

Table 9-6: Bird results from the desk-based assessment (National Biodiversity Data Centre, 2014)

2km Grid Square	Scientific Name	Common Name	Designation(s)	Year
W34V	<i>Hirundo rustica</i>	Barn Swallow	Wildlife Acts; Birds of Conservation Concern - Amber List	2010
W34V	<i>Pica pica</i>	Black-billed Magpie		2004
W34V, W34W	<i>Chroicocephalus ridibundus</i>	Black-headed Gull	Wildlife Acts; Birds of Conservation Concern - Red List	2010, 2001
W34V	<i>Limosa limosa</i>	Black-tailed Godwit	Wildlife Acts; Birds of Conservation Concern - Amber List	2010
W34W	<i>Fulica atra</i>	Common Coot	Wildlife Acts; EU Birds Directive Annex II, Section I Bird Species; EU Birds Directive Annex III, Section II Bird Species; Birds of Conservation Concern - Amber List	2001
W34V	<i>Tringa nebularia</i>	Common Greenshank	Wildlife Acts; Birds of Conservation Concern - Amber List	2004
W34W	<i>Falco tinnunculus</i>	Common Kestrel	Wildlife Acts; Birds of Conservation Concern - Amber List	2010
W34V	<i>Alcedo atthis</i>	Common Kingfisher	Wildlife Acts; Protected Species: EU Birds Directive Annex I Bird Species; Birds of Conservation Concern - Amber List.	2004
W34W	<i>Aythya ferina</i>	Common Pochard	Wildlife Acts; EU Birds Directive Annex II, Section I Bird Species; EU Birds Directive Annex III, Section II Bird Species; Birds of Conservation Concern - Amber List	2001
W34V	<i>Tringa totanus</i>	Common Redshank	Wildlife Acts; Birds of Conservation Concern - Red List	2010
W34V	<i>Tadorna tadorna</i>	Common Shelduck	Wildlife Acts; Birds of Conservation Concern - Amber List	2004
W34V	<i>Sturnus vulgaris</i>	Common Starling	Wildlife Acts; Birds of Conservation Concern - Amber List	2004
W34V	<i>Columba palumbus</i>	Common Wood Pigeon	Wildlife Acts; EU Birds Directive Annex II, Section I Bird Species; EU Birds Directive Annex III, Section I Bird Species	1991
W34V	<i>Calidris alpina</i>	Dunlin	Wildlife Acts; EU Birds Directive Annex I Bird Species; Birds of Conservation Concern - Amber List	2010
W34V, W34W	<i>Numenius arquata</i>	Eurasian Curlew	Wildlife Acts; EU Birds Directive Annex II, Section II Bird Species; Birds of Conservation Concern - Red List	2010, 2001
W34V	<i>Haematopus ostralegus</i>	Eurasian Oystercatcher	Wildlife Acts; Birds of Conservation Concern - Amber List	2004
W34V, W34W	<i>Anas crecca</i>	Eurasian Teal	Wildlife Acts; EU Birds Directive Annex II, Section I Bird Species; EU Birds Directive Annex III, Section II Bird Species; Birds of Conservation Concern - Amber List	2004, 2001
W34V	<i>Anas penelope</i>	Eurasian Wigeon	Wildlife Acts; EU Birds Directive Annex II, Section I Bird Species; EU Birds Directive Annex III, Section II Bird Species; Birds of Conservation Concern - Amber List.	2004
W34W	<i>Anas strepera</i>	Gadwall	Wildlife Acts; EU Birds Directive Annex II, Section I Bird Species; Birds of Conservation Concern - Amber List	2001
W34V, W34W	<i>Phalacrocorax carbo</i>	Great Cormorant	Wildlife Acts; Birds of Conservation Concern - Amber List	2004, 2001
W34V	<i>Larus argentatus</i>	Herring Gull	Wildlife Acts; Birds of Conservation Concern - Red List	2004
W34V	<i>Passer domesticus</i>	House Sparrow	Wildlife Acts; Birds of Conservation Concern - Amber List	1991
W34V	<i>Larus fuscus</i>	Lesser Black-backed Gull	Wildlife Acts; Birds of Conservation Concern - Amber List	2004
W34V	<i>Egretta garzetta</i>	Little Egret	Wildlife Acts; EU Birds Directive Annex I Bird Species	2010
W34V, W34W	<i>Anas platyrhynchos</i>	Mallard	Wildlife Acts; EU Birds Directive Annex II, Section I Bird Species; EU Birds Directive Annex III, Section I Bird Species	2004, 2001
W34V	<i>Larus canus</i>	Mew Gull	Wildlife Acts; Birds of Conservation Concern - Amber List	2004
W34V, W34W	<i>Cygnus olor</i>	Mute Swan	Wildlife Acts; Birds of Conservation Concern - Amber List	2010, 2001
W34V	<i>Vanellus vanellus</i>	Northern Lapwing	Wildlife Acts; EU Birds Directive Annex II, Section II Bird Species; Birds of Conservation Concern - Red List	2004
W34V	<i>Mergus serrator</i>	Red-breasted Merganser	Wildlife Acts; EU Birds Directive Annex II, Section II Bird Species	2004
W34V	<i>Columba livia</i>	Rock Pigeon	Wildlife Acts; EU Birds Directive Annex II, Section I Bird Species	1991
W34V	<i>Sterna sandvicensis</i>	Sandwich Tern	Wildlife Acts; EU Birds Directive Annex I Bird Species; Birds of Conservation Concern - Amber List	2010
W34V	<i>Muscicapa striata</i>	Spotted Flycatcher	Wildlife Acts; Birds of Conservation Concern - Amber List	1991

Waterbirds within Clonakilty Bay

Results from the 2010/2011 Waterbird Survey Programme as undertaken by The National Parks & Wildlife Service (Cummins and Crowe, 2011) recorded a total of 43 waterbirds at Clonakilty Bay in the winter of 2010/11. This study highlighted that Black-tailed Godwit were recorded with a peak count of 761 which is of international importance. This species occurred at 15 of the 17 surveyed subsites within the Bay, with numbers peaking in November. Furthermore, the surveys showed that Shoveler (35), Knot (793), Dunlin (1,081) and Greenshank (22) were recorded in numbers of national importance. Of note, the peak count of Curlew within Clonakilty Bay (545) falls only slightly short of the threshold number for national importance at 550 individuals. In addition, the most inland areas within the bay are important for Lapwing and Bar-tailed Godwit with highest numbers being recorded at this location.

A study of waders at Clonakilty Bay suggested that over-wintering species exhibited site fidelity over the six winter seasons that the study spanned (Lewis and Kelly, 2012). Furthermore, the study confirms a Bar-tailed Godwit and Black-tailed Godwit roosting site alongside the river channel within the inner estuary, near the sewage works and in close proximity to proposed works areas. This study highlighted the importance of the inner estuary for a range of foraging wading bird species. In addition to the shelter provided by this area, birds are possibly benefiting from organic enrichment that is sustaining relatively high numbers of macro-invertebrates, with the enrichment attributed to the Clonakilty Waste Water Treatment Plant (WWTP) which discharges effluent into the head of the estuary (Lewis and Kelly, 2012).

Other bird species recorded

No specific bird surveys were conducted as part of this EclA, however, during the surveys undertaken on site as part of this study the following species were observed, as detailed in Table 9-7.

Table 9-7: Bird species recorded during ecological walkover survey and other field surveys

Common Name	Scientific Name	Comment
Blackbird	<i>Turdus merula</i>	Frequent throughout study area
Blackcap	<i>Sylvia atricapilla</i>	Occasional around hedgerows within the flood storage area
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	Frequent at the head of Clonakilty Bay
Blue Tit	<i>Cyanistes caeruleus</i>	Frequent throughout study area
Chaffinch	<i>Fringilla coelebs</i>	Flock (>20) observed in Autumn 2014 in the hedgerow on the southern side of where the embankment is proposed
Carrion Crow	<i>Corvus corone</i>	Frequent throughout study area
Dipper	<i>Cinclus cinclus</i>	On the River Fealge, upstream of Seymour Pedestrian Bridge
Goldcrest	<i>Regulus regulus</i>	Occasional around hedgerows within the flood storage area
Goosander	<i>Mergus merganser</i>	Clonakilty Bay
Great Tit	<i>Parus major</i>	Frequent throughout study area
Greenfinch	<i>Carduelis chloris</i>	Flock (>20) observed in Autumn 2014 in the hedgerow on the southern side of where the embankment is proposed
Grey Wagtail	<i>Motacilla cinerea</i>	Several locations on the River Fealge, including beside the pedestrian bridge at the Credit Union
Kingfisher	<i>Alcedo atthis</i>	Recorded at Facksbridge
Long-tailed Tit	<i>Aegithalos caudatus</i>	Frequent throughout study area, including a flock of 10 in Autumn 2014 in the hedgerow on the southern side of where the embankment is proposed
Magpie	<i>Pica pica</i>	Frequent throughout study area
Mallard	<i>Anas platyrhynchos</i>	Clonakilty Bay and River Fealge
Mute Swan	<i>Cygnus olor</i>	Clonakilty Bay
Pheasant	<i>Phasianus colchicus</i>	Occasional in flood storage area
Pied Wagtail	<i>Motacilla alba</i>	Frequent throughout study area
Redshank	<i>Tringa totanus</i>	Clonakilty Bay
Robin	<i>Erithacus rubecula</i>	Frequent throughout study area

Common Name	Scientific Name	Comment
Rook	<i>Corvus frugilegus</i>	Frequent throughout study area
Whooper Swan	<i>Cygnus cygnus</i>	One recorded in March 2014 at head of Clonakilty Bay
Woodpigeon	<i>Columba palumbus</i>	Frequent throughout study area
Wren	<i>Troglodytes troglodytes</i>	Frequent throughout study area

The upstream reaches of the river have occasional small vertical embankments, however, these are generally too low to be used by Kingfisher or Sand Martin Riparia riparia to nest in, although isolated areas for Kingfisher nesting may be present. The desk-based assessment also returned records of Kingfisher for the area and individual birds have been recorded in the Facksbridge area.

The heavily modified sections of the river, through the town of Clonakilty, with large retaining walls and a number of bridges, contain a number of crevices, cracks and voids, which could be exploited by species such as Grey Wagtail or Dipper for nesting.

Throughout the surveyed reach there is ample habitat available (i.e. woodland, scrub, gardens) for nesting, particularly for passerine species.

9.3.4 Otter

During the ecological walkover survey, evidence of Otter was recorded at two locations along the river (see Figure 9-12). Otter footprints were found in soft mud on the left bank of the river in the upstream portion of the surveyed area, where an offline pool has been excavated into the bank and is used for monitoring water levels by the landowner.

A large pile of rocks located immediately upstream of where the Capeen Stream connects to the main River Fealge has also been used as a resting place for Otter. A number of spraints, of varying ages, were recorded on one of the rocks, close to the river, with the cavity behind having a flattened mud base with a number of footprints within. Given the relatively small size of this cavity, and its proximity directly on the river bank it is not considered to be a natal (i.e. breeding) den, which are ordinarily some distance from main watercourses, and frequently do not have spraint sites outside (Chanin, 2003).

Figure 9-12: Evidence of Otter

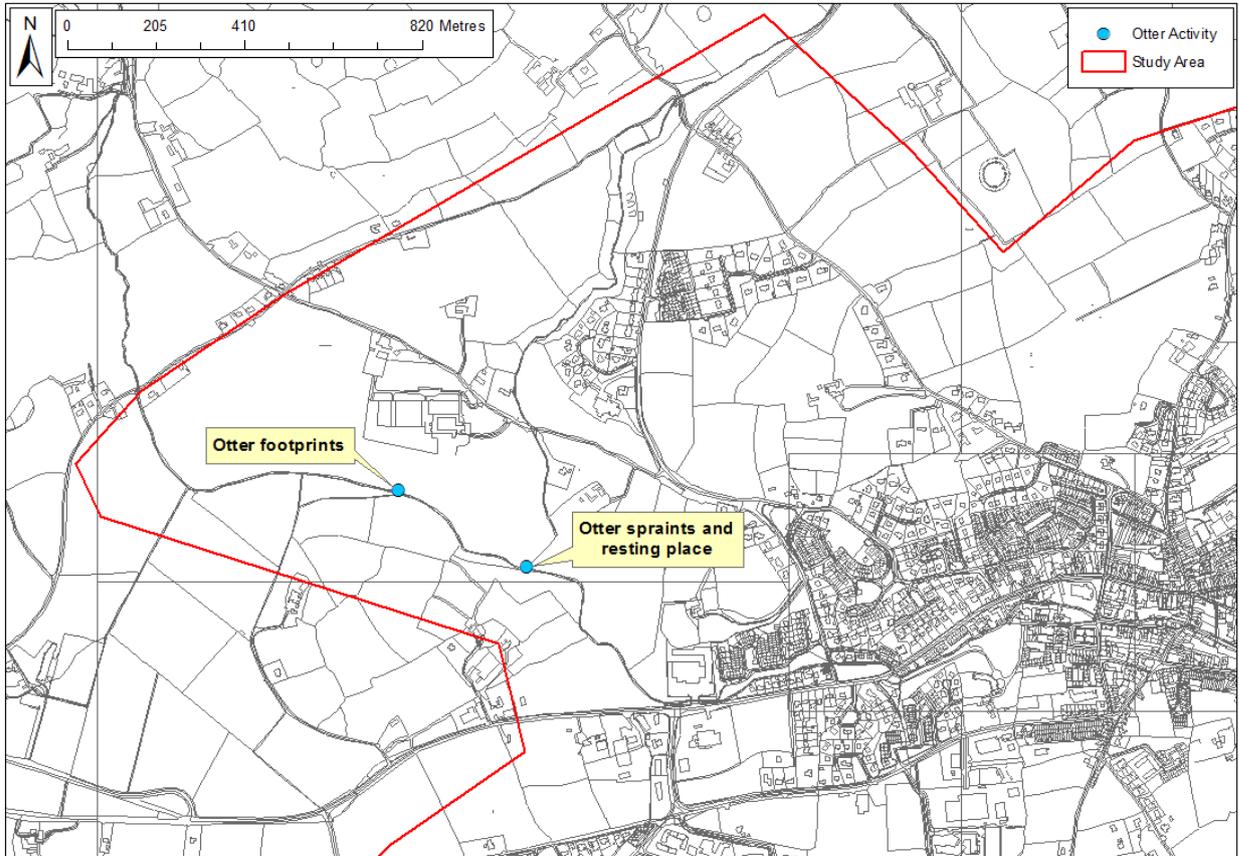


Figure 9-13: Footprints (left) and resting place with sprints on rock in the foreground (right)



The habitat surrounding the river in the upstream reaches of the surveyed area also provides good habitat for Otter, with the treeline along the river, and the areas of woodland and scrub, providing good cover. Furthermore, the fish survey (see section 9.2.3) identified that River

Fealge holds a significant food source for Otter, with good populations of salmonids and other fish species.

The desk-based assessment also returned records of Otter from the W34Q 2km grid square covering the study area, however, this record dates from the 1980s; this is likely to be due to the lack of recording effort rather than the absence of this species (NBDC, 2014).

9.3.5 Badger

No evidence of Badger was recorded during the ecological walkover survey, and the urban nature of the downstream parts of the study area are considered sub-optimal for this species due to the high levels of disturbance and extensive development. Upstream parts for the study area do however provide suitable habitat for this species.

The desk-based assessment returned records of Badger from the W34R 2km grid square covering the study area, from 2007 indicating their potential presence in the wider area.

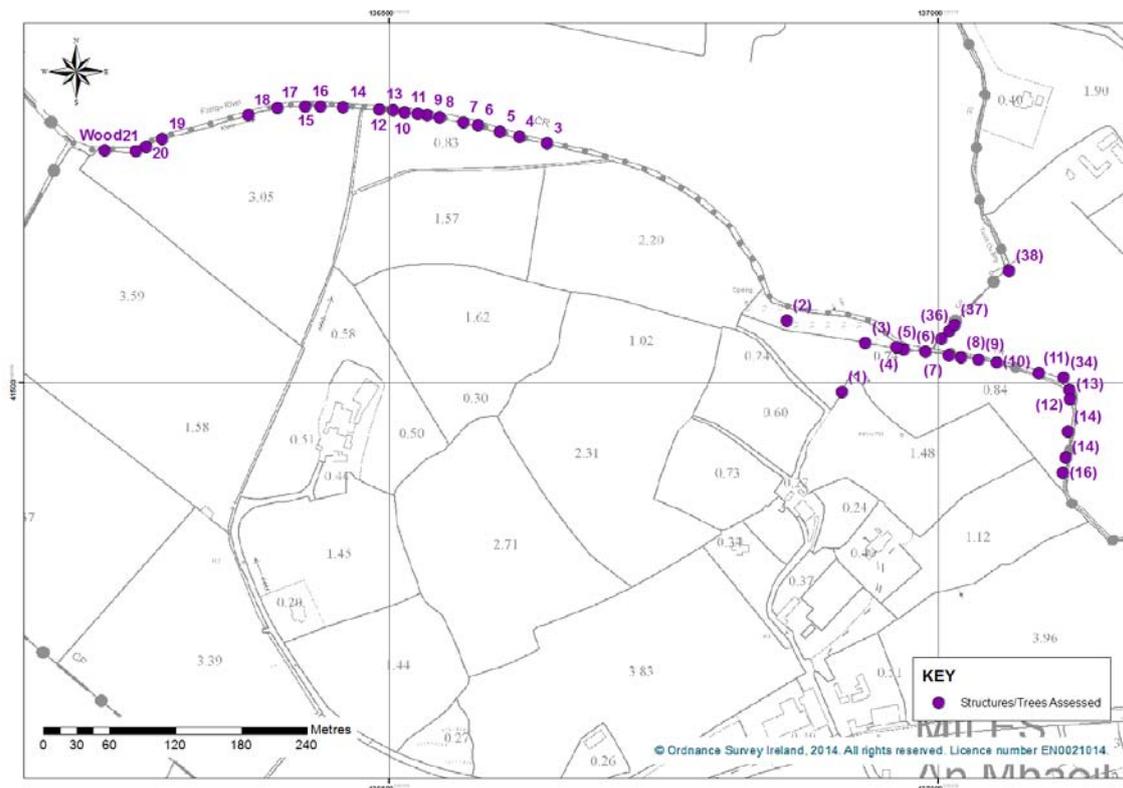
9.3.6 Bats

The bat survey identified that bats were fairly ubiquitous within the study area, however, there were a number of key locations where the numbers foraging animals were very high, especially in the town. However, in the rural part of the study area, the numbers recorded were lower but the species were of more note and there were a number of very prominent potential roosting features identified.

Roost Surveys

In the rural section upstream of the Clonakilty all trees that were surveyed for the presence of bats are mapped in Figure 9-14. Of these only a very small number had a high potential to hold roosting bats; numbers 10, 11, 13 and 14 at the eastern end of Figure 9-14. All of these were groups of trees and dominated by Alder *Alnus glutinosa* with Group 14 mono- specific.

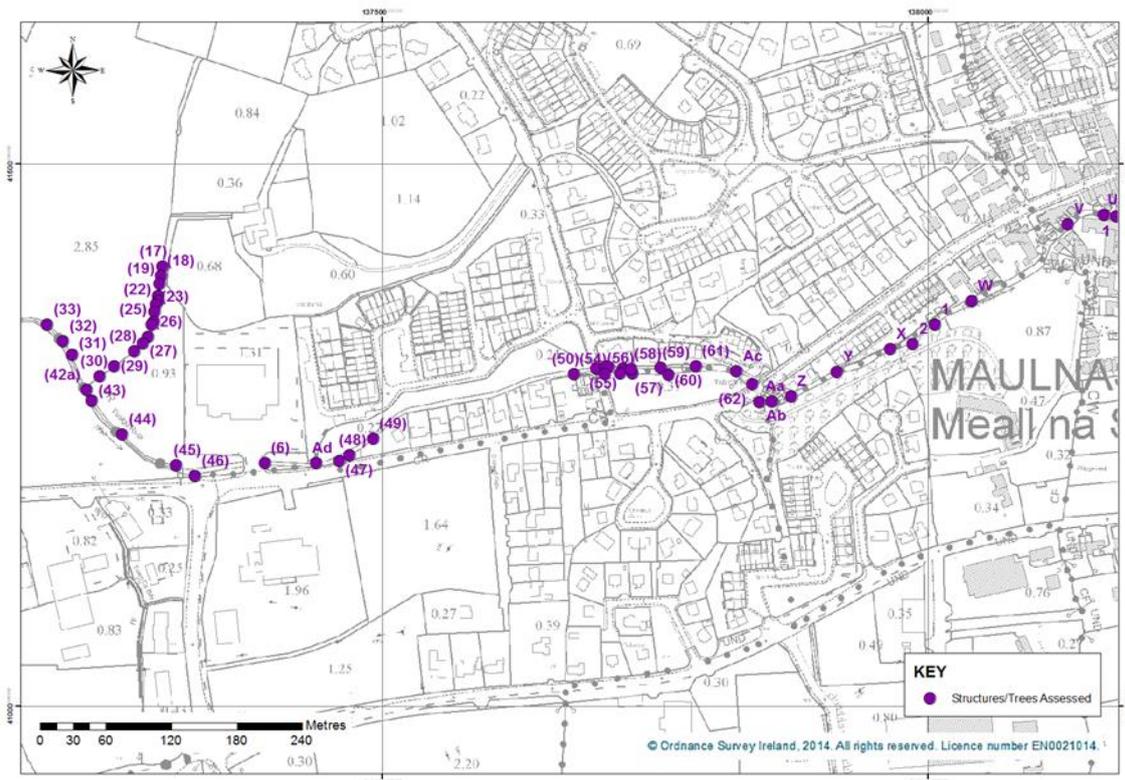
Figure 9-14 : All trees/structures surveyed for bats in the westernmost (rural) part of the study area



The western edge of the town is abutted by a small, out of town, retail park and new housing estates. The positions of all the trees and structures assessed in this section of the survey area are shown in Figure 9-15. Trees are less numerous here, but in the sections along the Fealge where areas of pasture and woodland remain as islands in the urban land cover, mature trees

are still present. In addition, a number of structures provide potential bat roosts. However, most of the trees do not offer good potential for roosting bats, with most of them being classed as having low or no potential. However, Alder tree number 59 does offer medium potential because of the presence of numerous features, including woodpecker holes and Ivy. In addition, within the woodland on the right bank of the Fealge near Woodbrook, a number of trees have a high potential for supporting roosting bats, especially an Ash tree (number 2 in Figure 9-15) which has obvious loose bark and other features that will suit tree-dwelling bat species. The river walls in this section are of various ages, are generally of low height and have often had extensive repairs. As a result they are considered to have a low potential to support roosting bats.

Figure 9-15 All trees/structures surveyed for bats in the central part of the study area



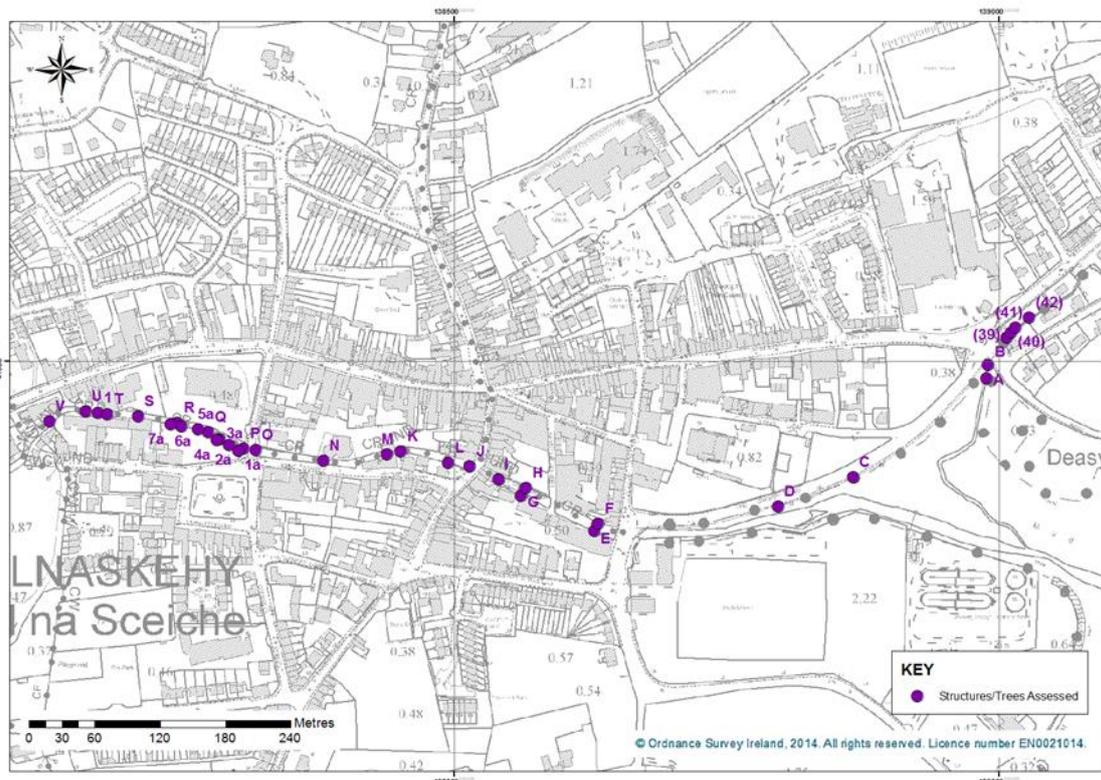
The eastern part of the survey area is urban in nature and contains the town centre as well as the tidal reaches of the River Fealge. The survey also covered a small tributary of the Fealge, upstream of a flap valve that separates it from the tidal estuary and its saltmarsh. This area is characterised by buildings with scattered trees, and numerous bridges, some of which are of considerable age. Along most of the survey reach the River Fealge is lined with walls of varying ages. Many of the buildings are also derelict or in a poor state of repair, and many of these, and the trees present, do offer the potential to support bat roosts. Those features in the eastern part of the survey that have been assessed for bat roost potential are shown in Figure 9-17. There are a number of trees situated to the east and west of the town centre: those on the east side, near Facksbridge, are generally of low or no potential whilst, on the west side of the town centre, on the right bank of the Fealge, opposite the Parish Church the situation is very different. Here there are a number of trees of high and medium potential to support bats (1a, 4a, 5a and 6a in Figure 9-17), with one standing dead Elm offering the greatest potential due to numerous longitudinal splits in the trunk (tree 4a). These riparian trees are situated on private land so investigations could only take place with the use of binoculars from the opposite (left) bank of the River Fealge, but the trees in this area offer some of the highest potential for bat roosts within the whole study area.

Figure 9-16: Ivy-covered walls on old brewery building



The structures in the area also offer bat roosting potential, in particular the Ivy-covered walls of the old brewery, immediately upstream of the church and the riparian woodland strip mentioned previously. These walls are composed of stone and, even though they have been repaired, there are a number of areas that still provide suitable cracks and crevices for roosting bats. In addition, the walls are densely covered with Ivy and Traveller's Joy *Clematis vitalba* along much of their length and are generally unlit, making the conditions ideal for roosting bats (Figure 9-16).

