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Introduction

- 16.1 This chapter of the Environmental Impact Assessment Report (EIAR) provides a summary of mitigation and monitoring commitments set out within the technical chapters, as recommended by Section 3.8.4 of the Environmental Protection Agency (2022) Guidelines on the Information to be contained in Environmental Impact Assessment Reports.

Mitigation Measures

Inherent and 'Designed-In' Mitigation Measures

- 16.2 The application site, by its nature, offers a number of advantages in terms of natural mitigation. The proposed extraction design aims to utilise the existing flat topography of the site along with grassed screening berms and hedgerow / native tree planting in a number of locations to enhance the natural topographical, acoustic and dust screening.
- 16.3 The proposed design is to work the pit in a phased manner so that it will lead only to a gradual land take at any one time over the life of the development, instead of immediate overburden stripping and extraction over the full extraction footprint. This gradual land take will help to avoid any dramatic or sudden impact on the fauna of the area, instead allowing them to adapt to the workings and relocate to adjoining lands.
- 16.4 The processing plant and ancillary site welfare facilities will be mobile and small scale in nature. There will be no discharge from the proposed development to any surface watercourse. Rain falling across the site will percolate downwards and recharge to the underlying sand and gravel. There will be no surface water run-off or overground flow across the site. No fuel and oils will be stored at the site.
- 16.5 The landscape and restoration plan to be implemented provides for diverse native tree and hedge planting, to assist in screening of views into the extraction site and to enhance the biodiversity value of the site. All hedges and trees planted as part of the proposed landscaping and restoration plans will be comprised of native and typically occurring species present in the local vegetation and/or hedgerows in Co. Offaly.

Legislation and Best Practice Mitigation Measures

- 16.6 The operation of the pit will be in accordance with legislation and industry best practice that is followed by BD Flood Unlimited Company in all of its operations.
- 16.7 The company is committed to achieving high environmental standards and has an established in-house environmental management system (EMS) at their existing sites. BD Flood is a member of the Irish Concrete Federation (ICF) and as a member commits itself to the principles of the Federations Environmental Code, which states:
"ICF members will minimise production of waste and where appropriate consider its beneficial use including recycling. They will deal with all waste in accordance with the relevant legislation and other controls in place, including waste contractors with valid Waste Collection Permits".
- 16.8 The company has achieved accreditation ISO14000 for its Environmental Management Systems. Copies of the company's Environmental Policy & NSAI 14001 Environmental Management Certification are provided in EIAR Chapter 1, **Appendix 1-B**.

- 16.9 Operations at the site will adhere to the Health and Safety Authority Safe Quarry Guidelines in relation to the Safety Health and Welfare at Work (Quarries) Regulations 2008¹ and this will limit the potential for unplanned events such as instability in adjacent lands. Planning legislation enforced through the granting of planning permission at the site and any associated planning conditions will require implementation of appropriate environmental mitigation and monitoring.
- 16.10 Current best practice guidance include, but is not limited to the following:
- EPA Environmental Management Guidelines (2006): Environmental Management in the Extractive Industry (Non-Scheduled Minerals); and
 - DoEHLG (Department of the Environment, Heritage and Local Government) April 2004: Quarries and Ancillary Activities Guidelines for Planning Authorities.

Specific Mitigation Measures

- 16.11 **Table 16-1** below sets out the specific mitigation measures that are proposed to be implemented through the proposed development.

¹ to be updated by the Safety Health and Welfare at Work (Quarries) Regulations 2025 coming into effect on 1st January 2026

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Table 16-1: Schedule of Site-Specific Mitigation Measures to be Implemented

