OCSC

O'CONNOR · SUTTON · CRONIN

MULTIDISCIPLINARY CONSULTING ENGINEERS

W383: THE SOUTH-NORTH ACCESS ROAD

CONSTRUCTION & ENVIRONMENTAL MANAGEMENT PLAN

For

Kilkenny County Council

9 September 2024

NOTICE

This document has been produced by O'Connor Sutton Cronin & Associates for its client, Kilkenny County Council. It may not be used for any purpose other than that specified by any other person without the written permission of the authors.

DOCUMENT CONTROL & HISTORY

OCSC Job No: W383	Project Code	Originator	Zone Volume	Level	File Type	Role Type	Number	Status / Suitability Code	Revision
	W383	OCSC	XX	XX	RP	C	0007	S4	P02

Rev.	Status	Authors	Checked	Authorised	Issue Date
P01	S2	Wian Marais	Patrick Raggett	Anthony Horan	2/08/2024
P02	S4	Wian Marais	Patrick Raggett	Anthony Horan	9/09/2024

TABLE OF CONTENTS

1 INTRODUCTION

1.1 APPOINTMENT

Kilkenny County Council has identified the need to engage the services of an engineer-led multi-disciplinary consultant team to advance the preliminary design, detailed design, statutory planning requirements, enabling and procurement, construction, and handover to complete the South-North Access Road (Abbey Road to Belmont Road), including PSDP Consultancy Services along with the procurement of specialist services and all other services as prescribed to advance the Scheme.

The purpose of this report is to provide an overview of the outline construction and environmental management measures proposed for the access road. This also includes a number of mitigation measures.

1.2 PROJECT DESCRIPTION AND STUDY AREA

In accordance with the provisions of Part XI of the Planning & Development Act 2000, as amended, and Part 8, Article 81, of Planning and Development Regulations 2001, as amended, Kilkenny County Council gives notice of its intention to develop the South – North Access Road, Ferrybank, County Kilkenny.

The principal features of the proposed development will consist of;

- Construction of a new road, the South – North Access Road, approximately 940m in length, from the end of the existing access road serving the Clover Meadows Housing Estate to the end of the existing access road serving the Abbeygate Housing estate/Abbeygate Shopping Centre. This to create a continuous road link between the existing Belmont Road Roundabout on the Belmont Road (R711) to the existing Abbeygate Roundabout on the Abbey Road (LP3412);
- Provision of a Traffic Signal controlled crossroads junction on the access road approximately 270m north-east of the existing Abbeygate Roundabout on the Abbey Road (LP3412);
- Provision of a Traffic Signal controlled cross roads junction on the access road approximately 430m south-east of the Belmont Roundabout on the Belmont Road (R711);
- Provision of a new road overbridge over the existing Greenway;
- Minor upgrades to the existing Clover Meadows and Abbeygate access roads being tied into to provide improved pedestrian and cycle facilities and provide additional fencing where required.
- Provision of cyclist and pedestrian facilities along the new access road;
- Provision for 2 No. future bus-stops to both sides of the new road;
- Provision of a new carpark for the Greenway accommodating c.172 no. parking spaces and 2 no. coach parking spaces along with toilets (with water supply and waste water treatment), bicycle parking, accessible car parking spaces (10No.) and car parking spaces of which 20% are provided for e-cars with associated charging facilities;

- Provision of a link from the South-North Access Road footpath to the existing Greenway via a ramped shared surface (pedestrians and cyclists) with stepped access also provided;
- Public lighting along the full length of the South - North Access Road and to the Greenway carpark;
- The installation of road markings and signage throughout;
- Provision of a surface water drainage system to include Sustainable Drainage Systems (SuDS), attenuation storage both above and below ground and flow restrictors to maintain discharge of surface water to greenfield runoff rates. This also includes an outfall along the adjacent Greenway;
- Hard and soft landscaping including boundary treatments throughout.

The study area for the scheme is shown in the figure below.

Figure 1-1: South-North Access Road Study Area (Source: Google Earth)

2 OVERVIEW OF THE CEMP

This document serves to inform the planning process in respect of the proposed development. It is intended that this Construction Management Plan will be an interim assessment and it is not intended to be a final version to cover the eventual construction of any permitted development. A detailed Construction Management Plan will be prepared in future. This document will be updated continuously to take account of any necessary changes on foot of the planning process and throughout any phased construction period.

