

**Appendices
And Compendium of Mitigation Measures
to
ENVIRONMENTAL IMPACT ASSESSMENT REPORT
for
Overhead Line Diversion
at
Intel, Leixlip Co. Kildare**

prepared for



**by
Environmental Impact Services**



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November 2022



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LIST OF APPENDICES

Appendices to Chapter 1. Introduction

Appendix 1.1 Compendium of Mitigation & Monitoring Measures

Appendices to Chapter 2. Screening & Scoping

Appendix 2.1 Draft Scoping Report

Appendix 2.2 EIAR Compliance Assessment

Appendices to Chapter 3. Alternatives

Appendix 3.1 Multi-criteria Comparison for Identifying the Best Performing Option

Appendices to Chapter 6. Biodiversity

Appendix 6.1 Timber Cutting Requirements Technical Note

Appendix 6.2 Tree Survey Report

Appendix 6.3 Guidelines for Ecological Impact Assessment in the UK and Ireland

Appendix 6.4 Tree Impact/Protection Plan. July 2022

Appendix 6.5 Protected Sites for Nature Conservation in the Vicinity of the Proposed Development

Appendix 6.6 Johnston (2022). Hydrogeology of the tufa habitats in the Rye Water, Co. Kildare

Appendix 6.7 Denyer Ecology (2022) Intel Petrifying Spring Survey. March 2022.

Appendices to Chapter 7. Land, Soils, Geology & Hydrogeology

Appendix 7.1 Impact Rating and Assessment Criteria

Appendices to Chapter 8. Water & Hydrology

Appendix 8.1 Impact Rating and Assessment Criteria

Appendices to Chapter 9. Air Quality & Climate

Appendix 9.1 Dust Management Plan

Appendices to Chapter 10. Noise & Vibration

Appendix 10.1 Acoustic Terminology

Appendices to Chapter 11. Landscape & Visual Impact

Appendix 11.1 Detailed Methodology

Appendix 11.2 Photomontages

Appendix to Chapter 13. Waste Management

Appendix 13.1 Resource & Waste Management Plan

Appendix to Chapter 15. Archaeology

Appendix 15.1 Statutory Context

Appendix 15.2 Photographic Record of OHL Diversion Route



APPENDICES TO SECTION 1

INTRODUCTION

APPENDIX 1.1

COMPENDIUM OF MITIGATION & MONITORING MEASURES

(Measures to avoid, ameliorate or monitor potential impacts predicted in this EIAR)

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INTRODUCTION

For ease of comprehension – during the Environmental Impact Assessment process by Consent Authorities and during implementation of the measures by the applicant and contractors – it is useful to have an overview of all of the measures that are proposed within the EIAR to mitigate adverse effects.

The Mitigation Measures proposed in an EIAR constitute important and enforceable undertakings about the details of how a project is developed and managed.

The *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (EPA, 2022) state:

'There are four established strategies for the mitigation of effects - avoidance, prevention, reduction and offsetting. The efficacy of each is related to the stage in the design process at which environmental considerations are taken into account. Effects avoidance is most applicable at the earliest stages, while prevention may be provided up to a much later stage. Mitigation of last resort, such as remedy or offsetting, may be the only option available for largely designed projects or for projects that cannot avoid significant effects due to their need to locate on a particular site.'

This proposed development has been subject to an iterative EIA process throughout the design stages. This process has led to an emphasis on mitigation by *avoidance* and *prevention* and where it was not possible to avoid or prevent them, effects have been addressed by *reduction*. This has been done through consideration of environmental aspects during site selection, site configuration, selection of technologies and during specifications of design and construction details and methodologies. This approach has resulted in numerous wide-ranging measures to *avoid*, *prevent* and *reduce* environmental effects being integrated into the design of the proposal including the construction plans. These measures are contained in the full set of planning application documents including the drawings and other design specifications including the Surface Water Drainage Report, the Landscape Plan and the outline Construction Environmental management Plan. The assessment of impacts in each specialist chapter of this EIAR takes these design features as being parts of the 'proposed development'. In many of the specialist sections the most significant of these features to the individual topic are described or referred to under the heading of *The Proposed Development* and/or under the heading of *Mitigation Measures*.

Where significant potential impacts are predicted in the assessment of impacts on any environmental factor, further measures are generally proposed to avoid, ameliorate or monitor these impacts. It is these further measures, which have not been incorporated into the design, that are compiled into this compendium of mitigation and monitoring measures.

Many of these measures cannot be precisely specified at this stage of documentation – such as matters arising from the method statements of contractors or the specification of proprietary items to be purchased by competitive tendering. The required specification standard of mitigation for such measures is contained in this compendium to facilitate the preparation of enforceable conditions by the consenting authority as well as to facilitate implementation by Intel and their agents.

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MEASURES FROM EIAR SECTION 6 *BIODIVERSITY*

CONSTRUCTION PHASE

- **Control of Soil Excavation**

Site preparation, clearance, levelling, construction of foundations, and access roads will require the excavation c. 2,060m³ of soil. All topsoil excavated in the construction of tower foundations will be reinstated where possible, on completion of the proposed works. Where practical and appropriate, excavated subsoil will be used for associated construction and landscaping purposes.

According to onsite investigations, the bedrock vulnerability varies from 'Low' to 'Extreme' (T6) along the projected line throughout the site. Removal and reinstatement of subsoil cover will not alter the vulnerability category of the underlying bedrock. The deposition of compacted soil would increase the overburden thickness and thus may even decrease the groundwater vulnerability.

Temporary storage of soil will be carefully managed in such a way as to prevent any potential negative impact on the receiving environment and the material will be stored away from any open surface water drains. Movement of material will be minimised in order to reduce degradation of soil structure and generation of dust. The tower foundations will be backfilled one leg at a time with the excavated material. The backfill is placed and compacted in layers. When the base construction crew leave the site, they will ensure the removal of all surplus materials from the site, including all unused excavated fill.

Measures to minimise the suspension and mobilisation of sediment downstream of the working area should consider silt barriers and coffer damming to create dry working areas.

To avoid excessive silt runoff, site clearance is not to be undertaken during wet conditions, when rainfall of more than 0.5 mm/hour is forecast within the next 24 hours or rainfall of more than 3mm/hour is forecast within the next five days in the Leixlip area. At the riverbank works locations, silt fencing will be installed along the river bank to retain eroded sediments. Catch nets may be used where relevant.

Soil cleared from the site and all materials associated with the building process are to be stored outside the flood zone in designated storage areas. The flood zone will be delineated on the works areas. No soil storing will be allowed within 30 m of the open water, which is in line with the Inland Fisheries Ireland guidelines

Although there is no evidence of historical contamination in the Proposed Development site, all excavated materials will be visually assessed for signs of possible contamination such as staining or strong odours. Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of possible contaminants in order to ensure that historical pollution of the soil has not occurred. Should it be determined that any of the soil excavated is contaminated, this will be disposed of by a licensed waste disposal contractor.

Stockpiles have the potential to cause negative impacts on air and water quality. The effects of soil stripping and stockpiling will be mitigated against through the implementation of appropriate earthworks handling protocol during construction. It is anticipated that any stockpiles will be formed within the boundary of the site and there will be no direct link or pathway from this area to any surface water body. Overburden material will be protected from exposure to wind by storing the material in sheltered parts of the site, where possible.

Dust suppression measures (e.g., damping down during dry periods), vehicle wheel washes, road sweeping, and general housekeeping will ensure that the surrounding environment are free of nuisance dust and dirt on roads.

- **Fuel and Chemical Handling**

The construction material storage yard is proposed to be located in the existing southern car parks within Intel's compound, between towers T1-T2 and T2-T3.

Wash-out of concrete trucks will not occur at the proposed development site, instead wash-out will be undertaken at the supplier washout facility. The location for the washout facilities is in Kilsaran, Adamstown, Lucan, Dublin and Roadstone which is located at Roadstone retail belgard, Tallaght, Dublin.

All chemicals and fuels will be stored properly in identified areas within the construction compound. No batching of wet-cement products will occur on site. Ready-mixed concrete will be delivered to the excavation site. Wash-down of concrete contaminated equipment will not take place within the site.

To minimise any impact on the underlying subsurface strata from material spillages, all oils, solvents and paints used during construction will be stored within temporary bunded areas. Oil and fuel storage tanks shall be stored in designated areas, and these areas shall be bunded to a volume of 110% of the capacity of the largest tank/container within the bunded area(s) (plus an allowance of 30 mm for rainwater ingress). Drainage from the bunded area(s) shall be diverted for collection and safe disposal.

Refuelling areas are to be identified in the CEMP prepared by the construction contractor. In the event of a machine requiring refuelling outside of this area, fuel will be transported in a mobile double skinned tank. An adequate supply of spill kits and hydrocarbon adsorbent packs will be stored in this area. All relevant personnel will be fully trained in the use of this equipment. Guidelines such as "Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors" (CIRIA 532, 2001) will be complied with.

In the case of drummed fuel or other chemicals which may be used during construction, containers should be stored in a dedicated internally bunded chemical storage cabinet and labelled clearly to allow appropriate remedial action in the event of a spillage.

Emergency response procedures will be outlined in the detailed CEMP. All personnel working on the site will be suitably trained in the implementation of the procedures.

All vehicles should be regularly checked for oil leaks, and ruptured hose pipes.

- **Control of Water during Construction**

Care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. All exposed soil surfaces will be within the work areas which limits the potential for any offsite impacts.

Any minor ingress of groundwater and collected rainfall in the excavation will be pumped out during construction.

There shall not be discharge of silty water from the works to any watercourse, should any discharge of construction water be required during the construction phase, discharge will be to foul sewer following agreement with Kildare CC/ Irish Water.

There will be no discharge of effluent to groundwater during the construction phase. All wastewater from the construction facilities will be stored for removal off site for disposal and treatment.

All works in the SAC or adjacent to it will comply with current best practice, notable the Inland Fisheries Ireland Guidelines on protection of fisheries during construction works in and adjacent to waters (IFI, 2016) and Transport Infrastructure Ireland's Guidelines for the crossing of watercourses during the construction of national road schemes (TII, 2008).

The contractor shall be obliged to ensure no deleterious discharges are released from the sites to the River Rye Water during excavation, de-watering, or erecting activities. Throughout the period of works the contractor shall also take account of relevant legislation and best practice guidance including but not limited to the following:

- C532 Control of water pollution from construction sites: guidance for consultants and contractors;
- C648 Control of water pollution from linear construction projects;
- SP156 Control of water pollution from construction sites – guide to good practice;
- NRA's 'Guidelines for the Crossing of Watercourses during Construction of National Road Schemes (NRA, 2005);
- The Eastern Regional Fisheries Board guidance document 'Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites' (Murphy, 2004); and
- The Southern Regional Fisheries Board guidance document 'Maintenance and protection of the inland fisheries resource during road construction and improvement works' (Kilfeather, 2007).

In order to minimise the risk of contamination, any stockpiled material designated for removal will be removed off-site as soon as possible. Surface water drain gratings in areas near or close to where stockpiles are located will be covered by appropriate durable polyurethane covers or similar. Active treatment systems such as siltbusters or similar may be adopted, depending on turbidity levels and discharge limits.

In addition to the above measures, the following controls will be used to avoid release of cement leachate from the site:

- No batching of wet-cement products will occur on site;
- Ready-mixed concrete will be delivered to the excavation site. Where possible, emplacement of pre-cast elements, will take place. Where possible pre-cast elements will be used;
- Shuttering and formwork shall be checked for gaps by the ECoW in advance of pouring. Where necessary, polyurethane foam may be used to seal shuttering joints to prevent concrete leaking.
- Wash-down of concrete contaminated equipment will not take place within the site.
- Concrete trucks will be brought as close as possible to the excavation to pour directly into the excavation. If this is not possible, concrete will be transported in dumpers fitted with concrete chutes;
- No washing out of any plant used in concrete transport or concreting operations will be allowed on-site;
- No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed;
- Weather forecasting will be used to plan dry days for pouring concrete;
- Ensure pour site is free of standing water and plastic covers will be ready in case of sudden rainfall event;
- The small volume of water that will be generated from washing of the concrete lorry's chute will be directed into a concrete washout area.

• **Measures to protect habitats during construction**

Measures outlined within Section 6.5.1.1 of the EIAR are sufficient to reduce the potential effects of surface and ground water quality impacts on habitats downstream and adjacent to the proposed development site to levels that are not significant at any geographic scale.

Any vegetation (including trees or woodlands) adjacent to, or within, the proposed development which is to be retained will be afforded adequate protection during the construction phase in accordance with the Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub Prior to, During and Post Construction of National Road Schemes (National Roads Authority, 2006b), as follows:

28 NOV 2022

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All trees within and adjacent to the proposed development site that are to be retained, will be fenced off at the outset of works and for the duration of construction to avoid structural damage to the trunk, branches or root systems of the trees as per the requirements of the British Standard Institution (BSI) British Standard (BS) 5837:2012 Trees in relation to in relation to design, demolition and construction – Recommendation . Temporary fencing will be erected at a sufficient distance from the tree so as to enclose the Root Protection Area (RPA) of the tree. The RPA will be defined based upon the recommendation of a qualified arborist;

Where fencing is not feasible due to insufficient space, protection for the tree/hedgerow will be afforded by wrapping hessian sacking (or suitable equivalent) around the trunk of the tree and strapping stout buffer timbers around it

The area within the RPA will not be used for vehicle parking or the storage of materials (including soils, oils and chemicals). The storage of hazardous materials (e.g. hydrocarbons) or concrete washout areas will not be undertaken within 10 m of any retained trees, hedgerows and treelines

A qualified arborist will assess the condition of, and advise on any repair works necessary to, any trees which are to be retained or that lie outside of the Proposed Development boundary but whose RPA is impacted by the works. Any remedial works required will be carried out by a qualified arborist

A buffer zone of at least 5m will be maintained between construction works and retained hedgerows to ensure that the root protection areas are not damaged

- **Measures to protect breeding birds during construction**

Vegetation (e.g. hedgerows, trees, scrub and grassland) will not be removed, between the 1st of March and the 31st of August, to avoid direct impacts on nesting birds. Where the construction programme does not allow this seasonal restriction to be observed, then these areas will be inspected by a suitably qualified ecologist for the presence of breeding birds prior to clearance. Areas found not to contain nests will be cleared within three days of the nest survey. Where the vegetation is not cleared within three days of checks, a repeat check will be required. Should nesting birds be encountered during surveys, the removal of vegetation will be required to be delayed until after the nesting has finished.

Measures outlined within Section 6.5.1.1 of the EIAR are sufficient to reduce the potential effects of water quality impacts on downstream breeding and wintering bird species, particularly species such as the kingfisher that depend on the aquatic environment for food to levels that are not significant at any geographic scale.

- **Measures to protect badger during construction**

As the usage of the proposed development site by badgers can change over time, a confirmatory pre-construction check of the proposed development site, especially the proposed tower locations for new burrow entrances will be carried out immediately prior to construction works commencing to confirm their usage by badger.

The existing badger setts as well as any new badger setts identified during the survey outlined above will be afforded protection in line with the requirements set out in the NRA (2005) guidance document as follows:

- Badger setts if encountered will be clearly marked and the extent of bounds prohibited for vehicles clearly marked by fencing and signage
- In the season June to November, no heavy machinery will be used within 30m of badger setts; lighter machinery (generally wheeled vehicles) will not be used within 20m of a sett entrance; light work, such as digging by hand or scrub clearance will not take place within 10m of sett entrances

- During the breeding season (December to June inclusive), none of the above works will be undertaken within 50m of active setts, nor blasting or pile driving within 150m of active setts
- Works can be undertaken within these zones following consultation with, the approval of and, if required, under the supervision of an ecologist with experience of badger mitigation.
- **Measures to protect otter during construction**
Measures outlined within Section 6.5.1.1 of the EIAR are sufficient to reduce the potential effects of water quality impacts on aquatic fauna including otter to levels that are not significant at any geographic scale.
- **Measures to protect molluscs during construction**
Measures outlined within Section 6.5.1.1 of the EIAR are sufficient to reduce the potential effects of surface and ground water quality impacts on local fauna including *Vertigo moulinsiana* and *Vertigo angustior* to levels that are not significant at any geographic scale.
- **Measures to protect crayfish during construction**
Measures outlined within Section 6.5.1.1 of the EIAR are sufficient to reduce the potential effects of water quality impacts on aquatic fauna including white-clawed crayfish to levels that are not significant at any geographic scale.

MONITORING

A Project Ecologist employed in an Ecological Clerk of Works (ECOW) role will be appointed to record completion of measures outlined in this report. Post-construction monitoring is proposed to gather information and assess whether the flora and fauna across the proposed route has responded favourably to mitigation, compensation and enhancement measures outlined in Section 6.5 of the EIAR.

Post-construction monitoring will be undertaken for the items listed below. A programme has been suggested for each item, although the programme will need to be agreed between the appointed Project Ecologist and the local authority. This is because several variables can influence programme, such as the completion date of the proposed development, whether the proposal is completed as a single entity or as several separate projects, or if the proposal is amended in the future:

- The effectiveness of the bird deflectors as outlined in Section 6.5.2.3 of the EIAR will be monitored by a suitably qualified and experienced ecologist. Surveys for flight activity and bird remains will be conducted along the length of the proposed development between T1 and T7 at years 1, 2, 3, 4 and 5 post-completion. The target and monitoring reporting will be agreed in advance with the local authority.

MEASURES FROM EIAR SECTION 7 LAND, SOILS, GEOLOGY & HYDROGEOLOGY

CONSTRUCTION PHASE

- **Control of Soil Excavation**

Site preparation, clearance, levelling, construction of foundations, and access roads will require the excavation c. 2,060m³ of soil. All topsoil excavated in the construction of tower foundations will be reinstated where possible, on completion of the proposed works. Where practical and appropriate, excavated subsoil will be used for associated construction and landscaping purposes.

According to onsite investigations, the bedrock vulnerability varies from 'Low' to 'Extreme' (T6) along the projected line throughout the site. Removal and reinstatement of subsoil cover will not alter the vulnerability category of the underlying bedrock. The deposition of compacted soil would increase the overburden thickness and thus may even decrease the groundwater vulnerability.

28 NOV 2022

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Temporary storage of soil will be carefully managed in such a way as to prevent any potential negative impact on the receiving environment and the material will be stored away from any open surface water drains. Movement of material will be minimised in order to reduce degradation of soil structure and generation of dust. The tower foundations will be backfilled one leg at a time with the excavated material. The backfill is placed and compacted in layers. When the base construction crew leave the site, they will ensure the removal of all surplus materials from the site, including all unused excavated fill.

Measures to minimise the suspension and mobilisation of sediment downstream of the working area should consider silt barriers and coffer damming to create dry working areas.

To avoid excessive silt runoff, site clearance is not to be undertaken during wet conditions, when rainfall of more than 0.5 mm/hour is forecast within the next 24 hours or rainfall of more than 3mm/hour is forecast within the next five days in the Leixlip area. At the riverbank works locations, silt fencing will be installed along the river bank to retain eroded sediments. Catch nets will be used where relevant.

Soil cleared from the site and all materials associated with the building process are to be stored outside the flood zone in designated storage areas. The flood zone will be delineated on the works areas. No soil storing will be allowed within 30 m of the open water, which is in line with the Inland Fisheries Ireland guidelines

- Although there is no evidence of historical contamination in the Proposed Development area, all excavated materials will be visually assessed for signs of possible contamination such as staining or strong odours. Site investigations classified the subsoils as mostly 'inert' as presented in Section 7.3.14 of the EIA. Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of possible contaminants in order to ensure that historical pollution of the soil has not occurred. Should it be determined that any of the soil excavated is contaminated, this will be disposed of by a licensed waste disposal contractor.

Stockpiles have the potential to cause negative impacts on air and water quality. The effects of soil stripping and stockpiling will be mitigated against through the implementation of appropriate earthworks handling protocol during construction. It is anticipated that any stockpiles will be formed within the boundary of the site and there will be no direct link or pathway from this area to any surface water body. Overburden material will be protected from exposure to wind by storing the material in sheltered parts of the site, where possible.

- Dust suppression measures (e.g., damping down during dry periods), vehicle wheel washes, road sweeping, and general housekeeping will ensure that the surrounding environment are free of nuisance dust and dirt on roads.
- **Fuel and Chemical Handling**
The construction material storage yard is proposed to be located in the existing southern car parks within Intel's compound, between towers T1-T2 and T2-T3.

Wash-out of concrete trucks will not occur at the proposed development site, instead wash-out will be undertaken at the supplier washout facility. The location for the washout facilities is in Kilsaran, Adamstown, Lucan, Dublin and Roadstone which is located at Roadstone retail belgard, Tallaght, Dublin.

All chemicals and fuels will be stored properly in identified areas within the construction compound. No batching of wet-cement products will occur on site. Ready-mixed concrete will be delivered to the excavation site. Wash-down of concrete contaminated equipment will not take place within the site.

To minimise any impact on the underlying subsurface strata from material spillages, all oils, solvents and paints used during construction will be stored within temporary bunded areas. Oil

and fuel storage tanks shall be stored in designated areas, and these areas shall be bunded to a volume of 110% of the capacity of the largest tank/container within the bunded area(s) (plus an allowance of 30 mm for rainwater ingress). Drainage from the bunded area(s) shall be diverted for collection and safe disposal.

Refuelling areas are to be identified in the CEMP prepared by the construction contractor. In the event of a machine requiring refuelling outside of this area, fuel will be transported in a mobile double skinned tank. An adequate supply of spill kits and hydrocarbon adsorbent packs will be stored in this area. All relevant personnel will be fully trained in the use of this equipment. Guidelines such as "Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors" (CIRIA 532, 2001) will be complied with.

In the case of drummed fuel or other chemicals which may be used during construction, containers should be stored in a dedicated internally bunded chemical storage cabinet and labelled clearly to allow appropriate remedial action in the event of a spillage.

Emergency response procedures will be outlined in the detailed CEMP. All personnel working on the site will be suitably trained in the implementation of the procedures.

All vehicles should be regularly checked for oil leaks, and ruptured hose pipes.

These measures are complementary to the control environmental measures described in Section 7.2.3 of the EIA.

- **Control of Water during Construction**

Care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. All exposed soil surfaces will be within the work areas which limits the potential for any offsite impacts.

Any minor ingress of groundwater and collected rainfall in the excavation will be pumped out during construction.

There shall not be discharge of silty water from the works to any watercourse, should any discharge of construction water be required during the construction phase, discharge will be to foul sewer following agreement with Kildare CC/ Irish Water.

There will be no discharge of effluent to groundwater during the construction phase. All wastewater from the construction facilities will be stored for removal off site for disposal and treatment.

All works in the SAC on adjacent to it will comply with current best practice, notable the Inland Fisheries Ireland Guidelines on protection of fisheries during construction works in and adjacent to waters (IFI, 2016) and Transport Infrastructure Ireland's Guidelines for the crossing of watercourses during the construction of national road schemes (TII, 2008).

- The contractor shall be obliged to ensure no deleterious discharges are released from the sites to the River Rye Water during excavation, de-watering, or erecting activities. Throughout the period of works the contractor shall also take account of relevant legislation and best practice guidance including but not limited to the following:

- C532 Control of water pollution from construction sites: guidance for consultants and contractors;
- C648 Control of water pollution from linear construction projects;
- SP156 Control of water pollution from construction sites – guide to good practice;
- NRA's 'Guidelines for the Crossing of Watercourses during Construction of National Road Schemes (NRA, 2005);

28 NOV 2022

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Planning Department

- The Eastern Regional Fisheries Board guidance document 'Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites' (Murphy, 2004); and
- The Southern Regional Fisheries Board guidance document 'Maintenance and protection of the inland fisheries resource during road construction and improvement works' (Kilfeather, 2007).

In order to minimise the risk of contamination, any stockpiled material designated for removal will be removed off-site as soon as possible. Surface water drain gratings in areas near or close to where stockpiles are located will be covered by appropriate durable polyurethane covers or similar. Active treatment systems such as siltbusters or similar will be adopted, depending on turbidity levels and discharge limits.

MONITORING

- Weekly checks will be carried out to ensure surface water drains are not blocked by silt, or other items, and that all storage is located at least 10 m from surface water receptors. Regular inspection of surface water run-off and any sediment control measures (e.g. silt traps) will be carried out during the construction phase.
- Regular auditing of construction / mitigation measures will be undertaken, e.g. concrete pouring, refuelling in designated areas, etc. A log the regular inspections will be maintained, and any significant blockage or spill incidents will be recorded for root cause investigation purposes and updating procedures to ensure incidents do not occur.

MEASURES FROM EIAR SECTION 8 *WATER & HYDROLOGY*

CONSTRUCTION PHASE

- **Surface Water Run-off**

Surface water runoff during the construction phase may contain increased silt levels or become polluted from construction activities. Runoff containing large amounts of silt can cause damage to surface water systems and receiving watercourses. Silt water can arise from dewatering excavations, exposed ground, stockpiles and access roads. Environmental control measures highlighted in Section 8.2.3 of the EIAR, will be employed to remove the risk to affect the local hydrological environment.

Care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. All exposed soil surfaces will be within the work areas which limits the potential for any offsite impacts.

Any minor ingress of groundwater and collected rainfall in the excavation will be pumped out during construction.

There shall not be discharge of silty water from the works to any watercourse, should any discharge of construction water be required during the construction phase, discharge will be to foul sewer following agreement with Kildare CC/ Irish Water.

There will be no discharge of effluent to groundwater during the construction phase. All wastewater from the construction facilities will be stored for removal off site for disposal and treatment.

All works in the SAC on adjacent to it will comply with current best practice, notable the Inland Fisheries Ireland Guidelines on protection of fisheries during construction works in and adjacent to waters (IFI, 2016) and Transport Infrastructure Ireland's Guidelines for the crossing of watercourses during the construction of national road schemes (TII, 2008).

The contractor shall be obliged to ensure no deleterious discharges are released from the sites to the River Rye Water during excavation, de-watering, or erecting activities. Throughout the period of works the contractor shall also take account of relevant legislation and best practice guidance including but not limited to the following:

- Inland Fisheries Ireland's Requirements for the Protection of Fisheries Habitat during Construction and Development Works.
- CIRIA (Construction Industry Research and Information Association) Guidance Documents:
 - Control of water pollution from construction sites (C532)
 - Control of water pollution from linear construction projects: Technical Guidance (C648)
 - Control of water pollution from linear construction projects: Site Guide (C649)
 - Environmental Good Practice on Site (C692)
- NRA Guidance Documents:
 - Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes).

In order to minimise the risk of contamination, any stockpiled material designated for removal will be removed off-site as soon as possible. Surface water drain gratings in areas near or close to where stockpiles are located will be covered by appropriate durable polyurethane covers or similar. Active treatment systems such as siltbusters or similar may will be adopted, depending on turbidity levels and discharge limits.

Temporary storage of soil will be carefully managed in such a way as to prevent any potential negative impact on the receiving environment and the material will be stored away from any open surface water drains. Movement of material will be minimised in order to reduce degradation of soil structure and generation of dust. The tower foundations will be backfilled one leg at a time with the excavated material. The backfill is placed and compacted in layers. When the base construction crew leave the site, they will ensure the removal of all surplus materials from the site, including all unused excavated fill.

As mentioned in the Proposed Development section, if contaminated soil/water is encountered, it will be required to be removed by a licensed waste contractor. Further soil sampling will be undertaken during pre-development works. The contractor will be required to submit a Construction Waste Management Plan (CWMP) to the local authority for approval which will address all types of material to be disposed of. Site investigation and laboratory analysis has not identified any existing contamination.

Measures to minimise the suspension and mobilisation of sediment downstream of the working area should consider silt barriers and coffer damming to create dry working areas.

To avoid excessive silt runoff, site clearance is not to be undertaken during wet conditions, when rainfall of more than 0.5 mm/hour is forecast within the next 24 hours or rainfall of more than 3mm/hour is forecast within the next five days in the Leixlip area. At the riverbank works locations, silt fencing will be installed along the river bank to retain eroded sediments. Catch nets may be used where relevant.

Soil cleared from the site and all materials associated with the building process are to be stored outside the flood zone in designated storage areas. The flood zone will be delineated on the works areas. No soil storing will be allowed within 30 m of the open water, which is in line with the Inland Fisheries Ireland guidelines.

- **Fuel and Chemical Handling**

The construction material storage yard is proposed to be located in the existing southern car parks within Intel's compound, between towers T1-T2 and T2-T3.

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Wash-out of concrete trucks will not occur at the proposed development site, instead wash-out will be undertaken at the supplier washout facility. The location for the washout facilities is in Kilsaran, Adamstown, Lucan, Dublin and Roadstone which is located at Roadstone retail belgard, Tallaght, Dublin.

All chemicals and fuels will be stored properly in identified areas within the construction compound. No batching of wet-cement products will occur on site. Ready-mixed concrete will be delivered to the excavation site. Wash-down of concrete contaminated equipment will not take place within the site.

To minimise any impact on the underlying subsurface strata from material spillages, all oils, solvents and paints used during construction will be stored within temporary bunded areas. Oil and fuel storage tanks shall be stored in designated areas, and these areas shall be bunded to a volume of 110% of the capacity of the largest tank/container within the bunded area(s) (plus an allowance of 30 mm for rainwater ingress). Drainage from the bunded area(s) shall be diverted for collection and safe disposal.

Refuelling areas are to be identified in the CEMP prepared by the construction contractor. In the event of a machine requiring refuelling outside of this area, fuel will be transported in a mobile double skinned tank. An adequate supply of spill kits and hydrocarbon adsorbent packs will be stored in this area. All relevant personnel will be fully trained in the use of this equipment. Guidelines such as "Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors" (CIRIA 532, 2001) will be complied with.

In the case of drummed fuel or other chemicals which may be used during construction, containers should be stored in a dedicated internally bunded chemical storage cabinet and labelled clearly to allow appropriate remedial action in the event of a spillage.

Emergency response procedures will be outlined in the detailed CEMP. All personnel working on the site will be suitably trained in the implementation of the procedures.

All vehicles should be regularly checked for oil leaks, and ruptured hose pipes.

These measures are complementary to the control environmental measures described in Section 7.2.3 of the EiAR.

MONITORING MEASURES

- Weekly checks will be carried out to ensure surface water drains are not blocked by silt, or other items, and that all storage is located at least 10 m from surface water receptors. Regular inspection of surface water run-off and any sediment control measures (e.g. silt traps) will be carried out during the construction phase.
- Regular auditing of construction / mitigation measures will be undertaken, e.g. concrete pouring, refuelling in designated areas, etc. A log the regular inspections will be maintained, and any significant blockage or spill incidents will be recorded for root cause investigation purposes and updating procedures to ensure incidents do not occur.

MEASURES FROM EIAR SECTION 9 AIR QUALITY & CLIMATE

CONSTRUCTION PHASE

- **Air Quality**
The proactive control of fugitive dust will ensure the prevention of significant emissions. The key aspects of controlling dust are listed below. Full details of the dust management plan can be found in Appendix 9.1. The dust minimisation measures will be incorporated into the overall

Construction Environmental Management Plan (CEMP) being prepared in relation to the development. In summary the measures which will be implemented will include:

- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic.
- Any road that has the potential to give rise to fugitive dust will be regularly watered, as appropriate, during dry and/or windy conditions.
- Vehicles exiting the site shall make use of a wheel wash facility prior to entering onto public roads.
- Vehicles using site roads will have their speed restricted, and this speed restriction must be enforced rigidly. On any un-surfaced site road, this will be 20 kph.
- Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary.
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.
- During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions.

At all times, these procedures will be strictly monitored and assessed. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust will be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.

- Monitoring of construction dust deposition along the site boundary to nearby sensitive ecological receptors (Rye Water Valley/Cartron pNHA and SAC) during the construction phase of the proposed development is recommended to ensure mitigation measures are working satisfactorily. This can be carried out using the Bergerhoff method in accordance with the requirements of the German Standard VDI 2119. The Bergerhoff Gauge consists of a collecting vessel and a stand with a protecting gauge. The collecting vessel is secured to the stand with the opening of the collecting vessel located approximately 2m above ground level. The TA Luft limit value is 350 mg/(m²*day) during the monitoring period of 30 days (+/- 2 days).

- **Climate**

Prevention of on-site or delivery vehicles from leaving engines idling, even over short periods.

Ensure all plant and machinery are well maintained and inspected regularly.

Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site.

MEASURES FROM EIA SECTION 10 NOISE & VIBRATION

CONSTRUCTION PHASE

- With regard to construction activities, reference has been made to BS5228 Parts 1 and 2, which offer detailed guidance on the control of noise and vibration from demolition and construction activities. Various mitigation measures will be considered and applied during the construction of the proposed development. Full details are in the Construction Environmental Management Plan (CEMP).

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MEASURES FROM EIA SECTION 11 LANDSCAPE & VISUAL IMPACT

- The location of taller structures on the lower portion of the zoned land.
- The retention of mature perimeter planting
- The adoption of the same colour scheme used to date
- The continuation of the established site policy of minimising of 'scale clues' (visible windows, doors, ladders etc.) and avoiding articulation on upper surfaces – especially on the tall north facing production areas.
- The adjustment of designs to take account of feedback from landscape architect
- The provision of replacement perimeter planting

MEASURES FROM EIA SECTION 13 WASTE MANAGEMENT

CONSTRUCTION PHASE

- A project specific RWMP has been prepared in line with the requirements of the requirements of The EPA, *Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects* (2021) and is included as Appendix 13.1. The mitigation measures outlined in the RWMP will be implemented in full and form part of mitigation strategy for the site. The mitigation measures presented in this RWMP will ensure effective waste management and minimisation, reuse, recycling, recovery and disposal of waste material generated during the excavation and construction phases of the proposed development.
 - Prior to commencement, the appointed Contractor(s) will be required to refine / update the RWMP (Appendix 13.1) in agreement with KCC and in compliance with any planning conditions, or submit an addendum to the RWMP to KCC, detailing specific measures to minimise waste generation and resource consumption, and provide details of the proposed waste contractors and destinations of each waste stream.
 - The Contractor will implement the RWMP throughout the duration of the proposed excavation and construction phases.
- It has been calculated by the project design team that 740m³ of excavated material will need to be removed off-site. Correct classification and segregation of the excavated material is required to ensure that any potentially contaminated materials are identified and handled in a way that will not impact negatively on workers as well as on water and soil environments, both on and off-site. In addition, the following mitigation measures will be implemented:
 - Building materials will be chosen to 'design out waste';
 - On-site segregation of waste materials will be carried out to increase opportunities for off-site reuse, recycling and recovery. The following waste types, at a minimum, will be segregated:
 - Concrete rubble (including ceramics, tiles and bricks);
 - Metals;
 - Glass;
 - Hazardous material; and
 - Timber.
 - Left over materials (e.g. timber off-cuts, broken concrete blocks / bricks) and any suitable construction materials shall be re-used on-site, where possible; (alternatively, the waste will be sorted for recycling, recovery or disposal);
 - All waste materials will be stored in skips or other suitable receptacles in designated areas of the site;
 - Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) will also be segregated and will be stored in appropriate receptacles (in suitably bunded areas, where required);
 - A Resource Manager will be appointed by the main Contractor(s) to ensure effective management of waste during the excavation and construction works;

- All construction staff will be provided with training regarding the waste management procedures;
- All waste leaving site will be reused, recycled or recovered, where possible, to avoid material designated for disposal;
- All waste leaving the site will be transported by suitably permitted contractors and taken to suitably registered, permitted or licenced facilities; and
- All waste leaving the site will be recorded and copies of relevant documentation maintained.
- Nearby sites requiring clean fill material will be contacted to investigate reuse opportunities for clean and inert material, if required. If any of the material is to be reused on another site as by-product (and not as a waste), this will be done in accordance with regulation 15 (By-products) (Previously Article 27 of the European Communities (Waste Directive) Regulations 2011) of S.I. No. 323/2020 - European Union (Waste Directive) Regulations 2020. EPA approval will be obtained prior to moving material as a by-product.

MEASURES FROM EIA SECTION 15 ARCHAEOLOGY

CONSTRUCTION PHASE

- Archaeological monitoring under licence from the National Monuments Service (NMS) of the Department of Housing, Local Government and Heritage (DHLGH) of all ground works in greenfield areas. A report on the results of the monitoring will be compiled on completion of the work and submitted to the local authority and the National Monuments Service. Depending on the results of the monitoring, further mitigation may be required such as preservation in-situ (avoidance) or preservation by record (archaeological excavation).

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APPENDIX TO SECTION 2

SCREENING AND SCOPING

APPENDIX 2.1

DRAFT SCOPING REPORT

**Proposed Scope of
Environmental Impact Assessment Report
for
Diversion of 110 kV Overhead Line
at Intel, Leixlip, Co Kildare**

prepared for

Intel Ireland



by

**Environmental Impact Services
Second Floor
The Courtyard
25 Great Strand Street
Dublin 1**



6 July 2022

CONFIDENTIAL

This document contains commercially sensitive information.
It should remain confidential until after a planning application has been lodged.

Contents

1 INTRODUCTION/PREAMBLE	7
2 SCREENING & SCOPING	7
3 ALTERNATIVES	8
4 PROJECT DESCRIPTION	8
5 POPULATION & HUMAN HEALTH	8
6 BIODIVERSITY	8
7 LAND, SOILS, GEOLOGY & HYDROGEOLOGY	9
B WATER & HYDROLOGY	10
9 AIR QUALITY & CLIMATE	10
10 NOISE & VIBRATION	11
11 LANDSCAPE & VISUAL IMPACT	11
12 MATERIAL ASSETS	12
13 WASTE MANAGEMENT	12
14 BUILT HERITAGE	12
15 ARCHAEOLOGY	15
16 ACCIDENT AND DISASTER RISKS	16
17 INTERACTIONS & CUMULATIVE EFFECTS	16

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INTRODUCTION

This document has been prepared to set out the proposed scope of the Environmental Impact Assessment Report (EIAR) which will form part of the planning application for this development. It has been prepared by Environmental Impact Services who have prepared EIARs and other environmental assessments for numerous projects on and in the vicinity of the Intel campus.

The development comprises the rerouting of a 110kV double circuit overhead line (OHL) that runs North/South across the east side of Intel's Leixlip campus. This diversion will navigate around the Eastern extremity of the campus. The main elements of the proposal are described below including a sketch plan and section.

This document is intended to facilitate pre-application consultation, particularly with Kildare County Council. The scope of the EIAR will be reviewed and adjusted in response to any feedback received and any significant issues that emerge during the design development and ongoing environmental assessment work.

It sets out the planned approach to preparation of the EIAR and the issues that are likely to be significant under each of the section headings that will be used. The assessment will consider direct, indirect, secondary, cumulative, short, medium and long-term, permanent, temporary, positive and negative effects. Interactions of effects with effects arising under other topics will all be examined under each topic heading, as relevant and applicable. Where extensive detailed material needs to be included to support an assessment of any specific aspect, then that material will generally be included in a separately bound volume of appendices.

APPROACH TO THE EIAR

These fundamental principles of EIA, as set out in the EPA Guidelines, will be followed.

a Anticipating, avoiding and reducing significant effects

- the assessment will avoid and reduce likely significant effects of the proposal by working with the design team to ensure that a hierarchy of mitigation is followed and that significant effects are mitigated by avoidance or prevention at design stage, where feasible, with mitigation by remedy/offsetting as a last resort only

b Assessing and mitigating effects

- the report will focus on assessment of likely significant effects
- identification and assessment of hypothetical effects will be avoided (e.g. effects which could occur if design did not incorporate measures to mitigate effects)
- baseline information included in the report will generally be limited to information that is clearly required to identify and assess the likely significant effects of the proposal
- inclusion of baseline information that is not actually required for the assessment will be avoided
- all measures proposed in the EIAR to mitigate predicted effects will be clearly linked to those predicted effects
- generic mitigation measures will be avoided
- where relevant, the extent to which each of the predicted effects has been mitigated will be assessed as 'residual effects'

c Maintaining objectivity

- all of the team contributing to the EIAR will ensure that the assessment is rigorous, replicable and transparent
- bias and subjectivity will be avoided

d Ensuring clarity and quality

- the EIAR will be prepared and managed by experts with appropriate levels of competency in their respective fields
- all parts of the EIAR will be clear, concise and unambiguous
- the EIAR will use standard descriptive methods, replicable assessment techniques and standardised impact descriptions

e Providing relevant information to decision makers

- the relevance, adequacy and compliance of information in all chapters will be made clear, particularly in relation to recent changes to the EIA Directive and regulations¹
- throughout the EIAR, information will be presented in a systematic and consistent format (as outlined below)
- predicted residual effects, taking account of proposed mitigation proposals, will be clearly set out
- any monitoring proposals will include clear triggers and actions
- mitigation measures which are incorporated in the design will be clearly described as elements of the proposed development
- mitigation measures arising from the EIA process will be presented in the chapter of the EIAR dealing with the relevant environmental factor and will also be included in an appendix compiling all of the mitigation measures together for clarity, ease of reference, to support the consent authority's decision-making process and to facilitate implementation

f Facilitating better consultation

- the scope of the EIAR will take account of consultation feedback
- all parts of the EIAR will be clear and accessible

FORMAT

The format within the specialist chapters will generally be as follows:

Introduction

- methodology

Project Description

- principal aspects of relevance to the specific topic (referring to but avoiding repetition of details contained elsewhere in the EIAR)
- construction and operational phases (including distinct stages or ramping of work/activity where appropriate)
- relevant mitigation measures incorporated in the design / construction plan

Receiving Environment

- description of the baseline / receiving situation during the construction and operational phases of the development
- baseline information will only be included where it is relevant to the assessment of likely significant effects which follows
- inclusion of routine or generic baseline information will be avoided where it is not relevant (e.g. information on ecological sites which are beyond the actual likely zone of influence of effects of the proposal)

Potential Impacts

¹ as introduced by Directive 2014/52/EU and transposed into the Planning & Development Regulations by S.I. No. 296 of 2018

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- during construction and operational phases

Mitigation Measures

- description of mitigation measures considered necessary to address specific potential impacts identified in the assessment and to enable the development to proceed to keep impacts within acceptable ranges and not to exceed environmental limits
- description of any proposed monitoring arrangements including reporting arrangements and details of what will happen in event of any exceedances

Residual Impacts

- actual impacts that are predicted to occur, taking the ameliorative effects of any proposed mitigation and monitoring measures into account

A non-technical summary of the EIAR will be provided and other specific requirements of the regulations will be addressed such as inclusion of a list of sources.

EIAR TEAM

The EIAR will be prepared by a team of competent experts as listed below. Summaries of their experience, expertise and knowledge will be provided to demonstrate their competencies.

Co-ordination and Management		
Role	Personnel	Company
Manager	Paul Fingleton	Environmental Impact Services (EIS)
Co-ordinator	Andrew Reynolds	
Specialist Topics		
Chapter	Personnel	Company
Population & Human Health	Conor Crowther & Paul Fingleton	AOS Planning / EIS
Biodiversity	Shea O'Driscoll	Scott Cawley
Land, Soils, Geology & Hydrogeology	Marcelo Allende	AWN Consulting
Water & Hydrology	Marcelo Allende	AWN Consulting
Air Quality & Climate	Niamh Nolan	AWN Consulting
Noise & Vibration	Leo Williams	AWN Consulting
Landscape & Visual Impact	Conor Skehan	EIS
Material Assets	Andrew Reynolds & Paul Fingleton	EIS
Waste Management	Chonail Bradley	AWN Consulting
Built Heritage	James Kelly	Kelly & Cogan Architects
Archaeology	Miriam Carroll	Tobar Archaeology
Accidents & Disasters	Andrew Reynolds & Paul Fingleton	EIS
Interactions & Cumulative Effects	Andrew Reynolds & Paul Fingleton (drawing on assessments by all of the above)	EIS

OUTLINE PROJECT DESCRIPTION

INTRODUCTION

This description indicates the principal features of the revised design as envisaged at this time. In keeping with good practice, the design will be developed, reviewed and adjusted during an iterative EIA and design process, taking account of feedback from ongoing environmental assessment work.

THE PROJECT

Intel proposes to realign an approximately 1.1 km long section of existing double circuit overhead line which supports the existing Maynooth-Ryebrook and Dunfirth-Kinnegad-Rinawade 110kV overhead line circuits. The proposal is to move a section of this line that spans Rye Water valley and the Intel site eastwards. The proposed route will take it around the eastern and south eastern sides edge of the Intel site. The two ends of the realignment will involve replacement of existing towers. The northern end is approximately 180m north of the Rye Water and the southern end is on the southern side of the Leixlip Maynooth Road (R148) in a supermarket car park.

The proposed realignment will consist of the following principal elements:

- Diverting a section of the existing 110kV double circuit overhead line to the north of the River Rye, along the eastern edge of the Intel site at Collinstown, linking back into the existing overhead line section at the car park of the Lidl supermarket, directly south of the R148.
- The installation of 7 No new double circuit steel lattice towers. Two of these will be replacement towers (Towers T1 & T7). The towers will range in height from approximately 27.4m to 42.2m above ground level and support six electrical conductors, one earthwire and associated overhead line infrastructure.
- The decommissioning and removal of 4 No existing double circuit steel lattice towers and associated electrical conductors to include the removal of the existing towers and associated electrical conductors from site.
- All ancillary site development, preparation and reinstatement works, including access, landscaping and connection to existing services and utilities and miscellaneous siteworks.

CONSTRUCTION

A Construction Environmental Management Plan (CEMP) will be provided to describe how the construction will be managed and the environmental controls that will be implemented.

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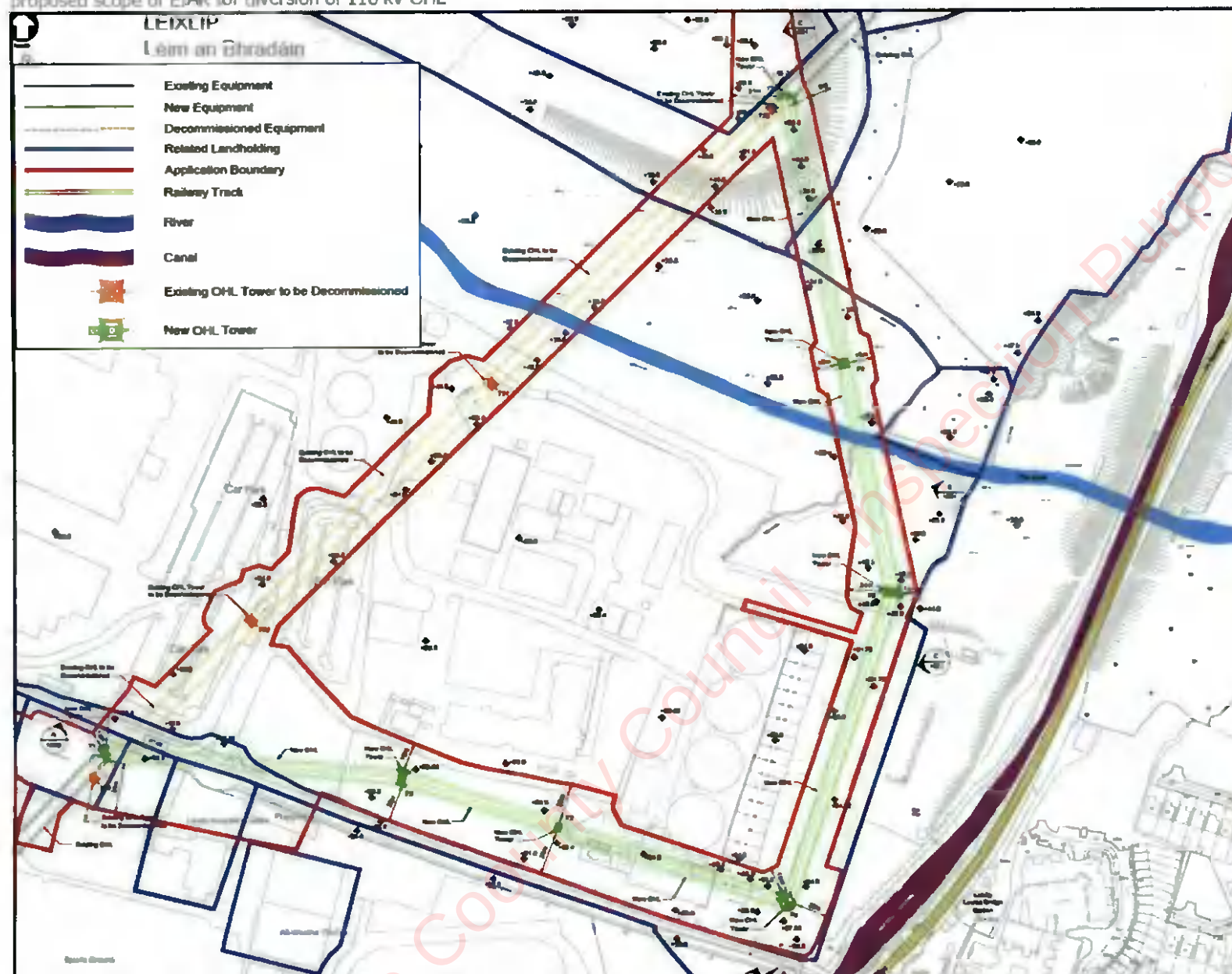


Figure 1 Indicative proposed plan

Existing line is to left and proposed realignment is to right and along bottom of map

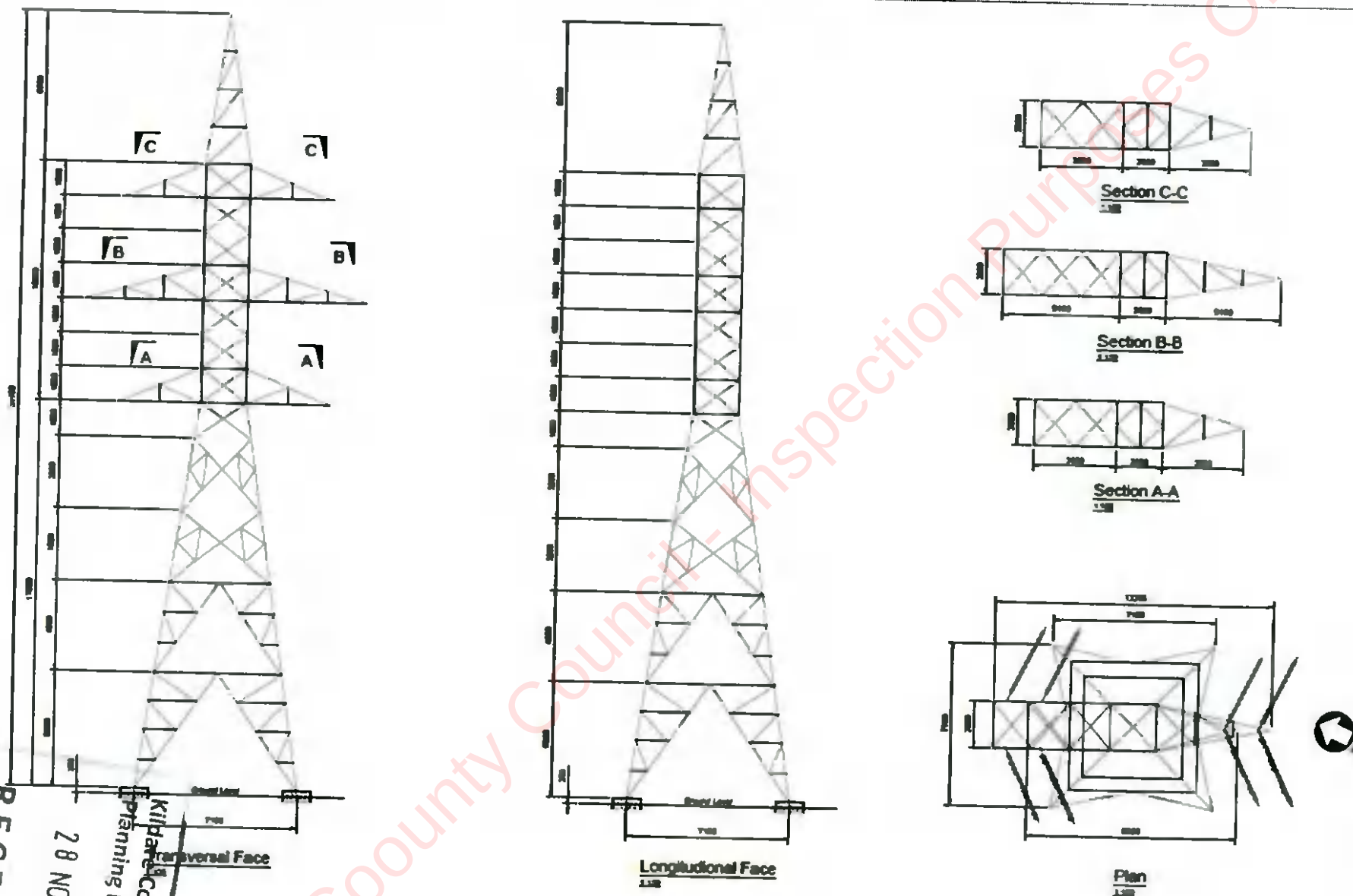


Figure 2 Indicative drawings of proposed towers

by Environmental Impact Services for Intel

- confidential -

EIAR CHAPTERS

1 INTRODUCTION/PREAMBLE

In addition to the EIAR, the planning application will also be supported by reports on distinct but related environmental topics. These are likely to include an Appropriate Assessment (AA) screening report, a Natura Impact Statement (NIS) and a Construction Environmental Management Plan (CEMP). There will also be a Flood Risk Assessment (FRA – Stage 1). The EIAR will refer to these other reports.

The competency of the EIAR team members will be appropriate to the scope of the EIAR and will be described in the Introduction including summary information on each section author.

As required by the regulations, any difficulties encountered in preparing the EIAR will be indicated.

2 SCREENING & SCOPING

The reasons that an EIAR has been prepared will be described with reference to the regulations and having regard to the relevant guidance, including *Environmental Impact Assessment Screening - Practice Note 02* (Office of the Planning Regulator, 2021) and *Environmental Impact Assessment of Projects Guidance on Screening* (European Union, 2017).

This chapter will discuss the scoping process – i.e. the basis for the determination of the issues addressed in the EIAR. It will also explain the format of the EIAR and the relationship of the chapter headings in the EIAR to the headings prescribed in the regulations.

To keep the scope of the EIAR focussed on likely significant issues that are not being addressed elsewhere, other reports on environmental issues which will be submitted as part of the planning application or related consent procedures will be referred to where appropriate but will not be duplicated in the EIAR. This will include requirements under legislation that is separate to the requirements of the Planning and Development Regulations and arises from other EU Directives such as the Habitats² and Birds³ Directives, the Waste Framework Directive⁴ and the Floods Directive⁵.

² Directive 92/43/EEC as amended

³ Directive 79/409/EEC as amended

⁴ Directive 2008/98/EC

⁵ Directive 2007/60/EC

3 ALTERNATIVES

This section will set out the need for the proposed project and the consideration of reasonable and relevant alternatives including underground and overhead options. It will explain the decisions that led to the selection of the proposed arrangement and how environmental considerations have been taken into account.

4 PROJECT DESCRIPTION

The principal elements of the application will be described, particularly those with potential to cause significant environmental impacts. This section will avoid repeating information included in the planning application report and drawings and will focus on details of relevance to the EIA process. It will be largely based on material included in the planning application report and other documents that form part of the planning application, such as a Construction Environmental Management Plan. The physical characteristics of the whole project will be described including construction, demolition and operational requirements, materials to be used and any phasing details.

The description will cover the type and quantities of expected residues, emissions and wastes produced during construction. The later specialised sections will refer to details contained in this section and augment these with more detailed data where required.

5 POPULATION & HUMAN HEALTH

The methodology for this section will include examination and compilation of relevant population and socio-economic data and reference to relevant Kildare County Development Plan and Local Area Plan criteria. Following data identification and collection, an assessment of the impacts will be made.

The assessment of impacts on human health will refer to the other parts of the EIAR which address impacts on the vectors through which health could be directly or indirectly affected, including air quality, noise, water quality and traffic. It will also refer to the separate assessments of flood risk hazards.

6 BIODIVERSITY

The methodology for this section will involve review of desk based studies/ information from recent Intel studies, relevant environmental publications and databases. Field surveys of the site will be reviewed and updated as appropriate. Following this updated baseline assessment; an impact assessment will be carried out with mitigation and monitoring measures proposed where necessary and with reference to the biodiversity and green infrastructure objectives of the Local Area Plan and County Development Plan. The level of detail in this part of the assessment will reflect the proximity of the development to the SAC, the elevated potential for effects and the need for careful mitigation.

This section will include assessment of potential construction phase impacts due to dust, noise, light, silts, hydrocarbon management or other potential contamination sources, including potential for mobilisation of contaminants and for effects on surface and groundwaters during construction. Potential operational phase considerations will include effects due to presence of towers and conductors close to flightpaths for swans and other birds.

This section will also take detailed account of the assessments of effects on surface and groundwaters, noise, lighting and other emissions as will be covered in other chapters of the EIAR.

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A separate Natura Impact Statement (NIS) will be prepared in compliance with the specific requirements for this under the Habitats Directive and having regard to the relevant DoEHLG Guidance. The NIS will assess potential impacts on the conservation objectives of the adjacent Rye Water SAC. It will focus on the qualifying features⁶ and the potential for these to be affected. The biodiversity section of the EIAR will refer to the NIS as relevant and appropriate and while avoiding duplicating its contents.

7 LAND, SOILS, GEOLOGY & HYDROGEOLOGY

Land, Soils and Geology

A description of the natural materials underlying the tower locations will be provided. Information will be presented on bedrock and overlying quaternary geology and soils utilising data obtained from national databases as well as from recent site data. Maps will be provided to illustrate the soils, subsoils and bedrock geology of the area.

The characteristics of the proposed development including quantity and quality of material to be removed during excavation of the tower foundations will be described. Proposed mitigation measures during both construction and operational phases will be discussed. Residual impacts will be assessed. Monitoring requirements for the construction and operational phases will be specified.

⁶ *Vertigo angustior* [1014], *Vertigo moulinsiana* [1016], Petrifying springs with tufa formation (*Cratoneurion*) [7220]

Hydrogeology

The description and assessment of groundwater will include:

- An assessment of groundwater vulnerability in the vicinity of the site;
- An assessment of existing groundwater quality data for the site;
- Inspection of the GSI Wellcard Index and Groundwater Protection Scheme for the area;
- An assessment of groundwater flow direction at the tower locations;
- A conceptual site model (CSM) in order to identify any likely hydrogeological Source-Pathway-Receptor linkages with protected areas (Rye Water SAC);
- Reference to the River Basin Management Plan for the Eastern River Basin District with respect to groundwater management.

The characteristics and effects of the development will be discussed in terms of impacts on the groundwater environment during the construction and operational phases. This will include an assessment of the impact on groundwater quality and flows during construction and operation. This groundwater assessment will also be utilised in the NIS to assess potential and actual predicted impacts on any groundwaters that are of importance to the Rye Water cSAC, including Louisa Springs (to East of Intel campus).

Mitigation measures (during both construction and operation) will be proposed and the containment and treatment of any groundwaters generated as a result of the proposed development will be addressed. Residual impacts following implementation of mitigation measures will be assessed. Any monitoring requirements that are identified for the construction and operational phases will be specified.

8 WATER & HYDROLOGY

This section will cover surface water, foul water and water supply. It will include:

- assessment of the soil types and drainage patterns at the site;
- assessment of the receiving drainage system (the Rye Water) including water quality and flows;
- assessment of potential direct or indirect hydrological linkages between the site and protected sites (Rye Water SAC) and
- reference to the Eastern River Basin Management Plan with respect to surface water management.

Baseline data sources will include records from previous EIAs and other studies at Intel, EPA records and Local Authority records.

Assessment of impacts during the construction and operational phases will include impacts on drainage patterns, surface water runoff and water bodies in the area.

Mitigation measures (during both construction and operation) will be proposed with a particular focus on silt control during construction. Residual impacts following implementation of mitigation measures will be predicted. Any monitoring requirements identified for the construction and operation phases will be specified.

Reference will be made to a separate report on flood risk which will be submitted as a separate document accompanying the planning application and will take account of climate change effects.

9 AIR QUALITY & CLIMATE

This chapter will focus on construction stage effects. Dust impacts during construction will be addressed, with particular regard to impacts on the SAC and appropriate mitigation measures. Exhaust emissions such as NO₂, PM₁₀, PM_{2.5} and CO₂ from construction site traffic and machinery will also be considered. No significant effects are anticipated post construction.

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Planning Department

28 NOV 2022

10 NOISE & VIBRATION

Baseline environmental noise surveys carried out at the eight locations as part of Intel's EPA Annual Environmental Reporting and data from an on-site continuous noise monitor will be used to establish an up to date noise baseline. The Baseline Environment section of the Noise and Vibration chapter will include measured data for a range of parameters (i.e. L_{Aeq} , L_{A10} , L_{A90} , L_{Amax} , L_{Amin}) and commentary relating to noise sources within the existing noise environment.

Source noise levels will be derived for all noise sources associated with the proposed development during both construction and operational phases. In terms of the construction phase source noise levels will be obtained from relevant standards such as *BS 5228 – 1: 2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise*.

The likely level of noise emissions from the development will be predicted in accordance with standard guidance (i.e. *ISO 9613: Acoustics – Attenuation of sound outdoors, Part 2: General method of calculation, 1996*). Where necessary, the existing Intel site noise model will be updated and various iterations of the noise model will be developed in order to assess the potential noise impact of the subject proposal. Where appropriate, distance attenuation, barrier screening, ground topography and meteorological conditions will be taken into account.

Vibration will also be considered for both construction and operational phases.

The potential noise & vibration impact of construction and operational phases of the development will both be assessed through reference to appropriate criteria and guidance documents. Where necessary, control measures required to ameliorate the impact will be specified. Additional predictive calculations will be undertaken as necessary in order to establish the residual impact of the development.

11 LANDSCAPE & VISUAL IMPACT

The design of the towers structures and installation of the cables are likely to have significant effects on the appearance and character in the immediate and wider environs.

The visibility of new structures will be examined using high quality visual imaging (computer generated photo-montages) from 10 viewpoints as representative / worst case locations for this purpose, see Figure 3 for view locations. Visibility in the wider landscape will also be considered.

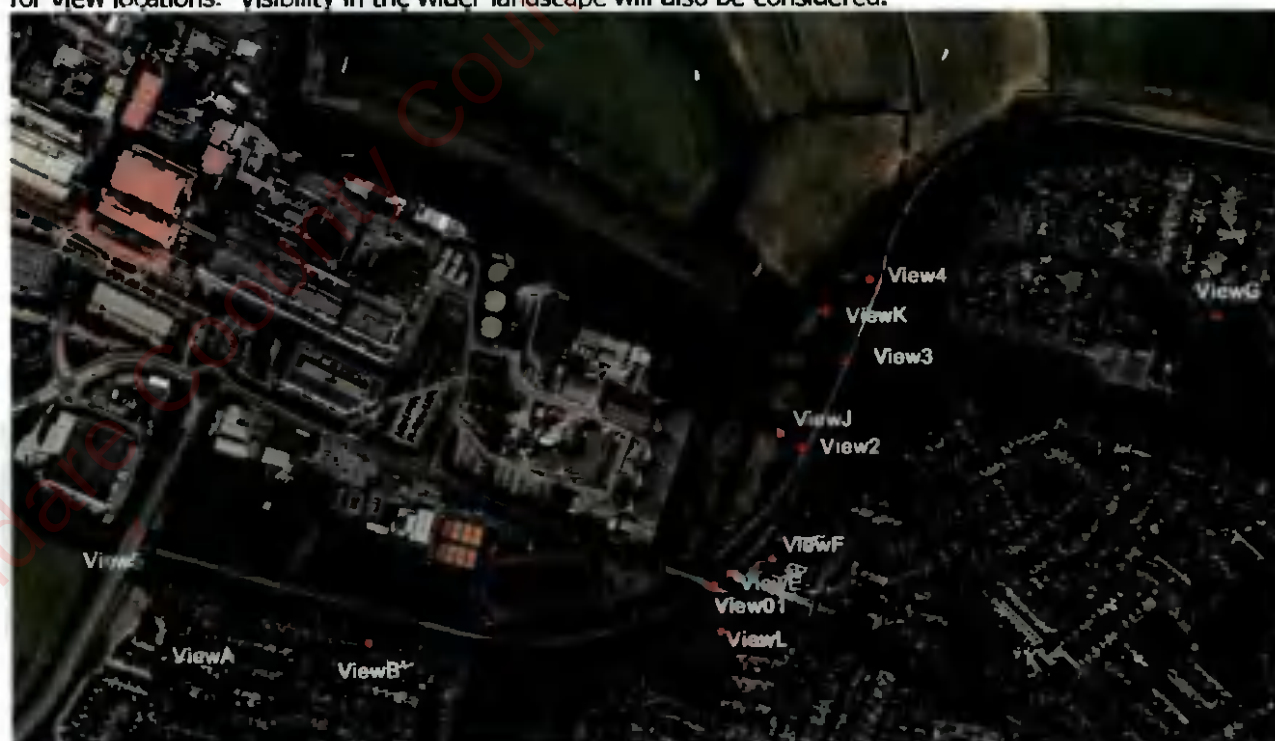


Figure 3 View Location Map

Labelling of views is on this map is draft. Locations which have been used for previous landscape assessments are labelled numerically. Locations added for this EIAR are labelled with letters.

12 MATERIAL ASSETS

This chapter will address any likely significant impacts on the surrounding public infrastructure and physical resources in the environment which may be of either human or natural origin (e.g. water infrastructure, electricity, telecommunications).

The key issue in this chapter is likely to be availability of electrical supply. Potential impacts on the ability of the supply infrastructure to deliver to other users will be considered in this chapter. Consultation with the service providers will be referred to.

The only traffic associated with the operational phase of the development will be occasional maintenance vehicles.

During construction there will be low numbers of vehicles over a total timeline of 6-8 months with shorter periods of activity at each tower location. Significant effects are unlikely to occur as associated traffic will be managed in accordance with a Construction Traffic Management Plan Traffic that will be worked out in detail by the contractor and for agreement with the Council prior to commencement.

