8. Noise and Vibration

This Chapter assesses the potential noise and vibration impacts which may be generated during the Remediation and Operational Phases of the proposed Project. The principal Remediation Phase noise and vibration impacts will be associated with machinery use, excavation, demolition of walls and construction of landfill management infrastructure, while Operational Phase noise and vibration impacts are anticipated to be insignificant following completion of the remediation programme.

Noise levels will vary throughout the Remediation Phase with a range of noise generating activities involved in the remediation works phase. Noise modelling has been completed for a set of conservative scenarios to account for all significant noise generating activities and has shown that the noise criteria can be met. The entire remediation programme has been assessed as being short-term in duration with a moderate significance in terms of over-all impact. Traffic noise impacts have been assessed as moderate and within the adopted noise criteria.

The results of the Operational Phase noise assessment indicate that the operation of the proposed Project will make no measurable change to the prevailing daytime, evening time and night time ambient noise environment. The predicted increase in operational traffic noise at the Noise Sensitive Receptors is anticipated to be barely perceptible and the associated noise impact is classified as negligible.

A range of best practice noise management measures will be employed to mitigate any potential noise disturbance during the Remediation Phase. As the noise impact assessment has shown there are no adverse noise impacts associated with the Operational Phase of the proposed Project and mitigation measures are not required during the operation of the multi-use public park.

8.1 Introduction

This Chapter considers and assesses the effects of the Kerdiffstown Landfill Remediation Project (hereafter referred to as “the proposed Project”) due to noise and vibration anticipated to occur during the Remediation and Operational Phases.

Kerdiffstown Landfill is located in County Kildare and comprises a former quarry, landfill and waste processing facility. The site has been progressively backfilled with wastes since the 1950’s until 2010. The site poses a number of risks due to large areas of uncapped waste, remnants of buildings and structures, over-steep slopes and absence of appropriate capping to the lined cell. The proposed Project comprises the remediation of the site to reduce the risks posed by the site in its current condition to public health and safety and the environment, whilst developing the site to provide an amenity to the local community, comprising a multi-use public park (the Remediation Phase). Following the Remediation Phase, the site will continue to be managed by KCC, and regulated by the EPA, as a remediated landfill whilst operating as a multi-use public park (the Operational Phase).

The remediation of the proposed Project and development of the multi-use public park is anticipated to take approximately five to seven years, with approximately four years of intensive construction works to remediate the site. The Operational Phase will be the operation of a public park with multi-use sports pitches, changing rooms, a children’s playground, etc. and management of the site as a remediated landfill. Table 8.1 below summarises the key activities anticipated to be carried out in each of the phases of the proposed Project. Further detail on the scope of the proposed Project is provided in Chapter 4 Description of the Proposed Project, and details on the outline phasing of the works are provided in Section 4.3.1 and outlined in Figure 4.8 and Figure 4.9.

Table 8.1: Summary of Key Activities during the Remediation and Operational Phases

Indicative Phase		Summary of Key Activities
Remediation Phase Phase 1 – Phase 8	Works to re-profile the site and construction of landfill infrastructure	• Construction of new site entrance and realignment of the L2005 Kerdiffstown Road • Demolition of 3 properties (REC010, REC011 and REC016) and concrete structures in Zone 2A, Zone 2B and Zone 4 • Installation of new foul and leachate pipeline connections to Johnstown Pumping Station • Construction of a new Landfill Infrastructure Compound • Removal of stockpiles of materials • Temporary stockpiling • Re-profiling and filling • Installation of capping systems • Installation of new or supplementary gas wells and gas venting measures • Construction, cleaning and commissioning of surface water management infrastructure • Removal of the existing flare stack in Zone 1 and the second back-up flare, commencing use of new flare stack in the new Landfill Infrastructure Compound supported by a back-up flare • Inspection and repair of concrete hardstandings in Zone 2A and Zone 2B • Removal of existing perimeter screening bund in Zone 1
	Construction of Multi-Use Public Park	• Construction of park infrastructure, including multi-use sports pitches, a building with changing rooms, public toilets and stores, car parking, a children's playground, informal trails and defined viewpoints. • Planting and landscaping • Ecological enhancement and mitigation features such as hibernacula, nesting boxes and log piles
Operational Phase	Operation of Multi-Use Public Park	• Operation of the multi-use public park • Operation and maintenance of the landfill gas management infrastructure • Operation and management of surface water management infrastructure • Operation and maintenance of the leachate management infrastructure • Environmental control and monitoring as agreed by the Environmental Protection Agency

Details on the project background and site history can be found in Chapter 3 The Need for the Proposed Project and descriptions of the remediation can be found in Chapter 4 Description of the Proposed Project.

The assessment focuses on the potential noise and vibration impacts associated with the deployment of equipment and machinery during remediation and vehicles accessing the proposed Project during the Remediation and Operational Phases, as these are the main sources of noise and vibration associated with the proposed Project.

8.1.1 Fundamentals of Acoustics

Noise is usually defined as an annoying or unwanted sound. Sound can be defined as any pressure variation (in air, water or other medium) that the human ear can detect. In order to account for the large range of pressure levels that can be detected by the human ear, sound is measured in terms of a logarithmic ratio of sound pressures. These measurements are described as Sound Pressure Levels (SPL) and are measured in decibels (dB).

The audible range of sounds expressed in terms of Sound Pressure Levels is 0dB (for the threshold of hearing) to 120dB (for the threshold of pain). As a rule of thumb, a doubling in the loudness of the sound occurs with every increase of 10dB in sound pressure. Similarly, for each 10dB decrease in sound pressure, the loudness is cut in half.

The frequency of sound is the rate at which a sound wave oscillates, and is expressed in Hertz (Hz). The sensitivity of the human ear to different frequencies in the audible range is not uniform. To account for this, a weighting mechanism known as the 'A-weighting' system is used to provide an accurate correlation with perceived loudness for the human ear. SPL's measured using 'A weighting' are expressed in terms of dB(A).

An indication of the level of some common sounds on the dB(A) scale is presented in Table 8.2 and a glossary of noise terms is provided in Table 8.3 .

Table 8.2: The Level of Typical Common Sounds on the dB(A) Scale

dB(A)	Sound Description
0	Threshold of Hearing
30	Quiet Bedroom
50	Public Library
60	Busy General Office
70	7m from Car Passing at 60kph
85	Very Busy Pub (raise voice to be heard)
100	Disco
110	Very Loud Rock Concert
120	Threshold of Pain

8.1.2 Noise Glossary

Table 8.3: Noise Glossary of Terms

Term	Definition
$L_{Aeq,T}$	This is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period (T).
L_{AN}	The A-weighted noise level exceeded for N% of the sampling interval.
L_{A90}	Refers to the A-weighted noise levels in the lower 90 percentile of the sampling interval; it is the level which is exceeded for 90% of the measurement period. It is commonly used to describe the background noise level.
L_{A10}	Refers to the A-weighted noise levels in the top 10 percentile of the sampling interval; it is the level which is exceeded for 10% of the measurement period.
L_{Amax}	The maximum Root Mean Square (RMS) A-weighted sound pressure level occurring within a specified time period.
L_{pA} (dB)	An 'A-weighted decibel' - a measure of the overall level of sound across the audible frequency range (20Hz – 20kHz) with A-frequency weighting, known as 'A–weighting', to compensate for the varying sensitivity of the human ear to sound at different frequencies.
RMS	The RMS value of a set of numbers is the square root of the average of their squares.
Noise Sensitive Location (Receptor)	Any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or other area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels.
Sound Pressure Level	Sound pressure refers to the fluctuations in air pressure caused by the passage of a sound wave. It may be expressed in terms of sound pressure level at a point.
Hertz	The unit of sound frequency in cycles per second.
dB	Decibel - The scale in which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the RMS pressure of the sound field and the reference pressure of 20 micropascals (20 µPa).
Sound Power Level	The logarithmic measure of sound power in comparison to a referenced sound intensity level of one picowatt (1pW) per m^2

8.2 Methodology

8.2.1 Study Area

The site of the proposed Project, is located in County Kildare, approximately 3km north-east of central Naas, approximately 400m north-west of Johnstown village and in close proximity to the strategically important M7/N7 corridor as shown on Figure 3.1. The land uses in the immediate vicinity of the site are land associated with

Kerdiffstown House to the north-east, golf courses to the north and north-east and a mixture of land uses including residential, agricultural and worked out quarries to the south-east, south-west and west. Potential noise and vibration impacts associated with the proposed Project are predicted to be at their most significant close to the site boundary but potential impacts may be observed at further removed locations. The general area surrounding the proposed Project was assessed in order to identify the noise sensitive receptors (NSRs) that have the potential to be impacted by noise emissions associated with the proposed Project and this informed the study area for the impact assessment. Noise and vibration impacts associated with the proposed Project works on NSRs are considered in this Section of the report.

8.2.2 Impact Assessment Methodology

This Section of the EIAR evaluates the potential noise and vibration impacts which may be generated during the Remediation and Operational Phases of the proposed Project. The assessment considers all potential impacts, before and after mitigation and control measures, and evaluates the significance of potential impacts on NSRs in the vicinity of the proposed Project. The methodologies adopted in the assessment are summarised as follows:

(i) A review of the existing baseline noise data for the proposed Project site was completed. This included the noise monitoring completed by Fitz Scientific in October 2012 and also the noise monitoring completed by BHP in October 2016.

(ii) A project specific baseline noise and vibration survey was carried out to provide up-to-date information on existing background and specific site noise levels at the proposed Project boundaries, particularly those closest to residential and other NSRs such as Kerdiffstown House, the golf courses and Johnstown Garden Centre. This baseline noise survey captured current noise data representative of all noise sensitive receptors in the vicinity of the proposed Project that could be impacted by the noise generating activities associated with the proposed Project. The survey was executed in accordance with the requirements of *ISO 1996 (2007): Acoustics - Description and Measurement of Environmental Noise Part 2 Determination of Environmental Noise Levels* and in addition, with reference to the EPA publication; *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4), 2016.* Noise and vibration monitoring was carried out in September and November 2016 at eight noise monitoring locations and two vibration monitoring locations in the vicinity of the proposed Project. The monitoring locations are shown in Figure 8.1.

(iii) Identification of appropriate criteria against which to assess the noise and vibration impacts associated with the proposed Project. Criteria for noise assessment are discussed in Section 8.2.3 and the criteria for vibration assessment are discussed in Section 8.2.4.

(iv) Noise and vibration impacts associated with the Remediation Phase have been calculated in accordance with ISO 9613: *Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation, 1996* using input data sourced from British Standard *5228-1:2009+A1:2014 –Code of Practice for Noise and Vibration Control on Construction and Open Sites Part 1: Noise* (BS 5228-1) and British Standard BS 5228-2:2009+A1:2014 *Code of Practice for Noise and Vibration Control on Construction and Open Sites Part 2: Vibration (BS 5228-2).*

(v) Noise impacts associated with the Operational Phase have been calculated in accordance with ISO 9613: *Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation, 1996* and with the use of noise modelling software. Details on the noise modelling are provided in Section 8.4.

(vi) The results generated by the impact assessments have been compared against the relevant criteria for both the Remediation and Operational Phases.

(vii) Mitigation and avoidance measures are proposed where required to ensure that impacts are managed and controlled to minimise the impact on receptors.

The scope of the assessment includes an assessment of Remediation and Operational Phase impacts. The assessment was carried out in accordance with the following guidance and tailored to the proposed Project based on professional judgement and local circumstance:

- EPA Guidelines on the Information to be Contained in Environmental Impact Statements (EPA, 2002) (and revised and draft guidelines 2015/2017); and
- EPA Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2003a) (and revised advice notes 2015).

The effects of the proposed Project are described by considering the possible impacts that could occur as a result of the proposed Project, the probability of their occurrence and the nature and significance of such impacts. The EPA draft revised *Guidelines on the Information to be Contained in Environmental Impact Statements* (2015) are draft Guidelines which take account of the revised EIA Directive (2014/52/EU) and which have been considered in this assessment. Impacts are described in the draft Guidance under various headings which are summarised as follows:

- Probability – likely, possible, unlikely;
- Quality – positive, neutral, negative;
- Significance – imperceptible, moderate, profound; and
- Magnitude – duration, frequency, extent, context.

A description of the significance of effects is presented in Table 8.4 which shows the approach taken to quantifying the significance and magnitude of potential noise impacts.

Table 8.4: Significance and Magnitude of Environmental Effects

Aspect	Description
Significance of Effects	
Imperceptible	An effect capable of measurement but without significant consequences.
Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant	An effect which, by its character, magnitude, duration or intensity significantly alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics.
Magnitude of effects	
Extent	This is described by the size of the area, the number of sites and the proportion of the population affected by the effect.
Duration	**Momentary effects** last seconds to minutes.
	Brief effects last less than a day.
	Temporary effects lasting less than one year.
	Short-term effects last from one to seven years.
	Medium-term effects last from seven to fifteen years.
	Long-term effects last from fifteen to sixty years.

Aspect	Description
	Permanent effects last over sixty years.
Frequency	How often the effect will occur.
Context	The contextual relationship between the effect and the existing baseline.

8.2.3 Noise Assessment Criteria

There is no specific Irish legislation which sets out environmental noise limits that must be achieved and therefore the assessment criteria that are presented in this report are based on the guidelines set out by regulatory bodies such as the Environmental Protection Agency (EPA), the World Health Organisation (WHO), the Department of Communications, Climate Action and Environment whose guidance and standards are based on international best practice.

Remediation Noise Criteria

The Remediation Phase construction noise will be temporary in nature and is usually experienced over a short to medium-term period and this characteristic requires it to be considered differently to other longer-term noises. Construction activities on larger-scale construction projects such as this one will inevitably result in noise being generated.

Chapter 4 Description of the Proposed Project describes the works associated with each Phase and remediation works for the proposed Project will be carried out both on-site and off-site. The on-site works include all remediation activities that will be carried out inside the site boundary while the off-site works include all Remediation Phase works that will be completed outside the site boundary such as the realignment of the L2005 Kerdiffstown Road. Consequently, the source of the noise being assessed (on-site or off-site) is required to be considered to ensure that the correct noise criteria are applied.

The on-site activities associated with the Remediation Phase of the proposed Project will, in this instance, be carried out under the conditions and requirements of an Industrial Emissions Activities Licence (IEAL) as granted by the EPA and as such the on-site Remediation Phase activities will have to meet the same Operational Phase noise limits that are normally applied in IEALs. This is further discussed below.

The offsite noise generating activities do not fall under the conditions of the IEAL and as such can be considered and assessed against the typical construction noise criteria as discussed below.

Off-Site Remediation Phase Noise Criteria

There is no Irish Guidance specifically published for the off-site construction work such as that proposed for the proposed Project but International best practice dictates that noise limits in the range 65 to 75dB are generally acceptable in the community during daytime construction activities. Such off-site works include the realignment works on the L2005 Kerdiffstown Road, drilling works under the N7 Road and the installation of the leachate and foul water sewer pipelines.

Transport Infrastructure Ireland (TII) (formerly the National Roads Authority) is the only government body in Ireland to publish construction noise limits which are presented in their document *'Guidelines for the Treatment of Noise and Vibration in National Road Schemes (NRA 2004)'*.

The guidelines are not mandatory but are recommended to achieve appropriate consistency with respect to the treatment of noise and vibration. The TII Guidelines point out that there is no published Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. However, they say that Local Authorities, where appropriate, shall control construction activities by imposing limits on the hours of operation and consider noise limits at their discretion. The TII Guidelines present

indicative noise levels that are typically deemed acceptable during the construction phase of road developments. These are presented below in Table 8.5.

Table 8.5: NRA Maximum Permissible Construction Phase Noise Levels at the Façade of Dwellings during Road Developments

Days & Times	$L_{Aeq, (1hr)}$ dB	$L_{pA(max) slow}$ dB
Monday to Friday - 07:00 to 19:00	70	80
Monday to Friday - 19:00 to 22:00	60[1]	65[1]
Saturday - 08:00 to 16:30	65	75
Sundays and Bank Holidays - 08:00 to 16:30	60[1]	65[1*]

Note 1: Construction activity at these times, other than that required in respect of emergency works, will normally require the explicit permission of the relevant local authority.

For the off-site Remediation Phase works it is considered appropriate to adopt the construction noise criteria presented in Table 8.5 above for all NSRs. The construction noise limit of 70dB $L_{Aeq,1hr}$ will be adopted for week-day works for all off-site construction activities. Any works required to be carried out outside of these hours will be required to comply with the appropriate limit presented in Table 8.5.

In order to assist with the interpretation of construction traffic noise, Table 8.6 offers guidance as to the likely impact associated with changes in traffic noise level. For construction traffic, due to the short-term time-period over which this impact occurs, the magnitude of impacts can be assessed against the 'short-term' period as described in the Design Manual for Roads and Bridges Volume 11, Section 3, Part 7 as revised in November 2011.

Table 8.6: Classification of Magnitude of Traffic Noise Impacts in the Short Term (Construction Phase)

Change in Sound Level (dB L_{A10})	Magnitude of Impact (Short-Term)
0	No change
0.1 to 0.9	Negligible
1.0 to 2.9	Minor
3.0 to 4.9	Moderate
5+	Major

For the off-site HGV movements, it is considered appropriate to adopt the construction noise criteria presented in Table 8.5 for all NSRs and the associated impacts will be assessed against the criteria presented in Table 8.5.

On-Site Remediation and Operational Phase Noise Criteria

The on-site Remediation works and Operational Phase of the proposed Project will require an Industrial Emissions Activities Licence (IEAL) from the EPA. The EPA administers a wide range of licensing, enforcement, assessment and monitoring activities and their guidance is based on WHO standards and best international practice. The EPA Noise Guidance Note NG4, sets out noise criteria to be met at the nearest NSRs for noise emissions falling within the scope of their licensing regime. The on-site Remediation Phase works and the Operational Phase of the proposed Project will be managed under the conditions and requirements of the IEAL granted by the EPA. Therefore, the relevant noise criteria set out in NG4 will be required to be met for this element of the proposed Project. The applicable table from the Guidance Note NG4 is presented in Table 8.7 below and these are considered the appropriate noise criteria for this project.

Table 8.7: Recommended Noise Limit Criteria for the On-Site Remediation and Operational Phases

Scenario	Daytime Noise Criterion dB $L_{Ar,T}$ (07:00 to 19:00 hrs)	Evening Noise Criterion dB $L_{Ar,T}$ (19:00 to 23:00 hrs)	Night-time Noise Criterion dB $L_{Ar,T}$ (23:00 to 07:00 hrs)
Quiet Area	Noise from the licensed site to be at least 10dB below the average daytime background noise level measured during the baseline noise survey	Noise from the licensed site to be at least 10dB below the average evening background noise level measured during the baseline noise survey	Noise from the licensed site to be at least 10dB below the average night-time background noise level measured during the baseline noise survey
Areas of Low Background Noise	45dB	40dB	35dB
All other Areas	55dB	50dB	45dB

The existing proposed Project area is not in a "Quiet Area" as defined in Section 4.4.2 of NG4. The screening criteria that the proposed Project does not meet for a Quiet Area includes the following:

- At least 3km from urban areas with a population >1,000 people;
- At least 10km from any urban areas with a population >5,000 people;
- At least 15km from any urban areas with a population >10,000 people;
- At least 3km from any local industry;
- At least 10km from any major industry centre;
- At least 5km from any National Primary Route; and
- At least 7.5km from any Motorway or Dual Carriageway.

In order to establish whether the noise sensitive locations in the vicinity of proposed Project would be considered 'low background noise' areas, the noise levels measured during the environmental noise survey need to satisfy the following three criteria:

- Average Daytime Background Noise Level ≤40dB L_{AF90} and
- Average Evening Background Noise Level ≤35dB L_{AF90} and
- Average Night-time Background Noise Level ≤30dB L_{AF90}.

The proposed Project was assessed and found not to be located in a Quiet Area and the baseline noise survey does not meet the requirements of a low background noise area, in which case the appropriate noise criteria for the nearest NSRs to the proposed Project are:

- $L_{Ar,T}$, Day (07:00 to 19:00 hrs) 55dB;
- $L_{Ar,T}$, Evening (19:00 to 23:00 hrs) 50dB; and
- $L_{Ar,T}$, and Night (23:00 to 07:00 hrs) 45dB.

The above noise criteria will be adopted for the duration of the on-site Remediation Phase works and also for the Operational Phase of the proposed Project.

The Design Manual for Roads and Bridges Volume 11, Section 3 also offers guidance on 'long-term' noise impacts associated with changes in traffic noise level. For the Operational Phase, traffic impacts are assessed against the 'long-term' impact classification, presented in Table 8.8.

Table 8.8: Classification of Magnitude of Traffic Noise Impacts in the Long Term (Operational Phase)

Change in Sound Level ($dB L_{A10}$)	Magnitude of Impact (Long-Term)
0	No change
0.1 to 2.9	Negligible
3.0 to 4.9	Minor
5.0 to 9.9	Moderate
10+	Major

8.2.4 Vibration Assessment Criteria

Some activities during the Remediation Phase of the proposed Project have the potential to generate ground vibrations at sensitive receptor locations. Activities such as demolition of concrete walls and houses, movement of loaded HGVs and other construction traffic can all cause vibration to occur. The levels of vibration associated with these activities would not normally be expected to cause structural damage to buildings but may have the potential to impact negatively on humans depending on environmental factors such as distance from source and mitigation measures employed. The Operational Phase of the proposed Project will not generate any significant vibration emissions and the only activity with the potential to generate low-level ground vibration will be the movement of the HGVs into and out of the site along the road network.

Construction Vibration Criteria

Vibration standards are defined for dealing with human comfort, and for dealing with structural or cosmetic damage to buildings. In both instances, it is appropriate to consider the magnitude of vibration in terms of Peak Particle Velocity (PPV). PPV is the simplest indicator of both perceptibility and the risk of damage to structures. PPV is measured in millimetres per second (mm/sec) and can be defined as the instantaneous maximum velocity reached by a vibrating element as it oscillates about its rest position.

