



CONSULTANTS IN ENGINEERING,  
ENVIRONMENTAL SCIENCE &  
PLANNING

# TIPPERARY TOWN HISTORIC LANDFILL REMEDIATION

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## CONSTRUCTION AND ENVIRONMENTAL MANAGEMENT PLAN (CEMP) FOR THE PROPOSED REMEDIATION OF TIPPERARY TOWN HISTORICAL LANDFILL

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**Prepared for:**

Tipperary County Council



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Tipperary County Council

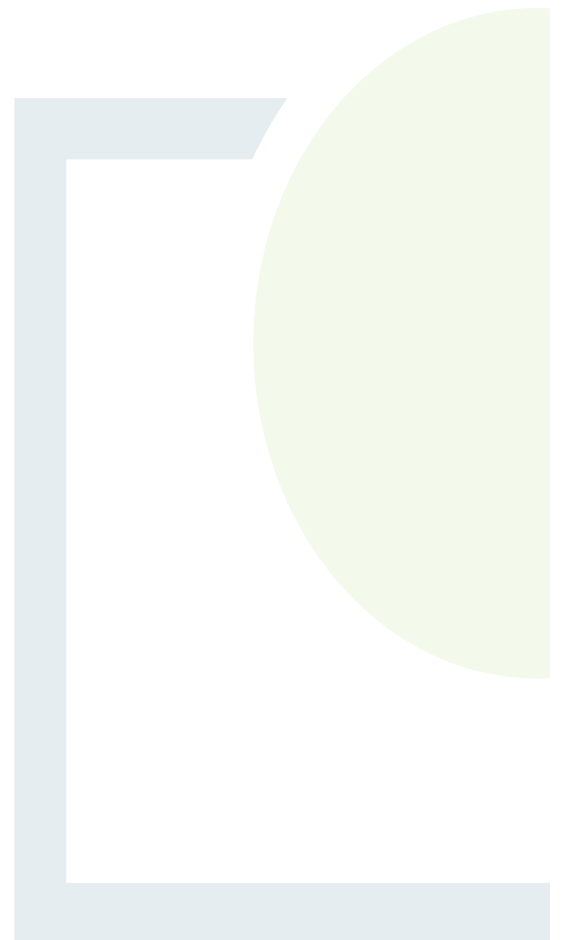
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# CONSTRUCTION AND ENVIRONMENTAL MANAGEMENT PLAN FOR THE PROPOSED REMEDIATION OF THE TIPPERARY TOWN HISTORICAL LANDFILL (CEMP)

## REVISION CONTROL TABLE, CLIENT, KEYWORDS AND ABSTRACT

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**Abstract:** This document comprises the Construction and Environmental Management Plan (CEMP) for the Remediation of the Historic Landfill at Carrownreddy, Tipperary Town, the purpose of which is to set out the key construction and environmental management issues associated with the proposed works. This plan will be developed further at the construction stage and on the appointment of the Contractor to the project.



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## 1. INTRODUCTION

This document is the Construction and Environmental Management Plan (CEMP) for the proposed Tipperary Town historical landfill remediation and has been prepared by Fehily Timoney and Company (FT) on behalf of Tipperary County Council (TCC) on a preliminary basis to accompany an application to An Bord Pleanála under Section 177AE of the Planning and Development Act, 2000 (as amended).

This document sets out the construction and environmental management concerns associated with the proposed works, to ensure that during construction, the environment is protected and impacts on the environment are minimised. This CEMP will be adopted by the contractor and supplemented where necessary for construction purposes. The plan will be added to at a later stage prior to the commencement of the construction phase having regard to ultimate planning conditions imposed by An Bord Pleanála and final construction plans.

The EPA issued a Certificate of Authorisation (CoA) for the site on the 6th February 2019 (Licence number: H0004-01, SEE Appendix 1). The proposed project is to implement the requirements of Certification of Authorisation to remediate a historic landfill site.

### 1.1 General Introduction and Purpose

This CEMP sets out the key environmental management issues associated with the proposed remediation works, to ensure that during the construction and operation of the development, the impacts on the environment are minimised. This CEMP will form the basis for the appointed contractor's Construction and Environmental Management Plan.

Condition 3 of the CoA requires TCC to implement remediation works to this historic landfill in order to ensure “..proper closure of the activity ensuring protection of the environment”. The CoA is issued under Regulation 7 (6) of the Waste Management (Certificate of Historic Unlicensed Waste Disposal and Recovery Activity) Regulations 2008.

The purpose of the proposed remediation works is to implement CoA Condition 3.

### 1.2 The Client

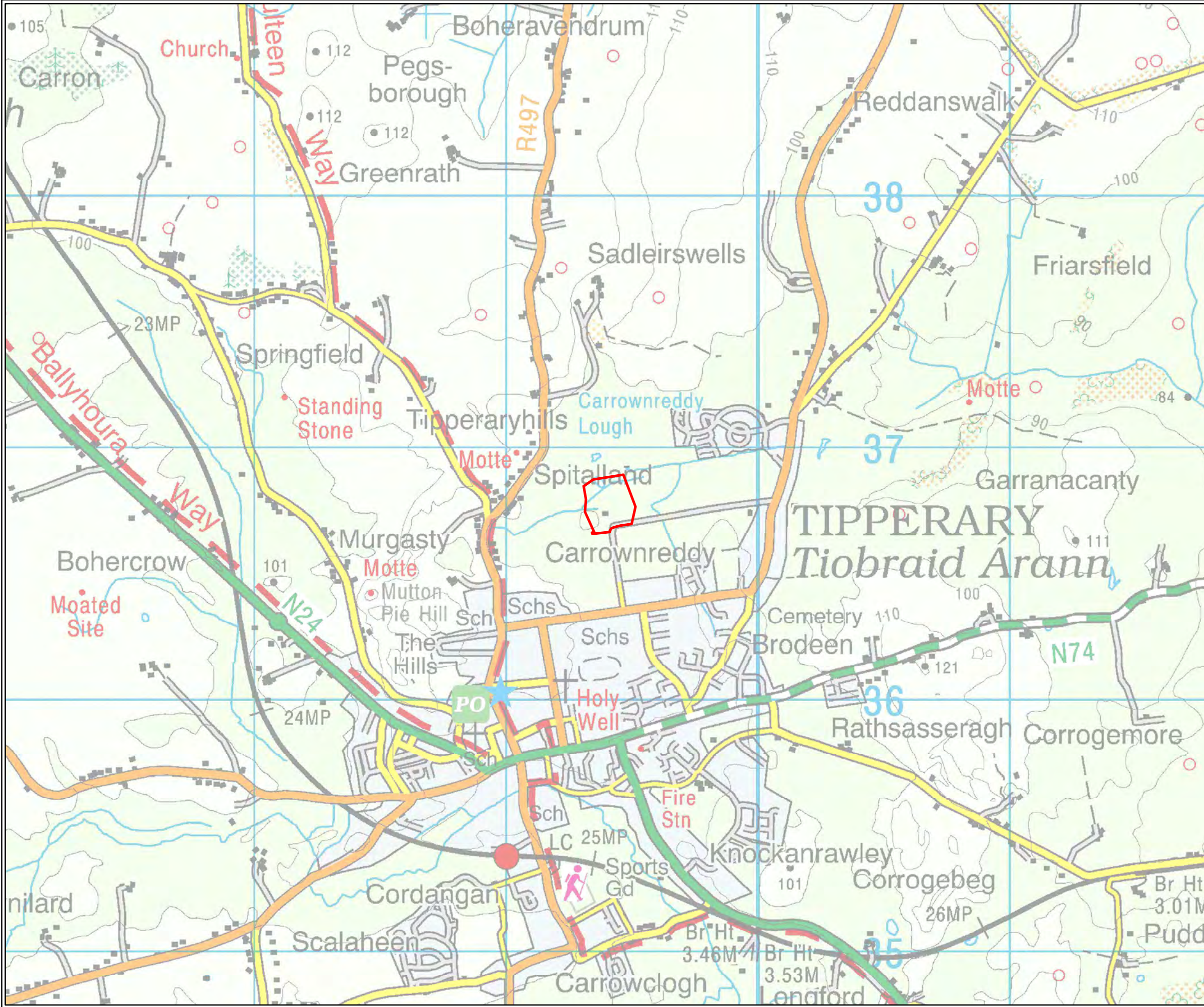
Fehily Timoney & Company (FT) was commissioned by Tipperary County Council to provide consultancy services in respect of the proposed Tipperary Town historical landfill remediation.

### 1.3 The Site

The site is a historic landfill having received waste from Tipperary Town from the 1940's to c. 1990. Waste deposited at the site is understood to comprise of municipal and commercial wastes to depths of approximately 9 m to 12 m. A Site Location Map showing the location of the site and its surrounding context is shown in Figure 1-1 overleaf.







— Landfill Boundary

<b>TITLE:</b>	Site Location
<b>PROJECT:</b>	Tipperary Town Historical Landfill Remediation
<b>FIGURE NO:</b>	1.1
<b>CLIENT:</b>	Tipperary County Council
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Tipperary Town Council currently uses part of the site as a depot for the storage of road maintenance materials and machinery.

Other lands adjoining to the site are primarily associated with low intensity agriculture. A swamp/wetland area surrounds the site on all sides except along the southern boundary and along part of the south-eastern boundary.

#### 1.4 Overview Description of the Project

The proposed development works (for which planning permission is sought) are as follows

- *Development of a temporary site compound on the proposed engineered capped development and a temporary office location removed from the engineered cap within the site boundary. Demolition of existing structures including an existing agricultural building, concrete walls and post and wire fencing.*
- *Clearance of vegetation and tree felling.*
- *Grading/Profiling of Existing Profile.*
- *Installation of an engineered landfill capping system to include: a landfill gas venting system an LLDPE Barrier, a sub-surface drainage system, a geogrid layer, sub-soil and top soil layers, a surface water drainage system, an access track, fencing and car park area, temporary works/mitigation measures, security fencing, landfill gas/leachate management infrastructure, landscaping and an anchor trench/gas barrier.*

The application site defined by the red line boundary in accompanying drawings is 3.57 ha in size. The proposed capping area within the application site proposed is 2.29 ha in size.

A Site Layout Plan showing the layout of the above project elements is enclosed with this planning application (Drawing Reference: P0563-0100-0014).

*The following will be carried out on-site following on from completion of the proposed development works.*

- *Ongoing Environmental monitoring.*
- *Oxidation of Methane in Landfill Gas.*
- *Maintenance of engineered cap on-site.*
- *Maintenance of surface water drainage system on-site.*





## 2. EXISTING ENVIRONMENT

The historical landfill site is in the townland of Carrownreddy immediately north of Tipperary town, the site is situated partially within areas of wetland and is surrounded by agricultural lands adjacent to the town. The site is accessed from the east via the Carrownreddy road, which is a cul de sac accessed from the R661. An aerial overview of the existing site is shown in Figure 2-1 below.



Figure 2-1: Aerial Overview of Existing Site



The historical landfill consists of a mound which rises out of a natural hollow, part of which has been infilled with waste over the years. The land to the west, east and north is noticeably lower, with the mound of waste which is now mainly capped with spoil and rubble dropping suddenly towards the surrounding wetland at its edges.

The basin is fed from the west by the Fidaghta stream. Surface water accumulates in the basin surrounding the landfill mound, which is dominated by marsh and alder woodland.

The outflow from the eastern side of the wetland joins the course of the Spital-Land, this channel flows south, rather than north as depicted on hydrology mapping on the EPA Maps application. The Spital-Land is a small, slow flowing stream of relatively low capacity (wet width c. 0.6m depth c. 0.1m). The channel continues across a field to the south of the landfill, and is then culverted under Rosanna Close housing estate. The channel was not observed again, however topography indicates that it continues underneath the town and drains ultimately into the Ara River to the south. The Ara in turn joins the Aherlow, which flows into the Lower River Suir SAC c. 18.2 km downstream of the historical landfill site.

The soil underlying and surrounding the landfill mound is peat varying between 1-3m deep; beneath this, a stratum of clay forms an impermeable layer.





## 3. OVERVIEW OF THE CONSTRUCTION WORKS

### 3.1 Construction Period

The construction period for the proposed development has been estimated to be in the region of 6 to 8 months.

### 3.2 Construction Staffing and Machinery

It is estimated that approximately 20 construction staff will be tasked with implementing the works over the course of the construction phase and three 25 tonne excavators will be utilized for the reprofiling.

### 3.3 Construction Phase

The remediation works will include:

- Development of a temporary site compound on the proposed engineered capped development and a temporary office location removed from the engineered cap within the site boundary.
- Demolition of existing structures including an existing agricultural building, concrete walls and post and wire fencing.
- Clearance of vegetation and tree felling.
- Grading/Profiling of Existing Profile.

*Installation of an engineered landfill capping system to include: a landfill gas venting system, an LLDPE Barrier, a sub-surface drainage system, a geogrid layer, sub-soil and topsoil layers, a surface water drainage system, an access track and a shared access way to adjoining third party lands, fencing, a car park area, temporary works/mitigation measures security fencing, landfill gas/leachate management infrastructure, landscaping and an anchor trench/gas barrier.*

#### 3.3.1 Development of Temporary Site Compound and Office Area

The temporary site compound covering a plan area of c. 200 m<sup>2</sup> shall comprise a materials storage area on the proposed engineered cap footprint and site offices and a parking area (100 m<sup>2</sup>) removed from the engineered cap. The material storage compound will be founded on existing formations (comprising granular fill and concrete bases) located adjacent to the existing building on-site. Site offices in the form of portacabins for and site canteen/welfare facilities (contractor and employers representatives) will also be provided to the south west of the site (outside the footprint of the landfill area). The site offices and canteen/welfare facilities areas shall be founded on a small area that will be levelled, compacted and overlaid with gravel surfacing.

Waste from the welfare facilities will be stored in a temporary above ground tank prior to disposal at a licensed facility.

Power to the site will be provided via electricity mains. Generators will be used on-site to supplement power requirements where necessary during the temporary works. There is no water supply to the site presently. Water will be provided via road tanker. There is no foul drainage network present on-site. Where liquid wastewater is generated, this will be collected in a road tanker and sent off-site to an appropriately authorized wastewater treatment facility.



### 3.3.2 Demolition of Existing Structures including an Existing Agricultural Building, Concrete Walls and Post and Wire Fencing

Structures associated with the existing site usage will be demolished as part of the site works. Structures to be demolished will include the existing agricultural style portal frame building used for salt storage and the adjacent and on-site concrete walls and concrete post and wire fencing. All above ground structures will be demolished and dispatched to an appropriately authorized waste facility for management. Concrete bases and foundations will be retained, and the proposed cap will be constructed over same. Recovered steel materials will be disposed at a licenced facility for re-use.

### 3.3.3 Clearance of Vegetation and Tree Felling

A number of areas of dense vegetation which are situated centrally on-site will be cleared during the works. In addition tree lining situated along the northern and western perimeters of the site which consist of scrubland will be felled.

Preliminary surveys in May 2018 had identified the presence of invasive species at the site. Treatment and eradication of invasive species began in autumn 2018 and is currently ongoing. Monitoring is carried out on a bi-annual basis.

Following successful treatment of invasive species it is proposed to excavate materials containing roots, encapsulate them in a 0.7 mm visqueen barrier and to bury them with a minimum 2.0 m cover within a dedicated "fill" location within the waste body prior to placing the engineered cap.

### 3.3.4 Grading/Profiling of Existing Profile

The existing waste body was covered following cessation of waste filling, with an intermediate cap comprising of soil materials. The existing profile is uneven with steep side slopes.

The existing finished surface will require re-profiling to facilitate:

- Safe execution of the site remediation works
- Long term slope stability of side slopes
- Safe access for maintenance of the cap.

Re-profiling will principally involve the (shallow) cutting of material at the top of side slopes, at local high spots and of material containing invasive species. These "cut" materials will be used as "fill" in local depressions. All cut and fill works will be carried out within the site boundary.

Average side slopes will be profiled to a slope of 1:3. Side slopes will not be allowed to exceed 1:2.5. It is proposed to retain where possible the existing profiles, in particular those less than or equal to 1:2.5.

Thereafter imported granular "dust" material 50 mm to 100 mm thick will be used provide a formation for the engineered cap.

The re-profiled surface will be domed and designed to facilitate installation of the engineered cap.



### 3.3.5 Installation of Engineered Landfill Capping System

The engineered landfill cap “barrier” system will

- Isolate the waste body from rainfall inputs which might otherwise produce leachate. This will protect underlying ground water and adjacent surface waters.
- Minimise the potential for uncontrolled landfill gas migration to the atmosphere or adjacent lands.
- Provide a physical barrier between the finished surface and buried wastes.
- Facilitate controlled discharge of surface water runoff and sub surface drainage flows into the receiving surface waters.

The cap shall comprise and is described under the following headings:

- A passive below liner landfill gas venting system.
- A LLDPE barrier.
- A subsurface over liner drainage system discharging to a surface drainage system.
- A geogrid on side slopes to support soil on side slopes.
- A subsoil layer average thickness 850 mm.
- A topsoil layer average thickness 150 mm barrier.
- A surface drainage system discharging into the adjacent watercourses.
- Access track.
- Temporary works.
- Security fencing.
- Landfill gas and leachate infrastructure.
- Landscaping
- Anchor trench.

#### Passive Below Liner Landfill Gas Venting System

Currently landfill gas as may be present vents gas to atmosphere via diffuse surface emissions. Once the LLDPE barrier is installed this preferential pathway to atmosphere will be isolated.

Below the LLDPE barrier a gas collection geocomposite and pipework system will be constructed to collect and direct landfill gas as may be present to controlled venting outlets to allow venting and/or oxidation of landfill gas as may be present to atmosphere.

The below liner gas collection geocomposite will be a cusped synthetic product or similar that is rolled out above the granular “dust” material overlying the re-profiled intermediate cap which overlies the waste. The gas collection geocomposite forms a “cavity” to intercept gas emissions from the underlying body.

The gas will be transferred via a supporting pipework system to elevated locations around the site to allow monitoring and passive venting of landfill to atmosphere. The underliner gas collection pipework will also connect into existing monitoring boreholes installed within the waste body.



Venting of gas will, subject to gas flow and quality, be allowed to vent to atmosphere either via a carbon filter located on one or more pipe stacks terminating 3-4 m above ground level or via a surface mounted biological filter constructed on the 1.0 m cap. The carbon filter if used will prevent odours being vented to atmosphere. The biological filter if used will prevent odours being vented to atmosphere and will oxidise methane if present.

#### LLDPE Barrier

The LLDPE barrier will be a 1.0 mm thick “plastic” sheet that is impermeable to both water and gas. It will prevent gas escaping into the overlying soils and stops water from rainfall entering the underlying waste body.

The LLDPE sheets will be welded at joints.

#### Subsurface Drainage Over Liner Drainage System

The over liner sub surface drainage collection geocomposite will be a cusped synthetic product or similar that is rolled out above the LLDPE barrier. It will form a “cavity” to intercept rainfall inputs into the cap. Subsurface drainage flows from the drainage geocomposite will be transferred via a supporting pipework system to a surface drainage system at the toe of the cap and ultimately to the downstream watercourse.

#### Geogrid on Side Slopes

Following installation of the surface drainage geocomposites, a geogrid will be installed to support placement of subsoil materials on side slopes.

#### Subsoil Layer

Suitably sourced subsoils (850mm) will then be imported to the site and placed atop of the sub surface drainage geocomposite and /or geogrid on side slopes.

The purpose of the subsoil layer will be to protect the synthetic geocomposite materials and to support landscaping.

#### Topsoil Layer

Suitable sourced topsoil (150 mm) will be placed atop the sub soil. The topsoil will have stones greater than 50 mm diameter removed by a proprietary stone picker or similar prior to seeding.

#### Surface Drainage System

The topsoil will have shallow grassed surface drainage swales that will direct surface water runoff to the receiving watercourses. The swales shall be constructed at grades between 1:50 and 1:100 to mitigate the risk of erosion. Final swale locations will be subject to finished profiles and layouts shown on drawing are indicative.

#### Access Track

Placement of a 1.0 m thick cap requires a stable toe formation and placement of the subsoil materials must commence at the bottom of the side slopes and progress upwards in order to protect the integrity of the underlying synthetic materials.



The wetland area to the north of the landfill is currently unable to provide a stable formation for the 1.0 m thick cap. It is proposed to place c. 2,250 m<sup>3</sup> of granular fill over a separation membrane and geogrid above and within the existing wetland substrate to provide a stable formation for the cap and a perimeter track around the toe of the landfill to facilitate placement of imported capping materials. The track will be approximately 5.0 m wide; thickness will be approximately 1.0 m and length approximately 450 m long. The track finished profile will be at or below the existing water level depending on runoff flow from the cap and adjacent lands. In the event that prevailing site conditions do not support dumper trucks carrying soil materials, temporary works using sheet piles may be required, see below. This method of work has been selected to negate the need for excavating into the wetland in order to minimise disturbance and formation of suspended solids.

The new access track will

- Provide a foundation for side slope materials.
- Facilitate installation of the slit trench gas barrier.
- Facilitate placement of soil materials on the side slopes of cap.
- Facilitate access to and / or maintenance of the cap and adjacent wetland low flow channel (located outside the perimeter road) post cap construction.

Following re-profiling this 5.0 perimeter access track and adjacent works outside the fence will extend on average 10 m and up to a maximum of 15 m into the surrounding swamp (comprised of both reed and large sedge swamps [FS1] and wet willow-alder-ash woodland [WN6] Fossitt habitat types) from the base of the landfill mound. Vegetation on the existing side slopes and wetland will be cleared to facilitate construction of the engineered cap.

The access track will be constructed progressively above the wetland by placing aggregate on a separation membrane and allowing the track to settle onto the wetland minimising disturbance soils and resultant sediment mobilisation.

Fencing covering the perimeter of the access track and the southern section of the site will be developed on-site. A permanent parking area will be developed to the south of the site just past the site entrance.

A strip of land will also be acquired from land folio TY51557F and will be developed as an access way to facilitate permanent, shared and independent post construction access way to adjoining third party land folios TY278848 and TY51557F. This access way will be surfaced with a granular material.

### Temporary Works

Temporary settlement/silt ponds will be provided on-site during the works. Three settlement/silt ponds will be placed around the perimeter of the landfill side slopes and stockpiles of imported material over the course of the works.

Silt fencing will also be installed around the perimeter of the landfill side slopes to prevent the discharge of silt laden stormwater off-site.

The installation of temporary sheet piles may also be required along the northern perimeter of the work area, subject to prevailing site conditions, to facilitate drainage and placement of the engineered barrier materials, associated pipe infrastructure, gas barrier at the toe of the side slopes, fencing, access and placement of suitable soil fill on side slopes.



Sheet piles if used will require steel sheets 3 m to 5 m long will be placed and extracted using a 360-degree excavator with a vibrating head attachment or similar.

If excavations contain leachate, dewatering discharges will be directed to a temporary leachate holding tank in the form of an IBC which will be provided at the contractor's compound over the course of the works. These tanks will be regularly replaced once they become full. The contents of these tanks will be collected from the site as disposed of at an appropriately authorized wastewater treatment facility. A new tank will be placed.

It is not yet known whether dewatering is required, and if so, how much dewatering is required. If dewatering is required, water will be pumped into the onsite drainage network which will discharge to proposed temporary settlement ponds to remove suspended solids prior to discharge to receiving surface waters. If dewatering is required to remove surface water ingress from the adjacent swamp to facilitate placement of services, localised pumping may be required to pump water back into the swamp outside this sealed area.

Detailed design drawings showing the required mitigation measures to be adopted during the project will be developed. Mitigation measures, as required, will be installed prior to the commencement of works, as required.

### Security Fencing

Following placement of the cap a perimeter palisade fence 2.0 m high will be installed around the landfill footprint.

### Installation of Landfill Gas/Leachate Management Infrastructure

Existing wells within and external to the landfill footprint will be used to monitor gas and leachate qualities.

Existing wells will have a chamber atop the wells at the same elevation as the surrounding ground.

The EPA will require regular monitoring of landfill gas quality. Subject to gas quality at venting locations landfill gas will either be vented to atmosphere via a carbon filter, (most probable based on observed gas quality as of 2020) or vented to atmosphere via a biological filter if elevated methane concentrations are observed to increase following installation of the LLDPE barrier.

The activated carbon filter will remove odours if present.

### Landscaping

Figure 3-1 shows an artist's impression of the final cap. Post capping and placement of the subsoils and topsoil layers it is proposed to landscape the site using an amenity wildflower grass cover. The cap will also make provision for an internal hardcore track to facilitate access to the perimeter track at the toe of the landfill and a small parking area for council staff conducting maintenance and monitoring as may be required.