Construction stage and maintenance traffic information will be set out at a high level only. Because these levels will be low*, it can be predicted that significant traffic effects are unlikely to occur. Therefore, a detailed assessment is not considered to be required.

* HGV loads to and from the site and concrete truck deliveries are anticipated to be approximately 100 each, over a likely timeline of some 4 months, an average of just over one HGV and one concrete truck per day.

Peak construction headcount is anticipated to be 15 to 20 operatives.

13 WASTE MANAGEMENT

While quantities of spoil are likely to be small, a description of the likely types and quantities of hazardous and non-hazardous wastes to be generated at the site during construction will nonetheless be provided. Procedures and systems for managing waste streams will be described.

Reference will be made to Local and National legislation, Plans and Guidelines and mitigation measures put in place to ensure waste storage facilities and waste management systems on the site comply with all applicable measures.

Appropriate waste recycling and disposal routes will be identified to ensure that waste recycling rates are maximised and waste disposal quantities are minimised.

Mitigation measures will be specified, if required, to ensure maximum waste recycling, minimum waste disposal and optimum waste management in terms of environmental impacts. Residual impacts will be assessed. Any monitoring requirements identified for the construction phase will be specified.

14 BUILT HERITAGE

A number of protected structures are located in the vicinity of the site and others of high importance are located at a greater distance. This chapter will consider and assess impacts upon protected structures noted within the Register of Protected Structures (RPS) of the current Kildare County Council Development Plan 2017 – 2023, and upon those proposed additions to the RPS on the Draft Kildare County Council Development Plan 2023 – 2029. In each case the potential impacts will be examined.

Newly proposed protected structures in immediate environs:
1 Louisa Bridge, PPS 6

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- 2 Station House, PPS3
- 3 Hexagonal Well, PPS7
- 4 Romanesque Bath, PPS8
- 5 Rye Water Aqueduct, PPS9
- 6 Collector's House, PPS10
- 7 Sandford Bridge, PPS19

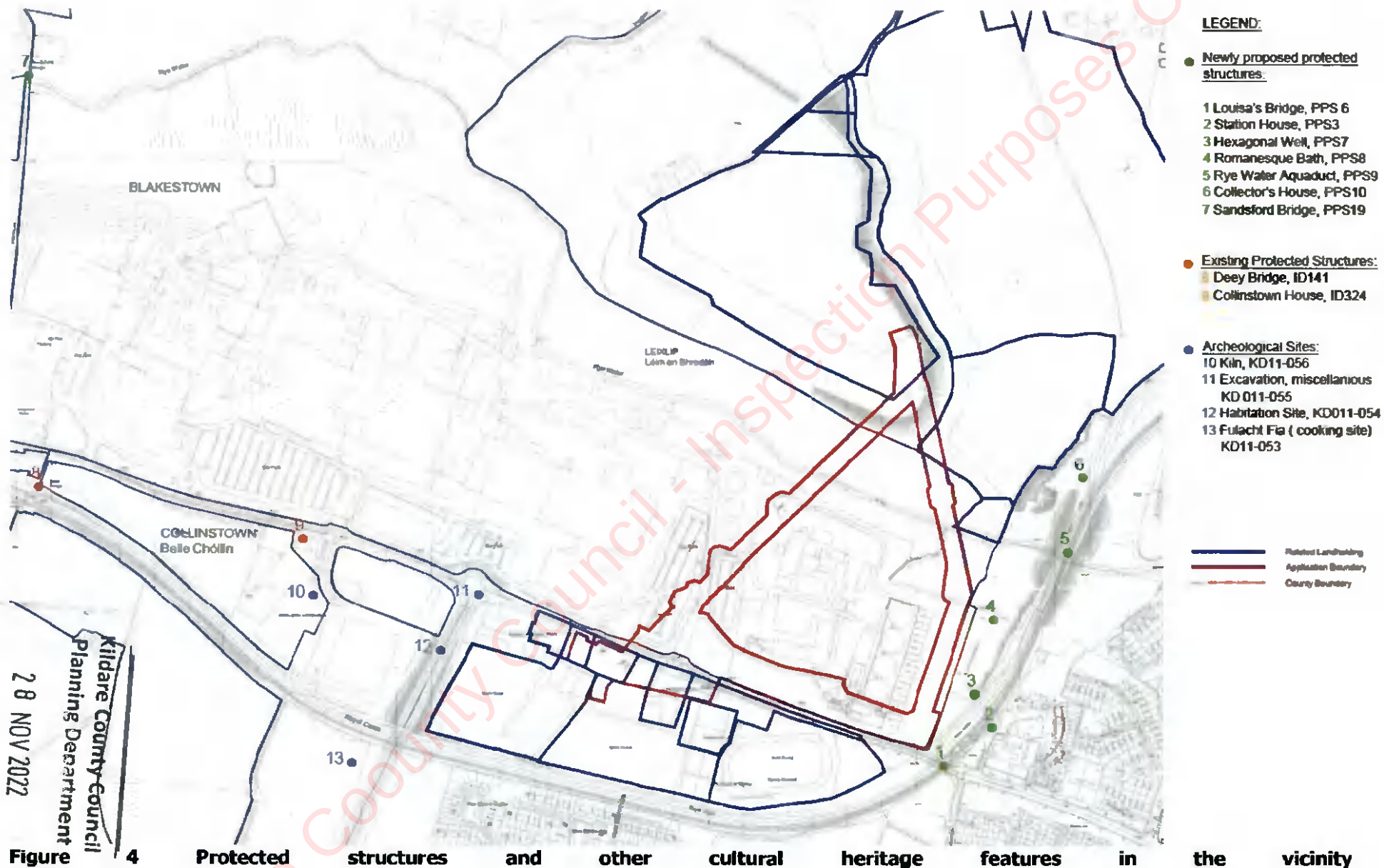
Existing protected structures:

- 8 Deey Bridge and Lock 13, Royal Canal Main Line Canal Bridge and Lock, ID141
- 9 Collinstown House, ID324

The architectural heritage value of these will be described and their significance will be discussed in the context of their present condition and settings. While the primary focus is upon any such protected structures as might be located within the application site, within the adjacent lands or within reasonably close proximity, there are a number of highly sensitive and significant heritage structures and environments in the broader locality such as for example Carton House and Demesne, the Conolly Folly and the Wonderful Barn, which will also be included in the assessment.

A number of structures that are not protected structures or proposed for inclusion into the RPS but which are of architectural interest have been identified as lying within or close to the application site. These comprise: the Royal Canal (Blakestown, Collinstown and Leixlip) Nelson's Cottage (fronting on to the R148), the Lock Keepers Cottage at Collinstown and Blakestown House. These structures will also be assessed.

This chapter will cross-refer to the Landscape & Visual Impact sections as relevant, including the computer generated photomontages of views.



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15 ARCHAEOLOGY

The site of the proposed development does not contain any monuments listed in the Record of Monuments and Places (RMP) or Sites and Monuments Record (SMR) for County Kildare. There are Eighty Recorded Monuments are located within 1 km of the subject lands, several of which have been previously excavated. These are listed in summary below

Table 1 Recorded Monuments within 1 km of the site

SMRS	ITM E	ITM N	CLASS DESCRIPTION	TOWNLAND
KD011-007----	699387	736650	Ritual site - holy well	LEIXLIP
KD006-001----	698880	738056	Ritual site - holy well	SION
KD006-002----	699130	737902	Castle - unclassified	CONFY
KD011-054----	698593	736810	Habitation site	COLLINSTOWN (Leixlip ED)
KD011-052----	698105	736142	Habitation site	COLLINSTOWN (Leixlip ED)
KD011-053----	698422	736550	Fulacht fia	EASTON
KD011-055----	698560	736765	Excavation - miscellaneous	COLLINSTOWN (Leixlip ED)
KD011-056----	698344	736807	Kiln	COLLINSTOWN (Leixlip ED)

The archaeological assessment will aim to identify constraints or features of archaeological significance within or adjacent to the lands proposed for development and offer mitigations for any potential impacts to same.

The assessment will be based on both a desktop review and a field survey of the proposed development site and its environs. It will include a general introduction to the area and the recorded archaeological monuments located in the vicinity of the lands proposed for development (see Figure 3). Using this information, the likely impact of development in respect of the receiving archaeological resource will be evaluated. The principal sources that will be consulted during the assessment are as follows:

- Sites listed in the Sites and Monuments Record (SMR)
- Record of Monuments and Places (RMP)
- National Monuments in State Care
- Topographical files of the National Museum of Ireland
- Cartographic sources and Aerial Imagery
- Sites reported in the Excavations Database
- Tangible Cultural Heritage Sites and Features
- Reports on archaeological assessment of the site carried out to date
- Irish placename database
- Traditions or historical figures associated with the site.

The final part of the assessment will identify appropriate mitigation measures which will need to be implemented to mitigate the potential impact of the proposed development on archaeological heritage. The potential direct impact of the proposed development on the archaeological resource, will be at the construction phase, during the removal of topsoil and general ground works, as it is possible that buried archaeological features may exist within the proposed development area. The implementation of pre-construction or construction-stage mitigation measures will ensure that any potential impacts are minimised. Such mitigation may include archaeological investigations using appropriate techniques (invasive and non-invasive) or construction stage archaeological monitoring under license from the Department of Housing, Local Government and Heritage. Potential indirect (visual) impacts on the surrounding archaeological resource will also be assessed.

16 ACCIDENT AND DISASTER RISKS

Risks to the environment due to accidents/disasters will be assessed. This will consider potential for environmental impacts to arise due to accidents on the site during construction and operation.

The assessment will consider the design standards of the proposal for general accident prevention and during construction and operation.

17 INTERACTIONS & CUMULATIVE EFFECTS

This chapter will show where interactions between effects on different environmental factors have been identified and addressed in the various chapters of the EIAR. It will also show where cumulative effects have been assessed.

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APPENDIX 2.2

EIAR COMPLIANCE ASSESSMENT

REVIEW AGAINST REQUIREMENTS OF THE REGULATIONS

Requirements of the Regulations ⁷		Covered primarily in the following -	
		Sections of the main EIAR document	Other Reports / Appendices ⁸
Article 94	An EIAR shall take into account the available results of other relevant assessments under European Union or national legislation with a view to avoiding duplication of assessments and shall contain -		
(a)	the information specified in paragraph 1 of Schedule 6	See section of this table titled <i>Schedule 6</i>	
(b)	any additional information specified in paragraph 2 of Schedule 6 relevant to the specific characteristics of the development or type of development concerned and to the environmental features likely to be affected	See section of this table titled <i>Schedule 6</i>	
(c)	a summary in non-technical language of the information required under paragraphs (a) and (b)		Non-Technical Summary of EIAR
(d)	a reference list detailing the sources used for the descriptions and assessments included in the report	A reference list of sources included in Appendix 1.2	
(e)	a list of the experts who contributed to the preparation of the report, identifying for each such expert—		
(i)	the part or parts of the report which he or she is responsible for or to which he or she contributed	S1.3 & Table 1.2	
(ii)	his or her competence and experience, including relevant qualifications, if any, in relation to such parts, and	S1.3 & Table 1.2	
(iii)	such additional information in relation to his or her expertise that the person or persons preparing the EIAR consider demonstrates the expert's competence in the preparation of the report and ensures its completeness and quality	S1.3 & Table 1.2	

⁷ The requirements of the amending EIA Directive 2014/52/EU have been transposed into the Planning & Development Regulations, 2001 by the European Union (Planning and Development) (Environmental Impact Assessment) Regulations, 2018 (SI No 296/2018).

⁸ Appendices are generally not listed where they are considered to be integral to a section in the preceding column. For example, where s6 is listed in the preceding column, this can be taken to also refer to the Appendices to s6.

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28 NOV 2022

Requirements of the Regulations ⁷		Covered primarily in the following -		
		Sections of the main EIAR document	Other Reports / Appendices ⁸	
Schedule 6				
1	(a)	A description of the proposed development comprising information on the site, design and size and other relevant features of the proposed development.	Chapter 4 & generally, Chapters 5 – 16 (subsections 4 & 6)	Outline Construction Environmental Management Plan
	(b)	A description of the likely significant effects on the environment of the proposed development.	Subsections 4 and 6 of specialist chapters	
	(c)	A description of the features, if any, of the proposed development and the measures, if any, envisaged to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment of the development.	S4.6, S4.7 and generally Chapters 5 – 16 (subsection 5)	Outline Construction Environmental Management Plan
	(d)	A description of the reasonable alternatives studied by the person or persons who prepared the EIAR, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the proposed development on the environment.	Chapter 3	
2		Additional information, relevant to the specific characteristics of the development or type of development concerned and to the environmental features likely to be affected, on the following matters, by way of explanation or amplification of the information referred to in paragraph 1:		
	(a)	a description of the proposed development, including, in particular—		
	(i)	a description of the location of the proposed development,	Chapter 1 & 4	
	(ii)	a description of the physical characteristics of the whole proposed development, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases;	Chapter 4	Outline Construction Environmental Management Plan
	(iii)	a description of the main characteristics of the operational phase of the proposed development (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used, and	Chapter 4	
	(iv)	an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation) and quantities and types of waste produced during the construction and operation phases;	Chapters 7, 8, 9, 10, 11, 12 & 14	Outline Construction Environmental Management Plan

Requirements of the Regulations ⁷		Covered primarily in the following -	
		Sections of the main EIA document	Other Reports / Appendices ⁸
(b)	a description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the person or persons who prepared the EIA, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects;	Chapter 3	
(c)	a description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge;	S4.2 and generally Chapter 5 – 16 (subsection 3)	
(d)	a description of the factors specified in paragraph (b)(i)(I) to (V) of the definition of 'environmental impact assessment' in section 171A of the Act likely to be significantly affected by the proposed development:		
	population	Chapter 5	
	human health	Chapter 5	
	biodiversity (for example fauna and flora)	Chapter 6	
	land (for example land take)	Chapter 7	
	soil (for example organic matter, erosion, compaction, sealing)	Chapters 7 & 8	
	water (for example hydromorphological changes, quantity and quality)	Chapter 8	
	air	Chapters 9 & 10	
	climate (for example greenhouse gas emissions, impacts relevant to adaptation)	Chapter 9	
	material assets	Chapter 12	
	cultural heritage, including architectural and archaeological aspects	Chapters 14 & 15	
	landscape	Chapter 11	
(e)(i)	a description of the likely significant effects on the environment of the proposed development resulting from, among other things—		
(I)	the construction and existence of the proposed development, including, where relevant, demolition works,	Generally, Chapters 5 – 16 (subsections 4 & 6)	Outline Construction Environmental Management Plan
(II)	the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources	Chapter 6 & 8	

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Requirements of the Regulations ⁷		Covered primarily in the following -	
		Sections of the main EIAR document	Other Reports / Appendices ⁸
(III)	the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste	Chapters 10,11 12	Outline Construction Environmental Management Plan
(IV)	the risks to human health, cultural heritage or the environment (for example due to accidents or disasters)	S2.3.1 & Chapters 5, 16	
(V)	the cumulation of effects with other existing or approved developments, or both, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources.	Chapter 17 & Chapters 7 – 12 as relevant	
(VI)	the impact of the proposed development on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the proposed development to climate change	Chapters 9 & 12	
(VII)	the technologies and the substances used	Chapter 4	Outline Construction Environmental Management Plan
(ii)	the description of the likely significant effects on the factors specified in paragraph (b)(i)(I) to (V) of the definition of 'environmental impact assessment' in section 171A of the Act should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the proposed development, taking into account the environmental protection objectives established at European Union level or by a Member State of the European Union which are relevant to the proposed development;	S2.3.1 & subsection 4 of Chapters 5 - 16	
(f)	a description of the forecasting methods or evidence used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information, and the main uncertainties involved;	S2.4 & subsection 1 of Chapters 5 - 16	

Requirements of the Regulations ⁷		Covered primarily in the following -	
		Sections of the main EIAR document	Other Reports / Appendices ⁸
(g)	a description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of an analysis after completion of the development), explaining the extent to which significant adverse effects on the environment are avoided, prevented, reduced or offset during both the construction and operational phases of the development;	Subsection 5 of Chapters 5 to 16	Outline Construction Environmental Management Plan
(h)	a description of the expected significant adverse effects on the environment of the proposed development deriving from its vulnerability to risks of major accidents and/or disasters which are relevant to it. Relevant information available and obtained through risk assessments pursuant to European Union legislation such as the Seveso III Directive or the Nuclear Safety Directive or relevant assessments carried out pursuant to national legislation may be used for this purpose, provided that the requirements of the Environmental Impact Assessment Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for, and proposed response to, emergencies arising from such events.	S2.3.1 Chapter 16	

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APPENDIX TO SECTION 3

ALTERNATIVES

APPENDIX 3.1

MULTI-CRITERIA COMPARISON FOR IDENTIFYING THE BEST PERFORMING OPTION



**Multi-criteria comparison for Identifying the
Best Performing Option
For Line Diversion at Intel, Leixlip Co. Kildare**

Sept 2022

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Contents

1	Introduction	6
1.1	The Project	6
2	Areas of Opportunity (Study Area)	8
2.1	Background to the identification of Areas of Opportunity	8
2.1.1	Route Options Opportunities [High Level]	9
3	Approach	10
3.1	Introduction	10
3.2	Information Gathering	10
3.2.1	Surveys	10
3.3	Constraints Mapping	10
4	Description of Route Options	13
4.1	OHL Options	13
	Figure 4-2 OGC Options U1, U2, U3, U4	14
4.2	UGC Options	14
5	Criteria for Identifying the Best Performing Option	15
5.1.1	Introduction	15
5.1.2	Planning	15
5.1.3	Environmental	15
5.1.4	Socio Economic	16
5.1.5	Deliverability	16
5.1.6	Technical	16
5.1.7	Criteria Scale	17
6	Evaluation Criteria Considerations and Context	18
6.1	Environmental & Planning Context	18
6.2	Technical & Deliverability Context	20
6.2.2	Deliverability Context	21
7	Detailed Application of Criteria to UGC and OHL Options	23
7.1	Assessment Methodology and Presentation	23
7.2	OHL Options Overview	24
7.3	Evaluation of OHL Option O1 – Western Route	25
7.3.1	Planning Performance Option O1 – Western Route	25
7.3.2	Environmental Performance Option O1 – Western Route	25
7.3.3	Socio-economic Performance Option O1 – Western Route	26
7.3.4	Technical Performance Option O1 – Western Route	26
7.3.5	Technical Performance Option O1 – Western Route	26

7.4	Evaluation of OHL Option O2a – Eastern Route, traversing site.....	28
7.4.1	Planning Performance O2a – Eastern Route, traversing site.....	28
7.4.2	Environmental Performance O2a – Eastern Route, traversing site	28
7.4.3	Socio-economic Performance O2a – Eastern Route, traversing site	28
7.4.4	Deliverability Performance Option O2a – Eastern Route, traversing site	29
7.4.5	Technical Performance Option O2a – Eastern Route, traversing site	29
7.5	Evaluation of OHL Option O2b – Eastern Route, traversing site & River Rye.....	31
7.5.1	Planning Performance - Option O2b Eastern Route, traversing site & River Rye.....	31
7.5.2	Environmental Performance Option O2b – Eastern Route, traversing site & River Rye	31
7.5.3	Socio-economic Performance Option O2b – Eastern Route, traversing site & River Rye	32
7.5.4	Deliverability Performance Option O2b – Eastern Route, traversing site & River Rye	32
7.5.5	Technical Performance Option O2b – Eastern Route, traversing site & River Rye.....	33
7.6	Evaluation of OHL Option O2c – Eastern Route, on Berm	34
7.6.1	Planning Performance Option O2c – Eastern Route, on Berm	34
7.6.2	Environmental Performance Option O2c – Eastern Route, on Berm	35
7.6.3	Socio-economic Performance Option O2c – Eastern Route, on Berm	35
7.6.4	Deliverability Performance Option O2c – Eastern Route, on Berm.....	35
7.6.5	Technical Performance Option O2c – Eastern Route, on Berm.....	36
7.7	Evaluation of OHL Option O2d – Easternmost intel land Route, crossing Rye	37
7.7.1	Planning Performance Option O2d – Most Eastern Route, crossing River Rye	37
7.7.2	Environmental Performance Option O2d – Most Eastern Route, crossing River Rye ..	37
7.7.3	Socio-economic Performance Option O2d – Most Eastern Route, crossing River Rye	38
7.7.4	Deliverability Performance Option O2d – Most Eastern Route, crossing River Rye....	38
7.7.5	Technical Performance Option O2d – Most Eastern Route, crossing River Rye.....	39
7.8	Evaluation of OHL Option O2e – Easternmost Route, crossing Rye	40
7.8.1	Planning Performance Option O2e – Most Eastern Route, crossing River Rye	40
7.8.2	Environmental Performance Option O2e – Most Eastern Route, crossing River Rye ..	40
7.8.3	Socio-economic Performance Option O2e – Most Eastern Route, crossing River Rye	41
7.8.4	Deliverability Performance Option O2e – Most Eastern Route, crossing River Rye....	41
7.8.5	Technical Performance Option O2e – Most Eastern Route, crossing River Rye.....	41
7.9	UGC Options Overview	43
7.10	Evaluation of UGC Option U1 – Western Route	44
7.10.1	Planning Performance Option U1 – Western Route.....	44
7.10.2	Environmental Performance Option U1 – Western Route	44

7.10.3	Socio-economic Performance Option U1 – Western Route	44
7.10.4	Deliverability Performance Option U1 – Western Route	45
7.10.5	Technical Performance Option U1 – Western Route.....	45
7.11	Evaluation of UGC Option U2 – Eastern Route, on Berm	47
7.11.1	Planning Performance Option U2 – Eastern Route, on Berm	47
7.11.2	Environmental Performance Option U2 – Eastern Route, on Berm	47
7.11.3	Socio-economic Performance Option U2 – Eastern Route, on Berm	47
7.11.4	Deliverability Performance Option U2 – Eastern Route, on Berm	47
7.11.5	Technical Performance Option U2 – Eastern Route, on Berm.....	48
7.12	Evaluation of UGC Option U3 – Eastern Route, crossing River Rye	50
7.12.1	Planning Performance Option U3 – Eastern Route, crossing River Rye	50
7.12.2	Environmental Performance Option U3 – Eastern Route, crossing River Rye.....	50
7.12.3	Socio-economic Performance Option U3 – Eastern Route, crossing River Rye.....	50
7.12.4	Deliverability Performance Option U3 – Eastern Route, crossing River Rye	51
7.12.5	Technical Performance Option U3 – Eastern Route, crossing River Rye	52
7.12.6	Evaluation of UGC Option U4 – Most Eastern Route, along Canal Bank	53
7.12.7	Planning Performance Option U4 – Most Eastern Route, along Canal Bank.....	53
7.12.8	Environmental Performance Option U4 – Most Eastern Route, along Canal Bank.....	53
7.12.9	Socio-economic Performance Option U4 – Most Eastern Route, along Canal Bank	53
7.12.10	Deliverability Performance Option U4 – Most Eastern Route, along Canal Bank	54
7.12.11	Technical Performance Option U4 – Most Eastern Route, along Canal Bank	55
8	Evaluation Criteria Applied to all UGC and OHL Options	57
9	Emerging Best Performing Option	58
9.1.1	Introduction	58
9.1.2	Emerging Best Performing Option	58
9.1.3	Best Performing Option	59
10	Appendix A detailed descriptions of Alternative Route Options.....	60
10.1	OHL Options Overview.....	61
10.1.1	Description of OHL Option O1 – Western Route	62
10.1.2	Description of OHL Option O2a – Eastern Route, traversing site	63
10.1.3	Description of OHL Option O2b – Eastern Route, traversing site & River Rye	64
10.1.4	Description of OHL Option O2c – Eastern Route, on Berm	65
10.1.5	Description of OHL Option O2d – Most Eastern intel Route, crossing Rye	66
10.1.6	Description of OHL Option O2e – Most Eastern Route, crossing Rye	67
10.2	UGC Options.....	68
10.2.1	Description of UGC Option U1 – Western Route	69

Multi-criteria comparison for Identifying the Best Performing Option

10.2.2	Description of UGC Option U2 – Eastern Route, on Berm	70
10.2.3	Description of UGC Option U3 – Eastern Route, crossing River Rye	71
10.2.4	Description of UGC Option U4 – Most Eastern Route, along Canal Bank.....	72
11	Appendix B	73

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1 Introduction

1.1 The Project

Intel continuously assesses the physical infrastructure of their site and its suitability for current and future operations.

One specific aspect of the infrastructure which is being reviewed is the location of existing electrical pylons on the site associated with the existing Maynooth-Ryebrook 110kV overhead line (OHL).

This report considers the options and feasibility for decommissioning or repositioning these pylons which will involve diverting the existing double circuit overhead line within the immediate surrounding area.

The line currently runs via Lidl supermarket, through the Intel site on the east side, and exits the site towards Confey as shown in Figure 1-1 below.

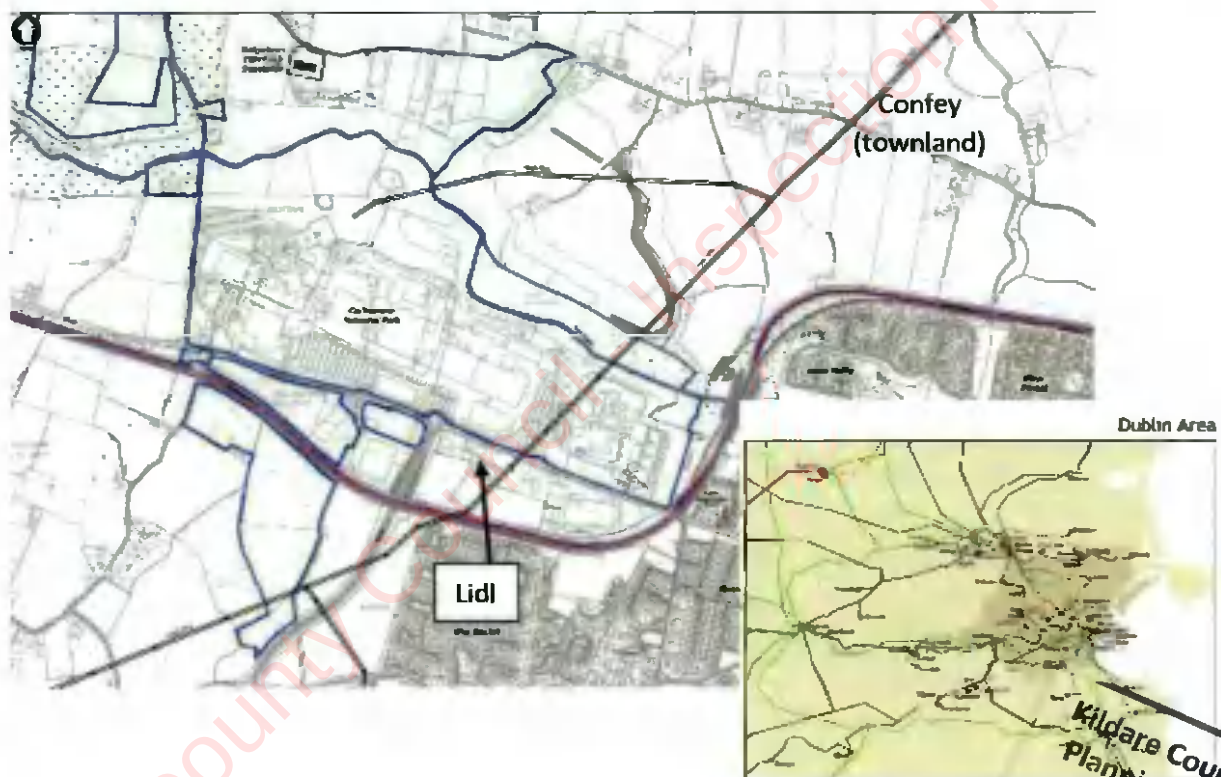


Figure 1-1 Existing the existing Maynooth-Ryebrook 110kV overhead line in the vicinity

This activity forms part of Intel's regular practice to ensure operational readiness and to test position Ireland to respond to future needs of the Corporation and the Intel campus site. This work is preparatory and by diverting the OHL it allows for greater flexibility to develop the existing Campus or strategic positioning of the site and the best use of zoned lands for future potential development requirements.

The objective of the project is thus to divert an existing Overhead line to facilitate better utilisation of underdeveloped zoned industrial lands, as schematically indicated in Figure 1-2 below.



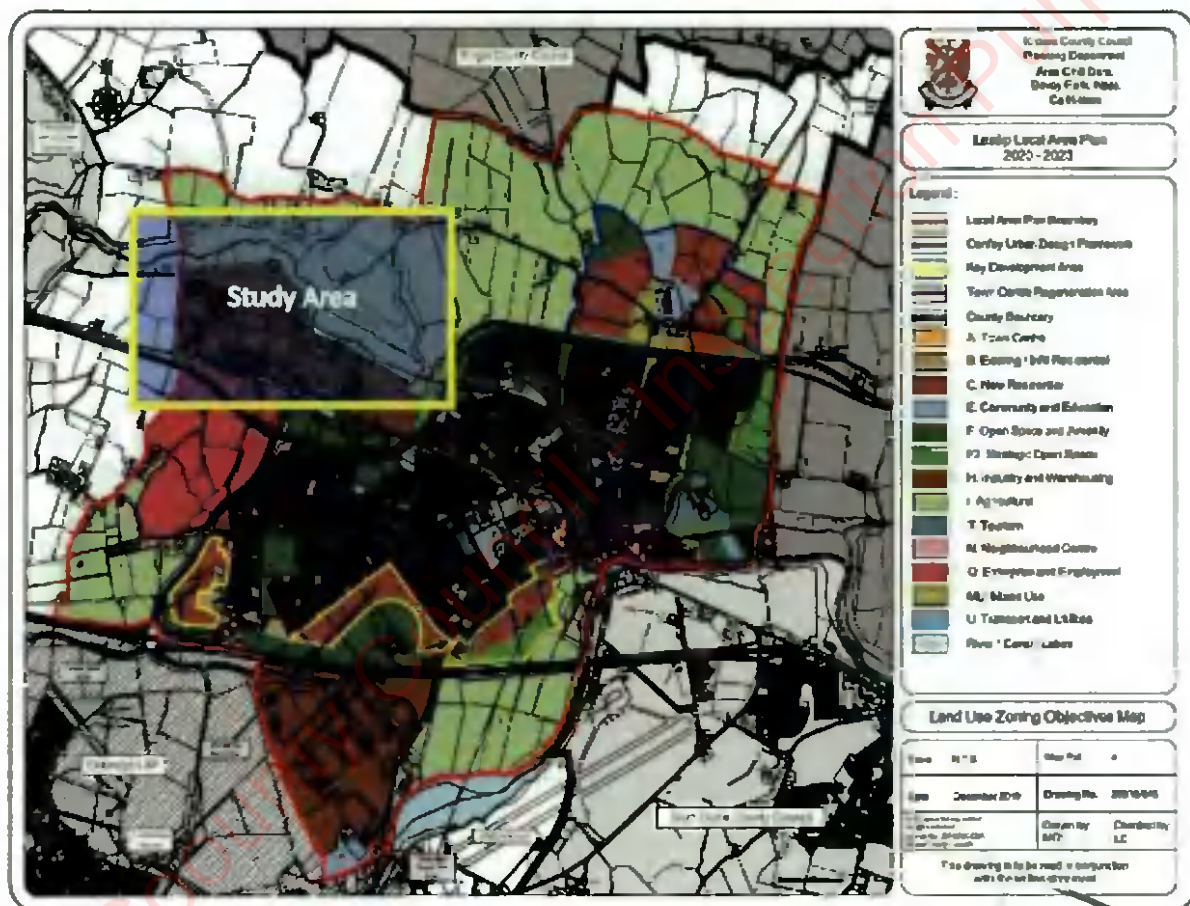
Figure 1-2 The Project Objective is to divert an existing Overhead line to facilitate better utilisation of underdeveloped zoned industrial lands.

2 Areas of Opportunity (Study Area)

2.1 Background to the identification of Areas of Opportunity

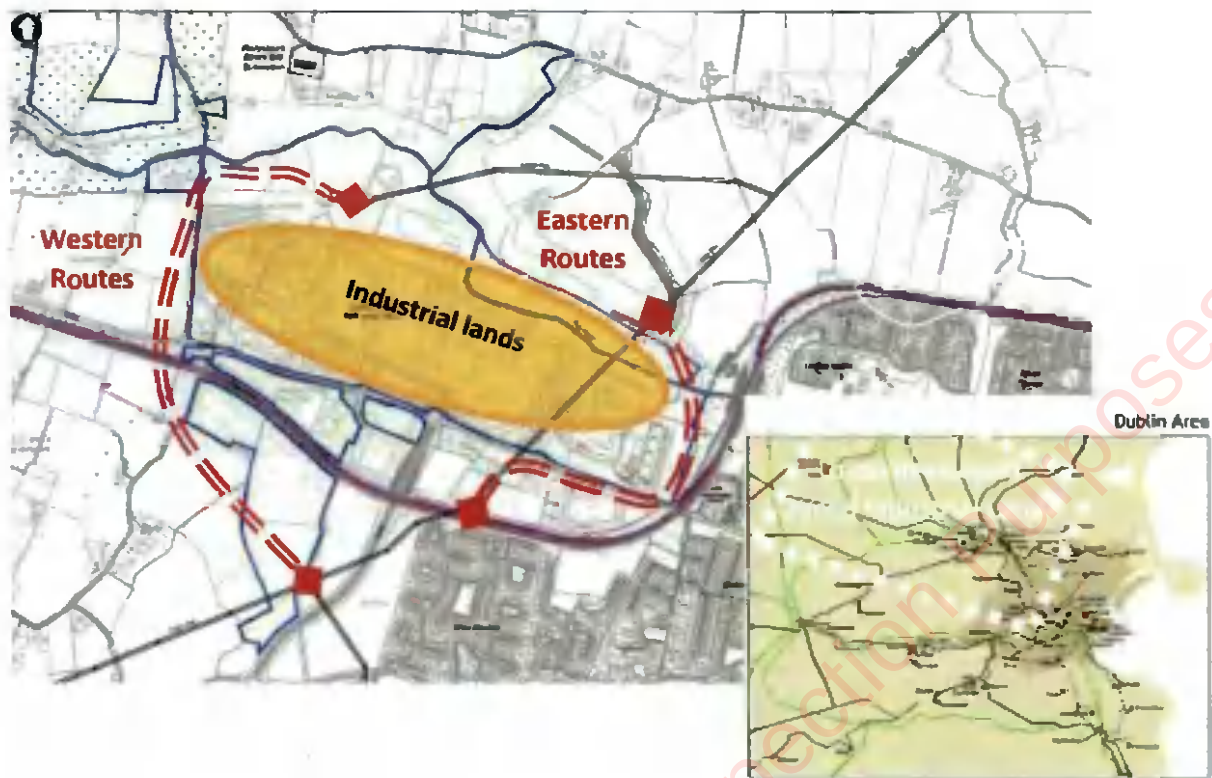
The area of study for potential line relocation was centred on Intel lands that are zoned for industry. A consideration of zoning for land uses, together with patterns of existing developments, confined the Study Area to places between the highly protected Carton Estate, which lies to the west and the densely developed residential areas of west Leixlip – as shown in Figure 2-1 below.

Figure 2-1: The Study Area



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Figure 2-2: Two Strategic Opportunity Options exist within the Study Area



2.1.1 Route Options Opportunities [High Level]

There are two principal strategic options for OHL diversion – west or east of the existing industrial areas, as well as one option U1 which passes through the site. Within these strategic options, a range of Overhead Line [OHL] and Underground Cable [UGC] options were examined in detail to identify 'Areas of Opportunity', by reference to Constraint Mapping [Section 3.3 of this report], as well as to established 'Criteria for Identifying the Best Performing Option' from the EirGrid Grid Development Framework? [Section 5 of this report].

Areas of Opportunity were further informed, principally, by avoiding particular sensitivities and by following areas where the risk/sensitivity/significance is lower, relative to other areas.

Initial options were identified through desktop analysis to determine possible routes. This desktop assessment considered the following:

- Watercourses
- Ecologically sensitive areas
- Archaeologically and Culturally sensitive areas
- Elevated and conspicuous terrain
- Utility, river, rail and road crossings
- Dwellings, infrastructure and settlements.

3 Approach

3.1 Introduction

A consideration of a wide range of alternatives is the best way to identify and to minimise the impact of powerline projects. These alternatives include both different routes, as well as different technologies, namely overhead lines [OHL] versus underground cables [UGC].

3.2 Information Gathering

The consideration of alternatives commenced with the identification of a Study Area to capture the maximum zone in which reasonable alternatives might occur [See Figure 2.1]. Within this zone, information was gathered on the existing layout and operations of electricity infrastructure, as well as surveys of existing industrial and infrastructure structures – both overhead and underground. In parallel, a comprehensive survey was carried out of all relevant planning and environmental factors.

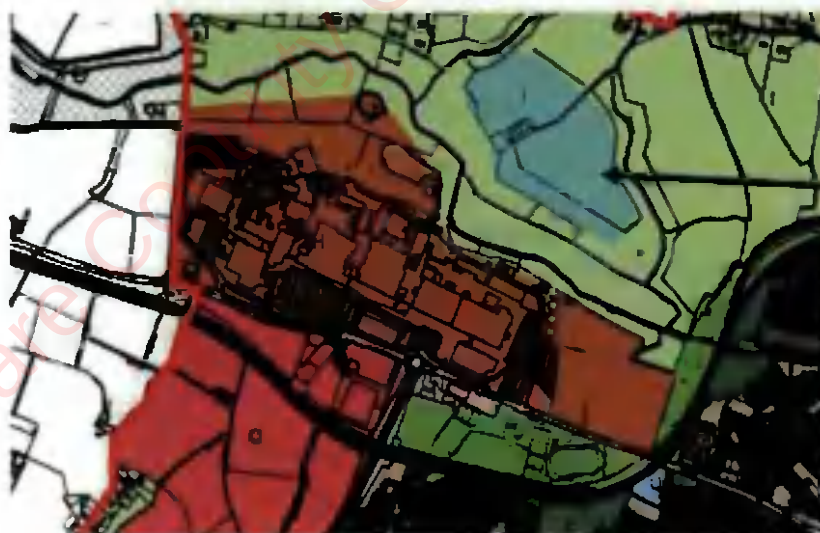
3.2.1 Surveys

In addition to gathering existing information, the study area was subject to detailed new surveys of topography, hydrogeology, geology and soils that required localised and carefully designed and implemented excavation and drilling. Detailed surveys were also carried out on ecology, vegetation, tree heights and conditions, as well as comprehensive photographic surveys from a range of locations. Details of the surveys and their findings are contained in the EIAR that accompanies the planning application.

3.3 Constraints Mapping

Relevant considerations are described below and illustrate how the constraints mapped within the Project study area were used to identify Areas of Opportunity within which OHL routes could be developed. Similarly, these constraints were used to inform the development of broad options for UGC. Constraints mapping is presented in figures 3.1 to 3.4 which follow.

Figure 3-1: Relevant Zoning and Land uses



Source: Kildare Co Co.



Figure 3-2: Summary of relevant constraints – from Leixlip Local Area Plan



Source: Kildare Co Co

Figure 3-3: Summary of Relevant Ecological Constraints from Protected Areas and Habitats



Source: NIS



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4 Description of Route Options



Figure 4-1 OHL Options O1, O2a, O2b, O2c, O2d O2e

4.1 OHL Options

Six overhead line options were examined along routes lying to the west and east of the exiting line. These are illustrated in Figure 4.1 and described, in outline, in Table 1 below. Detailed descriptions of each route are provided in Appendix 10.

Table 1 Overhead route Options

Key	Description	Reference
O1	Diversion to connect with existing substation at Ryebrook	OHL Option O1 – Western Route
O2a	Diversion within existing site to existing onsite mast	OHL Option O2a – Eastern Route, traversing site
O2b	Diversion west of onsite water tanks to existing mast north of the River Rye	OHL Option O2b – Eastern Route, traversing site & River Rye
O2c	Diversion east of onsite water tanks to existing mast north of the River Rye	OHL Option O2c – Eastern Route, on berm, crossing River Rye
O2d	Diversion east of site to existing mast north of the River Rye	OHL Option O2d – Most Eastern Route on Intel lands, crossing River Rye
O2e	Diversion east of site to existing mast north of the River Rye	OHL Option O2e – Most Eastern Route outside Intel lands , crossing River Rye



Figure 4-2 OGC Options U1, U2, U3, U4

4.2 UGC Options

Four Underground cable [UGC] options were examined along routes lying to the west and east of the exiting line. These are illustrated in Figure 4.8 and described, in outline in the table below. Detailed descriptions of each route are provided in the following pages.

Table 2 Underground Cable [UGC] OPTIONS U1, U2, U3, U4

Key	Description	References
U1	Route through roads, parking & between buildings to Ryebrook Substation	UGC Option U1 – Western Route
U2	Route inside R148 boundary, between water tanks and berm and along existing boundary of developed area	UGC Option U2 – Eastern Route, on berm
U3	Route west of berm; along berm edge and down and up valley slopes	UGC Option U3 – Eastern Route, crossing River Rye
U4	Route along south side of R148, Canal Bank and across fields	UGC Option U4 – Most Eastern Route, along Canal Bank

5 Criteria for Identifying the Best Performing Option

5.1.1 Introduction

As per EirGrid's Framework for Grid Development, a multi-criteria comparison has been carried out to evaluate the short list of options and identify the best performing option.

The evaluation of the options uses a multi-criteria comparison against five main criteria;

- Planning Performance
- Environmental Performance
- Socio-economic Performance
- Deliverability
- Technical performance

A description of the five criteria is outlined below.

5.1.2 Planning

- P1 [Conformity: Guidance & Policy]
 - Conformity with relevant Guidance Documents
 - Conformity with relevant National and Regional Planning Policy
 - Conformity with Local Plans and Policies – land use, and designations
- P2 [Conformity: Existing Patterns]
 - Conformity with pattern of development in the vicinity
- P3 [Impacts on Protected Natural, Cultural Heritage, Residences & Amenities]
 - Consequences of a grant for the natural and heritage environment in the area, especially designations
 - Consequences of a grant for the proper planning of the area, such as impacts on adjoining residents, land uses and designations
 - Consequences of a grant of permission for the sustainable development of the area

5.1.3 Environmental

- E1 Biodiversity:
 - Potential impacts on protected sites for nature conservation, habitats and protected species.
- E2 Soils and water impacts:
 - Potential impact on soils (geology, Irish geological heritage sites, etc) and water quality (of surface waters and groundwater).
- E3 Material Assets:
 - Potential impact on land use
- E4 Landscape & Visual:
 - Potential impacts on landscape constraints and designations and the potential impact on visual amenity.
- E5 Cultural Heritage:
- the potential for impacts on the cultural heritage resources – such as archaeology & architectural heritage
- E6 Noise:
 - Potential for vibration and noise impact of the development, taking into account sensitive receptors.

5.1.4 Socio Economic

- S1 Settlement & Communities:
 - The expected impact of a grid development option on towns, villages and rural housing, and the way of life of their communities, residents, workers and visitors.
- S2 Recreation & Tourism:
Impact on recreational activities (e.g. fishing, sports) and tourism during and after construction, that are not included in the other sub criteria.

5.1.5 Deliverability

Deliverability sub-criteria are:

D1 - Implementation Timelines:

Relative length of time until energisation (assess significant differences).

D2 - Project Plan Flexibility:

Does the project plan allow for some flexibility if issues arise during design and construction.

D3 - Permits & Wayleaves:

Various permissions and wayleaves required to proceed to construction (e.g. number or level).

D4 - Design Complexity:

Assessment of crossings, obstacles or constraints that may complicate or impact the design. The project should also comply with the specified ratings¹ as provided by EirGrid.

5.1.6 Technical

T1 - Compliance with safety standards:

The Project should comply with relevant safety standards such as those from the European Committee for Electrotechnical Standardisation (CENELEC). Materials should comply with IEC or CENELEC standards.

T2 - System Reliability:

The average failure rates for the OHL or UGC can be calculated using, for example, estimated availability figures (unplanned outages/100km/year), Mean Time to Repair (MTTR) and the length of the line or cable.

T3 - Expansion / Extendibility:

This considers the ease with which the option can be expanded, i.e. it may be possible to uprate an OHL to a higher capacity or a new voltage in the future and the implications of UGC solutions should be considered in this regard.

T4 - Repeatability:

This criterion examines whether this option can be readily repeated in the EirGrid network. For example, an OHL HVAC option is very repeatable, but a partially underground HVAC option is less repeatable as there can only be a certain amount of underground HVAC cable in each area of the network.

T5 - Technical Operational Risk:

'Technical Operational Risk' aims to capture the risk of operating different technologies in the network.

¹ 430mm² ACSR with a maximum operating temperature of 80°C giving a summer rating of 935 A and a winter rating of 1102 A



5.1.7 Criteria Scale

The effect on each criteria parameter is presented along a range from 'more significant'/'more difficult'/'more risk' to 'less significant'/'less difficult'/'less risk'. The following scale is used to illustrate each criteria parameter:

Table 3 Scale of Assessment Criteria used

More significant/difficult/risk ←			→ Less significant/difficult/risk		
Very High	High	Moderate - High	Moderate Low	Low	None

High Risk for Planning Factors means a low compliance with Development Plan Policies, Objectives or Zoning, while Low Risk means good compliance.

High Risk for Environmental Factors means a high potential to adversely affect the extent, integrity, character or stability of an environmental factor

High Risk for Socio-economic means a high potential to adversely affect amenities, business or economic activity in the locality.

High Risk for Technical Operations means the risk of construction or operating different technologies on the network or route.

6 Evaluation Criteria Considerations and Context

This section provides an option-by-option assessment of schematic layouts of the full range of available options.

The note examines 4 Underground Cable [UGC] Options [U1, U2, U3, U4] and 6 Overhead Line [OHL] Options O1, O2a, O2b, O2c, O2d, O2e. These are summarised in Figures 3 and 4, while detailed assessments of each schematic route are provided for UGC in Tables 1 – 4 and for OHLs in Tables 5 – 9.

6.1 Environmental & Planning Context

Options are assessed against Environmental and Planning Criteria as recorded in the Kildare County Development Plan and in the Leixlip Local Area Plan. [See Figures 3.2 – 3.4 above]

Key Environmental Constraints

Proximity to Designated Features

- SAC and Designated Habitats & Features
- Petrifying Springs
- Protected Views
- Roman Baths
- Carton House
- Hedsor House

Proximity to Amenities

- Royal Canal Way
- Leixlip Waterfall



Multi-criteria comparison for Identifying the Best Performing Option



Figure 6-1 Environmental & Planning Constraints

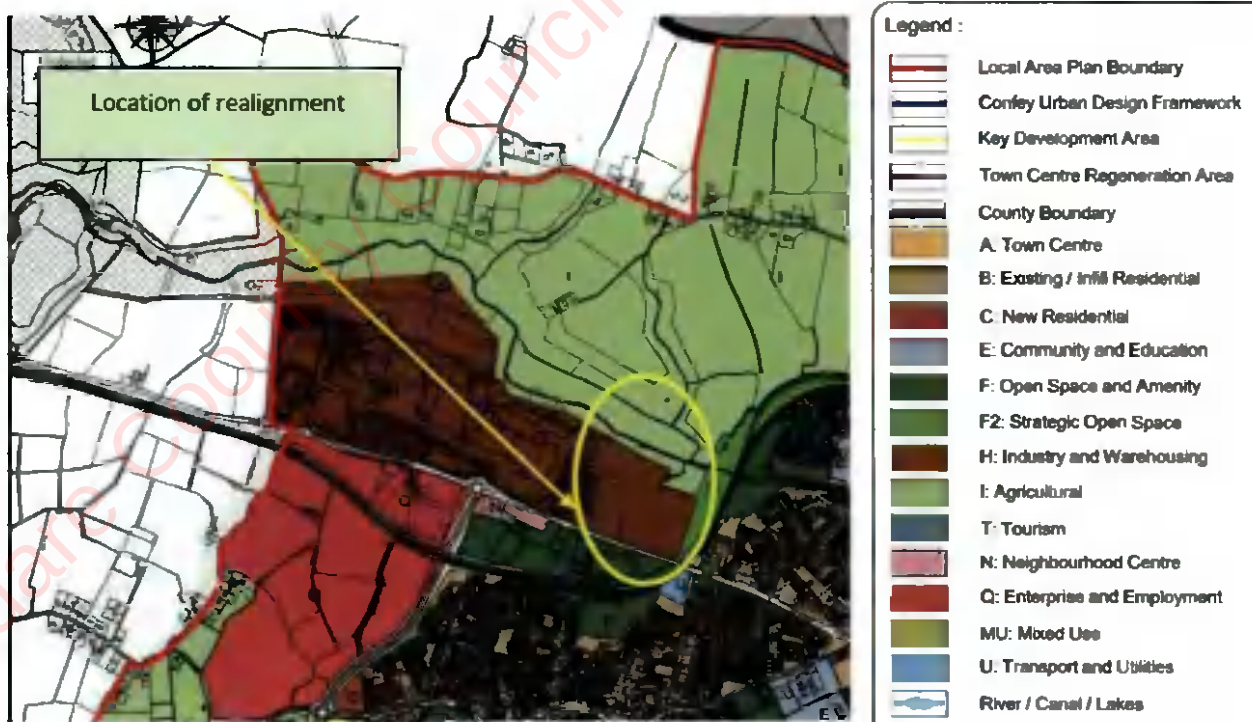


Figure 6-2
[Source

6.2 Technical & Deliverability Context

6.2.1.1 System Reliability

Each option is assessed on the average failure statistics, such as the mean time to repair (MTTR) and the unplanned outages per 100 km per year.

For reference, the unplanned outages for 110 kV overhead lines was 0.255 per 100 km per year for the period between 2011 and 2016. The mean time to repair was 3 days during the same period.

The unplanned outages for 110 kV cross-linked polyethylene cable was 1.430 per 100 km per year for the period between 2011 and 2016. The mean time to repair was 58 days during the same period. These statistics are summarised below in Table 3

Table 4 System Reliability Criteria

Technology	Irish Transmission system statistics		International Statistics
	Unplanned outages per 100 km per year	Mean Time To Repair (days)	Unplanned outages per 100 km per year
110 kV XLPE Underground Cable	1.43	58	0.085
110 kV Overhead Line	0.255	3	1.800

Source: EirGrid

6.2.1.2 Expansion / Extendibility:

Each option is assessed for the power carrying capability of the circuit, which is limited by the heat (thermal losses) generated by the power flowing through the circuit. To increase the power carrying capability of the circuit, this can be achieved by increasing its thermal capacity. For OHL technology this is usually achieved by uprating the line to a higher capacity by changing the OHL conductor or increasing its operating temperature. In terms of extendibility, OHL's can be refurbished to increase the life expectancy of the circuit.

For UGC, increasing the thermal rating may be difficult to achieve in the future due to the diameter of ducting and crossing of obstacles. Crossing of obstacles such as bridges, culverts, watercourses, transmission gas mains, drainage pipes or other cables can require UGC to be buried deeper and this would have an impact on the thermal rating of the cable.

6.2.1.3 Repeatability:

Each option is assessed on the repeatability of the technology used within the Irish transmission system. OHL technology at 110 kV is already widely in use, with more than 4500 km of circuit length in operation on the Irish transmission system. Considering system integration, operation, and maintenance there are no limits envisaged with regards to the repeatability of 110 kV OHL's on the Irish transmission system.

UGC technology at 110 kV is also in use, with approximately 400 km of circuit length in operation on the Irish transmission system. The average 110 kV UGC length on the Irish transmission system is circa 2km with the longest circuit between the Coomataggart and Ballyvouskill substations, of circa 31km. Considering the existing circuit is double circuit overhead line, it is considered likely that any future opportunities for additional UGC may be limited in the area due to system reliability.

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6.2.1.4 Technical Operational Risk:

Each option is assessed on the risk of operating different technologies on the transmission system. Overhead lines are seen as a tried and tested technology. Hence, low technical operational risk is associated with overhead line technology.

UGC is also considered as a tried and tested technology. However, introducing a section of cable in an existing double circuit which is predominantly overhead line, will increase different components, which increases complexity of control and protection schemes. With the increase of different components, this can reduce reliability and increase the inherent risk of failure.

6.2.2 Deliverability Context

Each route option is assessed with respect to deliverability performance on the basis of the following criteria:

6.2.2.1 Implementation Timelines

Each option is assessed for relative length of time from the beginning of the construction phase until energisation. Consideration is given to the route lengths, as well as any seasonal and local constraints that may impact the implementation. The critical path of the construction programme is the installation of the technology. As such, options with the same technology have similar implementation timelines.

Installation rates will assume a standard 5-day working week. The following rates are applied for double circuit installation:

- 25m per crew per day for installation of UGC. Assume works are sequenced to allow 2 crews working in parallel.
- 0.5km per week for installation of OHL. Assumes that works can be completed in parallel with multiple crews.

6.2.2.2 Project plan flexibility

Each option is assessed for the level of flexibility to identify a route. There is a reasonable level of flexibility to identify routes for all options. However, once the route is designed and the planning consent secured, there would be very little flexibility at that stage.

6.2.2.3 Dependence on other projects

Each option is assessed for the extent to which the route may be impacted by other infrastructure projects in the area. All options have been reviewed and do not have a dependence on other infrastructure projects; as such, this criterion will not form part of the assessment.

6.2.2.4 Permits and Wayleaves

All options presented will require new infrastructure and will require permits, wayleaves and/or easements. Each option will consider the number of landowners that may be subject to wayleave and/or easement requirements.

6.2.2.5 Design Complexity

Each route option is assessed in terms of obstacles or crossings encountered. The following constraints are considered in the assessment:

- Poor ground
- Water courses
- Elevated Terrain

Multi-criteria comparison for Identifying the Best Performing Option

- Utility, River, Rail and Road crossings
- The need for HDD
- Requirements to micro-route to ensure minimum duct bending radius of 6m
- Existing services within site or roadways
- Dwellings

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7 Detailed Application of Criteria to UGC and OHL Options

7.1 Assessment Methodology and Presentation

This section presents each route, overlain on an aerial photograph of the site, over three successive pages – as shown on Figure 7- 2. Indicative locations for project features, such as angle masts [AM] are indicated. An assessment is provided of the potential risk associated with each of the criteria for identifying the best performing option, as well as the evaluation criteria considerations that were set out in Sections 5 and 6.

Each criterion is given a risk assessment to determine whether there is a risk of non-conformance and, if so, by how much. These are then individually assigned a value – rated from Very High Risk to Low Risk [as described in the Criteria Scale at Section 5.7].

Each of these ratings are then transferred to a Table that provides a Summary Assessment of each route. These results, in turn are grounded in Table 9 Summary Evaluation of all routes. Table 9 facilitates an easy and visible comparison and identification of the best performing option.

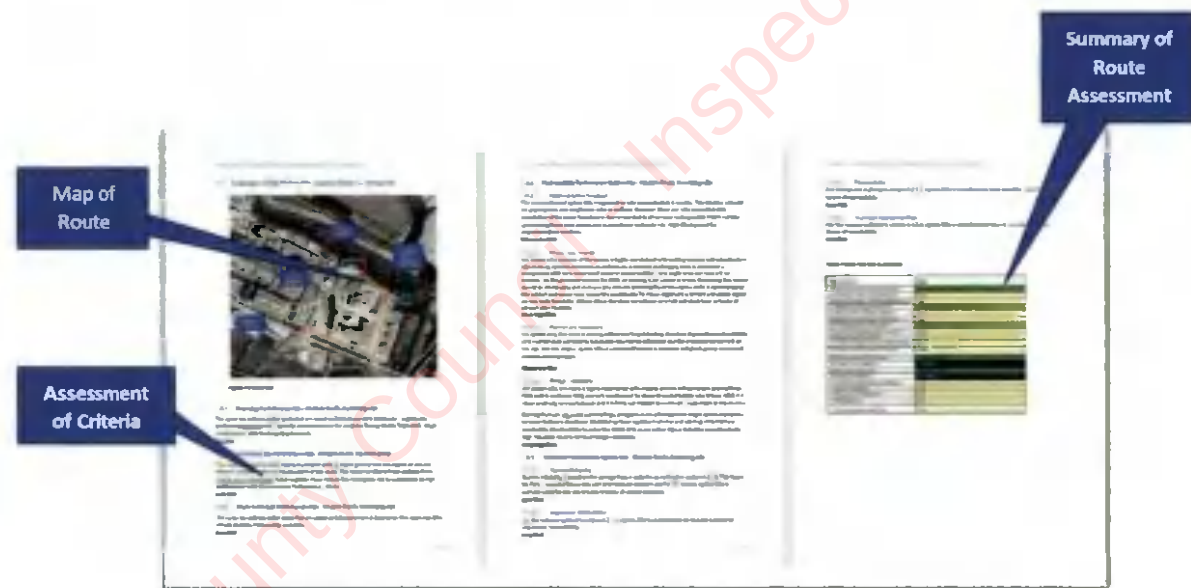


Figure 7-1 Presentation of Assessment of Alternatives

7.2 OHL Options Overview

This section provides a detailed application of criteria to UGC and OHL options by referring to the five criteria of planning, environmental, socio-economic, deliverability, as well as technical performance, for each option. Each route includes a table to summarise the risks and advantages arising from each route. The results of these tables are carried forward to facilitate comparisons between options in Section 8 of this report.



Figure 7-2

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7.3 Evaluation of OHL Option O1 – Western Route

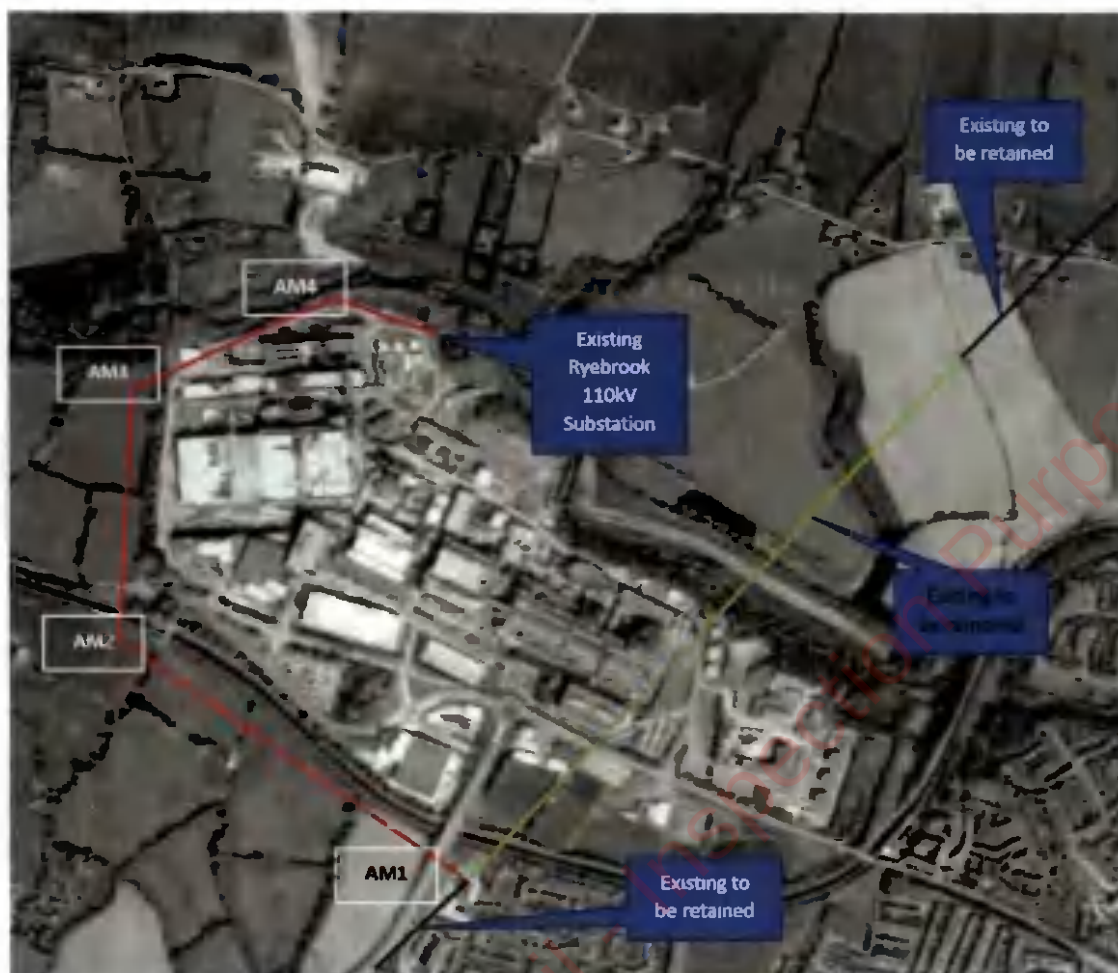


Figure 7-3 Route O1

7.3.1 Planning Performance Option O1 – Western Route

The southern sections – AM1 – AM2 pass through lands that are zoned as Q Employment & Enterprise. Transmission infrastructure/ masts would be considered as a land use which is generally in conformance with such a zoning objectives, and such a landuse is also indicated as being 'Open for Consideration' in the relevant Land Use Zoning Matrix in Table 14.5

The western sections AM2 – AM4 lie outside of the Local Area Plan Boundary on unzoned lands. However those parts that cross the Rye Water are likely to contravene objectives relating to the protection of Views and Prospects, as well as the Carton Demesne Protected Areas for architectural heritage. There is low conformity with Criteria P1, P2 and P3. Taken together these latter factors rank this as a High Risk for Planning Factors because of low compliance with Development Plan Policies, Objectives or Zoning.

High Risk

7.3.2 Environmental Performance Option O1 – Western Route

The western sections AM2 – AM4 traverse the Rye Water/ Carton pNHA and SAC as well as the Carton Demesne Protected Areas for architectural heritage and crossing the Royal Canal near Deey Bridge and Lock – which are Protected Structures. There is low conformity with Criteria E1, E4 and E5. Taken together, these latter factors rank this as a High Risk for Environmental conformance

High Risk

7.3.3 Socio-economic Performance Option O1 – Western Route

This route traverses the Royal Canal National Way-marked Trail which is a medium to low risk to adversely affect amenities, business or economic activity in the locality.

Moderate-Low Risk

7.3.4 Technical Performance Option O1 – Western Route

7.3.4.1 Implementation Timelines

The construction of option O1 is expected to take the longest, being approximately 7 months, as it is the longest of the OHL options. This timeline is based on assumptions and installation rates as outlined in section 6. However, there are risks associated with crossing major roads R449 and R148, crossing the railway and Royal canal, ground investigations and traffic management. Timelines will be increased due to dismantling the largest section of existing OHL route. Considering these risks, option 1 is considered high risk for implementation timelines.

High Risk

7.3.4.2 Project plan flexibility

For option O1, the route is the longest and it is proposed to be built in green field, allowing for some flexibility if issues arise during design and construction, provided wayleaves are granted. Option O1 is therefore considered mid-level risk, in terms of project plan flexibility.

Moderate-High Risk

7.3.4.3 Permits and Wayleaves

Option O1 is the longest OHL route and it will require more landowner and stakeholder engagement than other routes. Engagement with Waterways Ireland and Irish rail will be required for the two canal and two railway crossings. Option O1 is therefore considered high to moderate risk.

Moderate-High Risk

7.3.4.4 Design Complexity

Option O1 is highly constrained by major crossings: R449, R148, railway, Royal Canal and the River Rye. This option requires the erection of 4 No. angle masts. From AM3 to AM4 the route transverses the protected area of Carton Demesne (Northwest), developed industrial lands (Southeast) and the River Rye SAC. In the design of the route realignment, these crossings may present challenges and increase the complexity of the design at these locations. Option O1 is therefore considered very high risk in terms of design complexity.

Very High Risk

7.3.5 Technical Performance Option O1 – Western Route

7.3.5.1 System Reliability:

System reliability is based on the average failure statistics as outlined in section 6.2.1.1. The figures for OHL's compare favourably with international statistics and for this reason, option O1 is considered to be low risk in terms of system reliability.

Low Risk

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7.3.5.2 Expansion / Extendibility:

For the reasons outlined in section 6.2.12, option O1 is considered to be low risk for expansion / extendibility.

Low Risk

7.3.5.3 Repeatability:

For the reasons outlined in section 6.2.1.3 option O1 is considered to have low risk in terms of repeatability.

Low Risk

7.3.5.4 Technical Operational Risk:

For the reasons outlined in section 6.2.1.4, option O1 is considered to have to low risk in terms of repeatability.

Low Risk

Table 5 Route O1 Risk Assessment

Considerations	Risk
P1 Conforms with Policy & Guidance?	High – cuts through SAC & Carton Heritage area
P2 Conforms with Existing Patterns?	Low Risk – crosses mostly undeveloped Farmland
P3 Creates Impacts on Protected Features?	High – adjacency to SAC & cuts through Carton Heritage area
E1 Biodiversity Impact Potential?	High – runs close to edge of SNHA & SAC
E2 Soils & Water Impact Potential?	Low Risk
E3 Material Assets Impact Potential?	Low Risk
E4 Landscape Impact Potential?	High Risk – some Visibility from Sandfords Bridge
E5 Cultural Heritage: Impact Potential?	High Risk – some Visibility from Carton
E6 Noise Impact Potential?	Low Risk
S1 Impacts on Settlement & Communities:	Moderate – low Visibility from Royal Canal Walk
S2 Impacts on Recreation & Tourism:	Moderate – low Visibility from Royal Canal Walk
D1 Implementation Timelines:	High
D2 Project Plan Flexibility:	Moderate High
D3 Permits & Wayleaves:	Moderate High
D4 Design Complexity:	Very High
T1 Compliance with safety standards:	Low
T2 System Reliability:	Low
T3 Expansion / Extendibility:	Low
T4 Repeatability:	Low
TS Technical Operational Risk:	Low

7.4 Evaluation of OHL Option O2a – Eastern Route, traversing site



7.4.1 Planning Performance O2a – Eastern Route, traversing site

The route lies entirely within lands that are zoned as Q Employment & Enterprise – a generally conforming landuse that is open for consideration in the Land Use Zoning Matrix Table 14.5 – High Conformance with Planning Requirements.

