Environmental Impact Statement

Alexion
Proposed Manufacturing Facility
IE0311488-22-RP-0002, Issue: A

Issue date: 08 May 2015

Document Sign Off

Environmental Impact Statement

Alexion
Proposed Manufacturing Facility
IE0311488-22-RP-0002, Issue A

File No: IE0311488.22.080

CURRENT ISSUE					
Issue No: A	Date: 08/05/2015	Reason for issue: For Planning			
Sign Off	Originator	Checker	Reviewer	Approver	Customer Approval (if required)
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Signature	**Authorised Electronically**				
Date	08/05/2015		08/05/2015	08/05/2015	

PREVIOUS ISSUES							
Issue No	Date	Originator	Checker	Reviewer	Approver	Customer	Reason for issue

This Environmental Impact Statement has been prepared by PM Group with specialist input for document preparation and supporting reports from key consultants as summarised below:

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Glossary of Terms

AA	Appropriate Assessment
AADT	Annual Average Daily Traffic
AERMOD	Air dispersion modelling software
AG4	EPA Air Dispersion Modelling from Industrial Installations Guidance Note
AGI	Above Ground Installation
AHU	Air Handling Unit
AQSs	Air Quality Standards
ARCADY	Assessment of Roundabout Capacity and Delay – Traffic Computer Programme
As	Arsenic
BAT	Best Available Technology
BCI	Bat Conservation Ireland
BCT	Bat Conservation Trust
BD I	Birds Directive Annex I
Bgl	below ground level
BL	Boundary Location
BMS	Bristol Myers Squibb
BOD	Biochemical Oxygen Demand
BREF	BAT Reference Document
BS	British Standard
CCTV	Closed Circuit Television
Cd	Cadmium
CEMP	Construction Environmental Management Plan
CFRAMS	Catchment Flood Risk Assessment and Management Study
cGMPs	current Good Manufacturing Practices
CIP	Clean in Place
CMO	Contract Manufacturing Operation
CMP	Construction Management Plan
CMT	Construction Management Team
COD	Chemical Oxygen Demand
COP_{19}	Conference of Parties on Climate Change
CO	Carbon Monoxide
CO_2	Carbon Dioxide

cSAC	candidate Special Area of Conservation
CSM	Conceptual Site Model
CTMP	Construction Traffic Management Plan
CUB	Central Utilities Building
C&D	Construction & Demolition
C_6H_6	Benzene
dB	Decibel, standard unit for expressing the noise level (sound pressure level).
dBA	A-weighted Decibel Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sound of different frequency (pitch) in a similar way to the human ear.
DMRB	Design Manual for Roads and Bridges
DoECLG	Department of the Environment, Community and Local Government
DoAHG	Department of Arts, Heritage and the Gaeltacht
EC	European Community
EcIA	Ecological Impact Assessment
ED	Electoral Division
EEC	European Economic Community
EIS	Environmental Impact Statement
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMS	Environmental Management System
EMEA	European Medicines Agency
EPA	Environmental Protection Agency
ESB	Electricity Supply Board
ETS	Emissions Trading Scheme
EU	European Union
EWC	European Waste Catalogue
FCC	Fingal County Council
FDA	US Food and Drug Administration
FDI	Foreign Direct Investment
FPO	Flora Protection Order
GHG	Green House Gas
GLCs	Ground Level Concentrations
GMM	Genetically Modified Microorganisms

GMO	Genetically Modified Organisms
GSI	Geological Survey of Ireland
HDII/IV	EC Habitats Directive Annexes II/IV
HGV	Heavy Goods Vehicle
HSA	Health and Safety Authority
HT	High Technology
HVAC	Heating, Ventilation and Air Conditioning
Hz	Hertz
IAA	Irish Aviation Authority
IDA	Industrial Development Authority
IED	Industrial Emissions Directive
IEEM	The Institute of Ecology and Environmental Management
IGH	Irish Geological Heritage
IGI	Institute of Geologists of Ireland
IEL	Industrial Emissions Licence
IMB	Irish Medicines Board
IPPC	Integrated Pollution and Prevention Control
ISO	International Standard Organisation
kVA	Kilo Volt Amps
kV	Kilo Volt
LA_{eq},T	The equivalent continuous sound level – the sound pressure level of a steady sound having the same energy as a fluctuating sound over a specified measuring period (T). It can be considered similar to an average level. The LAeq value is the A-weighted Leq.
LA_{90}	The A-weighted sound pressure level exceeded for 90% of the monitoring period and is a good indicator of the background noise level excluding peak noise events.
LA_{10}	The A-weighted sound pressure level exceeded for 10% of the monitoring period and is a good parameter for expressing event noise such as passing traffic.
LA_{Max} (dBA)	The maximum RMS A-weighted sound pressure level occurring within a specified time period.
$LA_{r,T}$ (dBA)	The Rating Noise Level - the equivalent continuous A-weighted sound pressure level during a specified time interval, T, plus specified adjustments for tonal character and impulsiveness of the sound.
LAP	Local Area Plan
LCP	Large Combustion Plants
LPHW	Low Pressure Hot Water

mBTOC	depth of water below top of well casing
MIAI	Member of the Institute of Archaeologists of Ireland
mOD	depth of water in metres ordnance datum
MVA	Mega Volt Amps
MW	Megawatts
MW	Monitoring Well (groundwater)
NG4	EPA Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities
Ni	Nickel
NIAH	National Inventory of Architectural Heritage
NMI	National Museum of Ireland
NMP	Noise Monitoring Points
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides expressed as Nitrogen Dioxide
NPWS	National Parks and Wildlife Service
NRA	National Roads Authority
NSL	Noise Sensitive Location
OCM	O Callaghan Moran
OD	Ordnance Datum
OFG	Oils, Fats and Greases
OPW	Office of Public Works
OSI	Ordnance Survey of Ireland
O_3	Ozone
PAHs	Poly Aromatic Hydrocarbons
Pb	Lead
PE	Population Equivalents
PID	Photo Ionisation Detector
PLC	Programmable Logic Controller
PM	Project Management
PM_{10}	Particulate Matter less than 10 microns in diameter
$PM_{2.5}$	Particulate Matter less than 2.5 microns in diameter
pNHA	proposed Natural Heritage Area
PPE	Personal Protective Equipment
PPV	Peak Particle Velocity
PSDP	Project Supervisor, Design Process

PSCS	Project Supervisor Construction Stage
QC	Quality Control
RBD	River Basin District
RFC	Ratio of Flow to Capacity
RMS	Root Mean Square
RMP	Record of Monuments and Places
RO	Reverse Osmosis
RPS	Record of Protected Structures
R&D	Research and Development
SAC	Special Area of Conservation
SB	Soil Boring
SI	Statutory Instrument
SMR	Sites and Monuments Record
SO_4	Sulphates
SO_2	Sulphur Dioxide
SPA	Special Protection Area
SUDS	Sustainable Urban Drainage Systems
TKN	Total Kjeldahl Nitrogen
Total P	Total Phosphorus
TOC	Total Organic Carbon
TP	Trial Pit
TSS	Total Suspended Solids
UF/DF	Ultrafiltration/Diafiltration
UNFCCC	United Nations Framework Convention on Climate Change
USEPA	United States Environmental Protection Agency
UWWTP	Urban Waste water Treatment Plant
VOC	Volatile Organic Compounds
VSD	Variable Speed Drive
WA	Wildlife Acts
WEEE	Waste Electrical and Electronic Equipment

WFD	Water Framework Directive
WFO	Water for Operations
WFI	Water for Injection
WMU	Water Management Units
WWTP	Waste Water Treatment Plant

0 Non-Technical Summary

0.1 Introduction

This is a summary, in non-technical language, of the findings of the Environmental Impact Statement (EIS). It is presented under the same chapter headings as the EIS Volume 1 – Main Document.

Alexion Pharmaceuticals, Inc. (Alexion) is a global biopharmaceutical company focused on serving patients with severe and ultra-rare disorders through the innovation, development and commercialisation of life-transforming therapeutic products. Alexions key product is Soliris® (eculizumab).

Headquartered in Cheshire, Connecticut, today, Alexion has more than 2,200 employees worldwide, including operations in more than 30 European countries, to serve patients with severe and life-threatening rare diseases.

Alexion has identified a need for additional manufacturing capacity for its products in Europe. To fulfil this need Alexion is in the process of establishing a new biopharmaceutical campus in IDA Irelands College Business & Technology Park at Blanchardstown, Dublin 15 (referred to as College Park), for the manufacturing of pharmaceutical products.

The site location is shown in Figure 1.1 and Figure 1.2.

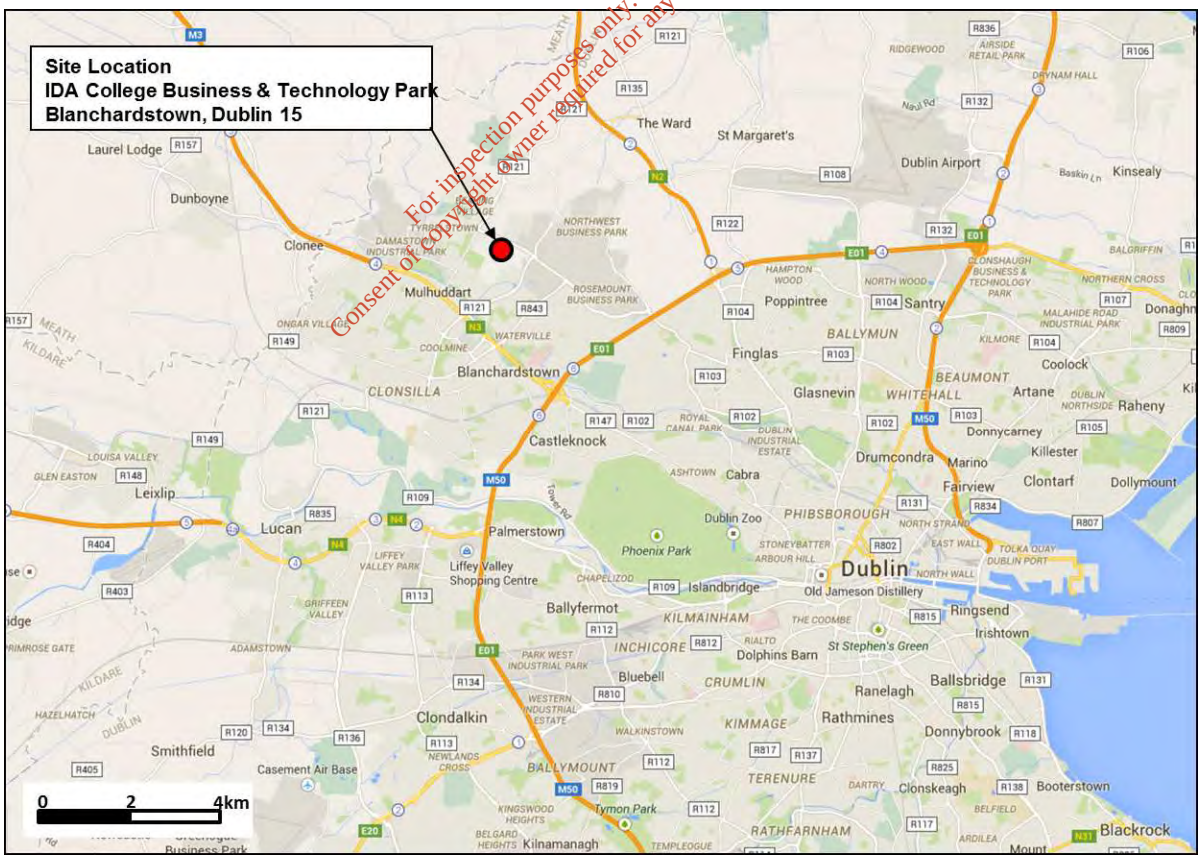


Figure 1.1 Site Location – Blanchardstown Dublin 15

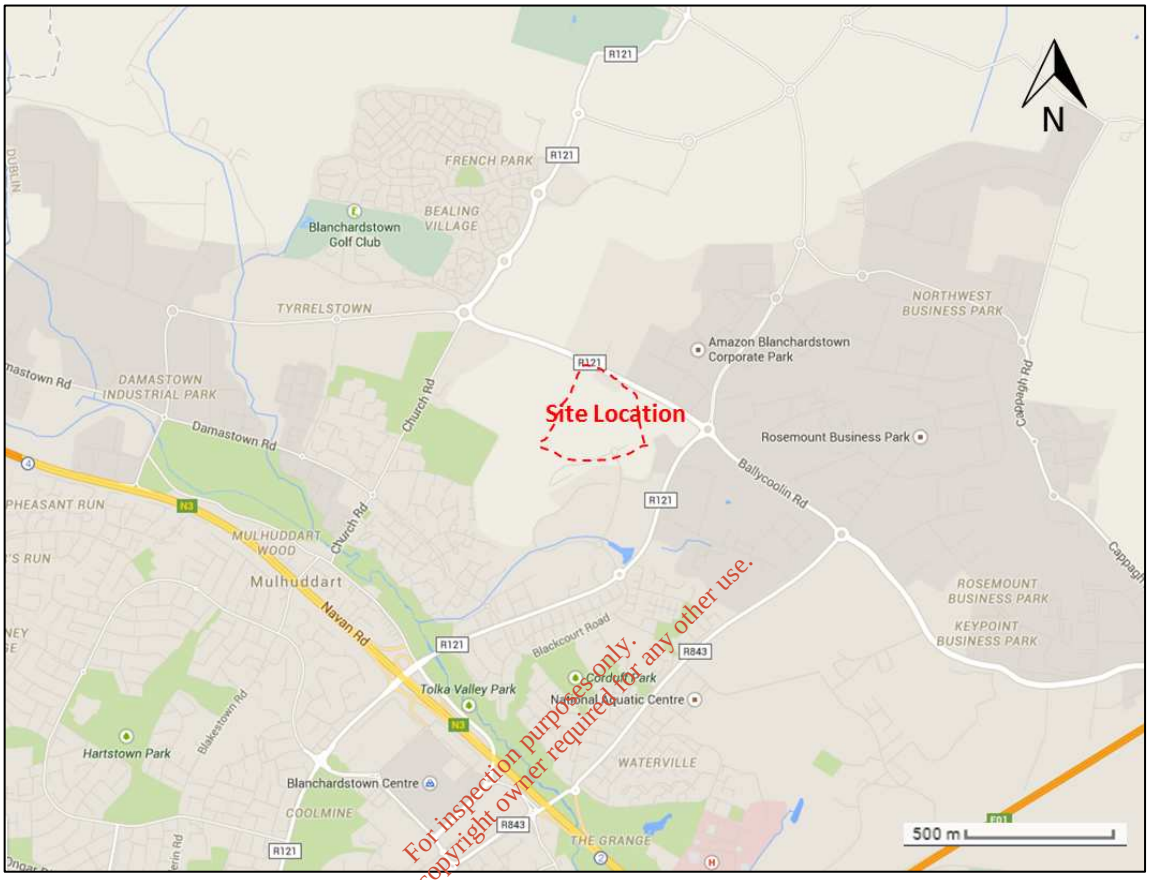


Figure 1.2 Site Location, College Park, Blanchardstown Dublin 15

The site is 16.8ha. site within the IDA Ireland College Park at Blanchardstown, Dublin 15. According to the Fingal County Development Plan 2011-2017 it is zoned as HT – office, research and development and high technology/high technology manufacturing type employment in a high quality built and landscaped environment.

Alexion intends to manufacture a variety of therapeutic proteins at College Park that are either approved for marketing by various region or country regulatory bodies or are involved in late stage clinical studies. These proteins will be produced to the bulk or formulated state, and filled for shipping from the site at College Park.

Phase 1 of the College Park development i.e. the construction of a 5 storey office building and roof top plant room, QC laboratories, packaging / warehouse, utility building and spine corridor and a Data Centre was granted planning permission by Fingal County Council in May 2014, with a further grant of planning permission for certain changes to Phase 1 granted in January 2015.

The proposed Manufacturing facility (Phase 2 of the biopharmaceutical campus) to which this planning application and EIS relate, incorporates the development of a Manufacturing building, Central Utilities Building (CUB), Warehouse and associated support buildings and external utilities.

As part of Phase 1 there will be approximately 290 employees when operational, including administration, laboratory, logistics and support personnel. Phase 2 will lead to the employment of an additional 280 staff; this will include both management and operational employees. This would lead to a total headcount of 570 for the Alexion College Park campus.

A number of permits/licences will be sought from the Environmental Protection Agency (EPA, namely an Industrial Emissions Licence (IEL), a notification to the EPA under the requirements of

the Genetically Modified Organisms (Contained Use) Regulations, as a Class 1 (lowest risk) activity and a Greenhouse Gas Permit under the EU Emissions Trading Directive.

A screening exercise for Appropriate Assessment has been carried out.

A scoping exercise to inform the content of the EIS was carried out, including consultation meetings with Fingal County Council, EPA and other interested parties. All of the comments, suggestions and written responses provided were taken into account in the preparation of this EIS and where relevant the responses are detailed in the specific sections of the EIS

0.2 Description of the Proposed Development

Project Overview

The proposed Manufacturing facility (Phase 2 of the biopharmaceutical campus) will comprise of the construction of the following building and facilities as an extension to the Phase 1 development;

- New Manufacturing Building: 4 storey building with intermediate level mezzanines
- New 2 storey Central Utilities Building (CUB) located to the north of the Phase 1 warehouse;
- New single storey Warehouse extension to the east and north sides of the Phase 1 warehouse building;
- A utilities yard and waste water treatment area to the rear (north) of the Phase 2 area. The ancillary external utilities within the utility yard will consist of; a single storey control building, single storey pump house, single-storey drum storage building, single storey electrical building, process water and waste water storage tanks, bunded water treatment chemical tanks, bunded diesel storage tank and back-up electrical generators;

  Each of these facilities will be accessible via a single-storey internal access corridor running through the spine of the campus with elevated utility rack;
- A staff entrance lobby extension to the western elevation of the Phase 1 internal access corridor;
- Car parking for an additional 220 vehicles is proposed in an area to the west of the campus;
- An electrical substation building with separate access off Cruiserath Road;
- Provision of temporary construction access off Cruiserath Road to be maintained as an emergency vehicle access and egress following construction;
- Ancillary site works including additional internal access roads, an additional fire water sprinkler tank, underground services, lighting, CCTV, soft and hard landscaping and increase to size of surface water attenuation pond to the southeast of the site.

See Figure 2.1 for site layout (Phase 1 shown in shaded red).

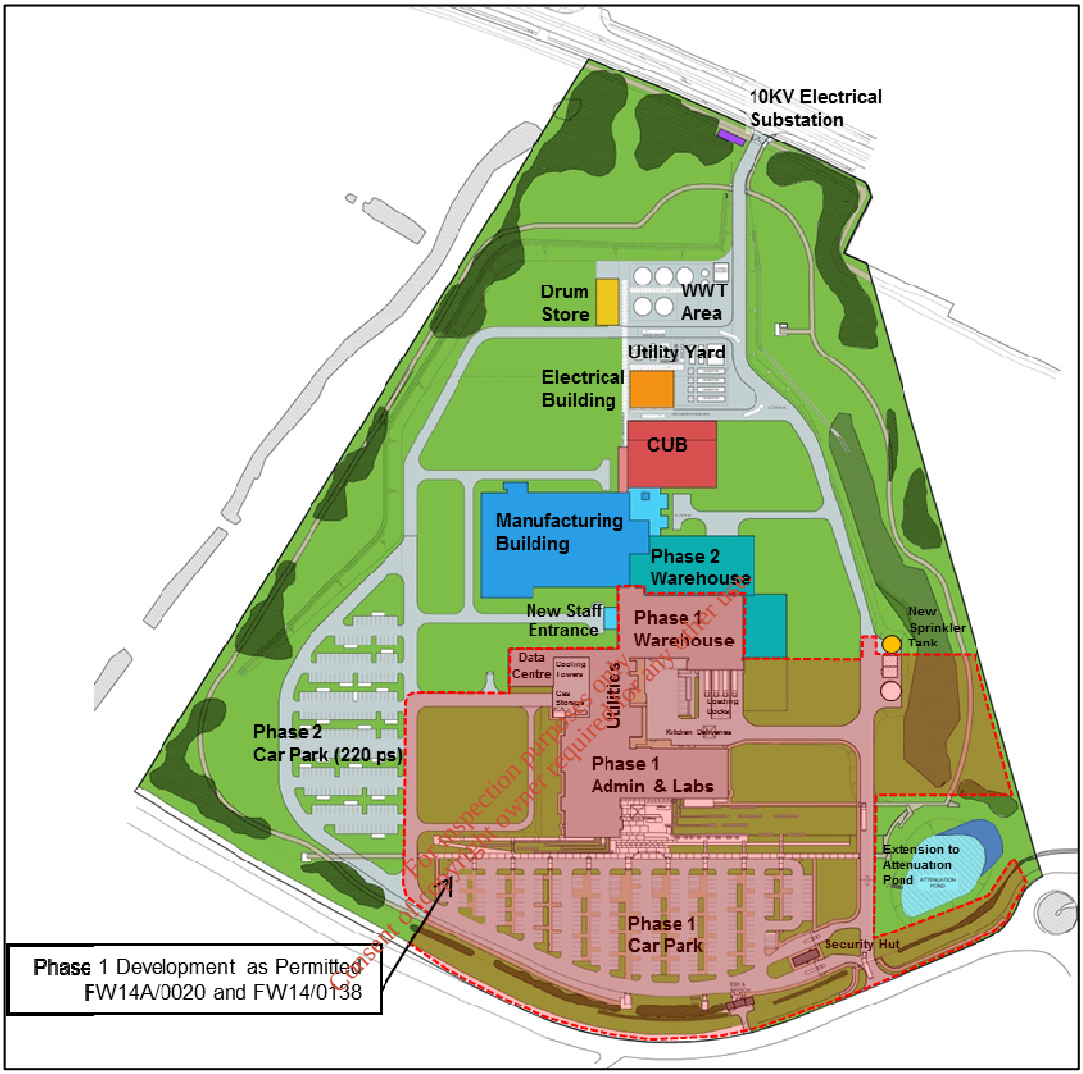


Figure 2.1 Site Layout Plan

The schedule of areas is shown in Table 2.1. The Manufacturing building will be approximately 21,869m^2. The manufacturing building is supported by a single storey warehouse to the east, and by a new single storey CUB north of the warehouse. Site Infrastructure is upgraded to support the manufacturing including the provision of a Waste Water treatment area located to the north of the buildings.

Table 2.1 Schedule of Areas

Building	Area (m^2)
Manufacturing Building including spine corridor	21,869
Warehouse Extension	3,626
Central Utilities Building	4,563
Electrical Building	448
Waste Water Control Building	38
Process Water Pump House	10
Drum Storage Building	323

Building	Area (m^2)
Electrical Substation Building	49
Staff Entrance Lobby Extension	68
Total	**30,994**

Once operational, the Phase 2 development will be fully integrated with the current Phase 1 facility. Staff, personnel and visitor access to the facility will be via the College Park entrance to the south of the facility. The current temporary construction access to the site from Cruiserath Road will be retained, but only for use as a point of emergency access and egress.

Description of the Production Process

The manufacturing processes to be employed by Alexion in the new manufacturing facility will follow what are now considered as industry standard techniques for the production of "medicines for patients" using biotechnology derived processes. Today, this approach is favoured over traditional organic chemistry routes used in the past because it is capable of yielding more complex molecules for medicinal applications, is more efficient in terms of productivity, poses lower safety risks, and has less environmental impact in terms of hazardous chemicals used or waste generated for disposal.

Description of the Proposed Buildings

A 3D representation of the Manufacturing Building is shown in Figure 2.1. The Manufacturing Building comprises a 4 storey, steel-framed structure approximately 42.5m high. There are reinforced-concrete suspended slabs at Levels 1, 2 and 3, and a reinforced-concrete, ground-supported slab at Level 0. Floor-to-floor layout is as summarised follows:

- Level 3: Cell Culture and Media and Buffer Preparation
- Level 2: Buffer Hold and access from Harvest
- Level 1: Purification
- Level 0: Utilities

The CUB Building comprises a two-storey, steel-framed structure 13.5m high (approx.). There is a reinforced concrete suspended slab at Level 1, and a reinforced-concrete, ground-supported slab at Level 0. The CUB building contains all associated utilities generation equipment for the new Manufacturing building.

The cooling towers will be located on a recessed part of the roof of the CUB above the chillers. The building has a 6m clear floor-to-floor height and an overall height of 13.5m. The flues from the 7No. boilers will be combined into a single stack structure that will adjoin the manufacturing building and extend to a height of 48.5m. All services from the CUB will travel along a rack located above the central spine corridor to connect to the various buildings.

An external Utility yard will be located immediately north of the CUB containing;

- a single storey control building,
- single storey pump house, single-storey chemical storage building,
- electrical compound, process water and waste water storage tanks,
- bunded water treatment chemical tanks,
- bunded diesel storage tank
- 5 no. back-up electrical generators;

Figure 2.1 3D Representation: Manufacturing Building

The warehouse building forms an extension to the existing phase 1 warehouse.

The warehouse will be directly linked with the Manufacturing building to facilitate transfer of materials and exiting of waste.

The new Warehouse building is a portal structure with clear height to accommodate the 7 rack high storage, with a total building height of approx. 16m. This is 5m. higher than the Phase 1 warehouse. The building also contains an internal mezzanine floor that houses the mechanical plant and storage for retain samples.

The proposed Phase 2 development will require a number of building services and utilities in order to become functional. The following on-site building and utility services will be provided as part of the proposed Phase 2 development.

- Water supply
- Chilled water
- Wastewater
- Electricity
- Natural Gas
- Fire Hydrants and Sprinkler Mains
- Lighting and CCTV

Sustainability

The design of the facility will be developed in line with the requirements of the European Union (Energy Performance of Buildings) Regulations 2012, S.I. No. 243 of 2012. Part 2 of these Regulations (Alternative Energy Systems) applies to the design of any building for which a planning application is made, or a planning notice is published, effective since 9 January 2013.

A number of other sustainability initiatives will be implemented as part of the development and these are discussed in more detail in other sections of the EIS, including;

- The preparation of site specific Mobility Management Plan with specific proposals for encouraging a modal shift to more sustainable forms of transport amongst staff
- The preparation of a site specific Construction & Demolition Waste Management Plan
- The development of an Environmental Management System (EMS) governing the environmental performance of the operating site in full accordance with EPA licensing requirements

Construction Works

An average of 545 workers is predicted, and a peak of 1263 (including contractors, construction management, supervision and Alexion personnel).

As part of the pre-construction planning phase the following key topics will be reviewed and arrangements for the management of these will be documented as part of an overall Construction Management Plan (CMP). These will include the following key topics:

- Construction Logistics including traffic management planning
- Construction Safety Arrangements
- Construction Environmental Management Planning
- Construction and Demolition Waste Management Planning
- Construction Execution Strategy and Plan
- Construction Completion & Turnover Plan

An outline Construction Environmental Management Plan (CEMP) has been prepared as part of this application.

Project Schedule

The total project life cycle from initial site development works to regulatory approval is shown in Table 2.2. Construction (site development and building erection) will be executed in parallel to ensure the earliest availability of each individual building. Following handover of the building to Alexion commissioning and will be carried out.

Table 2.2 Project Milestones

Key Milestones	Date
Start Basic Design Stage	Feb 2015
Submit Planning Application	May 2015
Construction Start	Jan 2016
Construction End/Commence Commissioning & Qualification	Dec 2017
Commence Activity	Nov 2018

0.3 Alternatives Considered

It is a fundamental requirement of the EIA process that viable alternatives have been evaluated, and that the proposed project represents the most appropriate solution in meeting the objectives of the development.

Alexion's proposal to develop a large-scale biopharmaceutical manufacturing facility at College Park has involved a number of key decisions along the way, including;

- Why build this facility?
- Selection of the preferred site/location for the development
- Selection of the preferred manufacturing process
- Selection of the preferred arrangement of the proposed buildings

A detailed evaluation of alternatives under each of these headings has been conducted by Alexion prior to selecting the preferred approach. In each case, minimisation of impacts on the receiving environment has been foremost in the evaluation and selection process.

A significant consideration in the design of the Phase 2 manufacturing facility, and in particular the manufacturing building itself, has been the determination of the overall height of building required to accommodate the designated manufacturing functions.

The proposed manufacturing facility to be developed by Alexion at College Park will be based on recognised conventional and industry best-practice approach, as opposed to any alternative or less efficient arrangement. The building will comprise 4 operating levels with the floor-to-floor height ranging from 9m. to 12m. each.

The floor-to-floor heights are dictated by the requirements to accommodate the scale of vessels and equipment required to manufacture the suite of biopharmaceutical products envisaged. The overall manufacturing building height (42.5m including parapets) is therefore necessary to achieve optimal manufacturing and environmental objectives.

0.4 Human Environment

The likely impacts on the human environment arising from the proposed development are assessed under the headings of local residences and businesses; the wider community; zoning and land use; health and safety; and local amenities and tourism.

The project is not predicted to have a significant adverse impact on the human environment. The development will have a significant positive impact in terms of creating temporary employment of up to 1263 jobs at peak construction and permanent employment of up to 280 jobs during the operational phase. In addition to direct employment it is anticipated that the proposed project will lead to indirect employment via related services during both the construction and operational phases.

In relation to zoning and land use, the proposed development is fully consistent with current objectives for the site, as the land for the proposed development is zoned HT (High Technology) in the Fingal Development Plan 2011 – 2017.

The operation of the proposed development will be carried out in strict accordance with all Irish and European regulations governing safety in the work place and in particular the regulations implemented under the Safety, Health and Welfare at Work (Construction) Regulations, 2013 (S.I. No. 291 of 2013) and the Safety, Health and Welfare at Work Act, 2005 during the construction and operational phases, respectively. Therefore, it will not impact on the health and safety of employees or residents in surrounding area.

0.5 Landscape & Visual

ARC Architectural Consultants Ltd carried out detailed assessment of potential visibility in March and April 2015 and identified representative locations from which there was a potential for the proposed development to be visible. ARC prepared photomontages from 25 no. locations to demonstrate the extent of visibility from the surrounding area. See EIS Volume 2 – Visual Impact Assessment – Photomontages.

Phase 1 of the new biopharmaceutical campus development is currently under construction on the site. The site is located at the south-western edge of College Park, which is characterised by significant office, research and technology developments of varying scale.

Visibility of the proposed Phase 2 development from within restricted spaces, such as residential roads and estates is likely to be very limited. In views where there are large open spaces in the foreground, such as across large open green spaces or along roads oriented towards the development, the proposed development is likely to be visible. Local area analysis has confirmed that the proposed Phase 2 development is likely to be visible from some specific locations at the edge of housing estates in the area, but is unlikely to be visible from within the main body of these estates or from within most of the areas of commercial development such as Blanchardstown Village or the Blanchardstown Shopping Centre. Analysis has also found that the proposed Phase 2 development is likely to be most visible across a limited number of green spaces in the area, along a small number of particular stretches of road, and from viewpoints very close to the proposed development.

Although Phase 2 includes a structure substantially taller than the first phase i.e. the Manufacturing Building, construction of structures of the scale and height now proposed is to be expected in developments associated with the biopharmaceutical industry, and the planned phasing of the Alexion development was indicated in earlier applications. The proposed development is, therefore, expected and consistent with emerging trends, so the highest level of visual impact likely to arise from its construction and subsequent existence is moderate. A detailed landscape plan has been included as part of the planning application EIS.

0.6 Traffic & Transportation

Traffic and Transportation has been assessed in the context of the relevant best practice guidance documents. Junction capacity analysis has been carried out using computer software programmes.

The baseline for the Traffic and Transportation chapter has been prepared on the basis of site visits, on-site surveys, document reviews and pre-planning liaison with Fingal County Council and other significant existing and proposed development owners in the locality.

Cognisance has been taken of a number of other proposed developments in the locality, including two separate developments in the biopharmaceutical sector, such that any potential cumulative impacts in terms of construction and operational traffic have been identified and addressed.

Construction Phase

Overall, the construction phase impacts will be temporary in duration.

Peak on-site construction employment is expected to be up to 1,263 personnel. Average on-site construction employment is expected to be 545 personnel. The core construction working hours' start and finish times will be outside the morning and evening peak hours. Accordingly, traffic generated by construction personnel will occur during existing off-peak periods and predicted not to have any significant adverse impact on the local road network.

Construction site access will be via a temporary construction access on Cruiserath Road, at the northern end of the proposed development site, as per the permitted Alexion Phase 1 construction phase. No construction traffic will access via College Park.

During the site enabling works, it is proposed to export excavated material off-site, by licensed haulier to licensed landfill, during a proposed three months site enabling works period. This will generate approximately 50 truck movements/day, both in and out of the proposed construction site, during the three months enabling works.

Peak construction staff will not occur during the three months enabling works, when peak construction deliveries will occur. Accordingly, the total daily traffic volumes generated during the three months enabling works would not have any significant adverse impact on the existing local road network capacity.

Post the three months enabling works phase, peak construction deliveries will be of the order of 10 to 20 heavy vehicles per day. There will be no abnormal loads.

The core construction working hours' start and finish times will be outside the morning and evening peak hours, to ensure that site personnel will not arrive during the morning peak hour and depart during the evening peak hour.

The proposed temporary construction site access on Cruiserath Road, at the northern end of the proposed development site, is designed to ensure that no construction traffic will access the site via College Park. The proposed temporary construction access on Cruiserath Road includes a dedicated right-turn lane on Cruiserath Road.

All construction parking and compounds will be provided within the site confines. Construction wheel wash facilities will be provided on-site. A specialist road washing and cleaning vehicle will be used regularly each day to maintain public roads. All necessary construction signage and other measures required by Fingal County Council will be provided.

A detailed Construction Traffic Management Plan will be submitted to Fingal County Council, for their approval, prior to the commencement of construction.

Operational Phase

Subject to planning permission, it is envisaged that the proposed development will be fully complete and operational in 2018.

Operational site access will via a single site access junction, on the existing College Park internal access road, at the southern end of the site, as per the permitted Alexion Phase 1 facility operational phase.

When fully operational, the proposed development will include 280 staff, up to 20 daily visitors and 12 daily rigid truck deliveries.

The proposed development operational staff numbers will be increased over a multi-year period, from a total of 100 staff in 2018, to a total of 280 staff by 2023. Operational staff will include staff working standard days and staff working a 24/7 four-cycle shift. Shift changes will be at 7.00 a.m. and 7.00 p.m., outside the peak traffic hours. The number of proposed development non-shift staff will be up to 60 staff in 2018 and up to 160 staff by 2023.

Total peak hour traffic volumes generated by the proposed development will be up to 146 vehicles two-way, including four heavy vehicles, during both the morning and evening peak hours. Total two-way daily traffic volumes generated by the proposed development operational phase will be up to 512 vehicles, including 24 heavy vehicles two-way.

Parking at the proposed development will be in accordance with the parking standards set out in Fingal County Development Plan 2011-2017. The proposed development includes 220 car parking spaces, including 6 disabled driver spaces, two electric car charging points, 10 motorcycle spaces and 70 cycle spaces.

- The shift change times for operational staff are outside the morning and evening peak traffic periods, to ensure that shift staff will not arrive and depart during peak traffic periods.
- Analysis shows that the existing proposed development local road network junctions will operate within full capacity during the morning and evening peak hour periods, without significant traffic queuing or delays, with the proposed development in place. The R121/N3 Northbound Off and On-Ramps traffic signals junction will operate approaching capacity, in 2033, but without significant traffic queuing or delays, typical for peak hour traffic periods.
- The R121 will continue to operate within its link capacity with the proposed development in place.
- The proposed development will not have any significant adverse impact on the proposed development local and national road network.

The Fingal County Development Plan has been prepared cognisant of the following Government guidance documents: - Smarter Travel – A Sustainable Transport Future – A New Transport Policy for Ireland 2009-2020, Transport 21 and the National Cycle Policy Framework 2009-2020. The Development Plan includes policies and objectives that aim to reduce unsustainable travel patterns and integrate land uses with transport infrastructures. Specifically, Fingal County Council's transport policies and objectives, as detailed in their Fingal County Development Plan, include the preparation and operation of Mobility Management Plans for all developments with a significant number of employees, to reduce traffic congestion and promote sustainable means of access for employees.

This planning application is accompanied by a 'Preliminary Mobility Management Plan' which states Alexion's ambitions and proposals for encouraging a modal shift to more sustainable forms of transport amongst staff. The Preliminary Mobility Management Plan also deals specifically with how Alexion propose to promote a modal shift based on the successful implementation of the Plan and how they propose to reduce car parking numbers over time. The 'Preliminary Mobility Management Plan' commits the applicants to implementing a successful workplace travel plan and contains measures which will ensure that the availability of private parking will not undermine its success.

0.7 Soils, Geology & Hydrogeology

A detailed soils, geology and hydrogeological assessment of the site was carried out to determine the existing ground conditions and determine what special precautions might need to be taken to protect the underlying soils, geology and hydrogeology during the construction and long–term operation of the facility.

The soils and subsoils typically consists of a maximum of 0.3m of topsoil overlying stiff, locally soft, firm and very stiff sandy silt to approximately 1.2m overlying medium dense to dense silty gravelly

sand or cobbles and boulders ranging from 1.8 – 3.5m below ground level. No contamination was detected in either the soils or the groundwater beneath the site during the detailed site investigations.

As part of the construction programme it is proposed to strip the top soil and portions of the subsoil from those areas of the site on which buildings, car parking and other infrastructure will be developed. These materials will be stored on site prior to re-use on a phased basis during the landscaping of the site as construction of the various elements are completed.

The key potential impacts of the construction phase are as follows:

- Unavoidable soil removal from below the site in localised areas.
- Inappropriate handling and storage and/or spillage of fuels, chemicals and concrete used during construction
- Runoff containing large amounts of silt could migrate vertically and impact on the groundwater quality underlying the site.
- Dewatering may result in the localised lowering of the water table in the immediate vicinity.

The primary mitigation measures which will be put in place in response to the impacts identified above are as follows:

- Excavated material will be separated into topsoil (if present) and subsoil stockpiles. It is envisaged that any topsoil encountered will be retained on site where possible and reused as fill material (if suitable).
- Although there is no evidence of spillages in the area, all excavated materials will be visually assessed for signs of possible contamination such as staining or strong odours.
- Oil and fuel storage tanks will be stored in designated areas, and these areas will be bunded.
- Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles, will take place in a designated area (where possible) of the site, which will be away from surface water gulleys or drains.
- Concrete will be mixed off-site and imported to the site. Wash down and washout of concrete transporting vehicles will take place at an appropriate facility offsite.

With the employment of the above mitigation measures, it is considered that the impacts on soils, geology and hydrogeology by the proposed development construction works will be imperceptible.

Once the facility is operational it is unlikely to have any adverse impacts on the local soils, geology and hydrogeology due to the aqueous-based nature of the production process, the high level of secondary containment of material storage, production areas and fuel storage areas and the high degree of waste water management and control on-site.

0.8 Flora & Fauna

The EIS considered and assessed the potential direct, indirect and cumulative ecological impacts on terrestrial and aquatic ecology within the ecological study area (zone of influence) of the proposed development. The assessment was undertaken in line with a number of guidance documents including Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009) and the CIEEM Guidelines for Ecological Impact Assessment in the United Kingdom (IEEM, 2006).

A habitat survey and multidisciplinary fauna survey was conducted on the 5th March 2015. At the time of the baseline surveys, the footprint of the proposed development was predominantly characterised by construction works for Phase 1 of the development, including buildings and artificial surfaces under construction and spoil heaps of excavated soil. A townland boundary hedgerow was located on the eastern side of the site, while a tree line was located just outside the fence line of the western boundary of the site. An attenuation pond has been constructed in the south eastern end of the site.

The spoil heaps and buildings were classified as being of low ecological value, while the townland boundary hedgerow, treeline and attenuation pond were classified as high local ecological value.

16 designated sites are located within 15 km of the proposed development. The closest designated site was the Royal Canal pNHA (2103) located 3km to the north. The closest European site was the Rye Water Valley/Carton cSAC (1398) with which there was no source-pathway receptor link. Several European sites in Dublin Bay (more than 15km from the subject lands) were connected by two pathways;

- via surface water generated at the proposed development site during construction and operation and discharged into Dublin Bay via the local sewer network and the River Tolka; and
- via foul effluent generated at the proposed development site and then treated and discharged from Ringsend WWTW into Dublin Bay.

There will be no loss of any semi-natural habitats within the site. The River Tolka could potentially be indirectly impacted if surface water run-off during construction introduced pollutants (e.g. spilled fuels, paints, detergents, etc.) or suspended solids via existing surface water sewer discharge points. Impact duration would be short-term due to the limited period of construction (<2 years). Impact significance would be likely to be limited to the Local geographic scale (i.e. the maximum ecological value of the River Tolka's fisheries). Mitigation measures such as the attenuation pond are already in place in Phase 1 lands and therefore will be in place to address potential impacts of Phase 2.

For fauna present on site, amphibians and reptiles potentially occurring in the hedgerow, may be killed during construction activities, however, this impact is likely to be temporary and short term due to the high reproductive capacity of these species. No bat roosts were recorded on site. However, bats recorded feeding around hedgerows may be temporarily impacted by lighting erected during construction and subsequently by operational lighting. Breeding birds are unlikely to be impacted by the proposed development due to the lack of requirement to clear breeding bird habitat during this Phase.

During construction, best practice will be implemented at all times in relation to all construction activities to maintain water quality standards in the River Tolka. Sustainable Urban Drainage Systems (SUDS) will be incorporated into the design of the development will assist in reducing runoff and improving water during the operational phase of the project.

The retention and enhancement of the townland boundary hedgerow, planting of a new hedgerow and wild flower mixes (including arable weeds) will help compensate for the removal of hedgerows and arable habitat that occurred during Phase 1 of the development and potentially provide habitat and a food source for birds.

The lighting plan will be designed with regards to bats to limit the amount of light on woody vegetation and to reduce light spill. The lighting plan will be reviewed by a qualified bat ecologist who shall, if necessary, recommend adjustments to direction and mountings if required.

Assuming successful implementation of mitigation measures, cumulative impacts will be significant at the local scale for breeding birds, bats and small mammals assuming the successful creation of replacement habitats and the introduction of favourable management regimes. Monitoring of the effectiveness of the mitigation measures will be conducted to ensure effectiveness.

0.9 Noise & Vibration

A baseline noise survey was undertaken at the site with measurements taken at the nearest noise sensitive locations. The aim of this survey was to establish the existing (baseline) noise environment so that potential impacts over and above current levels could be predicted and assessed. Modelling of noise emissions from the principal external noise sources was also carried out to predict future noise levels at noise sensitive locations (residential dwellings etc.) when the facility is operational. Existing ambient day, evening, and night-time noise levels at the site are influenced by traffic noise and overhead air traffic from Dublin Airport.

The construction phase of the proposed development will contribute to ambient noise levels for the duration of the construction works. It is proposed measures such as control of working hours and maintenance of construction equipment will be taken to minimise as much as practicable, any impact on ambient noise levels at the nearest noise sensitive receptors.

There will be a number of noise generating equipment items and activities associated with the operation of the proposed facility. The majority of the noisy equipment associated with the proposed development will be housed internally within the proposed development buildings, therefore mitigating that potential source. In order to assess the potential noise impact due to the proposed development a noise model has been carried out. Also included in the model are the noise sources associated with the Phase 1 development, which is currently under construction. Any noise from production and utilities equipment located inside/within the site buildings will be mitigated by both equipment design and/or the building structure to prevent any external noise impact.

The EPA's Guidance Note for Noise in relation to Scheduled Activities (NG4) recommends levels of 55dBA during the day, 50dBA during the evening, and 45 dBA at night, measured at the nearest noise sensitive receptors. Potential noise impacts will be mitigated by best installation and operational practice. The noise modelling study has demonstrated that there will be no negative impact on the nearest noise sensitive locations and the above recommended levels will not be exceeded.

Noise monitoring will be conducted upon commissioning of the site to ensure the operating facility will have no adverse impact on the nearest noise sensitive locations.

There is no requirement for either blasting or driven piles during the construction of the proposed facility. Therefore vibration is not envisioned as issue with respect to the proposed development.

0.10 Water & Effluent

When operational, the facility will generate two distinct aqueous waste streams. These streams are:

- Waste Water (process and sanitary)
- Storm Water Run-Off

Existing published water quality data and other information regarding natural surface waters, foul sewerage services (including Ringsend Wastewater Treatment Plant), storm water drainage and water supply were reviewed as part of the impact assessment.

There are no rivers, streams or other natural surface water bodies located on or directly adjacent to the site. The closest water body to the site is the Tolka River which at its closest point flows approximately 1km south-west of the proposed development site.

Surface water / storm water runoff from hard standing and roofed areas of the site will be attenuated before discharging to the existing Fingal County Council surface water drain which discharges to the Tolka River. A foul drainage system will be provided for the complete site and will be discharged to the existing Irish Water foul sewer and ultimately treated in Ringsend WWTP

Waste water generated from the proposed development will arise from a number of sources, namely process/manufacturing, labs, utilities and sanitary. It is proposed that process waste waters (non-sanitary) arising from the proposed development will undergo preliminary treatment on-site which will render the waste water amenable for discharge to the Irish Water sewer and subsequent downstream treatment at Ringsend Waste Water Treatment Plant which discharges into Dublin Bay.

Irish Water have confirmed that that the Ringsend WWTP (including current and planned extension and upgrade) has sufficient capacity to cater for the hydraulic and organic loading associated with the project.

Irish Water have also confirmed that sufficient hydraulic capacity is available in the sewerage system, from the point of discharge from the Alexion site via College Park and the sewer network,

to Ringsend WWTP (subject to a requirement to provide 7 hours on-site storage during specified storm events) without compromising overall capacity.

Impacts during the construction and operational phase were fully considered and a series of mitigation measures have been devised as a means of addressing these potential impacts, including;

- The development of a Construction Environmental Management Plan (CEMP)
- Prevent the generation of silty surface water run-off from the stockpiles through the use of covers, cut off ditches and through directing clean run off to local drainage for discharge
- Surface water discharge from the site will be attenuated as per the requirements of Fingal County Council. The allowable discharge from the site has been calculated at a rate of 3.4 litres per second per hectare. This is the basis of design to be submitted for planning permission.
- A Class 1 bypass oil separator will be installed on the surface water drainage line prior to the attenuation pond.
- An emergency shut off valve will be installed at the end of the site surface water drainage system to allow automatic shut-off of the surface water sewer, upstream of its point of connection to the external public surface water sewer and downstream of the on-site attenuation pond.
- The loading and unloading of chemical and fuel materials will be carried out in designated areas protected against spillage and leachate run-off.
- All tank and drum storage areas shall, as a minimum, be bunded, either locally or remotely, to a volume not less than the greater of the following:
  - 110% of the capacity of the largest tank or drum within the bunded area; or
  - 25% of the total volume of substance that could be stored within the bunded area.

All aqueous emissions from the site, both storm water run-off and waste water, will ultimately be governed by the terms of an Industrial Emissions Licence (IEL) to be issued by the Environmental Protection Agency (EPA).