Mitigation Measure Proposed		Timeframe
General	<p>BD Flood is committed to achieving high environmental standards and has an established in-house environmental management system (EMS) at their existing site operations.</p> <p>If planning permission is granted for the proposed development, then the EMS will be extended to the proposed site. The EMS is provided in Chapter 2: Appendix 2-A.</p>	Throughout all activities of the applicant
Population and Human Health - General	The main potential for disturbance to the local population and human health is through the potential for environmental emissions associated with the topic areas that are assessed within other chapters of the EIA; therefore, the mitigation measures proposed in relation to those are considered appropriate to address population and human health issues.	Throughout development
Biodiversity – Protection of Species and Habitats	<p>Mitigation measures in relation to water, noise and air quality (identified under those headings below) will protect the biodiversity and integrity of the nearby and downstream ecological receptors. In addition:</p> <ul style="list-style-type: none"> • extraction of the Site will be carried out on a phased basis with 4 phases ranging from 1.6 – 3.5 ha. Extraction operations within a particular phase will only be carried out when extraction in the previous phase has been completed; therefore, minimising the loss of foraging habitat for whooper swans at any time; • phased restoration to naturally regenerated habitat for biodiversity use, including a permanent water body. Therefore, in the long-term, the proposed development will increase the value of the Site for whooper swan, other waterbirds, and a variety of passerine bird species; • a 20m riparian corridor will be maintained between the proposed development and the Yellow River regardless of any other presence. This will minimise disturbance to this species throughout the duration of the project. • a pre-commencement otter survey is recommended to establish otter presence or absence within the Site, if the construction works do not commence within 18-months of the initial survey (survey undertaken on 5th February 2025). 	Prior to commencement
Biodiversity - Hedgerows	On commencement of the development, native hedge planting will be carried out along the western and southern boundary of the application area, to increase the screening by vegetation in views from locations to the west and south and to provide habitat corridor connections around the site.	On commencement

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Mitigation Measure Proposed	Timeframe
<p>Biodiversity – Enhancement</p> <p>As part of the final restoration works, it is proposed to carry out tree planting within the 20m wide riparian corridor between the eastern screening berm and the Yellow River, to encourage biodiversity between the application site and the adjacent river.</p> <p>The creation of a permanent waterbody and peripheral wild scrub areas to provide high value, native habitat for faunal species. It is anticipated that the restored site will contain a variety of habitats and plant species, making it considerably more diverse than the existing monoculture type grassland currently present.</p>	<p>On restoration</p>
<p>Land, Soils and Geology – Soil Management</p> <p>A specific Soil Management Plan will be developed for the site for the stripping, storage and reuse of the soils in restoration and peripheral landscaping at the site.</p>	<p>Prior to commencement</p>
<p>Soils will be managed on site in line with best practice measures identified in The Institute of Quarrying Good Practice Guide for Handling Soils in Mineral Workings, 2021. In order to limit the effects of erosion and deterioration on the soil, material will not be removed during either periods of prolonged dry weather or excessively wet weather; this is to avoid the higher potential for dust generation during extended periods of dry weather, and conversely the greater potential for soil erosion during extended periods of wet weather. The soil handling method can affect the quality of the restoration through severe soil deformation (compression and smearing); this is primarily caused through trafficking, the effects of which increase with soil moisture content. The scheme will involve progressive soil stripping across the proposed extraction area. The soil stripping and storage operations will be undertaken in such a manner so as to minimise soil compaction. The Soil Management Plan will cover the following focus areas:</p> <ul style="list-style-type: none"> • Soil Resource Conservation • Soil and Subsoil Management • Soil Handling during Adverse Weather Conditions • Minimising Erosion and Runoff • Soil Replacement and Site Restoration • Biodiversity and Ecological Protection • Monitoring and Adaptive Management 	<p>Throughout the development</p>
<p>Land, Soils and Geology – Stockpile Management</p> <p>Clay material stripped will be stored in perimeter berms that do not exceed 3m in height in order to protect the structure of the soils.</p>	<p>Throughout the development</p>