Low Risk

7.4.2 Environmental Performance O2a – Eastern Route, traversing site

The route lies entirely within highly developed lands on made ground that are devoid of natural features. European site lies directly north of this route. This route has little off-site visibility from nearby scenic sensitivities Taken together these factors this route gives rise to a moderate to high conformance with Environmental Performance Criteria.

Low Risk

7.4.3 Socio-economic Performance O2a – Eastern Route, traversing site

The route lies entirely within lands that are zoned as Q Employment & Enterprise. The route has little off-site visibility from nearby amenities.

Low Risk

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7.4.4 Deliverability Performance Option O2a – Eastern Route, traversing site

7.4.4.1 Implementation Timelines

The construction of option O2a is expected to take approximately 5 months. This timeline is based on assumptions and installation rates as outlined. However, there are risks associated with installation of the tower foundations due to constraints of services running within Intel's campus. Considering these risks, option O2a is considered moderate risk – High, for implementation timelines.

Moderate Risk

7.4.4.2 Project plan flexibility

For option O2a, location of the towers is highly constrained with existing services and infrastructure. Maintaining external clearances to all features is deemed challenging. AM2 is located at a pumphouse with very constrained space to accommodate a new angle mast and may not be feasible. At the proposed location for AM3, an existing 1.2m culvert is in-situ. Relocating this service would be challenging and increases the risks for deliverability of this option. AM3 is constrained by the culvert and access road, hence the opportunity for micro-alignment is limited and would impact on the route feasibility. Option O2a is therefore considered very high risk in terms of project plan flexibility.

Very High Risk

7.4.4.3 Permits and Wayleaves

For option O2a, the route is entirely within Intel's land holding. However, due to the constructability and maintenance constraints, wayleaves may not be obtainable due the existing development on the site. For this reason, option O2a is considered to have a moderate risk in terms of permits and wayleaves.

Moderate Risk

7.4.4.4 Design Complexity

For option O2a, the route is highly constrained with existing services, infrastructure and buildings. AM3 and in particular AM2, are very constrained for space to accommodate new towers. AM2 is in close proximity to a pumphouse and it is likely not feasible to construct a new tower in this location.

Existing features, e.g. roads and buildings, along the route will impact the height of the new towers to meet statutory clearances. Considering these significant services and existing infrastructure constraints, the feasibility to route the 110kV OHL as per option O2a is therefore considered very high risk in terms of design complexity.

Very High Risk

7.4.5 Technical Performance Option O2a – Eastern Route, traversing site

7.4.5.1 System Reliability:

System reliability is based on the average failure statistics as outlined in section 6.2.1.1. The figures for OHL's compare favourably with international statistics and for this reason, option O2a is considered to be low risk in terms of system reliability.

Low Risk

7.4.5.2 Expansion / Extendibility:

For the reasons outlined in section 6.2.1.2, option O2a is considered to be low risk for expansion / extendibility.

Low Risk

7.4.5.3 Repeatability:

For the reasons outlined in section 6.2.1.3, option O2a is considered to have low risk in terms of repeatability.

Low Risk

7.4.5.4 Technical Operational Risk:

For the reasons outlined in section 6.2.1.4, option O2a is considered to have to low risk in terms of repeatability.

Low Risk

Table 6 Route O2a Risk Assessment

Considerations	Risk
P1 Conforms with Policy & Guidance?	
P2 Conforms with Existing Patterns?	Low
P3 Creates Impacts on Protected Features?	Low
E1 Biodiversity Impact Potential?	Moderate-Low – near Petrifying Spring
E2 Soils & Water Impact Potential?	Low
E3 Material Assets Impact Potential?	Low
E4 Landscape Impact Potential?	Moderate-Low – near canal
E5 Cultural Heritage: Impact Potential?	Low
E6 Noise Impact Potential?	Low
S 1 Impacts on Settlement & Communities:	Low
S2 Impacts on Recreation & Tourism:	Low
D1 Implementation Timelines:	Moderate High
D2 Project Plan Flexibility:	Very High
D3 Permits & Wayleaves:	Moderate-High
D4 Design Complexity:	Very High
T1 Compliance with safety standards:	Low
T2 System Reliability:	Low
T3 Expansion / Extendibility:	Low
T4 Repeatability:	Low
T5 Technical Operational Risk:	Low



7.5 Evaluation of OHL Option O2b – Eastern Route, traversing site & River Rye

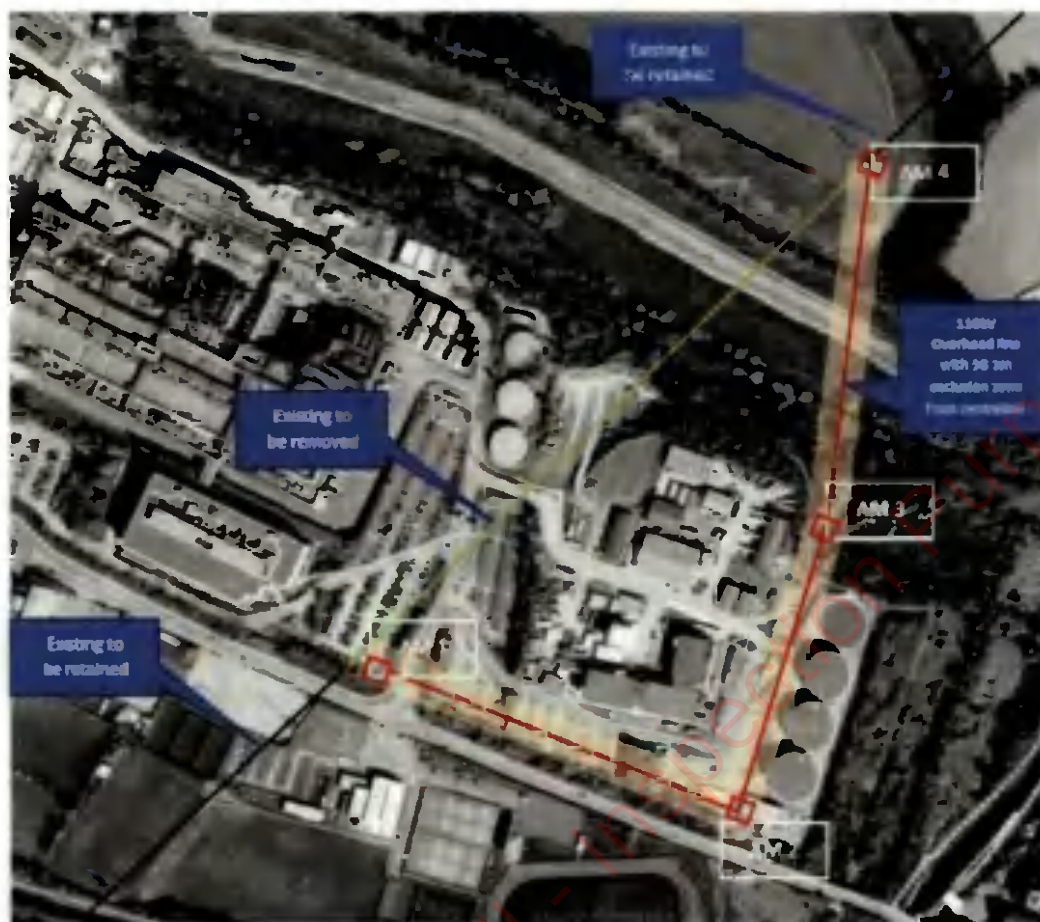


Figure 7-4 Option O2b Eastern Route

7.5.1 Planning Performance - Option O2b Eastern Route, traversing site & River Rye

Over half of the development route lies within lands that are zoned as Q Employment & Enterprise – a generally conforming landuse that is open for consideration in the Land Use Zoning Matrix Table 14.5 – Low risk of non-conformance with Planning Requirements.

The northern section crosses lands zoned I for Agriculture – where proposals for new uses are considered on a case-by-case basis – subject to other Plan provisions.

In this instance the designations of nearby views, amenities and ecological sensitivities are material considerations that give rise to a moderate to high risk of non-conformance with Planning Criteria.

Moderate-High Risk

7.5.2 Environmental Performance Option O2b – Eastern Route, traversing site & River Rye

The southern part of the route lies entirely within highly developed lands on made ground that are devoid of natural features. There is a European site within the northern part of this route. As per current conditions, this route has significant off-site visibility from nearby scenic sensitivities. Taken together these factors for this part of the route gives rise to a moderate - low risk of new non-conformance with Environmental Performance Criteria.

Moderate-Low Risk

7.5.3 Socio-economic Performance Option O2b – Eastern Route, traversing site & River Rye

The southern part of the route lies entirely within lands that are zoned as Q Employment & Enterprise. As per current conditions, the northern parts are visible from and have the potential to affect off-site regional and local amenities. Taken together these considerations give rise to a moderate-low risk of new non-conformance with Environmental Performance Criteria.

Moderate-Low Risk

7.5.4 Deliverability Performance Option O2b – Eastern Route, traversing site & River Rye

7.5.4.1 Implementation Timelines

The construction of option O2b is expected to take approximately 6 months. This timeline is based on assumptions and installation rates as outlined in section 6.2.2.1. However, there are risks associated with installation of the tower foundations due to constraints of services running within Intel's campus. Crossing the River Rye which is in a SAC, may require alternative stringing methodologies such as a catenary support system. Considering these risks, option O2b is considered moderate to high risk for implementation timelines.

High Risk

7.5.4.2 Project plan flexibility

For option O2b, location of the towers is highly constrained with existing services and infrastructure. Maintaining external clearances to all features is deemed challenging. AM2 is located at a pumphouse with very constrained space to accommodate a new angle mast and may not be feasible. At the proposed location for AM3, an existing 1.2m culvert is in-situ. Relocating this service would be challenging and increases the risks for deliverability of this option. AM3 is constrained by the culvert and access road, hence the opportunity for micro-alignment is limited and would impact on the route feasibility. Option O2a is therefore considered very high risk in terms of project plan flexibility.

Very High Risk

7.5.4.3 Permits and Wayleaves

For option O2b, the route is in its majority, within Intel's land holding. Landowner engagement will be required for the northern section of the route. Tower locations and construction compounds will need to remain outside the SAC. For these reasons, option O2b is considered to have a moderate - high risk in terms of permits and wayleaves.

Moderate-High Risk

7.5.4.4 Design Complexity

For option O2b, the route is highly constrained with existing services, infrastructure and buildings. AM3 and in particular AM2 are very constrained for space to accommodate new towers. AM2 is in close proximity to a pumphouse and is likely not feasible to construct a new tower in this location. In the northern section of the route, the final and temporary arrangements need to avoid the SAC. Existing features, e.g. roads, buildings or River Rye, along the route will impact the height of the new towers to meet statutory clearances. Considering these significant service constraints and the feasibility to route the 110kV OHL, Option O2b is therefore considered very high risk in terms of design complexity.

Very High Risk

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7.5.5 Technical Performance Option O2b – Eastern Route, traversing site & River Rye**7.5.5.1 System Reliability:**

System reliability is based on the average failure statistics as outlined in section 6.2.1.1. The figures for OHL's compare favourably with international statistics and for this reason, option O2b is considered to be low risk in terms of system reliability.

Low Risk

7.5.5.2 Expansion / Extendibility:

For the reasons outlined in section 6.2.1.2, option O2b is considered to be low risk for expansion/extendibility.

Low Risk

7.5.5.3 Repeatability:

For the reasons outlined in section 6.2.1.3, option O2b is considered to have low risk in terms of repeatability.

Low Risk

7.5.5.4 Technical Operational Risk:

For the reasons outlined in section 6.2.1.4, option O2b is considered to have low risk in terms of repeatability.

Low Risk

Table 7 O2b Assessment

Considerations	Risk
P1 Conforms with Policy & Guidance?	Low – proximity to all designations
P2 Conforms with Existing Patterns?	Low – follows existing patterns
P3 Creates Impacts on Protected Features?	Low – visibility from Designated Views & Amenities
E1 Biodiversity Impact Potential?	Moderate-Low – crosses SAC, like existing
E2 Soils & water Impact Potential?	Low
E3 Material Assets Impact Potential?	Low
E4 Landscape Impact Potential?	Moderate-Low – crosses valley, like existing
E5 Cultural Heritage: Impact Potential?	Low
E6 Noise Impact Potential?	Low
S1 Impacts on Settlement & Communities:	Low
S2 Impacts on Recreation & Tourism:	Moderate-Low – Visibility from Amenities and Views
D1 Implementation Timelines:	High Risk
D2 Project Plan Flexibility:	Very High
D3 Permits & Wayleaves:	Moderate High
D4 Design Complexity:	Very High
T1 Compliance with safety standards:	Low
T2 System Reliability:	Low
T3 Expansion / Extendibility:	Low
T4 Repeatability:	Low
T5 Technical Operational Risk:	Low

7.6 Evaluation of OHL Option O2c – Eastern Route, on Berm

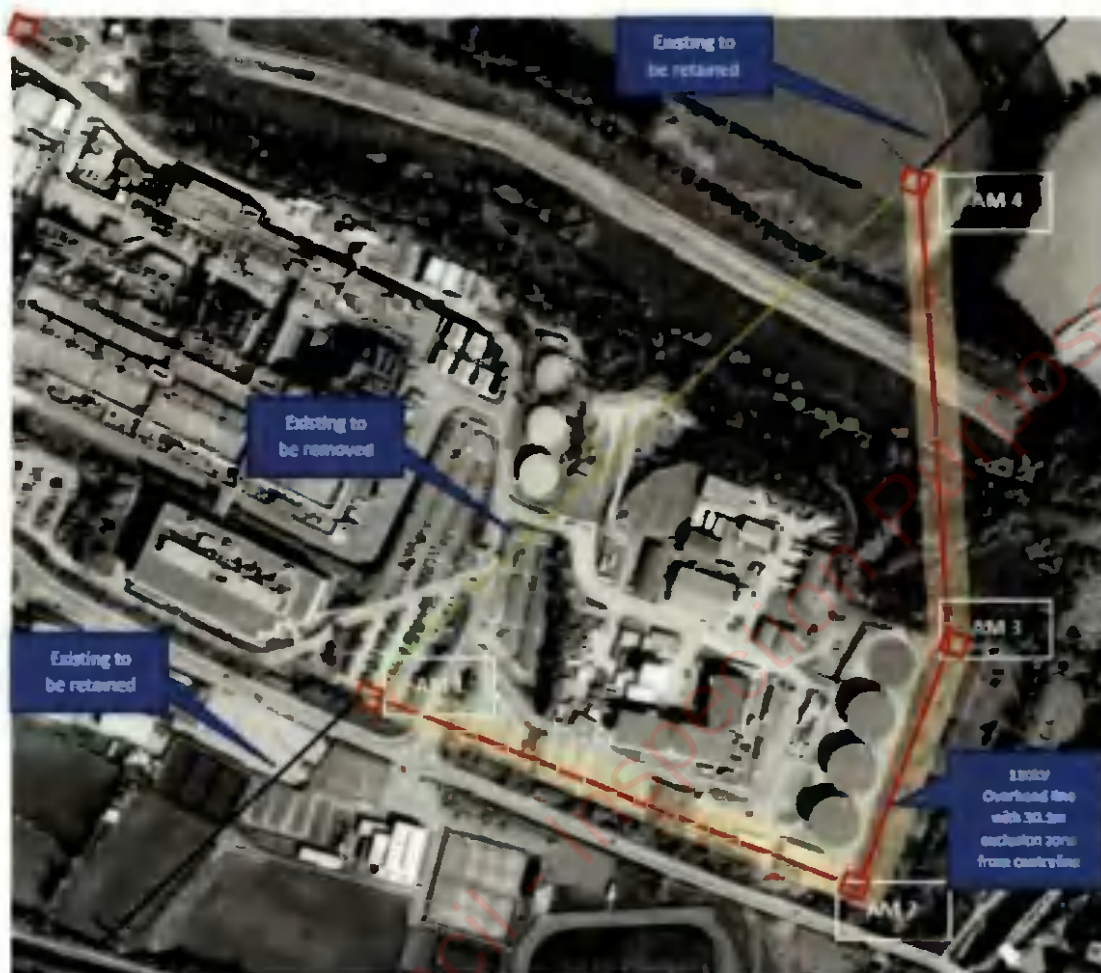


Figure 7-5 Route 2c

7.6.1 Planning Performance Option O2c – Eastern Route, on Berm

Over half of the development route lies within lands that are zoned as Q Employment & Enterprise – a generally conforming landuse that is open for consideration in the Land Use Zoning Matrix Table 14.5 – Low risk of non-conformance with Planning Requirements.

The northern section crosses lands zoned I for Agriculture – where proposals for new uses are considered on a case-by-case basis – subject to other Plan provisions.

In this instance the designations of nearby views, amenities, ecological sensitivities and proximity of adjacent residential land uses, are material considerations that give rise to a moderate to high risk of non-conformance with Planning Criteria.

Moderate-High Risk

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28 NOV 2022
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7.6.2 Environmental Performance Option O2c – Eastern Route, on Berm

The southern part of the route lies entirely within highly developed lands on made ground that are devoid of natural features. There is a European site lying within the northern part of this route. As per current conditions, this route has significant off-site visibility from nearby scenic sensitivities. Taken together, these factors for this part of the route give rise to a high risk of non-conformance with Environmental Performance Criteria.

High Risk

7.6.3 Socio-economic Performance Option O2c – Eastern Route, on Berm

The southern part of the route lies entirely within lands that are zoned as Q Employment & Enterprise. As per current conditions, the northern parts are visible from and have the potential to affect, off-site regional and local amenities. Taken together, these considerations give rise to a high risk of non-conformance with Environmental Performance Criteria.

High Risk

7.6.4 Deliverability Performance Option O2c – Eastern Route, on Berm

7.6.4.1 Implementation Timelines

The construction of option O2c is expected to take approximately 6 months. This timeline is based on assumptions and installation rates as outlined in section 6.2.2.1. However, there are risks associated with installation of the tower foundations due to constraints of services running within Intel's campus and expected poor ground conditions at the berm. Considering these risks, option O2c is considered moderate to high risk for implementation timelines.

Moderate-High Risk

7.6.4.2 Project plan flexibility

For option O2c, location of the towers is highly constrained with existing services and expected poor ground conditions. LV/MV switchgear located at AM2 makes this location not feasible for a tower location. Both AM2 and AM3 are located on steep berm ground which will cause stability issues. Maintaining external clearances to all features is deemed challenging. Tower locations and construction compounds will need to remain outside the SAC. Option O2c is therefore considered very high risk in terms of project plan flexibility.

Very High Risk

7.6.4.3 Permits and Wayleaves

For option O2c, the route is in its majority within Intel's land holding. Landowner engagement will be required for the northern section of the route. Tower locations and construction compounds will need to remain outside the SAC. For these reasons, option O2c is considered to have a moderate-high risk in terms of permits and wayleaves.

Moderate-High Risk

7.6.4.4 Design Complexity

For option O2c, the route is constrained with existing services and poor ground conditions: LV/MV switchgear located at AM2 makes this location not feasible for a tower location; both AM2 and AM3 are located on steep berm ground which will cause stability issues. In the northern section of the route, the final and temporary arrangements need to avoid the SAC. Existing features, e.g. roads, buildings or River Rye, along the route will impact the height of the new towers to meet statutory

clearances. Considering these significant service constraints and the feasibility to route the 110kV OHL, Option O2c is therefore considered very high risk in terms of design complexity.

Very High Risk

7.6.5 Technical Performance Option O2c – Eastern Route, on Berm

7.6.5.1 System Reliability:

System reliability is based on the average failure statistics as outlined in section 6.2.1.1. The figures for OHL's compare favourably with international statistics and for this reason, option O2c is considered to be low risk in terms of system reliability.

Low Risk

7.6.5.2 Expansion / Extendibility:

For the reasons outlined in section 6.2.1.2, option O2c is considered to be low risk for expansion / extendibility.

Low Risk

7.6.5.3 Repeatability:

For the reasons outlined in section 6.2.1.3, option O2c is considered to have low risk in terms of repeatability.

Low Risk

7.6.5.4 Technical Operational Risk:

For the reasons outlined in section 6.2.1.3, option O2c is considered to have to low risk in terms of repeatability.

Low Risk

Table 8 Route O2c Assessment

Considerations	Risk
P1 Conforms with Policy & Guidance?	Moderate-High – proximity to all designations
P2 Conforms with Existing Patterns?	Moderate-Low – most on land zoned for industry
P3 Creates Impacts on Protected Features?	Moderate-High – similar to current, but closer
E1 Biodiversity Impact Potential?	Moderate-High – proximity to Petrifying Spring
E2 Soils & Water Impact Potential?	Medium – proximity to Petrifying Spring
E3 Material Assets Impact Potential?	Low
E4 Landscape Impact Potential?	Moderate-High – similar to current, but closer
E5 Cultural Heritage: Impact Potential?	Moderate-High – similar to current, but closer
E6 Noise Impact Potential?	Low
S1 Impacts on Settlement & Communities:	Moderate – visibility from Residents
S2 Impacts on Recreation & Tourism:	Moderate – visibility from Amenities and Views
D1 Implementation Timelines:	Moderate – High
D2 Project Plan Flexibility:	Very High
D3 Permits & Wayleaves:	Moderate – High
D4 Design Complexity:	Very High
T1 Compliance with safety standards:	Low
T2 System Reliability:	Low
T3 Expansion / Extendibility:	Low
T4 Repeatability:	Low
T5 Technical Operational Risk:	Low

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7.7 Evaluation of OHL Option O2d – Easternmost intel land Route, crossing Rye

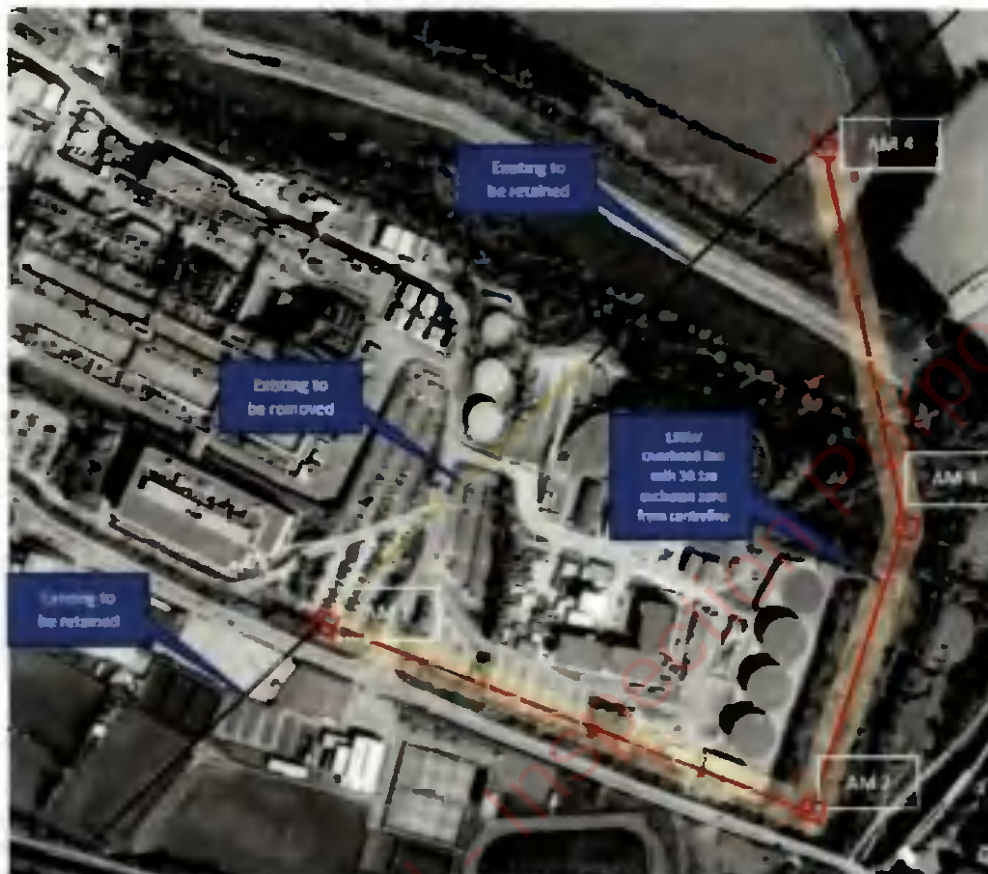


Figure 7-6 Route O2d

7.7.1 Planning Performance Option O2d – Most Eastern Route, crossing River Rye

Over half of the development route lies within lands that are zoned as Q Employment & Enterprise – a generally conforming land use that is open for consideration in the Land Use Zoning Matrix Table 14.5 – Low risk of non-conformance with Planning Requirements.

The northern section crosses lands zoned I for Agriculture – where proposals for new uses are considered on a case-by-case basis – subject to other Plan provisions.

In this instance the designations of nearby views, amenities, ecological sensitivities and proximity of adjacent residential land uses, are material considerations that give rise to a moderate to high risk of non-conformance with Planning Criteria.

Moderate-High Risk

7.7.2 Environmental Performance Option O2d – Most Eastern Route, crossing River Rye

The southern part of the route lies entirely within highly developed lands on made ground that are devoid of natural features. European sites lie within the northern parts of this route. As per current conditions, this route has significant off-site visibility from nearby scenic sensitivities – though it is

locally screened by adjacent vegetation. Taken together, these factors for this part of the route gives rise to a high risk of non-conformance with Environmental Performance Criteria.

High Risk

7.7.3 Socio-economic Performance Option O2d – Most Eastern Route, crossing River Rye

The southern part of the route lies entirely within lands that are zoned as Q Employment & Enterprise. As per current conditions, the northern parts are visible from and have the potential to affect off-site regional and local amenities – though it is partially screened by existing adjacent vegetation. Taken together these considerations give rise to a high risk of non-conformance with Socio-Economic Performance Criteria.

High Risk

7.7.4 Deliverability Performance Option O2d – Most Eastern Route, crossing River Rye

7.7.4.1 Implementation Timelines

The construction of option O2d is expected to take approximately 5 months. This timeline is based on assumptions and installation rates as outlined in section 6.2.2.1. However, there are risks associated with installation of the tower foundations due to constraints of services running within Intel's campus. Standard ground conditions are expected with the route kept outside the berm. Considering these risks, option O2d is considered moderate – High risk for implementation timelines.

Moderate-High Risk

7.7.4.2 Project plan flexibility

For option O2d, location of the towers is less constrained in comparison to the other OHL options. However, tower locations and construction compounds will need to remain outside the SAC. Option O2d is therefore considered moderate to low risk in terms of project plan flexibility.

Moderate-Low

7.7.4.3 Permits and Wayleaves

For option O2d, the route is in its majority within Intel's land holding. Landowner engagement will be required for the northern section of the route. Tower locations and construction compounds will need to remain outside the SAC. For these reasons, option O2c is considered to have a moderate-high risk in terms of permits and wayleaves.

Moderate-High Risk

7.7.4.4 Design Complexity

For option O2d, the route avoids the majority of services and infrastructure within the Campus by crossing these obstacles overhead and siting towers in undeveloped zoned industrial lands. In the northern section of the route, the final and temporary arrangements will need to avoid the SAC. Existing features, e.g. roads, buildings or the River Rye, along the route will impact the height of the new towers to meet statutory clearances. Option O2d is therefore considered moderate to low risk in terms of design complexity.

Moderate-Low

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7.7.5 Technical Performance Option O2d – Most Eastern Route, crossing River Rye

7.7.5.1 System Reliability:

System reliability is based on the average failure statistics as outlined in section 6.2.1.1. The figures for OHL's compare favourably with international statistics and for this reason, option O2d is considered to be low risk in terms of system reliability.

Low Risk

7.7.5.2 Expansion / Extendibility:

For the reasons outlined in section 6.2.1.2, option O2d is considered to be low risk for expansion/extendibility.

Low Risk

7.7.5.3 Repeatability:

For the reasons outlined in section 6.2.1.3, option O2d is considered to have low risk in terms of repeatability.

Low Risk

7.7.5.4 Technical Operational Risk:

For the reasons outlined in section 6.2.1.4, option O2d is considered to have low risk in terms of repeatability.

Low Risk

Table 9 O2d Assessment

Considerations	Risk
P1 Conforms with Policy & Guidance?	High – close proximity to all designations
P2 Conforms with Existing Patterns?	High – new impact on amenity areas
P3 Creates Impacts on Protected Features?	High – close proximity to all designations
E1 Biodiversity Impact Potential?	High – proximity to Petrifying Spring
E2 Soils & Water Impact Potential?	Moderate-Low – proximity to Petrifying Spring
E3 Maternal Assets Impact Potential?	Low
E4 Landscape Impact Potential?	High – new impact on amenity areas
E5 Cultural Heritage: Impact Potential?	Moderate-Low – proximity to Roman Baths
E6 Noise Impact Potential?	Low
S1 Impacts on Settlement & Communities:	High – proximity to residents
S2 Impacts on Recreation & Tourism:	High – new impact on amenity areas
D1 Implementation Timelines:	Moderate-High
D2 Project Plan Flexibility:	Moderate-Low
D3 Permits & Wayleaves:	Moderate-High
D4 Design Complexity:	Moderate-Low
T1 Compliance with safety standards:	Low
T2 System Reliability:	Low
T3 Expansion / Extendibility:	Low
T4 Repeatability:	Low
T5 Technical Operational Risk:	Low

7.8 Evaluation of OHL Option O2e – Easternmost Route, crossing Rye



Figure 7-7 Route O2e

7.8.1 Planning Performance Option O2e – Most Eastern Route, crossing River Rye

Between AM1 and AM2 this option is mostly located within lands that are zoned as Q Employment & Enterprise – a generally conforming landuse that is open for consideration in the Land Use Zoning Matrix Table 14.5 – Low risk of non-conformance with Planning Requirements., Between AM2 and AM3 most of the route is located with lands zoned as F2 Strategic Open Space.

The northern section crosses lands zoned I for Agriculture – where proposals for new uses are considered on a case-by-case basis – subject to other Plan provisions.

In this instance, the route passes through areas that are designated as amenities and ecological sensitivities. All of these are material considerations that give rise to a very high risk of non-conformance with Planning Criteria.

Very High Risk

7.8.2 Environmental Performance Option O2e – Most Eastern Route, crossing River Rye

Much of the southern part of the route crosses areas of ecological sensitivities. AM3 will be located within a SAC and within a known area of qualifying interests – as shown in Figure 3 3: Summary of Relevant Ecological Constraints from Protected Areas and Habitats. The route also passes directly

over the Leixlip Spa/ Roman Bath and Octagon Protected Structures. All of these are material considerations that give rise to a very high risk of non-conformance with Environmental Criteria.
Very High Risk

7.8.3 Socio-economic Performance Option O2e – Most Eastern Route, crossing River Rye

The route also passes directly over the Leixlip Spa amenity area and is close to the nearby viewing points and walking amenities. It is also the nearest route to Louisa Apartments. All of these are material considerations that give rise to a very high risk of non-conformance with Socio-economic Criteria.

Very High Risk

7.8.4 Deliverability Performance Option O2e – Most Eastern Route, crossing River Rye

7.8.4.1 Implementation Timelines

The construction of option O2e is expected to take approximately 7 months. This timeline is based on assumptions and installation rates as outlined in section 6.2.2.1. However, there are risks associated with installation of the tower foundations due to ecological constraints. Non-standard ground conditions are expected with the most saturated and highly sensitive parts of this route. Considering these risks, option O2e is considered very high risk for implementation timelines.

Very High Risk

7.8.4.2 Project plan flexibility

For option O2e, location of the towers is more constrained in comparison to any other OHL options. Tower locations and some construction activities will need to be within the SAC. Option O2e is therefore considered very high risk in terms of project plan flexibility.

Very High Risk

7.8.4.3 Permits and Wayleaves

For option O2d, the route is in its majority outside of Intel's land holding. Landowner engagement will be required for the central and northern section of the route. One tower locations will need to be within the SAC. For these reasons, option O2e is considered to have a moderate to have a very high risk in terms of permits and wayleaves.

Very High Risk

7.8.4.4 Design Complexity

Requirements to work within the areas of springs that are waterlogged and highly designated will present significant constraints with a very high design complexity.

Very High Risk

7.8.5 Technical Performance Option O2e – Most Eastern Route, crossing River Rye

7.8.5.1 System Reliability:

System reliability is based on the average failure statistics as outlined in section 6.2.1.1. The figures for OHL's compare favourably with international statistics and for this reason, option O2e is considered to be low risk in terms of system reliability.

Low Risk

Multi-criteria comparison for Identifying the Best Performing Option

7.8.5.2 Expansion / Extendibility:

For the reasons outlined in section 6.2.1.2, option O2e is considered to be low risk for expansion/extendibility.

Low Risk

7.8.5.3 Repeatability:

For the reasons outlined in section 6.2.1.3, option O2e is considered to have low risk in terms of repeatability.

Low Risk

7.8.5.4 Technical Operational Risk:

For the reasons outlined in section 6.2.1.4, option O2e is considered to have low risk in terms of repeatability.

Low Risk

Table 11 O2e Assessment

Considerations	Risk
P1 Conforms with Policy & Guidance?	Very High
P2 Conforms with Existing Patterns?	High – new impact on amenity areas
P3 Creates Impacts on Protected Features?	Very High – within all local designations
E1 Biodiversity Impact Potential?	Very High – within Petrifying Spring
E2 Soils & Water Impact Potential?	Very High – on saturated soils
E3 Material Assets Impact Potential?	Low
E4 Landscape Impact Potential?	Very High – within amenity areas
E5 Cultural Heritage: Impact Potential?	Very High – Proximity to Roman Baths
E6 Noise Impact Potential?	Low
S 1 Impacts on Settlement & Communities:	High – proximity to residents
S2 Impacts on Recreation & Tourism:	Very High – within amenity areas
D1 Implementation Timelines:	Very High
D2 Project Plan Flexibility:	Very High
D3 Permits & Wayleaves:	Very High
D4 Design Complexity:	Very High
T1 Compliance with safety standards:	Low
T2 System Reliability:	Low
T3 Expansion / Extendibility:	Low
T4 Repeatability:	Low
T5 Technical Operational Risk:	Low

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7.9 UGC Options Overview



Figure 7-8 UGC OPTIONS U1, U2, U3, U4

Four Underground cable [UGC] options were examined along routes lying to the west and east of the exiting line. This are illustrated in Figure 4.8 and described, in outline in the table below. Detailed descriptions of each route are provided in the following pages.

Table 10 Underground Cable [UGC] OPTIONS U1, U2, U3, U4

Key	Description	References
U1	Route through Roads, Parking & Between Buildings to Ryebrook Substation	UGC Option U1 – Western Route
U2	Route inside R148 boundary, west of tanks and along existing boundary	UGC Option U2 – Eastern Route, on Berm
U3	Route west of berm; along berm and up slope	UGC Option U3 – Eastern Route, crossing River Rye
U4	Route along southside of R148; Canal Bank and across fields	UGC Option U4 – Most Eastern Route, along Canal Bank

7.10 Evaluation of UGC Option U1 – Western Route

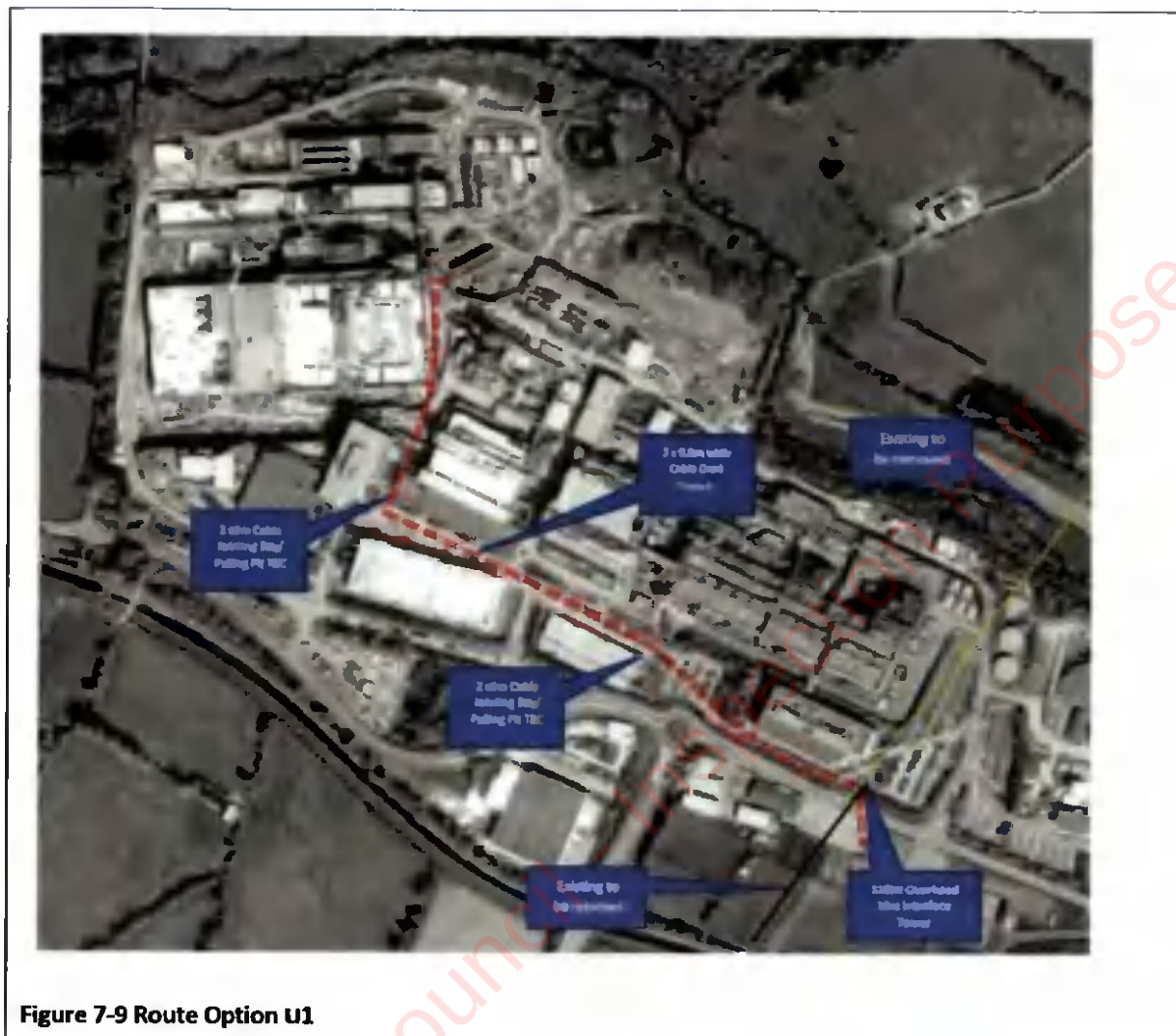


Figure 7-9 Route Option U1

7.10.1 Planning Performance Option U1 – Western Route

The route has a low impact on Planning criteria because it is not visible, except for the interface tower.

Low Impact

7.10.2 Environmental Performance Option U1 – Western Route

The route has a low impact on Environmental criteria because it occurs entirely within previously developed areas,

Low Impact

7.10.3 Socio-economic Performance Option U1 – Western Route

The route has a low impact on Socio Economic criteria because it occurs entirely within previously developed areas,

Low Impact

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7.10.4 Deliverability Performance Option U1 – Western Route

7.10.4.1 Implementation Timelines

The construction of option U1 is expected to take approximately 5 months. This timeline is based on assumptions and installation rates as outlined in section 6.2.2.1. However, there are risks associated with installation of Line Cable Interface Mast (LCIM), crossing of obstacles and ground investigations. Considering these risks, option 1 is considered moderate to high risk for implementation timelines.

High Risk

7.10.4.2 Project plan flexibility

For option U1, the route is highly constrained with services. The development of FAB34.1 which is opposite Ryebrook substation is a significant constraint which has rendered this option unfeasible. Option U1 is therefore considered very high risk in terms of project plan flexibility.

Very High Risk

7.10.4.3 Permits and Wayleaves

For option U2, the route is entirely within Intel's land holding. It should be noted that an 8m easement would typically be required for a double circuit UGC, and this may not be obtainable due the existing development on the site. For this reason, option U2 is considered to have a moderate – High risk in terms of permits and wayleaves.

Moderate Risk

7.10.4.4 Design Complexity

For option U1, the route is highly constrained with services of varying types and burial depths. This will result in a likely varying of the burial depth of the proposed new cable circuits and the need for installation in flat formation which would require a trench of approximately 1.1m for each of the two circuits. This is a significant width which may not be achievable. The development of FAB34.1 which is opposite Ryebrook substation is a significant constraint which has rendered this option unfeasible due to reduced space for installation and likely increased congestion of services. Option U1 is therefore considered very high risk in terms of design complexity.

Very High Risk

7.10.5 Technical Performance Option U1 – Western Route

7.10.5.1 System Reliability:

System reliability is based on the average failure statistics as outlined in section 6.2.1.1. The figures for UGC's are less favourable when compared with international statistics and for this reason, option U1 is considered to be moderate – high risk in terms of system reliability.

Moderate Risk

7.10.5.2 Expansion / Extendibility:

For the reasons outlined in section 6.2.1.2, option U1 is considered to be moderate - high risk for expansion / extendibility.

Moderate Risk

7.10.5.3 Repeatability:

For the reasons outlined in section 6.2.1.3, option U1 is considered to have a moderate - high risk in terms of repeatability.

Moderate Risk

7.10.5.4 Technical Operational Risk:

For the reasons outlined in section 6.2.1.4, option U1 is considered to have to moderate-low risk in terms of repeatability.

Moderate-Low Risk

Table 12 Assessment of U1

Considerations	Risk
P1 Conforms with Policy & Guidance?	Low
P2 Conforms with Existing Patterns?	Low
P3 Creates Impacts on Protected Features?	Low
E1 Biodiversity Impact Potential?	Low
E2 Soils & Water Impact Potential?	Low
E3 Material Assets Impact Potential?	Low
E4 Landscape Impact Potential?	Low
E5 Cultural Heritage: Impact Potential?	Low
E6 Noise Impact Potential?	Low
S1 Impacts on Settlement & Communities:	Low
S2 Impacts on Recreation & Tourism:	Low
D1 Implementation Timelines:	High
D2 Project Plan Flexibility:	Very High
D3 Permits & Wayleaves:	Moderate-High
D4 Design Complexity:	Very High
T2 System Reliability:	Moderate-High
T3 Expansion / Extendibility:	Moderate-High
T4 Repeatability:	Moderate-High
T5 Technical Operational Risk:	Moderate-Low

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46

7.11 Evaluation of UGC Option U2 – Eastern Route, on Berm

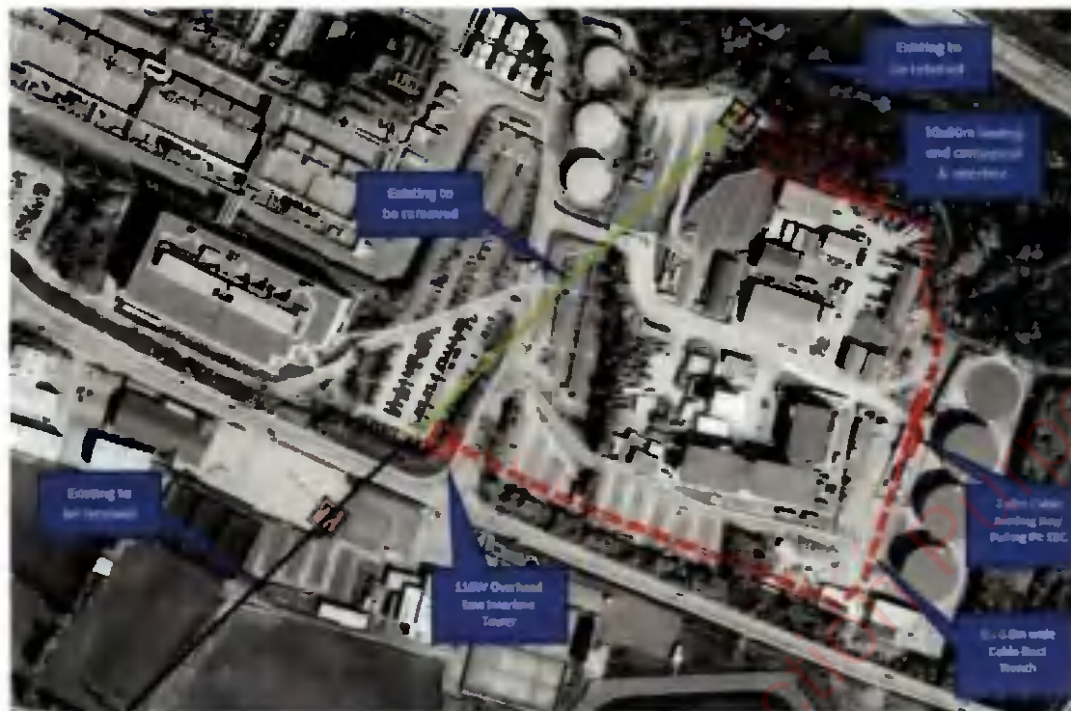


Figure 7-10 Route U2

7.11.1 Planning Performance Option U2 – Eastern Route, on Berm

The route has a low-moderate impact on Planning criteria because of proximity to the SAC and partial visibility of the End compound from the canal.

Moderate-Low Risk

7.11.2 Environmental Performance Option U2 – Eastern Route, on Berm

The route has a very high impact on Environmental criteria because of proximity to the SAC and location on a petrifying spring feature.

Very -High Risk

7.11.3 Socio-economic Performance Option U2 – Eastern Route, on Berm

The route has a Low- moderate impact on Planning criteria because of partial visibility of the 30m x 80m End compound from the canal.

Moderate-Low Risk

7.11.4 Deliverability Performance Option U2 – Eastern Route, on Berm

7.11.4.1 Implementation Timelines

The construction of option U2 is expected to take approximately 4 - 5 months. This timeline is based on assumptions and installation rates as outlined in section 6.2.2.1. However, there are risks associated with installation of the Line Cable Interface Mast, crossing of obstacles and the space

required to install the two underground cables due to constraints of services running parallel to the route. Considering these risks, option 2 is considered moderate to high risk for implementation timelines.

High Risk

7.11.4.2 Project plan flexibility

For option U2, the route is highly constrained with existing services. The access road North of the water tanks contain existing underground cables, with no space available to accommodate two new 110 kV underground cables. This route also traverses a 700mm Dia. Water Main, pumphouse and a large underground chamber. Considering these significant service constraints and the unlikelihood of being able to route the two underground cables between the building and the access road North of the water tanks, the opportunity for micro-alignment is likely limited and would impact on the route feasibility. Option U2 is therefore considered Very high risk in terms of project plan flexibility.

Very High Risk

7.11.4.3 Permits and Wayleaves

For option U2, the route is entirely within Intel's land holding. It should be noted that an 8m easement would typically be required for a double circuit UGC, and this may not be obtainable due the existing development on the site. For this reason, option U2 is considered to have a moderate - High risk in terms of permits and wayleaves.

Moderate Risk

7.11.4.4 Design Complexity

For option U2, the route is highly constrained with existing services. The access road North of the water tanks contains existing underground cables, with no space available to accommodate two new 110 kV underground cables. This route also transverses a 700mm Dia. Water Main, pumphouse and a large underground chamber. This and other service crossings will result in a likely varying of the burial depth of the proposed new cable circuit. The cable would therefore require installation in flat formation which would result in a trench of approximately 1.1m for each of the two circuits. This is a significant width which may not be achievable.

Considering these significant service constraints and the feasibility to route the two underground cables between the building and the access road North of the water tanks, Option U2 is therefore considered very high risk in terms of design complexity.

Very High Risk

7.11.5 Technical Performance Option U2 – Eastern Route, on Berm

7.11.5.1 System Reliability:

System reliability is based on the average failure statistics as outlined in section 6.2.1.1. The figures for UGC's are less favourable when compared with international statistics and for this reason, option U2 is considered to be moderate - high risk in terms of system reliability.

Moderate Risk

7.11.5.2 Expansion / Extendibility:

For the reasons outlined in section 6.2.1.2, option U2 is considered to be moderate - high risk in terms of expansion / extendibility.

Moderate Risk



7.11.5.3 Repeatability:

For the reasons outlined in section 6.2.1.3, option U2 is considered to have a moderate - high risk in terms of repeatability.

Moderate Risk

7.11.5.4 Technical Operational Risk:

For the reasons outlined in section 6.2.1.4, option U2 is considered to have to low – moderate risk in terms of repeatability.

Moderate Risk

Table 13 U2 Assessment

Considerations	Risk
P1 Conforms with Policy & Guidance?	Moderate-Low
P2 Conforms with Existing Patterns?	Low
P3 Creates Impacts on Protected Features?	Very High
E1 Biodiversity Impact Potential?	Very High
E2 Soils & Water Impact Potential?	Low
E3 Material Assets Impact Potential?	Low
E4 Landscape Impact Potential?	Low
E5 Cultural Heritage: Impact Potential?	Low
E6 Noise Impact Potential?	Low
S1 Impacts on Settlement & Communities:	Low
S2 Impacts on Recreation & Tourism:	Low
D1 Implementation Timelines:	High
D2 Project Plan Flexibility:	Very High
D3 Permits & Wayleaves:	Moderate
D4 Design Complexity:	Very High
T1 Compliance with safety standards:	Low
T2 System Reliability:	Moderate
T3 Expansion / Extendibility:	Moderate
T4 Repeatability:	Moderate
T5 Technical Operational Risk:	Moderate

7.12.4 Deliverability Performance Option U3 – Eastern Route, crossing River Rye

7.12.4.1 Implementation Timelines

The construction of option U3 is expected to take approximately 6 months. This timeline is based on assumptions and installation rates as outlined and assuming the Horizontal Directional Drill is also implemented in parallel with other ducting works. However, there are risks associated with the installation of Line Cable Interface Mast, crossing of obstacles, ground investigations and undertaking HDD under the River Rye. Procurement timelines and availability of HDD rigs may also impact the project timelines. There may also be seasonal constraints on crossing the River Rye. Considering these risks, option 3 is considered very high risk for implementation timelines.

Very High Risk

7.12.4.2 Project plan flexibility

For option U3, the route is highly constrained with existing infrastructure. The proposed route traverses an existing pumphouse building, existing water main pipelines and LV/MV switchgear. Considering the existing infrastructure, the routing of two underground cables through this area is likely unfeasible. Option U3 is therefore considered high risk in terms of project plan flexibility.

Very High Risk

7.12.4.3 Permits and Wayleaves

For option U3, the route is within Intel's land holding, with the exception of lands north of the River Rye. An 8m easement will required for the cable route. Due to only one landholding requiring engagement, option U3 is considered to have a to Moderate to High Risk in terms of permits and wayleaves.

Moderate-High Risk

7.12.4.4 Design Complexity

The proposed route transverses existing pumphouse buildings, existing water main pipelines and LV/MV switchgear. This presents challenges and increases the complexity to route the two new 110 kV underground cables. These service will result in a likely varying of the burial depth of the proposed new cable circuit. The cable would therefore require installation in flat formation which would result in a trench of approximately 1.1m for each of the two circuits. This is a significant width which may not be achievable.

The route also crosses the River Rye which is a SAC and, if implemented, will require a HDD. This crossing is a deep valley with steep inclines close to environmental sensitivities. The steepness of the inclines may result in the need for significant set-back distances to ensure the drilling profile is suitable, both for drilling and for cable installation and to ensure sufficient depth under the SAC is achieved. The length of the HDD is estimated to be approximately 250m.

Undertaking a HDD at this location would likely impact cable ratings. It is likely that a single bore per phase will be required rather than a bore per circuit due to rating considerations. In addition, the separation between bores may also need to be significant, based on geotechnical considerations. This will result in a significant HDD compound size for both driving and receiving pits, space for which may not be available.

Considering the existing infrastructure and complexities of implementing this option, the routing of two underground cables through this area is likely unfeasible. Option U3 is therefore considered very high risk in terms of design complexity.

Very High Risk

7.12.5 Technical Performance Option U3 – Eastern Route, crossing River Rye

7.12.5.1 System Reliability:

System reliability is based on the average failure statistics as outlined in section 6.2.1.1. The figures for UGC's are less favourable when compared with international statistics and for this reason, option U3 is considered to be moderate – high risk in terms of system reliability.

Moderate-High Risk

7.12.5.2 Expansion / Extendibility:

For the reasons outlined in section 6.2.1.2, option U3 is considered to be moderate- high risk for expansion / extendibility.

Moderate-High Risk

7.12.5.3

7.12.5.4 Repeatability:

For the reasons outlined in section 6.2.1.3, option U3 is considered to have a moderate – high risk in terms of repeatability.

Moderate Risk

7.12.5.5 Technical Operational Risk:

For the reasons outlined in section 6.2.1.4, option U3 is considered to have to low – moderate risk in terms of repeatability.

Moderate Risk

Table 14 U3 Assessment

Considerations	Risk
P1 Conforms with Policy & Guidance?	Very High
P2 Conforms with Existing Patterns?	Very High
P3 Creates Impacts on Protected Features?	Very High – crosses SAC
E1 Biodiversity Impact Potential?	Very High – crosses SAC
E2 Soils & Water Impact Potential?	Very High – excavation on steep slopes and under river
E3 Material Assets Impact Potential?	Low
E4 Landscape Impact Potential?	Very High – interface compound on ridge
E5 Cultural Heritage: Impact Potential?	Low
E6 Noise Impact Potential?	Low
S1 Impacts on Settlement & Communities:	Low
S2 Impacts on Recreation & Tourism:	High – visual impact of interface compound
D1 Implementation Timelines:	Very High
D2 Project Plan Flexibility:	Very High
D3 Permits & Wayleaves:	Moderate - High
D4 Design Complexity:	Very High
T2 System Reliability:	Moderate - High
T3 Expansion / Extendibility:	Moderate - High
T4 Repeatability:	Moderate
T5 Technical Operational Risk:	Moderate

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7.12.6 Evaluation of UGC Option U4 – Most Eastern Route, along Canal Bank



Figure 7-12 Route U4

7.12.7 Planning Performance Option U4 – Most Eastern Route, along Canal Bank

The visibility of the 30m x 80m end compound will be conspicuous from the Royal canal walk. The disruption and potential risk to and changes to the appearance of the protected structure of the Aqueduct are also a planning concern.

High Risk

7.12.8 Environmental Performance Option U4 – Most Eastern Route, along Canal Bank

The disruption and potential risk to the Aqueduct, the Canal as well as the SAC are all ecological and cultural heritage concerns.

Very High Risk

7.12.9 Socio-economic Performance Option U4 – Most Eastern Route, along Canal Bank

The disruption and potential risk to and changes to the appearance of the protected structure of the Aqueduct, as well as the amenity use of the canal and tow paths and views therefrom, are all concerns for amenity and leisure uses.

High Risk

7.12.10 Deliverability Performance Option U4 – Most Eastern Route, along Canal Bank

7.12.10.1 Implementation Timelines

The construction of option U4 is expected to take approximately 5 months. This timeline is based on assumptions and installation rates as outlined. However, there are risks associated with installation of Line Cable Interface Mast, crossing of obstacles, ground investigations and traffic management. Considering these risks, this option is considered high risk for implementation timelines.

High Risk

7.12.10.2 Project plan flexibility

For option U4, the route south of the Intel development may have flexibility for micro-routing in the event that unknown obstacles are found during construction. There is little flexibility for the section of the route traversing the Royal Canal towpath as two 0.6m trenches will be required with a 1.8m separation - space for which, in the towpath, may be constrained.

The length of the route along the tow path is over 600m. Subject to maximum cable lengths, this is likely to be restrictive on the locations of joint bays, reducing flexibility for micro-siting during construction. Given access constraints, the cable would likely need to be pulled from South to North, reducing flexibility with respect to cable pulling direction. Option U4 is therefore considered very high risk in terms of project plan flexibility.

Very High Risk

7.12.10.3 Permits and Wayleaves

For option U4, the route is nearly entirely within public lands and public amenity. Approximately 340m of the route is within third party lands. An 8m easement will required for the cable route. Permits will be required for installation within the Royal Canal towpath and on third party lands. Option U4 is therefore considered moderate – high risk.

Moderate-High Risk

7.12.10.4 Design Complexity

For option U4, the majority of the route is along the Royal Canal towpath and is also within the River Rye SAC. This results in a complex installation which will need to substantially mitigate construction impacts such as silt run-off into the SAC. The narrowness of the construction swathe in the towpath also increases the complexity of the installation.

The route needs to cross two substantial culverts – one where the Rye Water joins the Royal Canal, and a second where a significant drainage channel joins the Royal Canal. Provided the depth to the top of cover is sufficient, the route can traverse over these culverts and it is unlikely that these culverts can be modified. This may result in the need for shallow burial of the cable circuits and the inclusion of steel plates for mechanical protection. If insufficient cover is available, it is considered that in-stream works would not be allowed due to location within the SAC. The alternative would be a HDD, for which there is insufficient space for installation.

There is unlikely to be sufficient space within the towpath for the installation of joint bays, which means these need to be located on either end of the towpath section. The length of this section is approximately 600m and may require a cable drum with lengths exceeding standard delivery lengths, and the corresponding increase in weight may impact the vehicle required for drum delivery.

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An access road would be required in third party lands north of the towpath for construction. Two major services would need to be crossed in these lands, including a 40-bar high pressure gas main and a gravity sewer. Crossing of this infrastructure may need to be done by HDD.

There are a number of existing services within the R148. From a high-level review, it is not clear that suitable alignments for the two UGC circuits are available.

Option U4 is therefore considered very high risk in terms of design complexity.

Very High Risk

7.12.11 Technical Performance Option U4 – Most Eastern Route, along Canal Bank

7.12.11.1 System Reliability:

System reliability is based on the average failure statistics as outlined in section 6.2.1.1. The figures for UGC's are less favourable when compared with international statistics and for this reason, option 1 is considered to be moderate risk in terms of system reliability.

Moderate-High Risk

7.12.11.2 Expansion / Extendibility:

For the reasons outlined in section 6.2.1.2, option U4 is considered to be moderate – high risk for expansion / extendibility.

Moderate Risk

7.12.11.3 Repeatability:

For the reasons outlined in section 6.2.1.3, option U4 is considered to have a moderate – high risk in terms of repeatability.

Moderate Risk

7.12.11.4 Technical Operational Risk:

For the reasons outlined in section 6.2.1.4, option U4 is considered to have to low – moderate risk in terms of repeatability.

Moderate Risk

Table 15 U4 Assessment

Considerations	Risk
P1 Conforms with Policy & Guidance?	High
P2 Conforms with Existing Patterns?	High
P3 Creates Impacts on Protected Features?	Very High – beside pNHA
E1 Biodiversity Impact Potential?	Very High – beside pNHA
E2 Soils & Water Impact Potential?	Very High – excavation on Canal and Embankment
E3 Material Assets Impact Potential?	Very High – excavation on Canal and Embankment
E4 Landscape Impact Potential?	Moderate-High – substation on hill will be prominent
E5 Cultural Heritage: Impact Potential?	Moderate-High – temporary disruption of Canal Walk
E6 Noise Impact Potential?	Low
S1 Impacts on Settlement & Communities:	Moderate-Low – temporary Disruption of Royal Canal Walk
S2 Impacts on Recreation & Tourism:	Moderate-Low – temporary Disruption of Royal Canal Walk
D1 Implementation Timelines:	High
D2 Project Plan Flexibility:	Very High
D3 Permits & Wayleaves:	Moderate-High
D4 Design Complexity:	Very High
T2 System Reliability:	Moderate-High

Multi-criteria comparison for Identifying the Best Performing Option

T3 Expansion / Extendibility:	
T4 Repeatability:	
T5 Technical Operational Risk:	

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8 Evaluation Criteria Applied to all UGG and OHL Options

Table 11 Summary Evaluation of all routes

Table 12 Summary Evaluation		O1	O2a	O2b	O2c	O2d	O2e	U1	U2	U3	U4
Degree of Impact		Colour Code									
		Very High Risk									
		High Risk									
		Moderate-High									
		Moderate-Low									
		Low Risk									
Planning	P1 Conforms with Policy & Guidance?										
	P2 Conforms with Existing Patterns?										
	P3 Creates Impacts on Protected Features?										
Environmental	E1 Biodiversity Impact Potential?										
	E2 Soils & Water Impact Potential?										
	E3 Material Assets Impact Potential?										
	E4 Landscape Impact Potential?										
	E5 Cultural Heritage: Impact Potential?										
	E6 Noise Impact Potential?										
Socio-Economic	S1 Settlement & Communities:										
	S2 Recreation & Tourism:										
Deliverability	D1 Implementation Timelines:										
	D2 Project Plan Flexibility:										
	D3 Permits & Wayleaves:										
	D4 Design Complexity:										
Technical	T1 Compliance with safety standards:										
	T2 System Reliability:										
	T3 Expansion / Extendibility:										
	T4 Repeatability:										
	T5 Technical Operational Risk:										

9 Emerging Best Performing Option

9.1.1 Introduction

The following sections sets out the considerations that have led to the identification of an Emerging Best Performing Option (EBPO). These considerations are based on the information included in the preceding sections. Based on the evaluations in sections 7 and 8 of this report, a summary matrix for the options is provided in table 11 following:

9.1.2 Emerging Best Performing Option

Identification of the EBPO has considered and balanced the five key criteria: planning, environmental, technical, socio-economic, deliverability and technical.

The summary matrix shows that option O1 and U4 are deemed the highest risk options for both technologies. Option O1 is highly constrained by major crossings: R449, R148, railway, Royal Canal and the River Rye. The route also transverses the protected area of Carton Demesne. Considering the significant crossings, protected area, necessary wayleaves and consents, this route would be overly challenging to deliver and construct. For this reason, option O1 is high risk for implementation and deliverability.

For option U4, the majority of the route is along the Royal Canal towpath and within a SAC. This results in a complex installation which increases technical, planning and environmental risks for construction impacts, such as stability of the embankment or silt run-off into the SAC. The narrowness of the construction swathe in the towpath also increases the complexity of the installation. The route needs to cross water courses and existing services which increases the difficulty for installation. For these reasons, option U4 is high risk for implementation and deliverability.

Options O2a, O2b, and O2c are similar routes with similar challenges that vary mainly in degree. These routes perform better than other options for planning, environmental and social-economic criteria. However, these options are constrained by the existing infrastructure and services installed on the campus. For this reason, these options are unlikely to be feasible from a constructability perspective and even though the options perform well under planning, environmental and social-economic criterion, the options are considered high risk in terms of deliverability and are not considered viable options. Option O2e remains outside to the campus to avoid these challenges of existing infrastructure, but it performs far worse on environmental and planning criteria because of increased proximity to sensitive receptors.

Similar observations have been made for the UGC routes. Options U1, U2, and U3 have significant challenges in terms of deliverability. These routes perform better than other options for planning, environmental and social-economic criteria. However, these options are constrained by the dense patterns of existing infrastructure and services concentrations installed within the campus. For this reason, these options are unlikely to be feasible from a constructability perspective and even though the options perform well under planning, environmental and social-economic criterion, the options are considered high risk in terms of deliverability and are not considered viable options.

The summary matrix for options indicates reduced, but not negligible, risks associated with OHL option O2d under the deliverability performance criterion. Although this option has moderate to high risks for planning, environmental and social-economic criteria, the route is more feasible in comparison to the other options, because it equally minimises constraints due to technical, environmental and

28 NOV 2022 58

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planning criteria by availing of the screening offered by being located between the perimeter eastern berm and the mature hedgerow that lies to the east of this.

9.1.3 Best Performing Option

For these reasons and having considered the outcomes of the assessment process from a multi-criteria perspective, the EBPO option O2d has been identified as the overall EBPO for the line diversion project at Intel.

OHL option O2d has been identified as the EBPO and will be brought forward for development and will be fully assessed as part of any planning application.

Table 13 Risk Summary Matrix for Route Options

	O1	O2a	O2b	O2c	O2d	O2e	U1	U2	U3	U4
Planning	Blue	Yellow	Green	Green	Green	Black	Yellow	Green	Black	Blue
Environmental	Blue	Yellow	Green	Blue	Blue	Black	Yellow	Green	Black	Blue
Socio-Economic	Green	Yellow	Green	Blue	Blue	Black	Yellow	Green	Green	Blue
Deliverability	Black	Black	Black	Black	Green	Blue	Black	Black	Black	Black
Technical	Yellow	Yellow	Yellow	Yellow	Yellow	Blue	Green	Green	Green	Green
Overall Performance	Blue	Blue	Blue	Blue	Green	Blue	Blue	Blue	Blue	Blue

Degree of Impact	Colour Code
Very High Risk	Black
High Risk	Blue
Moderate-High Risk	Green
Moderate-Low Risk	Yellow
Low Risk	Light Green

10 Appendix A detailed descriptions of Alternative Route Options



10.1 OHL Options Overview



This section provides a detailed application of criteria to UGC and OHL options by referring to the five criteria of planning, environmental, socio-economic, deliverability as well as technical performance for each option. Each route includes a table to summarise the risks and advantages arising from each route. The results of these tables are carried forward to facilitate comparisons between options in Section 8 of this report.