0.11 Air Quality & Climate

A desktop assessment was carried out in order to describe the national and EU legislation in relation to air quality, and to describe the existing environment in the general area of the proposed development. The existing environment has been described with reference to EPA air monitoring data for Ireland. The EPA publication *Air Quality in Ireland 2012 Key Indicators of Ambient Air Quality* was referenced in order to describe the existing air quality in the general area of the proposed development site. Air quality in the area is seen as reasonably good based on comparison with air quality standards set out in Irish and European Law. The exception to this is high NO_x levels which are attributed to transport/vehicle emissions in the local area. Given the location of the monitoring station location (close to the M50/N3 Interchange) it is not believed recorded values are representative of conditions at the proposed development site.

The initial site development phase of the project will involve earthworks and ground improvement works. This work will involve excavation and earth moving on a large scale, which could give rise to dust emissions during dry conditions. Vehicle movements on local roads also have the potential to create occasional dust emissions, particularly during dry weather. Appropriate site management procedures will be implemented to minimise potential dust emissions. These will include vehicle wheel washing, spray dampening of roads, strict speed restrictions, inspection of public roads for cleanliness and, control of earthwork material handling and stockpiling to minimise exposure to wind. With these mitigation measures in place, together with continuous monitoring, the residual impact of dust emissions due to construction activities will be low.

3 No. 5.6MW high efficiency gas-fired steam boilers (2 duty and 1 stand-by) will be installed as part of the proposed development. 4 No. 1.2MW LPHW (low pressure hot water) boilers (3 duty and 1 stand-by) will be installed for hot water distribution.

It is proposed to install the boiler plant within the Central Utilities Building. The boiler flues shall be externally located on the outside of the building, supported in a purpose built steel cradle. The boilers will emit combustion exhaust gases containing NO2 and CO to atmosphere.

4 No. 2,500kVA standby generators will be installed to provide emergency power in the event of a failure of the electricity mains supply. They will be used for emergency cover only and not for peak shaving. Under normal circumstance, they will be run for short periods, estimated at one to two hours per week, for test purposes.

Organic solvents will only be used in relatively small quantities at the proposed development in media and buffer solutions. The process is aqueous based so no large volume solvents are used. The only solvent used in the purification process is an 18% solution of ethanol which will give rise to low level fugitive emissions only. These emissions will vent to a single release point on the building. There may also be some fugitive emissions from the use of IBCs containing ethanol. These ethanol emissions are expected to be minor.

There will be extract air vents located throughout the facility which will emit spent fresh air which has been utilised in the building(s) HVAC system.

A fire hydrant ring main will be provided around the perimeter of the buildings. The ring main will be fed from a new firewater storage tank and associated pump house located at the east of the proposed development. The firewater pump will not be run during normal operation other than for testing purposes (ca. 30 minutes per week). Low sulphur diesel will be used as a fuel for the firewater pump.

Air dispersion modelling has been used to predict the maximum ground level concentrations of nitrogen dioxide and carbon monoxide likely to occur as a result of these emissions during the operating phase. Based on the modelling the facility has been designed to ensure that the predicted environmental concentrations are within the applicable air quality standard limit values. These limit value standards have been developed for the protection of human health and the environment and as such the normal emissions from the proposed development are not predicted to have any significant adverse impacts on ambient air quality.

0.12 Waste Management

Wastes that will be generated over the 24-month construction period will typically include rubble, steel, timber, plastics, packaging, office and canteen waste and small quantities of hazardous waste (e.g. adhesives and paint containers). A system of segregation will be implemented on site with separate skips for timber, metal, plastic, rubble, canteen waste, paper/cardboard, paint/chemical containers and oils and greases. Where possible this material will be re-used or recycled while the remaining wastes shall be disposed of by licensed waste contractors in accordance with the relevant national and EU waste legislation. All subcontractors and site staff will be obliged to comply with a site Waste Management Plan that will be implemented by the Construction Management Team.

The operation of the facility will result in the generation of a range of wastes. These will include both hazardous and non-hazardous wastes.

One of the advantages of using biotechnology processes for the production of human medicines is the relatively small quantity of hazardous waste produced when compared to facilities using synthetic chemical processes. The latter can produce many thousands of tonnes per annum whereas it is expected that the Alexion Manufacturing Facility will produce hazardous waste in the order of 10-15 tonnes per annum.

Hazardous wastes generated will include material drums and containers, product contaminated wastes, laboratory wastes, off-spec raw materials in addition to miscellaneous sources such as waste oils, UV and fluorescent tubes. Segregation will be carried out at source with wastes sent for

recovery or recycling under licensed contract where possible e.g. fluorescent tubes, batteries and waste oils. Some residual hazardous wastes that cannot be recycled will go for disposal under licensed contract.

Anticipated non-hazardous wastes will include packaging waste, office waste, canteen and kitchen waste, empty containers and inactivated production bags, tubing and filters. Where possible these wastes will be sent off site for re use, recycling or recovery. Materials unsuitable for recycling and recovery will be sent off site for disposal to licensed landfill. A minimum recovery target of 60% has been set for non-hazardous waste.

The Alexion Facility will also be licensed by the EPA under the Industrial Emissions licensing system and as such will be subject to a number of principles and conditions including application Best Available Techniques (BAT), the setting of targets for waste reduction and recovery, and the requirement to establish and maintain an Environmental Management System (EMS) and Environmental Management Programme (EMP). All of these will ensure that waste will be managed in an environmentally responsible and proactive manner.

0.13 Material Assets

Material assets comprise physical resources in the environment, which may be of human or natural origin. The objective of the material asset assessment is to ensure that these assets are used in a sustainable manner with respect to the proposed development.

In relation to the use of natural resources there will be comparatively low use of fuel, electricity, natural gas and potable water during the construction phase. During the operational phase there will be resource requirements for manufacturing, principally electricity, natural gas and potable water. In this regard the facility is being designed to incorporate a number of significant resource efficiency and sustainable measures.

No impacts of significance were identified in relation to material assets of the site and its associated developments, and as such it is considered that mitigation is not required.

0.14 Archaeology, Architecture and Cultural Heritage

A number of sources were consulted in order to evaluate the archaeological potential of the area that will be impacted upon during construction work at the site. Field walking was carried out to assess the likely impact of the works on recorded archaeological monuments in the vicinity of the study area and to inspect the lands themselves for previously unknown visible archaeological sites.

The site inspection did not reveal any obvious traces of previously unrecorded archaeological monuments or features. While there is no direct impact on the recorded archaeological monuments within the environs of the study area, as yet unknown archaeological monuments may be impacted upon during large-scale topsoil removal. A number of mitigation measures are recommended in order to prevent accidental loss or damage to archaeological finds or features that lie below the present surface and have no visible surface traces.

0.15 Interactions and Cumulative Impacts

The assessment of impacts associated with the proposed development has also taken full account of the potential cumulative effects arising from interaction other existing, planned and reasonably foreseeable activities and projects in the vicinity of the Alexion development.

This section considers the impacts of the development which occur as a result of cumulative or indirect impacts, or interaction of impacts.

The proposed development will lead to a number of positive cumulative impacts which include the provision of temporary and permanent employment. Imperceptible negative cumulative impacts on air, noise, water and traffic were also identified.

Positive indirect impacts examined include spin-off employment opportunities. Imperceptible negative indirect impacts include the treatment and disposal of wastes and wastewaters off site.

An assessment of the interaction between impacts arising from the proposed development determined that an imperceptible negative impact would arise between landscape & visual impact and human beings. The assessment also determined that an imperceptible to slight negative impact would arise between traffic and air and water; and noise and human beings.

It is concluded that there are no significant cumulative or indirect impacts associated with the development. In addition, it is concluded that the interaction of the impacts does not lead to significant impacts beyond those identified for each of the individual environmental media.

1 Introduction

Alexion Pharmaceuticals, Inc. (Alexion) is in the process of establishing a new biopharmaceutical campus in IDA Irelands College Business & Technology Park at Blanchardstown, Dublin 15 (referred to as College Park), for the manufacturing of pharmaceutical products. The site location is shown in Figure 1.1 and Figure 1.2.

Figure 1.1 Site Location – Blanchardstown Dublin 15

Figure 1.2 Site Location, College Park, Blanchardstown Rd North, Blanchardstown, Dublin 15

1.1 Preamble

Phase 1 of the College Park development was granted planning permission by Fingal County Council in May 2014 (See Planning Ref. FW14A/0020 for application documents and accompanying Environmental Impact Statement (EIS)).

Phase 1 consisted of the construction of a 5 storey office building and roof top plant room, QC laboratories, packaging / warehouse, utility building and spine corridor. Ancillary buildings and structures included ESB substation, security hut, sprinkler tank and pump house, internal road network and yards, external plant and equipment including generators and cooling towers, 278 No. car parking spaces, 12 No. motorcycle spaces, 76 No. bicycle parking space, re-grading of the site, perimeter fencing, gates, traffic barriers, hard and soft landscaping, smoking shelter, rainwater attenuation pond, flagpoles, site and building signage. Permission also included a new entrance for construction and emergency access to the Cruiserath Road.

A further planning permission was granted in January 2015 (Planning Ref. FW14A/0138) for amendments to the previously approved planning application (Planning Ref.FW14A/0020). The amendments were office/lab building level changes, comprising of the lowering of the lower ground floor level and the increase in the overall height, extension to the office building roof plant room, extension of the ESB Substation, the re-positioning of the security hut, new generator housing along east of the link corridor, a new screen to the solvent/waste store with a canopy over, additional flues from the Administration roof plant and generators, minor amendments to the elevations including window and door locations and the retention and Completion of a single level Data Centre adjacent to the utility building.

Phase 1 is currently under construction on the 16.8 ha. greenfield site within College Park. It is anticipated that the construction works for Phase 1 will be completed by June 2015.

Phase 2 (the proposed development), to which this planning application and EIS relate, incorporates the development of a Manufacturing Building, Central Utilities Building (CUB), Warehouse and associated support buildings and external utilities on the site.

In accordance with Part 1 of the Fifth Schedule of the Planning and Development Regulations (Statutory Instrument (S.I.) No. 600 of 2001) as amended, an EIS has been prepared for the project. This EIS should be read in conjunction with all the particulars of the planning application.

Extensive environmental assessments were carried out of the College Park Phase 1 EIS. These assessments have been used and/or updated to include Phase 2. Each chapter of the EIS references the work carried out for Phase 1 and updates required for the Phase 2 development.

1.2 Overview - Alexion

Alexion is a global biopharmaceutical company focused on serving patients with severe and ultra-rare disorders through the innovation, development and commercialisation of life-transforming therapeutic products. Alexions key product is Soliris® (eculizumab).

Soliris® (eculizumab) works by inhibiting terminal complement, a normal part of the immune system that, when activated inappropriately, plays a role in serious diseases like Paroxysmal Nocturnal Hemoglobinuria (PNH) and atypical Hemolytic Uremic Syndrome (aHUS).

Alexion was established in the U.S. in 1992 and became a public company in 1996 (NASDAQ: ALXN). In recent years, it was added to the NASDAQ-100 Index (2011) and to the Standard & Poor's 500 Index (2012).

Headquartered in Cheshire, Connecticut today, Alexion has more than 2,200 employees worldwide, including operations in more than 30 European countries, to serve patients with severe and life-threatening rare diseases.

Alexion is evaluating other potential indications for its marketed drug and is developing four other highly innovative biotechnology product candidates, which are being investigated across nine severe and ultra-rare disorders beyond PNH and aHUS.

Alexion is committed to investing in on-going research and development that is focused on developing novel therapies with life-transforming potential. Currently, Alexion's research and development (R&D) efforts are focused primarily in the areas of haematology, nephrology, transplant, neurology, metabolic disorders and inflammatory disorders.

1.3 Need for the Project

Alexion has identified a need for additional manufacturing capacity for its products in Europe. To fulfil this need Alexion is proposing to develop a new state-of-the-art manufacturing campus in Ireland. The location for this campus is College Park, Blanchardstown, Dublin 15 (see Figure 1.1 for Site Location). The reasons for the site selection are discussed in Chapter 3 (Alternatives Considered). Alexion intends to invest in the creation of new bulk manufacturing facilities for a range of biopharmaceutical derived medical products for patients worldwide, together with associated business support functions.

Alexion intends to manufacture a variety of therapeutic proteins at College Park that are either approved for marketing by various region or country regulatory bodies or are involved in late stage clinical studies. These proteins will be produced to the bulk or formulated state, and filled for shipping from the site at College Park.

1.4 Site Description

The site is 16.8ha. site within the IDA Ireland College Park at Blanchardstown, Dublin 15. See Figure 1.2. The townland is called Buzzardstown. According to the Fingal County Development

Plan 2011-2017 it is zoned as HT – office, research and development and high technology/high technology manufacturing type employment in a high quality built and landscaped environment.

The site is located at the south western edge of the College Park, which is characterised by significant office, research and technology developments of varying scale. The R121 regional road runs along the northern boundary of the site. Much of the land within College Park remains undeveloped and the site is bounded to the east and west by large undeveloped sites. The Blanchardstown Institute of Technology is located to the south and southeast of the development site. There are buildings (one and two storeys in height) associated with College Park site services (water and power) located a short distance to the northeast of the site. College Park is located at the northernmost edge of Blanchardstown, approximately 2.5 km from its centre. The wider local area is characterised by major commercial and enterprise development, to the east and northeast, and by suburban housing to the south and northwest. Lady's Well Park and Mulhuddart Cemetery are located a short distance to the west of the site.

1.5 Project Overview

The proposed Manufacturing Facility (Phase 2 of the new Biopharmaceutical Campus) will comprise the construction of a manufacturing building supported by a warehouse extension to the east and north sides of the Phase 1 warehouse building; a central utilities building located to the north of the Phase 1 warehouse; a utilities yard and waste water treatment area to the rear (north) of the Phase 2 area. The ancillary external utilities within the utility yard will consist of; a single storey control building, single storey pump house, single-storey drum storage building, single storey electrical building, process water and waste water storage tanks, bunded water treatment chemical tanks, bunded diesel storage tank and back-up electrical generators;

Car parking for an additional 220 vehicles is proposed in an area to the west of the campus;

A detailed description of the proposed development, production process and activities is provided in Chapter 2 (Description of the Proposed Development).

As part of Phase 1 there will be approximately 290 employees when operational, including administration, laboratory, logistics and support personnel. Phase 2 will lead to the employment of an additional 280 staff; this will include both management and operational employees. This would lead to a total headcount of 570 for the Alexion College Park campus.

1.6 Governing Legislation

This section describes the framework for the project under current planning, environmental and related relevant legislation.

1.6.1 Environmental Impact Statement

An EIS is defined by the European Communities (Environmental Impact Assessment) Regulations (S.I. No. 349 of 1989) as:-

"A statement of the effects, if any, which proposed developments, if carried out, would have on the environment".

EIAs are carried out in response to the requirements of the EU Directives on the assessment of the effects (direct and indirect) of certain public and private projects on the environment. The principle national legislation which implements these obligations into Irish law, is Part X of the Planning and Development Act 2000, as amended, and Part 10 of the Planning and Development Regulations 2001, as amended. These Regulations outline the classes of projects subject to EIA and the statutory format and content for an EIS.

The Fifth Schedule of the Planning & Development Regulations, 2001 (SI No. 600 of 2001) as amended sets out a comprehensive list of project types and development thresholds that are subject to EIA.

Phase 1 came under Part II of the Fifth Schedule of the Planning & Development Regulations, 2001 which applies to:

"10 (b)(iv) Urban development which would involve and area greater than 2 hectares in the case of a business district, 10 hectares in the case of other parts of a built-up area and 20 hectares elsewhere"

As Phase 1 represented a development greater than 10 hectares, an Environmental Impact Statement (EIS) was required and carried out as part of the planning application (Planning Ref. FW14A/0020).

The proposed Phase 2 development falls within the list of project types requiring an EIA as detailed in Paragraph 6 of Part 1 of the Fifth Schedule of Planning & Development Regulations 2001 as amended:

"6. (e) ….for the production of basic pharmaceutical products using a chemical or biological process"

Accordingly, the application for planning permission for the proposed project must be accompanied by an EIS.

1.6.2 Appropriate Assessment

The Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora) is the main legislative instrument for the protection and conservation of biodiversity in the EU. Under this Directive member states are obliged to designate Special Areas of Conservation (SACs) which contain habitats or species considered important for protection and conservation in a European Union context.

In 1997, the Habitats Directive was transposed into Irish national law and the relevant Regulations, the European Communities (Natural Habitats) Regulations 1997, SI 94/1997. These Regulations were amended by SI 233/1998 & SI 378/2005. These were subsequently revised and consolidated in the European Communities (Birds and Natural Habitats) Regulations 2011, SI 477/2011.

In accordance with the Planning and Development (Amendment) Act 2010 and the European Communities (Birds and Natural Habitats) Regulations 2011, SI 477/2011 an Appropriate Assessment (AA) has been carried out to assess the potential to affect the integrity of the Natura 2000 network. The AA Screening Report is included as part of the planning application.

1.6.3 Industrial Emissions Directive

The Directive on Industrial Emissions 2010/75/EU (IED) was transposed into national legislation by Member States (including Ireland) in January 2013. The Directive aims to simplify existing legislation related to industrial emissions which applies minimum standards for the prevention and control of industrial emissions across the whole Community. IED consolidates a number of separate Directives into a single legislative instrument. Those consolidated Directives directly or indirectly relevant to this development include;

- Integrated Pollution Prevention and Control (IPPC) Directive (2008/1/EC);
- Volatile Organic Compounds (VOC) Solvents Directive (99/13/EC);
- Large Combustion Plants (LCP) Directive (2001/80/EC).

The proposed development will fall under the listed activities in the First Schedule of the EPA Act 1992 as amended now defined as requiring an Industrial Emissions Licence;

"Activity 5.16 The production of pharmaceutical products including intermediates"

Activity 11.1 The recovery or disposal of waste in a facility, within the meaning of the Act of 1996, which facility is connected or associated with another activity specified in this Schedule in respect of which a licence or revised licence under Part IV is in force or in respect of which a licence under the said Part is or will be required.

Accordingly a valid application for an Industrial Emissions Licence (IEL) is being prepared for submission to the EPA and will contain the information prescribed in the *Environmental Protection Agency (Industrial Emissions)(Licensing) Regulations, 2013 (SI No. 137 of 2013)*. Regulation 9 of

the Regulations sets out the statutory requirements for information to accompany a licence application.

In accordance with Article 14, 2 of the Industrial Emissions Directive *"BAT conclusions shall be the reference for setting the licence conditions".* At present there are no BAT Conclusions (BATC) published for this industrial category.

Best Available Techniques (BAT) and BAT Reference (BREF) documents applicable to Alexion include;

- BAT Guidance Note on Best Available Techniques for Pharmaceutical and other Speciality Organic Chemicals, 2008,
- BREF document for the Manufacture of Organic Fine Chemicals, August 2006,

Other relevant documents include,

- BREF Document on Best Available Techniques in Common Waste Water and Waste Gas Treatment / Management Systems in the Chemical Sector, February 2003,
- BREF Document on Best Available Techniques for Energy Efficiency, February 2009,
- BREF Document on Best Available Techniques on Emissions from Storage, July 2006,
- BREF Document on the General Principles of Monitoring, July 2003

Pre-application consultation has taken place with the EPA and other relevant consultees during the production of both the EIS and the IEL application. In terms of the scope of the EIS, the SI No. 137 of 2013 Environmental Protection Agency (Industrial Emissions) (Licensing) Regulations, 2013 require that issues raised during consultation on the IEL application, also need to be considered during preparation of an EIS. This is to ensure (a) that the EPA, which is the decision making authority for IELs, is adequately informed in its considerations as a statutory consultee in the planning process and (b) that the continuation of the EIA process through the IEL application stage is also duly considered. This results in additional and specific coverage of certain items in the EIS, such as detailed description of air and noise emissions including precise emission point locations; control and monitoring systems and best available technologies.

1.6.4 Other Relevant Legislation

Emissions Trading

The member states of the European Union (EU) are signatories to the Kyoto Protocol, which requires reductions in emissions of greenhouse gases by specific amounts over a period from 2008 to 2012 and beyond. The EU committed to an average reduction of greenhouse gas emissions by 8% below 1990 levels. The EU Emissions Trading Directive (Directive 2003/87/EC) is being implemented to achieve this target.

Directive 2003/87/EC as amended has been implemented into Irish Law by EC (Greenhouse Gas Emissions Trading) Regulations 2004, (S.I. No. 437 of 2004) and amending Regulations (European Communities (Greenhouse Gas Emissions Trading) (Amendment) Regulations 2005 (S.I. No. 706 of 2005)).

The Directive establishes an allowance-trading scheme for emissions to promote reductions of greenhouse gases, in particular carbon dioxide. The trading scheme applies to facilities with combustion installations with a rated thermal input exceeding 20 MW (except hazardous or municipal waste installations). The Directive requires these installations to obtain a Green House Gas (GHG) Permit from the EPA.

The total rated thermal input from the installations on the site will exceed 20 MW therefore an application for a GHG Permit will be made by Alexion in accordance with the relevant EPA Guidance.

Energy Efficiency Regulations

The European Union (Energy Efficiency) Regulations 2014 (S.I. No. 426 of 2014) states in Part 5 (11) *where required to support an application to the Environmental Protection Agency under the Act of 1992, a cost-benefit analysis shall be carried out by an economic operator when the economic operator plans to carry out one of the following:*

(a) to install a new thermal electricity generation installation with a total rated thermal input exceeding 20 MW that is not already a cogeneration unit;

(b) to substantially refurbish an existing thermal electricity generation installation with a total rated thermal input exceeding 20 MW and the refurbished unit will not be a cogeneration unit;

(c) to install or substantially refurbish an industrial installation with a total rated thermal input exceeding 20 MW generating waste heat at a useful temperature level and where the waste heat is not being used to satisfy economically-justified demand;

(d) to construct a new district heating and cooling network or to install a new energy production unit with a total rated thermal input in excess of 20MW in an existing district heating or cooling network or to substantially refurbish an existing such installation and waste heat is not being used from nearby industrial installations.

Part 1 (3) 1 states that *these Regulations do not apply to persons holding a greenhouse gas emissions permit granted in accordance with Regulation 7 of the European Communities (Greenhouse Gas Emissions Trading) Regulations 2012 (S.I. No. 490 of 2012).*

As stated previously Alexion will be applying for a GHG Permit in due course therefore the above regulations do not apply at present. If there are any amendments to the above regulations prior to permit application submission Alexion will make the necessary arrangements.

Genetically Modified Organisms (GMO) Regulations

In March 2001, the GMO (Contained Use) Regulations, 2001 (S.I. No. 73 of 2001), came into force under Irish law, giving effect to Directive 98/81/EC which amends Directive 90/219/EEC on the contained use of GMOs.

The GMO (Contained Use) Regulations, 2001 to 2010 require the classification of all GMO (and GMM – Genetically Modified Microorganisms) activities into one of four classes - Class 1, Class 2, Class 3 or Class 4 - as appropriate, depending on the level of risk the activity poses to human health or the environment. A risk assessment is required to determine the class (Class 1, 2, 3 or 4) into which the GMO/GMM contained use activity will fall, with Class 1 representing the lowest risk category.

The EPA is the Competent Authority in Ireland for the implementation of the GMO (Contained Use) Regulations. In order to use GMOs or GMMs the user is legally obliged to submit a notification to the EPA in accordance with the requirements of the Contained Use legislation, seeking the EPA's consent before commencing work with GMOs or GMMs.

The Alexion facility will involve the contained use of Class 1 GMMs and therefore comes within the requirements of the Regulations as specified above. Accordingly, a notification will be made by Alexion to the EPA on this basis.

Large Combustion Plant

The IED also applies to large combustion plants designed for production of energy, the rated thermal input of which is equal to or greater than 50 MW irrespective of the type of fuel used (Article 28).

European Union (Large Combustion Plants) Regulations 2012, S.I. 566 of 2012, came into effect on 7th January 2013 and transposes Chapter III and Annex V of IED, revoking and replacing the Large Combustion Plant Regulations 2003 (S.I. No. 644 of 2003).

The total thermal input for the Alexion facility will be reviewed as part of the IEL application process. An additional activity class (Class 2.1) will be introduced if the rated thermal input exceeds 50MW.

Seveso Regulations

EU Directive 96/82/EC on the Control of Major Accident Hazards Involving Dangerous Substances as amended by Seveso II Directive (2003/105/EC) has been implemented into Irish law under SI No. 74 of 2006 EC (Control of Major Accident Hazards Involving Dangerous Substances) Regulations, 2006 (Seveso II Regulations).

Please note the Seveso III Directive (2012/18/EU) was published on 24th July 2012 by the European Commission. It will amend and subsequently repeal the Seveso II Directive on 1st June 2015.

The manufacturing activities proposed for the site do not involve the use of significant quantities of dangerous substances. Based on maximum anticipated material inventories, it has been established that the proposed facility is not a Seveso site under the governing legislation.

1.7 EIS Methodology

1.7.1 EIS Preparation

The primary objective of the EIS is to identify baseline environmental and socioeconomic conditions in the area of the proposed development, predict potential beneficial and/or adverse effects of the proposed development during both construction and operational phases and propose appropriate mitigating actions where necessary.

In preparing this EIS, the following regulations and guidelines were taken into account:

- The requirements of EC Directives and Irish Regulations regarding Environmental Impact Assessment;
- 'Guidelines on the Information to be Contained in Environmental Impact Statements' (EPA, 2002); and
- 'Advice Notes on Current Practice in the Preparation of Environmental Impact Statements' (EPA, 2003).

Information on the project and the receiving environment was obtained through a number of means including:

- Aerial Photographs;
- Site Visits;
- Field Surveys;
- Site Investigations;
- Meetings with Fingal County Council and the EPA;
- Review of existing data for the general area of the site;
- Review of previous studies carried out at the proposed development site and locality, including EISs for nearby developments; and
- Consultation with other interested parties and stakeholders.

The EIS has also considered cumulative impacts. Cumulative impact is defined by the EPA (2002) Guidelines on information to be contained in Environmental Impact Statements as 'The addition of many small impacts to create one larger, more significant, impact' and by the EC (1999) Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions as 'impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project'.

1.7.2 The Study Team

PM Group has fulfilled the role of Lead Consultant and Project Coordinator for the preparation of the EIS. PM Group has been directly responsible for the preparation of the following chapters:

Chapter 1 (Introduction)

Chapter 2 (Description of the Proposed Development)

Chapter 3 (Alternatives Considered)

Chapter 4 (Human Environment)

Chapter 7 (Soils, Geology & Hydrogeology)

Chapter 9 (Noise & Vibration)

Chapter 10 (Water & Effluent)

Chapter 11 (Air Quality & Climate)

Chapter 12 (Waste Management)

Chapter 13 (Material Assets)

Chapter 14 (Archaeology, Cultural Heritage & Architectural Heritage)

Chapter 15 (Interactions and Cumulative Impacts)

Specialist contributions to the Environmental Impact Statement were made as follows:

Chapter 5 (Landscape and Visual): ARC Architectural & Planning Consultants (Visual Impact) and Mitchell Associates (Landscape)

Chapter 6 (Traffic and Transportation): Malachy Walsh & Partners

Chapter 8 (Flora and Fauna): Scott Cawley Ltd

1.7.3 Format of the EIS

The EIS contains 2 volumes. Volume 1 (this document) is the Main document. Volume 2 contains the photomontages associated with the visual impact assessment.

This EIS has been prepared according to the 'Grouped Format Structure' as outlined in the EPA's Guidelines on the Information to be Contained in Environmental Impact Statements (EPA, 2002). The EIS is divided into a Non-Technical Summary and 15 chapters. Each environmental topic has been examined in a separate chapter under the following headings:

- the characteristics of the proposed development;
- the receiving environment;
- potential impacts;
- mitigation measures; and
- residual impacts (where relevant).

Cumulative effects are assessed as appropriate in the relevant chapters and summarised in Chapter 15, Interactions and Cumulative Effects. Interactions between issues that arise under separate headings are assessed as they arise in the relevant chapters and summarised in Chapter 15, Interactions and Cumulative Effects.

The 2014 EIS Directive highlights specific topics that are now required in an EIS. Table 1.1 outlines these topics and the corresponding chapters in this EIS.

Table 1.1 EIA Directive Topics and relevant chapters

Directive Topics	EIS Headings
Population and Human Health	Human Environment (Chapter 4)
Biodiversity	Flora & Fauna (Chapter 8)
Land, Soil	Soils, Geology & Hydrogeology (Chapter 7)
Water	Water & Effluent (Chapter 10)
Air and Climate	Air & Climate (Chapter 11)
Material Assets	Material Assets (Chapter 13)
Cultural Heritage	Archaeology, Architecture and Cultural Heritage (Chapter 14)
Landscape	Landscape & Visual (Chapter 5)
Interactions	Interactions & Cumulative Impacts (Chapter 15)

In the completion of each chapter consideration was given to both the importance of an attribute and the magnitude of the potential environmental impacts of the proposed activities on that cited attribute. These impact ratings are presented in the Table 1.2 and are in accordance with impact assessment criteria provided in Section 5.0 of the EPA (2002) publication.

Table 1.2 Impact Assessment Criteria

Impact Characteristic	Term	Description
Quality	Positive	A change which improves the quality of the environment
	Neutral	A change which does not affect the quality of the environment
	Negative	A change which reduces the quality of the environment
Significance	Imperceptible	An impact capable of measurement but without noticeable consequences
	Slight	An impact which causes noticeable changes in the character of the environment without affecting its sensitivities
	Moderate	An impact that alters the character of the environment in a manner consistent with existing and emerging trends
	Significant	An impact, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment
	Profound	An impact which obliterates sensitive characteristics
Duration	Short-term	Impact lasting one to seven years
	Medium-term	Impact lasting seven to fifteen years
	Long-term	Impact lasting fifteen to sixty years
	Permanent	Impact lasting over sixty years
	Temporary	Impact lasting for one year or less
Type	Cumulative	The addition of many small impacts to create one larger, more significant impact

Impact Characteristic	Term	Description
	'Do Nothing'	The environment as it would be in the future should no development of any kind be carried out
	Indeterminable	When the full consequences of a change in the environment cannot be described
	Irreversible	When the character, distinctiveness, diversity, or reproductive capacity of an environment is not permanently lost
	Residual	Degree of environmental change that will occur after the proposed mitigation measures have taken effect
	Synergistic	Where the resultant impact is of greater significance than the sum of its constituents
	'Worst Case'	The impacts arising from a development in the case where the mitigation measures may substantially fail

1.8 Screening and Scoping of the EIS

1.8.1 Screening

The proposed development falls within the list of project types requiring an EIA as detailed in Paragraph 6 of Part 1 of the Fifth Schedule of Planning & Development Regulations 2001 as amended:

"6. (e) ….for the production of basic pharmaceutical products using a chemical or biological process"

Thus, the application for planning permission for the proposed project must be accompanied by an EIS.

The EPA 2003 Advice Notes on Current Practice (in the Preparation of Environmental Impact Statement) details environmental topics that should be addressed for each project type classification. The proposed facility falls into Project Type 7, as described in the EPA Advice Notes - *Installations for treatment of intermediate products and production of pharmaceutical products using a chemical or biological process*.

The primary purpose of the EIS is to define the anticipated environmental impacts as a result of the construction and operational phases of the proposed development and the associated mitigation measures and residual impacts.

1.8.2 Scoping

The scoping exercise is an important element of an EIS, incorporating inputs from relevant experts, statutory bodies, the applicant, and interested members of the public. The determination of potential impacts to be addressed in this EIS was largely based on:

- The requirements of the EIA and Planning Regulations;
- Site history and baseline assessments;
- Consultation with relevant statutory bodies (See Section 1.9);
- The requirements of Fingal County Council, as detailed in the Fingal County Development Plan 2010 – 2017 and the Regional Planning Guidelines for the Greater Dublin Area 2010 – 2022;
- 'Guidelines on the Information to be Contained in Environmental Impact Statements' (EPA, 2002);

- 'Advice Notes on Current Practice in the Preparation of Environmental Impact Statements' (EPA, 2003); and
- Environmental Considerations and BAT.

1.9 Consultation

Extensive consultation was carried out with statutory bodies and bodies with environmental responsibility and interest. The objective of consultation was to ensure that the views and concerns of all stakeholders were taken into account in the EIA process. The following bodies were directly consulted in the preparation of this EIS:

- Fingal County Council, including the following departments:
  - Planning
  - Environment
  - Parks
  - Water Services
  - Roads and Transportation
- The Environmental Protection Agency (EPA)
- Inland Fisheries Ireland
- IDA Ireland
- Irish Aviation Authority (IAA)
- ESB Network
- Bord Gais
- Irish Water

All of the comments, suggestions and written responses provided have been taken into account in the preparation of this EIS and where relevant the responses are detailed in the specific chapters of the EIS.

2 Description of the Proposed Development

2.1 Existing Land Use & Activities

The Alexion site is located on a 16.8 Ha. plot within the IDA College Business and Technology Park (i.e. College Park), approximately 12km north-west of Dublin City Centre, adjacent to the Institute of Technology, Blanchardstown (ITB). See Figure 1.1 and 1.2 for site location. The Fingal Development Plan 2011-2017 identifies the location of the Alexion site as being located within an area zoned to *"Provide for office, research and development and high technology/high technology manufacturing type employment in a high quality built and landscaped environment".*

Phase 1 of the College Park development i.e. the construction of a 5 storey office building and roof top plant room, QC laboratories, packaging / warehouse building, utility building and spine corridor was granted planning permission by Fingal County Council (FCC) in May 2014 (See Planning Ref. FW14A/0020 for application documents and accompanying Environmental Impact Statement (EIS)). A further planning permission was granted in January 2015 (Planning Ref. FW14A/0138) for amendments to the previously approved planning application (Planning Ref.FW14A/0020). See Section 1.1 for further details. The Phase 1 development is due for completion in Q3 2015.

Figure 2.1 Aerial Photograph showing College Park

Figure 2.2 shows a 3D representation of the College Park site showing both Phase 1 and Phase 2.

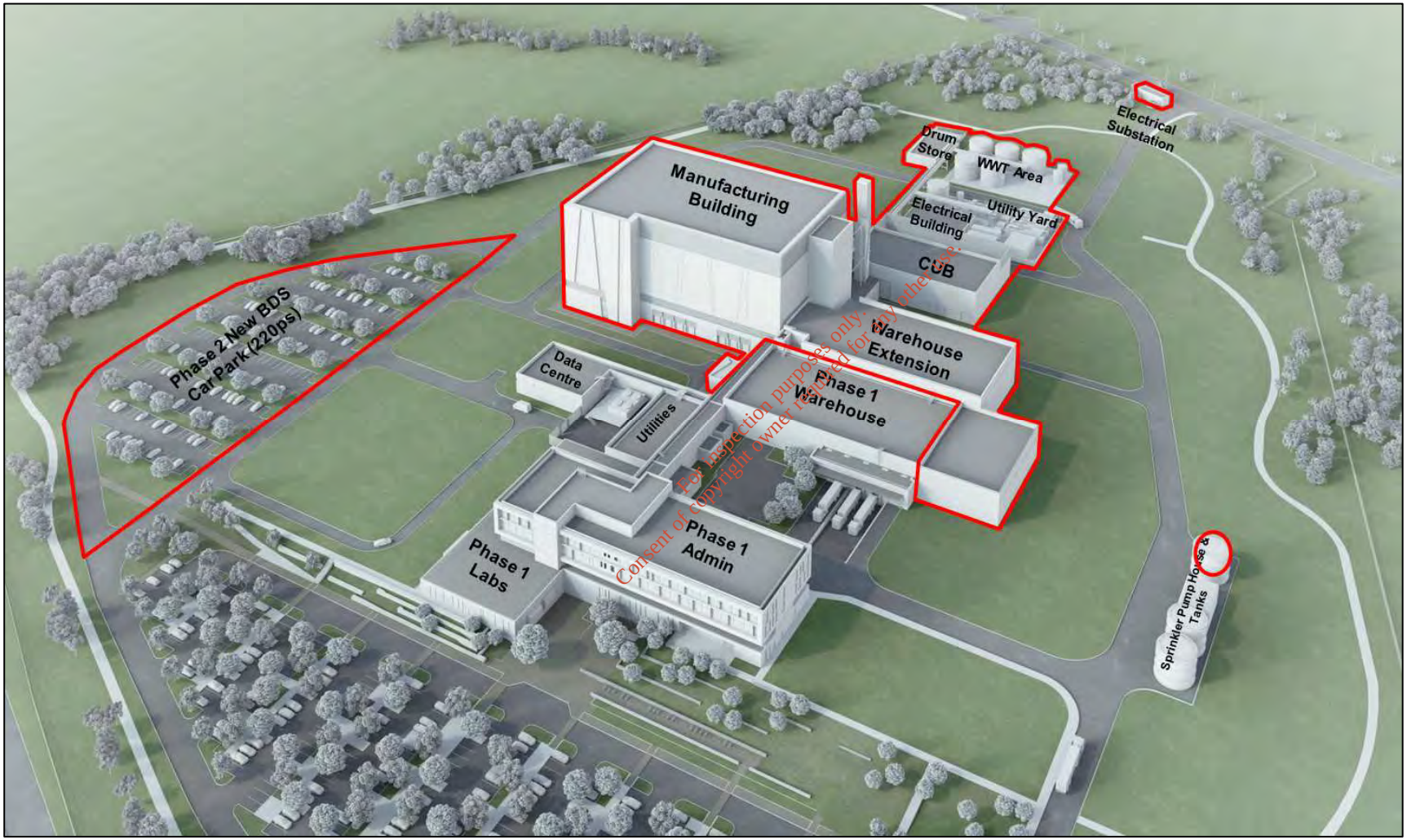


Figure 2.1 3D Representation (Phase 1 and Phase 2 (marked in red))

2.2 Project Overview

The proposed Phase 2 development will comprise of the construction of the following building and facilities as an extension to the Phase 1 development;

- New Manufacturing Building: 4 storey building with intermediate level mezzanines
- New 2 storey Central Utilities Building (CUB) located to the north of the Phase 1 warehouse;
- New single storey Warehouse extension to the east and north sides of the Phase 1 warehouse building;
- A utilities yard and waste water treatment area to the rear (north) of the Phase 2 area. The ancillary external utilities within the utility yard will consist of; a single storey control building, single storey pump house, single-storey drum storage building, single storey electrical building, process water and waste water storage tanks, bunded water treatment chemical tanks, bunded diesel storage tank and back-up electrical generators;

  Each of these facilities will be accessible via a single-storey internal access corridor running through the spine of the campus with elevated utility rack;
- A staff entrance lobby extension to the western elevation of the Phase 1 internal access corridor;
- Car parking for an additional 220 vehicles is proposed in an area to the west of the campus;
- An electrical substation building with separate access off Cruiserath Road;
- Provision of temporary construction access off Cruiserath Road to be maintained as an emergency vehicle access and egress following construction;
- Ancillary site works including additional internal access roads, an additional fire water sprinkler tank, underground services, lighting, CCTV, soft and hard landscaping and increase to size of surface water attenuation pond to the southeast of the site.

See Figure 2.2 for site layout (Phase 1 shown in shaded red).

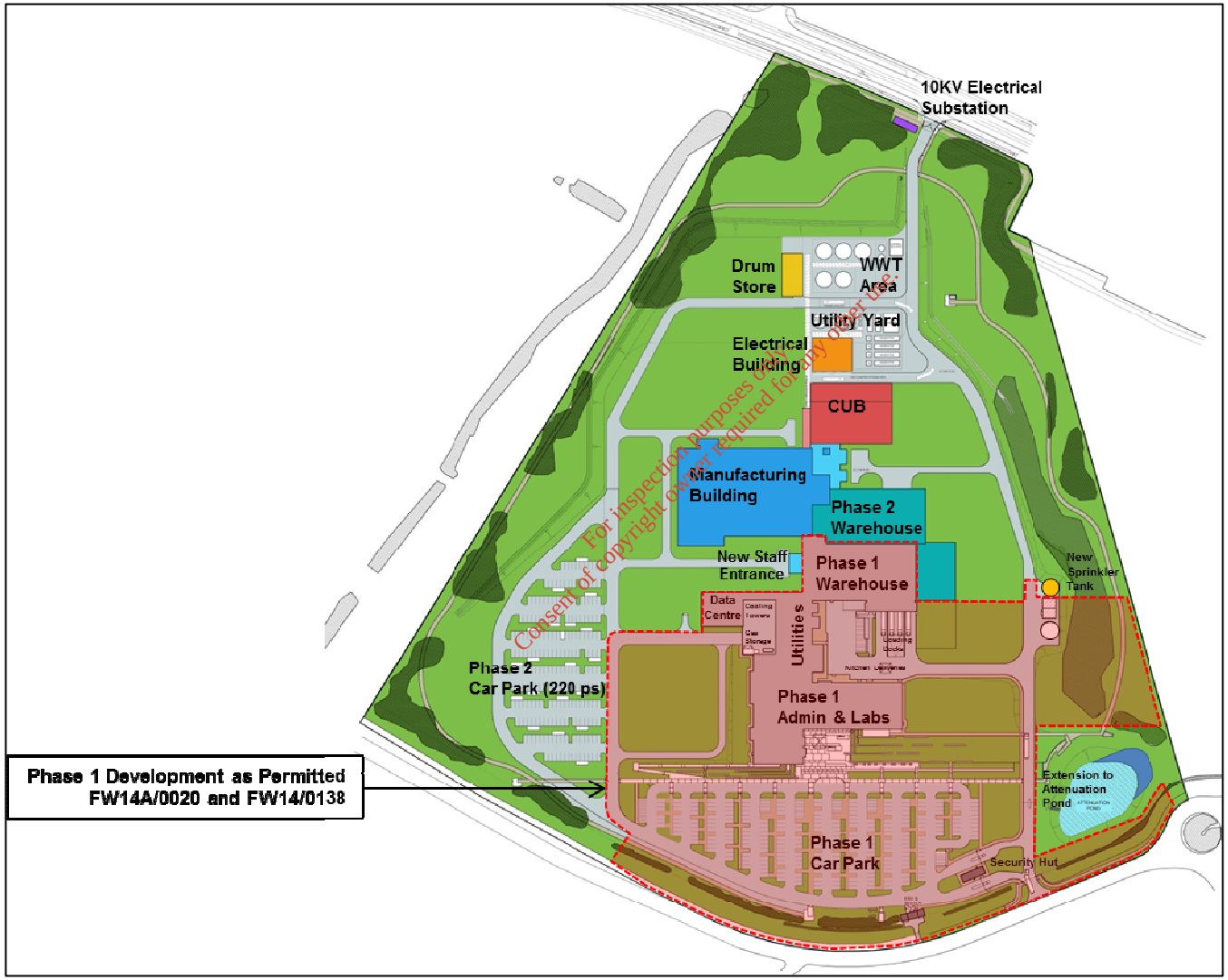


Figure 2.3 Site Layout Plan

The schedule of areas is shown in Table 2.1. The Manufacturing building will be approximately 21,869m^2. The manufacturing building is supported by a single storey warehouse to the east, and by a new single storey Central Utilities Building (CUB) north of the warehouse. Site Infrastructure is upgraded to support the manufacturing including the provision of a Waste Water treatment area located to the North of the buildings.

Table 2.1 Schedule of Areas

Building	Area (m^2)
Manufacturing Building including spine corridor	21,869
Warehouse Extension	3,626
Central Utilities Building	4,563
Electrical Building	448
Waste Water Control Building	38
Process Water Pump House	10
Drum Storage Building	323
Electrical Substation Building	49
Staff Entrance Lobby Extension	68
Total	**30,994**

Once operational, the Phase 2 development will be fully integrated with the current Phase 1 facility. Staff, personnel and visitor access to the facility will be via the College Park entrance to the south of the facility. The current temporary construction access to the site from Cruiserath Road will be retained, but only for use as a point of emergency access and egress.

2.3 Products Overview

The manufacturing building will be designed to manufacture cell culture derived drug substances - Eculizumab (Soliris) and Asfotase Alfa. It will be a multiproduct facility producing mammalian cell culture based protein therapeutics including monoclonal antibodies. The facility is intended to be multi-product with both campaign and concurrent manufacturing capabilities.

Eculizumab (Soliris) is presently manufactured at Alexion's Rhode Island Manufacturing Facility in the US, and at a Contract Manufacturing Organisation (CMO) site. Asfotase Alfa is manufactured at a CMO site.

2.4 Description of the Production Process

2.4.1 Introduction

The manufacturing processes to be employed by Alexion in the proposed manufacturing building will follow what are now considered as industry standard techniques for the production of "medicines for patients" using biotechnology derived processes. Today, this approach is favoured over traditional organic chemistry routes used in the past because it is capable of yielding more complex molecules for medicinal applications, is more efficient in terms of productivity, poses lower safety risks, and has less environmental impact in terms of hazardous chemicals used or waste generated for disposal.

The primary process steps per production train are as follows;

Upstream: Cell Culture & Harvest

Downstream: Purification and Product Formulation

The process is represented in a Block Flow Diagram in Figure 2.4.

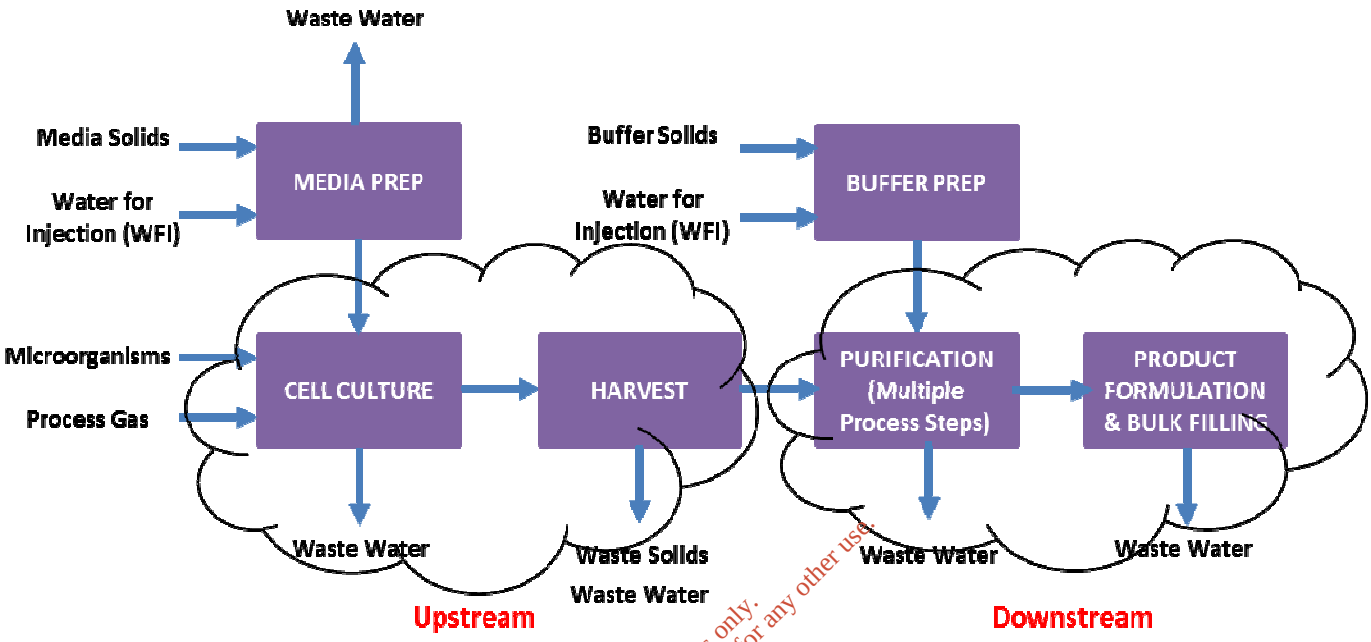


Figure 2.4 Block Flow Diagram outlining the production process

All of these primary process steps will be located within cleanrooms to be constructed within the footprint of the new 4 storey manufacturing building. These operations will be supported by the following process areas;

- Media Preparation (internal)
- Buffer Preparation (internal)
- Column Packing (internal)
- Component Preparation ((internal)
- Waste water Management (internal and external)
- Process Utility Supplies (internal and external)

2.4.2 Equipment Cleaning

In order to maximise productivity, all of the major processing equipment is cleaned via an automated system (Clean In Place or 'CIP'). The equipment is rinsed with purified water and residual soil is removed by use of recirculating cleaning solutions. All aqueous waste water is recovered from the cleaning systems and directed to the site Waste water Treatment Area.

