



**Figure 16-4-u.** Main storage embankment site, viewed from the junction of Fernhill Road and Kilgariff Cottages, with the cemetery in the foreground. The earth embankment will be located near to the Dunnes store but with minimal tree and hedgerow loss.



**Figure 2-v.** Main storage embankment site, viewed from Kilgariff Cottages. The managed, mown grasslands associated with the equestrian centre contrast with the arable fields and hedgerows beyond the Fealge River. This open view is typical of that available from a number of residential properties near this location.



**Figure 16-4-w.** Main storage embankment site, viewed from the terrace at the Fernhill House Hotel. The extensive south-facing panorama encompassing the broad valley of the Fealge River and gently rolling, rural landscape provides a setting to the terraced gardens. These have important amenity value for the hotel and allow space for outdoor events.





Existing view



Proposed storage embankment

**Photomontage with proposed scheme.**

*Note: for illustrative purposes only. Design - including layout, heights, finishes and details - may be subject to change.*

**Figure 16-5-a.** View looking south towards Dunnes from the junction of Kilgarriff Cottages and Fernhill Road. The cemetery is to the left. The storage embankment will be partially screened by intervening trees, with the footprint of the structure designed to avoid loss of such trees and hedgerows.





**Existing view**



**Photomontage with proposed scheme.**

*Note: for illustrative purposes only. Design - including layout, heights, finishes and details - may be subject to change.*

**Figure 16-5-b.** Main storage embankment site, viewed from the the N71 west of Dunnes. The earth embankment will be seeded with grass and the final design will minimise tree and hedgerow loss. The control structure and the spillway are representative only and subject to revision at detailed design stage.





Existing view



**Photomontage with proposed scheme.**

*Note: for illustrative purposes only. Design - including layout, heights, finishes and details - may be subject to change.*

**Figure 16-5-c.** View west, looking upstream along the Fealge River from the pedestrian bridge at the Credit Union building. The existing walls along Kent Street are likely to be strengthened and - where necessary - raised to 1.1m high. New walls will be constructed to the left bank (right of view) adjacent to the Post Office, which have the potential to improve on the existing timber fence and temporary repairs.





Existing view



**Photomontage with proposed scheme with possible street enhancements.**

*Note: for illustrative purposes only. Design - including layout, heights, finishes and details - may be subject to change and project constraints.*

**Figure 16-5-d.** View along Kent Street, looking west. The scheme may be an opportunity to provide localised, targeted enhancements to the public realm. Kent Street is an important thoroughfare through the Conservation Area, forming part of the Architectural Heritage Trail and linking key locations, such as the Post office, library and Emmet Square. Construction of a new wall may allow the opportunity to implement improvements to the paving, lighting and street furniture. Replacement trees may be required to mitigate any possible losses.





Existing view



Photomontage with proposed scheme.

*Note: for illustrative purposes only. Design - including layout, heights, finishes and details - may be subject to change.*

**Figure 16-5-e.** View west along Croppy Road. The N71 road from Cork to the west skirts the centre of Clonakilty, but allows the first opportunity for westbound travellers to glimpse views of the estuary and sea, allowing an appreciation of the setting and historical links between the town and harbour. A new wall, 1.1 to 1.3m high, may block some views and will be a prominent feature; consideration should be made towards the final details and finishes. This view shows a local style of partly coursed cladding with natural stone rubble .





Existing view



**Photomontage with proposed scheme.**

*Note: for illustrative purposes only. Design - including layout, heights, finishes and details - may be subject to change.*

**Figure 16-5-f.** View from the Ring Road towards Facksbridge roundabout and the Croppy Road. The Ring Road will be raised around 1.7m at this point, with new walls that will continue along the Croppy Road. Finishes and style to walls should ideally reflect the vernacular, historic styles, through the use of natural stone cladding.



## 17 Noise

### 17.1 Introduction

Glenside Environmental was commissioned by JBA Consulting to undertake a noise and vibration impact assessment for the proposed Clonakilty Drainage Scheme. This report presents the results of the assessment together with details of the methodologies employed.

The report adopts the following general format:

- An Overview describing the purpose of the section.
- A description of the Methodology used.
- A description of the aspects of the Receiving Environment relevant to the Noise Environment.
- A description of the Characteristics of the Proposed Development associated with the development.
- An assessment of the Impact of the proposed development on the Noise Environment.
- Recommendations for Mitigation (Remedial or Reductive) measures to reduce or eliminate any significant negative impacts identified.
- A description of the Monitoring Programme to be implemented to ensure that the proposed mitigation measures are operating effectively.

### 17.2 Overview

Although the construction phase of the proposed scheme has the greatest potential for impact it must be recognised that these works will be temporary in duration. It is anticipated that construction works will take approximately 18 months to complete. However, works will not be on-going in any one area for the duration of the construction phase. Given the fact that the scheme primarily comprises of constructing flood defences near coastal and areas close to the town centre, construction works will progress along the scheme which will in effect be a linear development. Therefore construction works associated with the proposed flood defence scheme will be temporary and transient in nature.

There are noise sensitive receptors located adjacent to the proposed works and as such noise sensitive receptors will be close to the construction working area along sections of the flood alleviation works. It will be necessary therefore to maintain strict adherence to mitigation measures and best practice presented herein to ensure that potential negative noise and vibration impact is kept to a minimum.

The proposed drainage scheme will involve extensive works along the banks of the Fealge River as it passes through Clonakilty Town. These will include constructing and replacement of existing walls and increased height in some areas. Noise and vibration impacts will be of limited duration and will only occur during the construction phase of the scheme when there will be a number of potentially significant sources of noise such as rock breaking, pile driving, water pumping, excavations with associated traffic and general construction noise. There will be no noise and vibration issues associated with the completed works.

This assessment is based on general information available at the planning stage of the project. The analysis presented is considered indicative of the scale of potential noise impacts during the construction phase. It should be noted that the data presented does not constitute a definitive estimate of noise levels. This detailed analysis can only be carried out when precise details of works are formulated in terms of equipment, processes, and timings. This detailed analysis will be the responsibility of contacting companies undertaking the work, in accordance with the applicable standards.

#### 17.2.1 Receiving Environment

There are a number of local residences in close proximity to the proposed works. The majority of the works will take place close to the town centre along the river walls, while construction of embankments will be required at the eastern and western ends of the town. Traffic noise dominates in most areas of the proposed scheme with reduced noise levels at the more rural



sensitive locations west of the town. The noise monitoring locations are illustrated on Figure 17-1.

### 17.3 Baseline Noise Assessment

In the absence of any national legislation relating to environmental/construction noise emission limits the assessment criteria used in this report are those used commonly adopted by regulatory and local authorities. The predicted change in the existing noise environment is also considered.

