Appendices
to
Environmental Impact Assessment Report
for
Internal Works & Change in Activity
at
Abbvie Ireland, NL B.V

Ballytivnan, Sligo

prepared for

on behalf of

by

Environmental Impact Services
First Floor
24 – 26 Ormond Quay Upper
Dublin 7

May 2018

Document Control	Author/Reviewer	Date
Prepared by	Paul Fingleton, Andrew Reynolds and other contributors listed in Table 1.1 of EIS	various dates to 16 May 2018
Checked by	Paul Fingleton	various dates to 16 May 2018

LIST OF APPENDICES

APPENDIX TO SECTION 1

INTRODUCTION

APPENDIX 1.1

COMPENDIUM OF MITIGATION MEASURES

INTRODUCTION

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

For ease of comprehension – during the Environmental Impact Assessment process by Consenting 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.

This section provides a collection – or compendium – of all of the mitigation measures that are proposed. These are presented on a section-by-section basis – to comprehensively identify all proposed mitigations measures. These are often used as a source of conditions by Consenting Authorities – or indeed may be referred to by a single condition – requiring the implementation of all measures contained in this Compendium.

MITIGATION MEASURES FROM EIAR SECTION 6 *BIODIVERSITY*

Following the best practice management measures detailed in the project description and within the CEMP, no specific mitigation measures are required to moderate the potential impact on biodiversity.

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

OPERATIONAL PHASE

Compliance with standard monitoring and maintenance procedures in an EPA licence will provide adequate protection for the land soil and groundwater beneath the facility. The increase in risk to soil and groundwater environment is low as apart from fuel storage there is no increase in the bulk chemical storage required for the proposed development There will be no underground tanks installed as part of this proposal and any transfer lines will be double contained and above ground

MITIGATION MEASURES FROM EIAR SECTION 8 *WATER & HYDROLOGY*

The outline CEMP includes mitigation measure for managing risks during construction related to

- Surface Water Run off
- Fuel & Chemical Handling
- Accidental Releases

As current, during operation an environmental management plan (EMP) will be in place to ensure compliance together with stringent EPA licencing requirements. This will include full containment of potential pollutant sources, site-specific emergency response measures and management of surface water run-off and wastewater discharge from the site.

MITIGATION MEASURES FROM EIAR SECTION 9 *AIR QUALITY & CLIMATE*

CONSTRUCTION PHASE

The pro-active control of fugitive dust will ensure the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released. The main contractor will be responsible for the coordination, implementation and ongoing monitoring of the dust management plan. The key aspects of controlling dust are listed below. Full details of the dust management plan can be found in Appendix 9.3

- The specification and circulation of a dust management plan for the site and the identification of persons responsible for managing dust control and any potential 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 management plan can be monitored and assessed;
- The specification of effective measures to deal with any complaints received.

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

Construction traffic and embodied energy of construction materials are expected to be the dominant source of greenhouse gas emissions as a result of the construction phase of the development. Construction vehicles, generators etc., may give rise to some CO_2 and N_2O emissions. However, due to short-term and temporary nature of these works, the impact on climate will not be significant.

However, some site-specific mitigation measures can be implemented during the construction phase of the proposed development to ensure emissions are reduced further. In particular the prevention of on-site or delivery vehicles from leaving engines idling, even over short periods. Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site.

OPERATIONAL PHASE

No additional mitigation measures are required as the operational phase of the proposed development is predicted to have an imperceptible impact on ambient air quality and climate.

MITIGATION MEASURES FROM EIAR SECTION 10 *NOISE & VIBRATION*

CONSTRUCTION PHASE

Various mitigation measures will be considered and applied during the construction of the proposed development the specific details will be set out in the Noise and Vibration Management Plan included as an Appendix to the CEMP to be adopted by the contractor. Specific examples of such measures are:

- Limiting the hours during which site activities likely to create high levels of noise or vibration are permitted;
- Establishing channels of communication between the contractor/developer, Local Authority and residents;
- Appointing a site representative responsible for matters relating to noise and vibration;
- Monitoring levels of noise and/or vibration during critical periods and at sensitive locations, and;
- All site access roads will be kept even so as to mitigate the potential for vibration from lorries.

Furthermore, it is envisaged that a variety of practicable noise control measures will be employed. These may include:

- Selection of plant with low inherent potential for generation of noise and/ or vibration;
- Erection of barriers as necessary around items such as generators or high duty compressors;
- Situate any noisy plant as far away from sensitive properties as permitted by site constraints and the use of vibration isolated support structures where necessary.

Vibration from construction activities to off-site residences should be limited to the values set out in Table 10.7. These limits are not absolute, but provide guidance as to magnitudes of vibration that are very unlikely to cause cosmetic damage. Magnitudes of vibration slightly greater than those in the table are normally unlikely to cause cosmetic damage, but construction work creating such magnitudes should proceed with caution.

OPERATIONAL PHASE

Building Services and Factory Process Plant
The new development will operate within the noise limits stipulated in the site IED licence issued by the EPA.

MITIGATION MEASURES FROM EIAR SECTION 11 *LANDSCAPE & VISUAL IMPACT*

The following existing mitigation factors will be sustained, namely:

- The development will be carried out in accordance with the design and detail submitted with this application.
- New materials and finishes will be consistent with those already employed at the site.
- Existing mature tree and shrubs at property boundaries will be retained and replaced as required.

MITIGATION MEASURES FROM EIAR SECTION 13 *TRAFFIC & TRANSPORT*

The Construction Traffic Management Plan will mitigate traffic impact through:

- Programming deliveries outside of peak periods; and
- Ensuring construction vehicles route to site via agreed routes.

A Mobility Management Plan is a continuous and evolving document requiring monitoring, review and revision to ensure that it remains relevant to all users of the site. The Mobility Management Plan contains more details on the requirement for the appointment of a Mobility Management Plan co-ordinator, to deal with promotion, engagement and monitoring of the effectiveness of the implemented measures.

Baseline staff surveys will be carried out within 6 months of the opening of the development. Travel surveys will subsequently be undertaken by new staff and on a bi-annual basis. These will be carried out in order to monitor the impact of the Mobility Management Plan and to establish how successful it has been in inducing modal shift. The measures implemented will be reviewed so that they can be adjusted and new measures introduced, where necessary.

Monitoring reports will be submitted to Sligo County Council at an agreed frequency and these reports and revised versions of the Mobility Management Plan can be made available as required. On-going

monitoring will take place via the Mobility Management Plan Coordinator Jim Leahy who will collect any feedback and suggestions from users at site about the Mobility Management Plan and its measures.

MITIGATION MEASURES FROM EIAR SECTION 14 *WASTE MANAGEMENT*

CONSTRUCTION PHASE

The C&DWMP (Appendix 14.1) has been prepared at this design stage of the project in accordance with the *Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects*. The C&DWMP will be fully implemented to ensure effective waste management and reuse, recycling, recovery and disposal of waste material generated at the site.

Any nearby sites requiring clean fill material will be contacted to investigate reuse opportunities for clean and inert excavated materials. 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 Article 27 of the *EC (Waste Directive) Regulations (2011)* as detailed in the C&DWMP. The construction contractor will ensure that recycling and recovery opportunities for excavated materials are sought rather than disposal, where appropriate. This will reduce the off-site impact of the management of these waste types and can provide recycled aggregates to the construction industry in place of raw materials.

In the event that localised contamination is encountered, excavated material will be segregated from clean material, tested, classified as non-hazardous or hazardous and managed appropriately. Controlled and bunded temporary stockpiling areas will be established, as required, to ensure any contaminated material does not mix with clean material and to ensure that run-off from contaminated material does not enter the site drainage network.

Monitoring of construction waste generated during the project will be undertaken in the form of an audit as described in Section 8 of Appendix 14.1. 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 target for reuse/recycling/recovery can be achieved.

Waste legislation will also be consulted on a regular basis in case of any changes which may impact on waste management procedures.

MITIGATION MEASURES FROM EIAR SECTION 15 ARCHAEOLOGY *& ARCHITECTURAL HERITAGE*

In the event that any previously unidentified subsurface archaeological features or artefacts are uncovered, appropriate measures will be implemented in consultation with the Department and in accordance with licence conditions.

APPENDIX TO SECTION 2

SCREENING AND SCOPING

APPENDIX 2.1

DRAFT SCOPING REPORT

Proposed Scope

of

Environmental Impact Assessment Report

for

Proposed Development

at

Abbvie (Ireland),
Ballytivnan, Sligo

DISCUSSION DRAFT

March 2018

Environmental Impact Services
1st Floor, 24 -26 Ormond Quay Upper, Dublin 7
+353 1 8721530

Document Control	Author/Reviewer	Date
Prepared by	Andrew Reynolds/Paul Fingleton	various dates to 15/03/18
Checked by	Paul Fingleton	15/03/18
Status	Discussion Draft	

CONTENTS

4.1 PREFACE

This scoping document has been prepared to show the proposed coverage of the Environmental Impact Assessment Report[1] (EIAR) which will form part of the documentation supporting the planning application for a proposed development to the existing facility at Abbvie, Ballytivnan, Co. Sligo.

The proposed scope is based primarily upon the requirements of the EIA Directive (Directive 2011/92/EU as amended by Directive 2014/52/EU). As the amended Directive came into force on 16 May 2017 but regulations transposing it into national legislation have not been yet been enacted, the principle of direct effect applies.

The proposed scope is also informed by previous experience and the applicable requirements of the Planning and Development Act and Regulations and on relevant guidelines, particularly the statutory EPA Guidelines[2]and including the recent EU guidance on Screening, Scoping and preparation of EIARs. As the EPA Guidelines date from 2002 and do not fully align with the requirements of the amended EIA Directive, account will also be taken of the draft revised version of these Guidelines which the EPA made available in 2017.

This document has been prepared for review and consultation purposes and will be developed to take account of feedback, particularly from the Planning and other relevant departments of Sligo County Council. The scope will also be reviewed and adapted to take account of issues that emerge during the preparation of the EIAR.

An outline description of the proposed development as currently envisaged is included below. Section 2 *Scoping* provides an overview showing how it is proposed to address the various requirements of the amended Directive in the EIAR.

The sections which follow outline potentially significant issues under each proposed EIAR section heading, as identified at this stage. Direct, indirect, secondary, cumulative, short, medium and long-term, permanent, temporary, positive and negative effects as well as impact interactions with other topics will all be examined under each topic heading, as relevant.

To ensure that the EIAR is clear, accessible and compliant it will focus on the likely significant effects of the development. It will avoid generic mitigation proposals.

As is usual during the pre-planning stages of most development proposals, aspects of this proposal may change during design development, before the planning application is lodged. These changes will be taken into account in the EIAR, as appropriate.

Any relevant mitigation or monitoring measures arising from previous planning permissions will be reviewed and considered, as relevant, through the individual sections of the EIAR.

4.2 APPROACH TO THE EIAR

The EIAR will be carefully prepared to ensure that it clearly addresses the requirements of the amended Directive and has appropriate regard to the EPA

[1] Formerly known as an Environmental Impact Statement (EIS). EIA Report is the term used in the amendments to the EIA Directive which have effect

[2] *Guidelines on the Information to be contained in Environmental Impact Statements*, EPA, 2002 and *Advice notes on the Preparation of Environmental Impact Statements*, EPA, 2003.

Guidelines. The fundamental principles of EIA as set out in the Guidelines will be followed throughout (a - f below).

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

- all parts of the EIAS will be clear, concise and unambiguous
- standard descriptive methods, replicable assessment techniques and standardised impact descriptions will all be employed

e Providing relevant information to decision makers

- the relevance, adequacy and compliance of information in the all sections will be made clear, particularly in relation to recent amendments to the EIA Directive[3]
- throughout the EIAR, information will be presented in a systematic and consistent format (as set out below)
- predicted residual effects, taking account of proposed mitigation proposals, will be clearly set out
- any monitoring proposals will include clear triggers and actions

[3] introduced by Directive 2014/52/EU

- mitigation measures which are incorporated in the design will be clearly described as elements of the proposed development
- mitigation measures arising from the EIA will be presented in the section of the EIAR dealing with the relevant environmental factor and will be copied into a separate compendium of mitigation measures for ease of reference, to facilitate the consent authority's decision-making process and to facilitate implementation

f Facilitating better consultation

- the scope of the EIAR will take account of pre-application consultation feedback from Sligo County Council
- all parts of the EIAR will be clear and accessible and will be prepared to be readily understandable by non-specialist readers

4.3 FORMAT

The format in the specialist sections (under headings given later in this document) will generally be as follows:

- Introduction
  - methodology
- Project Description
  - principal aspects of relevance to the specific topic (referring to, and avoiding repetition of, details contained in an earlier project description section)
  - 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
  - to describe 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 is it not relevant (e.g. information on ecological sites which are beyond the actual likely zone of influence of effects of the proposal)
- Potential Impacts
  - 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.