Humans are particularly sensitive to vibration with the threshold of perception typically being in the range of 0.14 to 0.3 mm/sec PPV and levels above this may cause annoyance. However, significantly higher levels than this can be tolerated for single short-term events and do not cause annoyance or disturbance to humans. BS 5228-2 provides guidance on vibration and its control and management on various site types. The standard also presents details on the human response to vibration and Table 8.9 outlines these effects.

Table 8.9: Guidance on Effects of Vibration Levels

Vibration level	Effect
0.14 mm/sec	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3 mm/sec	Vibration might be just perceptible in residential environments.
1.0 mm/sec	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10 mm/sec	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.

The response of a building to ground borne vibration is affected by numerous factors including the type of foundation, underlying ground conditions, the building construction and the state of repair of the building.

British Standard 7385-2 *Evaluation and Measurement for Vibration in Buildings. Guide to Damage Levels Arising from Groundborne Vibration* (BS 7385-2) provides guidance on vibration measurement, data analysis and reporting as well as building classification and guide values for building damage and is referenced in BS 5228-2. The damage threshold criteria presented in BS 7385-2 are based upon systematic studies using a

carefully controlled vibration source in the vicinity of buildings. This Standard states that there should be no cosmetic damage to buildings if transient vibration levels do not exceed 15mm/sec in the low frequency range and this rises to 20mm/sec at frequencies of 15Hz and to 50mm/sec at 40Hz and above. These guidelines should be reduced by up to 50% for listed structures or similar. It is also noted that the probability of damage for transient vibrations tends towards zero at 12.5mm/sec at component PPV. For continuous vibrations, the threshold is considerably less at around half this value.

Table 8.10 presents the vibration levels below which there is no risk of damage to buildings. These limits apply to vibration frequencies below 15Hz where the most conservative limits are required and are presented for both transient and continuous vibrations. For protected or potentially vulnerable buildings, the recommended construction vibration limit is reduced by half.

Table 8.10: Maximum Permissible Construction Phase Vibration Levels

Building Type	Vibration Limit - Peak Particle Velocity for Transient Vibrations for Frequencies <15Hz	Vibration Limit - Peak Particle Velocity for Continuous Vibrations for Frequencies < 15Hz
Structurally sound and not protected structures	12.5 mm/s	6.25 mm/s
Protected and/or vulnerable structures	6 mm/s	3 mm/s

8.2.5 Sources of Noise and Vibration

Remediation Phase Noise and Vibration

The principal Remediation Phase noise and vibration impacts will be associated with machinery used for the excavation, movement and compaction of waste and materials, demolition of concrete walls and buildings, construction of the landfill management infrastructure and other features of the proposed Project, re-profiling of waste, road and pipeline construction works and other associated activities. The type of machinery that is expected to be used includes excavators, backhoes, compactors, crushing and screening plant, mounted breakers, dump trucks, HGVs, road rollers and similar machinery. In addition, there will be some percussive noise generated as a result of any demolition works or breaking down of concrete slabs.

Operational Phase Noise and Vibration

The potential noise and vibration impacts are anticipated to be insignificant following completion of the remediation programme. During the Operational Phase, it is anticipated that noise and vibration impacts would be those associated with the landfill management infrastructure such as pumps and flares and with traffic accessing and exiting the multi-use public park and the Landfill Infrastructure Compound. The multi-use public park users, including walkers, teams using the sports pitches, etc. will result in a noise impact similar to that of any town park or sport pitch and is not considered to be significant in an overall context.

8.3 Baseline Conditions

8.3.1 Introduction

The project specific baseline noise monitoring survey consisted of carrying out noise measurements at eight noise monitoring locations in the vicinity of the proposed Project, these locations are shown on Figure 8.1. Noise monitoring locations were selected in accordance with Section 6.1 of the EPA Guidance Note NG4 by taking account of the site location, site layout and the nearest noise sensitive receptors to the boundary perimeter.

Baseline noise monitoring was carried out to determine the existing noise levels at NSR locations surrounding the proposed Project location. The detailed noise monitoring survey report has been completed in accordance with the requirements of NG4 and is presented in Appendix A8.1 of this EIAR.

8.3.2 Existing Noise Climate

Noise measurements were carried out at each monitoring location during the daytime period (07:00 to 19:00) and the evening time period (19:00 to 23:00) between 8 September 2016 and 14 September 2016. Night-time measurements (23:00 to 07:00) were recorded during the night of 15 March 2017. Monitoring periods for the noise survey were 30 minute intervals for the daytime measurements and 15-minute intervals for the evening time and night-time measurements. Precise noise measurement details are presented in Appendix A8.1. It is not anticipated that normal Remediation Phase construction works would be carried out during night-time hours, however it may be necessary on occasion to carry out emergency works and activities to ensure the continued operation of the landfill infrastructure control systems (e.g. leachate management system, gas flare, etc.).

The Noise Glossary in Section 8.1.2 includes definitions for the noise survey measurement parameters and other acoustic terminology used in this Chapter. A summary of the results are summarised in Table 8.11 below with the detailed measurement report presented in Appendix A8.1. These results are a reliable representation of the existing baseline noise climate in the vicinity of the proposed Project.

The noise monitoring locations N1 to N8 are described in Table 1 of Appendix A8.1 and are shown graphically on Figure 8.1.

Table 8.11: Baseline Noise Monitoring Results (averaged) at Noise Monitoring Locations

Monitoring Location	Measurement Interval	$L_{Aeq, T}$ dB(A)	$L_{A90, T}$ dB(A)	$L_{A10, T}$ dB(A)	LA_{Amax} dB(A)
N1	Daytime	55	48	56	90
	Evening time	52	48	54	78
	Night-time	42	40	44	57
N2	Daytime	51	44	52	86
	Evening time	56	54	57	65
	Night-time	55	52	57	65
N3	Daytime	54	51	55	85
	Evening time	57	55	59	67
	Night-time	50	46	53	61
N4	Daytime	50	47	51	82
	Evening time	50	49	51	72
	Night-time	45	43	46	71
N5	Daytime	53	51	54	70
	Evening time	53	52	55	73
	Night-time	45	41	47	56
N6	Daytime	53	51	54	79
	Evening time	53	51	54	69
	Night-time	46	43	47	71
N7	Daytime	58	56	60	82
	Evening time	63	61	65	67
	Night-time	58	51	61	68
N8	Daytime	58	57	60	73
	Evening time	52	50	53	66
	Night-time	47	43	49	64

On-site observations were made during the monitoring survey to support the baseline noise measurement results. It was generally observed that the main source of noise at all noise monitoring locations was anthropogenic in nature and by far the most dominant noise source was the passing traffic using the nearby M7 Motorway and the N7 dual carriageway. Non-anthropogenic noise sources such as dogs barking and the wind blowing through trees etc. had a minor impact on the noise environment at the noise monitoring locations. These observations were generally consistent throughout the daytime, evening time and night-time periods.

8.3.3 Existing Vibration Climate

There are no significant sources of vibration in the vicinity of the proposed Project. The main vibrations experienced at the nearest sensitive receptor locations relate to the passing traffic along the surrounding road network. Low-level, short-term vibrations may be experienced when fully loaded HGVs travelling at speeds in excess of 50km/hr pass in close proximity to private residences. There are no residential areas close enough to any of the main remediation activities to be of concern in terms of vibration activity.

To give an indication of existing vibration levels that can be expected in the vicinity of the proposed Project site, baseline vibration monitoring was carried out at two monitoring locations broadly in line with the noise monitoring locations N2 (on the footpath outside the residential receptor REC012) and N4 (on the footpath outside residential receptor REC001). Vibration monitoring was carried out in accordance with the requirements of BS 7385-2.

Continuous vibration monitoring was conducted using a Vibrock V901 tri-axial vibration recorder at each monitoring location. The measurement parameter recorded was resultant Peak Particle Velocity (PPV, mm/sec) and the instrument measures vibration levels in excess of 0.2 mm/sec. The measurement results are presented in Table 8.12.

Table 8.12: Baseline Vibration Monitoring Summary Results

Monitoring Location	Measurement Interval	Maximum Resultant PPV (mm/sec)	Time of Maximum PPV
N2 (REC012)	17-11-2016 at 12:00 to 18-11-2016 at 14:00	0.70	17-11-2016 at 17:53
N4 (REC001)	08-11-2016 at 16:00 to 11-11-2016 at 14:00	1.15	08-11-2016 at 16:12

The vibration measurement results are within the expected range for the monitoring locations and the maximum vibration levels recorded are consistent with moving vehicles in close proximity to the measurement location. It should be noted that Priority Construction Ltd were under-taking works on site during the vibration monitoring period and the vibration measurement results are within the expected measurement range for any typical sensitive receptor.

8.4 Predicted Impacts

8.4.1 Remediation Phase

Introduction

The noise levels associated with the Remediation Phase of the proposed Project have been calculated using the Bruel and Kjaer 7810 Predictor software package. The noise-modelling package uses a computer based noise propagation model, in accordance with the ISO 9613-2 standard, "*Acoustics - Attenuation of sound during propagation outdoors*", which is an international standard used to undertake noise prediction modelling. The noise model accounts for the impacts on noise propagation associated with the magnitude of the noise source,

the distance from the source to the receptor, the intervening ground type and topography, the presence of screens or buildings, meteorological impacts and the time that a noise source would be operating.

The noise model was constructed based on the ISO 9613-2 standard method using the named NSR locations. Noise data for plant and machinery associated with the various construction activities of the Remediation Phase was sourced from BS 5228-1 which provides sound pressure level data for a wide range of plant and equipment used for different construction activities.

The noise model calculates noise levels for a set of specified receptor locations that can be shown on a noise map that presents calculated sound pressure levels for various scenarios. Receptor locations were chosen for the closest NSRs in the vicinity of the proposed Project to account for the complete perimeter boundary covering north, south, east and west. These receptor locations are used to assess the potential Remediation Phase noise impacts at the nearest NSRs. There are six named NSRs in the impact assessment and all receptors within the study area are represented by these as the other receptors will experience the same or lower noise levels than the named receptors. The named receptors and the receptors they also represent are summarised in Table 8.13.

Table 8.13: Noise Sensitive Receptor Locations used in the Impact Assessment

Noise Sensitive Receptor ID	Description of Location
REC001	Kerdiffstown House
REC012	Private Residence on Kerdiffstown Road south of Zone 2A
REC014	Private Residence on Kerdiffstown Road west of Zone 2A. Represents REC013, REC015.
REC017	Private Residence on Kerdiffstown Road west of Zone 1. Represents REC040, REC041.
REC018	Private Residence on Kerdiffstown Road west of Zone 1A
REC039	Private Residence adjacent to the south-western corner of the site. Represents REC006, REC007, REC008, COM007.

This report presents the predicted sound pressure levels associated with the various phases of the remediation works at the named noise sensitive locations in the vicinity of the proposed Project.

On-Site Remediation Phase Works Noise

On-site Remediation works will be carried out over a number of different phases as described in Chapter 4 Description of the proposed Project. Each of the Remediation Phase works have been reviewed and considered from a noise perspective and the key phases associated with the remediation works where there is potential for significant noise emissions to arise on the proposed Project have been considered to occur during Phase 1, Phase 2, Phase 3, Phase 4, Phase 5 and Phase 6. Noise modelling has been completed for each of these Phases individually as well as Phases 7 and 8.

The actual noise level produced by Remediation Phase works will vary at the nearest sensitive receptor boundary at any time depending upon a number of factors including the type of plant in use, plant location, duration of operation, hours of operation and intervening topography. Given that the remediation works involves a number of phases which will encompass a range of different activities on a week to week basis, it is therefore difficult to precisely determine the likely noise levels at this stage, however, the impact assessment carried out for the proposed Project presents a set of conservative scenarios which represent the plausible worst-case scenario for each phase considered.

Therefore, the noise model that has been run for each Phase of works considered, is representative of a conservative scenario or the plausible worst-case for that particular phase of works. The plausible worst-case scenario provides for multiple items of plant (typically four or more) all operating simultaneously and continuously for two thirds of the day working in close proximity to the nearest NSRs that will be impacted by

that particular phase of works. Short-term activities such as the demolition of the houses, the installation of the perimeter fencing etc. have been assessed but due to their intensity and duration were not required to be considered in the plausible worst-case scenario. The longer-term works using heavy plant items such as excavators, compactors, dozers and dump trucks are considered to generate the greatest overall noise emissions and consequently represent the plausible worst-case scenario.

The assessment has been carried out this way in order to demonstrate whether or not the proposed noise criteria can be met for a likely or plausible worst case in terms of the noise generated by on-site activities. The predicted noise levels are indicative only and are intended for comparison with the adopted noise criteria. Depending on the specific activities occurring at the site the measured noise levels will vary accordingly.

For the purposes of a plausible worst-case assessment, Table 8.14 presents the plant items and their estimated on-time which have been assumed in the model for each of the key remediation activities associated with each Phase assessed. An on-time or operating time of 66% for plant items is presented in the assessment which assumes that plant will operate for a full eight hours over a twelve-hour daytime working period (07:00 to 19:00) or for forty minutes every hour. This is considered a conservative approach for construction activities such as those on this project considering the dynamic nature of construction works and construction sites.

Table 8.14: On-Site Remediation Activity Assumed for Each Phase of the Remediation Programme

Plant Details	Number of Plant Items								Sound Power Level Lw, dB(A)	Operating Time %
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8		
Tracked Excavator [note 1]	5	5	5	5	3	3	2	0	110 & 102	66
Mounted Breaker	2	0	0	0	0	0	0	0	121	66
Mobile Crusher	1	1	1	1	0	0	0	0	112	66
Mobile Screen	1	1	1	1	0	0	0	0	109	66
Artic Dump Truck	4	8	8	4	5	4	2	1	108	66
Bulldozer	3	3	3	2	2	2	2	0	102	66
Waste Compactor	3	3	3	2	2	0	0	0	100	66
Dumper (6t)	1	1	1	1	1	1	1	0	91	66
Road Sweeper	1	1	1	1	1	1	1	0	109	66
Tractor & Bowser	1	1	1	1	1	1	1	0	108	66
Wheeled Loader	0	0	0	0	0	0	0	1	104	66
Mobile Crane	0	0	0	0	0	0	0	1	95	66
Generator	0	0	0	0	0	0	0	1	88	100
Angle Grinder	0	0	0	0	0	0	0	1	109	66
Cutting & Grinding	0	0	0	0	0	0	0	1	107	66
Total daily HGV movements into and out of the proposed Project	140	140	140	140	140	140	18	8	106	

Note 1: Two of the tracked excavators used in Phase 1 have been assigned a higher sound power level due to their involvement in demolition works (Ref. Table C.1.12 of BS5882) while the sound power level from Table C7.12 of BS5228 has been used for the excavators for all other works at the proposed Project.
Note 2: The maximum number of HGV movements associated with the on-site remediation works will be 140 per day and this is only likely to occur during Phase 2 and Phase 3, however the worst-case of 140 movements per day has been modelled for Phases 1 to 6.

Table 8.14 presents the key noise generating activities associated with each phase of the remediation works assessed and their associated sound power levels. It is not anticipated that normal Remediation Phase construction works would be carried out outside daytime hours, however it may be necessary on occasion to carry out emergency works and activities to ensure the continued operation of the landfill infrastructure control systems (e.g. leachate management system, gas flare).

Predicted noise levels have been calculated for the nearest NSR locations and Table 8.15 presents the predicted noise level for each of the Remediation Phase works assessed.

It is important to note that Table 8.15 presents two scenarios for the Phase 1 works. Noise modelling was completed for the Phase 1 works for the site in its current state which yielded calculated noise results at a number of NSR locations that exceeded the assessment criteria of 55dB LAeq,1hr. It was therefore clear that the existing screening banks along the western and southern boundary of the site would not sufficiently mitigate the plausible worst-case noise emissions to allow compliance with the noise criteria at the nearest NSR locations.

The reinforcement of the existing screens and provision of acoustic screens in key locations along certain sections of the site boundary were then considered in order to significantly improve the existing situation. These acoustic screens will be erected at the beginning of Phase 1 and prior to any noise generating on-site activities occurring. They will remain in place until the end of the Remediation Phase works.

An acoustic screen of 5m height and with low reflection properties, typically constructed of straw or equivalent, will be erected along the northern, southern and western boundaries of Zone 2A. An acoustic screen of 2.4m height will be erected along the south-western corner boundary of Zone 4 immediately west and north of the receptor located along here (REC039). The screen shall be designed so that there is no line of sight between the noise source and the receptor. Similarly, an acoustic screen of 2.4m height will be erected along the haul route in to the site adjacent to receptor REC012. This is to protect the receptor from elevated noise levels associated with HGVs passing into and out of the proposed Project and will particularly be required during Phase 2 through to Phase 5. The existing screening banks adjacent the L2005 Kerdiffstown Road in the north-western section of the site will be reinforced with straw bales or equivalent in any areas where the screening banks have deteriorated or fallen away. The locations of the acoustic screens are shown on Figure 8.2. These acoustic screens are designed to be temporary in nature and can easily be removed or added to if required.

The calculated results presented in Table 8.15 has assumed the reinforcement of the existing situation with the temporary acoustic barriers in place for all Phases assessed.

The results presented in Table 8.15 show the maximum noise levels predicted for each NSR and represent the noise levels for the plausible worst-case scenario. However, considering the progressive nature of the proposed Project works during on-site remediation and the size of the site, all of the plant will not be operating simultaneously and will not be operating in the same boundary location all at the same time. Therefore, the model results represent a conservative estimation of the predicted noise levels at the nearest noise sensitive receptor locations.

The noise contour results of the modelled on-site remediation works are presented in Figure 8.3 to Figure 8.11 and the specific on-site remediation works noise levels at the assessed NSR locations are presented in Table 8.15.

Table 8.15: Predicted Noise Levels at NSR Locations for the Remediation Phase Works

NSR ID	Predicted Noise Level dB $L_{Aeq,1hr}$								
	No Acoustic Reinforcement in Place	Acoustic Reinforcement in Place							
	Phase 1	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
REC001	39	40	38	40	51	37	34	32	26
REC012	58	51	51	49	45	42	43	42	36
REC014	61	54	46	46	43	43	49	45	52
REC017	53	46	54	55	41	51	46	40	39
REC018	41	40	43	46	39	40	37	35	31
REC039	58	52	50	50	39	37	37	35	31

On-Site Phase 1

The noise environment during the Phase 1 works will be dominated by the demolition works involving the use of the mounted breakers required to demolish the existing concrete walls at the proposed Project. There will also be significant activity in Zone 3 and Zone 4 due to the earthworks activities and there will be crushing and screening of the demolished concrete in Zone 2B. There will only be very small quantities of materials imported to the proposed Project to be stockpiled during Phase 1.

During the Phase 1 on-site works noise levels are calculated to be highest at receptor REC014 which is the closest receptor to the demolition works in Zone 2A. The results indicate that the predicted noise levels associated with the Phase 1 remediation works will not exceed the assessment criteria of 55dB $L_{Aeq,1hr}$ at any of the named receptor locations after the existing screening banks have been reinforced and upgraded with acoustic barriers as described above and shown in Figure 8.4. The noise contour results of the modelled on-site remediation works for Phase 1 are presented in Figure 8.4 and outlined in Diagram 8.1 below.

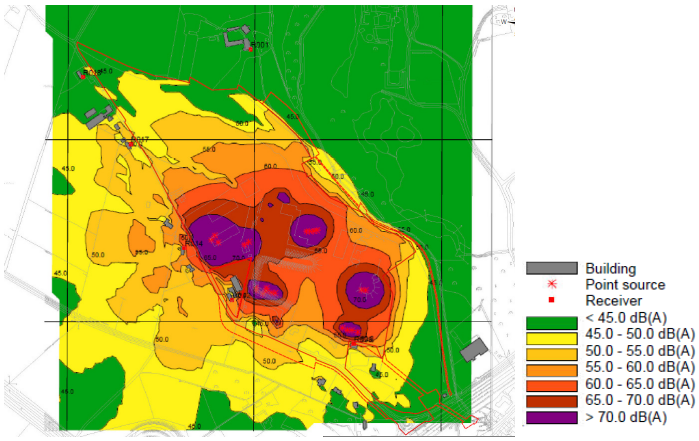

Diagram 8.1: Noise Contours Phase 1 On-site Remediation Works

There is potential for the limit to be exceeded at receptors REC012, REC013, REC014 and REC015 due to the increased noise levels associated with the concrete wall breaking works in Zone 2A. To ensure that the noise limits are met here, mounted breakers shall be positioned well apart from each other when operating simultaneously in Zone 2A. Scheduling of works for Zone 2A will ensure that the mounted breakers are correctly positioned to ensure that the relevant criteria are not exceeded at the nearest NSRs. This information shall be included in the Noise and Vibration Management Plan as discussed in Section 8.5.

The significance of the noise impacts at the named NSRs can be assessed in accordance with Table 8.4 using professional judgement and experience. The significance of the impact for the on-site Phase 1 works will vary from imperceptible to moderate at the nearest NSRs and will be temporary in duration.

On-Site Phase 2

Activities associated with Phase 2 include the importation of materials to the proposed Project for stockpiling, the removal of waste from Zone 4 into Zone 3, stockpiling of waste in Zone 2B and the re-profiling of Zone 1 including filling with surplus Zone 4 material. The noise contour results of the modelled on-site remediation works for Phase 2 are presented in Figure 8.5 and outlined in Diagram 8.2 below.

