



Preliminary Construction, Demolition and Waste Management Plan

Mixed Use Development at Clongriffin, Dublin 13
Strategic Housing Development Application No. 1

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1.1 Proposed Development

This report has been prepared by Waterman Moylan as part of the documentation in support of a Strategic Housing Development (SHD) planning application for 9 mixed use blocks in Clongriffin, Dublin 13, with provision made for 1,030 residential apartment units and 2,286m² of commercial floor space.

The subject development is one of three concurrent applications, which together consist of 15 mixed-use residential and commercial blocks, including ancillary infrastructure, with provision made for 1,950 apartment units and 22,728m² of commercial floor space. A breakdown of the schedule of accommodation is shown in Table 1, below:

Application	Block Numbers	Total No. of Residential Units	Ancillary Facilities (m ²)	Commercial Floor Area (m ²)	Total Floor Area (m ²)
Strategic Housing Development: Application No.1	6, 8, 11, 17, 25, 26, 27, 28 and 29	1,030	2,421m ²	2,286m ²	105,944m ²
<i>Strategic Housing Development: Application No.2</i>	<i>4, 5 and 14</i>	<i>500</i>	<i>1,094m²</i>	<i>3,125m²</i>	<i>51,840m²</i>
<i>Dublin City Council Planning Application</i>	<i>3, 13 and 15</i>	<i>420</i>	<i>820m²</i>	<i>17,317m²</i>	<i>65,772m²</i>
Total	15 Blocks	1,950	4,335m²	22,728m²	223,556m²

Table 1 | Schedule of Accommodation by Application

These three concurrent applications form part of a parent planning permission which was previously granted by Dublin City Council as part of the overall Clongriffin residential and commercial development, Reg. Ref. 0132/02, PL29N.131058.

The blocks which form the three concurrent applications are highly interconnected, and as such a holistic approach has been taken in preparing this Preliminary Construction, Demolition and Waste Management Plan.

The Clongriffin site is bounded to the north by the Mayne River, to the east by the Dublin–Belfast railway line, to the west by Fr. Collins Park and to the south by the Grange Road and generally slopes down to the north-east. The accompanying Waterman Moylan drawing 18-059-P1000 shows the site location within the overall Clongriffin Development.

1.2 Background of Report

This document was set up to be a ‘living document’ which would be updated and implemented by the Developer and Main Contractor as the project progresses.

This Preliminary Construction, Demolition and Waste Management Plan sets out typical arrangements and measures which may be undertaken during the construction phase of the project in order to mitigate and minimise disruption/disturbance to the area around the site. The purpose of this report is to summarise the possible impacts and measures to be implemented and to guide the Main Contractor who will be required to develop and implement the Preliminary Construction, Demolition and Waste Management Plan on site during the course of the construction period.

As is normal practice, the Main Contractor for the project is responsible for the method in which the construction works are carried out and to ensure that best practices and all legal obligations including Local Authority requirements and Health and Safety legislation are complied with. The Main Contractor is also responsible for the design and installation of all temporary works required to complete the permanent works. The plan can be used by the Main Contractor to develop their final Construction, Demolition and Waste Management Plan. The Applicant reserves the right to deviate from the contents of this Report as the construction of the development progresses on site. Any such deviation from this report, however, shall still comply with all relevant Local Authority requirements and legislation.

2. The Site and the Surrounding Environs

2.1 Site Description

The subject development consists of 9 mixed-use residential and commercial blocks, with a total of 1,030 apartment units and 2,286m² of commercial space.

The subject site forms part of a parent planning permission which was previously granted by Dublin City Council as part of the overall Clongriffin residential and commercial development, Reg. Ref. 0132/02, PL29N.131058. The Clongriffin Masterplan received planning permission for 3,520 dwellings and c.85,000m² of mixed retail, commercial, leisure and community uses. Subsequent amendments increased the permitted retail, commercial, leisure and community development to c. 100,000m².

The surrounding road network has been constructed under the parent planning application, with base kerbs and gullies in place. The subject site will be served by new infrastructure which will connect to existing services constructed under the parent planning application. The existing infrastructure includes the trunk foul and surface water drainage built within the roads.

Refer to Figure 1, below, indicating the subject blocks located to the eastern side of the Clongriffin Development – refer also to the accompanying Waterman Moylan drawings 18-059-P1100 to P1104, which show the site location within the overall Clongriffin Development.