4.4 COVERAGE OF KEY EIAR REQUIREMENTS INTRODUCED BY DIRECTIVE 2014/52/EU

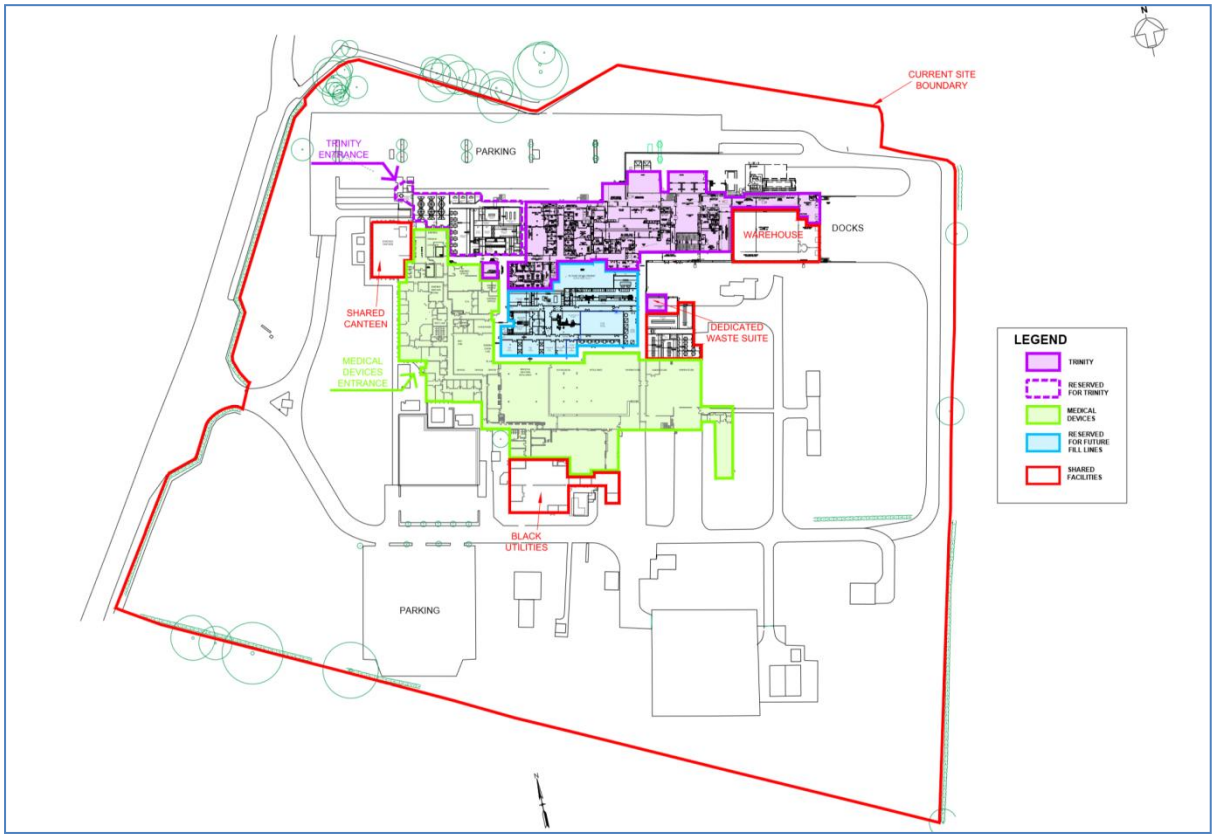
Relevant requirement[4]	**Approach in this EIAR**
description of reasonable, relevant alternatives	the alternatives will be appropriate and relevant to the project brief, for a change in activity at an existing facility in a peri-urban location
mandatory implementation of mitigation and monitoring measures	the mitigation measures and monitoring proposals arising from the EIA process will be clearly set out to facilitate implementation
requirement for incorporation of mitigation and monitoring measures in consents and ensuring that developers deliver these measures	the mitigation measures and monitoring proposals arising from the EIA process will be copied into a compendium of mitigation and monitoring measures to facilitate incorporation in the consent and post-consent implementation and auditing
addition of 'Land' as a prescribed environmental factor	this will not be a significant factor as there will be minimal land-take
replacement of prescribed environmental factor of 'Human Beings' with 'Population and Human Health'	Human Health will be addressed by reference to relevant safety standards and hazard assessments and to the assessment of the proposal under the relevant environmental factors (e.g. Air Quality)
'Flora & Fauna' is replaced by 'Biodiversity'	new title will be used
streamlining	relevant assessments carried out under other Directives will be referred to as applicable (e.g. AA and IED licencing)
EIA Quality	the competent expertise of all EIAR contributors will be set out at the beginning of the report
demolition works	the EIAR will describe and assess the effects of any demolition works
use of natural resources during construction and operation	these will be identified in the project description and assessed in the specialist sections as relevant to the assessment of likely significant effects
impacts of climate change on the project as well as impacts of the project on climate change	there is minimal potential for effects of climate change on the proposal – but flood risk will be considered impacts on climate change due to emissions will be addressed in the Air section
risks to human health, cultural heritage or the environment (due for example to accidents or disasters)	risks will be addressed under the prescribed environmental factors, where relevant reference will be made to the site's IE licence and safety assessment / compliance information too

[4] Taken from Appendix II of the draft *Guidelines on the information to be contained in* EIARs (EPA, 2017)

4.5 SITE LOCATION

(Source http://map.geohive.ie)

4.6 DRAFT LAYOUT



4.7 PROPOSED CHANGES

The proposal involves mainly internal changes to plant and equipment to support the change in activity at the site.
The design will incorporate environmental mitigation measures as appropriate.

An outline of the proposed sections of the EIAR follows.

SECTION 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[5] (screening) report. The emerging project details will be reviewed to check if a report on major accident hazard potential (SEVESO[6] report) is required. The EIAR will mention and refer to these and any other relevant reports as appropriate, both in the introduction and in subsequent sections.

The Abbvie site at Ballytivnan is currently operating as a medical device manufacturing facility and does not require a licence by the EPA under the EPA Act / Industrial Emissions Directive (IED). The proposed development will utilise bio-synthesis and will require a licence. The EIAR will refer to this, as appropriate. It will also refer to relevant requirements arising from other EU Directives as appropriate, such as the Water, Waste and Noise Directives[7]. Duplication of any separate environmental assessments required on foot of such other EU Directives will be avoided.

The team carrying out the EIA will have competent expertise in their respective fields, as appropriate to the scope of the EIAR. They will all be listed in the Introduction along with summaries of their competencies.

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

SECTION 2 SCREENING & SCOPING

This section will discuss the screening and scoping processes – i.e. the requirement for an EIAR and the basis for the determination of the issues that are addressed in the EIAR. It will also explain the format of the EIAR and the relationship of the section headings in the EIAR to the headings prescribed in the amended EIA Directive.

SECTION 3 ALTERNATIVES

This section will set out the need for the proposed project and the consideration of reasonable and relevant alternatives at layout and operational levels (as applicable). It will explain the decisions that led to the selection of the proposed scheme and how environmental considerations were taken into account to result in a project that will be built and operated within acceptable environmental limits.

[5] Assessment of potential impacts on ecological sites which are considered to be of importance at European level and are included in the European "Natura 2000" network of such sites.

[6] The Control of Major Accident Hazards Involving Dangerous Substances Regulations (often referred to as 'COMAH Regulations' or 'Seveso Regulations') which give effect to European Directive 96/82/EC http://www.hsa.ie/eng/Your_Industry/Chemicals/COMAH/Safety_Report/

[7] Directives 2000/60/EC, 2008/98/EC and 2001/49/EC

SECTION 4 PROJECT DESCRIPTION

The principal elements of the application will be described, focussing on elements which have greatest potential to cause environmental impacts. This section will not repeat all of the information included in the planning application report and drawings but will generally set out the details of relevance to the EIA process. It will describe the physical characteristics of the project, construction and operational requirements, materials to be used and any phasing details. This will cover the whole project including any demolition requirements.

The description of the operational phase will describe production processes and will describe energy demand and usage and the nature and quantity of materials and natural resources used (particularly water). The type and quantities of expected residues, emissions and wastes produced during construction and operation will be described at a high level in this section and in more detail under the specific environmental factors later in the report.

The potential for the proposal to give rise to or be affected by accidents or disasters will be considered as relevant in the context of new requirements arising from Directive 2014/52/EU. This will be taken into account in the assessment of the likely significant impacts on the prescribed environmental factors throughout the specialist sections of the report.

While detailed data on aspects such as emissions to water and air will be described in more detail in subsequent specialist sections, they will also be referred to at a high level in this section. All of the subsequent EIAR sections will cross-refer back to details that are included in this section.

It will be largely based on material that will also be included in the planning application report and will cross-refer to other documents included in the planning application.

SECTION 5 POPULATION & HUMAN HEALTH

The project site lies within the existing Abbvie facility. The complex is located within the Ballytivnan area. The methodology for this section will involve reference to relevant population and socio-economic data and reference to the relevant Sligo County Development Plan.
In accordance with the draft EPA Guidelines, human health will be considered mainly through reference to the assessment of construction and operational impacts on the vectors which would have potential to affect health in other sections of the EIAR. These vectors include air quality, water, noise, traffic and the landscape/amenities.
Following data identification and collection, an assessment of the impacts will be made. The main likely area of impact is anticipated to be sustainable local and regional employment and economic activity.

SECTION 6 BIODIVERSITY

The ecological value of any habitats on and near the site will be assessed in terms of their potential local importance. Protected sites do not occur in the immediate vicinity of the site.
An Appropriate Assessment (AA) screening report[8] will be prepared as a separate document to assess potential for effects on European designated ecological sites, the nearest of which is the Cummeen Strand/Drumcliff Bay SAC and Cummenne Strand SPA, 0.84 km to the West. The Biodiversity section of the EIAR will refer to this while avoiding duplication of the assessment.

Some mitigation measures are likely to be incorporated into the design and others included as commitments which will be implemented during construction and operation.

No significant residual impacts on habitats or species are anticipated.

SECTION 7 LAND, SOILS, GEOLOGY & HYDROGEOLOGY

This section will deal with issues relevant to land sealing, soils, geology and hydrogeology within the site and in the surrounding area. It will have due regard to the IGI *Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements* (2013). Where any requirements of those guidelines exceed or do not align with the requirements of the statutory EPA Guidelines, the latter will take priority.

[8] In compliance with the EU Habitats Directive 92/43/EEC

4.8 LAND, SOILS AND GEOLOGY

A description of the receiving environment with regard to the availability of the site for beneficial use and to the natural materials underlying the site will be provided. Information will be presented on bedrock geology as well as overlying quaternary geology and soils utilising data obtained from Geological Survey Institute (GSI) databases as well as from historical and recent site data, insofar as relevant for identification of likely significant impacts. Maps will be provided as useful. An assessment for contaminated soils will include a review of any potential for existing contaminated soil due to previous activities.
The characteristics of the proposed development will be described insofar as relevant to the assessment of likely significant impacts on land, soils and geology. 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 as appropriate.

4.9 HYDROGEOLOGY

The receiving environment in terms of groundwater will be assessed and described insofar as relevant to the assessment of likely significant impacts. The study will cover:

- existing groundwater quality data for the site
- groundwater flow direction at the site
- the groundwater body status underlying the site
- relevant groundwater management aspects of the River Basin Management Plan for the River Basin District in which the site is located.

The characteristics and impact of the development will be discussed in terms of impacts on the groundwater quality and flows during the construction and operational phases.
Mitigation measures (during both construction and operation) will be proposed as relevant for any predicted likely significant impacts and any required containment and treatment of 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 as being required to ensure compliance with relevant parameters will be clearly specified with appropriate triggers and actions.

SECTION 8 WATER & HYDROLOGY

The receiving environment will be described in terms of surface water and foul water. Data on surface water quality, the general hydrological environment and on wastewater discharges will be included.
This section will cover:

- drainage patterns at the site
- receiving drainage system

- surface water quality of the receiving environment, with reference to the 'good status' criteria set out in the Environmental Objectives (Surface Waters) Regulations 2009 (Statutory Instrument No. 272 of 2009)
- relevant available data including EPA records and Local Authority records for surface water quality in the vicinity of the site
- reference to the River Basin Management Plan for the River Basin District in which the site is located with respect to surface water management
- receiving waste water infrastructure and capacity.

Any new physical infrastructure to connect with existing water networks (if required) will be considered in the Material Assets section. The proposed tankering of high strength wastewater for off-site disposal will be assessed.
The EIAR will describe the changes in foul water loading and characteristics and the ability of available WWTP capacity to cater for this increase.
The characteristics and impact of the development will be discussed in terms of impacts on the water environment during the construction and operational phases. This will include an assessment of the likely significant impacts on:

- drainage patterns
- surface water runoff
- water bodies in the area
- sensitive water bodies
- the river catchment

Mitigation measures (during both construction and operation) will be developed in an iterative manner with the design team to arrive at appropriate and acceptable solutions to potential issues. Mitigation measures will be incorporated into the design insofar as practicable. This will aim to avoid or reduce likely significant effects. Residual impacts following implementation of mitigation measures arising from the EIA will be predicted. Any monitoring requirements identified for the construction and operation phases will be specified with clear trigger levels and associated actions.
The EIAR team will consult with the EPA / Sligo County Council regarding waste water as appropriate.

SECTION 9 AIR QUALITY & CLIMATE

Emissions from the development will be assessed in accordance with national and international best practice. Baseline data will be taken from relevant sources. The AERMOD air dispersion model will be applied and used in conjunction with the meteorological pre-processor AERMET PRO and the terrain pre-processor AERMAP. The assessment will include calculations and predictions to ensure that emissions remain within EPA permitted volumetric and quality limits.
The proposal's generation of greenhouse gases during both construction and operation will be assessed and quantified as required to assess the likely significant impact of the proposal in terms of appropriate targets, particularly national greenhouse gas generation targets.

Mitigation measures to address dust will be incorporated into the construction environmental management plan. Likely significant effects due to dust after these measures are implemented will be assessed and further mitigation and/or monitoring will be proposed if required.

SECTION 10 NOISE & VIBRATION

Baseline noise survey data undertaken to date will be reviewed to inform the study of historical noise levels at the site and to identify any areas of potential issues relating to compliance with noise emission limit values (ELVs).
Details in relation to typical construction methods, tools and phasing will be utilised as required to assess the likely significant construction stage effects. The predicted noise levels will be compared against best practice guidance for construction noise. Where required, we will specify noise mitigation measures in order to reduce noise impacts during this phase.
There will be an emphasis on incorporation of noise mitigation measures into the design of the facility. Likely significant effects after these measures are implemented will be assessed and further mitigation and/or monitoring will be proposed if required. Noise predictions in respect of the construction phase will be prepared in accordance with relevant guidance.
Plant room noise attenuation measures, building construction attenuation and other best practice measures will be incorporated into the design of the proposed development. Likely significant noise impacts associated with the operational phase will be assessed taking account of these measures along with the location and layout of proposed on-site buildings, car parking and plant locations. Should the predicted noise levels present any issues in terms of IED compliance then further mitigation will be proposed and the residual effects will be predicted to ensure compliance.

SECTION 11 LANDSCAPE & VISUAL IMPACT

The site extent during and after construction and elevational changes to the existing building will have a potential effect on the appearance and character of the environs.

The proposed development is within the existing Abbvie complex and changes are anticipated to be of low visual significance. Subject to review of emerging design information and discussion with Sligo County Council, photomontages are anticipated to be unlikely to be required.

This section will include cross-referencing to other sections as appropriate, particularly the section on Population & Human Health.

SECTION 12 MATERIAL ASSETS

The types of issues to be addressed in this section include likely impacts on the surrounding public infrastructure and physical resources in the environment which may be of either human or natural origin (including, electricity, telecommunications, waste disposal facilities etc.).

Waste water and waste management issues will be largely covered in other sections and these will be cross-referred to here as appropriate. Electrical demand and potential impacts on the ability of the supply infrastructure to deliver to other electricity users will be addressed in this section.

The environmental assessment of any new infrastructural / service connections that may be required and which are integral to the proposed development will be considered as appropriate in the context of the *O'Grianna v An Bord Pleanála*[9] case.

SECTION 13 ROADS, TRAFFIC AND TRANSPORTATION

This section will describe in detail the traffic generating characteristics of the proposed development. It will establish the predicted baseline traffic situations during the construction and operational phases. This will take account of relevant and available survey data from the National Transport Authority and new traffic surveys will be procured where required. A new base traffic model will be developed and calibrated.

The section will then give a detailed description of the construction phase, showing proposed contractor, materials and spoil disposal traffic volumes during the work and with reference to any phasing proposal. The description of the operational phase will be similarly detailed.

The assessment will include:

- forecasting based on operational and construction estimated employment numbers and TII growth forecasts;
- forecasting of scenarios for Opening Year, Opening Year +5 and Opening Year +15;
- modelling for Operational, Do Nothing, Do Minimum and Do Mitigation (if required);
- modelling for Construction traffic with Opening Year traffic volumes;
- development and assessment of mitigation measures if required;
- review of car parking provision against Development Plan and Mobility Management Plan;
- review and update Mobility Management Plan.

[9] (2014) IEHC 632 (12 December 2014)

A separate and detailed Traffic and Transportation Assessment (TTA) will also support the planning application. The EIAR section will cross-refer to that while avoiding duplication.

