Our Case Number: ABP-317810-23

An Bord Pleanála

Galway County Council
Áras an Chontae
Prospect Hill
Co. Galway

Date: 24 October 2023

Re: Open Cycle Gas turbine power plant (350MW) and associated infrastructure Located on land to the north of Tynagh Power Station, Derryfrench, Tynagh, Loughrea, Co. Galway.

Dear Sir / Madam,

An Bord Pleanála has received your submission in relation to the above mentioned proposed development and will take it into consideration in its determination of the matter.

The Board will revert to you in due course in respect of this matter.

Please be advised that copies of all submissions / observations received in relation to the application will be made available for public inspection at the offices of the local authority and at the offices of An Bord Pleanála when they have been processed by the Board.

More detailed information in relation to strategic infrastructure development can be viewed on the Board's website: www.pleanala.ie.

If you have any queries in the meantime, please contact the undersigned officer of the Board or email sids@pleanala.ie quoting the above mentioned An Bord Pleanála reference number in any correspondence with the Board.

Yours faithfully,

pp NM

Niamh Hickey
Executive Officer
Direct Line: 01-8737145

PA09

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Planning and Development Act 2000 (as amended)

Strategic Infrastructure Act 2006

Report as required by Section 37E(4) & (5) of the Planning and Development Act 2000 (as amended).

An Bord Pleanála Reference ABP 317810-23 – EP Energy Developments Ltd.

Application Details:

Applicant:	EP Energy Developments Ltd.
Received	15/08/2023
Agent:	Gravis Planning
An Bord Pleanála Reference Number:	ABP-317810-23
Proposed Development (Summary):	Open Cycle Gas turbine power plant (350MW) and associated infrastructure.
Site Location:	Tynagh Power Station, Derryfrench, Tynagh, Loughrea, Co. Galway

PLANNING ASSESSMENT

1.PURPOSE OF THIS REPORT

Following consultation pursuant to Section 37B of the Planning & Development Act 2000 (as amended) (the Act), and following notice issued to the applicant pursuant to Section 37B (4) (a) of the Act, An Bord Pleanála has determined that the proposed development constitutes Strategic Infrastructure Development within the meaning of Section 37A of the Act. The Board considered the size, scale and location of the development and determined that it fell within the definition of energy infrastructure in the Seventh Schedule of the Planning and Development Act, 2000 (as amended), thereby satisfying the requirements of Section 37(A)1 of this Act. The Board also considered the proposed development to be of strategic importance by reference to the requirements of Section 37A(2)(a) and (b) of the Planning and Development Act, 2000 (as amended) in that the proposed development will be of strategic economic and social importance to the state, as it will enhance the security of the national electricity supply. The Board further considered the proposed development to substantially contribute to the objectives of the National Planning Framework and RSES for the area in terms of climate change and low-carbon transition objectives of these documents.

Given the development has been determined to be a SID by An Bord Pleanála, the normal mechanism of applying to Galway County Council for planning permission does not apply. Therefore, the development proposal requires a planning application to be made directly to the Board. Accordingly, EP Energy Developments Ltd., as required, has applied directly to An Bord Pleanála for planning permission as per Section 37E of the Planning and Development Act, 2000 (as amended).

As required under Section 37E (4) of the Planning and Development Act 2000 (as amended), the purpose of this report is to set out the views of the Planning Authority on the effects of the proposed development on the environment and the proper planning and sustainable development of the area, having regard in particular to the matters specified in section 34(2) of the Planning and Development Act, 2000 (as amended). The matters specified in section 34(2) are:

(i) the provisions of the development plan,

(ia) any guidelines issued by the Minister under *section 28*,

(ii) the provisions of any special amenity area order relating to the area,

(iii) any European site or other area prescribed for the purposes of section 10(2)(c),

(iv) where relevant, the policy of the Government, the Minister or any other Minister of the Government,

(v) the matters referred to in subsection [34](4),

(va) previous developments by the applicant which have not been satisfactorily completed,

(vb) previous convictions against the applicant for non-compliance with this Act, the Building Control Act 2007 or the Fire Services Act 1981, and

(vi) any other relevant provision or requirement of this Act, and any regulations made thereunder.

(aa) When making its decision in relation to an application under this section, the planning authority shall apply, where relevant, specific planning policy requirements of guidelines issued by the Minister under section 28.

In the interest of clarification, there are no Special Amenity Area Orders (Item ii above) in County Galway. The matters referred to in section 34(4) of the Planning and Development Act, 2000 (as amended) relate to conditions to which may be attached by the Planning Authority during the consideration of a normal planning application.

This report shall be submitted to An Bord Pleanála for consideration, as required under Section 37E(4) of the Act. However, prior to submission to An Bord Pleanála, as per Section 37E(5) of the Act, the report shall be submitted to the Members of Galway County Council to seek their views on the proposed development. The members may, by resolution, decide to attach recommendations to this report (as per Section 37E(6) of the Act. The views expressed at the meeting of the Council on 25th of September 2023, and on the 23rd of October 2023 shall also be included (as per Section 37E (6) of the PDA 2000), for consideration by the Bord.

It should be noted that prior to determining any application for permission under 37E of the Act, the Board may, at its absolute discretion and at any time as per Section 37F of the Act:

-require the applicant to submit further information, including a revised Environmental Impact Assessment Report,

-indicate it is considering granting permission, subject to the applicant for permission submitted revised particulars, plans or drawings in relation to the development,

-request further submission or observations from the applicant, any person who made submissions or observations, or any person who made submissions or observations, or any person who may, in the opinion of the Board, have information which is relevant to the determination of the application, submit revised particulars, plans or drawings in relation to the development,

-make any information relating to the application available for inspection, notify any person or the public that information is so available and, if it considers appropriate, invite further submissions or observations to be made within such period as it may specify, or

-hold meeting with the applicant for permission or any other person where it appears to the Board to be expedient for the purpose of determining the application, or where it appears to the Board to be necessary or expedient for the purpose of resolving any issue with the applicant for permission or any disagreement between the applicant and any other party, including resolving any issue or disagreement in advance of an oral hearing,

2.DESCRIPTION OF THE PROPOSED DEVELOPMENT

This application proposes the provision of an Open Cycle Gas Turbine power plant (350MW) and associated infrastructure on land to the north of Tynagh Power Station, Derryfrench, Tynagh, Loughrea, Co. Galway.

The main component of the proposed development is a 350 MW Open Cycle Gas Turbine (OCGT) power plant, fuelled by natural gas, which will operate as a 'peaking plant'. The proposed OCGT will be capable of starting up rapidly to provide backup power generation when there is a gap between renewable power generation and demand. The proposed development will assist in facilitating the continued expansion of Ireland's renewable generation capacity while maintaining security of supply.

Electricity transmission will be ancillary to the plant, carrying electricity underground from the main transformer to the existing electrical substation to the south, where a new bay is proposed. No alterations are proposed to the electricity network outside of the site as part of the development proposal. The presence of the existing gas and electricity infrastructure at Tynagh Power Station is a key benefit of the site.

The key elements of the project are the OCGT unit and associated balance of plant and equipment; emissions stack, acoustic barriers; a secondary fuel storage and unloading facility; distillate fuel gantry, water storage tanks, gas AGI and electrical substation connection. No natural gas storage is proposed.

An Environmental Impact Assessment Report (EIAR) has been prepared in relation to the project and accompanies the application.

This application contains the following documentation:

- Completed Planning Application Form
- Cover Letter to Galway County Council with attachments to include:
  -Schedule of Documents & Drawing Schedule
  -Newspaper Notices (Irish Times & Irish Independent)
  -Site Notice
  -EIA Portal Confirmation Notice (ID: 2023140)
  -Landowners Letters of Consent
  -Letters to Prescribed Authorities
- Planning Application Drawings (Accompanied Drawing Schedule)
- Environmental Impact Assessment Report (EIAR)
  - Table of Contents (All Volumes)
  - Volume I – Environmental Impact Assessment Report (EIAR)
  - Volume II – Appendices (Part A)
  - Volume II – Appendices (Part B)
  - Volume III – Figures
  - Non-Technical Summary
- Planning Statement

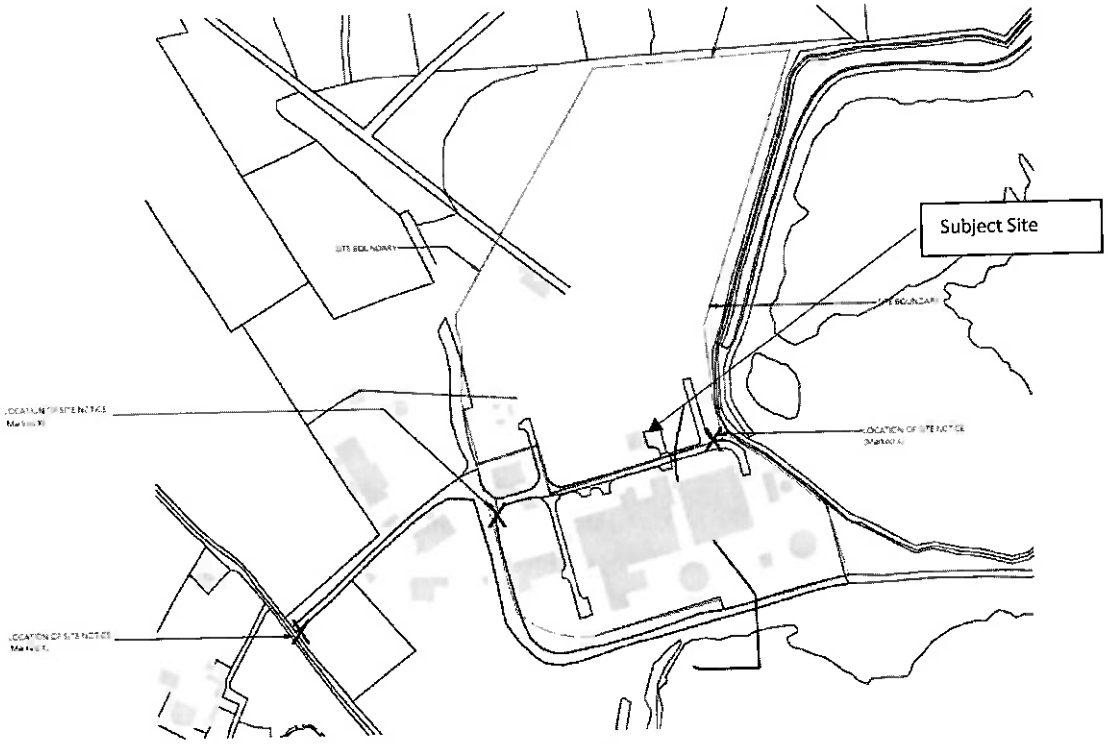
3.SITE LOCATION

The appeal site, comprising of 8.3ha in area, is located within the townland of Derryfrench, c.2km north-west of Tynagh Village and c.12km south of Loughrea, town in east County Galway. The site was formerly Tynagh Mines and now forms part of an energy complex which accommodates Tynagh Power Station, currently in use by Tynagh Energy. The adjoining lands include buildings and structures related to the generation of electricity and the single emission stack associated with the existing operational Closed Cycle Gas Turbine (CCGT) which is visible from the surrounding area. The subject site also benefits from proximity to a range of supply and transmission infrastructure including a high pressure buried gas pipeline, an electricity substation and a 220kv overhead power line.

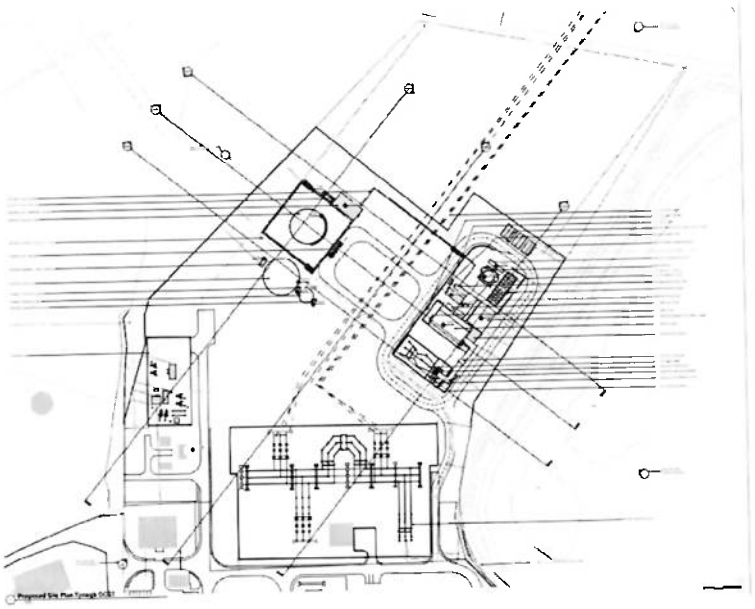
Lands surrounding the existing Power Station are typically rural in nature, principally agricultural pastureland with hedgerows, stone walls and undulating terrain. The existing Power Station buildings, internal road, fencing and a tailing pond are adjacent to the south of the site, an enclosed former mine lagoon is positioned southeast of the site, and the Sperrin Galvanisers Ltd. (IPPC) licensed facility is located to the west and also shares the vehicular access from the local road to the west, the L-4310 which extends southwards from the N65. There are several detached houses along this local road, with the densities increasing towards the junction with the N65 to the north and Tynagh Village to the south-east. There are also several farms and an equestrian centre in the surrounding area.

There are no nearby European or Nationally designated sites in the immediate vicinity, although there are a number of European Sites in the wider area (in excess of 6km), including the Slieve Aughty Mountains SPA to the west and south, the Middle Shannon Callows SPA and Lough Derg (Shannon) SPA to the south east, the Lough Derg North East Shore SA and Barroughter Bog SAC to the south east. There are also several features of local historic and cultural heritage interest in the surrounding area.

Map 1 *– Aerial Photograph of the Subject Site*



***Map 2** – Site Location*



***Map 3** – Site Layout*

4.RELEVANT POLICY & LEGISLATION:

4.1 European Policy

Large Combustion Plant Directive (2001/80/EC) – This Directive requires the reduction of emissions of acidifying pollutants, particles, and ozone precursors. Various limit values are based on licence dates.

Renewable Energy Directive (2009/28/EC [RED1] – This Directive requires a commitment to produce energy from renewable sources, setting national binding targets on the share of renewable energy in energy consumption and in the transport sector to be met by 2020. It aimed to make renewable energy sources account for 20% of EU energy by 2020. Ireland had a national target of 16%. The government decided that 40% of electricity consumed in 2020 would be generated by renewable sources. Members States must submit National Renewable Energy Action Plans and Progress Plans to the EC.

Recast Renewable Energy Directive 2018/2001/EU (January 2019) – Sets new binding target for share of energy from renewable sources in the EU of at least 32% for 2030, with a view to increasing the target through legislation by 2023. Member States are required to set national targets to meet, collectively, the binding Union target through integrated national energy and climate plans. The final share of energy from renewable sources for Ireland's gross final consumption of energy from 1st January 2021 must not be lower than 16% and Ireland will be obliged to take the necessary measures to ensure compliance with same.

Energy Roadmap 2050 – This 2011 Roadmap addresses the transition of the energy system in ways that would be compatible with the greenhouse gas reductions targets set out in RED!.

4.2 National Energy & Climate Policy

Climate Action Plan 2023 – This plan is the second annual update to Ireland's Climate Action Plan 2019 and the first to be prepared under the Climate Action and Low Carbon Development (Amendment) Act 2021. In reference to electricity, the plan specifically provides a target for the delivery of at least 2GW of from new flexible gas fired power generation by 2030 to ensure security of electricity supply and reduce emissions.

National Energy Security Framework- April 2022 – This framework is an overarching and comprehensive response to Ireland's energy security needs in the context of the war in Ukraine. This document also acknowledges that there are challenges to electricity security of supply that are unrelated to the impacts of the war in Ukraine and references EirGrid's All-Island Generation Capacity Statement, which identifies that the level of dispatchable electricity generation capacity (i.e. capacity that does not rely on wind or solar energy) needs to increase significantly over the coming years due to reduced reliability of existing plants, anticipated new power stations not being developed as planned, expected strong growth in demand for electricity, and the closure of existing generation.

Climate Action and Low Carbon Development (Amendment) Act 2021 - Ireland has a legally binding path to net-Zero emissions no later than 2050, and to a 51% reduction in emissions by the end of this decade. A key element from a local authority perspective is the requirement for local authorities to prepare individual Climate Action Plans. These Plans will include both mitigation and adaptation measures and are required to be updated every five years.

Key highlights of the Act include:

- This Act embeds the process of setting binding and ambitious emissions-reductions targets in law.
- The Act provides for a national climate objective, which commits to pursue and achieve no later than 2050, the transition to a climate resilient, biodiversity-rich, environmentally sustainable and climate-neutral economy.
- The Act provides that the first two five-year carbon budgets proposed by the Climate Change Advisory Council should equate to a total reduction of 51% over the period to 2030, relative to a baseline of 2018.
- The role of the Climate Change Advisory Council has been strengthened, enabling it to propose carbon budgets to the Minister which match our ambition and international obligations.
- The government must adopt carbon budgets that are consistent with the Paris agreement and other international obligations. All forms of greenhouse gas emissions including biogenic methane will be included in the carbon budgets, and carbon removals will be taken into account in setting budgets.
- The Government will determine, following consultation, how to apply the carbon budget across the relevant sectors, and what each sector will contribute in a given five-year period.
- Actions for each sector will be detailed in the Climate Action Plan which must be updated annually.
- Government Ministers will be responsible for achieving the legally-binding targets for their own sectoral area with each Minister accounting for their performance towards sectoral targets and actions before an Oireachtas Committee each year.
- Local Authorities must prepare individual Climate Action Plans which will include both mitigation and adaptation measures and will be updated every five years. Local Authority Development Plans must be aligned with their Climate Action Plan.
- Public Bodies will be obliged to take account of Climate Action Plans in the performance of their functions.

Circular Letter PL 12.2021 & Government Policy Statement on Security of Electricity Supply (2021) – The Circular Letter recognises the need in the current circumstances for a continued mixture of electricity generation and supporting infrastructure to maintain security of electricity supply and therefore advises planning authorities should consider planning applications, which are submitted for electricity infrastructure or infrastructure that may impact on electricity supply – including for existing conventional electricity generation, having regard to the Policy Statement.

The Programme for Government commits Ireland to an average 7% per annum reduction in overall greenhouse gas emissions from 2021 to 2030 (a 51% reduction over the decade) and to achieving net zero emissions by 2050. To achieve of these targets, the Government has committed that up to 80% of electricity consumption will come from renewable sources by 2030 on a pathway to net zero emissions.

To support society and the economy, the policy statement states that a reliable source of electricity is vital for consumers to have confidence in the transition to a net zero emissions future. To this end, ensuring continued security of electricity supply is considered a priority at national level throughout the transition to up to 80% of electricity consumption coming from renewable sources by 2030. While the majority of renewable energy generated by 2030 will be generated from wind and solar, these renewable energy sources are variable in nature, and therefore the Government require other technologies to both support their operation and provide electricity supplies when they are not generating such as conventional generation (typically powered by natural gas).

The Government anticipates natural gas will form the vast majority of conventional electricity generation, with some gasoil/distillate generation where regional constraints exist, such as the limited extent of the natural gas network. The Policy Document also highlights the need for gas-fired generation to be able to operate on gasoil/distillate as a backup fuel. Therefore, the Government's stated position is that the *'development of new conventional generation (including gas-fired and gasoil/distillate-fired generation) is a national priority and should be permitted and supported in order to ensure security of electricity supply and support the growth of renewable electricity generation'*.

National Development Plan 2021-2030 – This plan underpins the National Planning Framework and sets out the investment strategy from 2021-2030. It also recognises that in the short-to-medium-term, conventional (mainly gas-fired) electricity generation capacity will be critical to support the operation of the electricity system and provide security of supply for when variable generation (wind/solar) is not sufficient to meet demand. In this regard, circa 2 GW of new conventional electricity generation capacity will need to be delivered over the course of the coming decade with much of this needed by mid-decade. This conventional generation will spend much of its time in reserve for when needed i.e. when required to balance the system in times of high demand and low wind/solar generation. Therefore, although there will be significant investment in new generation capacity, the proportion of electricity generated by natural gas is expected to decrease from circa 50% to circa 30% by 2030. Ensuring security of electricity supply will also require investment in grid infrastructure, interconnection and storage (such as batteries).

National Energy and Climate Plan 2019-2030 – This plan was in accordance with Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action to incorporate all planned policies and measures that were identified up to the end of 2019, and which collectively deliver a 30% reduction by 2030 in non-ETS greenhouse gas emissions (from 2005 levels). In terms of energy security Ireland's objectives are to maintain and, where necessary, facilitate the enhancement of resilience of the gas and electricity networks, while remaining committed to maintaining the security of our energy system in the most cost-effective manner. The impact of the wide range of policies and measures, as set out, are aimed at increasing energy efficiency, which will contribute considerably to ensuring security of our energy system. A review of the security of energy supply of Ireland's natural gas and electricity systems is being

carried out, with the focus of the review up to 2030 in the context of ensuring a sustainable pathway to 2050.

National Planning Framework Project Ireland 2040 (2018) – National Strategic Outcome No. 8 of the NPF seeks to 'Transition to a Low Carbon and Climate Resilient Society' by 2050. New energy systems and transmission grids will be necessary for a more distributed, renewables-focused energy generation system, harnessing both the considerable on-shore and off-shore potential from energy sources such as wind, wave and solar and connecting the richest sources of that energy to the major sources of demand.The NPF notes that Ireland's National Energy Policy is focused on three pillars: (1) Sustainability; (2) Security of Supply; and (3) Competitiveness. The Government recognise that Ireland must reduce greenhouse gas emissions from the energy sector by at least 80% by 2050, compared to 1990 levels, while at the same time ensuring security of supply of competitive energy sources to our citizens and businesses.

National Mitigation Plan 2017 – This plan specifies the policy measures that are required to manage greenhouse gas emissions and the removal of emissions to further the national transition objective, framed around decarbonising four main carbon emitting sectors, namely; electricity generation; the built environment; transport; and agriculture. It recognises that fossil fuels are incompatible with a low carbon economy and, that while their use will be greatly diminished, natural gas may still be required in electricity generation.

4.3 Regional Policy

Regional Spatial and Economic Strategy 2020 -2032 The RSES provides a high-level development framework for the Northern and Western Region that supports the implementation of the National Planning Framework (NPF) and the relevant economic policies and objectives of Government. The RSES identifies 'Five Growth Ambitions' which aim to link strategic and operational challenges with prioritised capital interventions. One of these growth ambitions is 'Infrastructure Ambition', with the Strategy noting that the 'provision and maintenance of economic infrastructure, such as energy, water, and wastewater, are key to delivering compact growth and a connected, vibrant, inclusive, resilient and smart region.' The Regional Policy Objectives RPO 8.1, RPO 8.2, RPO 8.3, RPO 8.4 & RPO 8.7 aim to ensure that the development of the electricity network is undertaken a safe and secure way which meets projected demand levels, Government Policy and the need to achieve a long-term, sustainable and competitive energy future for Ireland.

4.4 Local Policy

Galway County Development Plan 2022- 2028 (CDP) – This plan is the overarching plan with respect to land use in the County and outlines the overall strategy for the proper planning and sustainable development of County Galway.

Core Strategy: Chapter 2 of the Galway County Development Plan 2022-2022 sets out the Core Strategy for County Galway. The Core Strategy sets out the anticipated population and household growth of County Galway to continue to advance the economic and social growth of the County. Over the plan period, the

population is projected to grow by at least 18,655 persons, which will necessitate the delivery of 10,738 additional houses to accommodate same. In addition, the Metropolitan Area of Galway City and Environs, including the settlements of Oranmore, Barna and Claregalway, form part of the Metropolitan Area Strategic Plan (MASP), which will operate as a key economic and service centre for the north western region and a key driver in regional development therein, as set out in the NPF/RSES and the Galway County Development plan. To accommodate the anticipated population and economic growth in Galway, it is imperative that there is a security in the supply of energy in the coming years. The Government has set an ambitious target of 80% of electricity to be generated from renewable sources by 2030. A secure and resilient supply of energy is critical to a well-functioning economy, being relied upon for heating, cooling, and to fuel transport, power industry, and generate electricity. The proposed OCGT at Tynagh will assist in improving the security of supply. The proposed development will contribute to making Ireland's energy supply more stable and secure.

Landscape Character Assessment: As set out in the Landscape Character Assessment (Appendix 4 of the Galway County Development Plan 2022-2028), the subject site is located within the Central Galway Complex Landscape Character Area in the Landscape Character Area of the Kilcrow Basin which is described as a " Working landscape, locally elevated. Larger areas of bog and forestry. Elevated concentrations of settlements and infrastructure" and is classified as having low landscape sensitivity. Furthermore, the subject site is not identified as being within the vicinity of any designated scenic routes, or protected view point angles and is located within a 'structurally weak" area in terms of rural settlement.

Local Authority Renewable Energy Strategy: To facilitate the sustainable growth of renewable energies a 'Local Authority Renewable Energy Strategy' (LARES) has been prepared for the county and is included as Appendix 1 of the CDP. The subject site is considered "not normally permissible" in terms of wind and solar development potential, as per the LARES, however this strategy also recognises that natural gas, particularly renewable and indigenous gas, will continue to have a role to play in the transition to a low carbon economy and that renewable energy developments may require support from such sources in times of high energy demand, with the gas network playing a key role as part of the supporting infrastructure for renewable energy developments.

Policy Objectives: The relevant sections and policy objectives of the Galway County Development Plan 2022-2028, namely Chapter 7 and Chapter 14, which have most significance to the principle of the proposed development are reproduced immediately below, with other relevant policy objectives to a development of this nature are listed/named under the various chapters of the plan.

Chapter 7: Infrastructure, Utilities and Environmental Protection

Electricity and Gas Policy Objectives:-

EG1 Enhancement of Electricity Infrastructure - Support and promote the sustainable improvement and expansion of the electricity transmission and distribution network that supply the County, while taking into consideration landscape, residential, amenity and environmental considerations.

EG 2 Delivery of Electricity and Gas Infrastructure - Support the provision and extension of electricity and gas transmission networks within the County which are critical to the economic development of the County subject to environmental quality, landscape, wildlife, habitats or residential amenity.

EG 3 Power Capacity - To support and liaise with statutory and other energy providers in relation to power generation, in order to ensure adequate power capacity for the existing and future needs of the County.

EG 4 Irelands Grid Development Strategy - Support the implementation of Ireland's Grid Development Strategy, while taking into account landscape, residential, amenity and environmental considerations.

Chapter 14: Climate Change, Energy and Renewable Resource

Electricity and Gas Network Policy Objectives:-

EG 1 Gas Network and Generating Capacity - To support the development of the gas network and associated generating capacity in order to sustainably support and augment renewable electrical energy generated in County Galway.