The noise and vibration impact assessment was carried out with cognisance to the methodologies and guidelines listed below:-

- Review of the location of the proposed drainage scheme defences and associated construction works, with respect to the location of sensitive receptors.
- Baseline noise monitoring was undertaken at a number of representative noise sensitive receptors in the vicinity of the proposed working area, in accordance with the National Road Authority, (NRA) "Guidelines for the Treatment of Noise and Vibration during the construction of National Road Schemes 2004.
- Plant and machinery noise levels were referenced from BS 5228 "Noise and Vibration Control on Construction and Open Sites.
- Assessment of noise emissions from the proposed works. Noise predictions were undertaken in accordance with BS5228 "Noise and Vibration Control on Construction and Open Sites", to predict noise levels at nearby houses.

Environmental noise surveys were conducted in order to quantify the existing noise environment. The survey was conducted in general accordance with ISO 1996: 2007: Acoustics – Description, measurement and assessment of environmental noise.

#### 17.3.1 Choice of Measurement Locations

Eight measurement locations were selected; each is described in turn below and shown in Figure 8-1. These noise monitoring locations are representative of the existing noise levels in Clonakilty town.

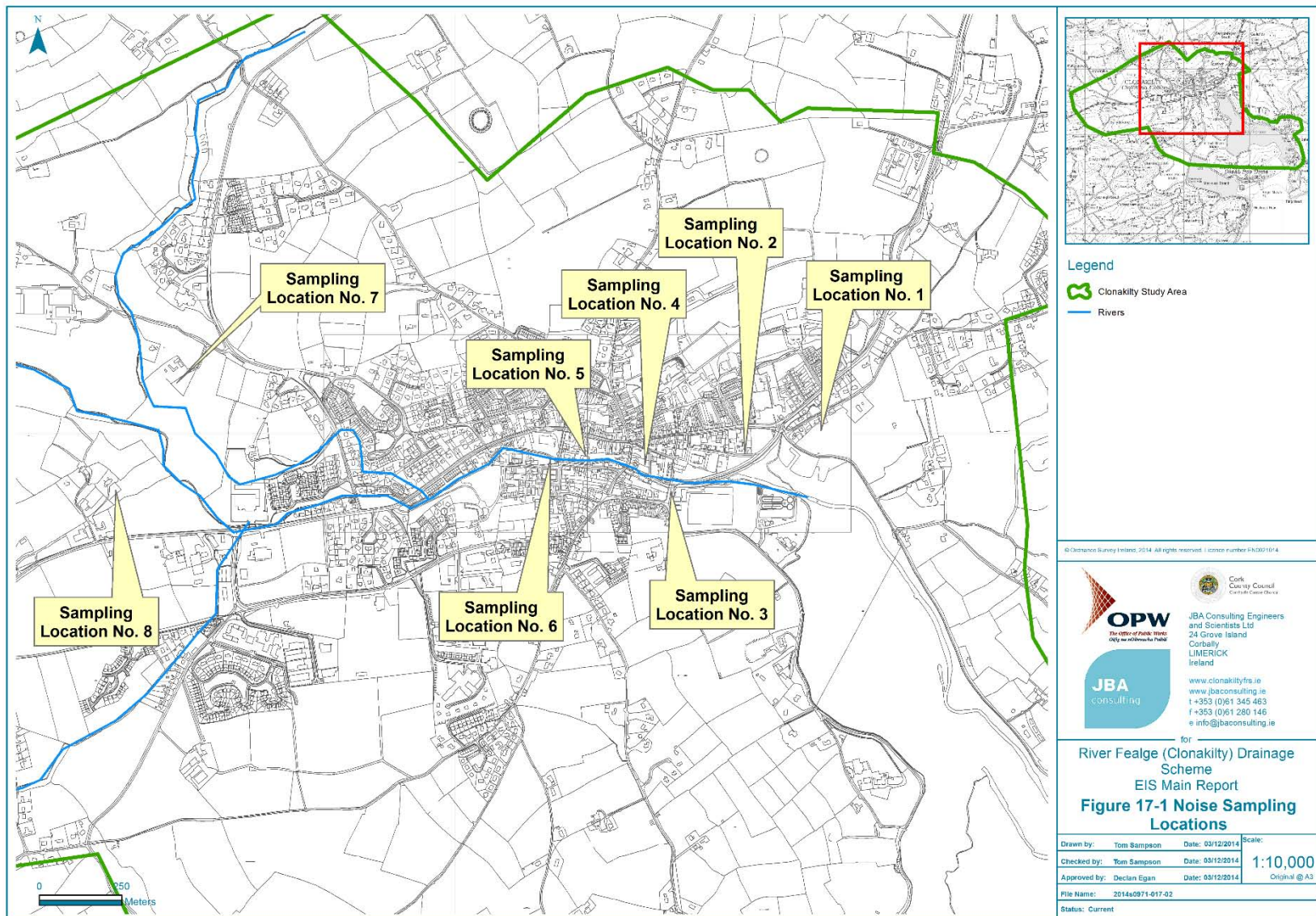
#### 17.3.2 Survey Periods

All works associated with the surveys were carried out during the daytime period.

The daytime measurements cover a period that was selected in order to provide a typical snapshot of the existing noise climate, with the primary purpose being to ensure that the proposed noise criteria associated with the development are commensurate with the prevailing environment. There are no night-time works proposed during the construction phases of the proposed flood defence scheme.

The weather during the survey period was dry and calm with low winds.







### 17.3.3 Procedure

Measurements were conducted at Locations 1 to 8 on a cyclical basis. Sample periods for the noise measurements were 15 minutes. The results were noted onto a Survey Record Sheet immediately following each sample, and were also saved to the instrument memory for later analysis where appropriate. Survey personnel noted all primary noise sources contributing to noise build-up.

### 17.3.4 Measurement parameters

The noise survey results are presented in terms of the following five parameters:

LAeq 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.

LAmx is the instantaneous maximum sound level measured during the sample period.

LAmin is the instantaneous minimum sound level measured during the sample period.

LA10 is the sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise.

LA90 is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

### 17.3.5 Results and discussion

The survey results for Location N1 are summarised in Table 17-1 below.

Table 17-1 : Results for Location N1 at rear of houses on Old Timoleague Road

Time		Measured Noise Levels (dB re. 2x10 <sup>-5</sup> Pa)				
		LAeq	LA90	LA10	LAmx	LAmin
Daytime	09:33 – 09:48	62	52	64	76	44
	12:55 – 13:05	61	52	63	72	46
	16:01 – 16:16	63	53	65	75	45

The main sources were local and distant traffic. Traffic movements on the Cork Road, the local by-pass and the Timoleague Road were main noise sources. Noise levels were in the range 61 to 63 dB LAeq and 53 to 55dB LA90.

The survey results for Location N2 are summarised in Table 17-2 below.