SECTION 14 WASTE MANAGEMENT

A review of the existing waste management environment, as addressed in the relevant legislation as well as national and regional policy and planning documents will be completed as relevant for assessment of likely significant effects of the proposal. At a local level this will include the Sligo County Development Plan, Connacht Ulster Region Waste Management Plan, Local Area Plans and Bye-Laws as well as existing and proposed waste infrastructure available to service the development.

The predicted quantum of Construction & Demolition (C&D) waste that will be generated will be quantified, insofar as relevant to the identification of likely significant effects, based on the gross floor areas of the proposed development and any buildings or infrastructure to be demolished at the site.

All available data will be reviewed to ascertain the types and quantum/volume of process wastes currently produced at the site. The likely types, quantum and volume of solid and liquid process wastes that will be generated from the proposed development will be estimated, insofar as relevant to the identification of likely significant effects. Any likely significant effects of any potentially hazardous waste and its treatment will also be assessed.

The types, quantum and volume of non-process waste that will be generated during the operational phase of the project will be estimated, insofar as relevant to the identification of likely significant effects, based on the proposed area of the development and any additional staff number increase.

An examination of likely significant waste-related impacts for the C&D and operational phases of the development will be completed and appropriate mitigation measures proposed where relevant.

SECTION 15 CULTURAL HERITAGE

As the proposed development is located within the existing Abbvie complex on lands that have largely been previously disturbed, potential for impacts is anticipated to be insignificant and a detailed archaeological or cultural heritage assessment is not proposed.

SECTION 16 INTERACTIONS & CUMULATIVE EFFECTS

Both interactions and cumulative effects will be assessed as relevant in the specialist sections of the EIAR. These will include cumulative effects on air quality, noise, water quality and the landscape. This section will show where specific interactions between issues and effects as well as cumulative effects have been addressed in the EIAR. This will demonstrate compliance with the regulations and guidelines.

APPENDIX TO SECTION 4

PROJECT DESCRIPTION

APPENDIX 4.1

DETAILED DESCRIPTION OF MANUFACTURING PROCESS

The purpose of this project is to design a facility to manufacture special medicines for treating illnesses (like cancer) in a highly controlled and contained environment.

The main process includes the linking of a bio-pharmaceutical molecule to a cytatoxic molecule providing effective delivery of the medicine within the patient.

The project will consist of internal demolition of part of the existing redundant manufacturing facility (ETO Steriliser), which is located to the west of the new warehouse, to make way for the proposed filling suite.

The facility in Ballytivnan will provide for conjugation or joining together of bio-pharma molecule and pharmaceutical acute-molecule thru Formulation, Vial Filling and Lyophilisation. The main process steps are Buffer Preparation, Thawing, Formulation, and then Vial Filling and Lyophilisation followed by semi-automatic inspection and Cold Storage before shipping. In order to support these operations additional clean utility generation and distribution will be required. The main support functions consist of; Water for Injection and Clean Steam, generation, storage and distribution, as well as Raw material and API storage.

One of the main considerations for this design (typically much like most cancer or oncology medicines) is to address the high containment requirements for the products produced in this suite and to maintain a safe working environment for the operator and maintenance personnel.

To achieve the required containment levels, the facility has been designed to prevent exposure of the product or excipients to the operator by means of closed processes or the used of containment equipment. Personnel and material handling procedures also form a significant part of the facility operation to maintain the required level of containment.

The location of the new manufacturing suite is in the North East of the existing site. The area in the building is currently in use as a production facility which will be de-commissioned and cleared to allow the construction of the new facility. The Ballytivnan site has been developed a number of times since the original plant was constructed in the 1970s. The new filling suite is located at the boundary of 2 no. separate structures constructed during different phases of development on the site. In order to facilitate the new project, existing structures and building shell upgrades will be required as well as upgrades to existing utility generation. A quantity of existing mezzanine will be reused for locating mechanical plant and process equipment associated with the filling line.

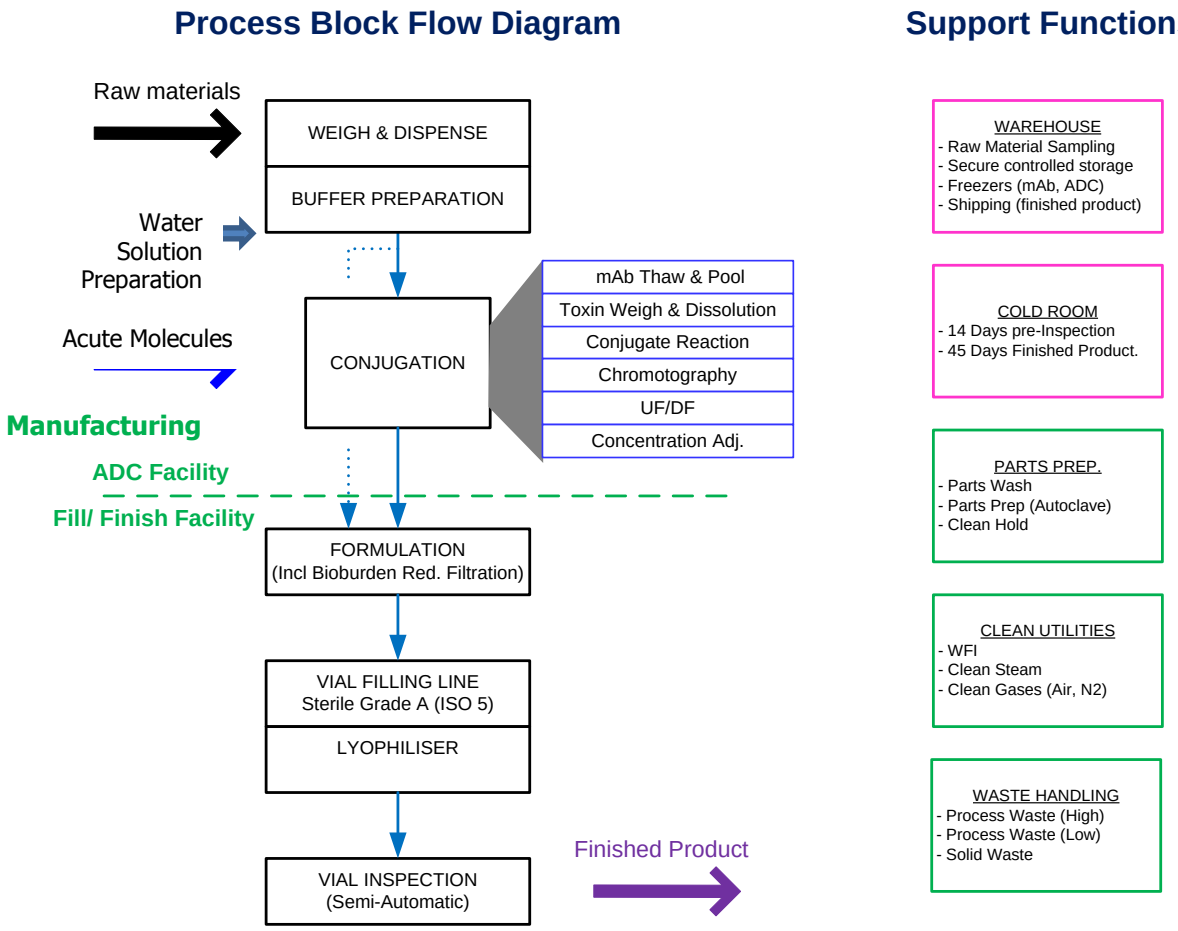
DESCRIPTION OF FACILITY

The proposed facility will be located in a shell space in Building 01 on the Sligo Ballytivnan site, along with required support facilities, equipment and utilities.

The following Block Flow Diagram outlines the core processing functionality and the process related support functions.

In addition to the process functionality, the facility design provides the appropriate personnel facilities (Gowning, Write-up etc.) as detailed on the drawings. The facility design also provides HVAC and technical support areas

(Electrical, Utilities etc.) as detailed on the drawings also.



The entire process is fully sealed and water based. The processes are also triple contained for the safety of personnel and the environment as follows:

1. The process are fully sealed and contained – single use reinforced plastic bioreactor bags are used to minimise the cleaning required. The filling of the final formulated medicine is within an isolater with its own air handling system.

2. The clean manufacturing rooms are fully contolled, all personnel and materials within these reams are carefully contolled.

3. The clean rooms are within a controlled pharmaceutical building.

3A. The wastes are 100% collected in double contained piping and tanking systems and tankered off site for disposal by registered contractors.

Operations

The basic process operations can be described as follows:

1. <u>Raw Materials</u>

All raw materials will be brought in through the warehouse, where there is provision for sampling within a controlled environment, and the materials will be stored until required.

The warehouse will also be used to receive and store process consumables, such as filter cartridges and single use bioreactor bags.

2. Dispensing

All process raw materials will be dispensed in the dispensary local to the warehouse. The provision of down flow booths will provide the controlled environment required for dispensing operations. Large volume materials will be weighed into stainless steel bins whilst smaller quantities will be dispensed into plastic bags.

A range of mechanical handling equipment, including trolleys and powered pallet trucks, will be provided to assist with the transport of materials to the dispensed goods store and hence to the preparation area where they will be used.

3. Purification

The purification operations described below are sequential and carried out using dedicated process equipment. The equipment is designed specifically for bio-chemical purification and includes the complex controls necessary to assure quality.

The initial purification steps are carried out in a single processing area. (see layouts)

Typically the first step of the purification process is ultrafiltration where the process stream will be concentrated to perform a buffer exchange step. Whilst the buffer exchange will remove some of cell culture contaminants the primary aim is to ensure the product is dissolved in a solution that allows it to bind the first chromatography column.

Ultrafiltration is a process where the product stream is pumped across special membranes and water is removed. The addition of the new buffer to the vessel as the process proceeds allows buffer exchange to occur.

The second purification step is chromatography where the product will be chemically stuck to a specially designed chromatography matrix within chromatography column. A complex series of washing steps improves purification and then allows the product to be chemically removed from the matrix and collected in a vessel.

These standard purification steps are typically repeated until the purified active ingredients contained in the final solution. Often a stabiliser is used to increase the longevity of the final medicine.

The product steam will then be filtered into the bulk filling vessel (or bag).

4. Formulation

The bulk product is then formulated or diluted with “water for injection” grade water to a concentration suitable for a patient dosage and filtered again.

5. Filling

The formulated product is filed into vials or syringes within an isolated filling machine. A freeze drying inspection/ship step (or lyolophicisation) is often used to remove the water in solution and the final product can be powdered or liquid.

The material is inspected, packaged and shipped worldwide.

6. Automation

The high productivity of a biopharmaceutical facility will only be achieved with extensive use of process automation. All key process operations will be automated and operated by the process staff from within the process areas. The automation will allow the critical process parameters to be monitored and logged.

The automation will include control of raw materials through monitoring of dispensing operations and dispensed material use in the process.

Critical process utilities will be controlled and / or monitored to ensure product quality is not compromised and system alarms are dealt with in a timely manner

APPENDIX TO SECTION 6

BIODIVERSITY

APPENDIX 6.1

THE DESIGNATED NATURA 2000 SITES, NATURAL HERITAGE AREAS AND PROPOSED NATURAL HERITAGE AREAS WITHIN 15 KM OF SITE.

The Designated Natura 2000 Sites, Natural Heritage Areas and proposed Natural Heritage Areas within 15km of site, arranged according to distance

Site Name	Code	SAC	SPA	NHA	pNHA	Distance [km]
Cummeen Strand/Drumcliff Bay (Sligo Bay)	000627	✓			✓	0.71
Cummeen Strand	004035		✓			0.77
Lough Gill	001976	✓			✓	1.16
Colgagh Lough	001658				✓	3.87
Sligo/Leitrim Uplands	004187		✓			3.97
Crockauns/Keelogyboy Bogs	002435			✓		4.00
Drumcliff Bay	004013		✓			4.14
Ben Bulben, Gleniff and Glencade Complex	000623	✓			✓	5.65
Knocknarea Mountain and Glen	001670				✓	7.00
Ballysadare Bay	004129		✓			7.40
Ballysadare Bay	000622	✓			✓	7.53
Union Wood	000638	✓			✓	8.12
Ballygawley Lough	001909				✓	8.41
Unshin River	001898	✓			✓	8.44
Lough Dargan	001906				✓	9.62
Slieveward Bog	001902			✓		9.64
Ballintemple and Ballygilgan	004234		✓			12.40
Streedagh Point Dunes	001680	✓				12.86
Streedagh Point Dunes	001680				✓	12.86
Knockmullin Fen	001904				✓	12.97
Bunduff Lough and Machair/Trawalua/Mullaghmore	000625	✓				14.49
Ardboline Island and Horse Island	004135		✓			14.70
Glenade Lough	001919	✓			✓	14.73