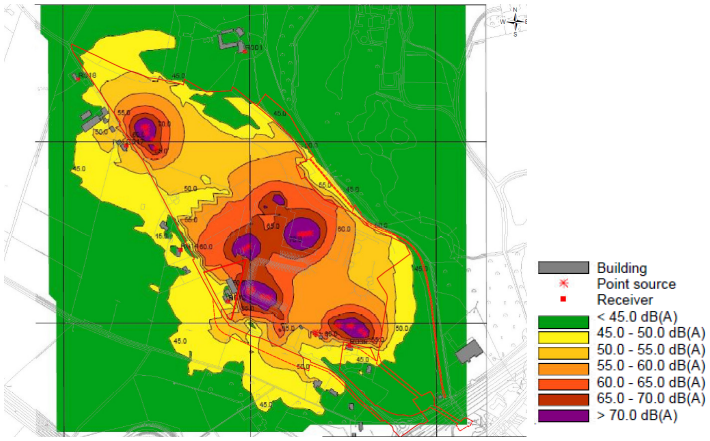

Diagram 8.2: Noise Contours Phase 2 On-site Remediation Works

During the Phase 2 works, noise levels were calculated to be highest at receptor REC017 which is amongst the closest receptors to the earthworks that will occur in Zone 1. The results indicate that the predicted noise levels associated with the Phase 2 remediation works will not exceed the assessment criteria of to 55dB $L_{Aeq,1hr}$ at any of the named receptor locations.

Phase 2 works will also involve the stockpiling of significant quantities of imported fill material in Zone 2A. Best Practice shall ensure that the stockpiling will be carried out in a sequence where the stockpile is built up from the boundary nearest to the receptors and added to so that the stockpile can act as a barrier between the noise source and the nearest receptors as the works develop. This information shall be included in the Noise and Vibration Management Plan as discussed in Section 8.5.The significance of the impact for the on-site Phase 2 works will vary from imperceptible to moderate at the nearest NSRs and will be temporary in duration.

On-Site Phase 3

The Phase 3 works are very similar in nature to the Phase 2 works but with an increased concentration of works in Zone 1 where increased volumes of materials will be deposited from Zone 4. The Zone 3 works will be much reduced and the works involving the pond construction in Zone 4 will be completed. The stockpiling of imported fill material will continue in Zone 2A. The noise contour results of the modelled on-site remediation works for Phase 3 are presented in Figure 8.6 and outlined in Diagram 8.3 below.

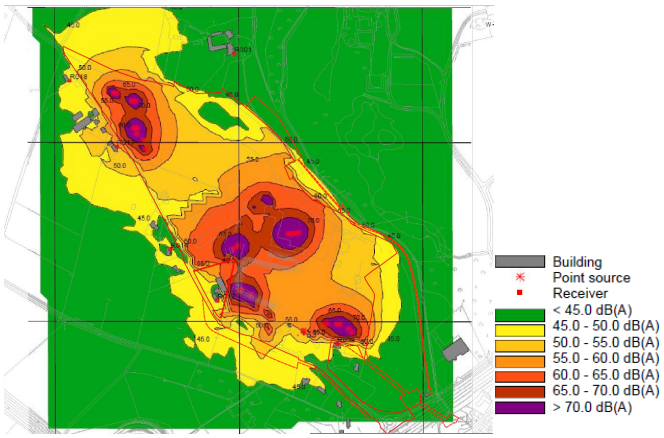

Diagram 8.3: Noise Contours Phase 3 On-site Remediation Works

During the Phase 3 works noise levels were calculated to be highest at receptor REC017 which is the closest receptor to the Zone 1 earthworks. The results indicate that the predicted noise levels associated with the Phase 3 remediation works will not exceed the assessment criteria of to 55dB $L_{Aeq,1hr}$ at any of the named NSR locations. Best Practice will ensure that the number of plant items in operation simultaneously when Zone 1 works are close to the NSRs along the L2005 Kerdiffstown Road are managed accordingly to ensure the noise criteria are met. This information shall be included in the Noise and Vibration Management Plan as discussed in Section 8.5.

It is also planned to remove the sub-soil stockpile adjacent to the proposed Project entrance during the Phase 3 works. This will require careful management of the work-load and strict control of the number of vehicles allowed in this area at any one time. Receptor REC012 is located in close proximity to the west end of the stockpile. Works shall commence by removing the stockpile from the eastern end first and working in a direction towards the receptor REC012 so that the stockpile itself can act as an acoustic barrier between the source and receptor for this element of the works. This information shall be included in the Noise and Vibration Management Plan as discussed in Section 8.5.

The significance of the impact for the on-site Phase 3 works will vary from imperceptible to moderate at the nearest receptors and will be temporary in duration.

On-Site Phase 4

The intensity of the noise generating works will be reduced for the on-site Phase 4 works with the daily imports of capping materials for storage in Zone 2A being reduced. The Zone 3 and Zone 4 earthworks will be complete and the main areas of activity will be the north-eastern slope of the proposed Project located in Zone 1 and the ponds in Zone 4. Both of these locations are further removed from the nearest receptors which will result in reduced noise impacts experienced at the nearest receptor locations. The noise contour results of the modelled on-site remediation works for Phase 4 are presented in Figure 8.7 and outlined in Diagram 8.4 below.

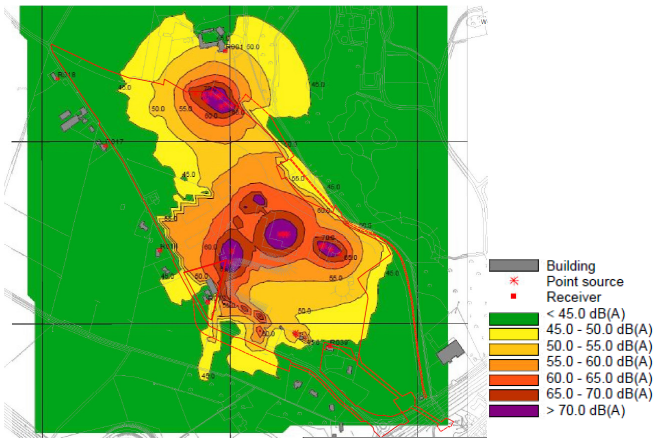

Diagram 8.4: Noise Contours Phase 4 On-site Remediation Works

During the on-site Phase 4 works noise levels are calculated to be highest at Receptor REC001 which is the closest receptor to the re-profiling works on the north-eastern slope of Zone 1. The results indicate that the predicted noise levels associated with the Phase 4 on-site remediation works will not exceed the assessment criteria of to 55dB $L_{Aeq,1hr}$ at any of the named receptor locations.

The significance of the impact for the Phase 4 works will vary from imperceptible to moderate at the nearest receptors and will be temporary in duration.

On-Site Phase 5

The intensity of the noise generating works for Phase 5 will be very similar to that of Phase 4 but with a further reduction in the daily imports of capping materials for storage in Zone 2A. The main remediation activities for Phase 5 will occur in the southern section of Zone 1 and the northern slopes of Zone 2B. The works in Zone 2B will be well removed from the nearest receptors and will not have significant impacts on any receptors. During the Phase 5 works noise levels are calculated to be highest at Receptor REC017 which is amongst the closest receptors to the Zone 1 works. The results indicate that the predicted noise levels associated with the Phase 5 remediation works will not exceed the assessment criteria of to 55dB L_{Aeq} at any of the named receptor locations. The noise contour results of the modelled on-site remediation works for Phase 5 are presented in Figure 8.8 and outlined in Diagram 8.5 below.

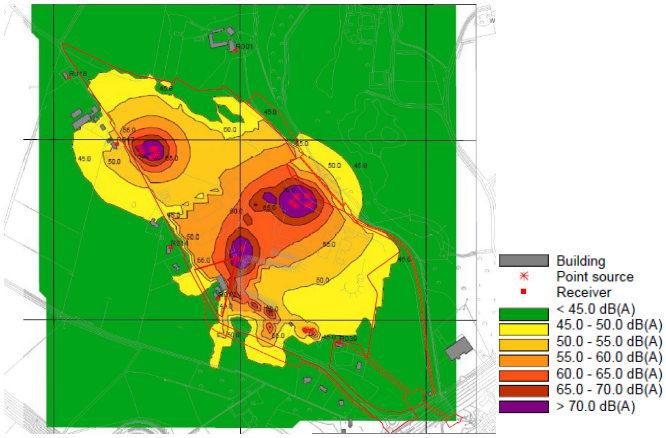

Diagram 8.5: Noise Contours Phase 5 On-site Remediation Works

Part of the Phase 5 works involves removing the existing screening bund in Zone 1 and this will be completed last, after the re-profiling and capping works of the south-eastern slopes of Zone 1 have been completed. This is

to ensure that the screening bank can act as an acoustic barrier between the noise sources and the nearest receptors for the duration of the capping works in this Zone and minimise noise impacts experienced at the receptor locations. This information shall be included in the Noise and Vibration Management Plan as discussed in Section 8.5.

The significance of the impact for the on-site Phase 5 works will vary from imperceptible to slight at the nearest NSRs and will be temporary in duration.

On-Site Phase 6

Noise generating works will be significantly reduced for Phase 6. It is generally expected that there would be no further significant traffic movement associated with material import. The remainder of the re-profiling and capping of Zone 1 will be completed and the crushed concrete stockpiles in Zone 2B will be used to form access tracks. The most noise sensitive works during Phase 6 will be completed in Zone 2A when the stockpiled material will be fully used and there will be minor capping and re-profiling of the Zone 2A boundaries to the edge of the hardstanding. The noise contour results of the modelled on-site remediation works for Phase 6 are presented in Figure 8.9 and outlined in Diagram 8.6 below.

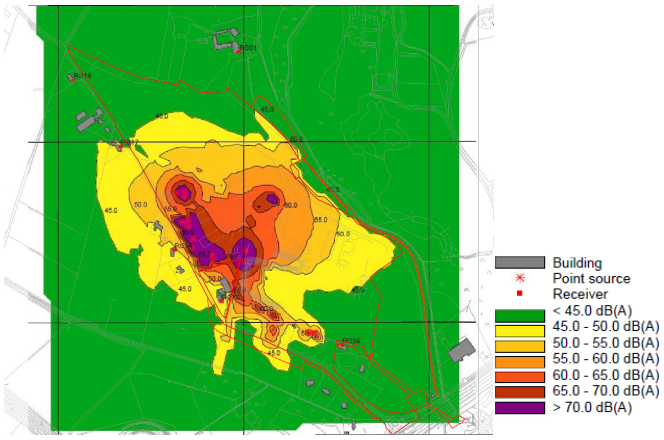

Diagram 8.6: Noise Contours Phase 6 On-site Remediation Works

During the on-site Phase 6 works noise levels are calculated to be highest at Receptor REC014 which is the closest receptor to the Zone 2A boundaries. The results indicate that the predicted noise levels associated with the Phase 6 remediation works will not exceed the assessment criteria of 55dB L_{Aeq} at any of the named receptor locations.

The significance of the impact for the on-site Phase 6 works will vary from imperceptible to slight at the nearest NSRs and will be temporary in duration.

On-Site Phase 7

Noise generating works will be significantly reduced for Phase 7 and the works will include the cleaning of the surface water management ponds, installation of gas wells and the final removal of any remaining stockpiles in Zones 2A and 2B. During the on-site Phase 7 works noise levels are calculated to be highest at Receptor REC014 which is the closest receptor to the Zone 2A boundary. The results indicate that the predicted noise levels associated with the Phase 7 remediation works will not exceed the assessment criteria of 55dB L_{Aeq} at any of the named receptor locations. The noise contour results of the modelled on-site remediation works for Phase 7 are presented in Figure 8.10 and outlined in Diagram 8.7 below.

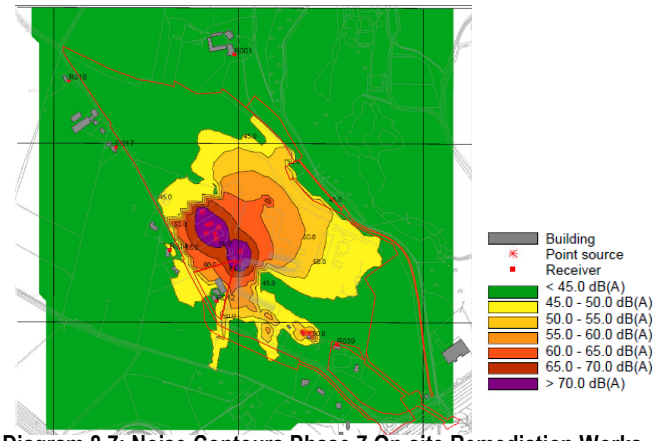

Diagram 8.7: Noise Contours Phase 7 On-site Remediation Works

The significance of the impact for the on-site Phase 7 works will vary from imperceptible to not significant at the nearest NSRs and will be temporary in duration.

On-site Phase 8

The Phase 8 works will include the construction of the multi-use public park including multi-use sports pitches, a building with changing rooms, public toilets and stores, a car park, children's playground and informal trails. During the on-site Phase 8 works noise levels are calculated to be highest at Receptor REC014 which is the closest to the construction of the sports pitches. The results indicate that the predicted noise levels associated with the Phase 8 remediation works will not exceed the assessment criteria of 55dB L_{Aeq} at any of the named receptor locations. The noise contour results of the modelled on-site remediation works for Phase 8 are presented in Figure 8.11 and outlined in Diagram 8.8 below.

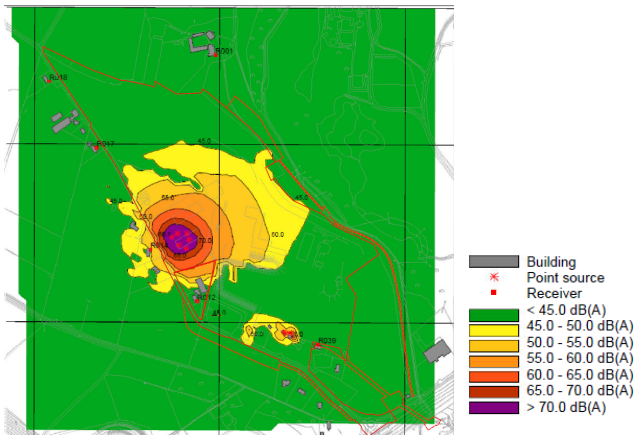

Diagram 8.8: Noise Contours Phase 8 On-site Remediation Works

The significance of the impact for the on-site Phase 8 works will vary from imperceptible to slight at the nearest NSRs and will be temporary in duration.

Off-site Construction Noise Impacts

The proposed Project includes some off-site works including the upgrade works on the L2005 Kerdiffstown Road, drilling works under the N7 dual carriageway and the installation of the leachate and foul water sewer pipelines. Works involved in upgrading the section of L2005 Kerdiffstown Road are considered to be the noisiest of the proposed off-site works and are likely to result in elevated noise levels during the works programme. The

road works are scheduled to be carried out at the beginning of Phase 1 before any significant increase of HGV movements into and out of the proposed Project. The road upgrade works will require the use of a variety of plant items including excavators, dump trucks, road surfacing and levelling plant and equipment. There will be very limited ground breaking required and the main elements of works will include earthworks, surfacing works and landscaping.

TII guidance refers to BS 5228-1 for calculation of noise levels associated with road construction works. Sound pressure levels for plant items commonly used on road construction works as set out in the Standard were used for the prediction of noise levels at selected locations.

The calculations use the methodology provided within BS 5228-1. For this method the sound pressure level of the noise source at a known distance is defined and the attenuation is calculated between its location and the selected receiver, taking account of distance, screening due to barriers, ground attenuation and the time that a noise source would be operating.

Table 8.16 and Table 8.17 set out assumed plant items during the key stages of the road upgrade works with the associated noise source reference from BS5228-1. The closest property to the proposed road works is REC006 and is located 22m from the closest point of the proposed path and 24.5m from the closest point of the proposed road. Other properties are further removed and will experience a lesser noise impact and consequently construction noise calculations have been completed for distances of 22m from the works to present a worst-case scenario.

The calculations assume that plant items are operating continuously for two thirds of the time and that all plant items are operating simultaneously and at the same distance for any one scenario. This scenario is considered a conservative estimate due to the dynamic nature of road construction works and all plant items will not be located at the closest point to the receptor. The use of a standard construction site hoarding along the boundary of the construction works has been included in the noise calculations.

Table 8.16: Calculated Construction Noise Levels for Road Realignment Preparation Works

Plant Details	BS5228-1 Reference	Calculated Noise Level, dB $L_{Aeq,T}$ at 22m distance from works
Mini excavator with hydraulic breaker	C5.2	59
Wheeled excavator	C5.11	52
Dozer	C5.12	55
Articulated dump truck	C5.17	61
Combined L_{Aeq}		64

Table 8.17: Calculated Construction Noise Levels for Road Realignment Construction Works

Plant Details	BS5228-1 Reference	Calculated Noise Level, dB LAeq,T at 22m distance from works
Dozer	C5.12	52
Road roller	C5.19	59
Vibratory compactor (asphalt)	C5.29	60
Asphalt paver (+ tipper lorry)	C5.30	54
Combined L_{Aeq}		63

During the L2005 Kerdiffstown Road realignment works noise levels are calculated to reach a maximum of 64dB $L_{Aeq,1hr}$ for the worst-case scenario at the nearest NSR (REC006) to the road realignment works. This scenario has all named plant items operating simultaneously at 22m from the dwelling for two thirds of the

working day. This is a highly conservative scenario and actual noise levels are anticipated to be much lower than those calculated.

The calculated noise levels for the worst-case scenario are below the adopted daytime construction noise criterion of 70dB $L_{Aeq,1hr}$ as per Table 8.5 for the road realignment works. The road realignment works will only occur between Mondays and Fridays and it is anticipated that there will be no road works undertaken on Saturdays or Sundays. If it becomes necessary to carry out road works on a Saturday, the works will still meet the Saturday limit of 65 dB $L_{Aeq,1hr}$.

The significance of off-site construction works noise impacts will vary from imperceptible to significant at the nearest receptors and will be temporary in duration.

Directional drilling will be required to complete the leachate pipeline connection from the site to the Johnstown Pumping Station which is situated across the N7 Dual Carriageway. While it is not possible at this stage to calculate the actual magnitude of construction phase noise emissions to the local environment, it is possible to predict typical noise levels using guidance set out in *BS 5228-1: 2009+A1 2014* using assumed activities.

Table 8.18 presents the noise levels associated with typical construction noise sources assessed in this instance along with typical sound pressure levels at a location 20m from the works. The calculations assume that plant items are operating continuously and simultaneously. The use of a standard construction site hoarding along the boundary of the construction works has been included in the noise calculations.

Table 8.18: Calculated Construction Noise Levels for Directional Drilling Works

Plant Details	BS5228-1 Reference	Calculated Noise Level, dB $L_{Aeq,T}$ at 20m distance from works
Directional Drilling	C2.44	61
Tracked excavator	C4.65	55
Dumper	C4.5	47
Combined $L_{Aeq,T}$		63

The predicted noise level for the scenario presented in Table 8.18 is well within the adopted limit value of 70dB $L_{Aeq,T}$, at distances of 20m or greater from the works. The nearest NSRs to the drilling works are further removed than the 20m assessed and therefore the noise criteria for the drilling works will be met at all the NSRs that may be impacted by the works.

Remediation Phase Traffic Noise

The Remediation Phase will result in increased traffic movements which will make use of the local road network to access and egress the proposed Project. Chapter 14 Traffic and Transport of this EIAR presents the detailed traffic details for the proposed Project.

The number of HGVs using the public roadway importing materials to the proposed Project will vary according to the different phases of the remediation works. All materials imported to the proposed Project to enable remediation works shall be required to access the site from the N7 via the L2005 Kerdiffstown Road. Average daily HGV movements will peak during Phase 1 to Phase 6 when up to a maximum of 140 movements per day will be experienced.

In order to assess the potential traffic noise level during the different phase works, the specific noise levels associated with passing construction traffic added to the existing baseline has been assessed. This can be done by assessing the noise levels associated with a passing construction vehicle movement by using the method outlined in BS 5228-1, F.2.5 *Method for mobile plant using a well defined route (e.g. haul roads)*. The general expression for predicting the L_{Aeq} alongside a haul road used by single-engined items of mobile plant is:

$L_{Aeq} = L_{WA} - 33 + 10*\log_{10}(Q) - 10*\log_{10}(V) - 10*\log_{10}(d)$ where

L_{WA} = the sound power level of the plant in dB

Q = the number of vehicles per hour

V = the average vehicle speed (km/hr)

d = distance between centre of haul road and nearest receptor

The closest noise sensitive receptors along the route are greater than 20m away from the centreline of the haul route. The calculation assumes the HGVs travelling at a speed of 45km/hr, with a Sound Power Level of 104dB L_{WA} for the trucks and the minimum distance of 20m between the haul roads and the nearest noise sensitive receptors.

The worst-case will arise during Phase 1 to Phase 6 remediation works when it is estimated that there will be up to 140 vehicle movements per day. Using the formula above, and accounting for the worst-case traffic movements, noise levels experienced at residential dwellings along the haul routes, including REC005, REC006, REC007, REC008, REC039, REC012, as a result of HGV movements are calculated to be up to 53dB $L_{Aeq,1hr}$. The impact assessment for the Remediation Phase traffic noise is presented in Table 8.19.

Table 8.19: Calculated Remediation Phase Traffic Impacts along the Haul Routes

Haul Route	Measured Baseline dB L_{Aeq}	Remediation Traffic Noise dB L_{Aeq}	Cumulative Noise Level dB L_{Aeq}	Cumulative L_{Aeq} Minus Baseline L_{Aeq} dB(A)	Impact Rating	Compliance with Assessment Criteria 70dB $L_{Aeq,T}$
Kerdiffstown Road, south of KLRP access	54 to 58	53	57 to 59	3 to 1	Moderate / Minor	Yes

The Remediation Phase traffic impact assessment has determined that during Phase 1 to Phase 6, traffic noise levels are calculated to increase at some residential properties that are 20m from the haul routes. The highest potential impact is calculated to be an increase in noise levels of 3dB(A). The impact rating for the NSRs on this haul route for the worst-case scenario is classified to be Moderate as per Table 8.6 criteria. It should be noted that the increase of 3dB(A) is on the bottom end of the impact scale for Moderate. All other impacts are classified as Minor or Negligible and all predicted Remediation Phase traffic noise levels are well within the assessment criteria of 70dB(A).