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Mitigation Measure Proposed	Timeframe
<p>Stripped soils will be re-vegetated where they are in place for a sufficient length of time to justify such a measure. The re-handling of soil material will be minimised as much as possible in order to preserve the integrity of the topsoil material. This is also an economically prudent practice.</p>	
<p>Land, Soils and Geology – Land Stability</p> <p>The design of the extraction area has provided suitable set-back distances to adjoining land boundaries to ensure long term stability.</p> <p>Operations at the proposed development site will comply with the Health and Safety Authority Safe Quarry Guidelines in relation to the Safety Health and Welfare at Work (Quarries) Regulations 2008 to ensure stability of the adjoining lands.</p>	<p>Throughout the development</p>
<p>Hydrology and Hydrogeology – Protection of Water Quality</p> <p>In order to mitigate against the risk of pollution to groundwater and surface water occurring at the site the following standard management mitigation measures will be implemented:</p> <ul style="list-style-type: none"> • There will be no surface water run-off or overground flow across the site; • There will be no off-site discharge from the proposed development to any surface watercourse; • During any fuelling or servicing of plant and equipment at the site a spill kit and drip trays will be available in the event of any accidental spills or leakages; • No fuel and oils will be stored at the site. Any fuels, oils and lubricants will be brought to the site in a double skinned bowser, in the case of fuel, and / or a drip tray, in the case of oils and lubricants; • A number of spill kits will be available on-site in the event of any accidental leakages or spillages, should they arise; • In order to control dust emissions, water will be sprayed from a tractor drawn bowser on dry exposed surfaces and stockpiles as required; • Areas of bare or exposed soils will, insofar as practicable, be kept to a minimum during the extraction operations; • All HGVs exiting the site will be routed through a bath type wheel wash; • a road sweeper will be used to maintain entrances and any emergency spillages on public roads; • The BD Flood environmental team undertake quarterly environmental audits at the site to ensure that compliance with all planning consents, licences and site environmental management system, which is accredited to ISO14001 standard, is both maintained and enhanced. 	<p>Throughout the development</p>
<p>Air Quality – Dust Management</p> <p>Site preparation / restoration</p> <ul style="list-style-type: none"> • Small, discrete working areas with progressive stripping / restoration; 	<p>Throughout the development</p>

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Mitigation Measure Proposed	Timeframe
<ul style="list-style-type: none"> • Construction of perimeter screening berms using stripped soils / overburden; • Screening berms vegetated as soon as practicable and maintained as part of the restoration scheme; • 135,000t of soil / overburden across the application site (smaller areas phased across the operational period); • Stockpiles of soil / overburden – moderate to high dust potential during short term unvegetated period; • Tractor and water bowser for use during dry / windy weather conditions. <p>Internal haulage</p> <ul style="list-style-type: none"> • Haulage requirements limited to short distances from working area / mobile plant area / graded stockpiling area adjacent to the mobile plant area • Low no. plant required (, 1x HGV for transport) • Tractor and bowser for use during dry / windy weather conditions • Unconsolidated haulage routes are greater than 150m from the nearest receptor <p>Excavation</p> <ul style="list-style-type: none"> • Majority of excavation undertaken below the natural lay of the land, acting as a natural barrier; • Low energy extraction methods – mechanical excavator; • Small working area (<5ha); • Excavated material of low dust potential (excavated below water table, high moisture content); • Tractor and water bowser for use during dry / windy weather conditions; • Maximum extraction rate of 100,000 tpa. <p>Material handling</p> <ul style="list-style-type: none"> • Low no. heavy plant in daily operation (1 x Long Reach Excavator, 1x Loading Shovel, 1x HGV for transport, 1x Mobile Screening Plant); • Unconsolidated surface; • Material of variable dust potential (mineral excavated wet, but allowed to dry out pre- and post-processing); 	