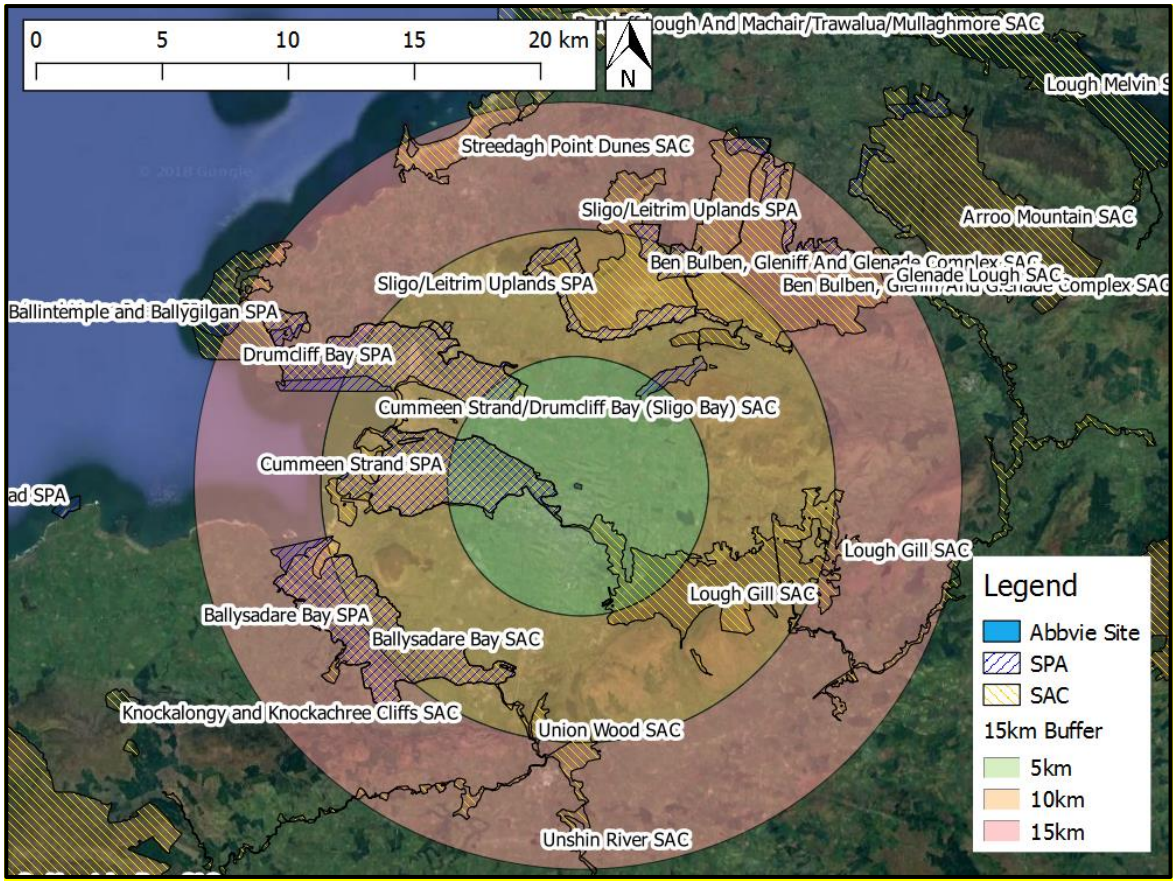


Figure 1 SAC's and SPA's Considered within the Assessment Process

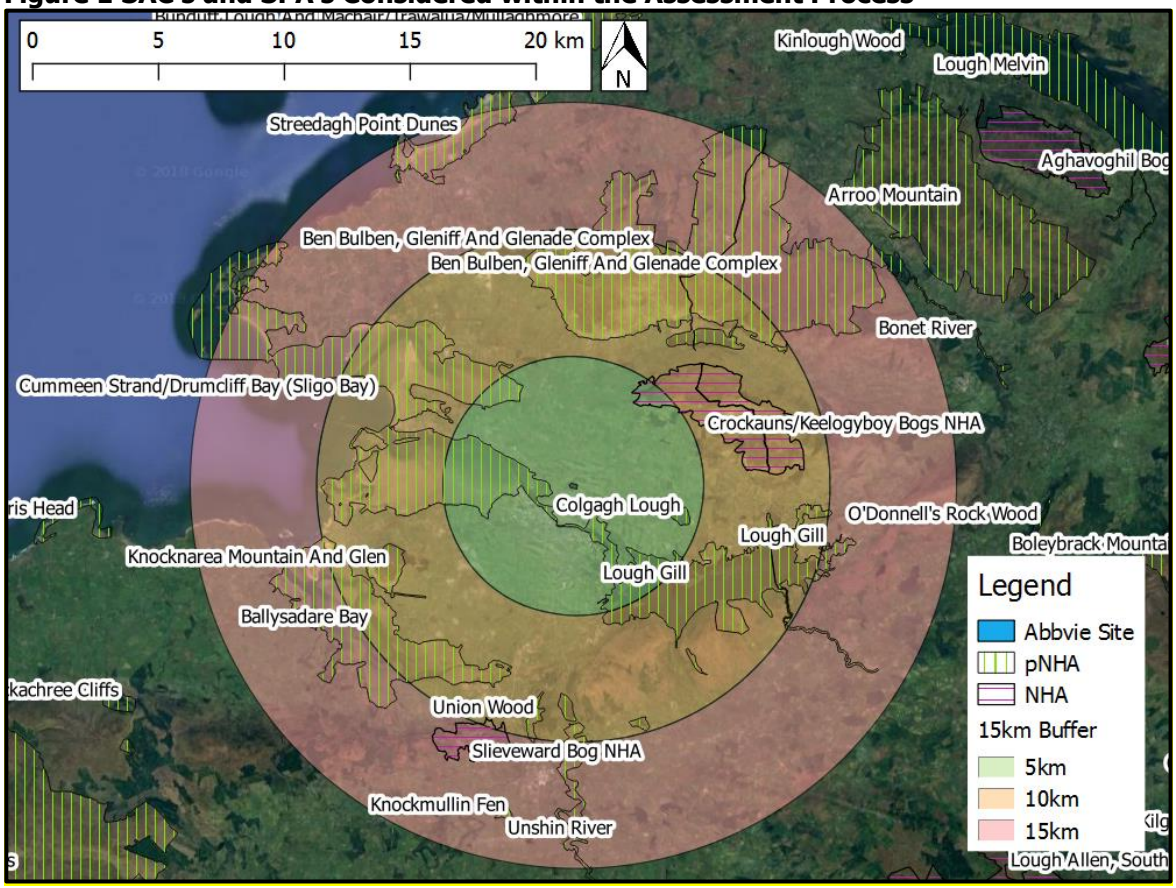
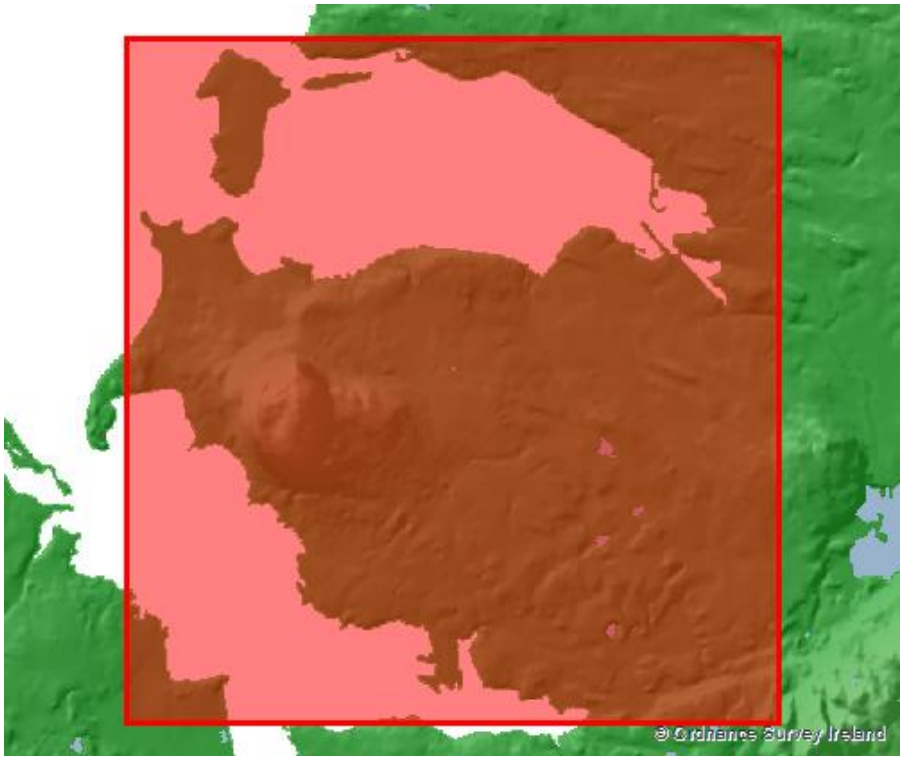


Figure 2 NHA's and pNHA's Considered within the Assessment Process

APPENDIX 6.2

RARE AND PROTECTED SPECIES FOUND WITHIN THE 022 HECTAD AROUND THE ABBVIE SITE.

Site location within the NBDC hectad (10 x 10km Grid Square); G63 and G73 respectively.



Rare and protected species found within the G63 and G73 hectad around the Abbvie Site.

Species name	Designation
Arctic Tern (Sterna paradisaea)	Protected Species
Ash-black Slug (Limax cinereoniger)	Threatened Species
Atlantic Pocket-moss (Fissidens monguillonii)	Threatened Species
Atlantic Salmon (Salmo salar)	Protected Species
Atlantic White-sided Dolphin (Lagenorhynchus acutus)	Protected Species
Bantry Notchwort (Leiocolea bantriensis)	Threatened Species
Barn Owl (Tyto alba)	Protected Species
Barn Swallow (Hirundo rustica)	Protected Species
Bar-tailed Godwit (Limosa lapponica)	Protected Species
Basking Shark (Cetorhinus maximus)	Threatened Species
Black Guillemot (Cepphus grylle)	Protected Species
Black-headed Gull (Larus ridibundus)	Protected Species
Black-legged Kittiwake (Rissa tridactyla)	Protected Species
Black-tailed Godwit (Limosa limosa)	Protected Species
Bombus (Bombus) magnus	Threatened Species
Bottle-nosed Dolphin (Tursiops truncatus)	Protected Species
Brent Goose (Branta bernicla)	Protected Species
Brown Long-eared Bat (Plecotus auritus)	Protected Species
Brown Snail (Zenobiella subrufescens)	Threatened Species
Chaetarthria seminulum	Threatened Species
Chalk Hook-moss (Drepanocladus sendtneri)	Threatened Species
Cliff Scalewort (Porella cordaeana)	Threatened Species
Common Coot (Fulica atra)	Protected Species
Common Eider (Somateria mollissima)	Protected Species
Common Frog (Rana temporaria)	Protected Species
Common Goldeneye (Bucephala clangula)	Protected Species
Common Grasshopper Warbler (Locustella naevia)	Protected Species
Common Greenshank (Tringa nebularia)	Protected Species
Common Guillemot (Uria aalge)	Protected Species
Common Kestrel (Falco tinnunculus)	Protected Species
Common Kingfisher (Alcedo atthis)	Protected Species
Common Linnet (Carduelis cannabina)	Protected Species
Common Lizard (Zootoca vivipara)	Protected Species
Common Pheasant (Phasianus colchicus)	Protected Species
Common Pochard (Aythya ferina)	Protected Species
Common Porpoise (Phocoena phocoena)	Protected Species
Common Redshank (Tringa totanus)	Protected Species
Common Sandpiper (Actitis hypoleucos)	Protected Species
Common Scoter (Melanitta nigra)	Protected Species
Common Seal (Phoca vitulina)	Protected Species
Common Shelduck (Tadorna tadorna)	Protected Species
Common Snipe (Gallinago gallinago)	Protected Species
Common Starling (Sturnus vulgaris)	Protected Species
Common Swift (Apus apus)	Protected Species
Common Tern (Sterna hirundo)	Protected Species
Common Whorl Snail (Vertigo (Vertigo) pygmaea)	Threatened Species
Common Wood Pigeon (Columba palumbus)	Protected Species
Corn Crake (Crex crex)	Protected Species
Corncockle (Agrostemma githago)	Threatened Species
Dark Ditrichum (Ditrichum lineare)	Protected Species
Dark Green Fritillary (Argynnis aglaja)	Threatened Species
Daubenton's Bat (Myotis daubentonii)	Protected Species

Dingy Skipper (Erynnis tages)	Threatened Species
Downy Plait-moss (Hypnum callichroum)	Threatened Species
Dunlin (Calidris alpina)	Protected Species
Dwarf Haircap (Pogonatum nanum)	Threatened Species
Ear Pond Snail (Radix auricularia)	Threatened Species
English Chrysalis Snail (Leiostyla (Leiostyla) anglica)	Threatened Species
Eurasian Badger (Meles meles)	Protected Species
Eurasian Curlew (Numenius arquata)	Protected Species
Eurasian Oystercatcher (Haematopus ostralegus)	Protected Species
Eurasian Pygmy Shrew (Sorex minutus)	Protected Species
Eurasian Red Squirrel (Sciurus vulgaris)	Protected Species
Eurasian Teal (Anas crecca)	Protected Species
Eurasian Tree Sparrow (Passer montanus)	Protected Species
Eurasian Wigeon (Anas penelope)	Protected Species
Eurasian Woodcock (Scolopax rusticola)	Protected Species
European Eel (Anguilla anguilla)	Threatened Species
European Golden Plover (Pluvialis apricaria)	Protected Species
European Otter (Lutra lutra)	Protected Species
European Shag (Phalacrocorax aristotelis)	Protected Species
Field Cuckoo Bee (Bombus (Psithyrus) campestris)	Threatened Species
Field Slug (Deroceras (Deroceras) agreste)	Threatened Species
Fine-leaved Marsh Feather-moss (Campyliadelphus elodes)	Threatened Species
Fir Clubmoss (Huperzia selago)	Protected Species
Fitzgerald's Notchwort (Leiocolea fitzgeraldiae)	Threatened Species
Freshwater White-clawed Crayfish (Austropotamobius pallipes)	Protected Species
Gadwall (Anas strepera)	Protected Species
Gervais's Beaked Whale (Mesoplodon europaeus)	Protected Species
Gipsy Cuckoo Bee (Bombus (Psithyrus) bohemicus)	Threatened Species
Globular Pea Mussel (Pisidium hibernicum)	Threatened Species
Goosander (Mergus merganser)	Protected Species
Great Black-backed Gull (Larus marinus)	Protected Species
Great Cormorant (Phalacrocorax carbo)	Protected Species
Great Crested Grebe (Podiceps cristatus)	Protected Species
Great Northern Diver (Gavia immer)	Protected Species
Greater Scaup (Aythya marila)	Protected Species
Green Blackwort (Southbya tophacea)	Protected Species
Grey Plover (Pluvialis squatarola)	Protected Species
Grey Seal (Halichoerus grypus)	Protected Species
Hair-pointed Grimmia (Grimmia trichophylla)	Threatened Species
Haliplus (Haliplinus) lineolatus	Threatened Species
Heath Snail (Helicella itala)	Threatened Species
Hen Harrier (Circus cyaneus)	Protected Species
Herring Gull (Larus argentatus)	Protected Species
Hoary Whitlowgrass (Draba incana)	Threatened Species
Hollowed Glass Snail (Zonitoides (Zonitoides) excavatus)	Threatened Species
Holt Notchwort (Cladopodiella francisci)	Threatened Species
Hook-beak Tufa-moss (Hymenostylium recurvirostrum)	Threatened Species
House Martin (Delichon urbicum)	Protected Species
House Sparrow (Passer domesticus)	Protected Species
Hydraena rufipes	Threatened Species
Hydrobia acuta	Threatened Species
Hydroporus morio	Threatened Species
Hygrotus (Coelambus) novemlineatus	Threatened Species
Irish Beard-moss (Didymodon maximus)	Protected Species
Irish Damselfly (Coenagrion lunulatum)	Threatened Species