Figure 9-17: All trees/structures surveyed for bats in the Eastern part of the study area



Timed Surveys

Time surveys were undertaken on the nights of 20th and 21st August 2014 by two surveyors. On the 20th August the two surveyors positioned themselves in the grassland to the south-west of the Cemetery (see Figure 9-18), near the trees which were identified as having medium potential to support roosting bats [trees 10, 11, 14 and 15 in Figure 9-14]. The surveys began

Figure 9-19: Locations of bat surveyors in the centre of the study area

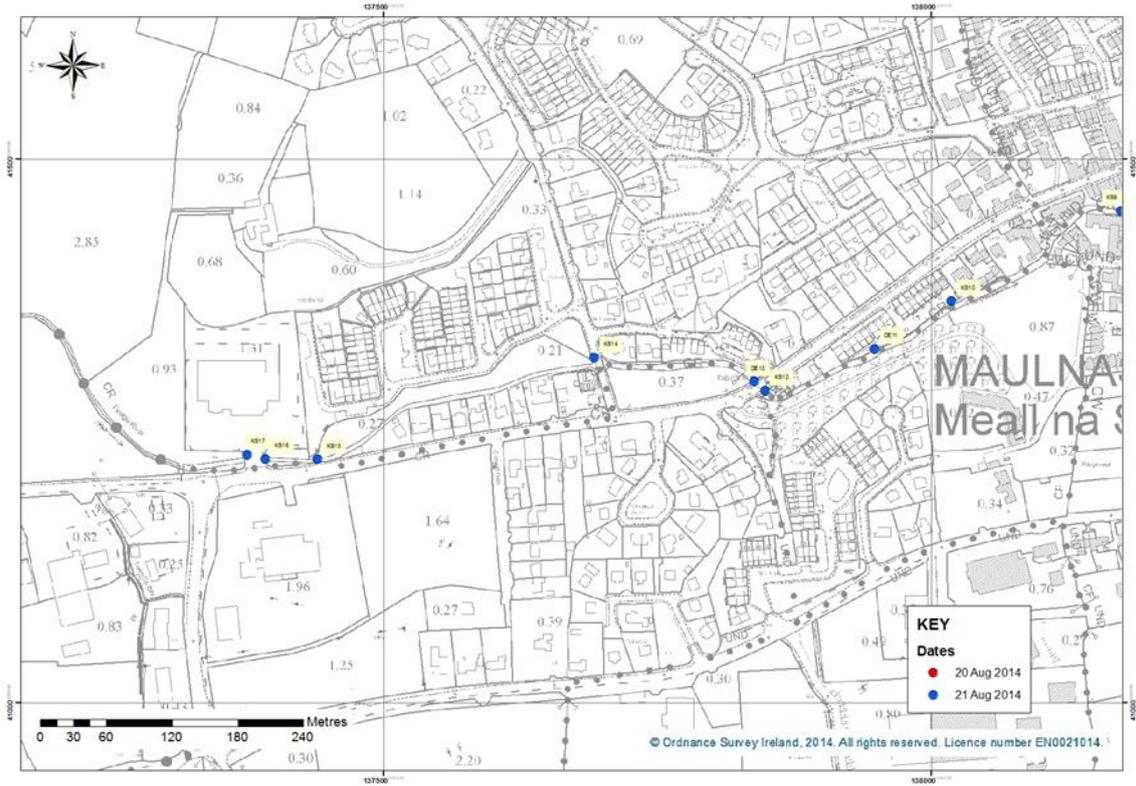


Figure 9-20: Locations of bat surveyors in the east of the study area

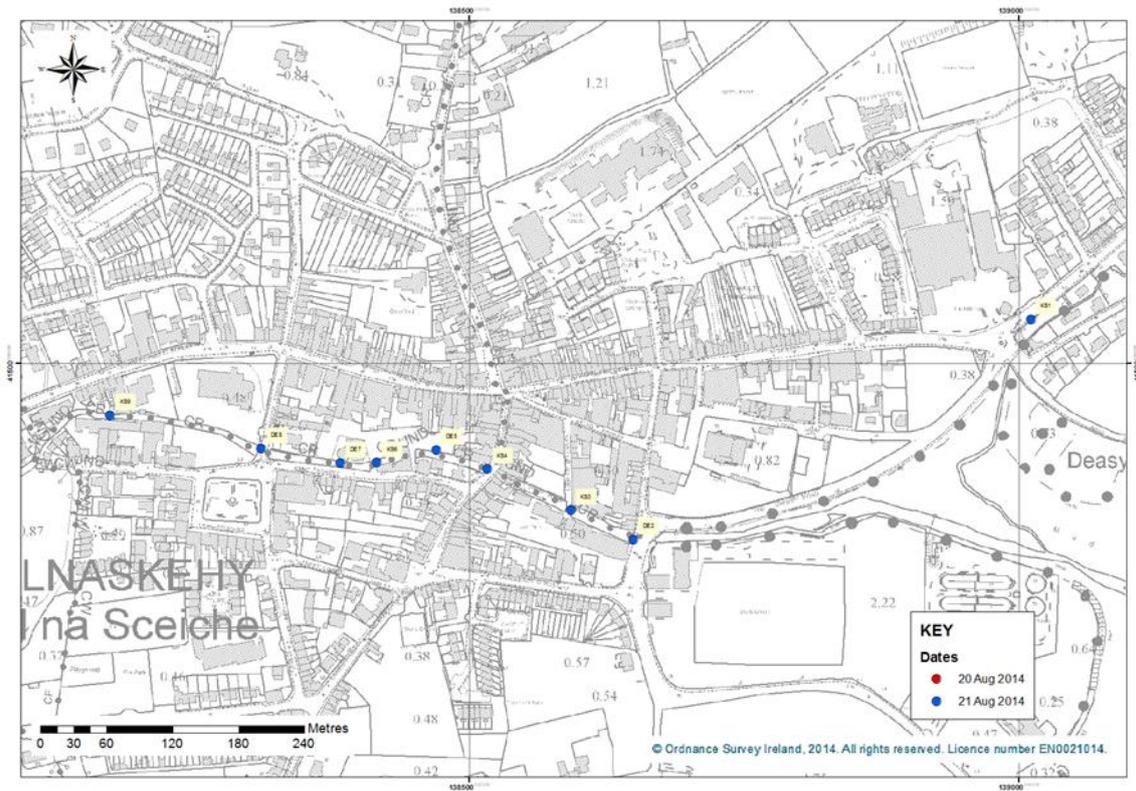
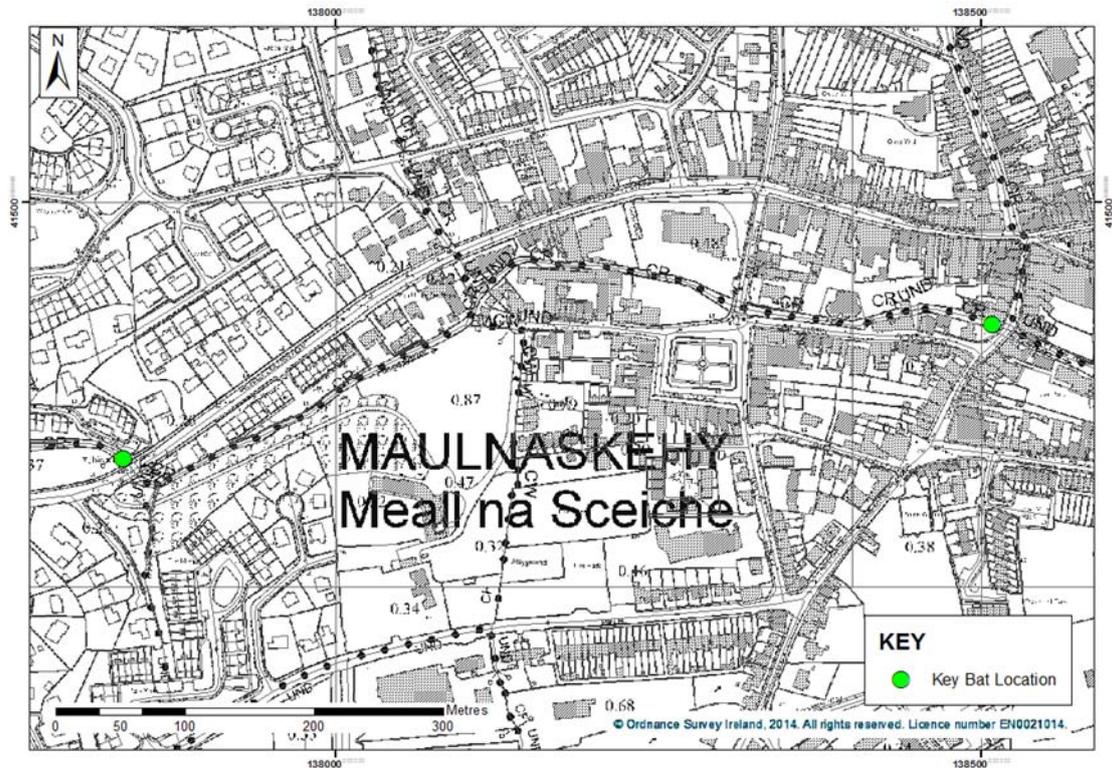


Figure 9-21 : Key bat foraging locations in Clonakilty



Other areas were much quieter than had been expected following the roost surveys, in particular the area immediately upstream of Clarke Street Bridge and the areas near the church and the old brewery upstream. The suitability of the habitat in terms of foraging opportunities and roosting locations would appear to be ideal, however, at the time of the visit, very few bats were recorded in these areas.

Static Survey

Static (Anabat Express) bat detectors were placed in two locations in the field to the southwest of the cemetery on the 20th August 2014 and left for two nights. One was placed alongside the River Fealge and the other on the hedgerow to the east of the site, approximately at the point where the embankment will tie into an area of higher ground. The results were analysed using Anabat Analook software and those for Static 118 are shown in Appendix 9B however, the second static recorder failed to function and no records were obtained. For this reason its position has not been recorded in Figure 9-18. The Static 118 detector results recorded Common and Soprano Pipistrelle Bats (in good numbers) on both survey nights as well as Leisler's Bat *Nyctalus leisleri*, again on both nights. On the night of the 20th-21st August, Whiskered Bats *Myotis mystacinus* were also recorded on numerous occasions and Daubenton's Bat *Myotis daubentonii* was recorded on one occasion during the night of 21st-22nd August 2014.

Bat Survey Conclusions

Bats are using the entire length of the River Fealge upstream of Rossa Street Bridge, however, there were no records of bats downstream of this location, where it becomes tidal. A few Common Pipistrelle passes were recorded near Facksbridge but these were occasional and did not appear to be associated with the watercourse. Whilst bats are widespread along the River Fealge, there are a few areas that have high activity within the town itself, and records were always of common bat species. To the west of the town in the area around the proposed flood storage reservoir, the records are sparser but other, rarer, species have been recorded foraging along the river and the tree lines at this location.

9.3.7 Fisheries

Habitat Assessment

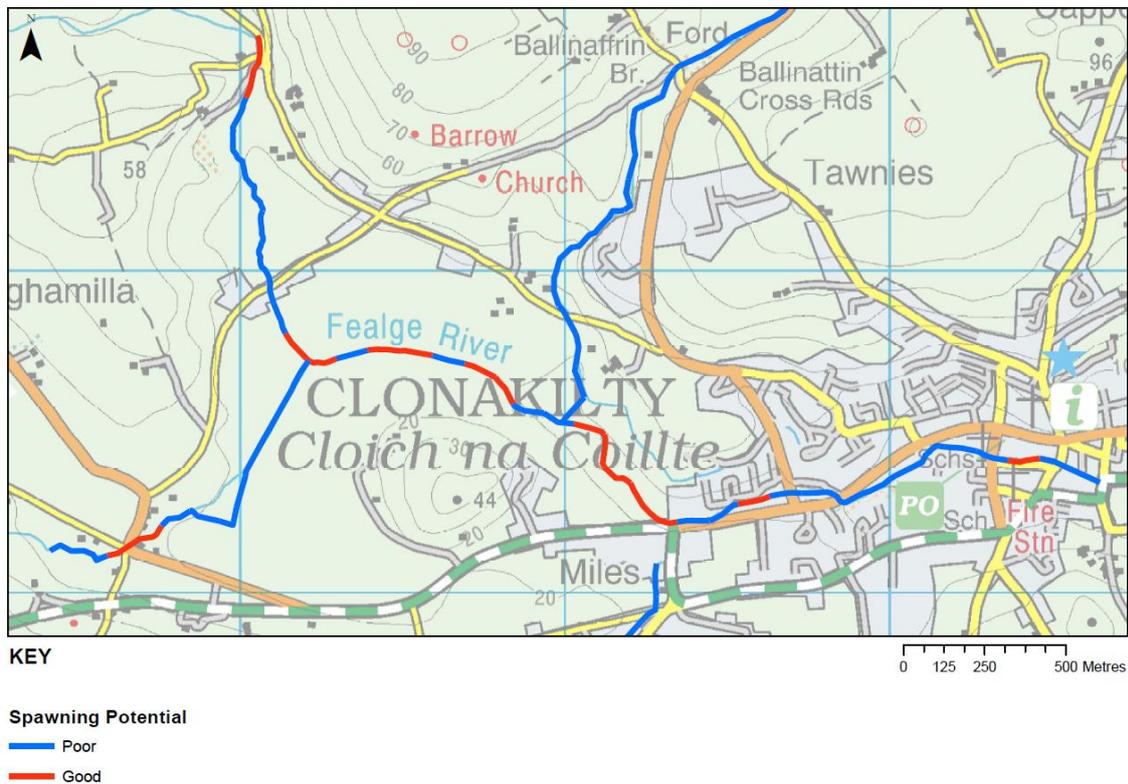
The survey identified that the four sample sites provide significant sections of good to excellent fish habitat. However, in-stream characteristics such as aquatic macrophyte growth affect the quality of certain sites. Some sites also provide potential habitat for lamprey species but overall lamprey habitat was not considered widespread in the sections under investigation.

In addition, the physical habitat assessment of sites within the study area for their suitability for macro-invertebrate production scored all sites highly; all sites can be considered to provide good to excellent macro-invertebrate production conditions (in particular Sites 1, 3 and 4). The results of the ecological habitat evaluation indicate that there should be a high volume of macro-invertebrates available, which will allow fish populations to thrive. All Sample Sites 1-4 were rated as C – High Value, Locally Important, based on the NRA evaluation criteria (2008).

Whilst the aquatic ecological and fisheries assessment found that the habitat available at the four sample sites provided excellent nursery habitat for salmonids, the hydromorphological survey identified that, within the Study Area as a whole:

- Many of the areas of gravel identified contained sand or silt which would limit the effectiveness of the substrate as salmonid and lamprey spawning habitat but provide habitat for adult Brook Lamprey. However, the survey was conducted after a period of low flows, and under elevated autumn flows, these gravels may well be cleaned. In-channel vegetation also modified preferential flow paths and obscured the view of areas of the river bed. Any in channel works should not seek to act as a barrier to sediment transportation as this could create future erosion and / or deposition issues locally and downstream through sediment starvation.
- Spawning habitat availability in the lower reaches of the Fealge is limited, with low velocities due to tidal influence and the presence of weirs. Gravel retention during high flow events may also be limited due to the canalised nature of the river in the urban area.
- The river throughout contains an abundance of gravel substrates which can provide, in some locations where fine sediment accumulation is absent, good places for fish spawning and a diverse hydromorphology characteristic of this river type. Figure 9-22: Areas of the River Fealge system with good potential to support fish spawning habitat below identifies the areas where good salmonid spawning habitat was present. However, as discussed in section 9.2.3 this survey was limited by being conducted at a sub-optimal time of year (summer).

Figure 9-22: Areas of the River Fealge system with good potential to support fish spawning habitat



Fish Survey

In total, 327 fish (12.58 kg) were intercepted during the electrical fishing activities over the four sites with five species of fish represented i.e. Brown Trout *Salmo trutta* (n=275), European Eel *Anguilla anguilla* (n=38), Salmon *Salmo salar* (n=3), Stone Loach *Barbatula barbatula* (n=5) and Three-spined Stickleback *Gasterosteus aculeatus* (n=5). Examples of intercepted fish are shown in Figure 9-23.

The resident salmonid populations of fish in the river are primarily Brown Trout (n=275), with just a few Salmon encountered (n=3). The vast majority of the salmonid fish encountered are 0+ and 1+, estimated at 91%. This indicates that Sample Sites 1-4 provides excellent nursery habitat for salmonids. In particular Site 2 and Site 4 provide good to excellent habitat for nursery and rearing areas for salmonids (both trout and salmon). Taken as a whole this is a very productive river for salmonids, with large numbers of juvenile brown trout present. Salmon numbers are low but the fact that salmon were recorded at Sample Site 1 is significant and illustrates that salmon are migrating to the top of the system. None of the salmon or trout caught were returning sea trout or salmon.

While lampreys are known to be present in this system from the desktop study no lampreys were recorded during this survey. The reason for this is that little suitable habitat is present at any of the four Sample Sites given the substrate is dominated by cobble at these locations. Where potential lamprey habitat was encountered this was electrofished.

Eel were recorded at all sample locations, but in larger numbers at Sample Site 4 within the urban zone of Clonakilty.

The full aquatic ecological and fisheries assessment can be found at Appendix 9A.

Figure 9-23: European Eel (top left), Atlantic Salmon (top right) and Brown Trout (bottom) caught during the electro fishing survey



White-clawed Crayfish

No White-clawed Crayfish *Austropotamobius pallipes* were recorded during extensive searches, which is likely to confirm their absence from this system.

9.3.8 Other Protected Fauna

The desk-based assessment also identified the presence of other protected fauna within the 2km grid square, as detailed in Table 9-8.

Table 9-8: Results from the desk-based assessment (National Biodiversity Data Centre, 2014)

2km Grid Square	Scientific Name	Common Name	Designation(s)	Year Recorded
Terrestrial Mammal				
W34Q	<i>Erinaceus europaeus</i>	West European Hedgehog	Wildlife Acts	2010
Invertebrates				
W34W	<i>Balea (Balea) perversa</i>	Tree Snail	Vulnerable	1991
W34V	<i>Cecilioides (Cecilioides) acicula</i>	Blind Snail	Vulnerable	1984
W34W	<i>Lasiommata megera</i>	Wall Butterfly	Endangered	1976
W34W	<i>Pyronia tithonus</i>	Gatekeeper Butterfly	Near threatened	1976
Amphibians				
W34V	<i>Rana temporaria</i>	Common Frog	EU Habitats Directive Annex V; Wildlife Acts	1997

9.3.9 Non-native Invasive Species

A small patch of Japanese Knotweed *Fallopia japonica* was recorded during the ecological walkover survey, in a small area of amenity grassland and ornamental planting to the south of the N71/Convent Road, north-east of the Facksbridge Roundabout.

No evidence of other invasive non-native species was recorded during the survey, with the exception of occasional ornamental Rhododendron *Rhododendron ponticum* in the grounds of the church.

One non-native invasive species has been recorded within the study area; the New Zealand Flatworm *Arthurdendyus triangulatus* in 1993. This species is established in Ireland and causes a significant reduction in earthworm populations, so although the record is pre-2000, it is notable as being a potential threat in the area (NBDC, 2014).

Cord-grass *Spartina* spp. is also known to occur in the estuary in places (NPWS, 1999), however, none was observed at the head of the estuary and in works areas during the ecological walkover survey.

9.3.10 Evaluation of Ecological Receptors

This section evaluates the nature conservation importance of the study area for its habitats and for the species it supports in terms of its relative importance in a geographical context, following the assessment criteria outlined in section 9.2.5.

The habitats and species which have been identified as valued ecological receptors within the study area have been evaluated based on the criteria given in Table 9-9. The value of the receptor is defined with reference to the geographical context of the study area i.e. the specific importance of the study area to each of the habitats or protected species populations identified as being present within it, or making use of it. This assessment of value is based on the condition of the site during the survey period, although, where information is available, reference is made to previous years when the study area was much wetter.

Table 9-9: Evaluation of Ecological Receptors

Receptor		Evaluation Rationale	Value of Receptor or Value of Site to Receptor
Clonakilty Bay SAC		As these sites are designated under the European Communities (Birds and Natural Habitats) Regulations 2011, made under European Habitats Directive, they are considered to be of international importance	International
Clonakilty Bay SPA			
Clonakilty Bay pNHA			
Habitats and Flora	River Fealge	The River Fealge, being the principal watercourse in the locality is considered to be of local importance, despite the relatively low species-richness and heavily modified nature, particularly in the downstream reaches	Local
	Watercourses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation (Annex I habitat)	The upstream reach of the River Fealge (upstream of Dunnes Stores) as identified as containing the Annex I habitat of watercourses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation, although of relatively low quality. However, this notable habitat type is present over a considerable length of watercourse and represents a viable area	National
	Estuarine and Intertidal habitats	Given that Clonakilty Bay SAC is designated for its estuarine and intertidal habitats, this habitat type is considered to be equivalent ecological value, despite the relatively poor quality of these habitats within the works areas	International
	Other Watercourses	Other watercourses within the study area considered to be of less than local importance only given their relatively low species-richness and heavily modified nature	Less than Local

Receptor		Evaluation Rationale	Value of Receptor or Value of Site to Receptor
	Grasslands	As the grassland habitats present within the Study Area are generally managed improved and amenity types, of which there are considerable proportions elsewhere within the region, this habitat type is considered to be of less than local importance only	Less than Local
	Hedgerows and Field Boundaries	Due to the considerable age and diversity of many of the hedgerows and field boundaries within the study area they are considered to be of local importance	Local
	Woodland/ Scrub	As the woodland and scrub habitats within the study area are generally of plantation origin or coniferous or mixed species composition, they are considered of less than local importance only	Less than Local
	Urban Environment	The heavily developed nature of the town of Clonakilty results in its assessment of being of less than local ecological value	Less than Local
Birds	Overwintering wetland birds	Given that Clonakilty Bay SPA is primarily designated for its overwintering wetland bird populations, this group of species is considered to be equivalent ecological value	International
	Other bird populations	The Study Area provides ample habitat and supports a range of other common bird species, consequently the a valuation of local importance is applied	Local
Otter		Although Otter are listed on Annex IV of the Habitats Directive and also on the Wildlife Acts, it is not considered that the River Fealge supports a substantial population of this species and the resting place identified was not considered to support breeding animals. The Otter population within the Study Area is therefore considered to be of Regional/ County importance	Regional/ County
Badger		Although no evidence of Badger was found during the ecological walkover survey, the desk-based assessment returned records of this species and the upstream portion of the study area provides suitable habitat for this species. The Study Area is therefore considered to be of local importance for this species	Local
Bats		The large numbers of Common and Soprano Pipistrelle Bats recorded in the town of Clonakilty during the bat survey is of note and, whilst the Habitat Suitability Index (HSI) for these species is in the third quintile, the numbers present would appear to be higher than this. In the more rural areas, rarer bat species, such as Leisler's and Whiskered, along with the commoner Daubenton's, were recorded. The numbers recorded tend to match those expected from the HSI data on the National Biodiversity Data Centre website. In view of the nature of the species recorded and the numbers of the commoner species present, the Study Area is considered to be of Regional/County importance.	Regional/ County
Fisheries		Given that the River Fealge was found to be a very productive river for salmonids, with large numbers of juvenile Brown Trout present and suitable habitat, it is considered to be of regional/county importance	Regional/ County

Non-native invasive species are not an ecological receptor that require an assessment of value to be given as they are a constraint to works; they will however be considered throughout this assessment.

9.4 Impacts of the Proposed Scheme

The following section identifies the potential impacts of the proposed River Fealge (Clonakilty) Drainage Scheme, both in the short-term during the construction period and in the long-term once the scheme becomes operational.

9.4.1 Short-term Construction Impacts

Designated Conservation Sites

The proposed River Fealge (Clonakilty) Drainage Scheme will require construction works to be undertaken along the boundaries of the Clonakilty Bay SAC and SPA, and also the pNHA. The aspects of the work that will encroach within the boundaries of the designated site are the construction of the tidal walls along 220m of the Ring Road, The Croppy Road between Clarke Street and Facksbridge and from Clarke Street along the south bank, through the Waterfront Development to boundary of the WWTP. Upon completion no part of the permanent tidal defence walls will encroach within the boundaries of the designated site, but during the construction phase there will be a temporary loss of, and physical damage to, mudflat and sandflat habitats within the footprint of the walls and wider working area, in particular along the alignment of the cofferdam. Mudflat and sandflat sediment, and the invertebrate community they support, will be disturbed and excavated to facilitate construction of the walls. This impact will however be temporary and an effect of medium magnitude is anticipated, potentially resulting in a major negative impact.

In addition, construction works along the boundaries of the designated site would generate disturbance as a result of machinery operation and workforce movement; this will impact upon the waterbird populations within the SPA. Whilst the Croppy Road already provides some background levels of disturbance as a result of vehicular and pedestrian movements, construction activities are likely to be more disruptive in terms of noise level and frequency of movement. This increased level of disturbance is likely to cause the displacement of bird populations from the head of the estuary area, resulting in increased stress and additional energy expenditure. At certain times of year (i.e. during cold spells in the winter) the effect of this could be particularly severe (i.e. of medium magnitude) and have a major negative impact. Further discussion of disturbance impacts of birds is provided below.

Indirect impacts on the designated sites could also occur as a result of construction activities both within the site, and also upstream. During the construction phase there is the potential that silt within watercourses will be mobilised or that pollution incidents could occur. The River Fealge could then act as a pathway for this contaminated material to reach the designated Clonakilty Bay, adversely impacting upon the habitats and species present. Contaminated water or silt may locally adversely affect the habitats, flora and macro-invertebrate fauna they support at the head of the estuary, including mudflats, sandflats and saltmarsh. This could then impact upon the food source of the waterbird populations in this area, causing them to have to find alternative feeding areas. However, given the large size of the estuary, the resulting dilution effects, and the relatively localised nature of the works, a large proportion of which are upstream of the site, this is unlikely to have a widespread impact across the bay. An impact of low magnitude is therefore anticipated, resulting in a conclusion of a moderate negative impact.

As potentially significant adverse impacts on the Clonakilty Bay SAC and SPA have been identified the project has been subject to an Appropriate Assessment under Article 6(3) of the Habitats Directive. An Appropriate Assessment Screening Report (JBA Consulting, 2014) has already been produced which assessed a range of possible flood risk management measures to assist in the options appraisal and selection process, and a Natura Impact Statement has been produced on the final selected option.

Habitats and Flora

The construction phase will involve in-channel working for the flood wall, flood embankment and sluice gate construction, and a large proportion of work will be conducted within the bankside environment. This will have a direct impact on the habitats and flora present within the river, including the Annex I habitat of Watercourses of plain to montane levels with the Ranunculion

fluitantis and Callitricho-Batrachion vegetation, resulting in loss of, and damage/disturbance, to habitats and species. Whilst the majority of this will be temporary in nature and confined to the construction phase, it could have an impact of medium magnitude, which would result in a **minor-moderate negative impact**. Upon completion, aquatic flora within the affected length of channel should quickly re-colonise from upstream seed sources. Impacts on riverine and riparian fauna are discussed in the sections below.

Indirect impacts on the River Fealge may also arise as a result of silt mobilisation and pollution incidents which could then adversely impact upon the river and species it supports, resulting in temporary declines in water quality, increased turbidity, fine sediment redistribution and nutrient enrichment. This is assessed as having an impact of medium magnitude, which would result in a **minor negative impact**. This impact will also occur in relation to the Annex I habitat of Watercourses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation, however, this will only impact on a short length of riverine habitat (approximately 100m) downstream of the works location to Dunnes Stores; downstream of Dunnes Stores this habitat is not considered to be present. This impact will occur upstream of the works as surface water pathways will carry any silt and contaminative material downstream. The magnitude of impact on this Annex I habitat type is therefore considered to be low given the short length of habitat affected, giving rise to a **minor negative impact**.

The construction impacts on estuarine and intertidal habitats, given that they are located within the Clonakilty Bay SAC and the site is designated for these habitat types, is discussed above and the same assessment applies.

A large proportion of the flood storage area consists of improved, species-poor grassland types. During the construction phase some of this grassland habitat will be lost and damaged as a result of construction of the embankment and associated works including access routes and storage compounds. Similarly, the embankment behind the houses on the Old Timoleague Road will be constructed within an area of improved agricultural grassland. However, given that the habitat to be affected is generally species-poor and intensively managed the impact is considered to be of low magnitude resulting in a **neutral impact**.

During the construction phase short lengths of hedgerow and treelines (approximately 80m) will require removal to allow construction of the flood embankment. This will result in the loss of this habitat for the bird, invertebrate and small mammal populations it supports, and also disrupt the continuity of the wildlife corridor that the hedgerow provides along the river. However, only a small length of hedgerow will require removal, there are considerable lengths of hedgerow habitat elsewhere within the study area, and the river will still provide some continuity of wildlife corridor; consequently an impact of low magnitude is anticipated which will result in a neutral impact. The specific impact of hedgerow removal on bird and bat species is discussed further below.

No adverse construction impacts on other watercourses within the study area, woodland and scrub, or the urban environment is anticipated.

Birds

The impact of the proposed works on the overwintering waterbird population which Clonakilty Bay supports is discussed above in relation to Clonakilty Bay SPA; this section considers impacts on the wider bird population within the study area, including breeding bird populations and non-waterbird populations in winter.

By the nature of the construction works involved in this scheme, a degree of disturbance to birds present in the vicinity of the works areas is inevitable. The magnitude of this impact, however, depends on a number of characteristics of the works, including:

- The timing of the construction activities
- The level of disturbance, both spatially and temporally
- The availability of equivalent habitats outside of the influence of disturbance to accommodate displaced birds.

There is little published literature available on the effects on birds of disturbance associated with construction activities such as those likely to be created by this scheme. The majority of studies are related to wetland, estuarine and marine species, and to the impacts of recreation, as

opposed to the impacts of construction on terrestrial passerines and waterbirds that are most relevant to this scheme.

Gill (2007) in a review of the approaches to measuring the effects of human disturbance on birds, with regard to recreation, provides a useful summary of the potential impacts disturbance can have on birds, that is of relevance here. There are four key types of measure, analogous to effect, which can result from disturbance:

- Changes in distribution (e.g. avoidance of disturbed areas; movements in response to humans on site)
- Changes in behaviour (e.g. increased vigilance; changed flight responses; altered breeding behaviour)
- Changes in demography (e.g. reduced fecundity or survival in disturbed areas)
- Changes in population size (e.g. severe changes in demography causing permanent population impacts)

The works proposed in this scheme will be conducted in relatively localised areas, and in relation to the flood walls aspects, in areas where levels of disturbance are already relatively high as result of the urban location. This, in combination with the substantial amounts of similar habitats outside the likely influence of the disturbance, should minimise the potential for long-term population impacts from disturbance throughout the construction phases.

The potential for the other three key changes (see bullet points above) to occur would, however, appear to be quite high. Although the birds present will be to some degree habituated to disturbance as a result of the urban location, the proposed works are likely to be beyond the range of variation normally experienced between years.

In light of the above, the magnitude of impact associated with disturbance during the construction phase is expected to be medium. It is not considered to be high, as no permanent impacts in a manner to affect the sustainability of the bird populations present are expected. Although beyond the levels usually experienced by birds in the study area, these will ultimately be reversible by removal of the disturbance upon completion of construction. Consequently, a **minor negative impact** is anticipated.

Depending on the scheduling of works, there is the potential that some bird species will be nesting when works commence; this is of particular concern when considering the hedgerow and tree removal works to accommodate the embankment or flood wall repair works; this could result in disturbance and damage/destruction of nests, particularly of passerine species. In addition, construction works could impact on any ground nesting bird species within the footprint. Without appropriate mitigation, the magnitude of this impact is predicted to be medium, which would have a **minor negative impact** on breeding bird populations.

Otter

Otter presence in the study area was confirmed during the ecological walkover survey. During the construction phase Otter movements along the River Fealge, including foraging activity, may be disrupted, particularly in relation to works on the embankment for the fluvial storage area, which is within 300m of the identified Otter resting place. The River Fealge, as the main watercourse in the area, contains a significant food source for Otter, as identified by the fish survey, and as the construction period will extend for approximately 18-24 months, an impact of high magnitude is anticipated in relation to disturbance of Otter populations, which could result in a **moderate negative impact**.