The Construction Management Plan, to be agreed upon with the Local Authority before the commencement of any construction works, will ultimately include details on the following:

- Daily and weekly working hours;
- Agreed haul routes for incoming materials;
- Licensed hauliers to be used;
- Disposal sites;
- Travel arrangements for construction personnel;
- Appropriate on-site parking arrangements for construction personnel to prevent overspill parking on the local road network;
- Temporary construction entrances to be provided;
- Wheel wash facilities if required;
- Road cleaning and sweeping measures to be put in place if required;
- Temporary construction signage to be put in place and maintained;
- Any proposed traffic management measures such as temporary traffic lights and signage on any public roads.

3 DEVELOPMENT OVERVIEW

The proposed development is located in Ferrybank within the Municipal District of Piltown in County Kilkenny. The Ferrybank area is located to the north of the river Suir and bounds Waterford City and has a population of approximately 6,500 people.

The development site is located between Abbey Road (LP3412) to the south and Belmont Road (R711) to the north. These represent the main road links locally, with the latter facilitating access to nearby Waterford City to the southwest, the N29 to the northeast and ultimately to the N25/M9 to the west.

Figure 3-1: Development Site Aerial View

As can be seen above, there is a notable extent of undeveloped land located between Belmont Road and Abbey Road. These have been subject to multiple planning applications over the last decades, the most significant of which started in 2003 with extensive development proposed under Planning Register References 03/760 and 03/1711. A number of subsequent applications and alterations were submitted but to date, only small pockets of development have taken place, namely the Clover Meadows and Abbey Gate residential developments and the Ross Abbey Town Centre. However, all of these are located immediately adjacent to the existing roads, respectively facilitated by short sections of access roads.

There are a number of live planning applications relating to the study area, the most notable of which include:

- Planning Ref: 20/453 40 no. residential units north of the existing Abbeygate Development;
- Planning Ref: 20/845 23no. apartments via change of use of existing commercial units at Ross Abbey Town Centre.

An application for a 97 no. unit residential development immediately south of the existing Clover Meadow development was refused in 2022 (Planning Reference: 22/336) with one of the reasons being prematurity relative to the delivery of the South-North Access Road.

The existing Clover Meadows access road is an approximate 6.5m wide carriageway with segregated cycle and pedestrian facilities on both sides of the road in relatively good condition. It is approximately 350m long and currently terminates with a gate to the undeveloped lands. The Abbeygate access road is similar in nature but with cycle, facilities present only on the northwest side of the road. It is approximately 80m long and is again gated at its terminus, with an incomplete section of access road provided thereafter.

The development site is bisected by the Southeast Greenway which is nearing completion, repurposing a disused railway line. It has sloped embankments tying back to the existing ground level on either side. The topography varies notably across the local area with highs of 44.0m to a low of 30.0m OD.

There is a small pond feature in the centre portion of the site.

The proposal to be developed will provide an additional new access road and improved connectivity between the R711 Belmont Road (Old N25) and the L3412 Abbey Road.

4 SITE ESTABLISHMENT

4.1 CONSTRUCTION PHASING

Due to the nature of the scheme, it is proposed to complete construction in one phase.

4.2 CONSTRUCTION PROGRAMME

It is expected that the construction phase of the scheme will have a duration of approximately 12 - 15 months.

4.3 SITE ACCESS & OPERATIONS

The site can be accessed from the north via Clover Avenue and from the south via Abbey Park. It is proposed that both of these access points be used for the construction accesses, with material stores on both sides of the planned bridge, within the site area.

The principal site compound will be located at the planned location of the car park, as shown indicatively in the figure overleaf.