Table 17-2 : Results for Location N2 Outside Veterinary Hospital on Croppy Road

Time		Measured Noise Levels (dB re. 2x10 <sup>-5</sup> Pa)				
		LAeq	LA90	LA10	LAmx	LAmin
Daytime	09:52 – 10:07	68	53	71	83	49
	13:09 – 13:24	67	54	70	81	51
	16:20 – 16:35	69	54	71	79	50

The sources of noise noted in the area was traffic on nearby roads. Noise levels were in the range 67 to 69dB LAeq and 53 to 54dB LA90. No significant source of vibration was noted during the survey periods.

The survey results for Location N3 are summarised in Table 17-3 below.



Table 17-3 : Results for Location N3 Outside Harte's Spar Shop

Time		Measured Noise Levels (dB re. 2x10 <sup>-5</sup> Pa)				
		LAeq	LA90	LA10	LAmix	LAmix
Daytime	10:13 – 10:25	69	54	72	83	54
	13:38 – 13:53	68	55	71	85	53
	16:39 – 16:54	68	56	73	85	53

The main noise sources were from passing traffic on the by-pass.. Noise levels were in the range 68 to 69dB LAeq and 54 to 56dB LA90.

The survey results for Location N4 are summarised in Table 17-4 below.

Table 17-4 : Results for Location N4 at William Houlihan Bridge (near Harte's Courtyard)

Time		Measured Noise Levels (dB re. 2x10 <sup>-5</sup> Pa)				
		LAeq	LA90	LA10	LAmix	LAmix
Daytime	10:28 – 10:43	62	60	61	67	59
	13:57 – 14:12	62	59	60	68	58
	17:00 – 17:15	63	60	62	67	58

The sources of noise noted in the area were the river flowing, extractor fan from Harte's Courtyard bar and local traffic. Noise levels were in the range 62 to 63dB LAeq and 59-60dB LA90. No significant source of vibration was noted during the survey periods.

The survey results for Location N5 are summarised in Table 17-5 below.

Table 17-5 : Location N5 at Car Park close to Credit Union

Time		Measured Noise Levels (dB re. 2x10 <sup>-5</sup> Pa)				
		LAeq	LA90	LA10	LAmix	LAmix
Daytime	10:51 – 11:06	56	45	54	56	55
	14:21 – 14:36	54	72	52	54	53
	17:22 – 17:37	55	74	52	54	53

The main noise sources was intermittent traffic movements in the carpark and surrounding roads. Other sources included the river and passing pedestrians. The average noise level ranged from 54 to 56dB(A).

The survey results for Location N6 are summarised in Table 17-6 below.

Table 17-6 : Location N6 adjacent Post Office

Time		Measured Noise Levels (dB re. 2x10 <sup>-5</sup> Pa)				
		LAeq	LA90	LA10	LAmix	LAmix
Daytime	11:22 – 11:37	61	56	63	70	52
	14:44 – 14:59	62	55	64	71	53
	17:42 – 17:57	62	55	64	71	53

This monitoring location was situated outside the post office, close to the river. Regular traffic movements dominated the local noise environment. The average noise levels ranged from 61-62dB(A) with background noise level from 55-56dB(A).

The survey results for Location 7 are summarised in Table 17-7 below.



Table 17-7 : Location N7 Residence North of Proposed Embankment

Time		Measured Noise Levels (dB re. 2x10 <sup>-5</sup> Pa)				
		LAeq	LA90	LA10	LAmx	LAmn
Daytime	11:53 – 12:08	38s	34	40	54	32
	15:11 – 15:26	42	34	44	49	33
	18:10 – 18:25	41	35	43	71	53

Monitoring at this location was conducted close to dwelling located north of the proposed embankment. There were no significant local sources with the location approximately 1km from the N71 to the south. The average noise levels were influenced by general environmental noise, birds and light breezes.

The survey results for Location 8 are summarised in Table 17-8 below.

Table 17-8 : Location N8 Residence West of Proposed Embankment

Time		Measured Noise Levels (dB re. 2x10 <sup>-5</sup> Pa)				
		LAeq	LA90	LA10	LAmx	LAmn
Daytime	12:19 – 12:34	45	40	47	60	37
	15:38 – 15:53	50	42	52	58	35
	18:36 – 18:51	46	42	48	59	37

Measurements at this location were influenced by distant traffic noise from the N71 to the south and general environmental noise. The average noise level ranged from 45-50dB(A).

## 17.4 Impacts of the Scheme on the Baseline Noise Levels

### 17.4.1 Noise Standards

As stated previously in this document, the potential noise and vibration impact of the proposed works on the surroundings will all occur during the construction phase. Unfortunately there is no published statutory Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. Local authorities normally control construction activities by imposing limits on the hours of operation and consider noise limits at their discretion.

In the absence of specific noise limits, appropriate criteria relating to permissible construction noise levels for a development of this type may be found in the National Roads Authority (NRA) publication Guidelines for the Treatment of Noise and Vibration in National Road Schemes which indicates the following criteria and hours of operation. The majority of the construction activity is expected to occur during normal working hours.

Table 17-9 indicates the maximum permissible noise levels at the facade of dwellings during the construction period as recommended by the NRA.

Table 17-9 : Maximum permissible noise levels at the facade of dwellings during construction

Days and Times	Measured Noise Levels (dB re. 2x10 <sup>-5</sup> Pa)	
	LAeq(1hr)	LAmx
Monday to Friday 07:00 to 19:00hrs	70	80
Monday to Friday 19:00 to 22:00hrs	60*	65*
Saturdays 08:00 to 16:30hrs	65	75
Sundays & Bank Holidays 08:00 to 16:30hrs	60*	65*

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

Indicative only – it may be appropriate to apply more stringent limits in areas where pre-existing noise levels are low.

The EPA guideline daytime noise limit for industrial noise is 55 dB(A), at the nearest noise sensitive location(s). The World Health Organisation guideline for outdoor areas is in the range



50 to 55 dB(A). The EPA guideline noise limit for industrial noise during the night-time (22:00 – 08:00) is 45 dB(A), at the nearest noise sensitive location(s).

Subjectively, the significance that can be attached to changes in noise levels (perceptible to human beings) can be described as follows in Table 17-10.

Table 17-10 : Significance Scale for Changes in Noise Levels (Perceptible to Human Beings)

Change in Noise Level	Impact rating	EPA Glossary of Impacts	Subjective Reaction
0	No change	n/a	n/a
<3 dB(A)	Not Significant	Neutral, Imperceptible or Slight Impact	Barely perceptible
3 – 5 dB(A)	Minor	Significant Impact: Positive or Negative	Perceptible
6 – 10 dB(A)	Moderate		Up to a doubling of loudness
11–15 dB(A)	Major		Over a doubling of loudness
>15 dB(A)	Severe	Profound Significant Impact: Negative only	---

Criteria for daytime construction noise are often set at a level higher than for other permanent intrusive noise sources because it is recognised that it is a short-term activity. In setting criteria for construction noise, account has to be taken of the technical feasibility of the proposed criterion, and also the trade-off between the noise level, and the duration of the noise exposure.