The works, being approximately 300m from the identified Otter resting place should have no direct adverse impact upon it. However, as Otter are highly mobile animals, resting places could become established elsewhere along the river system before construction commences, and the work works, particularly any vegetation clearance, could disturb or damage other Otter resting places that may become established. This could have a high magnitude impact on Otter populations in the location area, resulting in a **moderate negative impact**.

Badger

The desk-based assessment identified records of Badgers within the Study Area, although the ecological survey identified no evidence of this species. However, this species is highly mobile and could therefore come into works areas during the construction period, potentially resulting

in disturbance to foraging and commuting activity. Nevertheless, given the large amount of suitable habitat within the Study Area and surrounding landscape the potential impact has been assessed as being of negligible magnitude only with a consequent **neutral impact**.

Bats

The bat surveys have shown that the River Fealge corridor through Clonakilty and the environment surrounding the location of the proposed flood storage reservoir does contain good populations of a number of bat species. The exact roost locations of these bats is not known, however, and this is the major risk to these species from these works.

It is assumed that, in the area of the flood storage reservoir, approximately 80m of hedgerow will be removed during the construction phase. In this area a number of uncommon bat species were recorded, in particular Leisler's and Whiskered Bats. In addition a Daubenton's bat was noted, a species that is associated with the river itself and not the associated treelines. In terms of the bat roost potential of the trees in the length of hedgerow that will be lost, there is very little potential for these to contain a roost, however, their loss along with the hedgerow will mean a reduction in foraging habitat for the bat species utilising this area. In view of this, the construction phase is considered to have an effect of high magnitude and a **moderate negative impact** on bats.

Within the town, some of the works will have an effect upon the existing walls, many of which have the potential to support bat roosts. Without knowing the full details of the works proposed to these walls and the location of any bat roosts with these, there is a strong likelihood that bats using these structures will be adversely affected by these works. In the absence of more detailed information on bat roost locations within the town and the nature of the proposed works to the river walls, any construction here will have an effect of high magnitude and a **moderate negative impact** on bats.

Fisheries

The fish survey identified that the River Fealge contains good fish populations, particularly of Brown Trout, with some European Eel and Atlantic Salmon also recorded. During the construction phase, works will be required within the channel for the flood embankment and sluice structure and also in relation to the flood walls within the town. This could directly impact upon fish populations within the river through disturbance, including noise, visual and vibration, as a result of construction activities. This would displace fish from the immediate works area, potentially resulting in a temporary impediment to fish passage along the River Fealge, and into its tributaries. Should construction works require the diversion of the River Fealge, for example by over-pumping, this would create a complete, although temporary, impediment to fish passage along the river. There is also the potential for direct fish mortalities as a result of in-channel working, and also through entrainment in any pumping equipment if over-pumping is required to divert the stream during works. If in-channel works are conducted during the fish migration or spawning seasons then the impacts may be particularly severe; whilst any disturbance impact will only be temporary and confined to the construction phase, any behavioural or physical impacts on spawning success may result in the loss of a year class but not overall population sustainability; consequently the magnitude of the impact is considered to be low, resulting in a **minor negative impact**.

In addition to disturbance impacts, the construction works may directly impact upon fish habitats within the river, including areas identified as potential spawning habitat. However, in channel works are likely to be relatively localised and confined to the sluice location, where the embankment crosses the river, and along the footings of new/repaired flood walls. Consequently, the magnitude of the impact is considered to be low, resulting in a **minor negative impact**.

Indirect construction impacts may also arise on the fish populations through silt mobilisation and pollution incidents which could impact upon water quality, turbidity levels and could also result in the smothering of spawning gravels. Declines in water quality and the smothering of spawning gravels could potentially impact upon the ability of fish populations to survive within the river over the short to medium term, potentially resulting in an impact on medium magnitude and a **minor negative impact**.

Non-native Invasive Species

Construction activities in areas infested with non-native invasive species have the potential result in their spread to locations previously un-infested. The Japanese Knotweed stand recorded to the south of the N71/Convent Road, north-east of the Facksbridge Roundabout is located adjacent to an area where flood walls are proposed to be built and consequently this species could be spread should appropriate measures not be followed; this could have a **moderate negative impact**, however, this impact could be more severe if the plant is transferred to a habitat of high ecological value.

9.4.2 Long-term Operational Impacts *Designated Conservation Sites*

The proposed River Fealge (Clonakilty) Drainage Scheme involves the construction of permanent tidal defences in very close proximity to the designated Clonakilty Bay, in particular those defences along 220m of the Ring Road, The Croppy Road between Clarke Street and Facksbridge and from Clarke Street along the south bank, through the Waterfront Development to boundary of the WWTP. However, upon completion of the works, the new defences will not encroach within the boundaries of the SAC, SPA and pNHA. There will therefore be no permanent, negative impact on the designated site in terms of habitat loss or physical damage.

However, the tidal defences around the fringes of mudflat habitats within Clonakilty Bay (i.e. those along the Ring Road, the Croppy Road and those from Clarke's Street Bridge along the south bank near the WWTP) could cause increased scour which would gradually result in damage to and erosion of mudflat habitats around these areas. However, the magnitude of this impact is considered to be negligible as any increased scour will be extremely localised and will not impact upon the functionality of the mudflat habitats within the head of Clonakilty Bay SAC, SPA and pNHA as a whole. Furthermore, in comparison to existing conditions, the water levels are only expected to reach above the current wall level to the new wall level relatively infrequently, hence the level of impact is considered to be negligible compared to existing processes. Also, the area of habitat where increased scour may occur was identified by the ecological survey as being modified upper saltmarsh/ maritime grassland habitat, of poor condition and not representing high quality Annex I habitats. Mudflats are present beyond the area of highly modified habitat, but are not directly present at the base of where the new defences will be constructed and where the greatest increase in scour will occur. Consequently, a potential increase in scour from increased defence height is considered to result in a **neutral impact**.

The flood walls proposed for a number of locations (i.e. The Croppy Road, from Clarke Street Bridge along the south bank near the WWTP, between Seymour Street Pedestrian Bridge and Clarke's Street Bridge, between the library and Rossa Street Bridge, between Rossa Street Bridge and Seymour Street Pedestrian Bridge and between Michael Collins Bridge and the library) could heighten in-channel energy conditions during flood conditions, potentially mobilising some of the coarse gravel substrate within the River Fealge, preventing deposition. This gravel material may then be transported into the SAC whereas previously it would have been deposited within the channel of the Fealge. This indirect impact on geomorphological processes within the river and the effect on sediment supply to the mudflats at the head of the estuary could potentially impact upon the quality and extent of these habitat types within the SAC. However, the hydromorphological audit identified that significant quantities of gravel were not being transported through the system (see Chapter 10), and therefore the volumes of coarser sediment that may be deposited within the mudflat habitats is considered to be very low and in localised areas only. Therefore, this would have an impact of only negligible magnitude, which would result in a **neutral impact**.

In the area around Clonakilty Bay, the proposed Flood Relief Scheme aspects are passive flood walls that require no operational movement or activity, other than intermittent inspection and repair. Consequently, no direct adverse operational impact to bird populations within the SPA is anticipated in terms of disturbance. Any intermittent inspection and repair required is unlikely to generate disturbance levels above that already created by vehicular and pedestrian movements along the Croppy Road.

Habitats and Flora

Operation of the flood storage area and sluice gates will interrupt the flow of the river during flood events by holding water back. This interruption of natural flow regimes could impact upon the aquatic and riparian habitats, including the Annex I habitat of watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation. Within the channel of the River Fealge energy levels are likely to be dampened when the storage area fills and releases as a result of the reduction in magnitude and frequency of morphologically significant flows. Within the confines of the storage area, the net effect is likely to be a temporary increase in sediment deposition during the filling of the facility giving rise to a **minor-moderate negative impact** due to the medium magnitude of effect.

Downstream of the storage facility, the impacts of reduced morphologically significant flows are likely to be offset by an increase in velocities resulting from increased flow confinement within the channel (as a result of the constructed flood walls). The net impact of these opposite effects on the River Fealge, the Annex I habitat type, and also other watercourses in the study area, is likely to be **minor negative**, resulting in spatial redistribution of existing habitat within the channel and along the banksides, and potentially a reduced extent of spawning gravels downstream of the storage area associated with increased sediment deposition within the storage area.

There is also the risk of scour of the river bed at the outfall of the flood storage area where a substantial increase in peak water velocities is likely to be experienced associated with release of stored volume, resulting in damage to the riverine habitat at this location. However, the area of impact will be extremely localised around the new structure. An impact of low magnitude is therefore anticipated, resulting in a **neutral/minor negative impact**.

The operational impact on estuarine and intertidal habitats, given that they are located within the Clonakilty Bay SAC and the site is designated for these habitat types, is discussed above and the same assessment applies.

A large proportion of the flood storage area consists of improved, species-poor grassland types and increased inundation of this may result in changes in species composition. Whilst the flood storage area will only be inundated periodically and infrequently, it may result in a general trend of increasing wetness within the area which may increase species-diversity with species more tolerant of wetter conditions being able to survive within the area. However, this is also likely to be heavily influenced by the management applied to the grasslands. Over the long-term, a slight increase in wetness may result in increased species diversity within the grassland habitats of the flood storage area which may have a beneficial effect of low magnitude, however, this would still result in a **neutral impact**.

In addition, to increased wetness of the grassland habitats, the hedgerows in the storage area may also experience increased wet conditions within the root zone. Given that some of the species present within these hedgerows, with the exception of Alder which was abundant along the river, are generally intolerant of waterlogged conditions adverse impacts could occur such as reduced growth rates and plant health, potentially resulting in the death of the species intolerant of wet conditions. However, given that Alder is an abundant species, that a large number of hedgerows are elevated above ground level on stone/earth embankments and that inundation is only likely to occur infrequently, the operational impact on hedgerows in the flood storage area is considered to be low magnitude resulting in a **neutral impact**.

A similar effect may also occur in relation to the woodland and scrub habitats in the storage area, in particular the conifer plantation on the right bank of the river. Other woodland and scrub habitats tend to be located on elevated ground outside of the flood storage area. Furthermore an effect of negligible magnitude is anticipated as the conifer plantation, being of non-native species, is considered to be of very low ecological value, although it does provide areas of cover, consequently any impact on this woodland area is considered to be **neutral**.

No adverse operational impacts on the urban environment is anticipated.

Birds

Upon completion of the flood relief scheme, operational impacts on bird populations are considered to be minimal. Whilst a small section of hedgerow, and consequently potential nesting habitat, will have been removed as part of the works the abundance of this habitat type

within the study area as resulted in this effect being assessed as negligible magnitude and a **neutral impact**.

In relation to periodic inundation of the flood storage area, a number of wading bird species are known to use areas of agricultural land and pasture, such as that likely to be present within the areas designated to be flood storage areas, at certain times of year. In particular, Curlew are known to breed on damp grasslands and non-intensive farmland in river valleys and also use wet grassland and arable land on migration (Birdlife International, 2014). Increased inundation of the grassland habitats within the flood storage area may create additional areas where species such as Curlew may feed. This potential creation of additional feeding areas is considered to be an effect of negligible magnitude given the relatively small area likely to be created, the infrequency of inundation, the distance from the bay and its separation from it by the urban areas of Clonakilty and the considerable expanse of other feeding areas in the locality consequently a **neutral impact** is anticipated.

However, inundation of the flood storage area could also have adverse impacts on ground nesting birds if flood events occur during the nesting season, with nests potentially flooded out and chicks drowned. However, given the relatively intensive management undertaken within the grassland designated as the flood storage area, its suitability for ground nesting birds is relatively limited. Furthermore, the storage area will only partially fill every 1-2 years and consequently an effect of negligible magnitude is anticipated and a **neutral impact**.

Otter

The operational phase of the flood relief scheme could potentially impact upon Otter populations on the River Fealge. Operation of the sluice gates would cause a temporary and partial impediment to Otter movements along the river. However, this would only be the case when the sluice gates were shut, which is estimated to be relatively infrequently (i.e. once every 1 to 2 years), and animals still could leave the channel and pass over the embankment, although the likely lack of cover and openness on the embankment will discourage Otter from doing this. Given the infrequency of this operational impact, the magnitude of effect is considered to be negligible, with a **neutral impact** on Otter.

The inundation of the flood storage area could also impact upon Otter populations as a resting place was identified within the area designated to act as the flood storage area. Raising of water levels could inundate this resting place, making it temporarily uninhabitable for Otter. However, the resting place is located within a rock pile, at a level significantly above that of the river in normal flows and therefore it would likely only become flooded during events of extremely high magnitude. The resting place was also not identified as supporting breeding activity, and natal holts are those more vulnerable to the impacts of flooding. Furthermore, Otter, as riparian mammals are adapted to the natural hydrological functioning of watercourses and able to cope with flood events and consequently an effect of negligible magnitude is anticipated, resulting in a **neutral impact**.

Badger

The operational phase will have limited impacts on Badger populations potentially present in the wider area, however, during the phases when the flood storage area is holding water there may be a decline in potential foraging area for Badger. However, this is considered to have an effect of negligible magnitude, resulting in a **neutral impact**, given the abundance of suitability habitat elsewhere in the locality.

Bats

The operational phase is unlikely to affect any bat species using the habitats within the study area. All of the species recorded will forage above water and, since most flooding is likely to occur during the winter months, any potential impact will be lessened further. The trees in this area that have the greatest potential to contain bat roosts are all Alder, a species which is very tolerant of flooding. Given this and the ephemeral nature of the flooding, the operational phase of this project will have a **neutral impact**.

Within the town, providing no additional lighting is installed over the watercourse and any lighting is not directed over the water, the operational phase of the project will have a **neutral impact**.

Fisheries

During the operation of the flood storage area, the sluice gates will cause a temporary impediment to fish movements along the river. Although the sluice gates will be of an undershot design, they will not fully close and maintain a minimum 200mm high submerged orifice, and operation is likely to be relatively infrequent (i.e. once every 1 to 2 years), the water velocities experienced through the resulting orifice during some flood events may be impassable to all species including powerful swimming adult salmonids. Although such restriction of fish movements will be temporary, relatively infrequent and unavoidable, if occurring during the spawning season, there is a risk that spawning areas will not be accessible and therefore recruitment may be compromised. Consequently, operation of the flood storage area is considered to have an effect of low magnitude, resulting in a minor negative impact. More critical is the more permanent impasse the smooth surfaced, concrete sluice structure is likely to present to poor swimming elvers and smaller lamprey. The effect is likely to be more permanent than the impediment created during operation of the sluice structure, of a medium magnitude effect and therefore a **minor negative impact**.

To allow successful operation of the sluice gates, a cill or similar structure, will be required within the channel in which the gates can lock to prevent water movement downstream in a flood event. This will result in the permanent habitat loss of a small area of in-channel habitat due to the replacement of natural channel substrate with concrete, stone and other construction materials. This may result in a very localised loss of channel habitat exploitable by fish. However, given the likely small size of the area to be affected, this is considered to have an effect of negligible magnitude, resulting in a **neutral impact**.

There is also the risk of scour of the river bed at the outfall of the flood storage area where an increase in peak velocity will be experienced during the release of stored volume; this may potentially directly displace fish spawning habitat as the gravel survey identified that the section of channel where the embankment will be located is of good spawning potential. However, the area of impact will be extremely localised around the new structure and therefore an impact of low magnitude is therefore anticipated, resulting in a **minor negative impact**.

Furthermore, as discussed above in relation to habitats and flora, the operation of the flood storage area and sluice gates will interrupt the flow of the river during flood events by holding water back. Within the confines of the storage facility, an increase in fine sediment deposition is likely to temporarily compromise the high spawning habitat quality currently present in this area giving rise to a **minor negative impact** on salmonid species, their invertebrate prey and River Lamprey if occurring during spawning/incubation, but a **minor positive impact** on Brook Lamprey if occurring outside the lamprey spawning season.

The redistribution of sediments downstream of the storage facility (due to reduction in peak flows arising from the storage facility but increased velocities due to increased confinement within the channel) and potential for net reduction in extent of spawning gravels due to coarse sediment deposition within the storage area is likely to result in a minor negative impact on fish populations and their invertebrate prey.

Where culverts are to be replaced, physical barriers to upstream fish migration could be created. Elevated velocities associated with a lack of bed heterogeneity, along with engineered head differences associated with incorrect placement are possible. Such effects have the potential to give rise to an impact of medium magnitude and a **minor negative impact**. Similarly, where trash screens are to be included, bar spacing has the potential to restrict the upstream migration of larger fish species, particularly adult salmonids. Again, an impact of medium magnitude and a minor negative impact may be realised as a result.

Non-native Invasive Species

No operational impacts are identified in relation to non-native invasive species.

9.5 Mitigation Measures

This section describes the mitigation measures to avoid or reduce impacts on valued ecological receptors and protected species that will be incorporated into the proposed River Fealge (Clonakilty) Drainage Scheme.

9.5.1 Designated Conservation Sites

In order to mitigate identified construction and operational impacts on the Clonakilty Bay SAC and SPA, and also the pNHA, the following mitigation measures are proposed:

- The permanent works (i.e. the tidal defence walls) **will not** encroach into Clonakilty Bay SAC, SPA and pNHA.
- The footprint of the construction works on the tidal defence walls, including any cofferdam installation, will be minimised to limit encroachment into Clonakilty Bay SAC, SPA and pNHA.
- Wherever possible works on the tidal defence walls will be conducted from The Croppy Road and the south bank/WWTP area to limit damage to estuarine and intertidal habitats along the toe of the embankment.
- Upon completion of the construction works mudflat habitat will be reinstated by replacement of any intertidal sediments removed during construction. Upon commencement of the works any mudflat material to be disturbed will be removed, stockpiled in a secure location where no contamination from external sources can occur and upon completion of the works, replaced. Tidal processes will then re-mobilise these and reinstate the mudflat/sandflat. This will ensure that the substrate at the same remains the same.
- Follow pollution prevention measures as detailed in section 9.5.9.
- In order to prevent disturbance impacts to important overwintering bird populations within Clonakilty Bay SPA all works to the flood walls along Croppy Road between Clarke Street and Facksbridge, and from Clarke Street along the south bank, through the waterfront development and WWTP will be conducted between March and October inclusive.

9.5.2 Habitats and Flora

In order to mitigate identified construction and operational impacts on the habitats and flora of the study area, the following mitigation measures are proposed:

- In-channel working will be minimised, wherever possible.
- Upon completion of the works channel vegetation will be allowed to recolonise naturally, however, this will be monitored and if deemed necessary additional planting of suitable aquatic plant species will be undertaken.
- Upon completion of in-channel works, in-channel sediment features will be reinstated.
- Bed armouring at the flood storage area outfall will be installed to prevent significant scour of the river bed. Where this is installed it will be designed to replicate natural bed conditions to retain corridor value of the channel (i.e. setting of cobbles/gravel into concrete to provide uneven surface).
- Introduce spawning gravels at morphologically/hydraulically appropriate locations upstream of the storage area, equivalent to the extent of potentially compromised spawning gravels within the confines of the storage facility.
- To ensure the impacts on altered sediment transport processes downstream of the embankment are as predicted and any net loss of in-channel habitats are quantified, a monitoring programme is proposed that consists of the following, commencing at the point of scheme commissioning:
 - Repeat hydromorphological audit that captures change associated with flood events of significant and known magnitude (key return periods to be agreed with IFI)
 - Annual fish population survey for at least three years to capture changes in length-frequency distribution.

Should the above demonstrate that the magnitude of change to sediment transport processes is significant and there is a net change in extent and quality of in-habitat, further reach-scale remediation will be agreed with IFI and implemented. This could include the installation of in-channel features to maintain the extent and quality of existing spawning gravels (for salmonids and lamprey species) and fine sediment deposits (for adult Brook Lamprey).

- Follow pollution prevention measures as detailed in section 9.5.9.

- Upon completion of the works the new embankment, and in any other grassland areas disturbed during the construction works, will be re-sown with an appropriate species-rich grass and wildflower seed mix upon.
- Hedgerow planting will be undertaken to replace the length of hedgerow lost to accommodate the new flood embankment. Hedgerows will be replanted as close to the existing alignment and location as possible and will use native, locally sourced species appropriate to the locality.

9.5.3 Birds

In order to mitigate identified construction and operational impacts on birds, not including the overwintering waterbird populations in the SPA which are discussed in section 9.5.1 above, the following mitigation measures are proposed:

- All vegetation clearance works and site preparatory works will be conducted outside of the bird nesting season (March to September inclusive). If this is not possible, a breeding bird survey will be undertaken in advance of the works to ensure that there will be no impacts on nesting birds. If nests are found, they will be safeguarded, with an appropriate buffer, until the chicks have successfully fledged.
- Hedgerow planting will be undertaken to replace the length of hedgerow lost to accommodate the new flood embankment. Hedgerows will be replanted as close to the existing alignment and location as possible and will use native, locally sourced species appropriate to the locality.

9.5.4 Otter

In order to mitigate identified construction and operational impacts on Otter the following mitigation measures are proposed:

- No works will take place are to take place within 20m of the known Otter resting place (National Roads Authority, 2008), with this area appropriate demarcated and fenced if necessary.
- Prior to commencement of works, a further survey to identify the presence of any new Otter resting places/holts within 200m of the works areas will be undertaken. If found and likely to be damaged/disturbed by the works an appropriate mitigation strategy will need to be devised and a derogation license will need applied for from NPWS.
- Night-time working will not be permitted.
- To minimise the potential for Otters becoming trapped, all excavations will be left open for the minimum possible time, and not over-night. If excavations have to be left open over-night they will either be covered securely or fitted with an escape ramp (no more than 45°) to allow accidentally trapped animals to escape. Materials to cover excavations or create escape ramps will be on site at all times so that all excavation areas can be made safe before leaving site.
- All materials stored on site will be stacked securely so as to prevent accidental collapse if investigated by an Otter, or any other large mammals.

9.5.5 Badger

In order to mitigate identified construction and operational impacts on Badger potentially commuting and foraging in the works area the following mitigation measures are proposed:

- Night-time working will not be permitted.
- To minimise the potential for Badgers becoming trapped, all excavations will be left open for the minimum possible time, and not over-night. If excavations have to be left open over-night they will either be covered securely or fitted with an escape ramp (no more than 45°) to allow accidentally trapped animals to escape. Materials to cover excavations or create escape ramps will be on site at all times so that all excavation areas can be made safe before leaving site.
- All materials stored on site will be stacked securely so as to prevent accidental collapse if investigated by Badger, or any other large mammals.

- Prior to commencement, all works areas, site compounds and access routes will be re-surveyed to ensure that new Badger setts have not become established. If found, appropriate mitigation strategies will need to be devised and implemented.

9.5.6 Bats

In order to mitigate identified construction and operational impacts on bats the following mitigation measures are proposed:

- There will be no pointing or infilling of the existing walls in the town above 1.5m OD, unless the presence of bat roosts have been discounted via a pre-works bat roost survey.
- There will be no night working during the construction phase.
- Works will not damage the vegetation cover on the rear walls of the brewery. Repairs and replacement of the existing channel walls in this location will not extend above 1.5m OD.
- No works will be undertaken at Tobin's Bridge nor on the walls on the North side of Rossa Street Bridge.
- Any new lighting required as part of the project will be of as low a wattage as possible and will be directed away from the surface of the water.
- No tree-felling will take place between Bridge Street and Fernhill Bridge.
- Prior to the commencement of works outside the surveyed area, bat roost potential surveys will need to be carried out if tree or culvert removal is proposed. If roosts are found, and these are likely to be damaged/disturbed by the works, an appropriate mitigation strategy will need to be devised and a derogation licence will need applied for from NPWS.

9.5.7 Fisheries

In order to mitigate identified construction and operational impacts on fisheries the following mitigation measures are proposed:

- In-channel working will be minimised, wherever possible.
- In-channel working during the salmonid spawning season will not occur (November to March inclusive).
- During the construction phase it will be ensured that fish can migrate past the works areas and areas of in-channel working.
- Any pumps used for over-pumping must be 'fish-friendly' and fitted with appropriate screens.
- Avoid working in areas identified as being suitable for fish spawning, where practicable.
- If possible, hard engineering of the river bed will be avoided.
- Any riverbed materials removed or disrupted as part of the works will be replaced and any areas where new bed materials will be installed (i.e. wall footings, bed armour to prevent scour, sluice gate area), will be designed to replicate natural bed conditions. Existing bed material will be used to cover new bed materials, wherever possible. Bed material removed from the river will be stored on the bankside. The storage facility will be such that there will be no loss of sediments from the material stored and no external contamination (e.g. a bunded plastic sheet or sealed plastic container). Once excavations are complete, and any new material has been introduced, the stored material will be replaced over the bed. Once normal flows are restored after demobilisation, the replaced material will be redistributed by the currents. These measures will ensure no net loss of material and no significant changes to bed sediment morphology or composition.
- Follow pollution prevention measures as detailed in section 9.5.9.
- Include appropriate bristle substrate within a pass facility for elvers/lamprey at the proposed sluice structure, and specify a board finish to the concrete on the deck of the proposed sluice structure and up to a height of 300mm above the equivalent Q70 water level at the structure.

- Introduce spawning gravels at morphologically/hydraulically appropriate locations upstream of the storage area, equivalent to the extent of potentially compromised spawning gravels within the confines of the storage facility.
- Ensure that all culverts and trash screens are designed and installed in line with published best practice (e.g. Armstrong et al 2010; Turnpenny & O'Keefe 2005).
- To ensure the impacts on altered sediment transport processes downstream of the embankment are as predicted and any net loss of in-channel habitats are quantified, a monitoring programme is proposed that consists of the following commencing at the point of scheme commissioning:
 - Repeat hydromorphological audit that captures change associated with flood events of significant and known magnitude (key return periods to be agreed with IFI)
 - Annual fish population survey for at least three years to capture changes in length-frequency distribution.

Should the above demonstrate that the magnitude of change to sediment transport processes is significant and there is a net change in extent and quality of in-habitat, further reach-scale remediation will be agreed with IFI and implemented. This could include the installation of in-channel features to maintain the extent and quality of existing spawning gravels (for salmonids and lamprey species) and fine sediment deposits (for adult Brook Lamprey).

9.5.8 Non-native Invasive Species

In order to mitigate the potential spread of non-native invasive species the mitigation measures are proposed:

- Avoid working in areas where Japanese Knotweed is present; all areas within 7m of visible above-ground growth will be avoided and clearly demarcated.
- If work is required in areas infested with Japanese Knotweed (including any area within 7m of visible above-ground growth) an appropriate Japanese Knotweed Mitigation Strategy will need to be devised and implemented to prevent spread.
- Prior to commencement, all works areas, site compounds and access routes will be re-surveyed to ensure that stands of non-native invasive species have not become established. If found, appropriate mitigation strategies will need to be devised and implemented.

9.5.9 Pollution Prevention Measures

Appropriate mitigation measures will be implemented prior to the construction phase to ensure that water quality of the River Fealge is not adversely affected through pollution incidents and silt mobilisation. This mitigation will include:

- Appropriate sediment control measures will be employed.
- Any chemical, fuel and oil stores will be located on an impervious base within a secured bund with a storage capacity 110% of the stored volume.
- Biodegradable oils and fuels will be used where possible.
- Drip trays will be placed underneath any standing machinery to prevent pollution by oil/fuel leaks. Where practicable, refuelling of vehicles and machinery will be carried out on an impermeable surface in one designated area well away from any watercourse or drainage (at least 10m).
- Emergency spill kits will be available on site and staff trained in their use.
- Operators will check their vehicles on a daily basis before starting work to confirm the absence of leakages. Any leakages will be reported immediately.
- Daily checks will be carried out and records kept on a weekly basis and any items that have been repaired/replaced/rejected noted and recorded. Any items of plant machinery found to be defective will be removed from site immediately or positioned in a place of safety until such time that it can be removed. All items of plant will be checked prior to use before each shift for signs of wear/damage.

- All washing out of grout pumps will be carried out in designated areas away from the river, such as in the lined compound area. At no point will grout pumps be washed out at the worksite.
- All cofferdams, or other structure installed within the channel, to allow working in dry conditions must be designed by a competent person, be constructed of appropriate materials and take account of site conditions (i.e. depth of water, available space, bed substrate, flow velocities, flow patterns, duration of works, accessibility and potential ingress of water). During any working with cofferdams the following will be adhered to:
 - The cofferdam will be inspected daily for any movement, leakage and general deterioration; any defects found will be remedied immediately.
 - The working area will not be de-watered directly into the River Fealge or Clonakilty Bay; the removed water must receive treatment before discharge.
 - Before removal of the cofferdam at completion of the works all materials, debris, tools, plant and equipment will be removed from the work area and any potential sources of pollution/contamination within the cofferdam will be cleaned up.
 - The de-watered area will be re-watered before the cofferdam is removed to avoid the sudden ingress of water which may cause erosion of the replaced substrate.
 - When re-watering is undertaken, the pump inlets will be screened appropriately to prevent the intake of fish or other aquatic animals.
- During all works the weather forecast will be monitored and a contingency plan developed to prevent damage or pollution during extreme weather and high flow events.
- The above measures will also need to be followed during construction of the pumping stations on The Croppy Road and old GAA ground.

9.6 Residual Impacts

The following section summarises in tabular form the conclusions of sections 9.4 and 9.5 and identifies what the residual impact of the proposed River Fealge (Clonakilty) Drainage Scheme will be on ecological receptors.