Figure 10-1 OHL Options O1, O2a, O2b, O2c, O2d, O2e

Key	Description	Reference
O1	Diversion to connect with Existing Substation at Ryebrook	OHL Option O1 – Western Route
O2a	Diversion within existing site to existing onsite mast	OHL Option O2a –Eastern Route, traversing site
O2b	Diversion west of onsite water tanks to existing mast in Confey	OHL Option O2b –Eastern Route, traversing site & River Rye
O2c	Diversion east of onsite water tanks to existing mast in Confey	OHL Option O2c –Eastern Route, on Berm
O2d	Diversion east of site to existing mast in Confey	OHL Option O2d –Most Eastern Route on Intel lands, crossing River Rye
O2e	Diversion east of site to existing mast in Confey	OHL Option O2d –Most Eastern, crossing River Rye

10.1.1 Description of OHL Option O1 – Western Route

The overall length of Option O1, is approx. 2km. Option O1 originates at the existing 110 kV overhead line south of the railway and proceeds Northwest for approx. 800m until AM2. At this point the route turns North and runs for approx. 550m until AM3 where the alignment turns approx. >30deg East towards AM4 for another approx. 550m until Ryebrook substation. The OHL option O1 is shown in figure 4.2 below:

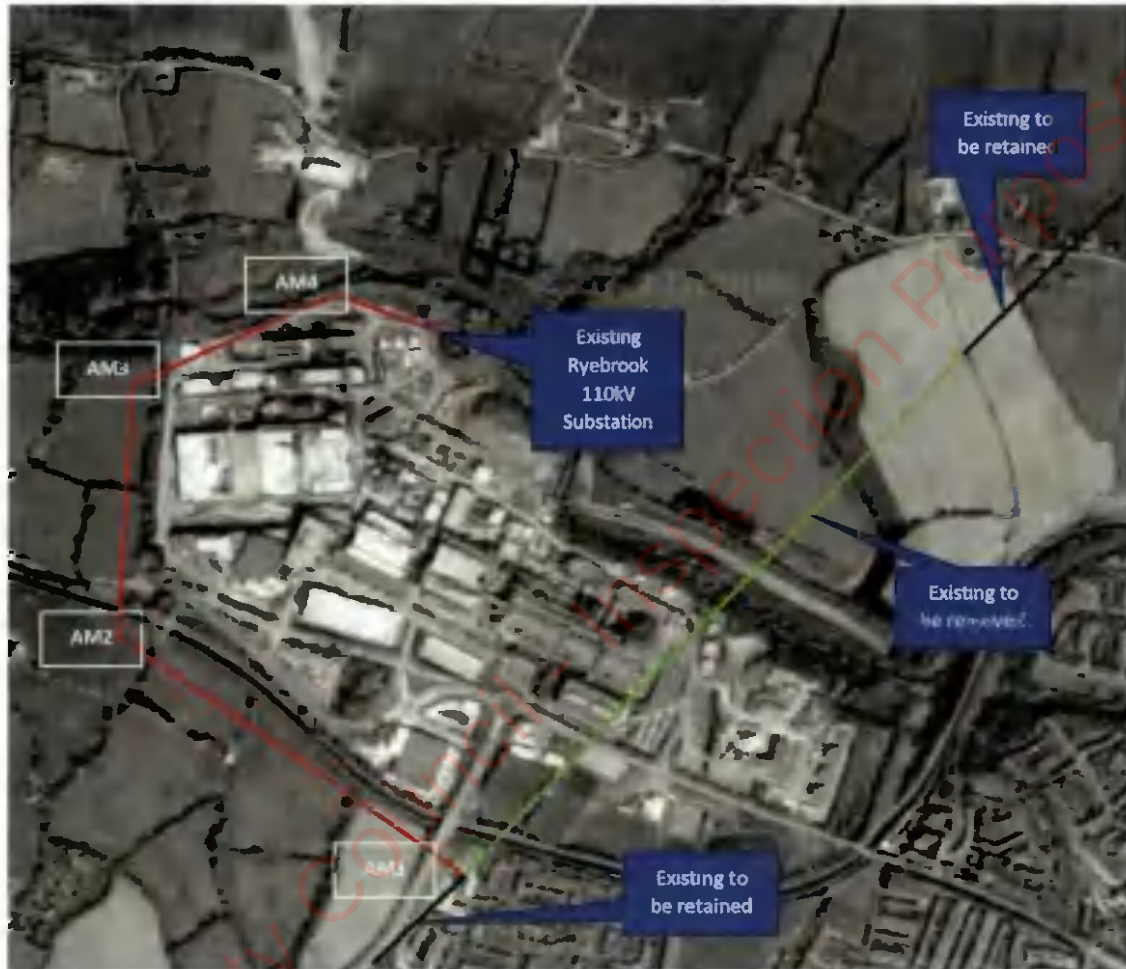


Figure 10-2 Route of Option O1

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10.1.2 Description of OHL Option O2a – Eastern Route, traversing site

The overall length of the route option O2a is approx. 750m. Option O2a originates at the existing 110 kV overhead line across the road (R148) from Lidl car park and proceeds Southeast within Intel's campus for approx. 315m, until it approaches a pumphouse. At this point the route turns North and runs for approx. 190m until it reaches the perimeter of the site where the route follows an existing internal access road Northwest, towards the existing 110 kV overhead line, for circa 250m. The OHL option O2a is shown in figure 4.3 below:

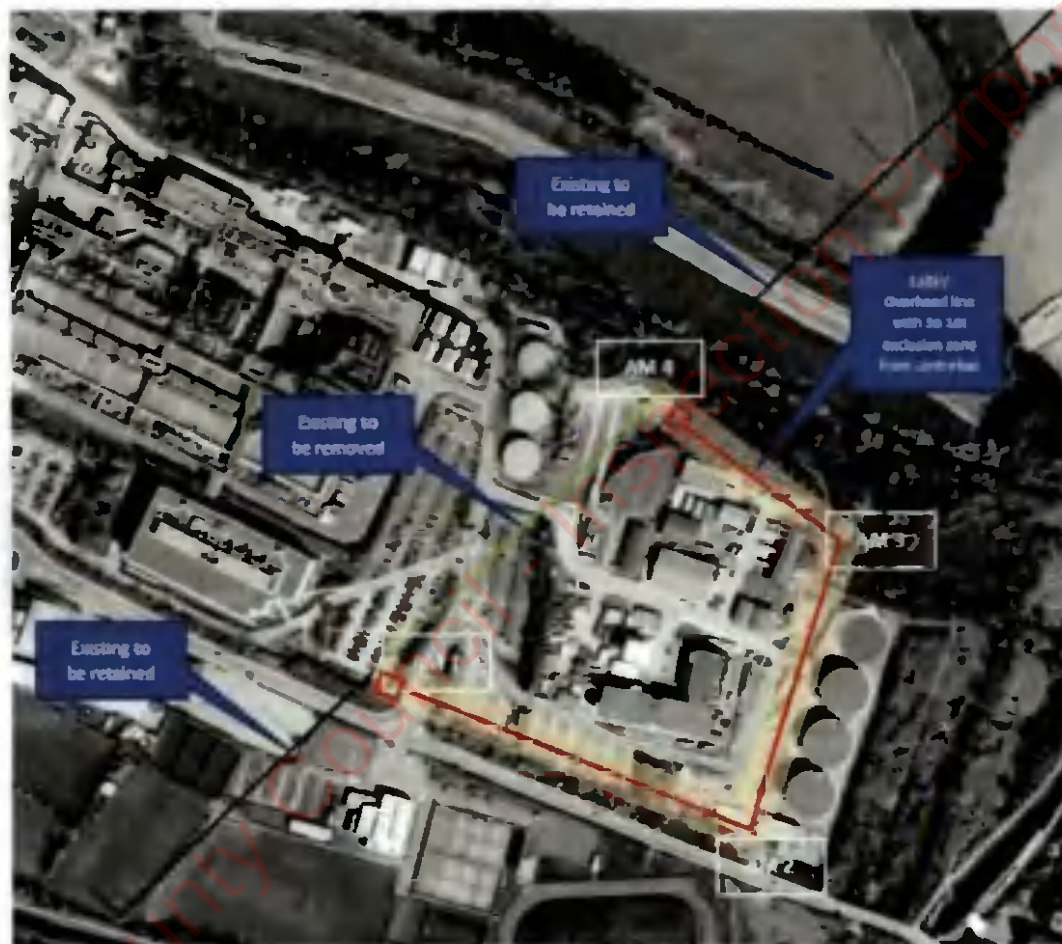


Figure 10-3 Route of Option O1

10.1.3 Description of OHL Option O2b – Eastern Route, traversing site & River Rye

The overall length of option O2b is approx. 850m. The route follows option O2a in the first two sections. It originates at the existing 110 kV overhead line across the road from Lidl car park and proceeds Southeast within Intel's campus for approx. 315m, until it approaches a pumphouse. At this point the route turns North and runs for approx. 190m until it reaches the perimeter of the site where the route follows a North-Westerly direction towards the existing 110 kV overhead line for circa 300m. This option re-joins the existing 110kV line in the vicinity of DCINT32. The OHL option O2b is shown in figure 4.4 below:

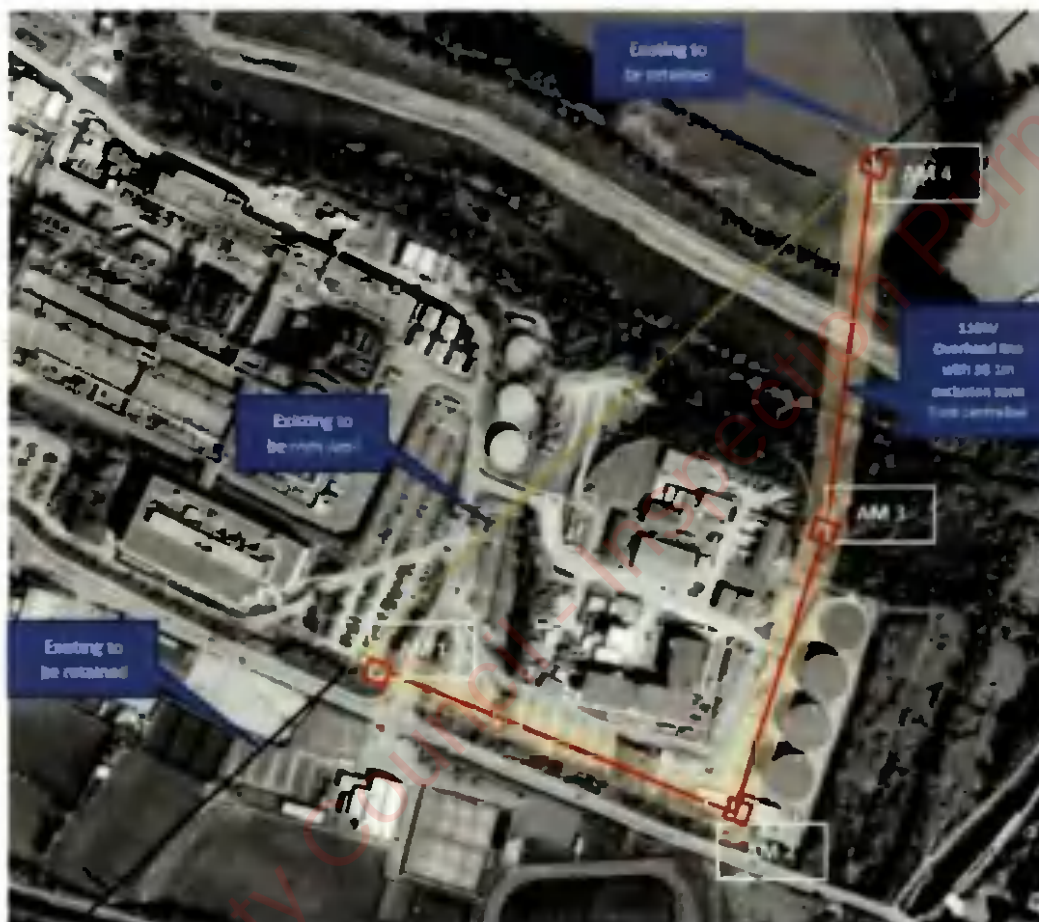


Figure 10-4 Route of Option 2b



10.1.4 Description of OHL Option O2c – Eastern Route, on Berm

The overall length of route option O2c is approx. 1km. Option O2c originates at the existing 110 kV overhead line across the road from Lidl car park and proceeds Southeast within Intel's campus for approx. 400m, until it approaches a berm at the Southeast corner of the Intel Site. At this point the route turns North and runs for approx. 250m, until it reaches the River Rye (which is an SAC), where the route turns Northwest towards the existing 110 kV overhead line for circa 350m. The OHL option O2c is shown in figure 4.5 below:

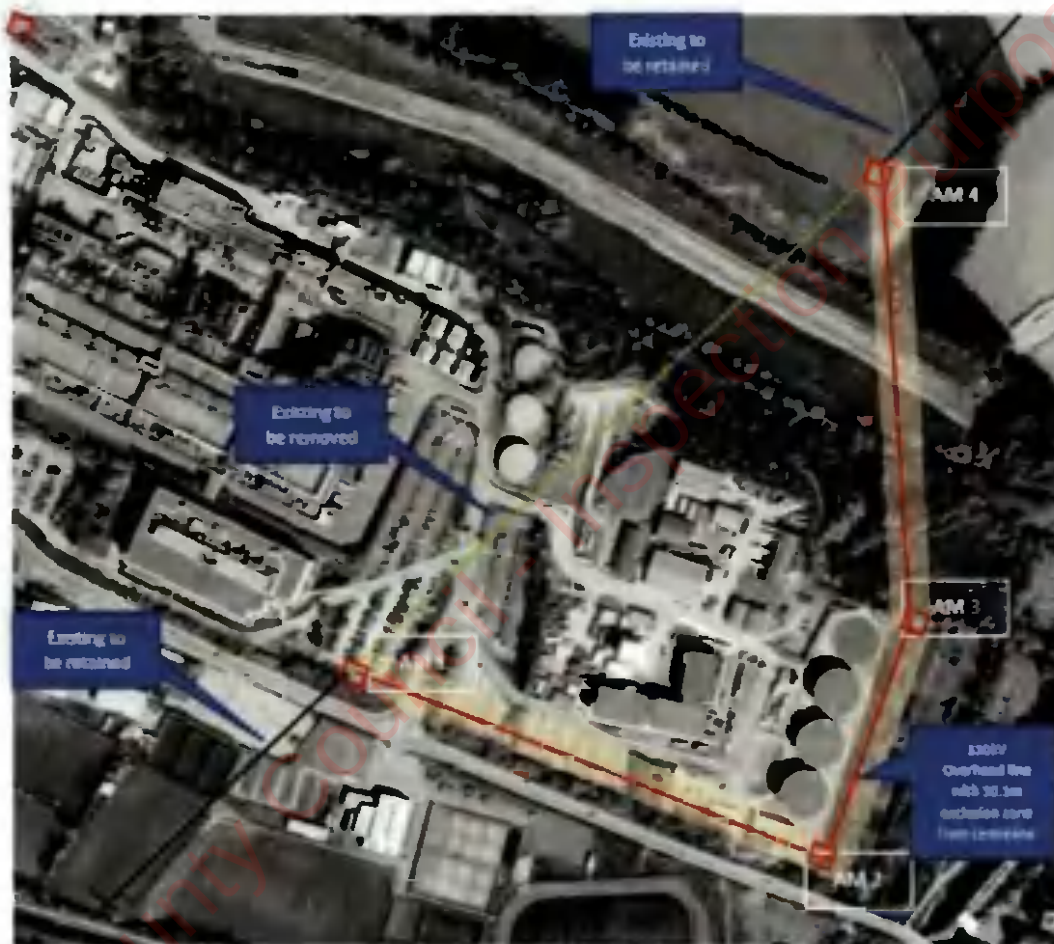


Figure 10-5 Route of Option 2c

10.1.5 Description of OHL Option O2d – Most Eastern intel Route, crossing Rye

The overall length of the route option O2d is approx. 1km. Option O2d originates at the existing 110 kV overhead line across the road from the Lidl car park and proceeds Southeast within Intel's campus for approx. 420m, until it passes a berm at the Southeast corner of the Intel Site. At this point the route turns North and runs for approx. 250m until it reaches the River Rye (which is an SAC), where the route turns Northwest towards the existing 110 kV overhead line (in the vicinity of DCINT32) for circa 330m. The OHL option O2d is shown in figure 4.6 below:



Figure 10-6 Route of Option 2d



10.1.6 Description of OHL Option O2e – Most Eastern Route, crossing Rye

The overall length of the route option O2d is approx. 1.1km. Option O2e originates at the existing 110 kV overhead line across the road from the Lidl car park and proceeds Southeast within Intel's campus for approx. 470m, until it passes a berm at the Southeast corner of the Intel Site. At this point the route turns North and runs for approx. 250m until it reaches the River Rye (which is an SAC), where the route turns Northwest towards the existing 110 kV overhead line (in the vicinity of DCINT32) for circa 330m. The OHL option O2e is shown in figure 4.7 below:



Figure 10-7 Route of Option 2e

10.2 UGC Options



Figure 10-8 UGC OPTIONS U1, U2, U3, U4

Four Underground cable [UGC] options were examined along routes lying to the west and east of the exiting line. This are illustrated in Figure 4.8 and described, in outline in the table below. Detailed descriptions of each route are provided in the following pages.

Table 14 Underground Cable [UGC] OPTIONS U1, U2, U3, U4

Key	Description	References
U1	Route through Roads, Parking & Between Buildings to Ryebrook Substation	UGC Option U1 – Western Route
U2	Route inside R148 boundary, west of tanks and along existing boundary	UGC Option U2 – Eastern Route, on Berm
U3	Route west of berm; along berm and up slope	UGC Option U3 – Eastern Route, crossing River Rye
U4	Route along southside of R148; Canal Bank and across fields	UGC Option U4 – Most Eastern Route, along Canal Bank

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10.2.1 Description of UGC Option U1 – Western Route

Route option U1 originates at the existing 110 kV overhead line across the road from Lidl car park and proceeds Northwest within Intel's campus for approx. 800m, until it approaches building IR5. At this point the route turns North and runs for approx. 400m into Ryebrook substation with the total route being approximately 1.2km. The UGC option U1 is shown in figure 4.9Table 15 below:



Figure 10-9 Route of UGC Option U1

10.2.2 Description of UGC Option U2 – Eastern Route, on Berm

Route option U2 originates at the existing 110 kV overhead line across the road from Lidl car park and proceeds Southeast within Intel's campus for approx. 315m, until it approaches a pumphouse. At this point the route turns North and runs for approx. 190m until it reaches the perimeter of the site where the route follows an existing internal access road Northwest towards the existing 110 kV overhead line for circa 250m, for a total length of approximately 750m. The UGC option U2 is shown in figure 4.10 below:



Figure 10-10 Route of UGC Option U2



10.2.3 Description of UGC Option U3 – Eastern Route, crossing River Rye

Route option U3 originates at the existing 110 kV overhead line across the road from Lidl car park and proceeds Southeast within Intel's campus for approx. 415m, until it approaches a berm at the Southeast corner of the Intel Site. At this point the route turns North and runs for approx. 245m until it reaches the River Rye (which is a SAC). The route then turns Northwest towards the existing 110 kV overhead line for circa 330m, for a total route length of approximately 1km. The UGC option U3 is shown in figure 4.11 below:



Figure 10-11 Route of Option U3

10.2.4 Description of UGC Option U4 – Most Eastern Route, along Canal Bank

Route option U4 originates at the existing 110 kV overhead line within Lidl car park and proceeds Southeast along the R148 for approx. 500m, until it approaches Louisa Bridge. At this point the route turns North and follows the Royal Canal Towpath for approx. 660m. where the route turns Northwest towards the existing 110 kV overhead line for circa 345m for a total route length of approximately 1.4km. The UGC option U4 is shown in figure 4.12 below:

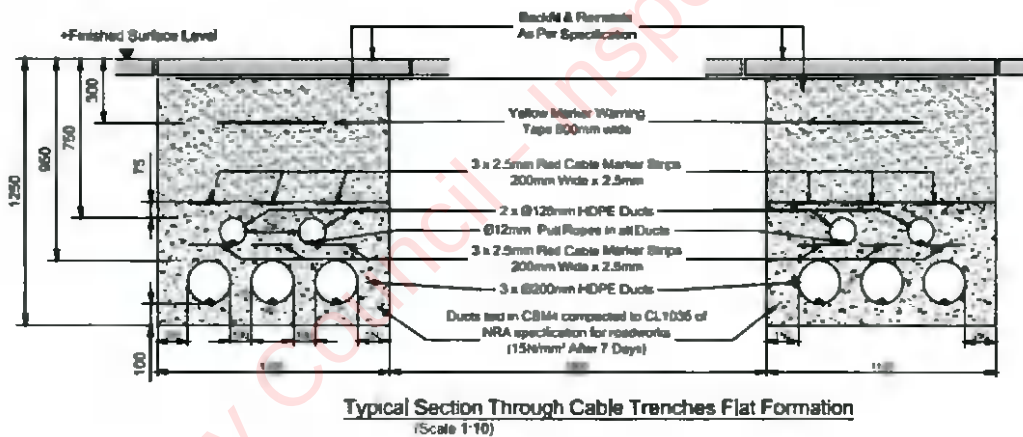
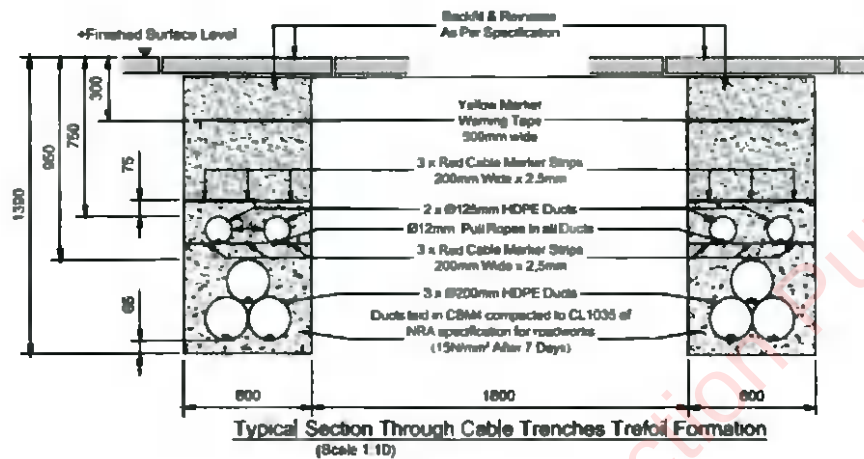


Figure 10-12 Route of Option U4

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11 Appendix B

Typical Cable Formations



APPENDIX TO SECTION 6

BIODIVERSITY

APPENDIX 6.1

TIMBER CUTTING REQUIREMENTS TECHNICAL NOTE

Timber Cutting Requirements

Technical Note

Project:	Collinstown 110kV OHL Diversion Project		
Our reference:	229101075 601	Your reference:	N/A
Prepared by:	Andrea Fontaina	Date:	21/02/2022
Approved by:	Tom Keane	Checked by:	Paul Foley
Subject:	Timber Cutting Requirements		

1 Introduction

The purpose of this technical note is to provide guidance on timber cutting requirements to maintain safety clearances between trees and the proposed new 110kV OHL diversion running east side of Intel's Leixlip Campus. The timber cutting requirements as set out in this technical note is to inform the environmental assessments for the planning application and is based on design pack issued 17/12/2021.

The dimensions shown in this note do not include extensive timber cutting works due to construction works, ie access or setting up working areas.

Timber cutting if carried out is to ensure that flashover(s) to timber do not occur when OHL conductors are moved by wind, and that falling trees cannot come into contact with any part of the transmission line.

2 Minimum Timber Cutting Requirements

- All trees must be outside their falling distance from any overhead line conductor in its undisturbed Position or any part of any support¹.
- Cut all trees, hedges and timber back to a maximum height of 3 metres* both under the conductors and to within a lateral distance of 10 metres from outside conductors.
 - * Where there is less than 1m surplus ground clearance beneath a conductor, the height of trees beneath the line, or within 10m laterally of the outer phase conductor shall be limited to 3m.
 - * Where there is more than 1m surplus ground clearance beneath the conductors, the 3m height limits shall be increased by the amount of surplus ground clearance.

Note, surplus ground clearance is the amount by which the catenary curve exceeds the ground clearance on the line profile drawing.

¹ Reference LDS-EFS-00-001-R0 110/220/400 kV Overhead Line Functional Specification

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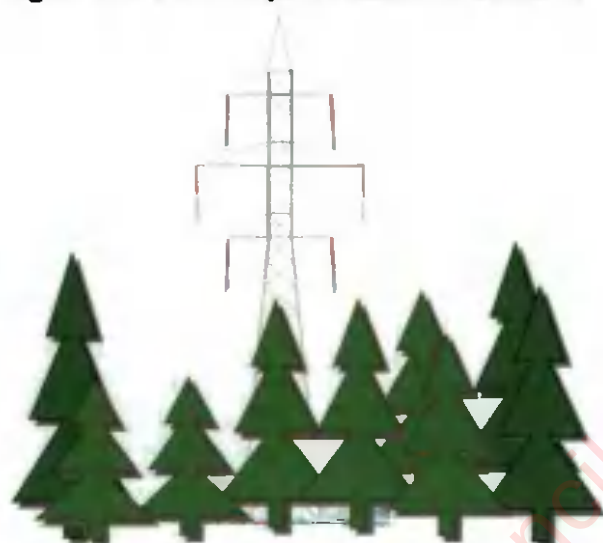
Below table summary of the minimum requirements for different type of trees and scenarios:

Table 2.1: Application of Standard for 110kV Voltage

Type	Minimum Requirement
Trees & Hedges	Cut all trees and timber back to a maximum height of 3 metres (plus surplus) both under the conductors and to within a lateral distance of 10 metres from outside conductors.
Overhanging Trees, Limbs or Branches	Removed
Trees within falling distance	Removed

The minimum requirement for trees and hedges presented in Table 2.1 is graphically represented in Figure 2.1 and Figure 2.2:

Figure 2.1: Before Implementation of Standard



Source: MML sketch

Figure 2.2: After Implementation of Standard



Source: MML sketch

3 Measuring on Site

Table 3.1 presents some guidance on the clearance envelope for the 110kV OHL running east side of Intel's Leixlip Campus:

Table 3.1: Measuring on Site

Span	Max. Length of timber cutting along the alignment (m)	Plan View Figure Reference	Max. Height of timber cutting from tree top (m)	Elevation View Figure Reference
T1-T2	97	Figure 3.1	10.5	Figure 3.2
T2-T3	38	Figure 3.3	6	Figure 3.4
T3-T4	34	Figure 3.5	6.6	Figure 3.6
T4-T5	100	Figure 3.7	4	Figure 3.8
T5-T6	-	Figure 3.9	-	Figure 3.10
T6-T7	71	Figure 3.11	12	Figure 3.12

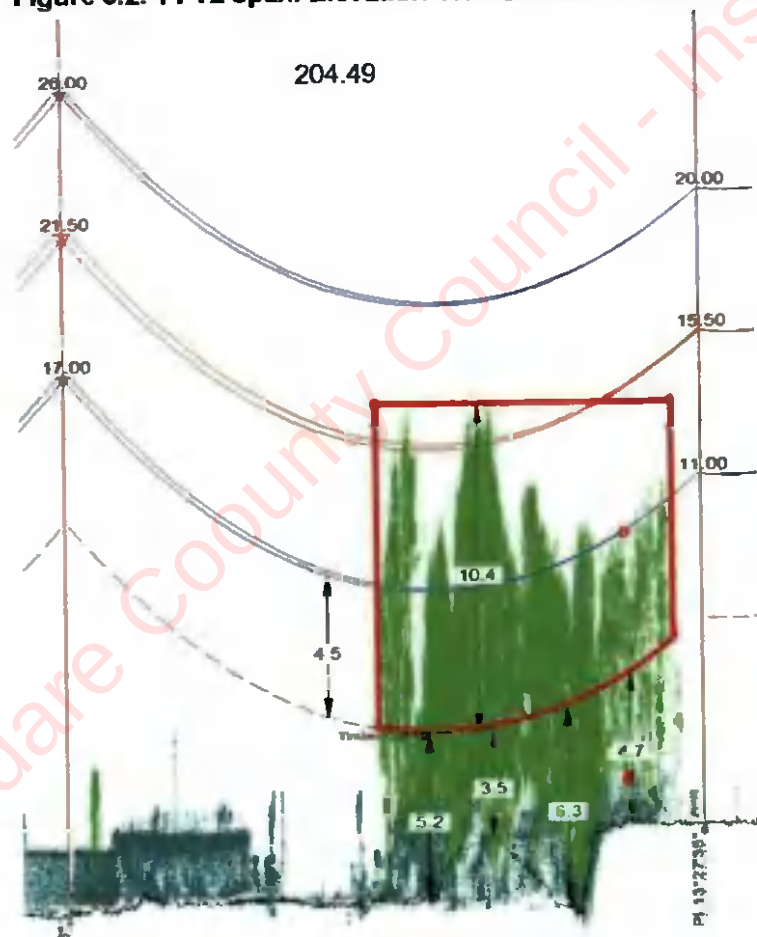
Note: All dimensions are based on the surveyed information, LiDAR data, provided on 02/12/2021.

Figure 3.1: T1-T2 span. Plan View Extents of Timber Cutting



Source: Extents of timber cutting shown within red mark-up.

Figure 3.2: T1-T2 span. Elevation View Extents of Timber Cutting



Source: Extents of timber cutting shown within red mark-up.

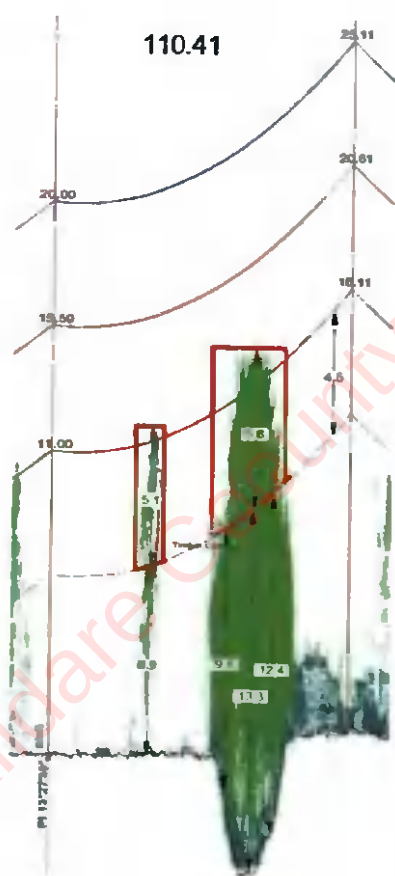
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Figure 3.3: T2-T3 span. Plan View Extents of Timber Cutting



Source: Extents of timber cutting shown within red mark-up.

Figure 3.4: T2-T3 span. Elevation View Extents of Timber Cutting



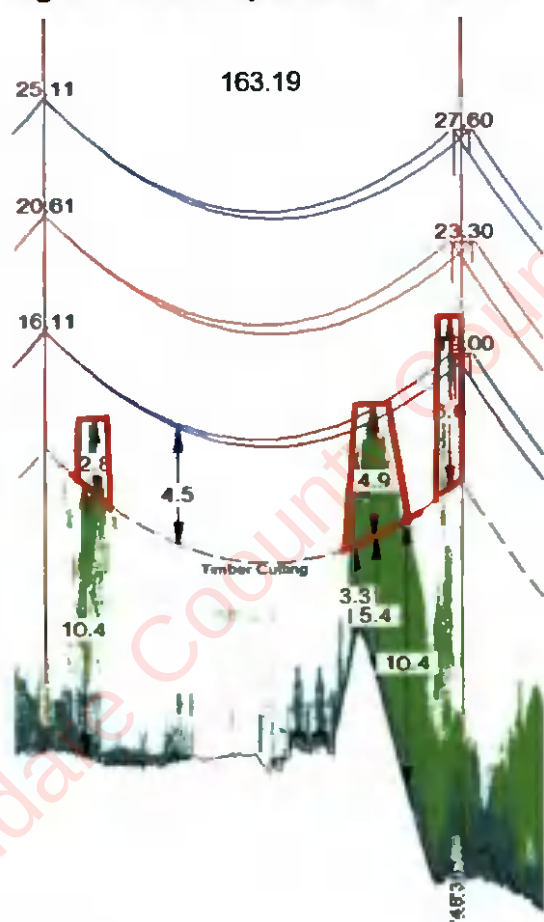
Source: Extents of timber cutting shown within red mark-up.

Figure 3.5: T3-T4 span. Plan View Extents of Timber Cutting



Source: Extents of timber cutting shown within red mark-up.

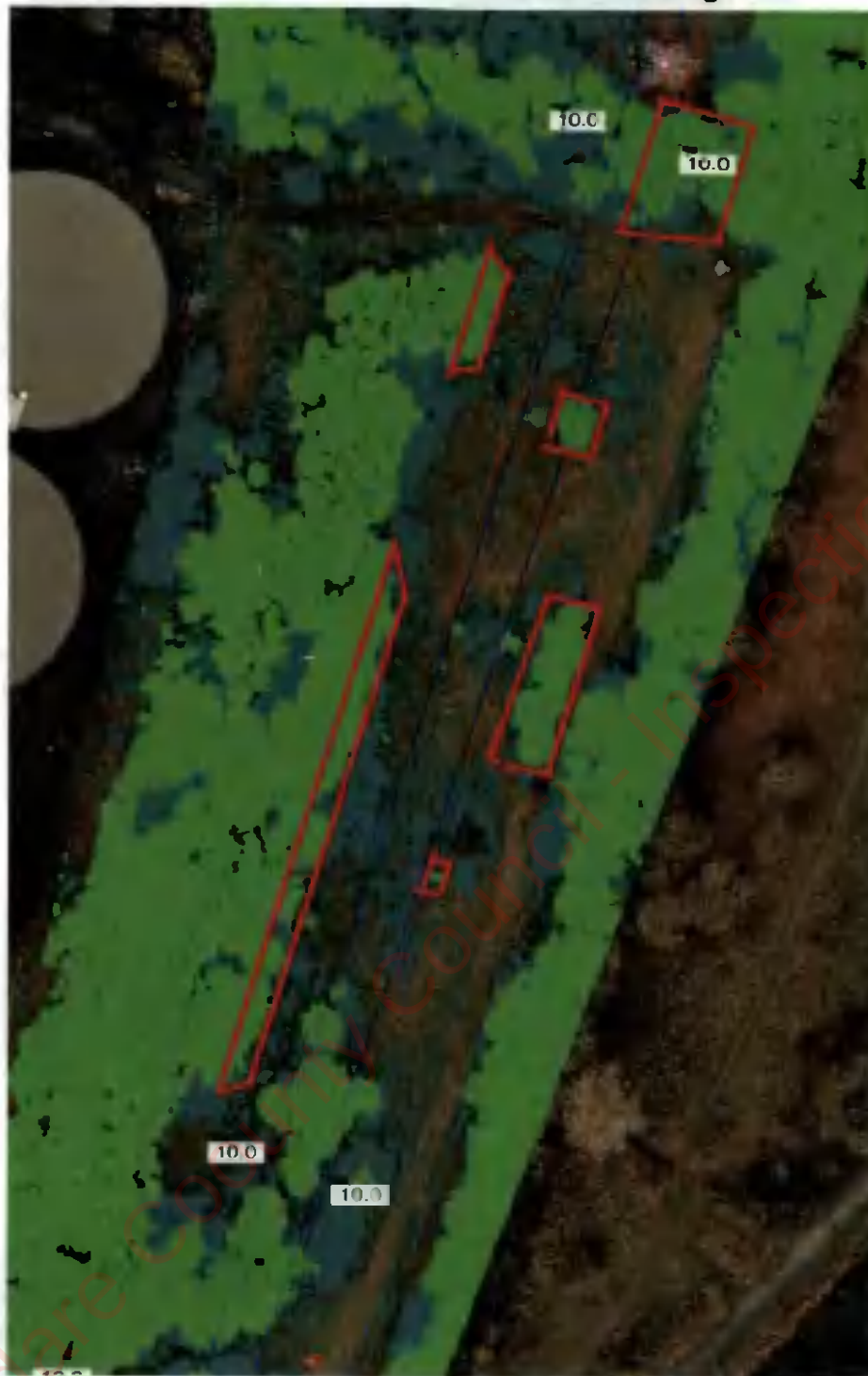
Figure 3.6: T3-T4 span. Elevation View Extents of Timber Cutting



Source: Extents of timber cutting shown within red mark-up.

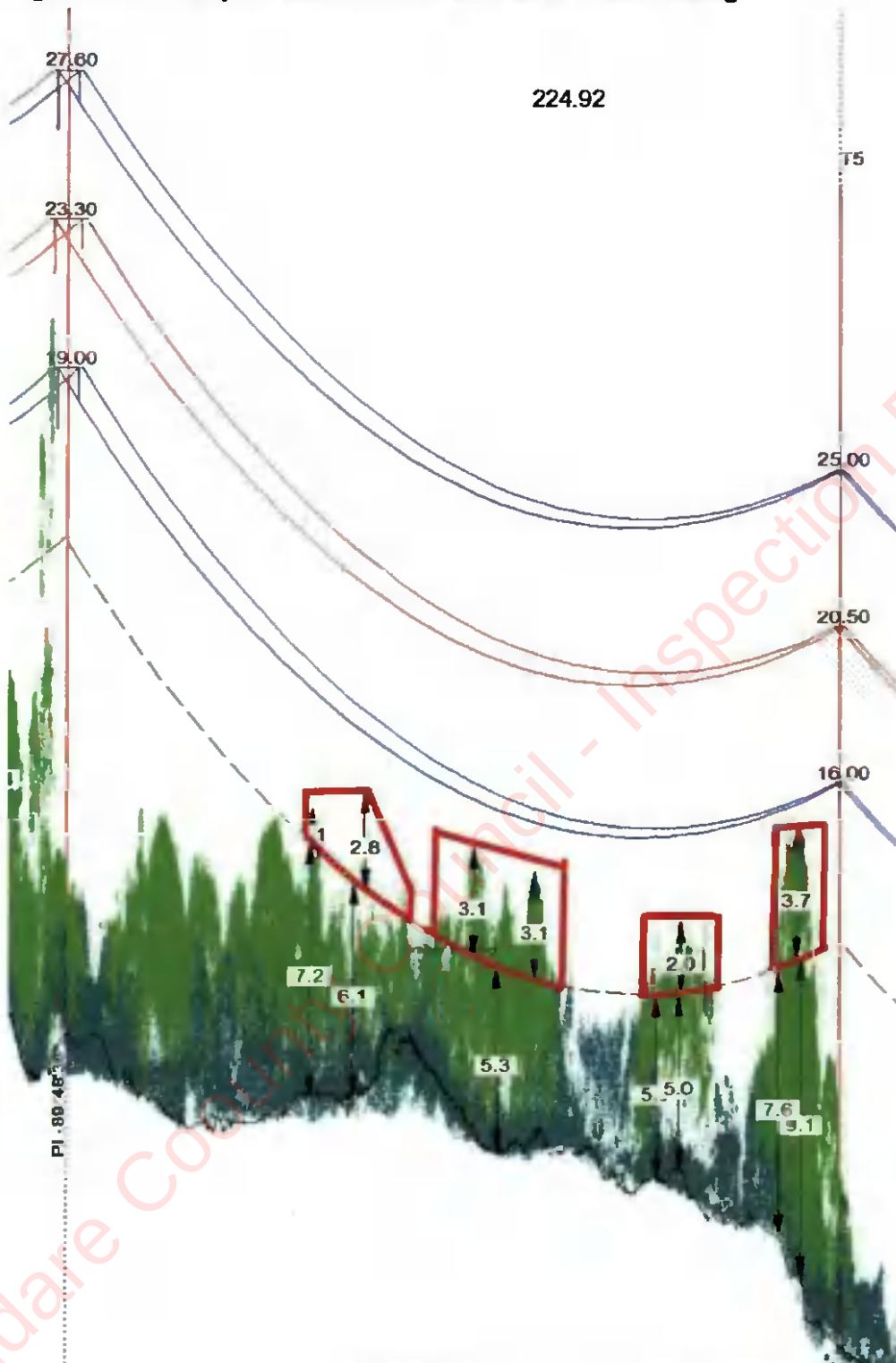
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Figure 3.7: T4-T5 span. Plan View Extents of Timber Cutting



Source: Extents of timber cutting shown within red mark-up.

Figure 3.8: T4-T5 span. Elevation View Extents of Timber Cutting



Source: Extents of timber cutting shown within red mark-up.

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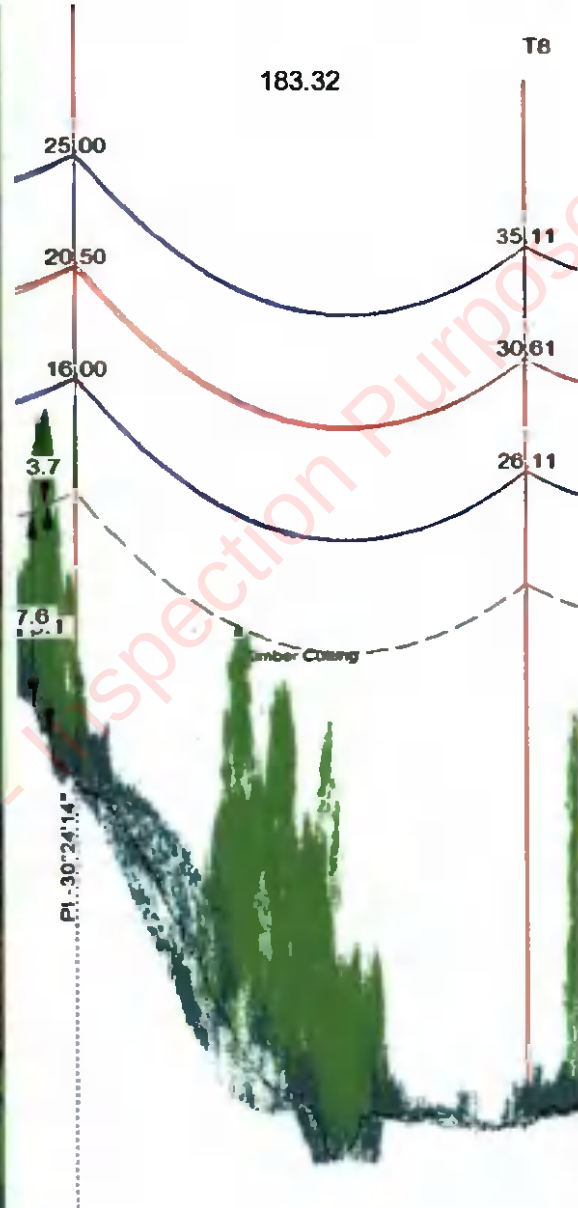
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Figure 3.9: T5-T6 span. Plan View Extents of Timber Cutting



Source: Extents of timber cutting shown within red mark-up.

Figure 3.10: T5-T6 span. Elevation View Extents of Timber Cutting



Source: Extents of timber cutting shown within red mark-up.

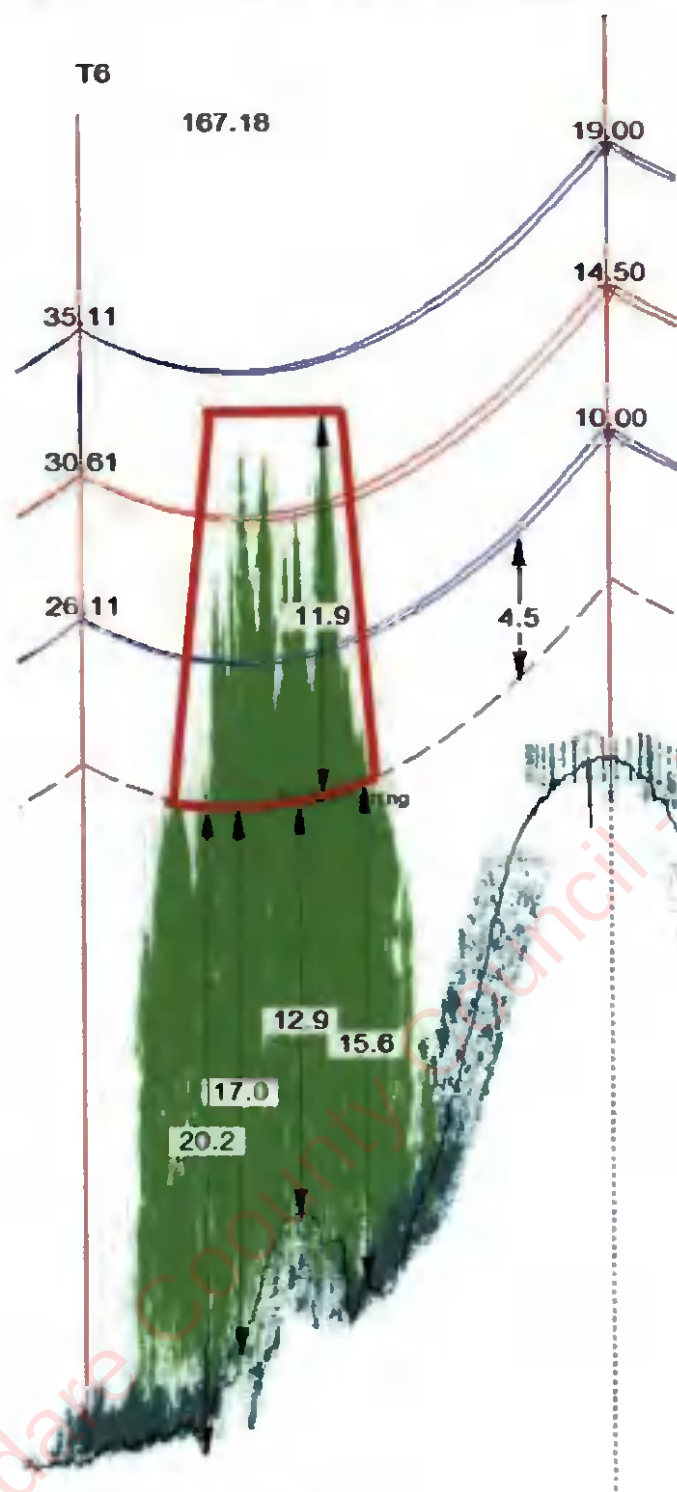
Figure 3.11: T6-T7 span. Plan View Extents of Timber Cutting



Source: Extents of timber cutting shown within red mark-up.

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Figure 3.12: T6-T7 span. Elevation View Extents of Timber Cutting



Source: Extents of timber cutting shown within red mark-up.

4 Considerations

- The above dimensions are to maintain safety clearances between trees and the new 110kV OHL diversion running east side of Intel's Leixlip Campus and do not include extensive timber cutting works due to construction works, ie access or setting up working areas.
- All dimensions provided in Table 3.1 and Figure 3.1 to Figure 3.12 are indicative based on the surveyed information (LiDAR data) provided on 02/12/2021.
- It is to be noted that rules set out in Section 2 will give safe tree clearance in all normal circumstances.
- Safety precautions should be observed as timber cutting work can be dangerous, if the correct procedures are not observed both for those engaged in the activity and for the people and property in the vicinity.
- Timber should be cut where possible to give a five-year maintenance free period. At the time of preparing this technical note, growth rates of trees were unknown.
- It is essential that the health of the tree is not damaged due to timber-cutting operations.

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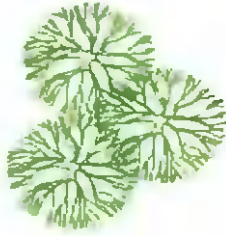
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APPENDIX 6.2

TREE SURVEY REPORT

Kildare Coounty Council - Inspection Purposes Only



Independent Tree Surveys Ltd

Tree Survey Report 110kV OHL Diversion Project Intel Campus Collinstown Business Park Leixlip Co. Kildare

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Contents	
1.0 Introduction	1
2.0 Report Limitations	2
3.0 Survey Methodology	3
3.1 Survey Key	3
3.2 Tree Retention Category (Cat) (BS5837: 2012 Trees in relation to design, demolition and construction – Recommendations)	4
3.3 Root Protection Area	4
4.0 Findings	5
5.0 Preliminary Recommendations	7
6.0 Site Photographs	8
7.0 Arboricultural Impact of the New Development	12
7.1 Project Description	12
7.2 Vegetation Management	12
7.3 Towers T1 to T2	13
7.4 Towers T2 to T3	13
7.5 Towers T3 to T4	14
7.6 Towers T4-T5	14
7.7 Towers T5-T6	15
7.8 Towers T6-T7	15
8.0 Arboricultural Method Statement	16
8.1 Tree Work Operations	16
8.1.1 Towers T1-T2	16
8.1.2 Towers T2-T3	16
8.1.3 Towers T3-T4	16
8.1.4 Towers T4-T5	16
8.1.5 Towers T5-T6	16
8.1.6 Towers T6-T7	16
8.2 Tree Protection Measures	17
9.0 Key Recommendations	18
10.0 References	18
11.0 Appendices	19
Tree Survey Schedule	19
Tree Survey/Constraints Plan Drawing 22042_TS	19
Tree Protection/Impact Plan Drawing 22042_TPP	19

1.0 Introduction

It is proposed to divert the existing 110kV overhead powerlines (OHL) running across the Intel campus in Leixlip, Co. Kildare to a route that goes around the main site to the east before re-joining the existing network on land to the north of the Rye Water River. The proposed route over-sails a series of groups of trees, hedges and woodlands and so this report has been prepared to provide an arboricultural assessment of the trees to help inform and aid the design and layout of the project. The report will also provide an arboricultural impact assessment and arboricultural method statement for the project. The proposed new route of the OHL system is shown below.



Plan of the proposed 110kV OHL diversion

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1 | Page

2.0 Report Limitations

- The inspection has been carried out from ground level using visual observation methods only.
- Trees are living organisms whose health and condition can change rapidly. Trees should be checked on a regular basis, preferably once a year. The conclusions and recommendations of this report are valid for one year.
- The fruiting bodies of some important species of decay fungi only emerge at certain times of the year and may not have been visible during this inspection.
- There is no such thing as a 100% safe tree in all conditions, since even perfectly healthy trees may fall or suffer branch break.
- The individual trees identified in the schedule and on the survey drawings have been plotted in their *approximate* positions, and should be regarded as indicative

Report Prepared by

John Morgan
BSc (Hons) Tech Cert (Arbor A)
M Arbor A (Membership number PR407)

July 7th 2022

3.0 Survey Methodology

The groups of trees along the project route were assessed from ground level during site visits on-foot using Visual Tree Assessment (VTA) techniques and relevant observations and findings were recorded.

3.1 Survey Key

Tree Group Numbers

Groups of trees identified by geographic position and/or composition (species, age class etc.) on and around the proposed route of the re-directed overhead powerlines were allocated numbers. These numbers identify the tree groups in the survey schedule and on the aerial images of the project site below.

Tree Species

Common and botanical names of the tree species were recorded.

Tree Crown Dimensions

Tree height (Ht) measurements are in metres and are estimated.

Stem Diameter (Dbh)

Measurements are in millimetres and taken at 1.5m from ground level, multiple stems (St) are recorded as a function of the BS:5837 RPA formulae described below. Where tree stems could not be directly accessed; the stem diameters were estimated.

Tree age classes

Y	Young	Recently planted (with 5 years or so)
SM	Semi-Mature	Well established young tree
EM	Early Mature	Established tree not yet fully grown
M	Mature	Full or near full grown tree
LM	Late Mature	Older specimen in full maturity
OM	Over Mature	Full maturity now declining through natural causes
Vet	Veteran	Notable due to large size, old age, ecological importance

Tree Physiological and Structural condition

Good:	No obvious defects visible, vigour and form of tree good.
Fair:	Tree in average condition for its age and the environment.
Poor:	Tree shows signs of ill health/structural defect
Bad:	Tree in seriously bad health/major structural problem

Work Recommendations

Preliminary management recommendations are made where necessary and relevant to current site conditions unless otherwise stated.

Estimated Remaining Contribution (ERC)

The approximate number of years that a tree should continue to live and contribute amenity, conservation, or landscape value to the site under current site conditions.

3.2 Tree Retention Category (Cat) (BS5837: 2012 Trees in relation to design, demolition and construction – Recommendations)

The tree retention category system grades a tree's suitability for retention within a development:

- A** Indicates a tree of high quality and value. These are trees that are particularly good examples of their species, which also provide landscape value. These trees are in such a condition as to be able to make a substantial contribution. (A minimum of 40 years is suggested)
- B** Indicates a tree of moderate quality and value. Trees that might be included in the high category, but are downgraded because of impaired condition. These trees are in such a condition as to make a significant contribution. (A minimum of 20 years is suggested)
- C** Indicates a tree of low quality and value - trees with an estimated remaining life expectancy of at least 10 years, or younger trees with a stem diameter of below 150mm and/or <10m in height.
- U** Trees that are in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years.

Sub Categories

Tree categories may be further categorised using the following sub-categories (e.g. C1, C2 or C3) - 1 mainly Arboricultural qualities, 2 mainly landscape qualities, 3 mainly cultural values.

3.3 Root Protection Area

The Root Protection Area (RPA) is the minimum area around individual trees to be protected from disturbance during construction works; RPA is recorded as a radius in metres measured from the tree stem and is shown on the tree survey/constraints drawing as a circle with the tree stem in the centre.

For single stem trees, the root protection area (RPA) should be calculated as an area equivalent to a circle with a radius 12 times the stem diameter.

For trees with more than one stem, one of the two calculation methods below should be used.

The calculated RPA for each tree should be capped to 707 m².

a) For trees with two to five stems, the combined stem diameter should be calculated as follows:

$$\sqrt{((\text{stem diameter } 1)^2 + (\text{stem diameter } 2)^2 \dots + (\text{stem diameter } 5)^2)}$$

b) For trees with more than five stems, the combined stem diameter should be calculated as follows:

$$\sqrt{((\text{mean stem diameter})^2 \times \text{number of stems})}$$

4.0 Findings

The trees were assessed during site visits on the 2nd, 14th of February and 23rd and 27th of June 2022; the field data for the tree groups is contained in the accompanying Tree Survey Schedule. Tree and tree group locations are shown on the Tree Survey/Constraints Plan drawing 22042_TS.

The survey area included the groups of trees, hedges and woodland that are located under or adjacent to the proposed route of the diverted powerline network.

Tree Group G1 encompasses the linear plantation of mixed species trees established between the R148 to the south and carparking areas of the Intel campus to the north. The trees have been planted onto a low mound and have become mostly well-established and form an effective landscape screen between the road and factory site. The group is made up of a mix of deciduous tree species (Ash, Willow, Lime, Cherry, Maple and Birch) that is now in semi or early maturity. Tree health amongst most species is reasonably good, however, many of the Ash trees are showing clear signs of crown dieback as a result of infection by the fungal disease known as Ash Dieback (*Hymenoscyphus fraxineus*), with some trees now severely affected. New underground infrastructure works in recent years have required that openings have been cut through the group, including at the western and eastern ends of the group and through the section of remnant hedgerow between the two carparks. Some new tree planting has been undertaken to infill the gaps, but this has yet to grow sufficiently to restore the screening fully. A row of street trees has been established into the roadside verge immediately south of group G1, these trees are made up of a line of Lime trees (group G1a) at the western end, followed by a row of Hornbeam (G1b), Elm (G1c) and a row of Cypress trees (G1d) at the far eastern end of the Intel grounds. These groups are comprised of a single row of trees; however, they do contribute to the landscape screening value of the group as a whole.

Group G2 is the group of trees (mostly Ash) growing in the sunken area at the eastern end of the IR96 carpark. The older trees originate along the sloping sides of the hollow, (which is presumed to be a drainage ditch of some sort) with younger mixed species saplings (including numerous young Sycamores) growing around the edges of the group. Virtually all of the Ash trees in the group were showing signs of crown dieback due to Ash Dieback disease, with some individuals now badly affected. The interior of the group was not readily accessible for more detailed examination.

Group G3 includes the remnants of the eastern end of the roadside plantation left isolated as trees were cleared to facilitate the new underground services, and the cluster of trees just inside the tall retaining wall. The group includes the tall Poplar tree (labelled T8) and several other trees (Norway Maple, Lime, Poplar) in the unmanaged grounds in the far southeastern corner of the campus.

Tree group G4 is the large plantation of young trees covering the linear berm built up to screen the eastern end of the site. This plantation is made up of a mix of species, including the broadleaves Alder, Hazel, Oak, Lime, Hawthorn, Beech and Birch and

conifers Larch and Scots Pine. The plantation is becoming well-established, with some of the Scots Pine and Larch trees now reaching around 10m in height. Tree health is mostly good or fair, however, the plantation is densely stocked and will benefit from thinning operations to re-space the trees over the coming years.

The area between the mound upon which group G4 is growing and the eastern boundary ditch has been partially colonised by low scrub growth of Willow, Hawthorn, Sycamore, Ash and Buddleia bushes as the area has been left unmanaged. The coverage of the scrub growth is sporadic, with most of it concentrated toward the south and only occasional saplings or bushes to the north. This scrub is labelled group G5 on the survey drawing.

Group G6 is the treeline/hedge originating outside the eastern boundary ditch and was included for added detail as it runs roughly parallel to the proposed OHL route between the new towers labelled T4 and T5. This treeline follows the eastern side of the drainage ditch and is comprised mostly of early mature Ash trees growing out of a mostly Hawthorn understorey. Many of the Ash trees are in poor condition, with extensive crown dieback due to Ash dieback disease widespread amongst the trees.

Group G7 is the remnant farm hedge running roughly east-west to the north of the new water tanks and northern end of the landscape mound covered by group G4. The hedge has been impacted by some of the previous ground works where ground levels have been raised to the south of the hedgeline. The actual line of the hedge has been somewhat blurred by additional tree growth to the southwest (Alder and Poplar) and as the hedge has been left unmanaged and overgrown. An opening has been created through the hedge towards the eastern end.

The survey area follows the sloping ground north down to the Rye Water, crossing three separate groups of trees before crossing the river itself. This area is currently unmanaged and becoming overgrown. A linear group (group G8) of early mature Willow trees runs parallel to the river channel; these trees are low, multi-stemmed Willow bushes growing out of the wet soil close to the edge of the river terrace. The trees are in good physiological health, but some are suffering from some branch/stem breakages as weak forks fail. The woodland to the west of group G8 is heavily overgrown with bushes and brambles, which restrict access into its interior. The southern part of this wider wooded area is dominated by mature and early mature Ash trees that make up group G9; these trees are being badly impacted by Ash Dieback disease (ADB), with the foliage of many trees being very sparse and depleted. The woodland (group G10) to the north and west becomes more mixed, with numerous Willow, Ash and Hawthorn trees along the riparian strip covering the sloping ground between the Rye Water to the north and internal road to the south. Many of the Ash trees are badly affected by ADB, including some of the larger individuals. The northern side of the riverbank has a narrow strip of woody vegetation, made up mostly of Field Maple, Willow, Hawthorn and Blackthorn bushes (group G11), with the group becoming wider and merging with the woodland towards the northeast.

Most of the river terrace north of the river channel is open farmland, however, the area to the east has been planted with mixed conifers (Spruce and Larch) to form a small plantation (group G12). This plantation is flanked along its western edge by a strip of mixed broadleaves (Ash and Willow) that are growing along the drainage ditch marking the field boundary. Many of the Ash trees are showing symptoms of ADB and are in poor condition.

The sloping ground to the north of the river terrace has been planted up with mixed conifers (Douglas Fir, Larch) to form a well-established forest plantation (group G14). The plantation trees appear to be in reasonably good condition, with tall, upright growth habits typical for the species. A new underground service has evidently been run through the plantation to the east, resulting in a swathe having to be cut through the forest block. The plantation is bounded by a deep drainage ditch to the south and west that is lined with mixed broadleaved trees and bushes (group G13) that predate the conifer plantation. The trees along the bank of the drainage ditch include a series of mature Oak trees (labelled T1-T7), some of which are of high landscape and conservation value. The group also includes numerous Hazel and Hawthorn bushes as well as a series of mature and early mature Ash trees, that are all showing signs of infection by Ash dieback disease.

5.0 Preliminary Recommendations

Preliminary management recommendations for the trees assessed are listed in the tree survey schedule in the appendices; these pertain to *current* site conditions unless otherwise stated.

All tree work should be carried out by qualified and experienced tree surgeons.

All tree work should be in accordance with *BS3998 (2010) Tree Work – Recommendations*.

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6.0 Site Photographs



1. Eastern end of tree group G1 along the road frontage with the R148; note 2x Ash trees with significant crown dieback as a result of Ash Dieback disease



2. Trees making up group G2 between two car parking areas, viewed from the west, the taller Ash trees are just starting to show signs of Ash Dieback disease



3. Taller Poplar tree T8 with tree group G4 planted on the mound to the right and scrub woodland G5 in the foreground; viewed from the north



4. View north across the river valley from just north of hedge G7 looking over groups G8-G15



5. Plantation forest block G12 viewed from the south, with riparian bushes along the riverbank



6. Deciduous trees making up groups G13 and G15, with conifer plantation G14 behind the taller Oak (trees T2-T5) and Ash trees in group G13.



5. Western edge of conifer plantation G14 on the left, and inside view of the north western part of group G13 to the right (looking south)

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7.0 Arboricultural Impact of the New Development

7.1 Project Description

The planned diversion of the 110kV OHL network will see the existing overhead line crossing the Intel campus from the pylon located in the Lidl car park (south of the R148) to the pylon located on farmland north of the Rye Water River terrace decommissioned and the line diverted around the southern and eastern sides of the campus. The diversion will require that the two pylons are replaced by new structures close by and the construction of five new pylons to carry the new overhead network along the new route. Three new pylons (towers T2-T4) will be built inside the intel campus fence line, with T2 and T3 being located in areas currently used for car parking. T4 will be built in the unmanaged scrubland in the far south-eastern corner of the campus. These three new towers will carry the new OHL system roughly parallel to the R148 before it is routed north across the scrub woodland from new tower T4 to tower T5. T5 will be built on disused pastureland at the southern edge of the Rye Water valley and support the new OHL system as it crosses the river channel to another new pylon (tower T6) to be built on the flat open farmland of the Rye Water River terrace. From tower T6 the new network will reconnect into the existing OHL system via a new replacement tower (T7) immediately northeast of the existing pylon located on the hill above the river terrace. The route of the new OHL network and the new towers is shown along with the areas requiring tree management works on the Tree Impact Drawing 22042_TPP.

7.2 Vegetation Management

The construction of the new network will require that the pre-existing vegetation will have to be managed to meet the safety clearance requirements necessary to ensure the safe operation of the new OHL system. The overhead conductors will be carrying significant electrical current and will require sufficient clearance from ground vegetation to prevent interference or electrical arcing to earth. Trees can conduct electricity, even if the branching is not in direct contact with the overhead cables themselves, causing power transmission problems and potentially serious safety consequences to people or livestock etc. nearby. These issues are routinely managed along overhead electrical networks by way of regular inspection and tree management programs that identify trees and branching that may be encroaching the safety clearance zones of the conductors and arrange for the trees to be cut back accordingly. Ideally the vegetation under an OHL network is managed in such a way that achieves a balance between the need for adequate safety clearances to be maintained and the continued retention of woody vegetation where practicable and the benefits that this vegetation provides (habitat, biodiversity, landscape screening, carbon storage etc.). The long-term viability of these management systems often requires a period of transition from the existing vegetation structure to one that is more manageable and sustainable.

The classic example of a sustainable vegetation management system under an OHL network is coppicing, where selected tree species are cut back to stump and allowed to regenerate fresh growth. Coppicing is the ideal management system for trees such as Sycamore, Ash, Hazel, Willow, Elm, Oak, Alder, Lime etc. that regenerate readily from cut stumps to produce fresh growth rapidly. Coppicing is a far more appropriate and efficient system of vegetation control than 'topping' or cutting back the height of trees; a practice that requires more frequent intervention and often impacts negatively on the physiological and structural condition of the affected trees.

7.3 Towers T1 to T2

The route of the diverted OHL network at Intel will run from tower T1 close to the existing pylon and cross the R148 to the new tower T2 in the car park. The overhead conductors will run over the top of the western end of the tree group G1 and require that some of the trees making up the group will need to be cut back to achieve the necessary safety clearances. The Timber Cutting Requirements Technical Note prepared by Mott MacDonald indicate that vegetation will need to be cut back to between 3.5 and 6.3m from ground level, depending on the underlying topography. Given the species composition of this tree group, the taller trees and those likely to become tall (Ash, Birch, Maple, Lime) within the safety zone should be cut back to stump and managed as coppice, with the lower bushes and shrubs (Hawthorn, Elder etc.) left intact or pruned back as needed. The high proportion of Ash trees in this area means that high mortality from Ash Dieback disease is likely over the coming years and these trees are best replaced by fresh planting of low growing species such as Hazel, Holly and Hawthorn etc. that can co-exist with the new OHL network.

7.4 Towers T2 to T3

The OHL span between the new towers T2 and T3 will over sail the group of trees (group G2) growing out of the gulley running perpendicular to the new network. The taller trees are almost all early mature Ash trees that are showing signs of decline associated with Ash Dieback. The technical report indicates that these trees will need to be reduced in height by 5-6m; reduction pruning would not be an appropriate treatment for trees of this species and condition, with coppicing/felling being recommended along with infill planting of new trees (such as Goat Willow) and shrubs along the sides of the gulley that would be more compatible with the long-term management of the site. The younger growth (mostly Sycamore and Willow saplings) surrounding the edges of the gulley should be coppiced on a regular rotation as soon as the treetops threaten to encroach the safety clearances. Some light side pruning of some of the trees (Willow, Norway maple) along the northern edge of group G1 will also be necessary to create and maintain the safety clearances.

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13 | Page

7.5 Towers T3 to T4

Some additional pruning of some of the trees along the northern edge of tree group G1 will be needed to achieve the clearances towards tower T3, however the main issue in this span is the rising ground levels towards the new tower T4, where the young trees forming group G4 cover the landscape mound and will be in contact with the lower conductors if they are left as they are. The maximum height for any vegetation along the top of the mound is indicated as 3.3m in the technical report, making the retention of any significant trees under the new OHL network in this area impractical. The mix of young trees making up the plantation on the mound is mostly suited to coppicing (Alder, Oak, Lime, and Hazel), however, coppicing of the trees along the top of the mound would need to be repeated on a very short rotation (every three years or so) if the tops of the young trees were to be kept outside the safety clearance zones. Taller growing tree species such as Scots Pine and Birch should be removed from below the OHL and lower growing species (such as Hazel in particular) encouraged to form the dominant species, with coppicing being practiced regularly across the entire clearance zone below and adjacent to the conductors. The working area required around the new tower T4 will need to be cleared of the existing scrub growth (elements of group G5). The tall Poplar tree labelled T8 is located just to the south of the new tower and is recommended for either coppicing or felling due to its proximity to the new overhead structures.