Jack Snipe (Lymnocryptes minimus)	Protected Species
Kageronia fuscogrisea	Threatened Species
Large Heath (Coenonympha tullia)	Threatened Species
Large Red-Tailed Bumble Bee (Bombus (Melanobombus) lapidarius)	Threatened Species
Large White-moss (Leucobryum glaucum)	Protected Species
Leptophlebia marginata	Threatened Species
Lesser Black-backed Gull (Larus fuscus)	Protected Species
Lesser Bulin (Merdigera obscura)	Threatened Species
Lesser Noctule (Nyctalus leisleri)	Protected Species
Lesser Striated Feather-moss (Eurhynchium striatulum)	Threatened Species
Little Egret (Egretta garzetta)	Protected Species
Little Grebe (Tachybaptus ruficollis)	Protected Species
Little Gull (Larus minutus)	Protected Species
Long-tailed Duck (Clangula hyemalis)	Protected Species
Mallard (Anas platyrhynchos)	Protected Species
Marsh Fritillary (Euphydryas aurinia)	Protected Species
Marsh Whorl Snail (Vertigo (Vertigo) antivertigo)	Threatened Species
Mediterranean Gull (Larus melanocephalus)	Protected Species
Merlin (Falco columbarius)	Protected Species
Mew Gull (Larus canus)	Protected Species
Moss Bladder Snail (Aplexa hypnorum)	Threatened Species
Moss Carder-bee (Bombus (Thoracombus) muscorum)	Threatened Species
Moss Chrysalis Snail (Pupilla (Pupilla) muscorum)	Threatened Species
Mute Swan (Cygnus olor)	Protected Species
Narrow-mouthed Whorl Snail (Vertigo (Vertilla) angustior)	Protected Species
Natterer's Bat (Myotis nattereri)	Protected Species
Nebrioporus (Nebrioporus) depressus	Threatened Species
Northern Lapwing (Vanellus vanellus)	Protected Species
Northern Pintail (Anas acuta)	Protected Species
Northern Shoveler (Anas clypeata)	Protected Species
Northern Wheatear (Oenanthe oenanthe)	Protected Species
Norway Timmia (Timmia norvegica)	Threatened Species
Peregrine Falcon (Falco peregrinus)	Protected Species
Pine Marten (Martes martes)	Protected Species
Pink-footed Goose (Anser brachyrhynchus)	Protected Species
Pipistrelle (Pipistrellus pipistrellus sensu lato)	Protected Species
Plaited Door Snail (Cochlodina (Cochlodina) laminata)	Threatened Species
Plated Snail (Spermodea lamellata)	Threatened Species
Point Snail (Acicula fusca)	Threatened Species
Prickly Snail (Acanthinula aculeata)	Threatened Species
Prickly Tamarisk-moss (Abietinella abietina var. hystricosa)	Threatened Species
Red Deer (Cervus elaphus)	Protected Species
Red Grouse (Lagopus lagopus)	Protected Species
Red Knot (Calidris canutus)	Protected Species
Red Leskea (Orthothecium rufescens)	Threatened Species
Red-billed Chough (Pyrrhocorax pyrrhocorax)	Protected Species
Red-breasted Merganser (Mergus serrator)	Protected Species
Red-throated Diver (Gavia stellata)	Protected Species
Ringed Plover (Charadrius hiaticula)	Protected Species
Risso's Dolphin (Grampus griseus)	Protected Species
Rock Pigeon (Columba livia)	Protected Species
Ruff (Philomachus pugnax)	Protected Species
Sand Martin (Riparia riparia)	Protected Species
Scarce Blue-tailed Damselfly (Ischnura pumilio)	Threatened Species
Scarce Emerald Damselfly (Lestes dryas)	Threatened Species

Sea Lamprey (Petromyzon marinus)	Protected Species
Shaded Wood-moss (Hylocomium umbratum)	Threatened Species
Showy Feather-moss (Eurhynchium speciosum)	Threatened Species
Sky Lark (Alauda arvensis)	Protected Species
Slavonian Grebe (Podiceps auritus)	Protected Species
Small Blue (Cupido minimus)	Threatened Species
Small Heath (Coenonympha pamphilus)	Threatened Species
Small-white Orchid (Pseudorchis albida)	Protected Species
Smooth Grass Snail (Vallonia pulchella)	Threatened Species
Smooth Newt (Lissotriton vulgaris)	Protected Species
Smooth Ramshorn (Gyraulus (Torquis) laevis)	Threatened Species
Soprano Pipistrelle (Pipistrellus pygmaeus)	Protected Species
Sperm Whale (Physeter macrocephalus)	Protected Species
Spotted Flycatcher (Muscicapa striata)	Protected Species
Stock Pigeon (Columba oenas)	Protected Species
Striated Whorl Snail (Vertigo (Vertigo) substriata)	Threatened Species
Striped Dolphin (Stenella coeruleoalba)	Protected Species
Swan Mussel (Anodonta (Anodonta) cygnea)	Threatened Species
Tree Snail (Balea (Balea) perversa)	Threatened Species
True's Beaked Whale (Mesoplodon mirus)	Protected Species
Tufted Duck (Aythya fuligula)	Protected Species
Tufted Feather-moss (Scleropodium cespitans)	Threatened Species
Twite (Carduelis flavirostris)	Protected Species
Upright Brown Grimmia (Schistidium strictum)	Threatened Species
Velvet Scoter (Melanitta fusca)	Protected Species
Wall (Lasiommata megera)	Threatened Species
Water Rail (Rallus aquaticus)	Protected Species
West European Hedgehog (Erinaceus europaeus)	Protected Species
Whirlpool Ramshorn (Anisus (Disculifer) vortex)	Threatened Species
Whooper Swan (Cygnus cygnus)	Protected Species
Willow Feather-moss (Amblystegium varium)	Threatened Species
Woodsy Thyme-moss (Plagiomnium cuspidatum)	Threatened Species
Yellow Bird's-nest (Monotropa hypopitys)	Threatened Species
Yellowhammer (Emberiza citrinella)	Protected Species

Invasive species found within the G63 and G73 hectad around the Abbvie Site.

Scientific Name	Common Name
Flora	
Acer pseudoplatanus	Sycamore
Arthurdendyus triangulatus	New Zealand flatworm
Buddleja davidii	Butterfly-bush
Clematis vitalba	Traveller's-joy
Elodea canadensis	Canadian Waterweed
Fallopia japonica	Japanese Knotweed
Heracleum mantegazzianum	Giant Hogweed
Hyacinthoides hispanica	Spanish Bluebell
Impatiens glandulifera	Indian Balsam
Leycesteria formosa	Himalayan Honeysuckle
Orobanche minor	Common Broomrape
Prunus laurocerasus	Cerry Laurel
Quercus ilex	Evergreen Oak
Rhododendron ponticum	Rhododendron
Ribes nigrum	Black Currant
Sargassum muticum	Wireweed
Fauna	
Branta canadensis	Canada Goose
Candidula intersecta	Wrinkled Snail
Capra hircus	Feral Goat
Cornu aspersu	Common Garden Snail
Dama dama	Fallow Deer
Dreissena (Dreissena) polymorpha	Zebra Mussel
Mustela furo	Feral Ferret
Mustela vison	American Mink
Oryctolagus cuniculus	European Rabbit
Potamopyrgus antipodarum	Jenkins' Spire Snail
Rattus norvegicus	Brown Rat
Rutilus rutilus	Roach
Tandonia budapestensis	Budapest Slug
Tandonia sowerbyi	Keeled Slug

* subject to restrictions (Third Schedule) under Regulation 49 of the European Communities (Birds and Natural Habitats) Regulations, 2011

APPENDIX 6.3

HABITAT CHARACTERISTICS AND DESCRIPTIONS FROM THE FIELD SURVEYS

Habitat characteristics and descriptions from the Field Surveys referred to in Section 6.2.5

Figure 6.3

Buildings and Artificial Surfaces (BL3)

The Existing facility consists of a manufacturing plant, carpark, access road networks and associated buildings.

Re-colonised Bare Ground (ED3)

The recolonized areas are all partially recolonised with 'weed' species and common grasses like sweet vernal grass.

Hedgerows (WL2)

There are some hedgerows present on site which are vary in height and density.

Amenity Grassland (GA2) and Agricultural Grassland (GA1)

This habitat occurred in the centre of the industrial buildings as a managed grassy patch for landscaping purposes. It was dominated by Perennial Rye Grass Lolium perenne, it is currently maintained as an amenity area.

APPENDIX TO SECTION 7

LAND, SOILS, GEOLOGY & HYDROGEOLOGY

APPENDIX 7.1

IMPACTS RATING AND ASSESSMENT CRITERIA

Impact Ratings and Assessment Criteria (Soils, Geology and Hydrogeology)
The NRA criteria for rating the magnitude and significance of impacts at EIA stage on the geological related attributes are also relevant in determining impact assessment and area presented in Table 2 below.

Table 6.1 Criteria for rating site importance of Geological Features (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.

Table 6.2 Criteria for rating impact magnitude 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
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
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
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

The NRA criteria for estimation of the importance of hydrogeological attributes at the site during the EIA stage are summarised below.

Table 6.3 Criteria for rating Site Attributes - Estimation of Importance of Hydrogeology Attributes (NRA)

Magnitude of Impact	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
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 6.4 Criteria for Rating Impact Significance at EIS Stage – Estimation of Magnitude of Impact on Hydrogeology 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 6.5: Rating of Significant Environmental Impacts at EIS Stage (NRA)

Importance of Attribute	Magnitude of Importance			
	Neglible	**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

Table 6.6: Criteria for rating impact magnitude at EIS stage – Estimation of magnitude of impact on hydrology attributes (NRA, 2009)

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute and/ or quality and integrity of attribute	Loss or extensive change to a water body or water dependent habitat
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Calculated risk of serious pollution incident >1% annually2
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Increase in predicted peak flood level >10mm1
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	Negligible change in predicted peak flood level1
Minor Beneficial	Results in minor improvement of attribute quality	Calculated reduction in pollution risk of 50% or more where existing risk is <1% annually2
Moderate Beneficial	Results in moderate improvement of attribute quality	Calculated reduction in pollution risk of 50% or more where existing risk is >1% annually2
Major Beneficial	Results in major improvement of attribute quality	Reduction in predicted peak flood level >100mm1

Additional examples are provided in the NRA Guidance Document

1 Refer to Annex 1, Methods E and F, Annex 1 of HA216/06

1 Refer to Appendix B3 / Annex 1, Method D, Annex 1 of HA216/06

Source: 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' by the National Roads Authority (NRA, 2009)

Table 6.7 Criteria for Rating Impact Significance of Hydrological Attributes (NRA, 2009)

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

Source: 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' by the National Roads Authority (NRA, 2009)

APPENDIX TO SECTION 8

WATER & HYDROLOGY

APPENDIX 8.1

IMPACT RATINGS AND ASSESSMENT CRITERIA

EIAR Guideline tables for Hydrology

Table 7.1: Criteria for rating impact magnitude at EIS stage – Estimation of magnitude of impact on hydrology attributes (NRA, 2009)

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute and/ or quality and integrity of attribute	Loss or extensive change to a water body or water dependent habitat
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Calculated risk of serious pollution incident >1% annually2
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Increase in predicted peak flood level >10mm1
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	Negligible change in predicted peak flood level1
Minor Beneficial	Results in minor improvement of attribute quality	Calculated reduction in pollution risk of 50% or more where existing risk is <1% annually2
Moderate Beneficial	Results in moderate improvement of attribute quality	Calculated reduction in pollution risk of 50% or more where existing risk is >1% annually2
Major Beneficial	Results in major improvement of attribute quality	Reduction in predicted peak flood level >100mm1

Additional examples are provided in the NRA Guidance Document

1 Refer to Annex 1, Methods E and F, Annex 1 of HA216/06

1 Refer to Appendix B3 / Annex 1, Method D, Annex 1 of HA216/06

Source: 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' by the National Roads Authority (NRA, 2009)

Table 7.2 Criteria for Rating Impact Significance of Hydrological Attributes (NRA, 2009)

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

Source: 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' by the National Roads Authority (NRA, 2009)

APPENDIX TO SECTION 9

AIR QUALITY & CLIMATE

APPENDIX 9.1

DESCRIPTION OF THE AERMOD MODEL

The AERMOD dispersion model has been developed in part by the U.S. Environmental Protection Agency (USEPA)[1,2,3,4]. The model is a steady-state Gaussian model used to assess pollutant concentrations associated with industrial sources. The model is an enhancement on the Industrial Source Complex-Short Term 3 (ISCST3) model which has been widely used for emissions from industrial sources.

Improvements over the ISCST3 model include the treatment of the vertical distribution of concentration within the plume. ISCST3 assumes a Gaussian distribution in both the horizontal and vertical direction under all weather conditions. AERMOD with PRIME, however, treats the vertical distribution as non-Gaussian under convective (unstable) conditions while maintaining a Gaussian distribution in both the horizontal and vertical direction during stable conditions. This treatment reflects the fact that the plume is skewed upwards under convective conditions due to the greater intensity of turbulence above the plume than below. The result is a more accurate portrayal of actual conditions using the AERMOD model. AERMOD also enhances the turbulence of night-time urban boundary layers thus simulating the influence of the urban heat island.

In contrast to ISCST3, AERMOD is widely applicable in all types of terrain. Differentiation of the simple versus complex terrain is unnecessary with AERMOD. In complex terrain, AERMOD employs the dividing-streamline concept in a simplified simulation of the effects of plume-terrain interactions. In the dividing-streamline concept, flow below this height remains horizontal, and flow above this height tends to rise up and over terrain. Extensive validation studies have found that AERMOD (precursor to AERMOD with PRIME) performs better than ISCST3 for many applications and as well or better than CTDMPLUS for several complex terrain data sets[5].

Due to the proximity to surrounding buildings, the PRIME (Plume Rise Model Enhancements) building downwash algorithm has been incorporated into the model to determine the influence (wake effects) of these buildings on dispersion in each direction considered. The PRIME algorithm takes into account the position of the stack relative to the building in calculating building downwash. In the absence of the building, the plume from the stack will rise due to momentum and/or buoyancy forces. Wind streamlines act on the plume leads to the bending over of the plume as it disperses. However, due to the presence of the building, wind streamlines are disrupted leading to a lowering of the plume centreline.

When there are multiple buildings, the building tier leading to the largest cavity height is used to determine building downwash. The cavity height calculation is an empirical formula based on building height, the length scale (which is a factor of building height & width) and the cavity length (which is based on building width, length and height). As the direction of the wind will lead to the identification of differing dominant tiers, calculations are carried out in intervals of 10 degrees.

In PRIME, the nature of the wind streamline disruption as it passes over the dominant building tier is a function of the exact dimensions of the building and the angle at which the wind approaches the building. Once the streamline encounters the zone of influence of the building, two forces act on the plume. Firstly, the disruption caused by the building leads to increased turbulence and enhances horizontal and vertical dispersion. Secondly, the streamline descends in the lee of the building due to the reduced pressure and drags the plume (or part of) nearer to the ground, leading to higher ground level concentrations. The model calculates the descent of the plume as a function of the building shape and, using a numerical plume rise model, calculates the change in the plume centreline location with distance downwind.

The immediate zone in the lee of the building is termed the cavity or near wake and is characterised by high intensity turbulence and an area of uniform low pressure. Plume mass captured by the cavity region is re-emitted to the far wake as a ground-level volume source. The volume source is located at the base of the lee wall of the building, but is only evaluated near the end of the near wake and beyond. In this

[1] USEPA (2017) AERMOD Description of Model Formulation & Evaluation
[2] EPA (2010) Air Dispersion Modelling from Industrial Installations Guidance Note (AG4)
[3] USEPA (1995) User's Guide for the Industrial Source Complex (ISC3) Dispersion Model Vol I & II
[4] USEPA (2005) Guidelines on Air Quality Models, Appendix W to Part 51, 40 CFR Ch.1
[5] Schulman, L.L; Strimaitis, D.G.; Scire, J.S. (2000) Development and evaluation of the PRIME plume rise and building downwash model. Journal of the Air & Waste Management Association, 50, 378-390

region, the disruption caused by the building downwash gradually fades with distance to ambient values downwind of the building.

AERMOD has made substantial improvements in the area of plume growth rates in comparison to ISCST3[1,3]. ISCST3 approximates turbulence using six Pasquill-Gifford-Turner Stability Classes and bases the resulting dispersion curves upon surface release experiments. This treatment, however, cannot explicitly account for turbulence in the formulation. AERMOD is based on the more realistic modern planetary boundary layer (PBL) theory which allows turbulence to vary with height. This use of turbulence-based plume growth with height leads to a substantial advancement over the ISCST3 treatment.