Cumulative Remediation Phase Noise Impacts

The Kerdiffstown Road realignment works will be completed over a short period of time during the early stages of the Phase 1 remediation works and there may be a short overlap between on-site remediation works and the off-site road realignment works. The on-site Phase 1 remediation works have been shown to comply with the 55dB $L_{Aeq,1hr}$ noise limit and the off-site road realignment have been shown to comply with the 70dB $L_{Aeq,1hr}$ limit.

The noise limit applicable at the NSR location is defined by the activity being assessed and the NSRs REC006, REC007, COM007, REC008, REC012 and REC039 which will be impacted by the road upgrade works will consequently have two different noise limits applying simultaneously to them, namely the 55dB $L_{Aeq,1hr}$ noise limit for on-site works and the 70dB $L_{Aeq,1hr}$ limit for off-site works. In this instance both activities will be required to meet the individual limits and cumulatively the noise will have to meet the 70dB $L_{Aeq,1hr}$ limit.

A commonly used simple method for the addition of decibels shows that when the difference between two decibels to be added together is greater than 12 the total contribution to the highest decibel is 0. Consequently,

when the decibel values of 70 and 55 are added together, the total figure is still 70 decibels. Therefore, the limit of 70dB $L_{Aeq,1hr}$ will still be achieved at the NSRs REC006, REC007, COM007, REC008, REC012 and REC039 even if on-site activities are overlapping with the off-site works.

Remediation Phase Vibration Impacts

There are no works proposed during the Remediation Phase with potential to cause damage to any of the buildings in the vicinity of the proposed Project. The demolition works in Zone 2B and Zone 4 and the road realignment works have potential the generate ground-borne vibrations. Empirical data for these activities is not provided in BS:5228-2, however, based on experience from other sites and the distances between the nearest receptors and the works the likely levels of vibration are considered to be orders of magnitude below the relevant criteria for cosmetic damage to buildings.

The only works with potential to cause vibration nuisance to humans will occur during the Phase 1 works when the concrete walls are being demolished at the proposed Project and the use of the waste compactor. All demolition works in Zone 2B and Zone 4 are too far removed from the nearest receptors to cause any vibrational impact. The demolition works in Zone 2A may cause very low vibration levels to be experienced at the nearest receptors to these works. However, considering that all the demolition is above ground and the type of intervening ground between the works and the nearest receptors all ground vibrations experienced at the nearest receptors will be less than 0.3 mm/sec. The waste compactor will be located on soft ground well removed from the nearest receptors which will ensure that no adverse vibration impacts are experienced at the nearest receptors. This information shall be included in the Noise and Vibration Management Plan as discussed in Section 8.5.

The worst-case scenario vibration impacts will be just perceptible in the most sensitive situations for most vibration frequencies as per Table 8.9.

8.4.2 Operational Phase

Multi-Use Public Park

The multi-use public park will have three sports pitches open to public use and will also have walkways and a playground. The facility will be accessible by members of the public during daylight hours and noise emissions associated with amenity users will be similar to any town park and will be imperceptible in terms of significance. There will be some additional traffic into the multi-use public park as a result of the proposed Project and this impact is discussed separately below.

There will be some limited overlap between the Remediation Phase works and the Operational Phase of the proposed Project in that the Landfill Infrastructure Compound will have been built and operating during the remediation works and this has been included in the impact assessment for the Remediation Phase. The Landfill Infrastructure Compound will generate very low levels of noise as the noise generating pumps will all be housed internally in the plant building and the only external noise will be associated with the operation of the gas flare.

The noise levels associated with the operation of the Landfill Infrastructure Compound have been calculated using the Bruel and Kjaer 7810 Predictor Software package as described in Section 8.4.1. The input noise data used for the plant associated with the Landfill Infrastructure Compound is presented in Table 8.20. The sound power levels were sourced from a combination of existing data from other similar facilities and from plant and equipment manufacturers. The noise levels for the gas flare were taken from on-site measurements recorded at the existing gas flare on the site.

Table 8.20: Input Data for Operational Phase Noise Model

Equipment Item	Number of Items	Operating Hours	Operating time %	Sound Power Level Lw, dB(A)
Pump	1	00:00-24:00	100	87
Air Blowers	2	00:00-24:00	100	83
Gas Flare	2	00:00-24:00	100	70

In order to assess the noise levels that will be generated for the Operational Phase of the proposed Project a noise model was generated to account for two air blowers and one duty pump operating 24-hours per day, housed internally in the plant building and two gas flares also operating 24-hours per day. Both the duty and stand-by gas flares were modelled to account for a worst-case scenario. The noise model also accounts for HGV traffic entering the Landfill Infrastructure Compound and accounts for 4 HGVs entering and departing the site during daytime hours.

The predicted operational noise levels for the daytime, evening time and night time and the over-all increase in noise level at the nearest receptors are presented in Table 8.21 to Table 8.23 and the associated noise contour results are presented in Figure 8.12 and 8.13 and outlined in Diagram 8.9. The impacts are assessed against the assessment criterion of 55dB $L_{Aeq,T}$ for daytime, 50dB $L_{Aeq,T}$ for evening time and 45dB $L_{Aeq,T}$ for night time.

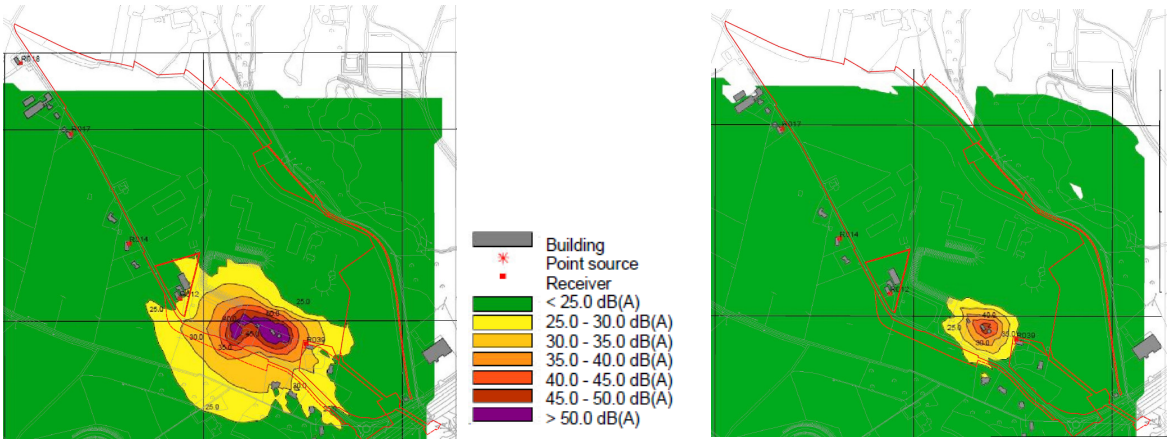

Diagram 8.9: Noise Contours Operational Phase (Left Daytime, Right Evening and Night-time)

Table 8.21: Predicted Noise Levels at the named NSR Locations for the Operational Phase (Daytime)

Noise Sensitive Receptor	Measured Baseline dB L_{Aeq}	Predicted Operational Noise dB L_{Aeq}	Cumulative Noise Level dB L_{Aeq}	Increase in Noise Level dB(A)	Compliance with Assessment Criteria 55dB $L_{Aeq,T}$
REC001	50	5	50	0	Yes
REC012	51	29	51	0	Yes
REC014	51	17	51	0	Yes
REC017	53	11	53	0	Yes
REC018	55	7	55	0	Yes
REC039	54	36	54	0	Yes

The results of the assessment indicate that day-time operational noise levels predicted at the nearest receptor (REC039) is 36dB L_{Aeq} and operational noise levels are all significantly below the day time criterion of 55dB L_{Aeq} at all receptor locations. The results of the assessment indicate that the operation of the proposed Project is

calculated to make no measurable change to the prevailing daytime ambient noise environment. There will be no increase in noise levels experienced at the nearest receptors and consequently the significance of the impact is classified as imperceptible and long-term in duration.

Table 8.22: Predicted Noise Levels at the named NSR Locations for the Operational Phase (Evening time)

Noise Sensitive Receptor	Measured Baseline dB L_{Aeq}	Predicted Operational Noise dB L_{Aeq}	Cumulative Noise Level dB L_{Aeq}	Increase in Noise Level dB(A)	Compliance with Assessment Criteria 50dB $L_{Aeq,T}$
REC001	50	0	50	0	Yes
REC012	56	15	56	0	Yes
REC014	56	10	56	0	Yes
REC017	53	4	53	0	Yes
REC018	52	3	52	0	Yes
REC039	57	26	57	0	Yes

The results of the assessment indicate that evening-time operational noise levels predicted at the nearest receptor (REC039) is 26dB L_{Aeq} and operational noise levels are all significantly below the evening time criterion of 50dB L_{Aeq} at all receptor locations. The results of the assessment indicate that the operation of the proposed Project is calculated to make no measurable change to the prevailing evening time ambient noise environment. There will be no increase in noise levels experienced at the nearest receptors and consequently the significance of the impact is classified as imperceptible and long-term in duration.

Table 8.23: Predicted Noise Levels at the named NSR Locations for the Operational Phase (Night time)

Noise Sensitive Receptor	Measured Baseline dB L_{Aeq}	Predicted Operational Noise dB L_{Aeq}	Cumulative Noise Level dB L_{Aeq}	Increase in Noise Level dB(A)	Compliance with Assessment Criteria 45dB $L_{Aeq,T}$
REC001	45	0	45	0	Yes
REC012	55	15	55	0	Yes
REC014	55	10	55	0	Yes
REC017	45	4	45	0	Yes
REC018	42	3	42	0	Yes
REC039	50	26	50	0	Yes

The results of the assessment indicate that night time operational noise levels predicted at the nearest receptor (REC039) is 26dB L_{Aeq} and operational noise levels are all significantly below the night time criterion of 45dB L_{Aeq} at all receptor locations. The results of the assessment indicate that the operation of the proposed Project is calculated to make no measurable change to the prevailing night-time ambient noise environment. There will be no increase in noise levels experienced at the nearest receptors and consequently the significance of the impact is classified as imperceptible and long-term in duration.

Traffic Impacts

A detailed Traffic and Transport Assessment has been prepared and is presented in Appendix A14.1 of this EIAR. Information from the traffic report has been used to determine the predicted change in noise levels in the vicinity of the roads and junctions that pass the entrance route to the proposed Project.

For the purposes of assessing potential noise impact, the relative increase in noise level associated with traffic movements on existing roads and junctions with and without the proposed Project are considered. The Annual Average Daily Traffic (AADT) figures used in the assessment are taken from the Traffic and Transport

Assessment. Operational traffic accessing the proposed Project will approach along the L2005 Kerdiffstown Road and turn into the proposed Project from south of the KLRP access or alternatively will approach along the Kerdiffstown Road and turn into the proposed Project from north of the KLRP access. The NSRs situated along the Kerdiffstown Road require to be assessed for traffic noise impacts by looking at the calculated change in noise level associated with the increase in overall traffic movements along these routes. Calculations were completed to determine the noise levels associated with the traffic numbers for the "with" and "without" scenarios to determine the change in noise level. In order to assess the worst case impact, robust assumptions have been made in the Traffic and Transport assessment regarding the proportion of Operational Phase traffic accessing the site, assuming that 100% of traffic will access the site from the north and 100% will access from the south. This is an extremely robust approach as the volumes of traffic traveling to the public park will, in reality, be significantly lower and therefore the assessment of Operational Phase traffic can very much be considered as worst case.

Table 8.24: presents the traffic volume figures and the associated change in noise level that will be experienced by the NSRs situated along the Kerdiffstown Road.

Table 8.24: Change in Noise Level due to Traffic

Road	2022 Projected AADT (Without proposed Project)	Daily Increase in Traffic With proposed Project	Change in Noise Level dB(A)
Kerdiffstown Road, south of KLRP access	1864	151	0.3
Kerdiffstown Road, north of KLRP access	1800	151	0.3

The predicted increase in noise levels at the NSRs along the Kerdiffstown Road due to the worst-case additional vehicular traffic associated with the proposed Project is 0.3dB(A). Table 8.8 offers guidance as to the likely impact associated with a change in traffic noise level. The predicted increase in traffic noise at the NSRs along these routes is 0.3dB(A), which is barely perceptible and the associated noise impact is classified as negligible.

8.5 Mitigation Measures

8.5.1 Remediation Phase Mitigation Measures

The impact assessment for the Remediation Phase works across the proposed Project has shown that remediation activities can be undertaken within the proposed noise criteria at the nearest sensitive receptors. It is possible that there may be some short-term instances where elevated noise levels may be experienced due to proximity of works to noise sensitive receptors and the type of works being undertaken. However, with good noise management practices and the appropriate noise mitigation measures the number and duration of these incidents will be minimised.

Prior to the commencement of any on-site works, the appointed contractor will be required to prepare a Construction Environmental Management Plan (CEMP) in agreement with Kildare County Council. The CEMP shall contain a stand-alone Noise and Vibration Management Plan (NVMP) which will detail how the appointed contractor will comply with the noise criteria set out in this EIAR and will deal specifically with on-site activities in a strategic manner to remove or reduce significant noise and vibration impacts associated with the remediation works. The NVMP will detail the provision and installation of the acoustic barriers, the best practice noise measures that the appointed contractor will adhere to on-site and the noise and vibration monitoring programme that the appointed contractor will undertake during the remediation works.

The appointed contractor shall be required to carry noise monitoring at NSR locations on a weekly basis and this shall be increased to continuous monitoring in agreement with the EPA and the conditions of the IEAL, once

the remediation works begin to approach the NSR locations. The measured noise levels at the NSR locations will be assessed against the noise limits and will be used to assist the scheduling of works., The results the noise monitoring will be available in real time to the KCC Site Manager. The measured noise levels at the NSR locations will be assessed against the noise limits and will be used to assist the scheduling of works to ensure that the noise emissions from the various works are kept within the prescribed noise limits. The appointed contractor shall also be required to carry out vibration monitoring at the nearest NSR locations during sensitive phases of the remediation works and this data shall be reviewed daily to ensure the limits are being complied with.

The NVMP will detail the best practice measures to be adhered to at the site including but not limited to the following:

- the correct positioning of the mounted breakers in Zone 2A during Phase 1 on-site works to minimise their combined impact - To ensure that the noise limits are met, mounted breakers shall be positioned well apart from each other when operating simultaneously in Zone 2A. Scheduling of works for Zone 2A will ensure that the mounted breakers are correctly positioned to ensure that the relevant criteria are not exceeded at the nearest NSRs;
- the correct sequencing of the building up or taking down of stockpiles on-site - Best Practice shall ensure that the stockpiling will be carried out in a sequence where the stockpile is built up from the boundary nearest to the receptors and added to so that the stockpile can act as a barrier between the noise source and the nearest receptors as the works develop;
- the careful management of the number of plant items in simultaneous operation when the works are close to the NSRs along L2005 Kerdiffstown Road and other key locations; and
- the careful positioning of heavy plant items, such as the waste compactor, to minimise the potential for ground borne vibrations to be generated.

The real time noise monitoring that will be carried out by the appointed contractor will be used to feed information back to the KCC Site Manager to assist with the above measures and to ensure that noise criteria are met for the Remediation Phase works.

As described above the remediation works will be managed through the use of construction noise limits which the appointed contractor will be required to work within. Best practice control measures including choice of plant, scheduling of works on site, provision of temporary acoustic screening, on-site noise monitoring and other measures will be employed in order to ensure noise limits are not exceeded.

Best practice noise management procedures for the control of noise and vibration from demolition and construction activities as presented in BS5228 will be followed. Such measures to be adhered will include the following:

On-site Work Practices

- Avoid unnecessary revving of engines and switch off equipment when not required;
- Keep internal haul routes well maintained and avoid steep gradients;
- Use rubber linings in chutes and dumpers to reduce impact noise;
- Minimise drop height of materials;
- Start-up plant and vehicles sequentially rather than all together;
- Equipment shall be located away from noise sensitive areas, as much as is feasible;
- Regular and effective maintenance by trained personnel shall be carried out to reduce noise and/or vibration from plant and machinery;
- Limit noisy construction works to 07:00 to 19:00 weekdays with Saturday working from 08:00 to 16:30 unless otherwise agreed with the relevant authority.

In addition to the above BS5228 recommendations, Section 10.3 of NG4 discusses the management of Waste Related Operations and includes the following mitigation measures which will also be adhered to at the proposed Project:

- Employ noise reducing technologies, such as attenuators or enclosures, where practicable;
- Ensure that noise control measures are maintained as per the manufacturers requirements;
- Minimise the number of vehicles/heavy plant on the proposed Project at any one time;
- Maintain vehicles in good order, employ the principles of preventive maintenance and undertake reference vehicle noise measurements at defined intervals;
- Ensure that noisy vehicles are parked as far as possible from noise sensitive areas;
- Ensure that drivers are aware of the potential for noise to cause annoyance/disturbance to local residents – they shall show due regard to this, particularly when entering and leaving the proposed Project (e.g. no unnecessary horn blowing); and
- Consider the use of alternative varieties of reversing alarm with reduced noise output, such as ambient noise sensing alarms with variable volume or directional modulated alarms – these must be evaluated on a case-by-case basis and regard must be had to any health and safety issues that may arise.

Selection of Quiet Plant

- In accordance with best practicable means, plant and activities to be employed on the proposed Project will be reviewed to ensure that they are the quietest available for the required purpose.

Acoustic Screens and Barriers

- Acoustic screens are required to be erected in certain locations for the duration of the Remediation Phase works (refer to Figure 8.2 and Section 8.4.1 for more details). These screens shall be carefully positioned to be as effective as possible. In general, the barrier shall have no gaps or openings in the joins of the barrier material and the barrier material shall have a minimum mass per unit area of 7 kg/m^2. The minimum height of the barrier shall typically be such that no part of the noise source will be visible from the receiving point. This will not always be possible and therefore the minimum recommended height is prescribed at 2.4m. The existing screening banks along the western boundary of the proposed Project will be supplemented to give additional noise protection to the private residences along the L2005 Kerdiffstown Road. This shall be done with the use of straw bales (or equivalent) as that is the most readily accessible and highly mobile screen type with very effective mitigation properties. The low-reflection acoustic screens required around the boundary of Zone 2A shall be solidly constructed of straw bales (or equivalent) and shall be of minimum 5m height. The locations for the erection of the acoustic screens are shown on Figure 8.2.

Noise Control

- Improved sound reduction methods, such as equipment enclosures shall be used (this is also addressed in NG4 guidance above).

Communications

- Maintain ongoing contact with local residents to ensure any complaints relating to Remediation Phase noise for the project from local residents can be addressed. Also, prior to any particularly noisy activities, local residents shall be contacted and notified of upcoming works in order to minimise the perceived noise impact. Any liaison with local residents will be undertaken in agreement with the KCC Site Manager.

Monitoring

- On-site noise monitoring during the actual works will be a key part in the mitigation programme for the proposed works. As discussed above, monitoring of the noise levels at NSR locations for comparison with the noise limits during the different Remediation Phases will be critical and the live measurement results

will be passed onto the KCC Site Manager and will be used to assist the scheduling of works to ensure that the noise emissions from the various works are kept within the limits.

Additionally, the appointed contractor shall continue the current engagement with local residents and stakeholders and will notify them before the commencement of any works forecast to generate appreciable levels of noise or vibration, explaining the nature and duration of the works. Throughout the Remediation Phase there shall be distribution of information circulars by the contractor informing people of the progress of works and any likely periods of significant noise and vibration. A nominated contact for any communications in relation to noise and vibration for the duration of the project remediation works and any queries, complaints or other formal correspondence regarding noise and vibration shall be appointed by the contractor.

8.5.2 Operational Phase Mitigation Measures

There are no adverse noise impacts associated with the Operational Phase of the proposed Project and the noise impact assessment has shown that mitigation measures are not required.

8.6 Residual Impacts

8.6.1 Remediation Phase

The impact assessment has shown that with correct implementation of appropriate noise and vibration mitigation measures, the resultant noise and vibration impacts will be sufficiently controlled to within the relevant criteria. The overall noise and vibration impact from the Remediation Phase of the proposed Project is anticipated to be short term and moderate considering the existing noise environment and the predicted impacts of the proposed Project.

8.6.2 Operational Phase

The impact assessment has shown that the proposed Project can operate within the adopted day, evening and night-time noise limits for the site. The overall noise and vibration impact from the operation of the proposed Project is anticipated to be long term and imperceptible considering the existing noise environment and the predicted impacts of the proposed Project.

8.7 Difficulties Encountered in Compiling Information

There were no specific difficulties encountered when carrying out this assessment.

8.8 Cumulative Impacts

The cumulative impact for the proposed Project can be assessed by taking account of the existing baseline noise environment and the addition of the predicted noise levels associated with the operation of the proposed Project. Assuming there is no change (positive or negative) to the existing noise environment as a result of other developments in the area, the cumulative impacts at the named receptor locations are estimated to be imperceptible as shown in Section 8.4.1.

In addition to the operation of the proposed Project there are a number of additional development projects proposed in the vicinity of the site that are considered in terms of a cumulative impact on overall noise levels that may be experienced at receptors. These projects are discussed in the following paragraphs.

8.8.1 Kerdiffstown Quarry

A Waste Facility Permit has been granted for the recovery of excavation or dredge spoil, comprising natural materials of clay, silt, sand, gravel or stone and which comes within the meaning of inert waste, through deposition for the purpose of the improvement or development of land at the former quarry at Kerdiffstown. In accordance with the permit (Waste Facility Permit Number: WFP – KE – 16 – 0084 – 01) the permit holder shall

ensure that the maximum tonnage of soil and stone recovered at the site is 98,928 tonne. The importation of inert materials will raise the ground levels at the site and stabilise the side slope of the redundant quarry. The quarry, receptor COM016 on Figure 3.4, is located across the L2005 Kerdiffstown Road opposite the western boundary of Zone 1 of the proposed Project site and west of the receptor REC018. The Waste Facility Permit restricts the truck movements onto the quarry site to a maximum of 35 per day and restricts the working hours to 08:00 to 17:00 Mondays to Fridays and 08:00 to 13:00 on Saturdays. This approximates to four loads of inert materials coming to the site per hour at maximum capacity. The project is anticipated to be completed over a three-year period which would significantly reduce the number of truck movements to approximately one per hour on average over the duration of the project.

