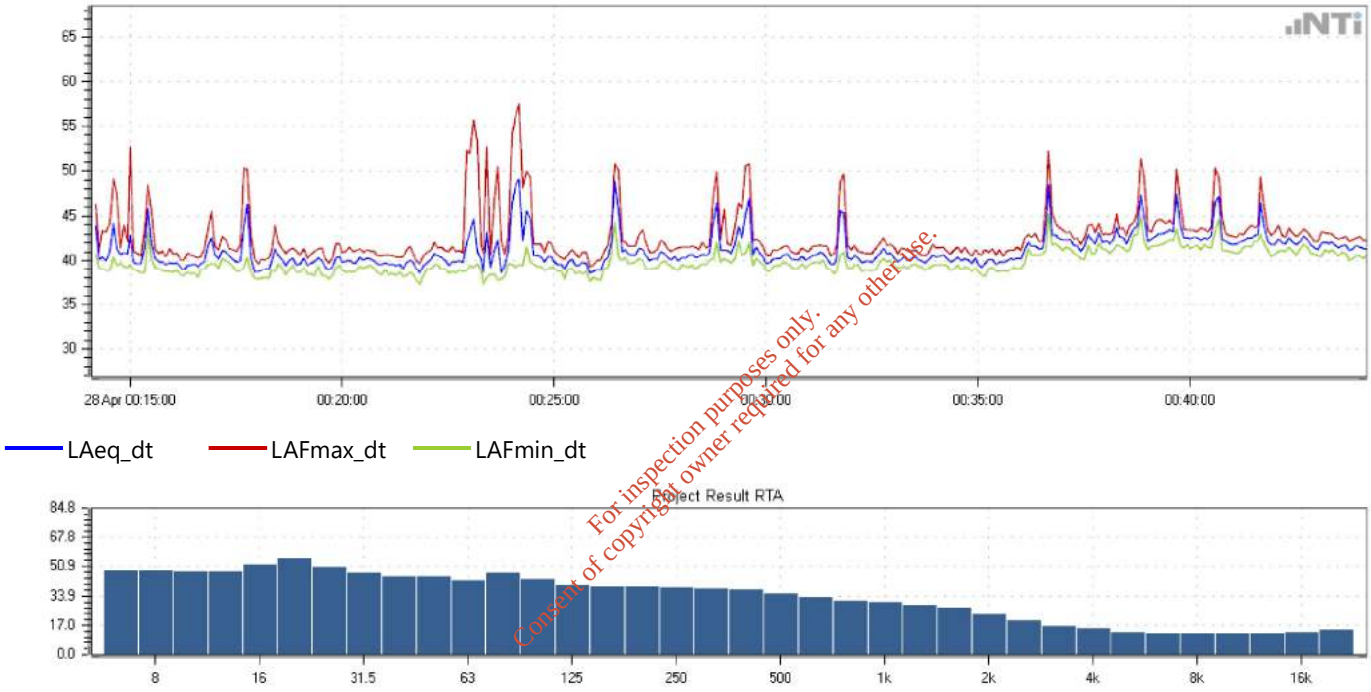


EPA Export 10/11/2016 14:00:56

NSL2 Night

Start: 2017-04-28 00:14:06

End: 2017-04-28 00:44:06



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Configuration

Device Info:	XL2, SNo. A2A-08898-E0, FW3.12
Mic Type:	NTi Audio M2230, SNo. 5062, User calibrated 2017-04-27 22:17
Mic Sensitivity:	43.4 mV/Pa
Range:	20 - 120 dB
LN based on:	LAeq_dt

Results

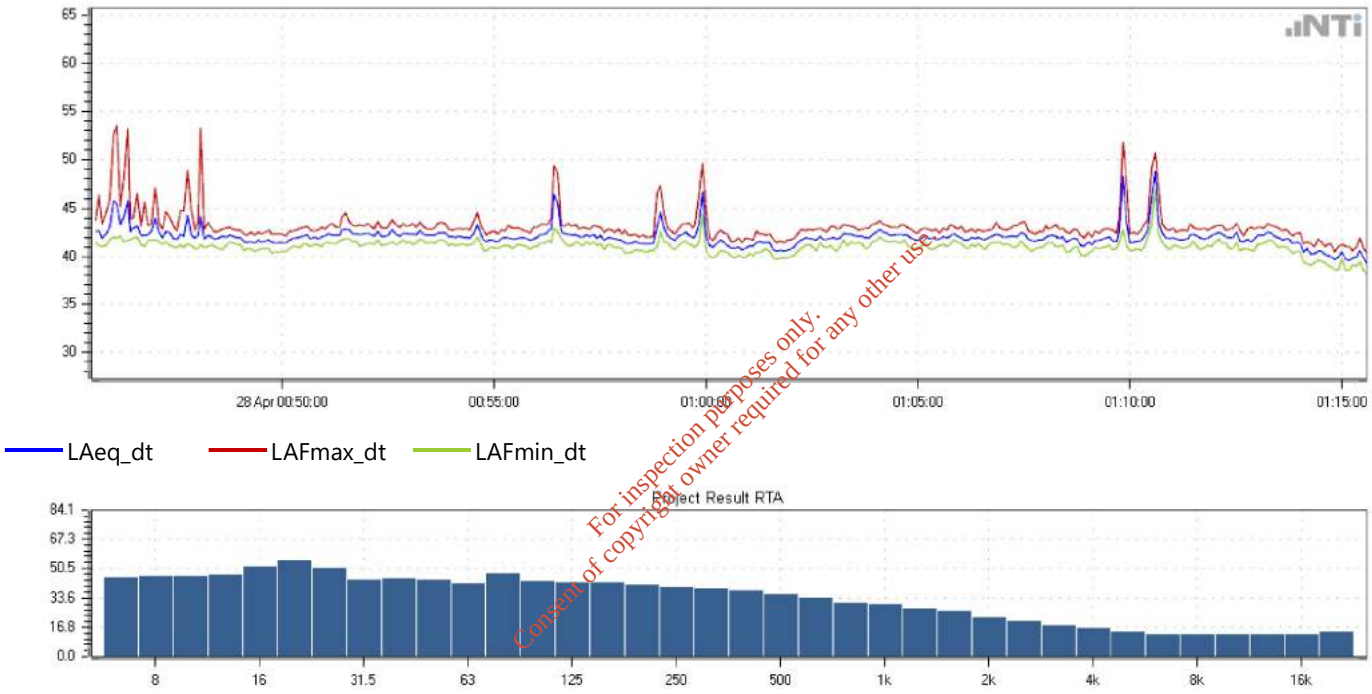
Type	Start Date and Time	Duration	LAeq [dB]	LAFmax [dB]	LAFmin [dB]	L 10.0 % [dB]	L 90.0 % [dB]
Recorded		**00:30:00**	**41.6**	**57.5**	**37.2**		
Project Result		**00:30:00**	**41.6**	**57.5**	**37.2**	**43.1**	**39.3**

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NSL2 Night

Start: 2017-04-28 00:45:34

End: 2017-04-28 01:15:34



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Configuration

Device Info:	XL2, SNo. A2A-08898-E0, FW3.12
Mic Type:	NTi Audio M2230, SNo. 5062, User calibrated 2017-04-27 22:17
Mic Sensitivity:	43.4 mV/Pa
Range:	20 - 120 dB
LN based on:	LAeq_dt

Results

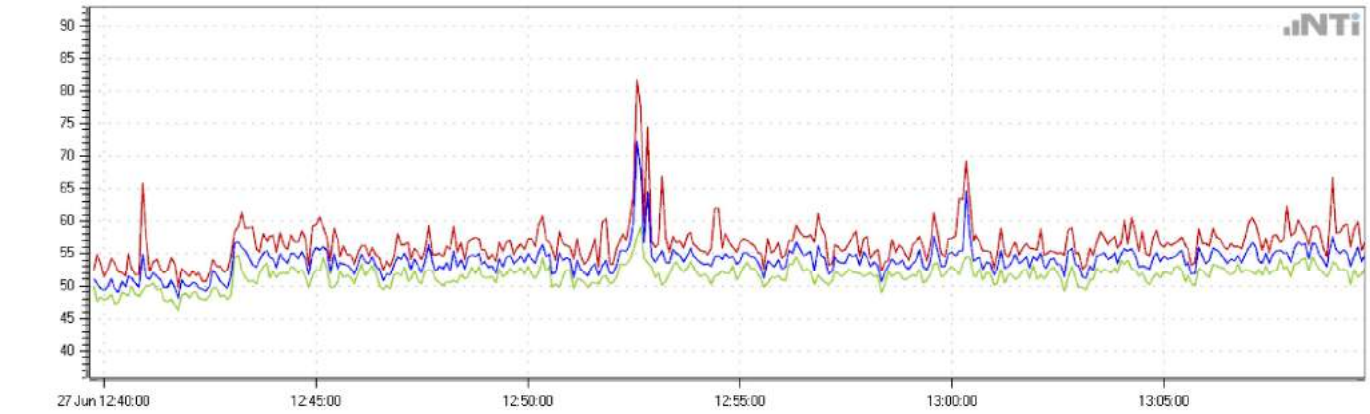
Type	Start Date and Time	Duration	LAeq [dB]	LAFmax [dB]	LAFmin [dB]	L 10.0 % [dB]	L 90.0 % [dB]
Recorded		**00:30:00**	**42.1**	**53.6**	**37.9**		
Project Result		**00:30:00**	**42.1**	**53.6**	**37.9**	**42.9**	**40.9**

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NSL3 Day

Start: 2016-06-27 12:39:44

End: 2016-06-27 13:09:44





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Configuration

Device Info:	XL2, SNo. A2A-08898-E0, FW3.03
Mic Type:	NTi Audio M2230, SNo. 5062, User calibrated 2016-06-27 12:38
Mic Sensitivity:	44.1 mV/Pa
Range:	20 - 120 dB
LN based on:	LAeq_dt

EPA Export 15-11-2018:04:00:56

Results

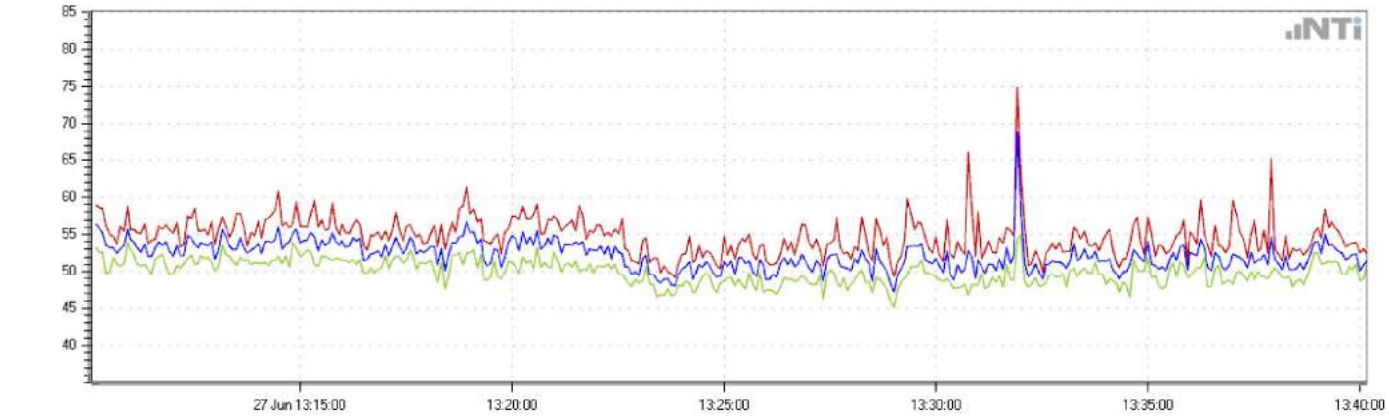
Type	Start Date and Time	Duration	LAeq [dB]	LAFmax [dB]	LAFmin [dB]	L 10.0 % [dB]	L 90.0 % [dB]
Recorded		**00:30:00**	**55.2**	**81.7**	**46.1**		
Project Result		**00:30:00**	**55.2**	**81.7**	**46.1**	**56.3**	**50.9**

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NSL3 Day

Start: 2016-06-27 13:10:06

End: 2016-06-27 13:40:06



LAeq_dt LAFmax_dt LAFmin_dt



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Configuration

Device Info:	XL2, SNo. A2A-08898-E0, FW3.03
Mic Type:	NTi Audio M2230, SNo. 5062, User calibrated 2016-06-27 12:38
Mic Sensitivity:	44.1 mV/Pa
Range:	20 - 120 dB
LN based on:	LAeq_dt

EPA Export 15-11-2018:04:00:56

Results

Type	Start Date and Time	Duration	LAeq [dB]	LAFmax [dB]	LAFmin [dB]	L 10.0 % [dB]	L 90.0 % [dB]
Recorded		**00:30:00**	**53.1**	**74.8**	**45.2**		
Project Result		**00:30:00**	**53.1**	**74.8**	**45.2**	**54.9**	**49.4**

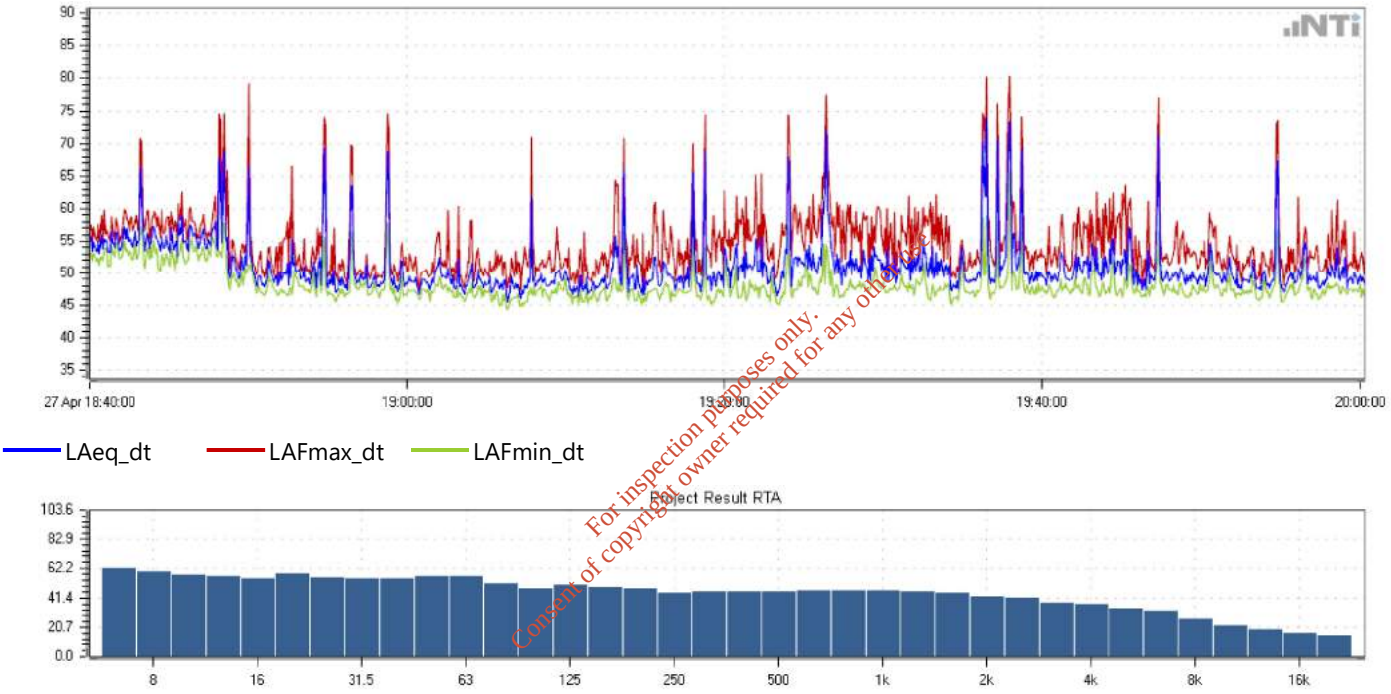
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NSL3 Evening