Grass will be used to prevent erosion of the soils and to provide an attractive final appearance similar to surrounding land use.

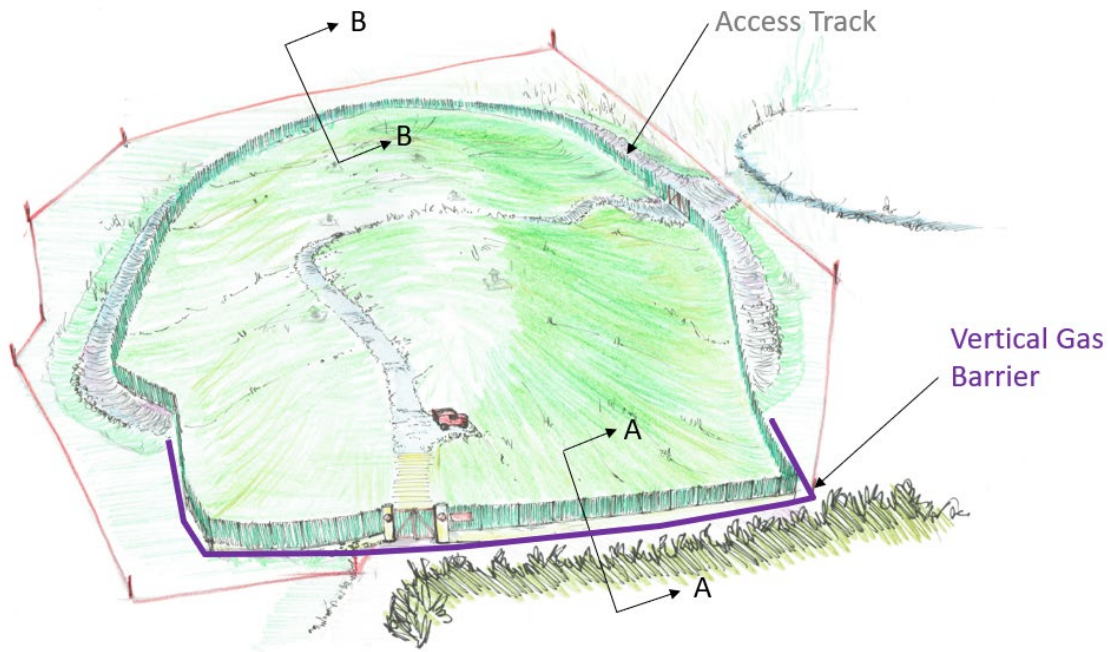


Figure 3-1: Artist Impression of the Proposed Development

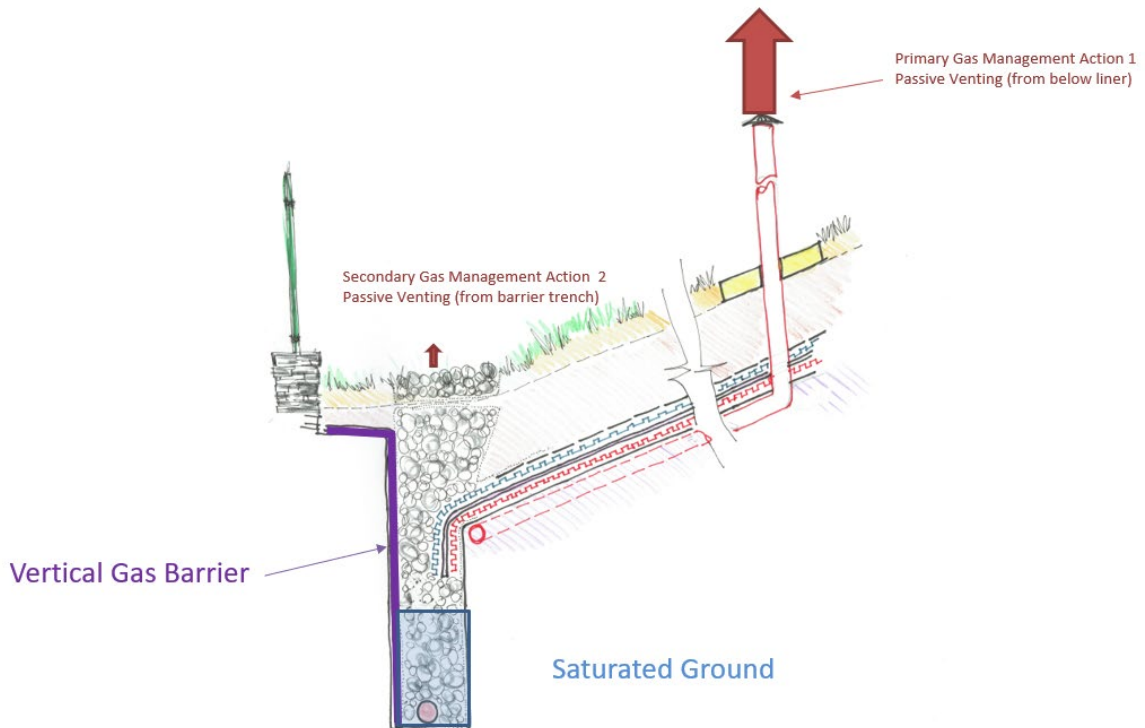
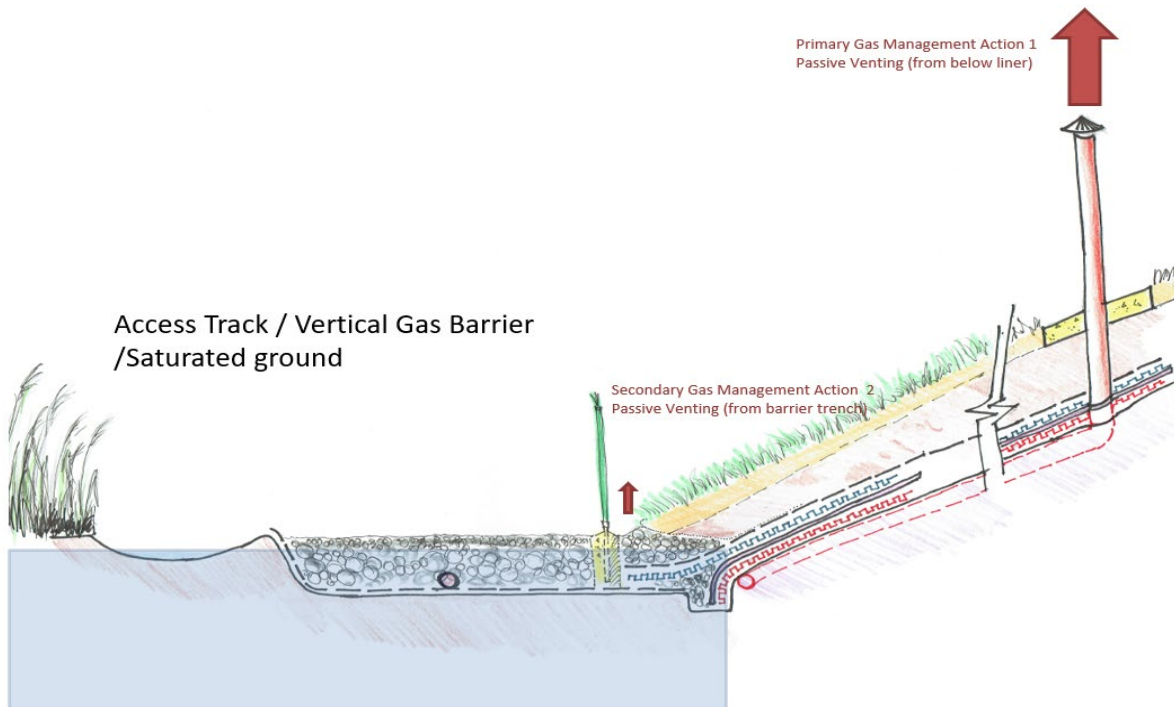


Figure 3-2: Artist Impression Section AA at front of site





**Figure 3-3: Artist Impression Section BB at back of site**

#### Installation of Anchor Trench/Gas Barrier

Figure 3-2 shows a typical section AA through the toe of the landfill side slope at the front of the site. It will comprise: an anchor trench, a gas barrier and a perimeter boundary fence. The section shows that the primary gas mitigation measure will be to intercept gas using the underliner gas collection geocomposite and to convey this gas via a pipe system to elevated points on the landfill for passive venting via a carbon filter. This system provides a preferential path for landfill gas venting.

The water at the base of the perimeter boundary fence will also provide a barrier to off-site gas migration.

The anchor trench will be required around the boundary of the entire landfill to anchor the proposed engineered cap. The depth of the anchor trench will typically be 600 mm. The anchor trench will also contain gas collection pipework below the LLDPE barrier and subsurface drainage pipework above the LLDPE barrier.

The gas barrier “slit” trench is a secondary “insurance” gas mitigation measure. It is a perimeter venting trench with a LLDPE vertical gas barrier located on the outside of the perimeter trench. This “insurance” measure is a backup to mitigate further the risk of gas migration off site in the unlikely event that the passive under liner gas system becomes compromised. The “slit” trench excavation inverts will vary between 1 and 3 m below existing ground level and will be filled with stone and allowed to become saturated with water.

Figure 3-3 shows a typical section at the toe of the landfill side slope at the rear of the site. At this location groundwater is at or close to the surface. The perimeter track post construction is designed to saturate the base of the perimeter slit trench with water. Water with a free surface to atmosphere allows venting of landfill gas to atmosphere and acts as a natural barrier mitigating the risk of off-site landfill gas migration.





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### 3.4 Construction Working Hours

The hours of construction activity will avoid unsociable hours and will be agreed with the planning authority in advance of site start. It is anticipated that this will restrict working hours at the site during the construction phase to be limited to 07:00 to 19:00 Monday to Saturday inclusive. Work on Sundays or public holidays will only be conducted in exceptional circumstances and subject to prior notification insofar as possible with the local community.





## 4. ENVIRONMENTAL MANAGEMENT PLAN

### 4.1 Introduction

This Environmental Management Plan (EMP) defines the project obligations, Environmental Management System (EMS) and environment mitigation measures relating primarily to the construction phase of the proposed works.

This EMP describes how the Contractor for the construction works will implement a site Environmental Management System (EMS) on this project to meet the specified contractual, regulatory and statutory requirements and mitigation measures. This plan will be further developed and expanded following the grant of planning permission and appointment of the Contractor for the construction works. Please note that some items in this plan can only be finalised with appropriate input from the Contractor who will carry out the construction works and once the planning conditions attached to any grant of planning are known. It will be the Contractor's contractual responsibility to implement an effective environmental management system to ensure that the Boards **environmental** requirements for the construction of this project are achieved.

All site personnel will be required to be familiar with the environmental management plan's requirements as related to their role on site. The plan describes the project, sets out the environmental procedures that will be adopted on site and outlines the key performance indicators for the site.

- The EMP is a controlled document and will be reviewed and revised as necessary.
- A copy of the EMP will be located at the Contractors site office.
- All employees, suppliers and Contractors whose work activities cause/could cause impacts on the environment will be made aware of the EMP and its contents.

### 4.2 Project Obligations

During the remediation phase of the proposed development several environmental management obligations must be implemented and achieved by Tipperary County Council and the Contractor. In addition to statutory obligations, there are several specific obligations set out in the accompanying Natura Impact Statement (NIS). When development consent is granted, there is also likely to be planning conditions, with which Tipperary County Council must comply. The CEMP will be reviewed and updated, if required, following any grant of permission. The Contractor and all of its sub-Contractors will be made fully aware of and be contractually required to adhere to all environmental obligations.

#### 4.2.1 NIS Obligations

The accompanying NIS which is provided under a separate cover, identifies measures that will be put in place to mitigate the potential environmental impacts arising from the construction phase of the proposed project.

#### 4.2.2 Planning Permission Obligations

Should the remediation works be consented by An Bord Pleanála, the planning conditions will be complied with and should be read in conjunction with the project CEMP and other related reports prepared by and on behalf of Tipperary County Council.



#### 4.2.3 Other Obligations

The Contractor will liaise directly with Tipperary County Council and An Garda Síochána in relation to securing any necessary permits to allow the works to take place including for example (non-exhaustive list):

1. Commencement notice;
2. Special Permits in relation to oversized vehicles on public roads, if required.

Tipperary County Council will continue to liaise closely with the local residents, especially near neighbours and landowners in relation to works and all reasonable steps will be taken to minimise the impact of the development.

### 4.3 Environmental Management System

The Environmental Management System (EMS), is outlined in the sections below.

#### 4.3.1 Environmental Policy

The Contractor is responsible for preparing and maintaining an Environmental Policy for the site. The policy should be appropriate to the project, commit to continuous improvement and compliance with legal requirements and provide a framework for objectives and targets. This will be communicated to all site personnel and will be available on-site notice boards.

#### 4.3.2 Training, Awareness and Competency

All site personnel will receive environmental awareness information as part of their initial site induction and briefing. The detail of the information should be tailored to the scope of their work on site. The Contractor for the construction works may decide to conduct the environmental awareness training at the same time as health and safety training (often referred to as Site Inductions).

This will ensure that personnel are familiar with the environmental aspects and impacts associated with their activities, the procedures in place to control these impacts and the consequences of departure from these procedures.

The CEMP will be retained in the site management office during the project. The environmental performance at the site will be on the agenda of the monthly project management meetings for the project.

Elements of the CEMP will be discussed at these meetings including objectives and targets, the effectiveness of environmental procedures, etc. Two-way communication will be encouraged by inviting all personnel to offer their comments on environmental performance at the site.

#### 4.3.3 Register of Environmental Aspects

The Contractor is responsible for preparing and maintaining a Register of Environmental Aspects pertaining to the site. This register will identify the environmental aspects associated with activities onsite and determine which aspects have or can have a significant impact on the environment. Risks and Opportunities associated with environmental aspects will be identified. Life-cycle impacts (I.e. upstream and downstream impacts) will be identified if present.



#### 4.3.4 Register of Legislation

The Contractor is responsible for preparing and maintaining a register of key environmental legislation pertaining to the site. This register will reference all current environmental legislation and will be inspected, reviewed and updated regularly to ensure compliance.

#### 4.3.5 Objectives and Targets

Objectives and targets are required to be set to ensure that the project can be constructed and operated in full accordance with the NIS, planning conditions and legislative requirements, with minimal impact on the environment.

Environmental objectives are the broad goals that the Contractor must set in order to improve environmental performance. Environmental targets are set performance measurements (key performance indicators or KPI's) that must be met in order to realise a given objective.

The Contractor will set objectives based on each significant environmental impact. Key objectives are likely to include the following:

- To ensure that nearby rivers and streams are not negatively impacted by construction works.
- To ensure that humans are not negatively impacted by dust generated by construction works.
- To ensure that humans are not negatively impacted by noise generated by construction works.
- To ensure that impacts to habitats and wildlife are minimised during works.
- To ensure that a waste management plan for this site will be fully implemented.
- To ensure that the visual impact during the construction work is minimised.
- To ensure that the proposed development is constructed in compliance with the EIAR.

Performance in relation to each of these objectives will be reviewed on a regular basis by means of inspections, audits, monitoring programmes, etc.

#### 4.3.6 Non-Conformance, Corrective and Preventative Action

- Non-conformance notices will be issued in the following cases:
- Where site activities do not conform with the requirements of the EMS.
- Where environmental monitoring shows that there is a breach of an emission limit value or Environmental Quality Standard on-site.
- Where there is a breach of an EPA condition imposed under the EPA's CoA for the site.
- Where there is a complaint relating to site activities.

Non-conformance is the situation where essential components of the EMS are absent or dysfunctional, or where there is insufficient control of the activities and processes to the extent that the functionality of the EMS in terms of the policy, objectives and management programmes, is compromised. A non-conformance register should be controlled by the Contractor.

The EMS and all its components must conform to the EMP, objectives and targets and the requirements of the ISO 14001 management standard.



In the event of non-conformance with any of the above, the following must be undertaken:

- Investigate cause of the non-compliance.
- Develop a plan for correction of the non-compliance.
- Determine preventive measures and ensure they are effective.
- Verify the effectiveness of the correction of the non-compliance.
- Ensure that any procedures affected by the corrective action taken are revised accordingly.

Responsibility must be designated for the investigation, correction, mitigation and prevention of non-conformance.

#### Internal Audits

Periodic Internal Audits will be carried out under the EMS to ensure that all site activities conform to the requirements of the EMS. Non-conformances identified during Internal Audits will be addressed by way of the Non-conformance management process detailed above. Opportunities for Improvement identified during Internal Audits will be communicated to relevant responsible personnel.

#### 4.3.7 EMS Documentation

The Contractor is required to keep the following documentation in relation to the environmental management of the project (as a minimum):

- Construction Environmental Management Plan for the proposed development
- Register of Environmental Aspects/Impacts
- Register of Planning Conditions
- Monitoring Records
- Minutes of Meetings
- Training Records
- Audit and Review Records

All of these documents and records are to be available for inspection in the site office. The documentation shall be up to date and shall be reviewed on a regular basis with revisions controlled in accordance with the site quality plan.

It will be a requirement to develop and maintain a Management and Monitoring programme in accordance with Condition 3 of the CoA for the site.

#### 4.3.8 Control of Documents

The Contractor will establish, implement and maintain a procedure to control CEMP documents and records so they are clearly identifiable, organised, current, easily located and revised when necessary.



## 4.4 Ecological Management Plan

FT was commissioned on behalf of Tipperary County Council to undertake an Appropriate Assessment Screening and Natura Impact Statement which accompany the application for the proposed landfill remediation.

The ecology appraisal involved a field assessment and a desktop review of relevant data available for the study site and locality.

### 4.4.1 Designated Sites

Potential impacts on European sites are considered in the Natura Impact Statement accompanying the Planning Application.

### 4.4.2 Habitats

The habitat types (according to the Fossitt, 2000 classification system) identified during the ecological surveys conducted at the site on the 3rd May of 2018 and the 2nd of June 2020 are outlined below.

#### *Improved agricultural grassland (GA1)*

Improved agricultural grassland (GA1) is present in several fields bounding the landfill mound. Species recorded included perennial rye-grass *Lolium perenne*, dandelion *Taraxacum* Agg., creeping thistle *Cirsium arvense*, meadow buttercup *Ranunculus acris*, docks *Rumex* spp. and ribwort plantain *plantago lanceolata*. The fields to the east and south of the landfill are used to graze horses, rather than the more widespread and intensive land use associated with dairy production.

#### *Dry meadows and grassy verges (GS2)*

Sections of the landfill mound support this habitat type, with cock's foot *Dactylis glomerata* and false oat-grass *Arrhenatherum elatius* dominating. Creeping and meadow buttercup *R.repens* and *R.acris*, dandelion, and nettle *Urtica dioica* were also present. The ground in these areas is more level and less disturbed than in other areas of the landfill.

#### *Wet grassland (GS4)*

A low-lying portion of the field bounding the south-eastern corner of the landfill which fringes swamp supports vegetation more characteristic of wet grassland (GS4), with yellow iris *pseudacorus*, cuckooflower *Cardamine pratensis* and hard rush *Juncus inflexus* recorded in this area.

#### *Improved agricultural grassland/Recolonising bare ground (GA1/ED3) Mosaic*

Spoil has been deposited over a large area to the east of the reed swamp fringing the eastern side of the landfill. This has raised the level of the land creating open fields with a densely compacted and dry topsoil. Perennial rye-grass, docks, ribwort plantain and daisy *Bellis perennis*, species commonly found in agricultural habitats were recorded. Rye-grass indicates re-seeding for agriculture, and close cropped sward and heavy poaching indicates the area is used to graze horses. The recolonising bare ground element is evident in the compacted soil surface and sparseness of vegetation present.

#### *Drainage ditches (FW4)*

The channel mapped flowing from south-west (channel to east of landfill) to north-east is not a stream. The channel is wide, with little to no flow of water, and is dominated by marsh vegetation; bulrush *Typha liatifolia*, with fool's watercress *Apium nodiflorum* in shallower fringing areas is the dominant vegetation type.



This channel is also impeded at one point by an earth bridge linking the two fields of improved agricultural grassland/recolonising bare ground (GA1/ED3) mosaic described above. To the south-west of this point, water from this drainage ditch flows south-west to join a flow of water exiting the swamp surrounding the landfill, which flows south-east and then south along the course of the channel mapped as the Spital-land. As previously noted the actual direction of flow for this channel is in a north-south direction the opposite direction to that indicated in EPA hydrology mapping.

The outflow of the swamp to the east joins the Spital-land channel to flow south-east before being culverted under the landfill access road, and continuing south-east through agricultural land. The stream then enters a culvert at the edge of a housing estate, and from this point on flows underground. The drain emerges again to the south of Tipperary Town before entering the River Ara.

The channel has a sandy/muddy substrate and is overshadowed by a hedgerow made up of elder *Sambucus nigra*, alder *Alnus glutinosa* and hawthorn *Crataegus monogyna* along part of its length. Nettles *Urtica dioica* and ivy *Hedera helix* fringe the banks along this stretch. The remainder of the channel running through agricultural land is more open, with only occasional short sections of hedgerow fringing.

Hard rush and fool's watercress are common along banks on this section. The channel is shallow, with gently sloping banks allowing access for livestock.

A second drainage channel on the western side of the landfill feeding into the swamp surrounding the landfill is also present. This channel runs from south east to north west and was dry during surveys. It drains the surrounding agricultural land into the swamp.

#### *Lowland/depositing rivers (FW2)*

The swamp is fed by a short watercourse named the Fidaghta which runs downhill from the west for c. 260m before entering the swamp surrounding the landfill at its western end. This channel is fringed by a hedgerow along its length.

#### *Reed and large sedge swamps FS1*

The areas of standing water around the landfill mound are dominated by bulrush *Typha latifolia* and yellow flag *Iris pseudacorus*; marsh horsetail *Equisetum palustre* was present in many areas, greater tussock sedge *Carex paniculata* was locally common. Meadowsweet *Filipendula ulmaria* was present in fringing areas, and a shallow outlying area at the southwestern corner of the swamp was dominated by bogbean *Menyanthes trifoliata*.

Duckweed *Lemna* sp. forms a film over areas of open water. The characteristic swamp vegetation present within these areas is indicative of permanent waterlogging and represents a relatively undisturbed natural habitat.

#### *Wet willow-alder-ash woodland (WN6)*

Parts of the swamp support small areas of woodland dominated by alder *Alnus glutinosa*, with willow *Salix* sp. occasional in the interior, and more common around the edges. The reed and large sedge swamp vegetation as described above is present under the trees in these areas; marsh marigold *Caltha palustris* was common in some areas shaded by trees.

Similarly, to the swamp habitat described above, these areas of wet woodland represent natural habitats of higher ecological value.





### *Treelines/ Hedgerows (WL1/WL2)*

The linear boundaries separating agricultural fields surrounding the site are marked by hedgerows and/ or treelines, with tree species including ash *Fraxinus excelsior*, alder, and hawthorn *Crataegus monogyna*, being common. Bramble *Rubus fruticosus* Agg., ivy *Hedera helix* and dog rose *Rosa canina* occurring in the understory.

### *Scrub (WS1)*

Areas of scrub have developed on parts of the landfill mound, both on top, and on the steep banks running down to the surrounding land. Willow is the main constituent, with bramble and the non-native invasive butterfly bush *Buddleija davidii* also being common.

### *Spoil and bare ground ED2*

An area of sparsely vegetated bare ground is present near the entrance to the landfill site; soil, gravel, and demolition waste form the surface, with occasional plants including hairy bittercress *Cardamine hirsuta*, red dead nettle *Lamium purpureum*, wild turnip *Brassica napa*, and cornsalad *Valerianella locusta* present.

### *Recolonising bare ground/ Spoil and bare ground (ED2/ED3) Mosaic*

Parts of the landfill mound are covered in a mosaic of recolonising bare ground as well as spoil and bare ground. These habitats are the result of historical soil dumping and disturbance, as well as ongoing disturbance. A large number of ruderal, generalist and colonising species are present including colt's foot *Tussilago farfara*, ragwort *Senecio jacobaea*, ground elder *Aegopodium podagraria*, teasel *Dipsacus fullonum*, yarrow *Achillea millefolium*, dandelion *Taraxacum* Agg., spear thistle *Cirsium vulgare*, herb-robert *Geranium robertianum* and ribwort plantain *Plantago lanceolata*.

A number of non-native invasive plant species are also present, with areas of winter heliotrope *Petasites fragrans* and Japanese knotweed *Fallopia japonica* onsite. Butterfly bush *Buddleija davidii* is also common.

Himalayan honeysuckle *Leycesteria Formosa*, old man's beard *Clematis vitalba* and snowberry *Symphoricarpus albus* are also present.