7.6 Towers T4-T5

The technical note indicates that some elements along the eastern edge of tree group G4 will need to be cut back along with some of the patchy scrub Willow growth that has become established along the route between T4 and T5. The trees in these areas should be coppiced to stump rather than pruned. Trees and bushes making up group G7 will also require clearance work, with the access route through the hedgerow being expanded to improve access to the site of tower T5 and to create space for the temporary work area. The vegetation at the eastern end of the group needs to be limited to between 7.6 and 9.1m from ground level; this will require that the early mature Ash trees in the hedge southeast of the new tower T5 be coppiced to stump; these trees are now suffering from Ash Dieback disease and would be best felled rather than being left in place to die. Some of the taller Hawthorn in the hedge may also be cut back or coppiced. Any replacement planting in this area should be restricted to hedging species such as Holly, Hawthorn, Hazel and Blackthorn, whose height growth can be readily managed.

7.7 Towers T5-T6

Analysis of data in the technical note shows that the tress in the river valley between towers T5 and T6 should be at or just below the safety clearance height minimum and so should not require significant cutting. This situation should be reviewed during the construction process and where appropriate, some of the taller Ash trees at the eastern end of group G9 should be coppiced as a precautionary measure. This group is made up mostly of Ash trees in poor condition because of Ash Dieback disease and are unlikely to put on any significant additional height growth because of the disease. The new tower T6 will be located in farmland and so will not require any tree clearance to facilitate the working area.

7.8 Towers T6-T7

The span of OHL connecting the new diverted section back onto the existing network will run from tower T6 on the river terrace north of the Rye Water River channel up to a new tower close to the existing pylon to the north. The new line will cross over the trees (group G13 including the mature Oak trees labelled 2-7) growing along the drainage ditch to the south and west of conifer plantation G14 and the western corner of the plantation itself. The technical note indicates that the trees growing along the ditch south of the plantation that include the Oak trees 1-5 should be at or below the height of minimum safety clearance, while the trees within group G13 further north (including Oak trees 6-7) will be very close to the minimum height and will likely require some reduction pruning (for the Oak trees) or coppicing (for the Ash trees). Most of the mature Ash trees within group G13 are showing clear signs of crown dieback as a consequence of Ash Dieback disease and would be best coppiced to stump rather than lowered in height by crown reduction pruning. The Oak trees (numbered 2-5 in particular) are of comparatively high value and should be reviewed as the project progresses and only be crown reduced if this is confirmed to be necessary to achieve the desired safety clearance. The data suggests that a tree height of approximately 20m could be acceptable where trees 2-5 are located; the tallest Oak tree (number 3) is estimated to be 18-20m in height, with the other Oaks being considerably shorter.

The plantation conifers in group G14 within the safety zone under the new OHL network will need to be felled to stump; these coniferous tree species will not coppice and should not be crown reduced or 'topped'. The conifers should be removed and replaced with lower growing shrubs and trees such as Hazel, Holly and Hawthorn.

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8.0 Arboricultural Method Statement

8.1 Tree Work Operations

The areas along the new OHL route where trees are to be removed or coppiced are indicated on the Tree Protection Plan drawing 22042_TPP.

8.1.1 Towers T1-T2

The mixed species trees (Ash, Cherry, Maple) under the route of the new OHL will be cut back to stump. Lower growing bushes of Hawthorn and Hazel will be coppiced as necessary or left in situ if confirmed to be below the safety clearance height.

8.1.2 Towers T2-T3

Branching spreading from the trees (mostly Willow) within group G1 will be cut back to obtain the necessary clearance. The Ash trees and taller saplings making up group G2 will be coppiced.

8.1.3 Towers T3-T4

Branching spreading from the trees within group G1 to the southeast of T3 will be cut back to obtain the necessary clearance. The Trees from the young plantation group G4 located underneath the new OHL will be coppiced to stump. The Poplar tree number 8 located south of T4 and adjacent scrub growth of Willow and Buddleia will also be coppiced.

8.1.4 Towers T4-T5

Young trees along the eastern edge of tree group G4 and the patches of scrub Willow growth will be coppiced. The Early mature Ash trees at the eastern end of group G7 and hedgerow Hawthorn bushes will be coppiced to create the necessary clearance and to facilitate the new tower and working space.

8.1.5 Towers T5-T6

Where necessary, some of the Ash trees at the eastern end of group G9 will be coppiced to obtain sufficient safety clearance from the new OHL.

8.1.6 Towers T6-T7

Conifers (Larch and Douglas Fir) in the area of plantation Group G14 below and adjacent to the new OHL will be felled to stump. Ash and other mixed broadleaves in group G13 around the conifer forest will be coppiced as necessary to achieve the safety clearance needed. The Oak trees 2-7 will be reviewed during the operation and may be subject to some crown reduction pruning to meet the necessary minimum safety clearances.

The felling and pruning work will be carried out by professional tree surgeons working to BS3998 (2010). All arisings (cordwood and brash) will be removed to a green waste facility or processed into mulch for recycling on the site.

8.2 Tree Protection Measures

Construction activity should be confined to the designated working areas and access routes and not be allowed to stray off towards tree groups being retained along the route. This should be achieved by adequate instruction to the contractors prior to commencement and supervision of the works as they progress. Where appropriate, temporary fencing should be deployed to confine activity to the work zones and away from trees vulnerable to damage. Most of the towers are built away from trees in areas already used for hard standing or open farmland and so their construction is unlikely to pose any significant hazard to trees. The areas around towers T4 and T5 will need to be more closely monitored during the construction process to ensure that no significant impact on trees and hedges being retained occurs.

Where construction machinery *must* encroach the RPAs of the trees to be retained for reasons unforeseen and unavoidable; suitable ground protection will be put in place to prevent any significant soil compaction or root damage near the trees; this should take the form of suitable strength ground protection mats or cellular confinement system capable of supporting the appropriate weight.

All site offices, materials storage, staff parking etc. will located outside of the RPAs of the trees wherever practical; where this is not possible then the ground surface will be covered by an appropriate ground protection layer.

The tree protection measures will be overseen and directed on-site by a dedicated site arborist. The arborist should also make regular visits to the site during the construction process to ensure compliance and be available to provide advice and guidance where necessary.

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9.0 Key Recommendations

Deciduous trees underneath the new OHL network should be managed by coppicing (not 'topping') where the species and clearance requirements allow. Conifers such as Larch and Douglas Fir should be cut to stump.

The young trees in group G4 along the landscape mound will require frequent coppicing underneath the OHL because of the restricted clearance caused by the height of the artificial mound.

Ash trees suffering from Ash Dieback disease are unlikely to produce viable regrowth following coppicing and should be replaced by new planting.

Any new planting should be compatible with long-term management under the OHL network, and so should be either slow growing (Oak, Yew etc.), relatively small in maturity (Hawthorn, Blackthorn), or readily coppiced (Hazel, Willow, Alder).

The mature Oak trees 2-7 within group G13 to the north of the Rye Water are worth retaining as standing trees if this is possible. These trees should be professionally crown reduced if height reduction is confirmed as being necessary.

Tree cutting and OHL line clearance operations should be undertaken outside the bird nesting season (1st September to end of February) and during the winter months, when the trees are dormant and seasonal undergrowth has died back.

10.0 References

BS5837 (2012) *Trees in relation to design, demolition and construction – Recommendations*

BSI Standards Limited 2012

Collinstown 110kV OHL Diversion Project

Timber Cutting Requirements – Technical Note (Mott MacDonald 2022)

11.0 Appendices

Tree Survey Schedule

Tree Survey/Constraints Plan Drawing 22042_TS

Tree Protection/Impact Plan Drawing 22042_TPP

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Tree Survey Schedule
Collinstown 110kV Diversion, Leixlip, Co. Kildare
July 2022

Type	No.	Species	Age	Ht m	Dbh mm	ERC	Phys Cond	Comments	Preliminary Recommendations	RPA m	Cat
G	1	Fraxinus excelsior (Ash), Tilia cordata (Small-leaved Lime), Prunus avium (Wild Cherry), Crataegus monogyna (Hawthorn), Salix spp. (Willow), Sambucus nigra (Elder), Betula pendula (Silver Birch), Carpinus betulus (Hornbeam), Acer platanoides (Norway Maple)	SM EM	6 to 14	150 to 350	10+	Fair/Poor	Linear group planting along landscape border between Intel car parks to the north and R148 Leixlip Road to the south. Group includes section of hedge running perpendicular to the main group. This hedge has been partly removed to facilitate the installation of a new underground service pipe, which also runs through the western and eastern parts of the group where swathes of the trees have had to be removed in the recent past. Ash Dieback disease (ADB) is becoming prevalent amongst the Ash trees, with some trees now badly affected. Some of the Willow has been pollarded in the past, however active tree management appears limited in recent times. The group continues to offer good landscape screening between the main road and interior of the campus.	Monitor condition of the Ash trees to track the progress of Ash Dieback disease (ADB). Infill gaps with new planting where practicable.	4.2	C2
G	1a	Tilia spp. (Lime)	SM	6 to 9	200 to 300	10+	Good	Single row of young Lime trees along verge.	No urgent works needed.	3.6	C2
G	1b	Carpinus betulus (Hornbeam)	SM	6 to 8	250	10+	Good	Single row of young Hornbeam trees along verge.	No urgent works needed.	3	C2
G	1c	Ulmus spp. (Elm cv.)	EM	13	200 to 250	10+	Fair	Single row of 14 young Elm trees along verge. Upright form.	No urgent works needed.	3	C2
G	1d	Cupressus x leylandii	SM	4 to 10	150 to 200	10+	Fair	Single row of Cypress trees along verge. Upright form.	No urgent works needed.	3	C2
G	2	Acer pseudoplatanus (Sycamore), Fraxinus excelsior (Ash), Salix caprea (Goat Willow)	M SM	5 to 15	150 to 450	10+	Fair/Poor	Inaccessible lower area between two car parks with a linear group of mature Ash trees running from north-south along a central ditch. Smaller Willow and Sycamore saplings and bushes to east and west of main group. Larger Ash trees mostly multi-stemmed and with thick Ivy cover. Definite signs of Ash Dieback disease starting to affect the larger trees. No recent management evident.	Monitor condition of the Ash trees to track the progress of Ash Dieback disease (ADB).	5.4	C2

Tree Survey Schedule
Collinstown 110kV Diversion, Leixlip, Co. Kildare
July 2022

Type	No.	Species	Age	Ht m	Dbh mm	ERC	Phys Cond	Comments	Preliminary Recommendations	RPA m	Cat
G	3	Fraxinus excelsior (Ash), Tilia cordata (Small-leaved Lime), Populus X canadensis (Hybrid Black Poplar), Acer platanoides (Norway Maple)	M EM SM	10 to 22	150 to 450	10+	Fair	Fair. Cluster of mixed species trees at the eastern end of group G1, just north of the large retaining wall supporting the R148. Larger and prominent Poplars up to 22m tall, most other trees 10m or so. Relatively low quality stems in unmanaged area. Some Ash dieback evident.	No urgent works needed.	5.4	C2
G	4	Alnus glutinosa (Common Alder), Larix spp. (Larch), Pinus sylvestris (Scots Pine), Quercus robur (Common Oak), Crataegus monogyna (Hawthorn), Tilia cordata (Small-leaved Lime), Corylus avellana (Hazel), Fagus sylvatica (Beech)	SM	6 to 10	100 to 250	10+	Fair/Good	Fair/Good. Extensive area of young plantation woodland covering landscape berm to the east of the main compound. The plantation is now well-established and is providing improving landscape amenity and conservation value year on year. Group includes some good quality Scots Pine and some taller Larch and Alder stems. Dense Hawthorn and Cornus spp. cover along the lower part of the group.	No urgent works needed. Stand may benefit from some selective thinning operations over the next 5-10 years.	3	B2
G	5	Acer pseudoplatanus (Sycamore), Salix caprea (Goat Willow), Fraxinus excelsior (Ash), Crataegus monogyna (Hawthorn)	SM EM	4 to 8	335	10+	Fair	Fair. Scrub growth of mostly multi-stem Willow bushes extending out across unused land. Mix of other species includes Buddleia and Gorze bushes. Becoming more patchy and sporadic to the north, with thick brambles and saplings of Willow, Hawthorn, Sycamore and Ash. Some conservation value, limited amenity or arboricultural value.	No urgent works needed.	4.02	C2
G	6	Acer pseudoplatanus (Sycamore), Fraxinus excelsior (Ash), Sambucus nigra (Elder), Crataegus monogyna (Hawthorn)	EM M	8 to 15	200 to 400	10+	Poor	Fair/Poor. Old hedgerow following the eastern side of the drainage ditch along the eastern boundary fence. No significant branch spread out over the boundary into the Intel premises. Extensive Ash dieback disease now impacting on the Ash trees along the group, with many of the larger trees now in poor condition.	Monitor condition of the Ash trees to track the progress of Ash Dieback disease (ADB). Coppice Ash trees if they suffer significant crown dieback (>50% crown death).	4.8	C2
G	7	Fraxinus excelsior (Ash), Crataegus monogyna (Hawthorn), Sambucus nigra (Elder)	M	5 to 8	200 to 300	10+	Poor/Fair	Poor/Fair. Remnant farm hedgerow that predates the modern business park. Mostly mature Hawthorn and Elder bushes with several having suffered stem breakages and collapses as the hedge has been left unmanaged. Trees have heavy Ivy coverage and dense bramble growth. Two mature Ash trees (12m tall) at the eastern end of the hedge are now in poor condition due to Ash Dieback disease.	Cut back suckering and undergrowth to allow access to trees. Coppice weaker/selected stems. Cut and lay Hawthorn where appropriate. Infill gaps with new hedging plants.	3.6	C2

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Planning Department

Tree Survey Schedule
Collinstown 110kV Diversion, Leixlip, Co. Kildare
July 2022

Type	No.	Species	Age	Ht m	Dbh mm	ERC	Phys Cond	Comments	Preliminary Recommendations	RPA m	Cat
G	8	Salix caprea (Goat Willow)	M	8 to 10	335	10+	Fair	Fair/Poor. Linear group of Willow trees, arranged roughly parallel to the river channel. Trees mostly multi-stemmed below 1.5m. Numerous tight forks/unions, some of which have failed, leaving collapsed stems.	Coppice weaker/selected stems.	4.02	C2
G	9	Fraxinus excelsior (Ash), Sambucus nigra (Elder), Crataegus monogyna (Hawthorn).	M	12 to 15	400	10+	Poor	Fair. Group of mature Ash trees on sloping ground. Thick Ivy growth on tree stems, extending up into the crowns of some trees. Crown dieback and epicormic growth indicative of Ash Dieback disease (ADB) present on many of the trees. Dense undergrowth prevented access amongst the trees.	Monitor condition of the Ash trees to track the progress of Ash Dieback disease (ADB). Coppice Ash trees if they suffer significant crown dieback (>50% crown death).	4.8	C2
G	10	Crataegus monogyna (Hawthorn), Fraxinus excelsior (Ash), Salix caprea (Goat Willow), Sambucus nigra (Elder), Prunus spinosa (Blackthorn)	EM	S to 15	300	10+	Fair/Poor	Fair/Poor. Mixed dense woodland growing at edge of watercourse. Mostly Willow (some having collapsed) along the riverbank, with Ash and mixed bushes and trees making up broader mass of group. Some significant dieback and epicormic shoots in the crowns of the Ash trees.	Monitor condition of the Ash trees to track the progress of Ash Dieback disease (ADB). Coppice weaker/selected stems where appropriate.	3.6	C2
G	11	Crataegus monogyna (Hawthorn), Fraxinus excelsior (Ash), Salix caprea (Goat Willow), Sambucus nigra (Elder), Prunus spinosa (Blackthorn), Acer campestre (Field Maple)	EM	S to 6	300	10+	Fair	Fair. Narrow linear group of mixed species trees and bushes forming a riparian strip along the northern bank of the Rye Water river.	No urgent works needed.	3.6	C2
G	12	Fraxinus excelsior (Ash), Salix caprea (Goat Willow), Picea sitchensis (Sitka Spruce), Larix decidua (European Larch)	EM	10 to 18	150 to 350	10+	Fair/Poor	Fair. Area of plantation forest north of the river. Mix of larger Spruce and Larch. Variable condition, with anti-social activity causing fire damage etc. No obvious signs of recent forest management operations. Strip of Ash and Willow along drain marking the northwestern boundary of the woodland. Some ADB amongst the Ash trees.	Monitor condition of the Ash trees to track the progress of Ash Dieback disease (ADB). Selectively thin plantation to remove weaker stems.	4.2	C2
G	13	Fraxinus excelsior (Ash), Corylus avellana (Hazel), Ilex aquifolium (Holly), Quercus robur (Common Oak)	M	10 to 20	200 to 800	40+	Fair/Poor	Fair. L-shaped group of mixed species hardwood trees growing on edge of ditch to the southwest and northwest of conifer plantation group G14. Group includes a series of mature Oak trees (1-7) of high conservation and arboricultural value, especially along the southern part of the group (along the northern bank of the ditch). Many of the Ash trees are showing signs of ADB.	Monitor condition of the Ash trees to track the progress of Ash Dieback disease (ADB).	9.6	A2

Tree Survey Schedule
Collinstown 110kV Diversion, Leixlip, Co. Kildare
July 2022

Type	No.	Species	Age	Ht m	Dbh mm	ERC	Phys Cond	Comments	Preliminary Recommendations	RPA m	Cat
G	14	<i>Larix decidua</i> (European Larch), <i>Pseudotsuga menziesii</i> (Douglas Fir)	M EM	15 to 22	150 to 400	20+	Fair	Fair. Mature conifer plantation established on the sloping land above the river alluvial terrace/flood plain. Typical upright form. Larger Douglas Fir (400mm dbh) mixed with smaller Larch (150-300mm dbh). Some trees damaged by excavation works at south eastern end of plantation.	Fell trees worst affected by excavation works.	4.8	B2
G	15	<i>Fraxinus excelsior</i> (Ash), <i>Sambucus nigra</i> (Elder), <i>Corylus avellana</i> (Hazel), <i>Ilex aquifolium</i> (Holly), <i>Crataegus monogyna</i> (Hawthorn)	M	5 to 15	250	10+	Fair/Poor	Fair. Old farm hedgerow growing along edge of ditch. Section included in survey includes a mature Ash tree (15m height) in poor condition with ADB; most trees and bushes making up the hedge are 5-8m tall. Dense lower growth, with little recent management evident.	Monitor condition of the Ash tree to track the progress of Ash Dieback disease (ADB).	3	C2

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Tree Survey Schedule
Collinstown 110kV OHL Diversion, Leixlip, Co. Kildare
July 2022

Type	No.	Species	Age	Ht m	Dbh mm	St	Cr	N	S	E	W	ERC	Phys Cond	Structural Condition/Comments	Preliminary Recommendations	RPA m	Cat
T	1	Quercus robur (Common Oak)	M	13	700	1	3	6	8	7	8.5	40+	Good	Fair. Medium sized tree growing on edge of ditch. Some recent root damage. Thick Ivy growth on tree stem.	No urgent works needed.	8.4	A2
T	2	Quercus robur (Common Oak)	M	11	550	1	3	2	6	6	4	20+	Fair	Fair. Medium sized tree growing on edge of ditch. Slight lean to South. Thick Ivy growth on tree stem. Asymmetric form due to group competition.	No urgent works needed.	6.6	B2
T	3	Quercus robur (Common Oak)	M	18	900	1	3	8	8.5	8.5	10	40+	Good	Fair. Large mature tree growing on edge of ditch. Spreading form. Initial lean to stem but self-corrects to vertical. Full crown with healthy foliage.	No urgent works needed.	10.8	A2
T	4	Quercus robur (Common Oak)	M	13	600	1	2	4	5	6	4	40+	Good	Fair. Medium sized tree growing on edge of ditch. Slight lean to South. Thick Ivy growth on tree stem. Some bark wounds to stem base.	No urgent works needed.	7.2	A2
T	5	Quercus robur (Common Oak)	M	11	700	1	3	5	6	7	7	40+	Good	Fair. Good vitality. Medium sized tree growing on edge of ditch. Thick Ivy growth on tree stem.	No urgent works needed.	8.4	A2
T	6	Quercus robur (Common Oak)	M	12	550	1	3	4	S	5	6	20+	Fair	Fair. Medium sized tree growing on edge of ditch. Thick Ivy growth on tree stem. Minor deadwood in crown.	No urgent works needed.	6.6	B2
T	7	Quercus robur (Common Oak)	M	12	450	1	S	S	2	4	S.S	20+	Fair	Fair. Medium sized tree growing on edge of ditch. Slight lean to stem. Thick Ivy growth on tree stem. Asymmetric form due to group competition.	No urgent works needed.	5.4	B2
T	8	Populus X canadensis (Hybrid Black Poplar)	EM	22	612	3	0	9	9	S	6	10+	Fair	Fair. Tall mature Poplar tree. Multiple stems below 1.5m. Unbalanced crown shepe.	No urgent works needed.	7.34	C2

APPENDIX 6.3

GUIDELINES FOR ECOLOGICAL IMPACT ASSESSMENT IN THE UK AND IRELAND

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International Importance:

- 'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation.
- Proposed Special Protection Area (pSPA).
- Site that fulfils the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended).
- Features essential to maintaining the coherence of the Natura 2000 Network.¹
- Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive.
- Resident or regularly occurring populations (assessed to be important at the national level)² of the following:
 - Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or
 - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive.
- Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971).
- World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972).
- Biosphere Reserve (UNESCO Man & The Biosphere Programme).
- Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979).
- Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979).
- Biogenetic Reserve under the Council of Europe.
- European Diploma Site under the Council of Europe.
- Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 1988).³

¹ See Articles 3 and 10 of the Habitats Directive

² It is suggested that, in general, 1% of the national population of such species qualifies as an internationally important population. However, a smaller population may qualify as internationally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

³ Note that such waters are designated based on these waters' capabilities of supporting salmon (*Salmo salar*), trout (*Salmo trutta*), char (*Salvelinus*) and whitefish (*Coregonus*)

National Importance:

- Site designated or proposed as a Natural Heritage Area (NHA).
- Statutory Nature Reserve.
- Refuge for Fauna and Flora protected under the Wildlife Acts.
- National Park.
- Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park.
- Resident or regularly occurring populations (assessed to be important at the national level)⁴ of the following:
 - Species protected under the Wildlife Acts; and/or
 - Species listed on the relevant Red Data list.
- Site containing 'viable areas'⁵ of the habitat types listed in Annex I of the Habitats Directive

County Importance:

- Area of Special Amenity.⁶
- Area subject to a Tree Preservation Order.
- Area of High Amenity, or equivalent, designated under the County Development Plan.
- Resident or regularly occurring populations (assessed to be important at the County level)⁷ of
- the following:
 - Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
 - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
 - Species protected under the Wildlife Acts; and/or
 - Species listed on the relevant Red Data list.
- Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance.

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⁴ It is suggested that, in general, 1% of the national population of such species qualifies as a nationally important population. However, a smaller population may qualify as nationally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

⁵ A 'viable area' is defined as an area of a habitat that, given the particular characteristics of that habitat, was of a sufficient size and shape, such that its integrity (in terms of species composition, and ecological processes and function) would be maintained in the face of stochastic change (for example, as a result of climatic variation).

⁶ It should be noted that whilst areas such as Areas of Special Amenity, areas subject to a Tree Preservation Order and Areas of High Amenity are often designated on the basis of their ecological value, they may also be designated for other reasons, such as their amenity or recreational value. Therefore, it should not be automatically assumed that such sites are of County importance from an ecological perspective.

⁷ It is suggested that, in general, 1% of the County population of such species qualifies as a County important population. However, a smaller population may qualify as County important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

- County important populations of species, or viable areas of semi-natural habitats or natural heritage features identified in the National or Local Biodiversity Action Plan, if this has been prepared.
- Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county.
- Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.

Local Importance (higher value):

- Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared;
- Resident or regularly occurring populations (assessed to be important at the Local level)⁸ of the following:
 - Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
 - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
 - Species protected under the Wildlife Acts; and/or
 - Species listed on the relevant Red Data list.
- Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality;
- Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.

Local Importance (lower value):

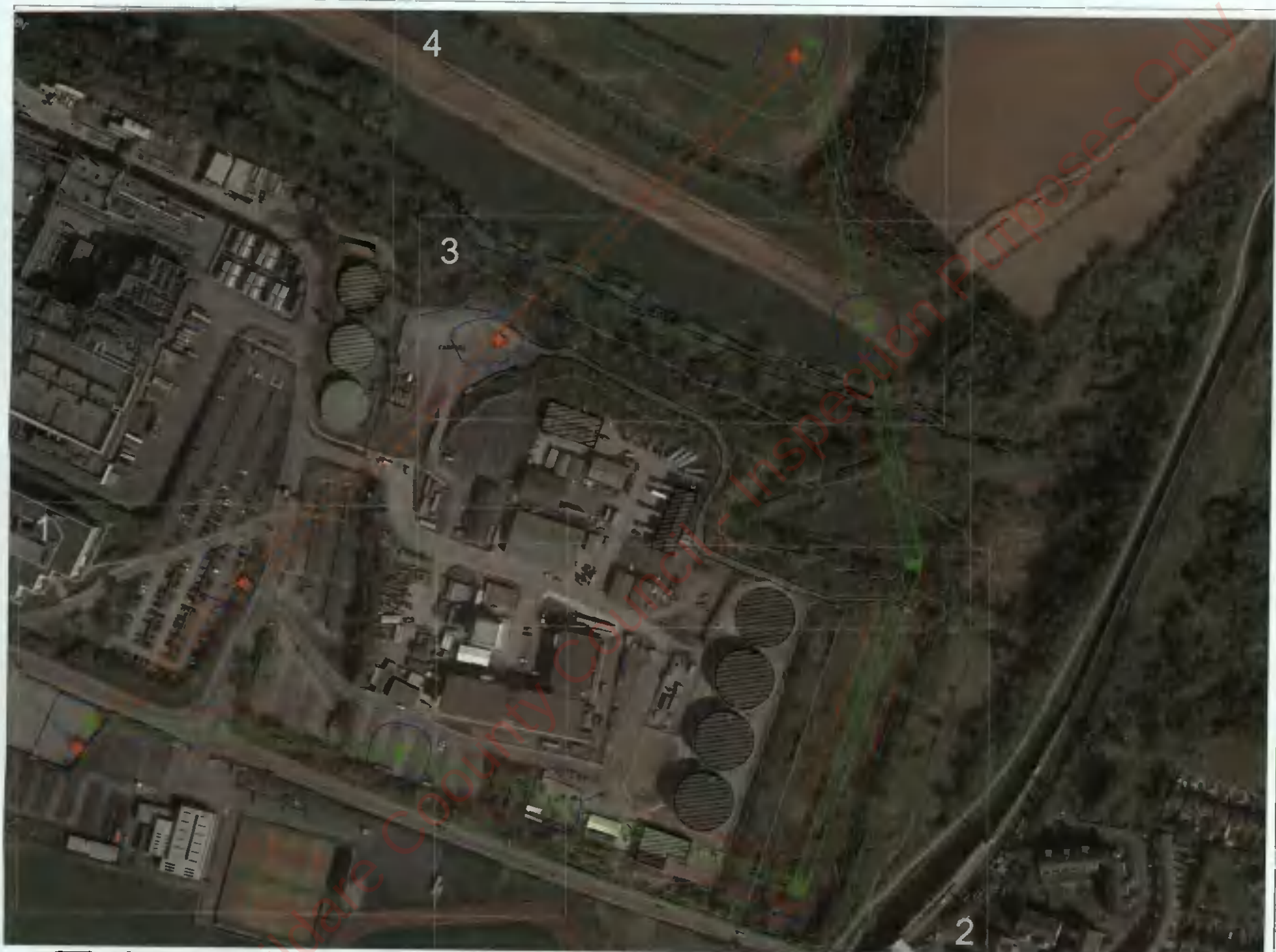
- Sites containing small areas of semi-natural habitat that are of some local importance for wildlife;
- Sites or features containing non-native species that are of some importance in maintaining habitat links.

⁸ It is suggested that, in general, 1% of the local population of such species qualifies as a locally important population. However, a smaller population may qualify as locally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

APPENDIX 6.4

TREE IMPACT/PROTECTION PLAN. JULY 2022

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- Root Protection Area
- Tree Canopy
- Tree Stem & Category Colour
- Tree Tag Number & Category
- Group C13
- Group C14
- Tree Tag No. Number
- Tree Tag No. Number
- Group of Trees to be Removed, Capped or Planted
- Category A Trees (High value)
- Category B Trees (Medium value)
- Category C Trees (Low value)
- Category D Trees (Poor condition)

NOTES

Please see Tree Survey Report for further detail
 All drawings to be read in conjunction with the Consulting Architects and Engineer's drawings

Independent Tree Surveys

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Project Name: Collinstown 110KV OHL
 Diversion Project, Leixlip, Co. Kildare

Drawing Title: Tree Impact/Protection Plan

Drawing Number: 22042_TPP Overview

Client: RTE

Agent:

Date: 06/07/2022

Scale: Not to Scale

APPENDIX 6.5

PROTECTED SITES FOR NATURE CONSERVATION IN THE VICINITY OF THE PROPOSED DEVELOPMENT

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European sites in the vicinity of the proposed development are listed below in Table 1, along with their qualifying/special conservation interests, reference to the most recent conservation objectives document, and their location relative to the proposed development site.

Other nationally protected sites for nature conservation in the vicinity of the proposed development are listed below in Table 2, along with the nature conservation interests for which they are designated, and their location relative to the proposed development site

Table 1 European sites in the vicinity of the proposed development.

European Site Name [Code] and its Qualifying interest(s) / Special Conservation Interest(s) (*Priority Annex I Habitats)	Location Relative to the Proposed Development Site
Special Area of Conservation (SAC)	
Rye Water Valley/Carton SAC [001398] 7220 Petrifying springs with tufa formation (<i>Cratoneurion</i>)* 1014 Narrow-mouthed Whorl Snail <i>Vertigo ongustior</i> 1016 Desmoulin's Whorl Snail <i>Vertigo moulinsiana</i> <i>S.I. No. 494/2018 - European Union Habitats (Conservation of Wild Birds (Rye Water Valley/Carton Special Area of Conservation 001398)) Regulations 2018.</i> NPWS (2021) Conservation Objectives: Rye Water Valley/Carton SAC 001398. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage. ⁹	Proposed development crosses the European site at one location. Proposed towers located c. 17m from the European site at the closest point.
Glenasmole Valley SAC [001209] 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (* important orchid sites) 6410 Molinia meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinia caerulea</i>) 7220 Petrifying springs with tufa formation (<i>Cratoneurion</i>)* <i>S.I. No. 345/2021 - European Union Habitats (Glenasmole Valley Special Area of Conservation 001209) Regulations 2021</i> NPWS (2021a) Conservation Objectives: Glenasmole Valley SAC 001209. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage	Located approximately 15.6km from the proposed development site
Wicklow Mountains SAC [002122] 3110 Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>) 3160 Natural dystrophic lakes and ponds 4010 Northern Atlantic wet heaths with <i>Erica tetralix</i> 4030 European dry heaths 4060 Alpine and Boreal heaths 6130 <i>Calaminarian</i> grasslands of the <i>Violetalia calaminariae</i> 6230 Species-rich <i>Nardus</i> grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) 7130 Blanket bogs (* if active bog)	Located approximately 17.1km from the proposed development site

⁹ The versions of the conservation objectives documents referenced in this table are the most recent published versions at the time of writing

European Site Name [Code] and its Qualifying interest(s) / Special Conservation Interest(s) (*Priority Annex I Habitats)	Location Relative to the Proposed Development Site
8110 Siliceous scree of the montane to snow levels (<i>Androsacetalia alpinae</i> and <i>Galeopsietalia ladani</i>) 8210 Calcareous rocky slopes with chasmophytic vegetation 8220 Siliceous rocky slopes with chasmophytic vegetation 91A0 Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles 135S <i>Lutra lutra</i> (Otter) NPWS (2017a) <i>Conservation Objectives: Wicklow Mountains SAC 002122. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.</i>	
South Dublin Bay SAC [000210] 1140 Mudflats and sandflats not covered by seawater at low tide 1210 Annual vegetation of drift lines 1310 <i>Salicornia</i> and other annuals colonising mud and sand 2110 Embryonic shifting dunes <i>S.I. No. 525/2019 - European Union Habitats (South Dublin Bay Special Area of Conservation 000210) Regulations 2019</i> NPWS (2013b) <i>Conservation Objectives: South Dublin Bay SAC 000210. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.</i>	Located approximately 20km downstream of the proposed development site
North Dublin Bay SAC [000206] 1140 Mudflats and sandflats not covered by seawater at low tide 1210 Annual vegetation of drift lines 1310 <i>Salicornia</i> and other annuals colonising mud and sand 1330 Atlantic salt meadows (<i>Glaucopuccinellietalia maritimae</i>) 1395 Petalwort <i>Petalophyllum ralfsii</i> 1410 Mediterranean salt meadows (<i>Juncetalia maritimi</i>) 2110 Embryonic shifting dunes 2120 Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) 2130 Fixed coastal dunes with herbaceous vegetation (grey dunes) 2190 Humid dune slacks <i>S.I. No. 524/2019 - European Union Habitats (North Dublin Bay Special Area of Conservation 000206) Regulations 2019</i> NPWS (2013a) <i>Conservation Objectives: North Dublin Bay SAC 000206. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.</i>	Located approximately 21.6km downstream from the proposed development site
Malahide Estuary SAC [000205] 1140 Mudflats and sandflats not covered by seawater at low tide 1310 <i>Salicornia</i> and other annuals colonising mud and sand 1330 Atlantic salt meadows (<i>Glaucopuccinellietalia maritimae</i>) 1410 Mediterranean salt meadows (<i>Juncetalia maritimi</i>) 2120 Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes)	Located approximately 22.4km from the proposed development site Kildare County Council Planning Department 28 NOV 2022 RECEIVED

European Site Name [Code] and its Qualifying interest(s) / Special Conservation Interest(s) (*Priority Annex I Habitats)	Location Relative to the Proposed Development Site
2130 Fixed coastal dunes with herbaceous vegetation (grey dunes) <i>S.I. No. 91/2019 - European Union Habitats (Malohide Estuary Special Area Of Conservation 000205) Regulations 2019</i> NPWS (2013c) <i>Conservation Objectives: Malohide Estuary SAC 000205. Version 1.</i> National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	
Baldoye Bay SAC [000199] 1140 Mudflats and sandflats not covered by seawater at low tide 1310 Salicornia and other annuals colonizing mud and sand 1330 Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) 1410 Mediterranean salt meadows (<i>Juncetalia maritimi</i>) <i>S.I. No. 472/2021 - European Union Habitats (Baldoye Bay Special Area of Conservation 000199) Regulations 2021</i> NPWS (2012) <i>Conservation Objectives: Baldoye Bay SAC 000199. Version 1.0.</i> National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht	Located approximately 24.5km from the proposed development site
Rogerstown Estuary SAC [000208] 1130 Estuaries 1140 Mudflats and sandflats not covered by seawater at low tide 1310 Salicornia and other annuals colonising mud and sand 1330 Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) 1410 Mediterranean salt meadows (<i>Juncetalia maritimi</i>) 2120 Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) 2130 Fixed coastal dunes with herbaceous vegetation (grey dunes) <i>S.I. No. 286/2018 - European Union Habitats (Rogerstown Estuary Special Area of Conservation 000208) Regulations 2018</i> NPWS (2013d) <i>Conservation Objectives: Rogerstown Estuary SAC 000208. Version 1.</i> National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	Located approximately 24.9km from the proposed development site
Knocksink Wood SAC [000725] 7220 Petrifying springs with tufa formation (Cratoneurion)* 91A0 Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles 91E0 Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)* <i>S.I. No. 93/2019 - European Union Habitats (Knocksink Wood Special Area Of Conservation 000725) Regulations 2019</i> NPWS (2021c) <i>Conservation objectives for Knocksink Wood SAC [000725]. Version 1.</i> Department of Housing, Local Government and Heritage.	Located approximately 26.3km from the proposed development site

European Site Name [Code] and its Qualifying interest(s) / Special Conservation Interest(s) (*Priority Annex I Habitats)	Location Relative to the Proposed Development Site
Howth Head SAC [000202] 1230 Vegetated sea cliffs of the Atlantic and Baltic coasts 4030 European dry heaths <i>S.I. No. 524/2021 - European Union Habitats (Hawth Head Special Area of Conservation 00202) Regulations 2021</i> NPWS (2016) <i>Conservation Objectives: Hawth Head SAC 000202</i> . Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.	Located approximately 27.2km from the proposed development site
Rockabill to Dalkey Island SAC [003000] 1170 Reefs 1351 Harbour porpoise <i>Phocoena phocaena</i> <i>S.I. No. 94/2019 - European Union Habitats (Rockabill To Dalkey Island Special Area Of Conservation 003000) Regulations 2019</i> NPWS (2013e) <i>Conservation Objectives: Rockabill to Dalkey Island SAC 003000</i> . Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	Located approximately 27.8km from the proposed development site
Ireland's Eye SAC [002193] 1220 Perennial vegetation of stony banks 1230 Vegetated sea cliffs of the Atlantic and Baltic coasts <i>S.I. No. 501/2017 - European Union Habitats (Ireland's Eye Special Area of Conservation 002193) Regulations 2017</i> NPWS (2017b) <i>Conservation Objectives: Ireland's Eye SAC 002193</i> . Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.	Located approximately 29.3km from the proposed development site
Lambay Island SAC [000204] 1170 Reefs 1230 Vegetated sea cliffs of the Atlantic and Baltic coasts 1364 Grey seal <i>Halichoerus grypus</i> 1365 Harbour seal <i>Phoca vitulina</i> <i>S.I. No. 294/2019 - European Union Habitats (Lambay Island Special Area Of Conservation 000204) Regulations 2019</i> NPWS (2013f) <i>Conservation Objectives: Lambay Island SAC 000204</i> . Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	Located approximately 33.8km from the proposed development site
Special Protection Area (SPA)	
South Dublin Bay and River Tolka Estuary SPA [004024] A046 Light-bellied Brent Goose <i>Branta bernicla hrtata</i> A130 Oystercatcher <i>Haematopus ostralegus</i> A137 Ringed Plover <i>Charadrius hiaticula</i> A141 Grey Plover <i>Pluvialis squatarola</i> A143 Knot <i>Calidris canutus</i> A144 Sanderling <i>Calidris alba</i>	Located approximately 18.5km from the proposed development site Kildare County Council Planning Department 28 NOV 2022

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European Site Name [Code] and its Qualifying interest(s) / Special Conservation Interest(s) (*Priority Annex I Habitats)	Location Relative to the Proposed Development Site
A149 Dunlin <i>Calidris alpina</i> A157 Bar-tailed Godwit <i>Limosa lapponica</i> A162 Redshank <i>Tringa totanus</i> A179 Black-headed Gull <i>Chroicocephalus ridibundus</i> A192 Roseate Tern <i>Sterna dougallii</i> A193 Common Tern <i>Sterna hirunda</i> A194 Arctic Tern <i>Sterna paradisaea</i> A999 Wetland and Waterbirds S.I. No. 212/2010 - European Communities (Conservation of Wild Birds (South Dublin Bay and River Tolka Estuary Special Protection Area 004024)) Regulations 2010. NPWS (2015b) Conservation Objectives: South Dublin Bay and River Tolka Estuary SPA 004024. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	
Wicklow Mountains SPA [004040] A098 Merlin <i>Falco columbarius</i> A103 Peregrine <i>Falco peregrinus</i> S.I. No. 586/2012 - European Communities (Conservation of Wild Birds (Wicklow Mountains Special Protection Area 004040)) Regulations 2012. NPWS (2022a) Conservation objectives for Wicklow Mountains SPA [004040]. Generic Version 9.0. Department of Housing, Local Government and Heritage	Located approximately 20.2km from the proposed development site
North Bull Island SPA [004006] A046 Light-bellied Brent Goose <i>Branta bernicla hrota</i> A048 Shelduck <i>Tadorna tadorna</i> A052 Teal <i>Anas crecca</i> A054 Pintail <i>Anas acuta</i> A056 Shoveler <i>Anas clypeata</i> A130 Oystercatcher <i>Haematopus ostralegus</i> A140 Golden Plover <i>Pluvialis apricaria</i> A141 Grey Plover <i>Pluvialis squatarola</i> A143 Knot <i>Calidris canutus</i> A144 Sanderling <i>Calidris alba</i> A149 Dunlin <i>Calidris alpina</i> A156 Black-tailed Godwit <i>Limosa limosa</i> A157 Bar-tailed Godwit <i>Limosa lapponica</i> A160 Curlew <i>Numenius arquata</i> A162 Redshank <i>Tringa totanus</i> A169 Turnstone <i>Arenaria interpres</i> A179 Black-headed Gull <i>Chroicocephalus ridibundus</i> A999 Wetlands & Waterbirds S.I. No. 211/2010 - European Communities (Conservation of Wild Birds (North Bull Island Special Protection Area 004006)) Regulations 2010.	Located approximately 21.6km from the proposed development site

European Site Name [Code] and its Qualifying interest(s) / Special Conservation Interest(s) (*Priority Annex I Habitats)	Location Relative to the Proposed Development Site
NPWS (2015a) <i>Conservation Objectives: North Bull Island SPA 004006. Version 1.</i> National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	
Malahide Estuary SPA [004025] A005 Great Crested Grebe <i>Podiceps cristatus</i> A046 Light-bellied Brent Goose <i>Branta bernicla hrota</i> A048 Shelduck <i>Tadorna tadorna</i> A054 Pintail <i>Anas acuta</i> A067 Goldeneye <i>Bucephala clangula</i> A069 Red-breasted Merganser <i>Mergus serrator</i> A130 Oystercatcher <i>Haematopus ostralegus</i> A140 Golden Plover <i>Pluvialis apricaria</i> A141 Grey Plover <i>Pluvialis squatarola</i> A143 Knot <i>Calidris canutus</i> A149 Dunlin <i>Calidris alpina</i> A156 Black-tailed Godwit <i>Limosa limosa</i> A157 Bar-tailed Godwit <i>Limosa lapponica</i> A162 Redshank <i>Tringa totanus</i> A999 Wetland and Waterbirds <i>S.I. No. 285/2011 - European Communities (Conservation of Wild Birds (Malahide Estuary Special Protection Area 004025)) Regulations 2011.</i> NPWS (2013g) <i>Conservation Objectives: Malahide Estuary SPA 004025. Version 1.</i> National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht	Located approximately 22.5km from the proposed development site
Baldoyle Bay SPA [004016] A046 Light-bellied Brent Goose <i>Branta bernicla hrota</i> A048 Shelduck <i>Tadorna tadorna</i> A137 Ringed Plover <i>Charadrius hiaticula</i> A140 Golden Plover <i>Pluvialis apricaria</i> A141 Grey Plover <i>Pluvialis squatarola</i> A157 Bar-tailed Godwit <i>Limosa lapponica</i> A999 Wetland and Waterbirds <i>S.I. No. 275/2010 - European Communities (Conservation of Wild Birds (Baldoyle Bay Special Protection Area 004016)) Regulations 2010.</i> NPWS (2013h) <i>Conservation Objectives: Baldoyle Bay SPA 004016. Version 1.</i> National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	Located approximately 24.7km from the proposed development site
Rogerstown Estuary SPA [004015] A043 Greylag Goose <i>Anser anser</i> A046 Brent Goose <i>Branta bernicla hrota</i> A048 Shelduck <i>Tadorna tadorna</i> A056 Shoveler <i>Anas clypeata</i> A130 Oystercatcher <i>Haematopus ostralegus</i>	Located approximately 25.7km from the proposed development site Kildare County Council Planning Department 28 NOV 2022

European Site Name [Code] and its Qualifying interest(s) / Special Conservation Interest(s) (*Priority Annex I Habitats)	Location Relative to the Proposed Development Site
A137 Ringed Plover <i>Charadrius hiaticula</i> A141 Grey Plover <i>Pluvialis squatarola</i> A143 Knot <i>Calidris canutus</i> A149 Dunlin <i>Calidris alpina alpina</i> A156 Black-tailed Godwit <i>Limosa limosa</i> A162 Redshank <i>Tringa totanus</i> A999 Wetlands S.I. No. 271/2010 - European Communities (Conservation of Wild Birds (Rogerstown Estuary Special Protection Area 004015)) Regulations 2010. NPWS (2013i) Conservation Objectives: Rogerstown Estuary SPA 004015. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	
Ireland's Eye SPA [004117] A017 Cormorant <i>Phalacrocorax carbo</i> A184 Herring Gull <i>Larus argentatus</i> A188 Kittiwake <i>Rissa tridactyla</i> A199 Guillemot <i>Uria aalge</i> A200 Razorbill <i>Alca torda</i> S.I. No. 240/2010 - European Communities (Conservation of Wild Birds (Ireland's Eye Special Protection Area 004117)) Regulations 2010. NPWS (2022b) Conservation objectives for Ireland's Eye SPA [004117]. Generic Version 9.0. Department of Housing, Local Government and Heritage.	Located approximately 29.1km from the proposed development site
Dalkey Islands SPA [004172] A192 Roseate Tern <i>Sterna dougallii</i> A193 Common Tern <i>Sterna hirundo</i> A194 Arctic Tern <i>Sterna paradisaea</i> S.I. No. 238/2010 - European Communities (Conservation of Wild Birds (Dalkey Islands Special Protection Area 004172)) Regulations 2010. NPWS (2022c) Conservation objectives for Dalkey Islands SPA [004172]. Generic Version 9.0. Department of Housing, Local Government and Heritage.	Located approximately 29.3km from the proposed development site
Howth Head Coast SPA [004113] A188 Kittiwake <i>Rissa tridactyla</i> S.I. No. 185/2012 - European Communities (Conservation of Wild Birds (Howth Head Coast Special Protection Area 004113)) Regulations 2012. NPWS (2022d) Conservation objectives for Howth Head Coast SPA [004113]. Generic Version 9.0. Department of Housing, Local Government and Heritage.	Located approximately 30km from the proposed development site

European Site Name [Code] and its Qualifying interest(s) / Special Conservation Interest(s) (*Priority Annex I Habitats)	Location Relative to the Proposed Development Site
Lambay Island SPA [004069] A009 Fulmar <i>Fulmarus glacialis</i> A017 Cormorant <i>Phalacrocorax carbo</i> A018 Shag <i>Phalacrocorax aristotelis</i> A043 Greylag Goose <i>Anser anser</i> A183 Lesser Black-backed Gull <i>Larus fuscus</i> A184 Herring Gull <i>Larus argentatus</i> A188 Kittiwake <i>Rissa tridactyla</i> A199 Guillemot <i>Uria aalge</i> A200 Razorbill <i>Alca tarda</i> A204 Puffin <i>Fratercula arctica</i> <i>S.I. No. 242/2010 - European Communities (Conservation of Wild Birds (Lambay Island Special Protection Area 004069)) Regulations 2010.</i> NPWS (2022e) Conservation objectives for Lambay Island SPA [004069]. Generic Version 9.0. Department of Housing, Local Government and Heritage.	Located approximately 33.8km from the proposed development site

Table 2 Nationally protected sites in the vicinity of the proposed development.

Designated Site Name [Code] and its nature conservation features	Location Relative to the Proposed Development Site
proposed Natural Heritage Area (pNHA)	
Rye Water Valley/Carton pNHA [001398] Diversity of flora and fauna species the river ecosystem supports – see also Rye Water Valley/Carton SAC in Table 1 above	Overlap with the pNHA boundary
Royal Canal pNHA [002103] Diversity of flora and fauna species the canal ecosystem supports and the presence of legally protected plant species, opposite-leaved pondweed <i>Groenlandia densa</i> .	c.595m south of the proposed development
Liffey Valley pNHA [000128] Diversity of flora and fauna species the river ecosystem supports, including rare and/or legally protected plant species (hairy St. John's wort <i>Hypericum hirsutum</i> , green figwort <i>Scrophularia umbrosa</i> and yellow archangel <i>Lamium galeobdolon</i>)	c.2.5km east of the proposed development
Dolphins, Dublin Docks pNHA [000201] Nesting common terns – see also South Dublin Bay and River Tolka Estuary SPA in Table 1 above	c.21.6km east of the proposed development
North Dublin Bay pNHA [000206]	c.22.4km downstream of the

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Designated Site Name [Code] and its nature conservation features	Location Relative to the Proposed Development Site
Diversity of coastal, estuarine, intertidal and marine habitats, and the flora and fauna species they support – see also North Dublin Bay SAC, North Bull Island SPA and South Dublin Bay and River Tolka Estuary SPA in Table 1 above	proposed development
South Dublin Bay pNHA Diversity of coastal, estuarine, intertidal and marine habitats, and the flora and fauna species they support – see also South Dublin Bay SAC and South Dublin Bay and River Tolka Estuary SPA	c.20.7km downstream of the proposed development

APPENDIX 6.6

JOHNSTON (2022). HYDROGEOLOGY OF THE TUFA HABITATS IN THE RYE WATER, CO. KILDARE

Hydrogeology of the tufa habitats in Rye Water, County Kildare.

INTRODUCTION

In the context of evaluating the conservation status of petrifying springs in and around the Rye Water Valley / Carton Special Area of Conservation (SAC) north of the Intel site, I was asked to review the hydrogeological conditions of the springs. Based on many years of experience investigating the hydrology of petrifying spring habitats, particularly in Kildare (Pollardstown Fen), Sligo and South Dublin, I visited four of the sites in the vicinity of Rye Water encompassing a variety of types of tufa in support of a comprehensive study of the ecology of the sites by J. Denyer (2022). This report is a set of observations on the hydrogeology of four of the sites as related to their conservation status. A general outline of the hydrogeology of tufa is followed by a review of the particular sites from a hydrogeological perspective based on available information and data.

PETRIFYING SPRINGS

The European Commission in the Habitats Directive (92-43-EEU) has defined the Annex I habitat *7220 *Petrifying springs with tufa formation (Cratoneurion)* as 'springs with active formation of tufa'. The identification of such sites requires both an assessment or characterisation of both the vegetation structure and the hydrogeology which determines the active formation of tufa (Farr et al, 2014). The vegetation may be described as 'calcareous spring communities commonly dominated by mosses' and is well described in the accompanying report by J. Denyer (2022) for sites at Rye Water Valley / Carton Special Area of Conservation (SAC).

The hydrogeology of springs can have significant variability but in Ireland, most of the tufa formations relate to Carboniferous limestone and associated glacial deposits. They often occur as 'cascades' (formed by water flowing or trickling down a slope) and associated formations (Heery, 2007) but also as other forms but always in contact with emerging groundwater. A simple hydrogeological classification is represented by a sketch from a British Geological Survey report on the characterization of tufa springs arising from the interpretation of the EU Habitats Directive Annex.

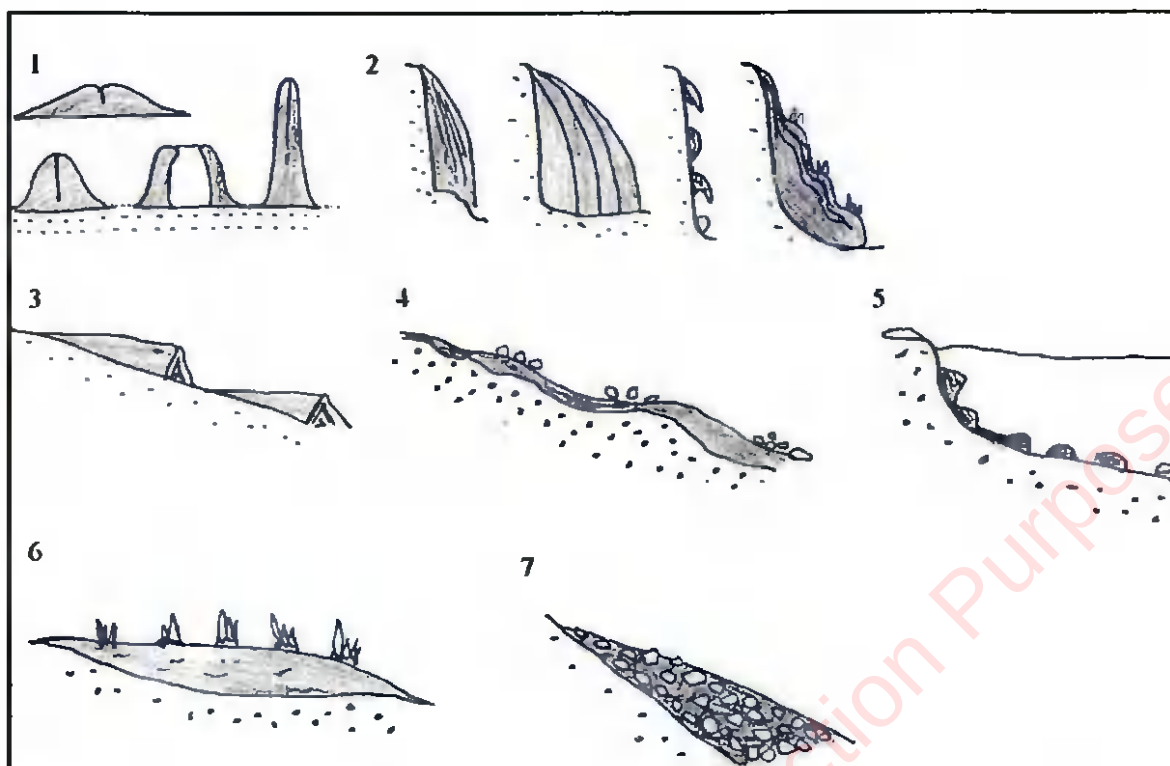


Figure 1 : _Sectional sketches of tufa formations: _1) Spring mounds, 2) cascades 3) barrages 4) fluvial crusts 5) lacustrine crusts 6) paludal deposits 7) surface cemented granular sediments (after Pentecost & Viles, 1994 in Farr et al, 2014)

Four of these: cascade, barrage, fluvial crusts and paludal deposits occur in the Rye Water Valley / Carton SAC or adjacent to it, with varying degrees of characteristic bryophyte vegetation.

The formation of tufa starts with the rainfall which recharges groundwater/aquifers via the soils, subsoils and bedrock. The rainwater is acidic largely from solution of carbon dioxide in the atmosphere and is undersaturated with respect to calcium carbonate. As it passes through the subsurface, the water dissolves ions including calcium, magnesium and bicarbonate particularly from limestone bedrock and carbonate rich subsoils. The groundwater ultimately becomes supersaturated with respect to calcium bicarbonate creating the necessary condition for tufa deposition. Groundwater will need to leave the subsurface, and/or interact with the atmosphere, in order to deposit tufa. Hydrogeologically, this occurs where the piezometric head of the water (i.e. the water table) intersects the topographical land surface, i.e. where springs and seepages occur. The key reactions are commonly represented by:



As contact with the air is established as groundwater emerges, the CO_2 comes out of solution in equilibrium with the atmosphere, and calcium carbonate is precipitated as tufa.

Many factors interact to affect the nature of the tufa fabric (as fine sediment / skeletal / solid) or even to prevent its formation (e.g. levels of aquatic contaminants). Thus, to create the habitat as recognized as a 'petrifying spring', both hydrogeological conditions and ecological criteria are relevant. The dependence on groundwater as an essential characteristic of a petrifying spring habitat is also reflected in the EU Water Framework Directive where it is recognized as a 'Groundwater Dependent Terrestrial Ecosystem' (GWDTE).

FACTORS AFFECTING TUFA FORMATION

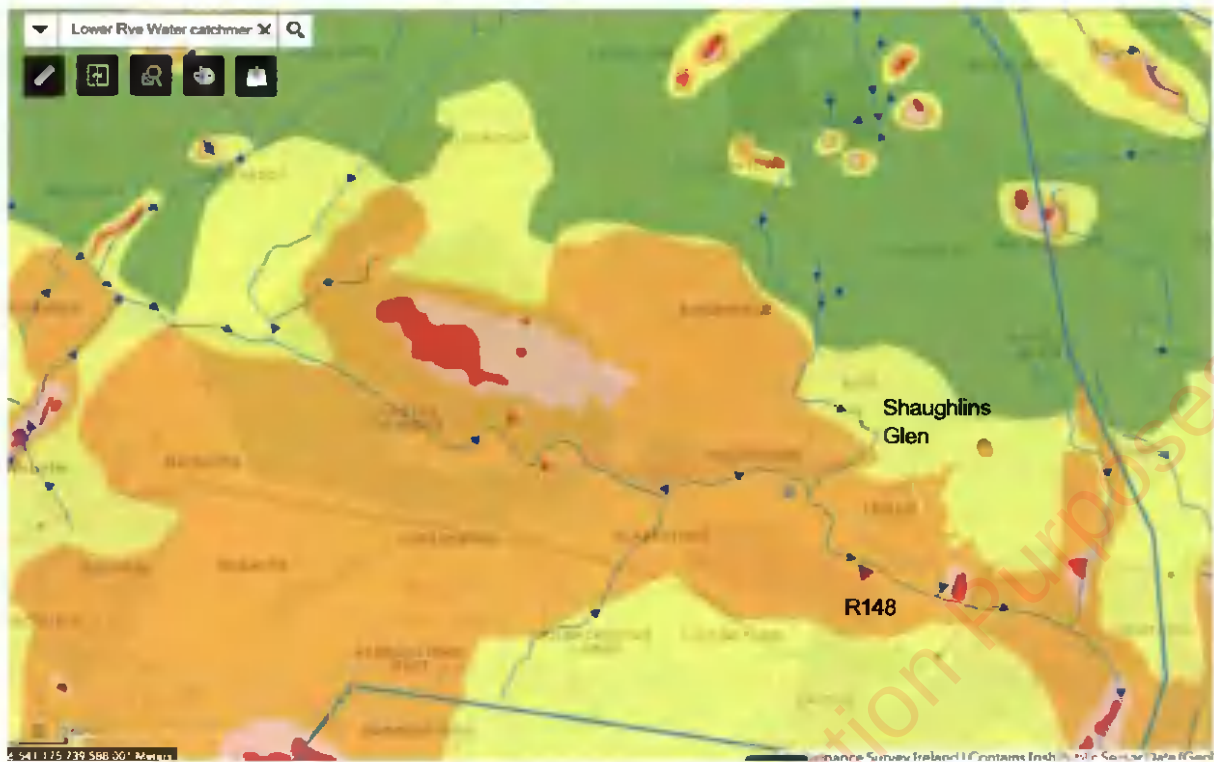
In general, tufa formation is governed by a complex relationship between physical, chemical and biological factors (Liu, 2017). However, tufa deposition is driven mainly by the release of CO₂ to the atmosphere which is facilitated by turbulence in the water, mixing of waters of different ionic concentrations and by uptake of CO₂ by photosynthetic plants, algae and mosses. Algae and mosses can also aid precipitation physically by trapping and binding CaCO₃ particles.

Water temperature also affects the rate of tufa formation as the solubility of both CO₂ and CaCO₃ decreases with increasing temperature. However, the effect on precipitation is small and the temperature of groundwater in central Ireland is relatively steady at approximately 11 deg C. However, groundwater with a deep origin, such as at Louisa Bridge spring, may have a higher temperature which would aid tufa deposition. On the negative side, the presence of phosphate or magnesium in significant amounts can inhibit tufa formation (Liu, 2017).

A conceptual hydrogeological model for the formation of tufas at Rye Water starts with CO₂ saturated groundwater in an anaerobic environment with a soil or bedrock origin. Emerging water, supersaturated with CaCO₃, requires good contact with air, either through turbulence in a cascade or through longer exposure at a stream barrier, often localized as in Hamwood stream. The presence of algae in polluted streams may aid precipitation of CaCO₃.

HYDROGEOLOGY OF THE CATCHMENT

The River Rye, a tributary of the River Liffey, in its catchment to the north of the Intel site lies wholly on glacial deposits resting on bedrock of the Lucan formation. The bedrock is of Carboniferous age and composed mainly of shaley limestone otherwise known as 'Calp' limestone. The only mapped significant structural fault is parallel to the south boundary of the Intel site, approximately coincident with the railway line. The warm spring at Louisa Bridge may be related to its extension.



Surface Water Features

EPA Surface Water

River Network and River Flow Direction Arrows



Lake Segments



Catchment and WFD Management Units

WFD Catchment Management Units

WFD GROUNDWATERBODIES



WFD SurfaceWater

WFD Catchments



WATER SubCatchments



WATER HydrometricAreas



Groundwater Vulnerability

Groundwater_Vulnerability_40K_IE26_ITM

Rock at or near Surface or Karst

Extreme

High

Moderate

Low

Water

Figure 2: GROUNDWATER VULNERABILITY MAP :
LOWER RYE WATER CATCHMENT
(EPA/Geological Survey Ireland)

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The bedrock across the site and the SAC is a 'Locally Important' equifer 'moderately productive in local zones' which implies that it has moderate local permeability. The soils and subsoils are relatively thin in the Rye Water valley but generally thicken away from the river, particularly to the north. The limestone bedrock also increases in elevation to the north and outcrops around the headwaters of the Hamwood stream (known as Shaughlin's Glen where it joins the Rye). The subsoils generally have moderate to low permeability with the notable exception of a belt of gravelly subsoil sediments to the north of the Rye which are bounded by Shaughlin's Glen/Hamwood stream to the west.

This stratigraphy favours the development of springs on the north side of the Rye Water where permeable bedrock outcrops in low permeability subsoil (Figure 2) in the headwaters of the Hamwood stream. In addition, the permeable gravelly subsoils to the east of Shaughlin's Glen favours seepages into the stream where tufa deposits are occurring.

On the south side of Rye Water, springs occur particularly from deeper groundwater risings (Louisa Bridge) in bedrock, less affected by the juxtaposition of permeable and less permeable subsoil layers.

The presence of two drain discharges (the KCC R148 Drain Outfall on the northern boundary of the Intel site and a second just to the west of Louisa Bridge (known as the Eest Stream (South)), both discharging to the Rye Water) testifies to the general lack of natural surface water flows on the south side of Rye Water.



Figure 3 SUBSOIL PERMEABILITY (green=high; yellow=moderate; blue=low)

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SHAUGHLIN'S GLEN/HAMWOOD STREAM

Hydrogeologically, this is a tufa/petrifying spring well worthy of conservation with several types of tufa: cascade at the discharge point on the Rye Water, barrier development along the lower reaches and fluvial crusts on the margins of the stream. Groundwater is emerging from springs in the headwater (Figure 2) as well as from the margins of the stream in its lower reaches (where the more permeable gravel subsoils are next to less permeable boulder clay (Figure 3). Deep alluvium along the stream channel also provides the route for upwelling groundwater. This hydrogeology has facilitated an elaborate series of steps in tufa formation along the lower reaches of the stream culminating in a small cascade at the discharge point.

This site is well illustrated in the Denyer (2022) report.

KCC R148 STORM DRAIN OUTFALL

The tufa 'cascade' at the discharge of a concrete storm drain rests on a set of stepped gabions constructed to de-energize the drainage flow as it moves down the slope to enter the Rye Water. To determine the origin of this discharge, a CCTV survey of the drains feeding this point was conducted by Super Drain Ltd in 2021 and 2022. It was found that the drain passed under the Intel site towards the south, across and along part of the R148 and along the R449 link road ending at the intersection with the M4 motorway, some 1.6 km in length. Its primary purpose is to receive road runoff from the R449 link road as well as the R148 and associated roundabouts together with runoff from parking areas along the way. However, several tributary drains may be collecting drainage from the adjacent built environment. The drain along the link road is collecting road runoff via French drains which are designed as limestone aggregate filled trenches intended to filter out the fines before the drainage water enters the pipe either from the road or from surrounding soil or roadbed. From previous personal experience of excavating French drains on the M4 highway, this design is not always successful and the evidence here is in the 10-20% depth of the pipe filled with sediment. While the overall stormwater drain to the south of the Intel site has suffered damage in the past (parts of the pipe have been internally lined with inserted PVC pipe), there is little direct ingress of natural groundwater. Thus, the evidence shows that natural groundwater contribution to the flow in the storm drain is negligible.

The sediment in the pipe is acting as a buffer storage for some of the road runoff water which appears to help maintain a steady, albeit small drainage flow at the outfall which increases following rainfall events. Other sources of water in the storm drain probably include an element of 'grey water' as evidenced by a detergent-like odour at the outfall and spikes of dissolved phosphorus picked up in the water sampling and analysis at the outfall. On visiting the outfall on 4th February 2022, a slight odour of hydrocarbons was also detected which would be consistent with vehicle emissions and road runoff.

On the other hand, several analyses of water samples at the outfall indicated supersaturation with CaCO_3 which is the precursor for tufa deposition. The presence of algae on the gabions (arising from nutrients in the drainage water) no doubt assisted the precipitation process. The CaCO_3 content in the water is being picked up from runoff and drainage water percolating through the French drains alongside the R449 link road which are filled with limestone aggregate, typically 1-2m deep depending on the vertical alignment of the road. Moreover, the sediments in the pipe will have a significant carbonate content. Lastly, there may also be a contribution from water percolating down through the gabions as they are filled also with carbonate rich rocks.

In short, the tufa at the cascade outfall is partly created by the arrangement of the gabions supported by the presence of algae, but more importantly the tufa does not come from natural spring groundwater and does not therefore, hydrogeologically, qualify as a 'petrifying spring' in the sense that is intended by the EU Directive.

CONCLUSION

The Rye Water and its tributary streams, inside and outside the SAC, have a hydrogeology that is ideally suited to the conditions for petrifying spring/tufa habitat formation. As a classic groundwater fed habitat, examples of different types of tufa occur in the Hamwood stream/Shaughlin's Glen and at Louisa Bridge. However, the hydrogeological criteria for a petrifying spring are not met at the storm drain outfall known as the KCC R148 Drain Outfall on the northern boundary of the Intel site. The outflow from the storm drain is essentially from road drainage and highway runoff and not from groundwater although tufa does form on the gabions at the discharge point. There are significant problems of water quality at this discharge point. Hydrogeologically, the KCC R148 Drain Outfall does not qualify as a petrifying spring.