Ecological Receptor	Value of Receptor	Nature of Impact	Identified Impact	Magnitude of Impact	Significance of Impact (unmitigated)	Mitigation Measures	Residual Impact
Clonakilty Bay SAC	International	Construction	Direct, temporary habitat loss and physical damage of mudflat, sandflat and saltmarsh habitats along the SAC boundaries to facilitate defence construction	Medium	Major Negative	<p>The permanent works will not encroach within the boundaries of the SAC</p> <p>The footprint of the construction works will be minimised (ie. they will not extend more than 5m from toe of the existing embankment/wall) to limit encroachment into the designation</p> <p>Works on the discharge point for the pumping stations on Croppy Road and the old GAA ground will be conducted at the same time and within the same footprint and as that for the tidal defences. Work will not encroach into previously unaffected areas of designated habitat</p> <p>Reinstate mudflat habitats upon completion of works</p>	Neutral
		Construction	Indirect habitat damage,	Low	Moderate	Follow pollution	Neutral

Ecological Receptor	Value of Receptor	Nature of Impact	Identified Impact	Magnitude of Impact	Significance of Impact (unmitigated)	Mitigation Measures	Residual Impact
			and associated impacts on flora and fauna within these habitats, from silt mobilisation and pollution incidents upstream		Negative	prevention measures (see section 9.5.9)	
		Operation	Localised scour of mudflat habitats at the head of Clonakilty Bay where defence height is increased	Negligible	Neutral	No mitigation proposed	Neutral
		Operation	Changes in sediment supply to habitats at the head of the estuary from higher energy in-channel conditions resulting from increased wall height	Negligible	Neutral	No mitigation proposed	Neutral
Clonakilty Bay SPA	Shelduck Tadorna tadorna [A048]	Disturbance (noise, visual)	Construction works along the boundaries of the SPA would generate disturbance as a result of machinery operation and workforce movement; this will impact upon the waterbird populations within the SPA, in particular Shelduck, Dunlin, Black-tailed Godwit and Curlew for which the site is designated. Lewis and Kelly (2012) identify that	Potential in-combination disturbance impacts associated the construction of the discharge points for the pumping stations on The		All cofferdam installation and removal works to the flood walls along The Croppy Road between Clarke Street and Facksbridge, and from Clarke Street along the south bank, through the waterfront development and WWTP will be conducted between March and September inclusive.	No
	Dunlin Calidris alpina [A149]						

Ecological Receptor	Value of Receptor	Nature of Impact	Identified Impact	Magnitude of Impact	Significance of Impact (unmitigated)	Mitigation Measures	Residual Impact
	Black-tailed Godwit Limosa limosa [A156]		the inner estuary area, in closest proximity to the works site, are important for Dunlin, Black-tailed Godwit and Curlew, however, little information is available for Shelduck and it is therefore assumed to be present in the inner estuary also. Whilst the Croppy Road already provides some background levels of disturbance as a result of vehicular and pedestrian movements, construction activities are likely to be more disruptive in terms of noise level and frequency of movement. A number of studies have identified differential disturbance responses of bird species, linked to the type of disturbance stimuli, the bird community present and their activity, the extent and topography of the site, the time of year and weather conditions	Croppy Road and old GAA ground may occur impacting up on the special conservation interests of the SPA.		<p>The cofferdam will be designed in order to provide visual and noise screening to birds using the head of the estuary. On the landward side further screening will be erected to hide the movement of machinery and the workforce. No machinery or working will work beyond the cofferdam.</p> <p>Any temporary lighting installed for the construction phase will be fitted with a cowl to limit light spill and will be directed away from the estuary.</p> <p>All machinery used along Croppy Road between Clarke Street and Facksbridge, and from Clarke Street along the south bank, through the waterfront development and WWTP will be fitted</p>	
	Curlew Numenius arquata [A160]						

Ecological Receptor	Value of Receptor	Nature of Impact	Identified Impact	Magnitude of Impact	Significance of Impact (unmitigated)	Mitigation Measures	Residual Impact
			<p>(Cutts and Allen, 1999). For example, Cutts and Allen (1999), in relation to flood defence works at Saltend on the Humber Estuary, have observed that Shelduck are susceptible to disturbance associated with construction activities, with a shift in location from preferred feeding areas within 250m of the works site in upper estuary areas. Similarly, Curlew reaction to disturbance events would suggest that a minimum feeding range is 150m from the works, although with a degree of habituation this may reduce to 100m (Cutts and Allen, 1999). Dunlin response to construction activity is variable, with minimum distances to disturbance of between 100-200m observed, although this varied cyclically from as low a 50m up to 500m (Cutts and Allen, 1999).</p>			<p>with noise reduction measures.</p> <p>When works extend through the winter period (i.e. October - February) daily monitoring of average daytime temperatures will be undertaken. When average daytime temperatures fall below 0°C for five consecutive days works will temporarily cease. Works can proceed again when temperatures become milder.</p> <p>The discharge points for the pumping stations on The Croppy Road and old GAA ground will need to be constructed between March and October inclusive.</p>	

Ecological Receptor	Value of Receptor	Nature of Impact	Identified Impact	Magnitude of Impact	Significance of Impact (unmitigated)	Mitigation Measures	Residual Impact
			Limited information is available for Black-tailed Godwit. The increased level of disturbance associated with the River Fealge (Clonakilty) Drainage Scheme construction works can therefore be considered to result in disturbance which will cause displacement of bird populations from the head of the estuary as activities will be conducted within the tolerance distances outlined above. This will result in increased stress and additional energy expenditure and at certain times of year (i.e. during cold spells in the winter) the effect of this could be particularly severe, potentially resulting in bird mortality.				
	Shelduck Tadorna tadorna [A048] Dunlin	Physical damage Changes in physical regime	The bird species for which the SPA is designated are reliant upon mudflat and sand flat habitats at the head of the estuary for	Same assessment as for Clonakilty Bay SAC applies.		Same mitigation as for Clonakilty Bay SAC applies.	No

Ecological Receptor		Value of Receptor	Nature of Impact	Identified Impact	Magnitude of Impact	Significance of Impact (unmitigated)	Mitigation Measures	Residual Impact
		Calidris alpina [A149] Black-tailed Godwit Limosa limosa [A156] Curlew Numenius arquata [A160] Wetland & Waterbirds [A999]	Changes in hydrological regime Changes in water quality / pollution	roosting and feeding. The assessment provided above in relation to the mudflat and sandflat habitats of Clonakilty Bay SAC therefore also applies in relation to the SPA as the bird species supported by the mudflat and sandflat habitats will similarly be impacted upon through a temporary loss of and reduced quality these habitats for roosting and feeding.				
		International	In relation to SPA habitats upon which bird species rely, see above assessment in relation to Clonakilty Bay SAC					
Clonakilty Bay pNHA		International	See above - the assessment for Clonakilty Bay SAC and SPA is considered applicable to the pNHA.					
Habitats and Flora	River Fealge	Local	Construction	Habitat loss and physical damage to habitats and species from in-channel working	Medium	Minor Negative	In-channel working will be minimised, wherever possible Monitor natural recolonisation of channel and undertake additional planting if required	Neutral
		Local	Construction	Indirect habitat damage, and associated impacts on flora and fauna within the river, from silt mobilisation and pollution incidents	Medium	Minor Negative	Follow pollution prevention measures	Neutral

Ecological Receptor	Value of Receptor	Nature of Impact	Identified Impact	Magnitude of Impact	Significance of Impact (unmitigated)	Mitigation Measures	Residual Impact	
	Local	Operation	Impacts on in-channel and riparian flora and fauna within storage area from changes to the hydrological and sediment transport regime of the River Fealge	Medium	Minor Negative	Introduction of gravels upstream of storage facility.	Neutral	
	Local	Operation	Impacts on in-channel and riparian flora and fauna downstream of storage area from changes to the hydrological and sediment transport regime of the River Fealge	Negligible	Neutral	Undertake monitoring to identify any impacts and undertake reach-scale remediation if required	Neutral	
	Local	Operation	Localised scour of the river bed from high energy flows at outfall of the flood storage area	Low	Neutral	Armouring of the river bed will be undertaken to prevent scour and this will replicate natural channel conditions	Neutral	
	Annex I Habitat Watercourses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation	National	Construction	Annex I habitat loss and physical damage to habitats and species from in-channel working	Medium	Moderate negative	In-channel working will be minimised, wherever possible Monitor natural recolonisation of channel and undertake additional planting if required	Minor Negative
		National	Construction	Indirect Annex I habitat damage from silt	Low	Minor negative	Follow pollution prevention measures	Neutral

Ecological Receptor	Value of Receptor	Nature of Impact	Identified Impact	Magnitude of Impact	Significance of Impact (unmitigated)	Mitigation Measures	Residual Impact	
			mobilisation and pollution incidents			(see section 9.5.9)		
	National	Operation	Impacts on Annex I habitat within storage area from changes to the hydrological and sediment transport regime of the River Fealge	Medium	Moderate negative	Introduction of gravels upstream of storage facility.	Neutral	
	National	Operation	Impacts on Annex I habitat downstream of storage area from changes to the hydrological and sediment transport regime of the River Fealge	Negligible	Neutral	Undertake monitoring to identify any impacts and undertake reach-scale remediation if required	Neutral	
	National	Operation	Localised scour of the river bed, and damage to Annex I habitat, from high energy flows at outfall of the flood storage area	Low	Minor negative	Armouring of the river bed will be undertaken to prevent scour and this will replicate natural channel conditions	Neutral	
	Estuarine and Intertidal habitats	International	See above - the assessment for Clonakilty Bay SAC and SPA is considered applicable to the estuarine and intertidal habitats					
	Other Watercourses	Less than Local	Operation	Impacts on in-channel and riparian flora and fauna from changes to the hydrological regime of the River Fealge	Negligible	Neutral	No mitigation proposed	Neutral
	Grasslands	Less than Local	Construction	Habitat loss and damage from embankment	Low	Neutral	Re-seed embankment and disturbed grassland areas with	Neutral

Ecological Receptor	Value of Receptor	Nature of Impact	Identified Impact	Magnitude of Impact	Significance of Impact (unmitigated)	Mitigation Measures	Residual Impact	
			construction and other associated works			species-rich seed mix upon completion		
	Less than Local	Operation	Potential increase in species-richness and diversity of grassland areas from increased wetness	Low	Neutral	N/A	Neutral	
	Hedgerows and Field Boundaries	Local	Construction	Loss of short lengths of hedgerow to allow construction of flood embankment	Low	Neutral	Hedgerow planting will be undertaken to replace lengths of lost hedgerow	Neutral
		Local	Operation	Potential reduction in plant health or death of woody species intolerant of wetter conditions	Low	Neutral	No mitigation proposed	Neutral
	Woodland/ Scrub	Less than Local	Operation	Potential reduction in plant health or death of conifer species intolerant of wetter conditions	Negligible	Neutral	No mitigation proposed	Neutral
Birds	Overwintering waterbird population	International	See above - the assessment for Clonakilty Bay SPA is considered applicable to the assessment of impacts on overwintering wetland birds					
		International	Operation	Increased feeding areas for certain wetland bird species from increased wetness in flood storage area	Negligible	Neutral	N/A	Neutral
	Other bird populations	Local	Construction	Disturbance of breeding and non-waterbird populations in winter as a result of construction works	Medium	Minor negative	No mitigation proposed	Minor negative
		Local	Construction	Damage/ destruction of	Medium	Minor negative	All vegetation	Neutral

Ecological Receptor		Value of Receptor	Nature of Impact	Identified Impact	Magnitude of Impact	Significance of Impact (unmitigated)	Mitigation Measures	Residual Impact
				nests (both in trees/hedgerows and on the ground)			clearance and site preparatory works to be undertaken outside of nesting bird season (March-September). Alternatively, they will be preceded by a nesting bird survey	
		Local	Operation	Permanent loss of nesting habitat from hedgerow removal	Low	Negligible	Hedgerow planting will be undertaken to replace lengths of lost hedgerow	Neutral
		Local	Operation	Inundation of nests of ground nesting birds	Negligible	Neutral	No mitigation proposed	Neutral
Otter		Regional/County	Construction	Disturbance to Otter population and disruption of movements along the River Fealge	High	Moderate Negative	Night time working will not permitted Excavations will not be left open or they will be left with a means to escape Materials will be stacked securely	Minor negative
		Regional/County	Construction	Disturbance or damage to Otter resting place	High	Moderate Negative	No works will take place are to take place within 20m of the known Otter resting place A further survey for new Otter resting places will be conducted prior to	Neutral

Ecological Receptor	Value of Receptor	Nature of Impact	Identified Impact	Magnitude of Impact	Significance of Impact (unmitigated)	Mitigation Measures	Residual Impact
						commencement of works and appropriate mitigation devised and implemented if necessary	
	Regional/ County	Operation	Partial impediment to Otter movements along the River Fealge during sluice operation	Negligible	Neutral	No mitigation proposed	Neutral
	Regional/ County	Operation	Very occasional inundation of the identified Otter resting place	Negligible	Neutral	No mitigation proposed	Neutral
Badger	Local	Construction	Disturbance to foraging and commuting Badger potentially present in Study Area	Negligible	Neutral	Night time working will not permitted Excavations will not be left open or they will be left with a means to escape Materials will be stacked securely	Neutral
	Local	Operation	Slight decline in area of foraging habitat available for Badger during flood events.	Negligible	Neutral	No mitigation proposed	Neutral
Bats	Regional/ County	Construction	Loss of foraging habitat (hedgerow)	High	Moderate Negative	Planting a new hedgerow in suitable location	Minor Negative
	Regional/ County	Construction	Loss of possible roosting sites	High	Moderate Negative	No construction or repointing of walls above 1.5m AOD upstream of Rossa Street Bridge	Neutral

Ecological Receptor	Value of Receptor	Nature of Impact	Identified Impact	Magnitude of Impact	Significance of Impact (unmitigated)	Mitigation Measures	Residual Impact
Fisheries	Regional/ County	Construction	Direct mortality of fish populations from in-channel working and entrainment in any pumps used	Low	Minor Negative	In-channel working will be minimised, wherever possible Any pumps used must be 'fish-friendly' and fitted with appropriate screens	Neutral
	Regional/ County	Construction	Disturbance to fish populations from in-channel working and potentially over-pumping, and temporary impediment to fish passage along river	Low	Minor Negative	In-channel working will be minimised, wherever possible In-channel working during the salmonid spawning season will not occur (November to March)	Neutral
	Regional/ County	Construction	Damage of fish habitat, including spawning areas.	Low	Minor Negative	Avoid working in areas identified as being suitable for fish spawning. If possible, hard engineering of the river bed will be avoided Upon completion replace existing bed substrates and ensure any new materials are designed to replicate natural bed conditions, or are	Neutral

Ecological Receptor	Value of Receptor	Nature of Impact	Identified Impact	Magnitude of Impact	Significance of Impact (unmitigated)	Mitigation Measures	Residual Impact
						covered with existing bed material	
	Regional/ County	Construction	Indirect impacts on fish populations from silt mobilisation and pollution incidents	Medium	Minor Negative	Follow pollution prevention measures	Neutral
	Regional/ County	Operation	Temporary partial impediment to fish movements along the River Fealge during flood events and sluice operation	Low	Minor negative	Elver/lamprey pass facility included in sluice structure. Use of board finish on concrete sluice structure.	Neutral
	Regional/ County	Operation	Permanent impediment to passage of poor swimming elvers and small lamprey due to impasse of smooth concrete surface of sluice sill	Medium	Minor negative	Concrete sill will replicate natural channel conditions (i.e. cobbles/ gravel embedded into concrete)	Neutral
	Regional/ County	Operation	Loss of small areas of potential spawning habitat from loss of natural channel bed substrate due to sluice gate and wall footings and scour at storage area outfall	Negligible	Neutral Impact	No mitigation proposed	Neutral
	Regional/ County	Operation	Scour of river bed immediately downstream of sluice which will displace fish spawning habitat	Low	Minor negative	Armouring of the river bed will be undertaken to prevent scour and this will replicate natural channel conditions	Neutral

Ecological Receptor	Value of Receptor	Nature of Impact	Identified Impact	Magnitude of Impact	Significance of Impact (unmitigated)	Mitigation Measures	Residual Impact
	Regional/ County	Operation	Changes to the hydrological and sediment transport regime of the River Fealge resulting in smothering of spawning gravels	Medium	Minor negative	Undertake monitoring to identify any impacts and undertake reach-scale remediation if required. Introduce spawning gravels upstream of the flood storage area.	Neutral
	Regional/ County	Operation	Culvert replacement may create physical barriers to upstream fish migration (i.e. elevated velocities, lack of bed heterogeneity, engineered head differences)	Medium	Minor negative	Ensure that all culverts and trash screens are designed and installed in line with published best practice (e.g. Armstrong <i>et al</i> 2010; Turmpenny & O'Keefe 2005)	Neutral
	Regional/ County	Operation	Trash screens have potential to restrict upstream migration of larger fish species, particularly adult salmonids	Medium	Minor negative	Ensure that all culverts and trash screens are designed and installed in line with published best practice (e.g. Armstrong <i>et al</i> 2010; Turmpenny & O'Keefe 2005)	Neutral
Non-native invasive species	N/A	Construction	Spread of Japanese Knotweed	N/A	Moderate Negative	Avoid working in areas where Japanese Knotweed is present and within 7m of visible above-ground growth	Neutral

Ecological Receptor	Value of Receptor	Nature of Impact	Identified Impact	Magnitude of Impact	Significance of Impact (unmitigated)	Mitigation Measures	Residual Impact
						If work is required in areas infested with Japanese Knotweed an appropriate Japanese Knotweed Mitigation Strategy will need to be devised and implanted	

9.7 Possible Enhancement Measures

In addition to the proposed mitigation measures, which are necessary to offset potentially significant adverse ecological impacts of the scheme, there are a number of potential enhancement opportunities that could be pursued as part of this project:

- Consideration will be given to incorporating construction of an artificial Otter holt in areas around the new flood embankment to provide an additional resting place on the River Fealge.
- Bird and bat boxes could be installed around the works area to provide additional nesting and roosting sites.
- Whilst in-channel working is being conducted, consideration will be given to the incorporation of a number of online, in-channel habitat features for fisheries, such as small bays along the channel to provide slower flowing refuge areas for fish. Any feature constructed will take into account any geomorphological considerations.
- The urban areas of river are heavily canalised and would benefit from the introduction of geomorphological variance. Where possible artificial channel features could be introduced e.g. berms, riffles, pools. This would help introduce habitat diversity to these canalised sections and improve habitats for macrophytes, macro-invertebrates and fish.
- Although any removal of hedgerow is proposed to be mitigated with compensatory planting of hedgerows, additional enhancements could also be made to the existing hedgerows. In appropriate areas hedgerows could be improved, for example by planting up any gaps with native species.
- Consideration will be given to the current street and car park lighting between Rossa Street Bridge and Tobin's Bridge; this will be reduced in intensity and redirected away from the Fealge River to minimise light disturbance impacts to bats.

9.8 Conclusions

This chapter has assessed the potential impact of the proposed River Fealge (Clonakilty) Drainage Scheme Works on ecological receptors. To establish the ecological baseline a number of desk-based and field surveys were conducted, these identified the presence of important ecological receptors within the study area, including the Clonakilty Bay SAC, SPA and pNHA, important bird populations, a significant bat population, Otter and notable salmonid fisheries.

The assessment of potential impacts identified that potentially the most significant ecological impacts will arise during the construction phase as a result of disturbance to Otter, fish, birds and bats, damage to and loss of small areas of notable habitats including hedgerows and water pollution incidents and sediment mobilisation. The significance of construction impacts ranged from major negative in relation to the internationally important designated sites, to neutral. Operational impacts are generally minimal, with only small-scale localised habitat loss anticipated. However, potential operational impacts of minor negative significance may arise in relation to fisheries due to adverse effects on spawning habitat and fish passage.

A range of mitigation measures were proposed to offset potentially significant negative impacts, including appropriate timing of the works, replacement planting, pollution prevention measures and habitat reinstatement. Consequently the residual impact for the majority of identified impacts was reassessed as being neutral or of minor negative significance only. It can therefore be concluded that the ecological impact of the construction and operation of River Fealge (Clonakilty) Drainage Scheme will be neutral or minor negative only, provided that the identified mitigation measures are fully implemented.

10 Hydromorphology

10.1 Introduction

This section provides an overview of the existing hydromorphological condition of the associated project watercourses along with the impacts associated with the construction of the proposed flood mitigation scheme.

Hydromorphology can be described as the hydraulic interaction between channel form and channel flows to define physical habitat. This also demonstrates the important link between hydromorphological forms and processes, and ecological condition and habitat. A hydromorphological response to a physical modification within a watercourse needs to be understood to determine not only the impacts on hydromorphological condition but also the impacts to habitats at a local scale. Please refer to section 9 for information regarding the impacts to physical habitat and species.

The EU Water Framework Directive (WFD) is a key piece of European water legislation that is designed to improve and integrate the way water bodies are managed throughout Europe. Hydromorphology is a key aspect of the EU Water Framework Directive.

The WFD defines the flow, shape and physical characteristics of a watercourse as its 'hydromorphology.' Any in-channel works can impact upon the shape of a watercourse and the natural processes that occur within it, including:

- flow patterns
- width and depth of a channel
- features such as pools, riffles, bars and bank slopes
- sediment availability/transport
- interaction between a channel and its floodplain
- ecology and biology (i.e. habitats which support plants and animals)

10.2 Assessment Methodology

The aim of the assessment is to determine whether the proposed works could have an impact upon any of the above criteria. Those criteria for which no potential adverse effects are identified are not considered further in the assessment.

The following assessment objectives were used to determine whether the proposed works comply with the overarching objectives of the WFD. These objectives were therefore derived from the Environmental Objectives of the Directive:

- Objective 1: The proposed scheme does not cause deterioration in the Status of the Biological Elements of the waterbody.
- Objective 2: The proposed scheme does not compromise the ability of the waterbody to achieve its WFD status objectives.
- Objective 3: The proposed scheme does not cause a permanent exclusion or compromised achievement of the WFD objectives in other bodies of water within the same RBD.
- Objective 4: The proposed scheme contributes to the delivery of the WFD objectives.

In order to establish whether the scheme complies with the WFD it is necessary to ascertain whether the preferred options have the potential to result in:

- Failure of a water body to achieve good ecological status or potential; or
- Failure to prevent deterioration in the ecological status or potential of a water body.

If the answer to these questions is 'no' the strategy can be considered WFD compliant. If either of these failures is identified, further assessment may be required to identify if the strategy meets all of the conditions set out by the WFD Legislation.

10.3 Baseline Assessment

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.

A baseline assessment was conducted in 2014 to gain an understanding of the current character and dynamics of the catchment water bodies and help place their character in the historic context of channel engineering and management. This was achieved through a Fluvial Audit (hydromorphological field survey) and desk based assessment of the study reaches.

Figure 10-1 : Gravel deposition in the upper reaches



The existing morphology throughout the Fealge River system is diverse and the bed of the channel is predominantly gravel based, operating naturally to move coarse sediment. This is supplied largely from glacial deposits being reworked from bank erosion and the bedrock dominated upper reaches which act to supply sediment entering the river in the upper reaches, downstream via a series of temporary in-channel bar stores. The majority of bars within the channel are dynamically stable and are replenished with sediment from upstream whilst also providing a source for transport to downstream reaches during geomorphologically effective flows.

Figure 10-2 : Urban Constrictions and temporary flood defences



Several barriers exist to sediment transport (such as bridges and culverts) which are currently managed to prevent flooding. Within the urban areas the channel has been modified historically as the urban area has expanded. This has resulted in a loss of floodplain and a confined channel as a result of bankside development and flood embankment construction (Figure 10-2 : Urban Constrictions and temporary flood defences). Under natural conditions, a river would flood its floodplain frequently, often for events in exceedance of the 1 in 2yr event. The river would also be able to erode laterally during geomorphologically effective flows (again, at a 1 in 2yr event or higher), this is currently prevented due to the significant bank protection works along the channel to protect nearby and bankside infrastructure. Therefore, the river is modified significantly when compared to likely natural processes associated to this river type.

Evidence of gravel deposition within these confined sections was strong. This suggests higher flow events through these areas are low energy which gives way for deposition. High energy events have the ability to deliver coarse gravel from upstream areas. As the flood event recedes sediment carried in suspension is deposited on to dynamically stable features (i.e. by replacing sediment already transported away). The maintenance of a coarse gravel bed suggests that there is sufficient energy within the system to prevent fine sediment deposition.

However, in areas where the channel has been artificially widened and realigned through the urban area, at structures for instance, fine sediment deposition occurs across the coarse gravel bed as a result of the reduced flow energy conditions created by the overwidening. This impacts the hydromorphological and ecological quality of the gravel bed.

The river throughout contains a good gravel substrate which can provide, in some locations, good places for fish spawning and a diverse hydromorphology characteristic of this active single thread river type. Any in channel works or permanent modifications to the channel bed, banks or floodplain could have an adverse impact upon in channel habitats and morphological features / processes. Spawning habitat availability in the lower reaches of the Feagle is limited, with low velocities due the tidal influence and the presence of weirs, resulting in increased fine sediment deposition.

The downstream reaches of the Feagle River are tidal. The Feagle discharges into the south-west of Clonakilty Bay alongside the Croppy Road, with a second smaller watercourse joining from the north-east at Facksbridge. Much of the tidal harbour area has been modified; however, limited evidence of excessive fine sediment deposition was seen within the fluvial channel. The estuarine zone has characteristic mudflat areas although the total surface area of these has been reduced in the past through reclamation of land now used predominantly for agriculture.

The narrowing has created a relatively dynamic mudflat zone that could be sensitive to artificial modification.

10.3.1 Summary hydromorphological baseline condition

In the fluvial dominated zones the river system is significantly modified compared to natural conditions associated to a river of this type as a result of urbanisation leading to disconnection of the floodplain, channel realignment, in-channel structures impacting sediment transport and channel widening. However, in some areas, the quality of the gravel bed is high and is likely to provide suitable spawning habitat for fish.

Historic narrowing of the estuarine zone through land reclamation has created a dynamic mudflat zone that is likely to be sensitive to artificial modification.

10.4 Hydromorphological Impacts of the Proposed Scheme

10.4.1 Overview

The hydromorphological processes and response to the proposed flood relief scheme is important to understand due to the direct impact that it could have on altering flood capacity and changing flood risk levels. It is also important in terms of maintaining or improving biotic health through the creation and development of ecological habitats impacting on water body hydro-geomorphological status which is a fundamental component of the European Water Framework Directive (WFD).

Following the baseline assessment a desktop study was undertaken to determine whether the proposed flood scheme could have an impact upon any of the criteria set out in the WFD for hydromorphological condition and status.

A key factor in determining the short term constructability and long term viability of the proposed scheme will be the hydromorphological processes in operation throughout the river system, namely the processes of erosion and accretion, and materials being transported, and the timescales involved. This has been assessed through the high level hydromorphic audit involving a catchment baseline survey and local fluvial audit to determine the historic, current and likely future dynamics of the river, paying particular attention to the sediment transport regime (coarse and fine) and associated patterns of erosion and deposition. This has been discussed above in section 1.3. The audit has concentrated on waterways directly impacted by the scheme but has also considered wider system response to disrupted / altered flow and transport processes.

The findings of the audit have been used to develop a conceptual model of the form and dynamics of the interacting watercourses allowing predictions to be made regarding potential flood works within Fealge catchment. This model will be key in ensuring a sustainable Water Framework Directive (WFD) compliant solution to the flooding problems that minimises hydromorphic impact elsewhere.

The proposed scheme has been assessed against the WFD objectives set out in chapter 1.2. 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. Appropriate mitigation measures should be implemented, which could include restoration of the channel to reduce risk of excess deposition, to continue to promote sediment transport and to prevent deterioration of the gravel bed sections. Bed armouring may be required at the outfall.

10.4.2 Key considerations

- Any future scheme should not alter the morphology of the river or estuary in a way that means it is unable to achieve the WFD objectives by 2021. It should seek to improve hydromorphological and ecological condition wherever possible.

- The river throughout contains a good gravel substrate in some locations which can provide suitable places for fish spawning and a diverse hydromorphology characteristic of this river type. Structures can significantly alter the depth of water and velocity of flow, leading to over deepened, impounded reaches upstream and altering the habitat and hydromorphological characteristics. Any in channel works or permanent modifications to the channel bed, banks or floodplain could have an adverse impact upon in-channel habitats and morphological features / processes and measures should be taken to reduce any adverse impacts.
- Two key factors have been considered, firstly embankment raising which could elevate in channel energy levels during flood conditions by concentrating flows within the already confined channel and secondly the regulation of upstream flows which could lead to enhanced deposition and dampened downstream flows. Without hydraulic information it is difficult to quantify the exact impact upon the sediment regime. However, as the existing bank full flows are expected to be maintained fine sediment should continue to be transported through the system during normal conditions. Nevertheless, the regulation of flows due to the creation of the storage area could lead to increased local deposition due to the dampening of flows, which could cause some downstream sediment starvation. It is recommended that monitoring of fine sediment deposition is carried out at the storage area site post construction.
- Any in channel works should not seek to act as a barrier to sediment transportation as this could create future erosion and / or deposition issues locally and downstream through sediment starvation and higher energy in channel flows.