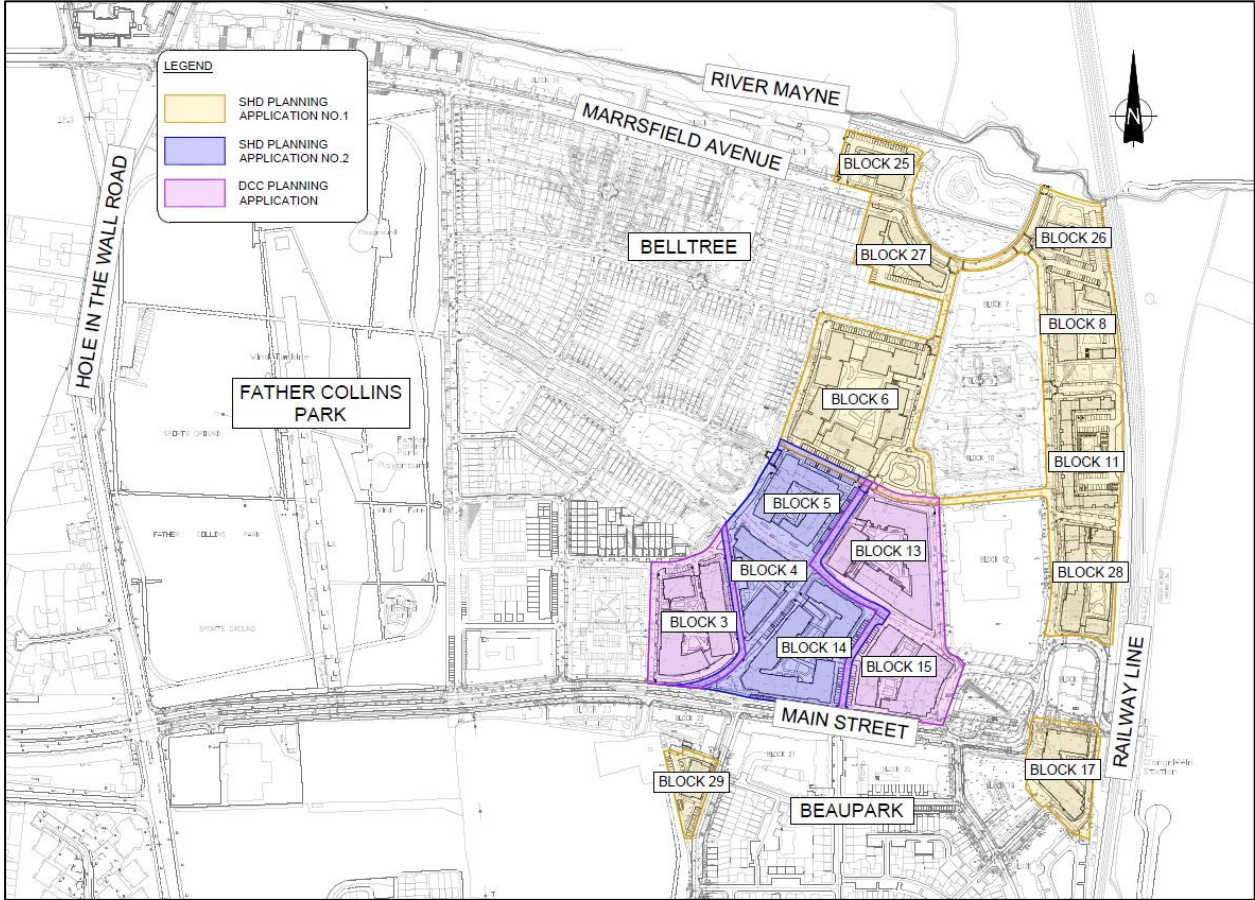


Figure 1 | Subject Development Blocks

2.2 Proposed Development

A schedule of accommodation for each block proposed under each of the three concurrent proposed applications is shown in Table 2, below:

Application	Block Numbers	Total No. of Residential Units	Ancillary Facilities (m ²)	Commercial Floor Area (m ²)	Total Floor Area (m ²)
Strategic Housing Development: Application No.1	Block 6	270	795	418	25,470
	Block 8	114	252	0	11,983
	Block 11	96	15	0	9,316
	Block 17	210	590	431	22,789
	Block 25	63	159	0	5,898
	Block 26	78	326	0	7,396
	Block 27	57	175	508	6,695
	Block 28	122	109	929	14,348
	Block 29	20	0	0	2,049
	Subtotal	1,030	2,421	2,286	105,944
Strategic Housing Development: Application No.2	Block 4	74	205	799	10,438
	Block 5	138	144	393	14,942
	Block 14	288	745	1,933	26,460
	Subtotal	500	1,094	3,125	51,840
Dublin City Council Planning Application	Block 3	141	147	4,523	20,285
	Block 13	187	540	6,108	27,751
	Block 15	92	133	6,686	17,736
	Subtotal	420	820	17,317	65,772
Total	15 Blocks	1,950	4,335	22,728	223,556

Table 2 | Schedule of Accommodation by Block

The development includes all associated site works and infrastructure which includes landscaped verges, footpaths, public lighting, utilities, private drainage and watermains.

The proposed development is to be constructed in three phases, as indicated in Figure 2, below. It is anticipated that construction of Phase 1 will commence shortly after receipt of planning approval. The estimated programme for the development shall therefore commence in 2020, with completion of all phases expected by 2025.