The access route to the quarry site is from the south using the L2012 Monread Road and crossing over the M7 motorway. This will result in keeping all the quarry infilling traffic well removed from the proposed Project works in the event of the quarry back-filling works occurring at the same time as the Remediation Phase works. The Waste Facility Permit requires the quarry works to meet noise limits of 55dB $L_{AEq,T}$ at the nearest receptor locations. The only receptor that has the potential to be impacted by works at both sites is REC018. The maximum predicted noise levels for the Remediation Phase works at REC018 is 45dB $L_{AEq,1hr}$ during Phase 3 works and consequently the cumulative impact from this development is anticipated to be neutral. There will be no impact from the Operational Phase of the infilling quarry.

8.8.2 The M7 Naas Newbridge Bypass Upgrade and M7 Osberstown Interchange & R407 Sallins Bypass Schemes

The M7 Naas Newbridge Bypass Upgrade and M7 Osberstown Interchange & R407 Sallins Bypass Schemes involve the addition of a third lane to both the north-bound and south-bound lanes of the M7 Motorway between Johnstown and Greatconnell, a new re-configured interchange at Newhall and a grade separated junction, M7 Osberstown Interchange, located between the existing M7 Maudlins and Newhall Interchanges. Review of the M7 Naas Newbridge Bypass Upgrade and M7 Osberstown Interchange & R407 Sallins Bypass Schemes Environmental Impact Statements and the Oral Hearing Briefs of Evidence, note that with the inclusion of the proposed mitigation measures the residual impact to noise as a result of the proposed road schemes is positive. Consequently, the cumulative impact from this development and the proposed Project is anticipated to be neutral. Environmental Impact Statements and the Oral Hearing Briefs of Evidence, note that with the inclusion of the proposed mitigation measures the residual impact to noise as a result of the proposed road schemes is positive. Consequently, the cumulative impact from this development and the proposed Project is anticipated to be neutral.

Construction works for the road scheme were shown to be able to be carried out within the proposed noise limits at the nearest receptors to the road works. The nearest receptors to the proposed Project are too far removed to be impacted by the road construction works and again the overall cumulative impact is considered to be neutral.

8.8.3 Applegreen Service Station at Naas (withdrawn)

The Planning Application for the development of the Applegreen Service Station on the eastern outskirts of Naas town and south of the N7 Road has been withdrawn. The nearest boundary for the proposed Service Station is approximately 600m from the proposed Project site entrance. The Operational Phase of the proposed Service Station is anticipated to be not significant at the nearest noise sensitive receptors and therefore the cumulative impacts from this project (if it were to proceed at a point in the future) and the proposed Project is anticipated to be neutral.

8.8.4 Housing Development at Craddockstown, Naas

A housing development has been granted permission to build a 284 housing-unit scheme at Craddockstown to the south of Naas town centre. The proposed housing development site is located over 2km south of the proposed Project site. Due to the extended distance between the two sites and the type of development proposed the cumulative impacts from the housing development project and the proposed Project is anticipated to be neutral.

The predicted noise impacts associated with the proposed Project are significantly below those associated with the existing noise environment and also those associated with the other planned projects as discussed above. Therefore, the Operational Phase of the proposed Project is anticipated to be imperceptible in terms of noise contributed to the surrounding environment. It is therefore not considered that any additional mitigation measures above those already provided are required to account for cumulative impacts.

8.8.5 Upper Liffey Valley Sewerage Scheme & Osberstown Wastewater Treatment Plant Upgrade

The Upper Liffey Valley Sewerage Scheme & Osberstown Wastewater Treatment Plant Upgrade is an Irish Water project which proposes to upgrade various wastewater elements (gravity sewers, pumping stations, storm handling facilities and rising mains) in the vicinity of the proposed Project. Works will be undertaken on drainage networks collecting wastewater from three catchments, namely Catchment A (Sallins, Clane and Prosperous); Catchment B (Naas, Johnstown and Kill); and Catchment C (Newbridge, Kilcullen, Athgarvan, Curragh and Carragh). Part of the upgrade includes a proposed new pumped sewer, a section of which will be installed along the L2005 Kerdiffstown Road adjacent to the proposed realignment works as part of the proposed Project. It is anticipated that the construction of the new pumped sewer will be scheduled at the same time as the realignment works to the L2005 Kerdiffstown Road to minimise potential impacts on local residents and traffic.

If construction works proceed for both schemes at the same time, the plant and machinery required will have to operate at different sections along the Kerdiffstown Road due to the nature of the work and the size and type of machinery required. In effect, the construction work for one project would be followed by the other project but they would never directly overlap. The precise detail of how the works would be completed if they were to proceed at the same time is not available at this time however the active plant and machinery for both schemes would need to be kept at a sufficiently removed distance from each other to ensure that the proposed noise limits are maintained. Assuming that the works for both schemes are managed as described above to minimise noise impacts, the cumulative impact is anticipated to be not significant. In the event that either the proposed Project or the new pumped sewer construction is delayed there will be no cumulative impact.

8.9 References

- British Standards Institution (1993) BS 7385-2:1993 Evaluation and Measurement for Vibration in Buildings. Guide to Damage Levels Arising from Groundborne Vibration
- British Standards Institution (2009, 2014). BS 5228-1:2009+A1:2014 –Code of Practice for Noise and Vibration Control on Construction and Open Sites Part 1: Noise
- British Standards Institution (2009, 2014) BS 5228-2:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites Part 2: Vibration
- Environmental Protection Agency (2002). Guidelines on the Information to be contained in Environmental Impact Statements
- Environmental Protection Agency (2003). Advice notes on current practice in the preparation of Environmental Impact Statements
- Environmental Protection Agency (2015). Revised Guidelines on the Information to be contained in Environmental Impact Statements
- Environmental Protection Agency (2015). Advice notes for preparing Environmental Impact Statements (Draft)
- Environmental Protection Agency (2016). Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)
- Highways England (1993). Design Manual for Roads and Bridges, Volume 11, Section 3
- ISO (1996). ISO 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation
- ISO (2007). ISO 1996-2:2007 Acoustics - Description and Measurement of Environmental Noise, Part 2 Determination of Environmental Noise Levels
- National Roads Authority (2004). Guidelines for the Treatment of Noise and Vibration in National Road Schemes

9. Landscape and Visual

This Chapter assesses the landscape and visual impacts of the proposed Project. It is envisaged that overall the landscape and visual aspects of the proposed Project at Operational Phase will be a positive improvement on the current un-remediated baseline scenario.

The baseline conditions assessed encompass a variety of aspects including landform and drainage, vegetation and land use, and transport routes. These baseline conditions have been used in determining the landscape sensitivity of the site with the landscape to the north and east of the site being deemed as medium while the landscapes to the south and west of the site being more consistent with low sensitivity ratings.

Remediation Phase landscape effects are deemed to be medium impact within the site itself and low impact within the surrounding environs. Remediation Phase visual impacts range between moderate and imperceptible, largely depending on viewing distance and these tend to relate to construction related activity and vegetation stripping. All Remediation Phase impacts will be temporary.

The use of the site as a public recreational facility has positive connotations for the Green Infrastructure Network of the environs of Naas and Johnstown and will influence public perceptions of the site in a positive manner. The Operational Phase landscape impact of the site is generally deemed to be positive in comparison to baseline conditions. There are a number of key mitigation measures that will be undertaken in order to minimise the overall visual impact of the proposed Project however in most instances it is considered that the residual visual impact of the Operational Phase will be a 'positive' improvement on the current un-remediated baseline scenario or will have no material effect on visual amenity.

9.1 Introduction

This Landscape and Visual Impact Assessment (LVIA) considers and assesses the effects of the Kerdiffstown Landfill Remediation Project (hereafter referred to as the proposed Project). The appraisal takes account of not only the end-use of the proposed Project, but also the complex construction period that will take place sequentially. Remediation of the site will result in changes to the existing landform and land cover and will require the movement of heavy plant and machinery within the site, as well as access to and from the site by construction traffic.

Kerdiffstown Landfill is located in County Kildare and comprises a former quarry, landfill and waste processing facility. The site has been progressively backfilled with wastes since the 1950's until 2010. The site poses a number of risks due to large areas of uncapped waste, remnants of buildings and structures, over-steep slopes and absence of appropriate capping to the lined cell. The proposed Project comprises the remediation of the site to reduce the risks posed by the site in its current condition to public health and safety and the environment, whilst developing the site to provide an amenity to the local community, comprising a multi-use public park (the Remediation Phase). Following the Remediation Phase, the site will continue to be managed by KCC, and regulated by the EPA, as a remediated landfill whilst operating as a multi-use public park (the Operational Phase).

The remediation of the proposed Project and development of the multi-use public park is anticipated to take approximately five to seven years, with approximately four years of intensive construction works to remediate the site. The Operational Phase will be the operation of a public park with multi-use sports pitches, changing rooms, a children's playground, etc. and management of the site as a remediated landfill. Table 9.1 below summarises the key activities anticipated to be carried out in each of the phases of the proposed Project. Further detail on the scope of the proposed Project is provided in Chapter 4 Description of the Proposed Project, and details on the outline phasing of the works are provided in Section 4.3.1 and outlined in Figure 4.8 and Figure 4.9.

Table 9.1: Summary of Key Activities during the Remediation and Operational Phases

Indicative Phase		Summary of Key Activities
Remediation Phase Phase 1 – Phase 8	Works to re-profile the site and construction of landfill infrastructure	• Construction of new site entrance and realignment of the L2005 Kerdiffstown Road • Demolition of 3 properties (REC010, REC011 and REC016) and concrete structures in Zone 2A, Zone 2B and Zone 4 • Installation of new foul and leachate pipeline connections to Johnstown Pumping Station • Construction of a new Landfill Infrastructure Compound • Removal of stockpiles of materials • Temporary stockpiling • Re-profiling and filling • Installation of capping systems • Installation of new or supplementary gas wells and gas venting measures • Construction, cleaning and commissioning of surface water management infrastructure • Removal of the existing flare stack in Zone 1 and the second back-up flare, commencing use of new flare stack in the new Landfill Infrastructure Compound supported by a back-up flare • Inspection and repair of concrete hardstandings in Zone 2A and Zone 2B • Removal of existing perimeter screening bund in Zone 1
	Construction of Multi-Use Public Park	• Construction of park infrastructure, including multi-use sports pitches, a building with changing rooms, public toilets and stores, car parking, a children's playground, informal trails and defined viewpoints. • Planting and landscaping • Ecological enhancement and mitigation features such as hibernacula, nesting boxes and log piles
Operational Phase	Operation of Multi-Use Public Park	• Operation of the multi-use public park • Operation and maintenance of the landfill gas management infrastructure • Operation and maintenance of the leachate management infrastructure • Operation and maintenance of the surface water management infrastructure • Environmental control and monitoring as agreed by the Environmental Protection Agency

In contrast to most landscape and visual appraisals the proposed outcome of the remediation works will represent an improvement to the baseline and historical conditions of the site. Thus, the focus of the assessment process in this instance is to maximise the positive impacts, whilst critically identifying potential impacts due to construction activities to be undertaken in the Remediation Phase and reducing the magnitude of those temporary negative impacts.

The landscape and visual assessment will integrate a number of elements into the assessment, namely:

Landscape Impact Assessment (LIA) which relates to the assessment of effects on the landscape as a resource in its own right and is concerned with how the proposal will affect the elements that make up the landscape, the aesthetic and perceptual aspects of the landscape and its distinctive character.

Visual Impact Assessment (VIA) which relates to the assessment of effects on specific views and on the general visual amenity experienced by people. This deals with how the surroundings of individuals, or groups of people, may be specifically affected by changes in the content and character of views as a result of the change or loss of existing elements of the landscape and/or introduction of new elements. Visual impacts may occur from; Visual Obstruction (blocking of a view, be it full, partial or intermittent) or; Visual Intrusion (interruption of a view without blocking).

Cumulative landscape and visual impact assessment is concerned with additional changes to the landscape or visual amenity caused by the proposed Project in conjunction with other developments (associated or separate to the proposed Project), or actions that occurred in the past, present or are likely to occur in the foreseeable future.

9.2 Methodology

9.2.1 Relevant Guidance Documents

This landscape and visual impact assessment is based on:

- EPA Guidelines on the Information to be Contained in Environmental Impact Statements (EPA, 2002) (and revised and draft guidelines 2015/2017);
- EPA Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2003a) (and revised advice notes 2015); and
- Landscape Institute and the Institute of Environmental Management and Assessment publication entitled Guidelines for Landscape and Visual Impact Assessment (GLVIA-2013).

The assessment includes three main aspects and these are outlined below in Section 9.2.2, Section 9.2.3 and Section 9.2.4.

9.2.2 Data Collection, Research and Baseline Establishment

The potential impacts to landscape and visual assets as a result of the proposed Project were assessed through a desk-based study of available information, including: Review of the Kildare County Development Plan (2017-2023), particularly in relation to the county Landscape Character Assessment and designated scenic routes and views. This informed the selection of an appropriate study area, within which, to examine the landscape and visual effects of the proposed Project. It also identified sensitive receptor locations within the study area from which to prepare photomontages for the later appraisal of visual impacts.

Extent of Study Area

Kerdiffstown Landfill is not a particularly prominent feature within its wider landscape setting, however, the Kildare County Development Plan (2017-2023) identifies a number of designated hilltop views, from which, vast areas of the landscape are visible. In the interests of a comprehensive appraisal, a 3km radius study area is used in this instance. However, there is a particular focus on receptors contained within 1km, except where iconic or designated scenic viewpoints exist at greater distances out to 3km.

9.2.3 Fieldwork, Viewshed Reference Point Selection and Photo Capture

This site-work stage involves the verification of potential viewpoint locations from the initial desk-based study and the capture of high-resolution photography for the preparation of the photomontages that form the basis of the visual impact assessment. Photomontages accurately represent the way in which a future development will appear within a particular view by superimposing a photo-realistic model of it into an existing photograph that represents the view in question. Field notes are recorded in relation to the likes of topography, land use, significant landscape features and overall landscape character. This process is used to inform the proposed Project specific landscape character assessment that is the basis of landscape impact appraisal. The project specific landscape character assessment is not intended to override the County Kildare Landscape Character Assessment. Instead, it allows for a comparison with the broader scale document to identify points of commonality and also where the county based assessment may not have identified salient landscape features or finer scale aspects of landscape character that are pertinent to the proposed Project. This is particularly relevant to complex hinterland areas as county-based landscape character assessments tend to focus on the core aspects of countryside (non-urban) character.

9.2.4 Appraisal of Landscape and Visual Impacts

Landscape Impact Assessment Criteria

When assessing the potential impacts on the landscape resulting from a proposed Project, the following criteria are considered:

- Landscape character, value and sensitivity;

- Magnitude of likely impacts; and
- Significance of landscape effects.

The sensitivity of the landscape to change is the degree to which a particular landscape receptor (Landscape Character Area (LCA) or feature) can accommodate changes or new elements without unacceptable detrimental effects to its essential characteristics. Landscape Value and Sensitivity is classified using the following criteria set out in Table 9.2, which have been derived from a combination of the Guidelines for Landscape and Visual Impact Assessment 2nd Edition 2002 (Institute of Environmental Management & Assessment 3rd Edition updated 2013) and professional judgement.

Table 9.2: Landscape Value and Sensitivity

Sensitivity	Description
Very High	Areas where the landscape character exhibits a very low capacity for change in the form of development. Examples of which are high value landscapes, protected at an international or national level (World Heritage Site/National Park), where the principal management objectives are likely to be protection of the existing character.
High	Areas where the landscape character exhibits a low capacity for change in the form of development. Examples of which are high value landscapes, protected at a national or regional level (Area of Outstanding Natural Beauty), where the principal management objectives are likely to be considered conservation of the existing character.
Medium	Areas where the landscape character exhibits some capacity and scope for development. Examples of which are landscapes, which have a designation of protection at a county level or at non-designated local level where there is evidence of local value and use.
Low	Areas where the landscape character exhibits a higher capacity for change from development. Typically, this would include lower value, non-designated landscapes that may also have some elements or features of recognisable quality, where landscape management objectives include, enhancement, repair and restoration.
Negligible	Areas of landscape character that include derelict, mining, industrial land or are part of the urban fringe where there would be a reasonable capacity to embrace change or the capacity to include the development proposals. Management objectives in such areas could be focused on change, creation of landscape improvements and/or restoration to realise a higher landscape value.

The magnitude of a predicted landscape impact is a product of the scale, extent or degree of change that is likely to be experienced as a result of the proposed Project. The magnitude takes into account whether there is a direct physical impact resulting from the loss of landscape components and/or a change that extends beyond the boundary of the proposed Project that may have an effect on the landscape character of the area. See Table 9.3.

Table 9.3: Magnitude of Landscape Impacts

Magnitude of Impact	Description
Very High	Change that would be large in extent and scale with the loss of critically important landscape elements and features, that may also involve the introduction of new uncharacteristic elements or features that contribute to an overall change of the landscape in terms of character, value and quality.
High	Change that would be more limited in extent and scale with the loss of important landscape elements and features, that may also involve the introduction of new uncharacteristic elements or features that contribute to an overall change of the landscape in terms of character, value and quality.
Medium	Changes that are modest in extent and scale involving the loss of landscape characteristics or elements that may also involve the introduction of new uncharacteristic elements or features that would lead to changes in landscape character, and quality.
Low	Changes affecting small areas of landscape character and quality, together with the loss of some less characteristic landscape elements or the addition of new features or elements.

Magnitude of Impact	Description
Negligible	Changes affecting small or very restricted areas of landscape character. This may include the limited loss of some elements or the addition of some new features or elements that are characteristic of the existing landscape or are hardly perceivable.
Neutral	Changes that do not involve the loss of any landscape characteristics or elements and will not result in noticeable changes to the prevailing landscape character.
Positive	Changes that restore a degraded landscape or reinforce characteristic landscape elements

The significance of a landscape impact is based on a balance between the sensitivity of the landscape receptor and the magnitude of the impact. The significance of landscape impacts is arrived at using the following matrix set out in Table 9.4.

Table 9.4: Impact Significance Matrix

	Sensitivity of Receptor				
Scale/Magnitude	***Very High***	***High***	***Medium***	***Low***	***Negligible***
Very High	Profound	Profound-substantial	Substantial	Moderate	Minor
High	Profound-substantial	Substantial	Substantial-moderate	Moderate-slight	Slight-imperceptible
Medium	Substantial	Substantial-moderate	Moderate	Slight	Imperceptible
Low	Moderate	Moderate-slight	Slight	Slight-imperceptible	Imperceptible
Negligible	Slight	Slight-imperceptible	Imperceptible	Imperceptible	Imperceptible
Neutral	Imperceptible	Imperceptible	Imperceptible	Imperceptible	Imperceptible
Positive	Positive	Positive	Positive	Positive	Positive
Note: The significance matrix provides an indicative framework from which the significance of impact is derived. The significance judgement is ultimately determined by the assessor using professional judgement. Due to nuances within the constituent sensitivity and magnitude judgements, this may be up to one category higher or lower than indicated by the matrix. Judgements indicated in orange are considered to be 'significant impacts' in EIA terms.					

Visual Impact Assessment Criteria

As with the landscape impact, the visual impact of the proposed Project will be assessed as a function of sensitivity versus magnitude. In this instance the sensitivity of the visual receptor, weighed against the magnitude of the visual effect.

Sensitivity of Visual Receptors

Unlike landscape sensitivity, the sensitivity of visual receptors has an anthropocentric (or human-centric) basis. It considers factors such as the perceived quality and values associated with the view, the landscape context of the viewer, the likely activity they are engaged in and whether this heightens their awareness of the surrounding landscape. Table 9.5 outlines the location and direction of view for the viewpoints considered in this assessment. Refer to Figure 9.3 for the location of these assessment viewpoints.

Table 9.5: Viewpoint Descriptions

Viewpoint (VP)	Magnitude of Landscape Impacts	Direction of View
VP1	Access road to Kerdiffstown House	W
VP2	Walled Garden at Kerdiffstown House	SW
VP3	2nd Hole of Palmerstown House Golf Course	W
VP4	3rd Hole of Palmerstown House Golf Course	NW
VP5	L2005 Kerdiffstown Road	NE
VP6	Clubhouse of Naas Golf Course	S
VP7	7th Green of Naas Golf Course	SW
VP8	N7 Pedestrian Overpass to Johnstown	N
VP9	Maudlins Interchange Overbridge	NW

A list of the factors considered by the assessor in estimating the level of sensitivity for a particular visual receptor is outlined below and used in Table 9.5 to establish visual receptor sensitivity at each Viewshed Reference Point (VRP):

Susceptibility of Receptors - In accordance with the Institute of Environmental Management and Assessment ("IEMA") Guidelines for Landscape and Visual Assessment (3rd edition 2013) visual receptors most susceptible to changes in views and visual amenity are;

- "Residents at home;
- People, whether residents or visitors, who are engaged in outdoor recreation, including use of public rights of way, whose attention or interest is likely to be focussed on the landscape and on particular views;
- Visitors to heritage assets, or to other attractions, where views of the surroundings are an important contributor to the experience;
- Communities where views contribute to the landscape setting enjoyed by residents in the area; and
- Travellers on road, rail or other transport routes where such travel involves recognised scenic routes and awareness of views is likely to be heightened".

Visual receptors that are less susceptible to changes in views and visual amenity include;

- "People engaged in outdoor sport or recreation, which does not involve or depend upon appreciation of views of the landscape; and
- People at their place of work whose attention may be focussed on their work or activity, not their surroundings and where the setting is not important to the quality of working life".