2.4.3 Waste Water Treatment

Waste water, or effluent, will arise from a number of sources on the site, namely; the process/manufacturing operations, labs, utilities and sanitary. It is planned that effluent arising from the development will undergo preliminary treatment on-site comprising heat inactivation (some streams), load balancing, pH correction and temperature correction prior to discharge to Irish Water public sewer within College Park. A detailed discussion on the management of waste water arising from the proposed manufacturing facility is included in Chapter 10 (Water and Effluent).

2.4.4 Process Utility Supply

Special high purity utility systems will be provided which will be used in all locations that could potentially come in contact with product. The following service supplies will be generated;

- Water for Injection (WFI) This high purity water is prepared by the distillation and subsequent condensing of purified water. The WFI is stored and distributed to all locations requiring water, including the CIP systems as well as the buffer and media solution prep areas.
- Clean Steam is prepared by the heating and vaporisation of WFI. The steam is distributed to the processing equipment and is used primarily for the sanitisation of the processing equipment prior to its use. 3No. clean steam boilers will be located in the CUB.
- Process Air is prepared by the compression and subsequent filtration of air. It is distributed throughout the facility for use with the processing equipment.

2.5 Description of the Proposed Buildings

2.5.1 Manufacturing Building

A 3D representation of the Manufacturing Building is shown in Figure 2.5. The western elevation is shown in Figure 2.6; the southern elevation is shown in Figure 2.7. It comprises a 4 storey, steel-framed structure approximately 42.5m high. There are reinforced-concrete suspended slabs at Levels 1, 2 and 3, and a reinforced-concrete, ground-supported slab at Level 0.

Floor-to-floor layout is as summarised follows:

- Level 3: Cell Culture and Media and Buffer Preparation
- Level 2: Buffer Hold and access from Harvest
- Level 1: Purification
- Level 0: Utilities

Figure 2.5 3D Representation: Manufacturing Building

2.5.2 Central Utilities Building (CUB)

The CUB Building comprises a two-storey, steel-framed structure 13.5m high (approx.), as shown in Figure 2.6.There is a reinforced concrete suspended slab at Level 1, and a reinforced-concrete, ground-supported slab at Level 0.

The CUB building contains all associated utilities generation equipment for the manufacturing building, specifically;

- Electrical room
- Electrical Distribution
- Boiler room (3No. clean steam boilers and 4No. low pressure hot water boilers)
- Chiller room
- Compressors
- Comms room
- Cooling towers, water treatment systems for boilers and cooling towers

The cooling towers will be located on a recessed part of the roof of the CUB above the chillers. The building has a 6m clear floor-to-floor height and an overall height of 13.5m. The flues from the 7No. boilers will be combined into a single stack structure that will adjoin the Manufacturing building and extend to a height of 48.5m., this is also shown in Figure 2.4. All services from the CUB will travel along a rack located above the central spine corridor to connect to the various buildings.

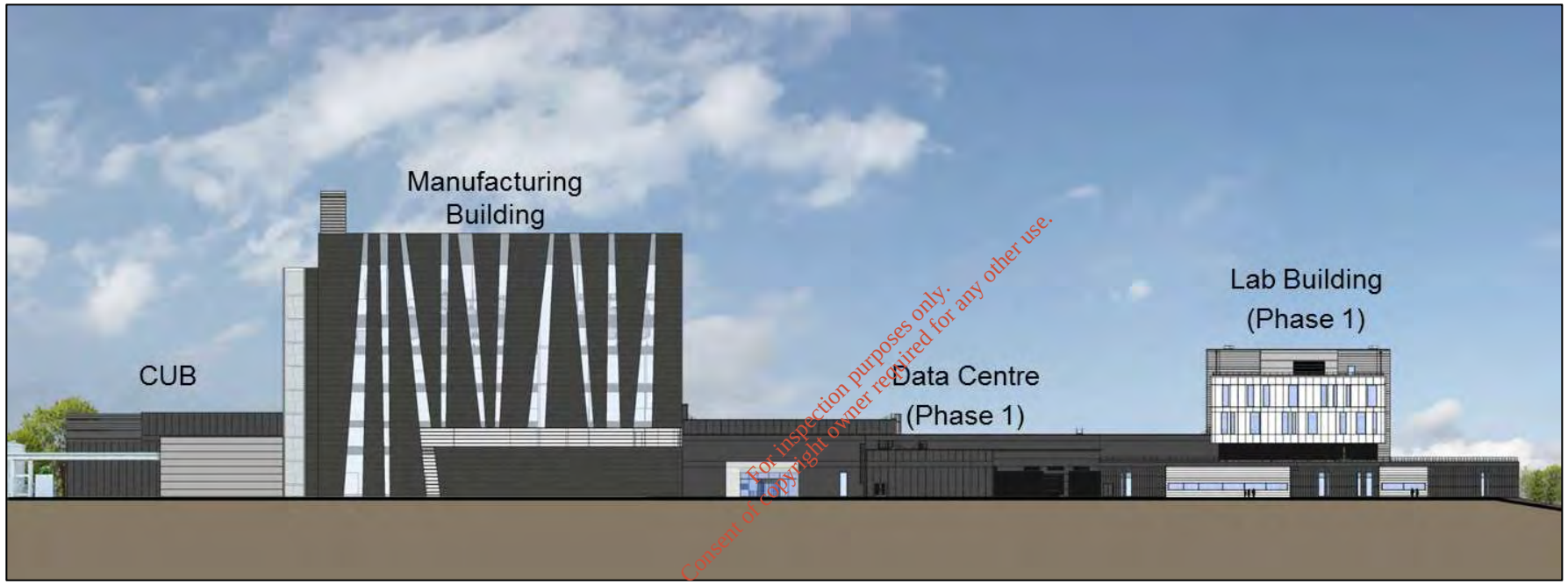


Figure 2.6 Western Elevation

Figure 2.7 Southern Elevation

2.5.3 Utilities Yard

An external Utility yard will be located immediately north of the CUB containing;

- a single storey control building,
- single storey pump house, single-storey chemical storage building,
- electrical compound, process water and waste water storage tanks,
- bunded water treatment chemical tanks,
- bunded diesel storage tank
- 5 no. back-up electrical generators;

2.5.4 Warehouse

The warehouse building forms an extension to the existing phase 1 warehouse. The warehouse facilities for the new manufacturing operations include:

- Receiving/ Shipping
- Ambient GMP Warehouse Staging
- Chemical Storage (HAZMAT) for GMP materials
- Cell Bank Storage Room
- Warehouse Locker/Toilet Facility
- Weigh & Dispense
- QC Sample
- Compressed gas storage and hook up
- Ethanol storage and associated dilution
- HVAC plant room and electrical distribution
- Retain sample storage (2-8 degree cold room)
- Decontamination waste autoclave
- Chemical waste handling
- General waste handling
- Fork truck charging

The warehouse will be directly linked with the manufacturing building to facilitate transfer of materials and exiting of waste.

The new Warehouse building is a portal structure with clear height to accommodate the 7 rack high storage, with a total building height of approx. 16m. This is 5m higher than the Phase 1 warehouse. The building also contains an internal mezzanine floor that houses the mechanical plant and storage for retain samples.

2.6 Utilities

The proposed Phase 2 development will require a number of building services and utilities in order to become functional. The following on-site building and utility services will be provided.

2.6.1 Water Supply

Public water supply to the site will be utilised to produce water for operations (WFO). To generate water for operations the mains water hardness will require softening to achieve a nominal 60ppm of

hardness. This will require a softening skid, with pumps, filters and softener. The water for operations is then stored within a large glass lined steel tank which is capable of 24 hours storage. All the above equipment is located in the utilities yard north of the CUB.

A bulk flow meter has been installed on the water main at the southern site entrance as part of Phase 1. The Phase 2 development will be supplied from a separate Irish Water watermain, with its own flow meter, on the eastern boundary.

It is proposed to extend the rainwater harvesting system installed as part of Phase 1 to cover supply to all WC cisterns and Urinal cisterns within the Phase 2 development. This will reduce the requirement for mains potable water on an intermittent basis (as affected by actual rainfall frequency).

2.6.2 Chilled Water

An extensive chilled water system is required in order to provide the cooling requirements for the manufacturing processes associated with the proposed Phase 2 development. It is proposed to utilise water cooled liquid chillers complete with external cooling towers, located in the new CUB building.

2.6.3 Waste water

Full details of the proposed waste water treatment area are included in Chapter 10 (Water and Effluent) of his EIS.

The waste water treatment area will be designed to provide treated effluent to comply with the site's anticipated EPA IEL conditions for discharge, sampling and monitoring to sewer. The treatment area will serve the manufacturing process which operates 24 hrs/day, 7 days/week and 52 weeks/year.

Communications with Irish Water have confirmed available capacity within the existing sewerage network and downstream waste water treatment plant at Ringsend.

2.6.4 Electricity

A number of overhead 10/20kV electricity lines that were previously on site have now been rerouted as part of the Phase 1 development.

The current ESB Networks supply for Phase 1 terminates at an ESB Switch room at the southern end of the Alexion site. The adjacent MV Switch room supplies 2 no. Unit Substations (Admin & CUB) via MV ring main arrangement. A new 10kV substation, to be located off Cruiserath Road, to the north of the site, will serve the Phase 2 development.

Additional electrical infrastructure required for Phase 2 will be accommodated in the new CUB and utility yard area.

2.6.5 Natural Gas

An existing 125mm, 4 bar Bord Gais pipeline is located at the south of the site. The Phase 2 facility's internal gas supply will be serviced from the new above ground installation (AGI), which is currently being installed by Bord Gais Networks.

Two options are currently being investigated with Bord Gais for the Phase 2 supply:

- Upgrade the existing Phase 1 AGI model G650 with a larger model.
- Retain the existing AGI G650 model and provide a new gas connection and AGI at the north of the site to serve Phase 2.

2.6.6 Fire Hydrants & Sprinkler Mains

A fire hydrant ring main will be provided around the perimeter of the buildings. The ring main will be fed from the new Phase 1 firewater storage tank and associated pump house located at the east of

the proposed development. An additional second firewater storage tank will be provided as part of the Phase 2 development.

The underground fire main will connect to the building at various points to provide a supply for the internal sprinkler system through a number of branch entry pipes.

The facility's hydrant main will be designed to comply with the Insurer's specifications. A 200mm internal diameter cement lined ductile iron main will be provided around the site.

All details relating to hydrants and fire fighting requirements will be detailed and agreed with the Fire Officer during the preparation of the fire certification for the facility.

2.6.7 Lighting and CCTV

Lighting and CCTV services will be an extension of the Phase 1 facilities. External lighting will be designed to give a minimum average of 30 lux in order to give sufficient ambient lighting to the building perimeter, pedestrian walkways, access roads, car parks and for CCTV security cameras. External lighting will comprise a mix of building mounted floodlights, column mounted floodlights and bollards. External lighting along external pedestrian entrances will be supplied complete with integral daylight / presence detection controls. The lighting plan will be reviewed by a qualified ecologist to ensure lighting is of the minimum height required for health and safety purposes and directed downwards away from woody vegetation, particularly on the boundaries of the proposed development.

Electronic security systems will be installed protecting the areas around the perimeter of the site. It is proposed to provide CCTV cameras at specific points around the site.

2.7 Site Infrastructure

2.7.1 Bulk Earthworks and Site Development

The Phase 2 project will require additional bulk earthworks to construct the car park and the external utility and waste water treatment areas. The Geotechnical Investigation carried out highlighted pyrite levels of the site's bedrock ranging from <1% to 4.3%. Based on such findings, excavated rock from the site will not be re-used for engineering works. The site investigations report also states that excavated overburden material would not be suitable in its natural state for re-use as an engineering fill below building footprints or in external areas where settlement is considered critical. See Chapter 7 (Soils, Geology & Hydrogeology) for information on soils reuse options.

2.7.2 Site Access & Access Roads

The final roads and pavements will be asphalt/dense bitumen macadam. Dedicated HGV loading areas/marshalling yards will be designed to be concrete slab construction.

2.7.3 Fire Access Roads

Fire access roads will be provided where necessary to allow fire tender access to the building perimeter and isolated fire hydrants.

Fire access roads will be constructed using the perimeter site roadways where possible. In other areas, the fire access roads will be constructed of a "grasscrete" paving system.

2.7.4 Car Parks

There is a requirement to provide and maintain car park spaces for staff, mobility impaired, emergency and visitor parking at a multi-purpose, central car park strategically located to serve the Phase 2 development. The number of car park spaces will be 220 including 6 disabled driver spaces, 2 electric car charging points, 10 motorcycle spaces and 70 cycle spaces . Parking at the proposed development will be in accordance with the parking standards set out in Fingal County Development Plan 2011-2017.

2.7.5 Footpaths

Footpaths will be provided to allow the safe movement of pedestrians. Isolated buildings and plant areas will be connected to the main building by designated footpaths or footways. Footpaths to be constructed of concrete or concrete paviours

2.7.6 Storm Water Drainage

The proposed design will result in much of the site area requiring an active drainage system. The majority of internal roadways and parking areas will be impermeable and will actively drain via gullies and a piped gravity drainage network.

A number of Sustainable Urban Drainage Systems (SUDS) measures have been included in the design of the proposed development. Such measures will reduce run-off rates by encouraging storm water to soak into the ground, whilst also providing a reduction in the pollutant load discharged to the storm water network. The following measures will be included:

- Bioswales within the car park
- Grasscrete make-up for fire access road, a material that allows percolation of rainwater back into the soil.
- Crushed rock make-up of emergency access road.

Storm water run-off from the site will be required to be attenuated prior to discharging to the adjacent public sewer system. This requirement is dictated by local regulatory requirements, and is intended to minimise hydraulic loading and flooding of downstream water courses and lands.

The Phase 2 development will require expansion of the Phase 1 storm water attenuation pond and a new attenuation tank/pond to account for the additional development. Further details are provided in Chapter 10 (Water & Effluent).

The quality of runoff from the proposed development will be further improved by the fact that the storm water attenuation pond will also act as a settlement pond. Furthermore, the runoff will pass through a hydrocarbon interceptor prior to discharge to the pond.

2.7.7 Foul Effluent Drainage

The site foul effluent drainage system will be designed in accordance with BS EN 752 and local guidelines.

All foul effluent drainage from the site will be designed to operate by gravity to connect to the Phase 1 drainage works which discharge to the adjacent Irish Water foul sewer network to the south of the site.

Oil/grease separators will be provided where necessary and shall comply with the requirements of BS EN 858.

2.8 Sustainability

2.8.1 Energy and Water

The design of the facility will be developed in line with the requirements of the European Union (Energy Performance of Buildings) Regulations 2012, S.I. No. 243 of 2012. Part 2 of these Regulations (Alternative Energy Systems) applies to the design of any building for which a planning application is made, or a planning notice is published, effective since 9 January 2013.

The key requirements of Part 2 (for non-residential development) are set out in 6(1)(a) and 6(2) and are summarised as follows:

6(1)	*a person who commissions the construction of –*
(a)	*a new building other than a dwelling shall ensure that, before construction starts, the technical, environmental and economic feasibility of installing high efficiency alternative energy systems is considered and, notwithstanding anything contained in any regulation, taken into account in the design of that new building.*
6(2)	*the alternative energy systems to be considered for the purposes of paragraph (1)(a) shall include -*
	(a) decentralised energy supply systems based on energy from renewable sources,
	(b) cogeneration,
	(c) district or block heating or cooling, particularly where it is based entirely or partially on energy from renewable sources, and
	(d) heat pumps.

As part of the design developed to date the environmental benefit and economic viability of a number of sustainable design measures (including alternative energy systems) have been considered. These include:

- Solar panels for generation of domestic hot water;
- Heat recovery on all air handling units (AHUs);
- Combined Heat and Power (CHP);
- Decentralised energy supply systems on renewable energy;
- Heat pumps;
- District heating / cooling systems;
- Heat recovery from the process cooling towers;
- Daylight compensation of perimeter lighting;
- Occupancy sensors for controlling lighting;
- Air-tightness testing of the building envelope to limit air infiltration;
- Use of rain water for toilet flushing;

Ultimately, the facility is being designed to incorporate the following resource efficiency and sustainable measures:

- The site proposes to use clean natural gas fuel only for steam generation.
- The site proposes to use best available technologies for steam generation with direct digital combustion control, oxygen trim and heat recovery through economisers and flash steam recovery. A high level of condensation recovery will also be implemented.
- Harvesting of rainwater from building roofs for domestic type reuse will be implemented where feasible to reduce water usage.
- Recirculated air for Heating Ventilation and Air Conditioning (HVAC) will be utilised, where possible
- Attention will be given to the required room volumes as this generally drives airflow and AHU sizing.
- Optimise air changes to achieve required Cleanroom Grade with the manufacturing building.
- Use of 30% to 60% cleanroom relative humidity range (to reduce operating costs).
- Capability for night setback of cleanroom HVAC.

- Use of pressure independent 2-port control valves for HVAC chilled and heating systems with pump VSDs.
- Energy efficient AHUs and the use of primary/secondary AHU configuration.
- Capability to reduce fan motor speeds via Variable Speed Drive (VSDs).
- Premium efficiency (IE3) motors.
- Attention to pressure drop through in-line fittings e.g. coils, filters, CAVs / VAVs etc.
- Accurate (diversified) load profiling critical to avoid oversizing.
- Water cooled compressors and chillers (more efficient than air cooled).
- Heat recovery from air compressors, glycol chillers, WFI, pure steam generator, process waste, condensate vent recovery etc. to generate reduced temperature heating distribution for HVAC e.g. 45 °C / 35 °C (compared to conventional 80 °C / 60 °C) + condensing boilers. Also within the Steam boiler package all boilers have flue gas economisers to preheat the boiler feed water along with VSD burners. Majority of steam condensate (>90%) is also recovered.
- Increased chilled water temperature for HVAC e.g. 8°C / 15 °C (compared to conventional 6 °C / 12 °C)
- Heated compressed air absorption dryers (not heatless)
- VSD technology for HVAC chillers and air compressors
- Consideration of part load efficiency in utility plant selection.

2.8.2 Other Initiatives

A number of other sustainability initiatives will be implemented as part of the development and these are discussed in more detail in other sections of the EIS, including;

- The preparation of site specific Mobility Management Plan with specific proposals for encouraging a modal shift to more sustainable forms of transport amongst staff, see Chapter 6 (Traffic and Transportation).
- The preparation of a site specific Construction & Demolition Waste Management Plan
- The development of an Environmental Management System (EMS) governing the environmental performance of the operating site in full accordance with EPA licensing requirements

2.9 Construction Works

The following section outlines the important aspects of the construction phase of the proposed Phase 2 development.

An average of 545 workers is predicted during the construction phase, and a peak of 1263 (including contractors, construction management, supervision and Alexion personnel).

2.9.1 Pre-Construction Planning Phase

As part of the pre-construction planning phase (and pre commencement compliance) the following key topics will be reviewed and arrangements for the management of these will be documented as part of an overall Construction Management Plan (CMP). These will include the following key topics:

- Construction Logistics including traffic management planning
- Construction Safety Arrangements
- Construction Environmental Management Planning
- Construction and Demolition Waste Management Planning

- Construction Execution Strategy and Plan
- Construction Completion & Turnover Plan

An outline Construction Environmental Management Plan (CEMP) has been prepared as part of this application, See Appendix A. The outline CEMP sets out the responsibilities, environmental standards and requirements for the duration of the construction phase of the project. The document includes the necessary environmental controls and mitigation measure to prevent/mitigate any potential impact on the surrounding environment. The document will be updated prior to commencement of the construction phase.

2.9.2 Site Development Works

The existing temporary construction access from the Cruiserath Road will be retained. The sequence will start with the establishment of a site compound, car parking, laydown areas, site security and access roads.

A construction car park will be set up on the north side of the site adjacent to the construction compound.

Pedestrian access routes will be segregated from vehicular traffic. Vehicles accessing the site will do so only under Construction Site Security authorisation and will be required to park-up in a designated lay-by until such authorisation is secured.

Contractors' offices/mess rooms etc., Construction Security/Site Induction Centre, Construction Management Team (CMT) Office Block and Toilet Block will be located in the new construction compound area.

Contractor lay-down and storage areas are to be located as follows:

- adjacent to the new construction compound,
- areas around the new Manufacturing Building footprint,(west side)
- areas around the new CUB footprint,(east side)
- shell areas within the new build (material staging only)

"Just-in-time" delivery method will apply to all project deliveries.

The construction car-park and pedestrian route to the site will have adequate lighting. The lay-down/storage area will have adequate lighting. Diesel Generators will be utilised for lighting purposes on a temporary basis as required.

Provision will be put in place for contained concrete wash out areas and a diesel fill area / contained waste area within the materials laydown area adjacent to the construction offices compound.

2.9.3 Security & Controlled Access to Site

The site will be fully fenced and hoarded to prevent unauthorised access.

A swipe card access will be put in place. The swipe access system will have associated software to facilitate the appropriate head count functions required for a project of this scale and type.

Construction security will control movements for all construction traffic onto and off of the construction site. A Site Logistics Coordinator from the CMT will coordinate all deliveries into the site area. Delivery personnel will be advised of the site basic rules at point of entry by security. The site PPE rules will apply to all delivery personnel. Security will check and confirm adherence to all site rules prior to sanctioning movement onto the site by any delivery company/personnel.

Construction security will remain in contact with the CMT and the existing site security via radio communication at all times.

Construction security will operate a 24 hour "rounds" system to ensure that the site is secured at all times. A daily report will be issued to the Construction Manager.

All personnel working on the site will undergo a project Site Safety Induction. Prior to induction, all personnel will be required to complete a site access application form. Strict adherence to the submission of site access application form prior to induction will be upheld. Visitors will only be allowed to access the site when accompanied by an authorised person

2.9.4 Access to Manufacturing Building

Personnel will follow a dedicated access/egress route from the construction compound at all times.

Dedicated pedestrian routes will be set out as part of the Site Logistics Plan. These will be maintained on an on-going basis. Pedestrian routes will be set out in the following areas:

- Route to and from the Manufacturing Building
- Route to and from CUB
- New construction compound,
- New construction car-park,
- Around the perimeter of the new building footprints, giving access/egress to the new building and access/egress to the materials lay-down and toilet facilities.

All pedestrian routes will be constructed of suitable material and the surface will be maintained to prevent trip hazards. Barriers will be utilised to create segregation with traffic. These barriers will be maintained on an on-going basis.

2.9.5 Lay-Down Area

Lay-down space will be allocated to contractors by the CMT. As lay-down space is of a premium value, allocated slots will be maintained daily to ensure obstructions are eliminated. Traffic will be controlled in and out of lay-down areas with the aid of “spotters” and materials will also be lifted in and out of the lay-down areas with the aid of overhead cranes and qualified “banks-men”. Pedestrian access/egress routes will be clearly defined for lay-down areas.

As stated above Lay-down areas will be developed adjacent to the new construction compound and at areas around the new manufacturing building footprint.

2.9.6 Car Parking

Car park rules will be clearly displayed. Reverse parking will be enforced and authorised parking stickers will be allocated to contractors from the CMT via the construction site security. Security will monitor the new construction car parks daily to ensure compliance.

2.9.7 Construction Traffic

The core construction working hours’ start and finish times will be outside the morning and evening peak hours, to ensure that site personnel will not arrive during the morning peak hour and depart during the evening peak hour.

The proposed temporary construction site access on Cruiserath Road, at the northern end of the proposed development site, is designed to ensure that no construction traffic will access the site via College Park. The proposed temporary construction access on Cruiserath Road includes a dedicated right-turn lane on Cruiserath Road.

All construction parking and compounds will be provided within the site confines. Construction wheel wash facilities will be provided on-site. A specialist road washing and cleaning vehicle will be used regularly each day to maintain public roads. All necessary construction signage and other measures required by FCC will be provided.

A detailed Construction Traffic Management Plan will be submitted to FCC, for their approval, prior to the commencement of construction.

Pedestrian routes will be segregated from vehicular traffic at all times. This will be part of the General Logistics Plan and will be monitored on an on-going basis. Safety Barriers and signage will be utilised to create the segregation and proper lighting levels will be maintained. An interim traffic control and pedestrian separation plan will be put in place for the enabling phase of the project until such time as the new construction compound and new site boundary is fully established. Construction Traffic flows and deliveries will be during off peak hours of public traffic.

2.9.8 Construction Utilities

Power, light, water, foul and drainage will be provided for construction by the CMT. The contractors will provide their own “hook up” to these utilities.

Lighting will be provided for all access/egress routes by the CMT. Task lighting will be provided by the individual contractors. Adequate lighting will be provided in all new construction car parks and lay-down areas.

Power boards will be provided by the CMT. These will be spread across various areas. (i.e. external areas, manufacturing building floors and CUB) Contractors will take power from these points. Provision will be made for limited workshop power.

Water connection points will be provided by the CMT. These will be located in the new construction compound. Contractors will take water supplies from these points as required.

Foul waste and drainage points will be located in the new construction compound. Contractors will make connections to these points as required.

2.10 Project Schedule

The total project life cycle from initial site development works to regulatory approval is shown in Table 2.2. Construction (site development and building erection) will be executed in parallel to ensure the earliest availability of each individual building. Following handover of the building to Alexion commissioning and will be carried out.

Table 2.2 Project Milestones

Key Milestones	Date
Start Basic Design Stage	Feb 2015
Submit Planning Application	May 2015
Construction Start	Jan 2016
Construction End/Commence Commissioning & Qualification	Dec 2017
Commence Activity	Nov 2018

3 Alternatives Considered

3.1 Introduction

Guidance provided by the EPA on the preparation of an EIS describes the importance attached to the consideration of alternatives in the overall EIA process. An outline of the main alternatives examined during the course of the project design development (Phase 1 and 2) is presented in this chapter, including explanation of what environmental factors were considered and how these considerations influenced the selection of the preferred option.

It is a fundamental requirement of the EIA process that viable alternatives to the key project decisions have been evaluated in the context of environmental impact.

The development of the proposals contained in this planning application (College Park Phase 2) have involved the following key project decisions:

- Why build this facility?
- Selection of the preferred site/location for the development
- Selection of the preferred manufacturing process
- Selection of the preferred arrangement of the proposed buildings

This chapter describes the alternatives that were considered under each of these headings and the reasons for the selection of the preferred options.

3.2 Why Build this Facility?

As previously mentioned in Section 1.3, Alexion has identified a need for additional manufacturing capacity in Europe. The need is generated by a market demand for biopharmaceutical medicines to treat patients with severe and ultra-rare disorders.

Alexion intends to invest in the creation of new bulk manufacturing facilities for a range of biopharmaceutical derived medical products for patients worldwide, together with associated business support functions.

Alexion intends to manufacture a variety of therapeutic proteins that are either approved for marketing by various region or country regulatory bodies or are involved in late stage clinical studies. These proteins will be produced to the bulk or formulated state, and filled for shipping.

3.3 Selection of the Preferred Site/Location for the Development

It is necessary to co-locate the additional manufacturing capacity adjacent to an existing biopharmaceutical supply chain facility, to ensure logistical efficiency and sustainability.

Alexion currently has two biopharmaceutical supply chain facilities in Ireland;

(i) Biopharmaceutical filling facility in Athlone. Existing building acquired in 2013.

(ii) Biopharmaceutical campus in College Park, Blanchardstown, Dublin 15. Greenfield site acquired in 2013 and currently under construction (laboratories, administration, warehouse and packaging).

The selection of the preferred location for this project involved careful consideration of a broad range of factors, all of which were deemed critical to the success and viability of the project. Key amongst these considerations were factors with potential environmental consequences, in particular;

1. The availability of a site with existing supporting business functions capable of accommodating the proposed Phase 2 development;
2. The availability of sustainable access to the site capable of supporting traffic associated with the site development and future manufacturing operations;

3. An environmental setting consistent with and compatible with the nature of manufacturing proposed, in terms of zoning policy and adjacent land uses; and
4. A site with established or available utility connections capable of supporting the proposed biopharmaceutical manufacturing processes, including; power, natural gas, water, waste water, surface water, and communications.

3.4 Selection of Preferred Manufacturing Process

The proposed Phase 2 development will involve the construction of a new manufacturing building and associated buildings and infrastructure for the manufacture of pharmaceutical products.

Traditionally the manufacture of pharmaceutical products is carried out either through a chemical or biological process. The facility proposed to be developed by Alexion will be based on a biological (or biotechnology) process. It is important to understand that the manufacture of Active Pharmaceutical Ingredients (APIs) by means of a biological process differs significantly from traditional bulk synthesis / chemical API manufacture. Biological processes are characterised by the mild aqueous conditions of the production and purification stages. This is in contrast to the small molecule chemical API process where extremes of temperature (hot and cold) and potentially aggressive chemicals are involved in the chemical reaction steps.

As such, biotechnology represents a clean and safe option for the manufacture of human medicines by virtue of:

- Low emergency or fire risk due to small quantities of chemicals;
- Low hazardous waste generation (no hazardous chemicals involved in the manufacturing process other than minor quantities for cleaning purposes);
- Low atmospheric emissions (little or no Volatile Organic Compound emissions due to the absence of solvents or other hazardous chemicals in manufacturing process); and
- The technology to be used at the site is classified as Class 1 for the contained use of Genetically Modified Micro-organisms (GMM), as regulated by the EPA.

Furthermore, because pharmaceutical manufacture using biological processes is based on complex techniques of biotechnology, there is a lot of variety in the type of technology and manufacturing processes used around the world. Alexion intend to replicate the technologies and processes already being used at facilities currently manufacturing their products. The knowledge and skills that Alexion and their people built up over the years in the design, operation and management of facilities around this technology will ensure that any potential environmental risks associated with the process will be minimised, in comparison with a situation where a new technology or manufacturing process is being introduced.

3.5 Selection of Preferred Arrangement of the Proposed Buildings

As Phase 1 of the College Park development has planning permission and currently in construction, this dictated the preferred arrangement of the proposed Phase 2 buildings. The characteristics of Phase 1 are:

- The block is arranged on an East-West axis which maximises the South façade which can be controlled for solar gain, which offers views out
- The East-West building provides a statement at the front of the site and maximises the screening of subsequent works
- The laboratory building is standalone and planned on an efficient module for flexible external subdivision
- A common reception area allows a single security point for staff and visitors

Phase 2 is seen as a continuation of the master planning philosophy adopted for Phase 1. A number of alternative options were assessed regarding the proposed arrangement of the Phase 2 buildings and infrastructure, see Figure 3.1.

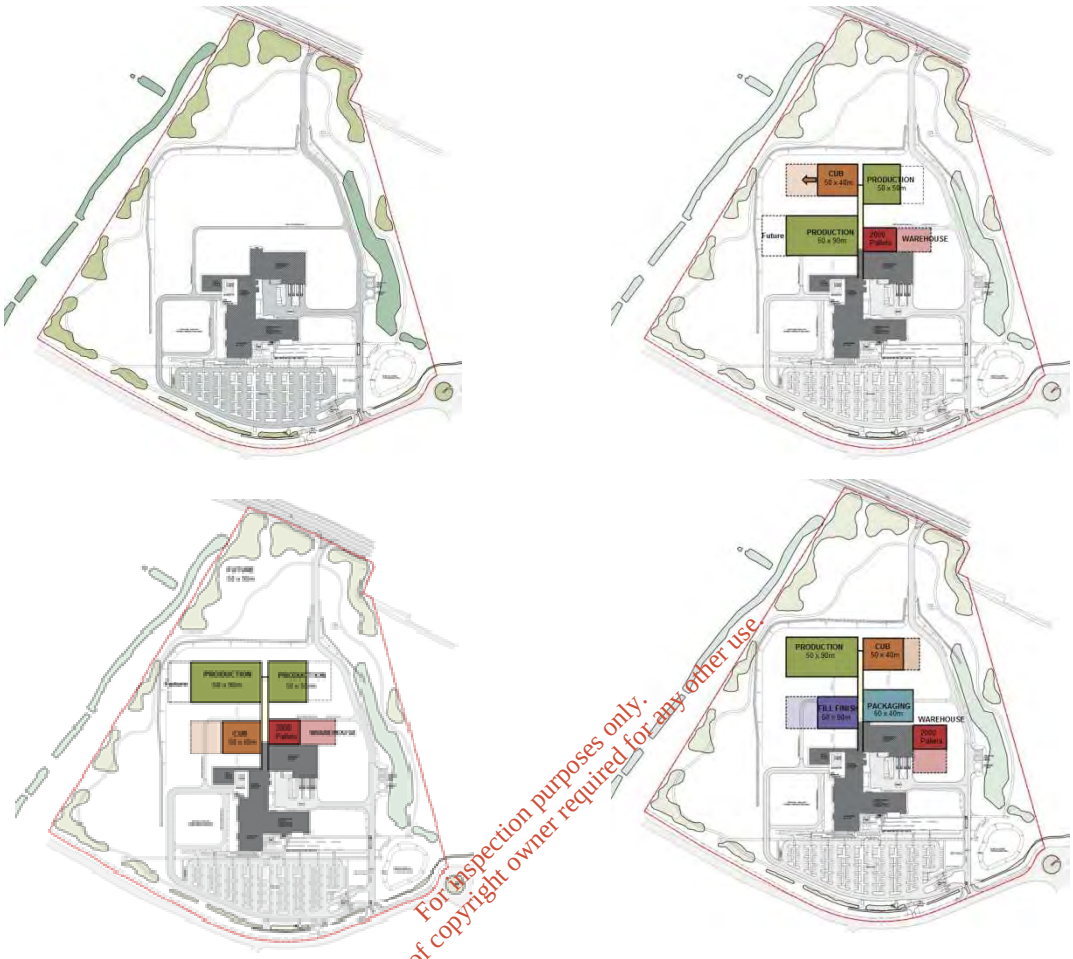


Figure 3.1 Alternatives Options

Following a review of the different options Figure 3.2 was chosen as the preferred option.

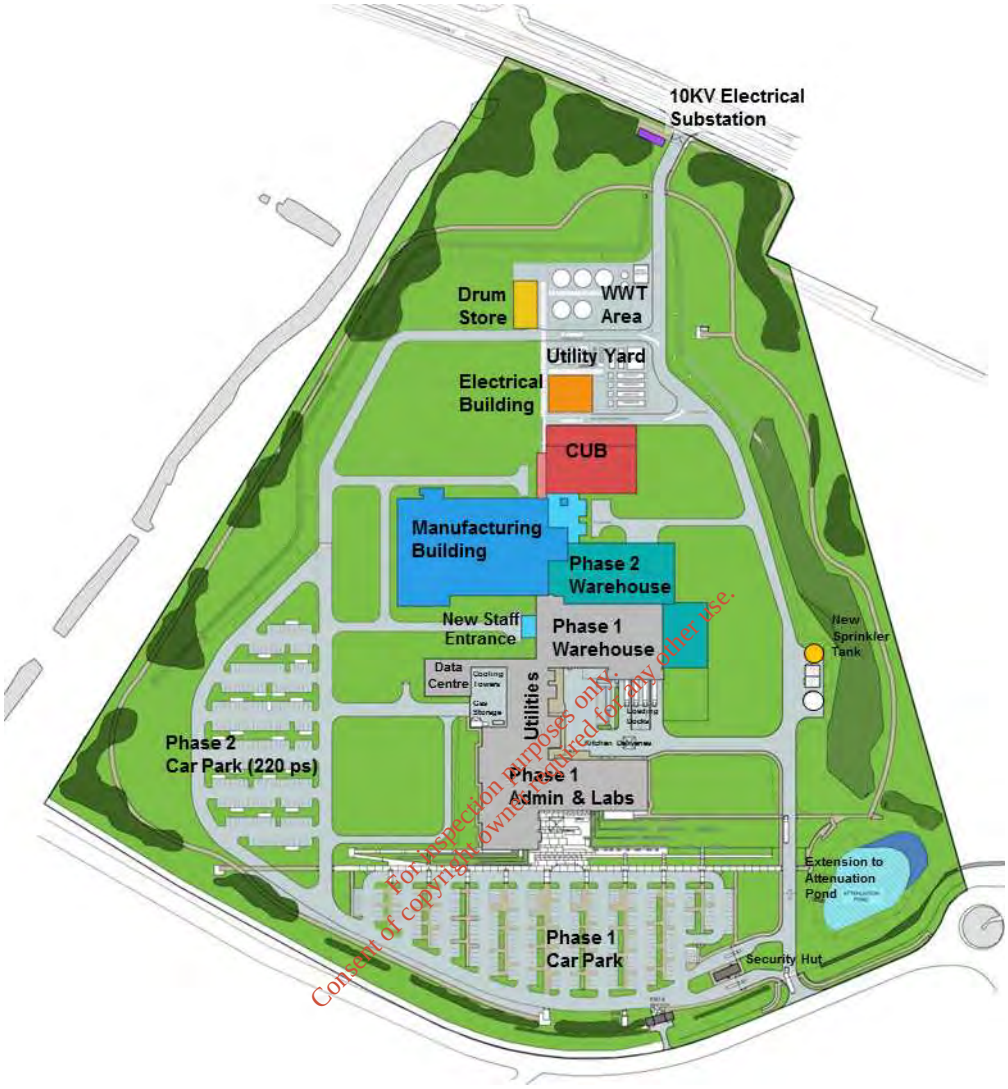


Figure 3.2 Selected Option

The following factors were considered in arriving at a preferred layout for the new manufacturing building and associated Phase 2 buildings and utilities;

- Consistency with the Master Plan strategy set out for the site in the planning documentation and EIS supporting the Phase 1 permitted development (see Figures 3.1 and 3.2)
- Continuation of the campus 'feel' of the development and the creation of a consistent link between the Institute of Technology campus and the other neighbouring industry, business and technological facilities and activities
- Continuation of the north/south longitudinal spine corridor as the most efficient means of personnel and materials link between the Phase 1 facilities (under construction) and the proposed Phase 2 manufacturing operations.
- Location of the large (21,869m^2 x 42.5m high) manufacturing building on the western side of the spine, on an east-west axis to minimise its visual impact when viewed from prominent locations in proximity to the site and from distance
- Location of the CUB on the eastern side of the spine so as to integrate and screen the boiler flue structure when viewed from prominent locations in proximity to the site and from distance

- Location of the utilities yard and waste water treatment area in the northern part of the site to avail of external visual screening by virtue of (i) facility buildings to the south and (ii) earthen embankments to the north.

A significant consideration in the design of the Phase 2 manufacturing facility, and in particular the manufacturing building itself, has been the determination of the overall height of building required to accommodate the designated manufacturing functions.

Conventional best practice in the design of biopharmaceutical manufacturing facilities dictates a structure comprising 3 or 4 primary operating levels which provides optimum manufacturing conditions in terms of

(i) minimising product and liquid transfer distances

(ii) optimal segregation of processes

(iii) maximum energy efficiency, and

(iv) optimal environmental performance / waste handling.

The proposed manufacturing facility to be developed by Alexion at College Park will be based on this conventional and industry best-practice approach, as opposed to any alternative or less efficient arrangement. The building will comprise 4 operating levels with the following approximate floor-to-floor height requirements;

- Level 3: Cell Culture and Media and Buffer Preparation (9m floor-to-floor)
- Level 2: Buffer Hold and access from Harvest (11m floor-to-floor)
- Level 1: Purification (10m floor-to-floor)
- Level 0: Utilities (8m floor-to-floor)

The floor-to-floor heights are dictated by the requirements to accommodate the scale of vessels and equipment required to manufacture the suite of biopharmaceutical products envisaged. The overall manufacturing building height (42.5m including parapets) is therefore necessary to achieve the optimal functional and environmental objectives defined above. In addition, the flues from the facility natural gas boilers will be required to extend an appropriate distance above the parapet of the manufacturing building. Accordingly, the flues will be combined into a single structure which will extend 6m approximately above the parapet of the building.

In accordance with Irish Aviation Authority (IAA) Order 215 of 2005, any proposed obstacle that meets or exceeds 45m above the ground must be submitted to the IAA for review. While the site of the proposed development at College Park lies outside the outer public safety zone of Dublin Airport, as the height of the boiler flue stack structure (at 48.5m) exceeds the IAA threshold of 45m, the IAA have been consulted in relation to the proposed development.

The IAA have recently published an advice document on land use planning and also launched a web based tool (ASSET) to help in the assessment of whether or not an erection or the construction of an object (permanent or temporary), would be likely to constitute an obstacle to aircraft in flight or interfere with aviation communications, navigation or surveillance systems. Through technical submissions made via the ASSET system, IAA have advised that the proposed structure intersects but does not penetrate known aerodrome obstacle limitation surfaces.

Further consultation will be held with IAA during the construction phase of the project, in particular in relation to any proposals for the installation of temporary working cranes that might exceed 45m in height, in which case separate authorisation will be sought in accordance with the above Order.

4 Human Environment

4.1 Introduction

This chapter describes the existing human environment in the vicinity of the proposed development site in terms of population, employment and land-use. The likely impacts on the human environment arising from the proposed development are assessed.

The impacts of other human related environmental aspects associated with the proposed development such as noise, traffic, visual impact and air quality are discussed in the relevant chapters of the EIS.

The site of the proposed development is located at College Park, Blanchardstown, Dublin 15. The Phase 1 development (currently under construction) has already resulted in a positive impact in terms of local employment and stimulating economic activity. Information derived from the planning, design and construction of the Phase 1 development has been used to inform the consideration of potential impacts on the human environment arising from the proposed Phase 2 development.

4.2 Assessment Methodology

Analysis of the effect of the proposed development on the human environment is undertaken in compliance with the requirements of "*Guidelines on the Information to be contained in Environmental Impact Statements*" (EPA, 2002) and "*Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)*" (EPA, 2003).

This chapter is focused on potential impacts which have not been assessed elsewhere in the EIS. The Advice Notes on Current Practice (EPA, 2003) identify issues which may be examined under assessment of impact on human environment as being:

- Economic Activity – will the development stimulate additional development and / or reduce economic activity, and if either what type, how much and where?
- Social Considerations – will the development change patterns and types of activity and land use?
- Land-use – will there be severance, loss of rights or way or amenities, conflicts, or other changes likely ultimately to alter the character and use of the surroundings?
- Health & Safety – will there be risks of death, disease, discomfort or nuisance?

The EPA 2003 Advice Notes recommend that the EIS indicates the location of sensitive neighbouring occupied premises likely to be directly affected and other premises, which although located elsewhere, may be the subject of secondary impacts such as alterations to traffic flows or increased urban development, with particular reference to the following:

- Homes
- Hospitals
- Hotels and holiday accommodation
- Schools and rehabilitation workshops
- Commercial premises.

The EPA advice notes also recommend that impacts on the transient population are considered, such as drivers, tourists and walkers.

In line with the advice notes, before assessing the impacts on the human environment, the principal receptors that may be impacted by the proposed development are identified as:

- Residential Receptors

- Residential properties within 1 km of the site
- Residential properties adjacent to the primary transport routes
- Residential properties in the wider context
- Land zoned for residential development.

Direct Economic Receptors

- Commercial and Industrial premises in close proximity to the site
- Zoned commercial lands in close proximity to the site
- Operational and construction related employment.

Indirect Economic Receptors

- Suppliers of construction materials
- Spin off employment and economic activity.

Social and Community Facilities

- Schools and community facilities within 1 km of the site
- Lands zoned for social and community facilities within 1 km of the site.

Transient Population

- Visitors to College Park.

Relevant information has been obtained from public bodies with regard to planning and development context, employment statistics, demographic statistics and community aspects. The primary bodies concerned were the Central Statistics Office (CSO) and Fingal County Council (FCC).

Desktop information reviewed in the process of information gathering includes the following:

- CSO data, including the censuses for 2006 and 2011; the Quarterly National Household Register; Live Register figures
- Fingal Development Plan 2011-2017

4.3 Characteristics of the Proposed Development

The Phase 2 development will be operated 24 hours/day on a 4 shift cycle. The anticipated operational employee numbers will be 280 with off-peak start and finish times. A Mobility Management Plan has been prepared with respect to the operation of the development. A more detailed description of the proposed development is provided in Chapter 2 (Description of the Proposed Development).

Regarding the Human Environment, the types of issues which developments such as this raise (both during construction and operation) include: additional economic opportunities; nuisance and disturbance during construction; increased traffic; and impacts on existing and adjoining land uses.

4.4 Receiving Environment

The existing human environment in relation to the planned development comprises those residing and working in the vicinity of the proposed site and also the wider community in Fingal, and Dublin City. Figure 4.1 shows the existing and zoned land uses in the surrounding area.