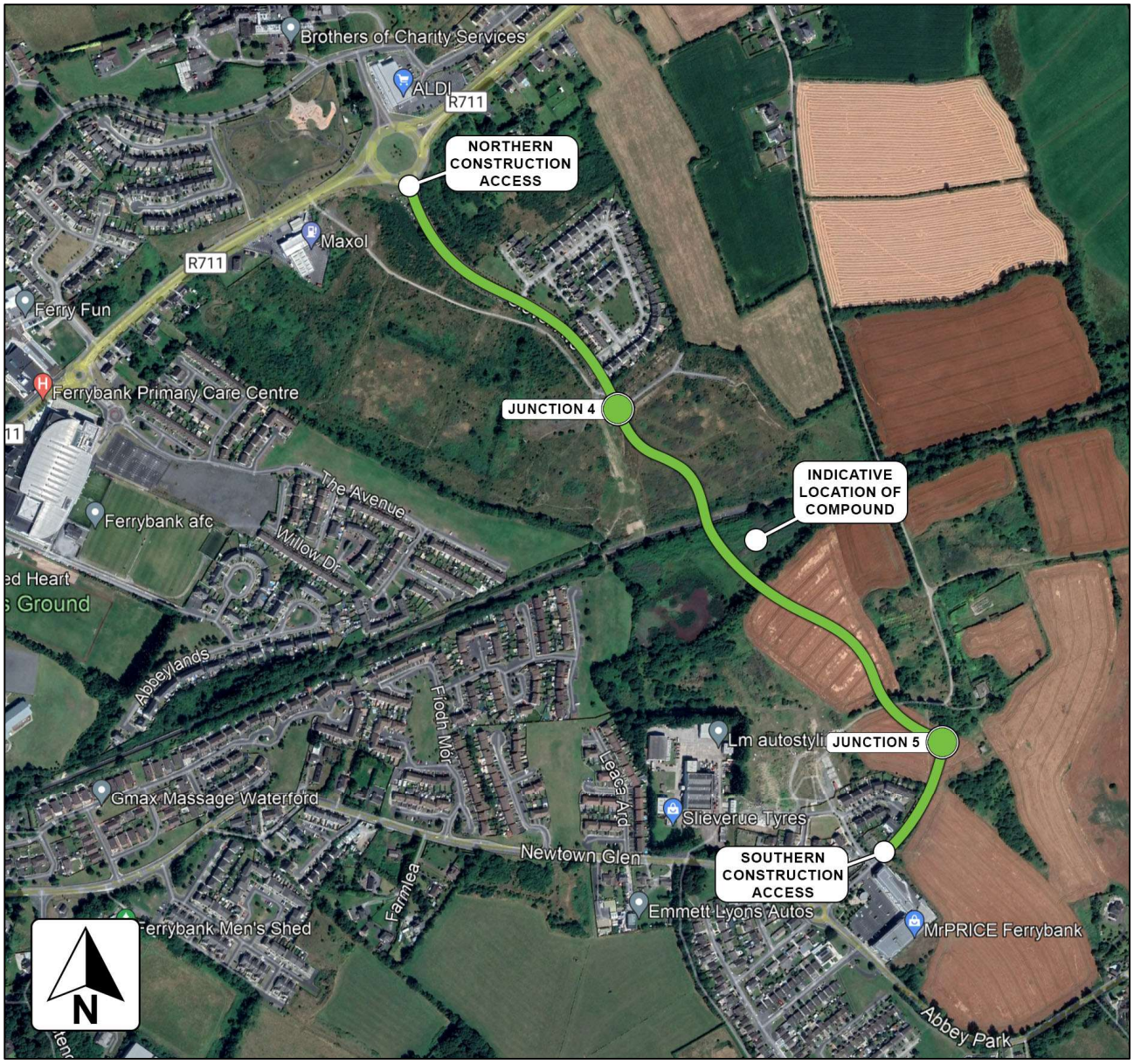

Figure 4-1: Site Compound and Access Details

4.4 HOARDING

Perimeter hoarding will be provided around the different phases of the site and along the public road to prevent unauthorised access to the site. Controlled access points will also be provided. Hoarding will be maintained to a high standard and painted or covered as appropriate. Temporary hoarding will be provided as necessary within the site as safety restrictions to prevent public access. The locations of this temporary hoarding will vary as work progresses across the site.

4.5 TREE PROTECTION

Appropriate measures will be put in place to protect any trees on the site which are designated for protection or retention under any granted planning permission for the development.

4.6 ARCHAEOLOGY

Appropriate arrangements will be made with a licensed archaeologist to monitor soil stripping and other development works as may be conditioned in any planning permission for the proposed development.

4.7 WORKS ON THE PUBLIC ROAD

Works on the public road will be carried out subject to, and under, a Road Opening Licence from the Local Authority. All works on the public road will be carried out per the Local Authority and HSA guidelines for working on public roads, with traffic management per Chapter 8 of the TSM and the appropriate traffic management guidelines.

4.8 DEMOLITION WORKS

It is not anticipated that any buildings/structures will require demolition as part of the proposed project.