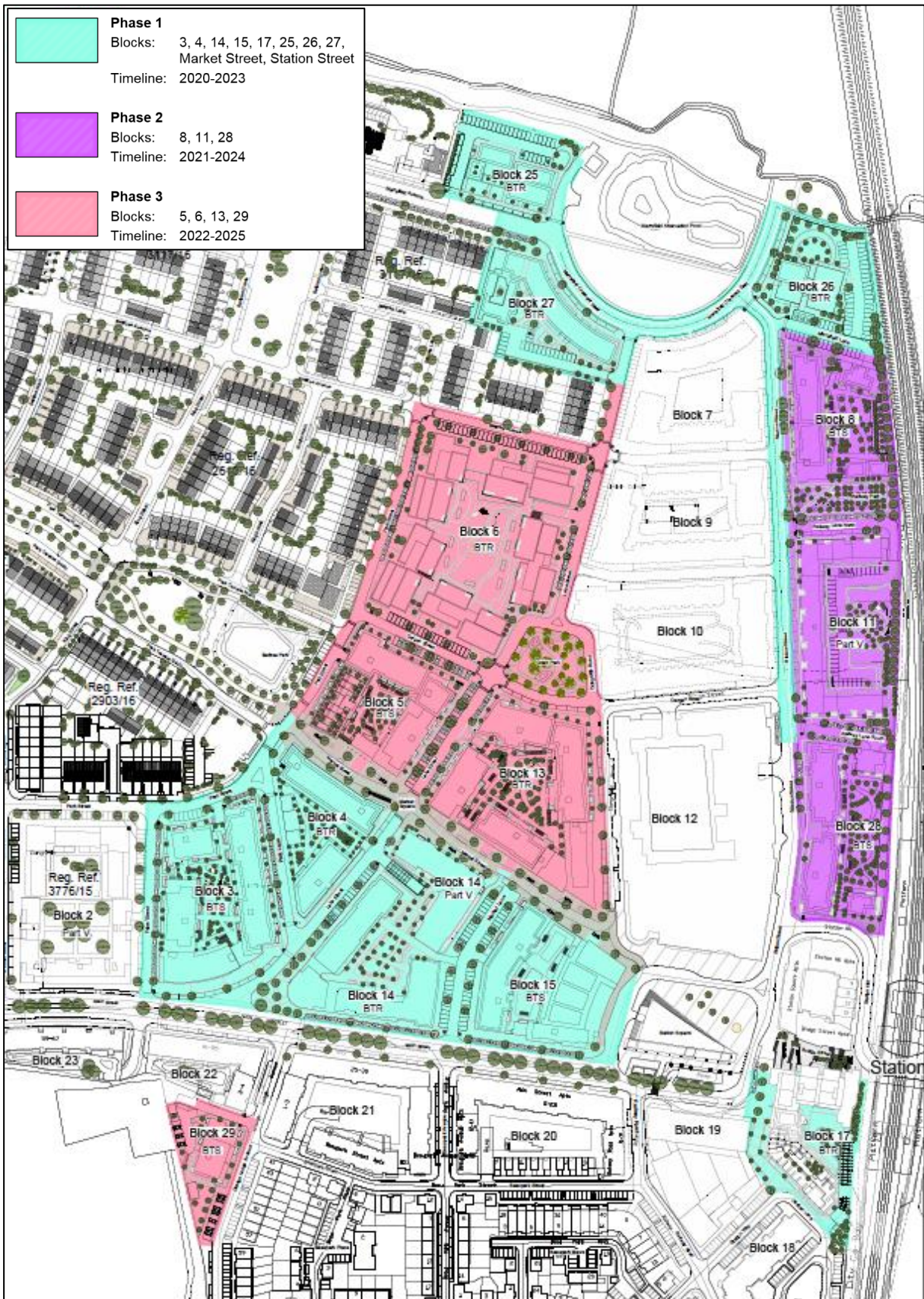


Figure 2 | Indicative Phasing Plan

3. General Site Set-Up and Pre-Commencement Measures

The following measures will be carried out by the Main Contractor:

- A general condition survey of the roads and infrastructure in the area prior to any work being carried out on the site.
- A site compound including offices and welfare facilities will be set up by the Main Contractor.
- Prior to any site works commencing, the Main Contractor will investigate/identify the exact location of and tag all existing services and utilities around and through the site with the assistance of the relevant DCC technical divisions and utility companies.
- Subject to confirmation by the Planning Authority, typical working hours for the site would be 07:00 to 18:30 Monday to Friday and 08:00 to 14:00 Saturday. No Sunday work is generally permitted. Special construction operations may need to be carried out outside these hours in order to minimise disruption to the surrounding area, which will be subject to agreement with the Planning Authority.
- Hoarding lines and site security will be set up within the development site as required.
- Hoarding and security fencing will be required at access to the public road network.
- Fencing will be set up in order to keep construction activity separated from the existing bodies of water.
- Access gates will be provided at all site and compound access points. The main construction access will be from a site entrance located along Marrsfield Avenue for Blocks 25, 26 and 27, along Lake Street for Block 6, at the east end of Dargan Street for Blocks 8, 11 and 28, from Grange Lodge Avenue for Block 29 and from Main Street for Block 17. A detailed traffic management plan will be prepared and implemented by the Main Contractor and agreed with the Local Authority prior to commencing works.

4. Construction and Demolition Waste Management

This Preliminary Construction, Demolition and Waste Management guideline will be incorporated into the requirements for the Main Contractor and the Plan will be developed by the Main Contractor as the construction progresses.

There are no existing buildings/structures present on the site, and as such an asbestos survey will not be necessary in this instance. In the event that contaminated soil is encountered, this soil will be removed by an appropriately accredited contractor and disposed of at an appropriately accredited facility.

4.1 Policy and Legislation

The principles and objectives to deliver sustainable waste management for this project have been incorporated in the preparation of this report and are based on the following strategic objectives:

- National Policy: The Waste Management Acts 1996 to 2005
- Local Policy: Waste Management Plan for the Dublin Region 2005 – 2010, November 2005.

This Waste Management Plan is also in accordance with the following guidance note published by the Department of the Environment, Heritage and Local Government in July 2006:

- Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition (C&D) Projects.

The hierarchy of waste management sets out the guiding principles in order of importance as follows:

1. Reduction of the amount of waste generated by the construction process.
2. Segregation of waste is a key concept that will be implemented during the course of the construction phase of the development to enable ease in re-use and recycling, wherever appropriate.
3. Recycle waste material where feasible, including the use of excess excavations as fill material, recycling of various waste fractions such as metals and packaging etc.

4.2 Typical Construction Waste

Typical construction waste which will be generated by the development is as follows:

- General site clearance waste including tree stumps etc.
- Some of the excavated material will require to be disposed of in a licensed landfill site due to slightly elevated levels of contamination identified in the site investigation.
- Surface water runoff.
- Packaging and waste construction materials generated during the course of the construction activities.

4.3 On-Site Construction Waste Management

It is estimated that all cut and fill operations and any other excavation will be balanced in terms of quantities. Therefore, it is envisaged that no significant amounts of excavated materials shall be disposed of off-site.

All waste masonry will be stored and crushed on site and used for site haul roads in later stages of the project.

Skips will be provided for the disposal of wood from the site. It is envisaged that the majority of the wood for disposal will come from pallets used for the transport of construction materials.

Other non-hazardous waste generated by the site (packaging and running of site offices) will be collected in separate roll-on skips.

Any hazardous material encountered will be disposed of to a suitably licence tip.

The Purchasing Manager shall ensure that materials are ordered so that the quantity delivered, the timing of the delivery and the storage is not conducive to the creation of unnecessary waste.

C & D Waste Material	Quantity (tonnes)
Clay and stones	<i>Minimal quantities anticipated. All arisings will be used as fill and landscaping on the site.</i>
Concrete	<i>Minimal quantities anticipated. Arisings will be used as crushed and used as site haul roads (a concrete crushing permit will be required if crushing is to occur).</i>
Masonry	<i>Minimal quantities anticipated. All arisings will be crushed and used as site haul roads.</i>
Wood	<i>To be Completed by C&D Waste Manager</i>
Packaging & Other Waste Materials	<i>To be Completed by C&D Waste Manager</i>
Hazardous Materials	<i>To be advised by pre-commencement survey</i>
Total Arisings Off Site	<i>To be Completed by C&D Waste Manager</i>

Table 3 | Estimated C&D Waste Arisings on Site

4.4 Off-Site Waste Management Licensing/Permitting

All waste materials (where necessary, after in-situ reuse and recycling options have been fully considered) shall be disposed of off-site, under the appropriate Duty of Care and subject to approvals/consents from the relevant statutory bodies. It is the responsibility of the Main Contractor to ensure that any company to whom waste is transferred is legally permitted to do so and that the facility they bring the waste to is licensed to handle that type of waste as outlined in the Waste Management Acts 1996-2005. The Waste Collection Permit Register, in accordance with the Waste Management (Collection Permit) Regulations 2001 will be consulted to ensure that waste carriers hold the appropriate permit.