REFERENCES

- Denyer, J., 2022 *Intel Petrifying Spring Survey*, Denyer Ecology, Report to INTEL
- Farr, G, Graham, J, and Stratford, C. 2014. *Survey, characterisation and condition assessment of Palustriella dominated springs 'H7220 Petrifying springs with tufa formation (Cratoneurion)' in Wales*. British Geological Survey Internal Report, OR/14/043.
- Heery, S. 2007. *A survey of tufa-forming (petrifying) springs in the Slieve Blooms, Ireland*, Report for Offaly & Laois County Councils
- Liu, L. 2017. *Factors Affecting Tufa Degradation in Jiuzhaigou National Nature Reserve, Sichuan, China*, Water, 9, 702

Pentecost, A. and Viles, H. 1994. *A review and reassessment of travertine classification*. *Geographie physique et Quaternaire*, 48(3), 305–314.



Paul Johnston

February 2022

Paul Johnston: engineering hydrologist, now adjunct professor after twenty years as lead of the environmental engineering group in the Dept of Civil, Structural and Environmental Engineering at Trinity College University of Dublin with graduate qualifications in geological engineering from University of Toronto, and Imperial College London. Forty years experience in the hydrogeology of wetlands, contaminated land and groundwater hydrology in UK, Ireland, Middle East and Africa. Relevant experience includes acting as technical advisor to An Bord Pleanála on hydroecology and waste management, the EPA in waste license oral hearings. Completed research contracts for the EPA on hydroecology of peatlands and fens, the National Parks and Wildlife Service on the hydrology of turloughs and bogs, the National Road Authority (NRA/TII) on the impact of road drainage on surface and groundwater, particularly on highways in Kildare (M4 and M7) and Galway, while reviewing the standards for drainage design.

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APPENDIX 6.7

DENYER ECOLOGY (2022) INTEL PETRIFYING SPRING SURVEY. MARCH 2022.



INTEL PETRIFYING SPRING SURVEY

March 2022

Report produced by Denyer Ecology for:
Intel

Signed

25/03/2022

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CONTENTS

1	INTRODUCTION	3
1.1	Background.....	3
1.2	Project aims.....	3
1.3	Site.....	3
1.4	Relevant expertise.....	4
2	METHODOLOGY.....	4
2.1	Desktop data	4
2.2	Field survey.....	4
2.2.1	Site walk-over.....	4
2.2.2	Detailed survey	5
2.2.3	Condition assessment	5
2.2.4	Conservation score.....	5
2.3	Water chemistry.....	5
2.4	Plant species nomenclature	5
3	SPRING SURVEY RESULTS AND EVALUATION.....	6
3.1	Walk-over survey.....	6
3.2	Detailed plot survey and condition assessment.....	17
3.2.1	Survey summary.....	17
4	SUMMARY.....	18
	REFERENCES.....	19
	APPENDIX A – DETAILED PLOT SURVEY & CONDITION ASSESSMENT RESULTS	

1 INTRODUCTION

1.1 Background

Denyer Ecology was commissioned to undertake a petrifying spring survey of lands by Intel, near Leixlip, Co. Kildare. Petrifying springs with tufa formation (*Cratoneurion*) [*7220] are an EC Habitats Directive Annex I priority habitat. This Annex I priority habitat is referred to as 'petrifying springs' in this report, whilst the terms base-rich/ tufa-forming/ stream/ spring/ seepage are used when referring in general to tufa forming habitats within the survey area.

1.2 Project aims

The aim of the survey was to identify all locations of tufa deposits and the Annex I priority habitat 'Petrifying springs with tufa formation' along the length of both riverbanks of the Rye Water behind Intel. Where a watercourse with tufa formation was located in this area, the full length of the tufa forming section of the watercourse was surveyed (e.g. upstream and outside of the main survey area). In addition, a survey was undertaken of the petrifying springs and seepages north and south of the river at Louisa Bridge. This survey area is shown in Figure 1.1.

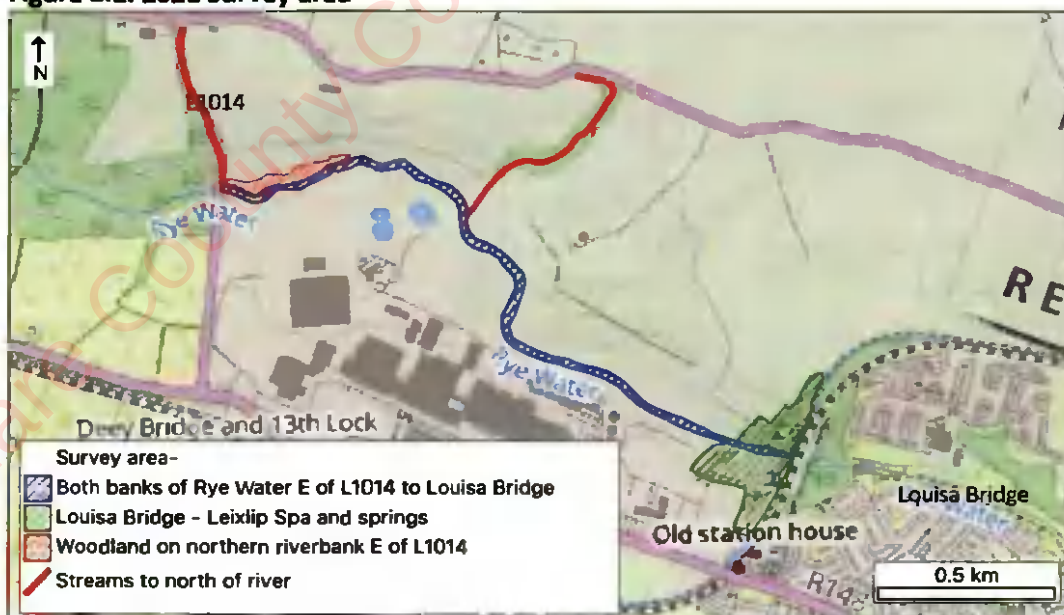
The field surveys commenced in August 2021 and were completed in December 2021. During this period, the EPA RFI was received, requesting a survey of petrifying springs along the riverbanks within the survey area (Figure 1.1). The riverbanks were revisited between November-December. This gives the advantage of both undertaking surveys in summer, when more species are present; and visiting sites in winter, when water levels are higher and springs with low summer flows are more visible. Therefore, it was a seasonably representative survey.

1.3 Site

The survey area is shown on Figure 1.1. This comprises:

- Survey of both riverbanks of the Rye Water from approx. the L1014 to Louisa Bridge (blue hatched area on Figure 1.1).
- Survey of woodland on the northern bank of Rye Water, to the east of the L1014 (red hatched area on Figure 1.1).
- Hamwood Stream and unnamed stream to the north of the river (red lines on Figure 1.1).
- Survey of Leixlip Spa/ Louisa Bridge springs, north and south of the river (green hatched area on Figure 1.1).

Figure 1.1. 2021 Survey area



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1.4 Relevant expertise

Dr Joanne Denyer

Dr Joanne Denyer is a highly experienced botanist and bryologist with 20 years' experience of ecological survey and research. She is experienced in the identification of all plant groups, including difficult groups such as aquatic macrophytes, charophytes and bryophytes. She received the National Biodiversity Data Centre 'Distinguished Recorder Award' in 2014 in recognition of outstanding contribution to bryological recording in Ireland. She regularly provides botanical and bryological training courses for amateurs and professionals and leads training meetings for the British Bryological Society (Irish group), Dublin Naturalist Field Club and the Botanical Society of the British Isles. Training courses provided include aquatic bryophytes (for EPA staff), microscope identification, *Sphagnum* identification and Annex I habitat bryophyte indicator species. She also lectures on bryophyte ecology and identification to undergraduates at University College Dublin and Trinity College Dublin.

Dr Denyer specialises in wetland habitats. She is Ireland's leading Annex I habitat priority petrifying spring specialist and has worked on a wide range of projects and sites in relation to this habitat. This includes detailed survey, assessment and monitoring, Ecological Impact Assessment and acting as an expert witness on calcareous springs at Oral Hearing. She provides advice on this habitat to County Councils and National Parks and Wildlife Service (NPWS). In 2018 she assisted NPWS in the latest Article 17 reporting (National Conservation Status Assessment) on Petrifying springs to the European Commission (under Article 11 of the Habitats Directive, each member state must report every 6 years on the conservation status of Annex I habitats). Dr Denyer is currently preparing updated '*Guidelines for the assessment of Annex I priority petrifying springs in Ireland*' for NPWS (Denyer, In prep.).

Dr Rory Hodd

Dr Rory Hodd is Ireland's foremost bryophyte expert, specialising in the survey and monitoring of rare and protected bryophyte species, as well as rare vascular plant and habitat survey and monitoring. Between 2014 and 2016, Dr Hodd worked on a survey of the status of 65 rare bryophyte species listed on the revised Flora (Protection) Order, 2015 (FPO) across Ireland, which resulted in the discovery of many new populations of rare and threatened species. Dr Hodd has undertaken many targeted bryophyte surveys of sites in the Republic of Ireland, Wales and Northern Ireland, for National Parks and Wildlife Service (NPWS), Natural Resources Wales (NRW) and the National Museum of Northern Ireland (NMNI), amongst other organisations. Dr Hodd is highly experienced in teaching bryophyte identification to undergraduate students, professional ecologists and members of the public. He has done much voluntary bryophyte recording for the British Bryological Society (BBS) in Ireland and the UK and is the BBS Regional Recorder for Co. Kerry. He regularly works with Dr Joanne Denyer to survey and assess Annex I habitat priority petrifying springs in Ireland, including the Dún Laoghaire-Rathdown Petrifying Springs Surveys (2019) for DLR County Council.

2 METHODOLOGY

2.1 Desktop data

Desktop data accessed in this assessment includes the following data sources:

- Aerial photography and OSI mapping.
- Additional literature and resources as relevant (referenced in text).

2.2 Field survey

2.2.1 Site walk-over

- All accessible areas of the study area (Figure 1.1) were walked over by two experienced botanists and bryologists.
- The location of any base-rich seepages/ springs/ tufa formation was mapped using a GPS.

- General notes of the vegetation (vascular plants and bryophytes) of any areas of base-rich seepages/ springs/ tufa formation were made and representative photographs taken.

2.2.2 Detailed survey

- Detailed survey was undertaken of each base-rich spring/ stream/ seepage to determine a) if it is an example of the Annex I priority habitat *7220; b) to evaluate its quality and condition; and, c) assign a conservation score and ranking.
- The detailed survey was undertaken in a representative or 'typical' section of each base-rich spring/ stream/ seepage. Where stream flowed into the Rye Water, the detailed plot was usually undertaken upstream from where the watercourses join (sometimes outside of the SAC). This is because the point at which the tufa forming streams join the river are atypical of the length of the stream. There may be 1-2 m of cascade tufa (e.g. Table 3.1, L01) with little vegetation due to the high flow and varying river height.
- Data collected included habitat and plot photographs; plot location(s) (GPS); recording of percentage cover of all vascular plant and bryophyte species (including positive and negative indicator species); shading; tufa type and extent; and, impacting activities (such as grazing, invasive species, changes to water quality and/ or quality, trampling and dumping).
- The plot sampling methodology follows Lyons, M.D. & Kelly, D.L. (2016). Monitoring guidelines for the assessment of petrifying springs in Ireland. *Irish Wildlife Manuals*, No. 94. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Ireland
- Petrifying spring/ stream vegetation communities were classified using Lyons, M.D. & Kelly, D.L. (2017). Plant community ecology of petrifying springs (*Cratoneurion*) – a priority habitat. *Phytocoenologia* 47 (1): 13-32.

2.2.3 Condition assessment

- The ecological condition of the springs was assessed using the 'Monitoring Guidelines for the Assessment of Petrifying Springs in Ireland' (Lyons & Kelly, 2016). Criteria include positive and negative indicator species (frequency and cover), woody species cover, vegetation height and disturbance.

2.2.4 Conservation score

- The 'Conservation Score' of the petrifying springs was assessed using the 'Monitoring Guidelines for the Assessment of Petrifying Springs in Ireland' (Lyons & Kelly, 2016). Criteria such as species diversity, High Quality indicator species, tufa-forming capacity and other positive characteristics are used to calculate the 'Conservation Score' for each spring. This score is then used to rank the quality of the spring at a national level (Lyons & Kelly, 2016)

2.3 Water chemistry

Where there was flowing water, the pH and conductivity of the spring water from each plot was measured using a handheld pH meter. Detailed water chemistry data was available for one watercourse (L12). Parameters recorded include pH, Alkalinity CaCO₃, Calcium Dissolved, Conductivity, Dissolved Hardness as CaCO₃, Nitrate, Orthophosphate, Total Dissolved Solids and Total Ammonia. Relevant parameters have been included in Appendix A.

2.4 Plant species nomenclature

Vascular plant nomenclature follows that of the *New Flora of the British Isles*. 4th Edition (Stace, 2019). Bryophyte nomenclature follows Blockeel et al. (2021).

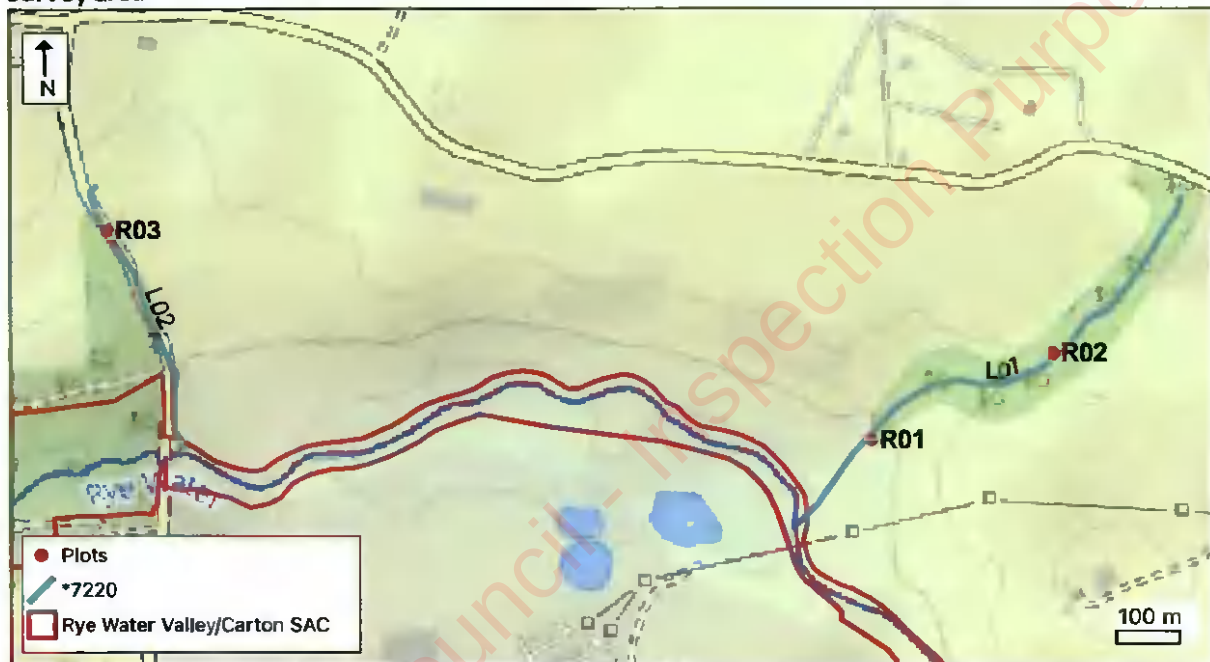
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3 SPRING SURVEY RESULTS AND EVALUATION

3.1 Walk-over survey

There are at least three areas of base-rich springs/ streams/ seepages within the survey area. In the western survey area (Intel Lands), there are two tufa forming streams: Hamwood Stream to the east and an unnamed stream to the west (Figure 3.1). In the central area, one base-rich stream was recorded on the southern riverbank (Figure 3.2). In the eastern survey area, springs and seepages were recorded at Leixlip Spa/ Louisa Bridge, both north and south of the river (Figures 3.3 and 3.4). Twelve of the thirteen mapped base-rich, tufa forming springs/ streams and seepages are examples of the Annex I priority habitat Petrifying springs. Summary details of all mapped base-rich, tufa forming springs/ streams and seepages recorded are included in Table 3.1.

Figure 3.1. Base-rich, tufa forming springs/ streams and seepages recorded within the western survey area



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Figure 3.2. Base-rich, tufa forming springs/ streams and seepages recorded within the central survey area

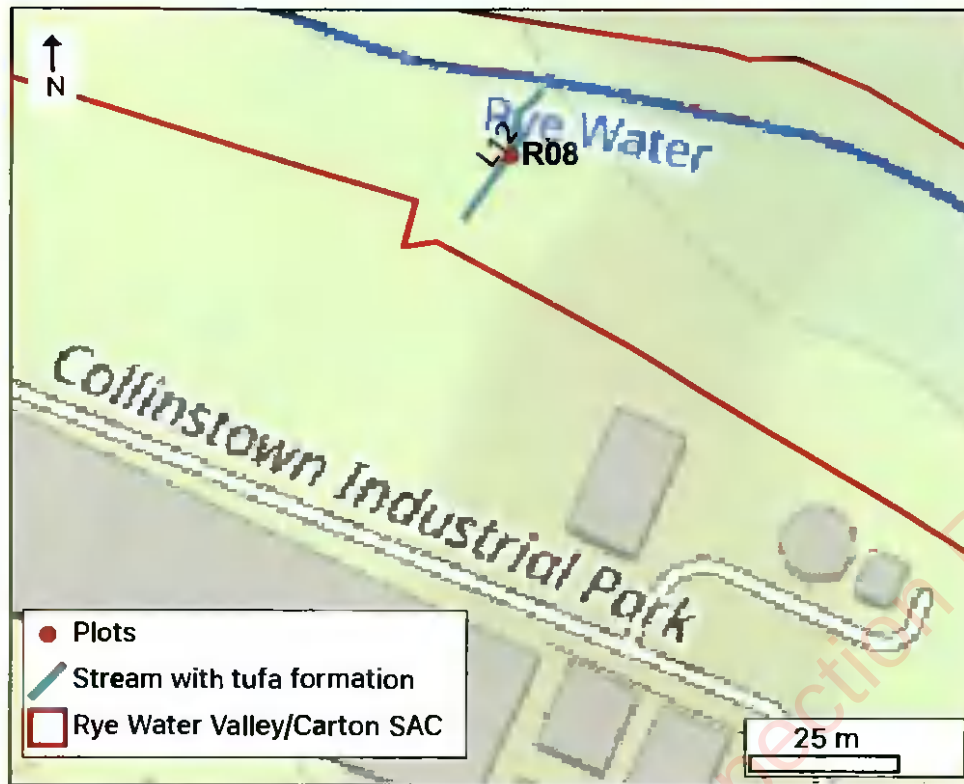
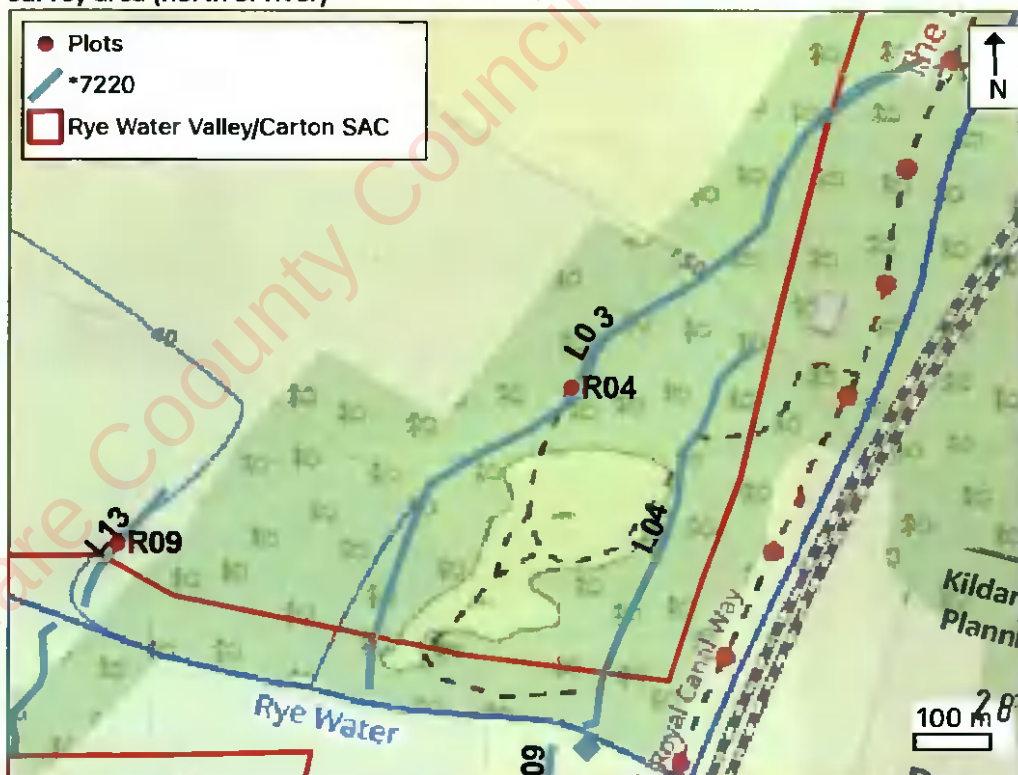


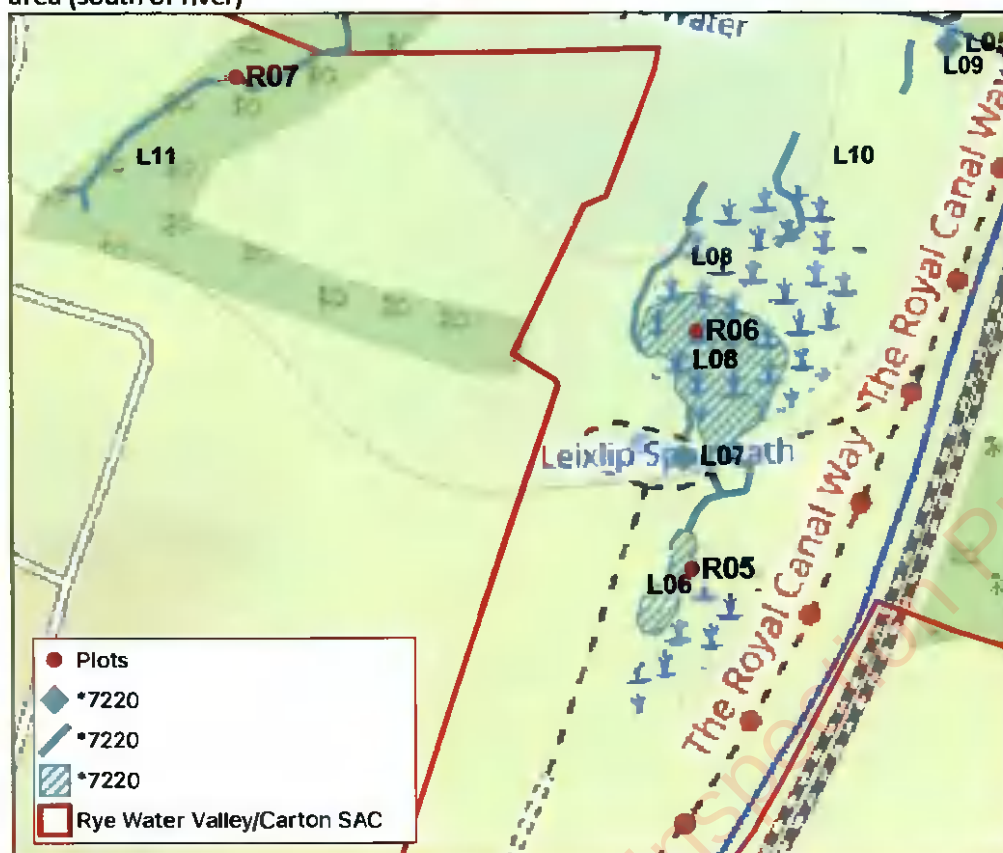
Figure 3.3. Base-rich, tufa forming springs/ streams and seepages recorded within the eastern survey area (north of river)



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Figure 3.4. Base-rich, tufa forming springs/ streams and seepages recorded within the eastern survey area (south of river)



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Table 3.1. Summary of Base-rich, tufa forming springs/ streams and seepages recorded from survey area in 2021 survey

Spring number	Description ¹	*7220	Relevé?	Photo
L01 - Hamwood Stream	Stream flowing south through wooded valley into Rye Water to south. Highly tufa forming throughout the length of the stream and splitting into several channels in some locations. The tufa comprises a series of tufa dams, behind which deeper water (up to 0.5m) is impounded. The inter-dam distance ranges from <1m to 10m. In some areas there is a series of dams less than 1m apart, separated by a longer distance (5-10m) to the next series of dams. In between the dams there is stream crust tufa (sheet-like deposits below flowing water), and/or oncoids/ ooids (coated abiotic or biotic grains). The entire survey section had tufa formation of some type within the channel. The vegetation is an example of Group 3 <i>Brachythecium rivulare</i>-<i>Platyhypnidium riparioides</i> tufaceous streams and flushes vegetation community.	Yes	Yes (R01 and R02)	
L02 – Kellystown Stream	The stream arises in a marshy area within woodland adjacent to Kellystown Lane. It flows through a hedgerow that runs along the east of the road, into a narrow channel adjacent to the road. A wall lines part of the western boundary to the road. It flows south down the east side of the lane and then diverts east again, near a field gate and south where it discharges through wet grassland into the Rye Water. It resembles a damp ditch rather than a stream. Tufa cover is high throughout the stream/ ditch with dams, stream crust and oncoids and ooids. The vegetation is an example of Group 3 <i>Brachythecium rivulare</i>-<i>Platyhypnidium riparioides</i> tufaceous streams and flushes vegetation community.	Yes	Yes (R03)	

Spring number	Description ¹	*7220	Relevé?	Photo
L03 – Stream & waterfall, Louisa Bridge North	Overflow stream from canal flowing down through Leixlip Spa north into the Rye Water to the south. There is tufa throughout the stream, but this is greatest on a steep section with a waterfall and where the stream meets the Rye Water. The main tufa formation is cascade tufa, but there is some stream crust tufa formation with blue-green cyanobacterial crust below the waterfall and relevé. The vegetation is an example of Group 3 <i>Brachythecium rivulare-Platyhypnidium riparioides</i> tufaceous streams and flushes vegetation community.	Yes	Yes (R04)	
L04 – Seepage/ stream, Louisa Bridge North	Small seepage at Leixlip Spa north. It arises below the old building (Toll House) adjacent to the canal. It was dry during the summer survey but had flow in the winter survey. It is less than a metre wide and discharges to the river. Bryophytes are sparse but some indicator species are present. There is abundant tufa as cascade tufa, stream crust and oncoids and ooids, particularly in the lower section. The vegetation has is an example of Group 3 <i>Brachythecium rivulare-Platyhypnidium riparioides</i> tufaceous streams and flushes vegetation community.	Yes	No	

Spring number	Description ¹	*7220	Relevé?	Photo
L05 – Tufa seepage on bridge stonework, Louisa Bridge North	Tufa formation on the southern arch of the canal bridge. Massive cascade tufa formation. There was no flowing water but there is seepage through the brickwork here. It is in accessible for detailed survey but is likely to support Group 1 <i>Eucladium verticillatum</i>-<i>Pellia endiviifolia</i> Tufa Cascades vegetation community.	Yes	No	
L06 – Upper terrace springhead and flushes, Louisa Bridge South	Series of springhead pools and associated fen and marsh on the upper terrace at Leixlip Spa south. Highly species-rich short sedge spring/ fen vegetation. The vegetation is an example of Group 6 <i>Carex lepidocarpa</i> small sedge Springs vegetation community.	Yes	Yes (R05)	

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Spring number	Description ¹	*7220	Relevé?	Photo
L07 – Roman Bath, Louisa Bridge South	Tufa formation around the pipe that seeps spring water into the thermal bath. This has formed cascade tufa with typical petrifying spring indicator species. Unlike the short sedge spring/ fen communities on the terraces, this petrifying spring is highly tufa forming and dominated by small acrocarp bryophytes. The vegetation is an example of Group 1 <i>Eucladium verticillatum</i>-<i>Pellia endiviifolia</i> Tufa Cascades vegetation community.	Yes	No	
L08 – Middle terrace springhead and flushes, Louisa Bridge South	Series of springhead pools and associated fen and marsh on the middle terrace at Leixlip Spa south. Highly species-rich short sedge spring/ fen vegetation. The steep bank to the south (below upper terrace) is becoming overgrown but also supports cascade tufa formation where spring water seeps from the bank. The vegetation is an example of Group 6 <i>Carex lepidocarpa</i> small sedge Springs vegetation community.	Yes	Yes (R06)	

Spring number	Description ¹	*7220	Relevé?	Photo
L09 – Stream into Rye Water, Louisa Bridge South	Small spring/ stream with tufa formation arising on the southern bank of the Rye Water and flowing into it. The exact origin is unclear, but it is likely to arise from the bank adjacent to the canal bridge. Cascade and paludal tufa with typical petrifying spring indicator species. The vegetation is an example of Group 3 <i>Brachythecium rivulare-Platyhypnidium riparioides</i> tufaceous streams and flushes vegetation community.	Yes	No	

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Spring number	Description ¹	*7220	Relevé?	Photo
L10 – Lower terrace flush, Louisa Bridge South	This is a small flush which flows down from the middle terrace to the tall-herb swamp on the lower terrace. Bryophytes and paludal tufa are sparse throughout and it grades into the surrounding marsh/ wetland vegetation. Petrifying spring indicator species are occasional. The vegetation is an example of Group 3 <i>Brachythecium rivulare</i> - <i>Platyhypnidium riparioides</i> tufaceous streams and flushes vegetation community.	Yes	No	
L11 – East Stream South	This is a stream which arises from a culvert to the south, with a small seepage area c. 10m to the east of the culvert. The stream is 1-2 metres in width and discharges to the Rye Water River to the north. There are tufa dams throughout the stream and some oncoids/ ooids and stream crust. The stream is wooded for most of its length. The vegetation is an example of Group 3 <i>Brachythecium rivulare</i> - <i>Platyhypnidium riparioides</i> tufaceous streams and flushes vegetation community.	Yes	Yes (R07)	

Spring number	Description ¹	*7220	Relevé?	Photo
L12 - KCC R148 Drain Outfall Intel lands	This stream discharges from a culvert to the south. The stream flows over a series of stepped gabion baskets. These have become almost entirely covered with cascade tufa throughout the stream length. The stream is 1-2 metres in width and discharges to the Rye Water River to the north. The stream is wooded in the upper section and then flows through wet grassland on the riverbank. A hydrogeological review of the stream inputs has shown that this stream has negligible natural groundwater input (Johnston, 2022). It is therefore not an example of the Annex I priority habitat 'Petrifying springs with tufa formation' [*7220]. However, there is significant tufa formation, the vegetation has affinity to Group 3 <i>Brachythecium rivulare</i>-<i>Platyhypnidium riparioides</i> tufaceous streams and flushes vegetation community (Lyons & Kelly, 2017) and it discharges into an SAC designated for 'Petrifying springs with tufa formation'. Therefore, a detailed relevé plot and condition assessment was undertaken for this stream (Denyer, 2022).	No	Yes (R08)	

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Intel petrifying spring survey

Spring number	Description ¹	*7220	Relevé?	Photo
L13 – East Stream North	This is a small stream which is located to the west of an area of conifer woodland, on the boundary of the Louisa Bridge survey area. The upper part of the stream has a muddy substrate and no tufa was observed. Downstream, there are some small tufa dams and stream crust tufa formation. The stream discharges to the Rye Water river to the south. The vegetation is an example of Group 3 Brachythecium rivulare-Platyhypnidium riparioides tufaceous streams and flushes vegetation community.	Yes	Yes (R09)	

¹Vegetation community from Lyons & Kelly (2017)

3.2 Detailed plot survey and condition assessment

3.2.1 Survey summary

Nine detailed plots were undertaken (Table 3.2; Figures 3.1-3.3). These were placed in representative sections of a sample of the mapped tufa-forming base-rich springs/ streams/ seepages. The aim was to sample the different types of springs/ streams and from different parts of the survey area. A summary of the results is shown in Tables 3.2 and 3.3. and the full results of the plot survey and condition assessment are shown in Appendix A.

Table 3.2. Main tufa formation, vegetation type and species richness in each plot

Spring no.	Plot no.	Vegetation community ¹	Tufa formation	Positive indicator species	Plot species richness	Average sp. richness for vegetation community ²
L01	R01	Group 3	Very High Total 100%: Dam (90%); Oncoids/ ooids (10%)	Low (1)	8	13.8
L01	R02	Group 3	Very High Total 100%: Dam (80%); Stream crust (20%)	Low (1)	11	13.8
L02	R03	Group 3	Very High Total 100%: Dam (20%); Oncoids/ ooids (30%); Stream crust (50%)	Low (1)	8	13.8
L03	R04	Group 3	Very High Total 100%: Cascade (100%)	Low (1)	6	13.8
L06	R05	Group 6	Moderate Total 5%: Paludal (5%)	High (13)	31	26.8
L08	R06	Group 6	Moderate Total 15%: Paludal (15%)	High (11)	27	26.8
L11	R07	Group 3	High Total 50%: Dam (50%)	Low (1)	15	13.8
L12	R08	Group 3	Very High Total 95%: Cascade (90%); Stream crust (5%)	Low (2)	12	13.8
L13	R09	Group 3	High Total 30%: Dam (10%); Stream crust (20%)	Low (2)	19	13.8

¹Lyons & Kelly (2017); ²Lyons (2015)

Table 3.3. Conservation score, ranking and condition assessment summary for each plot

Spring no.	Plot no.	Annex I spring	Conservation score	Conservation ranking	Condition assessment result
L01	R01	Yes	6	High	UNFAVOURABLE-INADEQUATE
L01	R02	Yes	6	High	UNFAVOURABLE-INADEQUATE
L02	R03	Yes	6	High	UNFAVOURABLE-INADEQUATE
L03	R04	Yes	6	High	UNFAVOURABLE-INADEQUATE
L06	R05	Yes	6	High	FAVOURABLE
L08	R06	Yes	6	High	FAVOURABLE
L11	R07	Yes	5	High	UNFAVOURABLE-INADEQUATE
L12	R08	No	6	n/a as not *7220	UNFAVOURABLE-BAD
L13	R09	Yes	5	High	FAVOURABLE

Eight of the nine tufa-forming base-rich springs/ streams/ seepages, surveyed with detailed plots, are considered to be examples of the Annex I priority habitat Petrifying springs. L12 is not considered to be an example of an Annex I petrifying spring (see Table 3.1 and Appendix A) as it has negligible natural groundwater input (Johnston, 2022). Five of the streams (L01, L02, L03, L11 and L12) fail the condition assessment on the number of positive indicator species, whilst L12 also fails on the cover of negative indicator species. However, L01, L02, L03 and L11 are still considered to be examples of the Annex I

priority habitat 'Petrifying springs' due to the very high tufa formation and presence of typical tufa vegetation. The variable nature of the flow in some of the streams (as they are at least partially groundwater fed), means that some typical tufa positive indicator species are less likely to occur. However, it is also likely that there are elevated nutrients (nitrates and phosphates) in the catchment of all of these streams, which is the main cause of the observed low diversity of positive indicator species, high relative cover of negative indicator species and locally high algal cover. In particular, the waterfall at Louisa Bridge North (L03) and the KCC R148 Drain Outfall (L12) have high algal cover. The East Stream South (L11) and the KCC R148 Drain Outfall (L12) also had strong odours arising from the water at the time of survey. L11 had turbid water which had a strong effluent odour, whilst L12 had a strong hydrocarbon odour. The pollution sources are unknown. L12 had very high phosphate levels recorded during December 2021 and January 2022. The phosphate level in L12 is consistently over the threshold value for good condition in a petrifying spring (15 µg/l), with a range of <25 to 139 µg/l (excluding an outlier of 523 µg/l) (=phosphate levels above the recommended level). Nitrate levels however were below the threshold value (within the recommended level).

The springhead/ flush areas at Louisa Bridge South (L06 and L08) passed all criteria and have high species richness. There is some encroachment by tall wetland species, and some woody saplings were present in the springs. It may be that water levels have lowered slightly over the past 10 years, or that it is a result of natural vegetation succession.

4 SUMMARY

- Thirteen petrifying springs/ streams/ seepages were mapped during the survey. Twelve are considered to be examples of the Annex I priority habitat 'Petrifying springs' [*7220].
- The KCC R148 Drain Outfall (L12) is not considered to be an example of an Annex I petrifying spring as it has negligible natural groundwater input (Johnston, 2022).
- The petrifying springs on the northern side of Rye Water and two to the west of Louisa Bridge on the southern side of the Rye Water, are all streams. The vegetation has most affinity to Group 3 *Brachythecium rivulare-Platyhypnidium riparioides* tufaceous streams and flushes vegetation community. These have low species diversity, but very high tufa formation.
- On the southern side of the Rye Water (within Rye Water Valley/Carton SAC), there are three different types of petrifying spring. The springhead and flushes on the terraces support the species-rich but low tufa forming Group 6 *Carex lepidocarpa* small sedge springs vegetation community. The Roman Bath, steep banks between the terraces and the underside of the canal bridge support the Group 1 *Eucladium verticillatum-Pellia endiviifolia* Tufa Cascades vegetation community. This is highly tufa forming and of moderate diversity (dominated by small acrocarps). A small stream near the bridge which discharges to Rye Water supports the typical low diversity stream Group 3 *Brachythecium rivulare-Platyhypnidium riparioides* tufaceous streams and flushes vegetation community.
- Five of the six of the stream survey plots (R01, R02, R03, R07 and R08) failed the condition assessment on the number of positive indicator species and/ or the number of negative indicator species. This is partly the nature of this type of variable flow stream, but also likely to be due to elevated nutrients in the stream water. Elevated nitrates and/ or phosphate levels can lead to observed low diversity of positive indicator species, high relative cover of negative indicator species and locally high algal cover. Water chemistry data for one stream (L12) showed elevated phosphate levels but nitrate levels below the target value for good condition. In addition, two streams (L11 and L12) had strong odours suggesting pollution from wastewater/effluent and hydrocarbons.
- The two small sedge springs survey plots (Rye Water Valley/Carton SAC) passed all condition assessment criteria.

- All surveyed streams and springs were ranked as being of 'High' Conservation Ranking. The stream plots have low species diversity, but high/ very high tufa formation and the small sedge springs survey plots had high species richness but low tufa formation.
- All of the mapped petrifying springs ultimately discharge into the Rye Water River. Petrifying springs L05, L06, L07, L08, L09, L10, and the stream with tufa (L12), arise within Rye Water Valley/Cartron SAC and all of their length/ area is located within the SAC. Petrifying springs L01, L02, L03, L04, L11, L13 arise outside of the SAC, but the point at which they discharge into the Rye Water River is located within the SAC. Petrifying springs are a Qualifying Interest of this SAC and therefore all of the petrifying springs have some association/ link with this SAC.

REFERENCES

- Blockeel, T.L., Bell, N.E., Hill, M.O., Hodgetts, N.G., Long, D.G., Pilkington, S.L. and Rothero, S.L. (2021): A new checklist of the bryophytes of Britain and Ireland, 2020, *Journal of Bryology*, DOI: 10.1080/03736687.2020.1860866
- Fossitt, J.A. (2000). *A guide to habitats in Ireland*. Heritage Council.
- Johnston, P. (2022) Hydrogeology of the tufa habitats in Rye Water, County Kildare. Unpublished report for Intel.
- Lyons, M.D. & Kelly, D.L. (2017). Plant community ecology of petrifying springs (*Cratoneurion*) – a priority habitat. *Phytocoenologia* 47 (1): 13-32.
- Lyons, M.D. & Kelly, D.L. (2016) *Monitoring guidelines for the assessment of petrifying springs in Ireland*. Irish Wildlife Manuals, No. 94. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Ireland.
- Lyons, M.D. (2015). *The Flora and Conservation Status of Petrifying Springs in Ireland*. Unpublished PhD thesis, Trinity College Dublin.
- Stace, C.A. (2019). *New Flora of the British Isles*. 4th Edition. C&M Floristics, Stowmarket, UK.



APPENDIX A - INTEL TUFA STREAM SURVEY AND CONDITION ASSESSMENT RESULTS 2021

SPRING DETAILS: R01

Site name: Intel lands	Spring name: Hamwood Stream (L01)	Relevé No.: R01
Survey date: 18/08/2021	Relevé dimensions: 2m x 2m	Relevé area: 4m2
Grid reference: N9872637630	Spring type: Stream	
Slope: 15	Altitude (m): 60m	Aspect: S
pH: 8.03	EC: 665 µS/cm	Temp.: 13.9°C

Spring description:

The relevé is located within the lower section (S) of the Hamwood Stream, Leixlip. The riverbank in this area is shaded by dense, tall Bramble *Rubus fruticosus* agg. scrub over and around the stream in this area.

The stream is approximately 2.0m in width along this section with flowing water. The stream has tufa formation throughout this section. The tufa comprises a series of tufa dams, behind which deeper water (up to 0.5m) is impounded. The inter-dam distance ranges from <1m to 10m. In some areas there is a series of dams less than 1m apart, separated by a longer distance (5-10m) to the next series of dams. In between the dams there is stream crust tufa (sheet-like deposits below flowing water), and/or oncoids/ ooids (coated abiotic or biotic grains). The entire survey section had tufa formation of some type within the channel. Within the sampled relevé, tufa cover in the channel was 100% and a cyanobacterial crust occurs on the bare tufa.

The majority of vegetation within the relevé is coming in from the bank, with the only species growing directly within the stream being the bryophytes *Platyhypnidium riparioides*, *Pellia endiviifolia* and *Cratoneuron filicinum*. The vegetation is an example of **Group 3 *Brachythecium rivulare*-*Platyhypnidium riparioides* tufaceous streams and flushes vegetation community** (Lyons & Kelly, 2017).

Relevé location:



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DETAILED RELEVÉ

Physical characteristics

Tufa	% Cover	Water	% Cover	Surface	% Cover
Cascade	-	Flowing/ trickling	25	Living field/ ground flora	10
Paludal (1)	-	Pool/ standing water	15	Bare tufa (active/ recent)	90
Stream crust	-	Dripping	-	Ancient/ inactive tufa	-
Oncoids/ ooids	10	Damp	60	Leaf litter/ standing dead	-
Dam	90	Dry, not impacted by spring	-	Bare soil	-
Cemented rudites	-	Other:	-	Bare stone	-
Non-tufa	-			Other:	-
TOTAL	100	TOTAL	100	TOTAL	100

Paludal tufa: 1 = weak/ thin/ discontinuous, 3 = strongly forming/ continuous/ conspicuous

APPENDIX A - INTEL TUFA STREAM SURVEY AND CONDITION ASSESSMENT RESULTS 2021

Shrub/ canopy layer

Species	Rooted outside Canopy (%)	Rooted inside Canopy (%)	Rooted inside Height (m)
<i>Fagus sylvatica</i>	70	-	-
<i>Euonymus europaeus</i>	10	-	-
<i>Rubus fruticosus</i> agg.	5	-	-
TOTAL CANOPY (ROOTED INSIDE + ROOTED OUTSIDE) %	TOTAL %: 85		
MAX HEIGHT (m) ABOVE QUADRAT (ROOTED INSIDE + ROOTED OUTSIDE):			12

Field/ ground flora

FORBS	%	GRAMINOIDS	%	BRYOPHYTES	%	WOODY	%
<i>Caltha palustris</i>	<1	<i>Carex remota</i>	1	<i>Rhynchostegium riparioides</i>	1	<i>Hedera hibernica</i>	3
				<i>Pellia endiviifolia</i>	1	<i>Fraxinus excelsior</i> (s)	<1
				<i>Cratoneuron filicinum</i>	1	<i>Rubus fruticosus</i>	1
						TOTAL WOODY <50cm	5
						PTERIDOPHYTES	
						TOTAL PTERIDOPHYTES	0
						ALGAE	
						TOTAL ALGAE*	0
TOTAL FORBS	<1	TOTAL GRAMINOIDS	1	TOTAL BRYOPHYTES	3	TOTAL COVER	10

*Algae not included in total vegetation cover (Lyons & Kelly, 2016)

Photographs

Photograph 1.1. View of Relevé R01 from the north.



Photograph 1.2. Detailed view of Relevé R01.



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APPENDIX A - INTEL TUFA STREAM SURVEY AND CONDITION ASSESSMENT RESULTS 2021

Condition assessment

Criteria	Result	Target value	Result and pass/ Fail
Species assessment criteria			
High quality indicator species	None recorded	n/a (included below)	n/a (included with positive indicator species)
Positive indicator species	1 species recorded: <i>Pellia endiviifolia</i>	3 species AND no loss from baseline number of species	Result = 1 positive indicator species FAIL
Typical accompanying species (neutral indicators)	0 species recorded	n/a	For information only
Invasive species	0 species recorded	Absent	Result = Absent PASS
Negative herbaceous indicator species	0 species recorded	Total cover should not be dominant or abundant	Result = Absent PASS
Negative bryophyte indicator species	2 species recorded: <i>Cratoneuron filicinum</i> , <i>Platyhypnidium riparioides</i>	No one species dominant or abundant; if ≥ 2 species present) then fails if ≥ 2 are frequent or 1 is abundant	Result = Rare PASS
Negative woody indicator species	n/a as wooded spring	Absent (except in wooded springs)	n/a
Spring water composition and flow			
Nitrate level	Not determined	No increase from baseline and not above 10 mg/l	n/a
Phosphate level	Not determined	No increase from baseline and not above 15 $\mu\text{g/l}$	n/a
Water flow	No change	No alteration of natural flow	No obvious impacts PASS
Impacts of grazing			
Field layer height	5cm	Height between 10 and 50cm	Result = 5cm FAIL
Trampling/dung	No trampling observed	Impact should not be abundant/dominant	Result = Absent PASS
Overall Structure & Functions Assessment			
All pass or one minor/borderline fail AND, if some indicators are Not Determined, the number of passes is at least five AND there is a pass for Positive Indicator Species		Green - Favourable	Result = 2 fail UNFAVOURABLE - INADEQUATE
1 - 2 Fail		Amber - Unfavourable Inadequate	
>2 Fail		Red – Unfavourable Bad	
Future prospects: Negative activities			
None recorded		n/a	Result = none recorded FAVOURABLE

Conservation Score

Criteria	Result	Score
Species diversity score	Low	1
HQ Indicator Species	None	0
Tufa-forming capacity	Very High	4
Other positive characteristics	Flows into SAC for which *7220 is a Qualifying Interest	1
Conservation Score		6
Rank		High

APPENDIX A - INTEL TUFA STREAM SURVEY AND CONDITION ASSESSMENT RESULTS 2021

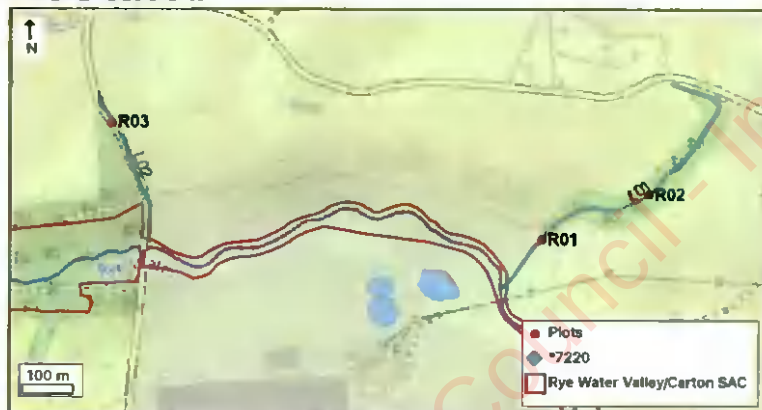
SPRING DETAILS: R02

Site name: Intel lands	Spring name: Hamwood Stream (L01)	Relevé No.: R02
Survey date: 18/08/2021	Relevé dimensions: 4m x 1m	Relevé area: 4m ²
Grid reference: N9893137725	Spring type: Stream	
Slope: 10°	Altitude (m): 70m	Aspect: SW
pH: 8.26	EC: 668 µS/cm	Temp.: 13.7°C

Spring description:

The relevé is located within the upper section (N) of the Hamwood Stream, Leixlip. The stream is 2-5m wide in this area, although the channel splits and has overflow channels in some areas. There was a moderate flow at the time of survey. This section is located in a wooded valley with steep banks on one or both sides through most of the length. The stream has tufa formation throughout this area. The tufa comprises a series of tufa dams, behind which deeper water (up to 0.5m) is impounded. The inter-dam distance ranges from c10m to 20m (greater distance between dams than in the lower channel). In between the dams there is stream crust tufa (sheet-like deposits below flowing water), and/or oncoids/ ooids (coated abiotic or biotic grains). Fallen wood and branches are frequently crusted with tufa showing recent tufa accumulation. The entire survey section had tufa formation of some type within the channel. Frequently there are dry channels to the east or west of the main channel which have significant tufa dams, although dry at the time of survey. The lack of vegetation on the dams and evidence of recent tufa formation, shows that these are likely to have flowing water for part of the year (e.g. high water levels/ floods). Within the sampled relevé, tufa cover in the channel was 100%. The tufa here is patchily vegetated with bryophytes, including *Conocephalum conicum* and *Pellia endiviifolia* forming the majority of cover, with scattered vascular plants including *Mentha aquatica*. This is an example of **Group 3 *Brachythecium rivulare*-*Platyhypnidium riparioides* tufaceous streams and flushes vegetation community** (Lyons & Kelly, 2017).

Relevé location:



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DETAILED RELEVÉ

Physical characteristics

Tufa	% Cover	Water	% Cover	Surface	% Cover
Cascade	-	Flowing/ trickling	20	Living field/ ground flora	25
Paludal (1)	-	Pool/ standing water	30	Bare tufa (active/ recent)	75
Stream crust	20	Dripping	-	Ancient/ inactive tufa	-
Oncoids/ ooids	-	Damp	50	Leaf litter/ standing dead	-
Dam	80	Dry, not impacted by spring	-	Bare soil	-
Cemented rudites	-	Other:	-	Bare stone	-
Non-tufa	-			Other:	-
TOTAL	100	TOTAL	100	TOTAL	100

Paludal tufa: 1 = weak/ thin/ discontinuous, 3 = strongly forming/ continuous/ conspicuous

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APPENDIX A - INTEL TUFA STREAM SURVEY AND CONDITION ASSESSMENT RESULTS 2021

Shrub/ canopy layer

Species	Rooted outside Canopy (%)	Rooted inside Canopy (%)	Rooted inside Height (m)
<i>Quercus robur</i>	15	-	-
<i>Fraxinus excelsior</i>	20	-	-
<i>Sambucus nigra</i>	5	-	-
<i>Prunus spinosa</i>	10		
TOTAL CANOPY (ROOTED INSIDE + ROOTED OUTSIDE) %	TOTAL %: 50		
MAX HEIGHT (m) ABOVE QUADRAT (ROOTED INSIDE + ROOTED OUTSIDE):			25

Field/ ground flora

FORBS	%	GRAMINOIDS	%	BRYOPHYTES	%	WOODY	%
<i>Mentha aquatica</i>	3	<i>Agrostis stolonifera</i>	<1	<i>Conocephalum conicum</i>	7	<i>Fraxinus excelsior</i> (s)	<1
<i>Rumex sanguineus</i>	1			<i>Pellia endiviifolia</i>	7	<i>Rubus fruticosus</i>	1
<i>Lemna trisulca</i>	1			<i>Cratoneuron filicinum</i>	1		
<i>Caltha palustris</i>	<1			<i>Brachythecium rivulare</i>	1	TOTAL WOODY <50cm	2
						PTERIDOPHYTES	
						TOTAL PTERIDOPHYTES	0
						ALGAE	
						Filamentous alga	3
						TOTAL ALGAE*	3
TOTAL FORBS	6	TOTAL GRAMINOIDS	<1	TOTAL BRYOPHYTES	16	TOTAL COVER	25

*Algae not included in total vegetation cover (Lyons & Kelly, 2016)

Photographs

Photograph 2.1. View of Relevé 2 from the east.



Photograph 2.2. Detailed view of part of Relevé 2.



APPENDIX A - INTEL TUFA STREAM SURVEY AND CONDITION ASSESSMENT RESULTS 2021

Condition assessment

Criteria	Result	Target value	Result and pass/ Fail
Species assessment criteria			
High quality indicator species	None recorded	n/a (included below)	n/a (included with positive indicator species)
Positive indicator species	1 species recorded: <i>Pellia endiviifolia</i>	3 species AND no loss from baseline number of species	Result = 1 positive indicator species FAIL
Typical accompanying species (neutral indicators)	2 species recorded	n/a	For information only
Invasive species	0 species recorded	Absent	Result = Absent PASS
Negative herbaceous indicator species	0 species recorded	Total cover should not be dominant or abundant	Result = Absent PASS
Negative bryophyte indicator species	2 species recorded: <i>Cratoneuron filicinum</i> , <i>Brachythecium rivulare</i>	No one species dominant or abundant; if ≥ 2 species present) then fails if ≥ 2 are frequent or 1 is abundant	Result = Rare PASS
Negative woody indicator species	n/a as wooded spring	Absent (except in wooded springs)	n/a
Spring water composition and flow			
Nitrate level	Not determined	No increase from baseline and not above 10 mg/l	n/a
Phosphate level	Not determined	No increase from baseline and not above 15 μ g/l	n/a
Water flow	No change	No alteration of natural flow	No obvious impacts PASS
Impacts of grazing			
Field layer height	50cm	Height between 10 and 50cm	Result = 50cm PASS
Trampling/dung	No trampling observed	Impact should not be abundant/dominant	Result = Absent PASS
Overall Structure & Functions Assessment			
All pass or one minor/borderline fail AND, if some indicators are Not Determined, the number of passes is at least five AND there is a pass for Positive Indicator Species	Green - Favourable		Result = 1 fail UNFAVOURABLE - INADEQUATE
1 - 2 Fail	Amber - Unfavourable Inadequate		
>2 Fail	Red – Unfavourable Bad		
Future prospects: Negative activities			
None recorded	n/a		Result = none recorded FAVOURABLE

Conservation Score

Criteria	Result	Score
Species diversity score	Low	1
HQ Indicator Species	None	0
Tufa-forming capacity	Very High	
Other positive characteristics	Flows into SAC for which *7220 is a Qualifying Interest	
Conservation Score		6
Rank		High

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APPENDIX A - INTEL TUFA STREAM SURVEY AND CONDITION ASSESSMENT RESULTS 2021

SPRING DETAILS: R03

Site name: Intel lands	Spring name: Kellystown Stream (L02)	Relevé No.: R03
Survey date: 18/08/2021	Relevé dimensions: 4m x 1m	Relevé area: 4m2
Grid reference: N9787137860	Spring type: Stream	
Slope: 5°	Altitude (m): 70m	Aspect: S
pH: 8.26	EC: 814 µS/cm	Temp.: 14°C

Spring description:

The stream arises in a marshy area within woodland adjacent to Kellystown Lane, just north of a pylon line. It then flows through a hedgerow that runs along the east of the road, into a narrow channel adjacent to the road. A wall lines part of the western boundary to the road. It flows south down the east side of the lane and then diverts east again, near a field gate and south where it discharges through wet grassland into the Rye Water. It resembles a damp ditch rather than a stream.

The entire surface of the ditch is covered by tufa, with tufa dams c1m apart and stream crust tufa between the dams. There was a small flow and standing water present. The tufa is little-vegetated, with multiple patches of the bryophytes *Pellia endiviifolia* and *Cratoneuron filicinum* and *Hedera hibernica* encroaching from the edges. This plot corresponds to Group 3 *Brachythecium rivulore-Platyhypnidium riparioides* tufaceous streams and flushes vegetation community (Lyons & Kelly, 2017).

Relevé location:



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DETAILED RELEVÉ

Physical characteristics

Tufa	% Cover	Water	% Cover	Surface	% Cover
Cascade	-	Flowing/ trickling	10	Living field/ ground flora	20
Paludal (1)	-	Pool/ standing water	60	Bare tufa (active/ recent)	75
Stream crust	50	Dripping	-	Ancient/ inactive tufa	-
Oncoids/ ooids	30	Damp	30	Leaf litter/ standing dead	5
Oam	20	Dry, not impacted by spring	-	Bare soil	-
Cemented rudites	-	Other:	-	Bare stone	-
Non-tufa	-			Other:	-
TOTAL	100	TOTAL	100	TOTAL	100

Paludal tufa: 1 = weak/ thin/ discontinuous, 3 = strongly farming/ continuous/ conspicuous

APPENDIX A - INTEL TUFA STREAM SURVEY AND CONDITION ASSESSMENT RESULTS 2021

Shrub/ canopy layer

Species	Rooted outside Canopy (%)	Rooted inside Canopy (%)	Rooted inside Height (m)
<i>Ulmus procera</i>	5	-	-
<i>Fraxinus excelsior</i>	20	-	-
<i>Sambucus nigra</i>	55	-	-
TOTAL CANOPY (ROOTED INSIDE + ROOTED OUTSIDE) %	TOTAL %: 80		
MAX HEIGHT (m) ABOVE QUADRAT (ROOTED INSIDE + ROOTED OUTSIDE):			12

Field/ ground flora

FORBS	%	GRAMINOIDS	%	BRYOPHYTES	%	WOODY	%
<i>Mentha aquatica</i>	1			<i>Pellia endiviifolia</i>	3	<i>Hedera hibernica</i>	9
<i>Helosciadium nodiflorum</i>	1			<i>Cratoneuron filicinum</i>	3	<i>Sambucus nigra</i>	1
<i>Angelica sylvestris</i>	1			<i>Brachythecium rivulare</i>	<1		
						TOTAL WOODY <50cm	10
						PTERIDOPHYTES	
						TOTAL PTERIDOPHYTES	0
						ALGAE	
						TOTAL ALGAE*	0
TOTAL FORBS	3	TOTAL GRAMINOIDS	0	TOTAL BRYOPHYTES	7	TOTAL COVER	20

*Algae not included in total vegetation cover (Lyons & Kelly, 2016)

Photographs

Photograph 3.1. View of Relevé 3 from the south.



Photograph 3.2. Detailed view of part of Relevé 3.



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APPENDIX A - INTEL TUFA STREAM SURVEY AND CONDITION ASSESSMENT RESULTS 2021

Condition assessment

Criteria	Result	Target value	Result and pass/ Fail
Species assessment criteria			
High quality indicator species	None recorded	n/a (included below)	n/a (included with positive indicator species)
Positive indicator species	1 species recorded: <i>Pellia endiviifolia</i>	3 species AND no loss from baseline number of species	Result = 1 positive indicator species FAIL
Typical accompanying species (neutral indicators)	1 species recorded	n/a	For information only
Invasive species	0 species recorded	Absent	Result = Absent PASS
Negative herbaceous indicator species	1 species recorded: <i>Helosciadium nodiflorum</i>	Total cover should not be dominant or abundant	Result = Rare PASS
Negative bryophyte indicator species	2 species recorded: <i>Cratoneuron filicinum</i> , <i>Brachythecium rivulare</i>	No one species dominant or abundant; if ≥2 species present) then fails if ≥2 are frequent or 1 is abundant	Result = Rare PASS
Negative woody indicator species	n/a as wooded spring	Absent (except in wooded springs)	n/a
Spring water composition and flow			
Nitrate level	Not determined	No increase from baseline and not above 10 mg/l	n/a
Phosphate level	Not determined	No increase from baseline and not above 15 µg/l	n/a
Water flow	No change	No alteration of natural flow	No obvious impact PASS
Impacts of grazing			
Field layer height	50cm	Height between 10 and 50cm	Result = 10cm PASS
Trampling/dung	No trampling observed	Impact should not be abundant/dominant	Result = Absent PASS
Overall Structure & Functions Assessment			
All pass or one minor/borderline fail AND, if some indicators are Not Determined, the number of passes is at least five AND there is a pass for Positive Indicator Species		Green - Favourable	Result = 1 fail UNFAVOURABLE - INADEQUATE
1 - 2 Fail		Amber - Unfavourable Inadequate	
>2 Fail		Red – Unfavourable Bad	
Future prospects: Negative activities			
None recorded		n/a	Result = none recorded FAVOURABLE

Conservation Score

Criteria	Result	Score
Species diversity score	Low	1
HQ Indicator Species	None	0
Tufa-forming capacity	Very High	4
Other positive characteristics	Flows into SAC for which *7220 is a Qualifying Interest	1
Conservation Score		6
Rank		High

APPENDIX A - INTEL TUFA STREAM SURVEY AND CONDITION ASSESSMENT RESULTS 2021

SPRING DETAILS: R04

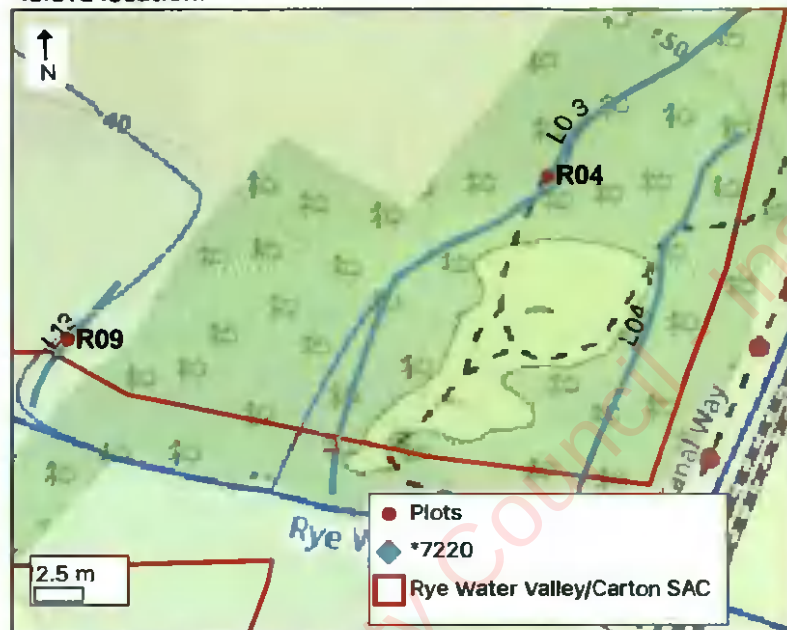
Site name: Louisa Bridge North	Spring name: North Waterfall (L03)	Relevé No.: R04
Survey date: 13/08/2021	Relevé dimensions: 2m x 2m	Relevé area: 4m ²
Grid reference: N9956036958	Spring type: Stream	
Slope: 90°	Altitude (m): 50m	Aspect: N
pH: 8.17	EC: 280 µS/cm	Temp.: 14.9°C

Spring description:

The relevé is located in the waterfall on the stream that runs through the northern section of the survey area. The stream has tufa formation throughout its length, but this is greater at the waterfall and where the stream joins the Rye Water to the south. The stream is wooded for most of its length and the waterfall is partially shaded. The stream is 3.0-4.0m in width along this section. There was a relatively low flow of water at the time of survey and it formed two smaller channels through the relevé. Water flow is higher in winter and forms a single, wider channel. Within the sampled relevé, cascade tufa cover in the channel was 100%. A cyanobacterial crust occurred on the bare tufa in the stream below the waterfall and relevé.

The water appears to have elevated nutrient levels as algal cover is high on the waterfall and *Brachythecium rivulare*, *Agrostis stolonifera* and *Nasturtium officinale* were the dominant bryophyte and vascular plant species present. The vegetation is an example of Group 3 *Brachythecium rivulare*-*Platyhypnidium riparioides* tufaceous streams and flushes vegetation community (Lyons & Kelly, 2017).