10.5 Summary of Impacts, Mitigation and Residual Impact Associated to Proposed Works

Defence Number	Description and extent of work	Hydromorphological impacts during construction and severity	Hydromorphological impacts of proposed defences on river processes and severity	Possible further assessment	Construction mitigation	Operation mitigation	Residual impacts
L38-L42 in Fig. 6.1	1.3 m high flood walls behind a number of properties on Convent Road. The flood walls will be replaced where required.	Low - The location of the proposed flood defence adjacent to buildings means damage to channel or floodplain features is unlikely.	Low - The location of the proposed flood defence is set back from the river bank and is unlikely to significantly impact river and estuarine processes under normal or flood flows.	n/a	n/a	n/a	n/a
E10 on Fig. 6.1	1.4 m high embankment behind the houses on the Old Timoleague Road. The embankment will be 60 m long. It is estimated that 150 m ³ of impermeable material will be required. That equates to approx. 300 tonnes of material.	Low – The location of the proposed flood defence is within a previously reclaimed mudflat area and therefore construction impacts on estuarine condition are likely to be low. Impacts will be to the now farmed land.	Low – The location of this defence is on reclaimed estuarine margins and mudflats that are now farmed. The impacts to the mudflat features and estuarine processes are therefore likely to be low under normal and flood flows.	n/a	n/a	n/a	n/a
R1 on Fig. 6.1	1.6 m high flood walls and raise the Ring Road to 1.7 m along a 220 m section of	Low/Med – Damage could be caused during construction to the adjacent mudflat neighbouring the	Medium – The location of the proposed defence running along the fringe of a mudflat feature could cause	Interrogate hydraulic model hydraulics to determine impacts on	Reinstate damaged mudflat zone once construction is complete.	Consider compensatory mudflat relocation.	Mudflat relocation often unsuccessful.

Defence Number	Description and extent of work	Hydromorphological impacts during construction and severity	Hydromorphological impacts of proposed defences on river processes and severity	Possible further assessment	Construction mitigation	Operation mitigation	Residual impacts
	the road.	proposed defence location.	increased scour as a result of higher flow energy conditions created by the increased defence height.	erosion and deposition.			
L36 on Fig. 6.1	1.1 m – 1.3 m high flood walls along Croppy Road between Fracksbridge and Clarke’s Bridge. The wall will be constructed at ground level, no requirement for in-river works. Wall will be fronted with local stone.	Low/Med – Construction of this bankside defence could impact the neighbouring mudflat. Likely to be fine sediment release into channel.	Medium – The construction of this bankside defence along Croppy Road could further heighten in-channel energy levels during flood conditions, potentially mobilising some of the coarse gravel substrate and preventing deposition. Risk of increased scour of neighbouring mudflat.	Interrogate hydraulic model hydraulics to determine impacts on erosion and deposition.	Reinstate damaged mudflat zone once construction is complete. Suitable fine sediment management measure or diversion of channel during works to prevent significant delivery of fines. However, impact of fine sediment release likely to be short term and should be assimilated into the normal flow regime.	Consider reconnection of floodplain in other acceptable zones. Improve hydromorphological condition of channel elsewhere. Set back defence wherever possible. Consider compensatory mudflat relocation.	Bankside defence likely to reduce deposition and formation of gravel features and a good condition gravel bed.
L35 on Fig. 6.1	1.2 m flood defence wall from Clarke’s Street Bridge, along the South Bank of the river and tying into the waste water treatment plant embankment	Medium - Construction of this bankside defence could impact the neighbouring mudflat. Likely to be fine sediment release into channel. Potential damage to in-channel fine and coarse sediment features.	Medium - The construction of this bankside defence could further heighten in-channel energy levels during flood conditions, potentially mobilising some of the coarse gravel substrate and preventing deposition.	Interrogate hydraulic model hydraulics to determine impacts on erosion and deposition.	Reinstate damaged mudflat zone and in-channel sediment features once construction is complete. Suitable fine sediment management measure or diversion of channel	Consider reconnection of floodplain in other acceptable zones. Improve hydromorphological condition of channel elsewhere. Set back defence wherever possible.	Bankside defence likely to reduce deposition and formation of gravel features and a good condition gravel bed.

Defence Number	Description and extent of work	Hydromorphological impacts during construction and severity	Hydromorphological impacts of proposed defences on river processes and severity	Possible further assessment	Construction mitigation	Operation mitigation	Residual impacts
	(TD/E2). This will be a reinforced concrete wall and some in-river works will be required.		Risk of increased scour of neighbouring mudflat.		during works to prevent significant delivery of fines. However, impact of fine sediment release likely to be short term and should be assimilated into the normal flow regime.	Consider compensatory mudflat relocation.	
E9 on Fig. 6.1	0.7 m high flood defence embankment at the boundary of the Waterfront Development and the Waste Water Treatment Plant.	Low – The location of the proposed defence is setback from the bank edge and is not immediately adjacent to a mudflat, therefore hydromorphic impact is low.	Low - The location of the proposed flood defence is set back from the river bank and is unlikely to significantly impact river and estuarine processes under normal or flood flows	n/a	n/a	n/a	n/a
B7 on Fig. 6.1	Solid parapets on Clarke's Street Bridge. All works conducted at ground level.	Low – Works not likely to involve in-channel works.	Low – Possible minor increase in impoundment length upstream as a result of solid parapets during flood flows, possibly increasing deposition above existing rates at a low level.	Interrogate hydraulic model hydraulics to determine impacts on erosion and deposition.	n/a	None unless a risk of deposition increase upstream, if so, consider alternative design.	Possible minor increase in sedimentation upstream as a result of increased impoundment length during flood flows.
B6 on Fig. 6.1	Replace railings with solid parapets in Seymour Street Pedestrian Bridge. All work	Low – Works not likely to involve in-channel works.	Low – Possible minor increase in impoundment length upstream as a result of solid parapets during flood flows, possibly	Interrogate hydraulic model hydraulics to determine impacts on erosion and	n/a	None unless a risk of deposition increase upstream, if so, consider alternative design.	Possible minor increase in sedimentation upstream as a result of increased impoundment

Defence Number	Description and extent of work	Hydromorphological impacts during construction and severity	Hydromorphological impacts of proposed defences on river processes and severity	Possible further assessment	Construction mitigation	Operation mitigation	Residual impacts
	done at ground level.		increasing deposition above existing rates at a low level.	deposition.			length during flood flows.
L32-L34 on Fig. 6.1	1.3 m high flood walls on both banks between Seymour Street Pedestrian Bridge and Clarke's Street Bridge. A new wall will be required on the northern bank. Assume in-river works.	Medium - Construction of this bankside defence could impact the channel bed and any neighbouring gravel features. Likely to be fine sediment release into channel.	Medium - The construction of this bankside defence could further heighten in-channel energy levels during flood conditions, potentially mobilising some of the coarse gravel substrate and preventing deposition.	Interrogate hydraulic model hydraulics to determine impacts on erosion and deposition.	Reinstate damaged sediment features and bed once construction is complete. Suitable fine sediment management measure or diversion of channel during works to prevent significant delivery of fines. However, impact of fine sediment release likely to be short term and should be assimilated into the normal flow regime.	Consider reconnection of floodplain in other acceptable zones. Improve hydromorphological condition of channel elsewhere. Set back defence wherever possible.	Bankside defence likely to reduce deposition and formation of gravel features and a good condition gravel bed.
L20-L24 on Fig. 6.2	1.1 m high flood walls on both sides of the banks between library and Rossa Street Bridge. Assume new walls will be required. Assume in-river works required for this	Medium - Construction of this bankside defence could impact the channel bed and any neighbouring gravel features. Likely to be fine sediment release into channel.	Medium - The construction of this bankside defence could further heighten in-channel energy levels during flood conditions, potentially mobilising some of the coarse gravel substrate and preventing deposition.	Interrogate hydraulic model hydraulics to determine impacts on erosion and deposition.	Reinstate damaged sediment features and bed once construction is complete. Suitable fine sediment management measure or diversion of channel during works to prevent significant delivery of fines.	Consider reconnection of floodplain in other acceptable zones. Improve hydromorphological condition of channel elsewhere. Set back defence wherever possible.	Bankside defence likely to reduce deposition and formation of gravel features and a good condition gravel bed.

Defence Number	Description and extent of work	Hydromorphological impacts during construction and severity	Hydromorphological impacts of proposed defences on river processes and severity	Possible further assessment	Construction mitigation	Operation mitigation	Residual impacts
	construction.				However, impact of fine sediment release likely to be short term and should be assimilated into the normal flow regime.		
B2 and B3 on Fig. 6.2	Replacement of railings on Credit Union Pedestrian Bridge with solid parapets. All work carried out at ground level.	Low – Works not likely to involve in-channel works.	Low – Possible minor increase in impoundment length upstream as a result of solid parapets during flood flows, possibly increasing deposition above existing rates at a low level.	Interrogate hydraulic model hydraulics to determine impacts on erosion and deposition.	n/a	None unless a risk of deposition increase upstream, if so, consider alternative design.	Possible minor increase in sedimentation upstream as a result of increased impoundment length during flood flows.
L25-L31 on Fig. 6.1	1.1 -1.3 m high flood walls on both banks between Rossa Street Bridge and Seymour Street Pedestrian Street Bridge. The walls on the north bank will be replaced. Assume in-river works.	Medium - Construction of this bankside defence could impact the channel bed and any neighbouring gravel features. Likely to be fine sediment release into channel.	Medium - The construction of this bankside defence could further heighten in-channel energy levels during flood conditions, potentially mobilising some of the coarse gravel substrate and preventing deposition.	Interrogate hydraulic model hydraulics to determine impacts on erosion and deposition	Reinstate damaged sediment features and bed once construction is complete. Suitable fine sediment management measure or diversion of channel during works to prevent significant delivery of fines. However, impact of fine sediment release likely to be short term and should be assimilated into the	Consider reconnection of floodplain in other acceptable zones. Improve hydromorphological condition of channel elsewhere. Set back defence wherever possible.	Bankside defence likely to reduce deposition and formation of gravel features and a good condition gravel bed.

Defence Number	Description and extent of work	Hydromorphological impacts during construction and severity	Hydromorphological impacts of proposed defences on river processes and severity	Possible further assessment	Construction mitigation	Operation mitigation	Residual impacts
					normal flow regime.		
L20-L24 on Fig. 6.2	1.1 m high walls on both banks between Library and Rossa Street Bridge. Assume new walls will be required. Assume in-river works required for this construction.	Medium - Construction of this bankside defence could impact the channel bed and any neighbouring gravel features. Likely to be fine sediment release into channel.	Medium - The construction of this bankside defence could further heighten in-channel energy levels during flood conditions, potentially mobilising some of the coarse gravel substrate and preventing deposition.	Interrogate hydraulic model hydraulics to determine impacts on erosion and deposition	Reinstate damaged sediment features and bed once construction is complete. Suitable fine sediment management measure or diversion of channel during works to prevent significant delivery of fines. However, impact of fine sediment release likely to be short term and should be assimilated into the normal flow regime.	Consider reconnection of floodplain in other acceptable zones. Improve hydromorphological condition of channel elsewhere. Set back defence wherever possible.	Bankside defence likely to reduce deposition and formation of gravel features and a good condition gravel bed.
L16-L19 on Fig. 6.2	1.1 m high flood walls on both banks between Michael Collins Bridge and the Library. Assume repairs and possible replacement of sections. Will require in-river works.	Medium - Construction of this bankside defence could impact the channel bed and any neighbouring gravel features. Likely to be fine sediment release into channel.	Medium - The construction of this bankside defence could further heighten in-channel energy levels during flood conditions, potentially mobilising some of the coarse gravel substrate and preventing deposition.	Interrogate hydraulic model hydraulics to determine impacts on erosion and deposition.	Reinstate damaged sediment features and bed once construction is complete. Suitable fine sediment management measure or diversion of channel during works to prevent significant delivery of fines. However, impact of fine sediment	Consider reconnection of floodplain in other acceptable zones. Improve hydromorphological condition of channel elsewhere. Set back defence wherever possible.	Bankside defence likely to reduce deposition and formation of gravel features and a good condition gravel bed.

Defence Number	Description and extent of work	Hydromorphological impacts during construction and severity	Hydromorphological impacts of proposed defences on river processes and severity	Possible further assessment	Construction mitigation	Operation mitigation	Residual impacts
					release likely to be short term and should be assimilated into the normal flow regime.		
D11 on Fig. 6.1	Underground pumping station at Croppy Road.	n/a	n/a	n/a	n/a	n/a	n/a
D10 on Fig. 6.1	Underground pumping station at Old GAA grounds.	n/a	n/a	n/a	n/a	n/a	n/a
D6 on Fig. 6.2	Underground pumping station at Rossa Street.	n/a	n/a	n/a	n/a	n/a	n/a
D3 on Fig. 6.2	Underground pumping station at Kent Street.	n/a	n/a	n/a	n/a	n/a	n/a
Reservoir upstream of Clonakilty town, including new walls and sluice E6, E7 and E8 on Fig. 6.5 SI1 and SI2 on Fig. 6.5	Proposed flood storage reservoir. Storage volume of 474,847 m3 including construction of embankment and sluice.	Medium – works involved in installation of the sluice and possible walls are likely to disturb channel banks and possibly the channel bed.	Medium – Operation of the reservoir is likely to create dampened flow energy levels within the river when the reservoir fills. This could result in deposition of sediment, fine and coarse within the channel. Elevated deposition here could impact sediment transport to downstream reaches, meaning the condition of the gravel bed downstream could	Interrogate hydraulic model hydraulics to determine impacts on erosion and deposition, both local to the reservoir and up and downstream.	Reinstate damaged sediment features and bed once construction is complete. Suitable fine sediment management measure or diversion of channel during works to prevent significant delivery of fines. However, impact of fine sediment release likely to be short term and	Wider remediation may be required as reach scale impacts are possible as a result of this option. This could include restoration of the channel to reduce risk of excess deposition, to continue to promote sediment transport and to prevent deterioration of the gravel bed sections. Bed armouring may	Risk of elevated deposition local to the reservoir. Scour at the outfall. Disruption of sediment transport to downstream reached. Fine sediment deposition downstream due to infrequent high flow events.

Defence Number	Description and extent of work	Hydromorphological impacts during construction and severity	Hydromorphological impacts of proposed defences on river processes and severity	Possible further assessment	Construction mitigation	Operation mitigation	Residual impacts
H1,H2,H3, H4 on Fig. 6.5			deteriorate. There could be a reduction of flow energy downstream of the reservoir when it is operated, leading to deposition of sediment and possible consolidation of fines within the channel as a result of less frequent high energy flows. There is a risk of channel incision downstream as a result due to the 1 to 2 yr frequency of operation of the reservoir on average. New walls lining the channel could restrict potential lateral activity of the channel and increase the risk of erosion downstream of the new walls. Risk of scour at the outfall where high velocities are predicted that are strong enough to move cobble sized material.		should be assimilated into the normal flow regime.	be required at the outfall.	
Do nothing	Assumes no defences are constructed	n/a	There are currently significant artificial modification to the	n/a	n/a	Reduce artificial pressures on the estuarine and fluvial	n/a

Defence Number	Description and extent of work	Hydromorphological impacts during construction and severity	Hydromorphological impacts of proposed defences on river processes and severity	Possible further assessment	Construction mitigation	Operation mitigation	Residual impacts
			<p>Feagle system with the fluvial and estuarine zones that work against natural processes associated to these systems. Therefore, hydromorphological condition is already significantly modified. However, mudflat condition is generally good, as is the coarse gravel substrate of the river in many locations. This is likely to remain in the medium term. Longer term, the existing modifications are likely to restrict the development of mudflats, creating a dynamic zone within the constrained estuarine area. The gravel bed of the river will continue to be dynamics.</p>			<p>systems wherever feasible.</p>	

11 Soils and Geology

11.1 Introduction

This chapter outlines the existing soils and geology environment within the study area and the immediate surrounding area in relation to the potential impacts of the proposed Clonakilty Drainage Scheme.

11.2 Desktop Assessment

The findings of site investigation works carried out by the Design Engineers for the scheme were not available during the preparation of this section of the Environmental Impact Statement. The constraints from bedrock geology, superficial deposits, economic geology and geological heritage have been assessed through a desk study and initial site visits to Clonakilty by members of the project team. The desk study reviewed the following information sources:

- GSI bedrock and groundwater data
- EPA soil, subsoil and historic mines data
- Development Plans (Clonakilty Local Plan (2009-2015)
- Cork County Council Development Plan (2009 - 2015)
- Draft Cork County Council Development Plan (2015-2022)
- ENVision geoportal site

In the following section topsoil refers to the soil closest to the surface and is the layer which sustains grasses and crops. Subsoils refer to the organic and inorganic deposits which occur below the topsoil and above the bedrock.

11.3 Baseline Soils and Geology in the Area

11.3.1 Bedrock Geology

Clonakilty town centre is underlain by Kinsale formation which covers most of the northern part of the study area. To the north and to the south of the Kinsale formation is bands of Old Head Sandstone Formation. The downstream reach and mouth of the Fealge River is over Old Head Sandstone Formation. The Old Head Sandstone Formation is flaser-bedded sandstone and minor mudstone. The carboniferous Kinsale Formation is a grey mudstone with subordinate sandstone. See Figure 11-1 for the bedrock geology.

Clonakilty Harbour is over a band of Castlehaven Formation with a band of Toe Head Formation. The Castlehaven Formation is formed of purple mudstone and siltstone. The Toe Head Formation is cross-bedded sandstone and minor mudstone

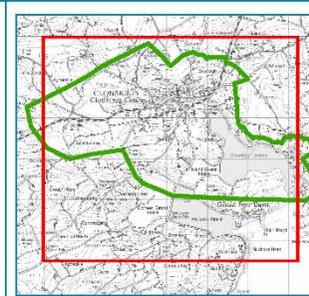
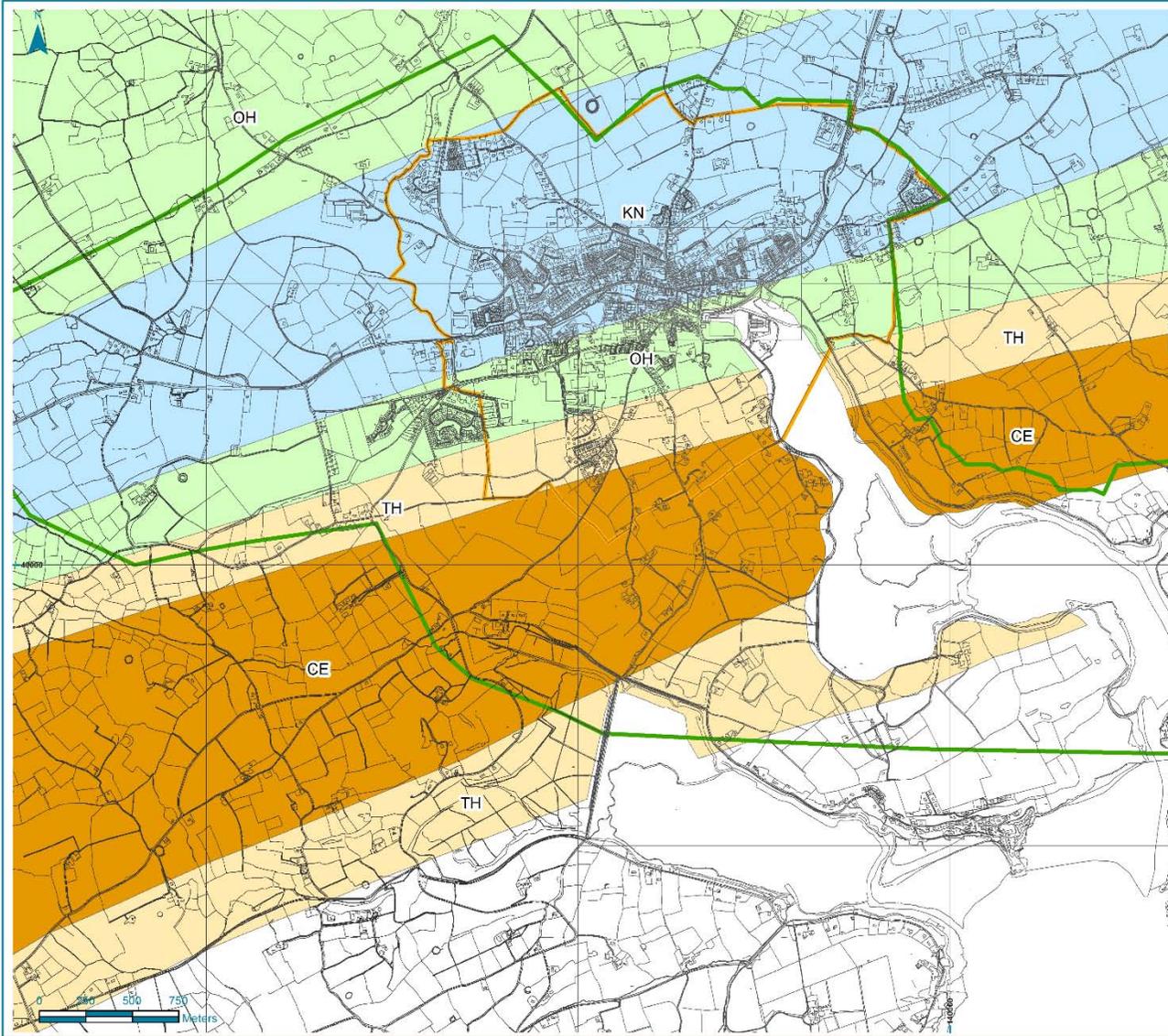
There are no bedrock boreholes or karst features in the study area.

11.3.2 Superficial deposits (soils)

There are no records of landslides in the study area.

The predominant soil type around Clonakilty is Sandstone and shales till (Devonian/Carboniferous) with some bedrock outcrops. To the south of Clonakilty, either side of the harbour soils are Sandstone till (Devonian), again with some bedrock outcrops. A band of estuarine sediments (silts/clays) separates Inchydoney Island and Clonakilty. The town of Clonakilty is classified as Made Ground. See Figure 11-2 for subsoil information.

The northern part of the study area is entirely covered with Sandstone and shales till.



Legend

-  Clonakilty Study Area
-  Town Boundary
- Bedrock Geology**
-  Castlehaven Formation (CE)
-  Kinsale Formation (KN)
-  Old Head Sandstone Formation (OH)
-  Toe Head Formation (TH)

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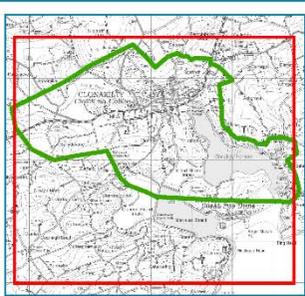
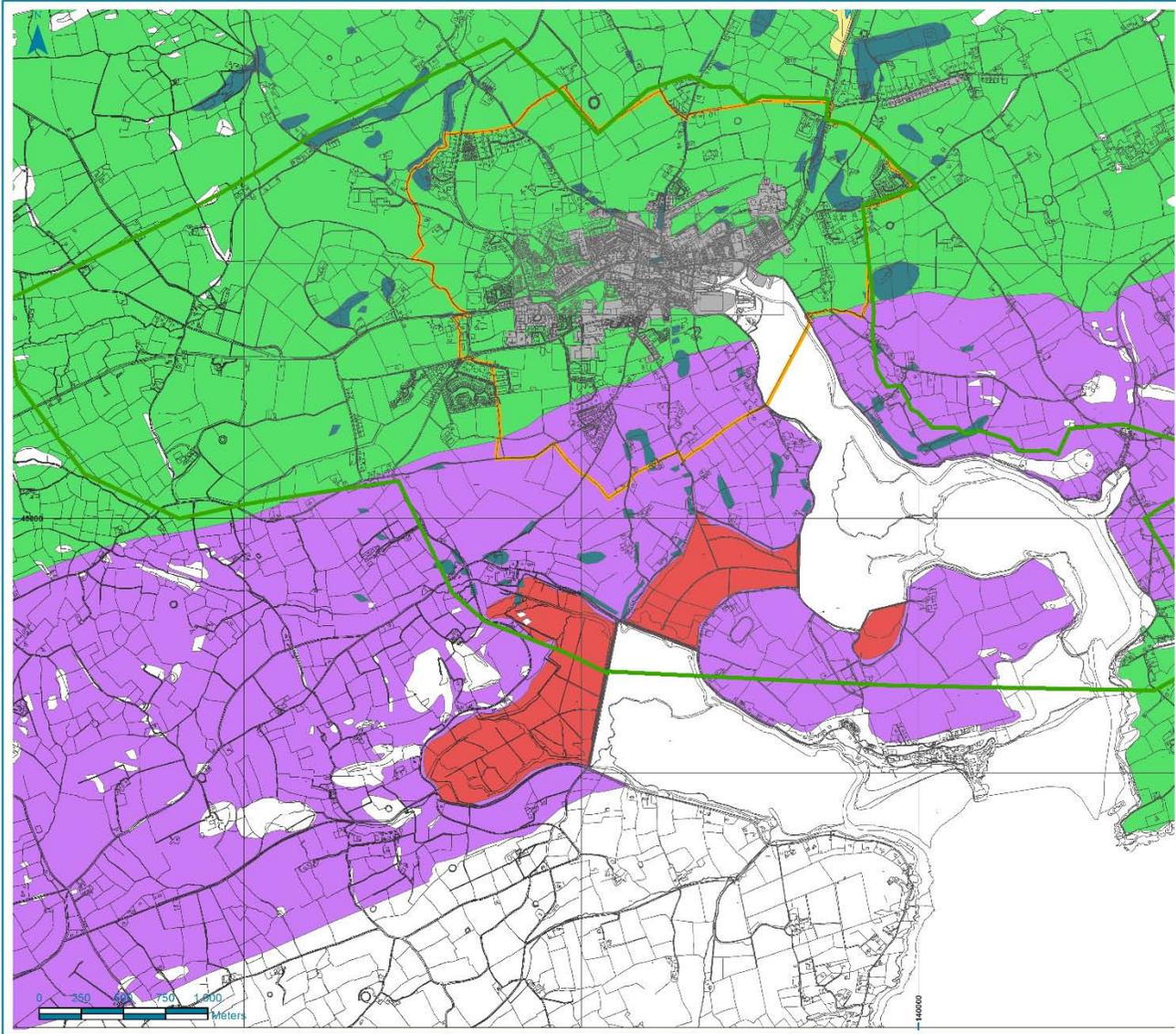
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for
**River Fealge (Clonakilty) Drainage
Scheme
EIS Main Report**
Figure 11-1 Bedrock Geology

Drawn by: Tom Sampson	Date: 03/12/2014	Scale:
Checked by: Tom Sampson	Date: 03/12/2014	1:20,000
Approved by: Declan Egan	Date: 03/12/2014	Original @ A3
File Name: 2014s0971-006-04		
Status: Current		



Legend

- Clonakilty Study Area
- Town Boundary
- Subsoils**
- Lake sediments undifferentiated
- Made ground
- Estuarine sediments
- Bedrock at surface
- Sandstone and shales till (Devonian/Carboniferous)
- Sandstone till (Devonian)
- Water

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for
River Fealge (Clonakilty) Drainage Scheme
EIS Main Report
Figure 11-2 Subsoils

Drawn by: Tom Sampson	Date: 03/12/2014	Scale: 1:22,000
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11.3.3 Economic geology

There are no active quarries in the study area. The historic slate mines at Modrana are listed as area of geological interest in the draft Cork County Council Development Plan (2015-2022). Simon's Cove in Clonakilty Bay is also listed as an area of geological interest for the marine rock platform, subglacial erosion and deposition.

There are no subsidence zones in the study area.

11.3.4 Geological heritage

There are no geological heritage sites within the study area or immediate surroundings. Clonakilty Harbour and Clonakilty Bay is a proposed Natural Heritage Site.

11.4 Impacts of the Scheme during Construction, without Mitigation Measures on Soils and Geology

The impacts of the scheme during construction and operation are discussed in the following sections.

11.4.1 Soils & Geology

The construction of the storage embankments (E6, E7 and E8 on Figure 6-5) and the embankment at the Old Timoleague Road (E10 on Figure 6-1) will cause compaction to the soils and subsoils. The excavation of the topsoil and the removal of the subsoil and the tracking of trucks and excavators will have **significant medium negative impacts** on the soils structure and the subsoils in the areas adjacent to the embankments. This will reduce the soils capacity to retain water. This may in the long term accelerate soil erosion in the areas around the embankments.

The excavation of the riparian zone for the construction of the wing walls to support the sluice and the diversion of the river during its construction will have a moderate medium term negative impact on the soil and subsoils in this area.

The removal of the topsoil and subsoil within the footprint of both embankments will increase the vulnerability of the groundwater particularly during the construction. The potential of groundwater pollution from diesel/hydraulic would have a **significant medium-term negative impact** on groundwater.

11.4.2 Geology

The foundations for the new defence walls that will be constructed as part of this scheme will require excavation to bedrock. The exposed bedrock, for the duration of the excavating of the footing, will be vulnerable to pollution from the works and the use of machinery in the area. This would result in a **short -term negative impact** on groundwater.

11.4.3 Hydrology

This is described in Section 6 (Water) of this EIS. The works have the potential to impact on the hydromorphology of the river. This is discussed in more detail in Section 9 (Hydromorphology) of this report.

11.5 Impacts of the Scheme during Operation, without Mitigation on Soils and Geology

The impacts of the scheme during construction and operation are discussed in the following sections. During the operational phase periodic maintenance will be required on the walls and the sluice. It is expected that a full maintenance programme will be required every 5-7 years.

11.5.1 Soils & Geology

The operational phase will not have any impact on the soils and geology in the area of the scheme.

11.5.2 Geology

The operational phase will not have any impacts on the geology of the area.

11.5.3 Hydrology

The operation of the scheme will result in a lowering of the water levels in the River Fealge during times of flooding. The water levels in the storage reservoir will rise; the depth of the water in the storage area will be dependent upon the extent of the rain and floods. Overall the scheme will have a **positive long-term impact** on Clonakilty and its inhabitants.

11.6 Mitigation Measures

During site set up 2 Nr. temporary roads should be constructed to allow access to the southern and northern section of the storage embankments. All traffic to the contractor's compound and deliveries of materials, soil etc. to the site should be restricted to these roads. Bunting should be used to guide hauliers to the temporary road.