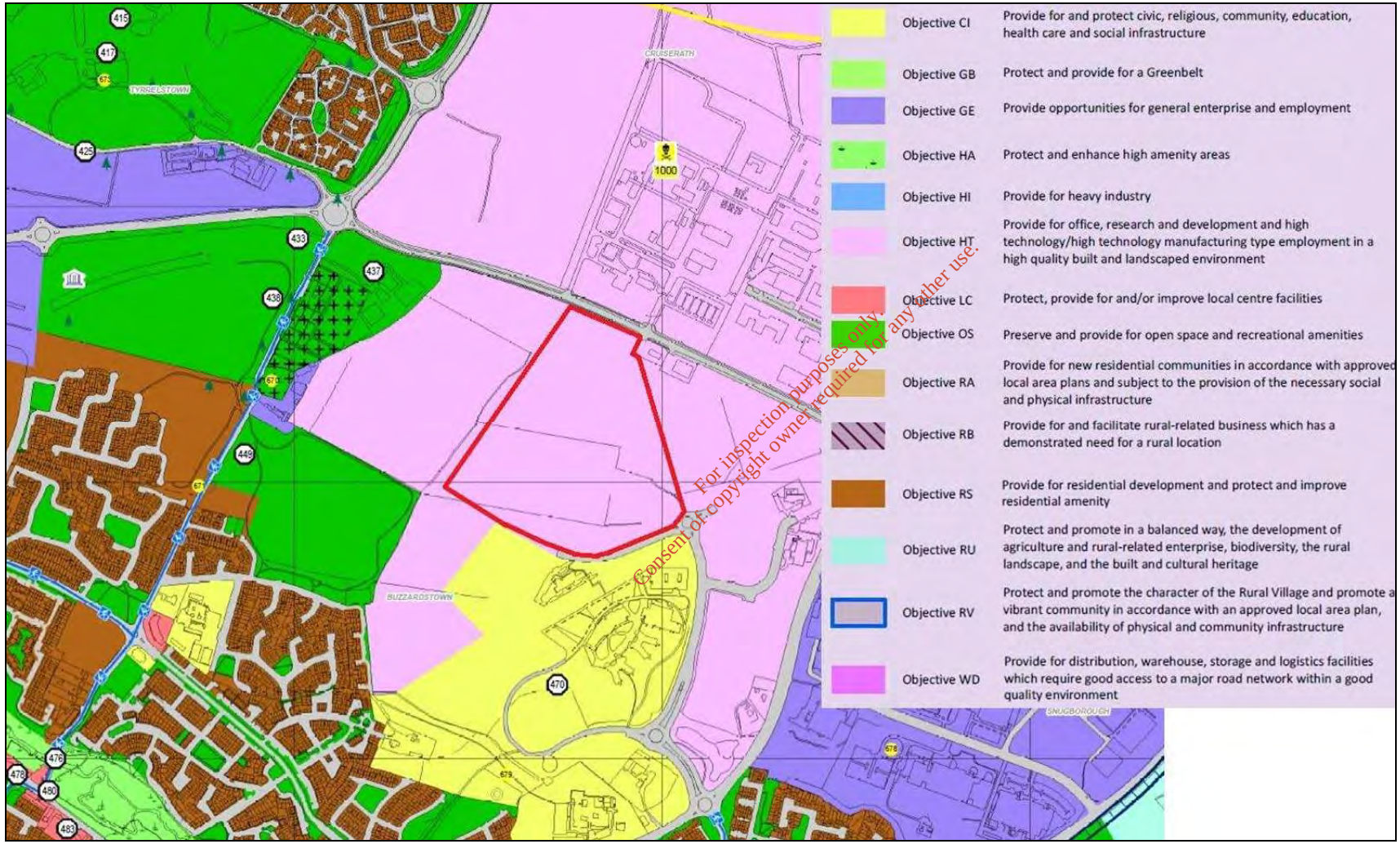


Figure 4.1 Landuse Zoning Objective (Source: Fingal Development Plan 2011 – 2017 Sheet 12 Blanchardstown North) (Alexion site outlined in red)

4.4.1 Local Residences and Businesses

The site for the proposed development is surrounded by undeveloped lands, housing, and commercial and industrial facilities. Currently Phase 1 of the overall development is being constructed on the site. North of the site is made up predominantly of undeveloped lands and industry, north of the Cruiserath Road. Further to the northwest are a number of mixed apartments and housing developments at Tyrellstown. Lands to the east of the site are made up of commercial and industrial parks east of the R121 regional road. These include various types of industrial and commercial facilities. Also east of the site is a childcare facility, and a halting site, which is located along Ballycoolin Road.

To the south and south west of the site there exists mainly housing including 'The Nurseries' and 'Dromheath' housing estates, and also the 'Warrenstown' area. Ladys Well Park is located to the south west of the proposed site and provides recreational facilities to local residents. Also to the south east of the site is Institute of Technology Blanchardstown. This facility extends as far as the IDA road, from which the proposed development will be accessed. To the east of the site there exists a graveyard along Church Road.

The site will be served by the local road network with access to the site from the R121 onto the IDA College Business and Technology Park road. Construction site access for the proposed development will be via Cruiserath Road, at the northern end of the proposed development site.

4.4.2 Amenities and Tourism

The site for the proposed development is situated to adjacent a number of existing commercial and industrial estates, in an area that has been zoned for industrial use only.

The nearest amenity facility to the proposed site is the Institute of Technology Blanchardstown which is located to the south of proposed development site. To the east of the site there is a childcare facility, which is within the confines of the IDA College Business and Technology Park.

4.4.3 The Wider Community

In order to assess the potential effects of the project on the wider community it is first necessary to establish the demography of the population. Attributes of the population which are examined in this chapter include population, age profile including dependency, employment profile and social class.

Data on these elements have been compiled from the 2006 and 2011 censuses, as well as some information from Quarterly National Household Surveys, all of which are compiled by the CSO.

4.4.4 Census

The most recent census of population was carried out in April 2011 and April 2006 by the CSO. Census data is compiled for the State as a whole, as well as smaller areas including counties, cities, towns and electoral divisions. Given the location of the proposed development the census information on population, age profile, employment and social class, has been analysed with respect to the State, Dublin and Fingal.

Population

Table 4.1 reveals the population increase that has occurred in the general vicinity of the proposed development between 2006 and 2011. Increases have occurred in all the relevant catchment areas, with a significant percentage increase occurring Fingal area. The proposed development will be located in the catchment area covered by the Fingal Development Plan 2011-2017.

Table 4.1 Populations in Vicinity of Proposed Development, 2006 and 2011

	2006	2011	% change
State	4,239,848	4,588,252	8.2
Dublin	1,187,176	1,273,069	7.2
Fingal	239,992	273,991	14.2

Age Profile

Table 4.2 reveals that in 2006 and 2011 a higher percentage of the population of Dublin and Fingal were independent, than were independent in the State. In addition the percentage of Dublin and Fingal's population which was of child-bearing age was also moderately higher than the same group within the State as a whole. These figures indicate that the population and labour force of these areas is likely to increase faster than that of the State.

Table 4.2 Age Profile of Population in the Vicinity of the Proposed Development

2011	0-14	15-44	45-64	65+	% Dependant (0-14 & 65+)	% Independent (15-64)	% Child Bearing (15-44)
State	979,590	2,030,390	1,042,879	535,393	33.0	67.0	44.3
Dublin	245,252	617,851	270,690	139,276	30.2	69.8	48.5
Fingal	66,407	132,931	54,792	19,861	31.5	68.5	48.5
2006	**0-14**	**15-44**	**45-64**	**65+**	**% Dependant (0-14 & 65+)**	**% Independent (15-64)**	**% Child Bearing (15-44)**
State	864,419	1,978,605	928,868	467,926	31.4	68.6	46.7
Dublin	217,652	602,022	244,991	122,511	28.7	71.3	50.7
Fingal	52,974	126,178	46,445	14,395	28.1	71.9	52.6

In all areas, there has been a relatively minor decrease in the independent and of child-bearing age population between 2006 and 2011. The independent population of the State decreased by 1.6% between 2006 and 2011, while the independent populations of Dublin and Fingal decreased by 3.4% and 1.5% respectively, over the same period. The population of child-bearing age decreased in the State by 2.4% between the 2006 and 2011 census while there were decreases of 2.2% and 4.1% for the same group in Dublin and Fingal respectively, over the same period.

This data suggests that there is existing and potential population and labour force growth in the vicinity of the proposed development. As a result employment opportunities will be required to keep pace with population and labour force growth.

Employment

Table 4.3 reveals the employment statistics for Dublin and Fingal. It is clear that there has been a significant increase in unemployment in both areas, as well as the State as a whole, between 2006 and 2011. Therefore there is a need for employment opportunities in the vicinity of the proposed development.

Table 4.3 Employment Statistics for Vicinity of Proposed Development

2011 – Labour Force					
	At work	Unemployed looking for first regular job	Unemployed having lost or given up previous job	Total in Labour Force	Unemployed as % of Total Labour Force
State	1,807,360	34,166	390,677	2,232,203	19.0
Dublin	540,729	10,678	100,771	652,178	17.1
Fingal	119,276	2,224	20,416	141,916	16.0
2006 – Labour Force					
	At work	Unemployed looking for first regular job	Unemployed having lost or given up previous job	Total in Labour Force	Unemployed as % of Total Labour Force
State	1,930,042	29,372	150,084	2,109,498	8.5
Dublin	572,896	9,355	46,750	629,001	8.9
Fingal	120,794	2,095	7,927	130,816	7.7

Social Class

Census information on employment can be further categorised by social class (Table 4.4). This categorisation indicates the type of employment that the national workforce is employed in or is capable of being employed in. The seven different classes are described as follows:

1. Professional workers;
2. Managerial and technical;
3. Other non-manual workers;
4. Skilled manual workers;
5. Semi-skilled manual workers;
6. Unskilled manual workers;
7. All other gainfully occupied and unknown.

For this analysis of social classes within the areas of interest, social classes 1-3 have been grouped together as these include most professional and non-manual workers. Social classes 4-7 are also grouped together and include semi-skilled and unskilled employees.

Table 4.4 Social Classes of Population in the Vicinity of the Proposed Development

2011 – Social Classes		
	Social Class 1-3 (%)	**Social Class 4-7 (%)**
State	52.1	47.9
Dublin	56.2	43.8
Fingal	59.0	41.0
2006 – Social Classes		
	Social Class 1-3 (%)	**Social Class 4-7 (%)**
State	49.9	50.1
Dublin	53.4	46.6
Fingal	57.2	42.8

Between 2006 and 2011, in all catchments of interest, the percentage of the populations which fall into social classes 1-3 increased. This suggests that in terms of labour force the Dublin and Fingal areas have a significant requirement for, and is capable of supporting industries with a need for professional, managerial and non-manual employees i.e. Class 1-3.

4.4.5 Quarterly National Household Survey

The Quarterly National Household Survey (QNHS) is a large-scale, nationwide survey of households in Ireland in which 39,000 households are surveyed each quarter.

It is designed to produce quarterly labour force estimates that include the official measure of employment and unemployment in the State. The most recent Quarterly Survey for which results have been published was undertaken in Quarter 4 (Q4) of 2014.

Main Results

In the State as a whole there were 1,938,900 persons in employment and 213,600 unemployed in Q4, 2014 making up a labour force of 2,152,500. This represents an increase in employment of 1.5% in the year to Q4 2014. There was a decrease in labour force of 0.5% in the year to Q4 2014.

The latest available comparable figures for all EU-28 (28 EU member states) and Irish employment figures are for Quarter 3 (Q3) of 2014. The employment rate in Ireland increased by 1.1%, to 62.2% over the year to Q3 2014, while the employment rate in the EU-28 was 65.5%.

4.4.6 Summary

In summary the preceding data indicates that Fingal and Dublin, as well as the State as a whole, have seen rises in population between 2006 and 2011. In addition the independent and child-bearing percentages of the population are considerably higher in Fingal and Dublin than in the State as a whole, which is indicative of the area's need for current and future employment opportunities.

Social Class statistics for the area also indicate that a high percentage of the population of Fingal and Dublin fall within Social Classes 1-3 which comprise professional, managerial and non-manual workers. Therefore there exists in this region a significant requirement for employment in similar categories.

4.5 Potential Impacts

4.5.1 Impacts on Local Resident and Businesses

The main potential impacts on local residences and businesses associated with the proposed development will relate mainly to traffic, noise, air emissions and visual impact. All of which are dealt with in the corresponding chapters of this EIS as follows:

- Chapter 5 (Landscape and Visual)
- Chapter 6 (Traffic and Transportation)
- Chapter 9 (Noise & Vibration)
- Chapter 11 (Air Quality)

In addition a potentially positive impact for local businesses of the proposed development is the additional economic activity that could be created in the local area, especially for businesses in the vicinity and surrounding area in Dublin. During the construction and operation of the proposed facility approximately 545 (average) and 280 people, respectively, will be employed at the site and their potential use, both personal and business-related, of local services and retail and leisure facilities would greatly benefit the business community in the area.

4.5.2 Impacts on the Wider Community (Socio Economic)

Construction Phase

The construction of the proposed development will take approximately 24 months. Commencement of the construction phase is envisaged for January 2016, but it is subject to the planning permission process.

The proposed project will result in a significant positive socio-economic impact providing both direct and indirect employment in the local area. The construction phase of the proposed project will result in the direct provision of approximately 1263 construction jobs at peak construction (including contractors, construction management, supervision and owner personnel), with an average of approximately 545 jobs over the duration of 24 months.

The proposed development will also provide indirect employment to the various service industries in the area. It is anticipated that supplies and services will be sourced locally, where feasible, thus maximising the positive socio-economic impact in the locality.

The proposed development works are likely to create an increase in demand for temporary accommodation in Blanchardstown and surrounding areas, again benefiting the hospitality sector in the local economy.

Operational Phase

Overall, the proposed development is predicted to have a significant positive impact on the human environment as it will provide both temporary and permanent employment and contribute to the local economy.

It is envisaged that operation of the proposed Phase 2 development will require a workforce of approximately 280 persons. The facility will require a variety of employment disciplines including scientists, engineers, manufacturing, warehousing, drug packaging and labelling staff and administration staff. Spin-off jobs resulting from the employment created as a result of the operating facility can be calculated using the “multiplier effect”. It is estimated that for every one full-time position created by the proposed development a second spin-off job will be created through the services industry or other.

The impact on housing demand arising from the overall development and operation of the proposed development is likely to be dispersed over a wide area including Dublin and the Greater Dublin Area. No adverse housing demand impacts are likely to be associated with the operation of the proposed development.

4.5.3 Impacts on Zoning and Land Use

The site for the proposed development is located on lands that are zoned HT (High Technology) in the Fingal Development Plan 2011 – 2017 and therefore does not involve any changes in zoning. Operational access to the proposed development will be via the IDA road to the south east of the site. The proposed development will not cause any severance issues or loss of rights of way for local landowners/land users.

4.5.4 Impacts on Health and Safety

Potential health and safety risks to people living and working in the vicinity of the proposed construction works and operational plant have been considered within a number of Chapters of this EIS as follows:

- Chapter 6 –Traffic and Transportation
- Chapter 9 – Noise
- Chapter 10 – Water and Effluent
- Chapter 11 – Air Quality
- Chapter 12 – Waste Management

This section considers any additional potential health and safety risks to the human environment arising from the proposed development.

Construction Phase

As with any construction site there will be potential risks to the health and safety of construction personnel on-site due to the use of large, mobile machinery and heavy equipment & materials (related mitigation measures are discussed in Section 4.6.)

Operational Phase

The main hazards at any operational site are related to the equipment and materials stored and used at that site. It is noted that the proposed development will not be a SEVESO site. Therefore, there is no potential significant negative impact in terms of health and safety.

The facility is being designed to comply with Irish Medicines Board (IMB), US Food and Drug Administration (FDA) and European Medicines Agency (EMEA) regulatory requirements for biopharmaceutical multi-product facilities under current Good Manufacturing Practices (cGMPs). The facility is also being designed to meet all other regulatory standards covering applicable health, safety and environmental requirements. Amongst which an Industrial Emissions Licence, Greenhouse Gas Permit and GMO Permit will be in place before commencement of operational activities.

4.5.5 Impacts on Local Amenities and Tourism

The site for the proposed development is situated adjacent to a number of existing commercial and industrial estates, in an area that has been zoned for industrial use only. As a result of this the impact of the facility on local amenities and tourism will be minimal.

The nearest amenity facility to the proposed site is the Institute of Technology Blanchardstown which is located to the south of proposed development site. Through good design and engineering practices there is no anticipated negative impact on this amenity as a result of the proposed development. To the east of the site there is a childcare facility, which is within the confines of the College Park. Again through good design and engineering practices there is no anticipated negative impact on this amenity as a result of the proposed development.

It is, however anticipated that the proposed development, both during construction and operation, will have a beneficial impacts in terms of creating business for the local commercial sector. The impact of traffic on the local road network is discussed in Chapter 6 (Traffic and Transportation) of this EIS.

4.5.6 'Do Nothing' Scenario

The main impact on the human environment if the proposed development does not proceed is the loss of the direct and indirect employment opportunities that the proposed development would create. Given the demographic statistics for the local and surrounding area, which indicate population and labour force growth in the region, developments such as the one proposed are extremely important for the future development, economic growth and prosperity of the area.

4.5.7 Cumulative Impacts

Much of the surrounding lands is either established High Technology/High Technology Manufacturing or zoned for similar development. Therefore potential exists for further development on either existing sites (e.g. Alexion or BMS), proposed sites (Montjeu) or on other currently Greenfield zoned lands.

The proposed developments will lead to a significant number of temporary jobs during construction and permanent jobs during operation which will substantially benefit the local economy. This will have a positive cumulative impact with the employment currently provided by other businesses in the area.

4.6 Mitigation Measures

Many of the potential impacts on the human environment relate to other environmental aspects such as noise, air, water quality, waste and traffic. The potential impact of these aspects in relation to the proposed development, and the related mitigation measures are dealt with in the corresponding chapters of this EIS. Of the remaining potential impacts relating to the human environment as outlined in Section 4.5 only those concerning health and safety require mitigation measures. These are outlined in the following sections.

4.6.1 Construction Health and Safety

During the pre-construction and construction phases safety will be managed in accordance with the Safety, Health & Welfare at Work (Construction) Regulations, 2013.

Pre-Construction Phase

The design of the final proposal will be subject to safety design reviews to ensure that all requirements of the project are safe. A Project Supervisor for the Design Process (PSDP) will be appointed as part of this process. Where issues are identified, corrective actions will be implemented to amend design issues prior to issuance of final design for construction.

Construction Phase

Safety will be a primary concern during the construction phase of the project. A contractor safety management program will be implemented identifying potential hazards associated with the proposed work. A Project Supervisor Construction Stage (PSCS) will be appointed as part of this process.

Temporary contractor facilities and areas under construction will be enclosed and fenced off from the public with adequate warning signs of the risks associated with entry to these facilities. Entry to these areas will be restricted and will be kept secure when construction is not taking place.

Measures to ensure public safety, with respect to construction traffic, will be included in a Traffic Management Plan, carried out as part of the overall CEMP.

4.6.2 Operational Health and Safety

The operation of the proposed development will be carried out in strict accordance with all Irish and European regulations governing safety in the work place and in particular the regulations implemented under the Safety, Health & Welfare at Work Act, 2005, as amended and the Safety, Health and Welfare at Work (Biological Agent) Regulations 2013, SI 572 of 2013. These Regulations define biological agents and apply to activities in which workers are or potentially are

exposed to biological agents as a result of their work. Employers must identify the biological agent to which workers are, or may be, exposed. They must assess the risk, making use of the list of biological agents, their classification, containment levels and measures provided for in the relevant Code of Practice, and proceed in accordance with the remaining Regulations where appropriate.

All relevant facility employees will be fully trained in the operating procedures for equipment and processes, with particular emphasis on related health and safety issues.

In the event of a fire the extensive building sprinkler systems will come into operation and necessary personnel will be fully trained to deal with such emergencies. In addition the buildings are designed so that any fire will be contained within its zone by a fire wall in order to prevent it spreading and therefore any damage and impact will be localised.

4.7 Residual Impacts

The main residual impact of the proposed development on human beings will be a long term positive significant economic and employment effect, contributing to the local economy.

5 Landscape and Visual

5.1 Introduction

This Chapter of the EIS, relating to landscape and visual, has been prepared by ARC Architectural Consultants Ltd. This Chapter should be read in conjunction with Chapter 1 (Introduction), Chapter 2 (Project Description) and Chapter 5 (Traffic and Transportation).

The assessment, which included visits to the proposed development site and its surrounds, is supported by a series of photomontages of the proposed development taken from surrounding viewpoints that are considered representative of general range of views towards the site. These photomontages are included in Volume 2 of the EIS. Landscape input has been provided by Mitchell Associates.

The site of the proposed development is located at College Park, Blanchardstown, Dublin 15. Information derived from the planning, design and construction of the Phase 1 development has been used to inform the consideration of potential landscape and visual impacts arising from the proposed Phase 2 development.

5.2 Assessment Methodology

A survey of the potential visibility of the proposed development was carried out on a number of dates in March and April 2015. In the first instance, mapping analysis was carried out to identify locations from which views of the proposed development were likely.

Mapping and on-site analysis identified some 40 locations where there was a potential for the proposed development to be visible. At each of the 40 no. locations, photographs were taken looking towards the proposed development. The on-site analysis also identified numerous locations from where the development was very unlikely to be visible. This analysis is presented in the Zone of Visual (ZVI) Map included in Appendix B.

In pre-planning meetings with Fingal County Council, 25 no. locations were chosen for photomontage analysis. Views chosen for this analysis were taken using a high resolution digital camera with a horizontal field of coverage of 73.6°, which would be considered a wide angle. A wide-angle lens was used to provide sufficient context in the view. Photographs with a narrow field of view may exclude relevant context. Wide-angle views, capable of providing sufficient context are particularly important when the viewpoint is close to proposed development. Photographs and photomontages based on wide angle photography are printed at A3 size, so that the angle of vision covered by the print, when held at reading distance, is approximately the same as would be covered by the same extent of the real scene, when viewed from the camera position.

The camera positions of the views were established using digital GPS equipment, Ordnance mapping and a topographical survey of the site and surroundings. All survey data was related to Irish Transverse Mercator. The date and time when each photograph was taken was recorded.

Photomontages were prepared for each of the 25 no. view locations. Models of the proposed development were provided by the design team, and were amended and textured by ARC using 3D Studio Max.

The surveyed reference on a crane on the Phase 1 construction site together with points on buildings under construction were attached to the three dimensional models. The model used for photomontages included appropriate detail of the proposed buildings as shown on design drawings. Renderings were made on computer from each camera position using the field of view of each photograph, and with the sun position correct for the date and time that each photograph was taken. The renders were inserted into the relevant view, and were scaled and positioned using the field of vision of each photograph and the reference points in each view. ARC would expect the dimensional accuracy of the scaling and positioning of the image of the proposed development within each view to be better than ± 1%.

5.2.1 Definition of Impacts on the Built Environment

The assessment of visual impacts on landscape and on the built environment had regard to the Guidelines on the Information to be Contained in Environmental Impact Statements prepared by the Environmental Protection Agency (2002), and to Directive 2011/92/EU (as amended by Directive 2014/52/EU) on the assessment of the effects of certain public and private projects on the environment.

The list of definitions given below is taken from Section 5: Glossary of Impacts contained in the Guidelines on the Information to be Contained in Environmental Impact Statements prepared by the Environmental Protection Agency. Some comment is also given below on what these definitions might imply in the case of visual impact or landscape and visual impact. The definitions from the EPA document are in italics.

Imperceptible Impact: An impact capable of measurement but without noticeable consequences. The definition implies that the development would be visible, capable of detection by the eye, but not noticeable. If the development were not visible, there could be no impact.

Slight Impact: An impact which causes noticeable changes in the character of the environment without affecting its sensitivities. For this definition to apply, a development would be both visible and noticeable, and would also bring about a change in the visual character of the environment. However, apart from the development itself, the visual sensitivity of the surrounding environment should remain unchanged.

Moderate Impact: An impact that alters the character of the environment in a manner that is consistent with emerging trends. In this case, a development must bring about a change in the visual character of the environment; and this change must be consistent with a pattern of change that is already taking place.

Significant Impact: An impact which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment. The wording of the definition is clear. Difficulty in assessing whether an impact might or might not be significant lies in the word 'sensitive'. In visual terms, particularly when related to the appearance of landscape or the built environment, what one person might be sensitive to another might not. A conservative approach, classifying impacts as significant even though many observers might not regard them as significant, is taken here.

Profound Impact: An impact which obliterates sensitive characteristics. In visual terms, profound impacts are only likely to occur on a development site, in that it is only on the site that all previous visually sensitive characteristics could be obliterated. Outside the site, some visual characteristic of the original environment is likely to remain.

The range of possible impacts listed above deal largely with the extent of impact; and the extent of the impact of a development is usually proportional to the extent to which that development is visible. The extent of impact will also, in part, depend on the sensitivity of the spaces from which the development is seen. This proportionality may be modified by the extent to which a development is regarded as culturally or socially acceptable. It is also the case that a building thought startling when first built, in time becomes part of the background, and what at first might have been regarded by the public a significant impact, fades to slight. Though buildings are intended to be permanent, and will be permanently visible, the extent of visual impact associated with a building often diminishes with time.

5.2.2 Definition of Landscape Impacts

Landscape impacts are the predicted effects generated by the proposed development on the character, fabric and quality of the landscape. These could include direct, physical impacts upon landscape elements, such as the loss of a tree or tangible effects to an existing landscape character. The definitions of impact significance in terms of landscape are as follows:

Major Impact: The development would result in the removal or the retention and enhancement of key landscape features; the development would result in extensive and or prominent alterations to important elements of the landscape character of a distinct area.

Moderate Impact: The development would result in the removal or the retention and enhancement of landscape features; the development would result in a weakening or strengthening of the landscape character of a distinct area by modifying components which contribute to that landscape character.

Minor Impact: The development would result in some alterations to existing landscape features; the development would result in changes to elements of the landscape character of a distinct area that are of a limited scale and or of a low prominence.

Negligible Impact: The development would cause barely discernible, or indiscernible changes to the physical elements within a landscape; the development would cause barely discernible or indiscernible changes to the existing landscape character of an area.

5.3 Characteristics of the Proposed Development

5.3.1 General Description & Building Design

The proposed Phase 2 development is described previously in detail within Chapter 2 (Project Description). The proposed Manufacturing Building has been designed to take into account the production processes required. See Section 3.5 for details. Full design details are set out in the drawings accompanying the planning application.

5.3.2 Appearance

The manufacturing building, CUB Building and warehouse extension will apply the same architectural language principle that was agreed as part of the Phase 1 development. It is the intention to keep the architectural treatment very simple and non-descript.

The manufacturing building has a proportional façade breakup that intends to reduce the appeared visual dominance of the building. The volume of the building was broken up into smaller components and elements from Phase 1 were applied to create a coherent architectural language throughout the campus. Proposed materials include structural glazing, composite panels and louvers.

Where possible and practical glass has been incorporated into the design to facilitate natural light into the workplace and create a more pleasant working environment.

5.4 Receiving Environment

The subject site is a large, high technology zoned and site in the College Park at Blanchardstown Road North, Blanchardstown, Dublin 15. The approved Phase 1 of the Alexion development is under construction on the site. The site is located at the south western edge of College Park, which is characterised by significant office, research and technology developments of varying scale. The R121 regional road runs along the northern boundary of the site. Much of the land within College Park remains undeveloped and the site is bounded to the east and west by large undeveloped sites. The Blanchardstown Institute of Technology is located to the south and southeast of the development site. There are buildings (one and two storeys in height) associated with College Park site services located a short distance to the northeast of the site.

College Park is located at the northernmost edge of Blanchardstown, approximately 2.5 km from its centre. The wider local area is characterised by major commercial and enterprise development, to the east and northeast, and by low density suburban housing to the south and northwest. Lady's Well Park and Mulhuddart Cemetery are located a short distance to the west of the site.

FCC granted permission for development comprising the first phase of the establishment of a new biopharmaceutical facility, incorporating a complex of buildings including an administration building, associated QC laboratories, warehouse, drug packaging and labelling facility, together with ancillary buildings such as a security gatehouse and pump house on the subject site in May 2014 (FCC Reg. Ref. FW14A/0020). The tallest of these buildings, the administration building, was proposed to rise to a height of 20.5 m above ground level. In January 2015, Fingal County Council issued a final grant of permission (FCC Reg. Ref. FW14A/0138) for amendments to the previously

granted permission, including an overall increase in the height of the office/lab building, an extension to the office building plant room; additional flues and a new single level data centre.

5.4.1 Potential Visibility of the Proposed Development

The potential visibility of any development depends on the position, size and height of the development itself and on the geometry of the landform and of any obstacles between the viewpoint and the development. If there is a large open foreground between the viewpoint and the development and if obstacles beyond that foreground are modest in height when compared to that of the proposed development, then the development is likely to be visible. On the other hand, if the foreground in any view is restricted, then even a very modest obstacle, relatively near to the viewpoint, will deny views of the development.

Therefore, in the case of the proposed Phase 2 development, visibility from within restricted spaces, such as residential roads and estates is likely to be very limited. Whereas, in views where there are large open spaces in the foreground, such as across large open green spaces or along roads oriented towards the development, the proposed development is likely to be visible. On site analysis has confirmed that the proposed Phase 2 development is likely to be visible from some specific locations at the edge of housing estates in the area but is unlikely to be visible from within the main body of these estates or from within most of the areas of commercial development such as Blanchardstown Village or the Blanchardstown Shopping Centre. On site analysis found that the proposed development is likely to be most visible across a limited number of green spaces in the area, along a small number of particular stretches of road, and from viewpoints very close to the proposed development.

In undertaking the assessment of the likely visual impact of the proposed development, ARC also reviewed the following documents in order to identify protected views or prospects from which there may be a potential for the proposed Manufacturing Facility to be visible and to alter the character of the view:

- The Fingal County Development Plan 2011-2017
- The Dublin City Development Plan 2011-2017
- The Kildare County Development Plan 2011-2017
- The Meath County Development Plan 2013-2019

Desktop review of the development plans of FCC and neighbouring Local Authority areas did not identify any protected views or prospects (including views or prospects identified as being of importance but which have not been specifically listed for protection) from which the proposed development has the potential to be visible or result in any visual impact. In the interests of completeness, the table below lists all protected views and prospects in Dublin City, Kildare, and Fingal within a roughly 10 km radius of the application site; and the two nearest views and prospects in Meath. The potential visibility of the proposed development on views from all these locations is none.

Table 5.1 Protected Views from Surrounding Areas

Development Plan	View No.	View Description	Potential visibility
Fingal	-	Development Plan maps show protected views along the River Liffey Valley. View looks away from application site.	None

Development Plan	View No.	View Description	Potential visibility
Dublin City	-	Figure 4: Key Views and Prospects indicates a key view from the Royal Hospital Kilmainham towards Phoenix Park. The view is approximately 9 km away from the application site and the entire Phoenix Park intervenes in the view.	None
Kildare	RL1	View RL1 relation to the views from Leixlip Bridge of the River Liffey. View is approximately 9 km away from the application site and looks away from application site.	None
Kildare	RC2	View RC2 relates to the views to and from Cope Bridge Newtown / Leixlip on the Royal Canal. View is approximately 8 km away from the subject site and looks away from application site.	None
Kildare	RC3	View RC3 relates to the views to and from Louisa Bridge Easton / Leixlip on the Royal Canal. View is approximately 9.5 km away from the application and looks away from application site.	None
Meath	73	View 73 relates to “extensive views to the north east, mid distance” of local significance from a “country road between Robinson’s Cross Roads on R108 and Windmill Hill”. View is approximately 17.5 km away and looks away from the application site.	None
Meath	77	View 77 relations to the north-westerly “View of Killen Castle/Skane Valley from south-east direction of the Warrenstown College”. View is approximately 20 km away from the site and looks away from the application site.	None

5.5 Potential Impacts

This section provides a description of the potential specific, direct and indirect impacts that the proposed development is likely to have on the visual environment.

The proposed development is the second phase of the phased development of a biopharmaceutical facility, the first phase of which is approved, is on site, and the construction of which is advanced. Although this second phase includes a structure substantially taller than the first phase, construction of structures of the scale and height now proposed is to be expected in developments associated with the biopharmaceutical industry, and the planned phasing of the Alexion development was indicated in earlier applications. The proposed development is, therefore, expected and consistent with emerging trends, so the highest level of visual impact likely to arise from its construction and subsequent existence is ‘moderate’.

The proposed manufacturing building that forms part of the current application is a large volume, but the extent of the visual impacts that it is likely to give rise to will depend on the extent to which it

is visible, and where visible, on how large an element it is within any view. Where the current proposed development, Phase 2, is seen as a substantial element within a view it is assessed below as likely to give rise to a 'moderate' visual impact. Where it forms a smaller element within a view, it is assessed as giving rise to a 'slight' or 'imperceptible' impact depending on the extent of visibility and on the character and importance of the view.

5.5.1 Construction Phase

The extent of visual impact of the development during the construction phase is likely to be similar to that for the operational phase, as set out below. The character of visual impacts during the construction phase is likely to be wholly negative at first, becoming neutral to positive as work proceeds and the new structure becomes apparent.

5.5.2 Operational Phase

The extent of potential visual impact of the proposed development on the built environment from locations around the proposed development is discussed below. The view locations discussed below are representative of locations from which it was suggested by mapping analysis that development might be visible.

Table 5.2 Assessment of Potential Visual Impacts

View	Location	Extent of Potential Impact
1	Roundabout to the southeast looking northwest	Moderate
2	Car park from the Linc Building of ITB looking north	Moderate
3	Institute of Technology Blanchardstown looking north	Slight to Moderate
4	R121 / Ballycoolin Road Roundabout looking southwest	Slight to Moderate
5	North side of the site looking southeast	Slight to Moderate
6	Tyrellstown Roundabout looking southeast	Imperceptible to Slight
6a	R121 Church Road Roundabout looking southeast	Slight
7	Church Road at the entrance to Mulhuddart Cemetery	Moderate
8	Dromheath Drive, west end, looking northeast	Moderate
8a	Dromheath Drive, eastern end, looking northeast	Slight
9	Mulhuddart at the Aldi Supermarket looking northeast	Slight
10	Warrenstown Green looking north	Slight
11	Brookhaven Lawn looking north	Slight
12	Edgewood Lawns at entrance to Corduff Park looking north	Slight
13	Within the National Sports Campus at Abbotstown looking northwest	Imperceptible to Slight
14	The R121 to M2 link road at Hollywoodrath looking southwest	Imperceptible
15	Curragh Hall at Gaelscoil an Chuilinn looking southeast	Imperceptible
16	Damastown at Avondale Road looking southeast	Imperceptible

View	Location	Extent of Potential Impact
17	Roundabout at Damastown Industrial Park looking southeast	Imperceptible
18	The N3 at the junction with the link road to Damastown Industrial Park looking northeast	Slight
19	Pace Avenue looking northeast	None
20	The R121 bridge over the N3 at Blanchardstown looking northeast	Slight to Moderate
21	Near the Crowne Plaza Hotel looking northeast	Slight
22	Across car park area in Blanchardstown Town Centre looking northeast	None
23	Dunsink Waste Management Facility looking northwest	Slight to Moderate

The character of the impact: positive, negative or neutral, will depend on how well a development is received by the public, and on the general contribution of the development to the built environment. The character of a visual impact, and even the duration of a visual impact, is very dependent on the attitude of the viewer. If a viewer is opposed to a new building for reasons other than visual, that viewer is likely to see the building in a negative light, no matter beautiful the building might be.

5.5.3 'Do Nothing' Scenario

In the do-nothing scenario, no development will take place, and the present character of the site will remain.

5.5.4 Cumulative Impacts

There will be a cumulative impact due to the zoning objectives in the surrounding area and permissions to develop residential and industry in the area. This cumulative impact is moderate to begin with however as the area develops and matures the impact will decrease.

5.6 Mitigation Measures

Significant consideration and evaluation has been applied to the design of the building façades in the context of minimising any potential visual impact. The photomontage views developed as part of this EIS were used extensively to inform and guide the choice of architectural treatment of the development. The following measures form part of the overall architectural philosophy adopted for the Phase 2 development. Some of these concepts are outlined in Figure 5.1.

- The manufacturing building in particular, due to it's scale, has a proportional façade breakup that intends to reduce the appeared visual dominance of the building
- Breaking the mass of the manufacturing building into two primary components breaks the scale of the building and changes the visual experience from the distant view.
- Proposed materials include a mix of structural glazing, composite panels and louvers. Vertical 'shoots' of glass has been incorporated into the design to facilitate natural light into the workplace while create more interesting and appealing elevations.
- A modest palette of materials with a natural finish which complements the building form has been selected. Materials selected will be sustainably sourced and easily maintainable.
- The use of simple shapes with darker cladding breaks down the scale of the manufacturing building at site level and helps the buildings integrate with the landscape from a distance.

- The break-up of the cladding panels to the building is deliberately oversized and detailed to reduce the perceived scale of the building.
- Smaller scale modules, canopies and landscaping are introduced at ground level to give a people-scale to the building.
- The CUB building and warehouse extension will apply the general architectural language principles that were developed and agreed as part of the Phase 1 development to create a coherent architectural language throughout the campus.

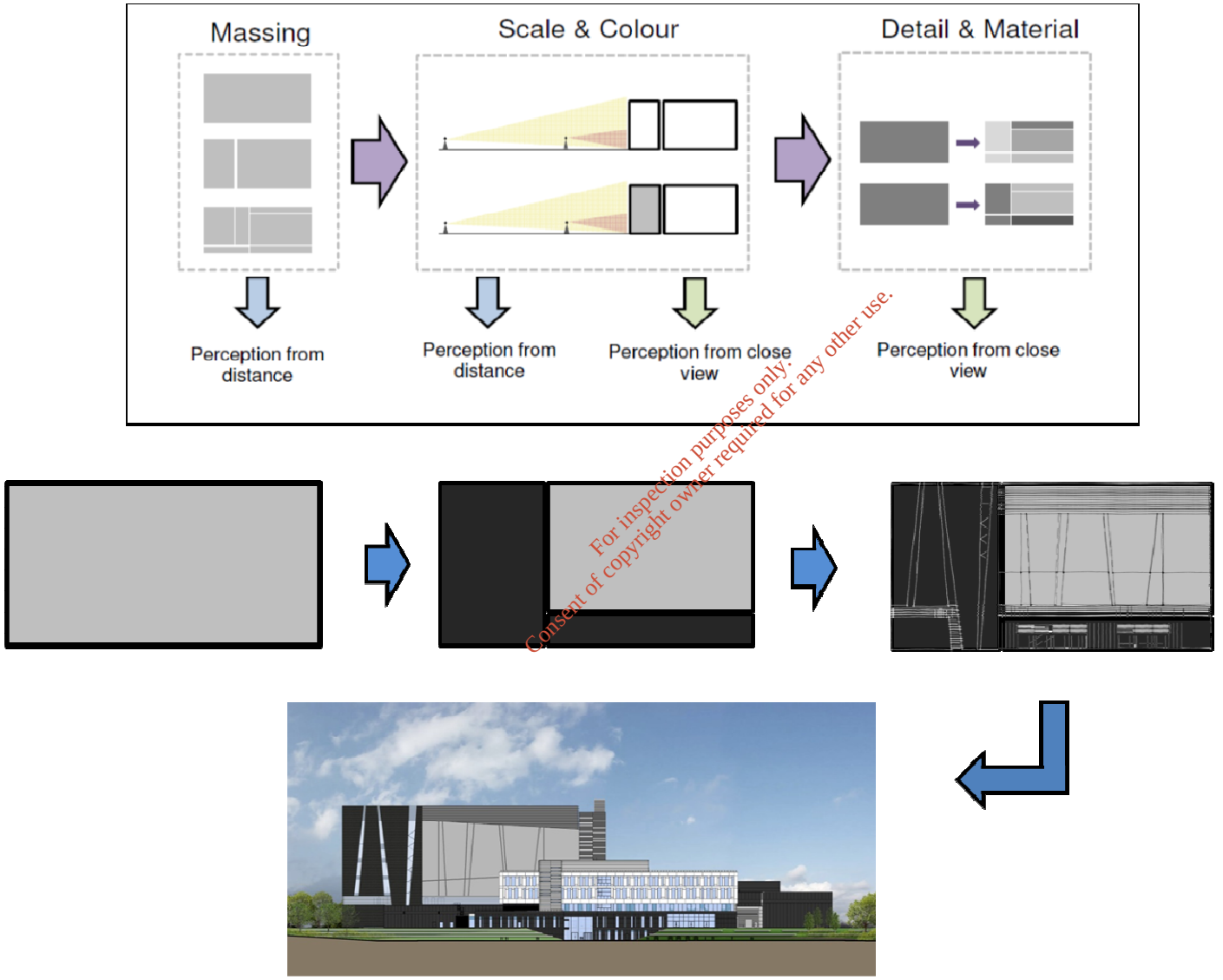


Figure 5.1 Architectural Treatment Philosophy

In addition, the landscaping proposed as part of this application will, of itself, result in changes in the visual environment. Many would consider boundary and other landscaping planting to have a mitigating effect on the visual impact of a development. See Appendix B for Landscape Plan.

5.7 Residual Impacts

The nature and extent of predicted visual impact of the proposed development on the built environment from each of the 25 chosen view locations is described below.

View 1: View from roundabout to the southeast of the development site looking northwest

From this view location, the Phase 2 elements will be visible to the right of the approved first phase of the Alexion development, now under construction. The Phase 2 building will appear larger in scale than the approved Phase 1 buildings, but will not be dominant in the view. It is predicted that the visual impact of the development on views from this location will be 'moderate' in extent.

View 2: View from the car park of the Linc Building of ITB looking north

The Phase 2 elements will be seen to the left of the approved first phase of the Alexion development from this view location. It is predicted that the visual impact of the development on views from this location will be 'moderate' in extent. The string design of the proposed buildings will be openly visible from this view location and is likely to be perceived by many as being positive in character.

View 3: View from the Institute of Technology Blanchardstown looking north

The proposed Phase 2 development will be largely obscured by intervening vegetation, particularly in the summer months. It is predicted that the visual impact of the development on views from this location will be 'slight' to 'moderate' in extent.

View 4: View from R121 / Ballycoolin Road Roundabout looking southwest

The Phase 2 buildings will be seen in the centre of this view, though they will not be a dominant element of the view. Approaching the site from this location, the proposed Phase 2 Manufacturing Facility will become a larger element in views, though boundary planting on the development site will reduce its visibility. Due to the numbers of vehicles that use the roundabout, this is considered to be an important viewpoint. It is predicted that the visual impact of the development on views from this location will be 'slight' to 'moderate' in extent.

View 5: View from the north side of the site looking southeast

Boundary planting along the north side of the site along the R121 will partly screen the proposed development from view when looking southeast from this location towards the development site. The proposed development is, therefore, predicted to have a 'slight' to 'moderate' impact on views from the north side of the site looking southeast.

View 6: View from the Tyrellstown Roundabout looking southeast

From this location, views of the proposed Phase 2 development will be largely screened by intervening topography and planting. The proposed development is, therefore, predicted to have an 'imperceptible' to 'slight' impact on views from the Tyrellstown Roundabout looking southeast.

View 6a: View from R121 / Church Road Roundabout looking southeast

The proposed Phase 2 Manufacturing Facility will be visible behind intervening planting. The proposed development is, therefore, predicted to have a 'slight' impact on views from this location.

View 7: View from Church Road at the entrance to Mulhuddart Cemetery looking east

The proposed Phase 2 development will be visible behind intervening walls, planting, and ESB pylons and other ESB structures. Having regard to the local importance of the cemetery, and despite the fact that the proposed development will be only partly visible, the proposed development is predicted to have a 'moderate' impact from this precise location. Mulhuddart cemetery is associated with a ruined early church and graveyard at the south end of the cemetery. The proposed

development will not be visible from the site of the early church and graveyard, and so will have no impact on them.

View 8: View from Dromheath Drive, west end, looking northeast

The proposed Phase 2 development will be clearly seen from this location partly obscured by intervening vegetation particularly in the summer months. The proposed development is predicted to have a 'moderate' impact on views from this location. From most of the Drumheath estate, views of the proposed development are predicted to be very limited.

View 8a: View from Dromheath Drive, east end, looking northeast

The proposed Phase 2 development will be seen from this location largely obscured by intervening vegetation particularly in the summer months. The proposed development is predicted to have a 'slight' impact on views from this location. Moving further east along Drumheath Drive the proposed development will become fully concealed behind intervening vegetation and landform, and the proposed development will have no impact.

View 9: View from Mulhuddart village at the Aldi Supermarket looking northeast

The proposed Phase 2 development will be partly visible in the distance, and will be a minor element in the scene. The proposed development is predicted to have a 'slight' impact on views from this location.

View 10: View from Warrenstown Green looking north

The proposed Phase 2 development will be visible from this location behind intervening planting, and in part behind the approved Phase 1 of the Alexion development. The proposed development is, therefore, predicted to have a 'slight' impact on views from this location. From parts of the open space in the Warrenstown estate, it may be possible to obtain similar views. However, from most of the Warrenstown estate, views of the proposed development are predicted to be very limited.

View 11: View from Brookhaven Lawn, looking north

This view is looking north along an open green space between the Brooklawn and Edgewood housing estates. The approved Phase 1 Alexion development is partly visible over houses at the north end of the green space. The proposed Phase 2 development will be visible to the left of Phase 1. The proposed development is predicted to have a 'slight' impact on views from this location. There are a number of locations in the area from which the proposed development is likely to be visible, but it is unlikely to be visible form most locations in the Brooklawn and Edgewood housing estates.

View 12: View from Edgewood Lawns at the entrance to Corduff Park looking north

The approved Phase 1 Alexion development is partly visible over buildings on the other side of Corduff Park. The proposed Phase 2 development will be visible to the left of Phase 1 from this view location. The proposed development is predicted to have a 'slight' impact on views from this location. The proposed development is also likely to be visible from other areas within Corduff Park, but is not likely to be visible from most parts of the Edgewood housing estates.

View 13: View from within the National Sports Campus at Abbotstown looking northwest

An on-site survey of visibility from within the National Sports Campus found only a small number of locations from which the tower cranes then in place on the Alexion site were visible. This indicates that the visibility of the Phase 2 development from within the National Sports Campus will be very limited. The proposed development is predicted to have an 'imperceptible to 'slight' impact on views from this location

View 14: View from the R121 to M2 link road at Hollywoodrath looking southwest

The proposed Phase 2 development may be just visible behind intervening obstacles from locations in this area. In the photomontage view, part of the Phase 2 development is just visible behind the BMS facility. The proposed development is predicted to have an 'imperceptible' impact on views from this location.

View 15: View from Curragh Hall at Gaelscoil an Chuilinn looking southeast

The proposed Phase 2 development will be just visible behind intervening topography and vegetation. The proposed development is predicted to have an 'imperceptible' impact on views from this location.

View 16: View from Damastown at Avondale Road looking southeast

The proposed Phase 2 development will be just visible behind intervening topography and vegetation, including trees along Church Road. The proposed development is predicted to have an 'imperceptible' impact on views from this location.

View 17: View from roundabout at Damastown Industrial Park looking southeast

The top of the proposed Manufacturing Facility of Phase 2 will be visible over intervening vegetation along Church Road. The proposed development is predicted to have an 'imperceptible' to 'slight' impact on views from this location.

View 18: View from the N3 junction with the link road to Damastown Industrial Park looking northeast

The approved Phase 1 Alexion development is visible on the skyline over buildings in the middle distance. The proposed Phase 2 Manufacturing Facility will be visible on skyline to the left of Phase 1 from this view location. The proposed development is only a minor element in the view. The proposed development is predicted to have a 'slight' impact on views from this location. It would appear the land around this road junction has been recently cleared of all vegetation as part of works to the road junction with the N3. If these lands are replanted or if buildings are constructed on them, it is likely that the proposed development will no longer be visible from this location.

View 19: View from Pace Avenue looking northeast

The proposed development will not be visible from this location and is predicted to have no impact on views from this location.