Start: 2017-04-27 18:40:00

End: 2017-04-27 20:00:15.8

Note: Evening from 19.00 hrs



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Configuration

Device Info:	XL2, SNo. A2A-08898-E0, FW3.12
Mic Type:	NTi Audio M2230, SNo. 5062, User calibrated 2017-04-27 18:34
Mic Sensitivity:	43.6 mV/Pa
Range:	20 - 120 dB
LN based on:	LAeq_dt

Results

Type	Start Date and Time	Duration	LAeq [dB]	LAFmax [dB]	LAFmin [dB]	L 10.0 % [dB]	L 90.0 % [dB]
Recorded		**01:20:15.8**	**55.4**	**80.3**	**44.3**		
Project Result		**01:20:15.8**	**55.4**	**80.3**	**44.3**	**55.4**	**47.3**

Audit Intervals

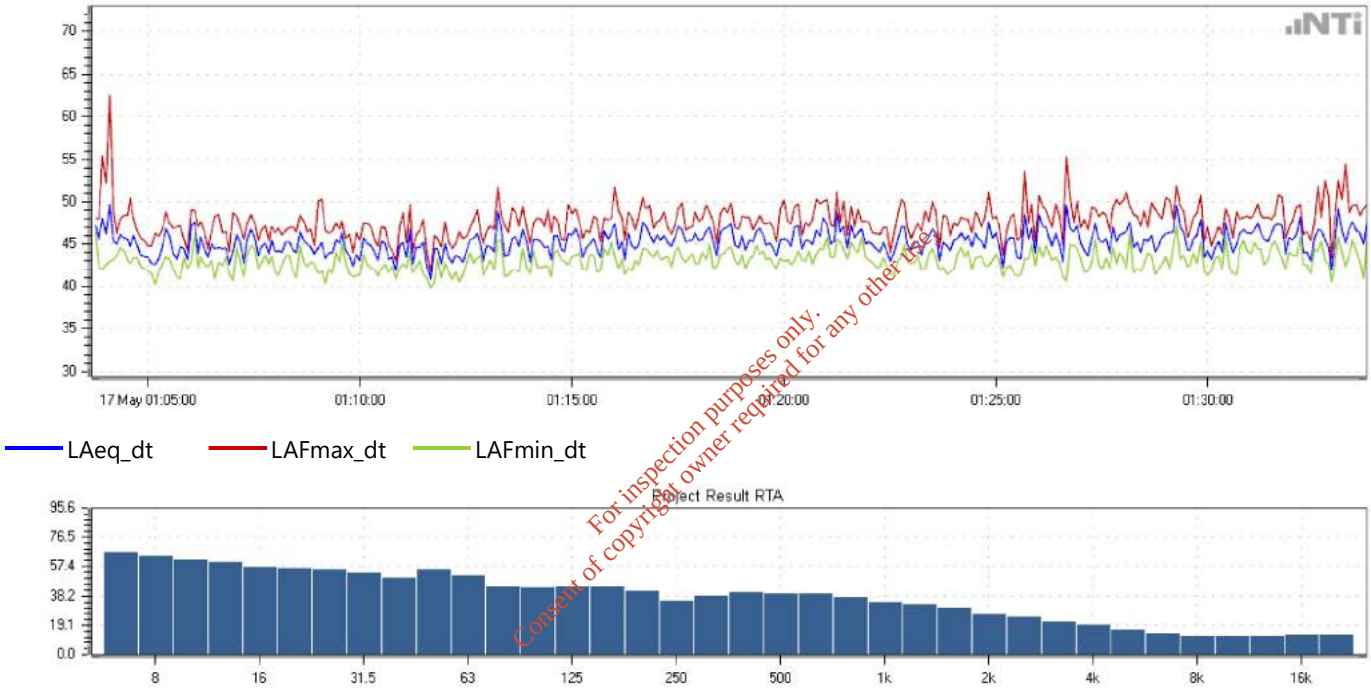
Type	Start Date and Time	Duration	LAeq [dB]	LAFmax [dB]	LAFmin [dB]	L 10.0 % [dB]	L 90.0 % [dB]
30'	**2017-04-27 18:30:00**	**00:20:00**	**56.1**	**79.1**	**45.3**	**57.0**	**47.8**
30'	**2017-04-27 19:00:00**	**00:30:00**	**53.6**	**77.4**	**44.3**	**53.1**	**46.8**
30'	**2017-04-27 19:30:00**	**00:30:00**	**56.4**	**80.3**	**45.2**	**53.9**	**47.5**
30'	**2017-04-27 20:00:00**	**00:00:15.8**	**48.8**	**53.2**	**46.2**	**50.6**	**47.0**

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NSL3 Night

Start: 2017-05-17 01:03:44

End: 2017-05-17 01:33:44



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Configuration

Device Info:	XL2, SNo. A2A-08898-E0, FW3.12
Mic Type:	NTi Audio M2230, SNo. 5062, User calibrated 2017-05-16 22:50
Mic Sensitivity:	43.4 mV/Pa
Range:	20 - 120 dB
LN based on:	LAeq_dt

Results

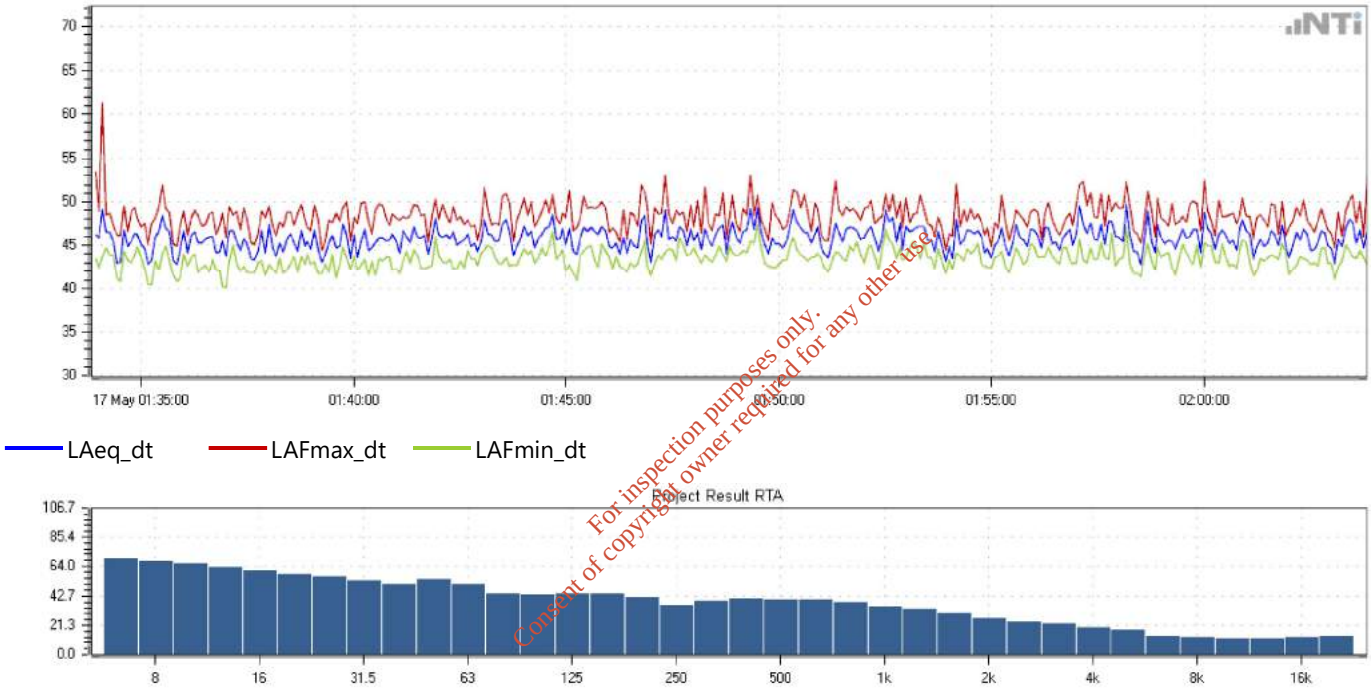
Type	Start Date and Time	Duration	LAeq [dB]	LAFmax [dB]	LAFmin [dB]	L 10.0 % [dB]	L 90.0 % [dB]
Recorded		**00:30:00**	**45.6**	**62.5**	**39.8**		
Project Result		**00:30:00**	**45.6**	**62.5**	**39.8**	**47.6**	**42.8**

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NSL3 Night

Start: 2017-05-17 01:33:50

End: 2017-05-17 02:03:50



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Configuration

Device Info:	XL2, SNo. A2A-08898-E0, FW3.12
Mic Type:	NTi Audio M2230, SNo. 5062, User calibrated 2017-05-16 22:50
Mic Sensitivity:	43.4 mV/Pa
Range:	20 - 120 dB
LN based on:	LAeq_dt

Results

Type	Start Date and Time	Duration	LAeq [dB]	LAFmax [dB]	LAFmin [dB]	L 10.0 % [dB]	L 90.0 % [dB]
Recorded		**00:30:00**	**46.0**	**61.3**	**40.1**		
Project Result		**00:30:00**	**46.0**	**61.3**	**40.1**	**48.1**	**43.4**

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ATTACHMENT J

TRAFFIC IMPACT ASSESSMENT

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TIPPERARY CO-OPERATIVE CREAMERY LTD.

PROPOSED DRYER 2 FACILITY

TRAFFIC REPORT

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JUNE 2017

MRG consulting engineers

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MRG Consulting Engineers **Civil Structural Architectural Environmental**

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- Post Development Heavy Goods Vehicular (HGV) Traffic

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5.0 Conclusions

Appendix A - Drawing No. 116020- 202 Site Layout Plan (A3)

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Revision Control Table

For & On Behalf of MRG Consulting Engineers Limited				
Rev.	**Status**	**Prepared By**	**Checked By**	**Date**
0	Draft Planning Issue	T. Horan	C. Sheehy	30th July 2016
1	Planning Issue	T. Horan	C. Sheehy	12th August 2016
2	Revised Planning Issue	T. Horan	C. Sheehy	20th August 2017

Admin/Templates/RCT - Rev 2

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1.0. Introduction

The operation of the milk processing facility at Tipperary Co-Operative Creamery Ltd. generates heavy goods vehicular traffic involved in the delivery of milk to its plant at Station Road, Tipperary Town site for processing and in the dispatch from site of products produced on the site including milk powder, milk based concentrates, butter and cheese products. Some heavy goods vehicular traffic is also generated in the delivery of goods such as fuel and detergents as required for plant operation and maintenance. Other traffic generated by the plant operation comprises cars and light commercial vehicles used by staff, visitors to the site and contractors involved in occasional maintenance works at the site.

The development proposed comprises the construction of a new milk drying facility referred to as "Dryer 2" which will be located on the Tipperary Co-Operative Creamery site at Station Road. The development will comprise the following main elements;

a) construction of the "Dryer 2" building to accommodate new dryer and associated utility plant with upper floors and platforms provided at various levels within the building to support and facilitate access to the new plant systems;

b) upgrade works to existing on-site waste water treatment plant;

c) Demolition works to facilitate construction of the new dryer building including partial demolition of an existing powder warehouse building, demolition of existing butter store building and removal of disused storage tanks together with associated bund structure and canopy roof structure over.

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The development is required to enable Tipperary Co Operative Creamery Ltd. to continue to produce milk powders to the increasing standards of the milk processing industry and to allow the company to move towards the production of higher value milk powders. The proposed plant development forms part of the Tipperary Co – Op's plan to maintain competitiveness and sustain the viability of the company into the future.

Current peak milk processing capacity at the Tipperary Co-Op site is approximately 1.62 million litres of milk per day. These products produced comprise Cheese, Butter, Milk powders and Milk Concentrates. Post development peak processing capacity is projected at 1.97 million litres of milk per day based upon a similar range of products but including increased volumes of milk powders.

The development will result in some increases in the levels of HGV traffic to and from the site, mainly associated with the delivery of milk equivalent product to the site and with the dispatch of final product from the site. The development will also result in some increases in employment levels at the plant with some consequent increase in light vehicular traffic accessing and exiting the site.

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This report contains details of existing traffic levels generated by current milk processing operations at the site and of projected increases in these levels post development of the Dryer 2 Facility together with an assessment of any impacts of such increases on the public road system.

2.0. Methodology

The information provided in this report is based on surveys of traffic movements and parking facilities at the Tipperary Co-Operative Creamery site at Station Road, Tipperary Town undertaken by MRG Consulting Engineers Ltd. Details of the numbers of inward and outward heavy goods vehicle movements to and from the site are based on records maintained at the security control and truck weighbridge control office at the site. A check count on HGV traffic levels was also carried out at the Abbey Street/Bridge Street/Station Road Junction on the 4th August 2016. Details in relation to staffing levels at the site were provided by Tipperary Co-Operative Creamery Ltd.

3.0. Description of Existing Conditions

3.1 Existing Road Network

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Tipperary Town itself is located on the N24 (Waterford – Limerick) National Primary Route which enters the town from the southeast along the Bansha Road to its junction with the N74 (Tipperary Town – Cashel) National Secondary Route, then runs west along Main Street before turning north west onto Church Street at its junction with O'Brien Street (R515 – Emly Road). The town is connected to the Cork- Dublin M8 Motorway via the N24 at Cahir, c.20km south east of the town and via the N74 at Cashel c.20km to the east. It is connected to the M7 Limerick- Dublin Motorway via the N24 c.35km to the north west of the town.

The existing Tipperary Cooperative Creamery site is located just south of Tipperary Town centre, and is bounded to the east by Station Road on the R664 Regional Road which connects the village of Aherlow to the town. The R664 connects to the N24 via Bridge Street at Main Street c.200m to the north of the site entrance on Station Road.

The Bridge Street/Abbey Street/Station Road T- Junction is located to the north of the Tipperary Co Operative Creamery site entrance on Station Road. The majority of both the HGV and other traffic heading to the Tipperary Co Op site comes through this junction either coming south along Bridge Street from its junction with the N24 at Main Street and straight through the junction, or coming west along Abbey Street from its junction with the N24 at the Bansha Road to turn left at the junction onto Station Road. Similarly, the majority of HGV traffic leaving the Tipperary Co Op site goes through this junction either heading north/straight through the junction to Bridge Street or turning right at the junction to head east along Abbey Street.

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The current layout of this existing T- junction is such that the available turning radii between Abbey Street and Bridge Street/Station Road are somewhat constrained. In particular it is noted that the turning movement of HGV's turning left onto Abbey Street from Bridge Street can be restricted by vehicles queuing on the Abbey Street approach to the junction resulting in some potential for traffic disruption on Bridge Street. However, it is noted that such movements are not associated with or relevant to HGV traffic travelling to or from the Tipperary Co Op site.

Right turning HGV movements from Station Road to Abbey Street appear to operate satisfactorily in the presence of queuing traffic on the Abbey Street approach to the junction. Similarly left turning HGV movements from Abbey Street onto Station Road appear to operate satisfactorily although there is a potential risk of some restriction to this movement being caused by the presence of traffic in the northbound lane on Station Road. It would appear however that the junction stop line on the Abbey Street approach and the availability of good sightlines between Abbey Street and Station Road mitigates this risk and that traffic flows generally operate satisfactorily between Abbey Street and Station Road.

3.2 Access to the Site

All vehicular access and exit movements to and from the Tipperary Co-Operative Creamery site are via the main entrance on Station Road. Inward and outward movements of all vehicles including HGV's, cars and light commercial vehicles is controlled by security barriers which are set back a distance of approximately 20 metres from the near carriageway edge on Station Road. HGV deliveries and dispatches are recorded at a weighbridge facility located within the site as shown on Drg No. 116020- 202 enclosed in Appendix A.

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Pedestrian access to the site for staff and visitors is via reception facilities contained in the Office and Administration Building located on Station Road at the north side of the vehicular entrance. Pedestrian access for authorised staff is also provided at an access controlled gate located to the south side of the Office/Administration Building.