EG 2 Electricity Transmission Networks - (a)To support the development of the transmission grid network in order to sustainably accommodate both consistent and variable flows of renewable energy generated in County Galway.
(b)Proposed renewable energy generation projects shall fully consider the capacity of the existing transmission grid network in determining the optimal grid connection for the project, in accordance with the proper planning and sustainable development of the area.
(c)In respect of proposed renewable energy developments, transmission grid capacity should be considered as a constraint where the Transmission Development Plan, or any other equivalent plan of the TSO, does not identify infrastructure reinforcement measures unless transmission grid capacity can be demonstrated.
(d)Notwithstanding ecological and environmental considerations, grid connection routing for development proposals should show all alternative routes that were considered, and should avoid materially impacting the road network, where possible. Undergrounding should be considered where it will significantly negate any identified impacts.
(e)It is important that the necessary transmission and distribution infrastructure is facilitated and put in place in order to maximise the renewable energy potential of County Galway. Liaison with Eirgrid, as a TSO, and alignment with their transmission plans and strategies will be of vital important in this respect.

EG 3 Natural Gas and Synthetic Networks - To facilitate the delivery and expansion of the Natural Gas and Synthetic Gas infrastructure for storage, transmission and energy generation throughout the County for both domestic and business/industry use and to have regard to the location of existing gas infrastructure pipeline in the assessment of planning applications.

Chapter 6: Transport and Movement

Non-National Roads Policy Objectives:-
NNR 2- Safeguard Regional and Local Roads

Chapter 7: Infrastructure, Utilities and Environmental Protection

Water Supply Policy Objectives:-
WS 4- Requirement to Liaise with Irish Water
WS 5- Private Water Supply
WS 7- Water Quality

Wastewater Policy Objectives
WW 6- Private Wastewater Treatment Plants
WW 7- Sustainable Drainage Systems

Air Quality Policy Objectives:-
AQ 1- Ambient Air Quality
AQ 2- Assessment of Air Quality
AQ 3- Air Quality Mitigation Measures

Noise Pollution Policy Objectives:-
NP 1- Galway County Council Noise Action Plan 2019-2023
NP 2- Developments within Noise Maps (Noise Action Plan 2019-2023)
NP3- Noise Impact Assessments
NP 4- Noise Pollution and Regulation
NP 5- Noise Mitigation Measures

Light Pollution Policy Objectives:-
LP 1- Lighting Schemes
LP 2- Lighting and Climate Action
LP 3-Dark Skies

Soil Quality Policy Objectives:-
SQ 1 - Soil Impact Assessments
SQ 2 - Soil Protection Measures
SQ 3- Soil Protection, Contamination and Remediation

Major Accidents & Seveso Site Policy Objectives:-
MAS 1- Separation Distances from SEVESO Sites
MAS 2- Soil Protection Measures
MAS 3- SEVESO III Sites

Chapter 8: Tourism and Landscape

Landscape Conservation and Management Policy Objectives
LCM 1- Preservation of Landscape Character
LCM 2- Landscape Sensitivity
PVSR 1-Protected Views and Scenic Routes

Chapter 10: Natural Heritage, Biodiversity and Green/Blue Infrastructure

Natural Heritage and Biodiversity Policy Objectives
NHB 1-Natural Heritage and Biodiversity of Designated Sites, Habitats and Species
NHB 2- European Sites and Appropriate Assessment
NHB 3- Protection of European Sites

NHB 4- Ecological Appraisal of Biodiversity
NHB 5- Ecological Connectivity and Corridors
NHB 7- Mitigation Measures
NHB 9- Protection of Bats and Bats Habitats

Water Resources Policy Objectives
WR 1- Water Resources
WR 2- River Basin Management Plans

Invasive Species Policy Objectives
IS 2- Invasive Species Management Plan

Trees, Woodlands, Hedgerows and Stone Walls Policy Objectives: -
TWHS 1- Trees, Hedgerows, Natural Boundaries and Stone Walls

Geological Sites Policy Objectives
PG 1- Geological and Geo-Morphological Systems

Chapter 12: Architectural, Archaeological and Cultural Heritage
Architectural Heritage Policy Objectives
AH 1- Architectural Heritage
AH 2- Protected Structures (Refer to Appendix 6)
AH 3- Protection of Structure on the NIAH

Archaeological Heritage Policy Objectives:-
ARC 1- Legislative Context
ARC 4- Protection of Archaeological Sites
ARC 9- Recorded Monuments

ARC 10- Zones of Archaeological Potential
ARC 12- Archaeology and Infrastructure Schemes

Chapter 14: Climate Change, Energy and Renewable Resource
Climate Change Policy Objectives:-
CC 1- Climate Change
CC 2- Transition to a Low Carbon, Climate-Resilient Society
CC 3- County Galway Climate Adaptation Strategy 2019-2024
CC 4- Local Authority Climate Action Plan
CC 5- Climate Adaptation and Mitigation
CC 6- Local Authority Renewable Energy Strategy (LARES)
CC 7- Climate Action Fund

Flood Risk Management Policy Objectives:-
FL 2- Flood Risk Management and Assessment
FL 3- Principles of the Flood Risk Management Guidelines
FL 6- Surface Water Drainage and Sustainable Drainage Systems (SuDs)
FL 7- *Protection of Waterbodies and Watercourses*
FL 8- Flood Risk Assessment for Planning Applications and CFRAMS
FL 10- SFRA/FRA and Climate Change

4.5 Strategic Assessment & Principle of the Proposed Development

The site of the proposed development is located within an existing industrial power plant complex in an unserviced area north-west of Tynagh, which is not zoned for development in the current Galway County Development Plan 2022-2028. The strategic assessment of the proposal is governed by inter alia the national, regional and local policy as outlined above in Section 4.1 through Section 4.4 above. Notably Policy Objectives EG1, EG2, EG3, EG4 and EG5 in Chapter 7 of the GCDP 2022-2028 and Policy Objectives EG1, EG2 and EG3 of Chapter 14 provide the policy basis supporting the principle of the proposed development. In addition, consideration is also afforded to the most relevant national policy position. The Climate Act 2023 specifically provides a target for the delivery of at least 2GW of from new flexible gas fired power generation by 2030 to ensure security of electricity supply and reduce emissions while the National Energy Security Framework- April 2022 identifies that the level of dispatchable electricity generation capacity (i.e. capacity that does not rely on wind or solar energy) needs to increase significantly over the coming years due to reduced reliability of existing plants, anticipated new power stations not being developed as planned, expected strong growth in demand for electricity, and the closure of existing generation. Similarly, the 2021 Policy Statement on Security of Electricity Supply confirms that the development of new conventional generation (including gas-fired and gasoil/distillate-fired generation) is a national priority and should be permitted and supported, in order to ensure security of electricity supply and support the growth of renewable electricity generation.

The proposed development meets a need for electricity generation that has been signalled by government as being an urgent and appropriate response to the transition to a renewables-based national energy need. The project is also proposed on a site that is characterised by having a combination of distinctive advantages which include it being a brownfield site in a rural area with existing gas and high-voltage connections and infrastructure. It considered that the principle of the use of the subject site for electricity generation would be fully consistent with the proper planning and sustainable development of the area as well as with the totality of Government's most up-to-date policy on climate change, facilitating the transition to increased renewable energy outputs, energy efficiency and the imperative requirement for decarbonising of the country's electricity generation system.

5. RELEVANT PLANNING HISTORY

Subject Site

21/2192: Granted by ABP & GCC: Permission for an Open Cycle Gas Turbine power plant (299MW) and associated infrastructure and buildings. The proposed development will include: Demolition of existing administration building, gatehouse, workshop, storage buildings (3no.) and car parking area; Installation of an Open Cycle Gas Turbine (OCGT) unit and associated plant (Including air intake, stack (40m high); main, auxiliary and ancillary transformers; fire wall; acoustic wall; electrical rooms; finfan coolers; skids (to include gas skid, distillate fuel skid, compressor cleaning skid, air drier skid, compressed air skid, lube oil skid, CO2 fire fighting skid); propane store; Continuous Emissions Monitoring System (CEMS); fire water tank and pump house; hardstanding maintenance area]; Secondary fuel storage area [4 no. bunded distillate fuel storage tanks - each tank c. 20.2m high (incl. hand rail), 10m diameter]; Fuel forwarding building; Extension to existing distillate unloading plant [1 no. new pump house to be installed]; Fuel forwarding gantry; Expanded Above Ground Installation ('AGI') to facilitate connection to existing gas pipeline; A new 220 kV bay and 220kV bus section within the existing electricity substation; New administration building, gatehouse and associated car parking (2 no. spaces), workshop, storage buildings (3 no.) and car park (52 no. spaces); And all associated ancillary development, site works and services including fill, underground pipework and cabling , upgraded wastewater treatment plant, drainage infrastructure, lighting, fencing, internal roadways, vehicle and pedestrian access gates, vehicular ramp, entrance barrier, etc. The application relates to development for the purposes of an activity requiring a license from the Environmental Protection Agency under the Industrial Emissions Directive. It also relates to a Lower Tier COMAH establishment and therefore falls under the requirements of the Control of Major Accident Hazard (COMAH) Regulations, 2015, with an EIAR submitted with the application. (EP Energy Developments Ltd.).

04/2511: Granted: Permission for (1) amendment of buildings and structures previously permitted under Planning Ref 03/2943 and (2) for the construction of gate house, fin-fan cooler, carpark in switch yard, gas cylinder storage shed, feed pump building, emergency generator and liquid fuel unloading station (Tynagh Energy Ltd.)

04/2193: Granted: Permission for a natural gas pressure reducing station consisting of 4 no. single storey buildings, fenced area and associated pipe work. Gross floor space of proposed new buildings 115 Sq. M (Michael Dufficy, C/o. Bord Gais Eireann);

04/1974: Granted: Permission for 220 kV overhead transmission line from ESB transmission network to 400 MW power station (Tynagh Energy Limited);

03/2943: Granted: Permission for construction of electricity generating facility (Mountside Properties Ltd.) EIS included with application.

Adjoining lands to south west:

06/5293: Granted: Permission for temporary change of use from existing shower block/laboratory at the former Tynagh Mines site to warehousing/light industrial use for the purposes of fabrication of aluminium panels and flashings. Alterations shall also include the demolition of the existing porch feature on the North East facing elevation to be replaced with a roller shutter type vehicular access door (gross floor space 781.86sqm) (Joe Hodgins);

05/346: Granted: Permission for 15M high monopole antennae support structure and mobile telephone antennae, link dishes equipment cabinet and security fence around site. (gross floor space 8sqm) (Vodafone Ireland Ltd.);

Lands to south of site:

15/1090: Granted: Retention of an existing 15m high monopole antennae support structure, with base section giving an overall height of 15.35m, carrying associated telecommunications equipment, associated cabin, associated equipment cabinets, within a fenced compound, and access track. The development will continue to form part of Vodafone Ireland Ltds.'s existing GSM and 3G Broadband telecommunications network.

10/297: Granted: Retention of an existing 15m high monopole antennae support structure, with base section giving an overall height of 15.35m and mobile telephone antennae, link dishes associated equipment containers and security fence around site (gross floor space cabin 7.1sqm) (Vodafone Ireland Ltd.)

Adjoining lands to north west:

19/633: Granted: Permission to extend workshop and to complete all associated site works. Permission is also sought to erect acoustic fencing along a section of the existing site boundary. The site is located within the confines of a Major Accident Site under the Seveso Directive. Gross floor space of proposed works: 600 sqm (Sperrin Galvanisers Ltd.);

18/221: Granted: Permission to extend workshop and complete all associated site works. Permission is also sought to erect acoustic fencing along a section of the existing site boundary. Gross floor space of proposed works 600 sqm. The proposed site is located at Derryfrench, Tynagh, Co. Galway and is within the confines of a Major Accident Site as determined by the Seveso Directive (Sperrin Galvanisers (Ire.) Ltd.);

17/1281: Withdrawn: Permission to extend workshop and complete all associated site works. Permission is also sought to erect acoustic fencing along a section of the existing site boundary. (gross floor space 650sqm) (Sperrin Galvanisers (IRE) Ltd.);

13/1411: Granted: Permission 1) To retain an extension to the workshop originally granted under planning permission 06-4850. (2) to extend the said workshop by 180sqm, (3) To retain two prefabricated cabins erected for office space. (4) to erect a two-storey structure to accommodate toilet facilities and offices. (gross floor area 208sqm proposed,128.76sqm retention) (Sperrin Galvanisers Ltd.);

06/4850: Granted: Permission for retention of (a) galvanising plant and associated facilities with minor modifications on a reduced site area (b) conversion of existing canteen to offices (c) provision of prefabricated toilet structure and (d) provision of prefabricated structure for staff facilities (Gross floor area 49.53 sqm) (Sperrin Galvanisers (Ireland) Ltd); 00/4637: Granted: Permission for provision of a galvanising plant consisting of (a) 60m x 24m building, (b) associated portacabin type office accommodation, (c) concrete storage yard, (d) pallisade perimeter fencing at former Tynagh mines site (Sperrin Galvanisers Ltd);

Other Histories in the vicinity of the site as per Planning Register:

04/4554: Refused: Permission to construct approximately 2000m of temporary road and associated services to facilitate the delivery of abnormally large loads of electricity generating equipment such as turbines and generators that cannot be transported to site on any existing roads. This equipment is for the 400MW Gas powered electricity generating plant currently under construction. This proposed temporary road will be accessed only under special road permit (remaining closed at all other times) from the N65 and will cross a third-class minor road prior to linking up with an existing road constructed during the operation of the former Tynagh Mines sites that leads to the construction site. Following the commissioning and completion of the power plant in 2006 the temporary road will immediately be covered with topsoil, grassed and returned to its previous use (Tynagh Energy Ltd.);

00/5409: Granted: Permission for the construction of a new 220KV overhead line from a proposed 400/220 KV substation at Ballynaheskeragh to the existing Cashla 220kv substation at Barrettspark (ESB); The total length of the line will be 47.2km, majority will consist of five overhead wires supported on steel lattice towers. The average distance between structures will be 340m.

65983: Granted: Permission for erection of an extension (Peter Conway -1992);

60342: Granted: Extension to dwelling house for use a separate dwelling and construction of a septic tank (Patrick Whelan-1990);

60052: Granted: Permission for construction of septic tank (Michael Martyn -1990);

55932: No data available.

54621: Granted: Permission for reconstruction of existing building to dwelling house (Ralph Conroy-1987);

14003: Granted: Permission for relocation of of Bairite processing plant (Milchem Minerals Ltd.-1973)

12077: Granted: Permission for construction of barite recovery processing plant and associated structures (1972) Granted by Minister.

10724: Granted: Retention of existing structure for the operation of calcining of ores (1972)

12077: No data available.

8608: Granted: Permission for erection of plant and structures for the crushing, grinding and treatment of minerals and erection of a service building (1971).

4860: Granted: Permission for erection of an explosives store (Irish Base Metals-1968)

116: No data available.

107: No data available.

649: Granted: Mining and processing of ore, factory (Irish Base Metals - February 1964); Permitted under the Town and Country Planning Act, 1934).

6. ENFORCEMENT INFORMATION RELATING TO THE SUBJECT SITE

There are no enforcement cases relating to the subject site as per the planning register.

7. DESIGNATED SITES

7.1 EUROPEAN DESIGNATIONS

Special Protected Areas (SPAs) & Special Areas of Conservation (SACs)

There are no European Sites within the subject lands delineated for the proposed development. The nearest European Site is located a distance of circa 8.2km kilometres from the development site. There are nine SACs and five SPAs (Natura 2000 sites) located within 15 km of the proposed development, as follows:

Details of designated site(s) and distance from application site within 15km:

Designated Site	Qualifying Interests	Distance from Site
	SACS	
Ardgraigue Bog SAC [2356]	• Active raised bogs [7110] • Degraded raised bogs still capable of natural regeneration [7120] • • Depressions on peat substrates of the Rhynchosporion [7150]	c.8.2km east
Barroughter Bog SAC [0231]	• Degraded raised bogs still capable of natural regeneration [7120] • Depressions on peat substrates of the Rhynchosporion [7150]	c.10km southeast & c.17km downstream of Cloonprask/ Barnacullia Stream & Lisduff Stream
Pollnaknockaun Wood Nature Reserve SAC [0319]	• Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]	c.10.8km south
Lough Derg, North East Shore SAC [2241]	• Juniperus communis formations on heaths or calcareous grasslands [5130] • Calcareous fens with Cladium mariscus and species of the Caricion davallianae [7210] • Alkaline fens [7230] • Limestone pavements [8240]	c.11.03km

	• Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0] • Taxus baccata woods of the British Isles [91J0]	
Rosturra Wood SAC [1313]	• Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]	c.11.04km
Lough Rea SAC [0304]	• Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. [3140]	11.46km west
Cloonmoylan Bog SAC [0248]	• Active raised bogs [7110] • Degraded raised bogs still capable of natural regeneration [7120] • Depressions on peat substrates of the Rhynchosporion [7150] • Bog woodland [91D0]	c.11.59km south
Derrycrag Wood Nature Reserve SAC [0261]	• Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]	c.13.14km south
River Shannon Callows SAC [0216]	• Molinia meadows on calcareous, peaty or clayey-silt-laden soils Molinioncaeruleae [6410] • Lowland hay meadows Alopecurus pratensis, Sanguisorba officinalis [6510] • Alkaline fens [7230] • Limestone pavements [8240] • Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0] • Otter Lutra lutra [1355]	14.26km east

See www.npws.ie for the further detail on conservation objectives of the above sites.

Designated Site	Qualifying Interests	Distance from Site
	SPAs	
Slieve Aughty Mountains SPA [4168]	Hen harrier Circus cyaneus [A082] Merlin Falco columbarius [A098]	c.6.04km sw
Lough Derg (Shannon) SPA [4058]	• Cormorant Phalacrocorax carbo [A017] • Tufted duck Aythya fuligula [A061] • Goldeneye Bucephala clangula [A067] • Common tern Sterna hirundo [A193] • Wetland and waterbirds [A999]	c.11.08km southeast, and c.19km downstream of Cloonprask/ Barnacullia Stream and Lisduff Stream
Lough Rea SPA [4134]	• Shoveler Anas clypeata [A056] • Coot Fulica atra [A125] • Wetland and waterbirds [A999]	11.46km west
River Shannon Callows SAC [0216]	• Molinia meadows on calcareous, peaty or clayey-silt-laden soils Molinioncaeruleae [6410] • Lowland hay meadows Alopecurus pratensis, Sanguisorba officinalis [6510] • Alkaline fens [7230] • Limestone pavements [8240] • Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0] • Otter Lutra lutra [1355]	c.14.2km east
Middle Shannon Callows SPA [4096]	• Whooper swan Cygnus cygnus [A038] • Wigeon Anas penelope [A050] • Corncrake Crex crex [A122] • Golden plover Pluvialis apricaria [A140]	c.14.27km east

	• Lapwing Vanellus vanellus [A142] • Black-tailed godwit Limosa limosa [A156] • Black-headed gull Chroicocephalus ridibundus [A179] • Wetland and waterbirds [A999]	

See www.npws.ie for the further detail on conservation objectives of the above sites.

A Screening for Appropriate Assessment report (AASR) carried out by Aecom Consultants on behalf of the applicant identified and considered all SACs and SPAs within the potential likely zone of impact of the site and the potential to result in likely significant effects and the pathways by which those effects may occur on any Natura 2000 site. 13 sites were identified on the basis of source-path-receptor relationships which concur with those listed in the tables set out above.

A desk study and a number of ecological assessments were carried out to inform the AASR which identified that the site comprises species-rich semi-natural grassland, mixed woodland, conifer plantation, freshwater habitats including a pond and wet ditch, scrub, and spoil and bare ground. Structures within the Site comprise a single disused shed of corrugated metal, the existing gas AGI and the existing electrical substation which is part of the Tynagh Power Station. The area of spoil and bare ground which was part of the historic closed Tynagh Mine site comprises a rocky pebbled substrate and appears to be disturbed frequently as there is only 1 to 2% of vegetation cover in this area. Habitats outside of the Site boundary within accessible lands to the north and west include species-rich grassland, a species-poor improved agricultural field, wetlands, conifer plantation, and additional scrub.

There are also large water bodies (former mine workings) outside of the Site to the east and south-east. The Cloonprask/ Barnacullia Stream and Mill Stream are located approximately 13m and 250m to the north-east and north of the Site, respectively. The Lisduff Stream is located approximately 510m south of the Site. These streams outflow to the Kilcrow River, which then outflows into Lough Derg. A suite of wintering bird surveys was carried out within a study area comprising the Site and adjacent lands comprising the visible wetland habitats within the former mine, including the former mine lagoon and tailings ponds. These surveys were carried out monthly between October 2021 and March 2022, and in October 2022 to March 2023. Surveys identified fourteen species of bird within the study area. The October 2021 surveys recorded the largest number of individuals with 159 records; this included large roosts of lapwing Vanellus vanellus, golden plover Pluvialis apricaria, and snipe Gallinago gallinago (Table 3.1). In October 2022, a large roost of lesser black-backed gull Larus fuscus was observed. In November 2021, January 2022 and March 2023 surveys recorded no birds, whilst the remainder recorded low numbers.

In examining the potential impact of the proposed development on disturbance of QI of any European sites within the zone of potential of the development, the report asserts that the proposed development will take place immediately adjacent to an existing industrial facility. Any additional construction-based or operation-based noise, artificial lighting and/ or the presence of personnel, plant and machinery during the construction/operation phase are unlikely to significantly exceed baseline conditions if experienced within European sites. With all European sites more than 5km away, it is stated that there will be no noise or visual disturbance at this distance. It is also highlighted that there is no suitable habitat for mobile species of identified European sites within the site, however, any SCI species occurring closer to the facility,

outside of the boundary of the SPA, would do so under existing disturbance conditions and would necessarily be habituated to levels of anthropogenic activity. Given that the Proposed Development will not result in any significant change to the existing conditions, as set out above, there can be no expectation of disturbance being caused.

In respect of emissions, the report notes for construction stage, particulate matter would not have impacts beyond 50m and therefore European sites, situated remotely would not be impacted by dust or arisings or other particulate matter alighting on vegetation or habitats. It further states that indirect effects of sediment and other contaminants would not be expected to reach the streams either north or south of the site. The planning authority note that the Cloonprask Stream is located adjoining the site towards the north-east and that the proposed development in excess of 50m from same. The ASSR also highlights that the construction process will be completed within the hardstanding and brownfield areas of the site and that considering the already industrial nature of the site, there are no concerns of noise, vibration, or lighting associated with either construction noise or operation phases. While there is a risk of pollution incidents during the construction phase e.g, fuel spillages from plant or the use of bentonite/ grout/ other chemicals, there are no works taking place near any watercourse nor instream works and as construction would be completed within the existing site and Power Station Site, it would be subject to its drainage regime. This regime ensures that run-off and overland flows pass into and are retained in a closed system within the mining lagoon to the southeast. Notably, the lagoon does not discharge potential sediment or contaminant-rich water into the local watercourses. The source-pathway-receptor link would therefore break down to the European sites with no link to the watercourses and so no impacts would occur to them as a result.

In respect of emissions, the report notes for the operation stage that air quality emissions on sensitive habitats within the Zone of Influence include habitats where poor air quality can affect growth and functioning such as with raised bogs and woodlands. Air quality modelling was completed and specifically examined all protected sites in the vicinity of the site and concluded that screening thresholds for atmospheric pollutants will not be exceeded as a result of the proposed development, or in combination with other plans and projects, and there is no need for further assessment of the impacts of air quality on European sites.

In terms of wastewater emissions, the wastewater from the site is treated via a wastewater treatment system situated on the eastern boundary of the Site. Wastewater is directed to a treatment system containing a Klargester BioDisc unit, sand filter unit and then onto a percolation drainage field which has been assessed and confirmed to meet the requirements. In relation to wastewater, it is stated that there are no likely significant effects on European Sites, as a result of a lack of a source-pathway-receptor relationship. The report received from the Environment Section of Galway County Council recommends that the wastewater disposal aspect of the application is reviewed in detail by An Bord Pleanala to ensure that there is adequate percolation in the area indicated.

A further potential vector was identified in watercourses potentially conveying pollutants to European sites. Indirect deposition of pollutants from emissions to air from the proposed development was

considered with regard to the three minor watercourses flowing within several hundred metres of the Site, one c. 13m to the north-east of the Site, the Cloonprask / Barnacullia Stream, the Mill Stream c. 250m to the north, and the other to the south, the Lisduff Stream, c. 510m all flowing in an easterly direction eventually into the Kilcrow River. However, it is asserted that these are constantly moving systems, with fresh water constantly flushing out any potential contaminants, and it is not possible for any accumulation resulting from air quality emissions to be dissolved into the water and build up to elicit a response within the aquatic habitat or beyond. Indirect effects on these ecological receptors from the emissions to air were dismissed. The planning authority consider that the Screening Report would benefit from further analysis on the river flows referred to, as available data (Environmental Sensitivity Mapping (geohive.ie)) indicates a lower rating river flows for the nearby Cloonprask stream adjoining the site.

The report concludes that in view of best scientific knowledge and on the basis of objective information, the Proposed Development, whether individually or in-combination with other plans or projects, beyond reasonable scientific doubt is not likely to have significant effects on any European site, and therefore that there is no requirement to proceed to the next step of Appropriate Assessment.

Having considered the contents of the SID planning application including the AA Screening report and the EIAR submitted, the planning authority concur with the findings of the Appropriate Assessment Screening Report. However, in this instance, An Bord Pleanála is the competent authority for the purposes of Appropriate Assessment (AA).

8.2 NATIONAL DESIGNATIONS - Natural Heritage Areas within 15km (NHAs)

NHA	Approx. Distance from the Site (km)
Eskerboy Bog NHA	c.4.84 km
Cloonoolish Bog NHA	c.7.46 km
Capira/Derrew Bog NHA	c.10.2 km
Sliabh Aughty Bog NHA	c.10.81 km
Moorfield Bog NHA	c.10.83 km
Mineen Bog NHA	c. 14.23 km

Proposed Natural Heritage Areas within 15km (pNHAs)

pNHA	Approx. Distance from the Site (km)
Ardraigue Bog pNHA	c.8.32 km
Barroughter Bog pNHA	c.9.87 km
Pollnaknockaun Wood Nature Reserve pNHA	c.10.69 km
Rosturra Wood pNHA	c.10.89 km
Lough Derg pNHA	c.10.9 km
Cloonmoylan Bog pNHA	c.11.44km
Lough Rea pNHA	c.11.47km
Derrycrag Nature Reserve pNHA	c.12.99km

River Shannon Callows pNHA	c.14.15km
Lough Derg pNHA	c.14.33km

Chapter 6 of the EIAR references NHAs and pNHAs and states that the desk study carried out identified any sites with national nature conservation designations within 2km of the subject site including NHAs and proposed NHAs. It is noted that a number of the NHAs and pNHAs within 15km of the subject site overlap with a number of the Designated European sites and have similar hydrological connections to same, which are considered in more detail in the AA Screening Report submitted and Chapter 9 of the EIAR. Table 9.9 of Chapter 9 of EIAR concludes that there will be no construction or operation impacts on sites of national importance with no mitigation is required, and no residual impact or no residual cumulative impact identified.

9. PROTECTED STRUCTURES/ACA/SPECIAL AMENITY AREA ORDERS/ ARCHAEOLOGY

9.1 Protected structures/ACA/Special Amenity Area Orders

There are no Protected Structures/ACA/Special Amenity Area Orders within the site boundary associated with the proposed development therefore no direct impacts to this resource are identified.