### *Scrub/ Recolonising bare ground (ED3/WS1) Mosaic*

Part of the landfill mound supports a mosaic of these habitat types as described above, with the lack of coherent and adequately sized areas of one type making mapping of individual types unfeasible.

### *Buildings and artificial surfaces BL3*

The concrete yard areas and corrugated metal building at the historical landfill site entrance conform to this habitat type.

#### 4.4.3 Invasive Species

As previously noted, a number of invasive species are present onsite. A number of these are currently subject to ongoing eradication measures. These measures which commenced in autumn 2018 are being carried out by Invasive Plant Solutions Ltd. on behalf of Tipperary County Council.



A number of Japanese knotweed stands are present. These are currently being stem-injected twice per year (at the beginning and end of the growing season). As of June 2021, most areas showed no signs of regrowth following 4 rounds of treatment. The exceptions were growth of several small shoots near one area, growth of larger stems (to 2m) in a 25 x 25 cm area within a treated stand, and several small patches of regrowth within the large stand at the south-western corner outside the site. Japanese knotweed is legally restricted (Schedule III listed) and as such cannot be spread or removed from the site except under licence.

Winter heliotrope is present at five locations. A total of five of these are confirmed to be undergoing treatment as of June 2021.

Butterfly bush is present at nine locations. This species is not currently subject to treatment measures.

Snowberry is present at one location and is not currently subject to treatment measures.

Two species were newly recorded in autumn 2018 and 2019, (respectively) Himalayan honeysuckle *Leycesteria Formosa* and old man's beard *Clematis vitalba*. These are still present as of June 2021.

A total of three invasive species have been eradicated since the original survey in 2018: Spanish bluebell, cherry laurel and montbretia. As Spanish bluebell is Schedule III listed and therefore cannot be removed from the site without a licence, excavated plant material is being retained onsite in secure containers. Other potentially invasive plant material is being stored and disposed of according to best practice by an invasive plant control specialist.

#### 4.4.4 Construction/Operational Stage Mitigation Measures

##### *Mitigation by Avoidance and Design*

The following measures have been undertaken at the planning stage of the project to reduce effects on designated sites through avoidance and design:

- Landfill side slopes no steeper than 1:2.5 and swale drainage system to mitigate the risk of erosion,
- Access track construction methodology to reduce suspended solids generation and prevent off-site landfill gas migration,
- Ongoing Invasive Species Management.

##### *Landfill Side Slopes*

Landfill side slopes are to be re-profiled such that they will not be steeper than 1:2.5. This is to facilitate access for maintenance and to mitigate the risk of rotational slope instabilities and erosion.

To mitigate the risk of translational instability (cap subsoil materials sliding off the barrier LLDPE membrane):

- An access track in the wetland, see below, will be provided to provide a foundation upon which the cap toe can be founded, and
- Geogrids were selected to provide support to facilitate placement of soils overlying synthetic materials on steep side slopes. Geogrids were selected to avoid the need to excavate large volumes of waste materials to provide stable slopes upon which an engineered cap could be placed.



To mitigate the risk of erosion on steep side slopes:

- Shallow surface water swales will be constructed at flat longitudinal slopes to reduce the risk of rill and gully erosion that might increase suspended solids and or compromise cap integrity during the aftercare period.

### *Access Track Installation*

A perimeter access track in the wetland is required to facilitate import of material and to provide a foundation upon which the cap can be constructed. The perimeter track was also designed to encourage water to enter the perimeter boundary cut-off gas venting trench. Water provides a barrier to landfill gas migration.

The perimeter access track will be constructed using a methodology designed to minimise the need for excavation thereby reducing the generation of suspended solids. Granular fill will be placed above the existing wetland substrate on a separation membrane and geogrid.

This methodology has been selected to negate the need for further excavation into the wetland for perimeter access track construction in order to minimise disturbance and formation of suspended solids.

In addition, access track construction shall use granular blocky aggregate with minimal fines. This will minimise the potential for the access track to generate suspended solids.

### *Invasive Species Management*

Invasive species control and eradication measures are currently being implemented on site, in accordance with the invasive species management plan (contained within Appendix 2). Monitoring of invasive species stands is undertaken on a bi-annual basis to assess the progress of these measures.

#### 4.4.5 General Mitigation Measures

The following general mitigation measures will be adopted and implemented on-site to minimize potential impact on ecological receptors.

A suitably qualified person will be appointed to ensure the effective operation and maintenance of mitigation measures during the construction process.

- Soil stockpiles will not be stored on the slopes or the toe of the mound;
- Compact surface of stored soils during reprofiling and capping works;
- Weather forecasts will be reviewed on a daily basis and earthworks will not be undertaken during periods of heavy rainfall.
- Silt fencing shall be located adjacent to all water courses and at the toe of the landfill side slopes.
- A series of silt fences shall be securely placed within the outflow channel draining the wetland to the east of the landfill. These shall be installed prior to any works. Straw bales will be incorporated into silt barrier closest to landfill if this does not cause excessive water retention.
- Temporary on-site silt ponds will be provided to allow settlement of suspended solids prior to runoff exiting the works area. These are to be constructed prior to commencement of remediation works.



- Dewatering flows from excavations will be managed to prevent elevated suspended solids entering the watercourse by use of temporary dedicated settlement ponds. Discharges into the onsite drainage network will only take place after silt fencing has been installed.
- If excavations contain leachate, dewatering discharges will be directed to a holding area and retained within the waste body or removed offsite and disposed of at a licensed facility.
- To construct the perimeter access track, granular fill will be placed above the existing wetland substrate on a separation membrane and geogrid. This methodology has been selected to negate the need for excavating into the wetland in order to minimise disturbance and formation of suspended solids.
- Access track construction shall use granular blocky aggregate with minimal fines.
- A silt screen shall be constructed at the toe of the reprofiled slopes to prevent silt entering adjacent watercourses.
- Any other diesel, fuel or hydraulic oils stored on site will be stored in bunded storage tanks – the bund area will have a volume of at least 110 % of the volume of such materials stored.
- Refueling of plant during construction will only be carried out at a designated bunded refueling station located within the proposed site compound.
- Appropriate spill control equipment, such as oil soakage pads, will be kept within the construction area and in each item of plant to deal with any accidental spillage.
- Portaloos and / or containerised toilets and welfare units will be used to provide toilet facilities for site personnel. Sanitary waste will be removed from site by a licensed waste disposal contractor.
- Existing invasive species management undertaken in line with the invasive species management plan shall continue during remediation works as required.
- An invasive species specialist or qualified ecologist will supervise cordoning and ongoing eradication of any invasive species present at the time of construction.
- A 7 m exclusion zone\* around Japanese knotweed growths will be cordoned off prior to construction. *\*[conditional on treatment]. If current treatment is successful in eradicating Japanese knotweed and 2 consecutive years with no growth of this species is recorded onsite prior to construction the 7m buffer can be discarded.*
- Soil infested with Japanese knotweed including an area of 7m\* surrounding growths shall be excavated to a depth of 1-3m as required. Excavated material shall be encapsulated in a 0.7 mm thick plastic membrane and a minimum cover of 2.0 m of soil above which the cap shall be constructed will be provided.
- As such all Japanese knotweed material will remain onsite. *\*[conditional on treatment] If current treatment is successful in eradicating Japanese knotweed and 2 consecutive years with no growth of this species is recorded onsite prior to construction the 7m buffer can be discarded.*
- Any stockpiled Japanese knotweed material awaiting burial will be stored securely and covered within designated cordoned areas.
- All machinery used to carry out Japanese knotweed eradication measures will be visually checked and washed down thoroughly. Potentially contaminated runoff will be collected, treated and any potentially contaminated residual material will be interred with the main body of contaminated material (residual material should also be encapsulated).
- Silt fences downstream of the landfill will be checked for Japanese knotweed material during and after eradication measures.



- Current invasive species monitoring (and treatment where required) will continue during the Operational / Post Construction Phase until two consecutive years where no invasive species are recorded onsite or immediately adjacent is achieved.
- Grassed water ways constructed at slopes to prevent erosion shall discharge surface and sub surface runoff flows to receiving water via the access track. No excavation of these waterways shall be undertaken and maintenance works will be limited to mowing only.
- There may be a requirement to locally mow the low flow drainage channel adjacent to the perimeter road to provide a preferential drainage path. If mowing is carried out grass clippings should be removed immediately to prevent nutrient inputs to the downstream catchment.
- The capped surface will be vegetated post-construction to prevent the generation of silted runoff.
- Post construction the LLDPE barrier will provide an engineered barrier that will isolate the waste body from rainfall inputs and prevent leachate production that might otherwise contaminate groundwater.

## 4.5 Noise, Vibration, Dust and Air Quality Management Plan

### 4.5.1 Existing Site

The historical landfill site is in the townland of Carrownreddy immediately north of Tipperary town, partially within a wetland surrounded by agricultural lands adjacent to the town. The site is accessed from the east via the Carrownreddy road, which is a cul de sac accessed from the R661.

The historical landfill consists of a mound which rises out of a natural hollow, part of which has been infilled with waste over the years. The land to the west, east and north is noticeably lower, with the mound of waste which is now mainly capped with spoil and rubble dropping suddenly towards the surrounding wetland at its edges.

### 4.5.2 Potential Impacts During the Construction Phase

Noise from the construction phase would arise from deliveries and/or removal of material to and from site, top-soil excavation, preparation of access roads and drainage, concrete mixing and pouring of foundations where necessary.

Dust emissions arise when particulate matter becomes airborne making it available to be carried downwind from the source. Dust emissions can lead to elevated PM10 and PM2.5 concentrations and may also cause dust soiling.

The amount of dust generated and emitted from a working site and the potential impact on surrounding areas varies according to:

- The type and quantity of material and working methods;
- Distance between site activities and sensitive receptors;
- Climate/local meteorology and topography.



The principal sources of potential air emissions during the construction of the proposed development include:

- Dust arising from earthworks
- Dust arising from the movement of construction vehicles over land as well as the transporting of materials to the site of the proposed development.
- Dust arising from the temporary storage of any excavated materials and wind blowing over unprotected, unconsolidated soils.
- Dust arising from uncovered truckloads, the movement of material around the site and the loading and unloading of aggregates and of materials within the site.
- Pollutants arising from temporary diesel generators.

#### 4.5.3 Construction Stage Mitigation Measures

During the construction phase there is potential for increased ambient noise levels and potential temporary impacts at dwellings north east and west of the site during the preparation of access roads and drainage. If noise emissions from these activities are an issue, the scheduling of construction activity will be addressed such that durations of construction activity likely to exceed the 65 dB LAeq,1hr noise limit do not occur simultaneously with other construction activity.

Generally, construction works will be carried out in accordance with best practice and in line with recommendations contained within BS 5228-1:2009+A1:2014.

To mitigate against the impacts of noise on the local community during construction, the following specific measures are proposed:

- A pre-construction commitment to managing noise levels will be agreed through notification and consultation with affected parties, if deemed necessary.
- Working hours at the site during the installation phase will be limited to 07:00 to 19:00 Monday to Saturday inclusive. Work on Sundays or public holidays will only be conducted in exceptional circumstances and subject to prior notification insofar as possible with the local community.
- Construction contractors will be required to comply with the requirements of the European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations, 1988 as amended in 1990 and 1996 (S.I. No. 320 of 1988, S.I. No. 297 of 1990 and S.I. No. 359 of 1996), and the Safety, Health and Welfare at Work (Control of Noise at Work) Regulations, 2006 (S.I. No. 371 of 2006).

The main control measures will involve control of noise at source measures using the following methods in line with Clause 8 'Control of noise' of BS 5228-1:2009+A1:2014:

- Operators of all mobile equipment will be instructed to avoid unnecessary revving of machinery (Clause 8.2.1 General).
- Use of appropriate plant and equipment where possible with low noise level generation where possible (Clause 8.2.2 Specification and substitution).
- All construction plant to be used on site should have effective well-maintained silencers (Clause 8.2.3 Modification of existing plant and equipment).
- Noise generating equipment will be located as far as possible away from local noise sensitive areas identified (Clause 8.2.5 Use and siting of equipment); and



- Regular and effective maintenance of site machinery including a full maintenance schedule to ensure that all pieces of equipment are in good working order. With efficient use of well-maintained mobile equipment, considerably lower noise levels than those predicted can be attained (clause 8.2.6 Maintenance).

In addition, the following best practice measures are proposed:

- Training of site staff in the proper use and maintenance of tools and equipment.
- Avoidance of unnecessary noise when carrying out manual operations and when operating plant and equipment.
- Machines that could be in intermittent use will be shut down between work periods or will be throttled down to a minimum.
- Plant start-up will be sequential rather than all together.
- Internal access tracks to be well maintained.
- Plant known to emit noise strongly in one direction will, when possible, be orientated so that the noise is directed away from noise-sensitive locations.

Drop heights for materials such as gravels will be minimised whenever practicable.

Mitigation measures to reduce dust nuisance and to minimise impact on air quality will be employed during the construction phase of the project. These mitigation measures will include the following:

- The Contractor or equivalent must monitor the contractors' performance to ensure that the proposed mitigation measures are implemented, and that dust impacts and nuisance are minimised.
- The applicant, in association with the contractor for the main civil works, will be required to produce and implement a Dust Control Plan. This plan will address all aspects of the development including excavations, access roads and temporary stockpiling. The plan will be prepared prior to any construction activities and will be established and maintained through the construction period.
- The drop height of materials will be minimised to a practicable level, to limit fugitive dust generation.
- Gravel will be used at site exit points to remove possible caked on dirt from tyres and tracks before travelling along public roads.
- The site supervisor will undertake daily visual inspections to examine dust generation.
- The working area will be kept as small as possible so as to minimise potential dust generation.
- To suppress the migration of dust from site, a water bowser will be available to spray work areas and access roads, especially during periods where excavation works coincide with dry periods of weather or existing activities.
- All loads with potential to cause dust nuisance will be covered using strong, waterproof sheets such as tarpaulin sheets and will not be overloaded. This will minimise the potential for fugitive emissions during transport. All other stockpiles will be kept damp and covered to prevent windblown dust emissions.
- Construction vehicles and plant will be routinely serviced to minimise the exhaust emissions during construction. Vehicles will not be left running unnecessarily and low emission fuels will be used where possible.





## 4.6 Surface Water Management Plan

### 4.6.1 Adjacent Watercourses:

The basin in the landfill is fed from the west by the Fidaghta stream. Surface water accumulates in the basin surrounding the landfill mound, which is dominated by marsh and alder woodland. Part of the area now occupied by the landfill is shown on historical 6 inch mapping (1837 – 1842) as a waterbody with emergent vegetation called Carrownreddy Lough.

EPA hydrology mapping depicts the Fidaghta stream continuing east from the eastern side of the wetland and being joined by the Spital-land stream flowing north from the town. Surveys onsite have confirmed this is not the case and the Spital-Land drain does not flow into the Fidaghta but instead flows south to join the River Ara.

The outflow from the eastern side of the wetland joins the course of the Spital-land watercourse, but this channel flows south, rather than north as depicted on EPA hydrology mapping. The Spital-land is a small, slow flowing channel of relatively low capacity (wet width c. 0.6m depth c. 0.1m). The channel continues across a field to the south of the landfill and is then culverted for c. 1 km before emerging from under the N24 in the south-eastern part of Tipperary Town.

The channel then flows along a field boundary for c. 100 m before entering the Ara River to the south. The Ara in turn joins the Aherlow, which flows into the Lower River Suir SAC c. 18.2 km downstream of the historical landfill site.

### 4.6.2 Proposed Drainage

The topsoil will have shallow grassed surface drainage swales that will direct surface water runoff to the receiving watercourses. The swales shall be constructed at grades between 1:50 and 1:100 to mitigate the risk of erosion. Final swale locations will be subject to finished profiles and layouts shown on drawing are indicative.

The proposed subsurface and surface water drainage system can be found in planning drawing P0563-0500-0001.

### 4.6.3 Construction Stage Impact and Mitigation

The impact of the remediation works during the construction phase is not significant for hydrology and water quality. However, the following mitigation measures to reduce potential impacts during the construction stage are outlined below:

- Weather forecasts will be reviewed on a daily basis and earthworks will not be undertaken during periods of heavy rainfall.
- The contractor will be contracted to ensure the effective operation and maintenance of drainage and other mitigation measures during the construction process. The operations management of the subject development will include regular monitoring of the drainage system and maintenance as required.
- Silt fencing shall be located adjacent to all water courses and at the toe of the landfill side slopes.
- A series of silt fences shall be securely placed within the outflow channel draining the wetland to the east of the landfill. These shall be installed prior to any works. Straw bales will be incorporated into silt barrier closest to landfill if this does not cause excessive water retention.
- Temporary on-site silt ponds will be provided to allow settlement of suspended solids prior to runoff exiting the works area. These are to be constructed prior to commencement of remediation works.





- Dewatering flows from excavations will be managed to prevent elevated suspended solids entering the watercourse by use of temporary dedicated settlement ponds. Discharges into the onsite drainage network will only take place after silt fencing has been installed.
- If excavations contain leachate, dewatering discharges will be directed to a holding area and retained within the waste body or removed offsite and disposed of at a licensed facility.
- A silt screen shall be constructed at the toe of the reprofiled slopes to prevent silt entering adjacent watercourses.
- Any other diesel, fuel or hydraulic oils stored on site will be stored in bunded storage tanks – the bund area will have a volume of at least 110 % of the volume of such materials stored.
- Refueling of plant during construction will only be carried out at a designated bunded refueling station located near the site entrance.
- Grassed water ways constructed at slopes to prevent erosion shall discharge surface and sub surface runoff flows to receiving water via the access track. No excavation of these waterways shall be undertaken and maintenance works will be limited to mowing only.
- Emergency drip trays and spill kits will be kept available on site, to ensure that any spills from vehicles are contained and removed off site.
- 
- Portaloo and/or containerised toilets and welfare units will be used to provide toilet facilities for site personnel. Sanitary waste will be removed from site via a licenced waste disposal contractor.
- Landfill side slopes no steeper than 1:2.5 and swale drainage system to mitigate the risk of erosion.
- Access track construction methodology to reduce suspended solids generation.

#### 4.7 Soil Management Plan

It is intended to maintain an earthworks balance on site, with all excavated material re-used within the site where possible, thereby minimising the need for removal of any materials for off-site disposal. This will in turn lead to the reduction of noise and dust associated with construction traffic.

Excavation and backfilling will take place over short lengths. There will be no permanent spoil heaps at the site of the proposed development.

Excavation works will be monitored by suitably qualified and experienced geotechnical personnel.

The programming of the works will be such that earthworks are not scheduled to be carried out during severe weather conditions. Where such weather is forecast, suitable measures will be taken to secure the works. Due to the possibility of soil-borne diseases, all topsoil/peat recovered from the site will remain on that property. Topsoil will be used for landscaping berms alongside existing and new access tracks where suitable and will also be used for reinstatement and landscaping purposes.

No off-site disposal of soil will be required from the site and no spoil stockpiles will be left on site after construction is completed.

In addition to the above, storage tanks used to store fuel for the various items of machinery, will be self-contained and double-walled. Refuelling will be carried out from these tanks or from delivery vehicles at designated refuelling areas. Specific mitigation measures relating to the management of hydrocarbons spills are outlined below:



- Fuels, lubricants and hydraulic fluids for equipment used on the construction site will be carefully handled to avoid spillage.
- Any spillage of fuels, lubricants or hydraulic oils will be immediately contained and the contaminated soil removed from the site and properly disposed of.
- Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling.
- Appropriate spill control equipment, such as oil soakage pads, will be kept within the construction area and in each item of plant to deal with any accidental spillage.
- Drip trays and spill kits will be kept available on site, to ensure that any spills from vehicles are contained and removed off site. Any diesel or fuel oils stored at the temporary site compounds will be banded. The bund capacity will be sufficient to contain 110% of the tank's maximum capacity.

## 4.8 Waste Management Plan

It will be the objective of Tipperary County Council in conjunction with appointed contractor to prevent, reduce, reuse and recover as much of the waste generated on site as practicable (in accordance with Waste Hierarchy Principles) and to ensure the appropriate transport and disposal of residual waste off site. This is in line with the relevant National Waste Management Guidelines and the European Waste Management Hierarchy, as enshrined in the Waste Management Act 1996, as amended.

### 4.8.1 Assignment of Responsible Personnel

It will be the responsibility of the contractor for the construction works (when appointed) to nominate a suitable site representative such as a Project Manager, Site Manager or Site Engineer as Waste Manager who will have overall responsibility for the management of waste. The waste manager will have responsibility to instruct all site personnel including sub-contractors to comply with on-site requirements.

### 4.8.2 Waste Generated

It is envisaged that all excavated materials on-site will be reutilized on-site during reprofiling of the site.

Any waste materials generated on-site during the construction of the proposed development will be handled and managed in accordance with the requirements of the Waste Management Act 1996, as amended, and associated Regulations. All waste will be stored in segregated waste containers at the temporary construction compounds and collected by appropriately licensed waste contractors. All waste materials transferred off-site for disposal or recovery will be taken only to suitably permitted/licensed waste facilities.

### 4.8.3 Waste Management During the Construction Phase

Any waste generated during the development construction phase will be collected, source separated and stored in dedicated receptacles at the temporary compounds during construction.



Typical categories of waste generated during the construction of this type of project:

- Municipal solid waste from the office and canteen
- Construction and demolition waste
- Waste oil/hydrocarbons
- Paper/cardboard/plastic wrapping
- Timber
- Steel.

As above-noted, It will be the responsibility of the contractor for the main construction works (when appointed) to nominate a suitable site representative such as a Project Manager, Site Manager or Site Engineer as Waste Manager who will have overall responsibility for the management of waste. The waste manager will have responsibility to instruct all site personnel including sub-contractors to comply with on-site requirements.

Where waste is generated, every effort will be made to separate and segregate the different waste streams.

**Table 4-1: Principal Wastes Generated during the Construction Phase**

Waste	Source
Timber	Temporary supports and packaging waste
Miscellaneous materials	Surplus materials from installation works
Lubricating oils, diesel	Unused quantities at end of installation period
Plastics	Packaging waste
Paper/cardboard	Packaging waste
Non-hazardous Office and Canteen Waste	Temporary welfare facilities unit
Food waste	Temporary welfare facilities unit
Sanitary waste	Temporary welfare facilities unit

#### 4.8.4 Installation Stage Waste Reduction

The appointed contractor will make all reasonable effort to minimise the creation of waste throughout the installation stage. This will be achieved through the following measures:

- The ordering of material will be optimised to ensure that only the necessary levels are delivered to site.
- All plant will be serviced before arriving on site. This will reduce the risk of breakdown and the possible generation of water oil on site.
- All operators will be instructed in measures to cut back on the amount of wastage for trimming of materials etc.
- Prefabrication of design elements will be used where suitable to eliminate waste generation on site, and;
- Where materials such as concrete are being ordered, care will be taken when calculating required quantities to reduce wastage.



#### 4.8.5 Construction Waste Re-use

Where possible, materials will be re-used onsite for other suitable purposes.

#### 4.8.6 Construction Waste Recycling

Where waste is generated, every effort will be made to recycle. In order to optimally recycle, waste source segregation of recyclable materials will be undertaken

Suitable containers will be provided for the storage and collection of source segregated materials. These containers will be clearly labelled and signposted.

The following sourced segregated materials containers will be made available on site at a suitable location:

- Timber;
- Ferrous metals;
- Aluminium;
- Dry mixed recyclables; and
- Packaging waste.

#### 4.8.7 Construction Waste Disposal

Where waste disposal is unavoidable, waste will be disposed of in a manner not likely to cause environmental damage:

- All waste materials will be stored in suitable locations and enclosed containers where suitable to avoid pollution and generation of wind-blown debris.
- All waste will be collected by a suitably competent and permitted waste collection contractor; All waste will be dispatched to an appropriate authorized waste facility
- Dispatch to a waste recovery facility will be preferred over dispatch to a waste facility involved in waste disposal or energy recovery, and;
- No material be burned on site under any circumstances.

#### 4.8.8 Training

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 Project Waste Management Plan and informed of the responsibilities that fall upon them as a consequence of its provisions.

It will be the responsibility of the Contractors' appointed Waste Manager to ensure that all personnel are made aware of their responsibilities under the plan via a toolbox talk or otherwise.

### 4.9 **Outline Traffic Management Plan**

The Construction Traffic Management Plan (CTMP) shall be finalised in accordance with this Plan following the appointment of the Contractor for the construction works.



Please note that some items in this plan can only be finalised with appropriate input from the Contractor who will actually carry out and schedule the works. Furthermore, it is appropriate that the Project Supervisor Construction Stage (PSCS), when appointed, should have an active role in the preparation/review of the Construction Traffic Management Plan.