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Mitigation Measure Proposed	Timeframe
<ul style="list-style-type: none"> Materials handled at various points, including stockpiling area, stockpiling area (pre-processed aggregate), plant area (processed aggregate), stockpiling area and loading area (processed aggregate); Tractor and water bowser for use during dry / windy weather conditions. <p>Aggregate Processing</p> <ul style="list-style-type: none"> Raw material of low to moderate dust potential (allowed to dry prior to processing but would have an inherently high moisture content); End material of moderate to high dust potential; Mobile plant (not fixed location) comprising crusher and screener (with water suppression as part of design); Low volume of material processed (100,000 tpa); <p>Aggregate Stockpiling</p> <ul style="list-style-type: none"> Short term stockpiles with frequent material transfers required All stockpiles located within pit working area limits pathway Stockpiles of raw mineral @ working area – low dust potential (high moisture content) Stockpiles of processed mineral – moderate to high dust potential All stockpiles of mineral >180m from offsite receptors 	
<p>Climate Change – Resilience</p> <p>Procedures to facilitate operational shutdown will be implemented where required during extreme weather conditions;</p> <p>Selection, design, operation, and maintenance of plant and equipment will be considered in terms of climate resilience;</p> <p>Insurance for site assets and operations will be obtained.</p>	<p>Throughout the development</p>
<p>Climate Change – Mitigation</p> <p>The Applicant will implement its company-wide Energy and Carbon Policy.</p> <p>Measures that will be considered include use of renewable energy sources / suppliers, use of energy efficient machinery / energy, consider future use of electric plant & machinery where practical, avoidance of unnecessary equipment / transport journeys should be avoided by management of transport and travel demands.</p> <p>Equipment should not be left in unnecessary idling mode.</p>	<p>Throughout the development</p>

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Mitigation Measure Proposed	Timeframe
<p>Training programme for GHG mitigation to be provided for employees/ contractors.</p> <p>Noise – Management Measures</p> <p>General best practice guidance on several aspects of construction site mitigation measures, including, but not limited to will be implemented:</p> <ul style="list-style-type: none"> • Selection of quiet and / or low vibration emitting plant; • Control of noise sources; • Screening; • Hours of work; • Liaison with the public; and • Monitoring. <p>Mechanical Plant</p> <ul style="list-style-type: none"> • All plant items will be properly and regularly maintained and operated according to the manufacturers’ recommendations, in such a manner as to avoid causing excessive noise; • All plant will be fitted with effective exhaust silencers which are maintained in good working order to meet manufacturers’ noise rating levels. Any defective silencers will be replaced immediately. <p>Vehicle Movement within Site Boundary</p> <ul style="list-style-type: none"> • Access / internal haul roads will be kept clean and maintained in a good state of repair, i.e., any potholes are filled, and large bumps removed, to avoid unwanted rattle and “body-slap” from heavy goods vehicles; • Vehicles waiting within the site will be prohibited from leaving their engines running and there will be no unnecessary revving of engines; • Care will be taken when unloading vehicles to reduce or minimise potential noise disturbance to residents 	<p>Throughout the development</p>
<p>Material Assets – Waste</p>	<p>All waste generated at the site will be appropriately stored and removed by licensed contractors</p> <p>Throughout the development</p>
<p>Archaeology and Cultural Heritage – Archaeological Resources</p>	<p>Due to the potential of the survival of previously unknown sub-surface archaeological deposits or finds within the application site and access road, all soil-stripping should be archaeologically monitored under licence from the National Monuments Service.</p> <p>During site preparation</p>

Monitoring Measures

- 16.12 A number of environmental monitoring activities are to be carried out during all stages of the proposed development to confirm the effectiveness of the mitigation measures described above, to establish if there are any trends in environmental parameters and to highlight the need for remedial action if necessary.
- 16.13 Environmental monitoring requirements have been identified in the specific chapters of the EIAR. The frequency of the monitoring requirements identified below have been collated and provided in a schedule displayed in **Table 16-2**. **Figure 16-1** indicates the proposed monitoring locations across the application site. Additional monitoring locations can be provided if deemed necessary by Offaly County Council should planning permission be granted.

Population and Human Health

- 16.14 Monitoring for the protection of population and human health during the proposed development will be carried out in accordance with the wider environmental monitoring programme for the protection of water, air quality and noise.

Biodiversity

- 16.15 A pre-commencement otter survey should be undertaken at the Site if the construction works do not commence within 18-months of the initial survey (survey undertaken on 5th February 2025). This is to ensure that no otter holts or couches have been created between the time of writing and the commencement of the proposed development, as per CIEEM Advice Note on the lifespan of ecological reports and surveys (CIEEM, 2019).

Land, Soils and Geology

- 16.16 BD Flood will clearly define the management responsibility for the site restoration work and will ensure that this person has the necessary information (from the planning application) and authority to manage the whole restoration process. Relevant staff will be briefed on the scheme and will be adequately supervised / controlled. A system of record keeping for the key restoration activities will be put in place.
- 16.17 A final site inspection 6 months after formal site closure will be carried out to confirm the final site restoration as implemented is functioning.