Improvements have also been made in relation to mixing height[1,3]. The treatment of mixing height by ISCST3 is based on a single morning upper air sounding each day. AERMOD, however, calculates mixing height on an hourly basis based on the morning upper air sounding and the surface energy balance, accounting for the solar radiation, cloud cover, reflectivity of the ground and the latent heat due to evaporation from the ground cover. This more advanced formulation provides a more realistic sequence of the diurnal mixing height changes.

AERMOD also has the capability of modelling both unstable (convective) conditions and stable (inversion) conditions. The stability of the atmosphere is defined by the sign of the sensible heat flux. Where the sensible heat flux is positive, the atmosphere is unstable whereas when the sensible heat flux is negative the atmosphere is defined as stable. The sensible heat flux is dependent on the net radiation and the available surface moisture (Bowen Ratio). Under stable (inversion) conditions, AERMOD has specific algorithms to account for plume rise under stable conditions, mechanical mixing heights under stable conditions and vertical and lateral dispersion in the stable boundary layer.

AERMOD also contains improved algorithms for dealing with low wind speed (near calm) conditions. As a result, AERMOD can produce model estimates for conditions when the wind speed may be less than 1 m/s, but still greater than the instrument threshold.

APPENDIX 9.2

METEOROLOGICAL DATA AERMET

AERMOD incorporates a meteorological pre-processor AERMET (version 16216)[6]. AERMET allows AERMOD to account for changes in the plume behaviour with height. AERMET calculates hourly boundary layer parameters for use by AERMOD, including friction velocity, Monin-Obukhov length, convective velocity scale, convective (CBL) and stable boundary layer (SBL) height and surface heat flux. AERMOD uses this information to calculate concentrations in a manner that accounts for changes in dispersion rate with height, allows for a non-Gaussian plume in convective conditions, and accounts for a dispersion rate that is a continuous function of meteorology.

The AERMET meteorological preprocessor requires the input of surface characteristics, including surface roughness (z_0), Bowen Ratio and albedo by sector and season, as well as hourly observations of wind speed, wind direction, cloud cover, and temperature. A morning sounding from a representative upper air station, latitude, longitude, time zone, and wind speed threshold are also required.

Two files are produced by AERMET for input to the AERMOD dispersion model. The surface file contains observed and calculated surface variables, one record per hour. The profile file contains the observations made at each level of a meteorological tower, if available, or the one-level observations taken from other representative data, one record level per hour.

From the surface characteristics (i.e. surface roughness, albedo and amount of moisture available (Bowen Ratio)) AERMET calculates several boundary layer parameters that are important in the evolution of the boundary layer, which, in turn, influences the dispersion of pollutants. These parameters include the surface friction velocity, which is a measure of the vertical transport of horizontal momentum; the sensible heat flux, which is the vertical transport of heat to/from the surface; the Monin-Obukhov length which is a stability parameter relating the surface friction velocity to the sensible heat flux; the daytime mixed layer height; the nocturnal surface layer height and the convective velocity scale which combines the daytime mixed layer height and the sensible heat flux. These parameters all depend on the underlying surface.

The values of albedo, Bowen Ratio and surface roughness depend on land-use type (e.g., urban, cultivated land etc) and vary with seasons and wind direction. The assessment of appropriate land-use types was carried out in line with USEPA recommendations[7] and using the detailed methodology outlined by the Alaska Department of Environmental Conservation[8]. AERMET has also been updated to allow for an adjustment of the surface friction velocity (u*) for low wind speed stable conditions based on the work of Qian and Venkatram. Previously, the model had a tendency to over-predict concentrations produced by near-ground sources in stable conditions.

Surface roughness

Surface roughness length is the height above the ground at which the wind speed goes to zero. Surface roughness length is defined by the individual elements on the landscape such as trees and buildings. In order to determine surface roughness length, the USEPA recommends that a representative length be defined for each sector, based on an upwind area-weighted average of the land use within the sector, by using the eight land use categories outlined by the USEPA. The inverse-distance weighted surface roughness length derived from the land use classification within a radius of 1km from Shannon Airport Meteorological Station is shown in Table 9.2.1.

[6] USEPA (2004) User's Guide to the AERMOD Meteorological Preprocessor (AERMET)
[7] USEPA (2005) Guidelines on Air Quality Models, Appendix W to Part 51, 40 CFR Ch.1
[8] Alaska Department of Environmental Conservation (2008) ADEC Guidance re AERMET Geometric Means (http://dec.alaska.gov/air/ap/modeling.htm)

SECTOR	AREA WEIGHTED LAND USE CLASSIFICATION	SPRING	SUMMER	AUTUMN	WINTER[NOTE 1]
270-180	100% Grassland	0.05	0.10	0.01	0.01
180-270	100% Urban	1	1	1	1

Note 1 Winter defined as periods when surfaces covered permanently by snow whereas autumn is defined as periods when freezing conditions are common, deciduous trees are leafless and no snow is present (Iqbal (1983))[9]. Thus for the current location autumn more accurately defines "winter" conditions in Ireland.

Table 9.2.1 Surface Roughness based on an inverse distance weighted average of the land use within a 1km radius of Shannon Airport Meteorological Station.

Albedo

Noon-time albedo is the fraction of the incoming solar radiation that is reflected from the ground when the sun is directly overhead. Albedo is used in calculating the hourly net heat balance at the surface for calculating hourly values of Monin-Obuklov length. A 10km x 10km square area is drawn around the meteorological station to determine the albedo based on a simple average for the land use types within the area independent of both distance from the station and the near-field sector. The classification within 10km from Shannon Airport Meteorological Station is shown in Table 9.2.2.

AREA WEIGHTED LAND USE CLASSIFICATION	SPRING	SUMMER	AUTUMN	WINTER [NOTE 1]
6% Urban, 49% Grassland, 45% Water	0.151	0.143	0.172	0.172

Note 1 For the current location autumn more accurately defines "winter" conditions in Ireland.

Table 9.2.2 Albedo based on a simple average of the land use within a 10km × 10km grid centred on Shannon Airport Meteorological Station.

Bowen Ratio

The Bowen ratio is a measure of the amount of moisture at the surface of the earth. The presence of moisture affects the heat balance resulting from evaporative cooling which, in turn, affects the Monin-Obukhov length which is used in the formulation of the boundary layer. A 10km x 10km square area is drawn around the meteorological station to determine the Bowen Ratio based on geometric mean of the land use types within the area independent of both distance from the station and the near-field sector. The classification within 10km from Shannon Airport Meteorological Station is shown in Table 9.2.3.

AREA WEIGHTED LAND USE CLASSIFICATION	SPRING	SUMMER	AUTUMN	WINTER[NOTE 1]
19% Urban, 81% Grassland	0.301	0.557	0.655	0.655

Note 1 For the current location autumn more accurately defines "winter" conditions in Ireland.

Table 9.2.3 Bowen Ratio based on a geometric mean of the land use within a 10km × 10km grid centred on Shannon Airport Meteorological Station.

[9] Auer Jr, (1978) Correlation of Land Use and Cover with Meteorological Anomalies, Journal of Applied Meteorology 17(5):636-643

APPENDIX 9.3

DUST MINIMISATION PLAN

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, the UK[10,11,12,13] and the USA[14].

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 Shannon Airport). As the prevailing wind is predominantly westerly to easterly, locating construction compounds and storage piles downwind 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[12,13]. 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[14]. 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 were 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.

[10] Institute of Air Quality Management (2014) Guidance on the Assessment of Dust from Demolition and Construction
[11] The Scottish Office (1996) Planning Advice Note PAN50 Annex B: Controlling The Environmental Effects Of Surface Mineral Workings Annex B: The Control of Dust at Surface Mineral Workings
[12] UK Office of Deputy Prime Minister (2002) Controlling the Environmental Effects of Recycled and Secondary Aggregates Production Good Practice Guidance
[13] BRE (2003) Controlling Particles, Vapours & Noise Pollution From Construction Sites
[14] USEPA (1997) Fugitive Dust Technical Information Document for the Best Available Control Measures

Site Roads / Haulage Routes

Movement of construction trucks along site roads (particularly unpaved roads) can be a significant source of fugitive dust 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%[12].

- A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles using unpaved site roads;
- Access gates to the site shall be located at least 10m from sensitive receptors where possible;
- Bowsers or suitable watering equipment will be available during periods of dry weather throughout the construction period. Research has found that watering can reduce dust emissions by 50%[14]. Watering shall be conducted during sustained dry periods to ensure that unpaved areas are kept moist. The required application frequency will vary according to soil type, weather conditions and vehicular use;
- Any hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only.

Land Clearing / Earth Moving

Land clearing / earth-moving works during periods of high winds and dry weather conditions can be a significant source of dust.

- During dry and windy periods, and when there is a likelihood of dust nuisance, watering shall be conducted to ensure moisture content of materials being moved is high enough to increase the stability of the soil and thus suppress dust;
- During periods of very high winds (gales), activities likely to generate significant dust emissions should be postponed until the gale has subsided.

Storage Piles

- The location and moisture content of storage piles are important factors which determine their potential for dust emissions.
- Overburden material will be protected from exposure to wind by storing the material in sheltered regions of the site. Where possible storage piles should be located downwind of sensitive receptors;
- Regular watering will take place to ensure the moisture content is high enough to increase the stability of the soil and thus suppress dust. The regular watering of stockpiles has been found to have an 80% control efficiency[12];
- Where feasible, hoarding will be erected around site boundaries to reduce visual impact. This will also have an added benefit of preventing larger particles from impacting on nearby sensitive receptors.

Site Traffic on Public Roads

Spillage and blow-off of debris, aggregates and fine material onto public roads should be reduced to a minimum by employing the following measures:

- Vehicles delivering or collecting material with potential for dust emissions shall be enclosed or covered with tarpaulin at all times to restrict the escape of dust;
- At the main site traffic exits, a wheel wash facility shall be installed if feasible. All trucks leaving the site must pass through the wheel wash. In addition, public roads outside the site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary.

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

APPENDIX 10.1

GLOSSARY OF ACOUSTIC TERMINOLOGY

GLOSSARY OF 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 μPa).

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.

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 $L_{Ar,T}$.

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 10.2

FUNDAMENTALS OF ACOUSTICS

In order to provide a broad understanding of some of the technical discussion in this assessment, this section provides a brief overview of the fundamentals of acoustics and the basis for the preparation of this noise assessment.

A sound wave travelling through the air is a regular disturbance of the atmospheric pressure. These pressure fluctuations are detected by the human ear, producing the sensation of hearing. In order to take account of the vast range of pressure levels that can be detected by the ear, it is convenient to measure sound in terms of a logarithmic ratio of sound pressures. These values are expressed as Sound Pressure Levels (SPL) in decibels (dB).

The audible range of sounds expressed in terms of Sound Pressure Levels is 0dB (for the threshold of hearing) to 120dB (for the threshold of pain). In general, a subjective impression of doubling of loudness corresponds to a tenfold increase in sound energy which conveniently equates to a 10dB increase in SPL. It should be noted that a doubling in sound energy (such as may be caused by a doubling of traffic flows) increases the SPL by 3dB.

The frequency of sound is the rate at which a sound wave oscillates, and is expressed in Hertz (Hz). The sensitivity of the human ear to different frequencies in the audible range is not uniform. For example, hearing sensitivity decreases markedly as frequency falls below 250Hz. In order to rank the SPL of various noise sources, the measured level has to be adjusted to give comparatively more weight to the frequencies that are readily detected by the human ear. Several weighting mechanisms have been proposed but the 'A-weighting' system has been found to provide one of the best correlations with perceived loudness. SPL's measured using 'A-weighting' are expressed in terms of dB(A). An indication of the level of some common sounds on the dB(A) scale is presented in Figure 6.2.

The 'A' subscript denotes that the sound levels have been A-weighted. The established prediction and measurement techniques for this parameter are well developed and widely applied. For a more detailed introduction to the basic principles of acoustics, reference should be made to an appropriate standard text.

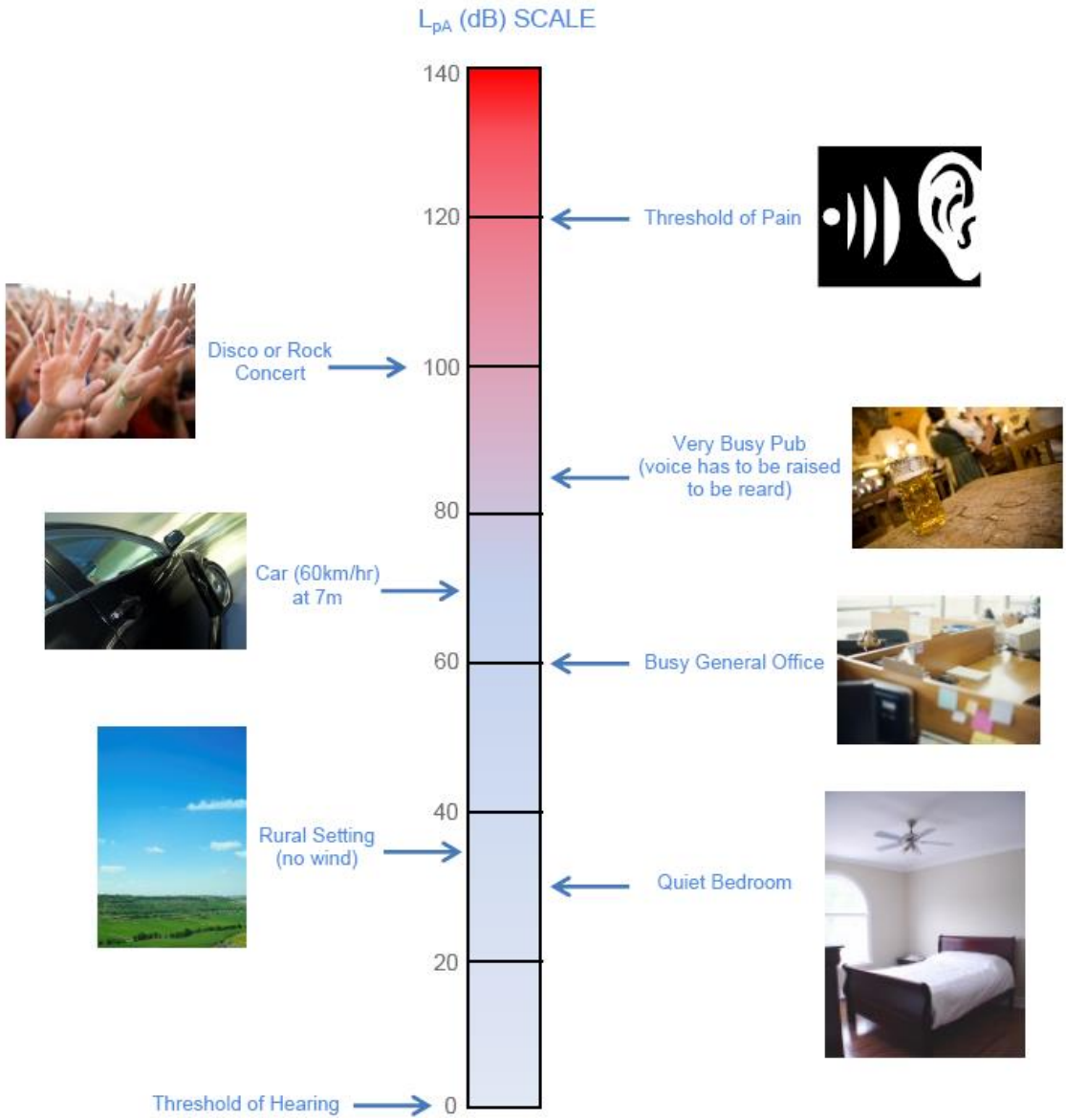


Figure A10.2 dB(A) Scale & Indicative Noise Levels – (EPA: Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4 – 2016)

APPENDIX TO SECTION 14

WASTE MANAGEMENT

APPENDIX 14.1

CONSTRUCTION AND WASTE DEMOLITION WASTE MANAGEMENT PLAN

The Tecpro Building,
Clonshaugh Business & Technology Park,
Dublin 17, Ireland.