3.2 Car Parking Facilities

The main car park facility serving the Tipperary Co-Operative Creamery plant is located at the west end of the site as shown on Drawing No. 116020- 02 enclosed. The car park contains 76no. spaces and is available for staff and for use by maintenance contractors visiting the site. A set down area for HGV's is provided at the north end of this car park which can accommodate up to 10no. trucks, trailers or containers.

A further 10no. car parking spaces are provided within the site in the vicinity of the site entrance with 8no. of these spaces provided at the front of the Butter Plant Building and the remaining 2no. provided adjacent to the entrance at its northern side.

There are also some car spaces provided external to the site comprising an off-road visitor car park on the south side of the site entrance on Station Road and some roadside perpendicular car spaces on Station Road in front of the Packaging/ Workshop Building immediately to the south of the visitor car park. There are 14no spaces provided in the visitor car park and a 10no. spaces provided in the roadside parking area.

The total car parking provision for staff and visitors is thus 110no. spaces.

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3.3 Existing Staff Details and Parking Provision

The total no. of staff and management personnel employed at the Tipperary Co Operative site is 107no. of which approximately 20% comprise management and administration staff with the remaining 80% comprising staff involved in production, quality control and plant maintenance activities. The breakdown of staff and management numbers involved in shift work and normal day working hours across a 24hour/full day period is summarised as follows;

Day workers normally working between 8.00am and 6.00pm – 71no.

Shift workers working from 6.00am to 2.00pm – 13no.

Shift workers working from 2.00pm to 10.00pm – 13no.

Shift workers working from 10.00pm to 6.00am – 10no.

The car parking provision for manufacturing facilities required under the Tipperary Town Plan 2013 is 0.5spaces per member of staff. On this basis the no. of spaces required would be 0.5(71 + 13) = 42no. spaces. The actual parking provision of 110no. spaces satisfies this criteria in full.

Check surveys by MRG in relation to daily car park usage during the months of April and May 2016 indicate a general maximum usage of approx. 70% or 60no. spaces of the total 86no. car spaces available for staff and external contractors. The resulting spare parking capacity is therefore in the order of 26no. spaces. Survey checks on the usage of the 14no. spaces in the visitor car park indicate that this car park is generally filled to between 50% and 75% by visitor traffic on a daily basis.

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The above surveys indicate that parking provision at the plant is adequate for current staff and maintenance contractors with a general spare capacity in the order of 26no. spaces. It is also evident that the visitor car park is adequately sized for the level of visitor traffic generated by the plant on a daily basis.

3.4 Post Development Staff Details and Parking Provision

The projected increases in staff levels as a result of the development of the Dryer 2 facility are relatively small reflecting the fact the new dryer plant is largely an automated plant system. Also, there will be no significant changes in arrangements for milk intake within the plant and for dispatch of final product from the plant which will remain largely in line with current arrangements.

The increases in staffing levels post development of the Dryer 2 Facility across shift work hours and during normal day working hours over a 24hour/full day period are summarised in the following table;

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Table 3.4

Working Hours	Current Staff No.	Additional Staff Post Dryer 2 Development	Total Staff Post Dryer 2 Development
Day workers normally working between 8.00am and 6.00pm	71no.	5no.	76no.
Shift workers working from 6.00am to 2.00pm	13no.	1no.	14no.
Shift workers working from 2.00pm to 10.00pm	13no.	1no.	14no.
Shift workers working from 10.00pm to 6.00am	10no.	1no.	11no.
Total	107no.	8no.	115no.

The above table indicates a maximum of 6no. additional staff on site during daytime hours post-development of the Dryer 2 facility. The no. of additional car parking spaces required based on the Tipperary Town Plan 2013 requirement of 0.5spaces per member of staff would thus be 3no. spaces. The no. of additional spaces already provided on site is 26no. as outlined above in Section 3.3 thus confirming that parking provision for additional staff is fully satisfied.

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3.5 Existing Heavy Goods Vehicular (HGV) Traffic

The number of inward and outward HGV movements to and from the Tipperary Co-Operative Creamery site per day varies depending on the available supply of milk, market demands and time of year. Processing activity at the plant is generally undertaken on a 24hour basis, 365 days a year.

Based on site records, the maximum number of HGV's entering the creamery site per day/24hour period at times of peak milk supply is 89 no. vehicles. The number of HGV's exiting the site over the same 24 hour period was also recorded at 89 no. vehicles. This would be consistent with the current peak processing capacity of the plant, identified as c.1.62 million litres of wholemilk/buttermilk per day, which equates to a total of 72 articulated tanker deliveries based on a capacity of 22,500 litres per tanker. The remaining movements would be those associated with articulated trucks collecting cheese and powder products, waste and delivery of packaging and other miscellaneous materials. It is noted that the number of HGV's entering the site during the off-peak milk supply period dropped to approximately 15no. vehicles per day.

A breakdown of the maximum no. of inward and outward HGV movements to and from the site over a 24hour day during the peak milk supply period based on site records is contained in the Table 3.2 overleaf. This table indicates that HGV movements occur from 1.00am in the morning to 10.00pm the following night. The table also indicates the following information in relation to HGV movements per hour;

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- The peak period for HGV deliveries to site is from 9.00am to 4.00pm each day which is consistent with the cycle of morning milk collection from milk suppliers. The table shows that the current total no. of HGV movements entering and leaving the site per hour between 9.00am and 4.00pm is in the range 10 no. to 17no. movements per hour.

- The number of HGV movements per hour entering and leaving the site between 8am and 9.00am is indicated at 6no. movements and between 4.00pm and 5.00pm is indicated at 9no. movements.

- Outside of the above periods there are movements per hour in the range 11no. to 14no. in the early morning period between 5.00am and 7.00am. In the late afternoon between 4.00pm and 5.00pm, 9no. movements indicated

- Before 5.00am in the morning and after 5.00pm in the evening, the numbers of movements per hour reduce significantly with a maximum rate of 5no. movements per hour indicated between 7.00pm and 8.00pm.

Table 3.5 : HGV Traffic Movements /Day during Peak Milk Supply Period

Times of HGV Entry & Exit to/from the TCC Site over 24 hour day	No. of HGV's entering the Site.	No. of HGV's leaving the Site.
0.00-1.00	0	0
1.00-2.00	1	1
2.00-3.00	1	1
3.00-4.00	2	2
4.00-5.00	0	0
5.00-6.00	7	4
6.00-7.00	5	6
7.00-8.00	8	6
8.00-9.00	1	5
9.00-10.00	10	6
10.00-11.00	6	6
11.00-12.00	6	8
12.00-13.00	7	6
13.00-14.00	4	6
14.00-15.00	8	6
15.00-16.00	9	8
16.00-17.00	4	5
17.00-18.00	2	4
18.00-19.00	2	2
19.00-20.00	3	4
20.00-21.00	2	2
21.00-22.00	1	1
22.00-23.00	0	0
23.00-24.00	0	0
Total No. of Movements over 24hour day	89	89

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A check count on HGV traffic movements to and from the site between 7.00am and 7.00pm was carried out on the 4th August 2016. The number of HGV's entering the site was recorded at 57no. versus 67no. indicated in the table above. The no. of HGV's leaving the site was recorded at 56no. versus 68no. indicated in the table above. The nos. of movements per hour were found to be consistent with the pattern of movements in the table above with a concentration of movements through the late morning and early afternoon hours. Overall, the count results of the 4th August 2016 were consistent with the HGV traffic levels indicated in the table above taking into account that the table above relates to peak milk supply period and that the recent count reflects some drop off in HGV traffic levels as peak milk supply wanes heading into the Autumn months, and would be in the order of c.80% of peak volumes.

3.6 Post Development Heavy Goods Vehicular (HGV) Traffic

The development of the new Dryer 2 Facility will lead to an increase in the levels of HGV traffic to and from the site, directly related to the increase in peak daily milk processing capacity of the site. The peak daily processing capacity of the site will increase in 1.62 million to 1.97 million litres of milk per day, an increase of c.350,000 litres of milk per day. On the basis of an articulated tanker capacity of c.22,500 litres per delivery, this would require an additional 16 deliveries per day. Assuming a similar proportional increase in non-tanker HGV traffic, the overall peak increase in HGV movements entering and leaving the site per day is likely to be 20 vehicles in each direction.

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A breakdown of the projected increase in HGV traffic entering and leaving the Tipperary Co- Operative Creamery site post-development of the Dryer 2 Facility is presented in the table below. The breakdown indicates that the maximum increase in movements per hour is 2no. additional movements entering the site and 2no. movements leaving the site. The total no. of additional HGV movements over a 24hour day is 20no. movements entering the site and 20no. movements leaving the site as outlined above. There is 1no. additional HGV movement entering the site between 8.00am and 9.00am and 1no. additional movement leaving the site between 4.00pm and 5.00pm.

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Table 3.6

Times of HGV Entry & Exit to/from the TCC Site over 24 hour day	No. of HGV's entering the Site.			No. of HGV's leaving the Site.		
	Current no. based on review of weighbridge records	Post Dev. Change	Post Dev. Total	Current no. based on review of weighbridge records	Post Dev. Change	Post Dev. Total
0.00-1.00	0	0	0	0	0	0
1.00-2.00	1	0	1	1	0	1
2.00-3.00	1	+1	2	1	0	1
3.00-4.00	2	0	2	2	+1	3
4.00-5.00	0	+1	1	0	0	0
5.00-6.00	7	+1	8	4	+1	5
6.00-7.00	5	+1	6	6	+1	7
7.00-8.00	8	+1	9	6	+1	7
8.00-9.00	1	+1	2	5	+1	6
9.00-10.00	10	0	10	6	+1	7
10.00-11.00	6	+2	8	6	+2	8
11.00-12.00	6	+2	8	8	0	8
12.00-13.00	7	+2	9	6	+2	8
13.00-14.00	4	+2	6	6	+2	8
14.00-15.00	8	+2	8	6	+2	8
15.00-16.00	9	0	9	8	+2	10
16.00-17.00	4	+1	5	5	0	5
17.00-18.00	2	+1	3	4	+1	3
18.00-19.00	2	0	2	2	+1	3
19.00-20.00	3	+1	4	4	0	4
20.00-21.00	2	+1	3	2	+1	3
21.00-22.00	1	0	1	1	+1	2
22.00-23.00	0	0	0	0	0	0
23.00-24.00	0	0	0	0	0	0
Total No. of Movements	**89no.**	**+20no.**	**119no.**	**89no.**	**+20no.**	**119no.**

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4.0 Assessment of Traffic Impacts Post Development of the Proposed Dryer 2 Facility

4.1 Impacts of Increase in Cars and Light Commercial Traffic

Car and light commercial traffic is generated by staff and visitors to the Tipperary Co-Operative Creamery site. There is no change of any significance in the level of visitor traffic to the site envisaged post development of the Dryer 2 Facility. The increase in staff levels at the Tipperary Co-Operative Creamery site post development of the Dryer 2 Facility is estimated at 6no. personnel working during daytime hours with 2no. further personnel working during shiftwork hours outside of normal daytime working hours. The additional parking requirement in respect of additional staff is estimated at 4no. spaces based on current levels of car park usage at the site. There is currently an estimated spare capacity of 26no. car spaces within the site for use by staff and by visiting contractors to the site which will fully satisfy the requirement for any additional parking spaces as a result of the proposed development.

With regard to impact of any additional traffic on the public road network, the level of traffic generated by the relatively small number of additional staff is negligible in the context of overall existing traffic in Tipperary Town and no impacts of any significance are envisaged. The following points are also noted with regard to traffic generated by staff;

- Post development of Dryer 2, it is estimated that 34% of staff (39no.) will be employed on a shiftwork basis arriving and departing from site at times outside of normal morning starting and evening finishing times, thus avoiding impact on normal morning and evening peak traffic levels in Tipperary Town.

- Of the 66% of staff (76no.) employed on daytime work hours post development of Dryer 2, over 50no. staff will be engaged in production related activity, mainly operating between the hours of 8.00am and 5.00pm. Management and administration staff mainly operate between the hours of 8.30am and 6.30pm. The varying starting and finishing times of employees and management working daytime hours mitigates impacts on morning and evening traffic levels in the town.

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4.2 Impacts of Increase in HGV Traffic

Traffic currently generated by the plant operation at Tipperary Co-Operative Creamery comprises deliveries by heavy goods vehicles of milk for processing and of fuel and other goods required for the operation and maintenance of the plant. Products manufactured at the plant including milk powders, concentrates, butter and cheese which are also dispatched from the creamery site by heavy goods vehicles. There are also some HGV dispatches from the site related to disposal of sludge from the on-site wastewater treatment plant. Records of the numbers of HGV movements to and from the site during peak milk supply periods indicate movements of up to 89no. inward and 89no. outward per 24hour day.

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The impact on the existing road network in and around Tipperary Town of HGV traffic generated by operations at the Tipperary Co Operative Creamery site during peak milk supply periods is assessed as low impact taking the following into account;

- HGV traffic to and from the site is distributed across 24hours with peak numbers of movements to and from the site in the relatively low range of 10no. to 17no. movements per hour occurring during early morning hours before 8.00am and through later morning and early afternoon hours after 9.00am and before 4.00pm each day. The peak HGV traffic to and from the site thus avoids normal morning and evening peak traffic in Tipperary Town, including school traffic, between 8am and 9am and between 4pm and 6pm.

- HGV traffic delivering milk to the creamery site is dispersed across the various national and regional routes which converge on Tipperary Town.

- Traffic count data for the N24 recorded immediately to the south of Tipperary Town indicates annual average daily traffic (AADT) levels for 2016 of 6329no. vehicles providing some evidence of the relatively low contribution to traffic levels in Tipperary Town by HGV traffic generated at the Tipperary Co Operative Creamery site.

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Table 3.6 of Section 3 of this report provides a breakdown of the projected additional HGV traffic to and from the Tipperary Co-Operative Creamery site post development of the proposed Dryer 2 Facility. The increase in the number of HGV movements during peak milk supply periods is estimated at 20no. total inward movements to the site and a further 20no. movements outward from the site per 24hr day. The resultant increase in the number of movements to and from the site per hour however is only one or two movements in each direction, with most of these movements taking place outside of the normal morning and evening peak traffic times, including school traffic times, in Tipperary Town between 8am and 9am and between 4pm and 6pm. It is concluded therefore that the increase in the levels of HGV traffic post development of the Dryer 2 facility is at a very low level with negligible potential for impact on current traffic flows on the public road network.

4.3 Impacts on existing Bridge Street/Abbey Street/Station Road Junction

As detailed above, the Bridge Street/Abbey Street/Station Road T- Junction is located to the north of the Tipperary Co Operative Creamery site entrance on Station Road and the current layout of this existing T- junction is such that the available turning radii between Abbey Street and Bridge Street/Station Road are somewhat constrained. In particular it was noted that the turning movement of HGV's turning left onto Abbey Street from Bridge Street can be restricted by vehicles queuing on the Abbey Street approach to the junction resulting in some potential for traffic disruption on Bridge Street. However, it was also noted that such movements are not associated with or relevant to HGV traffic travelling to or from the Tipperary Co Op site.

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Based on the foregoing, current HGV traffic to and from the Tipperary Co-Op site does not have an impact of significance on the flow of traffic through the Bridge Street/ Abbey Street/ Station Road junction. Given that the projected increase in numbers of HGV vehicles entering and leaving the Tipperary Co Op site post development of the Dryer 2 facility generally comprises of 1no. or 2no. additional movements per hour in each direction and outside of certain peak hours as noted above, the impact of post development HGV traffic on this junction will be negligible.

4.4 Impacts of Traffic Generated by Construction of the Development

Construction works in connection with the proposed Dryer 2 Facility shall generate additional traffic over a nominal anticipated construction period of 12 to 14months. Car and light commercial vehicle traffic shall be generated by construction workers travelling to and from work and by delivery of materials to site. Delivery of construction materials and disposal of waste materials shall also generate HGV traffic.