Hydrology and Hydrogeology

- 16.18 The following monitoring activities will be carried out to demonstrate that the development is not having an adverse impact on the surrounding environment and will document any improvements in water quality.
- surface water quality monitoring to be undertaken on a bi-annual basis for the duration of the proposed development, with grab sample from the Yellow River upstream and downstream of the site;
 - groundwater levels in all boreholes will be monitored on a bi-annual basis for the duration of the proposed development; and
 - groundwater quality monitoring to be undertaken on an annual basis for the duration of the proposed development.

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Air Quality

- 16.19 Dust deposition monitoring will be undertaken at the site for the duration of the proposed development in accordance with conditions attached to any future planning permission and in line with the EPA and DoEHLG guidelines).
- 16.20 Dust monitoring will be carried out for the duration of the proposed development on a monthly basis between March and September inclusive using the Bergerhoff Method at 3 no. monitoring locations.

Noise

- 16.21 Noise monitoring will be undertaken at noise sensitive locations around the periphery of the overall landholding site for the duration of the proposed development in accordance with conditions attached to any future planning permission and in line with the EPA and DoEHLG guidelines).
- 16.22 It will be necessary that the operator completes annual compliance noise surveys (twice per year) to establish operational noise emissions from the site. The surveys shall be completed by a Competent Person in accordance with the EPA *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities* (NG4). The surveys shall be completed using a Class 1 Sound Level meter.

Archaeological Monitoring

- 16.23 Due to the possibility of the survival of previously unknown sub-surface archaeological deposits or finds within the newly proposed extension area, all topsoil-stripping in this area should be monitored by a qualified archaeologist under licence from the National Monuments Service.

Landscape

- 16.24 With regard to the hedge planting, establishment maintenance will be carried out for 2 years following the planting works (minimum 3 maintenance visits per year; i.e. spring, summer and autumn). This will include weed control, replacement planting, watering (if required) and the adjustment/removal of tree ties and spiral guards (refer to EIAR **Figures 2-5**). Thereafter, there are no specific landscape monitoring requirements.

Table 16-2 Indicative Schedule of Environmental Monitoring

Activity (Responsibility)	Q1			Q2			Q3			Q4		
	J	F	M	A	M	J	J	A	S	O	N	D
Land, Soils and Geology - Continual monitoring during Restoration (Applicant)												
Monthly Dust Monitoring at 3 locations (Contracted Consultant), supplemented by visual checks												
Bi-annual Groundwater Level in 3 boreholes (Contracted Consultant)												
Bi-annual Groundwater Quality in 3 boreholes (Contracted Consultant)												