View 20: View from the R121 bridge over the N3 at Blanchardstown looking northeast

The approved Phase 1 Alexion development is visible on the skyline in the middle distance. The proposed Phase 2 development will be visible on skyline to the left of Phase 1. The proposed development is a relatively minor element in the view. However, since the proposed development will be on the skyline, and this location is one travelled by many vehicles, the proposed development is predicted to have a 'slight' to 'moderate' impact on views from this location.

View 21: View near the Crowne Plaza Hotel looking northeast

Glimpses of the upper elements of the proposed Phase 2 Manufacturing Facility will be visible in the distance through gaps and between intervening vegetation in views from this location. The proposed Phase 2 will be visible in the context of the Phase 1 development. It is predicted that the proposed development will have a 'slight' visual impact on views from this location.

View 22: View across car park area of Blanchardstown Town Centre looking northeast

This location is a location visited daily by many thousands of people. The proposed Phase 2 development will not be visible in views from this location. The location of the building envelope is indicated on the view with a red line.

View 23: View from the Dunsink Waste Management Facility looking northwest

The proposed Phase 2 Manufacturing Facility will be visible in the distance in views looking northwest from the Dunsink Waste Management Facility. The proposed development will be visible in the context of other large-scale commercial and industrial development and will be a relatively minor element in the view. There is a local objective (No 535) in the Fingal County Development Plan to "Provide a public car park and viewing point at the summit of the former tiphead at Dunsink". However, when visiting the site to take a photograph, ARC was informed by Fingal County Council Waste Management staff that significant out-gassing from the former facility is continuing, and is likely to continue for many years to come, and that public access to the site will not be possible until out-gassing abates. On the basis that the Dunsink Waste Management Facility may, at some future

time, come to be used as public open space, it is predicted that the proposed development will have a ‘slight’ to ‘moderate’ impact on views from this location.

The impacts considered above represent a worst-case scenario.

6 Traffic and Transportation

6.1 Introduction

PM Group appointed Malachy Walsh and Partners to prepare a Traffic and Transportation chapter for the Environmental Impact Statement (EIS) for the proposed Alexion Phase 2 biopharmaceutical facility at the IDA College Business and Technology Park, Blanchardstown, Co. Dublin. In this Traffic and Transportation chapter, the effect of traffic on the local road network due to the proposed Phase 2 development is assessed, to establish what impact the construction and operational generated traffic may have on the surrounding road network.

The Phase 1 development at the same site is currently under construction. Information derived from the planning, design and construction of the Phase 1 development has been used to inform the consideration of potential impacts on traffic and transportation arising from the proposed Phase 2 development. Malachy Walsh and Partners previously carried out the Traffic and Transportation assessment for the Phase 1 development.

6.2 Assessment Methodology

This chapter has been prepared in the context of the following:

- Fingal County Development Plan 2011-2017;
- The Chartered Institution of Highways and Transportation (CIHT), (1994), Guidelines for Traffic Impact Assessment;
- The National Roads Authority (NRA), (2014), Traffic and Transport Assessment Guidelines;
- The Department of Transport, (2013), Design Manual for Urban Roads and Streets;
- NRA, (2012), Project Appraisal Guidelines Unit 16.1 Estimating AADT on National Roads and Unit 5.5 Link-Based Traffic Growth Forecasting; and
- NRA, (2012), Design Manual for Roads and Bridges Volume 6 Section 1 Part 1 NRA TD 9/12 Road Link Design.

Existing traffic volumes on the local road network have been established on the basis of on-site traffic counts carried out by Malachy Walsh and Partners and reference to permanent traffic count data provided by the NRA. Figure 6.1 shows the proposed development location and surrounding road network.

Details of the permitted Alexion Phase 1 biopharmaceutical facility (under construction) have been established on the basis of the EIS submitted to Fingal County Council (FCC) (Planning Ref. FW14A/0020).

Details of the two other proposed developments in the vicinity of the Alexion site - (i) BMS Biotech development (Planning Ref. FW15A/0043) and (ii) Montjeu development (Planning Ref. FW15A/0038) have been established on the basis of data contained within the EIS submitted for both projects.

The existing R121 Blanchardstown Road North/IDA College Business and Technology/Blackcourt Road and R121/R121 Cruiserath Road/L3095 Corduff Road/R843 roundabout junctions have been analysed using the computer software programme ARCADY.

The existing R121/L3020 and R121/N3 Northbound Off and On-Ramps traffic signals junctions, at the R121/N3 Interchange, have been analysed using the computer software programme OSCADY.

6.2.1 Forecasting Methods

ARCADY (Assessment of Roundabout Capacity And DelaY) is a computer programme for calculating estimates of the capacity of roundabout junctions. The geometric details of the junction are supplied to the programme together with details of traffic flows and turning movements. The

programme analyses the junction in relation to the various traffic flows and calculates the capacity of each approach. The programme also calculates the average queue length on each approach and the average delay per vehicle. The average queue length may be displayed in graphical form.

OSCADY (Optimised Signal CApacity and DelaY) is a computer programme for calculating signal timings and estimates of traffic signals. The geometric details of the junction are supplied to the programme together with details of the traffic flows and turning movements. The programme analyses the junction in relation to the various traffic flows and calculates the optimum cycle time and green time for each approach, so that the delay for all vehicles is a minimum. The programme also calculates the average queue length on each approach and the average delay per vehicle. The average queue length may be displayed in graphical form.

ARCADY and OSCADY are issued by the UK company TRL.

6.3 Characteristics of the Proposed Development

Details of the characteristics of the proposed development are described in Chapter 2 (Description of the Proposed Development) of this EIS.

Descriptions of the characteristics of the proposed development, in terms of traffic and transportation, for the proposed development construction and operational phases, are provided in Sections 6.5.2 and 6.5.3, respectively, of this chapter.

6.4 Receiving Environment

6.4.1 Existing Road Network

The proposed development site is located within the IDA College Business and Technology Park, at its northern end, and immediately south of the R121 Cruiserath Road, as shown on Figure 6.1. The permitted Alexion Phase 1 biopharmaceutical facility is currently being constructed at the proposed development site. The College Business and Technology Park includes the Institute of Technology Blanchardstown.

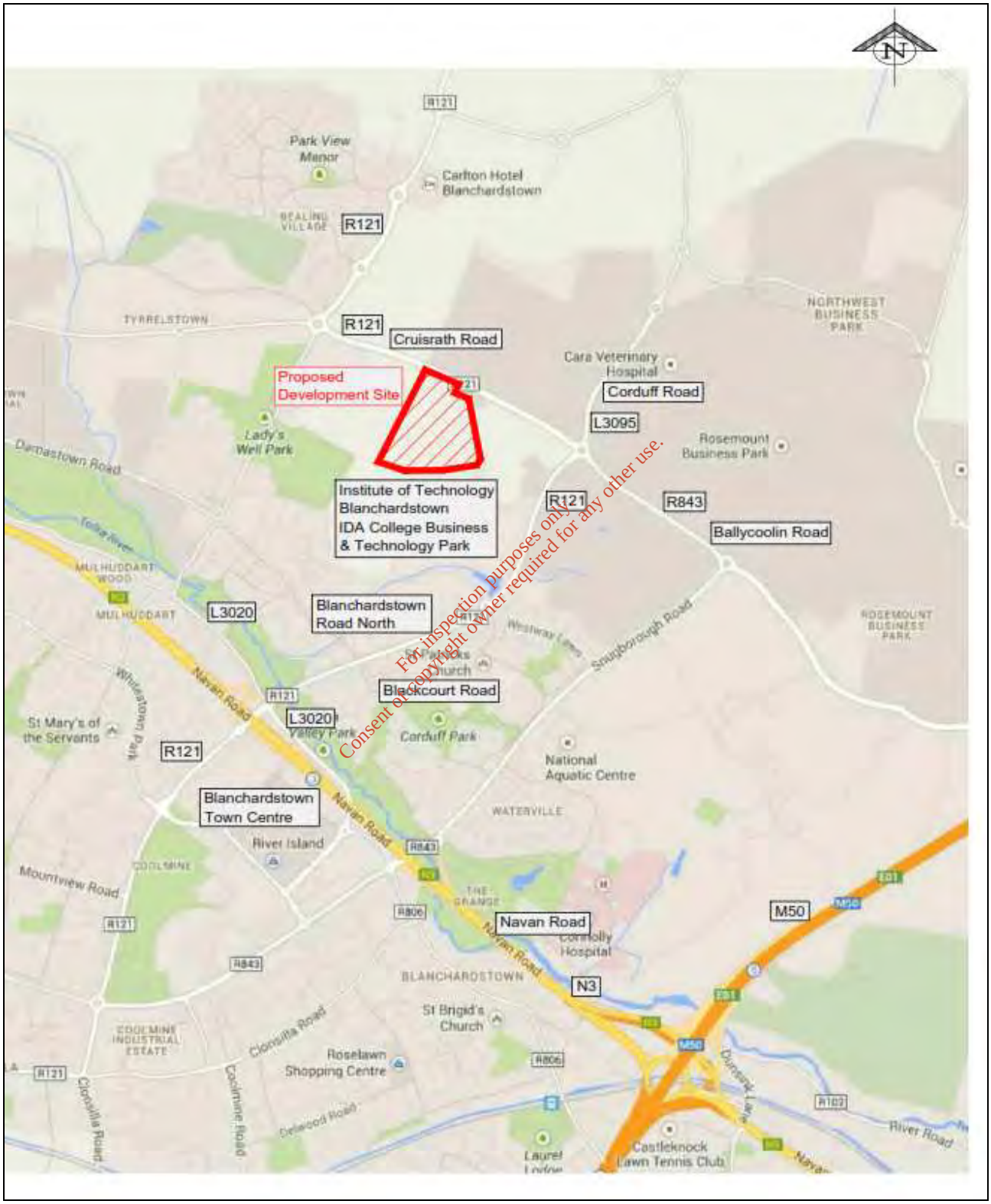


Figure 6.1 Site Location Map

Access to the IDA College Business and Technology Park is from the R121 Blanchardstown Road North, via a four-arm roundabout junction with the R121 Regional Road and Blackcourt Road. The existing College Park access, from the R121 Roundabout is a 2+2 lanes access road, with footways on both sides, to an internal three-arm roundabout. The existing College Park access road, located adjacent to the proposed development site, is a single carriageway road with grass verges on both sides, and a footway along its south side.

West of the IDA College Business and Technology Park, the R121 Blanchardstown Road North is a single carriageway road with dedicated bus lanes, off-carriageway cycle lanes and footways, on both sides.

Approximately 1.1 km west of its junction with College Park, the R121 forms a traffic signals controlled crossroads junction with the L3020 Local Road, on the east side of the N3/R121 Mulhuddart Interchange Bridge. On the west side of the Interchange Bridge, the R121 forms a traffic signals controlled junction with the N3/R121 Interchange Northbound Off-Ramp and Northbound On-Ramp.

Fingal County Council (FCC) has completed their N3 Mulhuddart Interchange Upgrade. The upgraded interchange includes integrated traffic signal controlled junctions; a widened interchange bridge, dedicated left-turn slip lanes, dedicated right-turn lanes, on-carriageway cycle lanes, controlled pedestrian crossing facilities and refuge islands, and a new left-turn slip lane and N3 Southbound On-Ramp from the interchange bridge.

The upgraded interchange includes 3+3 lanes on the interchange bridge, four lanes locally on all R121 approaches, three lanes locally on both L3020 approaches, and three lanes locally on the N3 Northbound Off-ramp approach, including dedicated left-turn slip lanes. In addition, dedicated on-carriageway cycle lanes are also provided.

FCC's N3 Mulhuddart Interchange Upgrade also included an upgraded traffic signals controlled junction at the N3 Southbound Off-Ramp/L3020 T-junction, located on the north east side of the Interchange, with two lanes on all three junction approaches and dedicated on-carriageway cycle lanes on the L3020.

FCC's Interchange Upgrade also included an upgraded T-junction at the L3020/N3 Southbound On-Ramp on the south east side of the Interchange, with a dedicated central ghost island and right-turn lane on the L3020.

The new additional southbound on-ramp, provided, by FCC, to allow westbound traffic on the R121 on the Interchange Bridge to slip left onto the N3 southbound, has eliminated the need for such traffic to turn right, from the Bridge, onto the L3020, in order to access the existing N3 Southbound On-Ramp.

The N3 Mulhuddart Interchange is located north east of Blanchardstown Town Centre. The N3/R121 Interchange Northbound Off-Ramp includes a dedicated left slip lane to Blanchardstown Town Centre. A dedicated bus lane is provided from Blanchardstown Town Centre onto the N3 Northbound Off-ramp.

The N3 Navan Road, links to the M3 Motorway, approximately 2.2 kms north of its R121 Mulhuddart Interchange. The N3 forms a full grade-separated interchange with directional ramps, with the M50 Motorway, approximately 2.5 kms south of its R121 Interchange. The M50 Motorway provides direct connections to the N32, M1, N2, N3, N4, N7, N81 and M11 National Primary Routes.

The N3 Navan Road forms a partial grade-separated interchange with the R843 Snugborough Road, between its R121 and M50 Interchanges, with a southbound on-ramp and northbound off-ramp. The N3/R843 Interchange provides access to Blanchardstown Town Centre.

The M2 Motorway and its Junction 2 Coldwinters Interchange are located on the east side of the proposed development local road network. Local road links to the M2 Coldwinters Interchange are provided via the R121 and L3095 routes.

The L3020 extends from the R843 Snugborough Road in the south west, overpassing the N3 Navan Road, to the R121 and Mulhuddart, in the north east.

Between the N3/121 Mulhuddart Interchange and College Park, the R121 forms a crossroads traffic signals junction with Castlecurragh/Warrenstown and Blackcourt Road, with controlled pedestrian crossing facilities.

The R121 extends from Lucan, in the west, overpassing the N3 and M2, to north of Dublin Airport.

East of the IDA College Business and Technology Park, the R121 is a single carriageway road with off-carriageway cycle lanes and footways on both sides, and a grass verge on its southern side. Approximately 0.85 kms east of College Park, the R121 forms a four-arm roundabout junction with the R121 Cruiserath Road, R843 Ballycoolin Road and L3095 Corduff Road.

The R121 Cruiserath Road is a single carriageway Road with off-carriageway cycle lanes, footways and grass verges on both sides, and a dedicated continuous central median ghost island marking with dedicated right-turn lanes to access junctions.

Blackcourt Road extends from its roundabout junction with the R121/IDA College Business and Technology Park, at its eastern end, to its traffic signals junction with the R121/Castlecurragh/Warrenstown, at its western end. Blackcourt Road includes vertical traffic calming measures and a three-tonne vehicle parking limit zone.

The R121/IDA College Business and Technology Park/Blackcourt Road Roundabout includes pedestrian refuge islands on all four junction arms. A controlled pedestrian crossing is located on the R121 Blanchardstown Road North, approximately 30 metres west of the IDA Business and Technology Park access. An additional controlled pedestrian crossing is located on the R121 Blanchardstown Road North, approximately 300 metres west of the IDA Business and Technology Park access, at the Riverside Community College.

6.4.2 Existing Transport Services

Dublin Bus stops are located, in both directions, on the R121, both east and west of the IDA Business and Technology Park access, and on Blackcourt Road. The R121 is part of the Blanchardstown Road North and South QBC.

Blackcourt Road is served by the Number 38, 38a and 38b Dublin Bus City centre services. Cruiserath Road and Ballycoolin Road are served by the Number 40d Dublin Bus City centre service. Blanchardstown Road North is served by the Number 220, 236, and 238 Dublin Bus local services, which serve the Blanchardstown Town Centre transport hub.

The Blanchardstown Town Centre transport hub provides local, City and Regional bus services, operated by Dublin Bus and Bus Éireann.

The IDA Business and Technology Park is linked to the Blanchardstown Town Centre transport hub and Coolmine Train Station by a shuttle bus service, operated by Express Bus, on behalf of the Institute of Technology Blanchardstown.

Coolmine Train Station is the nearest train station to the IDA College Business and Technology Park, and is located south west of the Park, south of the R843 and north of the M50.

Ballycoolin Road is served by the Number 801 Express Bus City centre service.

The R121 local road network, in the vicinity of the IDA Business and Technology Park, is located within the Dublin 60 km/hour suburban speed limit zone.

6.4.3 Existing Traffic

On-site morning and evening peak period traffic counts were carried out by Malachy Walsh and Partners, for the permitted Alexion Phase 1 biopharmaceutical facility, from 4.00 to 6.00 p.m. on Tuesday 10th, and from 7.00 to 9.00 a.m. on Wednesday 11th December 2013, on the IDA College Business and Technology Park local road network, at the following junctions:

- R121 Blanchardstown Road North/IDA College Business and Technology Park Access Road/Blackcourt Road roundabout junction;
- R121/R121 Cruiserath Road/L3095 Corduff Road/R843 Ballycoolin Road roundabout junction;
- R121/L3020 traffic signals junction on the northeast side of the N3/R121 Mulhuddart Interchange; and
- R121/N3 Northbound Off and On-Ramps traffic signals junction, on the southwest side of the N3/R121 Mulhuddart Interchange.

The recorded morning and evening peak hour traffic volumes occurred from 8.00 to 9.00 a.m. and from 5.00 to 6.00 p.m., respectively. The recorded peak hour traffic volumes were factored to 2015 levels on the basis of the medium growth rates for Dublin County, including Fingal, envisaged by the NRA in their Project Appraisal Guidelines Unit 5.5 Link-Based Traffic Growth Forecasting. The 2015 morning and evening peak hour traffic volumes are shown on Figures 6.2 and 6.3, respectively.

The link capacity of the R121 suburban road is approximately 1,300 vehicles in each direction, based on a UAP3 classification in accordance with the NRA Design Manual for Roads and Bridges (DMRB) Traffic Capacity of Urban Roads (DMRB TA 79/99). Accordingly, the R121, in the vicinity of the proposed development site, is currently operating at up to 55.8% of its link capacity, on the basis of the existing 2015 traffic volumes.

A summary of the existing (2015) weekday link traffic volumes, on the local road network, is provided in Table 6.1.

Table 6.1 Existing (2015) Weekday Link Traffic Volumes

Road	Morning Peak Hour		Evening Peak Hour	
	Total Vehicles	Heavy Vehicles	Total Vehicles	Heavy Vehicles
R121 (north) (1)	1,411	39	1,366	32
R121 Blanchardstown Road North (south) (2)	1,291	43	1,244	31
College Park Access	279	7	232	5
Blackcourt Road (3)	296	3	320	5
R121 Cruiserath Road	1,555	39	1,173	46
L3095 Corduff Road	1,091	27	1,027	35
R843 Ballycoolin Road	1,535	43	1,172	49
L3020 (South)	1,114	28	1,190	17
L3020 (North)	864	19	970	13
N3 Off-Ramp	742	17	937	24
N3 On-Ramp	535	13	906	19
R121 Interchange Bridge	1,797	36	2,107	39

Notes: (1): North of College Park Access Roundabout.

(2): South of College Park Access Roundabout.

(3): At R121/College Park Roundabout.

The existing (estimated 2015 full year) Annual Average Daily Traffic (AADT) volumes on the N3 Navan Road, south of the R121/N3 Mulhuddart Interchange, are 64,391 vehicles, based on the

permanent traffic counter data provided by the NRA (NRA Site: 1034 – N3 between junction 2 Blanchardstown and junction 3 Clonsilla, Blanchardstown, Co. Dublin).

Estimated AADT volumes on the R121 were determined on the basis of the recorded on-site traffic counts and the NRA permanent traffic counter data. The estimated existing (2015 full year) AADT volumes are provided in Table 6.2.

Table 6.2 Estimated Existing (2015) Annual Average Daily Traffic (AADT) Volumes

Road	AADT (Vehicles)	Heavy Vehicles (%)
R121 (north) (1)	14,096	2.6%
R121 Blanchardstown Road North (south) (2)	12,868	2.9%
R121 Interchange Bridge	19,816	1.9%
N3 (south) (3)	64,391	3.3%

Notes: (1): North of College Park Access Roundabout.
(2): South of College Park Access Roundabout.
(3): South of Mulhuddart Interchange.

6.5 Potential Impacts

6.5.1 "Do Nothing" Impact

The Fingal County Development Plan 2011 – 2017 identifies the land use zoning, objectives and policies for the proposed development site surrounding local area.

As detailed in Section 6.4.1, FCC has completed their N3 Mulhuddart Interchange Upgrade, which was identified as a road improvement scheme objective in their County Development Plan.

The Fingal County Development Plan public transport objectives include the provision of Metro North and Metro West, which includes a link with Blanchardstown.

The NRA, in their Project Appraisal Guidelines Unit 5.5 Link-Based Traffic Growth Forecasting, envisages that light vehicle traffic would increase by an annual growth factor of up to 1.005, during the period up to 2025, based on their medium growth scenario for Dublin County, including Fingal. Thereafter, the NRA envisages that light vehicle traffic would increase by an annual average factor of up to 1.004, to 2040, for their medium growth scenario. The equivalent annual growth factors, envisaged by the NRA for heavy vehicle traffic, are 1.004 and 1.000, respectively.

Subject to planning permission, it is envisaged that the proposed development will be fully complete and operational in 2018.

The NRA Traffic and Transport Assessment Guidelines identify the opening year and future years, five and 15 years after the opening year, for considering the impact of a proposed development. In this case, the operational opening year is 2018, and the future years are 2023 and 2033.

Accordingly, the existing (2015) traffic volumes have been factored to 2018, 2023 and 2033 levels on the basis of the foregoing NRA growth factors, to determine the future predicted traffic volumes, without the proposed development in place.

The proposed permitted Alexion Phase 1 biopharmaceutical facility is currently being constructed and includes a proposed 2015 operational opening year and a total of 290 operational staff. Details of the proposed permitted Alexion Phase 1 biopharmaceutical facility operational traffic have been established on the basis of the EIS submitted to FCC.

Details of the proposed adjacent BMS Biotech and Montjeu developments have been established on the basis of traffic impact assessments included as part of the EIS for each development, as well as consultations in accordance with the requirements of FCC. The existing BMS site is located on the north side of Cruiserath Road.

The proposed BMS Biotech facility includes a proposed 2017 operational opening year, a total of 500 staff, 450 staff maximum on-site at any one time and a new dedicated staff access on the east (N2 link) side of the existing BMS site. The proposed new site access would also impact existing site operational traffic distribution.

The proposed adjacent Montjeu biopharmaceutical development includes a 2016 operational opening year, 87 operational staff and access on Cruiserath Road.

Other proposed developments in the FCC area include proposed residential developments and a proposed data centre.

The details provided in respective planning applications to FCC by BMS and Montjeu informed the aggregated traffic volumes for these proposed developments.

These proposed developments' aggregated peak hour traffic volumes have been added to the predicted 2018, 2023 and 2033 peak hour traffic volumes, determined on the basis of the foregoing NRA growth factors, to determine the future peak hour traffic volumes without the subject proposed development.

The predicted 2018, 2023 and 2033 weekday morning and evening peak hour traffic volumes, without the proposed development in place, are shown on Figures 6.4, 6.5, 6.6, 6.7, 6.8 and 6.9, respectively.

A summary of the predicted 2018, 2023 and 2033 weekday peak hour link traffic volumes, on the proposed development local road network, without the proposed development in place, is provided in Table 6.3. The equivalent estimated AADT volumes are provided in Table 6.4.

Table 6.3 Summary of Predicted Link Traffic Volumes Without Proposed Development

Road	Year	Morning Peak Hour		Evening Peak Hour	
		Total Vehicles	Heavy Vehicles	Total Vehicles	Heavy Vehicles
R121 (north) (1)	2018	1,578	42	1,531	35
	2023	1,615	42	1,564	35
	2033	1,679	47	1,626	36
R121 Blanchardstown Road North (south) (2)	2018	1,514	46	1,443	34
	2023	1,549	48	1,475	34
	2033	1,605	49	1,531	36
College Park Access	2018	533	11	486	9
	2023	542	11	493	9
	2033	551	11	501	8
Blackcourt Road (3)	2018	344	3	408	5
	2023	352	3	416	5
	2033	365	3	433	5
R121 Cruiserath Road	2018	1,626	40	1,248	47
	2023	1,666	40	1,279	49

Road	Year	Morning Peak Hour		Evening Peak Hour	
		Total Vehicles	Heavy Vehicles	Total Vehicles	Heavy Vehicles
	2033	1,738	45	1,319	50
L3095 Corduff Road	2018	1,220	29	1,164	34
	2023	1,248	29	1,188	37
	2033	1,296	30	1,234	39
R843 Ballycoolin Road	2018	1,616	43	1,249	49
	2023	1,657	43	1,279	51
	2033	1,727	49	1,323	61
L3020 (South)	2018	1,160	29	1,287	18
	2023	1,188	29	1,317	18
	2033	1,236	30	1,369	18
L3020 (North)	2018	926	20	989	13
	2023	947	20	1,014	13
	2033	985	20	1,057	13
N3 Off-Ramp	2018	823	11	953	25
	2023	841	18	975	25
	2033	873	18	1,018	26
N3 On-Ramp	2018	545	13	971	20
	2023	551	13	995	20
	2033	582	13	1,034	20
R121 Interchange Bridge	2018	1,951	37	2,239	41
	2023	1,995	37	2,292	41
	2033	2,078	39	2,384	43

Notes: (1): North of College Park Access Roundabout.

(2): South of College Park Access Roundabout.

(3): At R121/College Park Roundabout.

Table 6.4 Estimated Annual Average Daily Traffic (AADT) Volumes Without Proposed Development

Road	Year	AADT (Vehicles)	Heavy Vehicles (%)
R121 (north) (1)	2018	15,781	2.6%
	2023	16,137	2.5%
	2033	16,776	2.5%

R121 Blanchardstown Road North (south) [2]	2018	15,010	2.9%
	2023	15,350	2.9%
	2033	15,918	2.9%
R121 Interchange Bridge	2018	21,268	1.9%
	2023	21,761	1.9%
	2033	22,649	1.9%
N3 (south) [3]	2018	65,351	3.3%
	2023	66,974	3.3%
	2033	69,778	3.2%

Notes: [1]: North of College Park Access Roundabout.

[2]: South of College Park Access Roundabout.

[3]: South of Mulhuddart Interchange.

The R121, in the vicinity of the proposed development site, will operate at up to 75.3% of its link capacity of 1,300 vehicles in each direction, by 2033, on the basis of the foregoing predicted traffic volumes and the NRA Design Manual for Roads and Bridges (DMRB) Traffic Capacity of Urban Roads (DMRB TA 79/99).

The existing R121 Blanchardstown Road North/IDA College Business and Technology/Blackcourt Road and R121/R121 Cruiserath Road/L3095 Corduff Road/R843 Ballycoolin Road roundabout junctions have been analysed using the computer software programme ARCADY. The existing R121/L3020 and R121/N3 Northbound Off and On-Ramps traffic signals junctions, at the R121/N3 Interchange, have been analysed using the computer software programme OSCADY. The results are summarised in Table 6.5.

Table 6.5 Summary of ARCADY and OSCADY Junction Capacity Analysis Without Proposed Development

Junction	Year	Peak Hour	Highest Ratio of Flow to Capacity (RFC)*	Maximum Queue Length (vehicles)	Highest Delay per Vehicle (minutes)
R121/College Park/Blackcourt Road Roundabout	2018	AM	0.457	0.8	0.05
		PM	0.449	0.8	0.06
	2023	AM	0.468	0.9	0.05
		PM	0.452	0.8	0.06
	2033	AM	0.484	0.9	0.05
		PM	0.473	0.9	0.06
R121/R121 Cruiserath Road/L3095 Corduff Road/R843 Ballycoolin Road Roundabout	2018	AM	0.653	1.8	0.10
		PM	0.466	0.9	0.07
	2023	AM	0.672	2.0	0.11
		PM	0.481	0.9	0.07
	2033	AM	0.702	2.3	0.12

		PM	0.505	1.0	0.08
R121/L3020 Traffic Signals on northeast of N3/R121 Interchange	2018	AM	0.718	4.3	0.56
		PM	0.782	5.7	0.66
	2023	AM	0.724	5.0	0.57
		PM	0.791	6.0	0.67
	2033	AM	0.738	5.3	0.59
		PM	0.806	6.5	0.70
R121/N3 Northbound Off and On-Ramps Traffic Signals on southwest of N3/R121 Interchange	2018	AM	0.746	3.9	0.50
		PM	0.899	14.0	0.94
	2023	AM	0.756	4.4	0.51
		PM	0.921	15.2	1.13
	2033	AM	0.773	4.8	0.54
		PM	0.960	18.4	1.40

*A Ratio of Flow to Capacity (RFC) of 1.000 indicates a junction operating at full capacity.

The foregoing junction capacity analysis confirms that the existing R121 Blanchardstown Road North/IDA College Business and Technology/Blackcourt Road and R121/R121 Cruiserath Road/L3095 Corduff Road/R843 roundabout junctions will operate well within capacity, without any significant traffic queuing and delays, during the predicted 2018, 2023 and 2033 morning and evening peak hours. The junctions will operate with highest Ratios of Flow to Capacity (RFC) of 0.484 and 0.702, respectively. A Ratio of Flow to Capacity (RFC) of 1.000 indicates a junction operating at full capacity.

The junction capacity analysis confirms that the existing R121/L3020 traffic signals junction will also operate well within capacity, without any significant traffic queuing and delays, with a highest RFC of 0.806. The R121/N3 Northbound Off and On-Ramps traffic signals junction will operate approaching capacity, with a highest RFC of 0.960, in 2033, but without significant traffic queuing or delays, typical for peak hour traffic periods.

The analysis confirms the significant impact of FCC's N3 Mulhuddart Interchange Upgrade scheme, in reducing previous peak traffic congestion at the Interchange.

6.5.2 Construction Phase

Subject to planning permission, on-site construction is scheduled for 25 months, from the mid/later part of 2015 to the mid/later part of 2017.

The core construction working hours' start and finish times will be outside the morning and evening peak hours of 8-9a.m. and 5-6p.m. respectively. Accordingly, traffic generated by construction personnel will occur during existing off-peak periods and will not have any significant adverse impact on the local road network.

Construction site access will be via a temporary construction access on Cruiserath Road, at the northern end of the proposed development site, as per the permitted Alexion Phase 1 construction phase. No construction traffic will access via College Park.

Peak on-site construction employment is expected to be up to 1,263 personnel. Site personnel will generate up to approximately 1,580 daily car and van trips two-way. This will include arrivals for the proposed start time, departures after the proposed finish time and 50% of personnel leaving and returning to site once a day, during either the mid-morning or lunchtime work breaks, at an average vehicle occupancy of 2.0 personnel per vehicle.

Average on-site construction employment is expected to be 545 personnel, which will generate up to approximately 682 daily car and van trips two-way. This will be significantly less than that generated during peak on-site employment.

During the site enabling works, it is proposed to export approximately 82,500m^3 of excavated material off-site, by licensed haulier to licensed landfill, during a proposed three months site enabling works period. This will generate approximately 50 truck movements/day, both in and out of the proposed construction site, during the three months enabling works.

Peak construction staff will not occur during the three months enabling works, when peak construction deliveries will occur. Accordingly, the total daily traffic volumes generated during the three months enabling works would not have any significant adverse impact on the existing local road network capacity.

Post the three months enabling works phase, peak construction deliveries will be of the order of 10 to 20 heavy vehicles per day. There will be no abnormal loads.

6.5.3 Operational Phase

Subject to planning permission, the proposed development will be fully complete and operational in 2018.

Operational site access will be via a single site access junction, on the existing College Park internal access road, at the southern end of the site, as per the permitted Alexion Phase 1 facility operational phase.

The proposed development operational staff numbers will be increased over a multi-year period, from a total of 100 staff in 2018, to a total of 280 staff by 2023. Operational staff will include staff working standard days and staff working a 24/7 four-cycle shift. Shift changes will be at 7.00 a.m. and 7.00 p.m., outside the peak traffic hours. The number of proposed non-shift staff will be up to 60 staff in 2018 and up to 160 staff by 2023.

In order to consider a robust impact assessment for this EIS, it is conservatively assumed that all staff working standard days will arrive during the morning peak hour and depart during the evening peak hour; and that 80% of all staff will travel, to and from work, as car drivers, with 20% of staff traveling as car passengers, via public transport, cycling and walking.

When fully operational, the proposed development will include 280 staff, up to 20 daily visitors and 12 daily rigid truck deliveries. It is envisaged that all visitors will travel to and from the site as car drivers, with 50% arriving during the morning peak hour and 50% departing during the evening peak hour.

Accordingly, total peak hour traffic volumes generated by the proposed development will be up to 146 vehicles two-way, including four heavy vehicles, during both the morning and evening peak hours.

It is envisaged that the distribution of operational generated traffic will be in accordance with the recorded existing College Park generated traffic volumes.

The predicted increases in 2018 and 2023/2033 peak hour link traffic volumes, on the proposed development local road network, with the proposed development in place are provided in Tables 6.6 and 6.7, respectively. The equivalent estimated AADT volumes are provided in Table 6.8.

Total two-way daily traffic volumes generated by the proposed development operational phase will be up to 512 vehicles, including 24 heavy vehicles two-way.

Parking at the proposed development will be in accordance with the parking standards set out in Fingal County Development Plan 2011-2017. The proposed development includes 220 car parking spaces, including 6 disabled driver spaces, 2 electric car charging points, 10 motorcycle spaces and 70 bicycle spaces.

The predicted 2018, 2023 and 2033 weekday morning and evening peak hour traffic volumes, with the proposed development in place, are shown on Figures 6.10, 6.11, 6.12, 6.13, 6.14 and 6.15, respectively.

Table 6.6 Predicted Increases in 2018 Peak Hour Link Traffic Volumes With Proposed Development

Road	Morning Peak Hour		Evening Peak Hour	
	Total Vehicles Increase	Heavy Vehicles Increase	Total Vehicles Increase	Heavy Vehicles Increase
R121 (north) (1)	+19	+2	+17	+2
R121 Blanchardstown Road North (south) (2)	+33	+2	+26	+2
College Park Access	+64	+4	+64	+4
Blackcourt Road	+12	+0	+0	+0
R121 Cruiserath Road	+7	+0	+6	+0
L3095 Corduff Road	+8	+2	+8	+2
R843 Ballycoolin Road	+4	+0	+0	+0
L3020 (South)	+9	+0	+13	+0
L3020 (North)	+8	+1	+1	+1
N3 Off-Ramp	+9	+0	+1	+0
N3 On-Ramp	+1	+1	+6	+1
R121 Interchange Bridge	+16	+1	+12	+1

Notes:

(1): North of College Park Access Roundabout.

(2): South of College Park Access Roundabout.

Table 6.7 Predicted Increases in 2023 & 2033 Peak Hour Link Traffic Volumes With Proposed Development

Road	Morning Peak Hour		Evening Peak Hour	
	Total Vehicles Increase	Heavy Vehicles Increase	Total Vehicles Increase	Heavy Vehicles Increase
R121 (north) (1)	+44	+2	+38	+2
R121 Blanchardstown Road North (south) (2)	+77	+2	+59	+2
College Park Access	+146	+4	+146	+4
Blackcourt Road	+25	+0	+49	+0
R121 Cruiserath Road	+15	+0	+13	+0
L3095 Corduff Road	+19	+2	+19	+2
R843 Ballycoolin Road	+10	+0	+0	+0

L3020 (South)	+21	+0	+31	+0
L3020 (North)	+19	+1	+1	+1
N3 Off-Ramp	+21	+0	+1	+0
N3 On-Ramp	+1	+1	+14	+1
R121 Interchange Bridge	+36	+1	+27	+1

Notes:

(1): North of College Park Access Roundabout.

(2): South of College Park Access Roundabout.

Table 6.8 Estimated Annual Average Daily Traffic (AADT) Volumes With Proposed Development

Road	Year	AADT (Vehicles)	Change	
			Vehicles	%
R121 (north) (1)	2018	15,843	+62	+0.39%
	2023	16,279	+142	+0.88%
	2033	16,918	+142	+0.85%
R121 Blanchardstown Road North (south) (2)	2018	15,114	+104	+0.69%
	2023	15,588	+238	+1.55%
	2033	16,156	+238	+1.50%
R121 Interchange Bridge	2018	21,312	+44	+0.21%
	2023	21,862	+101	+0.46%
	2033	22,750	+101	+0.45%
N3 (south) (3)	2018	65,468	+117	+0.18%
	2023	67,241	+267	+0.40%
	2033	70,045	+267	+0.38%

Notes:

(1): North of College Park Access Roundabout.

(2): South of College Park Access Roundabout.

(3): South of Mulhuddart Interchange.

The R121, in the vicinity of the proposed development site, will operate at up to 81.0% of its link capacity of 1,300 vehicles in each direction, by 2033, on the basis of the foregoing predicted traffic volumes and the NRA Design Manual for Roads and Bridges (DMRB) Traffic Capacity of Urban Roads (DMRB TA 79/99).

The existing R121 Blanchardstown Road North/IDA College Business and Technology/Blackcourt Road and R121/R121 Cruiserath Road/L3095 Corduff Road/R843 Ballycoolin Road roundabout junctions have been analysed using the computer software programme ARCADY. The existing

R121/L3020 and R121/N3 Northbound Off and On-Ramps traffic signals junctions, at the R121/N3 Interchange, have been analysed using the computer software programme OSCADY. The results are summarised in Table 6.9.

Table 6.9 Summary of ARCADY and OSCADY Junction Capacity Analysis With Proposed Development

Junction	Year	Peak Hour	Highest Ratio of Flow to Capacity (RFC)*	Maximum Queue Length (vehicles)	Highest Delay per Vehicle (minutes)
R121/College Park/Blackcourt Road Roundabout	2018	AM	0.478	0.9	0.05
		PM	0.450	0.8	0.06
	2023	AM	0.516	1.1	0.06
		PM	0.473	0.9	0.06
	2033	AM	0.533	0.9	0.06
		PM	0.495	1.0	0.07
R121/R121 Cruiserath Road/L3095 Corduff Road/R843 Ballycoolin Road Roundabout	2018	AM	0.637	1.7	0.10
		PM	0.469	0.9	0.07
	2023	AM	0.683	2.1	0.11
		PM	0.486	0.9	0.07
	2033	AM	0.718	2.5	0.12
		PM	0.510	1.0	0.08
R121/L3020 Traffic Signals on northeast of N3/R121 Interchange	2018	AM	0.721	4.9	0.59
		PM	0.783	5.7	0.66
	2023	AM	0.733	5.1	0.62
		PM	0.793	6.1	0.68
	2033	AM	0.746	5.5	0.64
		PM	0.809	6.4	0.71
R121/N3 Northbound Off and On-Ramps Traffic Signals on southwest of N3/R121 Interchange	2018	AM	0.745	4.1	0.43
		PM	0.902	13.7	0.96
	2023	AM	0.756	4.4	0.52
		PM	0.931	15.8	1.19
	2033	AM	0.775	4.8	0.55
		PM	0.969	19.5	1.47

*A Ratio of Flow to Capacity (RFC) of 1.000 indicates a junction operating at full capacity.

The foregoing junction capacity analysis confirms that the existing R121 Blanchardstown Road North/IDA College Business and Technology/Blackcourt Road and R121/R121 Cruiserath Road/L3095 Corduff Road/R843 roundabout junctions will operate well within capacity, without any significant traffic queuing and delays, during the predicted 2018, 2023 and 2033 morning and evening peak hours. The junctions will operate with highest Ratios of Flow to Capacity (RFC) of 0.533 and 0.718, respectively, compared to 0.484 and 0.702, respectively, without the proposed

development. A Ratio of Flow to Capacity (RFC) of 1.000 indicates a junction operating at full capacity.

The junction capacity analysis confirms that the existing R121/L3020 traffic signals junction will also operate well within, without any significant traffic queuing and delays, with a highest RFC of 0.809 in 2033, compared to 0.806, without the proposed development.

The R121/N3 Northbound Off and On-Ramps traffic signals junction will operate approaching capacity, with a highest RFC of 0.969 in 2033, but without significant traffic queuing or delays, typical for peak hour traffic periods. This compares to a highest RFC of 0.960, without the proposed development. This will occur during the evening peak hour. The highest RFC during the morning peak hour will be up to 0.775.

Accordingly, the proposed development will not have any significant adverse impact on the proposed development local and national road network.

The quantum of additional operational traffic generated by the proposed development, during the peak hour periods, will be less than that envisaged for equivalent possible future operational phases, detailed in the permitted Alexion Phase 1 facility EIS submitted to FCC, in accordance with their requirements. The proposed development now includes staff shift working and off-peak shift start and finish times.

6.6 Mitigation Measures

6.6.1 Construction Phase

The core construction working hours' start and finish times will be outside the morning and evening peak hours, to ensure that site personnel will not arrive during the morning peak hour and depart during the evening peak hour.

The proposed temporary construction site access on Cruiserath Road, at the northern end of the proposed development site, is designed to ensure that no construction traffic will access the site via College Park. The proposed temporary construction access on Cruiserath Road includes a dedicated right-turn lane on Cruiserath Road.

All construction parking and compounds will be provided within the site confines. Construction wheel wash facilities will be provided on-site. A specialist road washing and cleaning vehicle will be used regularly each day to maintain public roads. All necessary construction signage and other measures required by FCC will be provided.

A detailed Construction Traffic Management Plan will be submitted to FCC, for their approval, prior to the commencement of construction.

6.6.2 Operational Phase

The shift change times for operational staff are outside the morning and evening peak traffic periods, to ensure that shift staff will not arrive and depart during peak traffic periods.

6.7 Mobility Management Plan

The Fingal County Development Plan has been prepared cognisant of the following Government guidance documents: - Smarter Travel – A Sustainable Transport Future – A New Transport Policy for Ireland 2009-2020, Transport 21 and the National Cycle Policy Framework 2009-2020. The Development Plan includes policies and objectives that aim to reduce unsustainable travel patterns and integrate land uses with transport infrastructures. Specifically, Fingal County Council's transport policies and objectives, as detailed in their Fingal County Development Plan, include the preparation and operation of Mobility Management Plans for all developments with a significant number of employees, to reduce traffic congestion and promote sustainable means of access for employees.

This planning application is accompanied by a 'Preliminary Mobility Management Plan' which states Alexion's ambitions and proposals for encouraging a modal shift to more sustainable forms

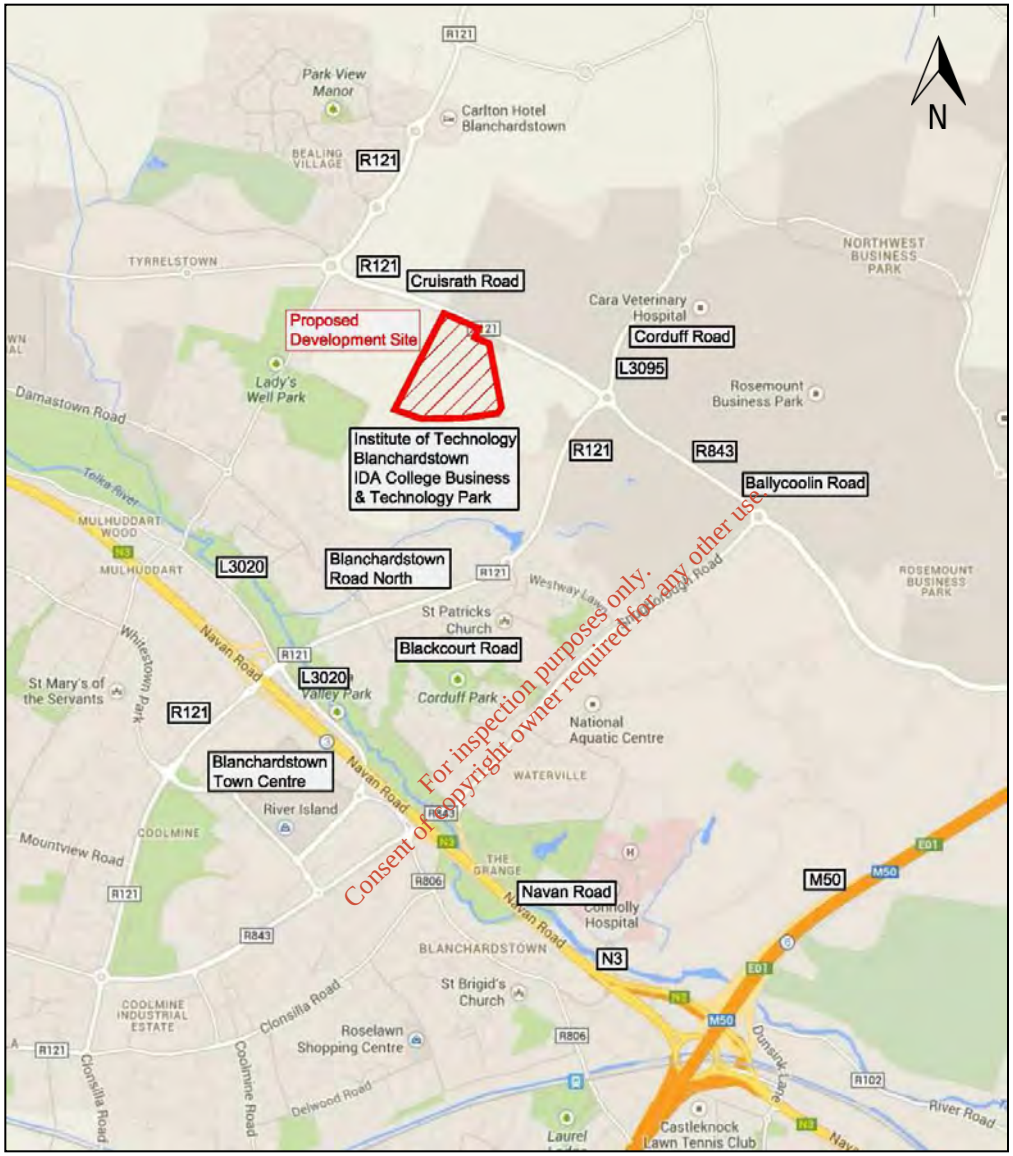
of transport amongst staff. The Preliminary Mobility Management Plan also deals specifically with how Alexion propose to promote a modal shift based on the successful implementation of the Plan and how they propose to reduce car parking numbers over time. The 'Preliminary Mobility Management Plan' commits the applicants to implementing a successful workplace travel plan and contains measures which will ensure that the availability of private parking will not undermine its success.

Once the proposed development becomes operational a staff travel survey will be carried out and an Updated Mobility Management Plan will be prepared and submitted to Fingal County Council for their approval, within six months after the commencement of sustaining operations. The Updated Mobility Management Plan will build on the Preliminary Plan, and update the modal targets based on actual staff demographics. Significant staff mobility management measures will be operated. A staff carpooling website will be provided, together with Revenue's approved bike to work scheme and public transport ticket scheme. Staff lockers, showers and changing facilities will be provided. Two electric car charging points, dedicated motorcycle parking spaces and cycle parking spaces will be provided.