As with any construction development project, the transport of materials onto the site will give rise to increased traffic and associated impacts. However, due to the very nature of construction these impacts will be temporary.

Materials arising on-site will be reused on-site where possible to minimize traffic movements off-site.

Public perception of the construction phase will be influenced primarily from the impact of traffic movements. The degree of traffic disturbance caused by the construction phase depends on the volume of material imported/exported, the associated civil engineering requirements and the length of the construction period.

This CTMP deals with the traffic generated during the construction of the proposed development. It concentrates on the traffic arising from each element of the works which includes the site clearance works and the building construction works.

Construction traffic will require regular access to the site at varying times throughout the construction phase.

The aim of this CTMP is to put in place procedures to manage traffic effectively on site and in the immediate vicinity of the development, to ensure the continued movement of traffic on the public roads and to minimise disturbance during transportation of materials. The correct implementation of this CTMP will ensure that appropriate procedures are in place to minimise any effects on the safety and movement of the general public.

Prior to the commencement of construction, the CTMP will be reviewed by the Contractor (and any sub-contractors) and will be updated as necessary.

The site is accessed from the east via the Carrownreddy road (L-8217), which is a cul de sac accessed from the R661. The surrounding routes are considered to be acceptable for the level of traffic generated during construction with some mitigation proposed. Similar traffic is currently using these roads to service the farmland and agriculture practices in the area. There should be ample capacity to carry the deliveries associated with the temporary short-term construction activities of the landfill.

The construction phase for the proposed works will result in additional traffic on the roads in the vicinity of the development, in particular the R661 and N74.

This additional traffic will include:

- Construction worker vehicles;
- Delivery vehicles carrying conventional construction materials e.g. aggregate;
- Delivery vehicles carrying machinery and equipment.

It should be noted however that final selection of construction plant and vehicles may vary depending on suitability, availability, contractor's choice, etc. Plant operators will be responsible for the upkeep and maintenance of construction plant and vehicles, ensuring good working order prior to use. Should emergency maintenance need to be carried out on site, this will be carried out at a designated area away from sensitive receptors and it will be ensured that a spill kit is nearby.



Parking for all site staff vehicles during the Construction phase will be provided adjacent to the construction compound. Parking of construction related vehicles (or queuing) will not be permitted outside the facility gate. This will be achieved using a combination of signage, suitable bollards (if required) and enforcement by site management.

HGVs entering the site shall do so via the proposed access, which will be developed to allow adequate visibility sightlines in accordance with TII Standard DN-GEO-03031: Road Link Design, 2012, and in accordance with Tipperary County Development Plan.

Public roads shall be kept free of mud, dust, spillages and debris from the construction site, construction plant or haulage vehicles. Any necessary measures shall be put in place at the site entry/exit points.

The roadway on site from the public road entrance, shall be kept free of dust, spillages and debris. Regular watering of the track will take place and Tipperary County Council will liaise with adjacent residences to avoid undue or unnecessary truck movements during un-social hours and note and amend any disturbance or nuisance from dust or noise in line with commitments made in the TMP.

Operational traffic is anticipated to be less than one or two vehicles per month and will use the indicated public access road.

#### 4.9.1 Consultation and Notification

##### *Traffic Management Co-ordinator*

The Contractor will appoint a dedicated competent Traffic Management Coordinator for the duration of this project and this person will be the main point of contact for all matters relating to traffic management on the project.

##### *Induction*

Prior to the works commencing, the Traffic Management Coordinator will carry out an induction for the materials haulage contractor staff to inform them of the traffic requirements in relation to vehicle movements. Traffic consideration shall form part of the induction process for all site staff also.

##### *An Garda Síochána*

Following the appointment of the successful Contractor for the main construction works for this project, this CTMP shall be finalised. The Traffic Management Coordinator will liaise directly with An Garda Síochána in relation to the plan and any concerns/requirements they have will be incorporated in to the plan. The necessary permits (including approved route permits) will be applied for and obtained from An Garda Síochána, if required.

##### *Tipperary County Council*

The Contractor will liaise directly with Tipperary County Council Roads Department in relation to the plan and any necessary permits (including standard permits) will be applied for and obtained from the Roads Department.



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## 4.10 Cultural Heritage Management

Archaeological test trenching and an impact assessment was undertaken for the site by AEGIS Archaeology limited on behalf of Tipperary County Council in 2005 which provides an assessment of the archaeological features in the vicinity of the site, including any standing remains. The mitigation measures proposed in these assessment report for development on-site will be fully incorporated into the CEMP and adhered to. the proposed remediation works to which this application to An Bord Pleanála pertains (i.e. That all the ground works associated with the development be archaeologically monitored in case isolated subsurface unrecorded archaeological features or artefacts relating to the possible enclosure are revealed).







## 5. SAFETY & HEALTH MANAGEMENT PLAN

### 5.1 Introduction

This Safety and Health Management Plan (SHMP) defines the work practices, procedures and management responsibilities relating to the management of health and safety during the design, construction and operation of the proposed development and shall be read in conjunction with the Preliminary Safety & Health Plan prepared for the project by the Project Supervisor for the Design Process. The Safety and Health Management Plan shall be finalised in accordance with this plan following the appointment of the contractor for the construction works.

This SHMP describes how the contractor for the construction works will implement a site safety management system (SMS) on this project to meet the specified contractual, regulatory and statutory requirements, environmental impact statement mitigation measures and planning conditions. It is the contractor's responsibility to implement an effective safety management system to ensure that the Council's safety requirements for the construction of this project are met. Any SMS will incorporate and develop upon any preliminary plans prepared for the project by the Project Supervisor for the Design Process.

All site personnel will be required to be familiar with the requirements of the safety management plan as related to their role on site. The plan describes the project organisation and sets out the health and safety procedures that will be adopted on site:

- The Safety and Health Plan is a controlled document and will be reviewed and revised as necessary.
- A copy of the Safety and Health Plan will be located on/near the site H&S notice board.
- All employees, suppliers and contractors whose work activities cause/could cause impacts on the environment will be made aware of the SHMP and its contents.

The selection criteria for the Contractor for the works will be based on the ability to construct the works in a manner that will not endanger the safety, health and welfare of any parties and competence to fulfil the role of PSCS.

All site personnel will be required to be familiar with the requirements of the Safety and Health Management Plan for the construction phase of the project as related to their role on site. The plan will describe the project organisation and sets out the health and safety procedures that will be adopted on site.

The Safety and Health Plan is a controlled document and will be reviewed and revised as necessary. A copy of the Safety and Health Plan will be located on/near the site H&S notice board. All employees, suppliers and contractors whose work activities cause/could cause impacts on the environment will be made aware of the SHMP and its contents.

Solas Safe Pass registration cards are required for all construction, delivery and security staff. Construction operatives will hold a valid Construction Skills Certificate Scheme card where required. Public safety will be addressed by restricting site access during construction. Appropriate warning signs will be posted, directing all visitors to the site office.

All personnel on site will wear adequate personal protective equipment (PPE), appropriate for their activity while on site.



In relation to working near overhead electric lines, the contractor will comply with ESB Networks Code of Practice for Avoiding Danger from Overhead Electricity Lines, 2008. Prior to site start, hazard exclusion zones will be established by the main contractor and overhead goalposts will be set up at designated crossing points where plant must pass directly under overhead electricity lines in accordance with ESNB requirements. A minimum 3m exclusion zone for 10kV, 20kV and 38kV overhead lines will be maintained at all times.

## 5.2 Project Obligations with Respect to Health and Safety

The construction of the proposed development will impose numerous safety management obligations on the Council, designer and contractor. These obligations are set out below. The contractor for the construction works and all of its sub-contractors are to ensure that they are fully aware of and in *compliance with these safety obligations*.

### 5.2.1 Statutory Obligations

The Safety, Health and Welfare at Work Act 2005 and the Safety, Health and Welfare at Work (Construction) Regulations 2013 place a responsibility on Tipperary County Council as the “Client”, the Designer, the Project Supervisors and the Contractor.

The Council must:

- Appoint a competent and adequately resourced Supervisor for the Construction Stage (PSCS)
- Be satisfied that the contractor appointed has adequate training, knowledge, experience and resources for the work to be performed.
- Co-operate with the project supervisor and supply necessary information.
- Keep and make available the safety file for the completed structure.
- Provide a copy of the safety and health plan prepared by the PSDP to every person tendering for the project.

Designers must:

- Identify any hazards that their design may present during construction and subsequent maintenance.
- Eliminate the hazards or reduce the risk.
- Communicate necessary control measures, design assumptions or remaining risks to the PSDP so they can be dealt with in the safety and health plan.
- Co-operate with other designers and the PSDP or PSCP.
- Take account of any existing safety and health plan or safety file.
- Comply with directions issued by the PSDP or PSCS.

The PSDP must:

- Identify hazards arising from the design or from the technical, organisational, planning or time related aspects of the project.
- Where possible, eliminate the hazards or reduce the risks.



- Communicate necessary control measure, design assumptions or remaining risks to the PSCS so they can be dealt with in the safety and health plan.
- Ensure that the work of designers is coordinated to ensure safety.
- Organise co-operation between designers.
- Prepare a written safety and health plan for any project and deliver it to the client prior to tender.
- Prepare a safety file for the completed structure and give it to the client.

The PSCS must:

- Co-ordinate the identification of hazards, the elimination of the hazards or the reduction of risks during construction
- Develop the Safety and Health Plan initially prepared by the PSDP before construction commences.
- Co-ordinate the implementation of the construction regulations by contractors
- Organise cooperation between contractors and the provision of information.
- Co-ordinate the reporting of accidents to the Authority
- Notify the Authority before construction commences.
- Provide information to the site safety representative.
- Co-ordinate the checking of stage working procedures.
- Co-ordinate measures to restrict entry on to the site.
- Co-ordinate the provision and maintenance of welfare facilities
- Co-ordinate arrangements to ensure that craft, general construction workers and security workers have a Safety Awareness card, e.g. Safe Pass and a Construction Skills card where required.
- Co-ordinate the appointment of a site safety representative where there are more than 20 persons on site.
- Appoint a safety adviser where there are more than 100 on site.
- Provide all necessary safety file information to the PSDP.
- Monitor the compliance of contractors and others and take corrective action where necessary.
- Notify the Authority and the client of non-compliance with any written directions issued.

The Contractor must:

- Co-operate with the PSCS.
- Promptly provide the PSCS with information required for the safety file,
- Comply with directions of the project supervisors.
- Report accidents to the Authority and to the PSCS where an employee cannot perform their normal work for more than 3 days.
- Comply with site rules and the safety and health plan and ensure that your employees comply.
- Identify hazards, eliminate the hazards or reduce risks during construction.
- Facilitate the site safety representative.



- Ensure that relevant workers have a safety awareness card and a construction skills card where required.
- Provide workers with site specific induction.
- Appoint a safety officer where there are more than 20 on site or 30 employed.
- Consult workers with site specific induction.
- Monitor compliance and take corrective action.

Consequently, at all stages of the project there are statutory requirements for the management of safety, health and welfare of all involved in or affected by the development. As previously outlined, this CEMP and specifically the Safety and Health Management Plan addresses key construction management issues associated with the proposed development. This plan will be developed further at the construction stage, on the appointment of the Contractor for the main construction works.

### 5.2.2 The Preliminary Safety and Health Plan

In accordance with the requirements of the Safety, Health & Welfare at Work (Construction) Regulations 2013, a Preliminary Safety & Health Plan will be required as part of the design process. This plan will be further developed by the PSCS on appointment and maintained as a live document during construction and commissioning of the proposed development.

The safety and health plan is required to include the following information:

- A general description of the project;
- Details of other work activities taking place on site;
- Works involving particular risks;
- The timescale for the project and the basis on which the time frame was established;
- Conclusions drawn by designers and the PSDP having taken into account the General Principles of Prevention and any relevant Safety and Health Plan or Safety File; and
- The location of electricity, water and sewage connections so as to facilitate early establishment of welfare facilities.

In accordance with the PSDP's procedures, the Preliminary Safety & Health Plan for the proposed development should include the following sections and subsections to ensure that the PSCS is aware of the health and safety issues at tender stage and enable them to price accordingly:

#### **Preamble:**

##### 1. General Project Information:

- 1.1 Title
- 1.2 Description of Project
- 1.3 Employer
- 1.4 Designers/Other Consultants
- 1.5 Project Supervisor Design Process



- 1.6 Drawings, Specifications and Other Documents
- 1.7 Intended Contract Commencement Date
- 1.8 Intended Contract Completion Date
- 1.9 Basis for Contract Duration
- 1.10 Restrictions on Working Hours
- 1.11 Notification of Project
- 1.12 Termination of the PSCS Appointment

2. The Existing Environment:

- 2.1 Site Location
- 2.2 Relevant Adjoining Land Uses
- 2.3 Site Restrictions
- 2.4 Restrictions on Access
- 2.5 Hazardous Area Classification
- 2.6 Existing Services
- 2.7 Ground Conditions
- 2.8 Existing Hazards
- 2.9 Liaison with Statutory Bodies

3. Other Work Activities:

- 3.1 Other Contracts Which May Affect Work
- 3.2 Occupation of Site
- 3.3 Building Activities
- 3.4 Other Work Activities
- 3.5 Emergency Procedures in Place on Site

4. Particular and Residual Risks:

- 4.1 Works Which Puts Persons at Work at Risk
- 4.2 Work Which Puts Persons at Risk from Chemical or Biological Substances
- 4.3 Work with Ionising Radiation
- 4.4 Work near High Voltage Power Lines
- 4.5 Work Exposing Persons at Work to the Risk of Drowning
- 4.6 Work on Wells, Underground Earthworks and Tunnels
- 4.7 Work Carried Out by Divers at Work Having a System of Air Supply



- 4.8 Work Carried Out in a Caisson with a Compressed Air Atmosphere
- 4.9 Work Involving the Use of Explosives
- 4.10 Work Involving the Assembly or Dismantling of Heavy Prefabricated Components
- 4.11 Work Involving Hazardous Material
- 4.12 Residual Risks

5. Additional Information:

- 5.1 Existing Documents
- 5.2 Site Possession
- 5.3 Site Rules
- 5.4 Site Specific Safety Objectives
- 5.5 Phasing of Works
- 5.6 Permits/Authorisation Required
- 5.7 Maintenance
- 5.8 Continuing Liaison
- 5.9 Specific Recommendations

6. Information Required for Safety File:

- 6.1 Information Required for Safety File from PSCS

5.2.3 The Management of Health and Safety during the Construction Phase

The selection criteria for the Contractor for the works will be based on the ability to construct the works in a manner that will not endanger the safety, health and welfare of any parties and competence to fulfil the role of PSCS.

The contract will be awarded on the basis of assessment of the candidates against relevant health and safety criteria including experience of similar projects, knowledge of the construction processes involved and training of their management and staff who will be involved in carrying out the works.

5.2.4 The Construction Stage Safety and Health Plan

In accordance with the requirements of the Safety, Health & Welfare at Work (Construction) Regulations 2013, the preliminary Safety & Health Plan prepared by the PSDP will be further developed by the PSCS before the commencement of the construction work and updated on a regular basis during the construction phase of the project.





The document will include the following sections and subsections to ensure the management of health and safety during the construction phase of the project:

**1. Description of Project:**

- project description and programme details
- details of client, PSDP and PSCS, designers
- contractor and other consultants
- extent and location of existing records and plans
- arrangements for communicating with Contractors, PSDP and others as appropriate.

**2. Communication and Management of the Work:**

- management structure and responsibilities
- safety and health goals for the project and arrangements for monitoring and review of safety and health performance
- arrangements for:
  - regular liaison between parties on site
  - consultation with the workforce
  - the exchange of design information between the Client, Designers, Project Supervisor for the Design Process, Project Supervisor Construction Stage and Contractors on site
  - handling design changes during the project
  - the selection and control of contractors
  - the exchange of safety and health information between contractors
  - security, site induction, and on-site training
  - welfare facilities and first aid
  - the production and approval of risk assessments and method statements
  - the reporting and investigation of accidents and other incidents (including near misses)
- site rules
- fire and emergency procedures

**3. Arrangements for Controlling Significant Site Risks:**

- safety risks
  - services, including temporary electrical installations
  - preventing falls
  - work with or near fragile materials
  - control of lifting operations
  - dealing with services (water, electricity and gas)
  - the maintenance of plant and equipment
  - poor ground conditions
  - traffic routes and segregation of vehicles and pedestrians
  - storage of hazardous materials



- dealing with existing unstable structures
- accommodating adjacent land use
- other significant safety risks
- health risks:
  - dealing with contaminated land
  - manual handling
  - use of hazardous substances
  - reducing noise and vibration
  - other significant health risks

The construction stage safety and health plan will be maintained on site by the PSCS and will be communicated to all relevant parties on an ongoing basis through inductions, site safety meetings and tool box talks etc. as required.

### 5.3 Control of Documents

The Contractor will establish, implement and maintain a procedure to control project documents and records so they are clearly identifiable, organised, current, easily located and revised when necessary



## 6. EMERGENCY RESPONSE

### 6.1 Introduction

This chapter of the CEMP presents an Emergency Response Plan for the proposed development. The Emergency Response Plan shall be finalised in accordance with this outline plan following the appointment of the contractor for the construction works and following detailed design development.

This Emergency Response Plan contains predetermined guidelines and procedures to ensure the safety, health and welfare of everybody involved in the project and to protect the environment during the construction phase of the proposed development. This plan outlines the immediate response to an emergency or disaster situation and will be developed by the construction works contractor and PSCS as part of their construction stage Safety and Health Plan.

An emergency is any disruptive or harmful event that endangers people, environment, property or assets. Emergencies can be small, as in a fire contained by employees using firefighting equipment or large, as in a disaster resulting from a storm.

In the context of the proposed development, examples of Emergency Response Plan emergency events are:

- Medical emergency
- Explosion
- Overheated equipment
- Chemical and fuel spill
- Fire
- Loss of power
- Vehicle incidents.

Example sources of emergency or disaster events are:

- Unstable/inappropriate stockpiles on site
- Faulty or incorrect use of equipment
- Falls from height
- Smoking
- Storm/adverse weather
- Power failure
- Fuel spill
- Road failure
- Serious vehicle collisions or overturning.



## 6.2 Emergency Response Plan

An emergency response plan deals with the immediate physical effects of a disaster and outlines the initial response.

### 6.2.1 Emergency Response Liaison

The contractor/PSCS will designate an individual to serve as the Emergency Response Liaison for this project. The emergency response liaison will coordinate the emergency response for the duration of any emergency at or nearby the project site.

Laois County Council, An Garda Síochána and the HSE Ambulance Co-ordinator will be provided with the construction programme and the onsite contact information from the Emergency Response Liaison prior to construction.

The Emergency Response Liaison will be immediately reachable at all times during project construction. The Liaison will coordinate with the above agencies to establish emergency procedures for access to and within the site in the event of an emergency.

### 6.2.2 Reporting Emergencies

In the event of fire, storm, flood, serious injury or other emergency, contact:

**ALL ON SITE EMERGENCIES DIAL 112 or 999**

### 6.2.3 Designated Responder

A map depicting the location with the emergency meeting point will be furnished to Laois County Council Fire Department and HSE ambulance co-ordinators.

Upon arrival on the scene, the senior EMS Officer will set up the incident command structure. The Emergency Response Liaison and all contractor's personnel will cooperate with directions of the incident commander and assist as directed.

The nearest emergency services, ambulance and Accident & Emergency (A&E) facilities are:

Service:	Contact Details:	
Accident & Emergency (A&E)	South Tipperary General Hospital	(052) 617 7000
Ambulance Service	Dial 112 or 999	
Fire Services	Dial 112 or 999	
Garda Station	Tipperary Town Garda Station	(062) 80670

Each member of the contractor's site team who are First-Aid and Cardiopulmonary Resuscitation (CPR) trained personnel will be identifiable with a hard hat sticker indicating their training.



#### 6.2.4 Emergency Alarm

The emergency alarm will be raised on site as soon as an emergency situation is detected, the alarm will be identified (contractor to check those that apply):

Air Horn		Radio		Voice		Hand Signals		Siren	
----------	--	-------	--	-------	--	--------------	--	-------	--

#### 6.2.5 Emergency Reporting

In the event of an emergency the nearest supervisor with radio equipment/mobile phone will be notified. The degree of emergency will be reported to the Emergency Response Liaison who will contact the Emergency Services and request the appropriate emergency service.

#### 6.2.6 Medical Protocol

In the event of a major medical emergency, the emergency centre (999) will be notified and an ambulance and emergency medical team will respond to the scene. All major medical cases require professional (ambulance) transportation. In the event of a minor medical case, the affected employee can be transported via company vehicle in the escort of a foreman or site engineer (with first aid training).

#### 6.2.7 Emergency Response

Upon notification, the Emergency Response Liaison will respond to the emergency scene and manage emergency operations:

1. **Assess hazards and make the area safe** – If you cannot enter the area without risking your safety, don't do it, call the Emergency Services immediately and wait for them. If you think you can safely enter the area, look around the emergency scene for anything that can be dangerous or hazardous to you, the casualty, or anyone else at the scene. Bystanders can help with making the area safe. First aid kits will be available on site. Operators that have been first aid/CPR/AED trained will be listed on site and easily identifiable by a hard hat sticker.
2. **Take charge of the situation** – if you are the first-aid provider on the scene act fast. If someone is already in charge, briefly introduce yourself and see if that person needs any help. If there is any chance the casualty could have a head or spinal injury, tell them not to move.
3. **Get Consent** – always identify yourself as a first-aid provider and offer to help. Always ask for consent before touching a conscious adult casualty and always ask for consent from a parent or guardian before touching an unconscious or conscious child or infant. With an unconscious adult casualty consent is implied as it is generally accepted that most people want to live. Remember to protect yourself first by wearing gloves and eye protection.
4. **Assess Responsiveness** – is the casualty conscious or unconscious? Note their response while you are asking them for their consent. If they respond, continue with the primary survey, and if they don't respond, be aware that an unconscious casualty is or has the potential of being a breathing emergency.
5. **Call out for help** – this will attract bystanders. Help is always useful in an emergency situation. Someone can be called over the phone for medical help. Others can bring blankets if needed, get water, etc. A bystander can help with any of the following:
  - Make the area safe.
  - Find all the casualties.



- Find the first aid kit, or any useful medical supplies.
- Control the crowd.
- Call for medical help.
- Help give first aid, under your direction.
- Gather and protect the casualty's belongings.
- Take notes, gather information, be a witness.
- Reassure the casualty's relatives.
- Lead the ambulance attendants to the scene of the emergency.
- Notify Emergency Services as soon as you can. Either send a bystander or call yourself.

In the event of a major medical emergency, the Emergency Response Liaison, as the person-in-charge of the emergency scene, will dispatch someone to the site access point nearest the emergency scene to direct and lead arriving outside responders to the emergency scene. The designated meeting point will be agreed prior to the commencement of construction. Emergency personnel will be met at this meeting point which has been communicated by management during the 999 call. The emergency personnel escort will use the hazard lights on their vehicle so they are easily identified.

#### 6.2.8 Escape and Evacuation Procedure

Dependent upon the degree of the emergency and if safe to do so, employees will evacuate to the designated assembly area where the designated wardens shall account for all employees and determine if anyone still remains within the emergency scene.

Should a wild land fire or peat slippage occur, and the designated assembly area is compromised, other locations will be designated as secondary assembly areas.

#### 6.2.9 Prevention of Illness/Injury due to Weather/Elements

1. All employees will have access to shelter and heat in the event of inclement weather.
2. Employees will have access to at least a litre of water at all times.
3. Weather forecast will be discussed every morning with the crews. Weather conditions and forecast will be monitored regularly by management.
4. No Employee will work alone. A buddy system will be used so employees can contact a supervisor in case of an emergency.

#### 6.2.10 Environmental Emergency Procedure

An emergency preparedness and response procedure is required to prevent environmental pollution incidents.

Suitable spill kits and absorbent material for dealing with oil spills will be maintained on site. In the event of pollution or potential risk of pollution, the Local Authority should be informed immediately.