T: + 353 1 847 4220
F: + 353 1 847 4257
E: info@awnconsulting.com
W: www.awnconsulting.com

APPENDIX 14.1

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT PLAN FOR ABBVIE, BALLYTIVNAN, SLIGO, CO. SLIGO

Report Prepared For

Jacobs Engineering
For Abbvie, Ballytivnan,
Sligo, Co. Sligo

Report Prepared By

Emer O' Brien Environmental Consultant

Our Reference

EOB/18/10006WMR01

Date of Issue

27 April 2018

Cork Office
Unit 5, ATS Building,
Carrigaline Industrial Estate,
Carrigaline, Co. Cork.
T: +353 21 438 7400
F: +353 21 483 4606

AWN Consulting Limited
Registered in Ireland No. 319812
Directors: F Callaghan, C Dilworth,
T Donnelly, E Porter
Associate Director: D Kelly

Document History

Document Reference		Original Issue Date	
EOB/18/10006WMR01		27 April 2018	
Revision Level	Revision Date	Description	Sections Affected

Record of Approval

Details	Written by	Approved by
Signature		
Name	Emer O' Brien	Elaine Neary
Title	Environmental Consultant	Associate Director
Date	27 April 2018	27 April 2018

DRAFT

CONTENTS

DRAFT

1.0 INTRODUCTION

AWN Consulting Ltd. (AWN) has prepared this Construction and Demolition (C&D) Waste Management Plan (WMP) on behalf of Jacobs Engineering for the proposed extension to the Abbvie manufacturing facility in Ballytivnan, Co. Sligo.

The purpose of this C&DWMP is to provide information necessary to ensure that the management of C&D waste at the site is undertaken in accordance with current legal and industry standards including the Waste Management Act 1996-2011 and associated Regulations [1], Protection of the Environment Act 2003 as amended [2], Litter Pollution Act 1997 as amended [3] and the *Connacht-Ulster Region Waste Management Plan 2015 – 2021* (2015) [4]. In particular, this C&DWMP aims to ensure maximum recycling, re-use and recovery of waste with diversion from landfill, where possible. It also seeks to provide guidance on the appropriate collection and transport of waste to prevent issues associated with litter or more serious environmental pollution (e.g. contamination of soil or water resources).

In the preparation of the C&DWMP consideration has been given to the requirements of national and regional waste policy, legislation and other guidelines (refer to Section 2.0). However, in determining the structure and content of the document, the following two publications have been referenced in particular:

- *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects, Department of the Environment, Heritage and Local Government (DoEHLG), 2006 [5].*
- *Construction and Demolition Waste Management – a handbook for Contractors and Site Managers, FÁS and the Construction Industry Federation, 2002 [6].*

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.

2.0 OVERVIEW OF WASTE MANAGEMENT IN IRELAND

2.1 National Level

The Irish Government issued a Policy Statement in September 1998, known as *Changing Our Ways*, which identified objectives for the prevention, minimisation, reuse, recycling, recovery and disposal of waste in Ireland [7]. The target for C&D waste in this Strategy was to recycle at least 50% of waste within a five year period (by 2003), with a progressive increase to at least 82% over fifteen years (by 2013) [7].

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 titled *Recycling of Construction and Demolition Waste* [8] concerning the development and implementation of a voluntary construction industry programme to meet the governments objectives for the recovery of construction and demolition waste.

The most recent national policy document was published in July 2012, entitled *A Resource Opportunity - Waste Management Policy in Ireland* [9]. This document stresses the environmental and economic benefits of better waste management, particularly in relation to waste prevention. The document sets out a number of actions in relation to C&D waste - it commits to undertake a review of specific producer responsibility requirements for C&D projects over a certain threshold.

The National Construction and Demolition Waste Council (NCDWC) was launched in June 2002, as one of the recommendations of the Forum for the Construction Industry, in the Task Force B4 final report. The NCDWC subsequently produced *Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects* in July 2006 in conjunction with the then Department of the Environment, Heritage and Local Government (DoEHLG).

The guidelines outline the issues that need to be addressed at the pre-planning stage of a development all the way through to its completion. 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;
- Waste disposal/recycling of C&D wastes at the site;
- Provision of training for waste manager and site crew;
- Details of proposed record keeping system;
- Details of waste audit procedures and plan; and
- Details of proposed consultation with relevant bodies i.e. waste recycling companies, Sligo County Council etc.

2.2 Regional Level

The Abbvie site on which the proposed extension is to be developed is located in the Local Authority area of Sligo County Council (SCC).

The *Connacht-Ulster Waste Management Plan 2015 – 2021* is the current regional waste management plan for the SCC area. The plan specifically includes a mandatory target of recycling and reuse of 70% of construction and demolition waste (excluding soil and stones) within the six year timeframe of the plan. Other mandatory targets include:

- A 1% reduction per annum in the quantity of household waste generated over the period of the plan;
- Achieve a reuse/recycling rate of 50% of municipal waste by 2020; and
- Reduce to 0% the direct disposal of residual municipal waste to landfill (from 2016 onwards) in favour of higher value pre-treatment processes and indigenous recovery practices.

Future targets set in the Plan for 2030 include:

- Preparing for reuse/recycling rate of 60-70% of municipal waste by 2030; and
- Reducing and where possible eliminating the landfilling of all major waste streams including municipal, industrial and construction and demolition wastes in favour of the recovery of residual wastes.

Municipal landfill charges in Ireland are based on the weight of waste disposed. Landfill charges are approximately €115-€120 per tonne of waste which includes a €75 per tonne landfill levy introduced under the *Waste Management (Landfill Levy) (Amendment) Regulations 2012.*

The *Sligo County Development Plan 2016 – 2023* [10] sets out a number of waste policies for Sligo county, in line with the policy and objectives of the regional waste management plan. The plan identifies the Council's commitment to the promotion of the Waste Hierarchy. Waste policies with a particular relevance to the proposed development are:

Policies:

P-WM-1: Promote the development of facilities in accordance with the waste hierarchy principle, which involves a shift towards prevention and waste minimisation measures, while developing recycling and reuse, disposal with energy recovery and, as the last option, disposal of residual waste to landfill.

P-WM-3: *Require the preparation of Waste Management Plans for the construction stages of developments where deemed necessary.*

P-WM-8: Development proposals on brownfield sites – such as former petrol stations, fuel/chemical storage areas and similar sites – shall be required to undertake an assessment if the potential for contaminated materials, soils etc to be unearthed during demolition/construction works, and the associated environmental risks. Where any environmental risk is identified, appropriate investigations shall be undertaken to determine the nature and extent of any materials or contaminated soils on the proposed development sites. A site-specific remediation plan shall be prepared to ensure that the construction and operation phases of development do not result in risk to human health, water quality, biodiversity, fisheries, air quality etc.

With regard to C&D waste specifically the Development Plan states that the Council will seek to promote the recycling and reuse of C&D waste. It will examine the scope for the recovery of C&D waste from local authority projects as well as the use of recycled construction materials in site development, road building and other infrastructural projects.

2.3 Legislative Requirements

The primary legislative instruments that govern waste management in Ireland and applicable to the project are:

- Waste Management Act 1996 (No. 10 of 1996) as amended 2001 (No. 36 of 2001), 2003 (No 27 of 2003) and 2011 (No. 20 of 2011). Sub-ordinate legislation includes:
    - European Communities (Waste Directive) Regulations 2011 (SI 126 of 2011) as amended 2011 (S.I. No. 323 of 2011) and 2016 (S.I 315 of 2016)
    - Waste Management (Collection Permit) Regulations (S.I No. 820 of 2007) as amended 2008 (S.I No 87 of 2008), 2015 (S.I. No. 197 of 2015) and 2016 (S.I. No. 24 and 346 of 2016)
    - Waste Management (Facility Permit and Registration) Regulations 2007, (S.I No. 821 of 2007) as amended 2008 (S.I No. 86 of 2008) as amended 2014 (S.I No. 320 and No. 546 of 2014) and as amended 2015 (S.I. No. 198 of 2015)
    - Waste Management (Licensing) Regulations 2000 (S.I No. 185 of 2000) as amended 2004 (S.I. No. 395 of 2004) and 2010 (S.I. No. 350 of 2010)
    - Waste Management (Packaging) Regulations 2014 (S.I. 282 of 2014) as amended 2015 (S.I No 542 of 2015)
    - Waste Management (Planning) Regulations 1997 (S.I. No. 137 of 1997)
    - Waste Management (Landfill Levy) Regulations 2015 (S.I. No. 189 of 2015)

  - European Union (Waste Electrical and Electronic Equipment) Regulations 2014 (S.I. No. 149 of 2014)
  - European Union (Batteries and Accumulators) Regulations 2014 (S.I. No. 283 of 2014) as amended 2014 (S.I. No. 349 of 2014) and 2015 (S.I. No. 347 of 2015)
  - Waste Management (Food Waste) Regulations 2009 (S.I. 508 of 2009), as amended 2015 (S.I. 190 of 2015) and European Union (Household Food Waste and Bio-waste) Regulation 2015 (S.I. No. 191 of 2015)
  - Waste Management (Shipment of Hazardous Waste) Regulations, 1998 (S.I. No. 147 of 1998) as amended
  - Waste Management (Hazardous Waste) Regulations, 1998 (S.I. No. 163 of 1998) as amended 2000 (S.I. No. 73 of 2000)
  - Waste Management (Shipments of Waste) Regulations, 2007 (S.I. No. 419 of 2007) as amended by European Communities (shipments of Hazardous Waste exclusicely within Ireland) Regulations 2011 (S.I No. 324 of 2011)
  - Waste Management (Movement of Hazardous Waste) Regulations, 1998 (S.I. No. 147 of 1998)
  - European Communities (Transfrontier Shipment of Waste) Regulations 1994 (S.I. No. 121 of 1994)
  - European Union (Properties of Waste which Render it Hazardous) Regulations 2015 (S.I. No. 233 of 2015)
- Planning and Development Act 2000 as amended (S.I. No. 30 of 2010) as amended (S.I. No. 310 of 2015)
- Protection of Environment Act 1992 as amended (S.I. No. 413 of 2003) as amended by the Planning and Development Act 2000 (No. 30 of 2000) as amended.
- Litter Pollution Act 1997 (S.I. No. 12 of 1997) as amended by Protection of the Environment (amendment) Act 2003 as amended.

These Acts and subordinate Regulations enable the transposition of relevant European Union Policy and Directives into Irish law.

One of the guiding principles of European waste legislation, which has in turn been incorporated into the *Waste Management Act 1996 - 2001* 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, 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 Abbvie ensures that the waste contractors engaged by 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 IED 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 DESCRIPTION OF THE PROJECT

3.1 Location, Size and Scale of the Development

The proposed new building and works will be located at the current Abbvie facility in Ballytivnan, Co. Sligo. The proposed development will comprise internal alterations to construct an integrated Bio-Chemical manufacturing facility sized 3,476 square meters within the building fabric of the existing Abbvie Ballytivnan Building. It comprises the construction of additional plant room internal mezzanines, sized 645 square meters within the existing building and an external single storey extension sized 20 square meters and 9 meters high, located to the North of the existing facility. Site works including revised road and car parks are planned and the yard layout will also be revised to facilitate ancillary services for the new building.

3.2 Overview of the Non-Hazardous Wastes to be produced

Hardstanding, made ground and subsoils will be excavated during the construction phase to facilitate construction of the new building, foundations and services.

It is expected that throughout the construction phase, waste will be produced from surplus materials such as broken or off-cuts of timber, concrete, tiles, bricks, etc. Waste from packaging (cardboard, plastic, timber) and oversupply of materials may 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 onsite during the construction phase. Waste printer/toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated infrequently from the site office.

3.3 Potential Hazardous Waste Arisings

3.3.1 Contaminated Soil

It is not expected that excavated contaminated soil will be encountered. However it is recommended that excavation works should be carefully monitored by a suitably qualified person to ensure any potentially contaminated soil is identified and segregated, if encountered. In the event that any potentially contaminated material is encountered, it will need to be segregated from clean/inert material, tested and classified as non-hazardous or hazardous using the HazWasteOnline application (or similar approved method), and then classified as inert, non-hazardous or hazardous in accordance with the European Communities (EC) Council Decision 2003/33/EC which establishes the criteria for the acceptance of waste at landfills [11].

3.3.2 Fuel/Oils

As fuels and oils are classed as hazardous materials, any on-site storage of fuel/oil, 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.

3.3.3 Asbestos

A survey was undertaken at the site for the purpose of identifying and managing any asbestos containing materials (ACMs) on the premises. ACMs were identified in a number of locations including steel pipes and the HVAC ducting. Removal of asbestos or ACMs will be carried out by a suitably qualified contractor and ACM's will only be removed from site by a suitably permitted/licensed waste contractor in accordance with *S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010 as amended and approved Codes of Practice.* All material will be taken to a suitably licensed or permitted facility.

3.3.4 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, waste electrical and electronic equipment (WEEE) containing hazardous components, batteries (Lead, Ni-Cd or Mercury) and/or fluorescent tubes and other mercury containing waste may be generated from the temporary site offices during construction works. These wastes, if encountered, will be stored in appropriate receptacles in designated areas of the site pending collection by an authorised waste contractor.

3.4 Main Construction and Demolition Waste Categories

The main non-hazardous and hazardous waste streams that may typically be generated by construction activities at the proposed site are presented in Table 3.1. The List of Waste code (also referred to as the European Waste code or EWC) for each waste stream is also shown.

Waste Material	LoW Code
Concrete, bricks, tiles, ceramics	17 01 01-03 & 07
Wood, glass and plastic	17 02 01-03
Bituminous mixtures, other than those mentioned in 17 03 01	17 03 02
Metals (including their alloys)	17 04 01-07
Soil and stones	17 05 04
Gypsum-based construction material	17 08 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 01-03
Chemicals (solvents, pesticides, paints, adhesives, detergents etc.)*	20 01 13, 19, 27-30
Insulation materials*	17 06 04

Table 3.1 Typical waste types generated and List of Waste Codes
(individual waste type may contain hazardous materials)*

4.0 ESTIMATED WASTE ARISINGS

4.1 Demolition Waste Generation

A small amount of demolition waste is expected to be generated in the preparation for the new development. The section of the existing building which is to be demolished to allow for the proposed new extension is constructed primarily of insulated cladding and steel. Other minimal quantities of demolition waste expected to be generated during this phase include concrete, metal, timber and some miscellaneous waste.