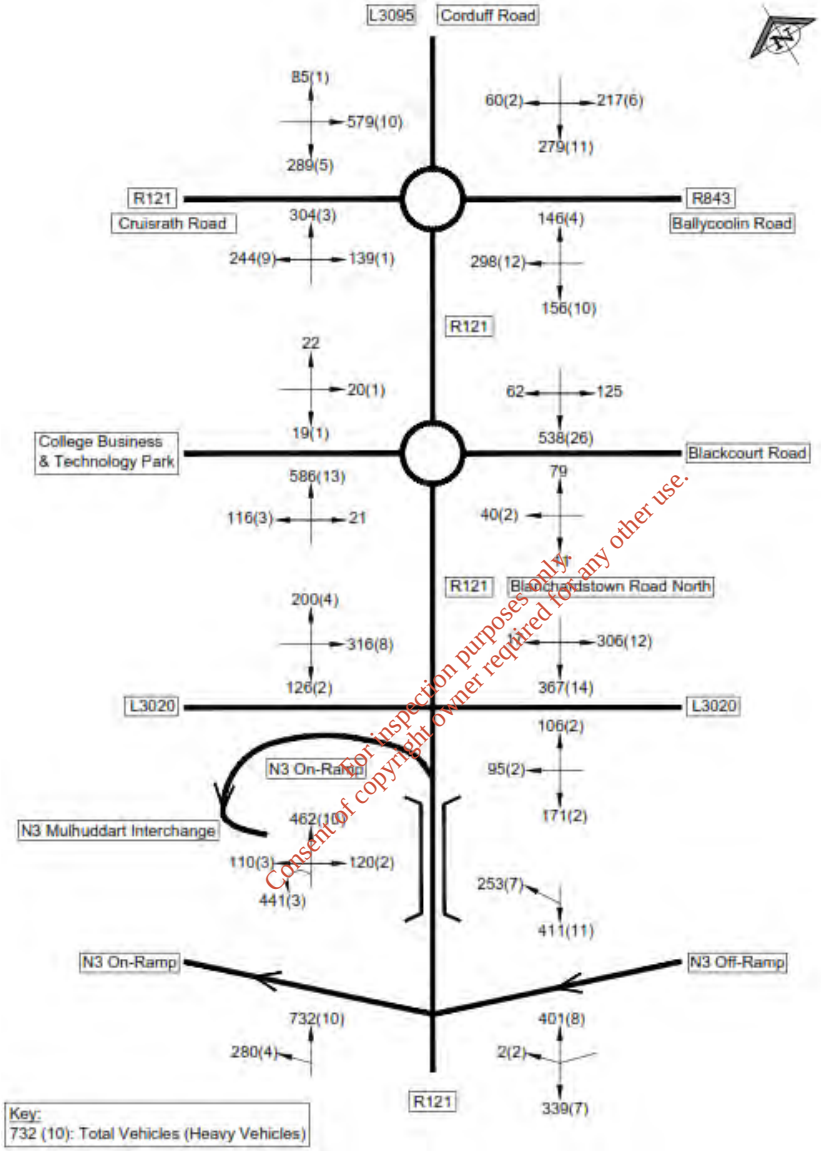
The preparation of the Updated Mobility Management Plan will include liaison with the Institute of Technology Blanchardstown regarding use of their shuttle bus service, linking College Park with the Blanchardstown Centre public transport hub and Coolmine Train Station; and liaison, as appropriate, with other local significant employers, in consultation with Fingal County Council. A dedicated Mobility Manager will be provided. In particular, Alexion will implement a car parking management strategy whereby measures including restrictions of use and access, and phased released of spaces in line with employment growth, will be applied in order to meet Mobility Management Plan objectives.

6.7 Residual Impacts

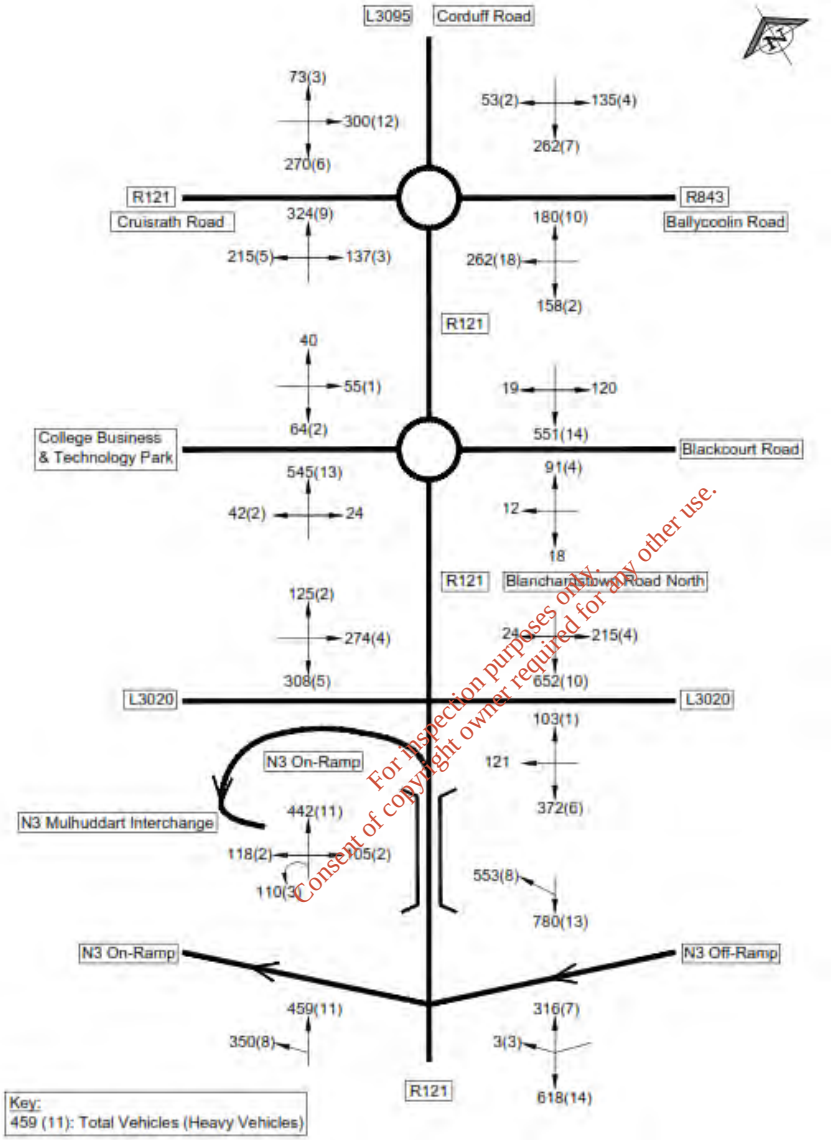
Based on the level of traffic generated and taking into account the capacity of the road network and proposed mitigation measures there are no construction or operational residual impacts predicted as a result of the proposed Phase 2 development.



ALEXION	Figure 6.1 – Site Location and Surrounding Road Network		PM GROUP
	Environmental Impact Statement, College Park Phase 2– Alexion		
	Project No.: IE0311488	Doc No.: IE0311488-22-RP-0002	May 2015



ALEXION	Figure 6.2 - Existing (2015) Weekday Morning Peak Hour Traffic Volumes		PM GROUP
	Environmental Impact Statement, College Park Phase 2– Alexion		
Project No.: IE0311488	Doc No.: IE0311488-22-RP-0002	May 2015	



ALEXION	Figure 6.3 - Existing (2015) Weekday Evening Peak Hour Traffic Volumes		PM GROUP
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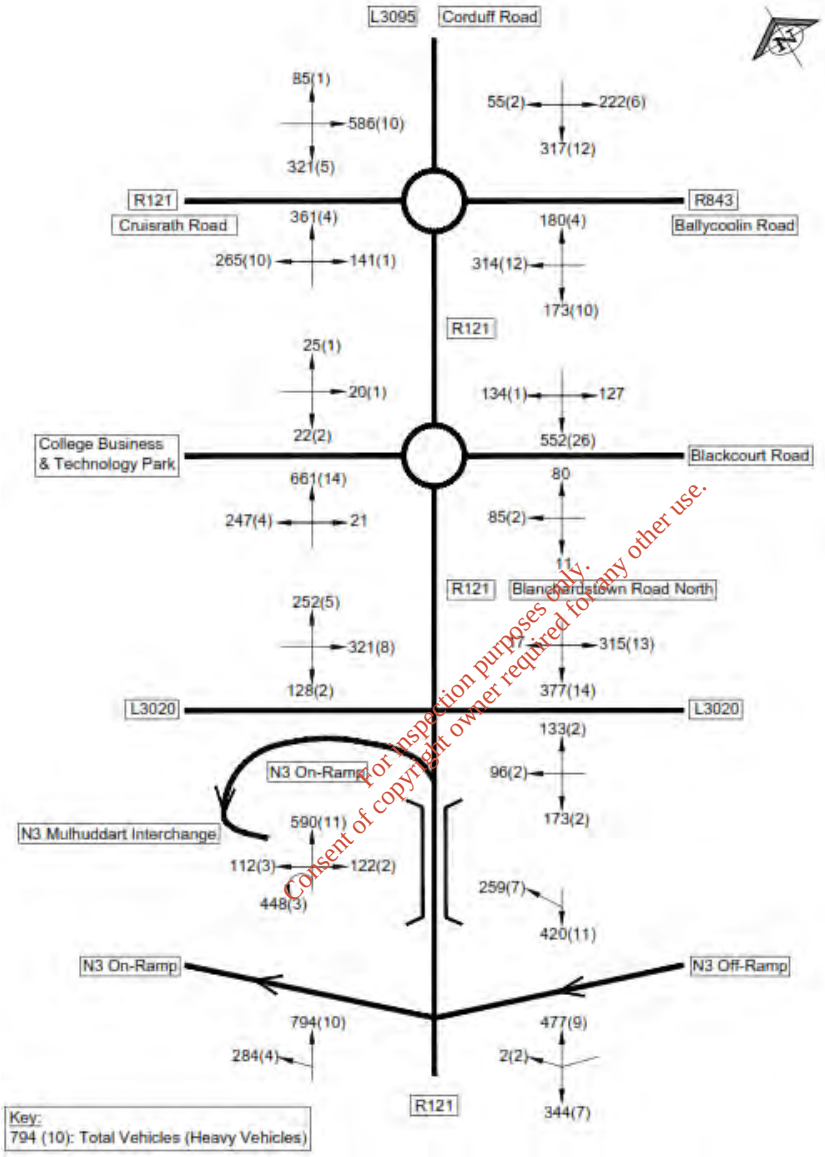
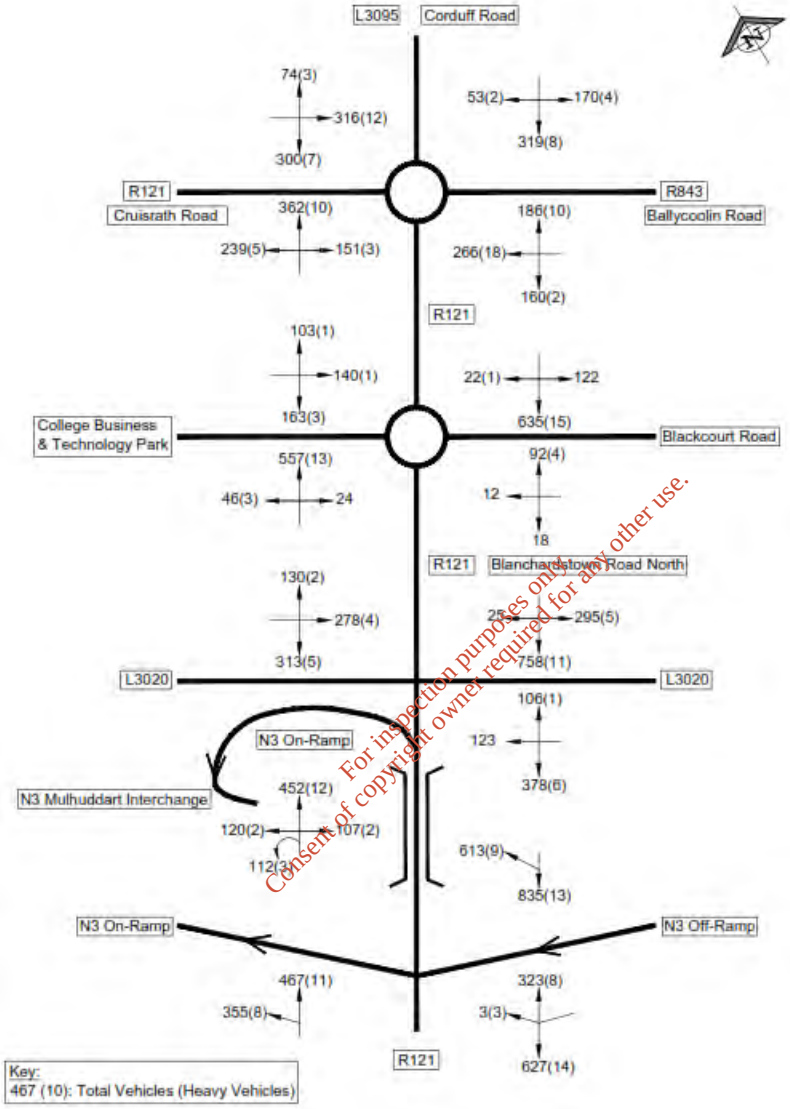
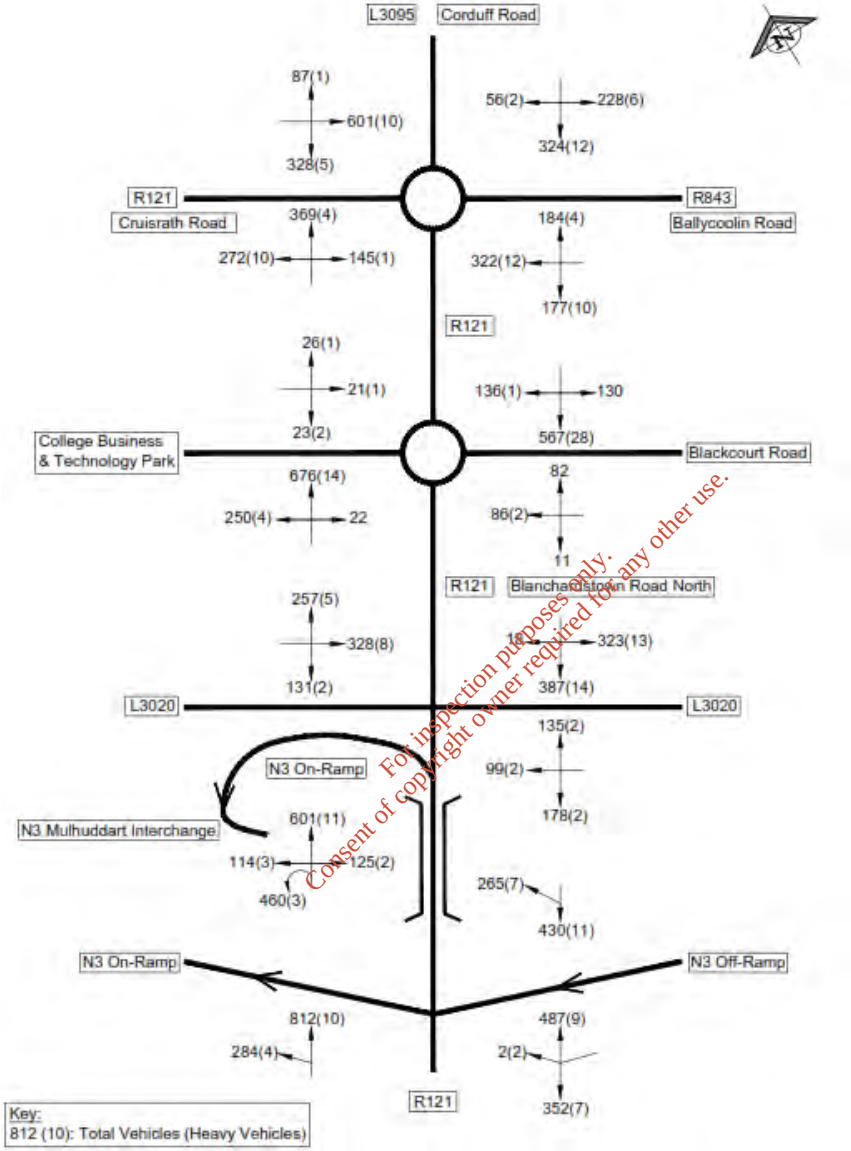
	Project No.: IE0311488	Doc No.: IE0311488-22-RP-0002	May 2015



ALEXION	Figure 6.4- Predicted 2018 Morning Peak Hour Traffic Volumes Without Proposed Development		PM GROUP
	Environmental Impact Statement, College Park Phase 2– Alexion		
	Project No.: IE0311488	Doc No.: IE0311488-22-RP-0002	May 2015



ALEXION	Figure 6.5 - Predicted 2018 Evening Peak Hour Traffic Volumes Without Proposed Development		PM GROUP
	Environmental Impact Statement, College Park Phase 2– Alexion		
	Project No.: IE0311488	Doc No.: IE0311488-22-RP-0002	May 2015



ALEXION	Figure 6.6 - Predicted 2023 Morning Peak Hour Traffic Volumes Without Proposed Development		PM GROUP
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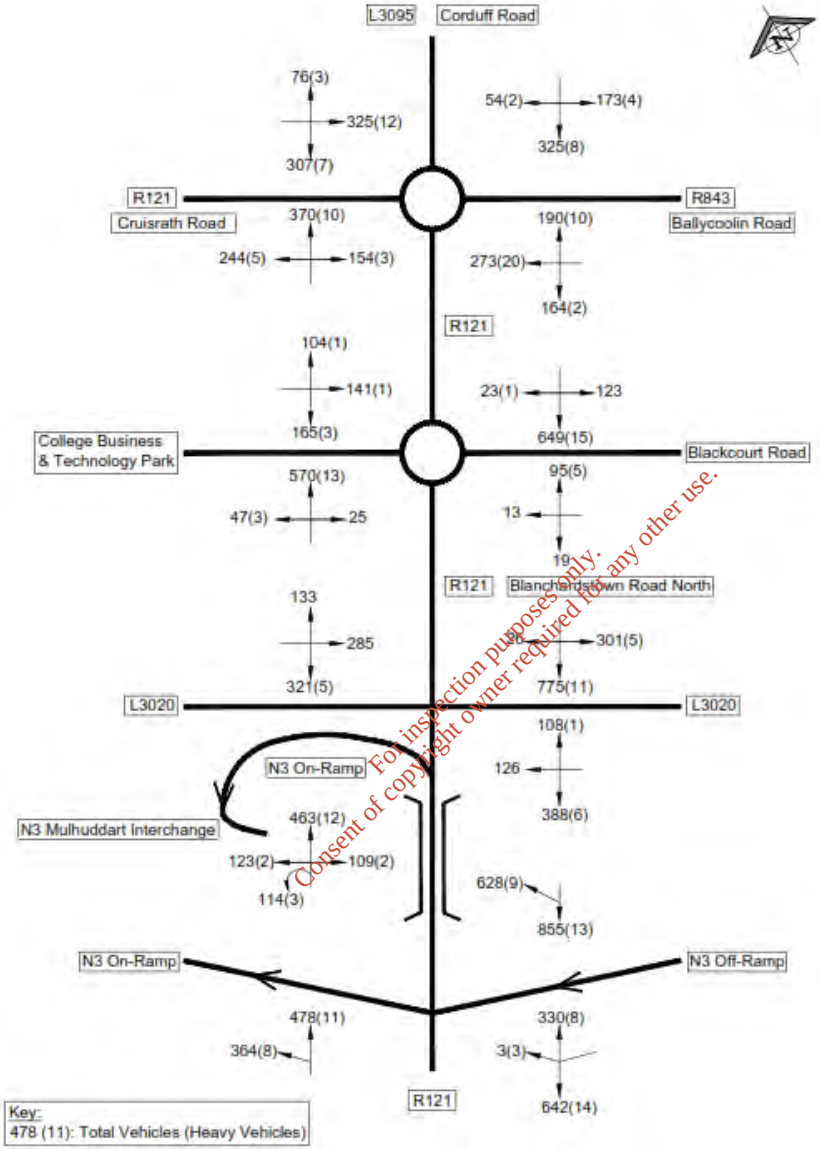
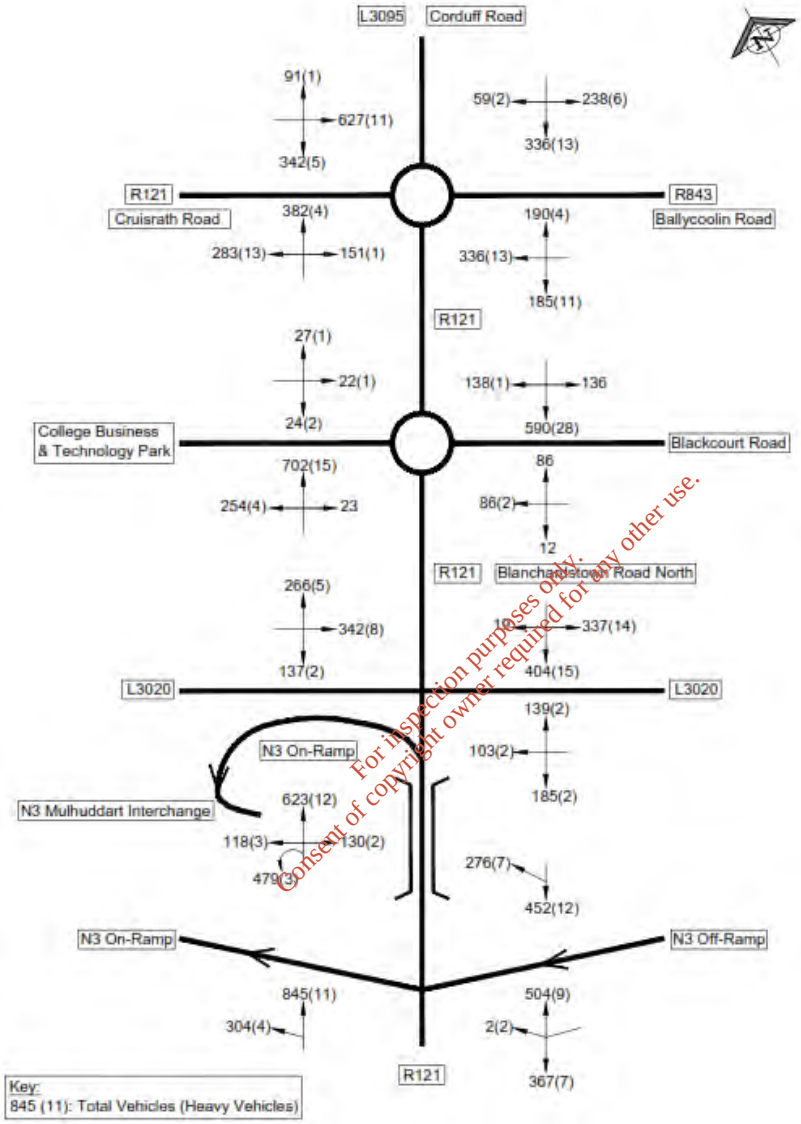


ALEXION	Figure 6.7 - Predicted 2023 Evening Peak Hour Traffic Volumes Without Proposed Development		PM GROUP
	Environmental Impact Statement, College Park Phase 2– Alexion		
Project No.: IE0311488	Doc No.: IE0311488-22-RP-0002	May 2015	



ALEXION	Figure 6.8 - Predicted 2033 Morning Peak Hour Traffic Volumes Without Proposed Development		PM GROUP
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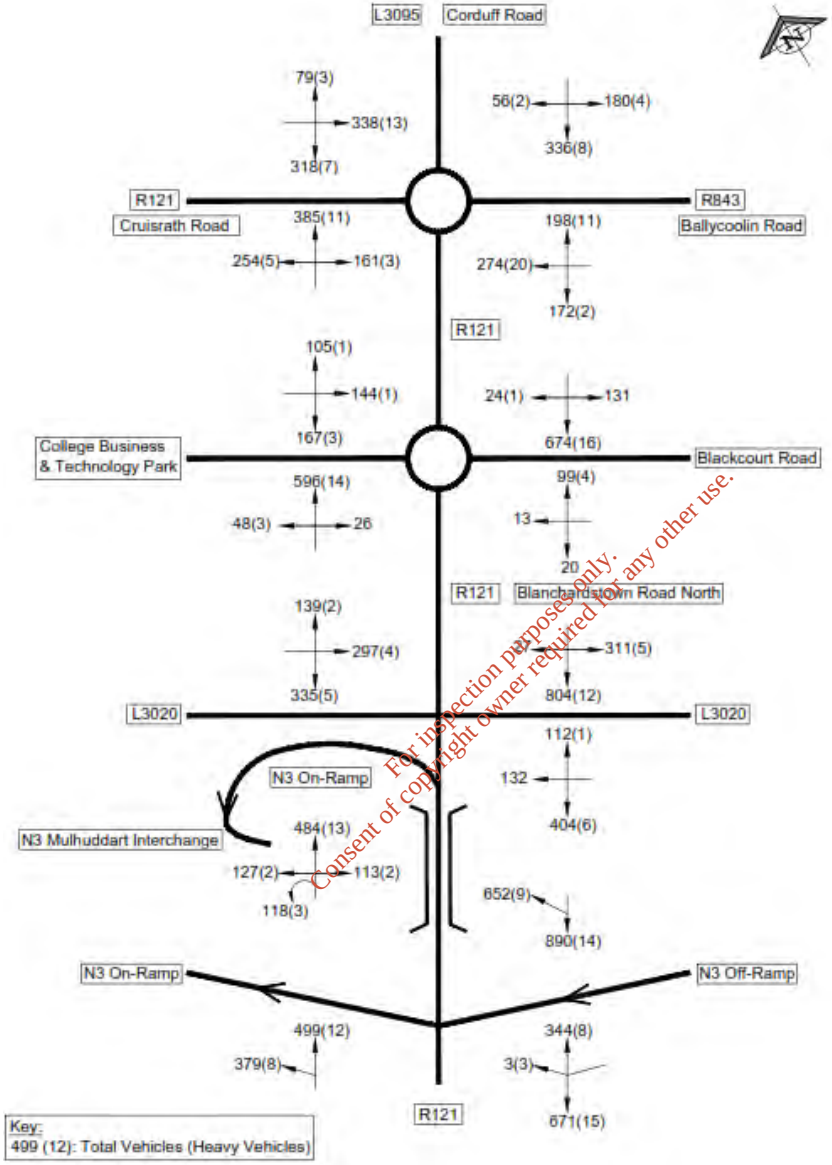
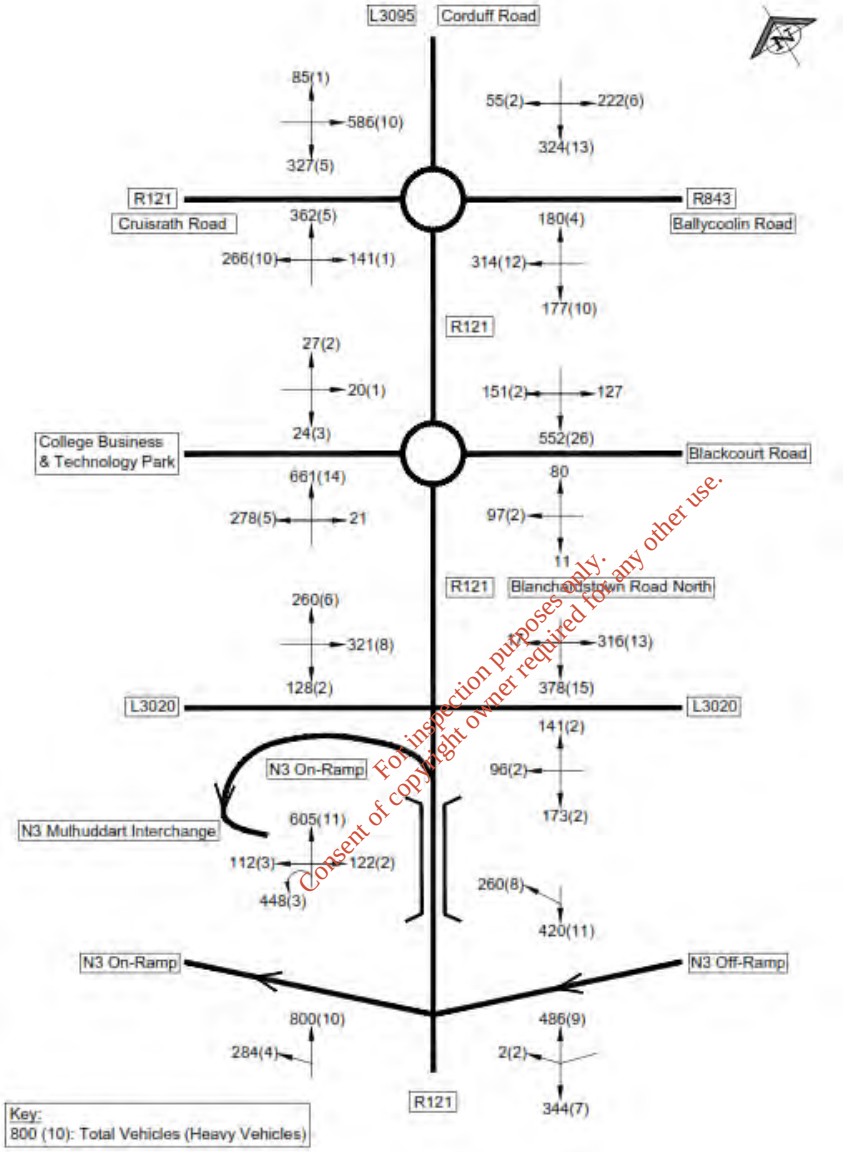
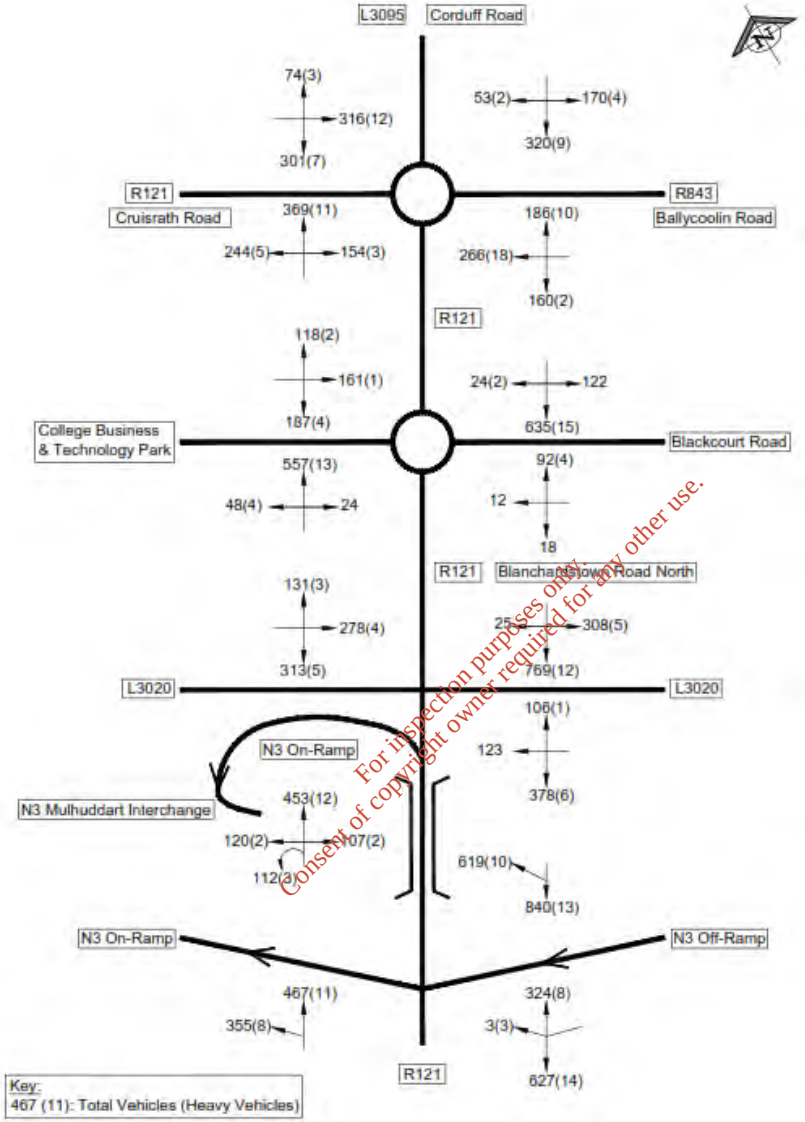


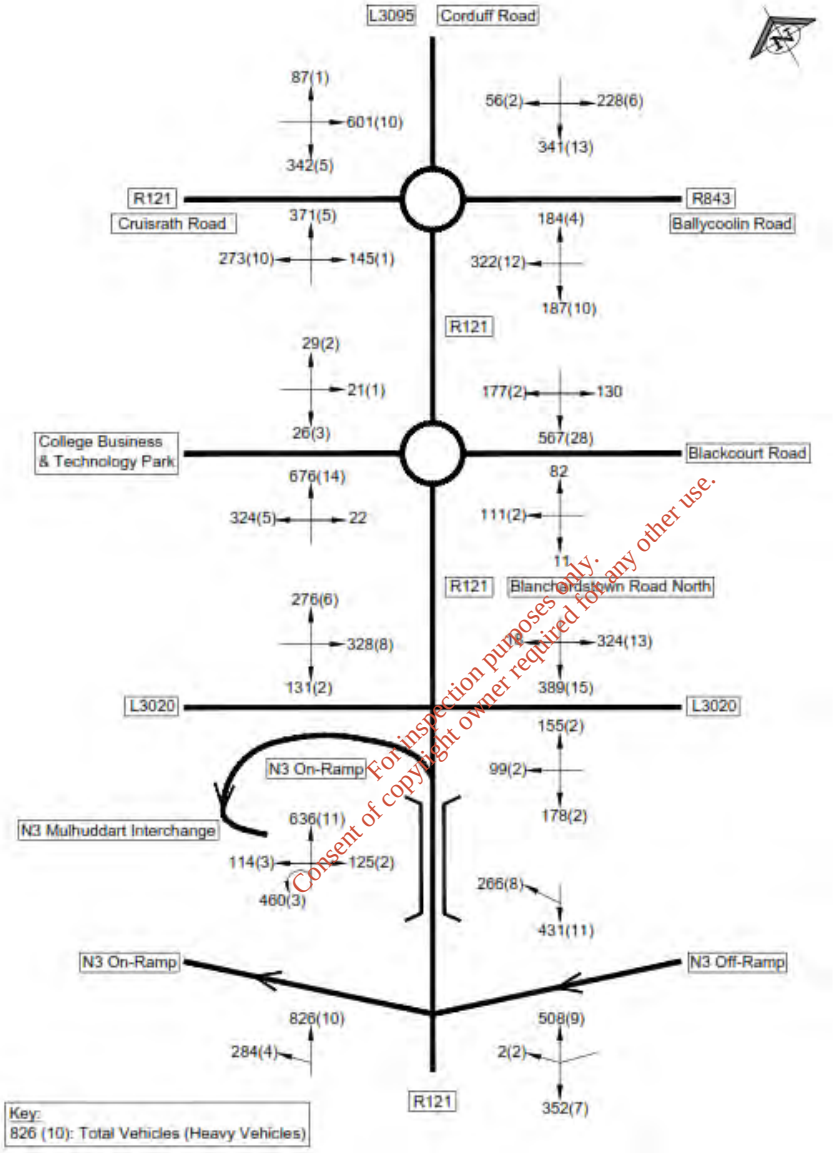
ALEXION	Figure 6.9 - Predicted 2033 Evening Peak Hour Traffic Volumes Without Proposed Development		PM GROUP
	Environmental Impact Statement, College Park Phase 2– Alexion		
	Project No.: IE0311488	Doc No.: IE0311488-22-RP-0002	May 2015



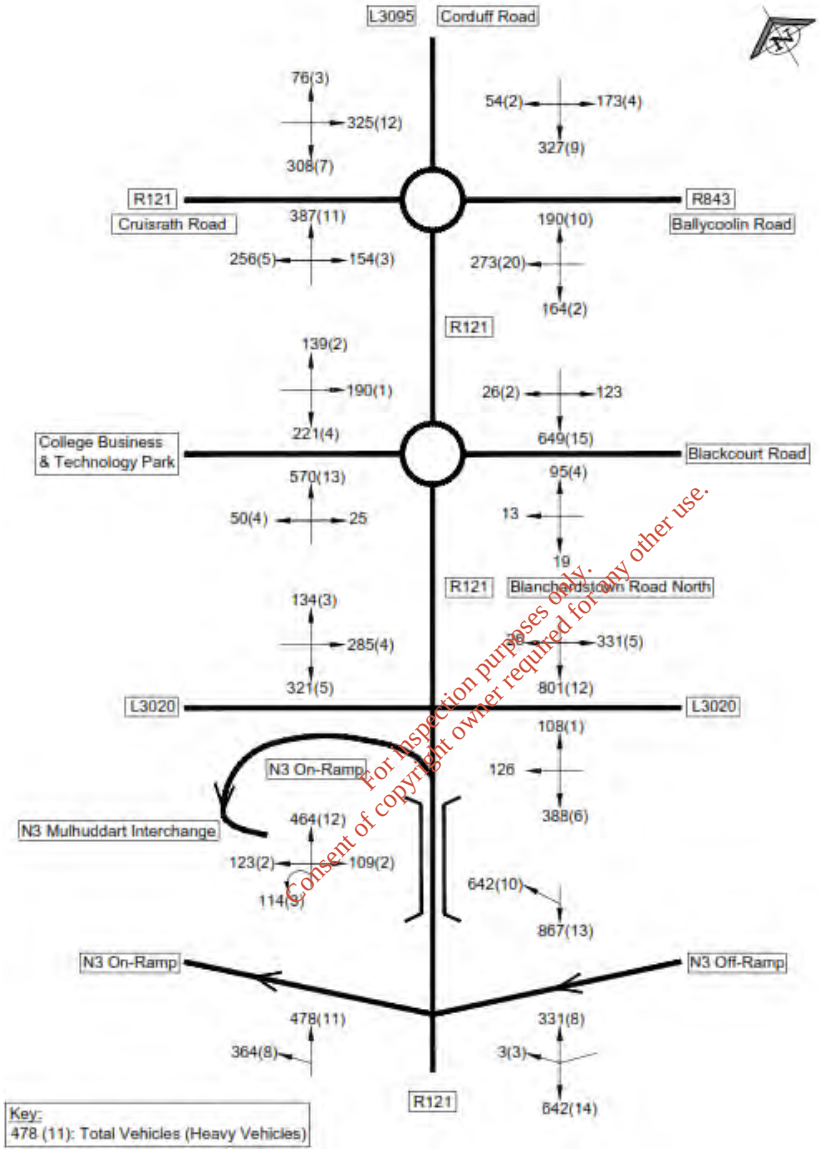
ALEXION	Figure 6.10 - Predicted 2018 Morning Peak Hour Traffic Volumes With Proposed Development		PM GROUP
	Environmental Impact Statement, College Park Phase 2– Alexion		
	Project No.: IE0311488	Doc No.: IE0311488-22-RP-0002	May 2015



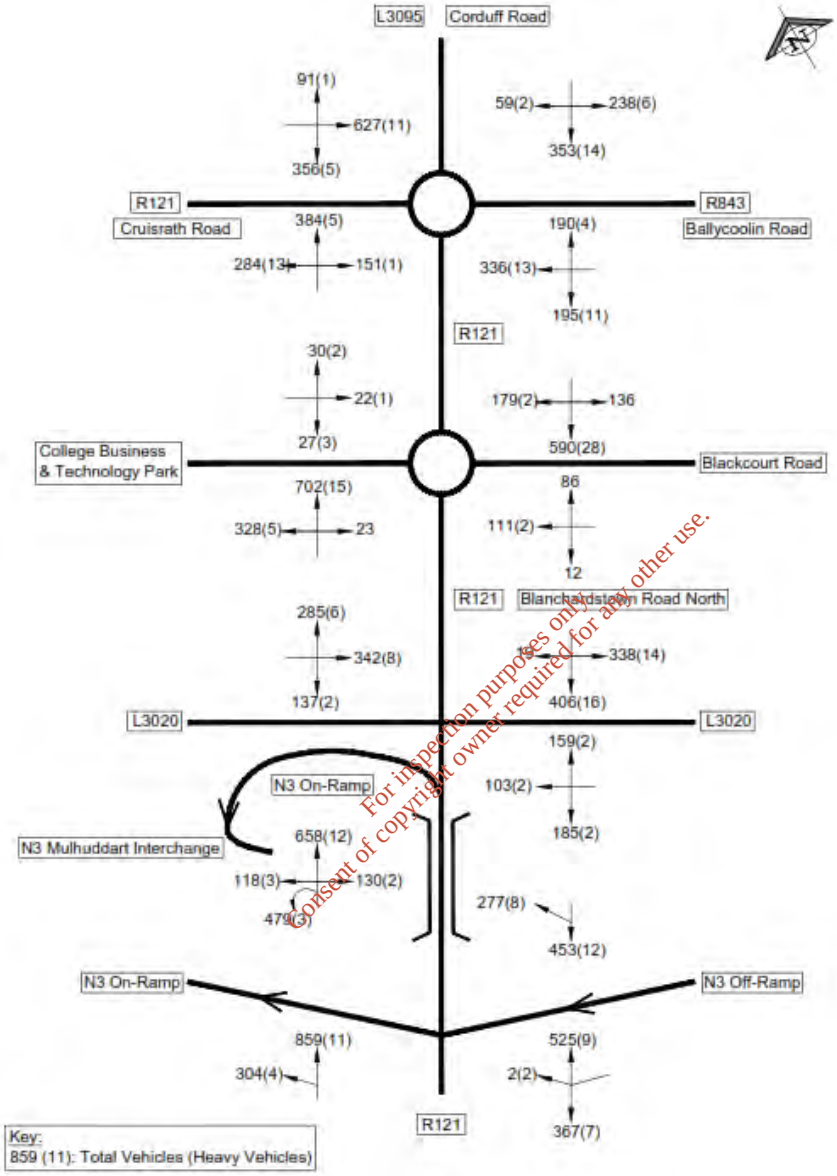
ALEXION	Figure 6.11 - Predicted 2018 Evening Peak Hour Traffic Volumes With Proposed Development		PM GROUP
	Environmental Impact Statement, College Park Phase 2– Alexion		
	Project No.: IE0311488	Doc No.: IE0311488-22-RP-0002	May 2015



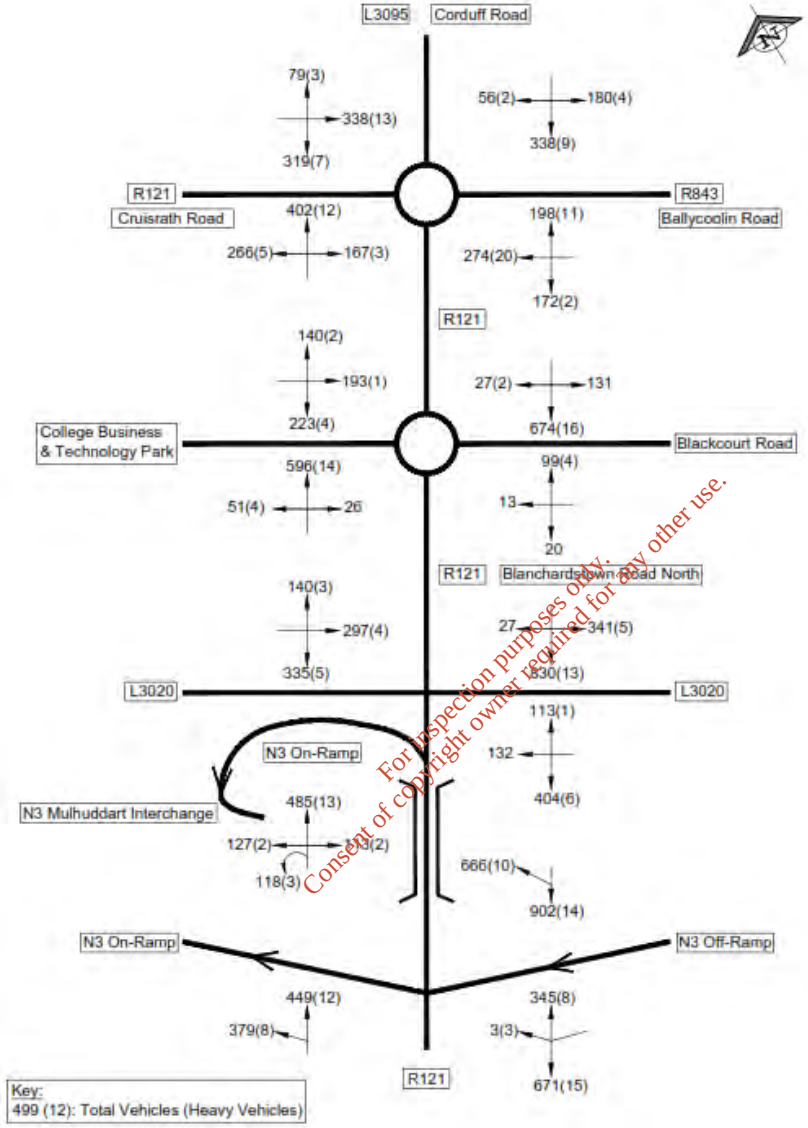
ALEXION	Figure 6.12 - Predicted 2023 Morning Peak Hour Traffic Volumes With Proposed Development		PM GROUP
	Environmental Impact Statement, College Park Phase 2– Alexion		
	Project No.: IE0311488	Doc No.: IE0311488-22-RP-0002	May 2015



ALEXION	Figure 6.13 - Predicted 2023 Evening Peak Hour Traffic Volumes With Proposed Development		PM GROUP
	Environmental Impact Statement, College Park Phase 2– Alexion		
	Project No.: IE0311488	Doc No.: IE0311488-22-RP-0002	May 2015



ALEXION	Figure 6.14 - Predicted 2033 Morning Peak Hour Traffic Volumes With Proposed Development		PM GROUP
	Environmental Impact Statement, College Park Phase 2– Alexion		
	Project No.: IE0311488	Doc No.: IE0311488-22-RP-0002	May 2015



ALEXION	Figure 6.15 - Predicted 2033 Evening Peak Hour Traffic Volumes With Proposed Development		PM GROUP
	Environmental Impact Statement, College Park Phase 2– Alexion		
	Project No.: IE0311488	Doc No.: IE0311488-22-RP-0002	May 2015

7 Soils, Geology and Hydrogeology

7.1 Introduction

This chapter assesses and evaluates the potential impacts of the proposed development on the soil, geological and hydrogeological aspects of the site and surrounding area. This chapter should be read in conjunction with the Chapter 2 (Description of the Proposed Development), Chapter 10 (Water & Effluent) and Chapter 12 (Waste Management) of this EIS.

The site of the proposed development is located at College Park, Blanchardstown, Dublin 15. The Phase 1 development (currently under construction) has involved significant site investigations and subsequent earthworks, information from which has been used to inform the consideration of potential impacts on soils, geology and hydrogeology arising from the Phase 2 development.