#### 6.2.11 Emergency Response Plan – Haul Routes

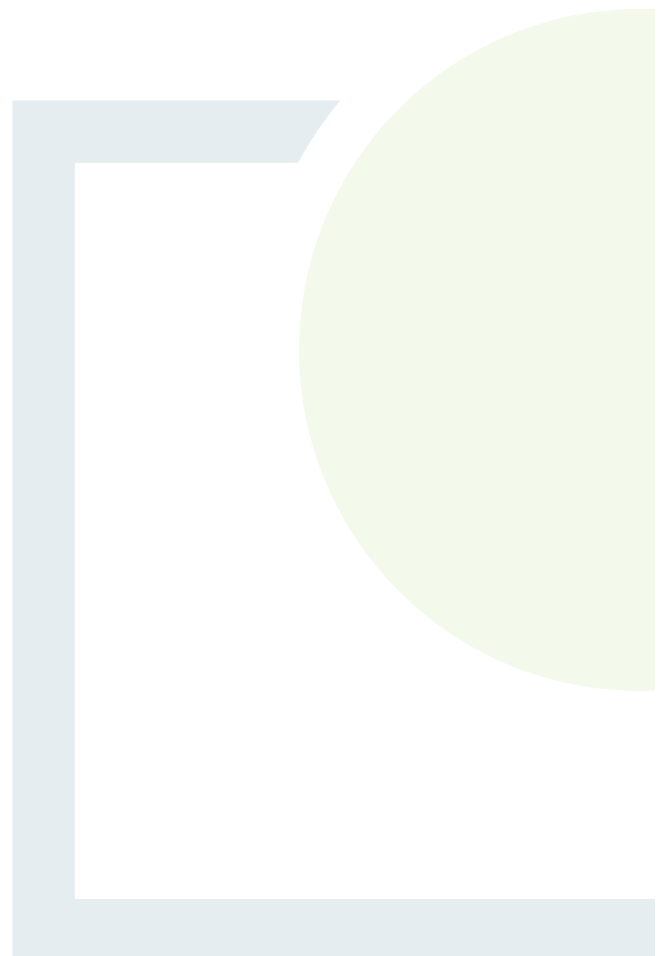
Emergency Response Procedure relating to transportation of plant, equipment and materials to the site will be developed by the contractor during the construction phase of the development.



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ENVIRONMENTAL SCIENCE  
& PLANNING

## APPENDIX 1

Certificate of Authorisation  
(Licence number: H0004-01)







Headquarters  
P.O. Box 3000  
Johnstown Castle Estate  
County Wexford  
Ireland

## Closed Landfill Certificate of Authorisation

<b>Certificate of Authorisation Number:</b>	H0004-01
<b>Certification of Authorisation Holder:</b>	Tipperary County Council
<b>Location of Facility:</b>	Carrownreddy Tipperary Town County Tipperary





HEADQUARTERS  
JOHNSTOWN CASTLE ESTATE  
COUNTY WEXFORD, IRELAND  
PHONE: +353-53-9160600  
FAX: +353-53-9160699

**WASTE MANAGEMENT (CERTIFICATION OF HISTORIC UNLICENSED  
WASTE DISPOSAL AND RECOVERY ACTIVITY) REGULATIONS 2008**

**HISTORIC LANDFILL**

**CERTIFICATE OF AUTHORISATION**

Decision of Agency, under Regulation 7(6) of the Waste Management (Certification of  
Historic Unlicensed Waste Disposal and Recovery Activity) Regulations 2008

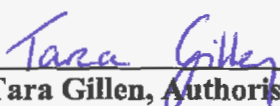
Reference Number: **H0004-01**

In pursuance of the powers conferred on it by the Waste Management (Certification of  
Historic Unlicensed Waste Disposal and Recovery Activity) Regulations 2008, the  
Environmental Protection Agency (the Agency) grants, under Regulation 7(6) of the said  
Regulations, this Certificate of Authorisation to Tipperary County Council, County Hall,  
Clonmel, County Tipperary, in respect of the closed landfill at Carrownreddy, Tipperary  
Town, County Tipperary, subject to conditions set out in the Certificate of Authorisation.

A copy of the Decision is attached.

**Sealed by the Seal of the Agency on this the 6<sup>th</sup> day of February, 2019**

**PRESENT when the seal of the Agency  
was affixed hereto:**

  
Tara Gillen, Authorised Person



## Glossary of Terms

All terms in this Certificate of Authorisation should be interpreted in accordance with the definitions in the Waste Management (Certification of Historic Unlicensed Waste Disposal and Recovery Activity) Regulations 2008 (S.I. No. 524 of 2008) unless otherwise defined in the Certificate of Authorisation.

<b>Agency</b>	Environmental Protection Agency.
<b>Agreement</b>	Agreement in writing.
<b>Annually</b>	At approximately twelve-monthly intervals.
<b>Application</b>	The application by the local authority for this Certificate of Authorisation including the risk assessment, any amendments to the risk assessment, additional information received from the local authority and other documents provided by the local authority.
<b>Certificate of Authorisation</b>	Includes this document and the application.
<b>Closed landfill</b>	As defined in the Waste Management (Certification of Historic Unlicensed Waste Disposal and Recovery Activity) Regulations 2008.
<b>Code of Practice</b>	As defined in the Waste Management (Certification of Historic Unlicensed Waste Disposal and Recovery Activity) Regulations 2008.
<b>Biannually</b>	All or part of a period of six consecutive months.
<b>Documentation</b>	Any report, record, results, data, drawing, proposal, interpretation or other document in written or electronic form which is required by this Certificate of Authorisation.
<b>Drawing</b>	Any reference to a drawing or drawing number means a drawing or drawing number contained in the application, unless otherwise specified in this Certificate of Authorisation.
<b>Environmental Pollution</b>	As defined in the Waste Management Act 1996 as amended.
<b>Incident</b>	The following shall constitute an incident for the purposes of this Certificate of Authorisation: <ul style="list-style-type: none"><li>(i) an emergency;</li><li>(ii) any emission which does not comply with the requirements of this Certificate of Authorisation;</li><li>(iii) any trigger level specified in this Certificate of Authorisation which is attained or exceeded; and</li><li>(iv) any indication that environmental pollution has, or may have, taken place.</li></ul>

<b>Inert Waste</b>	Waste that does not undergo any significant physical, chemical or biological transformations. Inert waste will not dissolve, burn or otherwise physically or chemically react, biodegrade or adversely affect other matter with which it comes into contact in a way likely to give rise to environmental pollution or harm human health. The total leachability and pollutant content of the waste and the ecotoxicity of the leachate must be insignificant, and in particular not endanger the quality of surface water and/or groundwater.
<b>Maintain</b>	Keep in a fit state, including such regular inspection, servicing, calibration and repair as may be necessary to perform its function adequately.
<b>Necessary Measures</b>	As defined in the Waste Management (Certification of Historic Unlicensed Waste Disposal and Recovery Activity) Regulations 2008.
<b>Risk Assessment</b>	As defined in the Waste Management (Certification of Historic Unlicensed Waste Disposal and Recovery Activity) Regulations 2008.
<b>Sample</b>	Unless the context of this document indicates to the contrary, the term sample or samples shall include measurements taken by electronic instruments.
<b>The Local Authority</b>	Tipperary County Council, County Hall, Clonmel, County Tipperary.
<b>Trigger Level</b>	A parameter value the achievement or exceedance of which requires certain actions to be taken by the local authority.

## Part I Authorisation of a closed landfill

The Environmental Protection Agency (the Agency) grants, under Regulation 7(6) of the Waste Management (Certification of Historic Unlicensed Waste Disposal and Recovery Activity) Regulations 2008 (the Regulations), this Certificate of Authorisation to Tipperary County Council, County Hall, Clonmel, County Tipperary, in respect of the closed landfill at Carrownreddy, Tipperary Town, County Tipperary, subject to conditions set out in Part II and the Reasons for the Decision in Part III.

## Part II Conditions

### Condition 1. Scope

- 1.1 For the purposes of this Certificate of Authorisation, the closed landfill authorised by this Certificate of Authorisation is the area of land outlined in red on Drawing No. P0563-INFO-0001 Rev. A, dated 05.11.18, submitted with the application. Any reference in this Certificate of Authorisation to “closed landfill” shall mean the area thus outlined in red. Activities associated with the closed landfill shall be carried on only within the area outlined.
- 1.2 No waste shall be accepted at the closed landfill.
- 1.3 No waste shall be burned at the closed landfill.
- 1.4 The facility shall be controlled, operated and maintained, and emissions shall take place as authorised by this Certificate of Authorisation. No material change that will result in an increase in the actual or potential nature or quantity of any emission shall be carried out or commenced without the agreement of the Agency.
- 1.5 Nothing in this Certificate of Authorisation shall prohibit authorised beneficial uses of the site of the closed landfill that do not interfere with the integrity of the remediation measures adopted.

<i>Reason:</i> To clarify the scope of this Certificate of Authorisation.
---

### Condition 2. Notifications, Records and Reports

- 2.1 The local authority shall notify the Agency as soon as practicable after the occurrence of any incident. The incident notification shall be provided in a format as may be specified in relevant guidance issued by the Agency.
- 2.2 The local authority shall keep the following documents available for inspection by the Agency at all reasonable times and to members of the public by request:
  - 2.2.1 Records of all sampling, analyses, measurements, examinations, calibrations and maintenance;
  - 2.2.2 Records of incidents;
  - 2.2.3 Records of all complaints of an environmental nature;
  - 2.2.4 The validation report prepared on completion of the remediation; and



2.2.5 Other documentation required by this Certificate of Authorisation or as may be otherwise directed by the Agency.

2.3 Environmental Liabilities

The local authority shall put in place and maintain a financial provision for costs of likely events or accidents/incidents related to the closed landfill and associated works.

2.4 The local authority shall annually pay to the Agency €1,100, or such sum as the Agency from time to time determines in accordance with charges policy, for the performance of its functions under the Waste Management (Certification of Historic Unlicensed Waste Disposal and Recovery Activity) Regulations 2008 in relation to the closed landfill regulated by this Certificate of Authorisation.

**Reason:** *To provide for the collection and reporting of adequate information on the activity. To provide for adequate financing for monitoring and financial provisions for measures to protect the environment.*

### Condition 3. Management and Monitoring

3.1 The local authority shall implement the following measures within 12 months of the date of grant of this Certificate of Authorisation, or as otherwise agreed by the Agency.

- a) prepare and implement a programme of 24-hour pumping trials for seven days, at least 3 gas yielding monitoring locations (12% v/v or above) to determine the quantity and characteristics of the landfill gas. This programme shall be submitted to the Agency and approval obtained in advance of implementation. The monitoring programme shall be completed within 4 months of the date of this certificate of authorisation.
- b) in the event that methane values consistently exceed 12% v/v, install measures for extracting and treating landfill gas by flaring or another suitable technique that is satisfactory to the Agency.
- c) install a low permeability landfill cap, minimum 500mm.
- d) install gas protection measures including the installation of a landfill gas cut-off trench along the southern boundary of the capped landfill area.
- e) unless otherwise agreed by the Agency, install gas vents in the landfill body at appropriate locations such that the increased back-pressure caused by the cap does not result in increased lateral movement of gas.
- f) minimise the disturbance of deposited waste to the extent possible.

3.2 The local authority shall manage the closed landfill to ensure that discharges and emissions from the closed landfill do not cause environmental pollution or deterioration in the status of the receiving surface water body or groundwater body.

3.3 The local authority shall compile a validation report in accordance with the requirements of the Code of Practice. Unless otherwise agreed, the validation

- report shall be submitted to the Agency within 30 months of the date of grant of this Certificate of Authorisation.
- 3.4 The local authority shall assess the results of all monitoring carried out to confirm whether the closed landfill continues to achieve the objectives set for it in the risk assessment or this Certificate of Authorisation.
- 3.5 The local authority shall annually conduct and record:
- a) a visual inspection of the landfill to ensure that the condition of the site has not deteriorated;
  - b) monitoring for leachate (sample, analyse, characterise, and measure the level of leachate) in all leachate monitoring boreholes;
  - c) monitoring to detect the presence and concentration of landfill gas in all monitoring boreholes;
  - d) monitoring (sample, analyse and characterise) of relevant surface waters both upstream and downstream of the closed landfill;
  - e) monitoring (sample, analyse and characterise) of groundwater from at least three available groundwater monitoring boreholes, two of which shall be downgradient of the closed landfill; and
  - f) the assessment of monitoring results against trigger levels and/or standard reference values for relevant pollutants including environmental quality standards in the European Communities Environmental Objectives (Surface Waters) Regulations 2009 and European Communities Environmental Objectives (Groundwater) Regulations 2010, as amended.
- 3.6 The following are the trigger levels for landfill gas emissions from the facility measured in any service duct or manhole on, at or immediately adjacent to the facility and/or at any other point located outside the body of the waste:-
- a) Methane, greater than or equal to 1.0% v/v; or
  - b) Carbon dioxide, greater than or equal to 1.5% v/v.
- 3.7 In relation to surface emissions measured over the waste body and identified features, the following shall constitute a trigger level:-
- a) VOC greater than or equal to 50ppmv as methane average over capped area; or
  - b) VOC greater than or equal to 100ppmv as methane instantaneous reading on open surfaces within the landfill footprint; or
  - c) VOC greater than or equal to 500ppmv as methane around all identified features.
- 3.8 The location, frequency, methods and scope of monitoring, sampling and analyses, as set out in this Certificate of Authorisation, may be amended with the agreement of the Agency.
- 3.9 Soil and stone imported for use in remedial, corrective or other engineering works at the closed landfill shall be greenfield soil and stone or soil and stone of equivalent nature and character in terms of chemical and physical contamination.

Documented acceptance, storage/stockpiling and utilisation procedures shall be operational in advance of receipt of such materials. Records shall be maintained showing the site of origin of the soil and stone and its nature.

- 3.10 No emissions, including odours and noise, from works carried on at the site shall result in an impairment of, or an interference with amenities or the environment beyond the facility boundary or any other legitimate uses of the environment beyond the facility boundary.
- 3.11 The local authority shall ensure that the closed landfill does not result in an impairment of, or an interference with, amenities or the environment at the facility or beyond the facility boundary (including those arising from emissions (including odours, noise, dust, litter and mud), vermin and birds).
- 3.12 Wells and boreholes
- 3.12.1 Groundwater monitoring wells shall be constructed having regard to the guidance given in the Agency's landfill manual "Landfill Monitoring".
- 3.12.2 All wellheads shall be adequately protected to prevent contamination or physical damage.
- 3.12.3 All wells & boreholes shall be adequately sealed to prevent surface contamination and, as may be appropriate, decommissioned in accordance with the UK Environment Agency guidelines "Decommissioning Redundant Boreholes and Wells", unless otherwise agreed by the Agency.
- 3.13 The local authority shall clearly label and provide safe and permanent access to all on-site sampling and monitoring points and to off-site points as required by the risk assessment or this Certificate of Authorisation. The requirement with regard to off-site points is subject to the prior agreement of the landowners concerned.
- 3.14 Incidents
- In the event of an incident the local authority shall immediately:
- (i) if necessary, contact the emergency services;
  - (ii) carry out an investigation to identify the nature, source and cause of the incident and any emission arising therefrom;
  - (iii) isolate the source of any such emission;
  - (iv) evaluate the environmental pollution, if any, caused by the incident;
  - (v) identify and execute measures to minimise the emissions/malfunction and the effects thereof;
  - (vi) identify the date, time and place of the incident; and
  - (vii) notify the Agency (in accordance with Condition 2.1) and all other relevant authorities including, where relevant, the Water Services Authority and Inland Fisheries Ireland.

### 3.15 Communications

- a) The local authority shall establish, maintain and implement a communications programme to inform the occupiers and owners of land and buildings adjacent to the closed landfill of the risks posed by landfill gas and its migration.
- b) The local authority shall, as part of the communications programme, publish gas monitoring data quarterly in a manner accessible by the public.

**Reason:** *To make provision for the proper closure of the activity ensuring protection of the environment.*

## Part III: Schedules

### Schedule 1: Reasons for the Decision

In granting this certificate of authorisation, the Agency determines that the risk assessment submitted by the local authority as part of the application for a certificate of authorisation is adequate. To ensure appropriate protection for human health and the environment and to ensure conformity with the provisions of Council Directive 2006/12/EC and Council Directive 80/68/EC, the conditions set out in Part II of this certificate of authorisation are specified as further necessary measures in addition to those identified by the risk assessment.

A screening for Appropriate Assessment was undertaken to assess, in view of best scientific knowledge and the conservation objectives of the site, if the activity, individually or in combination with other plans or projects is likely to have a significant effect on any European Site. In this context, particular attention was paid to the European Sites at the Lower River Suir SAC (Site Code 002137).

The activity is not directly connected with or necessary to the management of any European Site and the Agency considered, for the reasons set out below, that it cannot be excluded, on the basis of objective information, that the activity, individually or in combination with other plans or projects, will have a significant effect on any European Site and accordingly determined that an Appropriate Assessment of the activity was required. The reasons for this determination are as follows:

- The closed landfill site is connected hydrologically to the Lower River Suir SAC (002137).
- Leachate monitoring results showed multiple parameters exceeded the EPA Interim Guideline Values (IGVs) for Groundwater.
- Elevated levels of ammonia, iron, manganese and chromium were recorded in the surface water monitoring results.

The Agency has completed the Appropriate Assessment of potential impacts on these sites and has made certain, based on best scientific knowledge in the field and in accordance with the European Communities (Birds and Natural Habitats) Regulations 2011 as amended, pursuant to Article 6(3) of the Habitats Directive, that the activity, individually or in combination with other plans or projects, will not adversely affect the integrity of any European Site, in particular the Lower River Suir SAC (002137), having regard to their conservation objectives and will not affect the preservation of these sites at favourable conservation status if carried out in accordance with the application and risk assessment, this certificate of authorisation and the conditions attached hereto for the following reasons:

- The Lower River Suir SAC (Site Code 002137) is located approximately 6.5km northeast, east & south of the historical landfill site. Given the distance and water monitoring results from site investigations, it is unlikely that the Carrownreddy closed landfill site and the proposed construction works present any significant risk to the Lower River Suir SAC (Site Code 002137).

- Specifically, the construction works will be undertaken to avoid the potential for water pollution and will ensure that there will be no significant impact on Lower River Suir SAC (002137).
- the project, alone or in-combination with other projects, will not adversely affect the integrity, and conservation status of any of the qualifying interests of the Lower River Suir SAC (002137).
- Condition 3.5 requires ongoing environmental assessment and monitoring.

The Agency is satisfied that no reasonable scientific doubt remains as to the absence of adverse effects on the integrity of the European Sites: Lower River Suir SAC (002137).

## Part IV: SIGNATURE

**Sealed by the Seal of the Agency on this the 6<sup>th</sup> day of February 2019**

**PRESENT when the Seal of the Agency  
was affixed hereto:**

*Tara Gillen.*  
\_\_\_\_\_  
**Tara Gillen, Authorised Person**









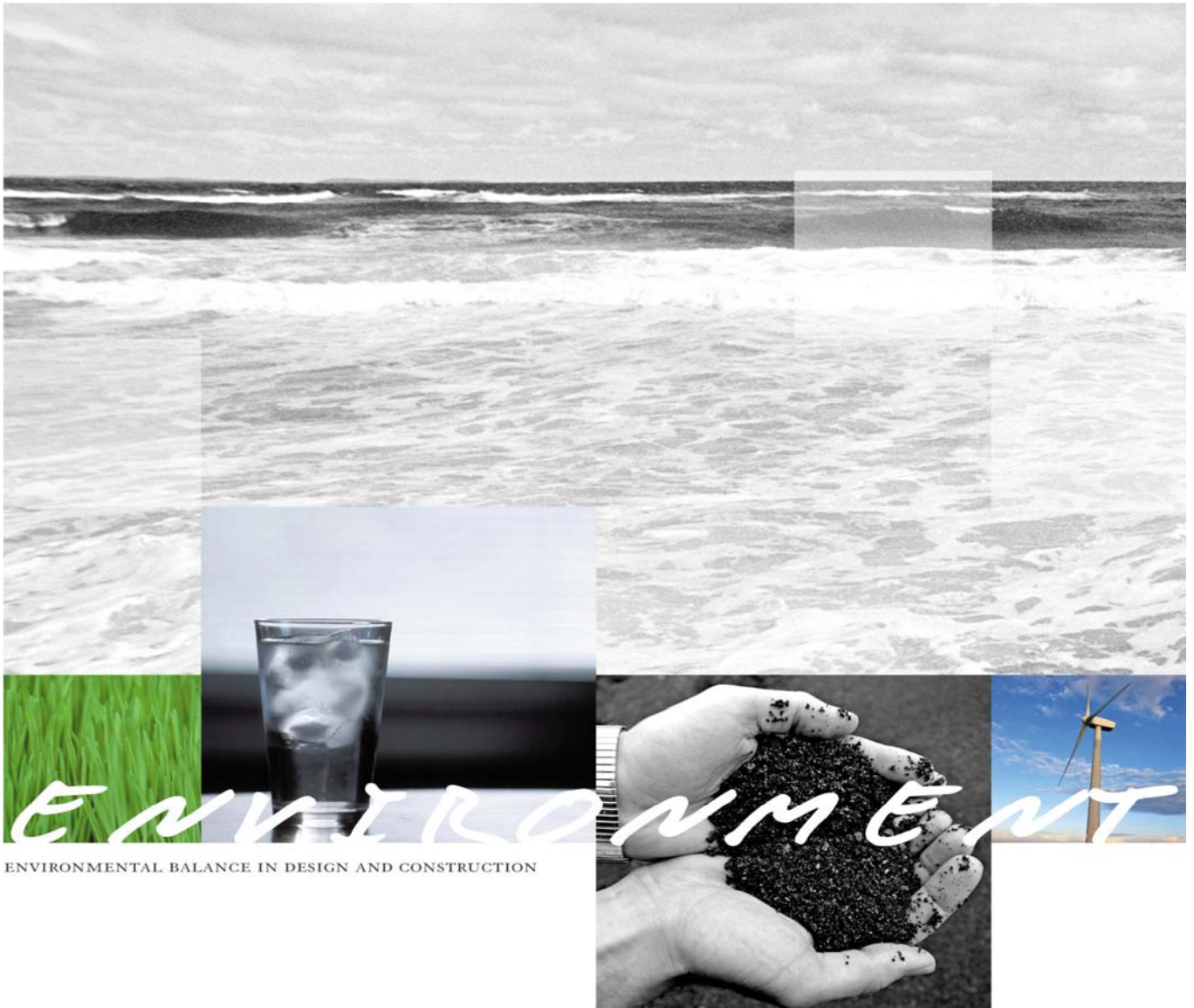
CONSULTANTS IN ENGINEERING,  
ENVIRONMENTAL SCIENCE  
& PLANNING

## APPENDIX 2

### Invasive Species Management Plan







ENVIRONMENTAL BALANCE IN DESIGN AND CONSTRUCTION

# OUTLINE INVASIVE SPECIES MANAGEMENT PLAN FOR TIPPERARY TOWN HISTORICAL LANDFILL REMEDIATION, CO. TIPPERARY

JULY 2018



Comhairle Contae Thiobraid Árann  
Tipperary County Council





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## 1 INTRODUCTION

Tipperary County Council commissioned Fehily Timoney & Company (FT) to prepare an outline Invasive Species Management Plan for the proposed remediation of Tipperary Town Landfill site, Co. Tipperary (see Figure 1-2). Fehily Timoney & Company (FT) has prepared this outline Invasive Species Management Plan (ISMP) to comply with Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (not to cause the spread of non-native invasive plant species listed in schedule III), and to ensure non-native invasive plant species not listed in schedule III are not spread to Natura 2000 sites. The report outlines a programme for the control, eradication and monitoring of invasive species at landholdings of and adjacent to Tipperary Town Landfill site, Co. Tipperary.

In keeping with the third schedule of S.I. No. 477/2011 European Communities (Birds and Natural Habitats) Regulations 2011, the overall aim of this management plan is to put in place systems to contain the spread of invasive species within the Tipperary Town Landfill and adjacent lands, to eradicate the invasive species from within the landfill footprint and adjacent lands, and to ensure they are not spread during of the remediation of the landfill. This document provides background information on the non-native invasive species, location mapping methodology used and results of the extent of the species within the landfill footprint and adjacent landholdings.

In Ireland, the spread and propagation of species listed the third schedule of S.I. No. 477/2011 European Communities (Birds and Natural Habitats) Regulations 2011 is an offence. Under Regulation 49 (2) - Save in accordance with a licence granted under paragraph (7), any person who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow in any place specified in relation to such plant in the third column of Part 1 of the Third Schedule, any plant which is included in Part 1 of the Third Schedule, shall be guilty of an offence. Under Regulation 50 it is an offence to transport a vector material listed in Part 3 of the Third Schedule except under licence; in the case of this site this would apply to soil or spoil taken from places infested with Japanese Knotweed (*Fallopia japonica*) and/or Spanish bluebell *Hyacinthoides hispanca*.