During the stripping of the topsoil and the excavation of the subsoil it is recommended that the denuded area is kept to a minimum. All the excavated material should be segregated on-site into topsoil and subsoil and opportunities for re-use should be sought. In the event that the material is not suitable for re-use, the soil should be taken off site and disposed of at a suitability licenced facility by a licenced waste haulier company. Records of the material taken off site should be maintained in the site offices.

The stockpiles of topsoil and subsoil should be located at a sufficient distance away from any watercourses. A Surface Water Management Plan should be prepared for the site that will outline how surface water runoff will be managed on site particularly in the areas around the contractor's compound and the stockpiles of material at the fluvial storage embankments. At a minimum the Plan should address:

- Profiling the stockpiles to avoid ponding of rain water
- Surface water runoff from denuded areas should be directed to a settlement pond
- All stockpiles should be remote (>40 m) from the river or estuary
- An Emergency Procedure should be prepared for events like the spillage of diesel or hydraulic oil. All contractors and sub-contractors should be made aware of this procedure.
- Adsorbents and pig bags should be available at the site offices.

In the event that suspect material is excavated which may indicate that the material is contaminated then a sample of the soil should be sent to an analytical laboratory for analysis. A full waste acceptance criteria (WAC) assessment should be carried out on the material to determine if it is inert, non-hazardous or hazardous. It should be disposed of accordingly depending on its classification. It is recommended that all laboratory analysis and disposal records for the material are maintained in the site offices.

11.6.1 Geology

Short-term negative impacts have been identified during the soil stripping and the excavation of foundations for the defence walls. The presence of diesel/hydraulic oil could result in a spill of this material or a leaking of a vessel/drum into the bedrock. Strict Operating Procedures for the handling of this material should be prepared and individuals working in the area should be made aware of the procedures.

11.6.2 Hydrology

The potential of spillages to surface water should be avoided by:

- Full containment of all hazardous material on site. Oils and hydraulic oils should be contained in bunded areas with a capacity of 110% the volume of the largest drum
- Spill kits, pig bags, adsorbents should be kept in the site office. All personnel on site should be familiar with their location. Used spill kits, or adsorbents must be replaced. Following an incident the adsorbent should be correctly labelled as hazardous and taken off site to a suitably licenced facility for disposal. The transportation of the waste adsorbent should be carried out by a licence waste haulier. All disposal records should be maintained in the site office. An investigation should be undertaken and corrective actions put in place.

11.7 Cumulative Impacts

There is a possibility of interaction between water quality and aquatic species living in the river and the estuary. These impacts are discussed in the relevant sections of this EIS.

11.8 Residual Impacts

11.8.1 Soils and subsoils

The proposed scheme will not have any residual impacts on soils and subsoils in the area.

11.8.2 Geology

The proposed scheme will not have any residual impacts on the geology of the area.

11.8.3 Hydrology

The proposed scheme will result in a change in the water levels in the river particularly during a flood event and will have residual impact on water levels in the river. This residual impact can be regarded as a positive residual impact.

12 Socio-economic Impact Assessment

12.1 Introduction

This chapter examines the socio-economic or community impacts of the proposed drainage scheme. The chapter sets out the methodology used, describes the context, the baseline environment in the locations where relief measures are to be provided, discusses the predicted impacts during construction, predicted impacts upon operation, details of the mitigation measures proposed and residual impacts anticipated. There are interactions between socio-economic and other impacts that are addressed by other chapters of the EIS dealing with visual impacts, noise, traffic, ecology and cultural heritage. The chapter has been prepared by Optimize on behalf of the design team.

12.2 Methodology

12.2.1 Guidelines

The following guidelines were referred to while preparing and writing this chapter:

- EPA: Guidelines on the Information to be contained in Environmental Impact Statements, 2002.
- EPA: Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) 2003.

Assessment of the community impacts has been undertaken broadly in line with these documents as they relate to impacts on human beings.

12.2.2 Data Sources and Consultations

A socio-economic assessment requires that an understanding of the community is built up through background research, site visits, and discussions with local people and community representatives. Specifically, in the case of this study, data was collected by means of:

- Primary data sources (e.g. demographic data from Census 2011 and Census 2006 produced by the Central Statistics Office).
- Drawings of the proposed relief scheme.
- Maps and aerial photographs of Clonakilty
- Other relevant environmental data considered by the EIA including traffic volumes and visual impact assessment.
- A review of secondary sources including the Clonakilty Development Plan 2009-2015.
- Review of responses to scheme consultations.
- Observation of local settlement patterns and the relationship between the town and the river and coast.
- Discussion with local people including the chamber of commerce, hoteliers, shop owners, angling interests, equine interests and residents.

12.2.3 Impact Categories and their Assessment

The purpose of the community assessment is to identify the likely significant impacts as they might affect local people. Socio-economic or community impacts fall into four key categories, namely:

- **General Amenity:** This category includes impacts on residential amenity and local and visitor amenity arising, for instance, from the perceptions and actual risk of flooding, exposure of pedestrians and cyclists to construction works or construction traffic and changes in environmental quality as informed by the specialist assessments of noise, visual impacts, cultural heritage or ecology

- Journey characteristics: An assessment of potential impacts on local journey time, reliability or pleasantness including accessibility and connectivity.¹
- Community severance: An assessment of potential impacts of walls or embankments with regard to any severance from community facilities, particularly those used by older people, children or other sensitive groups, or customers in the case of businesses.
- Economic impacts: an evaluation of the proposed flood relief scheme in the context of economic development and employment.

Interactions frequently occur between each impact type. Impacts are compared between the Do-Something scenario (with scheme) and the Do-Minimum scenario. They can either be negative or positive. Their significance is assigned as Imperceptible, Slight, Moderate, Major or Profound, and depends, among other considerations, on the nature of the environment affected, the duration of an impact and the probability of its occurrence. It usually follows that impacts of a human being nature are a function of:

- The scale of the impact itself.
- The impact on vulnerable or sensitive groups.

The socio-economic assessment generally addresses impacts at a community level rather than for individuals or identifiable properties, although impacts for individual businesses are discussed where they are directed affected. The significance of impacts as they would affect the worst hit subset of the population are summarised in the Impacts Table.

The ‘magnitude’ of impacts represents the number of people (or businesses) likely to be affected and is labelled as very high, high, medium or low. For example, an impact may be of major significance for a particular population subset, but the number of people concerned could be small and therefore of “low” magnitude.

12.2.4 The Context to the Flood Relief Scheme

The Town

Clonakilty is an attractive market town with a population of 4,721 as of the 2011 Census. In contrast to some other similar country towns, the legally defined core of Clonakilty has maintained an increasing population numbering exactly 4,000 compared with 3,745 in 2006. Table 12-1 and

Table 12-2 provide information on the current population of Clonakilty and the number and type of private households. The Central Statistics Office (CSO 2013) projects that, under a return to traditional regional growth shares, the population of the South-West Region will increase by 10.7% to 733,000 by 2031 representing a higher rate than for the State as a whole (4.8%).²

Table 12-1 : Population Clonakilty

Year	Clonakilty Town Area	Including Environs
2011	4,000	4,721
2006	3,745	4,154
2002	3,432	3,698
Percent change 2006-11	6.8%	13.6%
Percent change 2001-06	9.1%	12.3%

¹ Improved accessibility occurs when desired destinations become easier to reach. Connectivity refers to the removal of barriers to journey connectivity between two or more destinations.

² The M2F2 projection represents a return to traditional regional population growth shares typically of the 1990s rather than the 2000s when Dublin attracting significant internal migration.

Table 12-2 : Private Households Clonakilty

Type of Accommodation	Households	Persons
House/bungalow	1,263	3,367
Apartment	157	251
Bedsits	13	32
Not stated	46	104
Total	1,479	3,754

The Clonakilty Development Plan 2009-2015 identifies the role that the town plays as key settlement within County Cork, a major retail centre and an integrated employment centre within the N71 corridor linking Schull, Castletownbere, Bantry and Cork. It aims to adopt measures that will attract economic development and employment, but to balance these with the protection of the town's attributes as a place to live and visit. Table 12-3 provides information on the employment categories of the working population representing 39% of the total population. It demonstrates the rather high proportions who are employed in commerce and trade/professional services.

Table 12-3 : Employment Categories

Employment Category	Numbers	Percentage
Agriculture, forestry and fishing	31	2.0%
Building and construction	76	4.9%
Manufacturing	223	14.4%
Commerce and trade	387	24.8%
Transport and communications	92	5.9%
Public administration	90	5.8%
Professional	336	21.5%
Other	318	20.4%
Total	1563	100.0%

The Development Plan places an emphasis on the need to maintain the retail core of the Clonakilty. It recognises the town's environmental quality, including its historical and architectural heritage, and aims to enhance and extend the public realm. The town contains around 200 protected structures with the highest concentration being in the vicinity of Pearse Street, Oliver Plunkett Street, Emmet Squire and Bridge Street. Areas of the town centre are zoned for mixed use or for commercial/tourism and include pockets of derelict land for appropriate infill development.

As Clonakilty is sandwiched between hills to the north and south, land zoning to the west allows for future residential development and amenity use. This zoning can facilitate potential population of population of 3,000. A balance of over 1,500 could be accommodated within the town boundary in line with national guidelines for higher density development. Some commercial development has also been permitted to the west of the town as represented by the retail area centred on Dunne's Stores off Western Road just before the westbound connection of the N71. This is illustrated in Figure 11-1 which is a replicate of the Zoning Map given the Clonakilty Town Development Plan 2009-2015.

Clonakilty is an important destination for tourism. Visitors are attracted by the combination of a vibrant and attractive town centre, the built and cultural heritage, the nearby coastal scenery and beaches, along with the wider attributes of West Cork. The town contains a good number of lively cafes, pubs and craft shops along with more convention main street premises. The

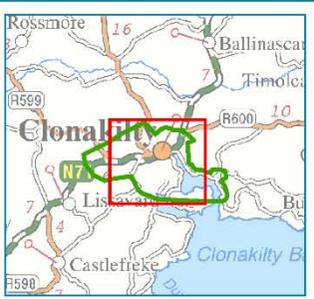
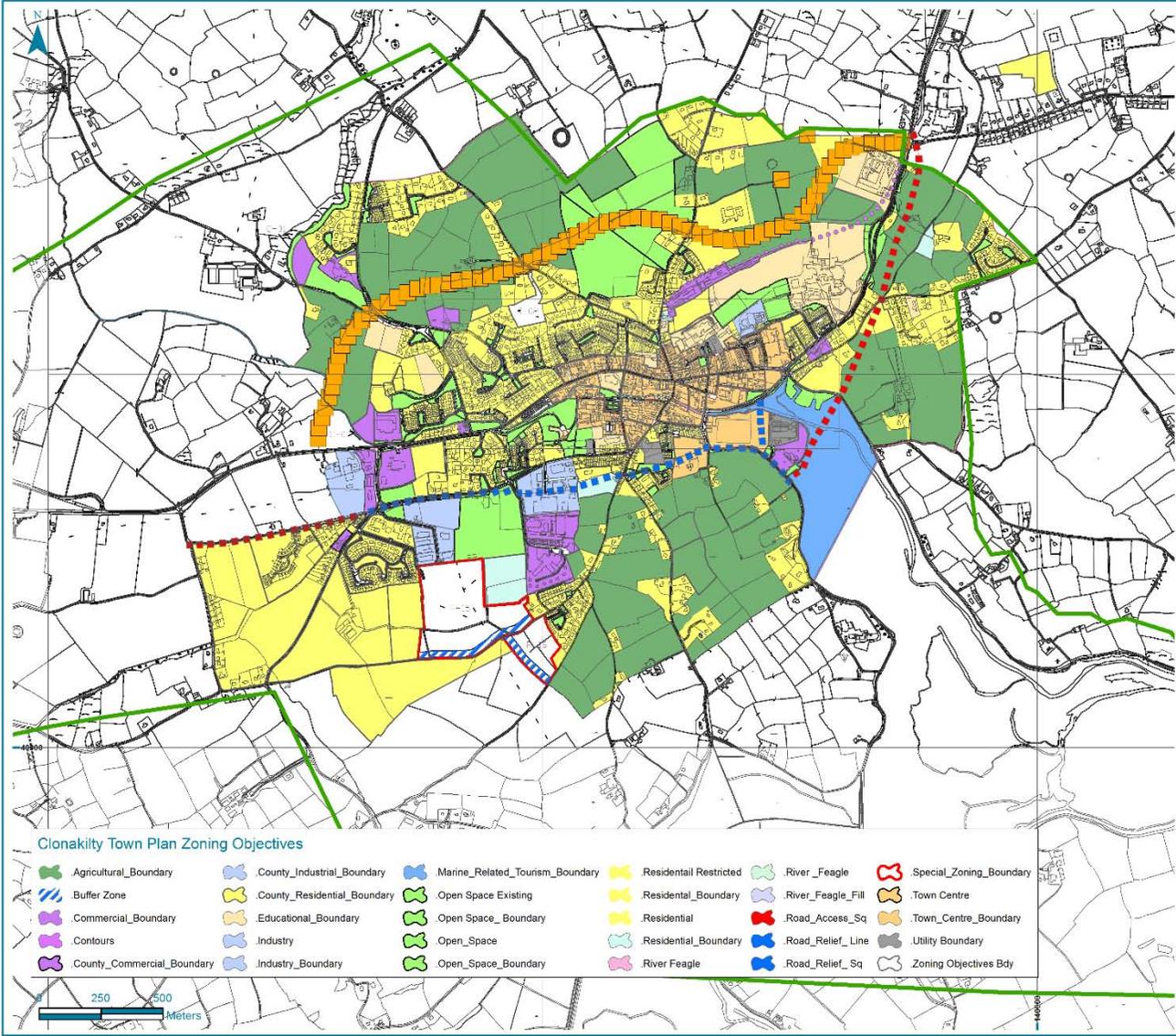
Model Railway Village is a specific attraction sited beside the bay. There is also a series of cultural and music festivals throughout the year. Visitor accommodation in the town is supplied by hotels and guest houses providing for over 4,400 beds.

Flood Risk

The laudable proposals for Clonakilty's future growth are placed at risk by the threat of flooding. In recent years significant flooding has occurred in the town on a number of occasions. In June 2012 much of the commercial heart of the town, along with areas along the River Fealge, found itself suddenly under water following a period of intense rainfall. The regularity of flooding has the potential to seriously set back aspirations to maintain a residential population and commercial activity in the town centre as set out in the Development Plan. According to Clonakilty Chamber of Commerce, 105 private residences were impacted by the 2012 event along with 170 commercial premises, more than ten of which sustained direct losses of over €40,000. The total damage was estimated at between €6 and €7 million including material damage and loss of business. Tourism is very important to the economy of Clonakilty and the 2012 floods occurred just before the main tourist season. A more enduring legacy of the flooding is that many businesses and residents are now unable to avail of insurance cover and so would be dependent on their own resources in the event of another significant flood event.

The flooding has also had a damaging social impact through the prevention of access to community facilities, damage to property and temporary relocation. Some of the properties worst affected by the 2012 floods were occupied by elderly people and other more vulnerable subsets of the population. Table 12-4 indicates the number of different age classes within the town electoral area and the respective proportional level of disability within these classes. Table 12-5 indicates the proportion of the population which falls into CSO social class categories, including those that can be presumed to be more disadvantaged. Local doctors report instances of elevated stress amongst vulnerable groups during occasions of recent flooding and continuing anxiety during periods of bad weather. Fortunately, Clonakilty has a strong community spirit and was able to recover quickly following the most recent floods.

The Strategic Environmental Assessment (SEA) of the Clonakilty Development Plan argues that a rezoning of lands will be sufficient to meet population projections and proposes a concentration of development in the existing town boundary including through the re-use of derelict lands. If this objective is to be realised, it will be necessary to reduce or eliminate the risk of regular flooding. This in turn will permit Clonakilty to continue to attract amenity use and tourism with its associated benefits for the local economy. Figure 12-1 illustrates land zoning within the town area.



Legend
 Clonakilty Study Area

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for
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Figure 12-1: Clonakilty Town Plan Zoning Objectives

Drawn by: Aaron Birchmore	Date: 26/11/2014	Scale: 1:15,000
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Table 12-4 : Age Categories and Disability

	0-24	25-44	45-64	65-74	75+
Total	1245	1276	852	269	358
Proportion of total	31.1%	31.9%	21.3%	6.7%	9.0%
Proportion of above with disability	7.3%	10.0%	17.7%	50.0%	

Table 12-5 : Social Class

Professional	Managerial / Technical	Non-manual	Skilled manual	Semi-skilled	Unskilled	Other
265	1033	737	607	491	187	680
6.6%	25.8%	18.4%	15.2%	12.3%	4.7%	17.0%

12.3 The Proposed Development

The proposed development is described in more detail IN Section 6 of the EIS. Its principal features include:

- An earth embankment to contain a storage area in the catchment of the River Fealge above the town.
- New walls and reconstruction of existing walls or foundations along the River Fealge.
- Replacement of metal fencing or grids with solid parapets on pedestrian bridges crossing the river.
- Culverting of sections of Garage Stream and improvement of walls classed as being in poor or very poor condition on the River Fealge up-stream of Michael Collins Bridge, for example at Deasy's Brewery.
- A 1.6m wall between the N71 at Croppy Road (Croppy Quay) and Clonakilty Bay to protect the primary route and town from tidal flooding.
- A 1.4m wall beside a small stream that feeds into the bay from the north.
- The raising by 1.7m of a section of the Ring Road at Deasy's Quay alongside the north of the bay.
- A 1.1 to 1.3 m high reinforced concrete wall along Croppy Road
- A short 1.4m high embankment behind houses to the east of Old Timoleague Road.
- A 1.3 m high wall on the south side of the estuary tying in with the embankment on the western boundary of the waste water treatment plant.
- Pumping stations at various points around the town.

Details of the proposed development were presented at a Public Information Days (16th October, 2012 and 16th July, 2013) and a Public Consultation Day (3rd July 2014). Comments provided by the public during these events have been considered within this assessment.

Most negative impacts will occur during construction, but will be finite in duration. Together, the measures included in the scheme will provide a cumulative reduction in flood risk. Upon operation, this will supply a profound positive impact compared with the do-nothing scenario for the residents and businesses in Clonakilty. The cost-benefit analysis of the scheme estimates the present value of damage avoided over a fifty year period at over €21 million.

In addition, works are on-going to improve drainage in the town and to separate storm water from foul water. These works are outside of the flood mitigation scheme, but will have a cumulative benefit on improving drainage and minimising the risk to health.

12.4 Baseline Environment

Clonakilty is an excellent example of a classic Irish town with a centre comprised of a variety of small shops, small businesses and hotels centred on Pearse Street, Ashe Street, Astna Street, Rossa Street and Connolly Street. Established housing has been supplemented by apartment development in recent years. However, there is vacant land available for infill development as well as unoccupied properties, a situation due largely to the recent recession, but with flood risk and access to insurance being additional factors.

Among the Clonakilty's principal employers are Carbery Plastics, Irish Yoghurts and Clonakilty Black Pudding. Bord Iascaigh Mhara and the Department of the Agriculture, Food and the Marine have offices in the town. The Clona dairy are located off the N71 Croppy Road within the flood risk area. The town attracts much tourism during the summer months, but its cultural heritage and mixture of family-run shops and cafes attracts visitors throughout the year, including for Christmas shopping.

The flooding of June 2012, affected mainly areas alongside the River Fealge and much of the town centre below Michael Collins Bridge on Bridge Street. Recent flooding has arisen due to a combination of fluvial flooding from the River Fealge and tributary streams and pluvial flooding due to drainage constraints. These factors can be exacerbated by the prevention of river outflow by high tides in Clonakilty Bay. Tidal flooding is also a risk.

Flood events have had a considerable social impact. Up to 500 people live in the town centre and many had to leave homes while properties were repaired or refurbished. The continuing threat of flooding at times of high rainfall is a persistent source of anxiety. Businesses have suffered significant economic losses due to material damage and loss of business. Many are now unable to obtain insurance cover. Most businesses have nevertheless remained in the town centre, but some potentially attractive sites and premises remain unoccupied.

The River Fealge enters Clonakilty from a valley to the west that is used mainly for grazing by livestock and horses. It passes between the Dunne's Stores car park and Western Road at which point it is also joined by the Garage stream. From here it flows through a green area between housing before passing under Western Road. It then runs behind a beauty salon, estate agents and residential housing including the car park of the small Cois Na L'Abhann estate. For most of this length it is separated from the housing to the north by a low stone wall of mostly fair condition. The old Clonakilty Technical School is shielded from the river by a high wall, but a row of small businesses immediately downstream (including the Western Road Surgery and another beauty salon) suffered serious flooding in the 2012 event when the water spilled over the low wall at this point. There is a corridor of green space, school playing fields and the grounds of Bushmount Retirement and Nursing Home to the south.

The river then passes between the Clonakilty Parish Centre to the north and the old Deasy's brewery building to the south which, while derelict, is of cultural heritage value. There is a gated development and apartments (including basement flats) on the far side of Deasy's Brewery and these suffered serious flooding in the 2012 event. Just below this point, the river is well shielded from the parish church and car park to the north by a tall high quality wall. To the south, the private Weston Lodge and neighbouring properties suffered serious flooding in 2012 even after the owner had built a private wall around the building within the garden of the property. Some water from the river reached Emmet Square (a conservation area), but more damage would have occurred without the high exterior walls of Weston Lodge, especially should the garden gate have failed.

Walls on the north bank of the river below Michael Collins Bridge on Bridge Street collapsed in the 2012 event and have not yet to be rebuilt. There is a concentration of community facilities below this point beginning with the town post office on the north bank which is housed in a building of heritage value. Clonakilty Credit Union forms a detached building separated from the

river by steel fencing and connected to Kent Street by a footbridge. There is a large car park to the rear which is linked to Kent Street by two small bridges, to Bridge Street through the Spiller's Land arcade (occupied by small cafes and shops) and to Oliver Plunket Street via a pedestrian alley beside O'Donovan's Hotel. There is a small weekly street market at this location. The south side of Kent Street is separated from the river by a low stone wall and comprises a terrace of mainly commercial small businesses, but including also the community facilities of an employment training centre, the local enterprise office and Clonakilty Methodist Church. The river then passes behind the town library on Kent Street and the eastern extension to the aforementioned car park. There are flood gates here and recent concrete block protection of the car park from the river. The river then passes between the fire station and the Clonakilty Chamber of Commerce building before flowing underneath shops on the east side of Rossa Street. This section is a particularly busy part of town. The river itself is too small to attract significant angling, but is fished in this section of town by local youngsters.

Beyond Rossa Street the Fealge passes beside the Courtyard Bar where a terrace with tables is set above the river. To the north, beside Seymour Street, there is undeveloped land, informal car parking to the rear of Rossa Street and warehousing belonging to a household store on Astna Street. Pedestrians can cross the river from Seymour Street via William A Houlihan Bridge to Harte's Yard which includes the Courtyard Bar, the garden/yard of Scannell's Bar and some small businesses (fitness, tanning, etc). A pedestrian path (separated by a metal fence) follows the river downstream from the William At Houlihan Bridge, passing the rear of a dental practice and emerging at a Spar store on the corner of the N71 (Casement Street) and Clarke Street.

The river outflows into Clonakilty Bay between the N17 (Croppy Quay/Road) and the Waterfront Development. Commercial premises on the ground floor of this development are currently vacant, but there are some occupied apartments on higher levels. Flooding of the main N71 is infrequent, but can have a significantly adverse impact on the accessibility of the town and West Cork given the absence of satisfactory alternative routes. At present, the main primary route is separated from the bay by a wooden fence and a narrow strip of green space bay. The footpath alongside the bay is much used by local people and visitors including for amenity (e.g. walks). There are a couple of benches beside a memorial to the Tiananmem Square massacre. On the town side is the Clona Dairy, the wastewater treatment plant and the Faxbridge Veterinary Hospital.

Croppy Road meets a roundabout with Wolfe Tone Street to the northern end of the bay at Fracksbridge. There is a small estate agents office here on the edge of a green space. Supervalu and Meadows and Byrne are located on the far side of Wolfe Tone Street. Deasy's Quay follows the river to the east. A waterside amenity is proposed in the town plan for this area of the bay. A small stream enters the bay at this point via a narrow channel between residential properties and a few small businesses on the N71 Cork Road and Old Timoleague Road to the east.

12.5 Construction Impacts

12.5.1 Storage area, embankment and spillway

The embankment for the water storage area (E6, E7 and E8 on Figure 6-5) is located away from most properties so that absolute impacts on residential amenity will be slight, but for three or four properties nearest to the site to the west. There will be **slight negative impacts** due mainly to noise to a similar number of more distant properties to the north. However, 11,250m³ of clay-like material will be required to construct the embankment and this will require around 1,000 truck movements over up to an eighteen month period.

The construction of the embankment could impact on a nearby stables to the west which uses land adjacent to the proposed embankment for grazing. The higher storage area currently receives only light grazing by a recently built stud farm and equestrian centre. The total farmed area within the entire study area is 2,564 hectares of which 41% is under pasture. However, the maximum extent of the storage area is 19,500m² and construction would impact almost exclusively on a small area within the vicinity of the embankment and spillway.

The level of disruption is very dependent on the origin of the material and from where it is delivered to the site. If materials are delivered from the direction of Cork, then heavy goods vehicles will join existing levels of traffic in passing beside residential properties on the primary road, for instance at Casement Street. The net impact would be an increase in traffic level of approximately 1.5% in the number of HGVs. If materials are delivered from the west then impacts will be significantly less.

The full extent of the storage area would include a section of the preferred route for the proposed Clonakilty Bypass. The storage area will not preclude the construction of a bypass, but the road design will not need to ensure that function of the storage area is not compromised.

12.5.2 Walls or bridges on the River Fealge

Replacement or heightened walls and bridges will be needed on the River Fealge to replace those in poor condition. Where repairs to foundations are needed these are proposed to occur from within the river channel during the summer months when the flow are low and works will not interfere with salmonids. There is a likelihood of some disruption due to short detours for pedestrians and cyclists, noise and materials delivery. Alterations to bridges and footbridges could cause inconvenience, but this should not extend to any temporary closure.

This disruption can be expected to impact on pedestrians, a small number of residential properties and businesses located on Kent Street, backing onto the river from Harte's Yard and at the Clarke Street Bridge. The impact will be of rather short duration at any one point and is expected to be of **slight negative significance** after mitigation (see table). There is a possibility that the footbridge will be closed at the Credit Union (B2 and B3 on Figure 6-2) presenting a severance impact despite the availability of alternative access, but this impact will be of a short duration.

12.5.3 Tidal walls Clonakilty Bay

Only slight disruption to westbound traffic flow is possible due to materials delivery. Slight disruption to the amenity of a small number of residents is possible at the Waterfront Development (L36 on Figure 6-1). People walking along the bay could also be impacted. However, the narrow green strip along the bay beside Croppy Road is not easily accessible except at one point at the southern end at the exit of the river. Construction is proposed to occur outside of the main tourist season when traffic levels are lower and impacts would be least visible.

12.5.4 Defences to the north of Clonakilty Bay

Construction of the wall along the stream to the north of the bay could cause some disruption to residential amenity and one or two businesses backing onto the stream due to occasional noise and need for access to the narrow channel.

Construction of the embankment behind Old Timoleague Road (E10 on Figure 6-1) will present some noise impacts and visual intrusion due to materials delivery by trucks. In addition, noise impacts are likely due to the raising of the surface of the road to the east (R1 on Figure 6-1). This will impact on residential amenity and on at least one business.

12.5.5 Storm water pumping stations

Three storm water pumping stations (D11 and D12 on Figure 6-1 and D3, D5 and D7 on Figure 6-2) are either in the process of construction or proposed within the town centre. A fourth is proposed for the site of the waste water treatment plant. There will be some modest construction impacts due to materials movement and excavation.

12.5.6 Construction employment

The proposed development will provide employment for approximately 18 months. There is the possibility that a proportion of workers could be sourced locally. An indirect impact will also arise from the need for impermeable material for the embankment which, due to the volume and traffic implications, will be best sourced locally if possible.

12.6 Operational Impacts

12.6.1 General

On completion, the flood defences will have a profound **positive impact** by removing or greatly reducing the risk of flooding and the impacts this has in terms of severance, disruption to daily life, health and direct threats to life, business and property.

Positive impacts will be most significant for the 500 people residing in the town centre and most especially those living in rental or owner-occupied accommodation in the central area which is at highest risk. There is a particular positive impact for more vulnerable population subsets such as elderly people or people with disabilities, for example people living on Casement Street or in basement flats. On previous occasions, these individuals will have had to have moved out during period of flooding or will have had to cope with a period of living in an unsatisfactory environment following a flood event. There has involved problems of material damage and damp with consequent financial and health implications.

The benefits to business will be greatest for those shops, hotels and other businesses located on Western Road, Kent Street, Connolly Street, Rossa Street, Clarke Street, Astna Street, College Road and Ashe Street/Wolftone Street. The protection should permit businesses without insurance to re-avail of cover.

The protection afforded to Clonakilty will have a **major positive impact** on the town's environment and economy and its ability to attract future residential and commercial development. This applies particularly to the new and infill development that would be considered under the consolidation sought for the town centre by the Town Plan. Any western expansion of the town would only be prevented in the area and immediate vicinity of the proposed flood storage area.

12.6.2 Storage Area, embankment and spillway

On completion, the storage area will have a major positive impact in itself in reducing the risk of flooding downstream. There is the likelihood of a **moderate negative visual intrusion impact** on the view to the west from one private residence to the east of the embankment. Elsewhere, the impact is assessed to be slight intrusion impact from the embankment itself. There is a possibility that parts of the current grassland nearest to the embankment could be replaced by vegetation more typical of wetland or wet grazing. This could be perceived as a **negative impact** by some people, but be visible only from a few residences to the north including a small area zoned for residential development, but also the grounds of the Fernhouse Hotel at a distance.