It is proposed that the site of the former Royal Hotel Building including associated former car park and yard areas, all located adjacent to the Tipperary Co- Operative Creamery site on the north side of the River Ara shall be used to accommodate construction related parking and temporary office facilities for the duration of the construction of the proposed development. Potential impact on town traffic is substantially mitigated based on the following;

The hotel site formerly accommodated a substantial car park facility with over 50 car spaces available. It is estimated that an additional 15no. car spaces could be provided on the site to facilitate construction parking.

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Construction work will commence by 8.00am on working days minimising any impact on normal morning traffic levels in the town

With regard to impacts on late afternoon/evening traffic of construction traffic leaving the site, traffic leaving the site will have to queue within the site before entering any traffic streams thus limiting impacts to within the site where there is considerable queueing length.

With regard to HGV traffic, the numbers of deliveries by HGV vehicles per day would in general be very low and of insignificant impact. It is also proposed that most HGV would as far as reasonably practicable be scheduled to avoid peak traffic flows in the town. Haul routes for the delivery of ready-mix and other construction materials will be agreed with the Roads Authority prior to commencement of construction of the development.

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5.0 Conclusions

The development of the new Dryer 2 Facility on the Tipperary Co-Operative Creamery site will result in an increase in peak production capacity from c.1.62 million litres per day to c.1.97 million litres of milk per day. The increase in production will generate additional HGV traffic involved in the delivery of milk and various supplies to the site and in the dispatch of product and waste materials from the site. The projected increase in numbers of HGV vehicles entering and leaving the Tipperary Co Op site post development of the Dryer 2 Facility will comprise of up to 2no. additional movements per hour in each direction and outside of certain peak hours resulting in negligible impact on the existing public road network.

An increase in staffing levels comprising 8no. additional personnel is proposed post development of the Dryer 2 Facility with 5no. of the additional personnel assigned to daytime working hours and 1no. additional staff assigned to each of 3no. 8hour shifts over a 24hour day. The maximum no. of additional staff personnel on site at the same time will be thus be 6no. comprising 5no. daytime staff and 1no. of the shiftwork staff. There is sufficient spare parking capacity on site to cater for the additional staff numbers. Given that the projected increase in staffing numbers is relatively minor, particularly when considered in the context of the current overall staffing level of 107no personnel at the site, the impact on the public road network of any vehicular traffic generated by additional staff will be minimal.

Impacts of traffic generated by the construction of the development will be mitigated by use of the adjacent vacant former hotel site which contains considerable parking accommodation as formerly developed and utilised by the hotel operation. The relatively early morning commencement of normal workday operations by construction contractors will mitigate any potential impacts of construction related traffic accessing the site on current traffic levels.

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ATTACHMENT L

CULTURAL HERITAGE ASSESSMENT

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JOHN CRONIN & ASSOCIATES
ARCHAEOLOGY | CONSERVATION | HERITAGE | PLANNING

Proposed Dryer Facility, Tipperary Co-Operative Creamery Ltd., Station Road, Tipperary, Co. Tipperary

Cultural Heritage Assessment



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June 2017

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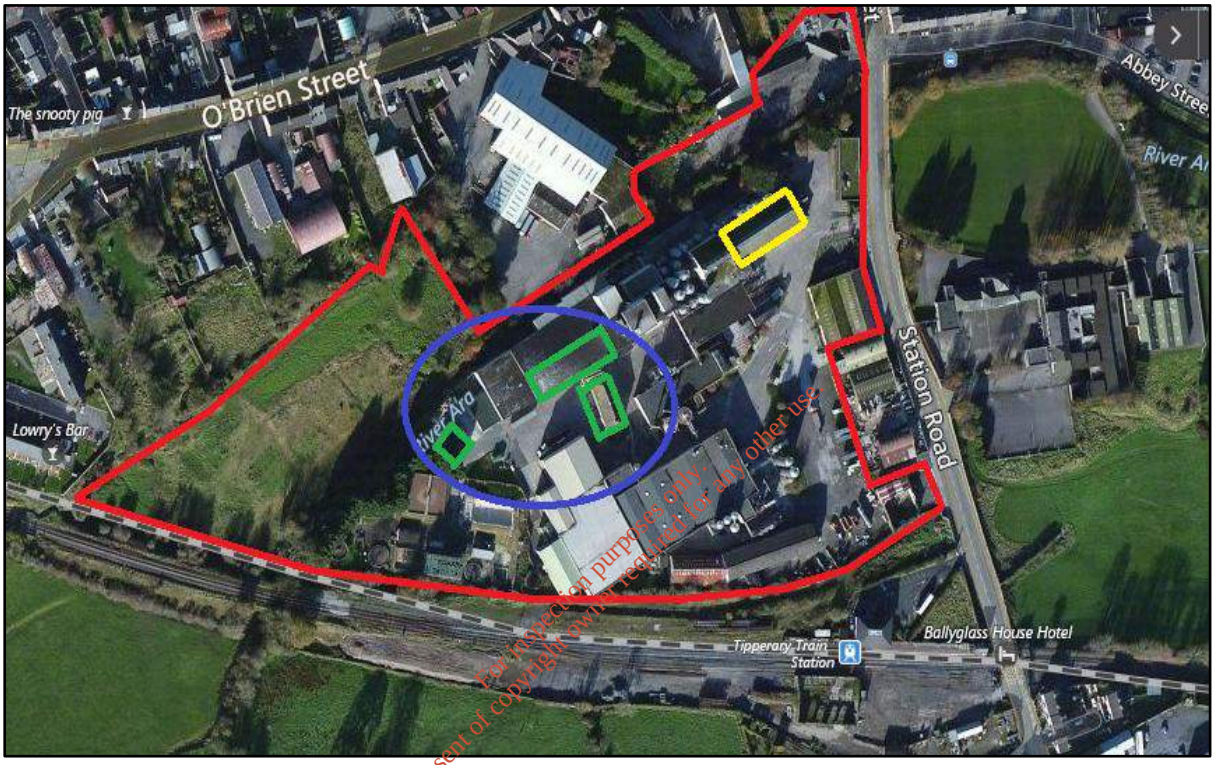
Appendix: Descriptions of archaeological monuments within approximately 500m of the development site 24

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1. Introduction

This cultural heritage (archaeological and architectural heritage) assessment of the existing buildings and infrastructure at the site of Tipperary Co-Operative Creameries Ltd. will set out to describe and appraise the built heritage significance of the protected buildings on the site and how these may be affected by the proposed development. Redevelopment and expansion of capacity at the milk-processing facility is proposed within the existing site boundary: this assessment relates to the development of the Dryer 2 facility within the rear/western area of the existing complex.



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Figure 1: *Site location map showing Tipperary Co-operative Creamery plant (outlined by red line) bounded by Station Road to east, Waterford-Limerick rail line to south and River Ara to north-west. Proposed development will occur within the area enclosed by the blue oval; the green outlines within this area indicate the buildings to be demolished. The original creamery building (a protected structure) is outlined in yellow; this building will be unaffected by the proposed development.*

At present there are extensive structures and plant which have been constructed on the site since its first development at the turn of the twentieth-century. The original creamery building, situated a short distance behind the present 1970s reception structure, is a protected structure. While this building has been altered since its original construction and has been surrounded by the essential collection, warehousing and processing infrastructure required to sustain the creamery business, it continues to retain a high degree of architectural and historic significance as well as having considerable visual appeal from the public realm on Station Road and the bridge over the River Ara.

John Cronin and Associates have been engaged by MRG Consulting Engineers to provide an assessment of the impact of the proposed development on historically and architecturally significant buildings within the site. The assessment will comprise:

- an examination of the geographic and historic context of the site
- a description and appraisal of the existing structures
- an assessment of the impacts of the proposed development on the significant items of cultural heritage associated with the site
- conclusions and recommendations for how to best mitigate any impacts

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John Cronin and Associates have provided multi-disciplinary consultancy expertise in the areas of conservation, archaeology and planning to clients for over twenty years. The site at Tipperary Co-operative Creameries Ltd. was visited by a built heritage specialist from the Ballincollig office of John Cronin and Associates, Eamonn Hunter (BSc. (Hons) Heritage Conservation) in June 2016. A comprehensive photographic survey of the site was undertaken at this time, followed up by desk-based research and consultation of historic documentary and cartographic sources.

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2. Context

The historic and legal context of the subject site as gathered during desk-based assessment, will be detailed in this chapter in order to properly inform discussion of the proposed development in later chapters.

Data Sources

The *Tipperary Town and Environs Development Plan 2013-2019* was consulted to determine the protected status of the site. The National Inventory of Architectural Heritage (NIAH) provides information on the architectural heritage resource.

Documentary sources for the historic background of the creamery site came from the 2008 Tipperary Co-op centenary publication *Celebrating a Century of Successful Co-operation,* as well as William Jenkins' book *Tipp Co-op, Origin and Development.* The digitised catalogue of the National Library of Ireland as well as the Ordnance Survey of Ireland's online map-viewer were consulted to chart the early twentieth-century layout and appearance of the site. All photographs not otherwise referenced were taken by staff of John Cronin and Associates Ballincollig office.

The principal sources reviewed for the assessment of the known archaeological resource were the Sites and Monuments Record (SMR) and the Record of Monuments and Places (RMP) for County Tipperary. The Database of Irish Excavation Reports (www.excavations.ie) was also consulted.

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Archaeological context

The following section is based on a desktop survey on the archaeological resource within the vicinity of the subject site; the section provides a summary of the main phases of the Irish archaeological record. A total of eleven RMP sites are located within c.500m of the site boundary (**Table 1**). These consist of a church and associated graveyard, the site of a religious house, town defences and the site of a castle. The published inventory descriptions of each individual site are provided in **Appendix 1** of this report.

***Table 1**: Recorded monuments within approximately 500m of the proposed development*

RMP No	*Class*	*Townland*	*Co-ordinates (ITM)*
TS067-004----	Historic town	Bohercrow, Carrownreddy, Collegeland, Garryskillane, Knockanrawley, Murgasty, Town Lot	589073, 635832
TS067-004001-	Religious house - Augustinian friars	Collegeland	589098, 635665
TS067-004002-	Castle - unclassified	Knockanrawley	589333, 635740
TS067-004003-	Church	Murgasty	588829, 635885
TS067-004005-	School	Collegeland	589143, 635605
TS067-004008-	Graveyard	Murgasty	588828, 635886
TS067-004009-	Town defences	Bohercrow, Carrownreddy, Knockanrawley, Murgasty, Town Lot	589073, 635830
TS067-005----	Ritual site - holy well	Knockanrawley	589472, 635885
TS067-123----	Kiln	Murgasty	588810, 635975
TS067-124----	Hut site	Murgasty	588828, 635985
TS067-131----	Burial ground	Murgasty	588805, 635948

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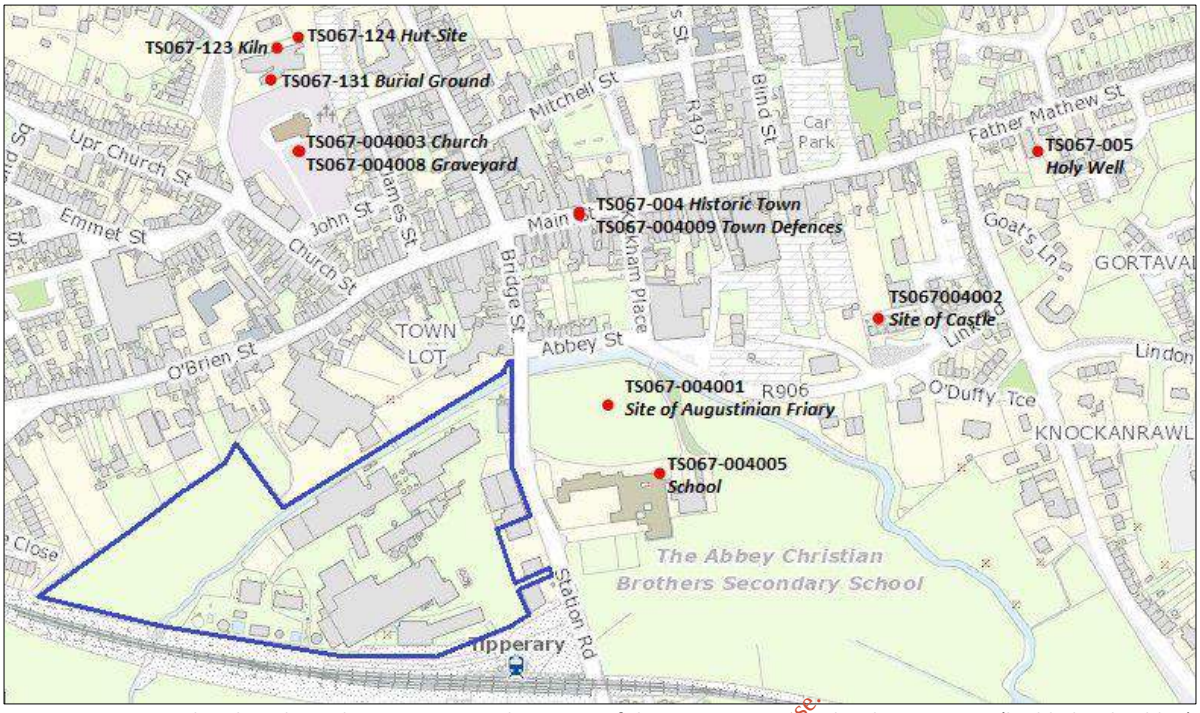


***Figure 2**: Protected Archaeological Monuments within 500m of the Tipperary Co-op development site (highlighted in blue)*

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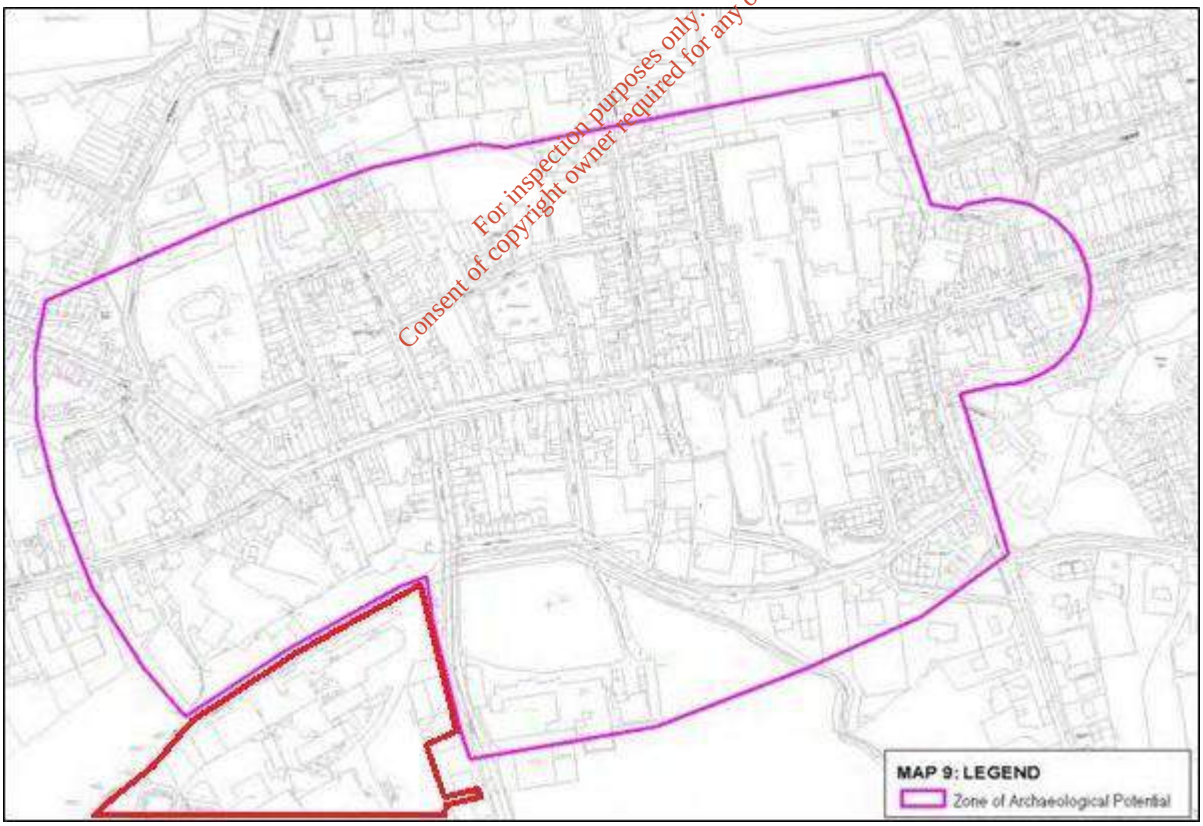


***Figure 3**: Zone of Archaeological Potential as defined in the Tipperary Town Development Plan with approximate area of site outlined in red.*

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Early Prehistoric period

The earliest recorded evidence for human settlement in Ireland dates to the Mesolithic period (7000–4000 BC) when groups of hunter-gatherers arrived on the island. The timber houses built by these Mesolithic settlers do not leave any above ground traces and their presence in an area can often only be identified by the presence of scatters of worked flints in ploughed fields or through the discovery of sub-surface traces of house foundations during excavation works. The Neolithic period (4000-2400 BC) began with the arrival and establishment of agriculture as the principal form of economic subsistence, which resulted in more permanent settlement patterns. As a consequence of the more settled nature of agrarian life, new site-types, such as more substantial rectangular timber houses and various types of megalithic tombs, begin to appear in the archaeological record during this period. While there is archaeological evidence for a widespread settlement pattern within the wider region during the Mesolithic and Neolithic periods, there are no recorded sites from either period within the study area.