The short-term limit refers to the highest instantaneous sound level. For typical construction works, compliance with the average noise level of 70 dB(A) LAeq, would also generally imply compliance with the short-term maximum limit of 80 dB(A). The exception would be noise of a significant impact nature such as piling, or rockbreaking.

These construction noise limits represent a reasonable compromise between the practical limitations in a construction project, and the need to ensure an acceptable ambient noise level for the residents. Exceedances of these limits represents an adverse impact. The scale of adverse impact depends on the degree of exceedence, and the duration of the construction noise. The descriptive scale of adverse impacts used in this report is as follows:

**Negligible:** construction noise level is within 70dB(A) limit, and the duration of project is the order of days

**Slight:** construction noise level is in range 70 – 75dB(A), and the duration of the project is the order of days, or noise level is in range 60-70 dB(A), and the duration of the project is the order of weeks

**Moderate:** construction noise level is in range 75 – 80 dB(A), and the duration of the project is the order of days, or noise level is in range 70-75 dB(A), and the duration of the project is the order of weeks, or noise level is in range 60-70dB(A), and the duration of the project is the order of months.

**Significant:** construction noise level exceeds 80 dB(A), and the duration of the project is the order of days, or noise level is in range 75-80 dB(A), and the duration of the project is the order of weeks, or noise level is in range 70-75dB(A), and the duration of the project is the order of months.

**Severe:** construction noise level exceeds 80 dB(A), and the duration of the project is the order of weeks/months, or noise level is in range 75-80 dB(A), and the duration of the project is the order of months.

#### 17.4.2 Construction Vibration Criteria

Measurements of vibration from construction sites have shown that, even from piling works, levels typically become imperceptible at relatively short distances from the vibration source.



However, higher levels of vibration are typically tolerated for single events or events of short duration. For example piling, one of the primary sources of vibration during construction works where competent rock is encountered, is typically tolerated at vibration levels up to 2.5 mm/s.

The National Roads Authority guidelines identify 2.5 mm/s as the vibration level that may be considered tolerable due to piling works. The potential vibration levels that could be generated by rock breaking works, if required would be expected to be comparable to the level of vibration that may be generated by piling works. The vibration level of 2.5 mm/s is substantially below the guideline values for protection of properties against cosmetic damage. The NRA limits for protection against cosmetic damage are given as a function of vibration frequency, and are:-

- 8 mm/s (vibration frequency <10Hz)
- 12.5 mm/s (vibration frequency 10 to 50Hz)
- 20 mm/s (vibration frequency >50 Hz).

The NRA 2.5mm/s limit is for piling, which is a continuous activity. This limit provides for protection against the vibration nuisance, and is comfortably within the limits for cosmetic damage. It is considered that the potential impact is therefore likely to be minor.

#### 17.4.3 Operational Vibration Criteria

In the case of nominally continuous sources of vibration, such as traffic, vibration is perceptible at around 0.5 mm/s and may become disturbing or annoying at higher magnitudes. However the operational phase of the proposed drainage scheme will not generate perceptible vibrations.

The NRA document Guidelines for the Treatment of Noise and Vibration in National Road Schemes also contains information on the permissible construction vibration levels during the construction phase.

### 17.5 Characteristics of the Proposed Development

#### 17.5.1 Construction Related Noise

During the various phases of construction of the proposed drainage scheme, the main potential noise sources that would be evident at the site would be:-

Site Preparation, noise will be generated by plant and machinery used to place fill material to form flood defence embankments at the site, construct concrete flood defence walls etc.

Haulage of fill construction materials to the site, by heavy goods vehicles and distribution of the material to the different sections of the drainage scheme site by excavators and earth mover trucks.

Internal/external haulage and delivery of construction materials by trucks.

Traffic associated with employees working at the site during the construction phase of the proposed drainage scheme.

There is different work activities associated with the proposed works. These generally comprise of the following:

- Concrete wall reinforcement;
- Construction of tidal walls, and the raising of the Ring Road over a short section
- Construction of earthen embankment walls;
- Construction of pumping stations;
- HGV movements.

A variety of items of plant will be in use for each of these work activities, such as excavators, lifting equipment, dumper trucks, compressors and generators.

The construction of the embankments will involve the major noise related activity with some heavy machinery required. This will occur at the east of the town near the Old Timoleague Road and at the west of the town in agricultural lands west of Dunnes Stores.



As the construction programme has only been established in outline form only, it is not possible to calculate the actual magnitude of noise emissions to the local environment.

However, the following sections present calculations of indicative noise levels for typical noise sources associated with each of the identified activity types. In each instance, source information was obtained from BS 5228: 2009: Code of practice for noise and vibration control on construction and open sites – Part 1: Noise which sets out typical noise levels for items of construction plant.

### 17.5.2 Construction Works Associated with the Drainage Scheme Works

To allow for prediction of the worst-case scenario the total plant involved in the construction works was input as being operational on a continual basis at the construction working area closest to the noise sensitive receptors. Details regarding the nature and numbers of plant and machinery to be utilised on-site during the construction works have not been finalised at this stage. However an assumption has been made that certain items of plant and machinery items will be required during the construction phase. Table 17-11 below also details the calculated noise levels at houses for the range of anticipated construction activities. Potential exceedance of the 70 dB(A) criterion is indicated by shading.

Table 17-11 : Calculated Noise Levels from Expected Noise Sources

Activity	Sound Power Level	Distance of Noise Sensitive Location from Works (metres)					
	LWA	10	20	40	60	80	120
		Noise level dB(A) LAeq,1hr					
Tracked Excavator	112	84.0	78.0	72.0	68.4	65.9	62.4
Pumping Water	94	66.0	60.0	54.0	50.4	47.9	44.4
Scraper moving earth	118	90.0	84.0	78.0	74.4	71.9	68.4
Road Construction	118	90.0	84.0	78.0	74.4	71.9	68.4
Pumping concrete to walls	107	79.0	73.0	67.0	63.4	60.9	57.4
Concrete Mixer	91	63.0	57.0	51.0	47.4	44.9	41.4
Petrol generator	98	70.0	64.0	58.0	54.4	51.9	48.4
Piling (cast in place)	116	88	82	76	72	69	66
Poker vibrator	93	65.0	59.0	53.0	49.4	46.9	43.4

### 17.6 Noise Impact Assessment

This section assesses noise impact at varying sections of the proposed works from the embankments required at the east of the town near the Ring Road, along to the centre of town where bridge works and increased wall height will be the main activity. At the western outskirts of the town the construction of the embankment will be required.

The embankments, at the western outskirts will require extensive earth moving and associated machinery including HGV movement and excavators. Similarly the construction of the embankment at the Old Timoleague Road will require, albeit it smaller, volumes of impermeable material for the construction of the embankment. Along the River Fealge some sections will require works to increase the height to some walls with other sections requiring construction of



walls up to 1.5m. It is expected that 2 no. pumping stations will be located in the town for this drainage scheme. 2 other pumping stations are being installed by Cork County Council.