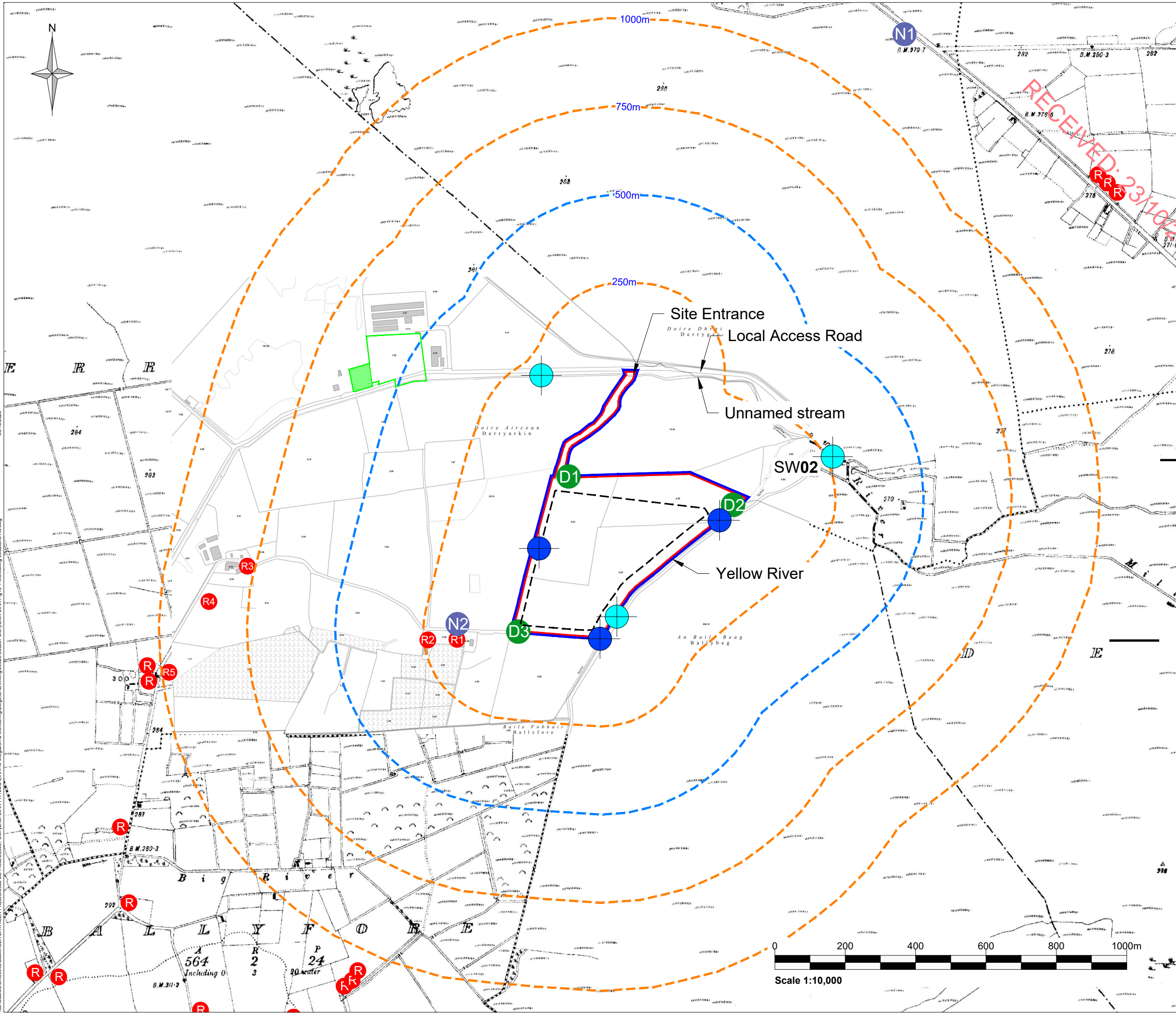
Activity (Responsibility)	Q1			Q2			Q3			Q4		
	J	F	M	A	M	J	J	A	S	O	N	D
Bi-annual Surface Water Quality in 3 stream locations (Contracted Consultant)												
Annual Noise Monitoring at 2 locations (Contracted Consultant)												
Climate Progress – GHG Monitoring Report (Applicant)	<i>In line with wider BD Flood Reporting</i>											
Landscape Maintenance (Contracted Consultant – 2-years following final restoration works)												

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Figures

Figure 16-1: Environmental Monitoring Locations

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Notes:
 Tailte Éireann OSI Mapping 5,000 scale - sheet no.'s 3180 & 3181

- Legend:**
- Applicant Land Interest Boundary
19.5 hectares
 - Proposed Planning Application Area
19.5 hectares
 - Proposed Sand and Gravel Extraction Area
11.7 hectares
 - Distance Off-Sets from Planning Application Boundary (red line)
250m, 500m, 750m and 1km
 - R2 Residential Property Locations
Residences numbered within 1km of Application Boundary
 - D1 Dust Monitoring Locations
 - N1 Noise Monitoring Locations
 - Groundwater Monitoring Well Locations
 - Surface Water Monitoring Locations

Rev	Amendments	Date	By	Chk	Auth



Client
 BD Flood Unlimited Company

Project
 Proposed Sand and Gravel Development at Derryarkin, Co. Offaly

Figure Title
 Proposed Development Environmental Monitoring Locations Map

Scale 1:10,000	@ A3	SLR Project No. 501.00023.065461
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