Late Prehistoric period

Metalworking arrived in Ireland with the advent of the Bronze Age period (c. 2400–500 BC). This period was also associated with the construction of new monument types such as standing stones, stone rows, stone circles and *fulachta fiadh*. The development of new burial practices saw the construction of funerary monuments such as cairns, barrows, boulder burials and cists. The arrival and widespread adoption development of an iron-working technology saw the advent of the Iron Age (600 BC – 400 AD). The Iron Age period was traditionally associated with a Celtic 'invasion' but this view is no longer widely accepted as recent archaeological evidence points instead to a gradual acculturation of the Irish Bronze Age communities following centuries of contacts with Celtic-type cultures in Europe. There are no recorded late prehistoric archaeological sites within the study area.

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Early medieval period

This period began with the introduction of Christianity in Ireland and continued up to the arrival of the Anglo-Normans during the 12th-century (*c.* 400–1169 AD). The establishment of the Irish church was to have profound implications for political, social and economic life and is attested to in the archaeological record by the presence of church sites, associated places for burial and holy wells. The early medieval church sites were morphologically similar to ringforts but are often differentiated by the presence of features such as church buildings, graves, stone crosses and shrines. This period saw the emergence of the first phases of urbanisation around the large monasteries and the Hiberno-Norse ports. However, the dominant settlement pattern of the period continued to be rural-based in sites such as ringforts, which comprise roughly circular enclosures delimited by roughly circular earthen banks formed of material thrown up from a concentric external ditch. Ringforts are one of the most numerous monuments in the Irish landscape and the early medieval terms for these sites (*rath*/*lios/dun*) these still form some of the most common place-name elements in the country. Archaeological excavations indicate that the majority of ringforts were early medieval farmsteads with internal timber buildings and were surrounded by associated field systems. There are no recorded Early Medieval archaeological sites within the study area.

Late medieval period

The arrival and conquest of large parts of Ireland by the Anglo-Normans in the late 12th-century broadly marks the advent of the Irish late medieval period, which continued up until the beginning of the post-medieval period in c.1550. The arrival and conquest of large parts of Ireland by the Anglo-Normans in the late 12th-century broadly marks the advent of the Irish late medieval period, which continued up until the beginning of the post-medieval period in c.1550. Within the late medieval period, towns, markets, and fairs were established and change and reform attempted in

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the Irish church. By the 15th-century the native Irish chieftains and lords began to establish tower houses and smaller castles as centres of territorial control. The town defences, an unclassified castle, a church with associated graveyard and the site of the Augustinian Friary all date to this period.

The following extract from the *Archaeological Survey of Ireland* file relating to the Historic Core of Tipperary town (RMP: TS067-004----) describes the development of the town in the medieval period:

> *'On a ridge, on the junction of the Limerick-Waterford road and the Cashel-Kilmallock road with the River Ara flowing roughly E-W to the S. It is likely that the town of Tipperary was the principal manor or caput of the Anglo-Norman cantred (an administrative area) of Okonagh (which included the eastern portion of the Tipperary barony of Clanwilliam, as well as portions of Limerick) and probably dates to the late 12th century. A motte and bailey (TS067-001----) c. 1.1km to the N and a motte (TS067-002----) c. 800m to the NW protect the northern and northwestern routes into the town. In 1215 the 'vill' or town of 'Tibrari' is mentioned in relation to the church there and in 1300 a reference to the 'community of the town' suggests that the town was incorporated at this stage (Bradley 1985, 56). Otto de Grandison, who held Clonmel, also held Tipperary town by 1281 (Thomas 1992, 194). It appears that the county court met at Tipperary until the Archbishop of Cashel moved it to Cashel, which was the subject of a legal case in 1297 (Thomas 1992, 194). The town was burned in 1329 by Brian O'Brian, however, there are references to the reeve (senior town official) and community up until 1432 (Bradley 1985, 56). There is historical evidence that the town was walled, though no physical evidence is visible at ground level. In 1300 a murage grant was given for a period of 10 years and in 1310 a further grant was given for a period of 3 years (Thomas 1992, 194). Based on the probable survival of the medieval town pattern on the modern town, it is suggested that the town consisted of an area of c. 15 hectares, roughly rectangular in shape, incorporating the church (TS067-004003-) and graveyard (TS067-004008-) in its NW angle and the castle (TS067-004002-) in the SE angle, with the river forming the southern boundary (Thomas 1992, 194-5). An Augustinian Friary (TS067-004001-) is located immediately S of the river. There is conflicting evidence of when this was founded, sources suggesting that this was either during the reign of Henry III (1216-1272) or later c.1300 by Stephen Butler (Gwynn and Hadcock 1970 (1988 reprint), 302). In the 15th century the town seems to have gone into decline and did not recover until the late 17th century. In 1660 the poll-tax returns for the town suggest a total population of c. 250, however, during the course of this decade the hearth-money records suggest that the town grew rapidly with the population almost doubling in size.'*

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Thomas (1992, 194-196) states that the only evidence for a town wall in Tipperary town comes from two murage grants in 1300 (10 years) and 1310 (3 years) respectively. The supposed line can be tentatively traced in the modern streetscape with the River Arra forming the southern defence and the site of 'King John's Castle' (RMP: TS067-004002) defining the south-eastern side. The site boundary of the medieval parish church (RMP: TS067-004003) and associated graveyard (TS067-004-008) may delimit the north-eastern line of the town defences although it must be stated that no physical evidence of these defences has been unearthed save for mention of two linear ditches noted by Dehaene (Excavation Licence No: 07E1044) which he interpreted as a 'relict boundary'. Indeed, archaeological monitoring of ground works associated with the installation of broadband in the town in 2007 (Excavation Licence No: 07E0506) produced no evidence for a town wall despite traversing several areas of the supposed line. Thomas also suggests that 'suburbs' may have existed

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to the south of the town core in the area of the Fair Green and Abbey but there is no physical evidence for this to date. The site of the Tipperary Co-operative Creamery has been in use as such since 1890 and recent geo-technical investigations have shown the ground in this area to be 'made-ground' (i.e. artificially raised by the introduction of materials from elsewhere).

Post medieval period

The post medieval period (1550+) saw the development of high and low status stone-built houses throughout the Irish countryside. During this period any given rural settlement cluster is likely to have consisted primarily of single-storey thatched cottages with associated farm buildings while two-storey farm houses became more common in the 19th-century. In the latter half of the 20th-century, there was a radical change in the nature and character of Irish domestic architecture manifested by the replacement of older stone-built structures with modern bungalows of concrete blockwork construction. There is a great amount of historical and cartographic evidence for a strong settlement of the study area during this period. The *Abbey Christian Brothers School* (situated to the east of the subject site) dates to this period.

The following description of Tipperary Town provides a general description of the area during the early- to mid-19th century (Lewis 1837):

> *'TIPPERARY, a market-town and a parish, in the barony of CLANWILLIAM, county of TIPPERARY, and province of MUNSTER, 18 ¼ miles (W. N. W.) from Clonmel, and 100 ¾ (S. W.) from Dublin, on the mail coach road from Waterford to Limerick; containing 7996 inhabitants, of which number, 6972 are in the town. This place, which is of great antiquity, is supposed to have derived its name, Tipra-Rae, signifying in the Irish language "the well of the plains," and of which its present appellation is only a slight modification, from its situation at the base of the Slieve-na-muck hills, forming a portion of the Galtee mountains. A castle was erected here by King John for the defence of the territory acquired by the English, to which may be attributed the growth of the town, and the subsequent foundation of a monastery for Augustinian canons in the reign of Henry III. contributed materially to its increase. The town, which gives name to the county, appears to have had formerly a corporation, from a grant made in 1310 by Edward II. to "the Bailiffs and Good Men of Typerary," allowing them "murage (as Adare) for three years." In 1329 the town was burnt by Breyn O'Breyn, but the monastery appears to have subsisted till the dissolution, when it was granted by Henry VIII. to Dermot Ryan, at a yearly rent of eight pence.*
>
> *The present town is situated on the river Arra, and consists of one principal street, from which several smaller streets branch off at right angles; in 1831 it contained 1042 houses, several of which are well built and of handsome appearance. The inhabitants are supplied with water from a public fountain, erected at the expense of Stafford O'Brien, Esq., who, with the representatives of John Smith Barry, Esq., is joint proprietor of the town; the streets are cleansed under the provisions of the act of the 9th of George IV., under which also it will be watched and lighted. Considerable improvements have been made and are still in progress; many of the old houses have been taken down and new buildings, erected, and the town has a very neat and thriving appearance: a penny post to Cappaghwhite and Bansha has been established: there are temporary barracks for the accommodation of 100 infantry.*

Excavation Database

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The Excavation Database (www.excavations.ie) contains summary accounts of all the archaeological excavations carried out in Ireland (North and South) from 1970 to 2015. The Database lists only one excavation as having occurred within the townlands within which the present Co-op complex is situated, namely Collegeland, Garrykillane and Scalaheen. This investigation was in the townland of Collegeland and was undertaken by Ms Anne-Marie Lennon (Licence Number 02E0263) for a development situated to the east of the Co-op site. The following is a summary of the monitoring works:

> *Monitoring of groundworks at this site revealed no evidence of the medieval Augustinian abbey. The exact location of the abbey is not certain. The last vestige of this structure, a stone archway, was knocked down in 1958 and is believed to be buried in the playing pitch to the north of the present-day school.*
>
> *Monitoring of the foundations of the new development uncovered the basement and walls of the 19th-century school buildings. A stone well was also found in the courtyard of the associated 19th-century farm. This well has been incorporated in the new school buildings as an architectural feature. The cellars and other walls have been preserved in situ*.

Historic origin and development of subject site

The detail on historic cartographic sources demonstrates the nature of past settlements and land use patterns in recent centuries and also highlights the impact of modern developments and agricultural practices. This information can aid in the identification of the location and extent of unrecorded, or partially levelled, features of archaeological or architectural heritage interest. Within an urban setting these cartographic sources can be useful in determining the development of a town and the material changes that occur in that setting. The cartographic sources examined for the study areas include the 1st edition of the 6-inch OS maps (surveyed and published in the 1830s-40s) and the 25-inch OS maps (surveyed and published 1887-1913). There were no unrecorded structures of archaeological or architectural significance noted on the footprint of the proposed development during the inspection of these sources.

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The 1st edition Ordnance Survey map surveyed in 1840 illustrates part of the Tipperary Co-op site as a 'Fair Green'. This was an area of commonage where weekly cattle markets were held up to and throughout the 19th century. A pathway is indicated leading from Bridge Lane and crossing the fair green from north-east to south-west. A school house is located in the middle portion of the site with rows of vernacular cottages adjacent to the pathway. These may relate to the Infantry Barracks to the south or may be part of the now demolished Scalaheen estate. The south-western portion of the site is shown on the 1st edition OS map to be part of the Scalaheen estate and planted with trees.

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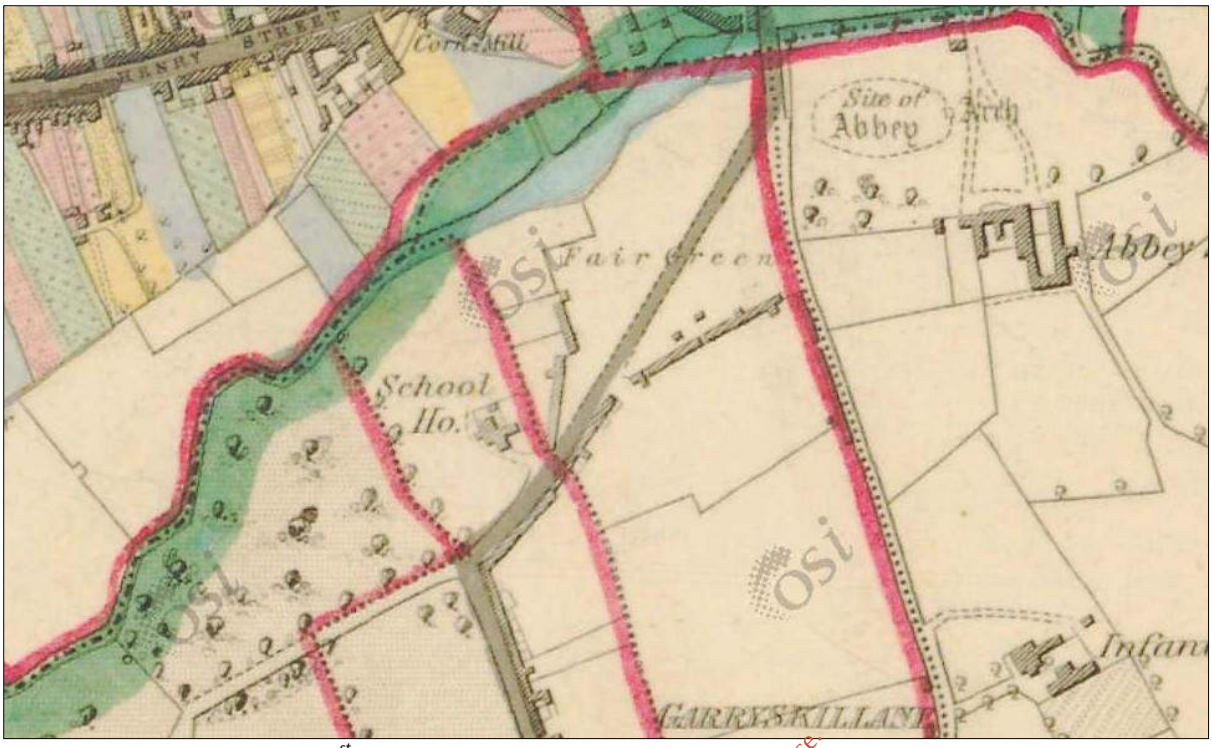


Figure 4: *Extract from 1st edition OS map (published 1843) centred on proposed development location*

The site of the Augustinian Abbey (RMP: TS067-004001) is illustrated immediately east of the Co-op site with an 'Arch', an architectural fragment, indicated to the east side of that area. The Abbey school (RMP: TS067-004005) which was originally founded in 1680 lies to the east of the Co-op site. The Arra river delineates the site boundary to the north with the south side of the site giving way to enclosed farmland and the grounds of Scalabeen house.