Recognised scenic value of the view (County Development Plan designations, guidebooks, touring maps, postcards etc.). These represent a consensus in terms of which scenic views and routes within an area are strongly valued by the population because in the case of County Developments Plans, for example, a public consultation process is required;

Views from within highly sensitive landscape areas. Again, highly sensitive landscape designations are usually part of a county's Landscape Character Assessment, which is then incorporated within the County Development Plan and is therefore subject to the public consultation process. Viewers within such areas are likely to be highly attuned to the landscape around them;

Primary views from dwellings. A proposed Project might be seen from anywhere within a particular residential property with varying degrees of sensitivity. Therefore, this category is reserved for those instances in which the design of dwellings or housing estates, has been influenced by the desire to take in a particular view. This might

involve the use of a slope or the specific orientation of a house and/or its internal social rooms and exterior spaces;

Intensity of use, popularity. This relates to the number of viewers likely to experience a view on a regular basis and whether this is significant at county or regional scale;

Connection with the landscape. This considers whether or not receptors are likely to be highly attuned to views of the landscape i.e. commuters hurriedly driving on a busy national route versus hill walkers directly engaged with the landscape enjoying changing sequential views over it;

Provision of elevated panoramic views. This relates to the extent of the view on offer and the tendency for receptors to become more attuned to the surrounding landscape at locations that afford broad vistas;

Sense of remoteness and/or tranquillity. Receptors taking in a remote and tranquil scene, which is likely to be fairly static, are likely to be more receptive to changes in the view than those taking in the view of a busy street scene, for example;

Degree of perceived naturalness. Where a view is valued for the sense of naturalness of the surrounding landscape it is likely to be highly sensitive to visual intrusion by distinctly manmade features;

Presence of striking or noteworthy features. A view might be strongly valued because it contains a distinctive and memorable landscape feature such as a promontory headland, lough or castle;

Historical, cultural and / or spiritual significance. Such attributes may be evident or sensed by receptors at certain viewing locations, which may attract visitors for the purposes of contemplation or reflection heightening the sense of their surroundings;

Rarity or uniqueness of the view. This might include the noteworthy representativeness of a certain landscape type and considers whether the receptor could take in similar views anywhere in the broader region or the country;

Integrity of the landscape character. This looks at the condition and intactness of the landscape in view and whether the landscape pattern is a regular one of few strongly related components or an irregular one containing a variety of disparate components;

Sense of place. This considers whether there is special sense of wholeness and harmony at the viewing location; and

Sense of awe. This considers whether the view inspires an overwhelming sense of scale or the power of nature.

Those locations which are deemed to satisfy many of the above criteria are likely to be of higher sensitivity. No relative importance is inferred by the order of listing. Overall sensitivity may be a result of a number of these factors or, alternatively, a strong association with one or two in particular.

Visual Impact Magnitude

The magnitude of visual effects is determined on the basis of two factors; the visual presence (relative visual dominance) of the proposed Project and its effect on visual amenity.

Given that the landfill maintenance infrastructure and multi-use public park ancillary structures do not represent significant bulk, visual impacts will result almost entirely from visual ‘intrusion’ rather than visual ‘obstruction’ (the blocking of a view). The magnitude of visual impacts is classified in Table 9.6.

Table 9.6: Magnitude of Visual Impact

Criteria	Description
Very High	The proposal intrudes into a large proportion or critical part of the available vista and is without question the most noticeable element. A high degree of visual clutter or disharmony is also generated, strongly reducing the visual amenity of the scene.
High	The proposal intrudes into a significant proportion or important part of the available vista and is one of the most noticeable elements. A considerable degree of visual clutter or disharmony is also likely to be generated, appreciably reducing the visual amenity of the scene.
Medium	The proposal represents a moderate intrusion into the available vista, is a readily noticeable element and/or it may generate a degree of visual clutter or disharmony, thereby reducing the visual amenity of the scene. Alternatively, it may represent a balance of higher and lower order estimates in relation to visual presence and visual amenity.
Low	The proposal intrudes to a minor extent into the available vista and may not be noticed by a casual observer and/or the proposal would not have a marked effect on the visual amenity of the scene.
Negligible	The proposal would be barely discernible within the available vista and/or it would not detract from, and may even enhance, the visual amenity of the scene.
Neutral	Changes that are not discernible within the available vista and have no bearing the visual amenity of the scene.
Positive	Changes that enhance the available vista by reducing visual clutter or restoring degraded features.

Visual Impact Significance

As stated above, the significance of visual impacts is a function of visual receptor sensitivity and visual impact magnitude. This relationship is expressed in the same significance matrix and applies the same EPA definitions of significance as used earlier in respect of landscape impacts (See Table 9.4).

9.3 Baseline Conditions

9.3.1 Study Area

Given that this is a remediation project rather than a development project involving the construction of significant structures or large-scale excavation it is not considered that significant landscape and visual effects could result beyond the immediate environs of the site. Nonetheless, this is a locally elevated landform element and it is important to consider views of the site that might be afforded from locations in the wider landscape context. By way of balance, therefore, a 3km radius study area is considered appropriate in this instance.

9.3.2 Landform and Drainage

The landform of the study area is generally flat to mildly undulating. The initial folds of the Wicklow Mountain foothills begin to emerge throughout the eastern quarters of the study area, whilst the land to the west is more planar in nature as it declines gently towards the River Liffey. The River Liffey meanders in a northerly direction through the western extents of the study area, whilst the smaller tributaries of the Morell River feed towards it from the higher ground in the east of the study area passing adjacent to the north-east of the site. Several ponds have been formed within the low-lying ground immediately to the north-east of the site (WB001 and WB002, refer to Figure 13.2 for the location of watercourses and waterbodies). These appear to utilise water from the Rathmore Stream for the benefit of Palmerstown demesne and golf course.

9.3.3 Vegetation and Land Use

The land cover and land use of the study area is richly varied, typifying the crossover of urban hinterlands between both the major metropolitan centre of Dublin City and that of the significant satellite centre of Naas. The land use matrix consists of urban (residential and industrial) land use at Naas to the south of the site and Sallins to the west. The complex land use matrix of the study area can be seen in Figure 9.1.

The N7 national road transitions into the M7 motorway a short distance to the south-west of the site and there are several complex orbital junctions onto this major road corridor to the south and east of the site. These broad transport corridors and associated infrastructure contribute significantly to the overall land cover of the study area. Whilst agricultural farmland is the predominant land use outside of the urban areas it is interspersed with several golf courses including Palmerstown House Estate and Golf Course immediately to the east of the landfill and Naas Golf Course to the north. These are often associated with former demesne landscapes of which there are a number in the immediate vicinity of the landfill as well as within the wider study area. Kerdiffstown House and demesne is located adjacent to the east of the landfill site and consist of parkland landscape and a walled garden that is contiguous with the House. There is also evidence of equestrian centres and horse training facilities within the rural landscape with the most notable of these being Goffs Equine Holdings a short distance to the east of the site. A former quarry site to the north-west of the landfill site has received planning permission and a waste facility permit for the recovery of excavation or dredge spoil, comprising natural materials of clay, silt, sand, gravel or stone and which comes within the meaning of inert waste.

9.3.4 Centres of Population and Houses

The most significant settlement in the context of the study area is Naas. The site is located in County Kildare, approximately 3km north-east of central Naas, approximately 400m north-west of Johnstown village and in close proximity to the strategically important M7/N7 corridor as shown on Figure 3.1. The neighbouring and almost contiguous settlement of Sallins lies on the opposite side of the motorway to Naas and is approximately 1km to the north-west of the landfill site. The smaller settlements of Johnstown and Kill lie on the opposite side of the N7 road corridor to the south-east and east of the site respectively. Though the area to the north-east of the site is relatively sparsely populated in the context of the remainder of the study area the local roads that skirt this area are consistently lined with rural dwellings.

9.3.5 Transport Routes

The most significant transport route within the study area is the M7 / N7 road corridor, which skirts around the eastern, southern and western sides of the proposed Project, refer to Figure 3.1. There are also elevated junctions and flyovers associated with this road corridor that occur within 500m of the site and provide potential views towards the site. A section of the Dublin – Cork national railway line also passes through the study area between Naas and Sallins and is approximately 850m to the north-west of the site at its nearest point.

9.3.6 Amenity, Tourist and Heritage Facilities

The main recreational amenity features are the various golf courses within the less populated northern half of the study area. These include; Palmerstown House Golf Club (adjacent to the north-east); Naas Golf Club (to the north); Killeen Golf Club (approximately 1.5km north) and Sherlockstown Golf Club (approximately 2.2km north-west). In addition to the golf course, Palmerstown House Estate is also utilised as a wedding and conference venue. Kerdiffstown House, which lies only a short distance to the north-east of the proposed Project, has been operated as a respite centre by the Society of St Vincent de Paul for several years.

The other notable amenity feature within the study area is the Grand Canal, which runs through the northern and western extents. This waterway and its associated tow paths are utilised by canal boaters and walkers.

The complex land use matrix of the study area can be seen in Figure 9.1.

9.3.7 Landscape Policy Context

Kildare County Development Plan 2017-2023

A Landscape Character Assessment was produced in 2004 for County Kildare and this is incorporated into the Kildare County Development Plan 2017-2023. The Landscape Character Assessment identifies four Landscape Character Types (LCTs) within the county and the proposed Project is shown to be contained within the 'Lowland Plains and Boglands' LCT. The county is then divided into a further 15 No. geographically distinct Landscape Character Areas (LCA) with Kerdiffstown Landfill situated within the 'Northern lowlands LCA (Diagram 9.1). This LCA is characterised by *'generally flat terrain and open lands with regular (medium sized)*

field patterns. Hedgerows are generally well maintained and low, with scattered trees along the field boundaries that partially screen the lowest lying areas. Nevertheless, the generally low-lying vegetation of the area allows long-distance and extensive visibility'.

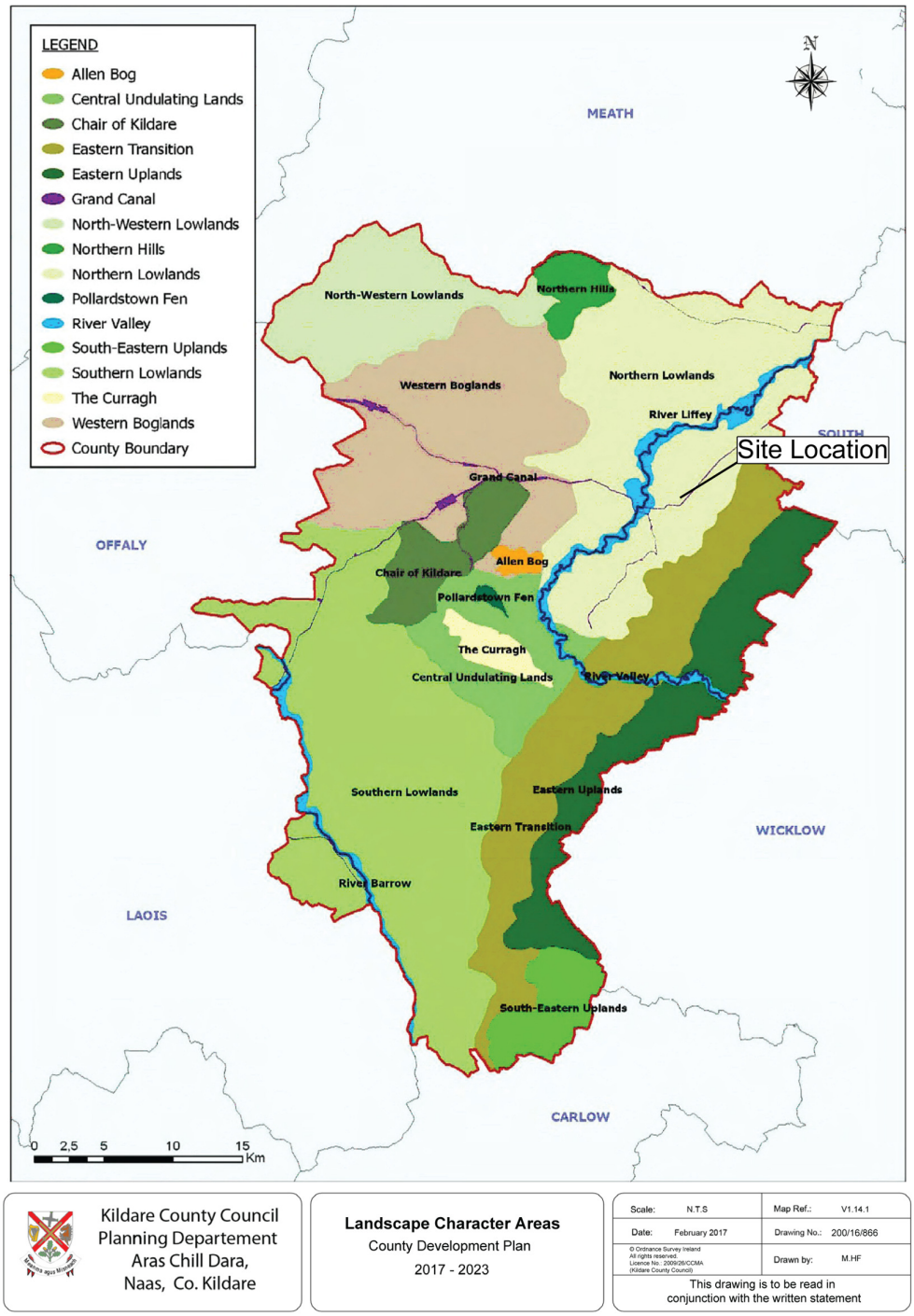

Diagram 9.1: Excerpt from Kildare County Development Plan (2017-2023), Landscape Character Areas Map

The landscape character assessment also attributes each LCA with a sensitivity rating relating to the ability to accommodate change. The 'Northern Lowlands LCA has been designated as a 'Low' sensitivity landscape and

is described as *'robust landscapes which are tolerant to change, and which have the ability to accommodate development pressure'*. (refer to Diagram 9.2)

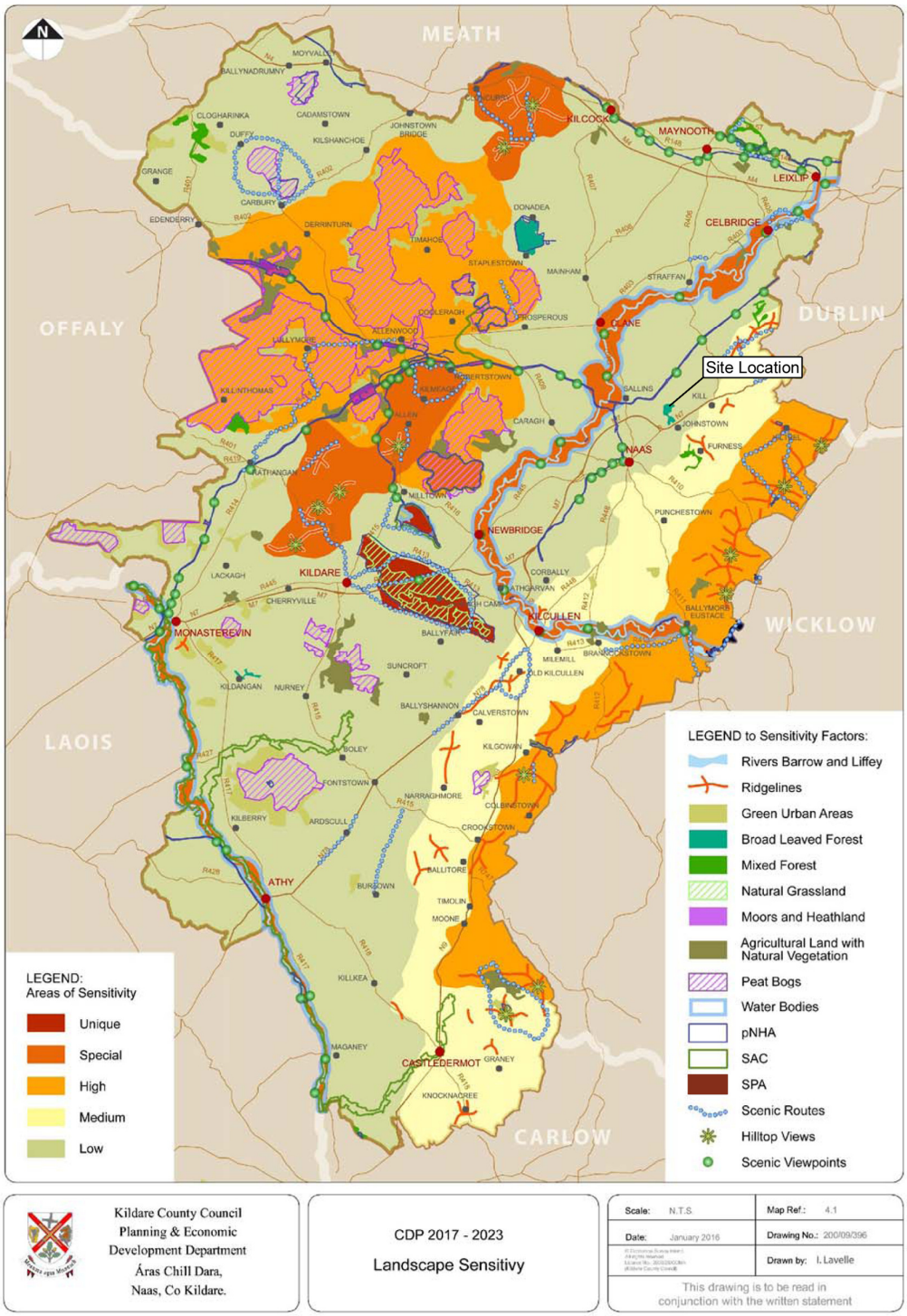

Diagram 9.2: Excerpt from Kildare County Development Plan (2017-2023), Map 4.1 Landscape Sensitivity

The Kildare County Development Plan (CDP) includes a number of policies regarding the 'Lowland Plains and Boglands' landscape type, some of which are relevant to the proposed Project. These include;

> ***LL1*** *- Recognise that the lowlands are made up of a variety of working landscapes, which are critical resources for sustaining the economic and social well-being of the county.*
>
> ***LL2*** *- Continue to permit development that can utilise existing structures, settlement areas and infrastructure, whilst taking account of the visual absorption opportunities provided by existing topography and vegetation.*
>
> ***LL3*** *- Recognise that this lowland landscape character area includes areas of significant landscape and ecological value, which are worthy of protection.*

The CDP also lists a number of general landscape policies, in Section 14.8 of the CDP, many of which have relevance to the proposed Project;

> ***LA1*** *- Ensure that consideration of landscape sensitivity is an important factor in determining development uses. In areas of high landscape sensitivity, the design, type and the choice of location of proposed development in the landscape will also be critical considerations.*
>
> ***LA2*** *- Protect and enhance the county's landscape, by ensuring that development retains, protects and, where necessary, enhances the appearance and character of the existing local landscape.*
>
> ***LA3*** *- Require a Landscape/Visual Impact Assessment to accompany significant proposals that are likely to significantly affect:*
> *- Landscape Sensitivity Factors*
> *- A Class 4 or 5 Sensitivity Landscape (i.e. within 500m of the boundary)*
> *- A route or view identified in maps 14.2 and 14.3 (i.e. within 500m of the boundary)*
>
> ***LA4*** *- Seek to ensure that local landscape features, including historic features and buildings, hedgerows, shelter belts and stone walls are retained, protected and enhanced where appropriate, so as to preserve the local landscape and character of an area, whilst providing for future development.*

Also included at the end of Chapter 14 of the CDP are a number of general landscape objectives. Those that are considered to be relevant to the proposed remediation project are included below;

> ***LO1*** *- Have regard to the Landscape Sensitivity Classification of sites in the consideration of any significant development proposals.*
>
> ***LO2*** *- Ensure landscape assessment will be an important factor in all land-use proposals.*
>
> ***LO3*** *- Investigate the feasibility of preparing a Landscape Conservation Area Assessment within the county to identify any area(s) or place(s) within the county as a Landscape Conservation Area in accordance with the Planning and Development Acts.*
>
> ***LO4*** *- Protect the visual and scenic amenities of County Kildare's built and natural environment.*
>
> ***LO5*** *- Preserve the character of all important views and prospects, particularly upland, river, canal views, views across the Curragh, views of historical or cultural significance (including buildings and townscapes) and views of natural beauty.*
>
> ***LO6*** *- Preserve and protect the character of those views and prospects obtainable from scenic routes identified in this Plan, listed in Table 14.2 and identified on Map 14.3.*

LO7 *- Encourage appropriate landscaping and screen planting of developments along scenic routes. Where scenic routes run through settlements, street trees and ornamental landscaping may also be required.*

LO8 *- Prepare further detailed guidance in relation to views and prospects available along scenic routes occurring within the boundaries of Local Area Plans.*

L10 *- Review and update the County Landscape Character Assessment in accordance with all relevant legislation and guidance documents.*

In respect of the Kerdiffstown Landfill Remediation Project, the landscape classifications and sensitivity designations are shown in Diagram 9.2. A number of matrices have been introduced relating to the compatibility of various land uses within each LCA (Diagram 9.3), and also in relation to principal landscape sensitivity factors (Diagram 9.4). These matrices do not include a specific reference to remediation projects such as that proposed. Nonetheless, it should be noted that the 'Northern Lowlands LCA is either 'most compatible' or 'highly compatible' with all of the other land use categories identified.