7.2 Assessment Methodology

The assessment of the potential impact of the proposed development on soils, geology and hydrogeology was carried out according to the methodologies specified in Environmental Protection Agency (EPA)[1,2] and Institute of Geologists of Ireland (IGI)[3] guidance documents.

Due consideration is also given to the National Roads Authority (NRA) Guidelines[4] where the methodology for assessment of impact is appropriate.

The rating of potential environmental impacts on the soils, geological and hydrogeological environment is based on the EPA matrix presented in Table 1.2 which takes account of the quality, significance, duration and type of impact characteristic identified.

The NRA criteria for rating the magnitude and significance of impacts at EIA stage on the soils, geological and hydrogeological related attributes are also relevant in determining impact assessment and are presented in Table 7.1.

[1] EPA, (2002), Guidelines on the Information to be Contained in Environmental Impact Statements
[2] EPA, (2003), Advice Notes on Current Practice (in the Preparation of EISs)
[3] IGI, (2013), Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements
[4] NRA, (2008), Guidelines and Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Roads Schemes.

Table 7.1 Criteria for rating impact magnitude at EIS stage – Estimation of magnitude of impact on soils, geology and hydrogeology attribute (NRA, 2009)

Magnitude of Impact	Criteria	Typical Examples*
Large Adverse	Results in loss of attribute and /or quality and integrity of attribute	– Irreversible loss of high proportion of local high fertility soils – Removal of entirety of geological heritage feature – Requirement to excavate and replace high proportion of peat, organic soils and/or soft mineral soils – Removal of large proportion of aquifer – Changes to aquifer or unsaturated zone resulting in extensive change to existing water supply springs and wells, river base flow 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	– Irreversible loss of moderate proportion of local high fertility soils – Removal of part of geological heritage feature – Requirement to excavate and replace moderate proportion of peat, organic soils &/or soft mineral soils – Removal of moderate proportion of aquifer – Changes to aquifer or unsaturated zone resulting in moderate change to existing water supply springs and wells, river base flow 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	– Irreversible loss of small proportion of local high fertility soils and/or high proportion of local low fertility soils – Removal of small part of geological heritage feature – Requirement to excavate and replace small proportion of peat, organic soils and/or soft mineral soils – Removal of small proportion of aquifer – Changes to aquifer or unsaturated zone resulting in minor change to water supply springs and wells, river base flow 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	– No measurable changes in attributes – Calculated risk of serious pollution incident <0.5% annually$

* Additional Examples are provided in the NRA Guidance Document – Box 5.1 and 5.3

Refer to Method C, Annex 1, Annex 1 of HA216/06 – Design Manual for Roads and Bridges

$ Refer to Appendix B3 / Annex 1, Method D, Annex 1 of HA216/06 – Design Manual for Roads and Bridges

The principal attributes (and impacts) to be assessed include the following:

- Geological heritage sites in the vicinity of the site;
- Landfills, industrial sites in the vicinity of the site and the potential risk of encountering contaminated ground from previous site use;
- The extent of topsoil and subsoil cover and the potential use of this material on site or the requirement to remove it off-site as waste for disposal or recovery;
- High yielding water supply springs/ wells in the vicinity of the site to within a 2 Km radius and the potential for increased risk presented by the proposed development;
- Classification (regionally important, locally important) and extent of aquifers underlying the proposed development and increased risks presented to them by construction and operation related activities. Examples include the removal of subsoil cover, drawdown in water levels and change in groundwater quality;
- Natural hydrogeological/ karst features in the area and potential for increased risk presented by the activities at the proposed development site; and
- Groundwater-fed ecosystems and the increased risk presented by the construction and operational phases of the proposed development both spatially and temporally.

7.2.1 Information Sources

The collection of baseline data (soils, geology and hydrogeology contained within the study area) was derived from the following sources:

- Geological Survey of Ireland (GSI) on-line mapping – Bedrock Geology, Aquifers, Geo-hazard Database, Geological Heritage Sites, Minerals and Karst Database[5] .
- EPA ENVision Maps – soils, subsoils, water quality[6] .
- Eastern River Basin District (ERBD) Management Plan 2009-2015[7].
- Chapter 7 – Soils, Geology and Hydrogeology, EIS for Alexion College Park Phase 1[8].
- Environmental Site Assessment Report (incl. soil and groundwater analysis), O'Callaghan Moran & Associates (OCM), October 2013
- Geotechnical Site Investigation Report, IGSL Ltd., January 2014

A site investigation was also undertaken at the proposed development site between the 16th July and the 8th August 2013. Works were carried out in accordance with BS10175, 2001[9] and EPA Guidance[10] and involved the following:

- Excavation of four (4 No.) trial pits and the collection of subsoil samples for laboratory analysis. Please note an additional 4 no. trail pits were excavated on the adjacent site as part of works.
- Installation of four (4 No.) groundwater monitoring wells and the collection of groundwater samples from three (3 no.) boreholes for laboratory analysis.

[5] GSI, (2013), Online Mapping, accessed March 2015, http://www.gsi.ie/Mapping.htm

[6] EPA ENVision database (2015) Groundwater Quality, Soils and Subsoils Database - http://gis.epa.ie/

[7] ERBD, (2009), ERBD Management Plan, 2009-2015 - http://erbd.ie/upload/files/ERBD%20RBMP%206%20July%202010%20Final.pdf ERBD Working Group, 2009.

[8] PM Group, (2014), Environmental Impact Statement, Alexion College Park Phase 1, IE0311193-22-RP-0001, Issue A.

[9] BS 10175:2001 - Investigation of Potentially Contaminated Sites - Code of Practice

[10] EPA, (2013), Guidance On The Management Of Contaminated Land And Groundwater At EPA Licensed Sites

7.3 Characteristics of the Proposed Development

The characteristics of the proposed development with regard to the soil, geological and hydrogeological environment are outlined as follows:

Construction Phase

The earthworks aspects of the development will include the following;

- Topsoil clearance from the northern portion of the site
- A process of "cut and fill" will be employed within the site in order to achieve the desired platform level from which to commence phase 2 construction works
- The cut and fill operation will involve the excavation of approximately 82,500m^3 of soil/subsoils.
- Infilling and landscaping will be undertaken. All soils and subsoils stripped will be reused for infilling, temporary foundation for construction compound and routes or landscaping on site, where possible. If not required these materials will be removed off site by a licensed waste contractor.
- Temporary storage of fuel may be required on site for construction machinery.
- Dewatering maybe required during excavation works

The construction phase of the proposed phase 2 development is predicted to last approximately 24 months.

Operational Phase

There will be no direct discharges to ground required for operation of the facility.

Once the site is constructed, there will be an underground drainage network on site for trade and foul effluent and storm waters with secondary containment as required.

Diesel will be stored on site for operation of generators. All site fuels will be stored within a bunded area.

Dilute ethanol will be used on site for equipment cleaning. There will be small quantities of acid and caustics for cleaning and waste neutralisation. The storage of these chemicals will be within bunded areas.

All waste water arising from the site will be conveyed to above ground waste water treatment tanks, all of which will be fully bunded

All underground drainage to be installed as part of the proposed development will be double contained and will include leak detection measures.

Water supply will be supplied from public mains and effluent discharge from the site waste water treatment area will be to public sewer in accordance with the conditions of the Industrial Emissions Licence.

The surface water drainage system consists of a number of independent drainage routes from the roofs, paved areas and sub-drainage systems. These systems combine on site and tie into an existing College Park system via a petrol interceptor located to the west of the site. Surface water combines with surface water from College Park and flows to the Tolka River. A more detailed description can be found in Chapter 12 (Water & Effluent).

7.4 Receiving Environment

7.4.1 Previous Field and Desktop Study

The findings of the OCM site investigation at College Park in 2013 were used in the assessment of soils, geology and hydrogeology as part of the EIS for College Park Phase 1.

7.4.2 Soils

The EPA soil mapping indicates that the soils underlying the proposed development site comprise primarily of Surface water Gleys / Ground water Gleys Basic (BminPD) and Grey Brown Podzolics / Brown Earths Basic (BminDW). Figure 7.1 shows the soil types at the proposed development site and the surrounding area.

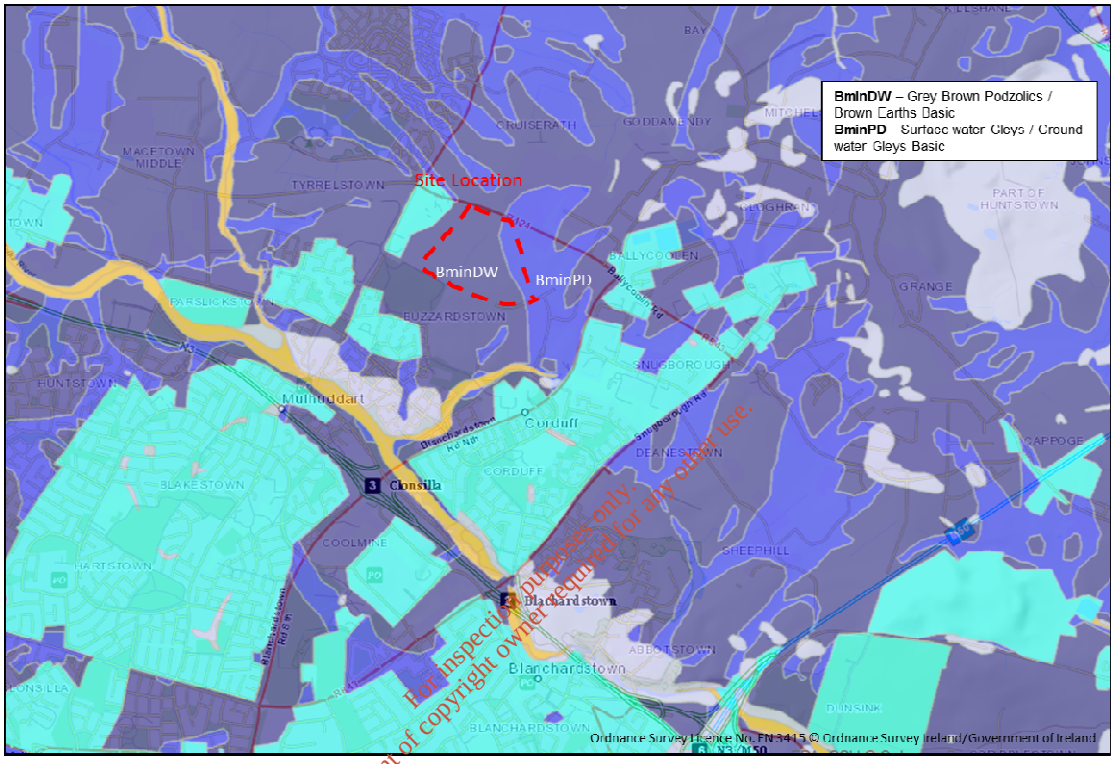


Figure 7.1 Surrounding Soil Types

A description of each soil type is presented as follows:

BminDW - Grey Brown Podzolics / Brown Earths Basic

Grey Brown Podzolics are usually formed from a calcareous parent material, which counteracts the effects of leaching. Because of this, the podzolisation process is restricted and the principal materials translocated down the soil profile are the clay particles themselves.

Brown Earths are relatively mature, well-drained, mineral soils possessing a rather uniform profile, which have not been extensively leached or degraded. They are formed from lime-rich, calcareous parent materials. Their high pH may limit use range for certain tree species.

BminPD - Surface water Gleys / Ground water Gleys Basic

These are soils in which the effects of drainage impedance dominate and which have developed under the influence of permanent or intermittent water logging. The impedance may be due to a high water table, to a 'perched' water table caused by the impervious nature of the soil itself, or to seepage of runoff from slopes.

7.4.3 Subsoils (Drift Geology)

The subsoil mapping for the site is presented in Figure 7.2.The map indicates the subsoils in the area as predominantly glacial tills (Carboniferous limestone till).

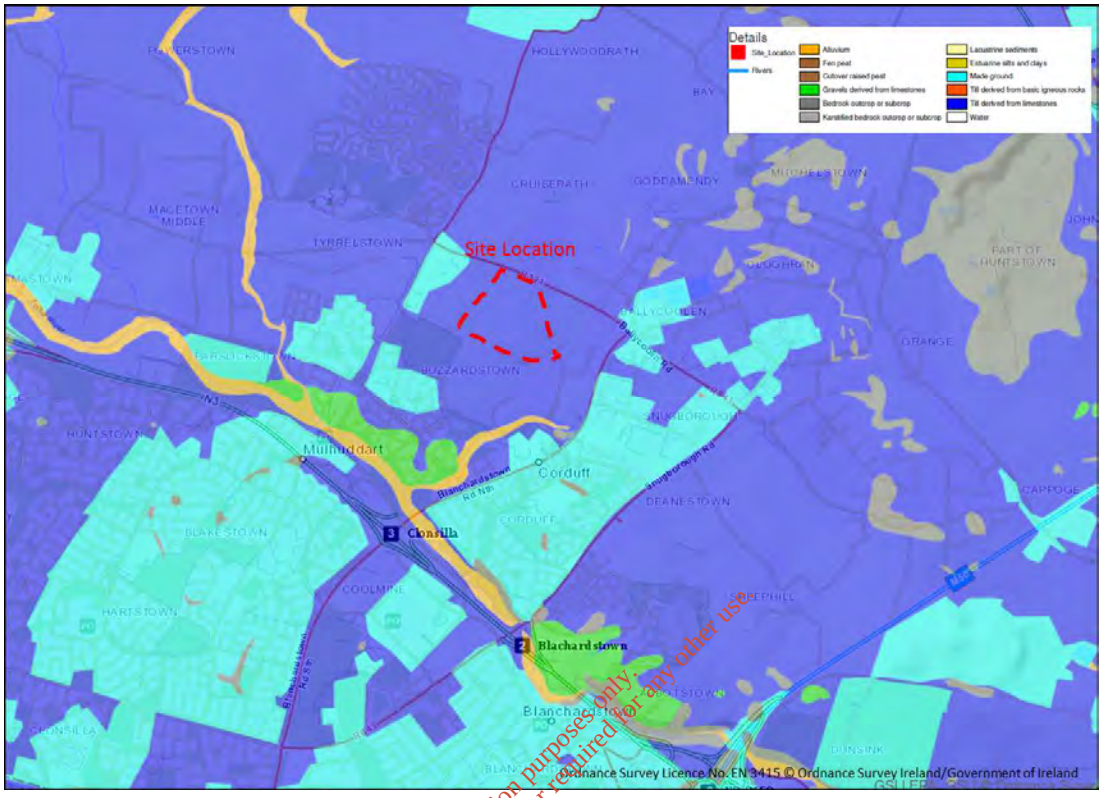


Figure 7.2 Surrounding Subsoil Types

As part of the OCM site investigation Eight (8 No.) trial pits were excavated on the site and the adjacent site between the 16th and 17th July 2013. See Figure 7.3 for Site Investigation locations.

The trial pits were terminated at presumed bedrock level which ranged in depth from 1.6m to 3.9m bgl.

The soils and subsoils typically consists of a maximum of 0.3m of topsoil overlying stiff, locally soft, firm and very stiff sandy silt to approximately 1.2m overlying medium dense to dense silty gravelly sand or cobbles and boulders ranging from 1.8 – 3.5m below ground level.

Sampling of the soil was carried out during the site investigation which included metals, Polychlorinated Biphenyls (PCBs), pesticides, Extractable Petroleum Hydrocarbons (EPH), Poly Aromatic Hydrocarbons (PAH), Benzene, Toluene, Ethylbenzene, Xylene (BTEX), VOC, asbestos, pH and sulphate. The analytical method detection limits (MDL) were all below relevant guidance levels. See Appendix C for laboratory analytical results.

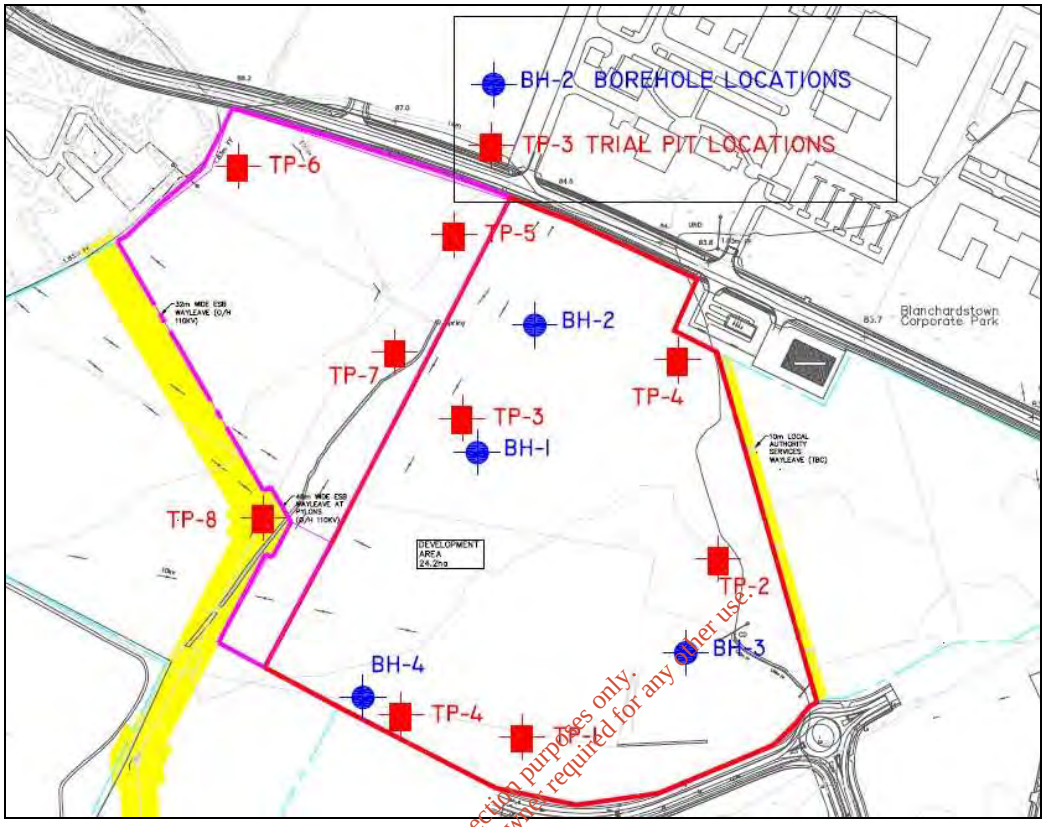


Figure 7.3 Trial Pit and Borehole Locations

Results in the OCM report were compared to the UK Environment Agency (UK EA) Soil Guideline Values (SGV) developed for use in assessing the chronic risk to human health from long-term exposure to chemicals in soil.

From the results obtained during that environmental assessment Asbestos, VOC, BTEX and pesticides were not detected in any of the samples. EPH was only detected in the sample collected from the fill material in TP-4. Hydrocarbons were not detected in the natural subsoils directly below the fill at this location.

The levels of PAHs were all lower than the Soil Guideline Values (SGVs). Cadmium was detected in TP-1, 2, 3, 4, 6 and 7 at levels above the background range but significantly lower than the SGV. Nickel and lead levels were marginally higher than the background range in TP-8; however the nickel level was significantly lower than the SGV. There is no SGV for lead.

While the cadmium levels generally were higher than typical background levels for Irish agricultural soils, they are all well below the SGV. OCM considered that the levels detected do not present a significant environmental or health risk.

The OCM report also refers to a previous site investigation at the College Park site carried out by White Young Green (WYG) in 2005. WYG concluded that there was no evidence of any significant soil or water contamination beneath the site.

7.4.4 Bedrock Geology

Figure 7.4 shows the underlying bedrock geology of the site and surrounding area based on GSI data. The bedrock geology below the study area comprises of 'Visean Argillaceous & Cherty Limestone, Shale ("Calp")' of the Tober Colleen Formation.

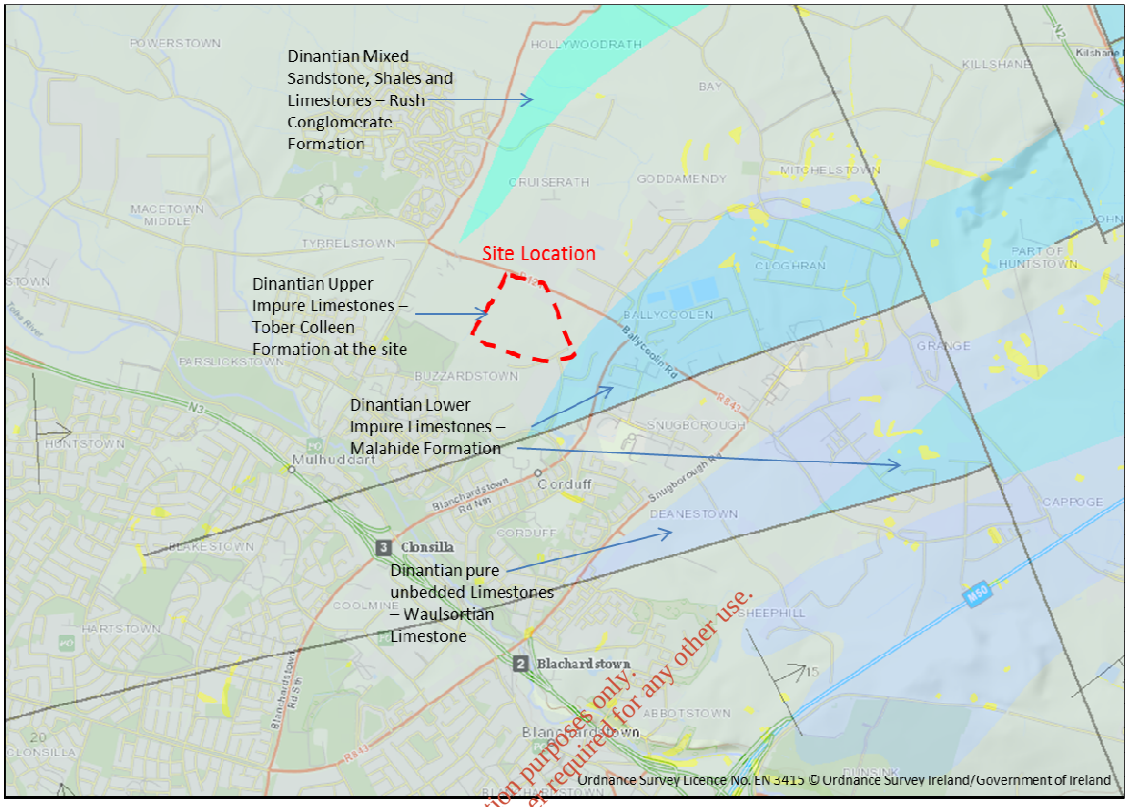


Figure 7.4 Bedrock Geology

As stated in the previous section bedrock is presumed at 1.6m to 3.9m bgl based on the site investigation findings.

Geological Heritage

The Geological Survey of Ireland (GSI) Irish Geological Heritage (IGH) Programme was contacted to determine if any geological heritage issues were present in relation to the site. Consequently GSI IGH recommended checking their online assessment via their Public Viewer www.gsi.ie/mapping. There are no recorded sites on the site of the proposed development and surrounding area.

Karst Features

The Karst database held by the GSI was consulted. This database holds records of locations and types of reported Karst features. The GSI database shows no record of any karst features at the subject site or the surrounding area.

Economic Geology

The Extractive Industry Register[11] and the GSI mineral database[5] was consulted to determine whether there were any mineral sites close to the proposed development. The nearest quarry is Huntstown Quarry, 4km. to the west of the proposed development site.

Geo-hazards

According to the GSI web database[5], there are presently no records of geo-hazards such as landslides, within a radius of 10km of the site.

[11] EPA, (2013), Extractive Industries Register, accessed Mar 2015, http://watermaps.wfdireland.ie/ExtractiveFacilities/Default.aspx

Radon

Radon concentrations for the area where the proposed development is located are considered low level with less than 1% of homes in the area exceeding the National reference level of 200 Becquerel (Bq)/m^3.

7.4.5 Hydrogeology

Aquifer Classification

Aquifers are underground layers of rock which contain water and which are capable of yielding it to surface waters such as streams and rivers and groundwater-fed ecosystems. Reference to the GSI National Draft Bedrock Aquifer Map[5] for the proposed development and surrounding area (see Figure 7.5) indicates that the site is underlain by a Poor Aquifer, which is generally unproductive except in local zones. According to the GSI National Draft Gravel Aquifer Map[5] there is no gravel aquifer present in the site area.

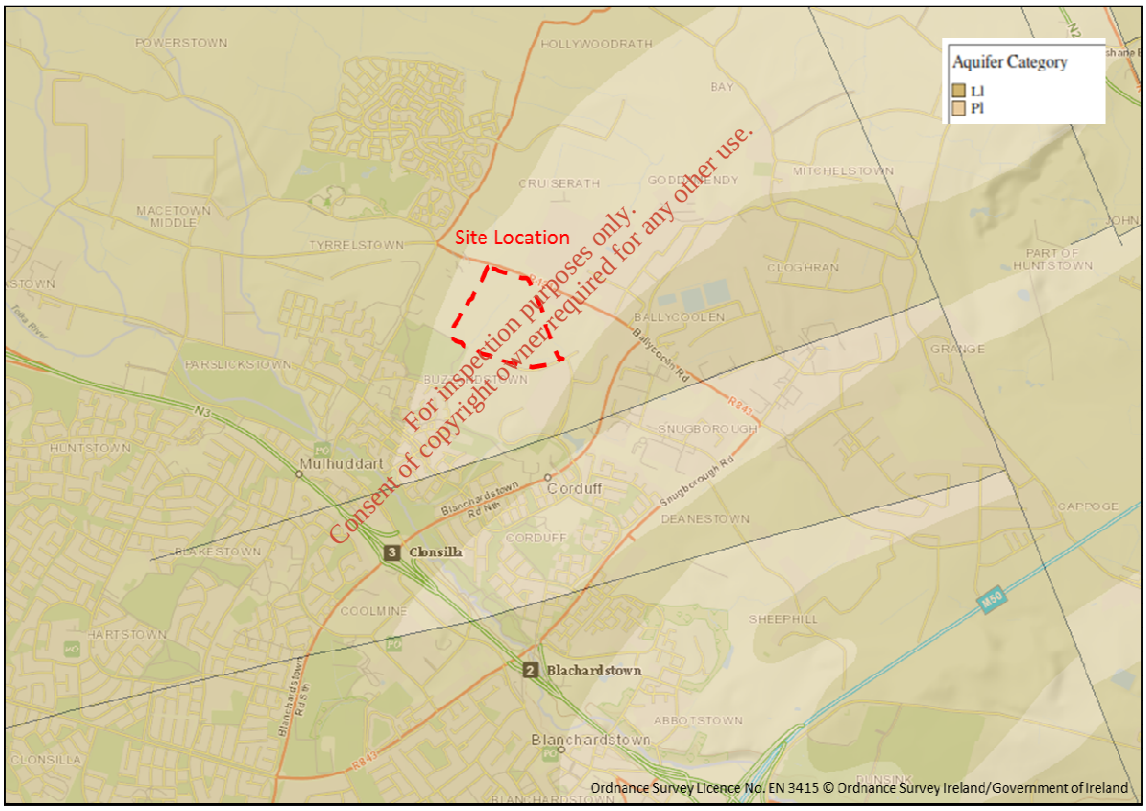


Figure 7.5 Underlying Hydrogeology

Groundwater Flow Direction

The calculation of groundwater flow direction is based on the water levels recorded on site on the 8th August 2013 are presented in Figure 7.6. The shallow groundwater flow direction on the College Park site also reflects the local topography and is to the south and south east.

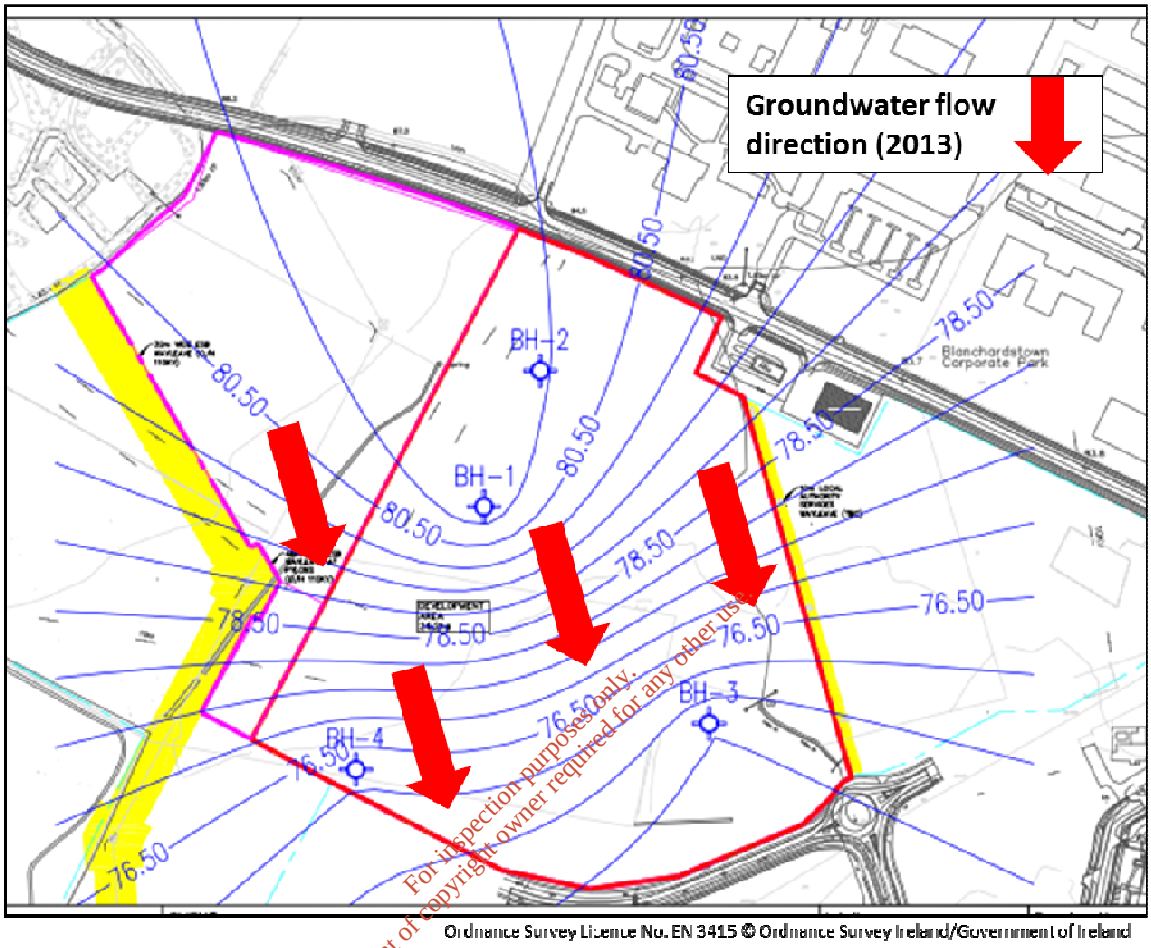


Figure 7.6 Groundwater Flow Direction

Groundwater Vulnerability

Vulnerability is defined by the GSI as the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities. The GSI uses four groundwater vulnerability categories - Extreme, High, Moderate and Low - in the assessment of risk to groundwater. The categories are shown in Appendix C.

The GSI has classified the vulnerability of groundwater/aquifer beneath the site and in the general area as High – indicating a subsoil depth of between 3m and 5m (Figure 7.7). The bedrock boreholes encountered rock at 0.8 – 4.1m bgl indicating that the aquifer vulnerability beneath the site ranges from High to Extreme.

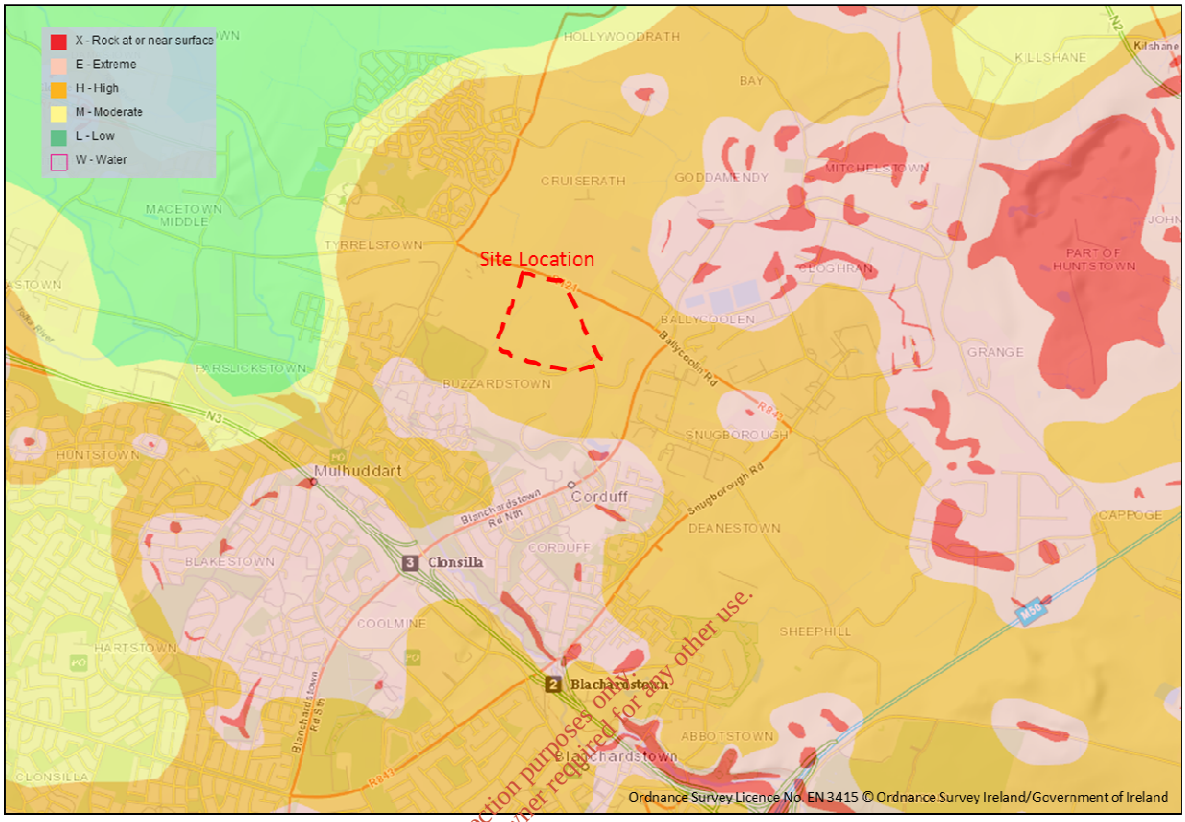


Figure 7.7 Groundwater Vulnerability

There are no Source Protection Areas on, or in the immediate vicinity of, the site, according to the GSI national database. A Source Protection Area is a land area that contributes groundwater to a borehole or spring.

Groundwater Quality

The SI No. 9 of 2010, EC Environmental Objectives (Groundwater) Regulations 2010, as amended, give effect to the criteria and standards to be used for classifying groundwater in accordance with the requirements of the Water Framework Directive (WFD). The current status of the groundwater under the proposed development site is classified as "Good" according to the WFD[7]. Under the objectives of the WFD and the ERBD, the groundwater quality in the Tolka catchment, where the proposed development site is located, must be protected and improved in order to achieve the objectives of the WFD by 2015.

As part of the OCM environmental assessment four bedrock borings were installed at each site. Three of the borings were converted to groundwater monitoring wells. Samples were collected from BH-2, BH-3 and BH-4 at the site. BH-2 is in the up-gradient portion of the site, while BH-3 and BH-4 are in the down-gradient area of the site.

The analysis included metals, PCBs, EPH, PAH, VOC, pesticides, pH and sulphate, sodium potassium, chloride, ammonia, nitrate and nitrite. The parameter range was based on the site history and the need to establish a comprehensive environmental baseline for the groundwater quality for the site. The analytical MDL were all below relevant guidance levels.

Results from the analysis were compared to Interim Guideline Values (IGV) published by the EPA and the Groundwater Threshold Values (GTV) set out in the EC Environmental Objectives (Groundwater) Regulations (S.I. 9 of 2010).

EPH, VOC and pesticides were not detected in any of the wells. The metal levels were all below the IGV and GTV. The chloride levels in all the wells were marginally higher than the IGV but below the GTV. The nitrate levels in BH-3 and BH-4 at exceeded the IGV but were below the GTV. Very

low levels of the PAHs Acenaphthylene, Acenaphthene, Fluorene and Phenanthrene were detected in BH-2 and BH-3. There are no IGV or GTV for these PAHs. Cadmium, nickel, lead and zinc were either not detected or below the IGV and GTV. The results indicate that the groundwater is not contaminated. See Appendix C for laboratory analytical results.

7.5 Potential Impacts

The potential impacts to soil, geology and hydrogeology from the proposed development are considered in this chapter.

7.5.1 Construction Phase

During the construction phase of the project, soil will be excavated from the site as part of the enabling earthworks and in order to facilitate the levelling of the site and the laying down of foundations for the new structures. These soil excavations will result in unavoidable soil removal from below the site in localised areas. Given the known subsoil conditions there are not expected to be any geotechnical stability issues.

As the project site is generally located within the area of high aquifer vulnerability there is a potential that any fuels or chemicals used during construction, if inappropriately handled or stored or lost through spillages could potentially have a degree of impact on both soil quality and groundwater quality in the area.

Concrete (specifically, the cement component) is highly alkaline and any spillage which migrates though subsoils would be harmful to groundwater quality.

Runoff containing large amounts of silt could migrate vertically and impact on the groundwater quality underlying the site. Silt water can arise from exposed ground and soil stockpiles (prior to reinstatement).

The dewatering may result in the localised lowering of the water table in the immediate vicinity.

Clean imported structural fill will be required for the enabling works phase of the construction works. The source of this fill material will need careful selection and vetting in order to ensure that it is of a reputable origin and that it is free of contamination. Aggregates will be imported to the construction site for use in the establishment of contractor's compounds, building works and the road and other works. The sourcing of these aggregates from reputable, authorised quarries is therefore important for the prevention of environmental impact and ensuring regulatory compliance.

In relation to the construction phase, the potential impact on the soils, geology and hydrogeology is Long term – Moderate-Negative.

7.5.2 Operational Phase

The operation of this facility is unlikely to have any significant adverse impacts on the local geological / hydrogeological environment due to the environmental design considerations that will be considered during the detailed design.

The construction hard standing and roofed areas over the presently un-surfaced ground across the site will result in an increase in the proportion of rainfall that forms surface water runoff. This will result in an imperceptible reduction in the amount of rainfall recharge to groundwater below the site.

Any accidental emissions from storage or delivery of chemicals or fuels could cause contamination if the emissions enter the soil and groundwater environment.

In relation to the operational phase, the potential impact on the soils, geology and hydrogeology is Long term – Moderate-Negative.

7.5.3 'Do Nothing' Scenario

If the proposed works are not carried out there can be no impact from construction and operation of the proposed development. The current condition of the soils, geology and hydrogeology are likely to remain unchanged.

7.5.4 Cumulative Impacts

The loss of productive soil resource is an inevitable consequence of the development of this site which was previously Greenfield. There will be an increase in potential for contamination of groundwater during construction and operation of proposed developments in the area, however, the proposed Phase 2 development and the proposed BMS and Montjeu applications will have CEMPs to reduce the potential for contamination during the construction phase. In addition, as these facilities are all likely to be licensed under the EPA during operation, mitigation measures and monitoring programmes proposed in order to comply with licence conditions will reduce the likelihood of any contamination being discharged to ground during operation.

7.6 Mitigation Measures

7.6.1 Construction Phase

General

In order to reduce the level of the potential impacts identified during the impact assessment it is necessary to devise mitigation measures to be adopted as part of the construction works on site in order to address the main areas of potential impact which are as follows:

- Control of soil excavation and fill placement works
- Fuel and chemical handling, transport and storage
- Sources of fill and aggregates for the project

Control of Soil Excavation and Fill Placement

The geotechnical investigation undertaken prior to construction allows for clearer definition of the nature of subsoil, geology and hydrogeology at the site and this information will facilitate construction planning. The improved dataset will also allow for the detailed design phase to identify any further potential mitigation measures required during the operational phase in order to minimise any potential soil, geology and hydrogeology impacts.

As soil is excavated during the clearance of the site it will be necessary to designate areas within the site where stockpiles will be established in order to facilitate the efficient transfer of material within the site. In order to minimise the potential environmental impact of stockpiles it will be necessary to adopt the following mitigation measures:

- Segregate different grades of soil where they arise
- Position spoil and temporary stockpiles at a suitable distance from drainage systems
- Minimise movements of materials within the stockpiles in order to reduce the degradation of the soil structure
- Prevent the generation of silty surface water run-off from the stockpiles through the use of covers, if feasible, cut off ditches and through directing clean run off to local drainage for discharge

The transportation of clean spoil to and from the site must be done in a manner which ensures minimal loss of material during transport and loads should be covered and lightly hosed in order to prevent dust nuisance.

Although there is no evidence of spillages in the area, all excavated materials will be visually assessed for signs of possible contamination such as staining or strong odours. Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of

possible contaminants in order to ensure that historical pollution of the soil has not occurred. Should it be determined that any of the soil excavated is contaminated, this will be dealt with appropriately as per the Waste Management Act of 1996 (as amended) and associated Regulations.

Fuel and Chemical Handling, Transport and Storage

Due to the high vulnerability of the local aquifer it will be necessary to adopt the following mitigation measures at the construction site in order to prevent any spillages to ground of fuels and to prevent any consequent groundwater quality impacts;

- Designate a bunded refuelling area at the contractor's compounds
- Spill kit facilities should be provided at the fuelling area in order to provide for any accidental releases or spillages in and around the area
- Any used spill kit materials should be disposed of using a hazardous waste contractor
- Where mobile fuel bowsers are used on the site the following measures should be noted:
    - Any flexible pipe, tap or valve must be fitted with a lock where it leaves the container and locked shut when not in use
    - Flexible delivery pipes must be fitted with manually operated locks or a valve at the delivery end that closes automatically when not in use
    - The pump or valve must have a lock and be locked shut when not in use
    - Each bowser should carry a spill kit and each bowser operator must have spill response training
    - Portable generators should be placed on suitable drip trays and any spillages should be cleaned up using spill kit materials

In the case of drummed fuels or other chemicals which may be used during construction the following measures should be adopted:

- Securely store all containers that contain potential pollutants e.g. fuel oils and chemicals in a dedicated internally bunded chemical storage cabinet unit or inside a concrete bunded area
- Label containers clearly so that appropriate remedial action can be taken in the event of a spillage
- Avoid storing drums tightly against each other. Store drums in a manner which allows them to be easily checked for leaks
- Before moving a drum check that the bung is secure
- Ensure that only drums which are UN approved and in good condition are allowed on to the site or reused within the site
- When moving drums from the bunded storage area a suitably sized spill pallet must be used for containing any spillages during transit
- Drums should be unloaded and loaded only by competent trained personnel using forklifts with drum grab attachments

Concrete will be mixed off–site and imported to the site. The pouring of concrete will take place within a designated area to prevent concrete runoff into the soil/groundwater media. Wash down and washout of concrete transporting vehicles will take place within a designated area of the site.

Sources of Aggregates and Clean Fill for the Project

The project contract and procurement procedures should be developed to ensure that all aggregates are sourced from reputable sources. All potential suppliers should be vetted for the following criteria:

- Environmental management status

- Regulatory and legal compliance status of the company
- Only suppliers who are in compliance with the planning requirements should be considered for inclusion in the project.

Likewise, clean fill material must only be sourced from suppliers which comply with the above requirements. It is recommended that an environmental due diligence is carried out of the proposed source area.

7.6.2 Operational Phase

As discussed in Section 1.5, the proposed development will be applying for an IEL. Part II (9) of S.I. No. 137/2013 - Environmental Protection Agency (Industrial Emissions) (Licensing) Regulations 2013 sets out the statutory requirements for information to accompany a licence application. These requirements include the need for Treatment, Abatement and Control Systems for all emissions in accordance with the relevant BAT (see Section 1.5.3).

Further details are discussed more in the mitigation measures section of Chapter 10 (Water and Effluent).

The site-wide mitigation measures and spill control programme that is proposed in accordance with the site IEL will apply during the operational phase. This will include on-going bund integrity and drain testing programme, environmental monitoring and management procedures for potentially polluting materials. See Table 10.2 for further details.

The proposed development will be designed and operated in accordance with the requirements of the EPA Guidance Note '*Storage and Transfer of Materials for Scheduled Activities, 2004*', which defines criteria for the design and operation of infrastructure on industrial sites for the storage and movement of potentially polluting materials.

Spill kits will be located at strategic points around the site in order to ensure a quick response to any spillages which occur. Any used spill kits will be disposed of using a hazardous waste disposal contractor and in accordance with all relevant EU and Irish waste management legislation.

7.7 Residual Impacts

With mitigation measures in place there will be no negative impact (either short term, long term, direct or indirect) as a result of this proposed development on the surrounding soils, geological and hydrogeological environment.

8 Flora and Fauna

8.1 Introduction

This chapter of the EIS describes the ecological interests in the area of the proposed development. Likely impacts are evaluated and where necessary mitigation measures are outlined to lessen any impacts.

Scott Cawley Ltd. was commissioned by PM Group Ltd. to undertake an Ecological Impact Assessment (EcIA) of the proposed Phase 2 development at College Park, Blanchardstown, Dublin 15. The aims of this Ecological Impact Assessment were to:

- Establish baseline ecological data for the proposed development site;
- Determine the ecological value of the identified ecological features;
- Assess the impact of the proposed development on ecological features of value;
- Apply mitigation measures to avoid, reduce, remedy or compensate impacts;
- Identify any residual impacts after mitigation.

Information already gathered from the planning, design and construction of the Phase 1 development (currently under construction) have been incorporated and updated to inform the consideration of potential impacts on flora and fauna arising from the Phase 2 development. Furthermore Appropriate Assessment Screening was carried out for Phase 2. The Appropriate Assessment Screening report is included as part of this planning application.

8.2 Assessment Methodology

8.2.1 Relevant Legislation, Policy and Guidelines

The assessment of the likely impacts of the proposed development on ecological features had regard to the following legislation, policy documents, and guidelines:

National and International Legislation

- Planning and Development (Amendment) Act 2010, as amended
- Wildlife Act, 1976 and Wildlife (Amendment) Act (2000) (as amended); hereafter collectively referred to as the Wildlife Acts.
- European Communities (EC) (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011 (as amended); hereafter the 'Birds and Habitats Regulations'.
- EU Birds Directive 2009/147/EEC;
- EU Habitats Directive 92/43/EEC (as amended);
- Flora (Protection) Order, 1999.