#### **Area 1** Old Timoleague Road to Waterfront Apartments

It is proposed to construct a 1.4m high 60m long embankment behind the houses on the Old Timoleague Road (E10 on Figure 6-1). The local road (The Ring Road) along the sea wall will be elevated over a 200 m stretch,(R1 on Figure 6-1) and there is potential for increased noise levels. Existing noise levels in this area are influenced by regular traffic movements from a number of local roads, which converge at the Cork Road Roundabout. The average noise levels were recorded at 62-63dB(A). Where the activity will take place at distances close to 60m from the embankment there is likely for **Moderate-Significant impact** with noise levels in the region of 75-80dB(A) for a number of weeks, thereafter with levels expected to be reduced to 70-75dB(A) at the nearest properties. The embankment will require 150m<sup>3</sup> of soil and it is expected the resultant traffic noise will not give rise to significant impact, considering the existing traffic dominated local noise environment.

The Ring Road will be raised along a 150m stretch and this will involve increased truck movements and general road construction activities. Tracked excavators involved in the works will result in noise levels of 75dB(A) at 10m. Earth moving to build up the road at this location will result in increased traffic.

Noise levels due to the excavation and construction of earthen embankments are likely to exceed the 70dB(A) construction noise limit at residences within 30m of the works. Similarly the construction of the flood walls close to the dwellings north of the Old Timoleague Road will result in noise levels above the existing ambient levels. Existing traffic noise in this area is noted to be above 67dB(A).

Flood walls will be constructed from Cork Road Roundabout along the northern and southern estuary boundaries parallel to a section of Croppy Road (L35 and L36 on Figure 6-1). It is expected that traditional methods will be employed. Existing noise levels in this area are influenced by regular traffic movements and average levels were recorded at 68dB(A). While the construction method is not finalised there may be a requirement for sheet piling being along parts of this route. The distance to closest properties and existing noise levels indicate that the noise impact along the Croppy Road would be slight.

#### **Area 2:** Clarke's Bridge to Rossa Street

The area along the river from Clarke's Bridge to Rossa Street will require the existing walls on both banks bridges to be built up and the construction of the reinforced concrete walls (L25 to L34 on Figure 6-1). It is proposed that 1.1m high walls will be constructed along exposed sections of the river.

The resultant noise levels at the noise sensitive locations along the river will vary depending on the type of works being undertaken and the proximity of these works. The existing noise levels in this area is influenced by traffic on local routes with noise levels noted to be in the range 56-63dB(A). There will be a requirement for sheet piling along this section of river.

Solid parapets will be constructed at Clarke's Street Bridge with all works conducted at ground level.

A new wall will be required on the northern bank between Seymour Street Pedestrian Bridge and Clarke's Street Bridge. This will require in-river works. Where in-river works take place there will be a requirement for pumping of water with the resultant noise levels predicted to be 66dB(A) at 10m from the pump. The likely construction of small scale cofferdams may require excavators work in the area for short-term periods early in this phase. Once this initial excavation has been completed it is expected that the wall construction will proceed with only minimal local noise impact. At 40m from source the sound level from excavations will reach 78dB(A) so there is potential for **moderate impact** where these works take place. The area around the Credit Union and Library will likely be impacted by short-term increases in noise levels. The impact is also predicted to be **moderate**.

Along Harte's Courtyard Apartments only remedial works will be required to existing walls therefore any noise impact will be minimal. There will be no extensive equipment with only intermittent deliveries of construction materials likely to result in potential noise increase. Existing noise levels in the area were recorded at 60-63dB(A). The predicted impact is expected to be slight.



### Area 3: Rossa Street to Bridge Street

Bridge repair works to parapets and increase in height to both banks will take place between Bridge Street and Michael Collins Bridge. New walls will be required on both banks between the Library and Rossa Street Bridge. This will require in-river works. The wall height will be less than the sections down-river towards Clarke's Bridge with height of 0.5m to 1.0m being required. Again as previously discussed the in-river works may require excavations along this narrow section but the duration for foundation preparations will be short-term.

The expected use of concrete pumps and poker vibrators will result some increase in noise levels. However at distances over 25m from the works, the noise levels will be within the 70dB(A) limit quoted in the NRA Publication for construction noise.

It is proposed to construct a number of pumping stations in this area (D3, D5 and D7 on Figure 6-2). These will be constructed below ground level and will require ground breaking and excavations of existing roads. Noise levels up to 80dB(A) could be expected from this activity, however these levels of noise would be expected to last days and the impact is classified as **moderate** in both areas. The existing average noise levels at these areas are influenced by regular traffic movements.

### Area 4: Western End Embankment Construction

Work on the large embankment at the western end of the town will take the longest duration due to the large volume of soil movement required.

It is expected that 11,250m<sup>3</sup> of earth (22,500 tonnes of soil) will be required to build up the embankment. Using 20 tonne trucks this equates to approximately 1,125 trucks (2,250 truck movements) to the site. Access to the site will be agreed with the landowners and the contractors. There is an existing entrance to the site on the southern portion of the embankment. Access to the northern section of the embankment will be off Fernhill Road.

The main noise sources from the construction of the embankment will be from truck movements, land spreading of soil and excavators. The predicted noise level will be 74dB(A) at 80m when closest to dwellings. This would be expected to be temporary in nature and only when the embankment construction approaches these dwellings. The predicted impact at locations close to the embankment construction is expected to be **moderate** at worst case. The impact at local residences east and west of the embankment is predicted to be slight to moderate at worst case.

A portion of the HGV site traffic will travel along the R588 Fernhill Road to carry material for the embankment construction. While the access off this road to the embankment has not yet been finalised it is predicted any impact in this region from site traffic on existing noise levels will be slight.

It is expected that piling may be required during the construction of the wing walls for the sluice valve at the embankment (SI1 and SI2 on Figure 6-5). The piling would be expected to be cast-in-place and the associated noise level would be 88dB(A) at 10m. At a distance of 80m the sound level will be within the 70dB(A) limit specified in the NRA publication. The piling duration would be short-term and the distances from the proposed sluice to nearest residences indicate there would be **negligible impact** from this activity. Similarly any associated vibration from this activity would be within the specified limits of 3mm/s.

#### 17.6.1 Construction Related Traffic

During the various phases of construction of the proposed flood relief scheme, the main potential noise sources that would be evident at the site would be:-

- Site Preparation, noise will be generated by plant and machinery used to place fill material to form flood defence embankments at the site, construct concrete flood defence walls, etc.
- Haulage of fill construction materials to the site, by heavy goods vehicles and distribution of the material to different sections of the drainage scheme site by excavators and earth mover trucks.
- Internal / external haulage and delivery of construction materials by trucks.
- Traffic associated with employees working at the site during the construction phase of the proposed drainage scheme.