9.1.1 Protected Structures

The EIAR considered all protected structure and NIAH structures within a 5km radius of the subject site and concluded that after mitigation, impacts were identified on RPS 3648 (thatched house) and RPS 3651 Castletown Bridge. These relate to changes in the setting of Castletown Bridge owing to the increase in traffic on the nearby bridge/road network during construction/operation stage. However, it is deemed to be a negligible impact leading to a significance of slight which is short-term and adverse.

RPS 3648 is located within 1km of the subject site, situated c.660km to the south-west. The adjoining property to the thatched house is a two bay two storey vernacular building which is on the NIAH. It is stated in the EIAR that the top of the existing stack (55m) is visible from this location, but the majority is hidden by the high earth bund to the south of the power station and intervening mature vegetation. However, the EIAR confirms that the proposed new stack, with a height of 40m will not be visible from this protected structure. The Conservation Officer in their report does not raise any objection to the proposed development and highlights that vibration monitoring is considered particularly appropriate and necessary and should be added as a condition if a decision to grant is made.

9.1.2 Archaeology

There are 11 recorded archaeological sites within 1km of the development site as described in Chapter 8 of the EIAR. The two closet monuments are GA116-049 (ringfort) and GA116-046 (castle-unclassified). The EIAR states that as the site has been previously disturbed by the previous construction within the Tynagh Mines complex, and that any archaeology that may have been present will have been destroyed, with the proposed development not physically impacting on unknown archaeology and no mitigation is deemed to

be required. The EIAR further contends that the proposed development will have impact on the setting of the archaeological assets during construction, citing visual intrusion, noise impacts and vibration, with 'embedded mitigation' to be adopted to reduce the impact of noise, dust and vibration during construction. During operation stage, a neutral colour palatte is proposed, in order to avoid or reduce adverse visual impacts of the development on heritage assets. The planning authority note the size of the subject site which is in excess of 8ha and highlight Section 12.6.11 of the Galway County Development Plan 2022-2028 which requires that a proposed development (due to location, size or nature) which may have archaeological implications for archaeological heritage be subject to an Archaeological Assessment, which it states includes areas close to archaeological monuments, extensive in area (half hectare or more) or length (1km or more) and development that require an Environmental Impact Statement. In this regard, a monitoring condition is advisable should An Bord Pleanala decide to grant planning permission for the proposed development.

10.SERVICES

Public Water Supply:

It is stated that there is an existing water connection. A review of pl.ref: 21/2192 indicated the water source for that development was from existing licensed abstraction from a groundwater well and Chapter 12 of the EIAR references that Tynagh Power Station has a registered abstraction (Abstraction Point Code APR000425) permitted to abstract up to 300 m3 per day from a groundwater well on the east side of the existing Tynagh Power Station site. However details provided indicate that abstracted water is not used for potable use, with all drinking water on site is supplied as bottled water.

Wastewater Disposal:

The development proposal includes a replacement of the existing wastewater disposal system that currently serves the Tynagh power plant. The proposed Bioficient system is of comparable size to the existing system and will operate effectively in conjunction with the existing percolation area. An assessment of the percolation area has been undertaken as set out in the 'Site Characterisation Form' in Appendix 12A, Volume II of the EIAR. It concludes that the existing drainage field and subsoil percolation rates have sufficient capacity to manage the discharge rates from the whole site foul water demands. The report received from the Environment Section of Galway County Council recommends that the site suitability aspect of the application be reviewed in detail by An Bord Pleanala to ensure that there is adequate percolation in the area indicated.

Surface Water:

In terms of the existing Tynagh Power Plant site, storm water is currently collected in a large outdoor collection chamber. This contains an inlet screen, oil adsorbent booms and some 'biobags' to digest any residual oil present. After settling in the large collection chamber, it is then pumped to an oil/ water separator unit, which then separates out any remaining oil present. Final storm water is then sent to a final discharge chamber. An oil in water detector here checks if there is any remaining oil present. Finally,

it is discharged to the former open pit mine. Treated process water and surface water is discharged into the former open pit mine under terms set out in its Industrial Emissions Licence (IEL) (P0700-02).

It is proposed that for the subject development, surface water drainage will tie into the existing system at the Tynagh Power Station. As there is an increase in impermeable hard surfacing associated with the development, in line with best practices, it is proposed to attenuate the surface water runoff to mimic the greenfield runoff conditions. A drainage system with attenuation system is proposed which will collect surface water before discharging it into the former open pit mine to the south of the site through the existing outfall.

The report from the Environment Section of Galway County Council also notes the absence of any direct discharge proposed to natural surface waters in the area and that the application details state that provided that the mitigation measures proposed are implemented, the development will not have any significant effect on groundwater or surface water. The report from the Environment section also recommends that this aspect of the application is reviewed in detail by An Bord Pleanala, taking into account the history of water quality issues in the area.

11. FLOOD RISK ASSESSMENT

Flood risk assessment is addressed in Chapter 12 (and Appendix 12A) of the EIAR. According to Galway County Council GIS mapping the excavated eastern area of the site was identified as being subject to indicative pluvial flood risk under PRFA data, while the southern area is identified as indicative groundwater flood risk. While Galway County Council note that PFRA data cannot be relied upon, the PFRA indicative groundwater flooding layer also corresponds with Galway County Council Satellite Imagery of the 2009 flood event. The current flood risk assessment/EIAR refers to potential groundwater flood risk as extracted from the GCDP 2022-2028 SFRA and confirms groundwater flooding relating to the lagoon area outside of the subject site. It is further stated that any flooding of this area would flow away from the site, with the conclusion that the risk of groundwater flooding is low and unlikely based on topography, groundwater depths and flow direction. The flood risk assessment also confirms that the subject site is not located within a fluvial flood risk area. Based on the details proposed and information submitted, flood risk has been satisfactorily considered and addressed.

12. HYDROLOGICAL AND HYDROGEOLOGICAL ASSESSMENTS

The hydrological and hydrogeological related assessments pertaining to the development are set out in Volume I, Chapter 12 & Chapter 13 (Volume I) and Appendices 12A,12B, 13A AB 13B (Volume II) of the EIAR. The appendices include a Site Specific Flood Risk Assessment, Surface Water Analytical Results, a Ground Investigation Report and a Tier 2 Generic Quantitative Risk Analysis Report.

In terms of hydrogeology, details provided indicate that the Lucan Limestone fractured bedrock unit which underlies this site, and the Waulsortion Limestone to the south, are classified as Locally Important aquifers but are productive only in local zones. The Old Red Sandstone further to the south of the site is classified as a Poor bedrock aquifer. Groundwater in the area has elevated concentrations of heavy metals as a result of the extensive mineralisation of the limestone bedrock in the vicinity of the fault. The Lucan Limestone fractured bedrock unit beneath the entire Site, and the Waulsortian Limestone unit further to the south,

are both assigned High to Extreme vulnerability to contamination, due to thin or absent subsoil cover. The Old Red Sandstone to the south of the former open cast mine pit is assigned similar vulnerability to contamination.

The existing CCGT power station has an abstraction well in the east of the site, the Tynagh Power Station Raw Water well (EPA Abstraction APR000425), for Industrial use to generate demineralised water for steam generation for power plant and plant service water. This well is licenced to abstract up to 300 m3 /day but the abstracted water is not used for potable use; all drinking water on site is supplied as bottled water. The well is sampled 3-4 times per year and analysed for a suite of inorganic parameters and metals. The well is believed to be fed from the nearby mine pit, which was flooded after the previous mining operations ceased. The adjacent Sperrin Galvanisers Ltd. site (IE licence P0658-01) is required to monitor groundwater from 2 wells annually for a suite of metals and inorganic determinants. Zinc in well GW2 in 2021 was the only parameter to exceed the Groundwater Threshold Values (GTVs).

Regarding hydrology, a watercourse known as the Lisduff Stream is approximately 515 m south of the Site, with the Barnacullia Stream 37 m north-west and the Mill Stream 260 m north of the Site. These three watercourses flow east into the Lisduff (Kilcrow) watercourse ultimately flowing south to Lough Derg into the River Shannon (11.1 km). The former Tynagh Mine open pit mine has been allowed to re-flood and is an enclosed open water body (code 25_303) which is approximately 280 m to the southeast of the Site boundary at its closest point. The enclosed former Tynagh Mine tailings ponds remain and form open water bodies (code 25_300) which are approximately 40 m to the east and north-east of the Site boundary at their closest point. Surface water and sediment within the area have been impacted by the site's historic use for mining.

The EIAR assessment provided acknowledges that there are potential risks to water bodies (ground and surface) during construction and operation phases from contaminants however it is stated that with the provision of best practice mitigation measures, there will result in negligible impacts on hydrology and hydrogeology and have an imperceptible effect on any high sensitivity receptors. In addition, the report from the Environment Section of Galway County Council expresses concerns in relation to potential impacts associated with historically contaminated soil on site and highlights that any works on site be properly managed to ensure that all mitigation measures and monitoring proposals are fully implemented.

13. WATER FRAMEWORK DIRECTIVE (WFD)

The proposed development is located within the Lower Shannon Water Framework Directive management unit. The nearby streams on site (Cloonprask, Barnacullia Stream) form part of the Lisduff (Kilcrow)_20 river, which has a WFD River Status as 'At Risk'. The groundwater body underlying the site is the Historic Mine (Tynagh) and which also has an 'At Risk' WFD Groundwater Body status. As previous referred to the EIAR, there are potential risks to water bodies (ground and surface) during construction and operation phases from contaminants however it is stated that with the provision of best practice mitigation measures, there will result in negligible impacts on hydrology and hydrogeology and have an imperceptible effect on any high sensitivity receptors.

14. LANDSCAPE STATUS AND VISUAL ASSESSMENT

As set out in the Landscape Character Assessment (Appendix 4 of the Galway County Development Plan 2022-2028), the subject site is located within the Central Galway Complex Landscape Character Area in the Landscape Character Area of the Kilcrow Basin which is described as a "Working landscape, locally elevated. Larger areas of bog and forestry. Elevated concentrations of settlements and infrastructure" and is classified as having low landscape sensitivity. Furthermore, the subject site is not identified as being within the vicinity of any designated scenic routes, or protected viewpoint angles and is located within a 'structurally weak" area in terms of rural settlement.

Chapter 10 of Volume I and Appendix of the EIAR examines landscape and visual impacts of the proposed development. A Zone of Theoretical visibility was established and the assessment considered landscape value, landscape susceptibility, landscape sensitivity, magnitude of landscape change, visual effects, value of the view and visual susceptibility. The visual aids provided (photomontages) from a number of selected viewpoints are considered to give a reasonable impression of the scale of the development in the context of the receiving landscape and also considered the cumulative impact of the development of the 299MW OCGT permitted under pl.ref:21/2192. A number of mitigation measures are proposed to minimise visual and landscape effects include the chosen unobtrusive colour scheme and the provision of minimal lighting.

The proposal provides for a number of industrial structures on site as presented in the plans and particulars submitted with the application and will extend northwards of the existing Tynagh power station and will ultimately form part of the overall existing power plant complex. A number of the tank structures range in height from 13m to 15m, with the most notable structures in terms of visual impact at operation stage relating to the air intake structure and emissions stack (40m). However, following consideration of the assessment on landscape and site inspection, it is considered that the new components will read with the existing power plant infrastructure as an overall industrial complex in this Class 1 landscape sensitivity designated area and would not be contrary to the established appearance and character of the area or to the proper planning and sustainable development of the area.

15. RESIDENTIAL AMENITY

Impacts on residential amenity particularly in terms of noise and air quality have been presented in the EIAR and associated appendices. In terms of emissions, Chapter 7 of the EIAR (Air Quality and Climate) concludes that the overall effect of changes in NO2, PM10, PM2.5 concentrations due to emissons from the proposed development is not significant.

In terms of noise, no significant adverse effects are predicted during construction phase of the development, however, to ensure noise levels are minimised, a number of mitigation measures are proposed, such as low vibration equipment, the establishment of good community relations with local residents and the timing of noisier activities to take place during the day during periods of the day that are considered less noise sensitive.

In terms of operation phase, it has been established that noise emissions from the proposed development would, without design mitigation, exceed the nominated criteria at all identified receptor locations. In this regard, mitigation measures, which include a 7m high acoustic barrier around the fin fan cooler, an 8m high acoustic barrier around the transformers, and a 10m high barrier around the generator, turbine,

diffuser and stack base have been incorporated into the design of the development to ensure that the predicted residual operational noise levels are at or below the relevant criteria at all selected receptors.

The EIAR also takes account of the cumulative impact of adjoining developments. It also considers the operation of the 299MW OCGT permitted under pl.ref:21/2192 and maintains that both OCGT's would only be operational concurrently during daytime and evening time only and would not exceed relevant daytime and evening criteria. No cumulative phase noise effects are identified.

16. CARRYING CAPACITY AND SAFETY OF ROAD NETWORK

Chapter 14 Traffic as set out in the EIAR assesses the carrying capacity and safety of the road network. This includes baseline conditions and constraints and includes a road surface assessment of the LP4310 Tynagh Road, to allow for monitoring of the effects of construction phase traffic. A bridge condition survey was also undertaken of bridges along the L-4310. Traffic flows were observed during traffic surveys and road capacity analysed, which show that the LP4310 Tynagh Road and the N65 will operate within capacity.

A report has been received from the Roads & Transportation section of Galway County Council which does not raise any objection to the proposed development and recommends a number of conditions for consideration, which include the following: demonstrating sightlines at the main entrance to the site at the public road, the provision of security for the purposes of reinstatement of the public road, the submission of a Transport Management Plan, the submission of up-to-date before and after condition survey of roads and bridges and falling weight deflector surveys of bridges, details of culverts and structures to be traversed with heavy loads and the structural adequacy of same to accommodate the loads, rectification proposals for structural damage, details of protection measures for bridges to be traversed, details of temporary traffic arrangements/controls on roads, a phasing programme in respect of the timing of use of the public road and a post construction road survey and scheme of works detailing works to repair any damage to the haul routes.

17. ENVIRONMENTAL CARRYING CAPACITY OF SUBJECT SITE & SURROUNDING AREA

Environmental Carrying Capacity of the subject site and surrounding area has been satisfactorily addressed within Section 20 of this report below (Environmental Impact Assessment Report).

18. REPORTS OF RELEVANT LOCAL AUTHORITY SECTIONS:

18.1 Report from the Roads & Transportation Engineer:

The Roads & Transportation Engineer's report dated 15/09/2023 notes the following:

1. *Demonstration of sightline triangles from vehicular entrance junction onto the public road shall be in accordance to DM standard 28 of the Galway County Development Plan to ensure maximum visibility splays are clear and unobstructed. Proposed Site access Junction visibility splays onto the L-4310 shall be demonstrated and agreed with the relevant planning authority prior to commencement of development.*

2. *Prior to commencement of development, the developer shall lodge with the planning authority a €100,000 cash deposit, a bond of an insurance company, or such other security as may be acceptable to the relevant planning authority, to secure the reinstatement of the effected road which may be damaged by the transport of materials to the site (i.e from the junction of the L-4310 local road and the N65 national secondary road (Gurtymadden Cross) to the site entrance), coupled with an agreement empowering the relevant planning authority to apply such security or part thereof to the satisfactory reinstatement of the public road.*

3. *Prior to commencement of development, a Transport Management Plan for the construction stage shall be submitted to, and agreed in writing with, the planning authority. The traffic management plan shall incorporate details of the road network to be used by construction traffic, including over-sized loads, and detailed arrangements for the protection of bridges, culverts or other structures to be traversed, as may be required. The plan shall also contain details of how the developer intends to engage with and notify the local community in advance of the delivery of oversized & abnormal loads. Details shall also include auto tracking/swept path analysis of such movements and the pre delivery and reinstatement works required to facilitate such movements.*

4. *Prior to commencement of development, details of the following shall be submitted to, and agreed in writing with, the planning authority:*
    a. *An up to date (most recent year) condition survey for of the roads and bridges along the haul routes shall be carried out at the developer's expense by a suitably qualified person both before and after construction of the proposed development. This survey shall include a schedule of required works to enable the haul routes to cater for construction-related traffic. The extent and scope of the survey and the schedule of works shall be agreed with the relevant planning authority prior to commencement of development.*
    b. *The applicant is requested to submit an up-to-date (most recent year) Falling Weight Deflectometer survey and condition survey of bridges along the L-4310 between the junction with the N65 national secondary road (Gurtymadden Cross) and the site entrance. The surveys shall be carried out at the developer's expense by a suitably qualified person in accordance with Transport Infrastructure Ireland standards. Where necessary, these surveys shall include a schedule of required works to enable the haul route to cater for construction related traffic whilst such works shall be agreed in advance with the planning Authority.*
    c. *All culverts and structures crossed over by HGV's or potential abnormal weight loads should be highlighted in aforementioned road and structure reports which shall give further structural design details of their structural adequacy to facilitate identified route to subject site.*
    d. *Details for the rectification of any construction damage which may arise.*
    e. *Detailed arrangements for the protection of bridges to be crossed.*
    f. *Detailed arrangement for temporary traffic arrangements/controls on roads.*
    g. *A phasing programme indicating the timescale within which it is intended to use each public route to facilitate construction of the proposed development.*
    h. *Within three months of the cessation of the use of each public road and haul route to transport material to and from the site, a road survey and scheme of works detailing works to repair any damage to these routes shall be submitted to the planning authority.*

i. *All works arising from the aforementioned arrangements shall be completed at the developer's expense within 12 months of the cessation of each road's use as a haul route for the proposed development.*

5. *A wheelwash facility incorporating underbody power washing shall be used by all vehicles exiting the site and shall be operational prior to the commencement of any development on the site.*

18.2 Report from the Conservation Officer:

The EIAR has a comprehensive chapter 8 on cultural assets and archaeology. It discusses all designated archaeological, protected structures and entries in NIAH. It sets out a Methodology, Regulatory and Policy Framework, Baseline Environmental Conditions and Constraints, Predicted Impacts Mitigation and Enhancement Measures, residual effects, and Cumulative Effects . The findings and conclusions are considered appropriate and acceptable.

Notwithstanding all the above, should Galway County Council consider vibration monitoring at heritage assets to be required at the expense of the developer, the Applicant would be agreeable to this being implemented through an appropriately worded planning condition.

In regard to RPS 3648, a thatched house, situated in proximity to the proposed development site, vibration monitoring is considered particularly appropriate and necessary. It is recommended that this is added as a condition if a decision to grant is made.

18.3 Report from the Environment Section (Climate Action Co-Ordinator):

Mitigation Measures: *A number of potential impacts on human health and the environment have been identified in the absence of mitigation measures. We would be particularly concerned in relation to potential impacts associated with contaminated soil on site. It is essential that any works on site be properly managed to ensure that all mitigation measures and monitoring proposals are fully implemented. It is my understanding that the previous Gas Turbine development at this site was supervised by a GCC employee, funded by the developer. It may be advisable that supervision be provided by independent consultants reporting to GCC. I would recommend further discussion between the Planning Section and An Bord Pleanala in this regard. This may also require discussion with the EPA.*

At a minimum, if planning permission is granted, it is recommended that the final CEMP should be submitted to the Planning and Environment Sections for approval prior to commencement of construction. The final CEMP should include details and a proposed timeline for all surveys, monitoring and mitigation measures proposed in the EIAR and NIS. A condition should also be applied stating that works shall be supervised by a suitably qualified and experienced Ecological Clerk of Works and that brief electronic reports shall be submitted to the Planning and Environment Sections, on a monthly basis during the construction phase, detailing the stage of the works, compliance with the CEMP, EIAR, NIS and any issues that have arisen.

Climate Change: *There are valid concerns in relation to the development of new natural gas facilities and the associated production of greenhouse gas emissions, particularly to power end-users such as data centres. This development will assist in providing a national base load of electricity and determining the*

appropriate level of natural gas development may be outside the remit of the local authority. These issues need to be assessed on a national basis and it is indicated in the application that the development is in line with the current national strategy in this regard.

Site Suitability Assessment: *It is proposed to upgrade the existing wwtp and discharge to the existing percolation area. It is recommended that this aspect of the application be reviewed in detail by An Bord Pleanala to ensure that there is adequate percolation in this area.*

Impact on Surface Water and Groundwater: *There is no direct discharge proposed to natural surface waters in the area. Provided that the mitigation measures proposed are implemented, it is stated that the development will not have any significant effect on groundwater or surface water. It is recommended that this aspect of the application be reviewed in detail by An Bord Pleanala, taking into account the history of water quality issues in the area.*

19. THIRD PARTY OBSERVATIONS/SUBMISSION SUBMITTED TO AN BORD PLEANALA

The closing time and date for submissions to An Bord Pleanála was 5.30pmon the 10th October 2023.

An Bord Pleanala has forwarded the planning authority the submissions received.

20. ENVIRONMENTAL IMPACT ASSESSMENT REPORT

The proposed development falls within the definition of a project under the EIA Directive 2011/92/EU as amended by EIA Directive 2014/52/EU and falls within the scope of Class 2 (a) under Part 1 Schedule 5 of the Planning and Development Regulations, 2001 (as amended) "a thermal power station or other combustion installation with a heat output of 300 megawatts or more". The maximum power output of the proposed OCGT will be 350MW, which is excess of the threshold set out under Schedule 5 for a thermal power station. A mandatory EIA is the required, and the applicant has submitted an EIAR.

The following section gives the Planning Authority's views in relation to the adequacy of the EIAR submitted as part of this planning application. There will be some overlap in the overall planning assessment and this subsection.

In this case, An Bord Pleanála is the competent authority for the purposes of carrying out an Environmental Impact Assessment (EIA). The EIAR submitted by the applicant informs the EIA, as does information available to the Board and information given by the Local Authority.

Article 3(1)(a) to (e) of the EIA Directive requires the environmental impact assessment to identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:

1. Population and Human health
2. Biodiversity (with particular attention to Habitats and Birds Directives)

3. Land, soil, water, air and climate
4. Material assets, cultural heritage and the landscape
5. The interaction between 1-4 above

Article 3(2) of the EIA Directive also requires effects on the factors as set out above shall include the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned. The EIAR has provided the relevant information for the above factors listed above.

The report has been prepared in three separate volumes.

Volume I - Environmental Impact Assessment Report (Main Text)

Volume II - Appendices

Volume III – Figures

A Non-Technical summary document has also been provided as a standalone document.

The Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (August 2018) specify that (as per EU Directive 2014/52/EU) there is a requirement for the EIAR to be prepared by competent experts. From reviewing the EIAR which accompanies this application, it is considered that it is set out in a clear format and consists of a wide-ranging, comprehensive assessment of the full range of issues and factors that could reasonably be anticipated for this open cycle gas turbine and associated development. The Non-Technical Summary (NTS) is also considered adequate.

The section below provides a summary of the environmental impacts of the proposal as outlined in the chapters contained in the EIAR with comments from the planning authority where relevant. Overall, the planning authority consider that an adequate EIAR has been submitted, the methodology adopted is acceptable with the conclusions arrived at considered reasonable. A number of matters have been raised by the planning authority where it is considered further clarity would be beneficial.

Chapter 1 – Introduction & Chapter 2 – Planning Policy

Chapter 1 provides a background for the proposal, EIAR and the applicants. It sets out the various elements of the proposed development and details of the site and its history. In terms of the EIAR, the chapter demonstrates how the proposal is compliance with the EIA Directive, in terms of legal basis, approach, scoping and pre-planning consultants. The chapter also sets out the assessment approach and methods for the EIAR, the structure of the report and the assessment team. The level of expertise of the component experts appears reasonable however this is a matter for the Board to determine.

Chapter 2 provides the national, regional and local planning and energy policy context to support the proposal.

Chapter 3 – Need and Alternatives

This chapter of the EIAR provides an assessment of the need and alternatives for the proposed development. The report has highlighted the need for the project based on Ireland transitioning from centralised fossil fuel based electrical power generation to distributed renewable based generation. In order to facilitate the continued expansion of Ireland's renewable generation capacity, modes of supporting the electricity network during periods when there is a gap between renewable power generation and power demand will be needed. It is stated that this project is designed specifically for this purpose, to be able to respond quickly to shortfalls in power generation at times of demand and will facilitate the integration of more renewable generation into the electricity network, helping to maintain the security of supply and supporting Ireland in its transition to a low carbon economy. The alternatives include the 'do-nothing' scenario, alternative site locations, alternative technical solutions and alternative layout options.

The 'do nothing' scenario would reduce security of supply for Ireland, while the alternative site locations scenario focused on the availability of existing required infrastructure at the site, such as gas supply and an electrical grid connection, in conjunction with the existing infrastructure and services at the Tynagh Power station. Two alternatives with regard to on-site design options A and B, were included as an alternative, which were considered in the context of available land, existing constraints, proximity to receptors and existing infrastructure associated with the existing Tynagh Power Station plant.

The design options were then assessed against the environmental factors (air & climate, cultural heritage, biodiversity, and landscape & visual, noise and vibration, water environment, soils and geology, traffic and land use). Option A was rejected as the existing site topography proposed was sub optimal for OCGT positioning and site layout. Option B emerged as the preferred Option due to having all the benefits of Option A including access to existing gas and electrical connections whilst also not requiring significant earthworks. Option B was therefore taken forward for full assessment in the EIAR.

Chapter 4 – Existing Site and Conditions

This chapter provides an assessment of the existing site conditions, its location and setting, details of the surrounding area, site history and identifies potential environmental sensitivities/receptors both within and outside of the site in compliance with Article 5 and Annex IV of the EIA Directive.

Chapter 5 – Proposed Development

This chapter provides a detailed description of the various components of the proposed development, including structures and infrastructure. Details are also provided of the construction (18-24 months); commissioning, operational and decommissioning phases of the development. The 299MW OCGT recently permitted under pl.ref:21/2192 is also referenced and considered the EIAR submitted in the context of the cumulative impact of both developments being realised.

Chapter 6 – Consultations

Chapter 6 provides details of the pre-application consultation undertaken by the applicant, including details of the SID pre-application consultation with An Bord Pleanála (Ref. PC07.315213).

Chapter 7 – Air Quality and Climate

This chapter of the EIAR provides information on the environmental effects of the proposed development on both air quality and climate. The planning authority have examined Chapter 7 and note the methodology applied, the legislative framework as set out in relation these environmental factors and the baseline environmental conditions and constraints data presented with regard to same. Relevant human receptor locations and ecological receptor locations were identified and assessed for impacts from the emissions stack and construction traffic, as relevant.

In terms of construction dust impacts, the study area extends up to 350m from the site boundary and 50m from the construction traffic route up to 500m from the site entrance. Ecological sensitive receptors are those that are located within 50m of the nearest construction activity/and or within 50m of a public road used by the nearest construction traffic, that is within 500m of the construction site.

The developer has prepared an air quality assessment (see Appendix 7A) which was carried out to evaluate the impact of the proposed development on local air quality. This report has highlighted that there would be a small increase in ground level concentrations of nitrogen dioxide and carbon monoxide. The report has confirmed that the operational concentrations of the modelled pollutants would be well within current Environmental Standards. The cumulative impact of the proposed development in conjunction with the existing power station and the approved development under planning reference 21/2192 were also considered. The analysis in this respect has confirmed that the combined impact on local pollutant concentrations would result in no significant effects. It is further stated that the proposed development will comply with the requirements of the European Union (Large Combustion Plants) Regulations 2012 S. I. No. 566 of 2012 under an Industrial Emissions (IE) Licence (which is to be applied for) so that any impacts of emissions to air, soil, surface and groundwater, and effects on the environment and human health, will be minimised and avoided where possible.