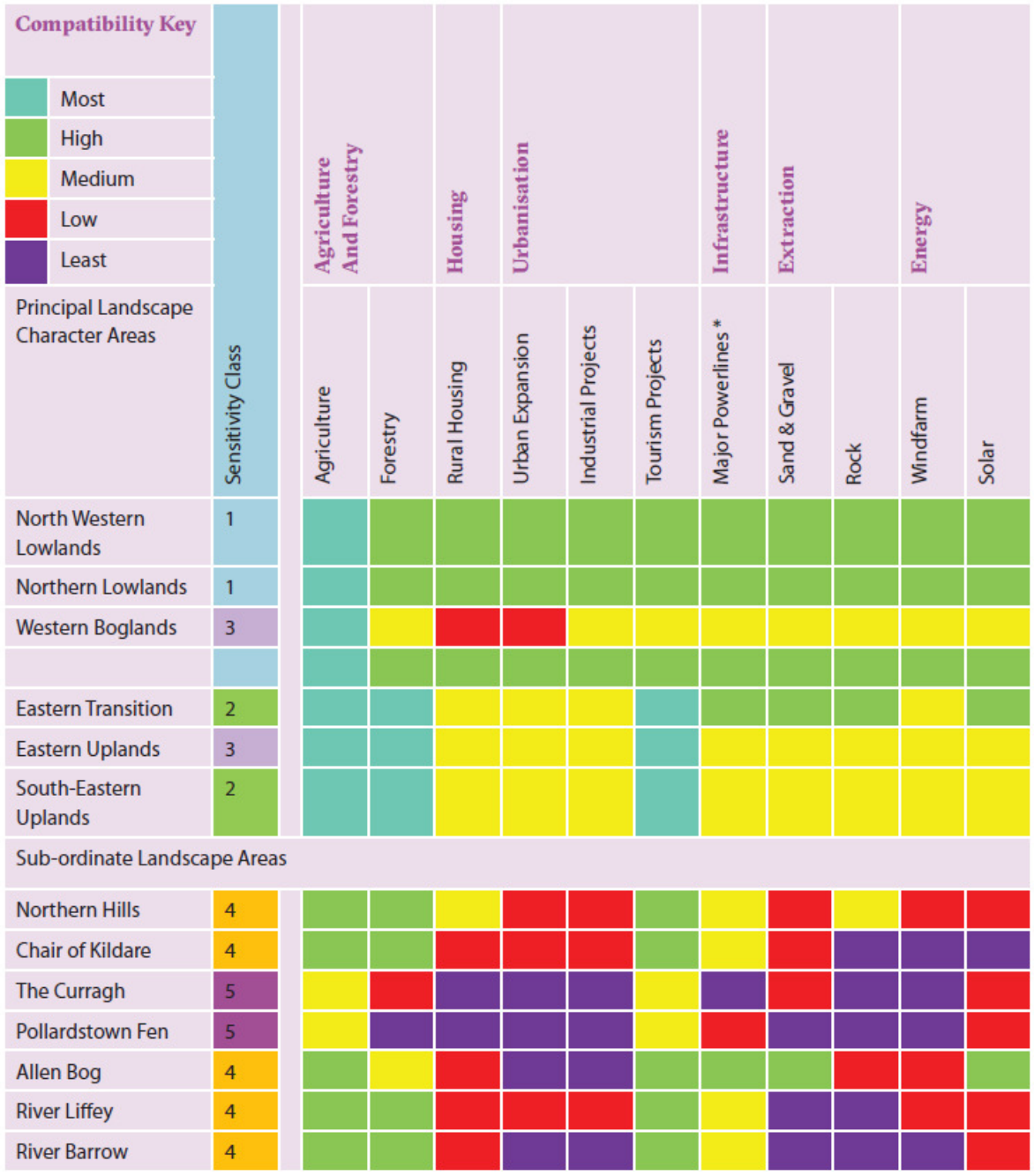

Diagram 9.3: Excerpt from Kildare County Development Plan (2017-2023), Table 14.3 Showing Likely Compatibility Between a Range of Land-Uses and Principal Landscape Areas

5 - Likely to be very compatible in most circumstances. 4 - Likely to be compatible with reasonable care. 3 - Likely to be compatible with great care. 2 - Compatible only in certain circumstances. 1 - Compatible only in exceptional circumstances. 0 - Very unlikely to be compatible.	Agriculture and Forestry		Housing	Urbanisation			infrastructure	Extraction		Energy	
Proximity within 300m of Principal Landscape Sensitivity Factors.	Agriculture	Forestry	Rural Housing	Urban Expansion	Industrial Projects	Tourism Projects	Major Powerlines	Sand and Gravel	Rock	Windfarm	Solar
Major Rivers and Water bodies	5	5	2	2	2	3	2	1	0	1	0
Canals	5	5	2	2	2	3	2	1	0	1	1
Ridgelines	5	5	1	1	1	1	1	0	0	2	0
Green Urban Areas	4	5	2	0	0	4	3	3	3	2	2
Broad-Leaved Forestry	3	5	2	2	2	4	3	2	3	1	2
Mixed Forestry	3	5	2	2	2	4	3	2	3	1	2
Natural Grasslands	5	2	2	1	1	4	2	1	1	2	2
Moors and Heathlands	2	2	1	0	0	1	2	1	0	2	1
Agricultural Land with Natural Vegetation	5	5	2	2	2	3	3	3	3	4	2
Peat Bogs	0	0	0	0	0	0	2	0	0	3	1
Scenic View	5	5	2	1	1	5	1	3	0	0	2
Scenic Route	5	5	2	1	1	5	1	3	0	0	2

Diagram 9.4: Excerpt from Kildare County Development Plan (2017-2023), Table 14.4 Showing Likely Compatibility Between a Range of Land-Uses and Proximity to Principal Landscape Sensitivity Factors

Kildare County Development Plan 2017-2023 - Green Infrastructure

Green infrastructure can be described as *'a strategically planned and managed network featuring areas with high quality biodiversity (uplands, wetlands, peatlands, rivers and coast), farmed and wooded lands and other green spaces that conserve ecosystem values which provide essential services to society'* (Comhar 2010, p.12, Chapter 13).

The enhancement of green infrastructure can have a range of landscape related benefits including;

- Provides green buffers /green wedges between built up areas;
- Supports unique habitats for wildlife, biodiversity, and fragile ecosystems;
- Has important recreational, tourism and cultural roles; and

- Provides corridors for walking and cycling;

Within the development plan (2017-2023) the council lists a number of key policies relating to green infrastructure in County Kildare, some of which have relevance to the proposed development;

> ***GI 1*** *- Ensure the protection, enhancement and maintenance of Green Infrastructure and recognise the health benefits as well as the economic, social, environmental and physical value of green spaces through the integration of Green Infrastructure (GI) planning and development in the planning process.*
>
> ***GI 2*** *- Develop and support the implementation of a Green Infrastructure Strategy for County Kildare.*
>
> ***GI 3*** *- Identify Green Infrastructure resources within and on the edge of the settlement boundaries by expanding the existing programme of Green Infrastructure mapping and to include, during the review process of Local Area Plans, Green Infrastructure policies and objectives.*
>
> ***GI 4*** *- Require that all Local Area Plans protect and manage the Green Infrastructure network in an integrated and coherent manner and add additional Green Infrastructure where possible.*
>
> ***GI 5*** *- Encourage, pursuant to Article 10 of the Habitats Directive, the management of features of the landscape, such as traditional field boundaries, important for the ecological coherence of the Natura 2000 network and essential for the migration, dispersal and genetic exchange of wild species.*
>
> ***GI 6*** *- Provide for the incorporation of underpasses and/or Green Bridges at ecologically sensitive locations on the county's road and rail corridors that will facilitate the free movement of people and species through the urban and rural environment.*
>
> ***GI 7*** *- Promote a network of paths and cycle tracks to enhance accessibility to the Green Infrastructure network, while ensuring that the design and operation of the routes responds to the ecological needs of each site.*

Following the policies listed in the development plan, the council has also produced a number of objectives relating to green infrastructure in County Kildare;

> ***GIO 1*** *- Prepare a Green Infrastructure Strategy for County Kildare in accordance with international best practice.*
>
> ***GIO 2*** *- Complete the mapping of Green Infrastructure for each town, village and settlement in County Kildare and to develop specific policies and objectives for each area.*
>
> ***GIO 3*** *- Prepare an inventory of locally important Biodiversity sites in the County to support the nationally designated sites and seek to ensure that they are protected through local authority planning processes.*

Views of Recognised Scenic Value

Views of recognised scenic value are primarily indicated within County Development Plans in the context of scenic views/routes designations, but they might also be indicated on touring maps, guide books, road side rest stops or on post cards that represent the area.

The County Development Plan includes a map of designated scenic views, routes and hill top views. There are no scenic views or routes located within the immediate vicinity of the proposed Project. Many of the designated views that are located in the surrounding area are canal bridge views that tend to be enclosed by canal-side vegetation. The only designated view that has the potential be influenced by the proposed Project is GC4 –

Devonshire Bridge, Sherlockstown Common, as the canal is closely aligned with the landfill. However, following fieldwork inspection it is not considered that there will be any visual impact from GC4. Refer to Diagram 9.5.

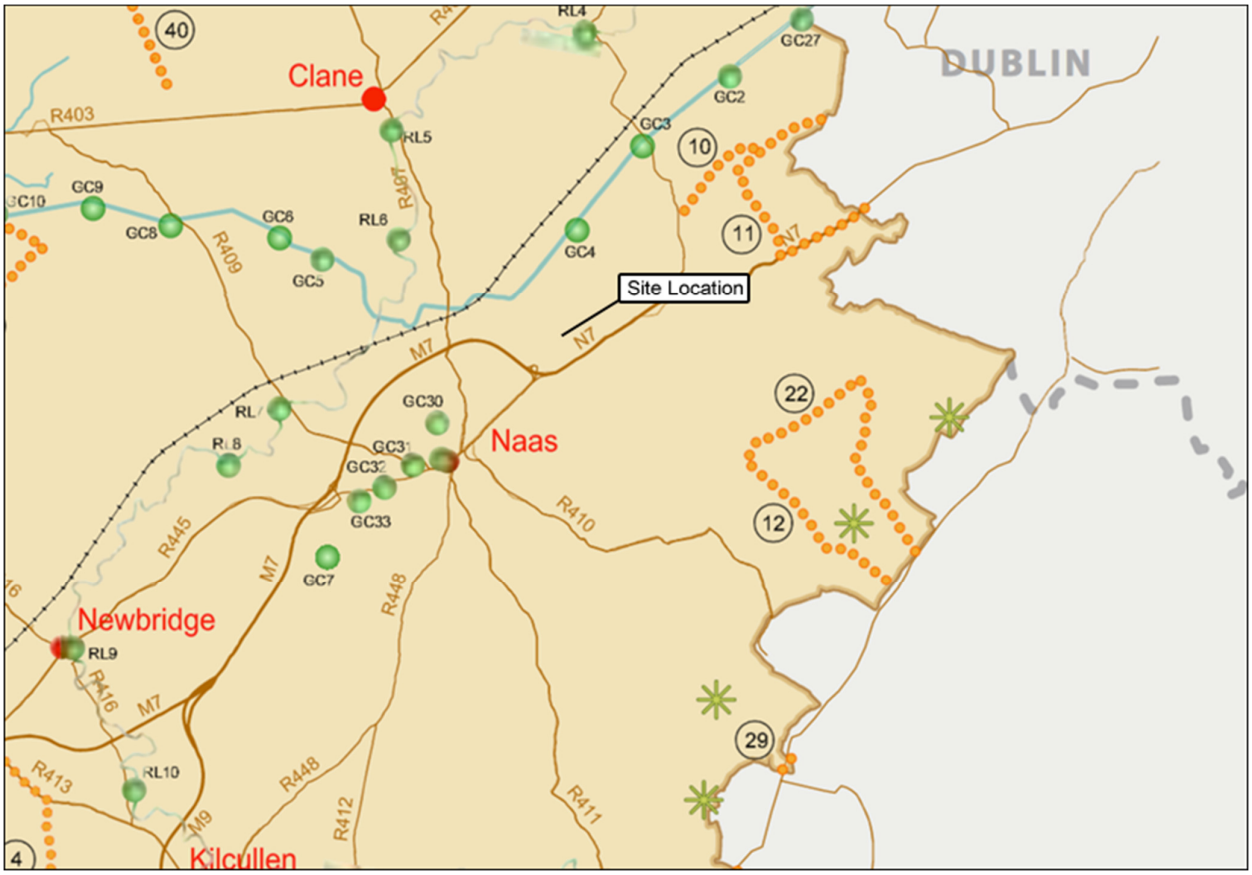

Diagram 9.5: Excerpt from Kildare County Development Plan (2017-2023), Map 14.3 Showing Approximate Location of Site in Relation to Designated Scenic Views, Routes and Hill Top Views

9.4 Predicted Impacts

9.4.1 Landscape Value and Sensitivity

The first aspect of the landscape appraisal, regardless of which stage is being assessed, is to determine the landscape sensitivity of the receiving landscape based on baseline conditions. For this project there is a clear distinction between the site itself, which is a former landfill in an uncapped and degraded condition that is in urgent need of remediation to protect the surrounding environs. Using any form of classification system, the site itself can only be considered to have 'Negligible' landscape sensitivity. Indeed, the definition used herein (Section 9.2.4) to describe a landscape of Negligible sensitivity fits closely;

> *"Areas of landscape character that include derelict, mining, industrial land or are part of the urban fringe where there would be a reasonable capacity to embrace change or the capacity to include the development proposals. Management objectives in such areas could be focused on change, creation of landscape improvements and/or restoration to realise a higher landscape value."*

The wider landscape of the study area is more complex in terms of sensitivity. To the north and east of the site is a series of designed landscapes including that of Kerdiffstown House, Palmerstown House Estate and Naas Golf Club (at least some of which appears to have once been a part of the grounds of Kerdiffstown House). With the exception of the current Kerdiffstown House estate, the other sites are currently used as golf courses. This is a common occurrence throughout the country that allows much of the parkland character and in particular,

mature tree groups, to remain in-situ. These lands along with 'Goffs' equine holdings further to the east are immaculately kept, have little built development and a relatively high degree of tranquillity given the intensity of the land uses that surround them to the south and west. These attributes are not specifically reflected in the County Landscape Character Assessment, which considers each Landscape Character Area (LCA) at a broader scale and attributes the subject LCA (Northern Lowlands) a 'Low' sensitivity rating. This need not be the default sensitivity judgement when considering the receiving landscape at the finer project level.

The landscape to the south and west of the site is much more utilitarian than the lands to the north and east. Beyond a brief apron of agricultural farmland is a bend in the M7 motorway that effectively wraps around these aspects of the site and incorporates a series of major junctions that serve Johnstown, Naas and Sallins. The north-eastern industrial quarter of Naas occupies a substantial portion of land immediately beyond the motorway before giving way to residential estates. The settlements of Johnstown and Sallins are located to the south-east and north-west of the site respectively. The busy Johnstown Garden Centre is a notable commercial operation immediately to the south-east of the site.

For the reasons outlined above, the sensitivity of the designed landscape to the north and east of the site is deemed to be in the order of Medium, whereas the utilitarian landscapes to the south and west are deemed to be more consistent with the Low sensitivity rating of the Northern Lowlands LCA in the Kildare Landscape Character Assessment.

Table 9.7: Landscape Sensitivity Judgements

Landscape Area	Sensitivity (in accordance with criteria contained in Table 9.2)
Kerdiffstown Landfill	Negligible
Naas environs - Utilitarian peri-urban landscape south and west of site including former quarry / landfill	Low
Former demesne landscapes / golf courses north and east of site	Medium

9.4.2 Magnitude of Landscape Impacts

Remediation Phase Landscape Impacts

There will be physical impacts on the landform and land cover of the site during the Remediation Phase and although this will involve considerable movement of material, the site is an end-of-life landfill. As such the landform is largely modified and most vegetative land cover is recently established. There will be a loss of small sections of the existing tree line near the Zone 1 northern perimeter of the site adjacent to the private access road leading to Kerdiffstown House in order to accommodate the remediation works and the installation of a surface water management system and provision of an access/maintenance track. Otherwise, it is intended that all perimeter trees will be retained as far as practicable. Local areas of steep slopes are present where trees may be lost during remediation works to stabilise those slopes. However, most trees to be removed are relatively small and are not significant in terms of amenity value or screening.

Re-profiling works are intended to minimise volumes associated with the excavation, movement and deposition of materials within the site. Design of the remediation profiles has achieved an approximate balance such that materials will not require to be removed from the site, reducing the impact of the works on the local community and environment. Significant export of materials from the site is not anticipated to be required during the site remediation works. Imported material will be required as part of the capping system and the quantities of material required are detailed in Chapter 4 Description of the Proposed Project. Material will not be exported unless it is observed to be non-compliant. The site profile will be altered, but the overall massing of the landfill will remain very similar and in many areas will reduce.

The highest section (Zone 1) is currently at a maximum height of 113.5mOD Malin. Following re-profiling works the maximum pre-settlement waste profile will be approximately 114.5mOD Malin; this height located in Zone 1. The multilayer engineered capping system for Zone 1 will have a total thickness of around 650mm bringing the maximum height of the site/ Zone 1 to 115.15mOD Malin. This increase will be barely discernible in the context of the existing site profile and there will be some settling of the waste mass in Zone 1 over a long period of time

(estimated to settle to around 110.5mOD Malin), which will more than balance any minor increases in height observed during the Remediation Phase. In order to understand the magnitude of difference between landfill heights, a scoping exercise was undertaken to examine the variation in height between the current maximum landfill height of 113.5mOD Malin and the originally permitted landfill height of 110.7mOD Malin. This used two comparative photomontages prepared from within and outside of the site and these showed a barely discernible difference in visual impact terms in the context of the overall mound in Zone 1 (refer to Volume 3A Photomontages). In terms of effects on landscape character, the Remediation Phase will present as similar to a construction site. There will be movement of large earthmoving plant and equipment and HGVs transporting materials and equipment around the site as well as to and from the site. A perimeter palisade security fence will be erected which will remain in perpetuity. There will also be a higher quantum of traffic generated on roads in the immediate vicinity of the site by appointed contractors working on the Remediation Phase, though it should be noted that there will be no increase in HGV traffic along the Sallins road to the north-west of the site. The current baseline scenario (un-remediated landfill) is relatively tranquil compared to the site activity that will occur during the Remediation Phase. Compared to the scrubby land cover on much of the site at present, the Remediation Phase will have a much higher proportion of exposed earth. However, the Remediation Phase comprises a series of relatively short phases as outlined in Chapter 4 Description of the Proposed Project where progressive exposing and re-covering of the waste mass would be undertaken on a daily basis, with new soils placed above to be progressively seeded with a suitable grass mix. In the short-term, the remediation works will tend to highlight the proposed Project to a greater degree within its immediate 'green' surrounds and impart something of an industrial character as well as the perception that this is a landscape undergoing substantial change. This perception will begin to alter as the proposed multi-use public park is constructed towards the end of the remediation stage. Whilst there will be continued construction works required to build the sports pitches, change facilities and children's playground, this aspect of the Remediation Phase also sees planting and landscaping works taking place simultaneously.

The proposed widening and realignment of the local access road to the south of the site will also result in short term construction related landscape impacts due to the loss of roadside vegetation and boundary treatments to the front of dwellings REC006, REC007 and REC008. These are relatively minor physical landscape impacts and the short term nature of these road works is also minor in terms of effects on landscape character (visual impacts at these properties addressed in Section 9.4.3 below).

Although the works associated with the Remediation Phase are of a substantial magnitude they relate to the re-profiling of an existing, highly modified landfill site and the effects on landscape character from the remediation activities will be short-term. Thus, Remediation Phase landscape effects are deemed to be Medium within the site itself and Low within the surrounding environs.

Table 9.8: Summary of Remediation Phase Landscape Impacts

Landscape Area	Sensitivity	Magnitude of Landscape Impacts	Significance of Landscape Impacts
Kerdiffstown Landfill	Negligible	Medium	**Imperceptible**
Utilitarian peri-urban landscape south and west of site including former quarry / landfill	Low	Low	**Slight-imperceptible**
Former designed landscapes / golf courses north and east of site	Medium	Low	**Slight**

9.4.3 Remediation Phase Visual Impacts

See Appendix A9.1 for individual Viewpoint appraisals.

Remediation Phase visual impacts have been assessed at nine representative viewpoint locations (see Table 9.5 and individual viewpoint (VP) appraisals contained in Appendix A9.1). It should be noted at the outset that the proposed Project area is not readily visible from within the surrounding landscape due to screening by a combination of terrain, vegetation and buildings. Only from immediately adjacent to the site and from elevated locations in the near vicinity is it even partially visible and in such instances it is generally the higher mound of Zone 1 that is contained within views.

Visual impacts for the residential properties adjacent to the proposed L2005 Kerdiffstown Road realignment to the south of the site are also considered. In these cases, the elevated VP8 provides a contextual understanding of the nature of visual change to the front boundaries of these properties.

Visual Receptor Sensitivity

Visual receptor (people and groups of people) sensitivity is considered to range between 'Medium' and 'Low' in the context of this visual appraisal. Recreational landscape users within the more tranquil parkland settings of the Naas and Palmerstown House Estate Golf courses are deemed to be at the higher end of this sensitivity spectrum. Viewers from the surrounding local road network and N7 overpasses are considered to be at the lower end of this sensitivity spectrum. Whilst viewers at VP1 (access road to Kerdiffstown House) are in a relatively tranquil parkland setting near the wooded Morell River corridor, the adjacent landfill slopes also contribute to the baseline setting and thus, the sensitivity at this location is deemed to be Medium-low on balance. (Receptor sensitivity judgments are contained in Appendix A9.1).