5 CONSTRUCTION TRAFFIC

5.1 TRAFFIC ROUTING

Regarding traffic routing, traffic management routes will utilise the Regional & National Road network and waste will be disposed of by licensed hauliers in appropriately licensed facilities only. All final traffic management routes will be agreed upon by the contractor with the relevant Local Authority in advance of the commencement of construction.

The exact location of batching plants and disposal sites will be established once a contractor has been appointed.

5.2 CONSTRUCTION TRAFFIC VOLUMES

It is difficult to assess the exact quantum of traffic that will be generated during the construction period. However, to estimate the volume and rate of construction traffic, it is first necessary to estimate the amount of excavation and earthworks required on the site, which is shown in the previous section.

Based on this, and from the experience of similar construction projects, it is considered that there will be a maximum of twelve HGVs serving the site during any given daytime hour. This is based upon the knowledge that it takes on average 10 minutes to load a lorry with spoil but could be as short as 5 minutes. As such, the two-way HGV traffic is unlikely to be higher than 24 vehicles per hour at any point of the day. Based on an 8-hour day and a 22 working-day month, 24 vehicles per hour equates to 4,224 vehicles per month.

Measures will be put in place to minimise the amount of construction traffic generated by the development. These measures will include the reuse of materials within the site for landscape purposes, or within adjacent sites for fill, to limit the amount of spoilage.

It will be an objective of this development to reuse as much material as possible and minimise the amount of material to be transported off-site.

The contractor will maximise the use of precast materials or prefabricated materials wherever possible and economically viable. Adequate storage space will be provided on site for the storage of materials and a site strategy will be put in place to manage the timing of deliveries to the site. Trips by construction workers will be limited by the provision of car-sharing and Travel to Work Scheme benefits. Construction workers will be encouraged to use public transport to the maximum possible extent. Adequate storage space will be provided on site for the storage of materials and a site strategy will be put in place to manage the timing of deliveries to the site. It is not anticipated that the amount of construction traffic will exceed the amount of operational traffic.

5.3 SITE PARKING

A limited amount of on-site parking will be provided for construction workers and visitors. The contractor will separately need to negotiate agreements with local businesses to provide additional parking if required.

5.4 STAFF WELFARE

Appropriate welfare facilities will be provided on-site for construction staff and will include, inter alia:

- Canteen facilities;
- Toilet and Shower Facilities;
- Office accommodation;
- Drying areas/changing areas;
- Tool storage areas.

5.5 CONSTRUCTION TRAFFIC MITIGATION MEASURES

A properly sized and designed wheel wash will be provided and maintained on-site as necessary for the earthworks and superstructure elements of the project. Appropriate water collection and filtering will take place prior to discharge to the public sewer system. Gate staff will be trained to inspect vehicles for cleanliness prior to egress to the public road network and any trucks that have been inadequately cleaned will be re-washed. A road sweeper will also be utilised as required on the public road at vehicular access/egress points.

Cover systems will be used as appropriate on vehicles removing spoil from the site so as to minimise dust arising on surrounding streets. Trucks leaving the site will, as previously noted, pass through a wheel washing system. In addition, these trucks will be watered down and covered. This will be carried out in a dedicated wash-down zone with dedicated site personnel.

The use of appropriate water-based dust suppression systems will greatly reduce the amount of dust and windborne particulates as a result of the demolition process. This system will be closely monitored by site management personnel particularly during extended dry periods and in accordance with site management methods discussed earlier.

6 SEGREGATION OF WASTE STREAMS

6.1 WASTE STORAGE & SEGREGATION

Waste materials generated will be segregated on-site. This will allow for the maximum possible degree of recycling. Where on-site segregation of certain waste types is not practical, off-site segregation will be carried out. Skips and receptacles will be provided to facilitate segregation at the source.

All waste receptacles leaving the site will be covered or enclosed. The on-site waste storage area will be secured within the overall site which will be hoarded off from the public and unauthorised access.

The appointed waste contractor will collect and transfer the waste as receptacles are filled. Any soil removed off-site will be carried by contractors licensed under the Waste Management Acts 1996 - 2008, the Waste Management (Collection Permit) Regulations 2007 and Amendments and the Waste Management (Facility Permit & Registration) Regulations 2007 and Amendments.

6.2 NON-RECYCLABLE WASTE

C&D waste which is not suitable for reuse or recovery will be placed in separate skips or other receptacles. This will include polystyrene, some cardboard and plastic which are deemed unsuitable for recycling.