Chapter 7 also examines the impact of the proposed development on climate. It presents the findings of Greenhouse Gas Impact Assessment and Climate Change Resilience Assessment as set out in Appendix 7B of the EIAR. The assessments set out the legislative and policy guidance context from international to local level. The greenhouse gas assessment has provided a breakdown in terms of the estimated greenhouse gas which would be generated during the construction phase and also the operational period of the development for its 25-year life and also annual emissions.

The proposed development is intended to be operated as a peaking plant which would be operated for limited number of hours per year. The development would therefore contribute towards ensuring a secure energy supply to the national grid. Having regard to government policy which aims to have 80% of its electricity supply via renewable energy sources the proposed development will contribute to ensuring that there are sources of energy generation that can be quickly dispatched to cover any imbalance in supply and demand. The report has highlighted the importance of the proposed infrastructure particularly

due to the reduction of use of coal and peat for electricity generation with natural gas being identified as a relatively lower-carbon option to supply security of supply.

Having regard to the foregoing it is considered that the proposed development would not have any unacceptable direct or indirect impacts in terms of air quality. In terms of climate, the development is identified as having a moderate adverse effect, with the plant operating beyond 2050 and therefore falling short of fully contributing to Irelands net zero trajectory. However, the EIAR also asserts that while Ireland is moving towards decarbonising the grid, gas-fired peaking plant power stations are required as an important part of the overall transition fuel mix, in order to ensure the Republic of Ireland's energy security. In addition, it is stated, the operational requirements of the proposed development will inevitably change during its design life, and it will be subject to regular reviews to identify potential modifications and amendments to enable continued alignment with Republic of Ireland climate goals. The planning authority also acknowledge that once operational will ensure a more robust national grid in terms of security of supply by way of a relatively lower carbon option than peat and coal.

Chapter 8– Cultural Heritage and Archaeology

This chapter of the EIAR provides information on cultural heritage and archaeology and the likely significant impacts of the proposed development upon the cultural heritage including archaeological and architectural heritage. The planning authority has examined this chapter and associated Appendix 8 of volume II of the EIAR and note the legislative and guidance and policy framework detailed for this environmental factor, the methodology outlined, and the baseline data presented with cultural heritage. There are no recorded monuments or protected structures located within the site. There are 11 recorded archaeological sites within 1km of the study area, one asset recorded on the NIAH and 1 protected structures recorded within the study area, RPS 3648 (thatched house). An assessment setting was undertaken for designated heritage assets (national monuments, protected structure and architectural conservation areas) within an outer area of the proposed development. It was determined that the proposed development in terms of potential impacts would have no significant effects on the assets identified owing to reasons of topography, distance, the nature of the site and existing screening. It is stated that settings of some of these assets may be impacted during construction owing to noise, traffic, visual intrusion with reliance on the implementation of CEMP with regard to mitigating these impacts during this phase, with no other mitigation proposed.

The Conservation Officer of Galway County Council was consulted regarding the proposed development with particular regard to Chapter 8 'Cultural Heritage and Archaeology' and has raised no objection to the proposed development from a conservation point of view. However, a condition is recommended to be attached to ensure vibration monitoring is carried out with regard to RPS 3648 (thatched cottage).

Following examination and analysis of the information provided in the EIAR in relation to the impacts of the development on cultural heritage and archaeology, the Planning Authority considers the methods are appropriate and the findings provide no indication that the resultant impacts, following the implementation of mitigation and subject to vibration monitoring of the RPS3648, would have a likely

significant effect on the environment in terms of land use and would not be contrary to the proper planning and sustainable development of the area.

Chapter 9 – Biodiversity

This chapter of the EIAR provides information on biodiversity and the likely significant impacts of the proposed development upon the ecological environment.

The planning authority has examined this chapter and associated Appendix 9 of volume II of the EIAR and note the legislative, guidance and policy framework detailed, the methodology outlined in conjunction with the baseline environmental conditions and constraints presented, with regard to biodiversity.

European sites located within 15km were considered along with National Heritage Areas and proposed National Heritage Areas, non-statutory nature conservation designations and records of protected and notable habitats and species were also reviewed within 2km of the site.

13 European designated sites are located within 15 km of the site, and these are listed in Table 9.4 as presented in Chapter 9 of the EIAR, with no non-statutory designations within 2km of the site and no parcels of ancient/long established woodland within 2km of the site. The NBDC database was consulted, with only species of regional or international importance considered. There were no records of protected or notable plants, bats, otter, reptiles or fish returned.

Records of badgers, common frog and smooth newt were returned. 38 notable bird species including 4 listed on Annex I of the Birds Directive (corncrake, golden plover, kingfisher and peregrine falcon) were noted with 17 of the 38 listed as red-listed species Birds of Conservation Concern in Ireland (BOCCI) and 20 listed as Amber-listed species. There are a further 39 BOCCI green-listed bird species and one record of a notable butterfly species, wood white Lepitedea sp. A habitat survey carried out on site identified eight dominant habitats present in the proposed site as per the Fossitt 2000 classification and these are other artificaial lakes and ponds (FL8), drainage ditches (FW4), semi-natural grassland (GS), spoil and bare ground (ED2) and buildings and artificial surfaces (BL3), mixed broadleaved woodland (WD1), conifer plantation (WD4) and scrub (WS1).

No protected plants, invasive species, no bats (habitat suitability and preliminary roost assessment), otter, badger, or other protected mammals, or wintering birds were confirmed. Smooth newts were identified within the small pond with an estimated maximum count of 25. Due to the proximity of the proposed development (circa 50m. north) impacts could be significant in the absence of mitigation. A suite of mitigation measures including silt fencing around the pond, the provision of a buffer zone of 10m between the pond and construction works and refuelling of machinery and plant are therefore proposed. Further measures are also proposed and are detailed within the outline CEMP with the EIAR Volume II, Appendix 5A. The mitigation measures as proposed are considered appropriate to ensure the nationally protected species are protected.

In terms of wintering birds, it is noted that a substantial number of surveys have been carried out on site between October 2021 and March 2023. Given the irregular use of the site, the report has suggested that

the site is a sub-optimal habitat for wintering birds, and impacts are not expected to be significant, mitigation not recommended with regard to wintering birds.

Regarding breeding birds, 4 species of conservation concern for breeding in Ireland (Goldcrest, Greenfinch, meadow pipit and willow warbler) were recorded displaying breeding behaviours. 13 probable breeding areas have been recorded on the site. However, no bird nests were recorded on site. The report has confirmed that during the construction phase there would be habitat loss and includes the construction phase mitigation measures to restrict the removal of vegetation to the non-breeding season (i.e. September to February), unless under the supervision of a suitably qualified Ecological Clerk of Works who would be required to survey the vegetation and ground for both breeding birds, immediately prior to removal. Galway County Council considers that in the event of a grant of planning permission, a specific condition should be attached to ensure all vegetation clearance would be undertaken outside of the bird nesting season (1st March to 31st August)

In terms of Appropriate Assessment, the Planning Authority note the submitted AA Screening Report which has concluded that the proposed development would not result in likely significant effects on Natura 2000 sites.

The Planning Authority having reviewed the documents as submitted, particularly Chapter 9 of the EIAR and are satisfied that effects on biodiversity can be addressed subject to strict adherence to the mitigation measures as detailed and outlined in the EIAR .

Chapter 10 – Landscape and Visual

This chapter assesses the likely significant effects of the proposed development on landscape and visual resources. The planning authority has examined this chapter and note the regulatory and policy framework detailed for this environmental factor, the methodology outlined, and the baseline data presented in relation to landscape matters. Information presented is supported Appendix 10A (Photomontage Booklet) of Volume II of the EIAR & Volume III (Landscape Designations, Landscape ZTV, Viewpoint Location Plan) of the EIAR.

A 5km radius was set as the study area, which it is stated defines the area within which potential effects could be significant, rather than the extent of visibility. The photomontage booklet as submitted has provided visualisations of the proposed development from 8 separate viewpoints in the surrounding area of the proposed development including but not confined to the N65 to the east and Tynagh village to the south. The photomontage includes the existing view, the approved view (pl.ref:21/2192), proposed and approved view (21/2192), a wireframe proposed, and wireframe proposed and approved view (pl.ref:21/2192).

The report has considered the development against the relevant policies with the Galway County Development Plan 2022-2028 and has had regard to the Landscape Character Assessment for the county. The site is located within the Eastern Plains Region and is classified as the Central Galway Complex Landscape. The report has identified that the site is within an area classified as having a low landscape sensitivity and is therefore unlikely to be adversely affected by change.

The EIAR examined construction and operational phase impacts of the proposed development. The report details that the most prominent views of the development would be within a radius of 500m from the boundary of the site. Elements of the proposed construction including the 40m high stack would be visible from nearby dwellings, the local road network and from parts of Tynagh village to the south. The report also confirms that there would be views of the proposed development from the wider area within the area studied but these are not considered to be significant, based on the wide panoramic view in which they would form one visible component of many. It is noted that the proposed would be viewed in conjunction with the existing 55m emissions stack associated with the exiting Tynagh Power Station.

The report has included a number of mitigation measures to minimise the impact of the proposed development on the receiving landscape which include architectural design including height, colour, form, textures and lighting, with minimisation of external lighting and roads cleaning during construction. The magnitude of the visual effects of the proposed development are outlined within Table 10.13 with the magnitude of visuals effects from viewpoints 1-8 ranging from no change to medium.

The Planning Authority note the extensive cut into an existing earthen bank to the northern portion of the site. It is unclear based on the details as submitted the how this will be graded/treated to ensure the development appropriately assimilates into its surroundings. The Bord may wish to further consider this aspect of the development.

The Planning Authority having reviewed the documents as submitted particularly the Photomontage Booklet and Chapter 10 of the EIAR are satisfied that the development as proposed would not result in undue adverse impacts on the receiving landscape.

Chapter 11 – Noise and Vibration

This chapter assesses the potential noise and vibration impacts during the construction, operation (including maintenance) and decommissioning phases of the development. This chapter has detailed the methods used to assess the effects of the proposed development including measures required to prevent, reduce or offset any significant adverse effects and the likely residual effects after these measures have been adopted. The assessment has considered the cumulative effect from a noise and vibration perspective, in terms of both the existing and approved development in conjunction with the proposed development. Five sensitive receptor locations were identified, and all were noted as residential properties and the closest receptors to the proposed development.

Noise: The assessment has considered potential impacts of noise as a consequence of both the construction and operation phase of the development. However, following the calculation of operational noise emissions it is indicated that sound emission from the proposed development would not comply with the relevant criteria. Mitigation measures for the operation phase include those that can be incorporated into the design of the proposed development which included an 7m to 10m high acoustic barrier around the stack base and diffuser. 3D sound modelling was rerun including the mitigation measures and the results presented indicate that with mitigation, sound emissions from the proposed development comply with the relevant criteria, with no significant adverse impacts predicted at residential receptor positions with regard to operational phase sound levels. Residual impacts are not deemed to be significant. Cumulative impacts refer to the construction phase of the development (gas

turbine) associated with pl.ref: 21/2192, currently not commenced, with all cumulative operational noise impacts at all receptors deemed to be low. Having reviewed the EIAR it is considered that the development would not have any significant effects during the construction, operational and decommissioning phases from a noise perspective subject to the implementation of the mitigation measures identified.

Vibration: The assessment has considered potential impacts of vibration as a consequence of both the construction and operation phase of the development. During the construction phase the assessment has detailed that the closest receptors to the site would be 260m or greater from any location where vibrating generating activities such as piling may occur. The development is not expected to result in any vibration impacts based on the 'Code of practice for noise and vibration control on construction and open sites' (BS 5228) which provides piling vibration methodologies up to a maximum of 110m. The assessment has also referenced the Highways England document 'Design Manual for Roads and Bridges LA 111 Noise and vibration (LA 111) which is used for roads schemes which recommends a maximum of 100m is normally sufficient. Based on the aforementioned the report has scoped out vibration impacts during the construction phase. During the operational phase the assessment has detailed that no plant proposed would generate significant vibration levels. The assessment has confirmed that all plant on site would be constantly monitored to identify maintenance issues to allow for any rectification. The assessment has therefore scoped out vibration impacts during the operational phase.

Chapter 12 – Water Environment

This chapter assesses the potential impacts on the water environment during the construction, operation (including maintenance) and decommissioning phases of the development. This chapter has is supported with information from other chapters of the EIAR including Chapter 9: Biodiversity, Chapter 13: Soils and Geology and Appendix 12A: Flood Risk and Drainage Assessment. Site walkovers included inspections of surface water bodies in the study area, with baseline surface water quality monitoring undertaken to inform the impact assessment presented, which it is stated is based on the source-pathway-receptor model. The details also set out the limitations and assumptions that the assessment encountered and was based upon. The regulatory framework is outlined, in particular EU legislation governing water policy, surface waters, groundwaters, the floods Directive and the Water Framework Directive, national plans such as the River Basin Management Plans and national guidelines.

Much of the baseline information presented in relation to the water environment such as land use, surface water features, hydrogeology, groundwater vulnerability, and groundwater quality, is similar to that presented in Chapter 13 -Soils and Geology, owing to the significant interrelation between these environmental factors. Additional baseline information is provided such as rainfall, existing drainage, discharge consents pollution incidents and flood risk. In terms of rainfall, the site is subject to an average rainfall of 1193mm per annum, with rain more than 1mm/day on approximately 147 days of the year. Average monthly rainfalls range from 60.2mm to 132.4mm, with April indicated as the driest month and December the wettest month.

The site is located within the Lisduff (Kilcrow) sub basin of the Lower Shannon surface water catchment and falls within the Historic Tynagh mine groundwater body. Shallow groundwater was encountered at depths of 1.5m to 3m below ground in shallow wells associated with the construction of the CCGT power

station, which also abstracts and treats groundwater from a well east of the power station site. Groundwater in the area has elevated concentrations of heavy metals as a result of the extensive mineralization of the limestone bedrock in the vicinity of the site. There are no Section 4 discharge licenses relating to the Tynagh site. The power station currently discharges treated process water and surface water into the former open pit mine under the terms set out in its IE license. In reference to abstraction licences, Tynagh power station has a registered abstraction, permitted to abstract up to 300 meters cubed per day from a groundwater well on the east side of the existing power station site. In reference to pollution incidents, none are known to have occurred at the site or at the existing power station site according to the EIAR.

Groundwater quality is examined, with the groundwater body underlying site classified as poor by the EPA. Groundwater monitoring is undertaken twice a year on three boreholes within the wider power station site, under the terms of the IE license, analysing diesel range organics, mineral oil, PH, temperature and electrical conductivity. Groundwater monitoring results indicate concentrations were below the laboratory's method detection limit groundwater flow is generally towards the northeast. Analysis undertaken for the EIAR indicates all volatile and semi-volatile organic compound concentrations were below the laboratory method detection limit, petrol hydrocarbon concentrations were generally below the detection limit, with exceedance of toluene in one borewell. Exceedances of petroleum hydrocarbons and toluene in the groundwater sample from beneath the site are determined to be likely related to the former use of the areas and mining site and are unlikely to affect the underlying bedrock aquifer water quality or nearby fresh surface water courses, which showed no exceedances of available Environmental Quality standards for any parameter with the exception of exceedances for zinc reported in a sample from the Kilcrow river downstream of the Barnacullia Stream.

Surface water quality is examined, with the Kilcrow waterbody assigned a 'poor' surface water quality status and is classified as an 'at risk' surface water body under the Water Framework Directive cycle 2016 to 2021. The EPA's monitoring program for 2019 to 2021 includes 6 monitoring locations. The former open pit mine and tailings ponds are not assigned a Lake Waterbody Water Framework Directive status. The Cappagh waterbody to the southwest the site and the Kilcrow waterbody to the south the site is both assigned a 'moderate' surface water quality status and are classified as 'at risk' surface water bodies under the Water Framework Directive cycle 2013 to 2018.

Notably, the site's former use as a mine is known to have resulted in impacts to surface water features in the area. A 2003 EPA document indicated heavy metal contamination particularly in the west tailings pond, prior to the development of the existing Tynagh power station facility. Lead and zinc concentrations were also noted to be elevated in the sediments within the Barnacullia Stream, northeast of the site, however it was also noted by the EPA that in general surface water quality in the area downstream of the site was satisfactory. A journal paper in 2015 included surface water and sediment sampling in the tailing ponds and Barnacullia Stream - it found elevated concentrations of a number of heavy metals in both sediment and surface water samples. The EIAR notes that additional surface water monitoring of local surface water features has been undertaken to inform the baseline study. Samples were taken in 2021 from locations upstream and downstream of the site. In Mill Stream and the Kilcrow River concentrations of all total petroleum hydrocarbons (TPHs), benzene, toluene, ethylbenzene and xylene compounds and a number

of heavy metals were below the laboratory method detection limit, with no exceedances of available Environmental Quality standards noted, save for the Environmental Quality standard for zinc, noting that zinc is identified as a major constituent of the Tynagh bedrock mineralization.

In terms of ecologically designated sites there are no recorded special areas of conservation (SACs), special protection areas (SPAs) or natural heritage areas (NHAs) within 5 kilometers off the site.

In reference to flood risk, a site-specific flood risk and drainage assessment has been carried out for the development and is presented in Volume II, Appendix 12A of the EIAR. This assessment has been carried out in consideration of the Planning System and Flood Risk Management Guidelines for Planning Authorities 2009 and confirms that the proposed development will not at risk from fluvial flooding and is at very low risk from groundwater flooding.

Predicted impacts from the 'do nothing' scenario, 'construction phase', 'operation phase' and 'decommissioning phase' are set out. Examples at construction phase include impacts on surface and groundwater water quality as a result of deposition or spillage of soils and contaminants, mobilization of contamination or uncontrolled surface water run-off, de-watering of excavations, increased groundwater flooding or recharge during ground excavations, alterations to overland flow paths, disturbance of soil, surface water run-off and sedimentation, rainfall infiltration to aquifer, spillages and leakages and flooding. Operational phase impacts on the water environment in the absence of mitigation include anthropogenic pollutants in surface water run-off, impacts on hydromorphology with installation or removal of new structures, nutrient enrichment from atmospheric deposition of pollutants emitted, increase in volume and rate of surface water run-off. In terms of decommissioning, similar impacts to those at construction phase are identified.

A number of mitigation and enhancement measures are proposed for the construction phase, operation phase and decommissioning phase. In terms of construction phase, the mitigation measures set out rely heavily on the Construction & Environmental Management Plan contained within EIAR Volume II Appendix 5A, the management of flood risk such as regular monitoring of forecasts, signing up to weather warning alerts and Emergency Response Plan and best practice dewatering methods. Operation phase monitoring includes implementation of the drainage strategy on site including SuDs and wastewater disposal, provision of fire water storage, bunding of tanks/fuel storage, operation in accordance with IE licence requirements, hazard prevention and Emergency Planning and routine maintenance. Mitigation in relation to the decommissioning phase refers to the implementation of a decommissioning plan.

An assessment of significant residual effects is presented in Table 12.3 of the EIAR. In reference to the construction phase the residual effects described are surface water quality (suspended fine sediments), surface water quality (chemical spillages), groundwater effects and flood risk. For the operational phase the effects are water quality impacts to surface watercourses from routine runoff and spillages, water quality impact to groundwater from routine runoff and spillages, foul water discharge and flood risk with the decommissioning phase surface water quality suspended fine sediments and chemical spillages. In reference to the decommissioning phase the residual effect of surface water quality (suspended fine

sediments and chemical spillages) on surface waters provides for additional mitigation in the form of implementing the Decommissioning Environmental Management Plan based on the CEMP.

The magnitude of the impact is deemed negligible for all the receptors, with no further mitigation recommended other than that outlined in the construction environmental management plan, save for:

- water quality impacts to surface watercourses, which is stated as further development of a drainage strategy at detailed design phase to include pollution control measures such as penstocks.
- water quality impacts to groundwater, which is stated as further development of a drainage strategy at detailed design phase to include pollution control measures such as penstocks.
- Flood risk, which is stated development of drainage strategy at the detailed design phase.
- It is stated that the magnitude of the impacts identified are negligible post mitigation, with the significance of residual effects confirmed as imperceptible for all receptors.

No cumulative effects are identified as a result of significant projects proposed (i.e. planning applications particularly 21/2192) that are likely to give rise to cumulative effects in conjunction with the proposed development.

Following consideration of the Water Section of the EIAR, the planning authority consider that further detail/assessment on river flows would be beneficial in terms of ensuring accumulation emissions does not occur, as is the case made in the EIAR.

Chapter 13 – Soils and Geology

This chapter of the EIAR provides information on and an assessment on the likely significant effects of the proposed development on soils and geology. Its sets out the regulatory policy framework, baseline environmental conditions and constraints, predicted impacts, mitigation and enhancement measures, residual and cumulative effects.

The report has detailed that the proposed development would disturb existing ground conditions and in the absence of mitigating measures would have the potential to result in significant effects. The development would have no impact on to or removal of agricultural land or soil resource as all works are on unvegetated made ground. Given the nature and scale of the works the development is highly reliant on mitigation measures which are detailed within a Construction Environmental Management Plan for the site.

The potential for adverse impacts on watercourses and groundwater impacts as a consequence of the development have been taken into account, with potential links to watercourse such as Lough Derg and/or the River Shannon and the Lisduff river have all been considered. The report has confirmed that given the implementation of mitigation measures as contained in Chapter 12, Chapter 13 and the CEMP and the absences of any works to watercourses, any impact would be negligible to these watercourses. Potential

impacts to groundwater were also determined to be negligible and resulting in an imperceptible effect on a high sensitivity receptor (Bedrock Aquifer).

An extensive suite of mitigation measures have been proposed which include minimising erosion by reduced disturbance and the stabilising of exposed materials, control measures to minimise the release of mobilised sediment, storage of chemicals and fuels, an emergency response plan and water quality monitoring including laboratory analysis. Additional measures in the form of a Site Waste Management Plan and measures to prevent, contain or limit impacts from contaminated lands or materials if encountered are also proposed. The mitigation measures as proposed are considered to have addressed any potential impacts as a consequence of the proposed development in term of possible impact on water quality due to manipulation of soil during the course of this project.

The report has considered the impact of the development on construction workers, off site residential receptors and off site urban/industrial land users is also likely to be negligible due to lack of extensive excavations. The report has confirmed that the proposed development will not require significant excavation during the earth work stage and also details that there would be a fill requirement of 21,000 cubic metres of soil which would be imported into the site. While the planning authority note the content of the report with regard to excavation it would appear having carried out a site inspection and reviewed the submitted site sections that substantial excavations would be required to accommodate the development to the northern end of the site. It is unclear based on the submission received the full extent of these excavations. It is recommended that both existing and proposed levels are demonstrated to clearly outline the extent of the excavations as proposed. Clarity is also requested with regard to what whether the excavated soil would be utilised on site or whether a waste licence maybe required. It is also considered that details of the imported soils should be assessed including justification for the quantity, source etc.

In addition, the report from the Environment Section of Galway County Council expresses concerns in relation to potential impacts associated with contaminated soil on site and highlights that any works on site be properly managed to ensure that all mitigation measures and monitoring proposals are fully implemented. The report references that the previous Gas Turbine development at this site was supervised by a Galway County Council employee, funded by the developer and that it may be advisable that supervision is provided by independent consultants reporting to Galway County Council. The report further states that at a minimum, if planning permission is granted, it is recommended that the final CEMP should be submitted to the Planning and Environment Sections for approval prior to commencement of construction. The final CEMP should include details and a proposed timeline for all surveys, monitoring and mitigation measures proposed in the EIAR and recommends that a condition is applied stating that works shall be supervised by a suitably qualified and experienced Ecological Clerk of Works and that brief electronic reports shall be submitted to the Planning and Environment Sections, on a monthly basis during the construction phase, detailing the stage of the works, compliance with the CEMP, EIAR and any issues that have arisen.

The Planning Authority note the mitigation measures as set out predominantly rely on the implementation of the Construction & Environmental Management Plan included in Volume II, Appendix 5A of the EIAR. Subject to strict adherence to the CEMP the Planning Authority the Planning Authority are generally

satisfied that a detailed assessment of the proposed development has been carried out. Furthermore, with regard to imported soils the Council recommend the Bord investigate the justification for the quantity, source etc. In terms of the proposed upgraded wastewater treatment and discharge to the existing percolation area the Bord are recommended to consider if there is adequate percolation in this area.

Chapter 14 – Traffic

This chapter of the EIAR provides information on traffic and transportation impacts associated with the development. It considers the existing traffic conditions, additional traffic generated by the proposed development and the impact on the surrounding highway network. The report outlines the legislative and guidance and policy framework detailed for this environmental factor, the methodology outlined, and the baseline data presented in relation to traffic matters.

Included in the assessment is a pavement survey, survey data, forecast traffic flow diagrams, autotracking/access arrangements, construction traffic management plan, falling weight deflectometer assessment, bridge condition survey and project overlap. These documents are all included within Volume II – Appendices (Part B).

The report has detailed that the construction phase of the development is 18 to 24 months in duration with HGV traffic expected between months 1-3 (maximum of 39 HGVs will arrive per day equating to 78 two way trips). Staff trips to and from the site would be 133 no. daily light vehicle arrivals (or 266 LGV tow-way trips). The report has confirmed that following a linked capacity assessment that the LP 4310 Tynagh Road will continue to operate at with ample capacity to serve all staff and HGV traffic on the network during peak periods.

The site access junction onto the LP 4310 has also been considered in terms of capability to deal with traffic resulting from the proposed development. The report has confirmed that the peak hour traffic impact and daily traffic impact will exceed the 10% threshold (12.1% see Tables 14.14 and 14.15 within Chapter 14). Whilst the threshold was exceeded, the report qualifies this by advising the 12 trips assessed were doubled to allow for a robust assessment. The report also highlights that the traffic impact is temporary (ie. HGV peak for 12 weeks). The traffic impacts were not considered to be of concern and would not have a detrimental impact on the road network.

The scenario of outages taking place with regard to the existing Tynagh CCGT has also been highlighted during the construction phase of the development which in such times would reduce the number of vehicles entering and existing the site from 133 to 120.

Regarding traffic impact on the pavement/road surface, an assessment was carried out which has identified that the current state of the LP 4310. This assessment has confirmed that this local primary road is in good condition with any defects noted localized in nature with no significant defects noted. The overall impacts of construction traffic associated with the proposed development are considered to be negligible.

Abnormal loads associated with the proposed development would arrive during the construction phase with journeys expected to travel from either Dublin Port or Shannon Foynes Port to the site. Auto Tracking for these routes has previously taken place under planning history file 04/2193. The applicant has advised that a detailed report on these routes will be provided to the relevant authorities before travel.

Operational phase impacts are scoped out owing to the low volume of daily flow traffic volume, as is the emergency scenario of delivery of back-up distillate fuel, owing to it being an exceptional event which has never occurred with the existing CCGT.