Remediation Phase Visual Impact Magnitude

It is during the Remediation Phase that the highest magnitude of visual impact is considered to occur, as the proposed Project will appear as a major construction project from surrounding receptors. Some of the main visual elements that will detract from baseline visual amenity include increased levels of HGV traffic on local roads and road works to construct a new site entrance that incorporates an offset roundabout. There will also be significant construction activity on the site using earth-moving plant and machinery. The existing scrub and rough grassland cover will be stripped from most areas of the site and although this is by no means attractive vegetation, it currently helps to assimilate and camouflage the visible slopes of the site within the existing parkland and semi-rural landscape setting. With this vegetation stripped, the site will present as a large mound of bare-earth from the nearest receptor locations though it should be noted that this represents a periodic worst-case-scenario as there will be periods between phases of capping works where bare earth will be reseeded. Views of the site during the Remediation Phase will generally improve as the proposed multi-use public park and its associated facilities are constructed towards the end of this Phase as these works also involve final seeding, planting and landscaping. However, the introduction of sports pitch floodlights and ball-stop netting poles will contribute slightly to visual clutter of vertical structures above the skyline from some locations, especially those to the south and east where these structures are not screened by the main landfill mound. The highest order Remediation Phase visual impacts are deemed to be High-medium at the nearest viewpoint locations where the Zone 1 landfill mound is clearly visible (VP1 and VP5). The visual impact magnitude reduces to Low and Negligible where the landfill is substantially screened by intervening vegetation and/or it is seen at greater distances in the context of a complex and busy landscape setting (VP6, VP7 and VP9).

For residential properties REC006, REC007 and REC008 there will be a loss of roadside vegetation and front boundary treatments (and a sliver of property) as part of the realignment works proposed for the local access road to the south of the site. This will reduce the sense of privacy and residential visual amenity during the construction period for the road and in relation to construction traffic utilising this road for the landfill remediation works. Although these impacts are considered to be in the order of High-medium during the road construction period, they will be temporary in terms of duration.

Remediation Phase Visual Impact Significance

Table 9.9: Remediation Phase Visual Impact Significance at the Individual Viewpoints

Viewpoint (VP)	Visual Receptor Sensitivity	Visual Impact Magnitude	Significance of Visual Impact
VP1	Medium-low	High-medium	**Moderate**
VP2	Medium	Low-negligible	**Slight-imperceptible**
VP3	Medium	Medium-low	**Moderate-slight**
VP4	Medium	Medium-low	**Moderate-slight**
VP5	Low	High medium	**Moderate slight**
VP6	Medium	Low	**Slight**
VP7	Medium	Low	**Slight**
VP8	Low	Medium	**Slight**
VP9	Low	Low-negligible	**Imperceptible**

When visual receptor sensitivity judgements are combined with visual impact magnitude judgements, the highest level of significance is considered to occur at VP1 from the grounds of Kerdiffstown House immediately adjacent to the Zone 1 mound of the site. The level of visual impact significance in this instance is deemed to be Moderate on balance of a Medium-Low sensitivity judgement and a High-medium visual impact magnitude. With a similar, but slightly further removed and more substantially screened view of the landfills' Zone 1 mound, VP3 and VP4 (Palmerstown House Estate and Golf Course) are considered to incur a 'Moderate slight' significance of impact. This is on the basis of 'Medium' sensitivity and 'Medium-low' impact magnitude judgements. On the opposite side of the landfill at VP5, the significance of visual impact is predicated to be 'Moderate slight' on the basis of the same level of magnitude as for VP1, but lower degree of sensitivity (low). At all of the other viewpoint locations, the significance of Remediation Phase visual impacts is deemed to be 'Slight' or 'Imperceptible'.

Despite the fact that Remediation Phase visual impacts of up to 'High-medium' will occur, such impacts will be largely temporary in terms of duration with operations being controlled on a daily basis to clear the surface, for remediation and covering with new soils/cover in progressive phases. The temporary nature of the works is not incorporated into the initial magnitude assessments in the interests of presenting worst-case-scenario. Nonetheless, the temporary duration of such impacts is an important factor in determining the overall significance of the proposed Project in EIA terms and on this basis the Remediation Phase visual impacts from the individual viewpoints and including the residential properties along the proposed realigned access road are not considered to be significant.

9.4.4 Operational Phase Landscape Impacts

Given that the main Remediation Phase landscape impacts relate to the proposed Project site appearing as a substantial construction site with associated activity and vehicle movements, there will be a marked reduction in landscape impacts once remediation work has ceased. Indeed, the multi-use public park end-use scenario will have a number of beneficial consequences for the landscape character of the area. The parkland character of the remediated site will blend with the similar character of golf course and Kerdiffstown demesne that lie adjacent to the north and east of the site. There will also be a much stronger sense that this is a managed and manicured landscape rather than a degraded, and at the very least fallow, landscape.

Whilst it would be optimal to establish native broadleaf trees in clusters throughout the site, this is not possible due to the need to maintain the integrity of the engineered capping system. However, peripheral areas beyond the capped extents will be planted with native trees insofar as possible and capped areas will incorporate some areas of shrub planting. The mottled effect of this shrub planting will help to further assimilate the remediated site with its parkland surrounding and deemphasise the utilitarian former use of the site. Areas of ecological habitat within and around the borders of the site will add to the utility of this landscape as well as its aesthetics.

There will be little sense of the former land use other than for several small areas of controlled access and residual components. These include, surface laid manhole covers, preventing access to below ground gas wells on the northern (Zone 1) area of the site and in the Zone 3 area adjacent to the site and the Landfill Infrastructure Compound housing a site office, building, leachate management infrastructure and landfill gas flares within a fenced and screened area adjacent to the public park entrance.

During evening hours in the winter time floodlights will illuminate the playing pitches. This will highlight the central portion of the multi-use public park within the wider landscape, particularly from the east and north where comparatively lower levels of night time lighting occur than to the west and south around Naas and Johnstown as well as the M7/N7 corridor (see Volume 3a of this EIAR for nightime photomontages from VP8). During these periods there is likely to be a noticeable increase in the intensity of non-rural development compared to baseline levels. However, within the context of this peri-urban landscape, these brief periods of minor additional illumination will have little influence on landscape character and the rural amenity of 'dark skies'.

The use of the site as a public recreational facility has positive connotations for the Green Infrastructure Network of the environs of Naas and Johnstown and will influence public perceptions of the site in a positive manner. For the reasons outlined above, the Operational Phase landscape impact of the site is deemed to be Positive in comparison to baseline conditions.

9.4.5 Operational Phase Visual Impacts

See Appendix A9.1 for individual Viewpoint appraisals.

Table 9.10: Operational Phase - Year 1 Visual Impact Significance at the Individual Viewpoints (Prior to Mitigation Establishment)

Viewpoint (VP)	Visual Receptor Sensitivity	Visual Impact Magnitude	Significance of Visual Impact
VP1	Medium-low	Neutral	**Imperceptible**
VP2	Medium	Neutral	**No Effect**
VP3	Medium	Negligible	**Imperceptible**
VP4	Medium	Negligible	**Imperceptible**
VP5	Low	Low	**Slight Imperceptible**
VP6	Medium	Positive	**Enhanced**
VP7	Medium	Positive	**Enhanced**
VP8	Low	Low	**Slight Imperceptible**
VP9	Low	Low negligible	**Imperceptible**

The assessment of Operational Phase visual impacts is divided between those that will occur immediately post remediation works (Year 1 Operational Phase) and those that will occur once mitigation planting measures have become substantially established (Year 7 – Operational Phase). The Year 1 scenario is addressed now and the Year 7 scenario is addressed later in Section 9.6 – Residual Impacts. Note that the Year 1 Operational Phase scenario assumes remediation activity been completed and grass has been established on bare slopes but not tree or shrub planting.

The key aspect of the Year 1 Operational Phase impact is that the construction related activity of earth moving plant and machinery and HGV movements to the site will have ceased. All structures associated with the management of the site (within the Landfill Infrastructure Compound) and multi-use public park (changing rooms building) will be in place. The most visible aspect of the proposed Project, the capped mound at the Zone 1 northern end of the site will be grassed. In terms of visual impact, the site will no longer appear as a landfill or a construction site, but rather, a managed visual extension of the parkland landscapes to the north and east or even farmed slopes. There will be some sense of this being a manmade rather than natural landform feature,

but this will have little effect on visual amenity. At this stage there will be something of a balance between the fact that the remediated landfill site is likely to be more noticeable within views than the camouflaged baseline scenario of scrub covered slopes, but there it will also represent an improved aesthetic. The required perimeter palisade security fence will detract slightly from the parkland aesthetic prior to its consolidation and screening by proposed perimeter planting (see VP1 and VP5), but this is not a readily visible feature from receptors that are not immediately adjacent to the site.

On the southern extent of the site where the newly formed site entrance roundabout is to be constructed and the Landfill Infrastructure Compound is most visible, there will be a noticeable increase in the intensity of the development on the site. There will also be a slight increase in visual clutter of vertical structures above the skyline in some of the southern and eastern views due to the sports pitch floodlights and ballstop netting poles. The local access road from the south will also be widened and realigned to include a two-way cycle lane on its eastern side and more formalised boundary treatments on its western side. This will result in the loss of some roadside vegetation and a more substantial corridor that will appear more urban and less rural than it does at present. For the three residential properties that will lose a section of the front boundary and associated roadside vegetation (REC006, REC007 and REC008), KCC will engage with the residents regarding appropriate new stonewall, fencing and/or replacement semi-mature planting screening along the realigned road at these properties. These measures will substantially restore the sense of privacy and residential visual amenity for these residents, though there will be a very minor foreshortening of views due to the permanent loss of a sliver of land along the front boundaries of these properties.

Overall, it will feel less like a rural hinterland landscape and more like a peri-urban landscape - this is the nature of wider area due to its proximity to the M7/N7 motorway, Naas, Sallins and Johnstown. The proposed multi-use public park end-use will also provide an appropriate transition from the peri-urban landscape into the parkland landscapes currently to the north and east of the site.

Overall the Year 1 Operational Phase visual impacts are deemed to range between Slight Imperceptible and Positive in comparison to the baseline scenario.

9.5 Mitigation Measures

There are a number of key mitigation measures that will be undertaken in order to minimize the overall visual impact of the proposed Project. Prior to commencement of the Remediation Phase, the appointed contractor shall prepare a Construction Environmental Management Plan (CEMP). The CEMP shall contain these mitigation measures and plans identified in the following sections and ensure that they are fully implemented during the Remediation Phase, to prevent or reduce the impacts identified in the impact assessment. The landscaping and planting proposals for the proposed Project will be subject to confirmation during the detailed design stage.

Mitigation measures in this instance are considered to be those singular interventions designed to ameliorate and consolidate the end-use multi-use public park in terms of its landscape and visual impacts rather than the transformation of the former landfill and waste processing facility into a public park, which is an enhancement measure and the overall objective of the project beyond the safe management of leachate and landfill gas. Landscape mitigation measures are indicated on Figure 4.20 – Landscape Masterplan and outlined in greater detail in the Landscape Masterplan Statement contained in Appendix A4.8. Related ecological mitigation measures are also shown on Figure 11.6 - Ecological Mitigation and Enhancements.

The main landscape and visual mitigation measures relate to tree and shrub planting within and around the site. There are limitations as to where tree planting can take place so as not to compromise the integrity of the engineering capping system. This leaves peripheral areas and site boundaries available for such planting and this will occur wherever practicable (Refer to Figure 4.20).

The most visible aspect of the site from surrounding areas is the Zone 1 mound, which is to be subject to ground clearance, re-profiling of slopes, placement of an engineered capping system with new soils and grass seed mix applied. At the north-west end of the mound is a proposed pond to manage surface water runoff from this area of the site and this occurs adjacent to a patch of woodland contained within the neighbouring property

of Kerdiffstown House. The area surrounding this pond will remain fenced off from the public providing an opportunity for ecological enhancement.

Another area where something of an ecological aesthetic and improved screening can be achieved is along the eastern slopes of the Zone 1. An existing line of small trees will be lost from this boundary of the site as part of the remediation works. However, a drainage swale will be constructed at the base of this slope and the existing site is to be extended slightly into the Kerdiffstown House lands to facilitate this. This swale will be outside of the capped area and will be planted with semi-mature parkland trees. Once established this band of trees will serve as a stronger physical and visual divide between the realigned private access road to Kerdiffstown House and the site slopes (which will have also been made less severe during remediation). The trees will eventually serve as something of a scale transition that will deemphasise the height and severity of the landfill slopes when viewed from Kerdiffstown House and from Palmerstown House Estate and Golf Course (see VP1 and VP3). In both an ecological and an aesthetic sense, the swale tree planting will connect the patch of woodland at the northern end of the site with that which wraps around the eastern boundary of the site and contains the Church ruins adjacent to the private access road to Kerdiffstown House.

Perimeter tree and hedge planting will also be incorporated into the boundary treatment on the western side of the site. This will include amenity planting around the site entrance as well as native hedgerow screen planting to fill a short gap in the roadside vegetation adjacent to an existing residential dwelling on the eastern side of the Kerdiffstown road (see VP5). Two patches of woodland planting in the form of whips and feathered trees will be provided at the south-eastern end of the site to expand and consolidate existing woodland areas that occur immediately adjacent to the site (Intervention A14 on Figure 4.20). The Landfill Infrastructure Compound located to the east of the public park entrance will be planted with trees and shrubs to screen the compound insofar as possible. Though the building and landfill gas flare stacks are still likely to remain visible and it may still be obvious that landfill related infrastructure exists beyond the screening, there will be a reduced sense of visual clutter and the Landfill Infrastructure Compound will blend more readily with the surrounding parkland context. It should be noted that all proposed woodland and hedgerow amenity and mitigation planting will comprise of native and naturalised species.

Wetland ponds are proposed for Zone 1A and central portion of Zone 4 and these will be planted up with a variety of wetland plants to benefit biodiversity. This lower portion of the site is not readily visible from surrounding visual receptors, but nonetheless, this planting will help to assimilate the multi-use public park end-use with the surrounding context in both a landscape and visual sense.

For the three residential properties (REC006, REC007 and REC008) that will lose front boundary vegetation as part of the widening and realignment works, the local access road to the south of the site, new stonewall/ fencing is proposed. Semi-mature tree and shrub planting will also be provided to the inside of the wall for additional screening and amenity purposes. These mitigation measures are subject to consultation with the property owners in question.

9.6 Residual Impacts

Table 9.11: Operational Phase - Year 7 Visual Impact Significance at the Individual Viewpoints (following mitigation)

Viewpoint (VP)	Visual Receptor Sensitivity	Visual Impact Magnitude	Significance of Visual Impact
VP1	Medium-low	Positive	**Enhanced**
VP2	Medium	Neutral	**No Effect**
VP3	Medium	Positive	**Enhanced**
VP4	Medium	Positive	**Enhanced**
VP5	Low	Neutral	**No effect**
VP6	Medium	Positive	**Enhanced**
VP7	Medium	Positive	**Enhanced**
VP8	Low	Neutral	**No effect**
VP9	Low	Neutral	**No effect**

Residual visual impacts are assessed at each of the representative viewpoints using a period of approximately seven years for the substantial establishment of mitigation planting. In every instance it is considered that the residual visual impact of the Operational Phase will be either a 'Positive' improvement on the current un-remediated baseline scenario or have 'No effect' on visual amenity. This is universally on the basis that the multi-use public park end-use will present a more manicured and managed appearance to that of the existing scrub covered site that exists at present. This tends to assimilate the proposed Project with the parkland aesthetic of, in particular, the surrounding golf courses and demesne landscape at Kerdiffstown House. That is, it presents as a visual extension of these landscapes.

The maturing boundary trees will deemphasise the severity of remediated site slopes and the overall height of the site within the surrounding landscape context. Rather than the appearance of a freshly constructed public park, the maturing trees will give a stronger sense of assimilation with the designed heritage landscapes (now golf courses) to the north and east. In two instances (VP8 and VP9), the view of sports pitch flood lights and ball-stop netting poles above the skyline will remain a slightly negative aspect of view, but overall this is balanced by the improved parkland aesthetic of the site resulting in no material reduction in visual amenity.

9.6.1 Night-time Visual Effects from Lighting

The potential visual effects from lighting proposals in this instance do not relate so much to effects on views and visual amenity, but the effects on rural amenity and in particular the concept of 'dark skies', which has become a recognised amenity of living in remote or rural areas. Nightime visual effects from lighting proposals, particularly relating to the sports pitch flood lights and the roadside lighting poles for the widened and realigned access road were examined using a representative nightime photomontage from VP8 – 'N7 pedestrian overpass to Johnstown' (see Volume 3A of the EIAR for photomontages). This photomontage indicates that there will be a noticeable, but not substantial, increase in lighting levels within the northern aspect of the view compared to baseline levels. This occurs directly from the light source as well as more diffused ground level illumination. The slightly increased level of illumination also highlights the change in the nature and intensity of use for the site from an end-of-life landfill to a multi-use public park.

In terms of mitigation and ameliorating factors, the flood lights are directed inwards towards the pitches and not into the surrounding landscape and focussed on the ground in order to maximise pitch illumination and reduce lightspill. The sports pitch lighting will also only be utilised during evening hours and predominantly during winter months, when it is most needed.

Roadside lighting is also baffled towards the ground, but it does not benefit from existing and proposed vegetative screening to the same degree as the internal sports pitch lighting (from this particular location at

least). It is also worth noting that it is a common perception that increased street lighting aids the sense of security in addition to the obvious road safety benefits.

For the reasons outlined above and within this peri-urban setting, the minor increase in the level of illumination proposed within and around the site is not considered to be significant issue.

9.7 Difficulties Encountered in Compiling Information

No difficulties were encountered in compiling information.

9.8 Cumulative Impacts

In addition to the proposed Project there are a number of additional development projects proposed in the vicinity of the site that are considered in terms of a cumulative impact on the landscape and visual environment. These projects are discussed in the following paragraphs.

9.8.1 Kerdiffstown Quarry

A Waste Facility Permit has been granted for the recovery of excavation or dredge spoil, comprising natural materials of clay, silt, sand, gravel or stone and which comes within the meaning of inert waste, through deposition for the purpose of the improvement or development of land at the former quarry at Kerdiffstown. In accordance with the permit (Waste Facility Permit Number: WFP – KE – 16 – 0084 – 01) the permit holder shall ensure that the maximum tonnage of soil and stone recovered at the site is 98,928 tonne. The importation of inert materials will raise the ground levels at the site and stabilise the side slope of the redundant quarry. The quarry, receptor COM016 on Figure 3.4, is located across the L2005 Kerdiffstown Road opposite the western boundary of Zone 1 of the proposed Project site and west of the receptor REC018.A Waste Facility Permit has been granted for the proposed quarry infilling. The access route to the quarry site is from the south using the L2012 Monread Road and crossing over the M7 motorway. This will result in keeping all the quarry infilling traffic well removed from the proposed Project works in the event of the quarry back-filling works occurring at the same time as the Remediation Phase works. No cumulative impacts from this project and the proposed Project are anticipated.

9.8.2 The M7 Naas Newbridge Bypass Upgrade and M7 Osberstown Interchange & R407 Sallins Bypass Schemes

The M7 Naas Newbridge Bypass Upgrade and M7 Osberstown Interchange & R407 Sallins Bypass Schemes (within 1km of the proposed Project) involve the addition of a third lane to both the north-bound and south-bound lanes of the M7 Motorway between Johnstown and Greatconnell and a new re-configured interchange at Newhall. No cumulative impacts from this project and the proposed Project are anticipated.

9.8.3 Applegreen Service Station at Naas (withdrawn)

The Planning Application for the development of the Applegreen Service Station on the eastern outskirts of Naas town and south of the N7 Road has been withdrawn. The nearest boundary for the proposed Service Station is approximately 600m from the proposed Project site entrance. No cumulative impacts from this project (if it were to proceed in the future) are anticipated.

9.8.4 Housing Development at Craddockstown, Naas

A housing development has been granted permission to build a 284 housing-unit scheme at Craddockstown to the south of Naas town centre. The proposed housing development site is located over 2km south of the proposed Project site. Due to the extended distance between the two sites and the type of development proposed, no cumulative impacts from the housing development project and the proposed Project are anticipated.

9.8.5 Upper Liffey Valley Sewerage Scheme & Osberstown Wastewater Treatment Plant Upgrade

The Upper Liffey Valley Sewerage Scheme & Osberstown Wastewater Treatment Plant Upgrade is an Irish Water project which proposes to upgrade various wastewater elements (gravity sewers, pumping stations, storm handling facilities and rising mains) in the vicinity of the proposed Project. Works will be undertaken on drainage networks collecting wastewater from three catchments, namely Catchment A (Sallins, Clane and Prosperous); Catchment B (Naas, Johnstown and Kill); and Catchment C (Newbridge, Kilcullen, Athgarvan, Curragh and Carragh). Part of the upgrade includes a proposed new pumped sewer, a section of which will be installed along the L2005 Kerdiffstown Road adjacent to the proposed realignment works as part of the proposed Project. It is anticipated that the construction of the new pumped sewer will be scheduled at the same time as the realignment works to the L2005 Kerdiffstown Road to minimise potential impacts on local residents and traffic. This will add to the intensity and extent of construction works and will be a temporary additional visual impact for local residents and road users on the L2005 Kerdiffstown road in combination with the proposed Remediation Phase works at the Kerdiffstown Landfill. The timing of these works to coincide with the remediation project is considered preferable, in terms of the nature and duration of landscape and visual impacts, to scheduling them separately. Nonetheless, the cumulative effect of these temporary works within the road corridor will be minimal even if circumstances do not allow them to be undertaken together with the landfill remediation works. In the event that either the proposed Project or the new pumped sewer construction is delayed it is not anticipated that there will be any significant cumulative impact.

It is therefore not considered that any additional mitigation measures above those already provided are required to account for cumulative impacts.

9.9 References

- Comhar (2010). An Introduction to Landscape Character Assessment (LCA)
- Environmental Protection Agency (2002). Guidelines on the Information to be contained in Environmental Impact Statements
- Environmental Protection Agency (2003). Advice notes on current practice in the preparation of Environmental Impact Statements
- Environmental Protection Agency (2015). Revised Guidelines on the Information to be contained in Environmental Impact Statements
- Environmental Protection Agency (2015). Advice notes for preparing Environmental Impact Statements (Draft)
- Kildare County Council (2017). Kildare County Development Plan 2017-2023
- Landscape Institute and the Institute of Environmental Management and Assessment (2013). Guidelines for Landscape and Visual Impact Assessment (GLVIA) 2nd Edition 2002 (3rd Edition updated 2013)