The relevant waste collection permits and waste licences shall be provided by the Main Contractor and shall be amended to this report.

An inspection of the site shall be made by the Main Contractor for hazardous substances, gas cylinders and the like. If such substances are encountered during the course of construction, then works must be halted. The project supervisor for construction stage (PSCS) and the responsible Statutory Authority shall be informed immediately.

The Main Contractor shall prepare a detailed inventory of construction based hazardous waste generated, such as tars, adhesives, sealants and other dangerous substances, and these will be kept segregated from other non-hazardous waste to prevent possible contamination. Arrangements shall be made for such substances for disposal in a safe manner to an authorized disposal site or by means acceptable to the relevant Authority.

The Main Contractor will ensure that the excavation works are carried out in accordance with best standard practice and excavation materials are well segregated to minimize any potential cross-contamination.

The Main Contractor shall carry out appropriate environmental chemistry testing in order to determine the waste classification of the soils that are to be excavated and that shall include Waste Acceptance Criteria testing. The test regime shall be agreed with the receiving landfill operator and the testing shall be carried out by an accredited laboratory.

Should excavation materials be assessed to be hazardous, the Main Contractor shall carry out pre-treatment of the waste soils to a methodology that is agreed with the receiving landfill operator and in accordance with Environmental Protection Agency guidance.

The Main Contractor is encouraged to reuse and recycle any waste materials as far as is reasonably practicable.

In respect of any liquid disposal including underground water, the Main Contractor shall carry out appropriate environmental chemistry testing in order to determine whether the liquid is contaminated or not. The test regime shall be agreed with the receiving disposal facility and the testing shall be carried out by an accredited laboratory.

The Main Contractor shall manage and carry out the works in accordance with best environmental practice and in accordance with the requirements of Local Authority, EPA and all requirements as specified in this document.

4.5 Appointment of C&D Waste Manager

The Main Contractor shall appoint a C&D Waste Manager. The C&D Waste Manager will have overall responsibility for the implementation of the project Waste Management Plan (WMP) during the construction phase.

Copies of the Waste Management Plan will be made available to all relevant personnel on site. All site personnel and sub-contractors will be instructed about the objectives of the Waste Management Plan and informed of the responsibilities which fall upon them as a consequence of its provisions. Where source segregation, selective demolition and material reuse techniques apply, each member of staff will be given instructions on how to comply with the Waste Management Plan. Posters will be designed to reinforce the key messages within the Waste Management Plan and will be displayed prominently for the benefit of site staff.

4.6 C&D Record Keeping

It is the duty of the C&D Waste Manager to ensure that necessary licenses have been obtained as needed. Each consignment of C&D waste taken from the site will be subject to documentation which will conform with Table 4 along with Transportation Dockets to ensure full traceability of the material to its final destination.

Detail	Particulars
Project of Origin	<i>Clongriffin, Dublin 13</i>
Material being Transported	<i>Soil, Construction waste</i>
Quantity of Material	<i>To be completed by C&D Waste Manager</i>
Date of Material Movement	<i>To be completed by C&D Waste Manager</i>
Name of Carrier	<i>To be completed by C&D Waste Manager</i>
Destination of Material	<i>To be completed by C&D Waste Manager</i>
Proposed Use	<i>To be completed by C&D Waste Manager</i>

Table 4 | Details of materials taken from site

4.7 Topsoil

In the case of topsoil careful planning and on-site storage can ensure that this resource is reused on-site as much as possible. Any surplus of soil not reused on site can be sold. However, topsoil is quite sensitive and can be rendered useless if not stored and cared for properly.

- It is important that topsoil is kept completely separate from all other construction waste as any cross-contamination of the topsoil can render it useless for reuse.
- It is important to ensure that topsoil is protected from all kinds of vehicle damage and kept away from site-track, delivery vehicle turning areas and site plant and vehicle storage areas.

If topsoil is stored in piles of greater than two metres in height the soil matrix (internal structure) can be damaged beyond repair. It should also be kept as dry as possible and used as soon as possible to reduce any deterioration through lengthy storage and excess moving around the site.

Records of topsoil storage, movements and transfer from site will be kept by the C&D Waste Manager.

4.8 Earthworks – Cut and Fill Policy

As the main roads and trunk drainage has already been constructed around each of the subject work, there will be minimum earthworks generated by the civil engineers works.

Earthworks for the structure foundations form the major part of the quantity of waste that will be generated by the construction phase of this project. In order to optimise the impact of the generation of surplus material due to excavation the following principles shall be considered during the detail design and construction phase:

- The quantity of excavated materials to be removed from or imported into the site has been reduced by establishing finished floor levels of the proposed buildings at grade.
- Unsuitable sub-soils generated by excavations on site will be reviewed for reuse as landscaping or non-engineering fills on adjoining or other construction sites within the region.
- Careful separation of builder's rubble packaging and contaminated waste from re-usable material will result in the minimisation of the disposal of material to landfill.

It is proposed to pile each Block within Clongriffin. A table has been produced below showing the estimated topsoil (generally 300mm) and subsoil generated from each Block. The estimate is based on a ground bearing slab of 650mm thick (225mm slab on top of 150mm insulation on 50mm T3 blinding on top of 225mm T2 Perm stone) multiplied by the area of each Block. In addition to this we estimate piling caps at 7m x 7m grids which will generate a further 2.2m x 2.2m x 1.050 deep excavations below the ground bearing slab (allowing for under-slab drainage).

Application	Block Numbers	Block Area (m ²)	Top Soil Excavated (m ³)	Subsoil Excavated (m ³)
Strategic Housing Development: Application No.1	Block 6	8,177	2,453	3,710
	Block 8	3,474	1,042	1,576
	Block 11	1,754	526	796
	Block 17	3,012	904	6,191*
	Block 25	1,020	306	463
	Block 26	803	241	364
	Block 27	1,702	511	772
	Block 28	4,443	1,333	2,016
	Block 29	586	176	266
	Subtotal	24,971	7,492	16,154
Strategic Housing Development: Application No.2	Block 4	3,040	912	1,379
	Block 5	3,759	1,128	1,706
	Block 14	6,734	2,020	16,523*
	Subtotal	13,533	4,060	19,608
Planning Application to Dublin City Council	Block 3	5,183	1,555	2,352
	Block 13	6,732	2,020	3,054
	Block 15	4,711	1,413	2,137
	Subtotal	16,626	4,988	7,543
Total	15 Blocks	55,130	16,540	43,305

* Includes basement car park

Table 3 | Excavated Material Generated

The total topsoil generated is 16,540m³ and the total sub soil generated is 43,305m³.