Before removal from the site, the non-recyclable waste skip/receptacle will be examined by a member of the waste team to determine if recyclable materials have been misplaced. If this is the case, efforts will be made to determine the cause of the waste not being segregated correctly and recyclable waste will be removed and placed into the appropriate receptacle.

An outline Layout Plan for a site-based waste segregation compound is shown in the figure overleaf.

Figure 6-1: Proposed C&D Waste Storage Area - Outline Layout Plan (NTS)

7 ENVIRONMENTAL MANAGEMENT

7.1 SITE INVESTIGATION

A Site investigation was undertaken by *Causeway Geotech* at the site between 5 December 2023 and 26 January 2026. The operations consisted of:

- Five boreholes;
- A standpipe installation in three boreholes;
- Eighteen machines dug trial pits;
- An infiltration test was performed in five trial pits; and
- Six road cores.

The result from this operation is captured in the report titled *South-North Access Road, Kilkenny – Ground Investigation* dated March 2024, and submitted under separate cover.

A summary of the ground types encountered in the exploratory holes, extracted from the site investigation, is listed below, in approximate stratigraphic order:

- **Paved surface:** road cores RC01-06 encountered between 120-220mm of bitmac.
- **Topsoil:** encountered at all locations with the exception of the road cores, between 100mm to 500mm thickness across the site.
- **Made Ground (sub-base):** approximately 50mm – 200mm of aggregate fill beneath the paved surface in RC01-06.
- **Made Ground (fill):** reworked slightly sandy slightly gravelly clay fill with fragments of tarmac and plastic encountered in BH05 extending to a depth of 1.40m.
- **Glacial Till:** sandy gravelly clay, frequently with low cobble content, typically soft or firm in upper horizons, becoming stiff with increasing depth. Occasional layers of gravelly clayey sand were encountered within the clay deposits. Gravelly clayey sand was encountered in BH03 from 5.45m to 15.20m depth, described as medium dense becoming dense. The base of this stratum was not proven.

7.2 POLLUTION PREVENTION

Only sediment-free run-off is to leave the site. A suitably sized detention basin or settlement area will be installed at the lowest point before discharge where excess run-off must leave the site. Silt curtains or earth berms will be used to channel run-off to locations where it can be controlled. These may take the form of an open detention area or, where the need arises, a portable skip/s, or similar, where inflow passes through straw bales, gravel etc.

The Site Manager will be responsible for the pollution prevention programme and will ensure that at least daily checks are carried out to ensure compliance. A record of these checks will be maintained.

The site compound will include a dedicated bund for the storage of dangerous substances including fuels, oils etc. Refuelling of vehicles/machinery will only be carried out within the bunded area. The site compound will display emergency contact details for Inland Fisheries Ireland, the National Parks and Wildlife Service, Kilkenny County Council, and the Environmental Protection Agency in the event of a pollution incident or environmental emergency. Adequate spill kits will be available in the event of a spill of oil or other hazardous substances.

7.3 TRAINING

All site personnel will be trained in the importance of good environmental practices including reporting to the site manager when pollution, or the potential for pollution, is suspected.

7.4 NOISE & VIBRATION CONTROL

During the construction of the works, the following codes and regulations will be adhered to:

- BS 5228:2009 Code of Practice for Noise and Vibration Control on Construction and Open Sites, Part 1 and Part 2
- Safety, Health and Welfare at Work (General Application) Regulations 2007 to 2016, Part 5 Noise and Vibration

The noise limits to be applied for the duration of the infrastructure works are those specified in the b Category of BS 5228. These limits are summarised below and will be applied at the nearest sensitive receptors to the works.

- Night (23.00 – 07.00) = 45dB
- Evening (19.00 – 23.00) = 45dB
- Day (07.00 – 19.00) = 70dB

In addition to the above noise limits, the following restrictions will be observed in relation to day-to-day operations:

- Day to Day Operation (Noise Sensitive & Schools) – 40dB LAeq,15min;
- Day to Day Operation (Commercial) – 55dB LAeq,15min;
- Emergency Operation (Noise Sensitive & Schools) – 55dB LAeq,15min.

Noise levels will be monitored continuously and a threshold value of 65 dB LAeq,1hr free field at residential noise-sensitive locations in the vicinity of the development will be adopted. Where noise levels exceed this threshold, adequate steps will be taken by the site management to review works and implement additional mitigation measures.