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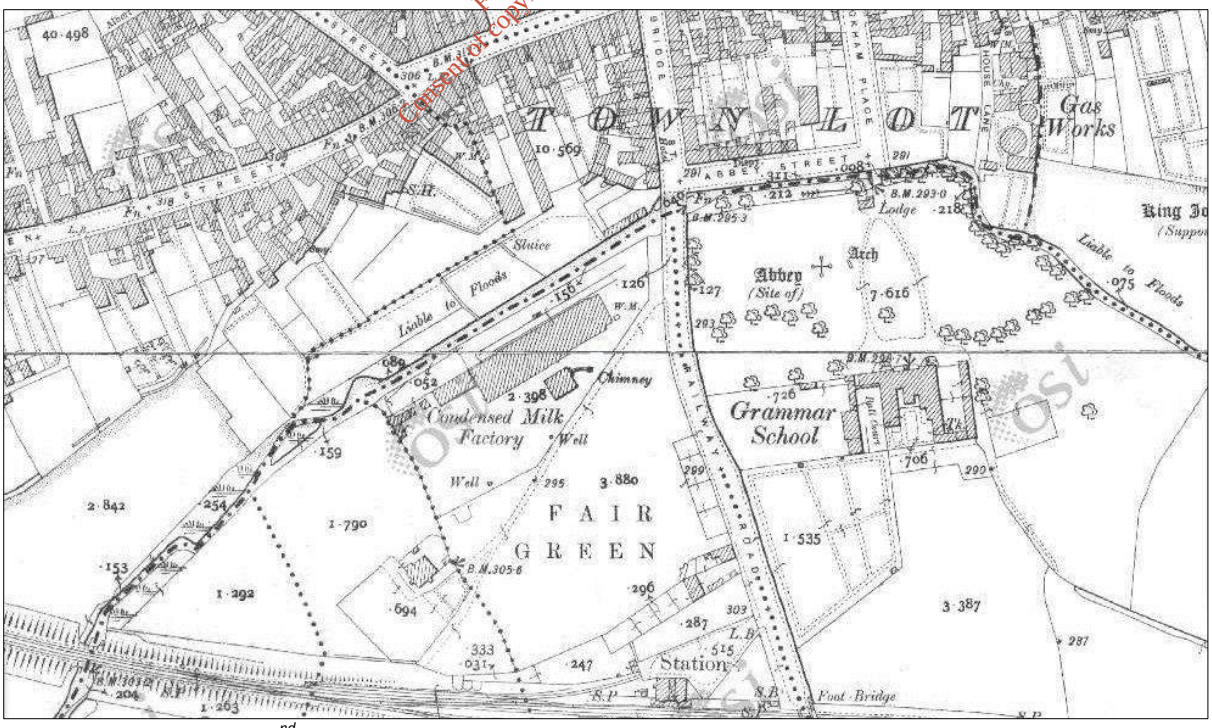


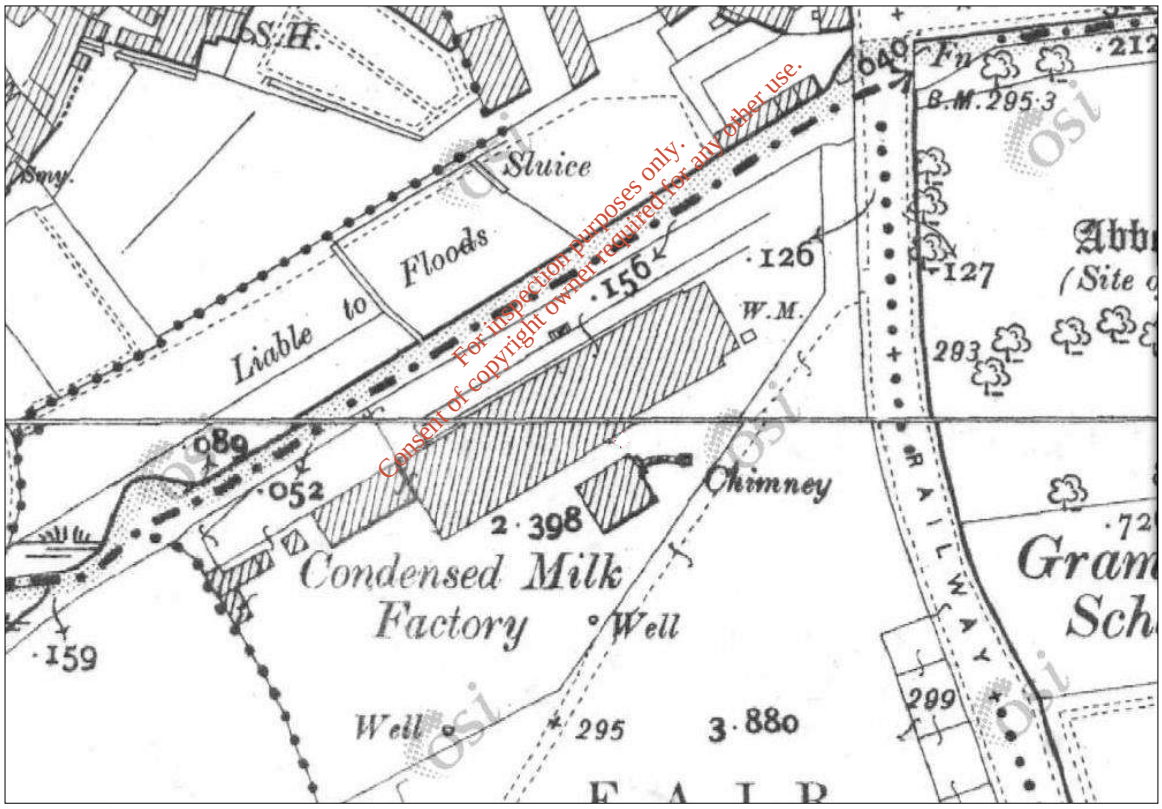
Figure 5: *Extract from the 2nd edition OS map (surveyed 1904; published 1906) centred on proposed development location*

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By the time of the 2nd edition OS survey of 1904, the Waterford-Limerick Junction railway line has been constructed which, together with the Railway station, now defines the southern boundary of the Co-op site. The Fair Green is now confined to the southern portion of the site and the 'Consensed Milk Factory', a predecessor to the Tipperary Creamery Co-op, occupies the northern part. Little has changed on the east side of Station Road (indicated as Railway Road) except a minor addition to the Grammar School.

It appears that the gabled building described in the Tipperary Town Record of Protected Structures (RPS ref. 100) was first constructed by the Condensed Milk Company, chaired by Sir Thomas Cleeve, in 1898. Not until 1908 was the then rival Tipperary Co-operative's Creamery built on the site of the existing store on O'Brien Street.

> *The Condensed Milk Company, the largest proprietary dairy company in Ireland built the present factory building on the site and it commenced operation in 1898. At the time, it was a considerable structure being 300' long, 60' in width and 44' high with the building and plant it held costing £30,000.*
>
> *(text adapted from Tipperary Co-operative Creamery Ltd., 2008)*



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Figure 6: *Detail of OS map showing original factory building, the north-east half of which is a protected structure*

The period 1914 to 1920 was one of unprecedented prosperity for Irish agriculture and the significant growth in agricultural prices at this time fuelled the success and expansion of the creamery business in Tipperary as elsewhere in the country. The Condensed Milk Company, managed by the Cleeve family since it was established in 1883 in Limerick by Sir Thomas Cleeve, had operated the plant at Station Road through deepening financial difficulties in the 1920s until the site was taken into state ownership in 1928 by the Dairy Disposal Board. With the exception of the late and early 1940s, the period up to the early 1970s comprised largely stagnant conditions in the Irish dairy industry with gradual amalgamation of local creameries and the growth of dominance of the

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farmer-owned co-operatives. The Tipperary Co-operative Society acquired the Dairy Disposal Company's interest in the Station Road facility in 1972 at which time there was considerable investment in infrastructure on the site coinciding with the introduction of bulk milk collection. The present reception building and administration block on Station Road was constructed in 1978.

Further major expansions on the Station Road site by Tipperary Co-operative Creamery Ltd. took place in the early 1980s when the Continental Cheese factory was constructed, in 2002 when a new Cut-and-Pack facility was built to cater for the established USA market and most recently in 2007 when the cheese plant was replaced.



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Figure 7: *Original Condensed Milk Factory (photograph taken c.1900) from road-bridge to north-east. Proposed development would be situated to the rear of the original footprint of this structure (in area indicated by the arrow) (the rear half of the original factory building was re-built and raised to three storeys in the early to middle twentieth-century, c.1935*

Legal context

There are no recorded archaeological sites located within the subject site; furthermore, the development site is situated outside the *zone of archaeological potential* outlined for Tipperary Town.

The original front section of the creamery building behind the present reception structure was described as part of its listing on the Record of Protected Structures (RPS ref. 100) within the *2013-2019 Tipperary Town and Environs Development Plan*:

> *Barn-style twelve-bay double-height creamery building built c. 1900 with single-storey entrance block having seven-bay front elevation and single-bay sides, having gable-fronted porch. Lower square- plan one-bay addition to south elevation.*

Under the Local Government (Planning and Development) Act, 2000, all Planning Authorities are obliged to keep a 'Record of Protected Structures' of special architectural, historical, archaeological,

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artistic, cultural, scientific, social or technical interest. As of the 1st January 2000, all structures listed for protection in current Development Plans, have become 'protected structures'.

The original creamery building has also been surveyed as part of the National Inventory of Architectural Heritage (NIAH reg. **22108100**). The NIAH is a survey of sites of architectural significance which was devised to assist in evaluating structures to be included in the record of protected structures. Listing on the NIAH does not necessarily carry any statutory responsibilities to the owner to protect the site but it does highlight the culturally significant aspects of the structure which ought to be conserved.

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3. Description of the site and proposed development

The site visit carried out in June 2016 undertook a visual and photographic survey of the architectural heritage, historic and visual character of the site. No opening-up work took place as part of this site-based assessment and no assessment of the condition of building fabric was made or should be inferred from information in this document

The original creamery building (former Condensed Milk Factory) has been described by the NIAH in 2005 as follows:

> *Twelve-bay double-height creamery building, built c.1900 [1898], with single-storey entrance block having seven-bay front elevation and single-bay sides, having gable-fronted porch [extended after mid twentieth-century). Lower square-plan single-bay [truck-loading bay] addition [c.2000] to south elevation. Pitched [fibre-cement]… sheeting to roof of main block, with raised vent along apex, …. Fibre-cement tiled pitched and hipped roofs elsewhere, having cresting to porch roof. Pierced scalloped bargeboards to east gable of main block and to gables and eaves of entrance block. Painted corrugated-iron cladding to east gable of main block and to entrance block except for porch. Rendered walls elsewhere. Diocletian window to east gable of main block, with painted metal surround and glazing bars giving arcaded appearance to whole. Square-headed openings elsewhere, with timber casement windows and uPVC to ground floor level, some having painted timber sills, and having timber-framed windows to entrance block with pivoting panes. Painted sheeted felt to canopy of entrance porch, with timber brackets and having dentils to cornice. Timber panelled double-leaf entrance door with over-light. Timber battened door to south elevation with nine-pane over-light. West gable of main block abutted by later twentieth-century block [c.1935].*
>
> *(DoAH&G, 2005)*

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Sometime after the Ordnance Survey 1:2500 map survey of 1904, a detached two storey ten-bay, limestone industrial building was built to the south of the Condensed Milk Factory (this building is currently used as a refrigerated storage unit) (see **Plate 3** below). The building has a hipped slate roof with clay ridge tiles, one brick chimney with oversailing courses to the southern end and one conical galvanised ventilation chimney to the centre of the ridge. The walls of the building consist of coursed, roughly squared limestone with punch-finished quoin stones and brick dressings to openings. Concrete sills throughout with most original upper-floor windows and ground floor window and door openings blocked up. Smooth cement-based render to rear (west) elevation. Two segmental arch-headed vehicular openings to ground floor, presently blocked up with concrete blocks and no longer accessible from an altered ground level around the building. Steel stairs lead to the upper-level doorway into first-floor offices at the southern end of the building.

Concrete window sills appear original and based on architectural style and general creamery history, this building probably dates to the mid-1920s to mid-1930s. The architectural style is reminiscent of railway structures of the early twentieth-century. Some minor elements remain of original historic interior including a simple door and small internal timber staircase but the bulk of the building has been completely lined as an open plan refrigerated store according to site staff).

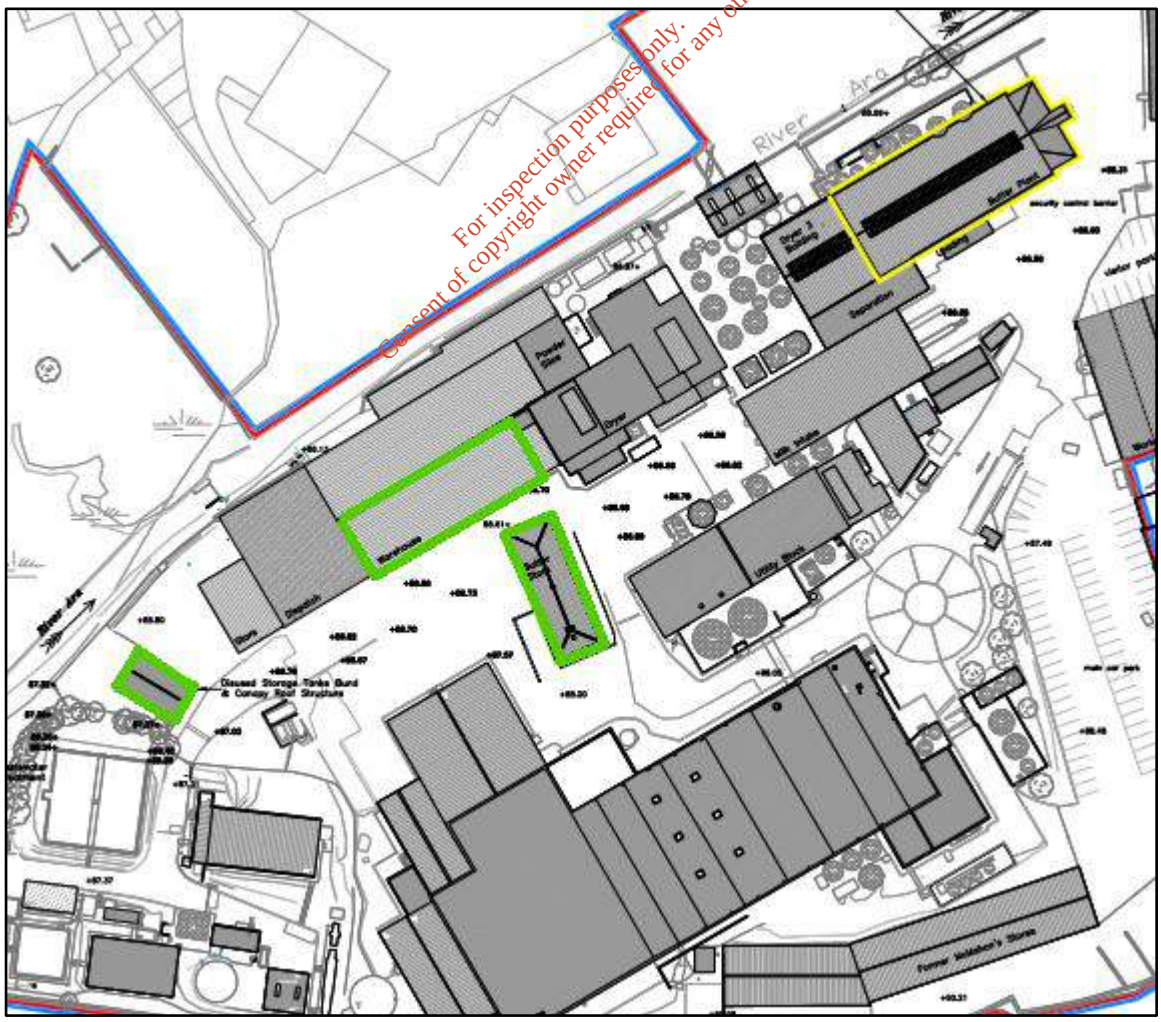
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Around the early 1930s, a gabled, three-storey building was added to the rear (south-west) half of the original condensed milk factory building, which was also altered having additional upper-level windows inserted, the roof-cladding and rainwater goods replaced. This additional building shared the original footprint of the Condensed Milk Company structure but raised its pitched roof a full storey above that of the double-height creamery building. Further expansion took place from the 1970s onwards.