Decommissioning works are deferred to a decommissioning plan as part of their Industrial Emissions licence, with effects deemed similarto those at construction phase. Mitigation and enhancement measures refer to a Construction Traffic Management Plan with an outline of same provided in (Volume II Part B) Appendix 14 of the EIAR. Minimal residual environmental effects are identified in terms of temporary traffic construction traffic. Cumulative impacts take account of the traffic associated with the existing CCGT (due to outages/maintenance), combined construction traffic and outage traffic, which was assessed against road capacity and no significant cumulative impacts were identified.

The Council's Roads and Transportation have reviewed the proposed development. No objection to the development has been raised but a suite of conditions has been recommended to be attached.

Chapter 15 – Land Use

This chapter of the EIAR provides information on land use impacts associated with the development. It sets out the regulatory policy framework, baseline environmental conditions and constraints and the planning histories in the vicinity of the site.

The information provided highlights that the site is located within a predominantly pastureland agricultural landscape, and forms part of the existing Closed Cycle Gas Turbine power station complex, which is also an existing lower tier SEVESO site, designated by the SEVESO Directive and the European Communities Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015 (S.I. no.209 of 2015). It also notes that Sperrin Industries is located to the south west of the site, which is subject to IE licensing and that a number of rural residential properties are located in the vicinity of the site, with an equestrian centre located 330m to the north east of the site and the village of Tynagh located 1.8km to the south of the site.

The principal issues considered in the land use assessment include planning policy and land use zonings, identification of any private property and housing, the identification of community land use, industry and business development land zoned for development, planning applications of relevance, loss and severance of agricultural land and relevant consultation responses. The Planning Authority note the mitigation measures as set out predominantly rely on the implementation of the Construction & Environmental Management Plan included in Volume II, Appendix 5A of the EIAR.

Following examination and analysis of the information provided in the EIAR in relation to the impacts of the development on land use, the Planning Authority considers that the matters considered are relevant, the methods are appropriate, and the findings provide no indication that the resultant impacts, following

the implementation of mitigation, would have a likely significant effect on the environment in terms of land use.

Chapter 16 – Population and Human Health

This chapter assesses the likely significant effects of the proposed development on population and human health, providing baseline population and health-related data and information on health effects associated with the proposed development. The chapter cross references other relevant chapters in the EIAR and environmental factors such as Chapter 7: Air Quality and Climate, Chapter 11: Noise and Vibration, Chapter 13: Soils and Geology and Chapter 12: Water Environment.

A number of mitigation and enhancement measures are identified for both the construction phase and the operational phase of the development as presented in Chapter 7: Air Quality and Climate, Chapter 11: Noise and Vibration, Chapter 12: Water Environment and Chapter 13: Soils and Geology, which are also expanded upon in Volume II of the EIAR and associated CEMP. The provisions of the CEMP are predominantly relied upon for the construction phase mitigation.

In terms of air quality, the EIAR has confirmed that mitigation in the CEMP will apply at construction phase and that it has been assumed that ELVs will be met for the operational plant as required under the Industrial Emissions Directive, as amended by the revised BREF noted (Best Available Technique Reference documents) and in accordance with use of Best Available Techniques (BAT) under environmental permitted regimes. Of note are that acoustic barriers that are proposed as mitigation in relation to noise impacts on human health, with the operation of appropriate Environment Management Systems for soils and geology protection. There are no mitigation measures proposed for impacts on human health arising from employment and population size to prevent any significant adverse effect and no cumulative effects have been identified with further elaboration provided in Chapter 19 of the EIAR, which focuses solely on cumulative impacts of the overall development. Finally, no residual effects have been identified in the assessment provided.

Of note is the report received from the Environment Section which highlights that a number of potential impacts on human health and the environment have been identified in the absence of mitigation measures, with particular concerns expressed in relation to potential impacts associated with contaminated soil on site. The report also highlights that any works on site are required to be properly managed to ensure that all mitigation measures and monitoring proposals are fully implemented. The report references that the previous Gas Turbine development at this site was supervised by a Galway County Council employee, funded by the developer and that it may be advisable that supervision is provided by independent consultants reporting to Galway County Council. The report further states that at a minimum, if planning permission is granted, it is recommended that the final CEMP should be submitted to the Planning and Environment Sections for approval prior to commencement of construction. The final CEMP should include details and a proposed timeline for all surveys, monitoring and mitigation measures proposed in the EIAR and recommends that a condition is applied stating that works shall be supervised by a suitably qualified and experienced Ecological Clerk of Works and that brief electronic reports shall be submitted to the Planning and Environment Sections, on a monthly basis during

the construction phase, detailing the stage of the works, compliance with the CEMP, EIAR and any issues that have arisen.

Chapter 17 – Material Assets

This chapter assesses the likely significant effects of the proposed development on material assets. The Planning Authority note legislative, guidance and policy framework detailed for this environmental factor, the methodology outlined, and the baseline data presented in relation to such matters.

Predicted impacts at construction phase include the generation of additional waste during construction, which is stated as a negligible tonnage (24 tonnes – see table 17.7). The report has indicated that no excavated soil will be exported from the site. The Planning Authority note that there appears to be extensive excavation taking place to the northern section of the site. This has been highlighted previously with the assessment of Soils and Geology (Ch 13). In terms of electrical and gas utilities it is confirmed that the proposed development would connect to existing infrastructure. Electrical connections will be constructed by ESB Networks while gas connections will be completed by Gas Networks Ireland. The report confirms that there would be low sensitivity associated with these materials assets during the construction phase. In the absence of implementation of any mitigation the significance would be neutral or slight.

Predicted impacts during the operational phase have highlighted the necessity to store secondary fuel on site, which will be stored within a tank contained in a bunder area. This secondary fuel source would only be used should there be an interruption to the gas connection and other generation on the grid cannot be met. Any contaminants from the secondary fuel that may accumulate during storage will be collected in a fuel treatment tank and contained within a bunded area, prior to its safe removal from the site. It is proposed to empty the tank twice per annum. When fuel is required in the plant, a fuel pump would forward the fuel from this storage area. In terms of electrical and gas utilities it is noted that both connections would be upgraded by ESB Networks and Gas Networks Ireland. Bearing in mind the generation of additional power as a consequence of the proposed development the significance of impact will be slight beneficial.

Mitigation and enhancement measures relate to the CEMP as set out in Appendix 5A of Volume II of the EIAR with the provision of an Environmental Management System at operation phase as required by the EPA. Residual effects are deemed to be negligible, neutral or slight, or slight beneficial residual effect, once mitigation is implemented.

The Council's Roads and Transportation have reviewed the proposed development. No objection to the development has been raised but a suite of conditions have been recommended to be attached.

Following examination and analysis of the information provided in the EIAR in relation to the impacts of the development on material assets, the Planning Authority consider a sufficient assessment has been provided by the applicant.

Chapter 18 – Major Accidents and Disasters

This chapter assesses the likely significant adverse effects of the proposed development arising from potential risks of major accidents and disasters. Article 3(2) of the EIA Directive also requires effects on the factors as set out above shall include the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned.

The Planning Authority have examined this chapter and note legislative, guidance and policy framework detailed for this environmental factor, the methodology outlined, and the baseline data presented in relation to such matters.

The report has detailed a summary of natural disasters which could occur within Table 18.3 contained within Chapter 18. The assessment has confirmed that the most likely potential accident which could occur would be through loss of containment of dangerous substances and subsequent fire and/or explosion. The Planning Authority note the mitigation measures within Chapter 18 and note such activities would be controlled by contractors health and safety and environmental legislation including COMAH/Seveso, design and construction in accordance with best practice/standards, a site specific health and safety plan, regular maintenance and inspection of all facilities to reduce risk of loss of containment, procedures to deal with emergencies should they occur. The report also outlines an emergency response plan for the site which would work closely together with the existing power plant and the approved development (21/2192). The ERP would contain detailed plans in response to emergencies such as loss of containment, fires and severe weather.

In terms of cumulative impact during the construction phase the development would not result in any cumulative impact as it is assumed the proposed development currently under consideration and the approved development (21/2192) would not be constructed at the same time.

In terms of the operational phase of the development it is assumed the proposed development currently under consideration and the approved development (21/2192) may operate concurrently at the same time. The report has confirmed that the existing Tynagh Power Station, the proposed development and the approved development (21/2192) would be managed by experienced operating personnel to ensure co-operation in activities thus reducing risk and the potential for accidents.

The report has included a summary of assessment which has considered the various potential accidents which may occur within Table 18.4. Once all mitigation as outlined within the report is in place the range of risk is from slight to neutral for the various potential accidents. The Planning Authority note that a submission from the HSA has been submitted to the Bord for consideration.

Chapter 19 – Cumulative Effects and Interactions

This chapter provides an assessment of the potential for cumulative and combined effects to occur as a result of the proposed development. The assessment concludes that there is no likelihood of any significant residual cumulative effects with extant planning applications (Ref: 21/2192, Ref:19/633, and Ref: 18/221) in the vicinity and the existing Tynagh Power Station. Furthermore, the assessment of combined effects has not identified any significant combined effects.

Chapter 20 – Conclusions

This chapter outlines the conclusions of the technical assessments on the proposed development and the likely significant cumulative effects. The chapter includes a summary of those adverse and beneficial environmental effects (See Table 20.2 therein) described throughout each of the previous chapters that are considered to be significant (i.e., moderate and major effects). Finally, the chapter includes a Schedule of Environmental Commitments (see Table 20.3 therein), which summarises all the impact avoidance, mitigation and enhancement measures that the Applicant is committed to delivering as part of the Proposed Development during its various phases in compliance with Article 5 and Annex IV of the EIA Directive.

21. COMMUNITY GAIN

Section 37G (7)(d) of the Planning and Development Act is noted whereby the Board may attach to a permission for development for an SID a condition requiring:

(i) the construction or the financing, in whole or in part, of the construction of a facility, or

(ii) the provision or the financing, in whole or in part, of the provision of a service,

in the area in which the proposed development would be situated, being a facility or service that, in the opinion of the Board, would constitute a substantial gain to the community.

It should be noted under Section 37G (8) a condition attached pursuant to subsection (7)(d) shall not require such an amount of financial resources to be committed for the purposes of the condition being complied with as would substantially deprive the person in whose favour the permission operates of the benefits likely to accrue from the grant of the permission.

The applicant does not appear to have submitted any proposals with respect to community gain. Owing to the provisions of 37G, it is considered that a community gain condition should be put forward and relevant condition attached should An Bord Pleanála decide to grant planning permission.

23. DEVELOPMENT CONTRIBUTIONS/SPECIAL CONTRIBUTIONS/BONDS

Development Contributions:

In the event of a grant of planning permission the levy as set out under the applicable Development Contribution Scheme made under section 48 of the Planning and Development Act 2000 should apply subject to any applicable indexation provisions of the Scheme at the time of payment.

Under the current scheme, the following would apply:

-Unless otherwise agreed in writing with the Planning Authority prior to the commencement of development, the applicant/developer shall pay €46,424.00 to the Planning Authority, unless a phased payment schedule has been agreed in writing with the Planning Authority. This charge has been calculated using the Development Contributions Scheme adopted by Galway County Council in accordance with the provisions of Section 48 of the Planning and Development Act 2000 (as amended):

The makeup of this sum is detailed in the list below:

Sub Area 2 Group 1:

€14.00 x floor area of proposed development minus floor area of demolition

€14 x 3316 (3721m2 - 405m2) = €46,424.00

REASON: So that the developer shall pay an equitable portion of the cost of the services which facilitates and/or which will facilitate the proposed development.

Special Development Contribution:

Galway County Council's preference is for the attachment of a specific condition in the event of a grant requiring pre-surveying of affected roads, proposals for rendering the routes fit for purpose, ongoing monitoring and repair during the project, post construction survey and remedial works [Roads & Transportation Engineers report refers].

Bonds

1.The Roads & Transportation Engineer considers that the construction of this development may lead to damage to the road network as a result of transport of materials to the site. Accordingly, it is recommended that, in the event of a grant of permission, the applicant shall be required to contribute to the cost of repairing this damage and as such a €100,000 cash deposit, a bond of an insurance company, or such other security as may be acceptable to the relevant planning authority shall be provided to the planning authority, prior to the commencement of development on site.

2.A bond to ensure reinstatement of the site is considered appropriate to attach as a condition in the event of a grant of planning permission as follows:

Prior to the commencement of development, the development shall lodge with the planning authority a cash deposit/bank bond or other such security as may be acceptable to the planning authority, to secure the satisfactory reinstatement of the site on cessation of the project coupled with an agreement empowering the planning authority to apply such security or part thereof to such reinstatement. The form and amount of security shall be as agreed between the planning authority and developer or, in default of agreement, shall be referred to An Bord Pleanála for determination.

24. CONCLUSION

Following consideration of the information to date and having regard to:

-the location of the proposed open cycle gas turbine on an established industrial and energy generating site
-the transitionary nature of the proposed development which will operate as and when needed to ensure security of electricity supply,
-the planning history of the site

-the character of the landscape in the area and of the general vicinity

-the pattern of existing and permitted development in the area and

-the distance to dwellings and other sensitive receptors from the proposed development

-the policy objectives of the Galway County Development Plan 2022-2028

-the policy position as set out in national plans including the National Planning Framework 2018-2040, the Climate Action Plan 2023, Climate Action and Low Carbon Development Amendment Act,2021 amending Climate Action and Low Carbon Development Act 2015, the National Security Framework 2022 and Policy Statement in the Security of Electricity Supply 2021 and the Regional Spatial and Economic Strategy for the Northern and Western Region 2020-2032.

-the likely consequences for the environment and European site which is subject to relevant environmental determinations (for which An Bord Pleanála is the Competent Authority), it is recommended that permission be granted for the above development subject to conditions.

25. PLANNING AUTHORITY'S RECOMMENDATION:

Grant permission subject to conditions:

1. The development shall be carried out and completed in accordance with the plans and particulars lodged with the application, except as may otherwise be required in order to comply with the following conditions.

REASON: In the interest of clarity.

2.The output from the proposed open cycle gas turbine shall be a maximum of 350MW.

REASON: In the interest of clarity and the proper planning and sustainable development of the area.

3. (i)The development shall be carried out strictly in accordance with all of the mitigation measures and monitoring proposals and in accordance with any timelines as set out in the Environmental Impact Assessment Report (EIAR).

(ii)The services of a suitably qualified and experienced Ecological Clerk of Works shall be retained to oversee and supervise the entirety of the construction works, and to provide monthly electronic reports to the planning authority (Planning and Environment Sections) detailing the stage of the works, and compliance with EIAR and CEMP mitigation measures.

(iii)During construction phase, the removal of vegetation shall be undertaken outside of bird nesting season (ie. 1st March to 31st of August),

REASON: in the interest of clarity and protection of the environment during the construction and operational phases of the proposed development.

4. (i)A Final Construction and Environment Management Plan (CEMP) shall be prepared by a suitably qualified person and submitted to the Environment Section and Planning Section of Galway County Council for written approval, prior to the commencement of construction on site. The CEMP shall incorporate all of the mitigation measures specified in the Environmental Impact Assessment Report and shall include details and a proposed timeline for any surveys, all monitoring and mitigation measures proposed in the EIAR. It shall also specifically include a method statement in respect of the management of any contaminated soils on site.

(ii) All groundworks and construction works during the construction phase of the development shall be supervised and monitored by a suitably qualified, independent person/consultant(s) with details of this person/to be agreed in writing with Galway County Council, in order to specifically ensure the appropriate management of contaminated soils on site. This shall be carried out at the expense of the developer and this person shall report, directly to the Environment Section of Galway County Council, in the form of brief electronic reports, on a monthly basis, detailing the stage of the works, compliance with the CEMP and EIAR and any issues that have arisen in relation to the management of contaminated in soils on site.

(iii)During the enabling works/construction stage of the proposed development, the appointed contractor shall adhere to the Construction Environmental Management Plan (CEMP) and the Mitigation Measures as set out in the EIAR as In addition to Condition 4(ii) above, an appointed Construction Environmental Manager or other suitability qualified person shall oversee the implementation of the Final CEMP and the protective mitigation measures of the EIAR. Brief electronic reports shall be submitted to the Planning and Environment Sections, quarterly during the construction phase, detailing the stage of the works, compliance with the CEMP and EIAR and any issues that have arisen.

(iv) Following construction, certification shall be provided by the appointed Construction Environmental Manager or other suitability qualified person confirming that the construction mitigation measures as set out in the Environment Impact Statement have been carried out in full and that any operational mitigation measures are in place. This certification shall be made available to the planning authority upon request.

REASON: In the interest of ensuring the proper planning and sustainable development of the area and in order to protect the environment and public health.

5. Unless otherwise agreed in writing with planning authority, a fixed red obstacle light(s) shall be fitted as close to the top of the main stack as practicable and shall be visible from all angles in azimuth. Details of this light(s), its location and period of operation shall be agreed with the planning authority before development commences.

REASON: In the interests of air traffic safety.

6. The operational life of this development shall be for 25 years after which time the structures shall be removed and the site reinstated in accordance with the decommissioning details as to be agreed under Condition 7 of this permission.

REASON: To ensure satisfactory compliance with conditions and in the interests of proper planning and sustainable development.

7. Prior to the commencement of development the developer shall submit for the written agreement of the planning authority detailed plans and proposals for the restoration and reinstatement of the entire site following de-commissioning of the plant. The restoration works shall be completed within two years of the closure of the plant. Where the planning authority is of the opinion that the plant has ceased to operate for a period in excess of one year and where the developer can offer no reasonable grounds to dispute this opinion, the planning authority shall be empowered to notify the developer to activate the restoration plan as provided for in this condition. In the event of the developer's failure to activate the restoration works, the planning authority shall be empowered to notify the developer of their intention to activate the restoration plan and of their intention, within a period of 60 days, to call upon financial guarantees referred to under Condition 8 of this permission.

REASON: To ensure a satisfactory restoration of the site in order preserve amenities.

8. Prior to the commencement of development, the development shall lodge with the planning authority a cash deposit/bank bond or other such security as may be acceptable to the planning authority, to secure the satisfactory reinstatement of the site on cessation of the project coupled with an agreement empowering the planning authority to apply such security or part thereof to such reinstatement. The form and amount of security shall be as agreed between the planning authority and developer or, in default of agreement, shall be referred to An Bord Pleanála for determination.

REASON: To ensure the site is restored to a satisfactory condition.

9. The development shall be served by the proposed new wastewater treatment plant which shall connect to the existing polishing filter and which shall be designed, located, constructed and maintained in accordance with the details received with the planning application and shall be in accordance with the requirements of the document "Code of Practice Domestic Waste Water Treatment Systems (p.e<10)",

(Environmental Protection Agency 2021) and EPA Wastewater Treatment Manuals Treatment Systems for Small Communities, Business, Leisure Centres and Hotels (1999). No other system shall be installed.

(b) The polishing filter shall maintain a minimum separation distance of 10 metres from any house, existing or proposed land drain or watercourse.

(c) Immediately following installation of the treatment plant, the developer shall submit to the Planning Authority, a report from a suitably qualified person with professional indemnity insurance certifying that the wastewater treatment plant has been installed and commissioned in accordance with the approved details and is working in a satisfactory manner.

(d) A maintenance contract for the treatment system shall be entered into and paid for in advance and shall be kept in place at all times. Signed and dated copies of the contract shall be made available to the Planning Authority on request.

REASON: In the interest of public health.

10. During construction, no polluting matter shall be allowed to drain from the site and enter any waters on, adjacent to or around the site.

REASON: To safeguard the amenities of the area and prevent water pollution.

11.All liquids, hydrocarbons, chemicals, oils, etc. shall be stored in a dedicated, waterproof bunded area of sufficient volume to hold 110% of the volume of the largest tank within the bund. All valves on the tanks shall be contained within the bunded area. All operations involving the loading and unloading of hydrocarbon products shall take place in a bunded area in such as manner as to safeguard the amenities of the area and prevent water pollution.

REASON: To avoid pollution of waters.

12.Construction work on site shall be carried out in such a manner as to ensure that no odour or dust nuisance occurs beyond the site boundary as a result of the proposed development.

REASON: To safeguard the amenities of the area.

13.All construction waste generated on site shall be disposed of through appropriately licenced collection and disposal contractors.

REASON: To safeguard the amenities of the area.

14.(a)All surface water shall be disposed of within the site in accordance with the plans and particulars set out in the planning applicatin and shall not be discharged onto the road or the adjoining property.

(b) Only clean uncontaminated storm water shall be discharged to the surface water system.

(c)The development shall not impair existing land or road drainage.

REASON: In the interest of proper planning and development.

15.The applicant shall maintain and make available for inspection an environmental complaints register for the construction and operational phases of the development.

REASON: In the interests of proper planning and sustainable development of the area.

16. No parking of construction vehicles or construction staff members vehicles shall be permitted on the public road.

REASON: In the interest of traffic safety.

17.Construction work shall take place between 0800 hours and 1800 hours Monday to Friday and the hours of 0800 and 1400 on Saturday. No works shall take place outside of these hours or on Sundays or Bank Holidays.

REASON: To protect the residential amenities of the area.

18. (a)Demonstration of sightline triangles from vehicular entrance junction onto the public road shall be in accordance to DM standard 28 of the Galway County Development Plan to ensure maximum visibility splays are clear and unobstructed. Proposed Site access Junction visibility splays onto the L-4310 shall be demonstrated and agreed in writing with the planning authority prior to commencement of development.

(b) The agreed sight lines shall be maintained and kept free from vegetation or other obstructions that would reduce the minimum visibility required.

(c) Overhead lines and poles shall be set back in line with the new fence line at the developer's expense before work commences in the development. No pole(s) shall be left in the layby or in the sightlines of the proposed development or any existing development where the poles might obstruct the view of the road of existing road users and/or persons accessing the site.

REASON: In the interest of traffic safety.

19. Prior to commencement of development, the developer shall lodge with the planning authority a €100,000 cash deposit, a bond of an insurance company, or such other security as may be acceptable to the relevant planning authority, to secure the reinstatement of the effected road which may be damaged by the transport of materials to the site (i.e. from the junction of the L-4310 local road and the N65 national secondary road (Gurtymadden Cross) to the site entrance), coupled with an agreement

empowering the relevant planning authority to apply such security or part thereof to the satisfactory reinstatement of the public road.

REASON: In the interest of traffic safety and protection of public infrastructure.

20. Prior to commencement of development, a Transport Management Plan for the construction stage shall be submitted to, and agreed in writing with, the planning authority. The traffic management plan shall incorporate details of the road network to be used by construction traffic, including over-sized loads, and detailed arrangements for the protection of bridges, culverts or other structures to be traversed, as may be required. The plan shall also contain details of how the developer intends to engage with and notify the local community in advance of the delivery of oversized and abnormal loads. Details shall also include autotracking/swept path analysis of such movements and the predelivery and reinstatement works required to facilitate such movements.

REASON: In the interest of traffic safety.

21. Prior to commencement of development, details of the following shall be submitted to, and agreed in writing with, the planning authority:

(i) An up to date (most recent year) condition survey for of the roads and bridges along the haul routes shall be carried out at the developer's expense by a suitably qualified person both before and after construction of the proposed development. This survey shall include a schedule of required works to enable the haul routes to cater for construction-related traffic. The extent and scope of the survey and the schedule of works shall be agreed with the relevant planning authority prior to commencement of development.

(ii)An up-to-date (most recent year) Falling Weight Deflectometer survey and condition survey of bridges along the L-4310 between the junction with the N65 national secondary road (Gurtymadden Cross) and the site entrance. The surveys shall be carried out at the developer's expense by a suitably qualified person in accordance with Transport Infrastructure Ireland standards. Where necessary, these surveys shall include a schedule of required works to enable the haul route to cater for construction related traffic whilst such works shall be agreed in advance with the planning Authority.

(iii)All culverts and structures crossed over by HGV's or potential abnormal weight loads should be highlighted in aforementioned road and structure reports which shall give further structural design details of their structural adequacy to facilitate identified route to subject site.

(iv)Details for the rectification of any construction damage which may arise.

(v)Detailed arrangements for the protection of bridges to be crossed.

(vi)Detailed arrangement for temporary traffic arrangements/controls on roads.

(vii)A phasing programme indicating the timescale within which it is intended to use each public route to facilitate construction of the proposed development.

(viii)Within three months of the cessation of the use of each public road and haul route to transport material to and from the site, a road survey and scheme of works detailing works to repair any damage to these routes shall be submitted to the planning authority.

(ix)All works arising from the aforementioned arrangements shall be completed at the developer's expense within 12 months of the cessation of each road's use as a haul route for the proposed development.

REASON: In the interest of traffic safety.

22 A wheel wash facility incorporating underbody power washing shall be used by all vehicles exiting the site and shall be operational prior to the commencement of any development on the site.

REASON: In the interest of traffic safety.

23. Construction and demolition waste shall be managed in accordance with a construction waste and demolition management plan, which shall be submitted to, and agreed in writing with, the planning authority prior to commencement of development. This plan shall be prepared in accordance with the "Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction and Demolition Projects", published by the Department of the Environment, Heritage and Local Government in 2021.

REASON: In the interest of sustainable waste management.

24. A plan containing details for the management of waste (and, in particular, recyclable materials) within the development, including the provision of facilities for the storage, separation and collection of the waste and, in particular, recyclable materials and for the ongoing operation of these facilities within each house plot shall be submitted to, and agreed in writing with, the planning authority prior to commencement of development. Thereafter, the waste shall be managed in accordance with the agreed plan.

REASON: To provide for the appropriate management of waste and, in particular recyclable

25. The developer shall ensure that all construction operations are carried out in a manner such that air emissions, dust, odour, litter or other waste/debris do not result in significant impairment of, or significant interference with, amenities and environment beyond the site boundary.

REASON: In the interests of proper planning and sustainable development of the area.

26.All necessary measures shall be taken by the applicant to prevent the spillage or deposit of clay, rubble or other debris on adjoining roads during the course of the works. The developer shall be responsible for installing and maintaining to a satisfactory standard a vehicular wheel washing facility on site during the construction phase of the development.

REASON: In the interest of traffic safety.

27. The applicant shall submit details to the planning authority for written agreement to provide and implement a community gain proposal, including any the financial commitments set out therein, which is considered a community gain in accordance with section 37 (G)(7)(d) of the Planning and Development Act 2000, as amended. In default of agreement on any of these commitments, the matter shall be referred to An Bord Pleanála for determination.
Reason: To offset the impacts on the local community in the construction phase and to maximise the long-term benefits of the proposed facilities to local residents.

28. Vibration monitoring shall be carried out with regard to RPS 3648 (thatched cottage) during the construction phase of the development.

REASON: To ensure the protection of the architectural heritage of the area and RPS 3648.

29. (a) Unless otherwise agreed in writing with the Planning Authority prior to the commencement of development, the applicant/developer shall pay €46,424.00 to the Planning Authority, unless a phased payment schedule has been agreed in writing with the Planning Authority. This charge has been calculated using the Development Contributions Scheme adopted by Galway County Council in accordance with the provisions of Section 48 of the Planning and Development Act 2000 (as amended):

The makeup of this sum is detailed in the list below:

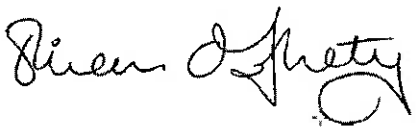
Sub Area 2 Group 1:

€14 x 3316m2 (3721m2 - 405m2) = €46,424.00

REASON: So that the developer shall pay an equitable portion of the cost of the services which facilitates and/or which will facilitate the proposed development.