Off-site infrastructure works, excavations and concrete works will be among the most significant activities. The activities that are likely to generate the most noise over prolonged periods will be demolition and concrete activities.

The general mitigation principles and methods will include:

- Selection of plants with low inherent potential for generating noise.
- Avoid unnecessary revving of engines and switch off plant items when not required.
- Keep plant machinery and vehicles adequately maintained and serviced.
- Proper balancing of plant items with rotating parts.
- Keep internal routes well-maintained and avoid steep gradients.
- Minimise drop heights for materials or ensure a resilient material underlies.
- Use of alternative reversing alarm systems on plant machinery.
- Where noise becomes a source of resonating body panels and cover plates, additional stiffening ribs or materials should be safely applied where appropriate.
- Limiting the hours during which site activities likely to create high levels of noise are permitted.
- Appointing a site representative responsible for matters relating to noise.
- Monitoring typical levels of noise during critical periods and at sensitive locations.

On occasions it may prove necessary to carry out noisy activities outside normal working hours, these activities will be discussed with the affected parties before they are carried out.

No heavy construction equipment/machinery (to include pneumatic drills, construction vehicles, generators, etc.) shall be operated on or adjacent to the construction site before 07.00 or after 19:00 Monday to Friday, and before 08:00 and after 13:00 on Saturdays.

No activities shall take place on-site on Sundays or Bank Holidays. No activity, which would reasonably be expected to cause annoyance to residents in the vicinity, shall take place on-site between the hours of 19:00 and 07:00. No deliveries of materials, plant or machinery shall take place before 07:00 in the morning or after 19:00 the evening.

Vibration limits to be applied for the infrastructure works are to be specified in the NRA document Guidelines for the Treatment of Noise and Vibration in National Road Schemes (NRA, Revision 1, 2004). These limits are outlined below:

Allowable vibration (in terms of peak particle velocity) at the closest part of the sensitive property to the source of vibration, at a frequency of:

Less than 11Hz	11 to 50 Hz	50 to 110 Hz (and above)
3mm/s	3 to 8mm/s	8 to 11mm/s

7.5 DUST CONTROL

Dust control will be best achieved at sources, and if possible, activities will be carried out in a manner as to preclude dust generation.

Where dust is generated, steps will be taken to protect workers in the vicinity who shall, as a minimum, be issued with appropriate dust masks. Dust will, as far as is reasonably practicable, be contained in the area where it was generated. Dust suppression will be carried out to ensure that dust nuisance affecting neighbouring properties is minimised.

Dust emissions from construction will be controlled through careful pre-project planning and effective site management. The following control measures and good practices will be employed:

- Prohibiting the burning of materials;
- Loading and unloading will only be permitted in designated areas;
- Provision of water sprays in dust-sensitive locations will be introduced, e.g. demolition areas, concrete cutting etc;
- Haulage vehicles transporting gravel and other similar materials to the site will be covered by a tarpaulin or similar.
- Access and exit of vehicles will be restricted to certain access/exit points.
- Vehicle speed restrictions of 20km/hr, or lower as deemed fit by the contractor, will be in place.
- Bowsers will be available during periods of dry weather throughout the construction period.
- During dry and windy periods, and when there is a likelihood of dust nuisance, a bowser will operate to ensure moisture content is high enough to increase the stability of soil and dust susceptible materials in order to suppress dust.
- Stockpiles will be stored in sheltered areas of the Site and covered, with appropriate levels of moisture applied regularly or as needed if exposed during dry weather.
- Gravel should be used at site exit points if appropriate to remove caked-on dirt from tyres and tracks.
- Equipment should be washed at the end of each workday.
- Hard-surfaced roads will be wet swept to remove any deposited materials.
- Unsurfaced roads will be restricted to essential site traffic only.
- If practicable, wheel-washing facilities should be located at all exits from the construction site.