This document provides background information on the non-native invasive species present, mapping of their location, and their extent within the site. It provides a legal context, sources of information including policy and guidelines to which cognisance has been paid, and the means of eradicating the species from site safely using prevention, containment, treatment, monitoring, follow up treatment, record keeping and appropriate disposal.

### 1.1 Site Description

The historical landfill site is in the townland of Carrownreddy immediately north of Tipperary town, partially within a wetland surrounded by agricultural lands adjacent to the town. The site is accessed from the east via the Carrownreddy road, which is a cul de sac accessed from the R661. The historical landfill consists of a mound which rises out of a natural hollow, part of which has been infilled with waste over the years. The land to the west, east and north is noticeably lower, with the mound of waste which is now mainly capped with spoil and rubble dropping suddenly towards the surrounding wetland at its edges.

The wetland surrounding the landfill mound drains from the south-western side into the Spital-Land watercourse, which flows south towards Tipperary town for c. 265 m before being channelled underground at the northern boundary of Rosanna Close housing estate. Due to the surrounding topography, the channel is assumed to continue underneath Tipperary town to join the Ara, which in turn joins the Aherlow, which flows into the Lower River Suir SAC c. 18.2 km downstream of the historical landfill site. This flow regime was confirmed during a site walkover on the 3<sup>rd</sup> May 2018.

This flow regime is in contradiction with the EPA watercourse mapping, which indicates that the Spatial-Land flows from south to north to join the Fidaghta watercourse which would drain the wetland surrounding the landfill and flows south east, eventually joining the River Suir. The headwaters of the Fidaghta are not located at the north-eastern corner of the wetland as indicated by the EPA, due to either a mapping error, or the deposition of spoil historically which may have altered to course of stream in this area. The soil underlying and surrounding the landfill mound is peat varying between 1-3m deep; beneath this, a stratum of clay forms an impermeable layer.

Invasive species are present on and around the landfill footprint. These are likely to have been introduced through the unregulated placement of soil.

### 1.1.1 Invasive species

Preliminary surveys have identified the presence of invasive species at the site, with Japanese knotweed *Fallopia japonica*, Spanish bluebell *Hyacinthoides hispanica* and winter heliotrope *Petasites fragrans* being of principle concern. It is proposed to undertake works to remove and appropriately dispose of all invasive species at the site. To this end, final invasive management plan will be prepared for the site by a suitably qualified contractor and approved by FT. Operations will include the excavation and disposal of areas of soil infested with Japanese Knotweed in accordance with relevant standards. All works are to be undertaken by a suitably qualified contractor.

## 1.2 Proposed Works

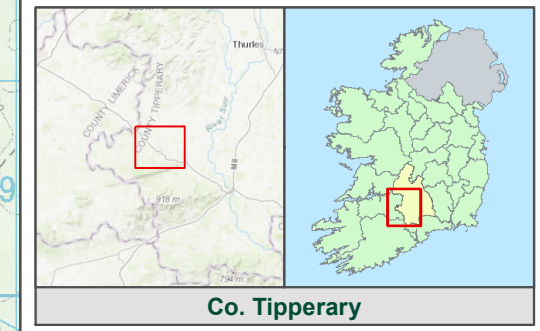
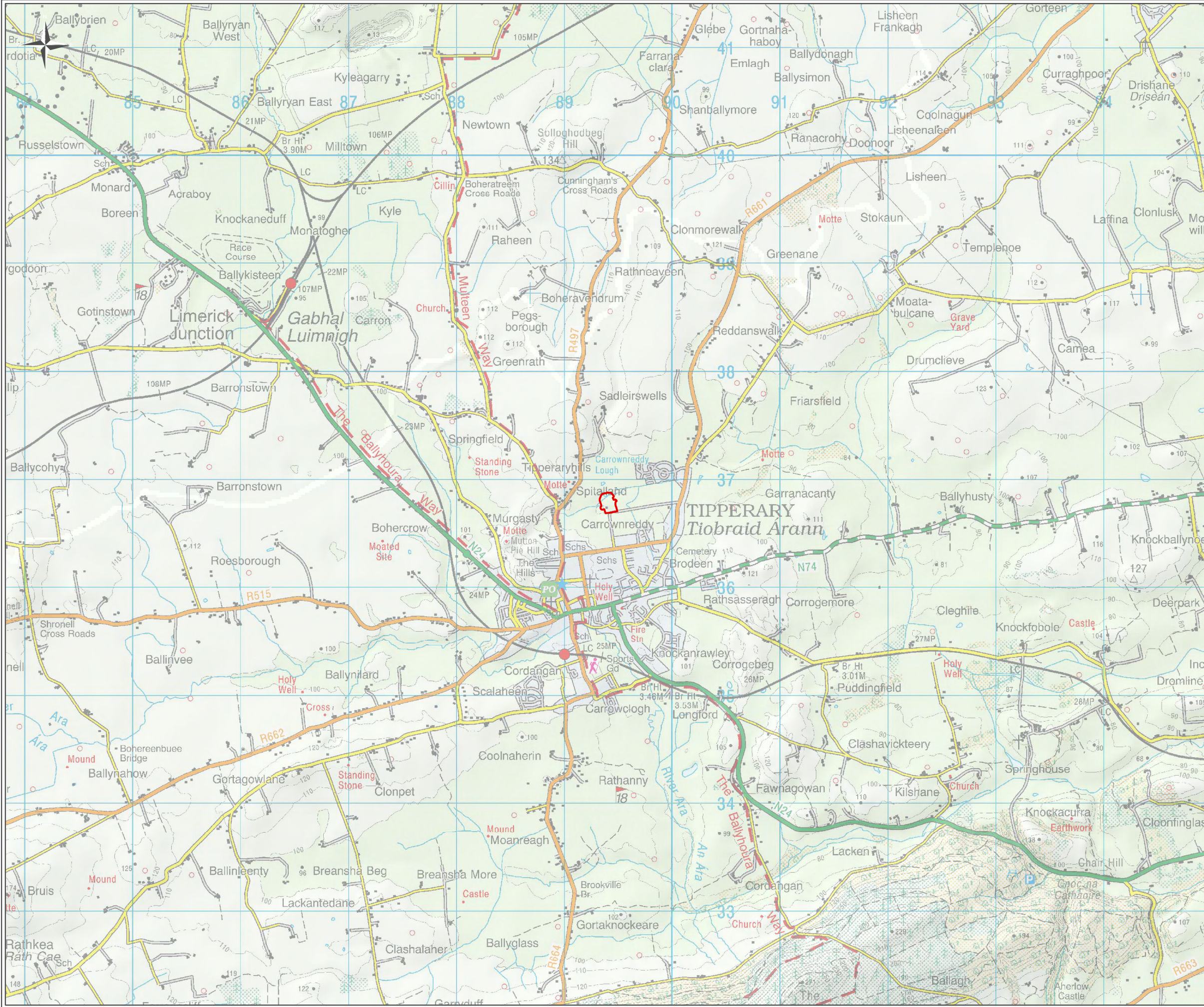
Tipperary County Council have responsibility for the remediation of Tipperary Town Landfill, located in the Townland of Carrownreddy, Tipperary Town. The landfill is a historic landfill having received waste from Tipperary Town from the 1940's to c. 1990. Waste deposited at the site is understood to comprise municipal and commercial wastes to depths of approximately 9m to 12m. Tipperary Town Council currently occupy part of the site as a depot for the storage of road maintenance materials and machinery. Other lands adjoining the site are primarily associated with low intensity agriculture. A marsh/wetland area surrounds the site on all sides except along the southern boundary and along part of the south-eastern boundary.

It is proposed to remediate the existing historic landfill site to the satisfaction of the EPA in line with current site's draft remediation plan. The final remediation plan for the site will be subject to EPA's approval but it is not envisaged to be substantively different from the draft remediation plan submitted. The remediation works will include:

- Invasive Species Management
- Demolition of Existing Structures
- Grading/Profiling OF Existing Side Slopes
- Profiling of Existing Site Area
- Installation of Engineered Landfill Capping System
- Installation of Landfill Gas Venting Trench
- Installation of Passive Landfill Gas Venting System
- Installation of Leachate Management Infrastructure, if required

Works of concern are the movement of soil containing viable material from invasive species which includes the demolition of existing structures (and subsequent movement of material), the regrading and profiling the top and sides of the landfill (which will involve movement of existing materials onsite) and the capping of the landfill.





**Legend**  
 Landfill Boundary

<b>Figure Title</b>	Site Location
<b>Figure No.</b>	1.1
<b>Project</b>	Tipperary Town Historical Landfill Remediation
<b>Client</b>	Tipperary County Council
<b>Scale</b>	1:35,000
<b>Page Size</b>	A3
<b>Revision</b>	A
<b>Date</b>	14/06/2018

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## 2 METHODOLOGY

### 2.1 Legislative Context

In Ireland the spread and propagation of species listed the third schedule of S.I. No. 477/2011 European Communities (Birds and Natural Habitats) Regulations 2011 is an offence. Japanese knotweed and Spanish bluebell are listed in the third schedule. Under Regulation 49 (2) - *Save in accordance with a licence granted under paragraph (7), any person who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow in any place specified in relation to such plant in the third column of Part 1 of the Third Schedule, any plant which is included in Part 1 of the Third Schedule, shall be guilty of an offence.*

### 2.2 Relevant Guidance

The methodology and guidance for this management plan has been devised in consideration of the following relevant guidance:

- PCA, (2014). Code of Practice for the Management of Japanese knotweed. Version 2.7. November 2014. Property Care Association.
- Kelly, J., Maguire, C.M. and Cosgrove, P.J., Muir, R.A. (2015). Best Practice Management Guidelines Japanese knotweed *Fallopia japonica*. Prepared for NIEA and NPWS as part of Invasive Species Ireland.
- NRA, (2010). Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads. Revision 1, December 2010. National Roads Authority.
- Tu, M., (2009). Assessing and Managing Species within Protected Areas. Protected Area Quick Guide Series. Editor J., Ervin, Arlington, VA. The Nature Conservancy, 40 pp.
- Stokes *et al.*, (2004). Invasive Species in Ireland. Unpublished report to Environment and Heritage Service and National Parks and Wildlife Service. Quercus, Queens University Belfast, Belfast.

### 2.3 Desktop Study

A desktop study was carried out to identify existing records of Invasive flora species adjacent to the site, habitat suitability of the site for the invasive species and nearby river bodies. This study allows the surveyor to narrow down the source of the species introduction and its likelihood of spreading within and outside of the site. The following sources of information were used:

- Invasive Species Ireland website <http://invasivespeciesireland.com/>
- OSI Aerial photography and 1:50000 mapping;
- National Parks and Wildlife Service (NPWS) mapping;
- National Biodiversity Data Centre (NBDC) mapping;
- Environmental Protection Agency (EPA) water quality data and CORINE 2012 data

### 2.4 Mapping and Evaluation of Invasive Species

A site survey was undertaken 3<sup>rd</sup> May 2018 (Table 2-1 provides further information). A visual inspection of the extent of the species was undertaken by an experienced ecologist. The location and extent of the invasive species of principle concern and one-off records were recorded using a handheld GPS. Mapping of Butterfly-bush *Buddleja davidii* was not considered practical, due to its presence throughout the site.

**Table 2-1: Baseline Field Assessment Details**

Date:	Ecologist	Weather Conditions:
03/05/2018	BOD	Cloud: 8/8; wind: F1; precipitation: none; visibility: excellent

### 3 INVASIVE SPECIES ACCOUNTS

The International Union for Conservation of Nature (IUCN) in their 'IUCN Guidelines for the Prevention of Biodiversity Loss Caused by Alien Invasive Species' 2000 paper describes non-native invasive species (referred to as an invasive species) as "an alien species which becomes established in natural or semi-natural ecosystems or habitat, is an agent of change, and threatens native biological diversity".

The six invasive species listed below were recorded at the historical landfill site and on the adjacent landholdings. Accounts of these species, summaries their ecology, growth and management periods, and distribution are included below.

- Japanese Knotweed (*Fallopia japonica*)
- Winter Heliotrope (*Petasites fragrans*)
- Spanish Bluebell (*Hyacinthoides hispanica*)
- Cherry Laurel (*Prunus laurocerasus*)
- Montbretia (*Crocasmia X crocosmiflora*)
- Snowberry (*Symphoricarpos albus*)
- Butterfly-bush (*Buddleija davidii*)

#### 3.1 Japanese Knotweed (*Fallopia japonica*)

According to the Invasive Species Ireland Project who have carried out a risk assessment of Japanese Knotweed (*Fallopia japonica*), which is distributed throughout the island of Ireland (see Plate 1 below), the species is "one of the highest risk (most unwanted) non-native invasive species in Ireland". The species poses a risk to in open and riparian areas where it spreads rapidly to form dense stands, excluding native vegetation and prohibiting regeneration. This process has been known to reduce diversity and alter semi-natural and locally important habitats for wildlife. Once stands become established, they are extremely persistent and difficult to remove. Japanese Knotweed can grow through weaknesses in both tarmac and concrete. Population clusters must be completely removed, under appropriate licencing, before construction or specific projects within the site can begin (ISI, 2018).

##### 3.1.1 Species ecology

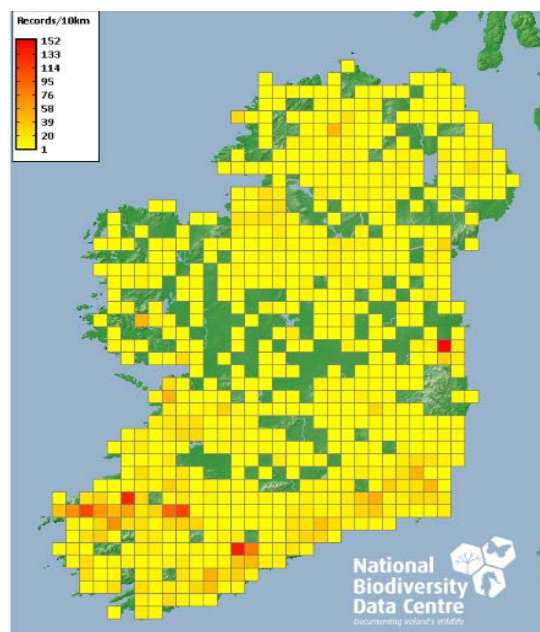
Although Japanese Knotweed plants flower, all flowers in Ireland and Britain are female, precluding the possibility of sexual reproduction. The means of spread is entirely through the movement of rhizomes or rhizome fragments in soil or cut stems. Japanese Knotweed has an extraordinary ability to spread vegetative from crown, stem and rhizome (underground root) if disturbed. Even tiny amounts of cut stem, crown or rhizome can produce a new plant. Controlling the spread of the species is therefore dependent on preventing the spread of the stem, crown or rhizome. Japanese Knotweed causes numerous impacts, both ecological and economic. It is capable of outcompeting native plants and blocking commuting corridors of native mammals, and damaging buildings, tarmacadam and concrete. In waterways, it can block and reduce water flow, increasing the risk of flooding. In winter, when it dies back, it can leave riverbanks bare and open to erosion.

Red/purple shoots appear early in spring, which in some cases resemble an asparagus-like appearance but, as the canes grow, the leaves unfurl and the plant takes its more characteristic appearance. The mature canes are like bamboo, being hollow, and have a characteristic pattern of purple speckles.

The leaves are shield-shaped with pointed tips and a flat base, arranged in a zig-zag formation. The plant can grow to over 3m in height. Flowering occurs in late summer/autumn (End July – typically August) and consists of small creamy white flowers. During the winter the leaves die back and reveal orange/brown woody erect stems. Rhizomes are bright orange inside and can extend to a depth of 3m and a width of 7m around the visible growth above ground. Plate 1 below displays characteristic features of Japanese Knotweed.



**Plate 1: Characteristic features of Japanese Knotweed**



**Figure 3-1: Distribution of Japanese Knotweed throughout Ireland**



3.1.2 Growth/treatment Timeframe

Japanese Knotweed shoots typically appear between March and April. During this time energy stores from the root system are used to facilitate initial growth. The summer growth period commences in May and lasts until July, typical growth occurs during this time. Flowering begins in August and lasts until October. During this time the pale flowers can be seen. Plate 2 displays a summary of the plants growing season.



Plate 2: Japanese Knotweed Growth season summary (Kelly, et al., 2015).

Plate 3 indicates the suitable period which glyphosate herbicide is used to remove Japanese Knotweed. It is suitable to use glyphosate herbicide on knotweed between the months of May and October, with August, September and October being the preferred months of use.

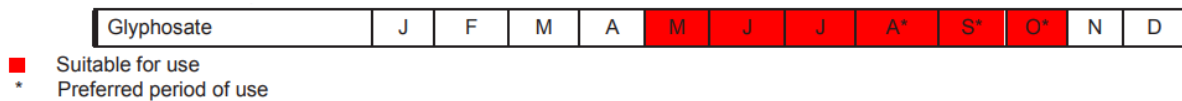


Plate 3: Japanese Knotweed Growth season summary (Kelly, et al., 2015).

3.2 Spanish Bluebell (*Hyacinthoides hispanica*)

3.2.1 Species ecology

Spanish Bluebell (*Hyacinthoides hispanica*) is native to the Iberian Peninsula. It was introduced into Brittan and Ireland as an ornamental plant but since has become invasive. The main threats associated with the species include hybridisation with the native Bluebell (*Hyacinthoides non-scripta*) and their ability to spread out competes other flora thus limiting the species diversity of an area.

The species is abundant in terrestrial dry woodlands and gardens. The species, unlike Japanese Knotweed, can spread both by seed and vegetatively, thought the growth of roots leading to new bulbs being formed. The Native and Spanish Bluebell are closely related species, thus making hybridisation easier, which is has negative implications for the native population.

Spanish Bluebell is perennial herb with white spherical bulbs. It has narrow green leaves of 20 to 50cm in length. Each bulb has 4-6 leaves which become erect before flowering, then later in the season collapse. Their bell-shaped flowers are visible from April to June and are a lilac to blue in colour. Anthers, within the flower are blue, in comparison to those of the native species which are creamy white. The Spanish Bluebell dies back once seeds have been produced in late summer.



Native Bluebell

Spanish Bluebell

**Plate 4: Displaying similarities between Spanish and Native Bluebell (Paul, 2016)**

### 3.2.2 Timeframe

The optimal time for treatment is in spring, before flowers emerge; this will prevent the plant reproducing sexually, and setting seed.

## **3.3 Winter heliotrope (*Petasites fragrans*)**

### 3.3.1 Species ecology

Winter Heliotrope (*Petasites fragrans*) is an invasive plant species, native to North Africa and the Mediterranean (Devlin, 2018). It often forms dense carpets of kidney-shaped leaves, 20-50cm wide, and is not often confused with other species. Heliotrope prefers damp areas and embankments, both within waste ground areas and cultivated land. It can often be found along roadways and drains.

These deciduous plants produce large roundish leaves up to 30cm in diameter. These are downy underneath. Its pale pink flowers have a distinctive sweet smell and flower in December and January. Foliage forms a dense carpet with a height of approximately 30cm. Its rhizomatous root system allows vegetative spreading. Plate 5 displays some characteristic features of Winter Heliotrope. The heliotrope plants in Ireland are all clone males, originating from a single male through fragmentation. These male plants are unable to produce seeds and thus rely on root systems and fragmentation to spread.

The species is thought to be widespread, but under recorded, in Ireland. Thought to have been introduced in the 1800s, first reported in pre-1866 records, it's believed that the species was originally either planted as winter ground cover or as a foodplant for bees (Reynolds, 2002).

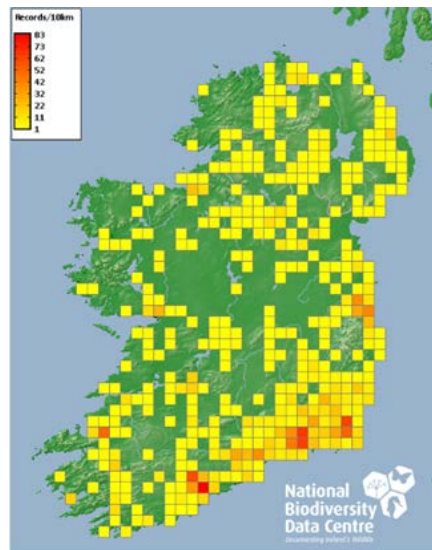
Once Winter Heliotrope becomes established, it forms dense carpets which inhibit and outcompete other vegetation, causing reduced biodiversity and cover of native species. This plant is mainly spread vegetatively, with small parts of rhizomes capable of producing new plants.



Foliage and flowers

Foliage

**Plate 5: Characteristic features of Winter Heliotrope (Source: Transport Infrastructure Ireland)**



**Plate 6: Distribution of Winter Heliotrope throughout Ireland (Source: National Biodiversity Data Centre)**

3.3.2 Timeframe

Winter heliotrope can be treated at any time of year, once the extent of growth has been mapped when leaves are present.

**3.4 Cherry Laurel (*Prunus laurocerasus*)**

3.4.1 Species ecology

Evergreen shrub which forms dense thickets comprised of either a single stem or multiple stems (especially if it has been trimmed). Thick evergreen 5-15cm long oblong-ovate leaves; glossy green on surface and pale underneath. Leaves arranged alternately on short leaf stalks and leaf edges are toothed with pointed tips. Small white fragrant flowers are held in clusters (racemes) and flowers are comprised of 5 petals any many yellow stamens. Fruit are purple/black and Cherry like and held in clusters. See Plate 7 below shows the defining features of Cherry Laurel.





Clusters of white flowers



This evergreen leaves alternate on stem with short leaf stalks.



Fruit in clusters.

**Plate 7: Characteristics of Cherry Laurel (Source: Kingcounty.gov)**

**3.4.2 Timeframe**

Cherry laurel can be cut down at any time of year; the herbicide glyphosate can also be applied throughout the year, however May to October inclusive is a sub-optimal period. Of principle concern when cutting and/or moving vegetation or surrounding soil would be the movement of viable seeds. As such the optimal time for cutting would be outside the flowering and fruiting period.

**3.5 Montbretia (*Crocsmia X crocosmiflora*)**

Montbretia (*Crocsmia X crocosmiflora*) is an invasive perennial which grows from underground corms. The X within its scientific name indicated that it is a hybridised species. The species was developed in France for horticultural use, it has since escaped and has become naturalised throughout Ireland. Montbretia can survive in most habitat types such as wet grassland, gardens and roadside.

In the case of most other such invasives, Montbretia uses its fast growth rates to outcompete and dominate the habitats which its introduced. This dominance can cause impact to native species and processes within these habitats. Dense tussocks of Montbretia can prevent the regeneration of seedlings and saplings, thus preventing natural re-generation of the habitat (DAFM, 2016).

### 3.5.1 Species ecology

Montbretia flowers are reddish to orange in colour, they can be between 25 to 55mm long and are arranged loosely along two opposite sides of the flower stem, in a zig-zag formation. They have a hollow tubular corolla with six petals, with green leaves described as 'grass-like', long and narrow. The leaves are soft, hairless, have pointed tips and can be 30-80cm long.

Montbretia spreads vegetatively throughout introduced habitats through underground corms and rhizome fragments. The corm is bulb-like and stores energy for survival during the winter months. It is estimated that each Montbretia plant can produce 14 new corms annually. These corms are thought to break off from the parent plant, thus spreading further into the habitat. The corms, corm fragments and rhizomes can be spread unintentionally as a result of ground disturbance, dumping of garden waste and by attaching to machinery.

The species is also capable of producing viable seed, providing a further means of spread.

### 3.5.2 Timeframe

Montbretia grows begins in early spring with leaves sprouting from the ground in March. The plant flowers between July and September. The most effective time to remove Montbretia is just before full flowering occurs in summer (DAFM, 2016).



**Plate 8: Montbretia (Source: DAFM)**



**Plate 9: Montbretia flower arrangement and leaf (Source: Wildflowers of Ireland)**

## 3.6 Snowberry (*Symphoricarpos albus*)

Snowberry is an invasive, often overlooked, species which is often present in hedgerows. Other than its pale white fruit, the species seems to blend in to the other species within the habitat. Snowberry is a twiggy and straggly plant which can reach over 2.5m high, often suspended using suckers.

Snowberry impacts habitats and species through forming dense thickets which outcompete native vegetation.

3.6.1 Species ecology

Snowberry produces small pale-pink 'funnel-shaped' flowers with 5 pale-petalled flowers (4-6mm across) in short, which flower from June to September. Its oval leaves are small and untoothed. In autumn its berries are round (1.5-2cm diameter) and white when ripe, of which each contain 2 seeds. This plant was introduced from North America. Interestingly, it is thought that bird species within Ireland have not yet adapted to feed upon berries of such a colour, as no native plant in Ireland holds ripe white berries.