Patrick O'Sullivan

Signed: Patrick O'Sullivan Executive Planner



Signed: Eimear O'Doherty A/Senior Executive Planner

Signed: Liam Hanrahan Director of Services

26. THE VIEWS OF THE MEMBERS OF GALWAY COUNTY COUNCIL

1. View of Members at September Meeting (25/09/2023)

Members raised the following points and queries:

- The site in question is not a normal brownfield field site. There were tonnes of cyanide left on the site from mining on the site.
- Rehabilitation of the of the overall site must be considered.
- Regarding remediation of the existing site caution is required in terms of what is requested. There is a danger we could unduly burden the project cost wise depending on the type of clean up requested.
- The development if approved would generate significant revenue for the local authority in terms of Rates.
- The impact on the Tynagh community must be positive. There will be little employment from the development so a Community Gain Fund needs to be put in place.
- On the basis of the power output the proposed development could generate a Community Gain Fund of up to €700,000 based on rates paid for a solar farm.
- Can the amount of a Community Gain Fund be quantified in terms of the energy generated?
- While a Community Fund and Rates may be significant, some residents in the community will be alarmed at the proposed development.
- Emissions from the stack in use at the moment have previously exceeded the CO_2 limits. The proposed stack is bigger. Emissions need to be considered.
- 24-hour lighting on the site is currently impacting adjoining landowners. Some farmers are restricted in their use of land.
- The development needs to be supported to ensure stability on the grid.
- From a business perspective the country needs power. This extra power source will also help attract business to the region and create jobs.
- We need power but not at any cost. The public will need reassurance regarding safety. With respect to gas on the site, they need assurance any issues that may arise can be dealt with effectively. It needs to form part of the assessment.

- Regarding a Community Gain Fund who oversees the commitments to the community.

2. View of Members at Loughrea MD Meeting (9/10/2023)

Members raised the following points and queries:

- Cllr. Michael Maher and Cllr. Shane Curley raised concerns with regard to the toxic/contaminated nature of the site and the implications for same once ground had been disturbed during the construction phase of the development.
- Cllr. Shane Curley also raised concerns in relation to heavy metals, water quality in nearby streams and dust monitoring.
- Cllr. Geraldine Donohue raised concerns with regard to water quality and with regard to both the quantity, quality and source of soil proposed to be imported onto the site
- Cllr. J. McClearn raised concerns with regard to dangerous substance, impact on local residences, who is responsible for monitoring.
- Cllr. Ivan Canning raised a number of concerns including water quality, noise pollution and light pollution. The frustrations of local people were also highlighted as who is responsible for the site as it is difficult to find out who is responsible when issues arise. Cllr. Canning also highlighted that livestock have died in the surrounding area.
- Cllr. Joe Byrne raised concerns with regard to the contaminated nature of the site.

3. View of Members at October Plenary Meeting (23/10/2023)

- Cllr. J. McClearn highlighted the historic nature of the site in terms of contamination and highlighted the importance of ensuring the development does not further adversely affect people who live nearby. All concerns of the members should be taken on board.
- Cllr. Ivan Canning also highlighted the history of the site and highlighted that the views of Councillors must be taken on board.
- Cllr. Geraldine Donohue raised concern with regard to both the quantity, quality and source of soil proposed to be imported onto the site.

- Cllr. Shane Curley raised concern with regard to monitoring of the development. The overall monitoring of the development both from a construction and operational perspective is extremely important and robust conditions must be implemented by the Bord.
- Cllr. Dermot Connelly requested that a Community Gain Fund is established.

4. Additional members view submitted.

Cllr. Ivan Canning – Email submitted to planning on the 17/10/2023

To whom it may concern,

Please find below a list of concerns that I have regarding the proposed new development at Tynagh mines.

I hope you take these concerns into consideration when making your decision regarding planning.

Yours sincerely

Cllr Ivan Canning

List of Concerns

1. If local well water is affected either contamination or loss of water as a result of development at the Tynagh mine who will supply the locals with water? Regular water tests should be done to ensure safe drinking water for locals and animals nearby. The Barnacullia river is a tributary for the river Shannon and Lough Derg; if this stream gets more contaminated there will be serious implications for everyone in the area. The EPA in 2003 have already stated that "animals should not be allowed access to the Barnacullia stream as the concentration of lead in sediments from these locations is greater than 1000 mg/kgDW".

When the current Powerstation is being turned on or off large amounts of yellow smoke/fumes come out of the chimney. These yellow fumes contain very large amounts of carbon and carbon dioxide emissions that are extremely harmful to the environment and people's health who live within a 5km radius.There is estimated to be over 900,000 tonnes of carbon emitted from the Tynagh Powerstation every year and when operating it emits 1.2 tonnes on average per minute. This is ridiculous when Ireland are trying to have net zero emissions by 2050.

The Tynagh Mine site is a highly toxic site as outlined by the EPA report in 2003. It contains toxic elements including Arsenic, Lead, Zinc, Copper, Silver, Manganese, Mercury and Cadmium. The report states arsenic levels are actually "1,600 times higher than safely limits and is a potential risk to thousands of people across east Galway". Irish Base Metals the company who owned the Tynagh Mines before it closed admitted to contaminating 2000 acres of land outside the perimeter of their site and stated it was not suitable for farming at that time. It is evident that Acid Mine Drainage is coming from the mine site and tailings pond every year. This discharge can cause contamination to drinking water and disrupt growth and reproduction of plants and animals.

The EPA report also states that "where local residents express concerns in relation to potential exposure to lead in their environment, the Western Health Board should consider the provision of voluntary screening of blood for lead in children and adults...This is the most effective way of establishing whether or not there is any significant impact on human health in the area arising from potential exposure to lead". I can assure you locals were not tested in the area at any stage since the closure of the Tynagh mine in 1982. Contaminants in the form of PM10s and PM2.5s may be in the air and being inhaled by the local people.

2. There is an application submitted to Dept of Agriculture for a felling licence to knock the forest adjacent to Tynagh Mine which is currently acting as a dust barrier for dust and sediment blowing from the dry abandoned mine site on to adjacent land(Tree Felling Licence Number: TFL00867422). These trees cannot be felled. The locals need these trees to dampen the air and noise pollution from the site.

3. A large number of people have become ill due to cancers and other rare diseases inside a 3 mile radius of the Tynagh Mine within 20 years of it closing. Nine people have Motor Neuron Disease, 8 people have developed Multiple Sclerosis and manypeople have different forms of cancer including multiple cases of Leukemia in children, breast cancers and throat cancers. There is also a child in the local area that has developed a very rare disease known as Moyamoya. The dust that travelled from the mine around the neighbouring villages during the operation of the mine and after and disturbance of the soil in recent years,has caused many people to become very sick. Many of the people who worked in the mine have since died of Cancer. Out of the pupils that attended Tynagh National School in the 1960s between 35 and 40 of those people have died before they reached their 60th birthday. These people were

exposed to large quantities of toxic materials when working in the mine and as a result have had their lives cut short.

4. Cattle, sheep and horses have died and gone blind due to lead poisoning while the current Powerstation & Sperrin Galvanisersfactories were being built. Blood test results have shown such findings. When the mine was in operation the locals were not allowed drink the milk from their cows or eat their vegetable produce due to the toxic soil caused by mining. The mine supplied the locals with milk and vegetables as a result. The disturbance of the soil with this development will result in the reoccurrence of lead poisoning again for the local farmers.

5. Noise and vibrations at night from the current Powerstationand the Sperrin galvanisers factory are very substantial. With the addition of another Powerstation the noise will be unbearable. Loud noises cause stress to humans and to animals. Earlier this year there was an issue with the current Powerstation which resulted in an extremely loud gushing noise from the pressure of air being released. The noise could be heard for miles. Stress to dairy cows can increased the SCC (sematic cell count) which means the milk cannot be sent to the creamery above a certain level. Stress can also cause cows and especially brood mares to abort their offspring. Noise, air and water pollution monitoring must be done to control this issue especially at night and on weekends.

The current Powerstation is a closed cycle gas turbine thisproposed development is an open cycle gas turbine; the noise emitted from an open cycle turbine is substantially greater than a closed one. This will bring the noise pollution at the site above a tolerable limit. The lights that shine from the current Powerstation and the Galvanising plant are already very bright. Can anything be done to keep the lighting in the evening to a minimum. Herding of animals is proven to be very difficultwhen blinded by such strong lights. The current Powerstation is also more than 20 years old and is not working as well as it used to. There is fear among the locals that if anything goes wrong it could potentially explode due to being powered by gas.

Cllr. Geraldine Donohue – Email submitted to planning on the 22/10/2023

I wish to have the attached two documents included as part of my submission - observation in relation to the above planning application to An Bord Pleanala.

I am deeply concerned that any ground disturbance necessary for the scale of this development will have an adverse affect on the water quality for the human and animal life in this area and hinterland.

Please confirm the following in relation to the "Imported Top Soil"?

1. Quantity tonnage?
2. What will the "Top Soil" consist of and quantity of each ingredient in same
3. Original location of Top Soil being imported from where?
4. How is it the "Top Soil" expected to be spread?
5. How is the treatment of "Top Soil" when being transported to the proposed site going to be dealt with.
6. Is there a contaminant risk associated with the imported soil?
7. Community Fund - what amount is this anticipated to be and what area will it cover?

Why is this site not being rehabilitated instead of being further developed?

Yours sincerely,
Councillor Geraldine Donohue

The two documents associated with this submission have been attached to the email submitted to An Bord Pleanála on the 23/10/2023. These reports are titled as follow;

- Contaminants in surface water and sediments around the Tynagh Mine, Galway, Ireland (Queens University, Belfast);
- Private water supplies expose thousands to e-coli and cancer risk (Irish Independent, 20/10/2023)

Cllr. Declan Kelly – Email submitted to planning on the 23/10/2023

To whom it concerns,

I wish to object to the proposed Strategic Development Infrastructure project in Tynagh on the basis of the many unknowns in terms of the potentially deleterious impact on the health of local residents & on the local environment.

Mise le meas,

Cllr Declan Kelly

Contaminants in surface water and sediments around the Tynagh Mine, Galway, Ireland.

O'Neill, A., Phillips, D. H., Bowen, J., & Sen Gupta, B. (2015). Contaminants in surface water and sediments around the Tynagh Mine, Galway, Ireland. *Science of the Total Environment, 512-513*, 261-272. https://doi.org/10.1016/j.scitotenv.2015.01.026

Published in:
Science of the Total Environment

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Peer reviewed version

Contaminants in surface water and sediments near the Tynagh silver mine site, County Galway, Ireland

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doi:10.1016/j.scitotenv.2015.01.026

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O'Neill, A., D.H. Phillips, J. Bowen, and B. Sengupta. 2015. Contaminants in surface water and sediments around the Tynagh Mine, Galway, Ireland. Science of the Total Environment. 512-513: 261-272.

Abstract

A former silver mine in Tynagh, Co. Galway, Ireland is one of the most contaminated mine sites in Europe with maximum concentrations of Zn, As, Pb, Mn, Ni, Cu, and Cd far exceeding guideline values for water and sediment. The aims of this research were to 1) further assess the contamination, particularly metals, in surface water and sediment around the site, and 2) determine if the contamination has increased 10 years after the Environmental Protection Agency Ireland (EPAI) identified off-site contamination. Site pH is alkaline to neutral because $CaCO_3$-rich sediment and rock material buffer the exposed acid generating sulphide-rich ore. When this study was compared to the previous EPAI study conducted 10 years earlier, it appeared that further weathering of exposed surface sediment had increased concentrations of As and other potentially toxic elements. Water samples from the tailings ponds and adjacent Barnacullia Stream had concentrations of Al, Cd, Mn, Zn and Pb above guideline values. Lead and Zn concentrations from the tailings pond sediment were 16 and 5 times higher, respectively, than concentrations reported 10 years earlier. Pb and Zn levels in most sediment samples exceeded the Expert Group (EGS) guidelines of 1000 and 5000 mg/kg, respectively. Arsenic concentrations were as high as 6238 mg/kg in the tailings ponds sediment, which is 62 and 862 times greater than the EGS and Canadian Soil Quality Guidelines (CSQG), respectively. Cadmium, Cu, Fe, Mn, Pb and Zn concentrations in water and sediment were above guideline values downstream of the site. Additionally, Fe, Mn and organic matter (OM) were strongly correlated and correlated to Zn, Pb, As, Cd, Cu and Ni in stream sediment. Therefore, the nearby Barnacullia Stream is also a significant pathway for contaminant transport to downstream areas. Further rehabilitation of the site may decrease the contamination around the area.

1. Introduction

A 1960 soil survey, conducted by Irish Base Metals, uncovered a major reservoir of metalliferous minerals within close proximity to Tynagh village, Co. Galway, Ireland (Environmental Protection Agency Ireland, 2009 and Henry, 2011). By 1961, exploration of the area commenced. Three ore bodies were discovered in the area. Following discovery of the ore bodies, open cast mining began in 1965 until 1974, and underground mining occurred via 84 km of portals (Brogan, 2003 and Environmental Protection Agency Ireland, 2009). The secondary ore body was found in a karst sinkhole and mineralization was formed by primary ore weathering. At the Tynagh Mine, all raw materials were processed on-site which included 9.9 million tonnes of economic grade Pb, Zn, Cu and Ag until 1982 when it closed (EPAI, 2009).

After all mining activities ended, initial remediation work was undertaken to stabilise the site, which included backfilling 71 km of underground portals, and contouring tailings piles (EPAI, 2009). The remediation work was considered inadequate by local residents and council members who raised concerns regarding the potential off-site contamination posed by the abandoned mine (EPAI, 2009). The concerns of the local residents and farmers were not addressed until 2002, when the Tynagh Mines Liaison Group set-up a protocol to 'protect human health, animal health and the environment' in the Tynagh Mine Area (TMA) (Brogan, 2003). To determine whether a contamination issue existed and whether this contamination posed a threat to the receptors, the Environmental Protection Agency Ireland (EPAI) conducted a risk assessment into the presence and extent of mine-sourced metals in surface water, soils, sediments, mining waste and tailings at the TMA in 2003 (Brogan, 2003). Generally, all surface water samples analyzed were below the recommended livestock standard for ingestion of that particular contaminant, thus indicating that there is no unacceptable risk on or around the TMA to grazing livestock. Nevertheless, the investigation also identified high levels of potentially toxic elements in water and sediment samples around the site. Concentrations of anions and a number of metals were greater than the Regulations for the Quality of Surface Water Intended for the Abstraction of Drinking Water (SI No. 294/1989). As a result, the EPAI recommended that all access to the Barnacullia Stream should be restricted to livestock (Brogan, 2003). The aims of this research were to 1) further assess the contamination, particularly metals, in surface water and sediment around the former Tynagh silver mine, Co. Galway, Ireland, and 2) determine if the contamination has increased over time 10 years after the EPAI identified off-site contamination.

2. Materials and methods

2.1. Study area

The TMA is a former silver mine in Tynagh, Co. Galway, west Ireland (Fig. 1), which lies 53° 15′ N, 8° 37′ W. The TMA covers a total of area of 115 ha and lies approximately 8.05 km from Lough Rea town and 20.9 km from Ballinasloe town. At present, the site is partially occupied by 1) Tynagh Energy Limited, 2) Priority Drilling Ltd., and 3) Milchem Equisport Centre. The main features of the

present TMA include 1) two tailings ponds containing dredged mine sediment, 2) a flooded open cast mine, and 3) heaped tailing spoils and solid waste containing remnants of past mining activities. The mine is situated in a sprawling countryside, which is primarily used for cattle pasture and mainly inhabited by farming families (EPAI, 2009).

The TMA lies within the River Shannon Catchment Area, which flows from west to east, draining into the Kilcrow River (Environmental Protection Agency Ireland, 2009 and Henry, 2011). Two streams run parallel to and within the northern and southern boundaries of the TMA, the Barnacullia Stream and the Derryfrench Stream, respectively (Fig. 1). Due to close proximity to the open cast mine and waste, water from these streams is deemed not fit for human or animal consumption (Brogan, 2003). Both streams are bordered by dense hedge vegetation and gates to prevent cattle from gaining access to the water.

The west of Ireland experiences a moist temperate maritime climate, which is directly influenced by the South Westerly prevailing winds of the North Atlantic Current. This moist air mass is responsible for cool summers of a maximum temperature of ~ 16 °C and mild winters with a minimum temperature of ~ 6 °C (Met Office, 2013). The region experiences an average annual precipitation total of ~ 1156 mm. The mine is on a higher elevation compared to areas to the north, and on a lower elevation compared to areas to the south.

2.2. Geology

The TMA is underlain predominantly by Lower Carboniferous Waulsortian Limestone and an Old Red Stone deposit, which are intersected by the deep seated North Tynagh Fault. This fault was a critical factor in the formation of mineral deposits during the Carboniferous period. It also aided in the movement of acidic water that was responsible for the decalcified and weathering of several million tonnes of rock throughout the Tertiary (Henry, 2011). There are eight primary ore mineralisations present within the TMA, which include arsenopyrite (FeAsS), barite ($BaSO_4$), bornite (Cu_5FeS_4), chalcopyrite ($CuFeS_2$), galena (PbS), pyrite (FeS_2), sphalerite (ZnS) and tennanite (CuO) (Brogan, 2003 and Environmental Protection Agency Ireland, 2009); therefore, the area is naturally high in sulphides (Brogan, 2003).

2.3. Water and sediment sampling

Following a similar plan to the EPAI (2003), the sampling phase in this study included a 1) Control area (background): The Castletown Stream is outside of the TMA catchment area and samples from it were compared to samples collected in other areas of the study; 2) Mine area: These sampling locations are within the northern boundary of the TMA, and include the tailings ponds, and a ditch at the base of the tailings ponds; and 3) Barnacullia Stream: These sites are along and within the Barnacullia Stream, which flows southwest to northeast and is sourced from within the northern boundary of the TMA. From that point, the stream flows east along the northern boundary of the mine

prior to deflecting north-eastwards and flowing for 0.5 km before converging with the Castletown Stream. The water and sediment samples were collected similarly to the methods used by the EPAI in 2003 for accurate comparisons. Water samples were collected in early October starting from the furthest location downstream, and sequentially sampled with movement upstream. Twenty-six surface water samples were collected in glass bottles. Five of the stream samples were from the same locations as in the previous EPAI study (Brogan, 2003) (Fig. 1). The earlier EPAI study concentrated more on the mine spoil area, while our study concentrated more on the stream water and sediments. These sampling points were also geo-referenced with a Garmin GPSMAP 78 (Garmin (Europe) Ltd, Southhampton, England, UK).

For stream water sampling, the bottles were rinsed downstream three times prior to filling (Brogan, 2003 and Buschmann et al., 2007). Duplicate water samples were collected for cation and anion analysis at each sampling point. To preserve the sample for cation analysis, water samples were acidified to a pH of less than 2 with 1% concentrated HNO_3 (Jung, 2001, Signes et al., 2008 and Romero et al., 2010). All samples were kept in cold storage until analyzed (Jung, 2001).

Twenty-one sediment samples were taken after the corresponding surface water samples were collected. A 10-cm length sediment sample was taken from the bed of the stream or tailings pond with an auger (Jung, 2001 and Camm et al., 2004). When the stream bed was impermeable, either a sediment sample from the adjacent submerged banks or a gravel sample from the bed was taken instead. The sample was sealed in a polyethylene bag and kept in cold storage until air drying. After air drying, the sediment samples were ground to pass through a ≤ 0.45 µm sieve.

2.4. Geochemical analysis

The pH of the stream water was measured in-situ at sampling points in the field (Jung, 2001 and Romero et al., 2010) before water and sediment samples were collected. The pH measurements were taken with a hand held waterproof Hanna HI 991301 pH/EC/TDS, temperature meter (Hanna Instrument Ltd, Bedforshire, England, UK). Both water and sediment samples were analyzed by inductively coupled plasma-optical emission spectroscopy (ICP-OES) with a PerkinElmer Optima 5300 DV (PerkinElmer, Waltham, MA, USA) using argon as the cell gas for total Ag, Al, As, Ba, Ca, Cd, Cr, Cu, Fe, Hg, Mg, Mn, Ni, Pb, S and Zn according to BS 6068–2.60: 1998. Working standards were made from Inorganic Ventures reference standards IV-STOCK-13 with a matrix of 5% HNO_3 (v/v) and IV-ICPMS-71A with a matrix of 3% HNO_3 (v/v) (Inorganic Ventures, Christiansburg, VA, USA). Calibration with reference samples and blanks, and replicate analysis for quality control were carried-out to ensure reliability of analytical data. Recovery obtained and limits of detection (LOD) for the metals analyzed by ICP-OES are in Table S1. The sediment samples underwent microwave digestion in 10 ml of HNO_3 for 15 min, followed by filtering through a 0.45 µm filter prior to ICP-OES analysis. Loss-on-ignition was used to measure OM where samples were heated in a Carbolite RHF 1600 furnace (Carbolite, Derbyshire, England, UK) at 550 °C for 4 h (Heiri et al., 2001).

Anions in the unacidified water and sediment samples were measured by ion chromatography (IC) using a Dionex DX500 system (Thermo Fisher Ireland Ltd, Dublin, Ireland), for fluoride (F^-), chloride (Cl^-), nitrate (NO_3^-), phosphate (PO_4^{3-}) and sulphate (SO_4^{2-}). Working standards used in the analysis of these anions were made from Ultra Scientific IC 1000 mg/L reference standards (Ultra Scientific, VWR Ireland, Dublin). Relative standard deviation and other calibration information regarding QA/QC for the IC analysis are shown in Table S2. Deionized water was added to 1 g of sediment at a ratio of 5:1 water:sediment, then shaken on a Jeio Tech SKC-7075 orbital platform shaker (Jeio Tech Co., Ltd (Europe UK), Oxfordshire, England, UK) for 30 min at 240 rpm. The samples were filtered through filter paper with a particle retention size of 5–13 μm using a vacuum pump (Lim et al., 2008).

2.5. Mineralogical analysis

Hydrogen peroxide (H_2O_2) was used to remove OM from mineral grains for better analysis of sediment by X-ray diffraction (XRD). Each sample was washed free of H_2O_2 with deionized water, air dried, finely ground (0.002 to 0.005 mm) using a mortar and pestle (Osán et al., 2002, Camm et al., 2004 and Di Luca et al., 2011), and placed in a packed mount for XRD analysis. XRD analysis of sediment was performed using a PANalytical X'Pert Pro Materials Research Diffractometer (PANalytical, Cambridge, England, UK) with an angular range (3–80 2θ), step size (0.04 2θ) and intensity range (2 counts/s^{-1}). Additionally, selected soil samples were impregnated with a resin, polished, carbon coated and analyzed with a Jeol 6500 FEG (Jeol (UK) Ltd, Herts, England, UK) scanning electron microscope (SEM) equipped with an Oxford Instruments INCAWave spectrometer for energy dispersive spectroscopy (EDS) and wavelength dispersive spectroscopy (WDS) (Oxford Instruments Plc, Oxford, England, UK).

2.6. Standard guideline values

Data in this study was compared to the same water and sediment standard guideline values that were used in the previous EPAI study 10 years before (Brogan, 2003) (Table 1). The current study also compared water geochemical parameters to the SI No. 272/2009 guideline values which are currently being used in Ireland in regards to the Water Framework Directive. The SI No. 272/2009 guidelines also include values for Pb, Hg, Cd, and Ni which are on the priority substance list (Directive 2008/105/EC environmental quality standards).

3. Results and discussion

3.1. Sediment and surface water contamination in the Tynagh Mine Area (TMA)

Sediment and surface water samples were collected from the flooded tailings ponds and a ditch lying at the base of abandoned tailings piles for geochemical analysis (Fig. 1 and Fig. 2a–d). Although both tailings pond sediment samples had similar anion concentration trends (Fig. 2b), sediment from

sampling point M8, collected closer to the flooded open cast mine, had a SO_4^{2-} concentration ~ 33% greater than sediment from sampling point M7 which was collected further south, possibly due to being closer to the flooded open cast mine. Sulphate concentrations were also above the SI No 294/1989 guideline value for water (Fig. 2a). The elevated SO_4^{2-} concentrations were greater than the guideline value of 200 mg/L for both water samples. Ditch water at the base of the tailings piles (M9 and M10) had high SO_4^{2-} concentrations. Total S^- is higher than SO_4^{2-} in all of the water and sediment samples because it is a combination of SO_4^{2-} and all of the other sulphur forms (Fig. 2, Fig. 3 and Fig. 4). Water collected from sampling point M11 also contained NO_3^- (663 mg/L) which exceeded the SI No 294/1989 guideline value possibly due to contamination from adjacent agricultural fields. Additionally, water from sampling points M8, M9 and M11 had F^- concentrations above the SI No 272/2009 guideline value.

Similar to the pH (8.03) values reported by the EPAI 2003, in-situ pH measurements showed that the tailing ponds were more alkaline than the upper Barnacullia Stream (7.85 to 6.21) (Fig. 2a). The tailings ponds; however, had a much lower Ca content, indicating an influence by the ore minerals and not the limestone host rock. Similarly, Navarro et al. (2008) reported neutral to alkaline environments within an abandoned mining area in SE Spain that were associated with carbonates. Water from sampling points M9 and M10 from the ditch were the only samples in the TMA to have a Ca concentration greater than the WHO drinking water standard value (Fig. 2c). These findings suggested that the ditch water may be fed from another source such as a spring flowing through limestone bedrock sourced from beneath the tailings piles.

Similar to a study by Romero et al. (2010), XRD detected quartz, calcite, dolomite, barite and pyrite. Additionally, SEM analysis identified barite and arsenopyrite in sediment from the mine tailings pond, which confirmed elevated concentrations of As, Ba, Fe and S in sediment. The minerals present within the tailings ponds were expected to be oxidised forms of those present in the ore bodies, due to their exposure to the environment during and after mining activity. In the EPAI (2003) study, As averaged 332 mg/kg within the tailings pond sediment; however, it was below WHO drinking water limits and SI 272/2009 guideline values in the surface water collected from the TMA. A notably higher As sediment concentration was also observed for the tailings ponds, with a maximum of 6238 As mg/kg, which is 62 and 862 times greater than the EGS and CSQG guideline values, respectively (Fig. 2d). Additionally, a sediment sample from the ditch (M9) exceeded the EGS guideline value. This also agrees with Camm et al. (2004) who observed As tailings concentrations exceeding 100 mg/kg at a former mine in south England.

Arsenic, Cd, Cu, Hg, Mn, Ni, Pb and Zn exceeded the CSQG guideline values in sediment samples collected from all of the mine tailings ponds and ditch sampling points. Chromium and Ag CSQS values were also exceeded in sediment collected from sampling points M7 and M8, respectively. Except for Ag and Ba, greater concentrations of As and metals were found in sediment from sampling point M7, compared to sediment from sampling point M8 (Fig. 2d). The EPAI generally observed

lower concentrations of metals in tailings pond sediment than that found in this study. For example, the concentrations of Pb and Zn observed in 2003 were 16 and 5 times less than those observed in 2013, respectively. Even though the sediments from the TMA were high in metals, many of these metals were below LOD by ICP-OES (Table S1) in the surface water from the TMA. Concentrations of Ag, Hg, As in all water samples collected from the TMA and the Castletown Stream control points were below LOD, while concentrations of Pb, Cu, Cr, Cd, were below LOD in water collected from sampling points M10, M11 and from the Castletown Stream. Aluminium was below LOD in water from sampling points M10 and M11, while Ni was below LOD in water from sampling point M11. Nevertheless, it is noteworthy that the SI No 294/1989 and SI No 272/2009 guideline values for Cd, and the SI No 272/2009 guideline value for Hg are lower than the ICP-OES LOD measurements (Table S1), which does not allow comparison with the guideline values for Cd and Hg that were used in this study.