5. Deliveries

It is intended that deliveries to the construction site will typically be made to one main access, depending on the Block, with access points outlined in Section 3.

Materials should be ordered and delivered to site on an “as needed” basis in order to prevent over supply to site. Deliveries will be managed upon arrival to the site and systems should be provided in order to avoid any queuing of delivery vehicles.

The proposed development is to be constructed in three phases, as indicated in Figure 2. It is anticipated that construction of Phase 1 will commence shortly after receipt of planning approval. The estimated programme for the development shall therefore commence in 2020, with completion of all phases expected by 2025.

A number of the construction traffic movements will be undertaken by heavy goods vehicles, though there will also be vehicle movements associated with the appointed contractors and their staff.

An estimate of the day to day traffic movements associated with the construction activities, based on experience of similar sites and the phasing plan, considered that the number of constructions related heavy goods vehicle movements to and from the application site will be approximately 20 arrivals and departures per day.

It is noted that the proposed development consists of the completion of 15 No. infill blocks to be constructed over a 6 year period.

On the basis that the construction period is 18 months, typically 4 No. blocks could be under construction at the same time.

There are no main infrastructure works to be undertaken as part of the proposed development, with all trunk foul, surface water and water network in place, together with road construction partially completed generally, with surface courses to be added. All site clearance is complete with minimal cut/fill requirements.

Each block is expected to generate 4-6 HGV movements per day.

Similarly, the general workforce with typical average of 50-80 in number per block, which equates to 200-320 employees and with an allowance for shared journeys could equate to a maximum of around 100-160 arrivals and departures per day by private car.

This number of construction vehicle movements is low compared to the number of trips expected to be generated by the proposed development during the operational phase. It should be noted that the majority of such vehicle movements would be undertaken outside of the traditional peak hours, and it is not considered that this level of traffic would result in any operational problems.

It is estimated that 75% of construction traffic will come from M50 / Malahide and 25% from city centre / Baldoyle direction. Delivery trucks will be instructed to access the various Blocks via Marrsfield Avenue and not Main Street.

Care will be taken to ensure existing pedestrian and cycling routes are suitably maintained or appropriately diverted as necessary during the construction period, and temporary car parking is provided within the site for contractor's vehicles. It is likely that construction will have a negligible impact on pedestrian and cycle infrastructure.

It is proposed that a Construction Management Plan (CMP) would be prepared by the appointed contractor in order to minimise the potential impact of the construction phase of the proposed development on the safety and amenity of other users of the public road. The CMP will consider the following aspects:

- Minimise the volume of material removed from site by optimising the cut to fill requirements within the site;
- Segregation of waste material produced during the construction process to minimise the contamination or reusable fill material resulting from excavation on the site;
- Wheel wash to be provided for vehicles leaving the site when earthworks are being carried out during winter periods;
- Ensure that deliveries to the site and removal of spoil material from this site are restricted to off peak periods where possible and practicable.
- Optimise routes to be used by heavy vehicles and detail construction traffic forecast;
- Determine the working hours of the site;
- Facilities for loading and unloading and;
- Facilities to parking cars and other vehicles.

6. Parking and Storage

Parking will be provided on site. No on-street parking or parking in the local residential areas will be permitted.

For each block, the Main Contractor will be required to schedule delivery of materials strictly on a daily basis. As there are adequate storage facilities available on site it is not envisaged that there will be any necessity to provide a secure materials staging compound remote from the site, in which to temporarily store materials from suppliers, until such time as these can be accommodated on site.

7. Dust and Dirt Control

Nuisance dust emissions from construction activities are a common and well recognised problem. Fine particles from these sources are recognised as a potential significant cause of pollution.

The Main Contractor will be required to demonstrate that both nuisance dust and fine particle emissions from the site are adequately controlled and are within acceptable limits.

Dust and fine particle generation from construction and demolition activities on the site can be substantially reduced through carefully selected mitigation techniques and effective management. Once particles are airborne it is very difficult to prevent them from dispersing into the surrounding area. The most effective technique is to control dust at source and prevent it from becoming air borne, since suppression is virtually impossible once it has become air borne.

7.1 Mitigation Measures

The following are techniques and methods which are widely used currently throughout the construction industry to control dust and dirt emitting from the site, and which may be used at the Clongriffin development.

1. The roads around the site are all surfaced and no dust is anticipated arising from unsealed surfaces.
2. A regime of 'wet' road sweeping can be set up to ensure the roads around the immediate site are as clean and free from dirt / dust arising from the site, as is reasonably practicable. This cleaning will be carried out by approved mechanical sweepers.
3. Footpaths immediately around the site can be cleaned by hand regularly, with damping as necessary.
4. High level walkways and surfaces such as scaffolding can be cleaned regularly using safe 'wet' methods, as opposed to dry methods.
5. Vehicle waiting areas or hard standings can be regularly inspected and kept clean by brushing or vacuum sweeping and will be regularly sprayed to keep moist, if necessary.
6. Vehicle and wheel washing facilities can be provided at site exit(s) where practicable. If necessary vehicles can be washed down before exiting the site.
7. Netting can be provided to enclose scaffolding in order to mitigate escape of air borne dust from the existing and new buildings.
8. Vehicles and equipment shall not emit black smoke from exhaust system, except during ignition at start up.
9. Engines and exhaust systems should be maintained so that exhaust emissions do not breach stationary emission limits set for the vehicle / equipment type and mode of operation.
10. Servicing of vehicles and plant should be carried out regularly, rather than just following breakdowns.
11. Internal combustion plant should not be left running unnecessarily.
12. Where possible fixed plant such as generators should be located away from residential areas.
13. The number of handling operations for materials will be kept to a minimum in order to ensure that dusty material is not moved or handled unnecessarily.