3.6.2 Timeframe

Snowberry comes into flower from June to September; their berries are ripe in Autumn. As such, the optimal time for treatment would be outside the flowering and fruiting period.



Plate 10: Snowberry flower (Devlin, 2018)



Plate 11: Snowberry berry and leaves (Source: GBNNS)

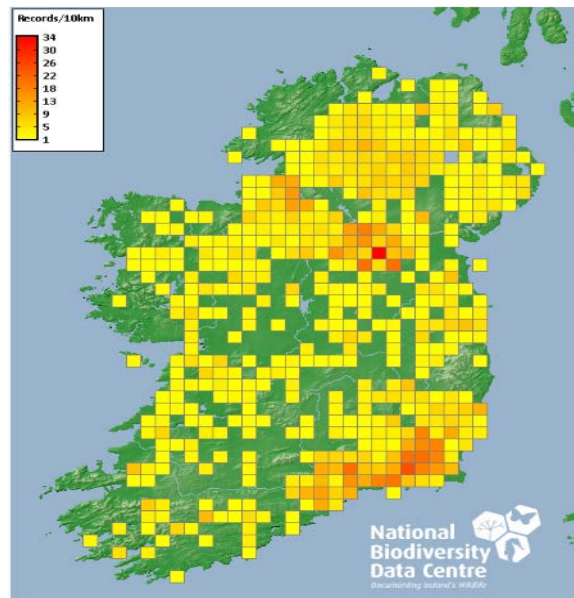


Plate 12: Distribution records of Snowberry in Ireland (Source: National Biodiversity Data Centre)



**3.7 Butterfly-bush (*Buddleia davidii*)**

The Butterfly-bush is a multi-stemmed shrub which can reach 4m in height. From June to September, the arching branches bear conical panicles of lilac flowers, which may occasionally be white, pink, red or purple. Leaves are long and serrated along the edges. In the winter, flower heads and seed capsules remain despite the plant being deciduous. Up to 3 million seeds are produced per plant and can remain dormant in the soil for many years. Plate 13 displays characteristic features of the Butterfly-bush.

Butterfly-bush is common throughout Ireland. It spreads through abundant seed dispersal by wind and draught behind vehicles. While being a valuable source of nectar, especially for butterflies, *Buddleia* can cause structural damage to buildings by rooting in cracks in masonry.



Flower head

Mature shrub

Flower and foliage

**Plate 13: Characteristic features of Butterfly-bush (Source: Wildflowers of Ireland)**

**3.7.1 Timeframe**

Optimal time for treatment and/or movement of material would be outside of flowering and seed-bearing periods.





## 4 EXISTING ENVIRONMENT

### 4.1 Desktop records

Historical records of invasive species from the relevant national datasets were assessed through the National Biodiversity Data Centre. Three invasive species were identified within both 2 and 10km grid squares encompassing the site (listed in table 4-1 below).

No other invasive flora species were historically recorded within these areas.

**Table 4-1: Historical Invasive species records in within 10km (grid R83) and 2km (grid R38Y) of the site**

Grid(s)	Species	Date of record	Dataset	Invasive Impact
R38Y and R38	Japanese Knotweed ( <i>Fallopia japonica</i> )	18/10/2012	National Invasive Species Database	High
R83	Giant-rhubarb ( <i>Gunnera tinctoria</i> )	30/05/2006	River Biologists' Database (EPA)	High
R83	Sycamore ( <i>Acer pseudoplatanus</i> )	25/07/2007	Species Data from the National Vegetation Database	Medium

#### 4.1.1 Japanese Knotweed records

A review of Japanese Knotweed records retrieved from Biodiversity Ireland website's<sup>1</sup> online database was undertaken within the landfill site and its adjacent surroundings. Records of invasive flora within 2km and 10km grid squares (R38Y and R38, respectively), encompassing the site, were assessed. Japanese Knotweed was recorded both during survey of the site and in historical records.

#### 4.1.2 Giant-rhubarb

A review of Giant-rhubarb records retrieved from Biodiversity Ireland website's online database was undertaken within the landfill site and its adjacent surroundings. Records of invasive flora within 2km and 10km grid squares (R38Y and R38, respectively), encompassing the site, were assessed. Giant-rhubarb was recorded during assessment of these records but was not recorded during survey of the site.

#### 4.1.3 Sycamore

A review of Sycamore records retrieved from Biodiversity Ireland website's online database was undertaken within the landfill site and its adjacent surroundings. Records of invasive flora within 2km and 10km grid squares (R38Y and R38, respectively), encompassing the site, were assessed. Sycamore was recorded during assessment of these records but was not recorded during survey of the site.

## 4.2 Results of Field Survey and Mapping

A field survey of the site was conducted on the 3<sup>rd</sup> of May 2018. Invasive plant species on site were identified and locations of species of principle concern were logged on a GPS device. The field survey detected seven invasive species present within the site.

These are:

- Japanese Knotweed (*Fallopia japonica*)
- Winter Heliotrope (*Petasites fragrans*)
- Spanish Bluebell (*Hyacinthoides hispanica*)
- Cherry Laurel (*Prunus laurocerasus*)
- Montbretia (*Crocsmia X crocosmiflora*)
- Snowberry (*Symphoricarpos albus*)
- Butterfly-bush (*Buddleija davidii*)

The co-ordinates recorded for these species are included in Appendix 1. As stated in section 2.4, the wide distribution throughout the site rendered mapping of Butterfly-bush (*Buddleija davidii*) impractical.

Figures 4-1 and 4-2 below show the locations and extents of invasive species mapped.

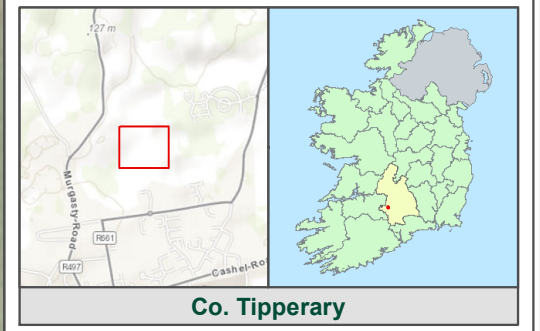
### 4.3 Location and links to sensitive habitats

The site's location within a wetland means there is potential for transport of Japanese knotweed stem fragments downstream to other locations, including Natura 2000 sites.

The wetland is not at risk from infestation of any of the invasive species recorded on-site, since the particular species in question cannot grow in wetland habitats.

The means of introduction to the landfill site for all species present is likely to have been via unregulated placement of soil.





**Co. Tipperary**

**Legend**

- Landfill Boundary
- Indicative Footprint of Remedial Works
- Japanese Knotweed

**Figure Title**  
Location & Extent of Japanese Knotweed

**Figure No.** 4.1

**Project**  
Tipperary Town Historical Landfill Remediation

**Client**  
Tipperary County Council

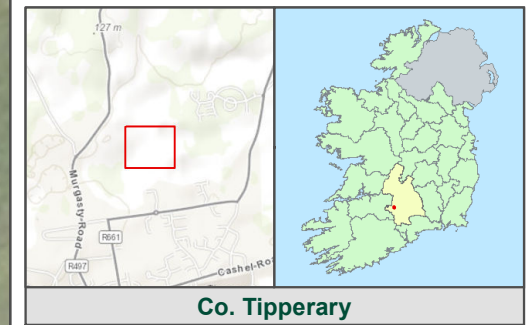
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**Revision** A    **Date** 29/06/2018








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**Legend**

-  Landfill Boundary
-  Indicative Footprint of Remedial Works
-  Cherry Laurel
-  Montbretia
-  Snowberry
-  Spanish Bluebell
-  Winter Heliotrope

**Figure Title**  
Location & Extent of Other Invasive Species

**Figure No.** 4.2


**Project**  
Tipperary Town Historical Landfill Remediation

**Client**  
Tipperary County Council

**Scale** 1:1,000    **Page Size** A3

**Revision** A    **Date** 29/06/2018

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## 5 PROPOSED MEASURES FOR THE MANAGEMENT OF INVASIVE SPECIES WITHIN AND ADJACENT TO THE DEVELOPMENT SITE

It is recommended that a qualified and competent specialist in the treatment of invasive plant species with appropriate experience and expertise is employed for the duration of the project to ensure that all the measures outlined in relation to the Invasive Species Management Plan are implemented.

### 5.1 General Measures

While it is extremely important and more efficient to contain invasive species at the point of infestation, care shall also be taken to ensure the plan shall also be adhered to ensure that the species is not spread outside the site.

According to Invasive Species Ireland (ISI) invasive non-native species are the second greatest threat (after habitat destruction) to worldwide biodiversity. Invasive species negatively impact Ireland's native species; changing habitats and ultimately threatening ecosystems which impacts on biodiversity as well as economics as they are costly to eradicate.

Halting the spread of non-native invasive species can be achieved via prevention, containment, treatment and eradication (ISI, 2012a).

#### 5.1.1 Prevention

Prevention of the spread of invasive species will be achieved by:

- The finalised invasive species management plan in conjunction with competent and experienced Contractor.
- Supervision of control measures and treatment works by an appropriately qualified ecologist or invasive species specialist.
- Raising awareness of site workers via tool box talks given by a suitably qualified person as part of site introduction; informing workers what to look out for and the what procedure to follow if they observe an invasive species.
- Only planting or sowing of native species within the proposed development will be allowed.
- Where invasive species have been physically removed and disturbed soil, this soil will be seeded or replanted (including 5cm deep mulch) with native plant species. This will prevent the easy colonisation of bare soil by invasive species in the area.
- Unwanted material originating from the site will be transported off site by an appropriately licensed waste contractor and disposed of properly at a suitably licenced facility.
- Signs should warn people working there that there is Japanese Knotweed and other invasive species contamination.
- Stockpiles of soil contaminated with Japanese Knotweed to be indicated clearly with appropriate signs and isolate them.
- Ensure good hygiene practices:
  - Remove the build-up of soil on equipment
  - Keep equipment clean
  - Do not move fouled equipment from one site to another.
- All vehicles exiting the site should be washed down with a pressure washer to prevent the transport of seeds, since this cannot be prevented comprehensively by any other measure.
- Waste water from washing facilities will be stored securely and treated to prevent spread outside the site.
- Footwear and clothing of operatives working near invasive species should be checked for seeds, fruits, or other viable material before exiting the site.



### 5.1.2 Containment

The three most common ways a site can become infected are:

1. Importation of infected soil.
2. Contamination on vehicles and equipment.
3. Illegal dumping.

Containment of invasive species will be achieved by:

- A pre-construction survey shall be undertaken during the growing season immediately prior to the construction phase to mark out the extent of invasive plant species. This survey shall inform the finalised draft of the invasive species management plan prior to the commencement of works. Prior to the construction phase, invasive species are to be treated (Section 5 for treatment methods).
- Japanese Knotweed within the site including the 7m buffer from the footprint of the development will be excavated (following herbicide treatment) prior to the construction phase. Cordoning off of Japanese Knotweed will occur if required. Japanese Knotweed's root structure rhizomes can extend up to 7 m in a lateral direction (but usually only up to 5 m), and 3m deep from the over ground parent plant.
- Cordoning off the area for other invasive species– this shall include a buffer of up to 1m surrounding the area of infection. This will prevent plants with underground rhizomes being transported to other sections of the site and it will also prevent contact with plants which could result in the transport of seed, fruit or vegetation to other parts of the site. No construction works will occur within exclusion zones prior to the eradication of invasive species.
- No machinery or personnel shall be allowed within exclusion zones. Similarly, there shall be no storage of materials within or adjacent exclusion zones.
- No soil or vegetation shall be removed from this area unless it is contained and is transported via an appropriately licensed waste contractor to a suitably licenced facility for treatment.
- Informing all site staff through toolbox talks as part of site inductions.
- Any new sightings of invasive plant species shall be relayed to construction staff and the developer. These areas shall follow the same protocol as the current infected area.

## 5.2 Japanese Knotweed

Two options for the treatment of Japanese Knotweed at the site have been recommended. Since the infested areas will be capped, all potentially infested soil will be required to be removed and disposed of appropriately. Either of these two options shall be used to eradicate Japanese Knotweed from the site and avoid the spread of the species. However, the following general recommendations will be adhered to as part of the plan:

- Japanese Knotweed root systems can extend up to 7m in a lateral direction (but usually only up to 5 m), and 2m deep from the over ground parent plant.
- Staff shall be made aware of this buffer zone when working within areas of infestation.
- Areas of infestation to be fenced off from other works areas including a buffering distance of up to 7m to create exclusion zones.
- Construction works will only be allowed within exclusion zones following the eradication of Japanese Knotweed.
- No treatment measures to take place in these areas without supervision and agreement by appointed appropriately experienced ecologist or Japanese Knotweed eradication specialist.
- All machinery and vehicles operating within areas of infestation to be thoroughly checked and if necessary cleaned prior to leaving the area to protect against further spreading of Japanese Knotweed.

- During vegetation clearance and the removal of rubbish and other waste materials from infested areas care must be taken to ensure that Japanese Knotweed is not carried with these materials out of the site. Japanese Knotweed plants (or other invasive species) should not be removed along with other vegetation during clearance works.
- No material shall be taken from areas of infestation (unless for disposal at a suitably licenced facility). All staff shall be made aware of nature of threat via toolbox talks as part of site inductions. Toolbox talks shall be undertaken with all personnel accessing the site to ensure that the details of the invasive species management plan are adhered to and to raise awareness of the potential treat of invasive species.
- Wheel washes shall be put in place at entry and exit points, if considered appropriate. Waste water from these facilities will be stored and treated to avoid further outbreaks.
- If operating within an area of known infestation all machinery, vehicles, equipment, foot ware and clothing will be cleaned thoroughly (if necessary using steam cleaners) in a contained area to avoid further contamination.
- It is unlikely that one treatment will kill this plant. Treatment will be required for years before eradication is achieved.

#### *Option 1: The burial method (on-site)*

This is an option that is used in situations where there is a pressing development need for the site and time constraints which would not allow for in-situ herbicide control over a longer period of time.

##### Pre-excavation treatment

The Japanese Knotweed infestation must be treated with herbicide before removing. When sufficient time has been allowed for the herbicide to take effect (preferably at least a fortnight) the canes should be cut and removed and contained for burial.

Herbicides can be applied using a range of suitable applicators such as a knapsack sprayer. Control is easier if dead winter stems are tidied over the winter months to assist with access before growth commences i.e. to prevent tripping on them or them interfering with your knapsack lance. It is advised to leave live canes in situ to reduce the risk of spread to other sites. Care must be taken to avoid spreading Knotweed crowns when tidying dead canes. Application in sensitive vegetation areas is best achieved by stem injection or weed wiper.

##### Stockpiling Japanese Knotweed infested soil prior to burial

If soil containing Japanese Knotweed is stockpiled, the material must be stored in a manner that will not harm health or the environment. The stockpile should be on an area of the site that will remain undisturbed. The area should be clearly signed and regularly treated with herbicide to avoid re-infestation.

As a precaution, the stock piled material should be laid on a root barrier membrane to avoid contaminating the site further and covered fully with the same material to avoid dispersal via wind.

##### Burying the material

Soil containing Japanese Knotweed material may be buried on the site where it is produced to ensure that it is completely eradicated.

It is advisable to apply a non-persistent herbicide at least once to reduce the growth of infective material. The period of time during which the herbicide is 'active' is described on the product label. Material cannot be buried during that period of activity.

Material must be buried on-site at least 5m deep. The Japanese Knotweed material must then be covered with a root barrier membrane layer before infilling it to 5m deep with inert fill or topsoil.

Root barrier membranes that may have been used to protect clean ground from vehicles involved in excavating Japanese Knotweed must also be buried. This method relies on the depth of burial as the main Japanese Knotweed treatment, rather than the protection from the root barrier membrane.

Where on-site burial is used, the area of deposition must be accurately mapped and the location recorded to prevent potential disturbance and re-infestation, future owners must be advised of its position. Japanese Knotweed is likely to survive for many years, depending on how effective the treatment was before it was buried. It is essential that it is not buried in a location where landscaping, installing services, building foundation are proposed or erosion from a watercourse is likely.

Where the deep burial of the dead Japanese Knotweed material is the preferred method of disposal, it is recommended to use glyphosate formulations. Other persistent herbicides are not allowed for deep burial under various waste regulations and due to a potential risk of pollution of groundwater.

Material, including contaminated soils, rhizome and the crown at the base of the stem, must be buried:

- at least 5 metres deep, (immediately cover to 1-2 metres, final depth after 2-4 weeks);
- at least 10 metres from the margins of the site or any engineering features, for example drains or bunds, of the site;

It is only acceptable to bury Japanese Knotweed material if the soil is otherwise uncontaminated.

- Moving soil off site
- Transporting soil infested with Japanese Knotweed, it is essential to carry out strict hygiene measures.

#### *Option 2: Moving Soil and treated Japanese Knotweed off site*

Material (soil, vegetation, etc.) contaminated with Japanese Knotweed can only be transported offsite under the conditions of a relevant licence from the National Parks and Wildlife Service (NPWS). The material can only be removed to a prearranged EPA licenced waste transfer facility by the licenced haulier. Excavation for off-site disposal, great care to avoid excess waste and make sure the excavated Japanese Knotweed does not contaminate surplus soil that is currently free from infestation during excavations. When transporting soil infested with Japanese Knotweed, it is essential to carry out strict hygiene measures. If proper standards are not followed, this may lead to Japanese Knotweed spreading. Japanese Knotweed is a particular problem along transport corridors, where it interferes with the line of vision and can cause accidents.

Trucks transport the material should only be filled up to a maximum of 20cm from the top. The void must be sealed with a well-secured membrane.

There must be enough membrane to let the soil be sealed into a temporary cell for transporting. It is very important that the soil is contained to prevent any material being lost when it is moved. To contain the soil in the short-term, you can use a lower specification of membrane.

The final fate of Knotweed material transported off-site would be deep burial or incineration at an appropriately licensed facility.

### **5.3 Winter Heliotrope**

Two options for the treatment of Winter Heliotrope at the site are recommended. This option shall be used to eradicate Winter Heliotrope from the site and avoid the spread of the species. However, the following general recommendations will be adhered to as part of the plan:

- Staff shall be made aware of this buffer zone when working within areas of infestation.
- Areas of infestation to be fenced off from other works areas including a buffering distance of up to 1m to create exclusion zones.
- Construction works will not be allowed within exclusion zones until the species has been fully eradicated but may continue outside of these areas.
- No treatment measures to take place in these areas without supervision and agreement by appointed eradication specialist.

- All machinery and vehicles operating within areas of infestation to be thoroughly checked and if necessary cleaned prior to leaving the area to protect against further spreading of Winter Heliotrope.
- No material shall be taken from areas of infestation; unless for disposal. All material will be either deep buried (2m) or transported by an appropriately licensed waste contractor and received by an appropriately licensed facility.
- All staff shall be made aware of nature of threat via toolbox talks as part of site inductions. Toolbox talks shall be undertaken with all personnel accessing the site to ensure that the details of the invasive species management plan are adhered to and to raise awareness of the potential treat of invasive species.
- Wheel washes shall be put in place at entry and exit points, if considered appropriate. Waste water from these facilities will need to be stored and treated to avoid further outbreaks.
- If operating within an area of known infestation all machinery, vehicles, equipment, foot ware and clothing will need to be cleaned thoroughly (if necessary using steam cleaners) in a contained area to avoid further contamination.

#### *Option 1 – Removal and follow up herbicide spraying*

As this species spreads vegetatively via rhizomes, treatment is comprised of a physical and chemical combined approach. First, rhizomes are removed and secondly the areas are re visited and any potential growth is sprayed using glyphosate-based herbicide after flowering in February to March or midsummer or later but before the foliage begins to die back (NRA, 2010).

Remaining plant matter from this process should be either buried, under the above conditions, or transported, using an appropriate licenced vehicle to a licenced waste processing facility.

It should be noted that a number of winter heliotrope growths are intermingled with Winter Heliotrope. Therefore, it follows that these areas should be excavated and buried along with the soil from these areas as outlined above.

#### *Option 2 – In-situ Burial*

If areas of Winter Heliotrope separate from knotweed infestations at an elevation which would allow material from outside the site of a sufficient depth (min 1m) to be deposited on top during the re-grading process without disturbance to the Winter Heliotrope, this, and subsequent capping would kill off the plant and prevent re-growth. This method would only work if no interaction with winter heliotrope occurred, precluding the transport of viable material on plant equipment.

## **5.4 Spanish Bluebell**

Three options for the treatment of Spanish Bluebell at the site have been proposed. It will be necessary to ensure that soil containing bulbs, seeds or other viable material is not transported within or outside the site; therefore, excavation and appropriate disposal, or in-situ burial are the means by which this can be achieved. As such, any one or a combination of these options shall be used to eradicate Spanish Bluebell from the site and avoid the spread of the species. However, the following general recommendations will be adhered to as part of the plan:

- Spanish Bluebell is spread both by seed and vegetatively. A buffer area of 1m will be left to prevent damage to the plants, seedpods and bulbs, which can result in the production of new individuals, thus making the plant more difficult to treat.
- Staff shall be made aware of this buffer zone when working within areas of infestation.
- Areas of infestation to be fenced off from other works areas including a buffering distance of up to 1m to create exclusion zones.
- Construction works will not be allowed within exclusion zones until the species has been fully eradicated but may continue outside of these areas.

- No treatment measures to take place in these areas without supervision and agreement by appointed eradication specialist.
- All machinery and vehicles operating within areas of infestation to be thoroughly checked and if necessary cleaned prior to leaving the area to protect against spread of seeds or other material.
- No material shall be taken from areas of infestation; unless for disposal. All material will be either deep buried (2m) or transported by an appropriately licensed waste contractor and received by an appropriately licensed facility.
- All staff shall be made aware of nature of threat via toolbox talks as part of site inductions. Toolbox talks shall be undertaken with all personnel accessing the site to ensure that the details of the invasive species management plan are adhered to and to raise awareness of the potential treat of invasive species.
- Wheel washes shall be put in place at entry and exit points, if considered appropriate. Waste water from these facilities will need to be stored and treated to avoid further outbreaks.
- If operating within an area of known infestation all machinery, vehicles, equipment, foot ware and clothing will need to be cleaned thoroughly (if necessary using steam cleaners) in a contained area to avoid further contamination.

#### *Mechanical excavation and removal*

Bulbs, roots and tissue can be mechanically removed from the ground. Care should be taken when completing this method as a missing bulb may be able to grow a new colony of bluebell. The best time to complete mechanical removal of Spanish bluebell is early spring, before the plant starts to flower. Waste materials, including soil, containing the Spanish bluebells are to be considered as 'controlled' waste and must be disposed of appropriately, through properly licenced processes.

#### *Option 1: Excavation and Burial On-site*

Excavate soil up to 1m from the plant/growth. Excavated material will be buried to a depth of 2m. Wash down all equipment into the transportation vehicle to ensure all material and seeds are transported to the burial site. Wash out transportation vehicle into burial site.

#### *Option 2: Excavation and Disposal at Licensed Facility*

Excavate soil up to 1m from the plant/growth. Wash down all equipment into the transportation vehicle to ensure all material and seeds are transported to the disposal site.

Trucks transporting the material should only be filled up to a maximum of 20cm from the top. The void must be sealed with a well-secured membrane.

There must be enough membrane to let the soil be sealed into a temporary cell for transporting. It is very important that the soil is contained to prevent any material being lost when it is moved. To contain the soil in the short-term, you can use a lower specification of membrane.

#### *Option 3 – In-situ Burial*

Similarly, to winter heliotrope above, infestations at an elevation which would allow material from outside the site of a sufficient depth (min 1m) to be deposited on top of the plants during the re-grading process without disturbance to Spanish Bluebell plants could be treated this way. This, and subsequent capping would kill off the plant and prevent re-growth. No direct interaction with plant material should occur during this process. Washing down of plant equipment and checking of clothing and footwear of operatives working in the area would also be required to ensure no seeds were transported during the process.

## 5.5 Cherry Laurel

Four options for the treatment of Cherry Laurel has been proposed. Any one or a combination of these four options shall be used to eradicate Cherry Laurel from the site and avoid the spread of the species. However, the following general recommendations will be adhered to as part of the plan:

- Construction works will only be allowed within exclusion zones once the species has been fully eradicated.
- No treatment measures to take place in these areas without supervision and agreement by appointed Cherry Laurel eradication specialist.
- The Cherry Laurel plant contains cyanide and as per good practice should only be handled with gloves. This plant will be disposed of via an appropriately licensed waste facility.
- Equipment, clothing and footwear should be checked following treatment operations and cleared of fruits/seeds as necessary

### *Option 1 – Cut to stump and dig out stump; bury during re-grading*

This method involves cutting the main stem of the plant down near ground level, and digging out the stump and any visible roots. This option is not usually practical in areas where there are other invasive plants present as the disturbed soil can allow for the setting of seeds or the spread of rhizomes of adjacent species (ISI, 2012b).