Relevé location:



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DETAILED RELEVÉ

Physical characteristics

Tufa	% Cover	Water	% Cover	Surface	% Cover
Cascade	100	Flowing/ trickling	50	Living field/ ground flora	60
Paludal (1)	-	Pool/ standing water	-	Bare tufa (active/ recent)	40
Stream crust	-	Dripping	-	Ancient/ inactive tufa	-
Oncoids/ ooids	-	Damp	50	Leaf litter/ standing dead	-
Dam	-	Dry, not impacted by spring	-	Bare soil	-
Cemented rudites	-	Other:	-	Bare stone	-
Non-tufa	-			Other:	-
TOTAL	100	TOTAL	100	TOTAL	100

Paludal tufo: 1 = weak/ thin/ discontinuous, 3 = strongly forming/ continuous/ conspicuous

APPENDIX A - INTEL TUFA STREAM SURVEY AND CONDITION ASSESSMENT RESULTS 2021

Shrub/ canopy layer

Species	Rooted outside Canopy (%)	Rooted inside Canopy (%)	Rooted inside Height (m)
<i>Crataegus monogyna</i>	10	-	-
<i>Fraxinus excelsior</i>	20	-	-
<i>Acer pseudoplatanus</i>	20	-	-
<i>Salix cinerea</i>	20	-	-
TOTAL CANOPY (ROOTED INSIDE + ROOTED OUTSIDE) %	TOTAL %: 70		
MAX HEIGHT (m) ABOVE QUADRAT (ROOTED INSIDE + ROOTED OUTSIDE):			5

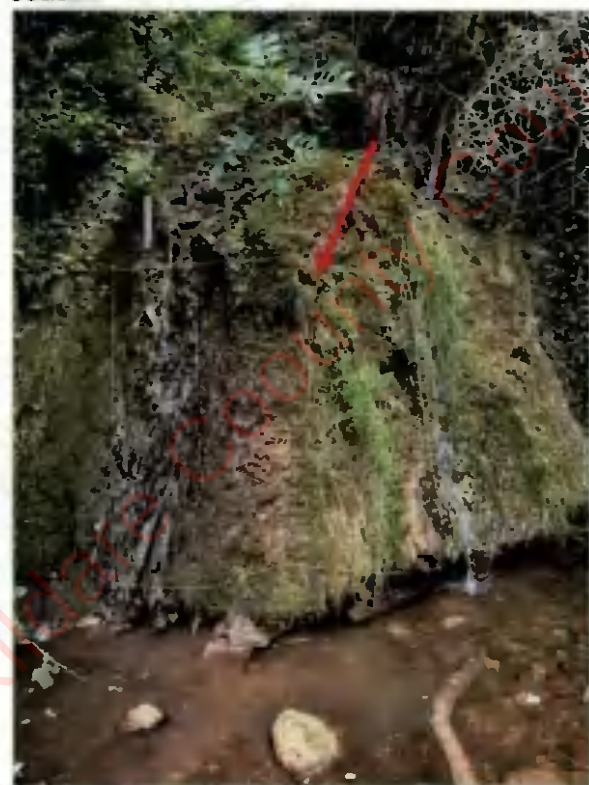
Field/ ground flora

FORBS	%	GRAMINOIDS	%	BRYOPHYTES	%	WOODY	%
<i>Angelica sylvestris</i>	3	<i>Agrostis stolonifera</i>	15	<i>Brachythecium rivulare</i>	25		
<i>Nasturtium officinale</i>	15			<i>Pellia endiviifolia</i>	1		
				<i>Cratoneuron filicinum</i>	1		
						TOTAL WOODY <50cm	0
						PTERIDOPHYTES	
						TOTAL PTERIDOPHYTES	0
						ALGAE	
						Filamentous algae	15
						TOTAL ALGAE*	15
TOTAL FORBS	18	TOTAL GRAMINOIDS	15	TOTAL BRYOPHYTES	27	TOTAL COVER	60

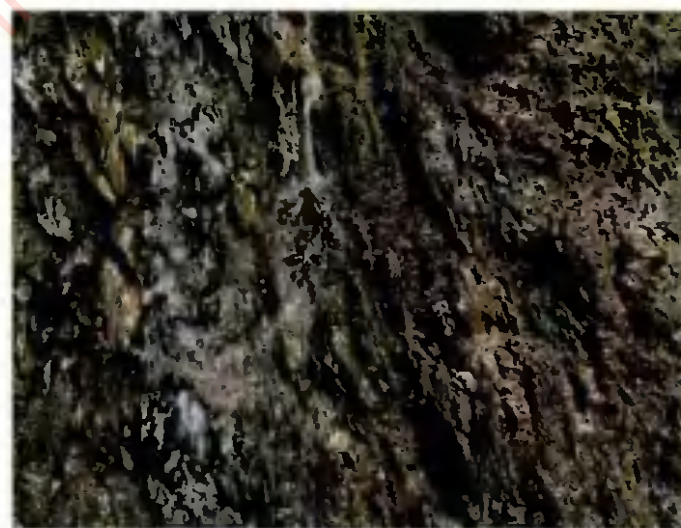
*Algae not included in total vegetation cover (Lyons & Kelly, 2016)

Photographs

Photograph 4.1. View of Relevé R04 from the south.



Photograph 4.2. Detailed view of Relevé R04.



APPENDIX A - INTEL TUFA STREAM SURVEY AND CONDITION ASSESSMENT RESULTS 2021

Condition assessment

Criteria	Result	Target value	Result and pass/ Fail
Species assessment criteria			
High quality indicator species	None recorded	n/a (included below)	n/a (included with positive indicator species)
Positive indicator species	1 species recorded: <i>Pellia endiviifolia</i>	3 species AND no loss from baseline number of species	Result = 1 positive indicator species FAIL
Typical accompanying species (neutral indicators)	1 species recorded: <i>Agrostis stolonifera</i>	n/a	For information only
Invasive species	0 species recorded	Absent	Result = Absent PASS
Negative herbaceous indicator species	0 species recorded	Total cover should not be dominant or abundant	Result = Absent PASS
Negative bryophyte indicator species	2 species recorded: <i>Brachythecium rivulare</i> , <i>Cratoneuron filicinum</i>	No one species dominant or abundant; if ≥2 species present) then fails if ≥2 are frequent or 1 is abundant	Result = <i>Brachythecium rivulare</i> Abundant FAIL
Negative woody indicator species	n/a as wooded spring	Absent (except in wooded springs)	n/a
Spring water composition and flow			
Nitrate level	Not determined	No increase from baseline and not above 10 mg/l	n/a
Phosphate level	Not determined	No increase from baseline and not above 15 µg/l	n/a
Water flow	No change	No alteration of natural flow	No obvious impact PASS
Impacts of grazing			
Field layer height	10cm	Height between 10 and 50cm	Result = 10cm PASS
Trampling/dung	No trampling observed	Impact should not be abundant/dominant	Result = Absent PASS
Overall Structure & Functions Assessment			
All pass or one minor/borderline fail AND, if some indicators are Not Determined, the number of passes is at least five AND there is a pass for Positive Indicator Species		Green - Favourable	Result = 2 fail UNFAVOURABLE - INADEQUATE
1 - 2 Fail		Amber - Unfavourable Inadequate	
>2 Fail		Red – Unfavourable Bad	
Future prospects: Negative activities			
J01 Mixed source pollution to surface and ground waters (limnic and terrestrial)		Moderate negative impact, originating outside of site	UNFAVOURABLE - INADEQUATE

Conservation Score

Criteria	Result	Score
Species diversity score	Low	1
HQ Indicator Species	None	0
Tufa-forming capacity	Very High	4
Other positive characteristics	Flows into SAC for which *7220 is a Qualifying Interest	1
Conservation Score		6
Rank		High

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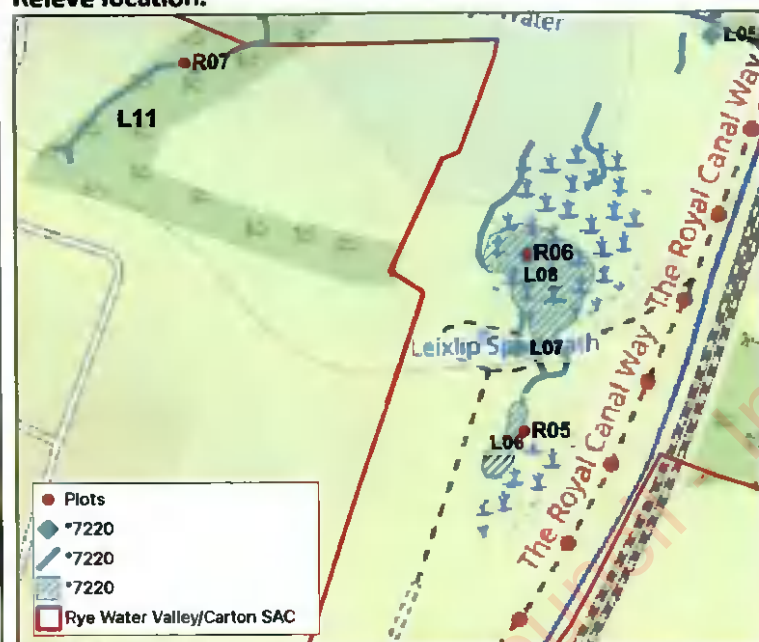
SPRING DETAILS: R05

Site name: Louisa Bridge South	Spring name: Upper terrace (L06)	Relevé No.: R05
Survey date: 13/08/2021	Relevé dimensions: 2m x 2m	Relevé area: 4m2
Grid reference: N9949636719	Spring type: Springhead	
Slope: 0	Altitude (m): 70m	Aspect: N
pH: 8.18	EC: 236 µS/cm	Temp.: 11.2°C

Spring description:

The relevé is located within the upper terrace at Louisa Bridge/ Leixlip Spa and springs. The springs emerge and form shallow pools with petrifying spring vegetation which grade into alkaline fen and marsh. The pools have been slowly infilling with vegetation in recent years with some tall vascular plants such as *Eupatorium cannabinum* and *Typha latifolia* are locally abundant. The relevé plot was positioned in the central spring in an area of fen vegetation. The tufa formation in this area is mainly paludal which is typical of this type of spring emergence. The vegetation is an example of Group 6 *Carex lepidocarpa* small sedge Springs vegetation community (Lyons & Kelly, 2017). These are weakly tufaceous springs on level ground with high species diversity (Lyons & Kelly, 2017).

Relevé location:



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DETAILED RELEVÉ

Physical characteristics

Tufa	% Cover	Water	% Cover	Surface	% Cover
Cascade	-	Flowing/ trickling	30	Living field/ ground flora	95
Paludal (1)	5	Pool/ standing water	-	Bare tufa (active/ recent)	-
Stream crust	-	Dripping	-	Ancient/ inactive tufa	-
Oncoids/ ooids	-	Damp	70	Leaf litter/ standing dead	-
Dam	-	Dry, not impacted by spring	-	Bare soil	5
Cemented rudites	-	Other:	-	Bare stone	-
Non-tufa	95			Other:	-
TOTAL	100	TOTAL	100	TOTAL	100

Paludal tufa: 1 = weak/ thin/ discontinuous, 3 = strongly forming/ continuous/ conspicuous

Shrub/ canopy layer

Species	Rooted outside Canopy (%)	Rooted inside Canopy (%)	Rooted inside Height (m)
TOTAL CANOPY (ROOTED INSIDE + ROOTED OUTSIDE) %	TOTAL %: -		
MAX HEIGHT (m) ABOVE QUADRAT (ROOTED INSIDE + ROOTED OUTSIDE):			-

APPENDIX A - INTEL TUFA STREAM SURVEY AND CONDITION ASSESSMENT RESULTS 2021

Field/ ground flora

FORBS	%	GRAMINOIDS	%	BRYOPHYTES	%	WOODY	%
<i>Mentha aquatica</i>	3	<i>Typha latifolia</i>	12	<i>Palustriella folcata</i>	15	<i>Hedera hibernica</i>	<1
<i>Pinguicula vulgaris</i>	1	<i>Molinia caerulea</i>	3	<i>Palustriella commutata</i>	8	<i>Salix cinerea</i>	<1
<i>Parnassia palustris</i>	1	<i>Carex nigra</i>	10	<i>Bryum pseudotriquetrum</i>	5		
<i>Lysimachia tenella</i>	1	<i>Carex panicea</i>	3	<i>Aneura pinguis</i>	1	TOTAL WOODY <50cm	1
<i>Eupatorium cannabinum</i>	1	<i>Carex lepidocarpa</i>	8	<i>Campylium stellatum</i>	1		
<i>Succisa pratensis</i>	1	<i>Briza media</i>	1	<i>Scorpidium cossonii</i>	1	PTERIDOPHYTES	
<i>Taraxacum officinale</i> agg.	1	<i>Eriophorum latifolium</i>	1			<i>Equisetum palustre</i>	<1
<i>Triglochin palustre</i>	1	<i>Juncus articulatus</i>	1				
<i>Epilobium parviflorum</i>	1	<i>Agrostis stolonifera</i>	5			TOTAL PTERIDOPHYTES	<1
<i>Helioscadium nodiflorum</i>	1	<i>Festuca rubra</i>	1			ALGAE	
<i>Cirsium palustre</i>	1					<i>Chara vulgaris</i>	8
						TOTAL ALGAE*	8
TOTAL FORBS	13	TOTAL GRAMINOIDS	45	TOTAL BRYOPHYTES	31	TOTAL COVER	91

*Algae not included in total vegetation cover (Lyons & Kelly, 2016)

Photos

Photograph 5.1. View of Relevé R05 from the south.



Photograph 5.2. Detailed view of Relevé R05.



Condition assessment

Criteria	Result	Target value	Result and pass/ Fail
Species assessment criteria			
High quality indicator species	None recorded	n/a (included below)	n/a (included with positive indicator species)
Positive indicator species	13 species recorded: <i>Lysimachia tenella</i> , <i>Aneura pinguis</i> , <i>Bryum pseudotriquetrum</i> , <i>Campylium stellatum</i> , <i>Carex lepidocarpa</i> , <i>Carex panicea</i> , <i>Chara vulgaris</i> , <i>Eriophorum latifolium</i> , <i>Festuca rubra</i> , <i>Palustriella commutata</i> , <i>Palustriella folcata</i> , <i>Parnassia palustris</i> , <i>Scorpidium cossonii</i>	3 species AND no loss from baseline number of species	Result = 13 positive indicator species PASS
Typical accompanying species (neutral indicators)	6 species recorded: <i>Agrostis stolonifera</i> , <i>Cirsium palustre</i> , <i>Epilobium parviflorum</i> , <i>Juncus articulatus</i> , <i>Mentha aquatica</i> , <i>Succisa pratensis</i>	n/a	For information only

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Criteria	Result	Target value	Result and pass/ Fail
Invasive species	0 species recorded	Absent	Result = Absent PASS
Negative herbaceous indicator species	1 species recorded: <i>Helioscadium nodiflorum</i>	Total cover should not be dominant or abundant	Result = Rare PASS
Negative bryophyte indicator species	0 species recorded	No one species dominant or abundant; if ≥ 2 species present) then fails if ≥ 2 are frequent or 1 is abundant	Result = Absent PASS
Negative woody indicator species	n/a as wooded spring	Absent (except in wooded springs)	n/a
Spring water composition and flow			
Nitrate level	Not determined	No increase from baseline and not above 10 mg/l	n/a
Phosphate level	Not determined	No increase from baseline and not above 15 μ g/l	n/a
Water flow	No change	No alteration of natural flow	No obvious impact PASS
Impacts of grazing			
Field layer height	5cm	Height between 10 and 50cm	Result = 30cm PASS
Trampling/dung	No trampling observed	Impact should not be abundant/dominant	Result = Absent PASS
Overall Structure & Functions Assessment			
All pass or one minor/borderline fail AND, if some indicators are Not Determined, the number of passes is at least five AND there is a pass for Positive Indicator Species		Green - Favourable	Result = All pass FAVOURABLE
1 - 2 Fail		Amber - Unfavourable Inadequate	
>2 Fail		Red – Unfavourable Bad	
Future prospects: Negative activities			
L02 Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices)		Low negative impact, originating inside of site	FAVOURABLE

Conservation Score

Criteria	Result	Score
Species diversity score	High	3
HQ Indicator Species	None	0
Tufa-forming capacity	Moderate	2
Other positive characteristics	Part of spring and fen complex within SAC	1
Conservation Score		6
Rank		High

APPENDIX A - INTEL TUFA STREAM SURVEY AND CONDITION ASSESSMENT RESULTS 2021

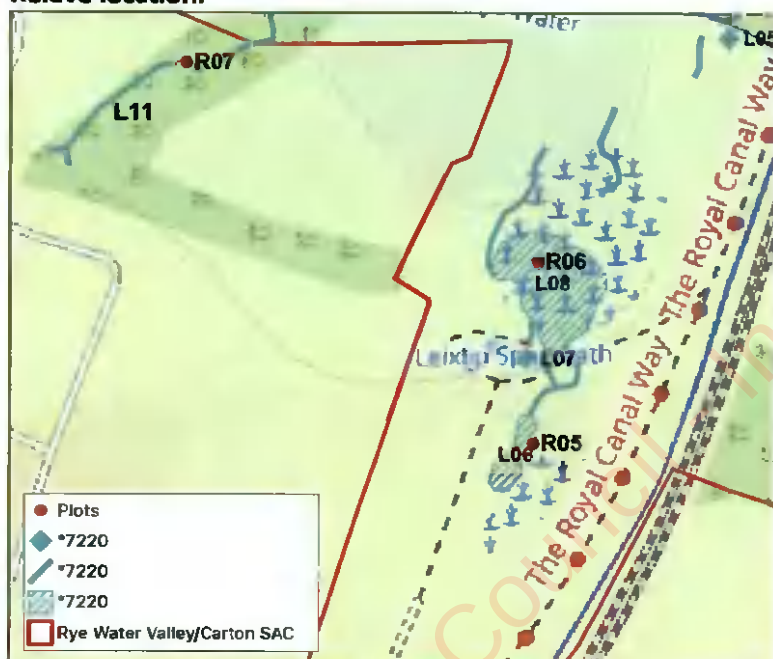
SPRING DETAILS: R06

Site name: Louisa Bridge South	Spring name: Middle terrace (L08)	Relevé No.: R06
Survey date: 18/08/2021	Relevé dimensions: 2m x 2m	Relevé area: 4m2
Grid reference: N9948736782	Spring type: Flush below springhead	
Slope: 0	Altitude (m): 65m	Aspect: N
pH: 8.18	EC: -	Temp.: 21.1°C

Spring description:

The relevé is located within the middle terrace at Louisa Bridge/ Leixlip Spa and springs. The springs emerge from the terrace edge to the south and also within the terrace. These flow into an area of petrifying spring/ alkaline fen vegetation across most of the central terrae area. These then discharge as small streams into the lower areas. Unlike the pools on the upper terrace, these do not appear to be infilling and were very wet at the time of survey with standing water. However, several woody saplings were recorded within the plot so there may be some successional changes occurring. The relevé plot was positioned in the central area, in fen vegetation. The tufa formation in this area is mainly paludal which is typical of this type of spring emergence. The vegetation is an example of **Group 6 *Carex lepidocarpa* small sedge Springs** vegetation community (Lyons & Kelly, 2017). These are weakly tufaceous springs on level ground with high species diversity (Lyons & Kelly, 2017).

Relevé location:



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DETAILED RELEVÉ

Physical characteristics

Tufa	% Cover	Water	% Cover	Surface	% Cover
Cascade	-	Flowing/ trickling	75	Living field/ ground flora	75
Paludal (1)	15	Pool/ standing water	-	Bare tufa (active/ recent)	-
Stream crust	-	Dripping	-	Ancient/ inactive tufa	8
Oncoids/ ooids	-	Damp	25	Leaf litter/ standing dead	-
Dam	-	Dry, not impacted by spring	-	Bare soil	17
Cemented rudites	-	Other:	-	Bare stone	-
Non-tufa	85			Other:	-
TOTAL	100	TOTAL	100	TOTAL	100

Paludal tufa: 1 = weak/ thin/ discontinuous, 3 = strongly forming/ continuous/ conspicuous

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APPENDIX A - INTEL TUFA STREAM SURVEY AND CONDITION ASSESSMENT RESULTS 2021

Shrub/ canopy layer

Species	Rooted outside Canopy (%)	Rooted inside Canopy (%)	Rooted inside Height (m)
TOTAL CANOPY (ROOTED INSIDE + ROOTED OUTSIDE) %	TOTAL %: -		
MAX HEIGHT (m) ABOVE QUADRAT (ROOTED INSIDE + ROOTED OUTSIDE):			-

Field/ ground flora

FORBS	%	GRAMINOIDS	%	BRYOPHYTES	%	WOODY	%
<i>Parnassia palustris</i>	3	<i>Molinia caerulea</i>	8	<i>Palustriella falcata</i>	10	<i>Hedera hibernica</i>	<1
<i>Lysimachia tenella</i>	1	<i>Carex panicea</i>	1	<i>Bryum pseudotriquetrum</i>	1	<i>Fraxinus excelsior</i>	<1
<i>Eupatorium cannabinum</i>	1	<i>Carex lepidocarpa</i>	5	<i>Aneura pinguis</i>	<1	<i>Salix cinerea</i>	<1
<i>Succisa pratensis</i>	1	<i>Eleocharis quinqueflora</i>	5	<i>Campylium stellatum</i>	1	TOTAL WOODY <50cm	2
<i>Patentilla erecta</i>	1	<i>Eriophorum latifolium</i>	5	<i>Scorpidium cossonii</i>	1		
<i>Triglochin palustre</i>	1	<i>Juncus inflexus</i>	1			PTERIDOPHYTES	
<i>Epilobium parviflorum</i>	2	<i>Agrostis stolonifera</i>	3			<i>Equisetum palustre</i>	<1
<i>Helioscadium nodiflorum</i>	1	<i>Juncus bulbosus</i>	<1				
<i>Samolus valerandi</i>	3					TOTAL PTERIDOPHYTES	<1
						ALGAE	
						<i>Chara vulgaris</i>	15
						TOTAL ALGAE*	15
TOTAL FORBS	14	TOTAL GRAMINOIDS	29	TOTAL BRYOPHYTES	14	TOTAL COVER	60

*Algae not included in total vegetation cover (Lyons & Kelly, 2016)

Photos

Photograph 6.1. View of Relevé R05 from the west.



Photograph 6.2. Detailed view of Relevé R05.



Condition assessment

Criteria	Result	Target value	Result and pass/ Fail
Species assessment criteria			
High quality indicator species	None recorded	n/a (included below)	n/a (included with positive indicator species)

APPENDIX A - INTEL TUFA STREAM SURVEY AND CONDITION ASSESSMENT RESULTS 2021

Criteria	Result	Target value	Result and pass/ Fail
Positive indicator species	11 species recorded: <i>Lysimachia tenella</i> , <i>Aneura pinguis</i> , <i>Bryum pseudotriquetrum</i> , <i>Campylium stellatum</i> , <i>Carex lepidocarpa</i> , <i>Carex panicea</i> , <i>Chara vulgaris</i> , <i>Eriophorum latifolium</i> , <i>Palustriella falcata</i> , <i>Parnassia palustris</i> , <i>Scorpidium cossonii</i>	3 species AND no loss from baseline number of species	Result = 11 positive indicator species PASS
Typical accompanying species (neutral indicators)	3 species recorded: <i>Agrostis stolonifera</i> , <i>Epilobium parviflorum</i> , <i>Succisa pratensis</i>	n/a	For information only
Invasive species	0 species recorded	Absent	Result = Absent PASS
Negative herbaceous indicator species	1 species recorded: <i>Helioscodium nodiflorum</i>	Total cover should not be dominant or abundant	Result = Rare PASS
Negative bryophyte indicator species	0 species recorded	No one species dominant or abundant; if ≥2 species present) then fails if ≥2 are frequent or 1 is abundant	Result = Absent PASS
Negative woody indicator species	n/a as wooded spring	Absent (except in wooded springs)	n/a
Spring water composition and flow			
Nitrate level	Not determined	No increase from baseline and not above 10 mg/l	n/a
Phosphate level	Not determined	No increase from baseline and not above 15 µg/l	n/a
Water flow	No change	No alteration of natural flow	No obvious impact PASS
Impacts of grazing			
Field layer height	5cm	Height between 10 and 50cm	Result = 25cm PASS
Trampling/dung	No trampling observed	Impact should not be abundant/dominant	Result = Absent PASS
Overall Structure & Functions Assessment			
All pass or one minor/borderline fail AND, if some indicators are Not Determined, the number of passes is at least five AND there is a pass for Positive Indicator Species	Green - Favourable		Result = All pass FAVOURABLE
1 - 2 Fail	Amber - Unfavourable Inadequate		
>2 Fail	Red – Unfavourable Bad		
Future prospects: Negative activities			
L02 Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices)	Low negative impact, originating inside of site		FAVOURABLE

Conservation Score

Criteria	Result	Score
Species diversity score	High	3
HQ Indicator Species	None	0
Tufa-forming capacity	Moderate	4
Other positive characteristics	Part of spring and fen complex within SAC	6
Conservation Score		6
Rank		High

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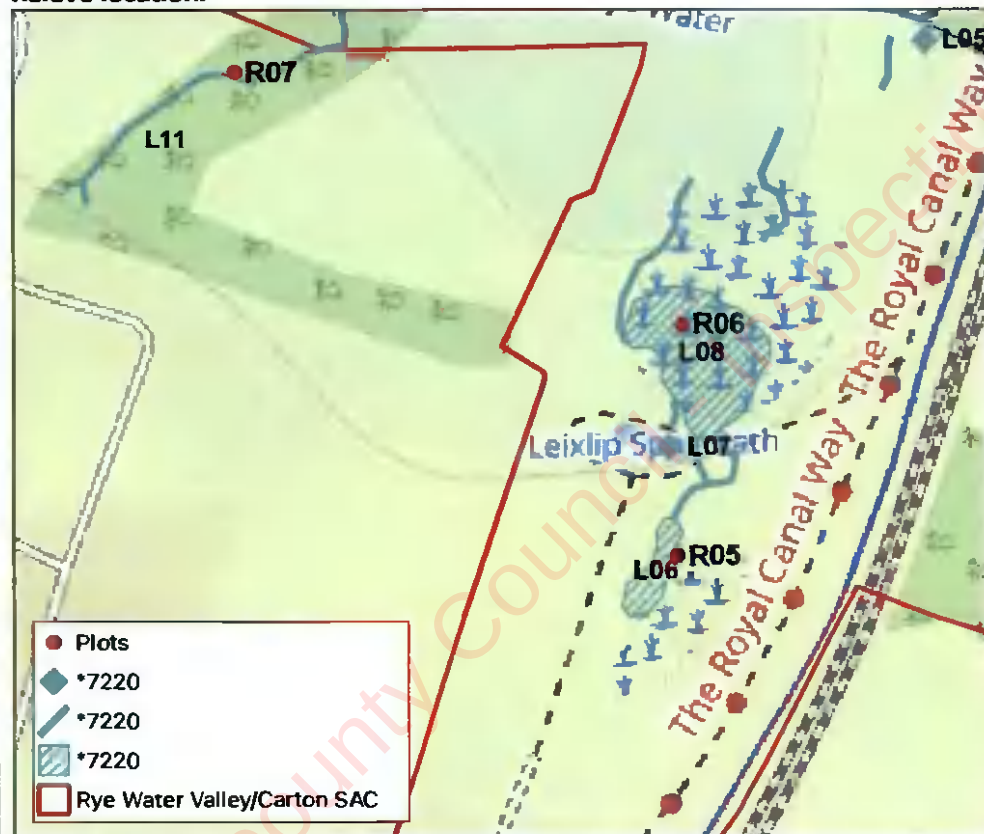
SPRING DETAILS: R07

Site name: Louisa Bridge South	Spring name: East Stream South (L11)	Relevé No.: R07
Survey date: 02/12/2021	Relevé dimensions: 2m x 2m	Relevé area: 4m ²
Grid reference: N9937736851	Spring type: Stream	
Slope: 45°	Altitude (m): 45m	Aspect: N
pH: 7.38	EC: 1800 µS/cm	Temp.: 9.4°C

Spring description:

This stream arises from a culvert to the south of the plot location. It is 1-2 metres in width and discharges to the Rye Water river to the north. There are tufa dams throughout the stream and some oncoids/ ooids and stream crust. Within the sampled relevé, tufa cover in the channel was 50%. However, the water in the stream was turbid and it was not possible to see the streambed in all sections. The tufa was discoloured (Photograph 7.2) and there was a strong odour of effluent from the water at the time of survey. The stream is wooded for most of its length. Algal cover (which can indicate high nutrient levels) is low in the stream, but the discoloured tufa, sparse stream bryophytes and odour from the water suggest that there is some form of water pollution in this stream. The vegetation is an example of Group 3 *Brachythecium rivulare-Platyhyphnidium riparioides* tufaceous streams and flushes vegetation community (Lyons & Kelly, 2017).

Relevé location:



DETAILED RELEVÉ

Physical characteristics

Tufa	% Cover	Water	% Cover	Surface	% Cover
Cascade	-	Flowing/ trickling	90	Living field/ ground flora	40
Paludal (1)	-	Pool/ standing water	-	Bare tufa (active/ recent)	10
Stream crust	-	Dripping	-	Ancient/ inactive tufa	-
Oncoids/ ooids	-	Damp (riverbank)	10	Leaf litter/ standing dead	15
Dam	50	Dry, not impacted by spring	-	Bare soil	3
Cemented rudites	-	Other:	-	Bare stone	1
Non-tufa	50			Other: Streambed	30
TOTAL	100	TOTAL	100	TOTAL	100

Paludal tufa: 1 = weak/ thin/ discontinuous, 3 = strongly forming/ continuous/ conspicuous

APPENDIX A - INTEL TUFA STREAM SURVEY AND CONDITION ASSESSMENT RESULTS 2021

Shrub/ canopy layer

Species	Rooted outside Canopy (%)	Rooted inside Canopy (%)	Rooted inside Height (m)
<i>Quercus</i> sp.	30	-	-
<i>Crataegus monogyna</i>	20	-	-
<i>Prunus avium</i>	30	-	-
		-	-
TOTAL CANOPY (ROOTED INSIDE + ROOTED OUTSIDE) %	TOTAL %: 80		
MAX HEIGHT (m) ABOVE QUADRAT (ROOTED INSIDE + ROOTED OUTSIDE):			15

Field/ ground flora

FORBS	%	GRAMINOIDS	%	BRYOPHYTES	%	WOODY	%
<i>Geranium robertianum</i>	<1	<i>Brachypodium sylvaticum</i>	<1	<i>Leptodictyum riparium</i>	6	<i>Hedera hibernica</i>	8
				<i>Oxyrrhynchium hians</i>	3	<i>Rubus fruticosus</i> agg.	3
				<i>Fissidens taxifolius</i>	3		
				<i>Thamnobryum alopecurum</i>	3	TOTAL WOODY <50cm	11
				<i>Lunularia cruciata</i>	1		
				<i>Amblystegium serpens</i>	<1	PTERIDOPHYTES	
				<i>Plagiomnium rostratum</i>	3	<i>Asplenium scolopendrium</i>	5
				<i>Aneura pinguis</i>	<1		
				<i>Fissidens crassipes</i>	1	TOTAL PTERIDOPHYTES	5
				<i>Rhynchostegium riparioides</i>	3	ALGAE	
TOTAL FORBS	<1	TOTAL GRAMINOIDS	<1	TOTAL BRYOPHYTES	24	TOTAL ALGAE*	0
						TOTAL COVER	40

*Algae not included in total vegetation cover (Lyons & Kelly, 2016)

Photographs

Photograph 7.1. View of Relevé R07 from the NE.



Photograph 7.2. Detailed view of Relevé R07.



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Condition assessment

Criteria	Result	Target value	Result and pass/ Fail
Species assessment criteria			
High quality indicator species	None recorded	n/a (included below)	n/a (included with positive indicator species)
Positive indicator species	1 species recorded: <i>Aneura pinguis</i>	3 species AND no loss from baseline number of species	Result = 1 positive indicator species FAIL
Typical accompanying species (neutral indicators)	1 species recorded: <i>Geranium robertianum</i>	n/a	For information only
Invasive species	0 species recorded	Absent	Result = Absent PASS
Negative herbaceous indicator species	0 species recorded	Total cover should not be dominant or abundant	Result = Absent PASS
Negative bryophyte indicator species	0 species recorded:	No one species dominant or abundant; if ≥ 2 species present) then fails if ≥ 2 are frequent or 1 is abundant	Result = Absent PASS
Negative woody indicator species	n/a as wooded spring	Absent (except in wooded springs)	n/a
Spring water composition and flow			
Nitrate level	Not determined	No increase from baseline and not above 10 mg/l	n/a
Phosphate level	Not determined	No increase from baseline and not above 15 μ g/l	n/a
Water flow	No change	No alteration of natural flow	No obvious impact PASS
Impacts of grazing			
Field layer height	3cm	Height between 10 and 50cm	Result = 3cm FAIL
Trampling/dung	No trampling observed	Impact should not be abundant/dominant	Result = Absent PASS
Overall Structure & Functions Assessment			
All pass or one minor/borderline fail AND, if some indicators are Not Determined, the number of passes is at least five AND there is a pass for Positive Indicator Species	Green - Favourable		Result = 2 fail UNFAVOURABLE - INADEQUATE
1 - 2 Fail	Amber - Unfavourable Inadequate		
>2 Fail	Red – Unfavourable Bad		
Future prospects: Negative activities			
J01 Mixed source pollution to surface and ground waters (limnic and terrestrial)	Moderate negative impact, originating outside of site		UNFAVOURABLE - INADEQUATE

Conservation Score

Criteria	Result	Score
Species diversity score	Low	1
HQ Indicator Species	None	0
Tufa-forming capacity	High	3
Other positive characteristics	Flows into SAC for which *7220 is a Qualifying Interest	1
Conservation Score		5
Rank		High

APPENDIX A - INTEL TUFA STREAM SURVEY AND CONDITION ASSESSMENT RESULTS 2021

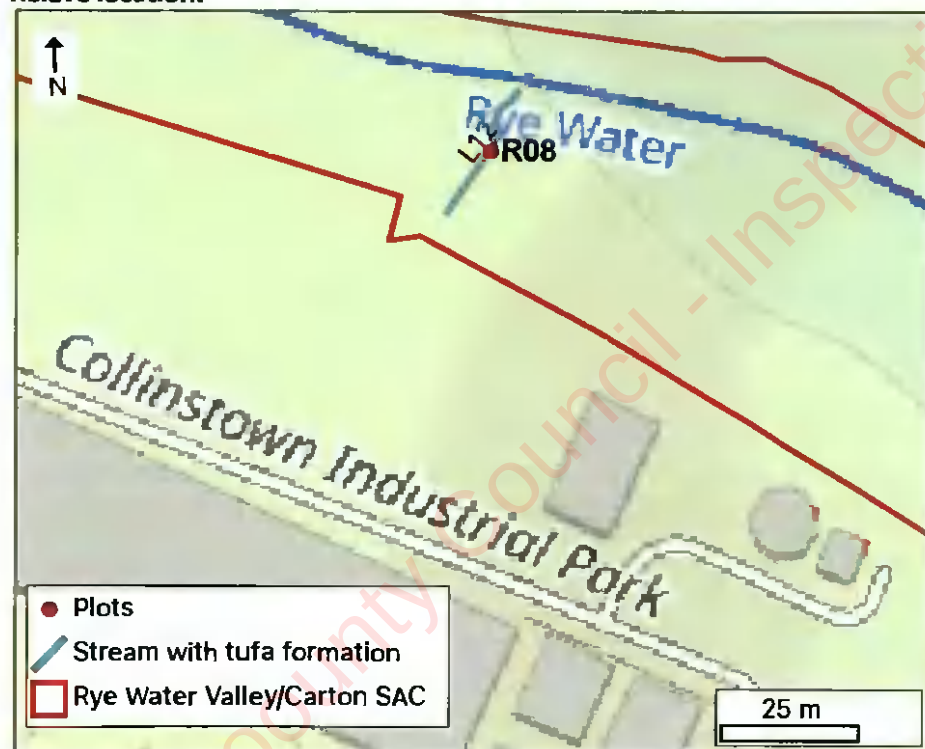
SPRING DETAILS: R08

Site name: Intel lands	Spring name: KCC R148 Drain Outfall (L12)	Relevé No.: R08
Survey date: 02/12/2021	Relevé dimensions: 2m x 2m	Relevé area: 4m ²
Grid reference: N9899237094	Spring type: Stream	
Slope: 45	Altitude (m): 55m	Aspect: N
pH: 8.04	EC: 1580 µS/cm	Temp.: 9.9°C

Spring description:

This stream discharges from a culvert to the south of the plot location. The stream flows over a series of stepped gabion baskets. These have become almost entirely covered with tufa throughout the stream length. The stream is 1-2 metres in width and discharges to the Rye Water river to the north. Within the sampled relevé, tufa cover in the channel was 90%. The tufa is discoloured and silt is present throughout the channel (Photographs 8.1 and 8.2). The water appeared clear but there was a strong odour of hydrocarbon from the water at the time of survey. The stream is wooded in the upper section and then flows through wet grassland on the river bank. Algal cover (which can indicate high nutrient levels) is high throughout the stream and the bryophytes in the stream were silt covered. In addition to the discoloured tufa and odour from the water, this suggests that there is some form of water pollution in this stream. The stream is not considered an example of the Annex I habitat 'Petrifying springs with tufa formation' as it has negligible natural groundwater input. However, as there is tufa formation with some positive indicator species, it was included in the detailed plot assessment. The vegetation has most affinity to **Group 3 *Brachythecium rivulare-Platyhypnidium riparioides* tufaceous streams and flushes** vegetation community (Lyons & Kelly, 2017).

Relevé location:



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DETAILED RELEVÉ

Physical characteristics

Tufa	% Cover	Water	% Cover	Surface	% Cover
Cascade	90	Flowing/ trickling	50	Living field/ ground flora	30
Paludal (1)	-	Pool/ standing water	-	Bare tufa (active/ recent)	62
Stream crust	5	Dripping	-	Ancient/ inactive tufa	-
Oncoids/ ooids	-	Damp	50	Leaf litter/ standing dead	3
Dam	-	Dry, not impacted by spring	-	Bare soil	-
Cemented rudites	-	Other:	-	Bare stone	-
Non-tufa	5			Other: Below gabion	5
TOTAL	100	TOTAL	100	TOTAL	100

Paludal tufo: 1 = weak/ thin/ discontinuous, 3 = strongly forming/ continuous/ conspicuous

APPENDIX A - INTEL TUFA STREAM SURVEY AND CONDITION ASSESSMENT RESULTS 2021

Shrub/ canopy layer

Species	Rooted outside Canopy (%)	Rooted inside Canopy (%)	Rooted inside Height (m)
<i>Fraxinus excelsior</i>	60	10	2
TOTAL CANOPY (ROOTED INSIDE + ROOTED OUTSIDE) %	TOTAL %: 60	10	
MAX HEIGHT (m) ABOVE QUADRAT (ROOTED INSIDE + ROOTED OUTSIDE):			10

Field/ ground flora

FORBS	%	GRAMINOIDS	%	BRYOPHYTES	%	WOODY	%
				<i>Cratoneuron filicinum</i>	3	<i>Fraxinus excelsior</i>	3
				<i>Oxyrrhynchium hians</i>	3		
				<i>Brachythecium rivulare</i>	1		
				<i>Thamnobryum alopecurum</i>	1	TOTAL WOODY <50cm	3
				<i>Lunularia cruciata</i>	<1		
				<i>Amblystegium serpens</i>	<1	PTERIDOPHYTES	
				<i>Fissidens adianthoides</i>	<1	<i>Asplenium scolopendrium</i>	1
				<i>Fissidens crassipes</i>	<1		
				<i>Rhynchostegium riparioides</i>	15	TOTAL PTERIDOPHYTES	1
				<i>Pellia endiviifolia</i>	3	ALGAE	
						<i>Filamentous algae</i>	5
						TOTAL ALGAE*	5
TOTAL FORBS	0	TOTAL GRAMINOIDS	0	TOTAL BRYOPHYTES	27	TOTAL COVER	30

*Algae not included in total vegetation cover (Lyons & Kelly, 2016)

Photos

Photograph 8.1. View of Relevé R08 from the north.



Photograph 8.2. Detailed view of Relevé R08.



APPENDIX A - INTEL TUFA STREAM SURVEY AND CONDITION ASSESSMENT RESULTS 2021

Condition assessment

Criteria	Result	Target value	Result and pass/ Fail
Species assessment criteria			
High quality indicator species	None recorded	n/a (included below)	n/a (included with positive indicator species)
Positive indicator species	2 species recorded: <i>Pellia endiviifolia</i> , <i>Fissidens adianthoides</i>	3 species AND no loss from baseline number of species	Result = 2 positive indicator species FAIL
Typical accompanying species (neutral indicators)	0 species recorded:	n/a	For information only
Invasive species	0 species recorded	Absent	Result = Absent PASS
Negative herbaceous indicator species	0 species recorded:	Total cover should not be dominant or abundant	Result = Absent PASS
Negative bryophyte indicator species	3 species recorded: <i>Cratoneuron filicinum</i> , <i>Brachythecium rivulare</i> , <i>Rhynchostegium riparioides</i>	No one species dominant or abundant; if ≥2 species present) then fails if ≥2 are frequent or 1 is abundant	Result = 1 species dominant FAIL
Negative woody indicator species	n/a as wooded spring	Absent (except in wooded springs)	n/a
Spring water composition and flow			
Nitrate level	2.0-3.7 mg/l (recorded Dec 2021-Jan 2022)	No increase from baseline and not above 10 mg/l	<10 mg/l PASS
Phosphate level	<25-523 µg/l (recorded Dec 2021-Jan 2022)	No increase from baseline and not above 15 µg/l	>25 µg/l on over 10 occasions FAIL
Water flow	No change	No alteration of natural flow	No obvious impact PASS
Impacts of grazing			
Field layer height	1cm	Height between 10 and 50cm	Result = 1cm FAIL
Trampling/dung	No trampling observed	Impact should not be abundant/dominant	Result = Absent PASS
Overall Structure & Functions Assessment			
All pass or one minor/borderline fail AND, if some indicators are Not Determined, the number of passes is at least five AND there is a pass for Positive Indicator Species	Green - Favourable		Result = 4 fail UNFAVOURABLE - BAD
1 - 2 Fail	Amber - Unfavourable Inadequate		
>2 Fail	Red – Unfavourable Bad		
Future prospects: Negative activities			
J01 Mixed source pollution to surface and ground waters (limnic and terrestrial)	Moderate negative impact, originating outside of site		UNFAVOURABLE - BAD

Conservation Score

N/A as not an example of an Annex I petrifying spring



APPENDIX A - INTEL TUFA STREAM SURVEY AND CONDITION ASSESSMENT RESULTS 2021

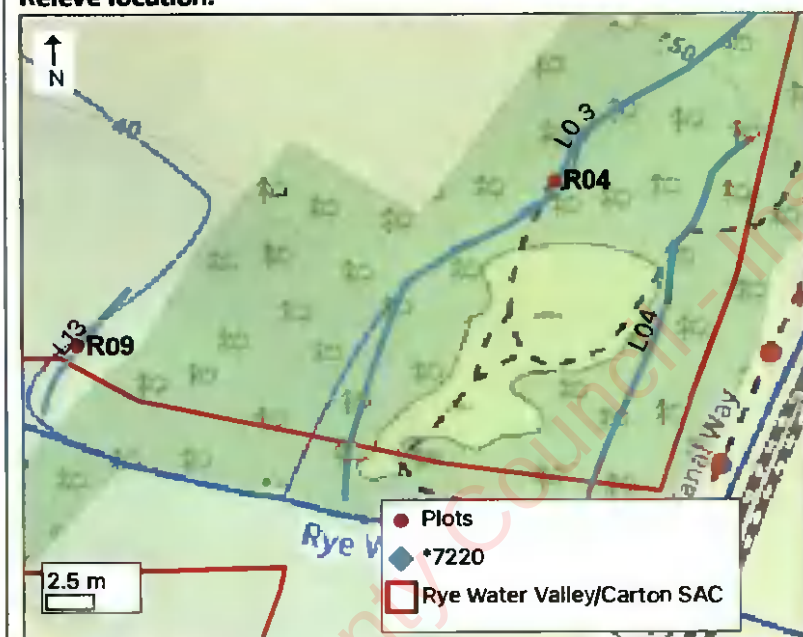
SPRING DETAILS: R09

Site name: Louisa Bridge	Spring name: East Stream North (L13)	Relevé No.: R09
Survey date: 13/12/2021	Relevé dimensions: 1 m x 4m	Relevé area: 4m ²
Grid reference: N9943736916	Spring type: Stream	
Slope: 10	Altitude (m): 40m	Aspect: NE
pH: 7.49	EC: 1160 µS/cm	Temp.: 8.3°C

Spring description:

This is a small stream which is located to the west of an area of conifer woodland, on the boundary of the Louisa Bridge survey area. Above the plot location it is a small stream (1-2m wide) with a muddy substrate and no tufa was observed. At the plot location and downstream, there were some small tufa dams and stream crust tufa formation. The stream discharges to the Rye Water river to the south. Where the stream joins the river the water level was very high and no tufa could be seen. However it is likely that the dams continue to where the stream and river meet (as for the stream to the east). The stream is wooded to the east and borders a grassy field to the west. It has been assessed as a wooded stream. To the north of the plot there was some signs of trampling in the mud at the edge of the stream and *Helioscadium nodiflorum* was locally frequent. This suggests that there may be slight nutrient enrichment from either upstream or the adjacent land use (forestry and grassland). However, no tufa was observed in this area. Within the sampled relevé, tufa cover in the channel was 30%. The vegetation is an example of **Group 3 *Brachythecium rivulare*-*Platyhypnidium riparioides* tufaceous streams and flushes vegetation community** (Lyons & Kelly, 2017).

Relevé location:



DETAILED RELEVÉ

Physical characteristics

Tufa	% Cover	Water	% Cover	Surface	% Cover
Cascade	-	Flowing/ trickling	80	Living field/ ground flora	70
Paludal (1)	-	Pool/ standing water	-	Bare tufa (active/ recent)	8
Stream crust	20	Dripping	-	Ancient/ inactive tufa	-
Oncoids/ ooids	-	Damp	-	Leaf litter/ standing dead	7
Dam	10	Dry, not impacted by spring	-	Bare soil	5
Cemented rudites	-	Other: riverbank	20	Bare stone	10
Non-tufa	70			Other:	-
TOTAL	100	TOTAL	100	TOTAL	100

Paludal tufa: 1 = weak/ thin/ discontinuous, 3 = strongly forming/ continuous/ conspicuous

APPENDIX A - INTEL TUFA STREAM SURVEY AND CONDITION ASSESSMENT RESULTS 2021

Shrub/ canopy layer

Species	Rooted outside Canopy (%)	Rooted inside Canopy (%)	Rooted inside Height (m)
<i>Rubus fruticosus</i> agg.	5	5	2
TOTAL CANOPY (ROOTED INSIDE + ROOTED OUTSIDE) %	TOTAL %: 5	5	
MAX HEIGHT (m) ABOVE QUADRAT (ROOTED INSIDE + ROOTED OUTSIDE):			3

Field/ ground flora

FORBS	%	GRAMINOIDS	%	BRYOPHYTES	%	WOODY	%
<i>Urtica dioica</i>	5	<i>Agrostis stolonifera</i>	5	<i>Brachythecium rivulare</i>	3	<i>Rubus fruticosus</i> agg.	5
<i>Helioscadium nodiflorum</i>	3	<i>Phalaris arundinacea</i>	1	<i>Pellia endiviifolia</i>	10	<i>Hedera hibernica</i>	5
<i>Epilobium hirsutum</i>	5	<i>Festuca rubra</i>	5	<i>Cratoneuron filicinum</i>	3		
<i>Geranium robertianum</i>	3	<i>Arrhenatherum elatius</i>	3	<i>Rhynchostegium riparioides</i>	5	TOTAL WOODY <50cm	10
<i>Galium aparine</i>	<1			<i>Fissidens taxifolius</i>	<1		
				<i>Fissidens crassipes</i>	1	PTERIDOPHYTES	
				<i>Kindbergia praelonga</i>	5		
				<i>Plagiomnium rostratum</i>	3		
						TOTAL PTERIDOPHYTES	0
						ALGAE	
						TOTAL ALGAE*	0
TOTAL FORBS	16	TOTAL GRAMINOIDS	14	TOTAL BRYOPHYTES	30	TOTAL COVER	70

*Algae not included in total vegetation cover (Lyons & Kelly, 2016)

Photographs

Photograph 4.1. View of Relevé R04 from the NW



Photograph 4.2. Detailed view of Relevé R04.



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APPENDIX A - INTEL TUFA STREAM SURVEY AND CONDITION ASSESSMENT RESULTS 2021

Condition assessment

Criteria	Result	Target value	Result and pass/ Fail
Species assessment criteria			
High quality indicator species	None recorded	n/a (included below)	n/a (included with positive indicator species)
Positive indicator species	2 species recorded: <i>Pellia endiviifolia</i> , <i>Festuca rubra</i>	3 species AND no loss from baseline number of species	Result = 2 positive indicator species FAIL
Typical accompanying species (neutral indicators)	2 species recorded: <i>Agrostis stolonifera</i> , <i>Geranium robertianum</i>	n/a	For information only
Invasive species	0 species recorded	Absent	Result = Absent PASS
Negative herbaceous indicator species	1 species recorded: <i>Helioscadium nodiflorum</i>	Total cover should not be dominant or abundant	Result = Occasional PASS
Negative bryophyte indicator species	3 species recorded: <i>Brachythecium rivulare</i> , <i>Cratoneuron filicinum</i> , <i>Platyhypnidium riparioides</i>	No one species dominant or abundant; if ≥2 species present) then fails if ≥2 are frequent or 1 is abundant	Result = All Occasional PASS
Negative woody indicator species	n/a as wooded spring	Absent (except in wooded springs)	n/a
Spring water composition and flow			
Nitrate level	Not determined	No increase from baseline and not above 10 mg/l	n/a
Phosphate level	Not determined	No increase from baseline and not above 15 µg/l	n/a
Water flow	No change	No alteration of natural flow	No obvious impact PASS
Impacts of grazing			
Field layer height	40cm	Height between 10 and 50cm	Result = 40cm PASS
Trampling/dung	No trampling observed	Impact should not be abundant/dominant	Result = Absent PASS
Overall Structure & Functions Assessment			
All pass or one minor/borderline fail AND, if some indicators are Not Determined, the number of passes is at least five AND there is a pass for Positive Indicator Species		Green - Favourable	Result = One minor fail FAVOURABLE
1 - 2 Fail		Amber - Unfavourable Inadequate	
>2 Fail		Red – Unfavourable Bad	
Future prospects: Negative activities			
J01 Mixed source pollution to surface and ground waters (limnic and terrestrial)		Low negative impact, originating inside of site	FAVOURABLE

Conservation Score

Criteria	Result	Score
Species diversity score	Low	1
HQ Indicator Species	None	0
Tufa-forming capacity	High	3
Other positive characteristics	Flows into SAC for which *7220 is a Qualifying Interest	1
Conservation Score		5
Rank		High

APPENDIX TO SECTION 7

LAND, SOILS, GEOLOGY & HYDROGEOLOGY

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APPENDIX 7.1

IMPACT RATING AND ASSESSMENT CRITERIA

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NRA Criteria for Rating the Magnitude and Significance of Impacts at EIA Stage National Roads Authority (NRA, 2009)

Table 1 Criteria for Rating Site Attributes – Estimation of Importance of Soil and Geology Attributes (NRA)

Importance	Criteria	Typical Example
Very High	Attribute has a high quality, significance or value on a regional or national scale. Degree or extent of soil contamination is significant on a national or regional scale. Volume of peat and/or soft organic soil underlying route is significant on a national or regional scale.	Geological feature rare on a regional or national scale (NHA). Large existing quarry or pit. Proven economically extractable mineral resource
High	Attribute has a high quality, significance or value on a local scale. Degree or extent of soil contamination is significant on a local scale. Volume of peat and/or soft organic soil underlying route is significant on a local scale.	Contaminated soil on site with previous heavy industrial usage. Large recent landfill site for mixed wastes. Geological feature of high value on a local scale (County Geological Site). Well drained and/or high fertility soils. Moderately sized existing quarry or pit. Marginally economic extractable mineral resource.
Medium	Attribute has a medium quality, significance or value on a local scale. Degree or extent of soil contamination is moderate on a local scale. Volume of peat and/or soft organic soil underlying route is moderate on a local scale.	Contaminated soil on site with previous light industrial usage. Small recent landfill site for mixed wastes. Moderately drained and/or moderate fertility soils. Small existing quarry or pit. Sub-economic extractable mineral resource.
Low	Attribute has a low quality, significance or value on a local scale. Degree or extent of soil contamination is minor on a local scale. Volume of peat and/or soft organic soil underlying route is small on a local scale.	Large historical and/or recent site for construction and demolition wastes. Small historical and/or recent landfill site for construction and demolition wastes. Poorly drained and/or low fertility soils. Uneconomically extractable mineral resource.

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Table 2 Criteria for Rating Site Attributes – Estimation of Importance of Hydrogeological Attributes (NRA)

Importance	Criteria	Typical Examples
Extremely High	Attribute has a high quality or value on an international scale	Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation e.g. SAC or SPA status.
Very High	Attribute has a high quality or value on a regional or national scale	Regionally Important Aquifer with multiple well fields. Groundwater supports river, wetland or surface water body ecosystem protected by national legislation – NHA status. Regionally important potable water source supplying >2500 homes. Inner source protection area for regionally important water source.
High	Attribute has a high quality or value on a local scale	Regionally Important Aquifer. Groundwater provides large proportion of baseflow to local rivers. Locally important potable water source supplying >1000 homes. Outer source protection area for regionally important water source. Inner source protection area for locally important water source.
Medium	Attribute has a medium quality or value on a local scale	Locally Important Aquifer. Potable water source supplying >50 homes. Outer source protection area for locally important water source.
Low	Attribute has a low quality or value on a local scale	Poor Bedrock Aquifer Potable water source supplying <50 homes

Table 3 Criteria for Rating Impact Significance at EIS Stage – Estimation of Magnitude of Impact on Soil/ Geology Attribute (NRA)

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute	Loss of high proportion of future quarry or pit reserves. Irreversible loss of high proportion of local high fertility soils. Removal of entirety of geological heritage feature. Requirement to excavate/remediate entire waste site. Requirement to excavate and replace high proportion of peat, organic soils and/or soft mineral soils beneath alignment.
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Loss of moderate proportion of future quarry or pit reserves. Removal of part of geological heritage feature. Irreversible loss of moderate proportion of local high fertility soils. Requirement to excavate/remediate significant proportion of waste site. Requirement to excavate and replace moderate proportion of peat, organic soils and/or soft mineral soils beneath alignment.
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Loss of small proportion of future quarry or pit reserves. Removal of small part of geological heritage feature. Irreversible loss of small proportion of local high fertility soils and/or high proportion of local low fertility soils. Requirement to excavate/remediate small proportion of waste site. Requirement to excavate and replace small proportion of peat, organic soils and/or soft mineral soils beneath alignment.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	No measurable changes in attributes
Minor Beneficial	Results in minor improvement of attribute quality	Minor enhancement of geological heritage feature
Moderate Beneficial	Results in moderate improvement of attribute quality	Moderate enhancement of geological heritage feature
Major Beneficial	Results in major improvement of attribute quality	Major enhancement of geological heritage feature

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Table 4 Criteria for Rating Impact Significance at EIS Stage – Estimation of Magnitude of Impact on Hydrogeological Attribute (NRA)

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute and/or quality and integrity of attribute	Removal of large proportion of aquifer. Changes to aquifer or unsaturated zone resulting in extensive change to existing water supply springs and wells, river baseflow or ecosystems. Potential high risk of pollution to groundwater from routine run-off. Calculated risk of serious pollution incident >2% annually.
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Removal of moderate proportion of aquifer. Changes to aquifer or unsaturated zone resulting in moderate change to existing water supply springs and wells, river baseflow or ecosystems. Potential medium risk of pollution to groundwater from routine run-off. Calculated risk of serious pollution incident >1% annually.
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Removal of small proportion of aquifer. Changes to aquifer or unsaturated zone resulting in minor change to water supply springs and wells, river baseflow or ecosystems. Potential low risk of pollution to groundwater from routine run-off. Calculated risk of serious pollution incident >0.5% annually.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	Calculated risk of serious pollution incident <0.5% annually.

Table 5 Rating of Significant Environmental Impacts at EIS Stage (NRA)

Importance of Attribute	Magnitude of Importance			
	Negligible	Small Adverse	Moderate Adverse	Large Adverse
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant/moderate	Profound/Significant	Profound
High	Imperceptible	Moderate/Slight	Significant/moderate	Profound/Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight/Moderate

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APPENDIX TO SECTION 8

WATER & HYDROLOGY

APPENDIX 8.1

IMPACT RATING AND ASSESSMENT CRITERIA

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NRA Criteria for Rating the Magnitude and Significance of Impacts at EIA Stage National Roads Authority (NRA, 2009)

Table 1 Criteria for Rating Site Attributes – Estimation of Importance of Hydrological Attributes (NRA)

Importance	Criteria	Typical Examples
Extremely High	Attribute has a high quality or value on an international scale	River, wetland or surface water body ecosystem protected by EU legislation e.g. 'European sites' designated under the Habitats Regulations or 'Salmonid waters' designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988.
Very High	Attribute has a high quality or value on a regional or national scale	River, wetland or surface water body ecosystem protected by national legislation – NHA status. Regionally important potable water source supplying >2500 homes. Quality Class A (Biotic Index Q4, Q5). Flood plain protecting more than 50 residential or commercial properties from flooding. Nationally important amenity site for wide range of leisure activities.
High	Attribute has a high quality or value on a local scale	Salmon fishery. Locally important potable water source supplying >1000 homes. Quality Class B (Biotic Index Q3-4). Flood plain protecting between 5 and 50 residential or commercial properties from flooding. Locally important amenity site for wide range of leisure activities.
Medium	Attribute has a medium quality or value on a local scale	Coarse fishery. Local potable water source supplying >50 homes. Quality Class C (Biotic Index Q3, Q2- 3). Flood plain protecting between 1 and 5 residential or commercial properties from flooding.
Low	Attribute has a low quality or value on a local scale	Locally important amenity site for small range of leisure activities. Local potable water source supplying <50 homes Quality Class D (Biotic Index Q2, Q1). Flood plain protecting 1 residential or commercial property from flooding. Amenity site used by small numbers of local people.

Table 2 Criteria for Rating Impact Significance at EIS Stage – Estimation of Magnitude of Impact on Hydrological Attribute (NRA)

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute	Loss or extensive change to a waterbody or water dependent habitat. Increase in predicted peak flood level >100mm. Extensive loss of fishery. Calculated risk of serious pollution incident >2% annually. Extensive reduction in amenity value.
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Increase in predicted peak flood level >50mm. Partial loss of fishery. Calculated risk of serious pollution incident >1% annually. Partial reduction in amenity value.
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Increase in predicted peak flood level >10mm. Minor loss of fishery. Calculated risk of serious pollution incident >0.5% annually. Slight reduction in amenity value.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	Negligible change in predicted peak flood level. Calculated risk of serious pollution incident <0.5% annually.
Minor Beneficial	Results in minor improvement of attribute quality	Reduction in predicted peak flood level >10mm. Calculated reduction in pollution risk of 50% or more where existing risk is <1% annually.
Moderate Beneficial	Results in moderate improvement of attribute quality	Reduction in predicted peak flood level >50mm. Calculated reduction in pollution risk of 50% or more where existing risk is >1% annually.
Major Beneficial	Results in major improvement of attribute quality	Reduction in predicted peak flood level >100mm

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Table 3 Rating of Significant Environmental Impacts at EIS Stage (NRA)

Importance of Attribute	Magnitude of Importance			
	Negligible	Small Adverse	Moderate Adverse	Large Adverse
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant/moderate	Profound/Significant	Profound
High	Imperceptible	Moderate/Slight	Significant/moderate	Profound/Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight/Moderate

APPENDIX TO SECTION 9

AIR QUALITY & CLIMATE

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APPENDIX 9.1

DUST MANAGEMENT PLAN

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INTRODUCTION

The objective of dust control at the site is to ensure that no significant nuisance occurs at nearby sensitive receptors. In order to develop a workable and transparent dust control strategy, the following management plan has been formulated by drawing on best practice guidance from Ireland (DCC, 2018), UK (IAQM (2014), BRE (2003), The Scottish Office (1996), UK ODPM (2002)) and the USA (USEPA, 1997). The dust minimisation measures will be incorporated into the overall Construction Environmental Management Plan (CEMP) being prepared in relation to the development.

SITE MANAGEMENT

The aim is to ensure good site management by avoiding dust becoming airborne at source. This will be done through good design and effective control strategies.

At the construction planning stage, the siting of activities and storage piles will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance (see Figure 9.1 for the windrose for Casement Aerodrome). As the prevailing wind is predominantly south-westerly, locating construction compounds and storage piles of sensitive receptors will minimise the potential for dust nuisance to occur at sensitive receptors.

Good site management will include the ability to respond to adverse weather conditions by either restricting operations on-site or quickly implementing effective control measures before the potential for nuisance occurs. When rainfall is greater than 0.2mm/day, dust generation is generally suppressed (IAQM, 2014; UK ODPM, 2002). The potential for significant dust generation is also reliant on threshold wind speeds of greater than 10 m/s (19.4 knots) (at 7m above ground) to release loose material from storage piles and other exposed materials (USEPA, 1986). Particular care should be taken during periods of high winds (gales) as these are periods where the potential for significant dust emissions are highest. The prevailing meteorological conditions in the vicinity of the site are favourable in general for the suppression of dust for a significant period of the year. Nevertheless, there will be infrequent periods where care will be needed to ensure that dust nuisance does not occur. The following measures shall be taken in order to avoid dust nuisance occurring under unfavourable meteorological conditions:

- The Principal Contractor or equivalent must monitor the contractors' performance to ensure that the proposed mitigation measures are implemented and that dust impacts and nuisance are minimised;
- During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions;
- The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details;
- It is recommended that community engagement be undertaken before works commence on site explaining the nature and duration of the works to local residents and businesses;
- A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out;
- It is the responsibility of the contractor at all times to demonstrate full compliance with the dust control conditions herein;
- At all times, the procedures put in place will be strictly monitored and assessed.

The dust minimisation measures shall be reviewed at regular intervals during the works to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures. In the event of dust nuisance occurring outside the site

boundary, site activities will be reviewed and satisfactory procedures implemented to rectify the problem. Specific dust control measures to be employed are described below.

PREPARING AND MAINTAINING THE SITE

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
- Fully enclose specific operations where there is a high potential for dust production and the site is active for an extensive period.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.

OPERATING VEHICLES / MACHINERY AND SUSTAINABLE TRAVEL

- Ensure all vehicles switch off engines when stationary - no idling vehicles.
- Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.
- Impose and signpost a maximum-speed-limit of 20 kph for haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing)

OPERATIONS

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g., suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

WASTE MANAGEMENT

- Avoid bonfires and burning of waste materials.

MEASURES SPECIFIC TO EARTHWORKS

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Only remove the cover in small areas during work and not all at once.

- During dry and windy periods, and when there is a likelihood of dust nuisance, a bowser will operate to ensure moisture content is high enough to increase the stability of the soil and thus suppress dust.

MEASURES SPECIFIC TO CONSTRUCTION

- Avoid scabbling (roughening of concrete surfaces) if possible.
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
- For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.

MEASURES SPECIFIC TO TRACKOUT

Site roads (particularly unpaved) can be a significant source of fugitive dust from construction sites if control measures are not in place. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions. Studies show that these measures can have a control efficiency ranging from 25 to 80%⁽¹¹⁾.

- A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles.
- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use. If sweeping using a road sweeper is not possible due to the nature of the surrounding area then a suitable smaller scale street cleaning vacuum will be used.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site logbook.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Access gates to be located at least 10 m from receptors where possible.

DUST MONITORING

It is recommended that dust deposition monitoring be put in place to ensure dust mitigation measures are adequately controlling emissions. Dust monitoring along the site boundary with sensitive receptors shall be conducted using the Bergerhoff method in accordance with the requirements of the German Standard VDI 2119. The Bergerhoff Gauge consists of a collecting vessel and a stand with a protecting gauge. The collecting vessel is secured to the stand with the opening of the collecting vessel located approximately 2m above ground level. The TA Luft limit value is 350 mg/(m²*day) during the monitoring period of 30 days (+/- 2 days).

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SUMMARY OF DUST MITIGATION MEASURES

The pro-active control of fugitive dust will ensure that the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released, will contribute towards the satisfactory performance of the contractor. The key features with respect to control of dust will be:

- The specification of a site policy on dust and the identification of the site management responsibilities for dust issues;
- The development of a documented system for managing site practices with regard to dust control;
- The development of a means by which the performance of the dust minimisation plan can be regularly monitored and assessed; and
- The specification of effective measures to deal with any complaints received.

APPENDIX TO SECTION 10

NOISE & VIBRATION

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APPENDIX 10.1

ACOUSTIC TERMINOLOGY

ambient noise	The totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, near and far.
background noise	The steady existing noise level present without contribution from any intermittent sources. The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 per cent of a given time interval, T ($L_{AF90,T}$).
broadband	Sounds that contain energy distributed across a wide range of frequencies.
dB	Decibel - The scale in which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the RMS pressure of the sound field and the reference pressure of 20 micro-pascals (20 μ Pa).
dB L_{pA}	An 'A-weighted decibel' - a measure of the overall noise level of sound across the audible frequency range (20 Hz – 20 kHz) with A-frequency weighting (i.e. 'A'-weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
Hertz (Hz)	The unit of sound frequency in cycles per second.
impulsive noise	A noise that is of short duration (typically less than one second), the sound pressure level of which is significantly higher than the background.
$L_{Aeq,T}$	This is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period (T). The closer the L_{Aeq} value is to either the L_{AF10} or L_{AF90} value indicates the relative impact of the intermittent sources and their contribution. The relative spread between the values determines the impact of intermittent sources such as traffic on the background.
L_{AFN}	The A-weighted noise level exceeded for N% of the sampling interval. Measured using the "Fast" time weighting.
L_{AFmax}	is the instantaneous slow time weighted maximum sound level measured during the sample period (usually referred to in relation to construction noise levels).
$L_{Ar,T}$	The Rated Noise Level, equal to the L_{Aeq} during a specified time interval (T), plus specified adjustments for tonal character and impulsiveness of the sound.
L_{AF90}	Refers to those A-weighted noise levels in the lower 90 percentile of the sampling interval; it is the level which is exceeded for 90% of the measurement period. It will therefore exclude the intermittent features of traffic and is used to estimate a background level. Measured using the "Fast" time weighting.
$L_{AT}(DW)$	equivalent continuous downwind sound pressure level.
$L_{T}(DW)$	equivalent continuous downwind octave-band sound pressure level.

L_{day}	L _{day} is the average noise level during the day time period of 07:00hrs to 19:00hrs
L_{night}	L _{night} is the average noise level during the night-time period of 23:00hrs to 07:00hrs.
low frequency noise	LFN - noise which is dominated by frequency components towards the lower end of the frequency spectrum.
noise	Any sound, that has the potential to cause disturbance, discomfort or psychological stress to a person exposed to it, or any sound that could cause actual physiological harm to a person exposed to it, or physical damage to any structure exposed to it, is known as noise.
noise sensitive location	NSL – Any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or other area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels.
octave band	A frequency interval, the upper limit of which is twice that of the lower limit. For example, the 1,000Hz octave band contains acoustical energy between 707Hz and 1,414Hz. The centre frequencies used for the designation of octave bands are defined in ISO and ANSI standards.
rating level	See L _{A,T} .
sound power level	The logarithmic measure of sound power in comparison to a referenced sound intensity level of one picowatt (1pW) per m ² where: $L_w = 10 \log \frac{P}{P_0} \text{ dB}$ Where: p is the rms value of sound power in pascals; and P₀ is 1 pW.
sound pressure level	The sound pressure level at a point is defined as: $L_p = 20 \log \frac{P}{P_0} \text{ dB}$
specific noise level	A component of the ambient noise which can be specifically identified by acoustical means and may be associated with a specific source. In BS 4142, there is a more precise definition as follows: 'the equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval (L _{Aeq, T})'.
tonal	Sounds which cover a range of only a few Hz which contains a clearly audible tone i.e. distinguishable, discrete or continuous noise (whine, hiss, screech, or hum etc.) are referred to as being 'tonal'.
1/3 octave analysis	Frequency analysis of sound such that the frequency spectrum is subdivided into bands of one-third of an octave each.