14. The transport of dusty materials and aggregates should be carried out using covered / sheeted lorries.
15. Material handling areas should be clean, tidy and free from dust.
16. Vehicle loading should be dampened down and drop heights for material to be kept to a minimum.
17. Drop heights for chutes / skips should be kept to a minimum.
18. Dust dispersal over the site boundary should be minimised using static sprinklers or other watering methods as necessary.
19. Stockpiles of materials should be kept to a minimum and if necessary, they should be kept away from sensitive receptors such as residential areas etc.
20. Stockpiles where necessary, should be sheeted or watered down.
21. Methods and equipment should be in place for immediate clean-up of spillages of dusty material.
22. No burning of materials will be permitted on site.
23. Earthworks excavations should be kept damp where necessary and where reasonably practicable.
24. Cutting on site should be avoided where possible by using pre-fabrication methods.
25. Equipment and techniques for cutting / grinding / drilling / sawing / sanding etc., which minimise dust emissions and which have the best available dust suppression measures, should be employed.
26. Where scabbling is to be employed, tools should be fitted with dust bags, residual dust should be vacuumed up rather than swept away, and areas to be scabbled should be screened off.
27. Wet processes should be used to clean building facades if possible. If dry grit blasting is unavoidable then ensure areas of work are sealed off and dust extraction systems used.
28. Where possible pre-mixed plasters and masonry compounds should be used to minimise dust arising from on-site mixing.
29. Prior to commencement, the Main Contractor should identify the construction operations which are likely to generate dust and to draw up action plans to minimise emissions. Furthermore, the Main Contractor should prepare environmental risk assessments for all dust generating processes, which are envisaged.
30. The Main Contractor should allocate suitably qualified personnel to be responsible for ensuring the generation of dust is minimised and effectively controlled.

8. Water

Following completion of any required initial dewatering of excavations for the drainage pipes, water supply, utilities and foundations, it is expected that flows of water into the excavation will be relatively small. These flows will be managed by sump pumping on an as-required basis.

During any discharge of surface water from the excavations, the quality of the water will be regularly monitored visually for hydrocarbon sheen and suspended solids. Periodic laboratory testing of discharge water samples will be carried out in accordance with the requirements of the discharge licence obtained from the Local Authority.

9. Noise Assessment and Control Measures

9.1 Air Quality Monitoring and Noise Control Unit's Good Practice Guide for Construction and Demolition

Prior to the commencement of work on the site a construction and demolition plan must be developed. When developing the construction and demolition plan reference must be made to the requirements of the Air Quality Monitoring and Noise Control Unit's Good Practice Guide for Construction and Demolition.

This Guide has been produced with reference to the London Good Practice Guide: Noise and Vibration Control for Demolition and Construction produced by the London Authorities Noise Action Forum, July 2016.

9.2 Environmental Noise Mitigation Measures

General Considerations:

1. All site staff shall be briefed on noise mitigation measures and the application of best practicable means to be employed to control noise.
2. Site hoarding should be erected to maximise the reduction in noise levels.
3. The contact details of the Main Contractor and site manager shall be displayed to the public, together with the permitted operating hours, including any special permissions given for out of hours work.
4. In the event that the Main Contractor gets a complaint about noise from a neighbour he will act immediately to remedy the situation.
5. The site entrance shall be located to minimise disturbance to noise sensitive receptors.
6. Internal haul routes shall be maintained, and steep gradients shall be avoided.
7. Material and plant loading and unloading shall only take place during normal working hours unless the requirement for extended hours is for traffic management (i.e. road closure) or health and reasons(application must be made to local council a minimum of 4 days prior to proposed works).
8. Use rubber linings in chutes, dumpers and hoppers to reduce impact noise.
9. Minimise opening and shutting of gates through good coordination of deliveries and vehicle movements.

Plant:

1. Ensure that each item of plant and equipment complies with the noise limits quoted in the relevant European Commission Directive 2000/14/EC.
2. Fit all plant and equipment with appropriate mufflers or silencers of the type recommended by the manufacturer.
3. Use all plant and equipment only for the tasks for which it has been designed.
4. Shut down all plant and equipment in intermittent use in the intervening periods between work or throttle down to a minimum.
5. Power all plant by mains electricity where possible rather than generators.
6. Maximise screening from existing features or structures and employ the use of partial or full enclosures for fixed plant.

7. Locate movable plant away from noise sensitive receptors where possible
8. All plant operators to be qualified in their specific piece of plant.
9. Compressors and generators will be sited in areas least likely to give rise to nuisance where practicable.

Vehicle activity:

1. Ensure all vehicle movement (on site) occur within normal working hours. (other than where extension of work requiring such movements has been granted in cases of required road closures or for health and safety reasons).
2. Plan deliveries and vehicle movements so that vehicles are not waiting or queuing on the public highway, if unavoidable engines should be turned off.
3. Plan the site layout to ensure that reversing is kept to a minimum.
4. Where reversing is required use broadband reverse sirens or where it is safe to do so disengage all sirens and use banks-men.
5. Rubber/neoprene or similar non-metal lining material matting to line the inside of material transportation vehicles to avoid first drop high noise levels.
6. Wheel washing of vehicles prior to exiting the site shall take place to ensure that adjoining roads are kept clean of dirt and debris. Regular washing of adjoining streets should also take place as required by road sweepers.

Demolition Phase: (There are no demolition works anticipated on this development)

1. Employ the use of acoustic screening; this can include planning the demolition sequence to utilise screening afforded by buildings to be demolished.
2. If working out of hours for Health and Safety reasons (following approval by council) limit demolition activities to low level noise activity (unless absolutely unavoidable).
3. Use low impact demolition methods such as non-percussive plant where practicable.
4. Use rotary drills and 'burstors' activated by hydraulic or electrical power or chemically based expansion compounds to facilitate fragmentation and excavation of hard material.
5. Avoid the transfer of noise and vibration from demolition activities to adjoining occupied buildings through cutting any vibration transmission path or by structural separation of buildings.
6. Consider the removal of larger sections by lifting them out and breaking them down either in an area away from sensitive receptors or off site.

Ground Works and Piling Phase:

1. The following hierarchy of groundwork/piling methods should be used if ground conditions, design and safety allows;
 - Pressed in methods, e.g., hydraulic jacking
 - Auger/bored piling
 - Diaphragm walling
 - Vibratory piling or vibro-replacement
 - Driven Piling or dynamic consolidation
2. The location and layout of the piling plant should be designed to minimise potential noise impact of generators and motors.