Montbretia is present adjacent to the Cherry Laurel plant in this instance.

If the stump and Montbretia are at an elevation which would allow burial (min 1m) following treatment, this would be sufficient to prevent re-growth.

If they are required to be buried at a lower level, this could be carried out provided it takes place in an adjacent area, within a quarantine zone overlapping both the extraction and burial sites, to ensure no viable material from either species exits the quarantine zone.

### *Option 2 – Cut to stump and treat stump with herbicide*

This method involves cutting the main stem of the plant down near ground level, and applying glyphosate (20% solution), triclopyr (8% solution) or ammonium sulphate (40% solution) to the freshly cut wound.

The herbicide concentrations used and timings of applications vary according to which chemical is used. When treating many stems, vegetable dye added to herbicide is useful for highlighting the stems that have and haven't been treated. The use of a brush or other such applicator will provide an accurate application and prevent damaging adjacent non-target plants via spray drift. Please see table below for best treatment time (ISI, 2012b).

### *Option 3 – Cut to main stem and inject stem with glyphosate*

This method involves the 'drill and drop' method where the main stem is cut and a hole drilled into the cut. This provides a targeted application of glyphosate (25% solution). The main drawback to this technique is that the plant is left in place to rot away; which can take a decade or more. Please see table below for best treatment time (ISI, 2012b).

### *Option 4 - Cut back to stump and spray regrowth with chemicals*

This application involves cutting a main stem down near ground level and then treating the new stems with herbicide. This method is the least effective as some stems may be missed and not treated. Also, the application of herbicide is generally via spraying which can result in adjacent non-target plants being killed off. Please see table below for best treatment time (ISI, 2012b).



Cutting	J	F	M	A	M	J	J	A	S	O	N	D
Glyphosate	J	F	M	A	M	J	J	A	S	O	N	D
Tryclopyr*	J*	F*	M*	A*	M*	J*	J*	A*	S*	O*	N*	D*
Ammonium sulphate	J	F	M	A	M	J	J	A	S	O	N	D

■ Optimum treatment time. Remember to consider breeding birds before embarking on a programme.  
■ Suboptimum treatment time but can be effective. In the case of glyphosate based herbicides consider higher concentrations 25--100% during this time period.  
 \* Suitable for treatment any time after cutting and appearance of new growth.

Figure 5-1: Best time for the treatment of Cherry Laurel (ISI, 2012b)

### 5.6 Montbretia

Four options for the treatment of Montbretia at the site have been proposed. Any one or a combination of these options shall be used to eradicate Montbretia from the site and avoid the spread of the species. However, the following general recommendations will be adhered to as part of the plan:

- Montbretia is spread vegetatively and a buffer of 1m will be left to prevent damage to the plant, or its corms, which can result in the production of new stems which can make the plant more difficult to treat.
- Staff shall be made aware of this buffer zone when working within areas of infestation.
- Areas of infestation to be fenced off from other works areas including a buffering distance of up to 1m to create exclusion zones.
- Construction works will not be allowed within exclusion zones until the species has been fully eradicated but may continue outside of these areas.
- No treatment measures to take place in these areas without supervision and agreement by appointed eradication specialist.
- All machinery and vehicles operating within areas of infestation to be thoroughly checked and if necessary cleaned prior to leaving the area to protect against further spreading of Winter Heliotrope.
- No material shall be taken from areas of infestation; unless for disposal. All material will be either deep buried (2m) or transported by an appropriately licensed waste contractor and received by an appropriately licensed facility.
- All staff shall be made aware of nature of threat via toolbox talks as part of site inductions. Toolbox talks shall be undertaken with all personnel accessing the site to ensure that the details of the invasive species management plan are adhered to and to raise awareness of the potential treat of invasive species.
- Wheel washes shall be put in place at entry and exit points, if considered appropriate. Waste water from these facilities will need to be stored and treated to avoid further outbreaks.
- If operating within an area of known infestation all machinery, vehicles, equipment, foot ware and clothing will need to be cleaned thoroughly (if necessary using steam cleaners) in a contained area to avoid further contamination.

#### Option 1 – In-situ burial

If the growth of Montbretia is at an elevation which would allow material from outside the site of a sufficient depth (min 1m) to be deposited on top during the re-grading process without disturbance to the Montbretia (and adjacent cur cherry laurel stump), this, and subsequent capping would kill off the plant and prevent re-growth. This method would only work if no interaction with the Montbretia occurred, precluding the transport of viable material on plant equipment.



### *Option 2 – Digging*

Digging can be used in order to extract corms and additional root system from the site. This should be completed before seeds are produced, pre July. If corms are damaged lost during excavation it is likely that new growth would form from these. Excavation machinery, tools and PPE must be cleaned before exit from the site. Subsequent excavated materials should be removed from the site, using appropriately licenced transport, to an appropriately licenced facility equipped to deal with such volumes (IWS, 2018).

### *Option 3 – Spray chemical treatment*

Infestations of Montbretia can also be treated with herbicide whilst the plants are actively growing, this is estimated to be from April to July, after the plants have sprouted, full leaf stage. A glyphosate based herbicide can be sprayed upon Montbretia during this time. It is recommended for post-treated areas that an appropriate grass-forb seed mix is sown in order to prevent recolonization (IWS, 2018).

### *Option 4 – Sweep chemical treatment*

A weak glyphosate mix should be used during the full leaf stage, when the leaves are green, in order to kill off above ground growth of the plants (IWS, 2018).

## **5.7 Snowberry**

One option for the treatment of Snowberry at the site has been proposed. Any one or a combination of these options shall be used to eradicate Snowberry from the site and avoid the spread of the species. However, the following general recommendations will be adhered to as part of the plan:

- Snowberry is spread both by seed, a buffer area of 1m will be left to prevent further contact with plants, possibly causing seeds to fall or become attached upon machinery or person. Disturbed seeds may result in the propagation of a new snowberry population elsewhere.
- Staff shall be made aware of this buffer zone when working within areas of infestation.
- Areas of infestation to be fenced off from other works areas including a buffering distance of up to 1m to create exclusion zones.
- Construction works will not be allowed within exclusion zones until the species has been fully eradicated but may continue outside of these areas.
- No treatment measures to take place in these areas without supervision and agreement by appointed eradication specialist.
- All machinery and vehicles operating within areas of infestation to be thoroughly checked and if necessary cleaned prior to leaving the area to protect against further spreading of Winter Heliotrope.
- No material shall be taken from areas of infestation; unless for disposal. All material will be either deep buried (2m) or transported by an appropriately licensed waste contractor and received by an appropriately licensed facility.
- All staff shall be made aware of nature of threat via toolbox talks as part of site inductions. Toolbox talks shall be undertaken with all personnel accessing the site to ensure that the details of the invasive species management plan are adhered to and to raise awareness of the potential threat of invasive species.
- Wheel washes shall be put in place at entry and exit points, if considered appropriate. Waste water from these facilities will need to be stored and treated to avoid further outbreaks.
- If operating within an area of known infestation all machinery, vehicles, equipment, foot ware and clothing will need to be cleaned thoroughly (if necessary using steam cleaners) in a contained area to avoid further contamination.

### *Option 1- Excavation*

Since the snowberry growth falls within the area of soil required to be excavated and disposed of around Japanese knotweed growth 5, the Snowberry will be required to be disposed of in the same manner and at the same time as this Japanese knotweed growth.

Excavation of the entire root system is thought to be a very effective method of Snowberry control. This must be done before the plants seeds ripen in autumn. Plant matter from this process can be disposed of using a licenced landfill site or may be buried to a depth of over 2m.

## **5.8 Butterfly Bush**

Since the primary mode of spread for this species is via the transport of seeds in wind, the potential for spread due to human activities is considered relatively less important than for the other invasive species present; Butterfly Bush would continue to disperse and spread on its own in the absence of human intervention, while for the other species present, transport by humans is a more important mechanism of spread.

Control measures should focus on preventing the transport of seed outside the site during re-grading works, and minimising disturbance of ripe seed-heads if clearance works are required to be carried out while ripe seed is present.

Due to the widespread presence of butterfly bush throughout the site, exclusion zones surrounding plants are unlikely to be impractical. As such, measures to prevent the accidental transport of seed outside the site should be focused on washing down of machinery exiting the site, and checking of clothing and footwear of operatives.

Since it is likely that vegetation clearance will be required prior to works, measures should be taken to minimise the potential for disturbance of seed.

These measures should focus on the removal of flower spikes from all plants present within the site.

If treatment can be undertaken while plants are in flower, all flower-spikes should be removed and buried on-site.

If treatment must be undertaken after flowers have been fertilised, each flower spike should first have a bag placed over it before cutting to prevent seeds being dislodged and spread during the process. The bags containing seed-heads should then be retained onsite and buried during re-grading works.

Following removal of reproductive material, plants should be cut to the stump, and cut material either retained on-site and buried during re-grading works, or transported off site and monitored until the following growing season to ensure no re-growth occurs prior to disposal.

## 6 MANAGEMENT PLAN

The management of any invasive species is achieved by the assessment and mapping of the invasive species, containment once found, continual monitoring and record keeping as well as the safe disposal of invasive species material.

### 6.1 Containment

For the efficient use of resources namely, financial and physical effort, it is important to prevent the further spread of invasive species containment. Containment will be achieved via:

- Cordoning off the area of infestation to prevent further spread of seed by people or machinery;
- Mark the cordoned off area with an information/warning sign (see appendix 3);
- Tool box talks to be carried out for all maintenance workers working within the site;
- Landholder to be informed of location of the invasive species and the management plan;
- To help with monitoring of the infestation the area is to be outlined where practical with spray paint;
- Ensure anyone treating the infestation is a suitably qualified trained professional who follows the management plan.
- The site will be re-surveyed prior to treatment/ remedial works to confirm the findings of the original survey.
- Follow up surveys will be carried out post-construction to determine effectiveness of treatment and trigger further treatment if required.

### 6.2 Schedule

As remediation works are required to be initiated during the second half of 2018, any control/eradication measures based on long- term chemical treatment is not feasible.

As such, the proposed measures are focused on off-site burial using appropriate methodologies. Periodic re-survey for Japanese knotweed would be advisable, to ensure that treatment measures were effective, and to trigger further treatment if necessary. There is no potential for any of the other species present to re-grow once buried under the landfill cap.

The potentially contaminated runoff and other materials generated during quarantine procedures will be required to be treated to prevent growth of any invasive species, and stored in a secure location and monitored for up to 18 months following final use.

Any plant material transported off site should be stored securely and monitored until the end of following growing season to ensure no viable material is disposed of in uncontrolled circumstances.

**Please note that the schedule and treatment method may require amendment following any given site visit.**

**Table 6-1: Treatment and Monitoring Schedule**

Year	Details of measures
1	<ul style="list-style-type: none"> <li>• A pre-construction survey shall be undertaken during the growing season to mark out the extent of invasive species within the site prior to any works commencing on-site.</li> <li>• Invasive species material which is to be retained onsite will be buried in advance of other regrading works, and no further excavation or disturbance of these areas will take place.</li> <li>• Japanese Knotweed within the site including the 7m buffer from the footprint of the development will be excavated (following herbicide treatment) prior to the construction phase.</li> <li>• Cordoning off the area of infestation (exclusion zone) – this shall include a buffer of up to 7m surrounding the area of infection for Japanese Knotweed to ensure that underground rhizomes shall not be transported to other sections of the site. These root structures rhizomes can extend up to 7 m in a lateral direction (but usually only up to 5 m), and 2m deep from the over ground parent plant. No construction works, storage or access allowable within these exclusion zones until Japanese Knotweed has been fully eradicated.</li> <li>• Invasive species material which is to be retained onsite will be buried in advance of other regrading works, and no further excavation or disturbance of these areas will take place.</li> <li>• Winter Heliotrope, Cherry Laurel, Montbretia, Spanish Bluebell and Snowberry shall include a buffer of up to 1m surrounding the area of infestation. This will prevent plants with underground rhizomes being transported to other sections of the site and it will also prevent contact with plants which could result in the transport of seed, fruit or vegetation.</li> <li>• Treatment of invasive species using one or more of the treatment options<sup>(i)</sup> proposed in Section 5.</li> <li>• Only once treatment has been completed and invasive species have been eradicated from within the area of works/buried securely will re-grading works commence.</li> <li>• Toolbox talk shall be given to all personnel accessing the site.</li> <li>• Site to be monitored continually for signs of regrowth of all invasive species during re-grading and capping works; Japanese Knotweed is of primary concern.</li> <li>• Disposal of ALL cut and excavated plant matter, if chosen to be processed off-site, should be done so through a licenced waste processor. Adequate licences may also need to be obtained for the transportation of such matter.</li> </ul>
2 - 5	<ul style="list-style-type: none"> <li>• Following capping, site to be monitored annually for signs of regrowth of invasive Japanese Knotweed.</li> <li>• Monitoring of plant material transported off site for signs of growth during following growing season.</li> </ul> <p>Monitoring of material collected during equipment washing for signs of growth during following growing season.</p>

**6.3 Mapping, Evaluating and Record Keeping**

During each treatment the following will take place before control treatments:

1. Check that the area of infestation is still cordoned off and a warning/information sign is still in place;
2. Photographs of the area(s) of invasive species infestation;
3. Map the extent via recording gps coordinates and measure the length and width of infestation and plot on map;
4. Evaluate the status/condition of the infestation;
5. If the infestation has spread spray paint the extent of the new area (for comparison on next visit);
6. Make sure step 1-5 are recorded;

At the end of each site visit the recorded data should be compared with the findings of this report and where required the management plan should be updated. Tipperary Co. Council will receive a short report on the progress of treatment following treatment works, and any subsequent monitoring.

## 6.4 Appropriate disposal

### 6.4.1 Storage

As outlined in section 5 above, all cut and excavated plant matter should be stored securely in line with the relevant treatment methodology.

### 6.4.2 Disposal

#### 6.4.2.1 *Deep burial*

Burial of plant matter and possible contaminated soil should be completed as per the species-specific conditions discussed in section 5. It is recommended that Japanese knotweed be buried to depths of 5m or greater beneath the surface. Contaminated soil from the excavation of the invasive species present on site, (see section 5) depending on the species, and where required by treatment methodology, may be buried alongside such Japanese knotweed plant matter.

Disposal of plant matter and soil off-site if required, should be completed through an appropriately licenced haulier and waste facility.

#### 6.4.2.2 *Incineration*

If no deep burial sites are available, transport to a licensed facility capable of incinerating soil containing Japanese knotweed rhizomes is an alternative treatment option.





## 7 CONCLUSION

There is a legal obligation not to spread plants listed on the third schedule of Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011; the relevant species at Tipperary Town landfill, and therefore those of principal concern, are Japanese Knotweed (*Fallopia japonica*) and Spanish Bluebell (*Hyacinthoides hispanica*). Environmental best practice, and the need to prevent the spread of the other invasive species present on-site to Natura 2000 sites, dictates the need to take measures to prevent the spread of these species.

Various treatment measures are advocated for the invasive species present on-site, with several options available in most cases.

It is recommended that a competent and experienced invasive species management Contractor is appointed to eradicate invasive species from the site.

A dedicated invasive species survey is recommended to be undertaken by the appointed Contractor to confirm the findings of the previous survey.

All invasive species present on-site will be required to be cordoned off prior to any treatment works, with exclusion zones in place as specified in section 5.

A quarantine zone where equipment washing and inspection of clothing and footwear can be carried out should be established at the site entrance prior to treatment works, and remain in operation until all vegetation has been removed or buried.

The growths of Japanese knotweed present must be treated, excavated and disposed of or buried according to relevant legislation and under licence before any works can take place in infested areas.

For the remainder of species, in-situ burial (or burial of cut material in the case of shrubs/trees) incorporated into re-grading works is advocated as the most efficient and cost-effective means of treatment; this would only be feasible where the plants are at an elevation which would allow sufficient soil to be deposited on top. Where this is not feasible, other options for treatment should be followed. Following burial, areas should remain cordoned off, with appropriate methodologies in place to ensure no disturbance occurs during subsequent works.

Treatment works should be supervised by an appropriately qualified ecologist or invasive species specialist.

Yearly monitoring for re-growth of Japanese knotweed is recommended for up to 5 years following capping. A specialist would not be required for this activity; however, any survey should ensure comprehensive coverage of the capped landfill.



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# Appendix 1

Co-ordinates recorded for invasive plant species







## Japanese Knotweed

Growth	Lat	Lon	Notes
1	52.48202	-8.15570704	N/A
	52.48203	-8.155556	N/A
	52.48209	-8.15562598	N/A
	52.4821	-8.155658	N/A
	52.48209	-8.15573302	N/A
	52.48208	-8.15574098	N/A
	52.48215	-8.15569899	N/A
	52.48214	-8.15572204	N/A
	52.4821	-8.15566102	N/A
	52.48209	-8.15553898	N/A
	52.48215	-8.155542	N/A
	52.48218	-8.15557603	N/A
	52.48217	-8.15563302	N/A
2	52.48264	-8.15614499	Sparse
	52.48266	-8.15619201	Sparse
	52.48263	-8.15627701	Sparse
	52.4826	-8.15631003	Sparse
	52.4826	-8.15625597	Sparse
	52.48263	-8.156218	Sparse
	52.48264	-8.15619302	Sparse
3	52.48249	-8.15656199	New shoots on spoil heaps
	52.4825	-8.15654003	New shoots on spoil heaps
	52.48252	-8.15647901	New shoots on spoil heaps
4	52.48346	-8.15627499	Patchy, many small shoots spread out
	52.4834	-8.15623702	Patchy, many small shoots spread out
	52.48341	-8.15622303	Patchy, many small shoots spread out
	52.48342	-8.15619797	Patchy, many small shoots spread out
	52.48345	-8.15619302	Patchy, many small shoots spread out
	52.48344	-8.15622697	Patchy, many small shoots spread out
	52.48347	-8.15621104	Patchy, many small shoots spread

Growth	Lat	Lon	Notes
			out
	52.48349	-8.15625303	Patchy, many small shoots spread out
	52.48349	-8.15627499	Patchy, many small shoots spread out
	52.48357	-8.15635999	Patchy, many small shoots spread out
	52.48357	-8.15635001	Patchy, many small shoots spread out
	52.48357	-8.15641698	Patchy, many small shoots spread out
	52.48356	-8.15639603	Patchy, many small shoots spread out
	52.48339	-8.15652402	N/A
	52.48339	-8.15654296	N/A
	52.48338	-8.15654003	N/A
	52.48337	-8.15655897	N/A
	52.48336	-8.15652704	N/A
	52.48337	-8.15648597	N/A
	52.48339	-8.15646702	N/A
5	52.48343	-8.15745701	0.5m down bank, c. 1m wide
	52.48341	-8.15750596	0.5m down bank, c. 1m wide
6	52.48328	-8.15739197	Sparse new stems
	52.48327	-8.15739498	Sparse new stems
	52.48323	-8.15738099	Sparse new stems
	52.48322	-8.15740697	Sparse new stems
	52.48323	-8.15744402	Sparse new stems
	52.48324	-8.15741904	Sparse new stems
	52.48328	-8.15739901	Sparse new stems
	52.4833	-8.15738702	Sparse new stems
	52.48329	-8.15736397	Sparse new stems
7	52.48317	-8.157384	Lone Stem
8	52.48277	-8.15720203	N/A
	52.48277	-8.15716297	N/A
	52.48279	-8.15719298	N/A
	52.4828	-8.15720798	N/A

Growth	Lat	Lon	Notes
9	52.48272	-8.15705996	Sparse
	52.48273	-8.15708804	Sparse
	52.48273	-8.15706499	Sparse
	52.48271	-8.15703699	Sparse
	52.4827	-8.15701998	Sparse
	52.48272	-8.15701101	Sparse
	52.48273	-8.15701202	Sparse
	52.48274	-8.15702702	Sparse
9	52.48273	-8.15701302	N/A
	52.48274	-8.15699098	N/A
	52.48275	-8.15698	N/A
	52.48276	-8.15700204	N/A
10	52.48237	-8.15756698	N/A
	52.48234	-8.15754703	N/A
11	52.48193	-8.15668998	N/A
	52.4819	-8.15667397	N/A
	52.48188	-8.15666702	N/A
	52.48189	-8.15662502	N/A
	52.48189	-8.1566606	N/A
	52.48189	-8.15655302	N/A
	52.4819	-8.15653601	N/A
	52.48193	-8.156578	N/A
	52.48194	-8.15662201	N/A
	52.48194	-8.15665604	N/A
	52.48193	-8.15671404	N/A
	52.48191	-8.15670499	N/A
12	52.4818	-8.15656601	c. 5m down bank
	52.48176	-8.15657197	c. 5m down bank
	52.48175	-8.15657498	c. 5m down bank
13	52.48206	-8.15664397	1 stem
14	52.48176	-8.15666903	N/A

Growth	Lat	Lon	Notes
	52.48179	-8.15665897	N/A
	52.48179	-8.15662603	N/A
15	52.48183	-8.15663399	1.5m strip, also P. frag under, extends to 792-799
	52.48181	-8.15670499	1.5m strip, also P. frag under, extends to 792-799

### Winter Heliotrope

Growth	Lat	Lon	Notes
1	52.48317104	-8.157214019	N/A
	52.48315503	-8.157236986	N/A
	52.48312301	-8.157241009	N/A
	52.483121	-8.157240003	N/A
	52.483136	-8.157248972	N/A
	52.48314698	-8.157264981	N/A
	52.48316802	-8.157281997	N/A
2	52.48304104	-8.156866003	Mixed with b. bur
	52.48303399	-8.156830966	Mixed with b. bur
	52.48300801	-8.156815041	Mixed with b. bur
	52.48298404	-8.156815963	Mixed with b. bur
	52.482977	-8.156855023	Mixed with b. bur
	52.48299804	-8.156854017	Mixed with b. bur
	52.483006	-8.15686902	Mixed with b. bur
3	52.48306802	-8.15707203	N/A
	52.48307297	-8.157013021	N/A
	52.48308898	-8.157005981	N/A

Growth	Lat	Lon	Notes
	52.48311404	-8.157030037	N/A
	52.48310801	-8.157068007	N/A
	52.48309803	-8.157090973	N/A
	52.48308697	-8.157122992	N/A
	52.48307498	-8.157117041	N/A
4	52.48189297	-8.156729965	Not all ground carpeted, but outer extent overlaps Knotweed
	52.48186497	-8.156736	Not all carpeted, but outer extent overlaps Knotweed
	52.48186799	-8.156696018	Not all carpeted, but outer extent overlaps Knotweed
	52.48187603	-8.156670034	Not all carpeted, but outer extent overlaps Knotweed
	52.48185902	-8.156586969	Not all carpeted, but outer extent overlaps Knotweed
	52.48193203	-8.156639021	Not all carpeted, but outer extent overlaps Knotweed
	52.48195399	-8.15671999	Not all carpeted, but outer extent overlaps Knotweed
	52.48195298	-8.15674304	Not all carpeted, but outer extent overlaps Knotweed
5	52.48166699	-8.156470964	up to knotweed
	52.48161703	-8.156470042	up to knotweed
	52.48154998	-8.156460989	up to knotweed
	52.48154998	-8.156470042	up to knotweed
	52.48155501	-8.156521004	up to knotweed
	52.48157303	-8.156575989	up to knotweed
	52.48162902	-8.156590993	up to knotweed
	52.48168199	-8.15660499	up to knotweed
6	52.481813	-8.156704986	N/A
	52.48181099	-8.156686965	N/A
	52.48181099	-8.156724013	N/A
	52.48183203	-8.156765001	N/A
	52.481856	-8.156788973	N/A
	52.48186396	-8.156751003	N/A
	52.48185701	-8.156732982	N/A
	52.481855	-8.156724013	N/A

### Cherry Laurel

Lat	Lon	Notes
52.48278	-8.15656	Small Plant

### Montbretia

Lat	Lon	Notes
52.48278	-8.15656	Limited growth (<2x2m) beside cherry laurel

### Spanish Bluebell

Growth	Lat	Lon
1	52.48265698	-8.155717012
2	52.48307901	-8.156057987
3	52.48316199	-8.156013982
4	52.48316702	-8.155989004
5	52.48320004	-8.156033009
6	52.48319099	-8.15605497
7	52.48358502	-8.156480016
8	52.48357999	-8.156504994
9	52.48354898	-8.156502983
10	52.483552	-8.15654397
11	52.48307398	-8.157393979
12	52.48191702	-8.157004975







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