- Dust production as a result of site activity will be minimized by regular cleaning of the site access roads using vacuum road sweepers and washers. Access roads should be cleaned at least 0.5 km on either side of the approach roads to the access points.
- Public roads outside the site shall be regularly inspected for cleanliness, at a minimum daily, and cleaned as necessary. A road sweeper will be made available to ensure that public roads are kept free of debris.
- The frequency of cleaning will be determined by the Site Agent and is weather and activity dependent.
- The height of stockpiles will be kept to a minimum and slopes should be gentle to avoid windblown soil dust.
- The following will be damped down during dry weather:
  - Unpaved areas subject to traffic and wind;
  - Stockpiles;
  - Areas where there will be loading and unloading of dust-generating materials, and
  - Borrow-pits.
- No run-off of water or mud will be permitted from the Site for the duration of the works. All construction-related water produced on-site will be stored and disposed of offsite at a licensed facility.

7.6 COMPLAINTS HANDLING

The Contractor will maintain a Site Complaints Log during construction, and it will include the following:

- Name, address, and contact details of the complainant;
- Date and time the complaint was made;
- Date, time and duration of activity that triggered the complaint;
- Characteristics of the complaint activity including descriptions of noise, visual effect etc.;
- The inferred cause or source of the activity;
- Weather conditions during the activity including, wind (including speed and direction), precipitation and the general environmental conditions; and
- The Investigation and follow-up actions.

7.7 LIAISON WITH SURROUNDING COMMUNITY

The Contractor will appoint a Community Liaison Officer (CLO) as a single point of contact to engage with the surrounding community. The CLO will respond to and keep the surrounding community informed of the progress and timing of construction activities that may affect them.

8 HOURS OF WORKING

Construction operations will be carried out in accordance with any granted planning conditions. It is expected that normal working hours will be from 07:00 – 19:00 Monday to Friday and from 08:00 – 14:00 on Saturdays.

It may be necessary for some specific construction activities to take place outside of these times and in those cases, a specific derogation will be sought from the Planning Authority, Kilkenny County Council.

Deliveries to the site will be arranged to arrive within normal working hours as set out above.

There may, again, be specific deliveries which need to arrive outside of these hours e.g., in respect of wide loads. In all such cases, the applicant will again liaise and agree to any necessary derogations with the Planning Authority.

9 ENVIRONMENTAL MITIGATION MEASURES

9.1 PRE-CONSTRUCTION PHASE

The following surveys must be conducted at least one month before the commencement of construction, during the appropriate season:

- Dawn/dusk (emergence) bat surveys, particularly focusing on the woodlands that provide suitable roosting habitats for bats;
- Breeding bird surveys: Conduct breeding bird surveys during the appropriate breeding season to identify nesting locations and potential breeding sites;
- Nesting habitat assessment: Identify and evaluate potential nesting habitats, including trees, shrubs, and other vegetation that birds may use for nesting;
- Perform a pre-commencement survey to identify any invasive species, especially Butterfly-bush (*Buddleja davidii*); and
- A pre-commencement for badgers is necessary, especially within the woodlands area. The proposed route crosses suitable areas for badgers.

9.2 CONSTRUCTION PHASE

The proposed design has incorporated intrinsic mitigation measures aimed at avoiding or lessening the impact of the proposed works on the key biodiversity receptors within the study area. The construction works will be compliant with the following requirements:

- Construction works will be limited to daylight hours to avoid effects on bats and birds. The use of construction lighting will be limited to an absolute minimum. In general, artificial light creates a barrier for commuting bats so lighting should be avoided where possible. If any external lighting is required, it must be sensitive to the presence of bats commuting in the area. Directional lighting (i.e., lighting that is cowled away from sensitive habitats with no light spillage, in line with Best Practice) shall be used.
- Existing trees should be retained where possible and site boundaries replanted where feasible. Treelines are of far greater benefit to bats than single, free-standing trees or shrubs as they provide corridors for movement, avoidance of light and predators, a better shelter belt for the clustering of insects, and a greater substrate for insect breeding and feeding (bats' food source).
- In general, artificial light creates a barrier for commuting bats so lighting should be avoided where possible. If any external lighting is required, it must be sensitive to the presence of bats commuting in the area.
- If nesting sites must be disturbed due to construction, nests must be relocated to nearby safe locations. This must be done by a qualified ecologist.
- Minimise the removal of trees and vegetation where birds are likely to nest. Preserve existing nesting trees whenever possible, and plan construction activities to work around these areas.