It is anticipated that the construction traffic noise levels will be within the recommended construction noise limits prescribed in the NRA Guidelines for the Treatment of Noise and Vibration during the construction of National Road Schemes 2004. The predicted construction traffic noise levels would be likely to be within the range of the existing ambient noise levels in the area and would not be expected to give rise to a significant negative noise impact in the area.

#### 17.6.2 Construction Related Vibration

Potential sources of vibration during typical construction projects include rock-breaking equipment, sheet piling machinery, excavators, dump trucks and HGV's. There are internationally recognised criteria for vibration levels, for vibration which would be likely to lead to complaints, and vibration levels which would be likely to lead to structural damage (BS6472: 1992 Guide to Evaluation of human exposure to vibration in buildings (1Hz to 80Hz), and BS7385: Part 2 1990: Guide to damage levels from ground-borne vibration).

It is anticipated that the levels of vibration generated by construction works associated with the proposed drainage scheme and haulage of material to the site would be below the criteria specified in these standards, as the level of vibration from these activities would not be significant.

If sheet-piled flood defence walls will be constructed along sections of the drainage scheme, vibration measurements can be carried out at any requisite monitoring points, if deemed necessary. This would help to ensure that vibrations generated by any of the construction activities at the site would not give rise to nuisance in the vicinity of proposed works.

#### 17.7 Mitigation Measures

In order to sufficiently ameliorate the likely noise and vibration impacts from the proposed works, a schedule of noise control measures has been formulated for the construction phase.

Reference will be made to BS 5228-1: 2009: Code of Practice for Noise and Vibration Control on Construction and Open Sites: Noise, which offers detailed guidance on the control of noise & vibration from demolition and construction activities. In particular, it is proposed that various practices be adopted during construction, including:

- limiting the hours during which site activities likely to create high levels of noise or vibration are permitted;
- provision of a 2.4m high hoarding around concrete wall and embankment works areas;
- establishing channels of communication between the contractor/developer, Local Authority and residents;
- appointing a site representative responsible for matters relating to noise and vibration;
- monitoring typical levels of noise and vibration during critical periods and at sensitive locations.
- Furthermore, it is envisaged that a variety of practicable noise control measures will be employed.

These may include:

- selection of plant with low inherent potential for generation of noise and/ or vibration;
- erection of enclosures as necessary around noisy processes and items such as generators, heavy mechanical plant or high duty compressors;
- placing of noisy / vibratory plant as far away from sensitive properties as permitted by site constraints and the use of vibration isolated support structures where necessary;

It is recommended that vibration from construction activities be limited to the NRA guideline values. It should be noted that these limits are not absolute, but provide guidance as to magnitudes of vibration that are very unlikely to cause cosmetic damage. Magnitudes of vibration slightly greater than those in the table are normally unlikely to cause cosmetic damage, but construction work creating such magnitudes should proceed with caution. Where there is existing damage, these limits may need to be reduced by up to 50%.



## **17.8 Monitoring**

A programme of noise and vibration monitoring at sensitive receptors will be detailed by the Contractor prior to works beginning. This will allow for a constant review of noise and vibration levels generated by the construction of the proposed scheme and will highlight the need for further mitigation measures should they be required.

Should complaints arise, it is recommended that noise monitoring be carried out at sensitive receptors during the construction phase of the proposed scheme to ensure guideline limits are not exceeded and to determine whether further mitigation measures are required.

## **17.9 Residual Impacts**

There will be no significant residual noise and vibration impacts associated with the construction or operation stage of the proposed flood defence scheme.



## 18 Material Assets

### 18.1 Introduction

This section of the Environmental Impact Assessment addresses the material assets in the town and surrounding areas. The material assets within the town and the surrounding areas were assessed by consultation with a number of documents including:

- The Clonakilty Town Plan 2009-2015
- The Strategic Environmental Assessment for the Town Plan
- EPA Waste Water Discharge Licence Applications for Waste Water Agglomerations within Clonakilty
- EPA data base on IPPC and waste licenced facilities within the study area
- A drawing of ESB services within the Study Area supplied by Cork County Council
- Consultation with UPC and Eircom.

The reader is also directed to Section 18 of this report for additional information on material assets in the town. The impacts of the scheme on traffic are discussed in Section 13 of this report.

The Clonakilty Town Development Plan (2009-2015) has identified a route for the Northern Ring Road around Clonakilty. The route of the proposed road passes through the fluvial storage area and the design engineers and Cork County Council have discussed the potential impacts. To accommodate the road and additional area has been added to the flood storage area.

### 18.2 Waste Water Treatment Plant

The waste water treatment plant (WWTP) located outside Clonakilty Town and has a designed load capacity of 5,333 population equivalent (P.E.). The summertime P.E. with the additional tourists is approximately 16,000. The waste water treatment plant caters for both industrial and domestic effluent. The sewerage system is partially a combined network with both gravity and pumped sections. The WWTP provides secondary treatment via a combination of grit removal/classifier, screening, extended aeration, secondary sedimentation and sludge thickening/removal.

The final treated effluent discharges to the estuarine channel of the River Fealge in Clonakilty Bay. The normal flow rate is 1,500 m<sup>3</sup>/d with a maximum discharge rate of 2,500 m<sup>3</sup>/d. The WWTP is normally overloaded during the peak tourist influx.

Nutrient reduction is required for WWTP discharges to Clonakilty Harbour by the end of 2016.

Cork County Council is currently carrying out drainage works in Clonakilty with the aim to separate foul and storm drains. In the long term this will help to reduce the hydraulic loading to the Bay.

### 18.3 Foul and Storm Water Sewers

A review of a drawing prepared by M.C. O Sullivan's Consultants in the 1980's shows that there is a combined sewer that runs down Curtain Hill, and intercepts the main line from Michael Collins Road, Oliver Plunkett Street, Pearse Street, and down Rossa Street. From here the line travels under the River Fealge to a submersible pump sump at Clarkes Street. It is pumped from here via a twin 150 mm rising main to the WWTP.

There are five emergency overflows within the agglomeration each associated with a pumping station. The emergency overflows are located at Long Quay, Clarke Street, Inchydoney main, Inchydoney minor and Gallanes. The influent flows by gravity to the pump stations, from where it is pumped to the WWTP. Each pump station contains both duty and stand-by pumps.

Cork County Council is currently carrying out drainage works in Clonakilty with the aim to separate foul and storm drains. In the long term this will help to reduce the hydraulic loading to the Bay.



## 18.4 Electricity

The following information was sourced from a drawing provided by Cork County Council on the electricity services provided in the town.