3. Where impact piling is the only option utilise a non-metallic dolly between the hammer and driving helmet or enclose the hammer and helmet with an acoustic shroud.
4. Consider concrete pour sizes and pump locations. Plan the start of concrete pours as early as possible to avoid overruns.
5. Where obstructions are encountered, work should be stopped, and a review undertaken to ensure that work methods that minimise noise are used.
6. When using an auger piling rig do not dislodge material from the auger by rotating it back and forth. Use alternate methods where safe to do so.
7. Prepare pile caps using methods which minimise the use of breakers, e.g., use hydraulic splitters to crack the top of the pile.

Monitoring:

1. Carry out regular on site observation monitoring and checks/audits to ensure that BPM is being used at all times. Such checks shall include;
 - Hours of work
 - Presence of mitigation measures
 - Number and type of plant
 - Construction methods
2. In the event that the Main Contractor gets a complaint about noise from a neighbour he will act immediately to remedy the situation.
3. A sound level digital meter will be employed as necessary to monitor noise, with results recorded to inform the contractor of noise level.
4. Site reviews must be recorded and made available for inspection.
5. Appraise and review working methods, processes and procedures on a regular basis to ensure continuous development of BPM.

Communication and Liaison:

1. A Community Liaison Plan should be developed by the developer in consultation with local residents/businesses and a single point of contact nominated to engage with Dublin City Council and the residents/businesses and to handle complaints and communication of site information.
2. All site staff should be briefed on the complaints procedure and mitigation requirements and their responsibilities to register and escalate complaints received.

9.3 Risk Assessment & Mitigation

The Main Contractor shall deal with the immediate dangers to hearing etc. associated with high noise levels and the impact of same on construction operatives, by means of risk assessment and mitigation / precautionary measures and equipment, all pursuant to the current health and safety legislation.

Current legislation limits, assessment period of 8 hours of one week (noisiest 8 hours likely to experience):

- Lower Action Value (LAV) – 80 dBA $L_{EX,8}$, 135 dB Peak – Hearing Protection shall be made available and information shall be provided.
- Upper Action Value (UAV) – 85 dBA $L_{EX,8}$, 137 dB Peak – Use of Hearing Protection is mandatory, measures to eliminate the noise as much as possible shall be applied.

- Exposure Limit Value (ELV) – 87 dBA $L_{EX,8}$, 140 dB Peak – Not to be exceeded

Protection by ear plugs/muffs given by their Signal-to-Noise Ratio (SRN) or Noise Reduction Rating (NRR) is typically 20 – 30 dB.

- Exposure = $L_{EX,8} - (SNR - 10)$

As a guide, if it is difficult to hear a normal conversation at a distance of 2m or a workplace is consistently noisier than a busy street, it is likely that the noise levels in the area are above 80 dBA.

9.4 Potential Noise Sources

It is not envisaged that any excessively noisy activities to be carried out over extended periods of time during the construction stage. However, due to the nature of the construction works, exposure to noise levels in excess of 80 dBA (Safe Working Limit) may occur occasionally. The Main Contractor will carry out a noise assessment in relation to the proposed works at construction stage. The noise assessment shall identify, but not limited to, the following steps in its analysis;-

1. Potentially Hazardous Activities: Use of site machinery and power tools. For example, concrete saws, angle grinders, vibratory plate compactors etc.
2. Potential Hazards: Excessive noise
3. Persons at Risk: People in the vicinity of the work generating an excessive noise. These persons include employees, contractors and members of the public.
4. Risk of Exposure to the Potential Hazard: Temporary or permanent hearing loss.
5. Risk Assessment before the Implementation of Control Measures: Medium
6. Risk Assessment after the Implementation of Control Measures: Low
7. Control Measures Implemented by: Site Manager / Works Supervisor

9.5 Mitigation Measures

The following control measures are to be implemented:-

1. Site Manager shall monitor a likelihood of prolonged exposure to excessive noise and commission noise surveying/monitoring programme where necessary.
2. Works Supervisor shall assess risk arising from noise prior to each particular activity taking place and determine appropriate action. The aim shall be to minimise the exposure to excessive noise levels.
 - a. If it is likely that the noise exposure exceeds Lower Action Value then hearing protection must be made available.
 - b. If it is likely that the noise exposure exceeds Upper Action Value then hearing protection is mandatory to be used. Work Supervisor shall decide on the most suitable hearing protection to be used based on Exposure (see formula above) and worker's personal preference (earmuffs or earplugs).
3. Works Supervisor shall ensure proposed measures are put in place and that their effectiveness and suitability is evaluated on regular bases.
4. Site management shall minimise noise at work by looking for alternative processes and/or working methods, which would make the work quieter and/or exposure times shorter.

5. Site Manager shall liaise with all site contractors in order to effectively control noise exposure.
6. Number of people working near source of the noise shall be minimised.
7. Plant and machinery will be compliant with current legislation and fitted with silencers where possible.
8. Employees must use hearing protection where its use is made compulsory.
9. Hearing protection zones shall be identified where necessary.
10. Spot checks on appropriate use of hearing protection shall be carried out.
11. Operators of rock breaking machines and workers nearby must wear adequate ear protection.

9.6 Proper Use of Hearing Protection

- Earmuffs: Worker must make sure that they totally cover their ears, fit tightly and that there are no gaps around the seals. Hair, glasses, jewellery, hats etc. shall not interfere with the seal. Seals and insides of earmuffs shall be kept clean. Worker shall make sure that any headband keeps its tension.
- Earplugs: Workers shall make sure that they are wearing them properly. They shall practice fitting them and get help if they are having trouble. Hands shall be clean before fitting earplugs. Earplugs must not be shared with other workers.
- Semi-inserts/caps: Same applies as for earplugs. Worker shall make sure that any headband keeps its tension.

All workers are expected to:

- Co-operate: Help the Company to do what is needed to protect their hearing. Make sure that they use properly any noise control device and follow any working methods that are put in place.
- Wear any hearing protection they are given: Make sure that they are wearing it properly. They shall wear it all the time when they are exposed noisy environment (over UAV). Taking it off even for a short while means that the hearing could still be damaged.
- Look after their hearing protection.
- Report any problems: Report any problems with the hearing protection or effectiveness of the measures to the work supervisor.