Sediment samples from the tailings ponds and ditch (M7, M8 and M9) also had concentrations of Cd, Ni, Cu, Hg, Pb, Zn and Mn above CSQG guideline values (Fig. 2c) and elevated Ca, Al and Fe concentrations. SEM-EDS and WDS analysis show high concentrations of contaminants, mainly metals, in mine tailing sediments. Lead, As and Zn were as high as 63.2%, 9.4%, and 16.12%, respectively (Fig. 5a,b). Also, coatings containing Pb and to a lesser extent Zn, were observed on silicate minerals from tailing sediment (M8) (Fig. 6) indicating that metals were released and subsequently sorbed onto mineral surfaces at the site. The presence of Zn and Pb, which are associated with sphalerite and galena, respectively, is characteristic of Ag mines (Jung, 2001). However, concentrations Pb and Zn as well as Cd and Cu, in this study were orders of magnitude greater than that observed by Jung (2001). The concentrations of Pb and Zn from the tailings pond sediment reported by the EPAI (2003) were 16 and 5 times less, respectively, than in this study. Most sediment samples from the tailings ponds and ditch at the bottom of the northern tailings pile had As, Pb and Zn concentrations that exceeded the EGS guidelines of 100, 1000 and 5000 mg/kg, respectively (Fig. 2d), while corresponding water samples had Pb and Zn concentrations at or exceeding abstraction guidelines from sampling points M7, M8 and M9. Additionally, the southernmost tailing pond water sample (M8) also had higher concentrations of Zn, Pb and other metals compared to water from sampling point M7. This trend was not reported by the EPAI (2003), suggesting that processes over the past decade, such as weathering, have exposed and mobilised metals. These findings were supported by other studies that report high levels of metals within abandoned mine tailings (Lim et al., 2008, Romero et al., 2010, Qiao et al., 2011 and Zornoza et al., 2011).

3.2. Sediment and surface water contamination in the Barnacullia Stream

Anions measured in surface water samples collected from the Barnacullia Stream and Castletown Stream (control) were below the SI No 294/1989 guidelines (Fig. 3a; Table 1 and Table 2). However,

F^- was above the SI No 272/2009 guideline value in water from sampling point D9. These values are also similar, but less than those reported by the EPAI in 2003 (Brogan, 2003 and Environmental Protection Agency, 2003). The order of abundance of anions in the Barnacullia Stream water was SO_4^{2-} followed by Cl^-, NO_3^-, F^- and PO_4^{3-}, with a similar order of abundance for sediment anions (Fig. 4a).

The pH of the upper Barnacullia Stream water (7.85 to 6.21) (Fig. 3a) was less alkaline than the tailing ponds. Similar to the EPAI 2003 pH (8.03) values, stream water pH decreased within increasing proximity to the TMA perhaps due to weathering of sulphide minerals within the TMA (Navarro et al., 2008). This theory is supported by the increasing SO_4^{2-} content with increasing proximity to the mine. For example, values of SO_4^{2-} between sampling points D5 and D13 were much greater than SO_4^{2-} values downstream, with an average concentration of 146 mg/L, though the guideline value was not exceeded (Fig. 3a). Generally, in the upper Barnacullia Stream most sediment samples had a high total S^- and SO_4^{2-}-concentrations that exceeded the corresponding water sample, with the exception of sediment from sampling points M1 and M4. Water samples from the upper Barnacullia Stream had an average SO_4^{2-}-concentration of 163 mg/L, which is below the guideline value used in this study. Sediment from sample point M5 had a significantly greater SO_4^{2-} content compared to concentrations downstream. Average SO_4^{2-} content recorded during this study was less than that observed by the EPAI, suggesting that the mobilisation of SO_4^{2-} from local ore bodies which contain sulphide bearing minerals, has decreased over the past decade. This difference may have been due to a seasonal variation as the EPAI collected samples in June and the samples for the current study were collected in October. As SO_4^{2-} content of water samples from the Castletown Stream was much lower than that reported by the EPAI for the same location (Brogan, 2003), it can be deduced that the catchment areas outside of the TMA are influenced by the local limestone geology. Anion concentrations clearly decreased at the confluence point, due to dilution by the Castletown Stream (Fig. 3a). Nevertheless, SO_4^{2-} and total S^- concentrations were greater in water sampled downstream of the confluence point. In-situ pH analysis of the water showed that downstream of the Castletown Stream is more alkaline than upstream, as a pH of 7.30 and 6.98 were observed, respectively. The EPAI recorded a pH of 7.70 for the water at a similar location (Brogan, 2003).

Additionally, NO_3^- and PO_4^{2-} concentrations in sediment samples M4 and M5, near the source of the upper Barnacullia Stream, were greater than corresponding water samples. These higher NO_3^- and PO_4^{2-}-concentrations in the sediment samples compared to the corresponding water samples may be due to the leaching of fertilizers from the adjacent fields which adsorbed onto the OM in the stream sediment. The sediment sample collected downstream of the confluence point (D1), contained 60.2 and 4.33 mg/kg of NO_3^- and PO_4^{2-}, respectively, which generally decreased upstream. Sediment from sampling point D8, located upstream of sampling point D1, also had higher than average NO_3^- and PO_4^{2-} contents.

XRD detected quartz, calcite, dolomite, barite, and pyrite in sediment samples collected from the upper Barnacullia Stream, which is characteristic of the Lower Carboniferous Waulsortian Limestone geology underlying the Shannon Catchment Area (Clifford et al., 1986). All sediment samples from the Barnacullia and Castletown Streams had very high Ca concentrations, > 100,000 mg/kg, which agreed with the Ca concentration in stream water samples and is characteristic of a limestone environment (Table 2). Additionally, Ca content in sediments increased downstream, suggesting the limestone bedrock acts as a natural buffer against acidic conditions created by elevated oxidation of sulphide minerals. The water from sampling point M5, at the most western point of the northern boundary of the mine site, had an Al concentration eleven times higher than the SI No. 294/1989 guideline value. Nevertheless, water from sampling points M1 to M4 also had higher Ca contents than in water from sampling point M5, which may buffer Al (Berger et al., 2000 and Andrews et al., 2003). The water samples collected along the Castletown Stream had a mean Ca concentration of 215 mg/L (Table 2). Weddellite was also detected by XRD and has been reported associated with a high OM content (Griffin et al., 1984 and Clifford et al., 1986), such as that observed along the Barnacullia Stream.

Along the upper Barnacullia Stream within the TMA boundary, concentrations of As, Cd, Cu, Mn, Ni, Pb, Hg, and Zn in sediment exceeded guideline values, while concentrations of Ag exceeded the guideline values in sediment from sampling points M4 and M2 in the stream. Concentrations of As, Cd, Cu and Pb in the sediment sample collected at sampling point M2 were all similar or less than that observed at the same location by the EPAI in 2003; 132 vs 332 mg/kg, 36.5 vs 41 mg/kg, 251 vs 255 mg/kg and 1759 vs 2869 mg/kg, respectively. However, the concentration of Zn in the stream sediment, was significantly greater than that observed by the EPAI; 8590 vs 5162 mg/kg, respectively. Similar to the metal concentrations in water collected on the TMA, several metals and As were below LOD in the water samples taken from the upper Barnacullia Stream. Water concentrations of Ag, Hg and As were below LOD at sampling points M1 to M6. Also, water concentrations of Al and Cr were below LOD, except at sampling points M5, and M4 and M5, respectively. Nevertheless, water concentrations of Cd, Ni, Mn and Zn along sampling points M1 to M6 (Fig. 3a, Table 1) exceeded the SI No 294/1989 guideline values, while Ni also exceeded the SI No 272/2009 guideline value. Lead exceeded the SI No 294/1989 guideline value in water from sampling points M1 to M3 and M6 and also exceeded the SI No 272/2009 guideline value at sampling point M4. Water samples (M1 to M4) collected downstream of sampling point M5 had Fe contents greater than SI No 294/1989 guideline value. According to Navarro et al. (2008), Pb, Zn and Cd along this water body may have originated from sulphide minerals. In the Castletown Stream (control), concentrations of most of the metals in water were below the guideline values used in the study (Fig. 3b; Table 1 and Table 2) for sediment; however, concentrations of Cd, Mn, Hg and Zn in sediments exceeded CSQG guideline values. Sediment As, Pb and Cu concentrations exceeded the CSQG guideline values at all sites along the lower Barnacullia Stream, except at sampling point D3. Arsenic, Pb and Zn concentrations exceeded the EGS guideline values in sediment collected at sampling points D11 and D13, while Pb exceeded the EGS guideline value at sampling points D7 and D8. Zinc concentrations also exceeded the EGS

guideline value in sediment from sampling points D5 and D2 along the Barnacullia Stream. Additionally, Ag concentrations were above the CSQG value in sediment from sampling points D13, D11 and D7. Similarly, the 2003 risk assessment conducted by the EPAI observed elevated levels of Cd, Zn, and also a Pb concentration in sediment exceeding the CSQG guideline value of 30.2 mg/kg in the Castletown Stream. The water from the Castletown Stream (Table 2) had an elevated concentration of Fe, which coincided with the sediment concentration of 6755 Fe mg/kg. Comparatively, this Fe value was significantly less than that observed within the TMA and downstream of the mine. The results of both studies suggested that there is a presence of metals, including As, outside of the TMA. A source of metals contamination was not identified. The metal profile was considered representative of the local geochemical background of the area, as reported byNavarro et al. (2008).

High amounts of metals, including As, also occur in groundwater near the site. Henry (2011) reported that Fe, Mn, Zn, Cu, Ba, Ni and As exceeded the Guideline Threshold Values (GTV) for Europe and the Irish Interim Guide Values (IGV) for ground water in a shallow well 2 m from the TMA boundary and in deep (100 m) wells several km east from the TMA. High concentrations of contaminants in groundwater from the deep wells are thought to be due to flooding of the 34 km of underground mine shafts which has released the contaminants from the Tynagh Fault, while the groundwater in a shallow well near the mine boundary is thought to be contaminated by surface runoff from the mine (Henry, 2011).

Generally, there was a trend of decreasing metal content with increasing distance from the mine area (Fig. 3b) which is a common characteristic of a site where contaminant transport is driven by local climate and hydrology (Jung, 2001, Lim et al., 2008, Navarro et al., 2008, Romero et al., 2010, Hajalilou et al., 2011, Chakraborti et al., 2013, Antunes and Albuquerque, 2013 and Silva et al., 2013). Metal distribution is dependent upon the form of the contaminant. It can either enter into solution, resulting in the contamination of a water body, or adsorb and precipitate onto sediment particles, resulting in sediment contamination (Navarro et al., 2008). Sediment collected from sampling points D13 to D11, located directly after the culvert, had peak concentrations of Ag, As, Cd, Cu, Fe, Mn, Pb and Zn (Table 2; Fig. 4b). Additionally, water samples from the lower Barnacullia Stream were higher in metals compared to water samples from the Castletown Stream (control), which suggests transport of contaminants along the stream from the TMA (Fig. 3b). Concentrations of Ag, Ba, and Mg in all water samples were below the respective guideline values (Fig. 3b); however, the SI No 272/2009 guideline value was exceeded for Cr concentrations in water from sampling points D8 to D6. Also, the SI No 294/1989 guideline value was exceeded for Al concentrations in water from sampling points D4 to D3, Pb concentrations in water from sampling points D9 to D8, and Cu concentrations in water from sampling point D11. Iron concentrations were above the SI No 294/1989 value in water from sampling points D13 and D11 to D9. It is noteworthy that Cd, Cu, Fe, Mn, Pb and Zn concentrations in water were higher than guideline values at one or more locations along the stream from sampling points D5 to D13. With exception of Mn, there were negligible concentrations of

the aforementioned metals within the Castletown Stream, which suggests that the metals were a result of contamination.

These high concentrations of metals and As in the sediments were also confirmed by SEM analysis which indicated a substantial presence of As, Fe, Pb and Zn in sediment collected at sampling point D13. Metals, especially Zn, were detected in coatings on calcite fragments (D13) (Fig. 5c). Barite fragments and colloidal-sized particles high in metals (i.e., lead carbonate precipitates) were examined by SEM analysis in fine sediment from the lower Barnacullia Stream (Fig. 5d) collected immediately after the culvert (D13). Although As concentrations in sediments decreased with distance downstream, SEM detected arsenopyrite in sediment from the Barnacullia Stream.

Sediment metal content decreased significantly at the confluence point between the Barnacullia and Castletown Streams (Fig. 3b) from sampling points D4 and D3, due to dilution by the Castletown Stream and also due to the natural attenuation of the metals, as previously observed by Romero et al. (2010). Nevertheless, downstream of the confluence point higher concentrations of the majority of metals were observed in sediment from sampling point D2, compared to sediment from sampling points D4 and D3. For example, Zn content in sediment from sampling point D2 was approximately three times the EPAI EGS guideline values, whereas the sediment collected at sampling points D4 and D3 contained only 3% of that guideline value. Copper was also higher in sediment collected at sampling point D2, compared to sediment from sampling points D4 and D3. This may be due to legacy contamination where contaminated material was washed from the mine site when it was in operation. Water from both confluence point sampling locations had Al concentrations greater than guideline values. These levels of Al in the water did not occur upstream of the Barnacullia Stream, but were observed within the Castletown Stream. Water from the confluence point (D3) and downstream of the convergence (D1) also had Mn concentrations that exceeded the SI No 294/1989 guideline value of 0.05 mg/L. With the exception of Mn, water samples collected from sampling point D1 did not exceed any other guideline value in lower Barnacullia Stream water. Similar Mn concentrations were observed for the Castletown Stream control area and along the lower Barnacullia Stream. The EPAI analysis of the convergence area showed a similar geochemical profile to that observed in the sediment from sampling point D2. Concentrations of As (47.7 mg/kg), Cd (21.5 mg/kg), Cu (40.4 mg/kg), Pb (87.5 mg/kg) and Zn (1404 mg/kg) in stream sediment were found to be greater than CSQS guideline values just downstream of the confluence point. The 2003 EPAI study observed similar concentrations of Cd (19 mg/kg), Cu (42 mg/kg) and Zn (1376 mg/kg), but a lower concentration of As (14 mg/kg), and a higher concentration of Pb (277 mg/kg). This indicated that the supply of metals from the TMA has increased over the past decade. Similar findings have been noted by Romero et al. (2010), who found a historic mine in western Cuba to be a significant source of metals despite being inactive for 15 years.

3.2.1. Correlation between contaminants and Fe, Mn and OM in sediment in the Barnacullia Stream

Iron and Mn showed good correlation, and were both highly correlated with Zn, Pb, As, Cd, Cu and Ni in stream sediment (Table 3); however, Fe was better correlated with these metals and As compared to Mn. Arsenic was retained in areas of high Fe-oxide content due to an affinity for Fe-oxides (Patinha et al., 2004,Sarkar et al., 2005, Qi and Donahoe, 2008 and García-Sánchez et al., 2010). Iron and As also were reported to be strongly correlated in groundwater near the TMA (Henry, 2011). Sediment samples high in OM that were comprised mainly of peat from the submerged stream embankments were notably higher in As and metals due to adsorption onto the OM because of its high surface area (Lin and Chen, 1998 and Weng et al., 2001). Additionally, metals were highly correlated with OM (Table 3). SEM analysis revealed OM (peat) encrusted with Zn, Pb, S, Fe, Ca, Si and Al (Fig. 7), and metals in coatings on carbonate minerals in sediment collected from the submerged stream banks (Fig. 5c). Although some metals sorbed onto OM particles were below detection by SEM, Cr, Cd, As, Mn, Ni, and Cu, along with the Pb and Zn, were highly correlated with OM (Table 3). Generally, As and metal concentrations decreased downstream, suggesting that the source of contamination came from the source of the stream. The Barnacullia Stream is thought to be sourced from a spring originating from beneath the tailings ponds area.Brogan (2003) reported that the tailings pond area within the TMA was not adequately lined potentially providing the source of contaminants to the stream.

4. Conclusions

High concentrations of contaminants were observed in water and sediment samples collected within the TMA. In particular, the tailings pond area had levels of Ag, Al, As, Ca, Cd, Cu, Fe, Mn, Ni, Pb and Zn that exceeded guideline values. Also, metal concentrations have increased over the past decade compared to a 2003 EPAI assessment, suggesting that persistent weathering and erosion has released the metal contaminants from ore minerals. Although the site has high levels of sulphide-rich ore, the site pH is alkaline to neutral because the $CaCO_3$-rich geological material acts as a buffer preventing the production of acid mine water. Concentrations Ag, Al, As, Cd, Fe, Mn, Pb and Zn exceeding guideline values were observed in stream water and sediment along the upper Barnacullia Stream, indicating that this water body is a significant pathway of contaminant transport to downstream areas. Iron, Mn and OM were highly correlated and correlated to Zn, Pb, As, Cd, Cu and Ni in stream sediment. Convergence of the Barnacullia and Castletown Streams diluted anions and metals in stream water to below guideline values; however, metal content of stream sediment remained high downstream of the confluence point. Contamination around the site may be decreased dramatically by further rehabilitation of the site. The samples collected were spot samples and were used to compare the results of an EPAI survey carried-out 10 years prior. A more detailed study examining the hydrology and geochemistry of the streams over an extended period of time would be useful in understanding of the dynamics of the streams in the transportation the contaminants away from the site.

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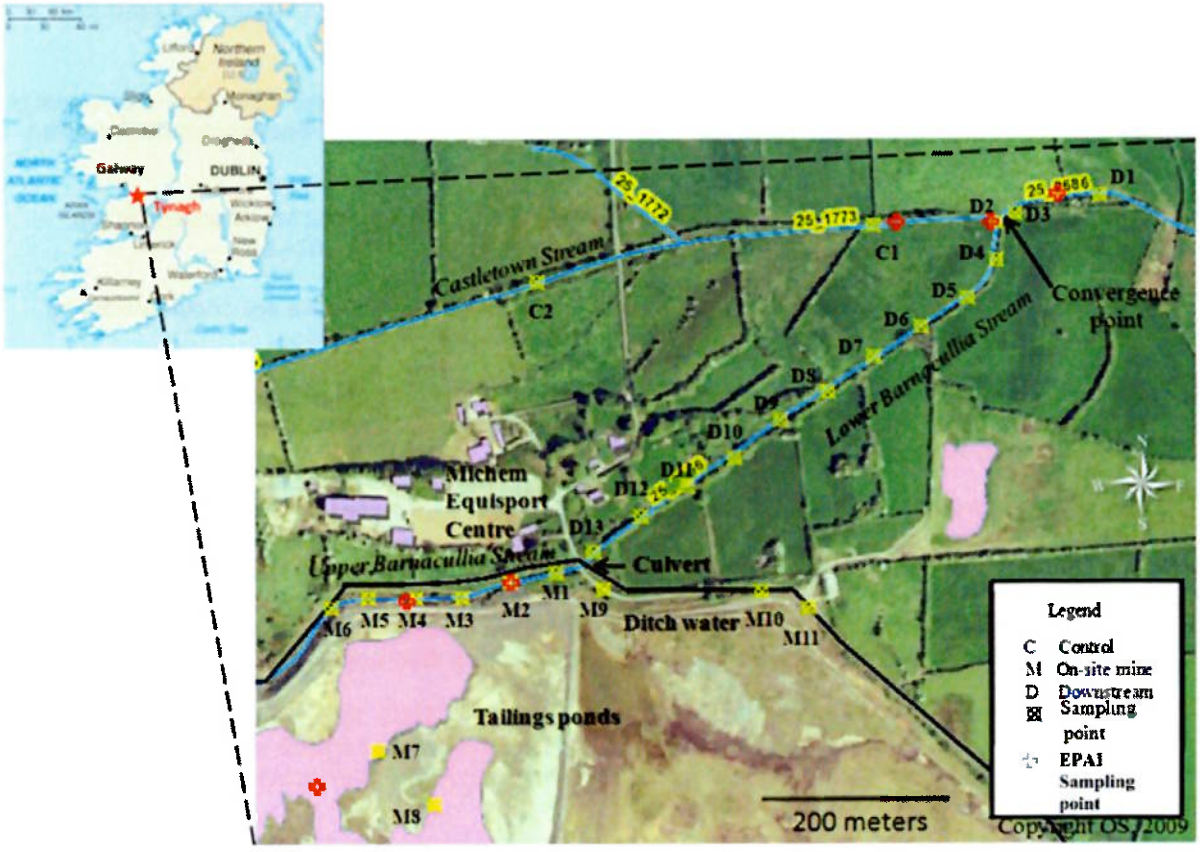


Fig. 1 Location of the sampling points at the study site in Ireland.

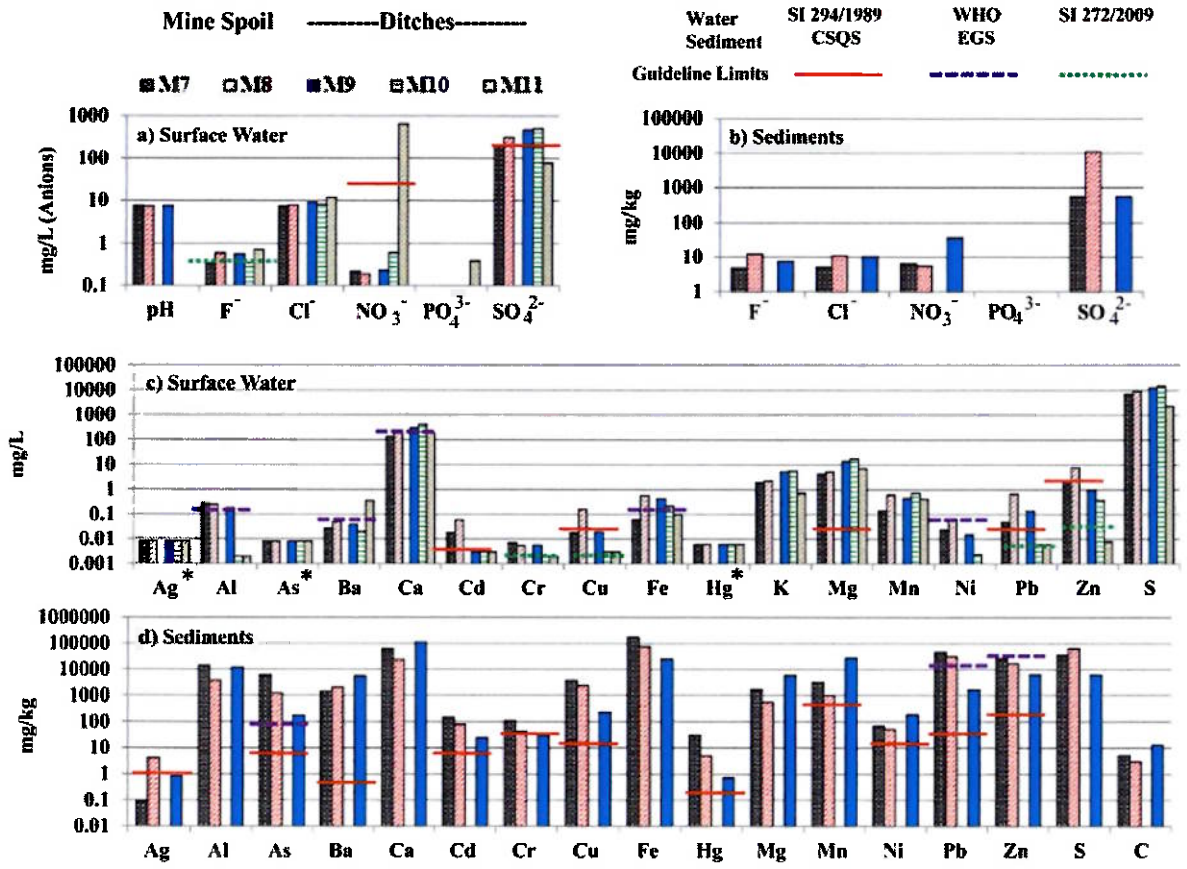


Fig. 2 Comparison of mine spoil and ditch samples showing pH and anions in (a) surface water and (b) sediments, and metals in (c) surface water and (d) sediments. Note: lines across bars indicate limit exceedance. *Below limit of detection.

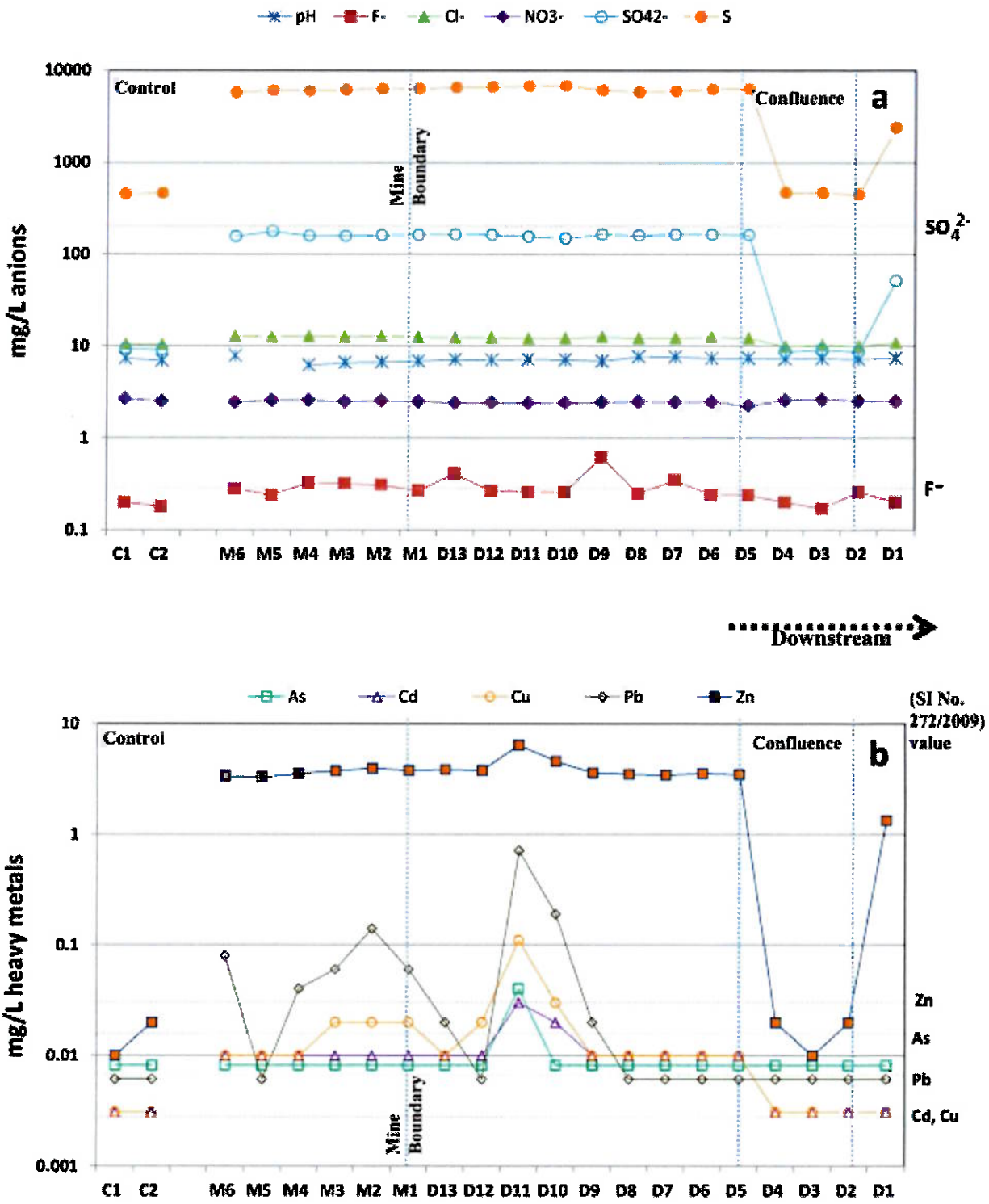


Fig. 3 Surface water a) pH and anions and b) metals from the control (Castletown Stream) and Barnacullia Stream. Note: dotted lines indicate guideline limits.