There is the likelihood of impacts on some land that is used as pasture for horses, particularly closer to the embankment. This could require the temporary or permanent movements of horses with possible implications for the relevant businesses, principally the future development a large stud farm and riding school to the north and stables to the west. The storage area is not zoned for development and is high quality agricultural land and pasture, but the storage area would constrain the westward expansion of the town at this location.

Lands to the east are zoned for Industrial and Commercial use giving way to a mixture of Residential and Amenity closer to town. New residential development has been proposed for appropriated zoned lands to the north-east. The reduced risk of flooding would improve the environment for development to the east.

12.6.3 Walls or bridges on the River Fealge

The construction or improvement of existing river walls that are in poor condition where the river runs parallel to Western Road will provide a **positive impact** for a number of residences and small businesses at this location. These developments would support the viability of any redevelopment of Deasy's Brewery and proposed amenity walks.

Elevated walls along the river at Kent Street and the replacement of fencing on pedestrian bridges will present a **slight visual intrusion** and amenity impact which can be minimised

through mitigation. While higher than the existing walls, the walls will be low enough for pedestrians to be able to view over the top.

There is a possibility of visual intrusion to Clonakilty Credit Union which will be located behind two rows of walls. However, the 1.1m wall will not be so high as to conceal the premises which will remain connected to Kent Street by a pedestrian bridge. There is potential for the sculpture at the entrance to be maintained.

There is a risk of **slight visual intrusion** for the terrace of the Courtyard Bar. However, this risk can be removed through the use of high quality materials and the safer separation from the river.

12.6.4 Tidal walls Clonakilty Bay

The tidal wall proposed for Clonakilty Bay (L36 on Figure 6-1) will have a **major positive impact** in protecting the town from high tides, particularly developments adjacent to the bay such as the Clona Dairy, the veterinary practice and retail businesses at Fracksbridge. It will also greatly reduce the risk of any closure of the main N71 with benefits for the local economy and journey amenity relative to the do-nothing scenario. Given the absence of satisfactory alternative routes between the town, West Cork and the City of Cork, the removal of this threat will have a major positive impact on the use of this primary route for regional access and connectivity.

The wall will inevitably present a slight to moderate visual intrusion and journey amenity impact for passing vehicles (cars) and cyclists (see Visual Impacts table). This could possibly reduce the incentive for some drivers to stop in the town. Pedestrians will, however, be able to see over the top of the wall. With mitigation, the overall amenity impact will be neutral or slight.

12.6.5 Defences to the north of Clonakilty Bay

The wall proposed for the stream will provide a major positive impact in reducing the risk of flooding to adjacent properties, to the N71 at Deasy's cross and to the retail centre with no negative impacts on completion. The embankment proposed for Old Timoleague Road will reduce the risk of tidal flooding and damage, but could present a **moderate visual intrusion** to rural views to the east from the ground floor level of approximately five properties including a guest house (see Visual Impacts table). However, at 1.4m the proposed embankment is only a little higher than the existing wall that runs behind the properties.

12.6.6 Storm water pumping stations

On operation, there will be little or no evidence of these stations above ground. The pumping station beside Croppy Road will be returned to a green space for amenity use.

12.7 Mitigation Measures

The following mitigation measures are proposed to address potential socio-economic impacts:

Storage area, embankment and spillway

- During construction, distribute deliveries of materials to avoid peak hour traffic
- Ensure continued access to residential properties, equine businesses and farms
- Negotiate timing of any particularly noisy operations with local residents and equine businesses.

Walls or bridges on the River Fealge

- Undertake construction works from river banks where possible
- Ensure continued access to businesses and other properties
- Minimise periods when pedestrian or cyclists diversions may be required.

- Noting that works are to be undertaken in summer, undertake these outside of one month peak summer holiday period where possible
- Keep use of stone cutting or other noisy machinery to a minimum.
- Construct walls or façade of attractive high quality materials
- Construct wall behind sculpture outside of Clonakilty Credit Union.
- Design should not preclude opportunities to cast a fishing line from the bridges.

Tidal walls Clonakilty Bay

- Noting that works are to be undertaken in winter, minimise any need for lane closures of N71 and particularly during run-up to Christmas.
- Minimise periods when pedestrian or cyclists diversions may be required.
- Keep use of stone cutting or other noisy machinery to a minimum especially in vicinity of Waterfront development
- Minimise noisy operations in vicinity of the Model Railway Village, especially at Christmas or other holiday periods.
- Construct walls or façade of attractive high quality materials
- Construct wall behind benches and Tiananmen Memorial if at all possible.
- Insert steps into wall or provide similar access to the existing access point at the outflow of Fealge River into the bay.

Defences to north of Clonakilty Bay

- Keep use of stone cutting or other noisy machinery to a minimum
- Ensure continued access to Old Timoleague Road and avoid use of signalling or road blockages at times of school runs for Kilgarraff National School.
- If possible, construct embankment outside of main summer holiday peak (one month) to avoid impacts on tourism businesses.
- The embankment should be fenced off from livestock and regularly managed to prevent excess weed growth.

12.8 Residual Impacts

Once operational, the combined effect of measures included in the flood relief scheme should greatly reduce the risk of flooding. It is almost impossible for any scheme design to entirely eliminate the risk from extreme events, but the scheme as proposed should permit the continued prosperity of Clonakilty as a place to live, work and visit. In particular, the measures will lift the flood-related anxiety of people living in the centre of town and improve access to insurance for residents and businesses. The raising of riverside walls and the erection of a new tidal wall are somewhat intrusive and the latter will result in a loss of views of the bay for many people using the N71. However, in other respects, there is an opportunity to enhance the character of this heritage town through the use of quality materials and by attracting appropriate renovation and occupancy of heritage buildings through the reassurance of reduced flood risk.

13 Traffic / Transportation and Roads Impacts

13.1 Introduction

This chapter sets out the Traffic/Transportation and Roads Impacts of the construction and operation of the preferred Clonakilty Drainage Scheme (Storage and Tidal Defences).

The assessment is based on the following sources of information and industry accepted practices:

- The Preferred River Fealge (Clonakilty) Drainage Scheme Options;
- The Content of the Clonakilty Traffic & Transportation Study (Jan 2011);
- National Roads Authority (NRA) Traffic and Transport Assessment Guidelines (2007);
- NRA Design Manual for Roads and Bridges (DMRB) Standards;
- NRA Project Appraisal Guidelines 'Link-Based Traffic Growth Forecasting' methodology (January 2011);
- Comprehensive site visits and road network appraisal of Clonakilty, undertaken in 2014.

This section of the EIS has been prepared by NRB Consulting Engineers Limited, specialist in assessing the Traffic & Transportation implications of developments (see www.nrb.ie).

The Transportation Assessment jointly examines the following:

- The Transportation Impacts during the Construction of the Scheme
- The Transportation Impacts during the Operational Stages of the Scheme

13.2 Baseline Assessment - Existing Traffic Conditions in Clonakilty

Clonakilty has an attractive and compact town centre, which is defined by a system of narrow, mostly one-way, streets, with on-street parking available. The N71 National Secondary Road runs through the town, in a broadly north-west direction. The N71 is a National Secondary Road, the primary link between Cork City and Bandon with Clonakilty, and onwards to Skibbereen and West Cork.

The town is also linked to the surrounding hinterland via the Regional Road R588 (Fernhill Road) which runs northbound from the town, the Regional Road R599 which runs N-West, and the Regional Road R600 linking to the east to Timoleague. Each of these Regional Roads links with the N71 National Road on the approach to, or within, the Town Centre.

The N71 through the town is a very narrow single carriageway road with a very restrictive horizontal alignment (several bends where large vehicles can only pass with care at very slow speeds). The NRA Traffic Counter information (N71 Between Clonakilty and Jones Bridge, Clonakilty, Co. Cork) indicates that the N71 carried an Annual Average Daily Traffic Flow (AADT) of 8,566 Passenger Car Units (PCUs, or "car-equivalents) with 3.1% Heavy Goods Vehicles (HGV) content in 2013 (HGVs being considered as trucks with more than 2 axles for the purposes of this assessment).

A full movement town centre Automatic Traffic Counter (ATC) survey of the N71 at Park Road (adjacent The Pines) was previously undertaken as part of the CTTS. This survey revealed a weekday AADT during August 2007 of 13,800 PCUs. The town centre ATC data is appreciably higher as it includes local and internal business traffic movements within the town centre cordon.

A recent classified traffic survey carried out as part of this assessment during October 2014 indicated that the N71 to the western perimeter of the town, at the preferred location for the creation of the storage area, carries an AADT of 6930 PCUs with 1.7% HGV content. A location plan showing the position of the Traffic Survey is included below as Figure 13-1. The survey revealed weekday AM and PM Peak hour Traffic Flows as illustrated in Figure 13-2 below;-

Figure 13-1 : Location of Oct 2014 Traffic Survey

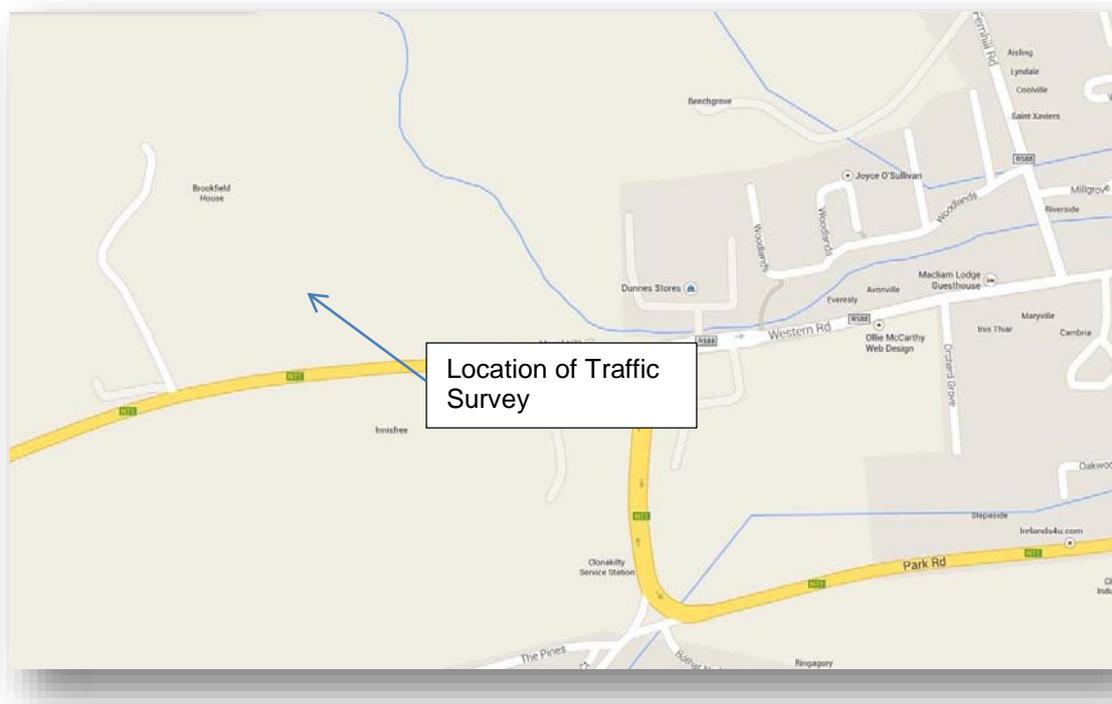


Table 13-1 : N71 Traffic Survey Results

Hour Starting	Total Traffic (PCUs)		HGVs (>2 Axle)		Cars/Vans		2-Way Tot PCUs
	Eastbound	Westbound	Eastbound	Westbound	Eastbound	Westbound	
00:00	17	18	0	0	17	18	35
01:00	5	11	0	1	5	8	16
02:00	6	7	0	0	6	7	13
03:00	6	2	0	0	6	2	8
04:00	7	4	1	0	4	4	11
05:00	21	6	3	0	12	6	27
06:00	70	24	4	0	58	24	94
07:00	135	66	4	1	123	63	201
08:00	226	186	6	4	208	174	412
09:00	189	155	4	3	177	146	344
10:00	240	209	8	6	216	191	449
11:00	257	244	7	6	236	226	501
12:00	244	277	7	8	223	253	521
13:00	256	244	7	6	235	226	500
14:00	233	265	7	7	212	244	498
15:00	185	284	5	7	170	263	469
16:00	145	296	4	9	133	269	441
17:00	222	289	6	8	204	265	511
18:00	146	209	5	6	131	191	355
19:00	120	164	3	4	111	152	284

Hour Starting	Total Traffic (PCUs)		HGVs (>2 Axle)		Cars/Vans		2-Way Tot PCUs
	Eastbound	Westbound	Eastbound	Westbound	Eastbound	Westbound	
20:00	123	118	3	3	114	109	241
21:00	91	89	2	2	85	83	180
22:00	56	54	1	1	53	51	110
23:00	26	30	1	1	23	27	56

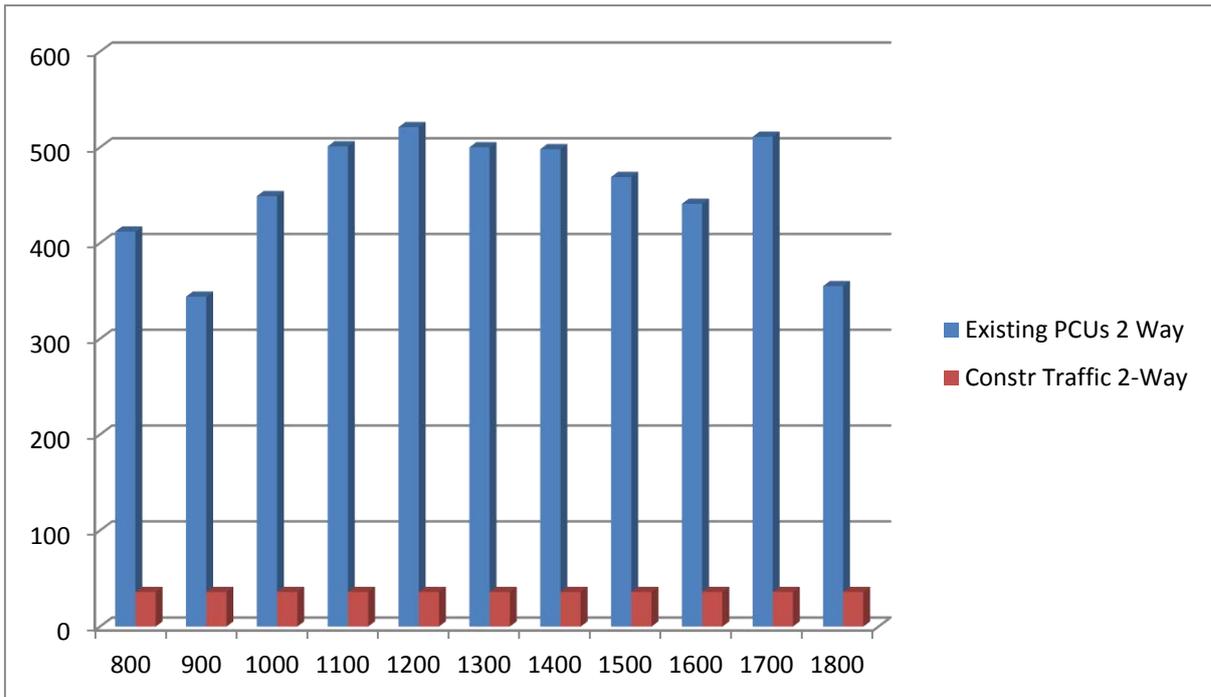
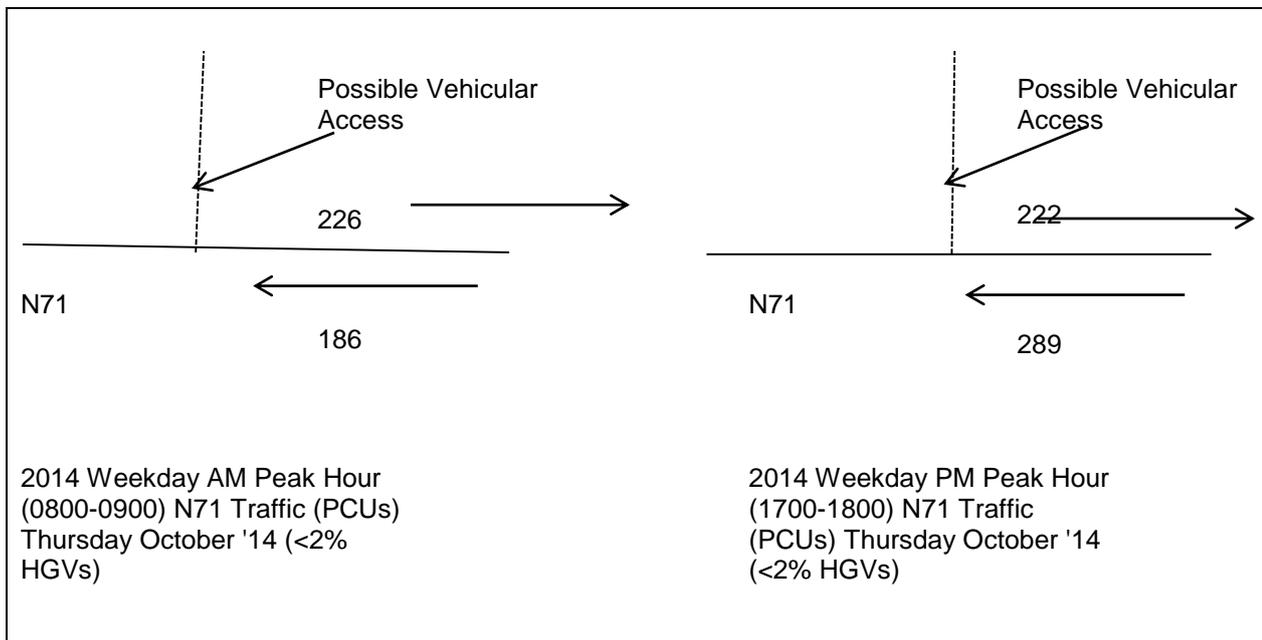


Figure 13-2 : Hourly Construction Traffic compared with Existing N71 Traffic Conditions

A review of the Road Safety Authority on-line Database reveals that, whilst there have been several (~20) motor accidents during the assessed period (2005-2014), in the environs of Clonakilty, there appears to have been no fatalities on the local roads. In these terms, the proposed scheme is considered unlikely to have any impact upon the frequency and severity of accidents.

Figure 13-3 : Baseline Traffic Data Information, N71



A detailed and comprehensive review of Traffic/Transportation issues associated with the town centre was undertaken as part of the Clonakilty Traffic & Transportation Study (CTTS) (prepared by RPS). This set out in detail the current problems and restrictions within the town, and identified key measures to alleviate current problems.

In terms of the Overview of Existing Conditions, the CTTS identified the following challenges under Section 2.1, reproduced below; -

Localised traffic congestion associated with the start and end of the school day, as cars taking staff and pupils to and from school converge on a few key locations during a short window of time

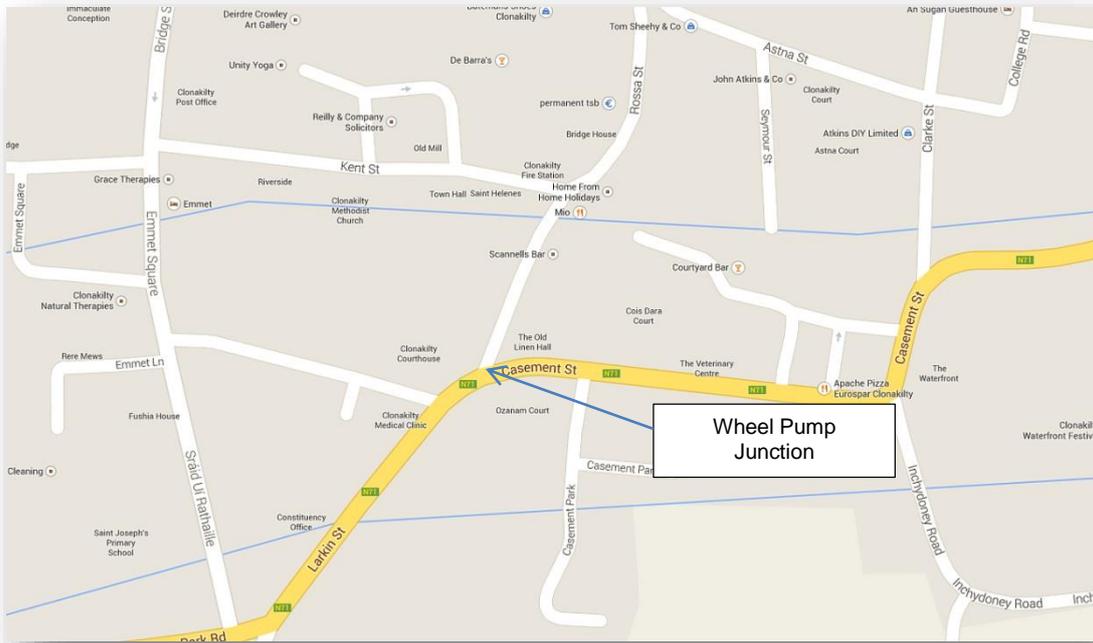
The N71 "bypass" which does not take traffic out of the town; this road carries high volumes of traffic, including HGVs; it is difficult for pedestrians to cross; there are particular problems near the wheel-pump junction with closely spaced junctions and poor visibility. (The location of the wheel pump junction is shown below as).

The tension between improving the town centre environment and maintaining the economic vitality of the town centre. The town centre would be more pleasant without the on-street parking, the too-narrow pavements and the queuing traffic with associated noise and pollution. But the town centre shops are competing with out-of-centre supermarkets which have ample free parking, and also to a certain extent competing with neighbouring towns; easy access by car is an important success factor for the vitality of the retail sector within the town.

Providing town centre parking space sufficient for the influx of tourists in summer as well as for year round residents of the area, commuters and shoppers.

The need to improve road safety for vulnerable road users, particularly for cyclists and for those pedestrians who have some impairment of mobility or vision.

Figure 13-4 : Wheel Pump Junction, Clonakilty



The CTTS addresses the following Transport Modes; -

- Pedestrians
- Cyclists
- Public Transport/Bus
- Parking
- Vehicular Traffic
- The Importance of the N71 which runs through the town

In terms of the Road Improvement Proposals, the CTTA identifies specific improvements to key roads and junctions within the Town Centre, within Section 7 of the Study, including suggested alterations to flow directions along streets.

The requirement for all or any of the identified measures to support the Clonakilty Drainage Scheme works is addressed within this EIS.

13.3 Transportation Impact of Proposed Scheme

The Guidelines for Traffic/Transport Assessment require us to undertake a Robust and Onerous Assessment of any scheme or proposal. In this case, in order to provide for the worst case we have assumed a very significantly 'compressed' works programme taking consideration of a start date of October 2015 and a finish date of March 2017, conscious that river works will be allowed May-September inclusive, in light of the presence of salmon.

Purely for the purposes of providing a thorough analysis we have assumed that no works whatsoever will be undertaken out-with this period. This has been done here in order to provide a severe and worst-case assessment of the impact upon roads. In reality the impact on roads will be significantly lower due to the works being undertaken over a longer period of time, with works out-with the river being permitted during the salmon season, with a resulting associated reduction in the daily traffic volumes during the construction period.

The proposed works themselves are not expected to have any significant impact whatsoever on traffic conditions when completed (i.e. during the Operational Period), therefore the assessment focuses upon the impact during the construction period. However, there will of course be significant benefits of no future road flooding as a result of the works.

For the purposes of this assessment, the construction operations have been divided into 3 distinct packages or elements; -

1. The town centre and estuary flood wall and defence works
2. The raising and re-grading of a section of the Ring Road, and
3. The fluvial storage area to the west of the town

Whilst there may be localised and very short terms disruption, the 3 distinct areas of construction are considered to have no medium to long terms impact whatsoever on cyclists, pedestrians, public transport or parking. Our assessment has therefore focussed upon Construction traffic impact (which in reality has only a short-medium term effect).

In general it should be remembered that the incidence of flooding in Clonakilty historically has a very significant adverse impact upon traffic progression, not just for local traffic but for traffic movements to and from West Cork along the N71. In this regard, the completed relief works are expected to have a very significant benefit in terms of the smooth uninterrupted flow of traffic through Clonakilty.

13.3.1 Town Centre/Estuary Flood Walls and Defence Works

It is expected that these construction operations will require the presence of 3-5 operatives, with a single machine (such as a JCB) and possibly a piling rig and a small mechanical dumper. It is anticipated that the works will require 3-4 deliveries or removals of materials per day. Based on the robust assumption of 1 car per operative, this element of the work will result in an additional 15-20 PCU movements per day (2-Way) within the town.

Given that the survey revealed a total of 13,800 PCUs 2-way using the N71 within the town centre, this additional traffic volume associated with the construction operations is considered negligible and will we expect go unnoticed. A total of 20 additional PCUs is negligible in terms of the existing volume of 13,800 AADT. Notwithstanding the low level of impact, there may of course be a requirement for very localised traffic management measures during the progression of these works, and any such measures can and will be done through agreement with the Local Authority and the Garda. There will be a requirement for localised deliveries of materials, such as batches of concrete or concrete blocks, and any such deliveries will be locally controlled through the use of cones and temporary traffic management, which will have a minimal and localised impact at the specific works location.

13.3.2 Raising and Re-grading of a section of the Ring Road

The subject part of the works consist of on-line works, altering the levels of the existing road way along the Ring Road from Fracksbridge. This element of the works will in-so-far-as possible likely be undertaken out-with peak traffic periods, and will require localised temporary signed diversions and a traffic management plan to be agreed in advance with the Local Authority and the local Garda. Local Access will be maintained to local properties.

13.3.3 Construction of the Flood Storage Area West of the town

It is expected that the creation of the outlet wing walls and the out-flow control system will require manpower resources of 2-3 operatives, a crane, mechanical dumper, and an excavator machine such as a JCB for approximately 6-8weeks. Together with materials deliveries, this represents approximately 15-20 PCUs (vehicles) per day 2-way. Given that the N71 carries approximately 7,000 PCUs AADT in this location, the construction operations are considered to represent a negligible impact.

A significant element of the work in creating the storage area will be in forming the basin through the use of grading machinery. It will be necessary to import low-permeability clay in order to create the impermeable embankments to the south of the storage area. This involves the importation of 11,250m³ of material (or approximately 22,500T). This is broken down to approximately 13,500 T of material for the south side of the river and 9,000 T for the northern portion of the embankment. Based on 20 T per truck, this represents a total of 1,125 Truck Movements associated with the importing of the clay material for both sides of the embankment. Based on the robust assessment that this material will be imported and formed in place over a 3 month (13 week) programme, and assuming a 5-day working week, this represents an additional 11 truck movements per day (or 22 2-way truck movements, or 66 PCUs using a conversion factor of '3') to construct the southern portion of the embankment. Similarly to haul 9,000 T of material to construct the embankment on the northern side of the river, over the same period of time, an additional 7 trucks per day will be required (or 14 2-way truck movements, or 42 PCUs using a conversation factor of 3).

This additional traffic associated with the importation of material represents 1.5% of the total traffic flow on the adjacent N71. In these terms, the traffic impact is considered negligible. It is anticipated that the traffic carrying the material for the construction of the northern portion of the embankment will go through the Dunne's Stores roundabout and travel to the junction of the R585 (Fernhill Road). The additional HGV traffic will place a slight to moderate impact on the existing traffic in this area.

In terms of the direction of arrival and departure of these vehicles, this will be dependent upon the contractors preferred source of construction materials. However, there is more than adequate forward stopping distance and exit visibility at the proposed access to allow the safe movement of vehicles whether turning right or left. The addition of 22 truck movements (2-way) per day to the road network either to the west on the N71 or to the east towards the "Dunnes" roundabout will have a negligible impact in terms of the current traffic volumes in the area. Similarly with the additional 14 truck movements at the junction of the R585 and the N71.

The construction of the storage area will require the creation of the temporary vehicular access to the lands. This can be agreed between the contractor and the landowner in advance of the commencement of the works. There is an existing exit off the N71 to the west of the existing Mace/Maxol garage, generally remote from residential property, but within the 60kph section of road. The entrance to the site off the Fernhill Road will also need to be agreed between the landowners and the contractor. Temporary roads will be required to access the site of the embankment and flow control structure.

The layout and design of the temporary construction access for both sides of the embankment would be agreed with the Local Authority prior to commencement and may require the preparation of a Road Safety Audit prior to operation, being located on a 60kph section of a National Secondary Road. However, the layout will meet the requirements of the NRA Design Guidance (Volume 6 Section 2 TD41/42 "The Geometric Design of Major/Minor Priority Junctions and Vehicular Access to National Roads") in terms of the geometric parameters to provide a safe form of access. The N71 is a wide single carriageway ~7m in width at this location, being flat with good visibility in each direction and in this regard there are no concerns regarding the ability to construct of a safe temporary vehicular access.

The road signage associated with the temporary access will fully meet the requirements of the Department of Transport's Traffic Signs Manual.

The temporary access will include the internal provision of wheel wash & brush facilities to ensure that there is no inadvertent depositing of mud or clay on the public roads associated with the passage of construction vehicles with additional road sweeping as necessary.

Table 13-2 : Construction Traffic Impacts of Scheme Elements

Element	Quality Impact		Impact Significance		Impact Duration	
1. Town/Estuary Walls & Defence	Positive		Slight		Short Term	Y
	Neutral	Y	Moderate	Y	Med Term	
	Negative		Significant		Long Term	
2. Raising/Re-grading Ring Rd	Positive		Slight		Short Term	Y
	Neutral		Moderate		Med Term	
	Negative	Y	Significant	Y	Long Term	
3. Construct Storage Area	Positive		Slight		Short Term	Y
	Neutral	Y	Moderate	Y	Med Term	
	Negative		Significant		Long Term	

14 Air and Climate

14.1 Introduction

This Chapter of the EIS describes the impact to air quality and climate associated with the proposed Drainage Scheme. This Chapter should be read in conjunction with the proposed scheme layout plans (Section 6) and the project description of this EIS.