### 18.4.1 Overhead LV (44V/230V) Lines

Overhead lines within the Study Area include:

- Along the road between Lady's Cross and Miles
- Line running west from Dunne's Stores over the River Fealge
- Overhead line running from Tawines Hill along the road and serving Fern Hill Hotel and the Ard Alainn housing estate.
- Overhead line from the cemetery to Michael Collins Road and Oliver Plunket Street
- Line from Connolly Street to Casement Street
- Line from Clogheen Meddows to John's Street Upper
- Line from Ashe Street to Astna Street.

Underground Lines (MV/LV (10kV & 400V/230V) includes:

- In the area around Dunnes Stores
- On the Western Road
- Emmets Square, Pearse Street, Bridge Street, Kent Street, Clarkes Street, Connolly Street, and Lamb Street Lower
- Cables in the River Feagle behind the library and the Town Hall.

## 18.5 Broad Band

No replies on the presence of broadband in the area were received for either UPC or Eircom.

## 18.6 Agriculture

The Central Statistics Office Agricultural Census, 2000 recorded 72 farms in Clonakilty Rural. These farms comprise an estimated 2,564 ha of land of which 41% is dedicated to pasture and 29% to silage.

## 18.7 Waste Management

A number of private waste contractors (KWD and Country Clean Recycling) operate a waste collection services in Clonakilty.

There is a C&D collection and disposal operator (Pat O Driscoll Plant Hire) that operates under a Waste Facility Permit issued by Cork County Council (WFP-CK-09-0021-01).

The Clonakilty Waste and Recycling Centre is a civic amenity site operated by Cork County Council and is licenced by the EPA (W0008-01). The site is located in the Clogheen Industrial Estate. This site can accept a range of non-hazardous and hazardous wastes. It also facilitates the collection and disposal of waste electronic and electrical equipment, scrap metal and white goods.

Benduff Landfill site (W007-01) accepts domestic waste generated in Clonakilty.

There is a Litter Management Plan for the town.

## 18.8 Drinking Water

Water is abstracted from the Argideen River receives primary treatment in the Clonakilty Water Treatment Plant located on the Bandon Road outside the town. Approximately 2 million gallons of water per day is treated and supplied to the town.

## 18.9 IPPC Licenced Facilities

A review of the EPA data base found one IPPC licence (P0944-01) issued to Michael O Hea for the operation of a poultry farm.



## 18.10 Car Parks

There are public car parks located on:

- Kent Street
- Deasys Car Park
- College Street Car Park
- Churchyard

There is disabled parking in Pearse Street and Kent Street.

## 18.11 Impacts of the Proposed Scheme on Material Assets

The impacts of the proposed scheme on the material assets in Clonakilty is discussed in the flowing sections. This impact assessment is based on the current layout of the scheme and more information may become available during the detailed design stage, for example the presence of underground cables etc.

## 18.12 Impacts on the Waste Water Treatment Plant

The construction of the embankment along the western boundary of the waste water treatment plant (E9 on Figure 6.1) will have no impact on the operation of the treatment plant. The construction of a number of storm water pipelines around the town and along Croppy Road (D8, D9, D10 on Figure 6.1 and D1, D2, D4 and D6 on Figure 6.2) will have a positive impact on the waste water treatment plant because of the reduction in hydraulic loading to the treatment plant.

## 18.13 Impacts on Fouls and Storm Sewers

A number of new storm water pipelines are being installed as part of this scheme in Kent Street, Connelly Street, Rossa Street, Asthna Street, Long Quay and at Croppy Road (D8, D9, D10 on Figure 6.1 and D1, D2, D4 and D6 on Figure 6.2). These new pipelines and their associated underground pump stations will have a positive impact on the foul and storm sewers.

## 18.14 Impacts on Electricity

The western portion of the fluvial embankment (E8 on Figure 6.5) is located underneath an overhead 110kV power line. The construction of the storage embankment underneath the power line will have no impact on the line. The contractors will be made aware of the lines and the working corridor will be cordoned off with bunting.

There are electricity cables underneath the River Fealge behind the library and the town hall. The scheme will involve the excavation for foundation and the construction of reinforced walls 1.1m high close to the library and town hall (L16-L24 on Figure 6.2). These operations will have the potential to come in contact with the underground cables at this location.

## 18.15 Agriculture

A number of the measures for the scheme will be located on agricultural land. The embankment at the rear of the houses at the Old Timoleague Road (E10 on Figure 6.1) will be located on agricultural land. The work will have a moderate negative impact on agricultural activities in this area. When constructed the embankment will have a moderate negative impact on the agricultural potential of the land because a portion of the land will be sterilised from use.

Similarly the construction of the fluvial embankment (E7, E8, E9 on Figure 6.5) and the supports for the sluice (SI1 and SI2 on Figure 6.5) and the spillway (H3 and H4 on Figure 6.5) will have a long term negative impact on the agricultural land. The positioning of the embankment may sterilise a portion of land between the western section of the embankment and the N71 road.

The storage reservoir will cover an area of 191,500m<sup>2</sup>. The magnitude of the impact of the scheme on this land will be dependent upon the frequency and extent of the flooding.

## 18.16 Waste Management

The scheme will not impact on waste management operations in the area. However wastes that are generated on site, either domestic wastes from the contractor's compound or construction



or demolition waste generated on site will need to be disposed of as per the requirements of the Waste Management Act. Any spillages of oil/diesel that may occur during the works will need to be disposed of as hazardous waste and the appropriate forms, tracking and disposal certificates will need to be retained by the contractors in the site offices. If a contaminated material is identified during any excavations etc. the material should be tested, a WAC assessment carried out on the material and based on the results, the correct disposal outlets should be found for the material.

### 18.17 Car Parks

A storm water pipe line and an underground pumping station will be installed in Kent Street car park. The construction work will have a temporary moderate negative impact on the use of the car park by the public. The presence of a kiosk over the pumping station will result in a permanent loss of parking space in the car park.

### 18.18 Mitigation Measures to Remedy the Impacts

A number of the impacts on the material assets in the town will be temporary and will last for the duration of the works. The potential impacts on the underground electricity cables will be mitigated by the Health & Safety Plan that will be place for the construction of the scheme. In addition it is recommended that the contractor's contacts service providers to get information on the location of the underground services. This will also apply to the gas lines, telephone and broad band lines.

Specific mitigation measures might include:

- Ongoing discussions with Cork County Council and the NRA regarding the proposed Northern Relief Road. The scheme has accommodated the proposed road where the proposed route is within the storage area.
- The contractors Health & Safety Plan should inform all sub-contractors of the location of underground services and appropriate measures should be taken to accommodate safe working in these areas.
- All waste management and handling of wastes must follow the required statutory regulations such as the Waste Management Act and Waste Collection Permit regulations. All records for waste disposal should be maintained in the site offices.

### 18.19 Residual Impacts

The installation of the proposed mitigation measures will ensure that there will be no significant residual impacts. The loss of some agricultural land will be a permanent residual impact.