The proposed development

Tipperary Co-Operative Creamery Ltd. propose the development of a new milk evaporation and drying facility at the site of their existing milk processing plant at Station Road, Tipperary Town. The development works shall include the following elements; a) construction of a new building to accommodate the new evaporator, dryer and associated utility plant with upper floors and platforms provided at various levels within the building to support and facilitate access to the new plant systems; b) upgrade works to existing on-site waste water treatment plant; c) demolition works to facilitate construction of the new building including partial demolition of an existing warehouse building, demolition of existing butter store building and removal of disused storage tanks together with associated bund structure. The proposed development works are confined to a discrete area to the west of the footprint of the original creamery building (see **Figures 8** and **9** below).

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Figure 8: *The present Co-op facility –the proposed development works will involve the demolition of one building, the partial demolition of an existing warehouse and the removal of disused storage tanks together with associated bund structure (all outlined in green); the protected structure is outlined in yellow*

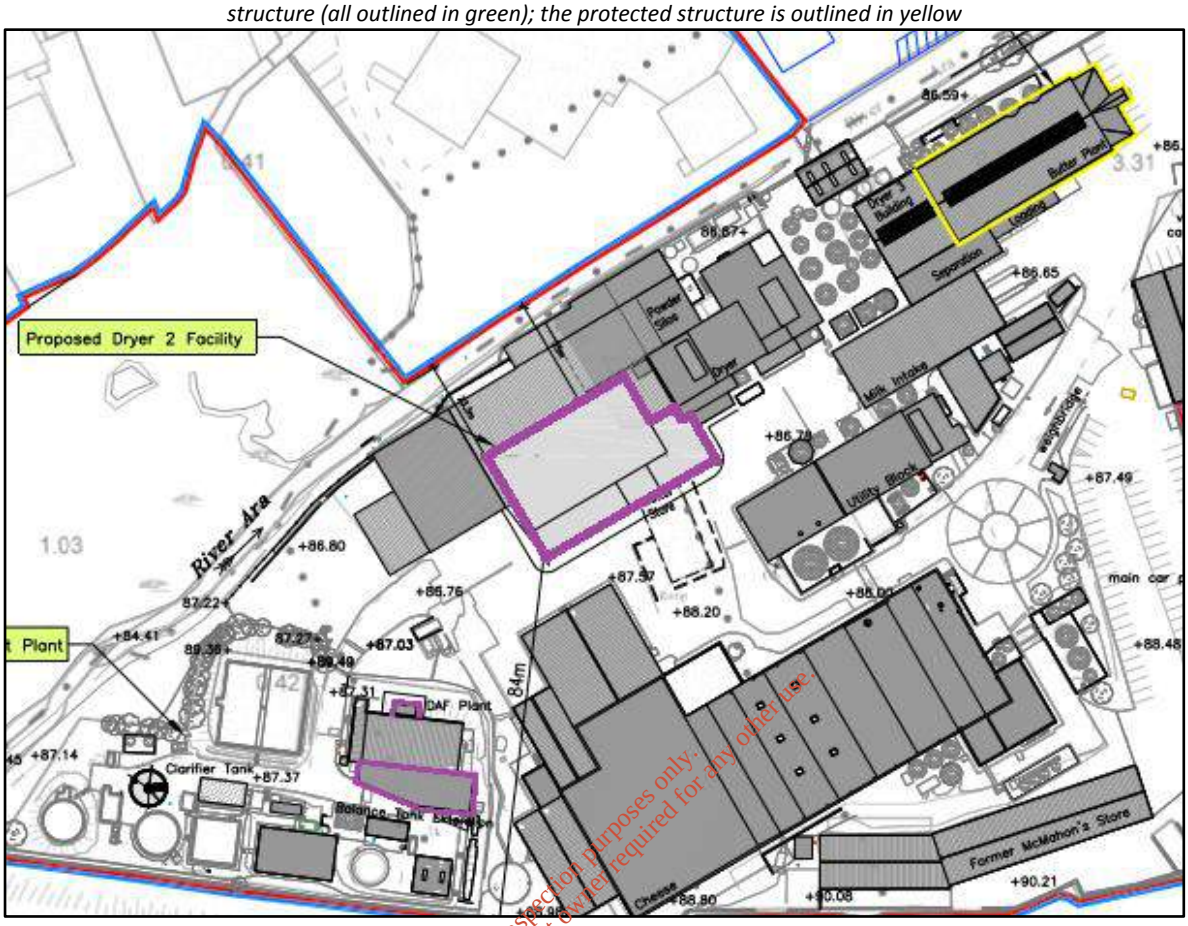


Figure 9: *Outline of the footprint of the proposed Dryer 2 Facility and of upgraded elements of the Wastewater Treatment Plant (purple outline)*

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Plate 1: *View from south-west of buildings due to be demolished to make way for* ***Dryer 2*** *– no significant fabric will be lost with this proposal. Loss of stone-built butter store to right of photograph will be a minor negative impact but can be mitigated by documenting it through recording.*



Plate 2: *Interior of existing store building proposed to be demolished and replaced by* ***Dryer 2.*** *No architectural or historic fabric of significance here.*

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Plate 3: *Butter store from east. Loss of architecturally and historically significant but heavily altered butter store is negative but can be mitigated through a programme of recording.*

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Plate 4: *Proposed* ***Dryer 2*** *even at its considerable height and massing will not significantly impact further on the visual amenity of the protected original creamery structure as it is far enough away and behind an intensively industrial site.*

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Archaeological appraisal

There are no recorded archaeological sites located within the subject site; furthermore, the development site is situated outside the zone of archaeological potential outlined for Tipperary Town. The nearest archaeological monument is the site of the Augustinian Friary situated to the east of the subject site. The brown-field developed nature of the proposed development site shows there is little potential for the survival of unrecorded archaeological features and artefacts. The northern part of the site lies in close proximity to the River Arra and geo-technical trial-holing in the area has shown the terrain here to be 'made ground'. It is likely that previous ground works on site would have impacted on any potential sub-surface archaeological features and artefacts.

Whilst the wider urban landscape context reveals a long history of settlement activity in the area, the development site lies outside the historic town core and beyond the projected line of the medieval town defences. Although Thomas states that there may have been 'suburbs' in this area (Thomas 1992,194) it is likely that the developments of the last century would have directly impacted on this potential archaeological resource.

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4. Assessment of impact

Archaeological character impact

The brown-field developed nature of the proposed development site shows there is little potential for the survival of unrecorded archaeological features and artefacts. The northern part of the site lies in close proximity to the River Arra and geo-technical trial-holing in the area has shown the terrain here to be 'made ground'. It is likely that previous intensive ground works for the construction of the buildings proposed for demolition would have impacted on any potential sub-surface archaeological features and artefacts. The proposed development by Tipperary Co-operative Creamery Ltd. will have no material or visual impacts on the archaeological significance or historic character of any recorded monument in the wider area.

Architectural and historic character impact

The main impact of the proposed construction of Dryer 2 will be demolition of the existing stone-built butter store building, an early twentieth-century structure of some architectural and industrial heritage interest but with extensive alteration to the interior and no protected status. A comprehensive measured survey and photographic survey of this building before its demolition should be undertaken to preserve it by record.

There will be no built heritage impact caused by demolishing the existing open-span concrete-walled powder storage structure on the proposed footprint of Dryer 2 and the height and massing of the new building will not radically alter the scale of the site overall visually - it will be far enough away from the protected front building to mean that this original creamery structure will continue to be the visual focus of the campus from the public road.

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Visual impact

The visual impact of the proposed development will mainly result from changing the massing of buildings within the site. Given the significant number of other existing tall buildings, tanks and other infrastructure within the development site, the introduction of a new large-scale element here will have **no significant impact** on the visual amenity of the protected structure situated towards the eastern frontage of the site (towards Station Road). The Proposed Dryer 2 even at its considerable height and massing will not significantly impact further on the visual amenity of the protected original creamery structure as it is far enough away and behind an intensively industrial site.

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5. Mitigation measures

Given the developed nature of the site, archaeological mitigation measures are not deemed necessary or applicable in this instance.

A comprehensive measured survey and photographic survey of the butter store (to be undertaken by a suitably qualified person) before its demolition should be undertaken to preserve it by record.

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6. Conclusions

Archaeology

The brown-field developed nature of the proposed development site shows there is little potential for the survival of unrecorded archaeological features and artefacts. The northern part of the site lies in close proximity to the River Arra and geo-technical trial-holing in the area has shown the terrain here to be 'made ground'. It is likely that previous intensive ground works for the construction of the buildings proposed for demolition would have impacted on any potential sub-surface archaeological features and artefacts. The proposed development by Tipperary Co-operative Creamery Ltd. will have no material or visual impacts on the archaeological significance or historic character of any recorded monument in the wider area.

Architectural heritage

The proposed development involves demolition of three structures within the rear (west) portion of the existing Co-op site. Only one of these structures has any architectural quality: the butter store, an early twentieth-century structure of some architectural and industrial heritage interest but with extensive alteration to the interior and no protected status. A comprehensive measured survey and photographic survey of this building before its demolition should be undertaken to preserve it by record.

The height and massing of the new building will not radically alter the scale of the site overall visually - it will be far enough away from the protected front building to mean that this original creamery structure will continue to be the visual focus of the campus from the public road.

There will be a minor visual alteration to views of the historic buildings on the site from the public realm but this is not considered negative. The proposed development may in fact improve the visual amenity of the site by obscuring cluttered infrastructure in the backdrop to the protected creamery building.

No material or visual impacts to any protected structures and places of cultural heritage significance in the immediate vicinity of the creamery site is foreseen as a result of the proposed development.

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Tipperary Town Council, South Tipperary County Council (2013) *Tipperary Town and Environs Development Plan 2013.*[pdf] Tipperary Town Council, South Tipperary County Council. Available at http://www.tipperarycoco.ie/sites/default/files/Publications/Tipperary%20Town%20%26%20Environs%20Development%20Plan.pdf [accessed 14 Jun. 2016].

Wikipedia (2015) *Condensed Milk Company of Ireland.* [online] Available at https://en.wikipedia.org/wiki/Condensed_Milk_Company_of_Ireland [accessed 1 Jul. 2016].

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Appendix: Descriptions of archaeological monuments within approximately 500m of the development site

The following descriptions are derived from the published the Archaeological Survey of Ireland's website (www.archaeology.ie)

Historic Town (Monument Number:TS067-004----)

On a ridge, on the junction of the Limerick-Waterford road and the Cashel-Kilmallock road with the River Ara flowing roughly E-W to the S. It is likely that the town of Tipperary was the principal manor or caput of the Anglo-Norman cantred (an administrative area) of Okonagh (which included the eastern portion of the Tipperary barony of Clanwilliam, as well as portions of Limerick) and probably dates to the late 12th century. A motte and bailey (TS067-001----) c. 1.1km to the N and a motte (TS067-002----) c. 800m to the NW protect the northern and northwestern routes into the town. In 1215 the 'vill' or town of 'Tibrari' is mentioned in relation to the church there and in 1300 a reference to the 'community of the town' suggests that the town was incorporated at this stage (Bradley 1985, 56). Otto de Grandison, who held Clonmel, also held Tipperary town by 1281 (Thomas 1992, 194). It appears that the county court met at Tipperary until the Archbishop of Cashel moved it to Cashel, which was the subject of a legal case in 1297 (Thomas 1992, 194). The town was burned in 1329 by Brian O'Brian, however, there are references to the reeve (senior town official) and community up until 1432 (Bradley 1985, 56). There is historical evidence that the town was walled, though no physical evidence is visible at ground level. In 1300 a murage grant was given for a period of 10 years and in 1310 a further grant was given for a period of 3 years (Thomas 1992, 194). Based on the probable survival of the medieval town pattern on the modern town, it is suggested that the town consisted of an area of c. 15 hectares, roughly rectangular in shape, incorporating the church (TS067-004003-) and graveyard (TS067-004008-) in its NW angle and the castle (TS067-004002-) in the SE angle, with the river forming the southern boundary (Thomas 1992, 194-5). An Augustinian Friary (TS067-004001-) is located immediately S of the river. There is conflicting evidence of when this was founded, sources suggesting that this was either during the reign of Henry III (1216-1272) or later c.1300 by Stephen Butler (Gwynn and Hadcock 1970 (1988 reprint), 302). In the 15th century the town seems to have gone into decline and did not recover until the late 17th century. In 1660 the poll-tax returns for the town suggest a total population of c. 250, however, during the course of this decade the hearth-money records suggest that the town grew rapidly with the population almost doubling in size (Smyth 1991, 165).

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Town Defences (Mon. No.: TS067-004009-)

In 1300 a murage grant was given for a period of 10 years and in 1310 a further grant was given for a period of 3 years (Thomas 1992, 194). Based on the probable survival of the medieval town pattern on the modern town, it is suggested that the town consisted of an area of c. 15 hectares, roughly rectangular in shape, incorporating the church (TS067-004003-) and graveyard (TS067-004008-) in its NW angle and the castle (TS067-004002-) in the SE angle, with the River Ara forming the southern boundary (Thomas 1992, 194-5). There is no visible trace of an enclosing wall, bank or fosse at ground level.

School (Mon. No.: TS067-004005-)

On the E side of Railway Road, S of the River Ara and in the grounds of the Augustinian Friary (TS067-004001-). In 1669 a royal charter granted Erasmus Smith 'several parcells of abby land, with the old abby, in Tipperary...to hold ye premisses to ye uses of his charity' (Quane 1960, 41). This charity was the establishment of a free grammar school. Construction of the school began in 1680 when the old abbey was demolished to provide building materials. In 1690 the school was closed as the building was taken over as a headquarters by the Williamite army. The following year the school was burned down. In 1702 a new school was completed

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(Bourke 1989, 86). This late 17th/early 18th-century building survived for over a hundred years when in 1820 a new school replaced it. The 'Father Humphreys Memorial School' that is present today, opened in 1955, was partly built on the old Abbey School.

Religious House- Augustine Friars (Mon. No.: TS067-004001)

S of Tipperary town (TS067-004----) and immediately S of the River Ara, at the SE junction of Abbey Street and Railway Road. There is conflicting evidence of when this Augustinian Friary was founded, sources suggesting that this was either during the reign of Henry III (1216-1272) or later c.1300 by Stephen Butler, an ancestor of the earls of Carrick-on-Suir (Gwynn and Hadcock 1970 (1988 reprint), 302). In 1539 the friary was surrendered by the then prior, Donough O'Cuyrke (O'Quirk) and the possessions, consisting of 'a church, chapter-house, dormitory hall, two chambers, an inner chamber, kitchen, stable, cemetery and garden, all said to be in ruins and not valued (ibid.). The jurors also stated that 'the church has from time immemorial been the parish church of Typperare. There are no superfluous buildings, but all are necessary for the farmer, and with 2 gardens and other accommodations cont. 2 acr. And are worth nothing above repairs' (White 1943, 327). The jurors appraisal was probably exaggerated to reduce the value of the property as one of the jurors, Dermot Ryan, subsequently gained possession of the abbey (Quane 1960, 40; Gwynn and Hadcock 1970 (1988 reprint), 302). In the 1680s the abbey was demolished and the materials were used to build an Erasmus Smith Grammar School (Quane 1960, 42). Only a pointed arch survived, with a soffit rib carried by pointed corbels, which is visible on at least two pre-1950s photographs. According to the OS Letters of 1840, 'This arch is about sixteen feet [c. 4.8m] high, and is eight feet ten inches [c. 2.5m] wide. There is but a very small portion of the wall, which was four feet two inches [c. 1.2m] thick, remaining on each side (O'Flanagan 1930, vol. 3, 34 -35(103)). A survey of the arch in 1920 gives the width of the arch as 8 feet 10½ inches (c. 2.69m), the height to the spring of the arch as 8 feet 9½ inches (c. 2.67m) and the thickness as 4 feet 1¼ inches (c. 1.24m), with the soffit rib being 11 inches thick (0.26m) (OPW files, 15 April 1920). In 1958 an attempt was made to move the arch, however, this only resulted in its total 'collapse and disintegration' (Quane 1960, 75). No trace of the abbey survives at ground level.