Relevant Policies and Plans

- National Biodiversity Plan 2011 – 2016;
- Fingal Development Plan 2011-2017 (FCC, 2011);
- Fingal Biodiversity Action Plan 2010-2015

Relevant Guidelines

- Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (EPA, 2003);
- Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2002);

- Guidelines for Ecological Impact Assessment in the United Kingdom (IEEM, 2006).
- Best Practice Guidance for Habitat Survey and Mapping (Heritage Council, 2011).
- A Guide to Habitats in Ireland (Fossitt, 2000).
- Bat Mitigation Guidelines for Ireland (National Parks and Wildlife Service, 2006).
- Bat Surveys: Good Practice Guidelines (Bat Conservation Trust, 2012).
- Environmental Planning and Construction Guidelines Series (National Roads Authority, 2005 – 2011).

8.2.2 Desk Study

In addition to those listed in the References at the end of the chapter, key resources included:

- Ordnance Survey Ireland mapping available online at http://www.osi.ie/Home.aspx ;
- Data on rare/protected/threatened species and designated sites held online by the National Parks & Wildlife Service (NPWS)[12]; and the National Biodiversity Data Centre[13]; and
- British Trust for Ornithology and Birdwatch Ireland Bird Atlas 2007-2011 Data[14].

8.2.3 Consultation

No consultation of stakeholders was deemed necessary given the available desktop data and the fact that surveys and consultation had been undertaken for the previous Phase 1 planning application which addressed similar issues in the same location.

8.2.4 Field Survey Methodology

A habitat and multi-disciplinary fauna survey of the site of the proposed development site was carried out on the 8th August and 4th December 2013 and a bat survey was conducted on the 27th and 28th of August 2013 as part of the ecological impact assessment for Phase 1- currently under construction. The results from these historical surveys are referred to in this chapter and used as part of the assessment process where appropriate.

Surveys in 2013 addressed the entire site covered by Phase 1 (permitted under Planning Ref. FW14A/0020 and under construction) and Phase 2 (subject of this application).

A further habitat survey and multidisciplinary fauna survey was conducted on the 5th March 2015 applying to the Phase 2 lands. For Phase 1 and Phase 2 habitat surveys, habitat types were classified using the Guide to Habitats in Ireland (Fossitt, 2000).

For both Phase 1 and Phase 2, the fauna surveys, evidence was obtained primarily from field signs such as feeding signs and droppings, as direct observation for many species is rare. Habitats were assessed for potential, or confirmed usage by protected fauna, particularly protected species and species threatened according to the All-Ireland “Red Lists”[15]. The habitat and fauna survey for Phase 2 was conducted outside the optimal survey period for flowering plants, breeding birds and bats as per NRA guidelines (NRA, 2009).

For the bat surveys conducted as part of Phase 1, all mature trees in hedges and tree lines were assessed for bat roost potential using the protocols in the Bat Conservation Trust (BCT) Good Practice Guidelines (Hundt, 2012). Trees were assigned a rating of bat roost potential based on a visual inspection of potential roost opportunities from ground level using binoculars. Category 1 trees have “definite bat roost potential”. Category 2 trees have “some features which may have limited potential to support bats”. Category 3 trees have no potential for roosting bats. The bat activity surveys were conducted in mild, calm and dry conditions. Both surveys consisted of a dusk

[12] Available online at http://www.npws.ie/mapsanddata/ Accessed in April 2015.
[13] Available online at maps.biodiversityireland.ie Accessed in April 2015.
[14] Available online at http://www.bto.org/volunteer-surveys/birdatlas Accessed in April 2015.
[15] Mammal Red-list from Marnell et al., 2009. Birds from Birds of Conservation Concern in Ireland (Colhoun & Cummins. 2013); Fish and Amphibians from King et al., 2011; Non-marine molluscs from Byrne et.al, 2009; Butterflies from Regan et al. (2010).

and dawn survey and an extended dusk surveys from 30 minutes prior to dusk for a period of five hours of survey. The aim of the surveys was to identify any evidence for roosts and to record the use of the site by bats for feeding and commuting. Equipment used included Pettersson D240x time expansion ultrasound detector and infra-red night vision monocular.

8.2.5 Ecological evaluation and impact assessment methodology

Site Evaluation Criteria

The criteria used to assess the ecological value of features followed the Guidelines for assessment of Ecological Impacts of National Road Schemes (NRA, 2009) (Appendix D) and were consistent with the Guidelines for Ecological Impact Assessment in the United Kingdom (IEEM, 2006).

Impact Assessment Criteria

In accordance with NRA guidelines (2009), impact assessment was only undertaken of sensitive ecological receptors[16], namely features within the "zone of influence"[17] of the development "both of sufficient value to be material in decision-making and likely to be affected significantly" (NRA, 2009). Features qualifying as sensitive ecological receptors were those valued as "Local Importance (Higher value)" or higher - as per the ecological value criteria in Appendix D.

Limitations / deficiencies

Detailed vegetation surveys were undertaken in December 2013 and March 2015, which was outside the flowering season of most vascular plants, including woodland ground flora species. A precautionary approach was adopted to address potential impacts to rare/protected flora species that may have been overlooked. However, given the disturbed habitat types that dominated the landscape in 2015 due to the construction of Phase 1, the evaluation of their ecological value and the proposed mitigation measures are deemed to be accurate and reasonable, despite being carried out at this time of year.

Mammal surveys (including bats) were conducted during the optimal season for the Phase 1 lands and are deemed applicable for this application. The survey for birds and bird habitats in August and December 2013 was after the breeding bird season (i.e. after the period during which bird song and bird display behaviour facilitates identification of breeding territories). In these circumstances, a list of breeding bird species for the subject lands could not be entirely confirmed.

Bat surveys undertaken as part of Phase 1 were within the optimum survey period for activity (May-August) but would have been at the latter part of the maternity and post-natal dispersion period and therefore some breeding roosts may have gone unrecorded. The risk of this is deemed to be very low considering that there were no suitable buildings on the site and none of the trees were deemed to offer good roosting sites for bats.

The criteria for ecological evaluation is shown in Appendix D.

8.3 Characteristics of the Proposed Development

The proposed development comes under the second phase (Phase 2) of construction for a pharmaceutical facility on the site. Phase 1 of the College Park development i.e. the construction of a 5 storey office building and roof top plant room, QC laboratories, packaging / warehouse, utility building and spine corridor and a Data Centre was granted planning permission by Fingal County Council in May 2014 (Planning Ref. FW14A/0020), with a further grant of planning permission for certain changes to Phase 1 granted in January 2015 (Planning Ref. FW14A/0138). Phase 1 is currently under construction.

[16] Termed "key ecological receptors" in the NRA guidelines (2009).
[17] In accordance with NRA (2009) Guidelines, the Zone of Influence is an important term to define the receiving environment for the activities associated with the project and the biophysical changes that are likely to occur. The Zone of Influence is the "effect area" over which change is likely to occur. This differs for different species and habitats due to varying sensitivities to potential impacts. For instance some birds of prey will flush from an active nest at several hundred metres from human disturbance, while some woodland passerines will tolerate disturbance at a few metres.

College Park Phase 2 (the proposed development), to which this planning application and EIS relate, incorporates the development of

The proposed surface water piped drainage network will discharge to an existing 1050mm Council drain at the south east of the site. This drain connects to an 1800mm pipeline that continues to the ornamental pond at the Business Park entrance (constructed), which in turn discharges to the Tolka River. The existing greenfield run-off from the site has been agreed with Fingal County Council as being 3.4l/s/ha. To restrict the outflow in accordance with this permitted site discharge, it is proposed to use a hydro-brake flow control device. A number of SUDS measures have been included in the design of the proposed development. Such measures will reduce run-off rates by encouraging storm water to soak into the ground, whilst also providing a reduction in the pollutant load discharged to the storm water network;

- Bioswales within main facility car park.
- Grasscrete make-up for fire access road.
- Crushed rock make-up of emergency access road.

The quality of runoff from the proposed development will be further improved by the fact that the storm water attenuation pond will also act as a settlement pond. A Class 1 bypass oil separator will be installed on the surface water drainage line prior to the attenuation pond which will retain any fuel/oil leaks in the surface water runoff. The separator will be inspected and maintained as part of the site preventive maintenance system.

The site is serviced by a 450mm diameter foul sewer located to the south of the site and a 525mm diameter foul sewer flowing southwards along the eastern boundary of the site. Waste water from the Dublin 15 area, including College Park, is currently directed to the Ringsend Waste Water Treatment Plant (WWTP) for treatment prior to discharge to Dublin Bay. See AA Screening Report (which accompanies this planning application) for a description of the current water quality of Dublin Bay.

Under a Connection Agreement from Irish Water, Phase 1 of the Alexion development at College Park connects to the 450mm diameter sewer to the south of the site. A waste water treatment area is proposed for the Phase 2 facility. It will be designed to provide treated effluent to comply with the site's anticipated EPA IEL conditions for discharge, sampling and monitoring to municipal sewer. On-site waste water management proposed is as follows:

- Heat inactivation
- Flow equalisation/balancing tanks (24 hour)
- pH Neutralisation
- Monitoring & control in accordance with IE Licence

After on-site treatment, waste water from the Phase 2 facility will flow into the Irish Water 525mm sewer located to the south east of the site, which will transfer foul water to the WWTP at Ringsend. The average daily flow will be 1060 m^3/day.

Detailed descriptions of the proposed water and effluent system for the Phase 2 development is discussed in Chapter 10 (Water & Effluent) of the EIS.

8.4 Receiving Environment

8.4.1 Site Overview

The Alexion site is located in the townland of Buzzardstown on the rural/industrial fringe of west county Dublin. Recent construction activity had disturbed ground on the margins of the subject lands, which were dominated by flat, arable land, and pasture delineated by frequent hedgerows and tree lines. There were no significant watercourses or wetland habitats recorded within the site apart from a choked drainage ditch to the west, which was dry at the time of the visit. A recreation area associated with the Institute of Technology Blanchardstown abuts site to the south west. The

proposed development lands were in an area surrounded by industrial facilities to the northeast, the Institute of Technology Blanchardstown to the south and residential developments a little further away to the southwest and west.

8.4.2 Protected Areas

Candidate Special Areas of Conservation (cSAC) are designated under the EC Habitats Directive (92/43/EEC) as amended, which is transposed into Irish law through a variety of legislation including the Birds and Habitats Regulations and the Planning and Development Acts. The legislation enables the protection of certain habitats (listed on Annex I of the Directive) and/ or species (listed on Annex II). Special Protection Areas (SPAs) are designated under the Birds Directive (2009/147/EC). This allows for the protection of bird species on Annex I of the Directive, regularly occurring populations of migratory species (such as ducks, geese or waders), and important wetland habitats for birds. Together cSACs and SPAs "European sites" form a network of designated sites across Europe (Natura 2000). National Heritage Areas (NHAs) are designations under the Wildlife Acts in order to protect habitats, species or geology of national importance. Many of the NHAs in Ireland overlap with European sites. Although many NHA designations are not yet fully in force under this legislation (referred to as 'proposed NHAs' or pNHAs), they are currently offered limited protection under planning legislation which requires that planning authorities give due regard to their protection in planning policies and decisions.[18] .

The closest designated site was the Royal Canal pNHA (2103) located 3km to the north. The closest European site was the Rye Water Valley/Carton cSAC (1398) with which there was no source-pathway receptor link. Several European sites in Dublin Bay (more than 15km from the subject lands) were connected to them by two pathways;

- via surface water generated at the proposed development site during construction and operation and discharged into Dublin Bay via the local sewer network and the River Tolka; and
- via foul effluent generated at the proposed development site and discharged from Ringsend WWTP into Dublin Bay.

Having assessed these pathways an Appropriate Assessment Screening Statement concluded there would be no likely significant effects on any European sites as a result of the proposed development, either alone or in combination with other plans or projects.

The proposed Phase 2 development will discharge surface water generated during construction and operation into the River Tolka via the existing surface water sewer network. The North Dublin Bay pNHA/cSAC and South Dublin Bay and River Tolka Estuary SPA is located at the mouth of the River Tolka in Dublin Bay. There are no source-pathway-receptor links between the proposed development and any other protected areas.

Designated sites are mapped in Figure 8.1. The identification of pathways is shown in Table 8.1.

[18] Source: NPWS Website. Available online at http://www.npws.ie/protectedsites/naturalheritageareasnha/

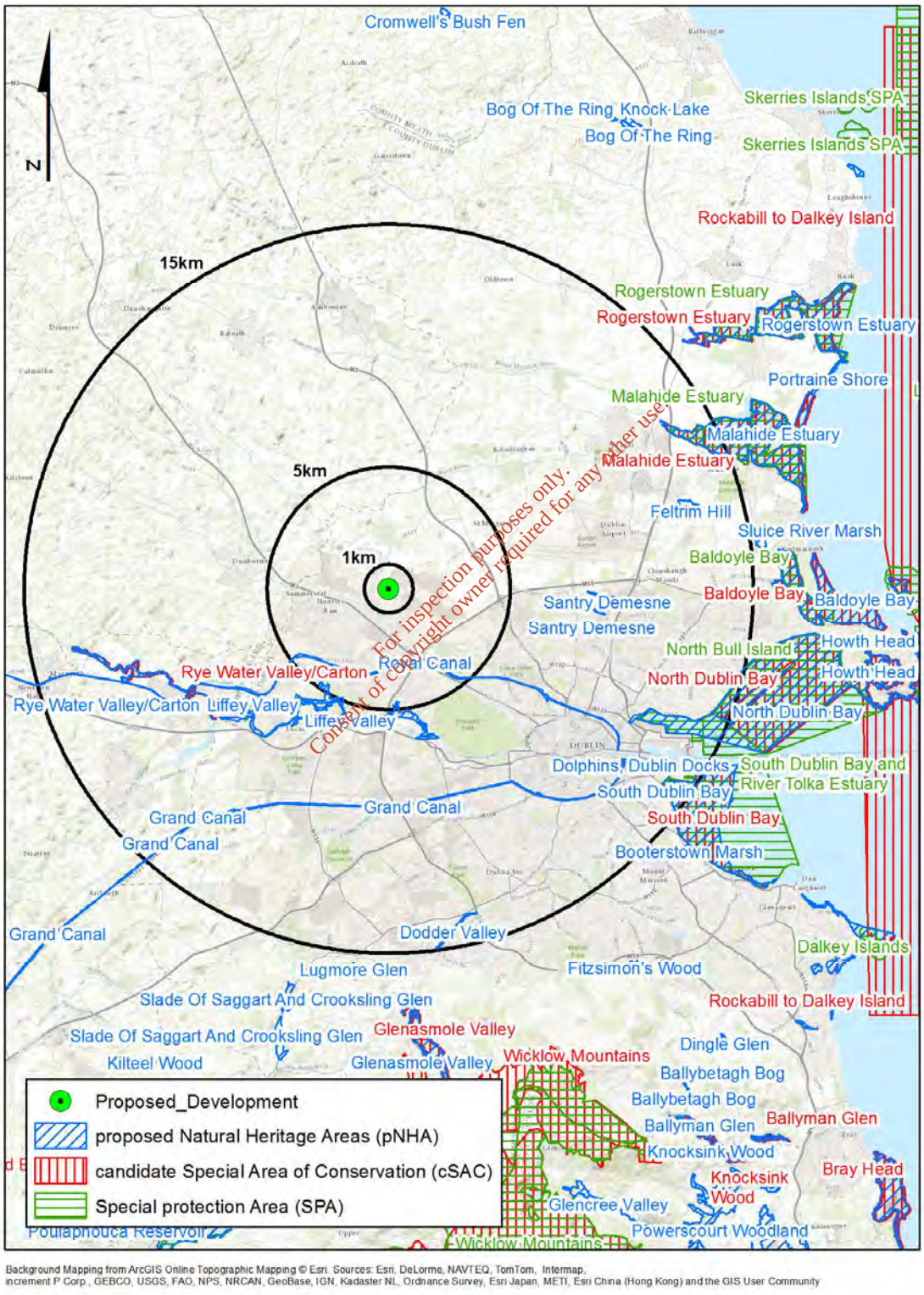


Figure 8.1 Designated sites within 15 km of the proposed development site

Table 8.1 Identification of Pathways between Subject Lands and Designated Sites

Designated Site and Code	Approx. Distance	Receptor-pathway-source linking the Designated site and the Proposed Development arising in significant effects?
Royal Canal pNHA [2103]	3km	No. There are no source-pathway-receptor linkages between the designated site and the Proposed Development.
Liffey Valley pNHA [128]	4km	No. There are no source-pathway-receptor linkages between the designated site and the Proposed Development.
Santry Demense pNHA [178]	7km	No. There are no source-pathway-receptor linkages between the designated site and the Proposed Development.
Grand Canal pNHA [2104]	8km	No. There are no source-pathway-receptor linkages between the designated site and the Proposed Development.
Rye Water Valley/Carton SAC/pNHA [1398]	8.5km	No. There are no source-pathway-receptor linkages between the designated site and the Proposed Development.
Feltrim Hill pNHA [1208]	12km	No. There are no source-pathway-receptor linkages between the designated site and the Proposed Development.
Malahide Estuary cSAC/pNHA [205]	13km	No. There are no source-pathway-receptor linkages between the designated site and the Proposed Development.
Dodder Valley pNHA [991]	14km	No. There are no source-pathway-receptor linkages between the designated site and the Proposed Development.
South Dublin Bay pNHA/SAC [210], South Dublin Bay and River Tolka Estuary SPA [4024], North Bull SPA [4026], , North Dublin Bay pNHA/SAC [206], Rockabill to Dalkey Island SAC [3000], Dalkey Island SPA [4172].	11-20km (but-5km from Ringsend WWTW outfall)	Whilst there are two linkages between the proposed development and the European site, the Appropriate Assessment Screening Statement has concluded there will be no significant effects from either: -surface water entering Dublin Bay via surface water sewers, and the River Tolka ; or -effluent entering Dublin Bay following treatment and discharge by Ringsend WWTP

8.4.3 Desktop Study Results

Distribution records for rare / protected species within 2km of the subject lands were obtained from the National Parks & Wildlife Service Research Branch on the 30th March 2015. Records were also obtained from the online database of the National Biodiversity Centre in March 2015. The results are shown below in Table 8.2.

Bat Roost Records were obtained from Bat Conservation Ireland (BCI) for the site and a buffer distance of 1km on the 27th January 2014. The BCI had no records of roosting bats for the subject lands, but one roost was noted 600m south on Blanchardstown Road North for Pipistrelle species of bats. Seven widespread species of bat were recorded feeding/commuting within 10km.

Table 8.2 Records of rare, protected and threatened species within 2km of the site.

Common Name	Scientific Name	Protection[19]	Status[20]
West European Hedgehog	*Erinacaeus europaeus*	WA	Least Concern
Eurasian Badger	*Meles meles*	WA	Least Concern
Leisler's Bat	*Nyctalus leisleri*	WA, HD IV	Near Threatened
Soprano Pipistrelle	*Pipistrellus pygmaeus*	WA, HD IV	Least Concern
Common Pipistrelle	*Pipistrellus pipistrellus*	WA, HD IV	Least Concern
Daubenton's Bat	*Myotis daubentonii*	WA, HD IV	Least Concern
Moss Carder Bee	*Bombus muscorum*	None	Near threatened
Large Red-Tailed Bumblebee	*Bombus lapidarius*	None	Near Threatened

Likelihood of occurrence of protected species within proposed development

Flora[21]

Given the level of disturbance due to construction works for Phase 1, there is a very low risk that rare plants could occur on site. However, rare arable species such as Red hemp-nettle or Corn chamomile that although described as "extinct", occasionally re-appear from buried seed and could reappear following the disturbance works due to construction.

Fauna

There was no potential for most aquatic species including Lamprey and Whorl snail species to occur within the site due to the absence of wetland habitat. There was some potential for Common Frog and Smooth Newt to occur as these species often hibernate in terrestrial habitats during the non-breeding season in early winter. There was low potential for all other fauna listed in Table 8.2 to occur within the site, given the level of disturbance recorded during the site survey. However, the construction of an attenuation pond on the south eastern corner of the site, although only recently constructed, could be utilised by amphibians as a breeding site. The potential occurrence of all species has been elaborated upon in the field survey results section, and has informed impact assessment and the proposed mitigation measures.

[19] HDII/IV = EC Habitats Directive Annexes II/IV; WA = Wildlife Acts; BD I = Birds Directive Annex I.

[20] Fauna conservation status: Mammals from Marnell et al., 2009; Birds from Colhoun & Cummins, 2013 ; Fish and Amphibians from King et al., 2011; Non-Marine Molluscs from Byrne et.al, 2009; Bees from Fitzpatrick et al., 2006.

[21] Habitat Preferences and distribution data from Parnell & Curtis (2012), Curtis & McGough, Doogue et al., (1998), and the online atlas of the British and Irish Flora www.brc.ac.uk/plantatlas

8.4.4 Field Survey Results

Habitat Surveys

From the 2013 and 2015 field surveys of the proposed development site, several habitat types (following Fossitt 2000) were identified within and adjacent to the site as follows:

- Freshwater [temporary pools in disturbed ground (No Fossitt category); Drainage ditch (FW4)]
- Grassland [Dry calcareous and neutral grassland (GS1); Dry meadows and grassy verges (GS2)]
- Woodland and scrub [Hedgerows (WL1), Treelines (WL2)];
- Exposed rock and disturbed ground [recolonising bare ground (ED3)]
- Cultivated and built land [Arable Land (BC1)];

As part of the assessment of the application for Phase 1, it was determined that the thick hedgerow belt along the eastern boundary (WL1) followed the Buzzardstown townland boundary and is likely to be at least 160 years old. It was valued at the intermediate value of "Local" to "County" Importance. This hedge was of significantly higher value than the south eastern and southern hedgerows which were judges to be of Local Importance (Higher value) due to their lower species diversity, younger age, narrower width, and the absence of an associated ditch. The particularly high ecological value of townland boundary hedges was noted in Objective OS31 of the Fingal County Development Plan 2011-2017 (FCC, 2010).

During the 2015 field survey, the following habitats were identified within the site:

- Freshwater [Attenuation pond created as part of the Phase 1 development (FL8); temporary pools filled with rain water and created by vehicular activity]
- Cultivated and Built Land [Buildings and Artificial Surfaces (BL3); Spoil and bare ground (ED2)]
- Woodland and scrub [Hedgerow (WL1); Treeline (WL2)]

No dry meadow and grassy verge (GS2), dry calcareous grassland (GS1) or arable land (BC1) were recorded during the 2015 survey as these were now either Buildings and Artificial Surfaces BL3 or Spoil and Bare Ground ED2 due to the construction works being undertaken for Phase 1 of the development.

Freshwater

Attenuation Pond (FL8) and temporary pools

All freshwater habitats recorded on site in 2015 were recently-created and unlikely to hold significant aquatic flora and fauna at present although they are capable of being used by breeding Common Frog- see later. The temporary pools are unlikely to remain following the completion of current construction works for Phase 1. However, the attenuation pond could in time become suitable habitat for amphibians, water fowl and aquatic invertebrates, such as dragonflies and damselflies.

(A)

(B)

Plate 8.1: (A) Attenuation pond created at the south eastern end of the site, constructed to deal with surface water run-off; (B) temporary pools filled with rain water and created by vehicular activity.

Cultivated and Build Land

Buildings and Artificial Surfaces (BL3)

The southern end of the site was dominated by buildings under construction as part of Phase 1 of the development and the construction site compound to the north. There was no vegetation present.

(A) (B)

Plate 8.2: (A) Construction site compound; (B) Buildings under construction on-site as part of Phase 1 of the development.

Spoil and Bare Ground (ED2)

The majority of the site currently outside the area under construction consisted of large areas of spoil and bare ground habitat, which was mainly created through vehicular activity and the storage of soil excavated from the area. Most of the soil was too recently disturbed to have any plants growing on it, however chickweed *Stellaria media* and Thistle *Cirsium spp*. were observed to be growing on a spoil heap just to the north of the construction compound.

Plate 8.3: Spoil and Bare ground (ED2) created from the construction works for Phase 1 of the development.

Woodland and Scrub

Hedgerows (WL1) and Treelines (WL2)

In the 2013 surveys, hedgerows were recorded on the eastern and south eastern boundaries. The canopy comprised mature Wych Elm *Ulmus glabra*, mature Hazel *Corylus avellana* and semi-mature Ash *Fraxinus excelsior*. The dense understorey comprised Elder *Sambucus nigra*, Hawthorn *Crataegus monogyna,* Dog Rose *Rosa canina* Blackthorn *Prunus spinosa*, Hazel and

Dog Rose. The field layer comprised Cow Parsley *Anthriscus sylvestris*, Common Ivy *Hedera helix*, Hogweed *Heracleum sphondylium*, and Ground-Ivy *Glechoma hederacea*.

The thick hedgerow belt along the eastern boundary (WL1) followed the Buzzardstown townland boundary and was deemed of “local” or “county” importance and was to be retained as part of the development of the site.

During the 2015 survey it was noted that a hedgerow recorded running from east to west across the centre of the site had been removed as predicted, as well as a section of the townland boundary that projected outwards on the south western side. Damage to a section of the townland boundary hedgerow that was retained (see photo 5), include a gap and a trench. Mitigation measures have been provided to address the breach of the townland boundary hedgerow.

(A)

(B)

Plate 8.4: (A) townland boundary hedgerow at the eastern end of the site with protective fencing; (B) Treeline on western side of the site. Note this tree line is outside the fence line of the site.

Plate 8.5: (A & B) Damage to the townland boundary hedgerow.

In the 2013 survey, tree lines were recorded at the southern boundary of the site and just outside the western boundary of the site. These consisted of Ash and Wych elm.

In the 2015 survey it was noted that the southern tree line has since been removed as part of the construction of Phase 1, while the western tree line is still intact but lies outside the site boundary and therefore has not been regarded to be a sensitive ecological receptor.

Figure 8.2 shows the habitat map for the proposed development.

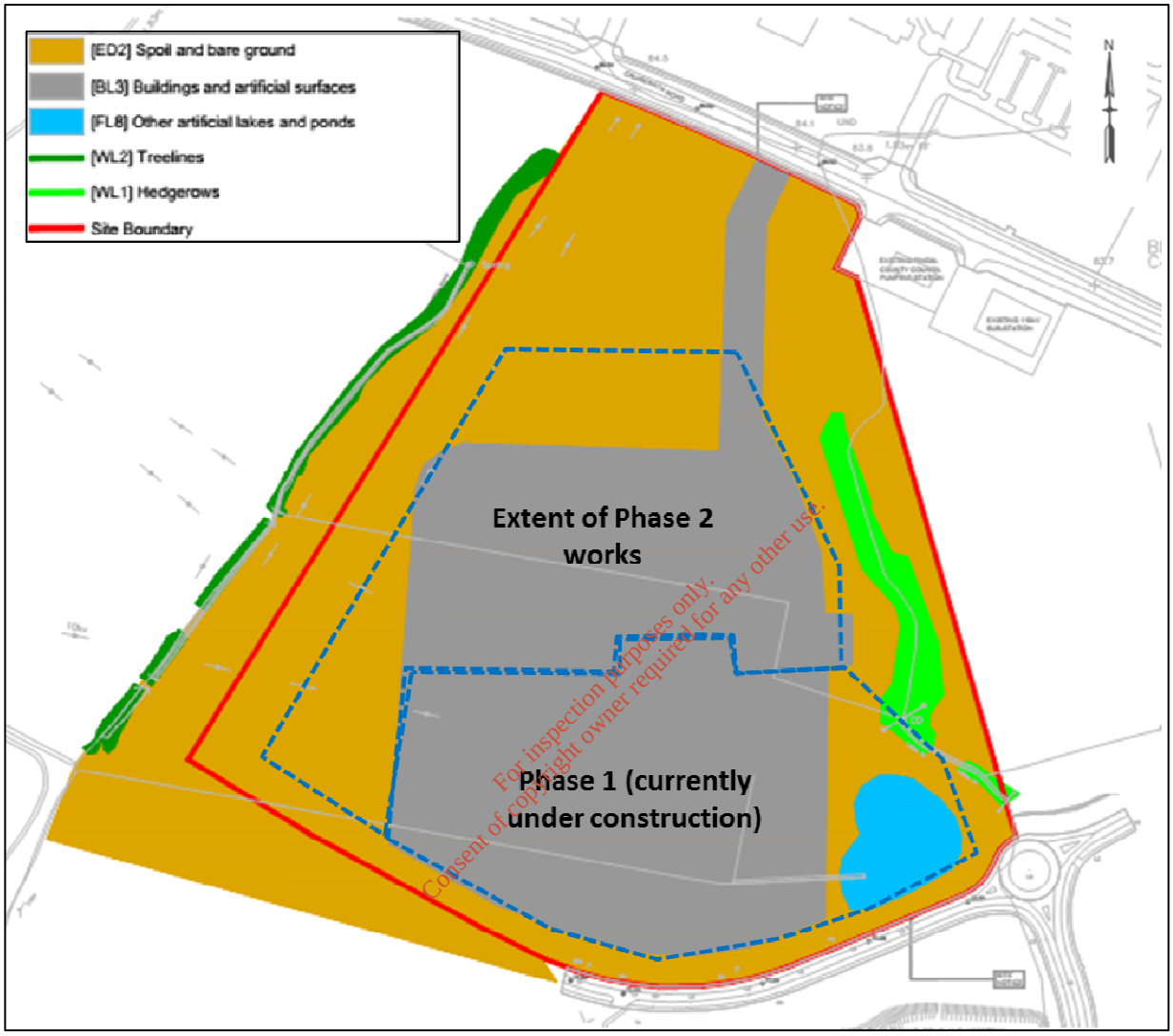


Figure 8.2 Habitat Map

8.4.5 Fauna Survey Results (Protected, rare, threatened and invasive species)

No protected mammal species were recorded during the 2013 surveys, however, it was noted that the site had suitable habitat for badger *Meles meles*, pygmy shrew *Sorex minutus*, hedgehog *Erinaceus europaeus*, Irish hare *Lepus timidius hibernicus* and Irish stoat *Mustela erminea hibernicus*. Rabbit burrows were noted in the townland boundary hedgerow.

No protected mammal species were observed during the 2015 surveys, however rabbits, rabbit droppings and active burrows were noted in the townland boundary hedgerow.

8.4.6 Fauna Survey Results (Bats)

In 2013, the hedge network and adjacent grasslands were deemed to offer potential feeding habitat to seven species of bat based on known bat habitat preferences (Lundy & Roche, 2011).

The dusk dawn surveys conducted on the 27th and 28th of August 2013 recorded Soprano pipistrelles *Pipistrellus pygmaeus*, common pipistrelles *Pipistrellus pipistrellus* and Leisler's *Nyctalus leisleri* foraging briefly on the site. There was no evidence that there were any tree roosts on the site as suggested by bat activity but occasional use of unseen crevices by bats could not be entirely ruled out.

A bat activity survey was not conducted as part of the 2015 survey as the time of year was outside the optimal survey period (May-September). The remaining hedgerow and tree line are likely to still be suitable foraging habitat for the species previously recorded. The newly constructed attenuation pond is likely to offer very suitable foraging habitat in the future, if it is allowed to vegetate, for a number of bats species, including some that have not been previously recorded.

8.4.7 Fauna Survey Results (Amphibians and Reptiles)

No amphibians or reptiles were recorded on site in 2013 and there was only limited potential breeding habitat recorded. No amphibians or reptiles were recorded during the 2015 survey, however, the attenuation pond offers very suitable breeding habitat for frogs (and newts if allowed to vegetate). The only terrestrial habitat available for amphibians are reptiles are present is the section of townland boundary hedgerow and the western tree line.

8.4.8 Fauna Survey Results (Birds)

The bird surveys used the Birds of Conservation Concern in Ireland classification system (BoCCI) (Colhoun & Cummins, 2013) of "Green" (birds of low concern), "Amber" (birds of medium concern), and "Red" (birds of high concern). The 2013 survey recorded no Annex I birds (Listed under the EU Birds Directive) on site but did record three singing male yellowhammers *Emberiza citrinella* (Red-listed), skylark *Alauda arvensis* (Amber-listed) and buzzard *Butteo butteo*. The only species determined to be potentially breeding on-site was yellowhammer.

A breeding bird survey was not conducted as part of the 2015 survey as the survey date was outside the optimum period for breeding bird surveys. However, ad-hoc records of birds were recorded. A single buzzard was observed flying overhead and rooks *Corvus frugilegus* were recorded foraging in some of the bare ground. The site is unlikely to currently offer suitable conditions for both sky lark and yellowhammer due to the loss of the arable fields and grassland and levels of construction activity on the site.

8.4.9 Fauna Survey Results (River Tolka)

The River Tolka will be the receiving watercourse for surface water during construction and operation via existing surface water sewers. The River flows into Dublin Bay downstream of the outfall location. Atlantic Salmon *Salmo salar*, Brown Trout *Salmo trutta*, and European Eel *Anguilla anguilla*. White-clawed Crayfish and Otter are known to occur.

Table 8.3 summarises the results of the ecological evaluation.

Table 8.3 Ecological Evaluation of Sensitive Ecological Receptors

Habitat / Species	Highest Ecological Valuation Level (Importance)	Sensitive Ecological Receptor?
Designated Sites		
European sites (SPAs and cSACs)	International	No[22]
Other nationally designated sites	National-International	No[22]
Protected Species		
Common Buzzard	Local-County value[23]	Unlikely
Aquatic species in the River Tolka including Atlantic Salmon, Brown Trout, European Eel, and otter (all indirect impacts)	Local (Higher value)	**Yes**
Habitats & Flora		
BL3 Buildings and Artificial Surfaces	Local (Lower value)	No
ED2 Spoil and Bare Ground	Local (Lower value)	No
FL8 Attenuation Pond	Local (Higher value)	No
WL1 Hedgerows	Local (Higher value) and intermediate Local-County	**Yes**
WL2 Treelines	Local (Higher value)	No
Other Fauna		
Invertebrates (including butterflies)	Local (Higher value)	Yes
Small mammals (e.g. rats, mice, fox)	Local (Lower value)	No

8.5 Potential Impacts

8.5.1 Construction Phase

European Sites

As concluded in the Appropriate Assessment Screening Statement, there will be no likely significant effects, or adverse effects to integrity of any European sites arising from the proposed development, either alone or in combination with other plans or projects.

This conclusion was informed by:

- The absence of physical overlap of the subject lands with any European sites and separation distance of European sites from the subject lands;
- The absence of any mobile European site "special conservation interests"[24] within the subject lands;
- The Sustainable Urban Drainage Systems (SUDS) measures incorporated into the design of the Phase 2 development;

[22] Refer to Table 8.1 and the Appropriate Assessment Screening Report, which explain the finding that no designated sites are sensitive ecological receptors.
[23] There is currently no published estimate for the Buzzard population of Co. Dublin. The most recent estimate for the Republic of Ireland is 1,500 breeding pairs (Rooney, 2013), and these are highly concentrated in ca. 20 mid and eastern counties. A conservative approach has estimated the Dublin population as ca. 100 pairs, so that 1 pair is of County importance (i.e. 1 pair is 1% of the population of County Dublin).
[24] This term, defined in the Birds and Natural Habitat Regulations, refers to the species for which a European site is designated and covers the term "qualifying interests" that has previously been applied.

- The “Unpolluted” status of coastal waters eventually receiving foul and surface water discharges from the proposed development via the River Tolka; and
- The assurance that the Ringsend WWTP extension works will be completed in the short-medium term. See Chapter 10 (Water & Effluent) for more details.

Nationally Designated Sites

All potential impacts to pNHAs in Dublin Bay are assessed in the Appropriate Assessment Screening Statement due to the overlap of pNHA and cSAC/SPA site boundaries in Dublin Bay. There are no potential impacts predicted to any other sites.

Habitat Loss

Since the site clearance for Phase 1 has included the footprint for Phase 2, all construction impacts have already been accounted for in the previous application for Phase 1. There will be no loss of any semi-natural habitats and therefore the potential impacts are not predicted to be significant in regard to habitat loss.

Aquatic fauna in the River Tolka

The River Tolka potentially contains Atlantic Salmon, Brown Trout, European eel and potential otter which could potentially be indirectly impacted if surface water run-off during construction introduced pollutants (e.g. spilled fuels, paints, detergents, etc.) or suspended solids via existing surface water sewer discharge points. Impact duration would be short-term due to the limited period of construction (<2 years). Impact significance would be likely to be limited to the Local geographic scale (i.e. the maximum ecological value of the River Tolka’s fisheries). Mitigation measures include the attenuation pond, already in place as part of Phase 1 and other SUDS measures.

Common Frog and Smooth Newt

Common Frogs and Smooth Newts could hibernate in hedgerows adjacent to the subject lands and breed in ephemeral pools and ponds and be injured during site activities. The level of impact significance would be limited by the small populations concerned, the abundance and widespread distribution of all three species nationally, and their “Least Concern” conservation status in Ireland (King et al., 2011). Impact duration would be short-term due to the relatively high reproductive rates of these species compared to other species.

Bats

No roosts were recorded during the surveys of the site in 2013 and there are not predicted to be any significant impacts to any potential roosts in trees given the lack of suitable roost sites. Light spill from temporary construction lighting is unlikely to be significant due to its temporary nature and the likelihood for limited night working except during the winter months when bat activity is generally much reduced.

Birds

There is not predicted to be any vegetation removal as part of the construction of Phase 2 so there will be no direct impact on breeding bird habitats. Nest boxes have been erected around the site but are close to areas of vehicle movement and will require relocation as part of further mitigation and management of the site.

8.5.2 Operational Phase

Bats

In the absence of mitigation, boundary security lighting could illuminate previously dark areas around the subject lands thereby reducing their potential usage by bats. Potential impacts would be long term but limited to the Local geographic scale.

Birds

During operation, the visible and audible presence of humans near previously undisturbed nesting habitat for a variety of bird species could impact breeding success of these species with impacts

predicted to be significant at Local-County geographic scale. As per the assessment of Phase 1, the impact on species such as Yellowhammer are regarded to be significant at the County scale. In absence of mitigation, they would not be predicted to remain breeding in proximity to introduction of boundary fencing, lighting, and/or increased human disturbance in the proposed car park area.

Potential Cumulative Impacts

Existing or proposed projects or plans potentially impacting the same sensitive ecological receptors as the proposed development could lead to impacts of a higher geographic scale of significance. Cumulative impacts of the further phases of development have also been addressed in this section.

Under the Fingal County Development Plan 2011-2017, the subject lands and significant areas of farmland in the hinterland are zoned as HT- High Technology". Development of these lands in their entirety is likely to result in net loss of hedgerow and grassland habitats. Phase 1 of the proposed development included landscaping for the Phase 1 development and all of the lands within future phases. In short, this means that all of the hedgerow loss and loss of arable land that is required for all phases occurred as part of Phase 1. The implications of the subsequent phases of development such as Phase II are, in reality far lower in magnitude and significance than Phase 1. The impacts of the subsequent phases of development will amount to the following:

- loss of grassland habitat planted with wildflower seed mix as part of Phase 1 (not yet implemented);
- increase in magnitude of human disturbance;
- increase in magnitude of vehicle disturbance including lighting; and
- increase in volume of foul effluent sent to the public sewer network.

In the absence of any mitigation, these changes in impact magnitude would be unlikely to raise the geographic level of significance for cumulative impacts above the local scale. This is due to the potential resilience of the species recorded at the site (or expected to occur) which are also widespread species of stable populations that are able to live in close proximity to human habitation.

8.5.3 'Do Nothing' Scenario

In the case of the "Do-nothing" scenario, areas that are not proposed for development will revegetate and minor increases in ecological value will take place over the medium-long term. Even in the absence of the development, the value of the subject lands to birds of conservation value such as Yellowhammer and Buzzard is likely to decrease due to the likelihood for intensive development in accordance with local industrial land-zoning objectives. In the long-term the site will recover some of its pre-development ecological value.

8.5.4 Cumulative Impacts

The proposed Phase 2 development site is located in an area of West Dublin that is zoned for development, both High Technology/High Technology Manufacturing and residential. It coincides with further developments in close proximity to the site.

The potential for adverse cumulative impacts may occur as developments in the surroundings may also require the modification of, or removal of semi-natural habitat which is of value to flora and fauna. This is likely to be limited to localised impacts. Potential exists for cumulative adverse impacts on sensitive downstream watercourses. However, the mitigation measures included in both Chapter 8 (Flora and Fauna) and Chapter 10 (Water and Effluent) will ensure that the proposed development will not contribute to any such impacts.

8.6 Mitigation Measures

Measures that were proposed as part of Phase 1 that are also relevant to Phase 2 have been carried forward into this section. None of these measures should be seen to supersede the mitigation measures proposed as part of Phase 1.

8.6.1 Construction Phase

Pollution Prevention

The contractor will have regard to the following measures to minimise the potential for pollution during the construction phase:

- Prevent silt or contaminants from reaching any watercourses (e.g. use of silt fences if overland flow is seen toward the northwest of the site);
- The attenuation pond, already constructed as part of Phase 1, will ensure that any surface water is channelled to this area;
- Channel surface water into the attenuation pond so sediment settles before discharge;
- Regular inspection of attenuation pond;
- Bund areas for the storage of any fuels, oils, greases, cement, etc.;
- Maintain emergency spill kits by works and inspect these before works commence;
- Use dust preventative measures (e.g. damping-down exposed soil with sprinklers) to limit dust blow, particularly during dry windy days;
- Dispose of excavated material not used for landscaping at a licensed waste disposal facility; and
- Ensure imported fill will be free from contaminants.

Habitat Loss

The Landscape Plan (Appendix B) includes the following measures to offset the loss of hedgerow and grassland habitats:

2a) Protection of retained hedgerows: Wooden fencing will be reinstated around the sections of the townland boundary hedgerow that will be retained where it has fallen into disrepair in order to protect against accidental damage to the trees and flanking grassland on each side. Protective fencing will be in accordance with BS 5837:2012 and will be checked on a weekly basis to ensure it is intact.

Inspection of the townland boundary in 2015 noted that most of the grassland habitat at the base of the hedgerow had been scraped off or covered in spoil and that the hedgerow had been breached in one area and damaged in others. The hedgerow will be reinstated prior to the commencement of Phase 2 by appropriate supplementary planting to address loss of connectivity.

2b) New hedgerow planting: Planting of new hedgerows around the perimeter of the site will comprise native species mix including:

- Hazel Corylus avellana
- Ash Fraxinus excelsior
- Elder Sambucus nigra,
- Hawthorn Crataegus monogyna,
- Dog Rose Rosa canina
- Blackthorn Prunus spinosa
- Wych Elm Ulmus glabra
- Oak Quercus robur
- Holly Ilex aquifolium

2c) Grassland wildflower planting: Extensive areas of wildflower planting will take place at the attenuation pond, on the dry banks of the berms along the southern boundary and in the landscape

management blocks. Seed mixes have been taken from the collection of seeds produced by Design by Nature[25]. All seed mixes are of native Irish origin.

i) Seed mix for the area surrounding the attenuation pond and at the wet edges should include the mix EC05 “Wetland Wild Flora (Seasonally Flooded)”.

ii) Seed mix for the berms will comprise EC12 “Wild Flora for Earth Banks, Bunds and Ditches”.

iii) Seed mix for the landscape blocks in the centre of the site within the perimeter footpath will include a combination of EC01 “Annual Wildflowers (Cornfield Annuals)” and EC09 “Species Rich Amenity Grassland”. Each seed mix will be separately sown in different areas but may be allowed to have areas of transition between the two.

iv) All areas of wildflower planting will be prepared in accordance with good practice and the advice provided by the seed mix distributor.

v) The success of the wildflower planting will be monitored for the first three years following planting to avail of the Seed Cert guarantee system and a report issued the local authority at the end of this period.

Breeding Birds

Nest boxes have been erected on retained vegetation but they require relocation after the end of the breeding season (end August) as they are vulnerable to disturbance.

In order to provide for nesting habitat for Yellowhammer and other hedgerow-nesting birds, grassland within 3m of all perimeter hedgerows will not be cut until the end of the summer season (after 31st August) each year.

In order to compensate for the loss of arable crops that were likely to be foraging resources for seed-eating birds such as Yellowhammer, as part of the previous application for the Phase 1 development, it was proposed that a portion of the perimeter of the entire site (15%) will be sown with a mix of seeds such as the following:

- Wild Mustard
- Spring Wheat
- Millet
- Spring Triticale
- Spring Barley
- Fodder Radish

Areas sown with this seed mix will include the area close to the retained townland boundary and along the western perimeter which is also close to the existing hedgerow to the west of the development site

Bats – Light spill

Lighting will be of the minimum height required for health and safety purposes and directed downwards away from woody vegetation, particularly on the boundaries of the proposed development. The first objective will be to limit illumination of woody vegetation to a maximum of 3 lux (reductions to 1 lux are preferable). The second objective will be to limit vertical light spill below 3m to avoid bat flight paths. To ensure these objectives can be accommodated within the design, and health and safety considerations, the lighting plan will be reviewed by a qualified bat ecologist who shall, if necessary, recommend adjustments (e.g. through retrofit of cowls, shields or louvers).

8.6.2 Operational Phase

As discussed in Section 1.5, the proposed development will be applying for an Industrial Emissions Licence (IEL). Part II (9) of S.I. No. 137/2013 - Environmental Protection Agency (Industrial

[25] www.wildflowers.ie

Emissions) (Licensing) Regulations 2013 sets out the statutory requirements for information to accompany a licence application. These requirements include the need for Treatment, Abatement and Control Systems for all emissions in accordance with the relevant BAT (see Section 1.5.3).

The site-wide mitigation measures and spill control programme that is proposed in accordance with the proposed IEL will apply during the operational phase. This will include on-going bund integrity and drain testing programme, environmental monitoring and management procedures for potentially polluting materials.

The proposed development will be designed and operated in accordance with the requirements of the EPA Guidance Note '*Storage and Transfer of Materials for Scheduled Activities, 2004*', which defines criteria for the design and operation of infrastructure on industrial sites for the storage and movement of potentially polluting materials.

Spill kits will be located at strategic points around the site in order to ensure a quick response to any spillages which occur. Any used spill kits will be disposed of using a hazardous waste disposal contractor and in accordance with all relevant EU and Irish waste management legislation.

Pollution Prevention

The petrol interceptor(s) and the attenuation pond will be regularly maintained and kept in properly working for the lifetime of the development.

Birds

Bird and bat boxes will be maintained during site operation. These will be cleaned out annually between November and February with soapy water. There will be minimal usage of pesticides and rodenticides in management of the site where Buzzard may feed on small mammals visiting the site.

8.7 Residual Impacts

Assuming successful implementation of mitigation measures, cumulative impacts will be significant at the following geographic scales:

- Disturbance of breeding birds, after management of grassland close to hedgerows and provision of foraging resources: significant at a local geographic scale;
- Other fauna including bats, other birds, and small mammals - significant at a local geographic scale.

Monitoring of the effectiveness of mitigation measures will take place as follows to ensure that the predicted residual impacts are minimised :

a) Surveys to monitor breeding Yellowhammer and use of feeding areas: twice per breeding season for two consecutive years following landscaping works;

b) Surveys to record use of bird nest boxes for three consecutive years following erection;

c) Post completion check of light spill on perimeter hedgerows.

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