APPENDIX TO SECTION 11

LANDSCAPE & VISUAL IMPACT

APPENDIX 11.1

DETAILED METHODOLOGY

Photomontages are used to simulate the likely visual changes that would result from the proposed development and are produced by combining computer generated renders of the proposal with photographs of the existing site.

Photographs are taken from selected locations using a Cannon EOS 400D digital SLR camera with an 18-55mm lens. A focal length setting of 35 mm on this lens is used which gives a horizontal field of view of 36 degrees which is equivalent to a 55 mm lens on a 35mm camera. (A standard 50 mm lens on a 35mm camera has a field of view of a little under 40 degrees).

A camera height of 1.6 m is used (average standing eye level). Notes are made of the exact location and ground level of the camera using GPS equipment and relevant maps. The direction the camera is pointed in, the lighting conditions, the elevation and direction of the sun etc, and the date and time the photograph was taken are also noted. Survey information is also recorded for significant, easily distinguishable objects (lampposts, trees, corners of buildings etc.) visible within each view, to be used as "control" when perspective matching the photograph. These surveyed objects when correctly matched with the base photograph ensure that the proposed render of the 3d model and the existing photograph are accurately merged together.

The 3d software used for modelling the proposed development and for perspective matching the photographs is Autodesk AliasStudio. The camera details, position, angle of view, direction, tilt, etc. are imported into the software and the photographs are used as background images in the virtual camera view. A suitable representation is then modelled for the surveyed "control" objects visible in each view and these are accurately aligned with their corresponding images in the background photograph. Once the process of perspective matching is complete the 3D model of the proposed development is set up for rendering. The lighting conditions noted from when the photographs were taken are simulated, and each perspective matched view of the 3d model is rendered. The rendered image of the model is then superimposed onto the existing photograph in Adobe Photoshop. Those portions of the model that should be obscured by foreground objects i.e., buildings, cars, trees etc, are removed. Items in the photograph at the same distance from the camera as the proposed model are compared with the render to determine if it shows the same sharpness, blurriness, blueing-out, etc. Adjustments are made to the rendered model as appropriate to produce the final photomontage

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APPENDIX 11.2

FULL SIZED PHOTOMONTAGES



View 1 Existing



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View 1 Proposed



View 1 Proposed Redline



View 2a Proposed



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View 2a Proposed Redline



View 2b Existing



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View 2b Proposed



View 2b Proposed Redline



View 3a Existing

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View 3a Proposed



View 3a Proposed Redline

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View 3c Existing

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View 3c Proposed



View 3c Proposed Redline

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View 4a Existing



View 4a Proposed



View 4a Proposed Redline

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View 4b Existing



View 4b Proposed



View 4b Proposed Redline



View 4c Existing



View 4c Proposed

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View 4c Proposed Redline



View 5a Existing

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View 5a Proposed



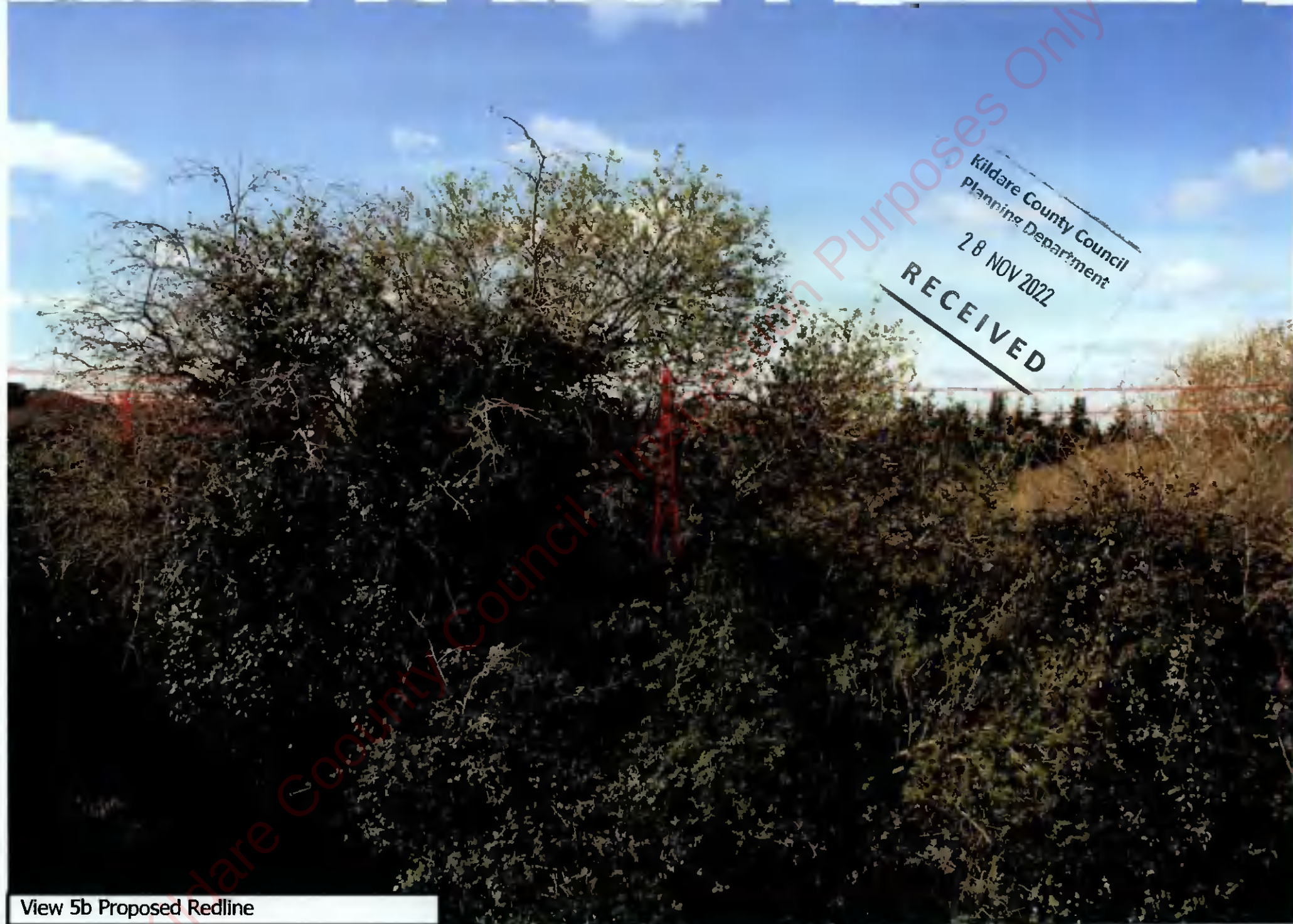
View 5a Proposed Redline



View 5b Existing



View 5b Proposed



View 5b Proposed Redline



View 5c Existing



View 5c Proposed



View 5c Proposed Redline

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View A1 Existing



View A1 Proposed

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View A1 Proposed Redline



View A2a Existing



View A2a Proposed



View A2a Proposed Redline

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View A2b Existing



View A2b Proposed



View A2b Proposed Redline

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View A3a Proposed





View A3a Proposed Redline

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View A3b Existing





View A3b Proposed

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View A3b Proposed Redline



View A4a Existing

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View A4a Proposed



View A4a Proposed Redline

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View A4b Existing



View A4b Proposed



View A4b Proposed Redline



View A5a Existing



View A5a Proposed



View A5a Proposed Redline



View A5b Existing



View A5b Proposed



View A5b Proposed Redline



View A6a Existing

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View A6a Proposed



View A6a Proposed Redline



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View A6c Existing



View A6c Proposed



View A6c Proposed Redline



View 7a Existing



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View 7a Proposed



View 7a Proposed Redline

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View A7b Existing



View A7b Proposed

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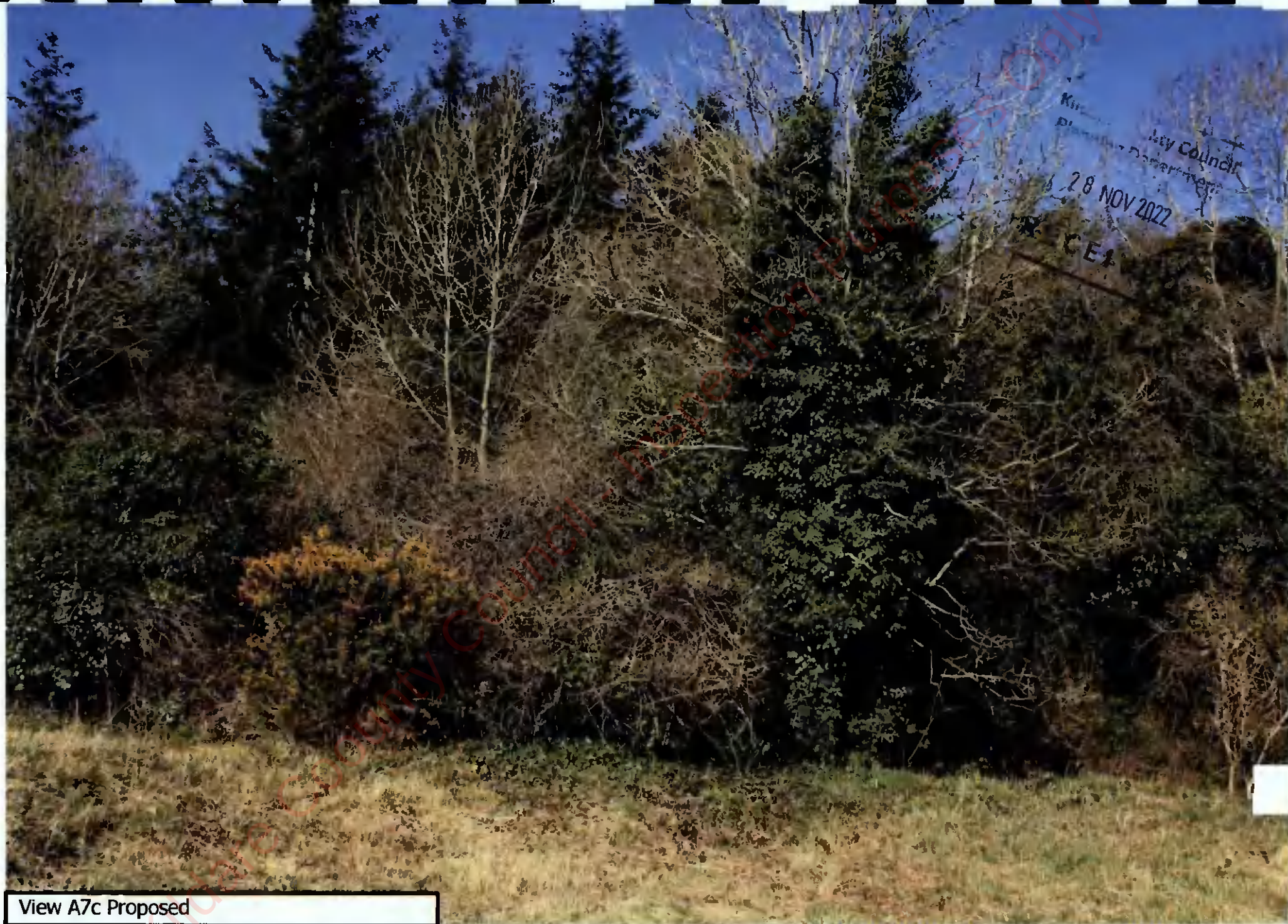
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View A7b Proposed Redline



View A7c Existing



View A7c Proposed



View A7c Proposed Redline

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View A8 Existing



View A8 Proposed

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View A8 Proposed Redline

APPENDIX TO SECTION 13

WASTE MANAGEMENT

APPENDIX 13.1

RESOURCE & WASTE MANAGEMENT PLAN

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**RESOURCE & WASTE
MANAGEMENT PLAN FOR
THE PROPOSED RE-
ALIGNMENT OF AN
OVERHEAD ELECTRICITY
POWER LINE**

**COLLINSTOWN, LEIXLIP,
CO. KILDARE**

Report Prepared For

Intel Ireland Limited

Report Prepared By

**Chonail Bradley, Principal Environmental
Consultant**

Our Reference

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Contents

Page

1.0	INTRODUCTION	4
2.0	CONSTRUCTION & DEMOLITION RESOURCE WASTE MANAGEMENT IN IRELAND 4	
2.1	National Level	4
2.2	Regional Level	6
2.3	Legislative Requirements	8
3.0	DESIGN APPROACH	9
3.1	Designing For Prevention, Reuse and Recycling	9
3.2	Designing for Green Procurement.....	9
3.3	Designing for Off-Site Construction	10
3.4	Designing for Materials Optimisation During Construction.....	10
3.5	Designing for Flexibility and Deconstruction.....	10
4.0	DESCRIPTION OF THE DEVELOPMENT	10
4.1	Location, Size and Scale of the Development	10
4.2	Details of the Non-Hazardous Wastes to be Produced	11
4.3	Potential Hazardous Wastes Arising	12
5.0	ROLES AND RESPONSIBILITIES	13
5.1	Role of the Client	14
5.2	Role of the Client Advisory Team.....	14
5.3	Future Role of the Contractor.....	14
6.0	KEY MATERIALS & QUANTITIES	15
6.1	Project Resource Targets	15
6.2	Main Construction and Demolition Waste Categories	15
6.3	Demolition Waste Generation	16
6.4	Construction Waste Generation	17
6.5	Proposed Resource and Waste Management Options.....	17
6.6	Tracking and Documentation Procedures for Off-Site Waste	21
7.0	ESTIMATED COST OF WASTE MANAGEMENT	21
7.1	Reuse	21
7.2	Recycling	21
7.3	Reuse Recycle & Disposal.....	22
8.0	DEMOLITION PROCEDURES.....	22
9.0	TRAINING PROVISIONS.....	22
9.1	Resource Manager Training and Responsibilities	22

9.2	Site Crew Training	23
10.0	TRACKING AND TRACING / RECORD KEEPING	23
11.0	OUTLINE WASTE AUDIT PROCEDURE.....	24
11.1	Responsibility for Waste Audit.....	24
11.2	Review of Records and Identification of Corrective Actions.....	24
12.0	CONSULTATION WITH RELEVANT BODIES.....	24
12.1	Local Authority	24
12.2	Recycling / Salvage Companies.....	25
13.0	REFERENCES	26

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1.0 INTRODUCTION

AWN Consulting Ltd. (AWN) has prepared this Resource & Waste Management Plan (RWMP) on behalf of Intel Ireland Limited for the re-alignment of an overhead electricity power line, located to the east side at their site at Collinstown, Leixlip, Blakestown, Kellystown, Collinstown Industrial Park, Leixlip, Co. Kildare. The proposed development consists of the realignment of an approximate 1.1km section of the existing Maynooth-Ryebrook 110kV double circuit overhead line.

The Environmental Protection Agency (EPA) of Ireland issued 'Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects' in 2021. These guidelines replace the previous 2006 guidelines issued by The National Construction and Demolition Waste Council (NCDWC) and the Department of the Environment, Heritage and Local Government (DoEHLG) in 2006. The RWMP would be the replacement document for the Construction & Demolition Waste Management Plan. Further detail can be found in section 2.

This plan will provide information necessary to ensure that the management of Construction & Demolition (C&D) waste at the site is undertaken in accordance with the current legal and industry standards including the *Waste Management Act 1996* as amended and associated Regulations ¹, *Environmental Protection Agency Act 1992* as amended ², *Litter Pollution Act 1997* as amended ³ and the *Eastern-Midlands Region Waste Management Plan 2015 – 2021* ⁴. In particular, this plan aims to ensure maximum recycling, reuse and recovery of waste with diversion from landfill, wherever possible. It also seeks to provide guidance on the appropriate collection and transport of waste from the site to prevent issues associated with litter or more serious environmental pollution (e.g. contamination of soil and/or water).

This RWMP includes information on the legal and policy framework for C&D waste management in Ireland, estimates of the type and quantity of waste to be generated by the proposed development and makes recommendations for management of different waste streams. The RWMP should be viewed as a live document and should be regularly revisited throughout a project's lifecycle so that opportunities to maximise waste reduction / efficiencies are exploited throughout, and that data is collected on an ongoing basis so that it is as accurate as possible

2.0 C&D RESOURCE WASTE MANAGEMENT IN IRELAND

2.1 National Level

The Irish Government issued a policy statement in September 1998, *Changing Our Ways*⁵, which identified objectives for the prevention, minimisation, reuse, recycling, recovery and disposal of waste in Ireland. The target for C&D waste in this report was to recycle at least 50% of C&D waste within a five year period (by 2003), with a progressive increase to at least 85% over fifteen years (i.e. 2013).

In response to the *Changing Our Ways* report, a task force (Task Force B4) representing the waste sector of the already established Forum for the Construction Industry, released a report entitled '*Recycling of Construction and Demolition Waste*' ⁶ concerning the development and implementation of a voluntary construction industry programme to meet the Government's objectives for the recovery of C&D waste.

In September 2020, the Irish Government published a policy document outlining a new action plan for Ireland to cover the period of 2020-2025. This plan, 'A Waste Action Plan for a Circular Economy' ⁷ (WAPCE), replaces the previous national waste management plan, "A Resource Opportunity" (2012), and was prepared in response to the 'European Green Deal' which sets a roadmap for a transition to an altered economical model, where climate and environmental challenges are turned into opportunities.

The WAPCE sets the direction for waste planning and management in Ireland up to 2025. This reorientates policy from a focus on managing waste to a much greater focus on creating circular patterns of production and consumption. Other policy statements of a number of public bodies already acknowledge the circular economy as a national policy priority.

The policy document contains over 200 measures across various waste areas including circular economy, municipal waste, consumer protection and citizen engagement, plastics and packaging, construction and demolition, textiles, green public procurement and waste enforcement.

One of the first actions to be taken was the development of the Whole of Government Circular Economy Strategy 2022-2023 'Living More, Using Less' (2021) ⁸ to set a course for Ireland to transition across all sectors and at all levels of Government toward circularity and was issued in December 2021. It is anticipated that the Strategy will be updated in full every 18 months to 2 years.

The Environmental Protection Agency (EPA) of Ireland issued 'Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects' in November 2021 ⁹. These guidelines replace the previous 2006 guidelines issued by The National Construction and Demolition Waste Council (NCDWC) and the Department of the Environment, Heritage and Local Government (DoEHLG) in 2006 ¹⁰. The guidelines provide a practical approach which is informed by best practice in the prevention and management of C&D wastes and resources from design to construction of a project, including consideration of the deconstruction of a project. These guidelines have been followed in the preparation of this document and include the following elements:

- Predicted C&D wastes and procedures to prevent, minimise, recycle and reuse wastes;
- Design teams roles and approach;
- Relevant EU, national and local waste policy, legislation and guidelines;
- Waste disposal/recycling of C&D wastes at the site;
- Provision of training for Resource Waste Manager (RM) and site crew;
- Details of proposed record keeping system;
- Details of waste audit procedures and plan; and
- Details of consultation with relevant bodies i.e. waste recycling companies, Local Authority, etc.

Section 3 of the Guidelines identifies thresholds above which there is a requirement for the preparation of a bespoke RWMP for developments. The new guidance classifies developments on a two-tiered system. Developments which do not exceed any of the following thresholds may be classed as Tier 1 development, which require a simplified RWMP:

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- New residential development of less than 10 dwellings.
- Retrofit of 20 dwellings or less.
- New commercial, industrial, infrastructural, institutional, educational, health and other developments with an aggregate floor area less than 1,250m².
- Retrofit of commercial, industrial, infrastructural, institutional, educational, health and other developments with an aggregate floor area less than 2,000m²; and
- Demolition projects generating in total less than 100m³ in volume of C&D waste.

A development which exceeds one or more of these thresholds is classed as Tier-2 projects.

This development requires a RWMP as a Tier 1 development as it is not above any of the criterion.

Other guidelines followed in the preparation of this report include 'Construction and Demolition Waste Management – a handbook for Contractors and Site Managers' ¹¹, published by FÁS and the Construction Industry Federation in 2002 and the previous guidelines, 'Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects' (2006).

These guidance documents are considered to define best practice for C&D projects in Ireland and describe how C&D projects are to be undertaken such that environmental impacts and risks are minimised and maximum levels of waste recycling are achieved.

2.2 Regional Level

The proposed development is located in the Local Authority area of Kildare County Council (KCC). The *Eastern-Midlands Region Waste Management Plan 2015 – 2021* is the regional waste management plan to the administrative area, published in May 2015. Currently the EMR and other regional waste management plans are under review and the Regional Waste Management Planning Offices expect to publish the final plan in 2022.

The Regional Plan sets out the strategic targets for waste management in the region and sets a specific target for C&D waste of "70% preparing for reuse, recycling and other recovery of construction and demolition waste" (excluding natural soils and stones and hazardous wastes) to be achieved by 2020.

Municipal landfill charges in Ireland are based on the weight of waste disposed. In the Leinster Region, charges are approximately €130 - €150 per tonne of waste, which includes a €75 per tonne landfill levy introduced under the *Waste Management (Landfill Levy) (Amendment) Regulations 2012*.

The *Kildare County Development Plan 2017 – 2023* ¹¹ came into force as of March, 1st 2017 and sets out a number of objectives for the Kildare County area, in line with the objectives of the regional waste management plan. Waste objectives with a particular relevance to the development are:

- **WM 1:** To implement European Union, National and Regional waste related environmental policy, legislation, guidance and codes of practice to improve management of material resources and wastes.
- **WM 3:** To support the implementation of the Eastern-Midlands Region Waste Management Plan 2015-2021 by adhering to overarching performance targets, policies and policy action.

- WM 4: To support waste prevention through behavioural change activities that disassociates economic growth with resource use.
- WM 7: To secure appropriate provision for the sustainable management of waste within developments, including the provision of facilities for the storage, separation and collection of such waste.
- WM 10: To encourage waste prevention, minimisation, reuse, recycling and recovery as methods of managing waste. Where waste management is not being carried out properly, the Waste Management Act 1996 as amended, will be used as a means of ensuring specific national policies and regulations are adhered to.
- WM 15: Support and facilitate the separation of waste at source into organic and non -organic streams or other waste management systems that divert waste from landfill and maximise the potential for each waste type to be reused and recycled or composted and divert organic waste from landfill, in accordance with the 'National Strategy on Biodegradable Waste 2006 and the Eastern – Midlands Region Waste Management Plan 2015-2021.

The KCC *Draft Kildare County Development plan 2023-2029* ¹² was released in March 2022 sets policies and objectives in support of the regional development plan and the Waste Action Plan for a Circular Economy 2020-2025 for the proper planning and sustainable development of the Kildare area. The following policies and objectives are of particular relevance to waste management:

- P6: Implement European Union, National and Regional waste related environmental policy, legislation, guidance, and codes of practice, in order to support the transition from a waste management economy towards a circular economy.
- IN O36: Encourage a just transition from a waste economy to a green circular economy in accordance with 'A Waste Action Plan for a Circular Economy 2020-2025'.
- IN O37: Provide, promote, and facilitate high quality sustainable waste recovery and disposal infrastructure / technology in keeping with the EU waste hierarchy to cater for anticipated population growth and the business sector in the County.
- IN O38: Ensure the provision of adequately sized public recycling facilities in association with new commercial developments and in tandem with significant change of use / extensions of existing commercial developments where appropriate to maximise access by the public.
- IN O39: Require the appropriate provision for the sustainable management of waste within developments (particularly apartment buildings), including the provision of facilities for storage, separation, and collection of waste
- IN O41: Encourage waste prevention, minimisation, re-use, recycling, and recovery as methods for managing waste.
- IN O44: Support and facilitate the separation of waste at source into organic and non-organic streams or other waste management systems that divert waste from landfill and maximise the potential for each waste type to be re-used, recycled or composted.
- IN O46: Support the implementation of the actions outlined in the Kildare Litter Management Plan 2020-2023 (and any subsequent updates).

The KCC *Leixlip Local Area Plan 2020-2023* ¹¹ which was released in 2020 sets policies in support of the regional development plan for the proper planning and sustainable

Kildare County Council
Planning Department

28 NOV 2022

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development of the Leixlip local area over a three-year period. The following policies and objectives are of particular relevance to waste management:

Policies

- **Policy 15:** It is the policy of the Council to protect environmental quality in Leixlip through the implementation of European, national and regional policy and legislation relating to air quality, greenhouse gases, climate change, light pollution, noise pollution and waste management.

Objectives

- **I15.1:** To adequately maintain recycling facilities and to secure the provision of additional facilities, as required, including in conjunction with development.
- **I15.2:** To avoid, prevent or reduce harmful effects on human health and the environment as a whole through promoting the preservation of best ambient air quality with sustainable development.
- **I15.2:** To support the take-up and use of ultra-low emissions vehicles and encourage, through the development management process the provision of electric vehicle charging infrastructure, where appropriate.

2.3 Legislative Requirements

The primary legislative instruments that govern waste management in Ireland and applicable to the development are:

- Waste Management Act 1996 as amended.
- Environmental Protection Agency Act 1992 as amended.
- Litter Pollution Act 1997 as amended.
- Planning and Development Act 2000 (as amended) ¹³

One of the guiding principles of European waste legislation, which has in turn been incorporated into the *Waste Management Act 1996* as amended and subsequent Irish legislation, is the principle of "*Duty of Care*". This implies that the waste producer is responsible for waste from the time it is generated through until its legal recycling, recovery or disposal (including its method of disposal). As it is not practical in most cases for the waste producer to physically transfer all waste from where it is produced to the final destination, waste contractors will be employed to physically transport waste to the final destination. Following on from this is the concept of "*Polluter Pays*" whereby the waste producer is liable to be prosecuted for pollution incidents, which may arise from the incorrect management of waste produced, including the actions of any contractors engaged (e.g. for transportation and disposal/recovery/recycling of waste).

It is therefore imperative that the Developer ensures that the waste contractors engaged by demolition and construction contractors are legally compliant with respect to waste transportation, recycling, recovery and disposal. This includes the requirement that a contractor handle, transport and recycle/recover/dispose of waste in a manner that ensures that no adverse environmental impacts occur as a result of any of these activities.

A collection permit to transport waste must be held by each waste contractor which is issued by the National Waste Collection Permit Office (NWCPO). Waste receiving facilities must also be appropriately permitted or licensed. Operators of such facilities cannot receive any waste, unless in possession of a Certificate of Registration (COR) or waste

permit granted by the relevant Local Authority under the *Waste Management (Facility Permit & Registration) Regulations 2007 and Amendments* or a Waste or Industrial Emissions Licence granted by the EPA. The COR / permit / licence held will specify the type and quantity of waste able to be received, stored, sorted, recycled, recovered and/or disposed of at the specified site.

3.0 DESIGN APPROACH

The client and the design team have integrated the '*Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects*' guidelines into the design workshops, to help review processes, identify and evaluate resource reduction measures and investigate the impact on cost, time, quality, buildability, second life and management post demolition and construction. Further details on these design principals can be found within the aforementioned guidance document.

The design team have undertaken the design process in line with the international best practice principles to firstly prevent wastes, reuse where possible and thereafter sustainably reduce and recover materials. The below sections have been the focal point of the design process and material selections and will continued to be analysed and investigated throughout the design process and when selecting material.

The approaches presented are based on international principles of optimising resources and reducing waste on construction projects through:

- Prevention;
- Reuse;
- Recycling;
- Green Procurement Principles;
- Off-Site Construction;
- Materials Optimisation; and
- Flexibility and Deconstruction.

3.1 Designing For Prevention, Reuse and Recycling

Undertaken at the outset and during project feasibility and evaluation the Client and Design Team considered:

- Establishing the potential for any reusable site assets (structures, equipment, materials, soils, etc.);
- The potential for refurbishment and refit of existing structures rather than demolition and new build;
- Assessing any existing buildings on the site that can be refurbished either in part or wholly to meet the Client requirements; and
- Enabling the optimum recovery of assets on site.

3.2 Designing for Green Procurement

Waste prevention and minimisation pre-procurement have been discussed and will be further discussed in this section. The Design Team will discuss proposed design solutions, encourage innovation in tenders and incentivise competitions to recognise sustainable approaches. They should also discuss options for packaging reduction with the main Contractor and subcontractors/suppliers using measures such as 'Just-in-Time' delivery and use ordering procedures that avoid excessive waste. The Green procurement extends

Kildare County Council 9
Planning Department

28 NOV 2022

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from the planning stage into the detailed design and tender stage and will be an ongoing part of the long-term design and selection process for this development.

3.3 Designing for Off-Site Construction

Use of off-site manufacturing has been shown to reduce residual wastes by up to 90% (volumetric building versus traditional). The decision to use offsite construction is typically cost led but there are significant benefits for resource management. Some further considerations for procurement which are being investigated as part of the planning stage design process are listed as follows:

- Modular buildings as these can displace the use of concrete and the resource losses associated with concrete blocks such as broken blocks, mortars, etc.;
 - Modular buildings are typically pre-fitted with fixed plasterboard and installed insulation, eliminating these residual streams from site.
- Use of pre-cast structural concrete panels which can reduce the residual volumes of concrete blocks, mortars, plasters, etc.; and
- Designing for the preferential use of offsite modular units.

3.4 Designing for Materials Optimisation During Construction

To ensure manufacturers and construction companies adopt lean production models, including maximising the reuse of materials onsite.. This helps to reduce the environmental impacts associated with transportation of materials and from waste management activities. This includes investigating the use of standardised sizes for certain materials to help reduce the amount of offcuts produced on site, focusing on promotion and development of off-site manufacture.

3.5 Designing for Flexibility and Deconstruction

Design flexibility has and will be investigated throughout the design process to ensure that where possible products (including buildings) only contain materials that can be recycled and are designed to be easily disassembled. Material efficiency is being considered for the duration and end of life of a building project to produce; flexible, adaptable spaces that enable a resource-efficient, low-waste future change of use; durability of materials and how they can be recovered effectively when maintenance and refurbishment are undertaken and during disassembly/deconstruction.

4.0 DESCRIPTION OF THE DEVELOPMENT

4.1 Location, Size and Scale of the Development

Intel Ireland Limited intends to apply for the re-alignment of an overhead electricity power line, located to the east side and also located at adjacent properties north and south of their site at Collinstown, Leixlip, Blakestown, Kellystown, Collinstown Industrial Park, Leixlip, Co. Kildare.

The proposed development comprises of the following:

- Diverting a section of the existing 110kV double circuit overhead line to the north of the River Rye, along the eastern edge of the Intel site at Collinstown, linking back into the existing overhead line section at the car park of the Lidl supermarket, directly south of the R148.

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4.2 Details of the Non-Hazardous Wastes to be Produced

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Planning Department**

28 NOV 2022

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There will be soil, stone, gravel, clay and made ground excavated to facilitate construction of new foundations and underground services. The development engineers (Skanstec) have estimated that c.1,320m³ of material will need to be excavated to do so. It is currently envisaged that c.580m³ will be able to be retained and reused onsite for landscaping and fill, the remaining material (c.740m³), will need to be removed offsite due to the limited opportunities for reuse on site. This will be taken for appropriate offsite reuse, recovery, recycling and / or disposal.

During the construction phase there may be a surplus of building materials, such as timber off-cuts, broken concrete blocks, cladding, plastics, metals and tiles generated. There may also be excess concrete during construction which will need to be disposed of. Plastic and cardboard waste from packaging and supply of materials will also be generated. The contractor will be required to ensure that oversupply of materials is kept to a minimum and opportunities for reuse of suitable materials is maximised.

Waste will also be generated from construction workers e.g. organic / food waste, dry mixed recyclables (waste paper, newspaper, plastic bottles, packaging, aluminium cans, tins and Tetra Pak cartons), mixed non-recyclables and potentially sewage sludge from temporary welfare facilities provided on site during the construction phase. Waste printer / toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated infrequently from site offices.

4.3 Potential Hazardous Wastes Arising

4.3.1 Contaminated Soil

Soil sampling and ground investigation is in two stages. The initial soil sampling was completed through samples taken during slit trenching from T2 – T5 locations within Intel's campus. Soil samples were taken from the excavations, and tests were carried out. Further bore hole GI is currently being scheduled at each tower location.

If any potentially contaminated material is encountered, it will need to be segregated from clean / inert material, tested and classified as either non-hazardous or hazardous in accordance with the EPA publication entitled '*Waste Classification: List of Waste & Determining if Waste is Hazardous or Non-Hazardous*'¹⁴ using the *HazWasteOnline* application (or similar approved classification method). The material will then need to be classified as clean, inert, non-hazardous or hazardous in accordance with the *EC Council Decision 2003/33/EC*¹⁵, which establishes the criteria for the acceptance of waste at landfills.

In the event that Asbestos Containing Materials (ACMs) are found within the excavated material, the removal will only be carried out by a suitably permitted waste contractor, in accordance with *S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010*. All asbestos will be taken to a suitably licensed or permitted facility.

In the event that hazardous soil, or historically deposited waste is encountered during the construction phase, the contractor will notify KCC and provide a Hazardous / Contaminated Soil Management Plan, to include estimated tonnages, description of location, any relevant mitigation, destination for disposal / treatment, in addition to information on the authorised waste collector(s).

4.3.2 Fuel/Oils

Fuels and oils are classed as hazardous materials; any on-site storage of fuel / oil, and all storage tanks and all draw-off points will be bunded and located in a dedicated, secure area of the site. Provided that these requirements are adhered to and the site crew are trained in the appropriate refuelling techniques, it is not expected that there will be any fuel / oil waste generated at the site.

4.3.3 Invasive Plant Species

A site invasive species survey will be undertaken prior to the site works beginning. This will include a site walkover survey of the entire site, and around part of the outside perimeter to search for any invasive species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011.

If any third schedule invasives species such as Japanese Knotweed (*Fallopia japonica*) are located within in the development area an invasives species management will be prepared and submitted to KCC.

4.3.4 Asbestos

Due to the nature of existing structures that are to be dismantled being metal pylons and concrete, there is a potential for asbestos or asbestos containing materials (ACMs) in insulation materials on these structures. There will be no demolition asbestos survey undertaken as part of the proposed development.

If located on site the removal of asbestos or ACMs will be carried out by a suitably qualified contractor and ACMs will only be removed from site by a suitably permitted / licenced waste contractor, in accordance with *S.I. No. 589 of 2010 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010*. All material will be taken to a suitably licensed or permitted facility.

4.3.5 Other Known Hazardous Substances

Paints, glues, adhesives and other known hazardous substances will be stored in designated areas. They will generally be present in small volumes only and associated waste volumes generated will be kept to a minimum. Wastes will be stored in appropriate receptacles pending collection by an authorised waste contractor.

In addition, WEEE (containing hazardous components), printer toner / cartridges, batteries (Lead, Ni-Cd or Mercury) and / or fluorescent tubes and other mercury containing waste may be generated from during C&D activities or temporary site offices. These wastes, if generated, will be stored in appropriate receptacles in designated areas of the site pending collection by an authorised waste contractor.

5.0 ROLES AND RESPONSIBILITIES

The *Best Practice Guidelines on the Preparation of Resource Waste Management Plans for Construction and Demolition Projects* promotes that a RM should be appointed. The RM may be performed by number of different individuals over the life-cycle of the Project, however it is intended to be a reliable person chosen from within the Planning/Design/Contracting Team, who is technically competent and appropriately trained, who takes the responsibility to ensure that the objectives and measures within the

Kildare County Council
Planning Department

28 NOV 2022

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Project RWMP are complied with. The RM is assigned the requisite authority to meet the objective and obligations of the RWMP. The role will include the important activities of conducting waste checks/audits and adopting construction and demolition methodology that is designed to facilitate maximum reuse and/or recycling of waste.

5.1 Role of the Client

The Client are the body establishing the aims and the performance targets for the project.

- The Client has commissioned the preparation and submission of a preliminary RWMP as part of the design and planning submission;
- The Client is to commission the preparation and submission of an updated RWMP as part of the construction tendering process;
- The Client will ensure that the RWMP is agreed on and submitted to the local authority prior to commencement of works on site;
- The Client is to request the end-of-project RWMP from the Contractor.

5.2 Role of the Client Advisory Team

The Client Advisory Team or Design Team is formed of architects, consultants, quantity surveyors and engineers and is responsible for:

- Drafting and maintaining the RWMP through the design, planning and procurement phases of the project;
- Appointing a RM to track and document the design process, inform the Design Team and prepare the RWMP.
- Including details and estimated quantities of all projected waste streams with the support of environmental consultants/scientists. This should also include data on waste types (e.g. waste characterisation data, contaminated land assessments, site investigation information) and prevention mechanisms (such as by-products) to illustrate the positive circular economy principles applied by the Design Team;
- Managing and valuing the demolition work with the support of quantity surveyors;
- Handing over of the RWMP to the selected Contractor upon commencement of construction of the development, in a similar fashion to how the safety file is handed over to the Contractor;
- Working with the Contractor as required to meet the performance targets for the project.

5.3 Future Role of the Contractor

The future demolition and construction Contractors have not yet been decided upon for this RWMP. However, once selected they will have major roles to fulfil. They will be responsible for:

- Preparing, implementing and reviewing the (including the Pre-Demolition) RWMP throughout the demolition and construction phases (including the management of all suppliers and sub-contractors) as per the requirements of these guidelines;
- Identifying a designated and suitably qualified RM who will be responsible for implementing the RWMP;

- Identifying all hauliers to be engaged to transport each of the resources / wastes off-site;
- Implementing waste management policies whereby waste materials generated on site are to be segregated as far as practicable;
- Renting and operating a mobile-crusher to crush concrete for temporary reuse onsite during construction and reduce the amount of HGV loads required to remove material from site;
- Applying for the appropriate waste permit to crush concrete onsite;
- Identifying all destinations for resources taken off-site. As above, any resource that is legally classified as a 'waste' must only be transported to an authorised waste facility;
- End-of-waste and by-product notifications addressed with the EPA where required;
- Clarification of any other statutory waste management obligations, which could include on-site processing;
- Full records of all resources (both wastes and other resources) should be maintained for the duration of the project; and
- Preparing a RWMP Implementation Review Report at project handover.

6.0 KEY MATERIALS & QUANTITIES

6.1 Project Resource Targets

Project specific resource and waste management targets for the site have not yet been set and this information should be updated for these targets once these targets have been confirmed by the client. However, it is expected for projects of this nature that a minimum of 70% of waste is fully re-used, recycled or recovered. Target setting will inform the setting of project-specific benchmarks to track target progress. Typical Key Performance Indicators (KPIs) that may be used to set targets include (as per guidelines):

- Weight (tonnes) or Volume (m^3) of waste generated per construction value;
- Weight (tonnes) or Volume (m^3) of waste generated per construction floor area (m^2);
- Fraction of resource reused on site;
- Fraction of resource notified as by-product;
- Fraction of waste segregated at source before being sent off-site for recycling/recovery; and
- Fraction of waste recovered, fraction of waste recycled, or fraction of waste disposed.

6.2 Main Construction and Demolition Waste Categories

The main non-hazardous and hazardous waste streams that could be generated by the construction activities at a typical site are shown in

Kildare County Council
Planning Department

28 NOV 2022

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Table 6.1. The List of Waste (LoW) code (applicable as of 1 June 2015) (also referred to as the European Waste Code (EWC)) for each waste stream is also shown.

Table 6.1 Typical waste types generated and LoW codes (individual waste types may contain hazardous substances)

Waste Material	LoW/EWC Code
Concrete, bricks, tiles, ceramics	17 01 01-03 & 07
Wood, glass and plastic	17 02 01-03
Treated wood, glass, plastic, containing hazardous substances	17-02-04*
Bituminous mixtures, coal tar and tarred products	17 03 01*, 02 & 03*
Metals (including their alloys) and cable	17 04 01-11
Soil and stones	17 05 03* & 04
Gypsum-based construction material	17 08 01* & 02
Paper and cardboard	20 01 01
Mixed C&D waste	17 09 04
Green waste	20 02 01
Electrical and electronic components	20 01 35 & 36
Batteries and accumulators	20 01 33 & 34
Liquid fuels	13 07 01-10
Chemicals (solvents, pesticides, paints, adhesives, detergents etc.)	20 01 13, 19, 27-30
Insulation materials	17 06 04
Organic (food) waste	20 01 08
Mixed Municipal Waste	20 03 01

* Individual waste type may contain hazardous substances

6.3 Demolition Waste Generation

Demolition works at the site will involve the demolition of existing structures on site. Demolition figures published by the EPA in the 'National Waste Reports' and data from previous projects have been used to estimate the approximate break-down for indicative reuse (offsite), recycling and disposal targets of demolition waste. This breakdown is shown in Table 6.2.

Table 6.2 Estimated off-site reuse, recycle and disposal rates for demolition waste

Waste Type	Tonnes	Reuse/Recovery		Recycle		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Wood, glass and plastic	0.1	0	0.0	85	0.1	15	0.0

Waste Type	Tonnes	Reuse/Recovery		Recycle		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Concrete, Bricks, Tiles, Ceramics	0.6	30	0.2	65	0.3	5	0.1
Bituminous mixtures, coal tar and tarred products	0.5	0	0.0	25	0.1	75	0.4
Metals (including their alloys), mixed metals, iron and steel, and cable	27.9	5	1.4	95	26.5	0	0.0
Treated wood, glass, plastic, containing hazardous substances	5.0	10	0.5	60	3.0	30	1.5
Total	34.1		2.1		33.0		2.1

6.4 Construction Waste Generation

It is expected that wastes generated (other than excavated material) from other construction activities will be negligible as the majority of the structures are pre-fabricated offsite. Portable welfare and sanitary facilities will be provided for the contractors so sewage sludge will be generated from pumping out of the portable facilities. Contractors will consume food offsite so it is not expected that there will be any waste from contractors breaks and lunches.

All waste arising during the construction phase will be transported off-site by an approved waste contractor holding a current waste collection permit. All waste arising requiring reuse, recycling, recovery or disposal off-site will be brought to facilities holding the appropriate COR, licence or permit, as required.

The appointed contractor(s) will be required to prepare a detailed Construction Environmental Management Plan (CEMP) prior to commencement of construction which may refine the waste estimates.

There will be soil, stones, clay and made ground excavated to facilitate construction of new foundations and underground services. The development engineers (Skanstec) have estimated that c.1,320m³ of material will need to be excavated to do so. It is currently envisaged that c.580m³ will be able to be retained and reused onsite for landscaping and fill, the remaining material (c.740m³), will need to be removed offsite due to the limited opportunities for reuse on site. This will be taken for appropriate offsite reuse, recovery, recycling and / or disposal.

6.5 Proposed Resource and Waste Management Options

Waste materials generated will be segregated on-site, where it is practical. Where the on-site segregation of certain wastes types is not practical, off-site segregation will be carried out.

28 NOV 2022 17
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out. There will be skips and receptacles provided to facilitate segregation at source, where feasible. All waste receptacles leaving the site will be covered or enclosed. The appointed waste contractor will collect and transfer the wastes as receptacles are filled. There are numerous waste contractors in the Kildare region that provide this service.

All waste arisings will be handled by an approved waste contractor holding a current waste collection permit. All waste arisings requiring disposal off-site will be reused, recycled, recovered or disposed of at a facility holding the appropriate registration, permit or licence, as required.

During construction, some of the sub-contractors on site will generate waste in relatively low quantities. The transportation of non-hazardous waste by persons who are not directly involved with the waste business, at weights less than or equal to 2 tonnes, and in vehicles not designed for the carriage of waste, are exempt from the requirement to have a waste collection permit (per Article 30 (1) (b) of the Waste Collection Permit Regulations 2007, as amended). Any sub-contractors engaged that do not generate more than 2 tonnes of waste at any one time can transport this waste off-site in their work vehicles (which are not designed for the carriage of waste). However, they are required to ensure that the receiving facility has the appropriate COR / permit / licence.

Written records will be maintained by the contractor(s), detailing the waste arising throughout the C&D phases, the classification of each waste type, waste collection permits for all waste contractors who collect waste from the site and COR / permit / licence for the receiving waste facility for all waste removed off-site for appropriate reuse, recycling, recovery and / or disposal

Dedicated bunded storage containers will be provided for hazardous wastes which may arise, such as batteries, paints, oils, chemicals, if required.

The anticipated management of the main waste streams is outlined as follows:

Soil, Stone, Gravel, Clay and Made Ground

The waste hierarchy states that the preferred option for waste management is prevention and minimisation of waste, followed by preparing for reuse and recycling / recovery, energy recovery (i.e. incineration) and, least favoured of all, disposal. The excavations are required to facilitate construction works so the preferred option (prevention and minimisation) cannot be accommodated for the excavation phase.

When material is removed off-site it could be reused as a by-product (and not as a waste). If this is done, it will be done in accordance with regulation 15 (By-products) (Previously Article 27 of the *European Communities (Waste Directive) Regulations 2011* and referred to as Article 27 in this report) of S.I. No. 323/2020 - European Union (Waste Directive) Regulations 2020, which requires that certain conditions are met and that by-product notifications are made to the EPA via their online notification form. Excavated material should not be removed from site until approval from the EPA has been received. The potential to reuse material as a by-product will be confirmed during the course of the excavation works, with the objective of eliminating any unnecessary disposal of material.

The next option (beneficial reuse) may be appropriate for the excavated material, pending environmental testing to classify the material as hazardous or non-hazardous in accordance with the EPA *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* publication. Clean inert material may be used as fill material

in other construction projects or engineering fill for waste licenced sites. Beneficial reuse of surplus excavation material es engineering fill may be subject to further testing to determine if materials meet the specific engineering standards for their proposed end use.

Any nearby sites requiring clean fill/capping material will be contacted to investigate reuse opportunities for clean and inert material. If any of the material is to be reused on another site as a by-product (and not as a waste), this will be done in accordance with Article 27. Similarly, if any soils/stones are imported onto the site from another construction site as a by-product, this will also be done in accordance with Article 27. Article 27 will be investigated to see if the material can be imported onto this site for beneficial reuse instead of using virgin materials.

If the material is deemed to be a waste, then removal and reuse / recovery / disposal of the material will be carried out in accordance with the *Waste Management Act 1996* as amended, the *Waste Management (Collection Permit) Regulations 2007* as amended and the *Waste Management (Facility Permit & Registration) Regulations 2007* as amended. Once all available beneficial reuse options have been exhausted, the options of recycling and recovery at waste permitted and licenced sites will be considered.

In the event that contaminated material is encountered and subsequently classified as hazardous, this material will be stored separately to any non-hazardous material. It will require off-site treatment at a suitable facility or disposal abroad via Transfrontier Shipment of Wastes (TFS).

Bedrock

While it is not envisaged that bedrock will be encountered, if bedrock is encountered, it is anticipated that it will not be crushed on site. Any excavated rock is expected to be removed off-site for appropriate reuse, recovery and / or disposal. If bedrock is to be crushed on-site, the appropriate mobile waste facility permit will be obtained from KCC.

Silt & Sludge

During the construction phase, silt and petrochemical interception will be carried out on run-off and pumped water from site works, where required. Sludge and silt will then be collected by a suitably licensed contractor and removed off-site.

Concrete Blocks, Bricks, Tiles & Ceramics

The majority of concrete blocks, bricks, tiles and ceramics generated as part of the construction works are expected to be clean, inert material and should be recycled, where possible. If concrete is to be crushed on-site, the appropriate mobile waste facility permit will be obtained from KCC.

Hard Plastic

As hard plastic is a highly recyclable material, much of the plastic generated will be primarily from material off-cuts. All recyclable plastic will be segregated and recycled, where possible.

Timber

Timber that is uncontaminated, i.e. free from paints, preservatives, glues, etc., will be disposed of in a separate skip and recycled off-site.

Kildare County Council
Planning Department
19

28 NOV 2022

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Metal

Metals will be segregated, where practical, and stored in skips. Metal is highly recyclable and there are numerous companies that will accept these materials.

Plasterboard

There are currently a number of recycling services for plasterboard in Ireland. Plasterboard from the construction phases will be stored in a separate skip, pending collection for recycling. The site Manager will ensure that oversupply of new plasterboard is carefully monitored to minimise waste.

Glass

Glass materials will be segregated for recycling, where possible.

Waste Electrical & Electronic Equipment (WEEE)

Any WEEE will be stored in dedicated covered cages / receptacles / pallets pending collection for recycling.

Other Recyclables

Where any other recyclable wastes, such as cardboard and soft plastic, are generated, these will be segregated at source into dedicated skips and removed off-site.

Non-Recyclable Waste

C&D waste which is not suitable for reuse or recovery, such as polystyrene, some plastics and some cardboards, will be placed in separate skips or other receptacles. Prior to removal from site, the non-recyclable waste skip / receptacle will be examined by a member of the waste team (see Section 9.0) to determine if recyclable materials have been placed in there by mistake. If this is the case, efforts will be made to determine the cause of the waste not being segregated correctly and recyclable waste will be removed and placed into the appropriate receptacle.

Asbestos Containing Materials

Any asbestos or ACM found on-site should be removed by a suitably competent contractor and disposed of as asbestos waste before the demolition works begin. All asbestos removal work or encapsulation work must be carried out in accordance with S.I. No. 589 of 2010 *Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010*.

Other Hazardous Wastes

On-site storage of any hazardous wastes produced (i.e. contaminated soil if encountered and / or waste fuels) will be kept to a minimum, with removal off-site organised on a regular basis. Storage of all hazardous wastes on-site will be undertaken so as to minimise exposure to on-site personnel and the public and to also minimise potential for environmental impacts. Hazardous wastes will be recovered, wherever possible, and failing this, disposed of appropriately.

On-Site Crushing

It is currently not envisaged that the crushing of waste materials will occur on-site. However, if the crushing of material is to be undertaken, a mobile waste facility permit will first be obtained from KCC and the destination of the accepting waste facility will be supplied to the KCC waste unit.

6.6 Tracking and Documentation Procedures for Off-Site Waste

All waste will be documented prior to leaving the site. Waste will be weighed by the contractor, either by a weighing mechanism on the truck or at the receiving facility. These waste records will be maintained on site by the nominated project RM (see Section 9.0).

All movement of waste and the use of waste contractors will be undertaken in accordance with the *Waste Management Act 1996* as amended, *Waste Management (Collection Permit) Regulations 2007* as amended and *Waste Management (Facility Permit & Registration) Regulations 2007* and amended. This includes the requirement for all waste contractors to have a waste collection permit issued by the NWCPO. The nominated project RM (see Section 9.0) will maintain a copy of all waste collection permits on-site.

If the waste is being transported to another site, a copy of the Local Authority waste COR / permit or EPA Waste / Industrial Emissions Licence for that site will be provided to the nominated project RM (see Section 9.0). If the waste is being shipped abroad, a copy of the Transfrontier Shipping (TFS) notification document will be obtained from Dublin City Council (DCC) (as the relevant authority on behalf of all Local Authorities in Ireland) and kept on-site along with details of the final destination (COR, permits, licences, etc.). A receipt from the final destination of the material will be kept as part of the on-site waste management records.

All information will be entered in a waste management recording system to be maintained on-site.

7.0 ESTIMATED COST OF WASTE MANAGEMENT

An outline of the costs associated with different aspects of waste management is outlined below. The total cost of C&D waste management will be measured and will take into account handling costs, storage costs, transportation costs, revenue from rebates and disposal costs.

7.1 Reuse

By reusing materials on site, there will be a reduction in the transport and recycle / recovery / disposal costs associated with the requirement for a waste contractor to take the material off-site. Clean and inert soils, gravel, stones, etc., which cannot be reused on-site may be used as access roads or capping material for landfill sites, etc. This material is often taken free of charge or at a reduced fee for such purposes, reducing final waste disposal costs.

7.2 Recycling

Salvageable metals will earn a rebate, which can be offset against the costs of collection and transportation of the skips.

Clean, uncontaminated cardboard and certain hard plastics can also be recycled. Waste contractors will charge considerably less to take segregated wastes, such as recyclable waste, from a site than mixed waste.

Kildare County Council
Planning Department

21
28 NOV 2022

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Timber can be recycled as chipboard. Again, waste contractors will charge considerably less to take segregated wastes, such as timber, from a site than mixed waste.

7.3 Reuse Recycle & Disposal

Landfill charges are currently at around €130 - €150 per tonne which includes a €75 per tonne landfill levy specified in the *Waste Management (Landfill Levy) Regulations 2015*. In addition to disposal costs, waste contractors will also charge a collection fee for skips.

Collection of segregated C&D waste usually costs less than municipal waste. Specific C&D waste contractors take the waste off-site to a licensed or permitted facility and, where possible, remove salvageable items from the waste stream before disposing of the remainder to landfill. Clean soil, rubble, etc., is also used as fill / capping material, wherever possible.

8.0 DEMOLITION PROCEDURES

There will be waste materials generated from the demolition/dismantling of existing towers DCINT29 to DCINT32 (4 no. total) suspension type as well as from the excavation of the pylon foundations. A formal demolition plan including safety procedures will be prepared by the demolition contractor; however, in general, the following sequence of works should be followed during the demolition stage.

Check for Hazards

Prior to commencing demolition works, the overhead line structures to be demolished/dismantled will be checked for any likely hazards including asbestos, asbestos-containing Materials, electric power lines or cables, telecommunications, unsafe structures and fire and explosion hazards, e.g. combustible dust, chemical hazards, oil, fuels and contamination.

Removal of Components

All hazardous materials will be removed first. All components from the structures that can be salvaged will be removed next. This will primarily include metal however may also include glass insulators, etc.

9.0 TRAINING PROVISIONS

A member of the construction team will be appointed as the RM to ensure commitment, operational efficiency and accountability in relation to waste management during the C&D phases of the development.

9.1 Resource Manager Training and Responsibilities

The nominated RM will be given responsibility and authority to select a waste team if required, i.e. members of the site crew that will aid them in the organisation, operation and recording of the waste management system implemented on site.

The RM will have overall responsibility to oversee, record and provide feedback to the client on everyday waste management at the site. Authority will be given to the Waste Manager to delegate responsibility to sub-contractors, where necessary, and to coordinate

with suppliers, service providers and sub-contractors to prioritise waste prevention and material salvage.

The RM will be trained in how to set up and maintain a record keeping system, how to perform an audit and how to establish targets for waste management on site. The RM will also be trained in the best methods for segregation and storage of recyclable materials, have information on the materials that can be reused on site and be knowledgeable in how to implement this RWMP.

9.2 Site Crew Training

Training of site crew in relation to waste is the responsibility of the RM and, as such, a waste training program should be organised. A basic awareness course will be held for all site crew to outline the RWMP and to detail the segregation of waste materials at source. This may be incorporated with other site training needs such as general site induction, health and safety awareness and manual handling.

This basic course will describe the materials to be segregated, the storage methods and the location of the Waste Storage Areas (WSAs). A sub-section on hazardous wastes will be incorporated into the training program and the particular dangers of each hazardous waste will be explained.

10.0 TRACKING AND TRACING / RECORD KEEPING

Records should be kept for all waste material which leaves the site, either for reuse on another site, recycling or disposal. A recording system will be put in place to record the waste arisings on Site.

A waste tracking log should be used to track each waste movement from the site. On exit from the site, the waste collection vehicle driver should stop at the site office and sign out as a visitor and provide the security personnel or RM with a waste docket (or Waste Transfer Form (WTF) for hazardous waste) for the waste load collected. At this time, the security personnel should complete and sign the Waste Tracking Register with the following information:

- Date
- Time
- Waste Contractor
- Company waste contractor appointed by, e.g. Contractor or subcontractor name
- Collection Permit No.
- Vehicle Reg.
- Driver Name
- Docket No.
- Waste Type
- EWC / LoW

A copy of the receipt issued at the time of collection on site and at the receiving facility will both be obtained.

The waste vehicle will be checked by security personal or the RM to ensure it has the waste collection permit no. displayed and a copy of the waste collection permit in the vehicle before they are allowed to remove the waste from the site.

Kildare County Council
Planning Department

28 NOV 2022

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The waste transfer dockets will be transferred to the RM on a weekly basis and can be placed in the Waste Tracking Log file. This information will be forwarded onto the KCC Waste Regulation Unit when requested.

Each subcontractor that has engaged their own waste contractor will be required to maintain a similar waste tracking log with the waste dockets / WTF maintained on file and available for inspection on site by the main contractor as required. These subcontractor logs will be merged with the main waste log.

Waste receipts from the receiving waste facility will also be obtained by the site contractor(s) and retained. A copy of the Waste Collection Permits, CORs, Waste Facility Permits and Waste Licences will be maintained on site at all times and will be periodically reviewed by the RM. Subcontractors who have engaged their own waste contractors, should provide the main contractor with a copy of the waste collection permits and COR / permit / licence for the receiving waste facilities and maintain a copy on file, available for inspection on site as required.

11.0 OUTLINE WASTE AUDIT PROCEDURE

11.1 Responsibility for Waste Audit

The appointed RM will be responsible for conducting a waste audit at the site during the C&D phase of the proposed Project. Contact details for the nominated RM will be provided to the KCC Waste Regulation Unit after the main contractor is appointed and prior to any material being removed from site.

11.2 Review of Records and Identification of Corrective Actions

A review of all waste management costs and the records for the waste generated and transported off-site should be undertaken mid-way through the demolition and construction phase of the proposed Project.

If waste movements are not accounted for, the reasons for this should be established in order to see if and why the record keeping system has not been maintained. The waste records will be compared with the established recovery / reuse / recycling targets for the site. Each material type will be examined, in order to see where the largest percentage waste generation is occurring. The waste management methods for each material type will be reviewed in order to highlight how the targets can be achieved.

Upon completion of the C&D phase, a final report will be prepared, summarising the outcomes of waste management processes adopted and the total recycling / reuse / recovery figures for the development.

12.0 CONSULTATION WITH RELEVANT BODIES

12.1 Local Authority

Once construction contractors have been appointed and have appointed waste contractors, and prior to removal of any C&D waste materials off-site, details of the proposed destination of each waste stream will be provided to the KCC Waste Regulation Unit.

KCC will also be consulted, as required, throughout the demolition, excavation and construction phases in order to ensure that all available waste reduction, reuse and recycling opportunities are identified and utilised and that compliant waste management practices are carried out.

12.2 Recycling / Salvage Companies

The appointed waste contractor for the main waste streams managed by the demolition and construction contractors will be audited in order to ensure that relevant and up-to-date waste collection permits and facility registrations / permits / licences are held. In addition, information will be obtained regarding the feasibility of recycling each material, the costs of recycling / reclamation, the means by which the wastes will be collected and transported off-site, and the recycling / reclamation process each material will undergo off-site.

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Planning Department

28 NOV 2022

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13.0 REFERENCES

1. Waste Management Act 1996 (No. 10 of 1996) as amended.
2. Environmental Protection Agency Act 1992 as amended.
3. Litter Pollution Act 1997 (S.I. No. 12 of 1997) as amended
4. Eastern-Midlands Region Waste Management Plan 2015 – 2021 (2015).
5. Department of Environment and Local Government (DoELG) *Waste Management – Changing Our Ways, A Policy Statement* (1998).
6. Forum for the Construction Industry – *Recycling of Construction and Demolition Waste*.
7. Department of Communications, Climate Action and Environment (DCCAE), *Waste Action Plan for the Circular Economy - Ireland's National Waste Policy 2020-2025* (Sept 2020).
8. DCCAE, *Whole of Government Circular Economy Strategy 2022-2023 'Living More, Using Less'* (2021)
9. Environmental Protection Agency (EPA) '*Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects*' (2021)
10. Department of Environment, Heritage and Local Government, *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects* (2006).
11. FÁS and the Construction Industry Federation (CIF), *Construction and Demolition Waste Management – a handbook for Contractors and site Managers* (2002).
12. KCC, *Kildare County Development Plan 2017 – 2023* (2017).
13. KCC, *Draft Kildare County Development Plan 2023 – 2029* (2022).
14. KCC, *Lexlip Local Development Plan 2020 – 2023* (2020)
15. Planning and Development Act 2000 (S.I. No. 30 of 2000) as amended
16. EPA, *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* (2018)
17. Council Decision 2003/33/EC, establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC.
18. Environmental Protection Agency (EPA), *National Waste Database Reports 1998 – 2018*.
19. EPA and Galway-Mayo Institute of Technology (GMIT), *EPA Research Report 146 – A Review of Design and Construction Waste Management Practices in Selected Case Studies – Lessons Learned* (2015).

APPENDIX TO SECTION 15

ARCHAEOLOGY

APPENDIX 15.1

STATUTORY CONTEXT

INTRODUCTION

Archaeological monuments are safeguarded through national and international policy, which is designed to secure the protection of the cultural heritage resource. This is undertaken in accordance with the provisions of the European Convention on the Protection of the Archaeological Heritage (Valletta Convention). This was ratified by Ireland in 1997.

Both the National Monuments Acts 1930 to 2004 and relevant provisions of the Cultural Institutions Act 1997 are the primary means of ensuring protection of archaeological monuments, the latter of which includes all man-made structures of whatever form or date. There are a number of provisions under the National Monuments Acts which ensure protection of the archaeological resource. These include the Register of Historic Monuments (1997 Act) which means that any interference to a monument is illegal under that Act. All registered monuments are included on the Record of Monuments and Places (RMP).

The Record of Monuments and Places (RMP) was established under Section 12 (1) of the National Monuments (Amendment) Act 1994 and consists of a list of known archaeological monuments and accompanying maps. The Record of Monuments and Places affords some protection to the monuments entered therein. Section 12 (3) of the 1994 Amendment Act states that any person proposing to carry out work at or in relation to a recorded monument must give notice in writing to the Minister (Culture, Heritage and the Gaeltacht) and shall not commence the work for a period of two months after having given the notice. All proposed works, therefore, within or around any archaeological monument are subject to statutory protection and legislation (National Monuments Acts 1930-2004).

A number of monuments are further protected by being in the ownership or guardianship of the State or the subject of preservation orders (National Monuments) and registration orders. Works to or at these monuments require the consent of the Minister for Arts, Culture and the Gaeltacht. The National Monuments Acts provide for the protection of all archaeological heritage, whether known, newly discovered, or yet to be discovered (e.g. through ground disturbance, fieldwork, or the discovery of sites underwater).

KILDARE COUNTY DEVELOPMENT PLAN 2017-2023

Kildare County Development Plan 2017-2023 outlines a number of policies and objectives in relation to archaeology as follows:

ARCHAEOLOGICAL HERITAGE

It is the policy of the Council to:

AH 1 Manage development in a manner that protects and conserves the archaeological heritage of the county, avoids adverse impacts on sites, monuments, features or objects of significant historical or archaeological interest and secures the preservation in-situ or by record of all sites and features of historical and archaeological interest. The Council will favour preservation in-situ in accordance with the recommendation of the Framework and Principles for the Protection of Archaeological Heritage (1999) or any superseding national policy.

AH 2 Have regard to the Record of Monuments and Places (RMP), the Urban Archaeological Survey and archaeological sites identified subsequent to the publication of the RMP when assessing planning applications for development. No development shall be permitted in the vicinity of a recorded feature, where it detracts from the setting of the feature or which is injurious to its cultural or educational value.

AH 3 Secure the preservation (in-situ or by record) of all sites, monuments and features of significant historical or archaeological interest, included in the Record of Monuments and Places and their settings, in accordance with the recommendations of the Framework and Principles for the Protection of Archaeological Heritage, DAHG (1999), or any superseding national policy document.

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28 NOV 2022

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AH 4 Ensure that development in the vicinity of a site of archaeological interest is not detrimental to the character of the archaeological site or its setting by reason of its location, scale, bulk or detailing and to ensure that such proposed developments are subject to an archaeological assessment. Such an assessment will seek to ensure that the development can be sited and designed in such a way as to avoid impacting on archaeological heritage that is of significant interest including previously unknown sites, features and objects.

AH 5 Contribute towards the protection and preservation of the archaeological value of underwater or archaeological sites associated with rivers and associated features.

AH 6 Contribute towards the protection of historic burial grounds within the county and encourage their maintenance in accordance with conservation principles in co-operation with the Historic Monuments Advisory Committee and National Monuments Section of Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs (DAHRRGA).

AH 7 Promote and support in partnership with the National Monuments Section of the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs (DAHRRGA), the concept of Archaeological landscapes where areas contain several Recorded Monuments.

AH 8 Encourage, where practicable, the provision of public access to sites identified in the Record of Monuments and Places under the direct ownership, guardianship or control of the Council and/or the State.

AH 9 Encourage the provision of signage to publicly accessible recorded monuments.

WORLD HERITAGE

It is the policy of the Council to:

AH 12 Contribute towards the protection of any site designated as World Heritage Site in Kildare.

It is an objective of the Council to:

AO 5 Recognise the potential World Heritage Site in Kildare on the UNESCO Tentative List – Ireland-2010 and support the nomination of Dún Ailinne to World Heritage status.

APPENDIX 15.1

STATUTORY CONTEXT





Plate 1: Proposed location of Tower 1 in existing carpark, looking SW.



Plate 2: Proposed location of Tower 2 in existing car park within Intel lands, looking SW.



Plate 3: Proposed location of Tower 3 in existing car park, looking SW.



Plate 4: Proposed location of Tower 4, looking NW.



Plate 5: Proposed location of Tower 5, looking NW.



Plate 6: Proposed location of Tower 6, looking NE.

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28 NOV 2022

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Plate 7: Existing tower located within Intel lands to be decommissioned.



Plate 8: Existing tower in Intel lands towards southern end of OHL to be decommissioned