4.2 Construction Waste Generation

Table 4.1 shows the breakdown of construction waste types produced on a typical site based on data from EPA *National Waste Reports* [12] and research studies carried out by the EPA and Galway-Mayo Institute of Technology (GMIT) [13].

Waste Types	%
Mixed C&D	33
Timber	28
Plasterboard	10
Metals	8
Concrete	6
Other	15
Total	**100**

Table 4.1 Breakdown of waste materials generated on a typical Irish construction site

Table 4.2 shows the estimated construction waste generation for the proposed development based on the gross floor area of construction and other information available to date, along with indicative targets for management of the waste streams. The estimated waste amounts for the main waste types are based on an average large-scale development waste generation rate per m^2, typically using the waste breakdown rates shown in Table 4.2 with some amendments to reflect those construction materials to be used in the proposed development.

	Tonnes	Reuse/Recovery		Recycle		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	13.0	10	1.3	80	10.4	10	1.3
Timber	9.6	40	3.8	55	5.3	5	0.5
Metals	4.5	5	0.2	90	4.0	5	0.2
Concrete, Bricks, Tiles, Ceramics	2.1	30	0.6	65	1.3	5	0.1
Other	5.1	20	1.0	60	3.1	20	1.0
Total	34.3				24.2		3.1

Table 4.2 Estimated on- and off-site reuse, recycling and disposal rates for construction waste

Notwithstanding the information in Table 4.2, there will be hardstanding, made ground and subsoils to be excavated to facilitate the construction of the new building foundations, revised car park and ancillary services. Cut out and removal of flooring from the current building will be required and the project engineers (Jacobs Engineering) estimate the volume of concrete to be 120m^3. This is approximately

equivalent to 288 tonnes based on an average density of 2.4 tonnes per m^3. This material will be shipped off site as a waste.

Excavated material will be reused on site where possible, but it is currently anticipated that all of the excavated material will be removed off-site as waste. *Jacobs to confirm all to be removed off site.* Material derived from excavations that could be reused as engineering fill would have to be shown to be suitable for such use and will be subject to appropriate control and testing.

It should be noted that until final materials and detailed construction methodologies have been confirmed, it is difficult to predict with complete accuracy the construction waste that will be generated from the proposed works as the exact materials and quantities may be subject to some degree of change and variation during the construction process.

All waste arisings during the excavation and construction phase will be transported off site by an approved waste contractor holding a current waste collection permit. All waste arisings requiring reuse, recycling, recovery or disposal off-site will be brought to facilities holding the appropriate COR, licence or permit, as required.

4.3 Proposed Waste Management Options

4.3.1 Waste Management Options for Excavated Materials

It is expected that soil will be removed off site and in this case the following approach will be taken.

If the material is removed off-site for reuse as a by-product (and not as a waste), it will be done in accordance with Article 27 of the *European Communities (Waste Directive) Regulations 2011*. Article 27 requires that certain conditions are met and that by-product decisions are made to the EPA via their online notification form.

The Waste Management 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 bulk excavation phase.

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* [14] publication. Clean material may be used as fill material in this project, other construction projects or as engineering fill for waste licensed sites. Beneficial reuse of surplus excavation material as engineering fill may be subject to further testing to determine if materials meet the specific engineering standards for their proposed end-use.

In keeping with SCC's intent to promote the reuse and recycling of C&D waste, 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.

If the material is deemed to be a waste, then removal and reuse/recycling/ recovery/disposal of the material will be carried out in accordance with the *Waste Management Acts 1996 – 2011* as amended, the *Waste Management (Collection*

Permit) Regulations 2007 as amended and the *Waste Management (Facility Permit & Registration) Regulations 2007* as amended. The volume of waste removed will dictate whether a COR, permit or licence is required by the receiving facility. Once all available beneficial reuse options have been exhausted, the options of recycling and recovery at waste permitted and licensed sites will be considered.

Should it be decided that clean, excavated material will be disposed of at a suitable site yet to be permitted, it is advised that an application for a waste facility permit application be initiated a minimum of 2-4 months in advance of the date on which it is expected the material will be required to be removed to the proposed site for disposal.

In the unlikely 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).

4.3.2 Waste Management Options for other Construction Waste

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. There will be skips and receptacles provided to facilitate segregation at source. All waste receptacles leaving site will be covered or enclosed. The appointed approved waste contractor will collect and transfer the wastes as receptacles are filled.

All waste arisings will be handled by an approved waste contractor holding a current waste collection permit. All waste arisings requiring reuse, recycling, recovery or disposal off site will be transferred to a facility holding the appropriate COR, permit or licence, as required.

Mixed C&D waste (classified under the List of Waste code 17 09 04) is permitted for acceptance at a number of waste facilities in the region.

Written records will be maintained by the contractor detailing the waste arising throughout the excavation and construction phases, the classification of each waste type, the contact details and waste collection permit number of all waste contractors who collect waste from the site and the end destination details for all waste removed and disposed off-site.

Dedicated storage containers will be provided for hazardous wastes which may arise such as batteries, paints, oils, chemicals etc., as required. The containers used for storing hazardous liquids will be appropriately bunded or will be stored on suitably sized spill pallets.

The management of the main waste streams are detailed as follows:

Bedrock

It is not expected that bedrock will be encountered during excavations. However, in the unlikely event bedrock should be encountered, it will either be crushed onsite and used for infill during construction where possible, or be removed from the site by permitted/licensed contractors under the *Waste Management Act 1996 - 2011*, *Waste Management (Facility Permit & Registration) Regulations 2007* as amended, and the *Waste Management (Collection Permit) Regulations 2007* as amended and reused or disposed of off-site.

If it is to be reused on another site as by-product (and not as a waste), this will need to be done in accordance with Article 27 of the *EC (Waste Directive) Regulations, 2011*.

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 or reused where possible.

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 placed into a dedicated skip and recycled off-site. Clean timber is typically recycled as chipboard.

Metal

Metals will be segregated into mixed ferrous, aluminium cladding, high grade stainless steel, low grade stainless steel etc., 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 phase 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 and Electronic Equipment

Waste electrical and electronic equipment (WEEE) will be stored in dedicated covered cages/receptacles/pallets pending collection for recycling off site.

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

Construction 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 6.0 of this report) to determine if recyclable materials have been placed in there by mistake. If this is the case, efforts will be made to determine why the waste has not been segregated

correctly and recyclable waste will be removed and placed into the appropriate receptacle.

Hazardous Wastes

On-site storage of any hazardous wastes produced (i.e. contaminated soil 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.

It should be noted that until the Main Contractor is appointed, it is not possible to provide information on the specific destinations of each waste stream. Prior to commencement of the development and removal of any waste off site, details of the proposed destination of each waste stream will be provided to SCC.

4.4 Tracking and Documentation Procedures for Off-Site Waste

All waste will be documented prior to leaving the site. Waste will be weighed by the waste contractor, either by weighing mechanism on the truck or at the receiving facility. These waste records will be maintained on site by the contractor.

All movement of waste and the use of waste contractors will be undertaken in accordance with the *Waste Management Acts 1996 – 2011* as amended, *Waste Management (Collection Permit) Regulations 2007* as amended and *Waste Management (Facility Permit & Registration) Regulations 2007* as amended. This includes the requirement for all waste contractors to have a waste collection permit issued by the NWCPO. The nominated project Waste Manager (see Section 6.0) 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/IED Licence for that site will be provided to the nominated project waste manager (see Section 6.0). If the waste is being shipped abroad, a copy of the Transfrontier Shipping (TFS) notification document will be obtained from Dublin City Council (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.

If any surplus soil or stone is being removed from the site for reuse on another construction site as a by-product, this will need to be done in accordance with Article 27 of the *EC (Waste Directive) Regulations, 2011*. Similarly, if any soil or stone are imported onto the site from another construction site as a by-product, this will also be done in accordance with Article 27.

All information will be entered in a waste management recording system to be maintained on site.

5.0 ESTIMATED COST OF WASTE MANAGEMENT

An outline of the costs associated with different aspects of waste management is provided 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.

5.1 Reuse

By reusing materials on site, there will be a reduction in the transport and off-site recycling/recovery/disposal costs associated with the requirement for a waste contractor to take the material away to landfill.

Clean and inert excavated material which cannot be reused on site may be used as capping material for landfill sites, or for the reinstatement of quarries, etc. This material is often taken free of charge for such purposes, reducing final waste disposal costs.

5.2 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 typically charge less to take segregated wastes, such as recyclable waste, from a site than mixed waste.

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.

5.3 Disposal

Landfill charges in Ireland are currently at around €115-€120/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 fee for provision and collection of 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 registered, permitted or licensed facility and, where possible, remove salvageable items from the waste stream before disposing of the remainder to landfill.

6.0 TRAINING PROVISIONS

A member of the construction team will be appointed as the Waste Manager to ensure commitment, operational efficiency and accountability during the excavation and construction phases of the project.

6.1 Waste Manager Training and Responsibilities

The nominated Waste Manager will be given responsibility and authority to select a waste team if required, i.e. members of the site crew that will aid him/her in the organisation, operation and recording of the waste management system implemented on site. The Waste Manager will have overall responsibility to oversee, record and provide feedback to the Project Manager 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 Waste Manager 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 Waste Manager 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 C&DWMP.

6.2 Site Crew Training

Training of the site crew is the responsibility of the Waste Manager and, as such, a waste training program should be organised. A basic awareness course will be held for all site crew to outline the C&DWMP 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. A sub-section on hazardous wastes will be incorporated into the training program and the particular dangers of each hazardous waste will be explained.

7.0 RECORD KEEPING

Records will be kept for all waste material which leaves the site, either for reuse on another site, recycling, recovery or disposal. A recording system will be put in place to record the construction waste arisings on site. A copy of the Waste Collection Permits, COR, Waste Facility Permits and Waste/IED Licences will be maintained on site at all times.

The Waste Manager or delegate will record the following;

- Waste taken for reuse off site;
- Waste taken for recycling;
- Waste taken for disposal; and
- Reclaimed waste materials brought on site for reuse.

For each movement of waste on or off site, a signed docket will be obtained by the Waste Manager from the waste contractor, detailing the weight and type of the material and the source and destination of the material. This will be carried out for each material type. This system will also be linked with the delivery records. In this way, the percentage of construction waste generated for each material can be determined.

The system will allow the comparison of these figures with the targets established for the recovery, reuse and recycling of construction waste presented earlier and to highlight the successes or failures against these targets.

8.0 OUTLINE WASTE AUDIT PROCEDURE

8.1 Responsibility for Waste Audit

The appointed Waste Manager will be responsible for auditing the site during the construction phase of the project.

8.2 Review of Records and Identification of Corrective Actions

A review of all the records for the waste generated and transported on or off-site should be undertaken mid-way through the 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 reuse/recovery/recycling/disposal 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. Waste management costs will also be reviewed.

Upon completion of the construction phase, a final report will be prepared, summarising the outcomes of waste management processes adopted and the total reuse, recycling, recovery and disposal figures for the development.

9.0 CONSULTATION WITH RELEVANT BODIES

9.1 Sligo County Council

Once the Main Contractor has been appointed and prior to removal of any waste materials offsite, details of the proposed destination of each waste stream will be provided to SCC for their approval.

SCC will also be consulted, as required, throughout the construction phase 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.

9.2 Recycling/Salvage Companies

Companies that specialise in C&D waste management will be contacted to determine their suitability for engagement. Where a waste contractor is engaged, each company will be audited in order to ensure that relevant and up-to-date waste collection permits and facility COR/permits/licences are held. In addition, information regarding individual construction materials will be obtained, including 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.

DRAFT

10.0 REFERENCES

1. Waste Management Act 1996 (No. 10 of 1996) as amended. Sub-ordinate and associated legislation includes:
   - European Communities (Waste Directive) Regulations 2011 (S.I. No. 126 of 2011) as amended.
   - Waste Management (Collection Permit) Regulations 2007 (S.I. No. 820 of 2007) as amended.
   - Waste Management (Facility Permit and Registration) Regulations 2007 (S.I No. 821 of 2007) as amended.
   - Waste Management (Licensing) Regulations 2000 (S.I No. 185 of 2000) as amended.
   - European Union (Packaging) Regulations 2014 (S.I. No. 282 of 2014) as amended.
   - Waste Management (Planning) Regulations 1997 (S.I. No. 137 of 1997) as amended.
   - Waste Management (Landfill Levy) Regulations 2015 (S.I. No. 189 of 2015)
   - European Union (Waste Electrical and Electronic Equipment) Regulations 2014 (S.I. No. 149 of 2014)
   - European Union (Batteries and Accumulators) Regulations 2014 (S.I. No. 283 of 2014) as amended.
   - Waste Management (Food Waste) Regulations 2009 (S.I. No. 508 of 2009) as amended.
   - European Union (Household Food Waste and Bio-waste) Regulations 2015 (S.I. No. 191 of 2015)
   - Waste Management (Hazardous Waste) Regulations 1998 (S.I. No. 163 of 1998) as amended.
   - Waste Management (Shipments of Waste) Regulations 2007 (S.I. No. 419 of 2007) as amended.
   - European Communities (Transfrontier Shipment of Waste) Regulations 1994 (S.I. No. 121 of 1994)
   - European Communities (Shipments of Hazardous Waste exclusively within Ireland) Regulations 2011 (S.I. No. 324 of 2011)
   - European Union (Properties of Waste which Render it Hazardous) Regulations 2015 (S.I. No. 233 of 2015)
2. Environmental Protection Act 1992 (Act No. 7 of 1992) as amended by the Planning and Development Act 2000 (Act No. 30 of 2000) as amended and the Protection of the Environment Act 2003 (Act No. 27 and S.I. No. 413 of 2003)
3. Litter Pollution Act 1997 (Act No. 12 of 1997) as amended by the Litter Pollution Regulations 1999 (S.I. No. 359 of 1999) and Protection of the Environment Act 2003, as amended.
4. Connacht-Ulster Region Waste Management Plan 2015 – 2021 (2015).
5. Department of the Environment, Heritage and Local Government, "*Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects*" (2006).
6. FÁS and the Construction Industry Federation (CIF), *Construction and Demolition Waste Management – a handbook for Contractors and Site Managers* (2002).
7. Department of Environment and Local Government (DoELG) *Waste Management – Changing Our Ways, A Policy Statement* (1998).

DRAFT

8. Recycling of Construction and Demolition Waste – Forum for the Construction Industry.
9. Department of Environment, Communities and Local Government (DoECLG), *A Resource Opportunity - Waste Management Policy in Ireland* (2012).
10. Sligo County Council (SCC), County Development Plan 2017-2023 Volume 1 (2017)
11. 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.
12. Environmental Protection Agency (EPA), *National Waste Database Reports 1998 – 2012*
13. 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)
14. EPA, *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* (2015)

DRAFT