- Badgers rely on specific habitats for food, shelter, and breeding. Preserving natural habitats, especially setts (badger burrows), and adjacent foraging areas is crucial for their survival. Therefore, erecting sturdy fences or barriers would prevent them from accessing sensitive locations like agricultural fields, or roadsides.
- If working near the stream or pond, suitable net fencing should be installed at least 1 metre from the highest part of the bank on both sides of the stream or around the pond to prevent silt and sediment from entering the water. A double layer of geotextile membrane is recommended for use. It should be installed along the river ensuring about 30cm of the material is buried underground. Regular checks should be carried out (approximately once a week and again after any periods of heavy wind or rain) to ensure the net remains upright and intact. Any damaged sections should be replaced immediately.
- In the event that bats are found on the site during construction works, works will immediately cease in that area, and the local NPWS conservation ranger will be contacted. The bats should be removed by hand by a suitably qualified bat surveyor.
- Avoid construction activities in areas known to support amphibians, such as ponds, marshes, and streams.
- If amphibians are found on site, install temporary exclusion fencing around amphibian breeding sites and habitats to prevent direct access and disturbances by construction personnel and equipment.
- A management plan for all invasive species identified during the pre-construction survey must be prepared and implemented. The management plan will detail the treatment programme which can be divided into three main stages: initial removal, control of stems and roots, and follow-up. The management plan will quantify the number of invasive species and their characteristics (age, condition, and previous treatments) and when to begin clearance. Suitable conditions for the recovery of native ground flora will be created which will reduce open areas for recolonisation by invasive species. The management plan will detail acceptable timeframes for planned clearance and repeated treatments. As part of the plan, follow-up work will be necessary to remove any small plants and seedlings that have been missed or that have germinated following the initial remediation phase.
- An experienced Ecologist should be on site when required during construction works and site clearance to provide ecological advice to avoid and/or minimize ecological impacts.

9.3 MITIGATION MEASURES FOR BUTTERFLY BUS (BUDDLEJA DAVIDII)

The proposed design has integrated inherent measures to minimize the impact of Butterfly Bush (*Buddleja davidii*) on surrounding areas. The construction activities will adhere to the following criteria:

- Site assessment: Conduct a thorough assessment of the construction site to identify any existing *Buddleja davidii* plants or potential areas of invasion. This assessment will help determine the appropriate mitigation strategies.
- Removal before construction: Remove *Buddleja davidii* plants on the site or within the construction zone before construction activities begin. Use proper techniques to uproot and dispose of the plants, ensuring that no seeds or vegetative parts remain to prevent regrowth.

- Establish buffer zones: Create buffer zones around the construction area to prevent the encroachment of *Buddleja davidii* from neighbouring properties or adjacent natural areas. Monitor and control any potential spread from these buffer zones.
- Prevent seed dispersal: *Buddleja davidii* is notorious for its ability to produce large quantities of seeds that can disperse over long distances. Implement measures to prevent seed dispersal during construction, such as covering the plants with tarps or nets.
- Regular inspections: Assign someone to conduct regular inspections of the construction site to detect and remove any *Buddleja davidii* seedlings or regrowth promptly. Early intervention is critical to preventing widespread infestations.
- Soil disturbance management: Minimise soil disturbance as much as possible during construction. Disturbed soil provides an opportunity for *Buddleja davidii* seeds to germinate and establish.
- Site hygiene: Maintain a clean construction site by regularly removing plant debris, soil, and equipment that could inadvertently transport *Buddleja davidii* seeds to other areas.
- Herbicide application: As a last resort and under the guidance of a professional, consider using herbicides specifically labelled for *Buddleja davidii* control if other methods have not been effective. Use herbicides responsibly and follow all safety and environmental guidelines.
- Native plant restoration: After construction is complete, implement a native plant restoration plan for the affected area. Replanting with native species will help prevent *Buddleja davidii* from recolonizing and restore the natural ecosystem.
- Educate construction workers: Ensure that all personnel working on the construction site are aware of the invasive nature of *Buddleja davidii* and the importance of implementing mitigation measures.

10 VERIFICATION

This report was compiled and verified by:

Wian Marais BEng (Civil), BEng Hons (Transportation), CEng MIEI
Chartered Civil Engineer
O'Connor Sutton Cronin & Associates

OCSC

O'CONNOR · SUTTON · CRONIN

MULTIDISCIPLINARY CONSULTING ENGINEERS

Head Office

9 Prussia Street
Dublin 7
Ireland
D07KT57
T: +353 (0)1 8682000
E: ocsc@ocsc.ie | W: www.ocsc.ie

Civil | Structural | Mechanical | Electrical | Sustainability | Environmental