10. Erosion and Sediment Control

10.1 Run-Off to Ditches

Significant quantities of waste and potential pollutants can be generated during construction. Controls must be put in place to prevent these pollutants from washing into the local storm water system.

Protection of the Mayne River located to the north of the site is paramount during the construction stage of the subject development. Temporary measures will be put in place to remove sediments, oils and pollutants.

The recommendations as outlined in the Eastern Regional Fisheries Board document outline the following seven items to be considered for the protection of adjacent water courses during the construction stage:

1. Fuels, oils, greases and hydraulic fluids must be stored in bunded compounds well away from the watercourse. Refuelling of machinery, etc., should be carried out in bunded areas.
2. Runoff from machine service and concrete mixing areas must not enter the watercourse.
3. Stockpile areas for sands and gravel should be kept to minimum size, well away from the watercourse.
4. Runoff from the above should only be routed to the watercourse via suitably designed and sited settlement ponds/filter channels. Silt barriers are to be erected along the north of the site to protect attenuation ponds and ultimately the Mayne River.
5. Settlement ponds should be inspected daily and maintained regularly.
6. Temporary crossings should be designed to the criteria laid down for permanent works.
7. Watercourse banks should be left intact if possible. If they have to be disturbed, all practicable measures should be taken to prevent soils from entering the watercourses.

The main pollutants of site water are silt, fuel/oil, concrete and chemicals. See Table 5, below, for a list and brief description of pollution prevention measures.

Source	Action
Detergents	Use of detergents should be carried out in designated areas draining to the foul sewer.
Fuel/Oil	Fuel/oil stores must be located away from the site drainage system and the edge of watercourses.
	Ensure adequate measures are identified to prevent or contain any spillage such as creating a fall away from any drainage grid or blocking drainage points.
	Prevent oil pollution by:
	<ul style="list-style-type: none"> • Suitable bunded storage of fuel/oil, and use of drip trays under plant, and
	<ul style="list-style-type: none"> • An oil separator, and/or • On-site spill-kit • Commercially available absorbent granules, pads or booms.
Material Storage	Store drums, oil and chemicals on an impervious base and within a secured bund.

	Ensure topsoil and/or spoil heaps are located at least 10m away from water courses. Consider seeding them or covering with a tarpaulin to prevent silty runoff and losses due to wind.
Leaks and Spills	Storage facilities are to be checked on a regular basis to ensure any leaks or drips are fixed to prevent loss and pollution.
	Ensure appropriate spill response equipment is located near to the material in case of containment failure or material spills, and ensure site staff know how to use it.
	Adequate stocks of absorbent materials, such as sand or commercially available spill kits and booms should be available at all times.
Litter	Provide waste bins on-site as appropriate.
Construction Vehicles	Provide vehicle wheel washing.
Concrete, Cement and Bentonite	Washout of these materials should be carried out in a designated, impermeable contained area. The washout water itself should be disposed of off-site, or discharged to the foul sewer if authorised.

Table 5 | Pollution Prevention Measures

10.2 Sediment Control

Construction runoff is heavily laden with silt which can block road gullies and reduce the hydraulic capacity in pipes and rivers, contributing to ponding and flooding. Continued development without appropriate controls will ultimately keep maintenance costs elevated, whether that be in cleaning gullies, jetting pipes or dredging. Sediment control plans can be implanted on site to mitigate these issues.

Sediment basins and traps should be installed before any major site grading takes place. Additional sediment traps and silt fences should be installed as grading takes place to keep sediment contained on site at appropriate locations.

Key runoff-control measures should be located in conjunction with sediment traps to divert water from planned undisturbed areas away from the traps and sediment-laden water into the traps. Diversions should be installed above the areas to be disturbed before any grading operations. Any perimeter drains should be installed with stable outlets before opening major areas for development. Any additional facilities needed for runoff control should be installed as grading takes place.

During grading operations temporary diversions, slope drains, and inlet and outlet protection installed in a timely manner can be very effective in controlling erosion and sediment build up.

The main run-off conveyance system with inlet and outlet protection measures should be installed early and used to convey stormwater run-off through the development site without creating gullies or channels. Install inlet protection for storm drains as soon as the drain is functional to trap sediment on site in shallow pools and to allow the flood flows to enter the storm drainage system safely. Install outlet protection at the same time as the conveyance system to prevent damage to the Mayne River.

10.3 Sediment Control Measures

Sediment entrapment facilities are necessary to reduce sediment discharges to downstream properties and receiving waters. All run-off leaving a disturbed area should pass through a sediment entrapment facility before it exits the site and flows downstream.

- **Straw Bales:** Straw bales can be placed at the base of a slope to act as a sediment barrier. These are not recommended for use within a swale or channel. Straw bales are temporary in nature and may perform for only a period of weeks or months. Proper installation and maintenance is necessary to ensure their performance.
- **Silt Fencing:** A silt fence is made of a woven synthetic material, geotextile, and acts to filter run-off. Silt fencing can be placed as a temporary barrier along the contour at the base of a disturbed area, but is not recommended for use in a channel or swale. The material is durable and will last for more than one season if properly installed and maintained. Silt fencing is not intended to be used as a perimeter fence or in area of concentrated flow. If concentrated flow conditions exist, a more robust filter should be considered.
- **Silt Barriers:** Silt barriers can also be temporarily installed in any road gullies of partially constructed roads to prevent sediment movement into downstream drainage systems or SUDS components. When the catchment area is greater than that allowed for straw bale barriers or silt fences, runoff should be collected in diversion drains and routed through temporary sediment basins.
- **Diversion Drains:** Diversion drains are simple linear ditches, often with an earth bund, for channelling water to a desired location. If the drains are being eroded they can be lined with geotextile fabric or large stones or boulders.

11. Proposed Construction Phasing and Programme

The proposed development is to be constructed in three phases, as indicated in Figure 2, below. It is anticipated that construction of Phase 1 will commence shortly after receipt of planning approval. The estimated programme for the development shall therefore commence in 2020, with completion of all phases expected by 2025.

UK and Ireland Office Locations