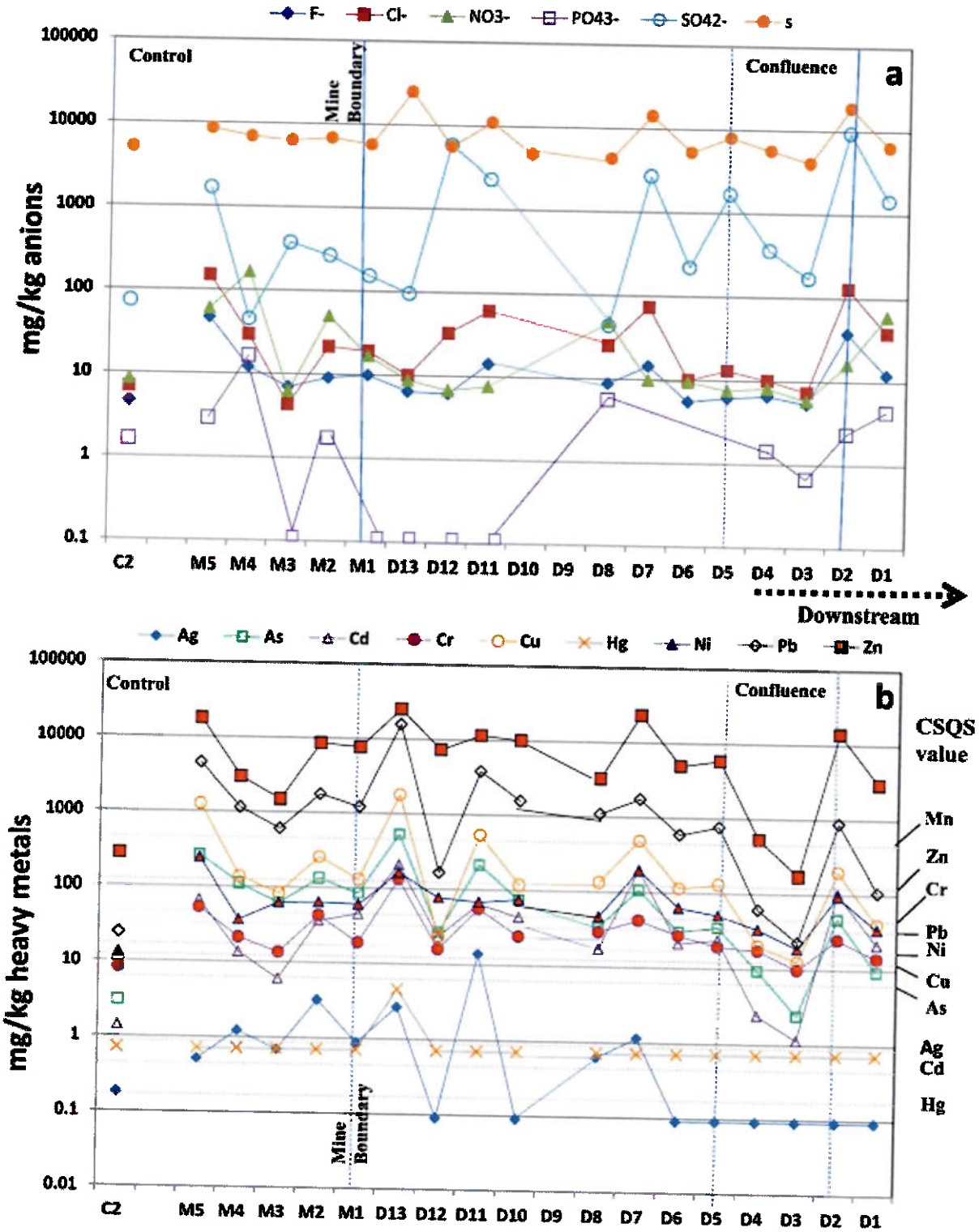


Fig. 4 Sediment a) anions and b) metals from the control (Castletown Stream) and Barnacullia Stream. Note: dotted lines indicate guideline limits.

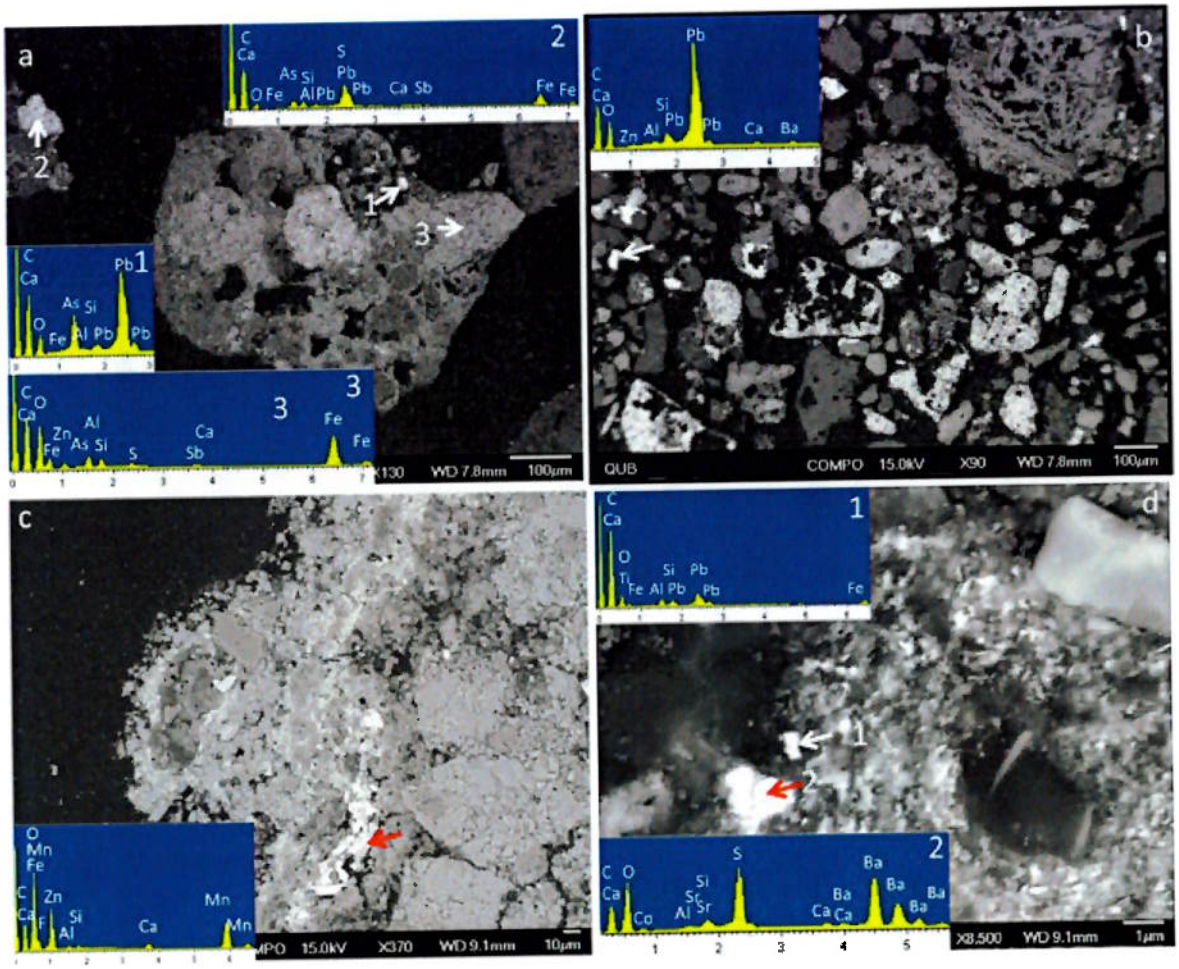


Fig. 5 Photomicrographs of selected samples from TMA mine spoil area sediment showing particles that are high in metals (a, b), and the lower Barnacullia Stream where Zn is associated with Mn-rich coatings on dolomite fragments (c), and fine colloidal-size...

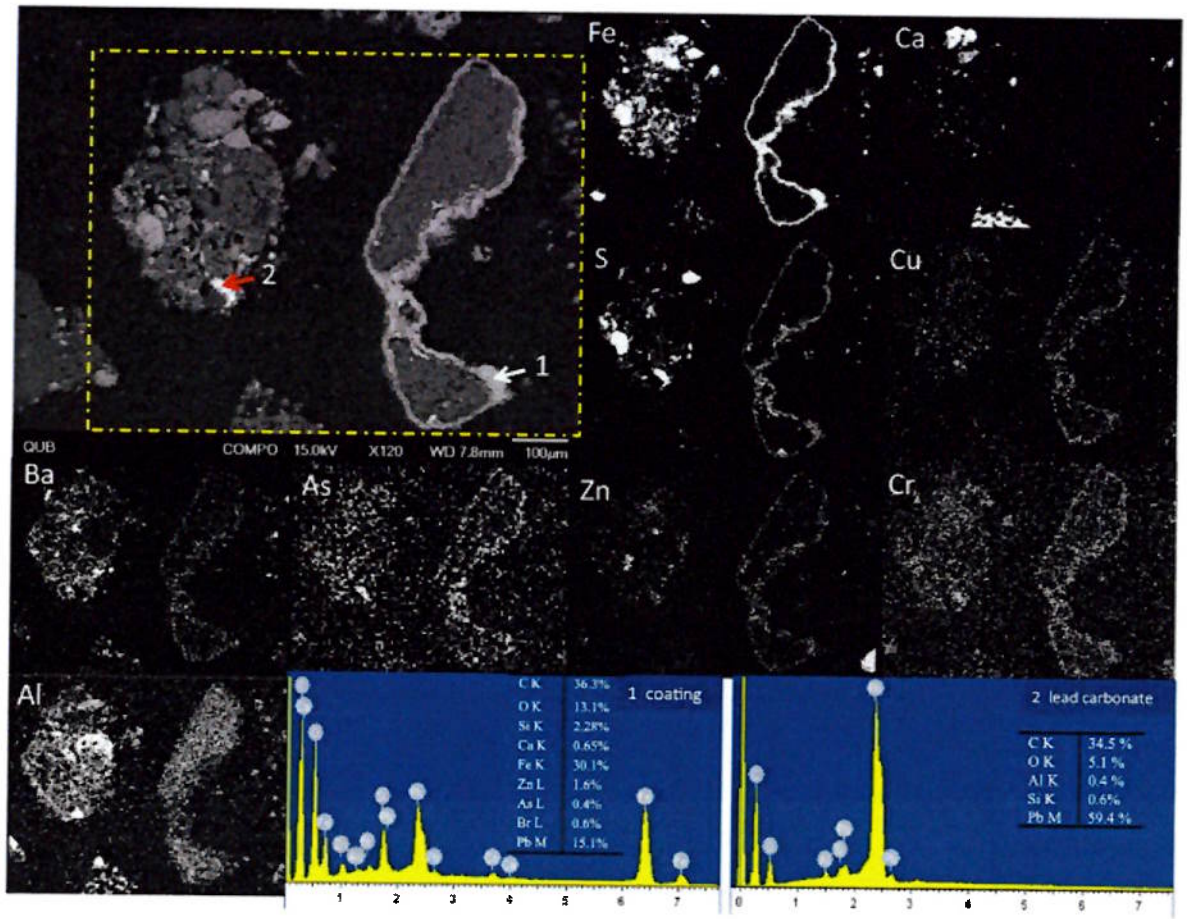
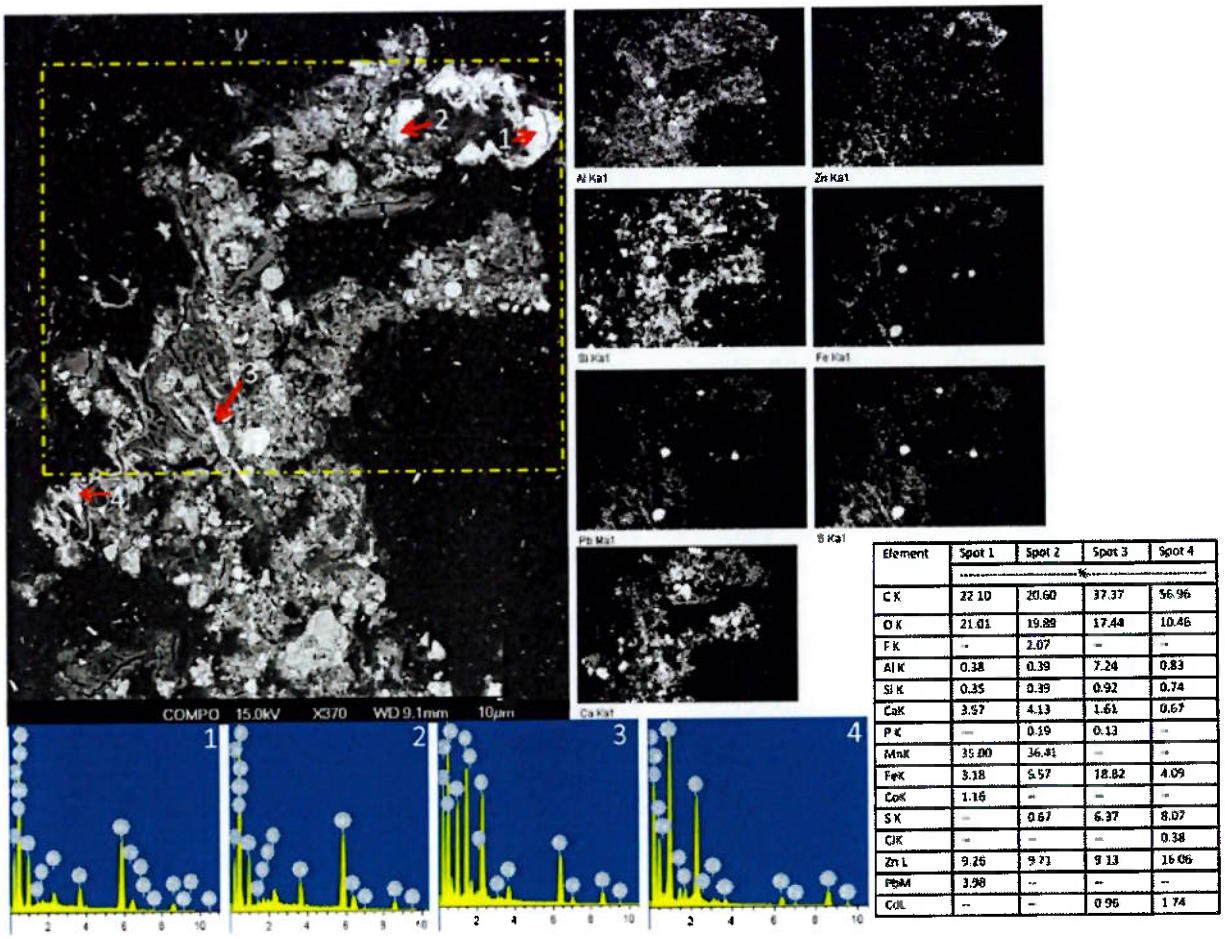


Fig. 6 Photomicrograph, WDS elemental maps and analysis, and SEM-EDS analysis of a silicate mineral and other sediment from the mine spoil area showing a coating (1) rich in metals on a silicate mineral and lead carbonate (2) in other sediment.



Element	Spot 1	Spot 2	Spot 3	Spot 4
	wt%			
C K	22.10	20.60	37.37	56.96
O K	21.01	19.89	17.44	10.46
F K	--	2.07	--	--
Al K	0.38	0.39	7.24	0.83
Si K	0.35	0.39	0.92	0.74
CaK	3.57	4.13	1.61	0.67
P K	--	0.19	0.13	--
MnK	35.00	36.41	--	--
FeK	3.18	5.57	18.82	4.09
CoK	1.16	--	--	--
S K	--	0.67	6.37	8.07
Cl K	--	--	--	0.38
Zn L	9.26	9.71	9.13	16.06
PbM	3.98	--	--	--
Cd L	--	--	0.96	1.74

Fig. 7 Photomicrograph, WDS elemental maps and analysis and SEM-EDS analysis of a fragment of peat encrusted with metals including Zn, Cd, and Pb.

Table 1. Guideline values for metals and anions.

	Water (mg/L)			Sediment (mg/kg)	
	SI No. 294/1989[a]	**WHO Drinking Water Standard**	**SI No. 292/2009[b]**	**CSQS[c]**	**EGS[d]**
pH	5.5-9.0	-	-	-	-
F^-	1	-	0.5	-	-
Cloride	250	-	-	-	-
NO_3^-	50	-	-	-	-
PO_4^{3-}	0.67-0.92	-	-	-	-
SO_4^{2-}	200	-	-	-	-
Ag	-	-	-	1.0	-
Al	-	0.1	-		-
As	0.05	0.01	0.025	7.24	100
Ba	-	0.7	-	-	-
Ca	-	300	-	-	-
Cd[e]	0.005	-	≤0.0002[f]	0.7	-
Cr	0.05	-	0.0034 (CrVI), 0.0047 (CrIII)	52.3	-
Cu	0.05	-	0.005[f]	18.7	-
Fe	-	0.3	-	-	-
Hg[e]	-	-	0.00005	0.2	-
Mg	-	<300	-	-	-
Mn	0.05		-	460	-
Ni[e]	-	0.07	0.02	16	-
Pb[e]	0.05	-	0.0072	30.2	1000
Zn	3.0	-	0.04[f]	120	5000

[a]Statutory Instruments-European Communities Environmental Objectives (Surface Waters) Regulations for the Quality of Surface Water Intended for Abstraction of Drinking Water, 1989
[b]Statutory Instruments-European Communities Environmental Objectives (Surface Waters) Regulations, 2009
[c]Canadian Sediment Quality Guideline value for the Protection of Aquatic Life
[d]EPAI Expert Group for Silvermines Guideline Values for the Protection of Animal Health in Agricultural Soils
[e]Priority Substance in WFD (includes the element and its compounds) (Directive 2008/105/EC environmental quality standards)
[f]AA-EQS for other surface waters under the SI 272/2009

Table 2. Selected metals and organic matter (OM) in surface water and sediment.

ID	Al	Fe	Mn	Ba	Ca	Mg	Al	Fe	Mn	Ba	Ca	Mg	OM
	Surface Water mg/L						Sediment mg/kg						%
Castletown Stream: Control													
C1	0.41	0.23	0.09	0.0327	213	10.1	-	-	-	-	-	-	
C2	0.57	4.8	0.1	0.0316	216.5	10.4	2165	6755	3408	143	267421	9538	2.78
Upper Barnacullia Stream													
M6	0.0021[1]	0.14	0.04	0.0794	185.1	8.79	-	-	-	-	-	-	-
M5	1.07	0.1	0.1	0.0841	183.3	8.86	3816	38486	18656	4575	106173	10491	53.3
M4	0.0021[1]	0.41	0.15	0.0951	206.6	9.66	6097	14124	2715	2187	179811	10554	21.2
M3	0.0021[1]	1	0.18	0.0946	204.7	9.45	4020	10958	1298	1238	234787	16861	7.41
M2	0.0021[1]	0.81	0.24	0.0983	212.2	9.62	2914	20964	4909	2797	215861	13530	23.5
M1	0.0021[1]	0.57	0.18	0.0979	211.4	9.58	2419	19423	6828	410	224666	7036	-
Lower Barnacullia Stream													
D13	0.0021[1]	0.5	0.2	0.1	219	9.75	8150	35035	7377	2167	125559	7246	-
D12	0.0021[1]	0.25	0.16	0.11	222	9.88	4501	17300	21535	446	269098	14943	23
D11	0.04	7.03	1.15	0.14	234	10.2	5076	27946	8729	4579	181085	9996	-
D10	0.0021[1]	2.08	0.43	0.11	229	9.96	2013	20465	11691	517	233871	7994	-
D9	0.07	0.33	0.36	0.11	211	9.4	-	-	-	-	-	-	-
D8	0.0021[1]	0.13	0.13	0.1	229	9.58	7571	13555	2797	1769	169743	6229	10.1
D7	0.0021[1]	0.06	0.12	0.1	231	9.71	5212	25439	8737	2438	118054	6348	42
D6	0.04	0.08	0.14	0.1	235	9.94	7805	12650	3416	1269	216894	12684	9.71
D5	0.0021[1]	0.06	0.12	0.1	231	9.86	4230	10522	2117	1809	224769	12128	11.1
D4	0.11	0.13	0.05	0.03	217	10.1	7153	10496	2355	601	219872	12620	7.92
D3	0.23	0.17	0.07	0.03	213	10.2	3030	7295	1800	108	232667	8134	2.83
D2	0.0021[1]	0.08	0.03	0.05	215	9.81	4191	12842	2410	1354	188910	13125	-
D1	0.0021[1]	0.23	0.14	0.08	221	9.77	5678	9589	2157	356	232919	8076	-
	Guideline value (SI 294/1989) (Surface Abstraction Standard)						CSQS Values						
	0.1[a]	0.3[a]	0.05	0.7[a]	300[a]	<300[a]			460[b]				

SI No. 294/1989 guideline values. [1]Indicates the value was >LOD. [a]In the absence of a guideline value from SI No. 294/1989, a WHO drinking water quality standard was provided (World Health Organization 2004a, 2004b, 2007). [b]Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (Canadian Council of Ministers of the Environment 1999). Values > guideline values are in red.

Table 3. Linear regression (r^2) values between Fe, Mn, OM and metals/heavy metals in the stream sediments.

	Fe	Mn	Zn	Pb	As	Cd	Cu	Ni	Cr
Fe	--	0.8153	0.9245	0.8656	0.8564	0.855	0.8289	0.7186	--
Mn	0.8153	--	0.8163	0.7111	0.6313	0.6827	0.7284	0.6272	--
OM	0.9421	0.8173	0.834	0.7592	0.7775	0.8421	0.7676	0.8793	0.6897

Private water supplies expose thousands to e-coli and cancer risk

Stock image of microbiologist holding an antibiotic sensitivity plate of an E. coli bacteria

Noel Byrne of the EPA

Caroline O'Doherty

Fri 20 Oct 2023 at 06:20

Thousands of people were exposed to e-coli from contaminated rural water schemes last year and thousands more drank from supplies with elevated levels of a chemical linked to cancer.

The problems were detected among 380 private group water schemes and 1,700 small private supplies that provide drinking water to more than 200,000 people.

However, quality issues may be even more widespread because not all private supplies are registered with the local authority and not all those registered were inspected.

Latest inspection data from the Environmental Protection Agency (EPA) found one in 30 private supplies failed drinking water standards, compared with one in 734 of public water supplies.

"It is a local public health concern that private drinking water quality hasn't improved in recent years despite the availability of public funding to support upgrades to water supplies," said Dr Tom Ryan, director of the EPA's office of environmental enforcement.

"In addition, as there is no legal requirement to register private drinking water supplies, it is not possible to quantify the full extent of the risk to public health."

Group water schemes must have quality checks if they serve 50 or more people or provide 10,000 litres of water a day, or if businesses are among the premises they serve.

Noel Byrne of the EPA said water management issues must be addressed

Last year, 14 schemes, supplying more than 5,500 people, failed the standard for e-coli, a bacteria that comes from sewage and animal waste.

It can cause severe gastrointestinal illnesses, and its presence in water usually indicates the supply has not

been adequately disinfected.

The other main problem is high levels of trihalomethanes (THMs), which are chemical compounds that form when vegetation and other organic matter reacts with chlorine added for disinfection.

Group schemes supplying 14,000 people had excessive levels of THMs, probably indicating the supply had not been adequately filtered before disinfection.

THMs have been linked to cancer and other illnesses, and the European Commission is taking legal action against Ireland after repeated failures to deal with the problem.

Small private supplies also had issues with e-coli, with 67 of the 1,623 supplies tested failing to meet required standards.

It is difficult to put a figure on the number of people exposed to the contamination since small private supplies are those that serve commercial and community premises such as hotels, pubs, schools and nursing homes, which do not have a mains supply.

The EPA puts the figure at thousands and says many more are believed to fall into this category, but are not registered and not inspected.

That is despite a review carried out on behalf of the Department of Housing earlier this year that recommended that all private water supplies be legally required to be registered with their local authority.

The review also found uneven access to funding for water quality improvements across the country and urged greater supports to improve management at under-performing private group schemes.

EPA programme manager Noel Byrne said the review's findings must be acted on.

"It is crucial that these issues, relating to registration, funding and management are addressed so that private water supplies meet required standards and public health is protected," Mr Byrne added.

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- **Train delays and roads impassable as Dublin and Wicklow see deluge amid Status Orange rain warning (/weather/train-delays-and-roads-impassable-as-dublin-and-wicklow-see-deluge-amid-status-orange-rain-warning/a2018500524.html)**

- **Olivia McCormack: Killers of the Flower Moon captures the sound of greed as only Martin Scorsese could (/opinion/comment/olivia-mccormack-killers-of-the-flower-moon-captures-the-sound-of-greed-as-only-martin-scorsese-could/a1043375589.html)**

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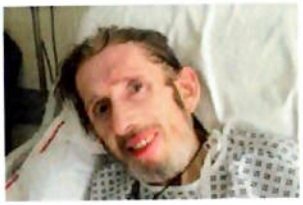

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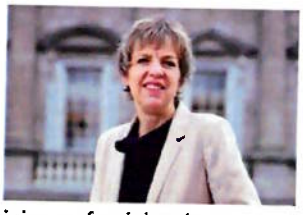

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Former London gangster-turned-author Dave Courtney dies aged 64

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Anthony Joshua teases 'mega-card' of Deontay Wilder bout sharing bill with Tyson Fury v Oleksandr Usyk

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(/sport/other-sports/boxing/anthony-joshua-teases-mega-card-of-deontay-wilder-bout-sharing-bill-with-tyson-fury-v-oleksandr-usyk/a893085959.html)

Rugby World Cup PREMIUM

Tony Ward: We mustn't become obsessed by World Cup at expense of the Six Nations

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