## 19 Interaction of the Foregoing

### 19.1 Introduction

Chapters 6 to 16 of this Environmental Impact Statement describe the impacts of the proposed scheme on the environment. The Environmental Impact Assessment Regulations requires a description of:

*‘the interaction between any of the foregoing aspects’*

Interactions can occur when a predicted impact causes interaction or dependency with other environmental aspects. This section discusses the interactions between aspects and assesses them as positive, negative or neutral (as having no interaction or interdependency).

Cumulative impact interactions can occur as either interactions between impacts associated with just one project or interactions between the impacts of a number of projects in an area.

As a result, two types of cumulative impact interaction have been considered within this Environmental Statement (ES) as follows:

1. The combined effect of individual impacts arising as a result of the Proposed Development, for example effects in relation to noise, airborne dust or traffic impacting on a single receptor; and
2. The combined impact of the Proposed Development with several other development schemes which may, on an individual basis be insignificant but, together (i.e. cumulatively), have a significant impact.

The design of the proposed scheme considered the design and the environmental constraints identified at the early stages of this project. This process is discussed in Section 5 – Alternatives Considered, in this EIS.

Indirect and cumulative impacts were considered during the development of this scheme as a result of the sensitivity of the Special Area of Conservation in Clonakilty Bay, the presence of salmonids in the River Fealge, the architectural heritage of Clonakilty town, its archaeology and the inhabitants and commerce within the town. The requirements of the Clonakilty Town Plan were also considered. The options selected reduced the scale of intervention in the town, by reducing flow into the town as a result of engineering storage in the upper catchment. The tidal defences avoided large scale works in Clonakilty bay by using modest tidal defences within the boundary of the town. The balance between environmental, social, cultural heritage and economics constraints has been described in this assessment.

The remaining interactions after the optimisation of the layout of the scheme between the various aspects of the environment are discussed in each section of the environmental impact statement and reproduced in summary in the following section.

### 19.2 Potential Interactive Impacts

#### 19.2.1 Human Beings

Human beings are specifically addressed in Section 12. They are also indirectly considered where their livelihood and quality of life are considered. The scheme is positive for the inhabitants of Clonakilty. However the scheme will generate negative impacts such as visual impacts and agricultural land severance. Negative impacts will also occur during construction due to increased traffic in the town and road closures, noise and dust.

#### 19.2.2 Ecology and Fisheries

The construction of the sluice and the storage of flood waters may have a negative impact on the fish in the River Fealge because of increased suspended solid loading to the river. This impact will be short term and controlled by following good site management practices. Silt release will also depend on the number of occasions that the reservoir fills and empties in the early phase of its operation. The deposition of silt and suspended solids on the river bed has the potential to cover potential spawning grounds for salmonids.



### 19.2.3 Hydrogeology and Hydrology

Interactions between geology and water quality will occur during the construction phase due to soil excavation. This also has the potential knock-on negative impacts on fisheries and ecology.

### 19.2.4 Hydromorphology

There will be negative interactions between the operation of the storage area control device and the hydromorphology of the River Fealge. The proposed scheme has been assessed against the WFD objectives. The Fealge river system through Clonakilty is considered to be in a 'moderate' condition (ecological and chemical) in the River Basin Management Plan, with an objective to be restored by 2021 to satisfy stated WFD targets. The proposed scheme should not cause deterioration in the existing waterbody status and should not compromise its ability to achieve a future objective. Wider remediation may be required as reach scale impacts are possible as a result of the scheme, such as increased fine sediment deposition in the vicinity of the storage area due to dampened flows. These interactions may require channel remediation works, following a period of monitoring.

### 19.2.5 Interaction with other Plans and Programmes

The construction of this scheme also interacts with other programmes and policies. For example the scheme interacts with:

- The current Clonakilty Town Development Plan (2009-2105)
- The Cork County Biodiversity Plan (2009-2014)
- Draft Cork County Landscape Strategy (2007)
- The South West River Basin Management Plan (2010-2015)

#### **Clonakilty Town Development Plan (2009-2015)**

The Clonakilty Town Development Plan sets out the development objectives for the town over the life time of the plan. Two proposed project – the construction of the proposed bypass around the town (the North Ring Road) and the upgrade of the waste water treatment plant.

The footprint for the proposed bypass will pass through the storage area. The design of the storage area has made provision for the additional area that will be occupied by the bypass.

The works to be carried out at the waste water treatment plant include increasing and improving the capacity at the WWTP (by increasing the design load from 5,333 P.E. to 20,500 P.E.), including the incorporation of nitrogen and phosphorous reduction. The improvement works will also include the general refurbishment at the WWTP, an upgrade of the Long Quay pumping station and the construction of a new pumping station at Ring Village. An element of the drainage scheme is the provision of a number of storm water pipe lines in the town and a number of pumping stations that will discharge into the river or the estuary. The storm water drains will have the positive effect of reducing the hydraulic loading to the waste water treatment plant. The provision of nutrient management of the effluent discharges from the WWTP will assist in reducing the eutrophic status of the estuary and bay. This will have a knock-on effect of increasing the likelihood of the water quality in the estuary and bay achieving good water quality status by 2021 as per the requirements of the Water Framework Directive.

A Tidal Barrage is proposed in the development plan (draft) and if it goes ahead, it will be assessed under the Habitats Directive. However, it is envisaged that the proposed scheme will reduce the potential requirement for a Tidal Barrage as a flood management structure. The potential cumulative impacts of the proposed flood alleviation scheme in combination with a Tidal Barrage would not be significant, as a result of the flood alleviation measures chosen as these aim to avoid permanent works within the estuary and Clonakilty Bay SAC and SPA. However, the Tidal Barrage as a project in its own right may have significant impacts on Clonakilty Bay SAC and SPA and therefore is not viewed as the most appropriate option in the Options Appraisal Report due to the potential significant permanent impacts on Clonakilty Bay SAC and SPA, for this reason the development of the Tidal Barrage is unlikely to proceed due to adverse impacts on Clonakilty Bay SAC and SPA. However should it proceed the current flood scheme will not contribute to the adverse impacts of the Tidal Barrage.



**The Cork County Biodiversity Plan (2009-2014)**

In summary this Plan sets out Cork County Council's objectives to protect biodiversity in the County. The preferred drainage scheme for Clonakilty went through a number of processes; a constraints study, an environmental options appraisal and an Environmental Impact Statement before a decision was made on the final scheme. Stage 1 Screening Assessment were conducted on all the options considered. The tidal barrage option was removed because of the legal status (it is a Special Protection Area) and sensitivity of the Clonakilty Bay.

The final design of the scheme will have cognisance the fish (salmon, trout and lamprey) that inhabit the River Fealge and all in-river work will be carried out between May and September.

**Draft Cork County Landscape Strategy (2007)**

The visual impact assessment of the scheme had cognisance of the Landscape Strategy and the Scenic Views listed in the Cork County Development Plan. The final design and frontage on the defence walls will be agreed with the Clonakilty Town Architect.



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