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Church (Mon. No.: TS067-004003-)

Though currently occupying a position roughly in the centre of Tipperary town, immediately N of John Street, it was possibly originally located within the NW angle of the town, the town defences (TS067-004009-) may have formed the N and W boundary of the graveyard (Thomas 1992, vol. 2, 195). In 1215 the advowson (the patronage including the tithes) of the church of the vill of Tibrari (town of Tipperary) was granted to Christ Church Cathedral, Dublin (Bradley 1985, 56). A royal visitation of 1607 found the parish church in repair, suggesting that it continued in use after the Reformation for Protestant worship and in 1730 the medieval church was hugely remodelled (Butler 2006, 53-5, 189). The present C of I church at this location dates to 1832. Nothing survives at ground level of the medieval church, which is indicated as being immediately S of the C of I church on the 1st (1840) ed. OS 6-inch map. There are no apparent medieval architectural fragments or pre-1700 graveslabs in the graveyard.

Graveyard (Mon. No.: TS067-004008-)

In the centre of Tipperary town, immediately N of John Street and possibly originally within the NW angle of the town defences. The medieval church (TS067-004003-) is no longer visible at ground level. The present C of I church at this location dates to 1832. There are no apparent medieval architectural fragments or pre-1700 graveslabs visible in the graveyard.

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Castle-Unclassified (Mon. No.: TS067-004002-)

On a height in the SE section of the town, c. 100m NE of the River Ara. Corporation housing and warehouses constructed since 1954 currently occupy the location. This castle is not indicated on the 1st (1840) ed. 6-inch OS map and on the 25-inch map it is designated as 'King John's Castle (Supposed site of)' with hachures depicting the SE portion of an inner and outer curving scarp, with a suggestion that the scarp continues on both sides northward beneath modern property boundaries. There are no known historical references to this castle and as there are no visible remains at ground level it is not possible to ascertain the nature or date of this castle.

Burial Ground (Mon. No.: TS067-131----)

An excavation was carried out in a green-field site, immediately N of the medieval church (TS067-004003-) and graveyard (TS067-004008-) in advance of the construction of a government office building (Cummins 2000, 203). During testing in 1997 five burials, orientated E-W, were excavated, though no dating evidence was retrieved (Hodkinson 1998, 180). In 1998, a further sixteen burials were excavated, aligned E-W or slightly NE-SW (Cummins 1998, 203). The total number of burials represent eleven adults, five juveniles and two neonates (ibid.). Associated pottery suggested a post-medieval date for the burials.

Kiln (Mon. No.: TS067-123----)

An excavation was carried out in a green-field site, N of the medieval church (TS067-004003-) and graveyard (TS067-004008-), in advance of construction of a government office building (Cummins 2000, 203). An E-W orientated kiln structure was cut into the sand subsoil (ibid.). This consisted of a linear flue (L 8.5m; Wth 3.48m; D 1.2m) leading to an elliptical bowl at the E end (ibid.). It was keyhole-shaped in plan (ibid.). The sides were stone-lined, and a single lintel stone was found over the flue (ibid.). The kiln was filled with collapsed sand from the sides of the structure (ibid.). There was a basal, charcoal-rich deposit under the stone lining, which may contain evidence of charred cereal grains, indicative of a corn-drying function (ibid.). There were also small fragments of oxidised limestone in some of the overlying fills, which may suggest a limekiln function.

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Hut-site (Mon. No.: TS067-124----)

An excavation was carried out in a green-field site, N of the medieval church (TS067-004003-) and graveyard (TS067-004008-), in advance of construction of a government office building (Cummins 2000, 203). A circular hut site, 4m in diameter, was excavated in the NE corner of the field, and no enclosing bank or fosse was uncovered (ibid.). The upper level of the hut had been disturbed by cultivation activity, and there was a high amount of hollows in the interior caused by root/burrowing activity (ibid.). A sherd of post-medieval pottery was found in a context severely disturbed by root/burrowing activity (ibid.). The hut was surrounded by a narrow gully, 0.2-0.5m wide and 0.2m deep, containing no evident post-holes or stake-holes (ibid.). It may have functioned as a bedding trench (ibid.). The entrance in the N was indicated by a backfill of moderately compacted sand within the gully, and a hearth lay close to the centre of the hut (ibid.). The interior of the hut was occupied by overlapping sand layers containing a number of small post-holes and stake-holes (ibid.). They did not indicate any identifiable structures, apart from a possible spit over the hearth (ibid.). There were two shallow pits in the NE corner, and one of these contained a fragment of a jet/lignite bracelet.

Ritual Site-Holy Well (Mon. No.: TS067-005----)

At E end of Tipperary town, in the yard of corporation houses on the S side of Father Matthew Street, off S side of Main Street. Named on current OS 6-inch map as 'St Bridget's Well or Toberbreda'. It is incorporated into W side of wall of restaurant building. Circular well (diam. 1.7m) defined by random rubble stone wall (ext. H 0.4m above pavement) bonded with a cement based mortar. Upper courses of wall truncated in E segment by wall of building. Interior of shaft lined with rubble stone and bonded with lime based mortar. Full depth of well not determined. Water source possibly blocked as stagnant water is at a depth of c. 2.5m below top of well shaft. Iron grate fixed into place over opening of shaft.

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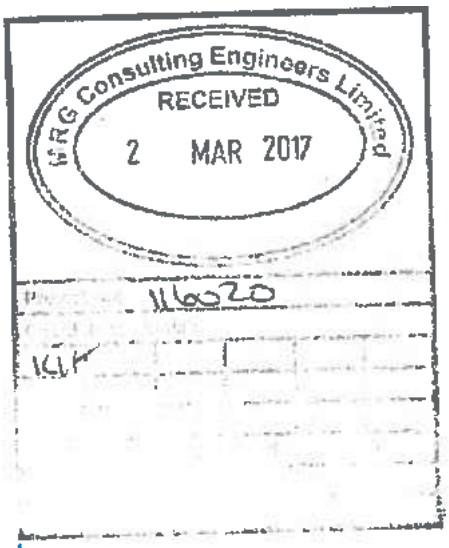
ATTACHMENT M

CORRESPONDENCE

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Bonneagar Iompair Éireann
Transport Infrastructure Ireland



Mr. Kevin Harty
MRG Consulting Engineers Limited
No. 4 Day Place
Tralee
Co. Kerry

Dáta | Date	Ár dTag | Our Ref.	Bhur dTag | Your Ref.
1 March 2017	TII17-96778	116020/Corr/04/04G/20170210-Lt1

RE: **Tipperary Cooperative Creamery Ireland, Tipperary Town, Co. Tipperary**
Proposed Dyer 2 Development

Dear Mr. Harty,

Thank you for your letter and enclosures of 10 February 2017 regarding the above. The position in relation to your enquiry is as follows.

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Transport Infrastructure Ireland (TII) wishes to advise that it is not in a position to engage directly with planning applicants in respect to proposed developments. TII will endeavour to consider and respond to planning applications referred to it given its status and duties as a statutory consultee under the Planning Acts. The approach to be adopted by TII in making such submissions or comments will seek to uphold official policy and guidelines as outlined in the Spatial Planning and National Roads Guidelines for Planning Authorities (DoECLG, 2012). Regard should also be had to other relevant guidance available at www.TII.ie.

The issuing of this correspondence is provided as best practice guidance only and does not prejudice TII's statutory right to make any observations, requests for further information, objections or appeals following the examination of any valid planning application referred.

With respect to EIS scoping issues, the recommendations indicated below provide only general guidance for the preparation of EIS, which may affect the National Roads Network.

The developer should have regard, inter alia, to the following;

- Consultations should be had with the relevant Local Authority/National Roads Design Office with regard to locations of existing and future national road schemes,
- TII would be specifically concerned as to potential significant impacts the development would have on the national road network (and junctions with national roads) in the proximity of the proposed development. It is noted that the EIS Scoping Report submitted does not identify the expected traffic generation or their use of

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the national road network, therefore impacts on the national road and associated junctions should be considered and addressed,

- The developer should assess visual impacts from existing national roads,
- The developer should have regard to any Environmental Impact Statement and all conditions and/or modifications imposed by An Bord Pleanála regarding road schemes in the area. The developer should in particular have regard to any potential cumulative impacts,
- The developer, in conducting Environmental Impact Assessment, should have regard to TII Publications (formerly DMRB and the Manual of Contract Documents for Road Works),
- The developer, in conducting Environmental Impact Assessment, should have regard to TII's Environmental Assessment and Construction Guidelines, including the Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (National Roads Authority, 2006),
- The EIS should consider the Environmental Noise Regulations 2006 (SI 140 of 2006) and, in particular, how the development will affect future action plans by the relevant competent authority. The developer may need to consider the incorporation of noise barriers to reduce noise impacts (see Guidelines for the Treatment of Noise and Vibration in National Road Schemes (1st Rev., National Roads Authority, 2004)),
- It would be important that, where appropriate, subject to meeting the appropriate thresholds and criteria and having regard to best practice, a Traffic and Transport Assessment be carried out in accordance with relevant guidelines, noting traffic volumes attending the site and traffic routes to/from the site with reference to impacts on the national road network and junctions of lower category roads with national roads. The Authority's Traffic and Transport Assessment Guidelines (2014) should be referred to in relation to proposed development with potential impacts on the national road network. The scheme promoter is also advised to have regard to Section 2.2 of the NRA/TII TTA Guidelines which addresses requirements for sub-threshold TTA,
- The designers are asked to consult TII Publications to determine whether a Road Safety Audit is required,
- In the interests of maintaining the safety and standard of the national road network, the EIS should identify the methods/techniques proposed for any works traversing/in proximity to the national road network,
- In relation to haul route identification, the applicant/developer should clearly identify haul routes proposed and fully assess the network to be traversed. Separate structure approvals/permits and other licences may be required in connection with the proposed haul route and all structures on the haul route should be checked by the applicant/developer to confirm their capacity to accommodate any abnormal load proposed.

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Notwithstanding, any of the above, the developer should be aware that this list is non-exhaustive, thus site and development specific issues should be addressed in accordance with best practise.

I hope that the above comments are of use in your EIS preparation.

Yours sincerely,

P.P. Mark Byrne

Michael McCormack
Senior Land Use Planner

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From: MRG - Info <info@mrg.ie>
Sent: 21 February 2017 12:34
To: Kevin Harty
Subject: FW: Tipperary CoOperative Creamery Limited - Proposed Dryer 2 Development FAO Kevin Harty

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From: Frank ODonoghue [mailto:Frank.ODonoghue@fisheriesireland.ie]
Sent: 21 February 2017 12:04
To: MRG - Info <info@mrg.ie>
Cc: i.doyle@epa.ie
Subject: Tipperary CoOperative Creamery Limited - Proposed Dryer 2 Development FAO Kevin Harty

Tipperary CoOperative Creamery Limited - Proposed Dryer 2 Development. FAO Kevin Harty

Your Ref: 116020/Corr/04/04G/20170210-Lt1

Dear Mr Harty,

I refer to your letter dated 10th February in relation to the above named development. As you are undoubtedly aware there have been significant issues with the quality of discharges from Tipperary Co-Op's surface water network to the River Ara. Inland Fisheries Ireland (IFI) is of the view that the proposed redevelopment of the site provides the opportunity to include infrastructural measures to address these issues.

It is noted that the outline of the proposed development proposes the upgrading of the existing Waste Water Treatment Plant (WWTP) with a new balance tank and clarifier. IFI is of the view that the CoOperative should provide effluent treatment to a sufficient standard so as to allow for the direct discharge to waters from the facility. The discharge of treated effluent to the foul sewer and thence to the municipal waste water treatment plant at Tipperary makes little sense. This invariably results in unnecessary hydraulic loading of the municipal plant and increased risk of potential pollution in the receiving waters of the River Ara.

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The construction phase of the proposed developments has the potential to convey deleterious matter such as concrete, silt, fuel, lubricating and hydraulic oils from construction plant and equipment to receiving waters unless proper safeguards are in place.

Uncured concrete can kill fish and macroinvertabrates by altering the pH of the water. Pre-cast concrete should be used whenever possible, to eliminate the risk to all forms of aquatic life. When cast-in-place concrete is required, all work must be done in the dry and effectively isolated from any water that may enter the stream for a period sufficient to cure the concrete.

One of the potential impacts from developments such as proposed is the discharge of silt-laden waters to fisheries streams from newly developed sites at which earth moving and excavation works are ongoing. Silt can clog salmonid spawning beds, and juvenile salmonids are particularly sensitive to elevated levels of silt. Similarly plant and macroinvertebrate communities can literally be blanketed over, and this can lead to loss or degradation of valuable habitat. It is important to incorporate best practices into construction methods and strategies to minimise discharges of silt/suspended solids to waters. Measures such as silt fences, silt bags and silt traps if required should be installed at locations that will intercept run-off to waters.

All oils, greases, fuels and lubricants should be stored in secure bunded areas, and particular care and attention should be taken during refuelling and maintenance operations on plant and equipment. Where site works involve the discharges of drainage water to receiving rivers and streams, temporary oil interceptor facilities should be installed and maintained. Where temporary diesel or petrol driven pumps are required, they should be sited within portable temporary bunded units, such as can easily be fabricated, and are readily available. Plant and machinery should be checked regularly for leaks etc.

We would recommend that you refer to the following link for IFI's publication "Guidelines on protection of fisheries during construction works in and adjacent to waters":
http://www.fisheriesireland.ie/fisheries-management-1/624-guidelines-on-protection-of-fisheries-during-construction-works-in-and-adjacent-to-waters

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Measures and practices to prevent the spread of invasive species should be addressed. Invasive species may drive local native species to extinction via competitive exclusion, niche displacement or hybridisation with related native species. For example, Himalayan balsam, Giant hogweed and Japanese knotweed compete with native bank vegetation undermining banks resulting in increased erosion and siltation of fish spawning beds. Giant Hogweed is also a human health hazard. Zebra mussels and Asian clam compete with fish alter the water chemistry of a waterbody, they can also mask the effects of eutrophication/enrichment.

Invasive species can transform habitats and endanger whole ecosystems with serious implications for the environment and the economy. Construction sources include imported materials such as top soil and earthmoving equipment, pumps, boats, ropes etc, previously used perhaps unknowingly on lands or in waters containing invasive species. To prevent the introduction or spread of alien invasive species IFI recommends that all equipment used which has come from another site/water body shall be properly and appropriately steam cleaned and or frozen and or otherwise disinfected prior to and following usage. Any contractors engaged in the carrying out of the upgrading works must be made aware of this. Further information on invasive species their impact and control, and on bio-security is available at:
www.invasivespeciesireland.com

Regards,

Frank O'Donoghue
Senior Fisheries Environmental Officer - Inland Fisheries Ireland - Clonmel
---
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From: Ian Lumley <heritage@antaisce.org>
Sent: 16 February 2017 15:52
To: Kevin Harty
Subject: Att Kevin Harty Re Tipperary Co Op Creamery Ltd Tipperary, Proposed Dryer 2 Development
Attachments: Not So Green Report.pdf; Not so Green Summary.pdf

Att Kevin Harty

Re Tipperary Co Op Creamery Ltd Tipperary, Proposed Dryer 2 Development

Dear Mr Harty,

Thank you for letter of 10 Feb with EIS scoping

The proposal is predicated on continued levels of milk supply of 133.8 gallons PA and an increase to 147.8 gallons PA.

The environmental impact of this continuing and increased milk supply needs to be assessed on climate, biodiversity, and land use impact .

We attach report to inform your consideration of these impacts.

Yours sincerely,

Ian Lumley

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--
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