This assessment was prepared in accordance with the “Guidelines on the information to be contained in Environmental Impact Statements” (EPA 2002).

This study will identify, describe and assess the impact of the development in terms of its impact on air quality and climate.

Air quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values. The applicable standards in Ireland include the Air Quality Standards Regulations 2012, which incorporate EU Directives.

This section of the EIS was prepared by Glenview Environment.

14.1.1 Air Quality Legislation

In order to reduce the risk to health from poor air quality, National and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values or “Air Quality Standards” are health- or environmental-based levels for which additional factors may be Considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set. Air quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values. The Air Quality Standards Regulations specify limit values in ambient air for sulphur dioxide (SO₂), lead, particulate matter (PM₁₀) (Stage I) and carbon monoxide (CO), which came into effect on 1st January, 2005. For nitrogen dioxide (NO₂), oxides of nitrogen (NO_x), particulate matter (PM₁₀) (Stage II) and benzene the effective date was 1st January 2010. Alert thresholds for SO₂ and NO₂ are specified. The Regulations also specify margins of tolerance for exceedance of the new limit values in the period prior to their entry into force, which have relevance to the air quality assessment responsibilities assigned to the EPA in the Regulations.

14.2 Existing Environment

14.2.1 Existing Meteorological Conditions

A key factor in assessing temporal and spatial variations in air quality is the prevailing meteorological conditions. Depending on wind speed and direction, individual receptors may experience very significant variations in pollutant levels under the same source strength (i.e. traffic levels). Wind is of key importance in dispersing air pollutants and for ground level sources, such as traffic emissions, pollutant concentrations are generally inversely related to wind speed. Thus, concentrations of pollutants derived from traffic sources will generally be greatest under very calm conditions and low wind speeds when the movement of air is restricted. In relation to dust, the situation is more complex due to the range of sources of this pollutant. Smaller particles (less than PM_{2.5}) from traffic sources will be dispersed more rapidly at higher wind speeds. However, fugitive emissions of coarse particles (PM_{2.5} – PM₁₀) will actually increase at higher wind speeds. Thus, measured levels of PM₁₀ will be a non-linear function of wind speed.

The nearest representative weather station to Clonakilty, collating detailed weather records is Cork Airport, which is located approximately 50km north east of the site. Cork Airport Weather Station has been examined to identify the prevailing wind direction and average wind speeds over an annual period. This review found that:

- The prevailing wind direction for the area is between northwest to southwest.
- Easterly winds tend to be very infrequent.

- Wind characteristics vary between a moderate breeze to gales (average 10.8 days with gales per annum).
- Monthly average wind speeds range between 9.03 and 12.1 knots with highest wind speeds occurring during winter months (December and January).
- Lowest wind speeds were recorded in the June, July and August period.

Poor dispersion can occur under certain weather characteristics known as inversions that form in very light or calm wind and stable atmospheric conditions.

14.2.2 Available Background Data

Air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities. The most recent annual report on air quality “Air Quality Monitoring Report 2013”, details the range and scope of monitoring undertaken throughout Ireland. In terms of air monitoring, Clonakilty is categorised as Zone D.

Long-term NO₂ monitoring is carried out at two rural Zone D locations, Kilkitt. Co. Monaghan and Emo, Co. Laois. The NO₂ annual average for both sites in 2013 was 4 µg/m³. The results of NO₂ monitoring carried out at the urban Zone D location in Castlebar in 2013 indicated an average NO₂ concentration of 11 µg/m³ while the Zone C locations of Mullingar and Kilkenny had average NO₂ concentrations of 6 and 4 µg/m³ respectively with no exceedances of the 1-hour limit value. Hence long-term average concentrations measured at these locations were significantly lower than the annual average limit value of 40µg/m³. Based on the above information and baseline monitoring data, a conservative estimate of the 2015 background NO₂ concentration for the region of the Proposed Scheme is 15 µg/m³.

Long-term PM₁₀ monitoring was carried out at the urban Zone D locations of Castlebar and Claremorris in 2013. The PM₁₀ annual averages for both locations in 2013 were 13 and 15 µg/m³ respectively. The PM₁₀ annual average in 2013 for the rural Zone D location of Kilkitt was 11 µg/m³. In addition, data from Tallaght provides a good indication of urban background levels, with an annual average in 2013 of 17 µg/m³.

Based on the above information, a conservative estimate of the background PM₁₀ concentration for Clonakilty of 15µg/m³ has been used.

A study by the UK ODPM gives estimates of likely dust deposition levels in specific types of environments. In open country a level of 39 mg/m²/day is typical, rising to 59 mg/m²/day on the outskirts of town and peaking at 127 mg/m²/day for a purely industrial area. As a worst-case, a level of 127 mg/m²/day can be estimated as the existing dust deposition level for the current location.

14.2.3 Baseline Air Quality Monitoring

A baseline air quality monitoring survey was carried out in the vicinity of the proposed floodwall and embankment works using an approved air monitoring technique. A total of five sample locations were chosen to represent the baseline air quality in the area. These locations are presented in Table 14-1 and graphically in Figure 14-1.

Table 14-1 : Description of Dust Monitoring Locations

Location Reference	Description
D1	At rear of houses on Old Timoleague Road.
D2	Along Croppy Road adjacent old GAA grounds.
D3	At car park close to Credit Union.
D4	In car park at Dunnes Stores.
D5	In agricultural land at access road to dwellings (off the N71)

The baseline air quality assessment was scoped to determine the existing ambient dust levels derived from traffic and other sources of particulate pollution in the study area.

Baseline ambient dust deposition levels was assessed using dust deposition gauges – Bergerhoff Gauges, erected at a 2m height. The baseline survey was carried out over a short period of time from 17th October 2014 to 17th November 2014. The finding of the survey are shown in Table 14-2 below.

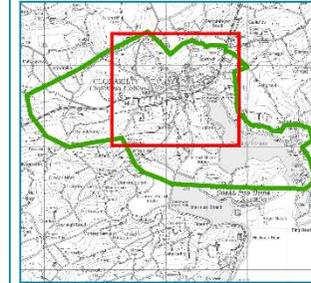
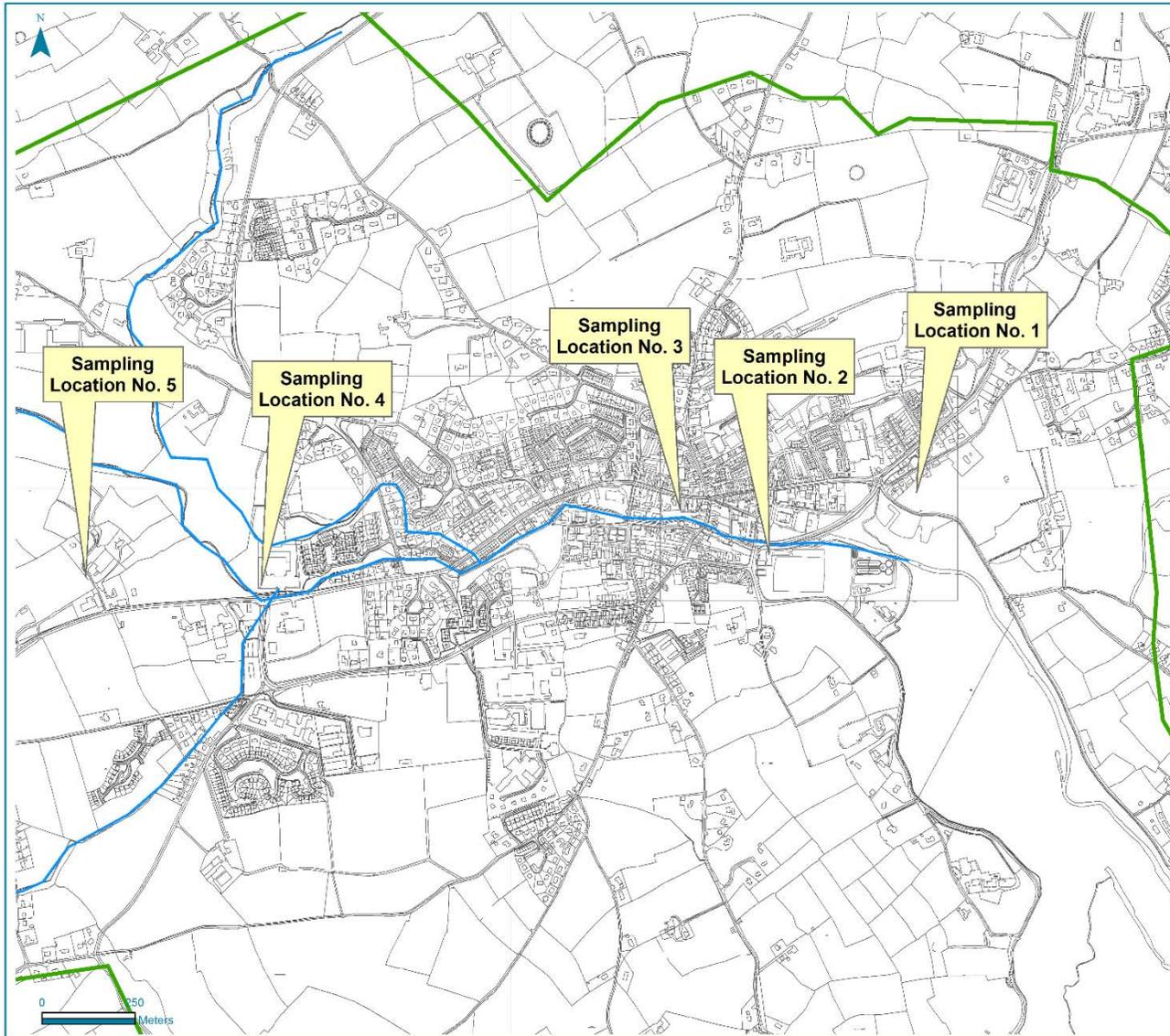
Table 14-2 : Ambient Air Quality in the Site of the Proposed Scheme (17/10/14 – 17/11/14)

Location No.	Dust Deposition mg/m2/day	Industry Guideline (source EPA) mg/m2/day
D1	64.8	350
D2	84.5	350
D3	93.4	350
D4	147.7	350
D5	61.2	350

These results indicate air quality (as dust) in this area is considered good. The results of each location indicate that the area currently experiences good air quality with low levels of ambient dust. All levels are below the EPA Licensed facility guideline of 350 mg/m2/day. The highest dust deposition volume was at 147.7 mg/m2/d, which is located D4 near Dunne's Stores. The lowest recorded dust level was at 61.2 mg/m2/d.

All other samples when examined showed varying levels of dust mostly derived from traffic, heating appliances, landscaping, and road sweeping and falling foliage.

A study by the UK ODMP gives estimates of likely dust deposition levels in specific types of environments. In open country a level of 39 mg/m2/day is typical, rising to 59mg/m2 /day on the outskirts of town and peaking at 127mg/m2/day for a purely industrial area.



Legend

-  Clonakilty Study Area
-  Rivers

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for
River Fealge (Clonakilty) Drainage Scheme
EIS Main Report
Figure 14-1 Air Sampling Locations

Drawn by: Tom Sampson	Date: 27/11/2014	Scale:
Checked by: Tom Sampson	Date: 27/11/2014	1:10,000
Approved by: Declan Egan	Date: 27/11/2014	Original @ A3
File Name: 2014s0971-016-01		
Status: Current		

14.3 Potential Air Quality And Climate Impacts

The proposed drainage scheme works mainly occur in urban areas of the town, mixed residential areas on the outskirts and agricultural lands adjacent to one-off dwellings.

The local road network consists of streets servicing the urban and residential areas. The level of traffic in the area may generate traffic derived pollution e.g. nitrogen oxides, particulate matter and benzene from vehicle exhausts.

14.3.1 Construction Impacts (on Air Quality)

There is the potential for a number of emissions to atmosphere during the construction of the development. Construction activities including for example material handling, earth moving and excavating are likely to generate some dust emissions.

The potential for dust to be emitted depends on the type of construction activity being carried out in conjunction with environmental factors including levels of rainfall, wind speed and wind direction. Dust emissions are dramatically reduced where rainfall has occurred due to the cohesion created between dust particles and water and the removal of suspended dust from the air. It is typical to assume no dust is generated under “wet day” conditions where rainfall greater than 0.2 mm has fallen.

Information collected from Cork Airport Meteorological Station (1962-1991) identified that typically 204 days per annum are “wet”. Thus for greater than 55% of the time no significant dust generation will be likely due to existing meteorological conditions.

The potential impact from dust also depends on the distance to potentially sensitive locations and whether the wind can carry the dust to these locations. The majority of any dust produced will be deposited close to the potential source and as such any impacts from dust deposition will typically be close to the source or within 500m of it. Excavation works will be short in duration and will only be required at some locations for preparation of foundations. Stockpiling of earth for embankments has potential to result in dust deposition but this can be reduced if mitigation measures are put in place.

Furthermore it is considered that construction activities likely to generate dust will mainly be confined to particles of dust greater than 10 microns which are considered a nuisance but do not have potential to cause harm or significant health impacts. It is also considered that the construction of the development will occur in distinct phases. As such, the potential for dust nuisance and significant levels of PM10 and PM2.5 will vary temporarily and spatially as the construction develops.

The construction vehicles, generators etc., will also give rise to petrol and diesel exhaust emissions, although this is of minor significance. Worst case truck movements during the peak construction period are anticipated to be 20/hour. Construction traffic of this level will lead to dust emissions of the order of 3g/m³ each hour along the haul routes based on no mitigation being implemented, however with mitigation this figure will reduce to approximately 2g/m³ per hour. Thus it is unlikely that the emissions of this magnitude will lead to dust deposition levels at any locations which exceed the TA Luft limit value for dust nuisance of 350 mg/m² per day. The effect of construction activities on air quality, in particular construction dust, will not be significant at the proposed development site following the implementation of the proposed mitigation measures outlined in this chapter. It is proposed to adhere to good working practices and dust mitigation measures to ensure that the levels of dust generated will be minimal and are unlikely to cause an environmental nuisance.

14.3.2 Construction Impacts (on Climate)

Impacts to climate during the construction phase include emissions from transport of materials to the site, embodied CO₂ in construction materials (such as cement, steel, etc.), emissions

from plant machinery and other ancillary areas such as contractor compounds, waste management, etc. These emissions cannot be quantified pre-planning, as details of material use are not available, however in terms of national emissions are unlikely to be significant.

14.3.3 Operational Impacts (on Air Quality)

Scheduled Emissions

Regarding operations at the proposed flood defence scheme, the activities to be located in the scheme area are planned for flood containment only. As a result, there are no scheduled emissions (i.e. through stacks, vents, etc.) planned for the development and site activities are most likely not to cause any deterioration in local air quality.

Traffic

There are relatively high volumes of traffic on the adjoining roads currently in the area of the proposed works. Any alterations to the existing traffic scenario, i.e. traffic volumes and/or a significant drop in vehicle speed (to gridlock speeds) may cause a variation in the pollutant concentrations. There are no plans to reroute the existing traffic system once the scheme is completed, thus levels of traffic-borne pollution should remain unchanged with no increase once the scheme is operational.

Operational Impacts (on Climate)

Unless maintenance is required (due to damage to the floodwalls), no further works will be necessary once the project is completed. Routine checks from local authority engineers and/or the OPW will be carried out on a routine basis, however it is envisaged that there will be no other significant sources of nitrogen oxides, sulphur dioxide or vehicle particulates. Likewise there will not be any ozone depleting substances used or emitted during the operational phase of the project.

14.4 Mitigation Measures

Mitigation measures efforts will be made to ensure that emissions from the proposed development will be minimised where possible, and comply with good environmental practice. The following mitigation measures will be implemented.

14.4.1 Construction Stage

In order to ensure that no dust nuisance occurs, a Dust Minimisation Plan will be formulated for the construction phase of the project. The plan must include the following measures:

- Site roads shall be regularly cleaned and maintained as appropriate. Hard surface roads shall be swept to remove mud and aggregate materials from their surface.
- Any un-surfaced roads shall be restricted to essential site traffic only. Furthermore, any road that has the potential to give rise to fugitive dust must be regularly watered, as appropriate, during dry and/or windy conditions.
- Vehicles using site roads shall have their speed restricted, and this speed restriction must be enforced rigidly. On any un-surfaced site roads and on hard surfaced roads site management dictates that speed shall be restricted to 20 km per hour.
- All vehicles exiting the proposed embankment sites at the eastern and western ends of the town should make use of a wheel wash facility prior to entering onto public roads, to ensure mud and other wastes are not tracked onto public roads. Public roads outside the site shall be regularly inspected for cleanliness, and cleaned as necessary.
- Material handling systems and site stockpiling of materials shall be designed and laid out to minimise exposure to wind. Water misting or sprays shall be used as required if particularly dusty activities are necessary during dry or windy periods.

14.4.2 Operational Stage

Road Traffic

Once the construction stage of the flood defence scheme is completed, the only potential traffic associated with the scheme will comprise of site inspections during the design life of the works.

Continued free-flow of the traffic in the vicinity of the proposed flood defence scheme will not be affected by the scheme. This will not have any impact on traffic flow in the area or traffic related pollutants.

14.5 Residual Impact

14.5.1 Construction Stage

If a satisfactory dust minimisation plan is implemented, the effect of construction on air quality will not be significant. The main environmental nuisance associated with construction activities is dust. However, if the construction contractor adheres to good working practices and dust mitigation measures outlined the levels of dust generated will be minimal and are unlikely to cause an environmental nuisance.

If in the event that dust from the construction of the project is creating an environmental nuisance, an ambient dust deposition survey is recommended. This survey should be carried out by competent persons using EPA approved Bergerhoff gauges. Typically these surveys require gauges on the site close to the source at the nearest sensitive receptors.

The TA Luft (German Government “Technical Instructions on Air Quality”) states a guideline of 350 mg/m²/day for the deposition of non-hazardous dusts. This value should be used to determine the impact of residual dust as an environmental nuisance.

Given the timescale, the plant and machinery involved and strict as well as the adherence to the mitigation measures it is anticipated that the process will not have an adverse impact on the local climate, therefore resulting in no residual impacts on climate.

14.5.2 Operation Stage

Given the nature of the proposed development, it is anticipated that the completed flood defence will not have an adverse residual impact on the local air quality or climate.

Traffic entering and leaving the works will be relatively free flowing and should not result in any significant build up in traffic-derived pollution in the area. The relatively low traffic volumes associated with the proposed development, once operational, is not predicted to cause any significant negative impact on air quality in the area.

15 Archaeological and Cultural Heritage

15.1 Introduction

This report details the archaeological, architectural and cultural heritage issues that need to be addressed in respect of a proposed River Fealge (Clonakilty) Drainage Scheme along the River Fealge in the townlands of Desert, Kilgarriff, Maulnaskehy, Miles, Scartagh, Tawnies Upper, Tawnies Lower and Youghals, in Clonakilty, Co. Cork (Appendix 15H - Figure 1). These works were undertaken on behalf of JBA Consulting and will include the construction of fluvial storage with tidal defences along the river, which will consist of some new embankments and flood walls. The project is at the pre-planning phase; the completed Environmental Impact Statement (EIS) will accompany the application for planning permission.

15.1.1 Objective

This study, which forms part of the Environmental Impact Statement, aims to assess the baseline archaeology and cultural heritage environment, to evaluate the likely significant impacts that the proposed development will have on this environment and to provide mitigation measures, in accordance with the policies of the Department of Arts, Heritage and the Gaeltacht (DAHG) and the Cork County Council, the National Monuments Acts 1930-2004 and best practise guidelines, to ameliorate these impacts.

In order to provide a comprehensive assessment, an extensive desktop study in addition to a field inspection of the proposed development area was undertaken.

15.1.2 Overview of Identified Significant Constraints

A total of 113 individual cultural heritage sites (Appendix 15A) are located within the development site and 12 of these (CH#1–12) are recorded monuments. The majority of the remaining sites are protected structures within the town of Clonakilty. In addition the urban core of Clonakilty has been designated an Architectural Conservation Area and a Zone of Archaeological Potential. The river Fealge itself and its estuary are considered to be an area of archaeological potential (CH#113) for the purposes of this assessment.

15.2 Proposed Development and Site Location

15.2.1 Proposed Development

The proposed flood defences incorporate a fluvial storage area with new tidal defences along the river bank and at start of the estuary (Appendix 15H - Figure 2). The scheme is fully described in Section 6 of this EIS.

The fluvial storage measure can mitigate downstream fluvial flood risk and will have a storage area of approximately 194,900 m² up to the 13.8 m contour. The maximum height of the embankment (at the river bank) is approximately 5.6 m. This measure does not mitigate upstream fluvial floods risk. Consequently, some minor fluvial defence measures (embankments and flood walls) may be required at Killgarriff Bridge and on the Ballyhalwick Stream. The embankment will incorporate a spillway to allow drainage back into the Fealge River. Embankments which will be placed on either side of the river. Immediately before the river banks, wing walls will be constructed to support the sluice. The sluice will be over the river and used to control river flows in times of flooding.

The tidal defences are:

- 1.1 m high flood walls on both banks between Michael Collins Bridge and the Library
- Replace railings with solid parapets on Credit Union pedestrian bridge
- 1.1 m high flood walls on both banks between Library and Rossa Street Bridge
- 1.1 to 1.3 m high flood walls on both banks between Rossa Street Bridge and Seymour Street Pedestrian Bridge

- Replace railings with solid parapets in Seymour Street Pedestrian Bridge
- 1.3 m high flood walls on both banks between Seymour Street Pedestrian Bridge and Clarke Street Bridge
- Strengthen and raise parapets of Clarke's Street Bridge
- 1.1 m to 1.3 m high flood walls along Croppy Road between Clarke Street and Fracksbridge
- 1.2 m high flood walls from Clarke Street along the south bank, through the Waterfront Development to boundary of Waste Water Treatment Plant
- 0.75 m high flood defence embankment at boundary of Waterfront Development and Waste Water Treatment Plant. Embankment to run north south tying into existing ground levels
- 1.6 m high flood wall and 1.7 m raised road level along 220 m of the Ring Road from Fracksbridge
- 1.4 m high flood embankment behind houses on the Old Timoleague Road
- 1.3 m high flood walls behind a number of properties on Convent Road
- Other repair/replacement works on the existing defence walls in the river

15.2.2 Site Location

This study area focuses on a portion of the Fealge River, and a number of its tributaries within the town of Clonakilty and the surrounding environs. It includes eight townlands (Table 15-1) in the barony of Carbery East (E.D.).

Table 15-1 : Townlands within study area

Townland	Parish	Barony
Desert	Desert	Carbery East (E.D.)
Kilgarriff	Kilgarriff	Carbery East (E.D.)
Maulnaskehy	Kilgarriff	Carbery East (E.D.)
Miles	Kilgarriff	Carbery East (E.D.)
Scartagh	Kilgarriff	Carbery East (E.D.)
Tawnies Upper	Kilgarriff	Carbery East (E.D.)
Tawnies Lower	Kilgarriff	Carbery East (E.D.)
Youghals	Kilgarriff	Carbery East (E.D.)

15.3 Legislative and Policy Framework

15.3.1 Legislative Procedures

This assessment has been undertaken in accordance with the provisions of the following legislative procedures which are further detailed in Appendix 6:

- EIA Directive 85/337/EEC as amended by 97/11/EC and 2003/35/EC
- National Monuments Acts 1930-2004
- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 1999
- Local Government (Planning and Development) Acts 2000-2001

15.3.2 Policies

This assessment was undertaken in accordance with the policies set out in Chapter 7 of the Cork County Development Plan 2009-2015; Chapter 12 of the Draft Cork County Development Plan 2015-2022 and Chapter 4 of the Clonakilty Development Plan 2009-2015.

15.4 Study Methodology

This section presents the methodology used in assessing the baseline cultural heritage environment. The scope and methodology for the baseline assessment has been devised in consideration of the following guidelines:

- 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)'
- Department of Arts, Heritage, Gaeltacht and the Islands (DAHGI) (1999) 'Frameworks and Principles for the Protection of the Archaeological Heritage'
- Department of the Environment, Heritage and Local Government (2004) 'Architectural Heritage Guidelines'
- National Roads Authority (2005) 'Guidelines for the Assessment of Architectural Heritage Impacts of National Road Schemes'
- National Roads Authority (2005) 'Guidelines for the Assessment of Archaeological Heritage Impacts of National Road Schemes'

15.4.1 Terms and Definitions Used

The following sets out the definitions of the terms which are used throughout the report:

- a. The phrase 'cultural heritage' is a generic term used in reference to a multitude of cultural, archaeological and architectural sites and monuments. The term 'cultural heritage', in compliance with Section 2(1) of the Heritage Act (1995), is used throughout this report in relation to archaeological objects, features, monuments and landscapes as well as all structures and buildings which are considered to be of historical, archaeological, artistic, engineering, scientific, social or technical interest.
For the purpose of this assessment, each identified cultural heritage site is assigned a unique cultural heritage number with the prefix 'CH'.
- b. A feature recorded in the 'Record of Monuments and Places' (RMP) refers to a recorded archaeological site that is granted statutory protection under the National Monuments Act 1930-2004. When reference is made to the distance between an RMP and the proposed development site (see below), this relates to the minimal distance separating the site from the known edge of the RMP. Where the edge of the RMP is not precisely known, the distance relates to that which separates the site from the boundary of the RMP zone of archaeological potential as represented on the respective RMP map; where this is applied, it is stated accordingly.
- c. For the purpose of this assessment, the zone of archaeological potential of a recorded monument is taken to constitute 50 m from the known boundary of the site.
- d. An 'area of archaeological potential' refers to an area of ground that is deemed to constitute one where archaeological sites, features or objects may be present in consequence of location, association with identified/recorded archaeological sites and/or identifiable characteristics.
- e. The term 'proposed development site' refers to the defined area of land within which the proposed development, including access tracks etc, may be constructed.
- f. In relation to the term 'study area' please see Section 4.2 below.

- g. The term ‘receiving environment’ refers to the broader landscape within which the study area is situated. Examination of the site’s receiving environment allows the study area to be analysed in its wider cultural context.
- h. The terms ‘baseline environment’ and ‘cultural heritage resource’ refer to the existing, identifiable environment against which potential impacts of the proposed scheme may be measured.

Note: Information regarding archaeological site types and periods is provided in a glossary in Appendix 15G.

15.4.2 Study Area

The study area has been defined in respect of two factors: 1.) the ability of sites/information sources to provide information pertaining to the archaeological potential of the proposed development site, and 2.) the potential physical impact, as well as impact on setting, that the proposed scheme may have on sites of cultural heritage significance.

Taking these factors into account the study area has been defined as follows:

Table 15-2 : Dimensions of Study Area

Subject	Study area
National Monuments	Within 50 m of development site
Recorded archaeological monuments (RMPs)	Within 50 m of proposed development site
Protected Structures and/or their curtilage	Within approx. 50 m proposed development site
Architectural Conservation Areas (ACAS)	Within approx. 50 m proposed development site
Structures recorded in the NIAH	Within approx. 50 m of proposed development site
Unregistered features of cultural heritage	Within approx. 10 m of proposed development site
Townland boundaries	Within proposed development site
Areas of archaeological potential	Within approx. 50 m of proposed development site
Previous Excavations	Within townlands encompassed by and adjacent to the proposed development site
Topographical files	Within respective townland incorporated by the proposed development site

15.4.3 Desktop Study Methodology

The present assessment of the archaeological, architectural and cultural heritage of the proposed development area is based on a desktop study of a number of documentary and cartographic sources. The desktop study was further augmented by an examination of aerial photography as well as a field survey. The main sources consulted in completing the desktop study are listed here.

- Sites and Monuments Record (SMR) and Record of Monuments and Places (RMP) for County Cork
- Various editions of the Ordnance Survey of Ireland maps
- Urban Archaeological Survey of County Cork
- Archaeological Inventory for County Cork – Volume 1 (Power et al. 1992)
- National Inventory of Architectural Heritage
- Excavation Bulletins Database (www.excavations.ie)
- Cork County Council Plan 2009 (2nd edition)
- Draft County Cork Development Plan 2015-2022
- Clonakilty Development Plan 2009-2015
- Various published sources for local history

- Ordnance Survey Namebooks and Letters
- Topographical files

15.4.4 Field Inspection Methodology

A field inspection of the proposed development site was undertaken by Rubicon Heritage Services Ltd on 5 November 2014.

The primary purpose of a field inspection is to assess local topography in order to identify any potential low-visibility archaeological and/or historical sites that are not currently recorded and which may be impacted upon negatively by the proposed development. It is also the purpose of the field inspection to survey any known monuments or sites and to consider the relationship between them and the surrounding landscape, all of which need to be considered during the assessment process.

The methodology used during the field inspection involved recording the present land use as well as the existing topography for the entire area comprising the proposed development site. A photographic record and written description were compiled for any known and/or potential sites of archaeological, architectural and/or cultural significance. In addition, a GPS (Global Positioning System) waypoint was taken for each identified site of said significance.

The results from the field survey have been included in Appendix 15A as appropriate and also in Section 6.2: Site Description.

15.4.5 Difficulties Experienced During Compilation of Assessment

No difficulties were encountered in compiling this assessment or during fieldwork. Field work was undertaken at low tide to allow for a comprehensive inspection of the foreshore.

15.5 Methodology Used for Assessing Baseline Values of Sites, Magnitude of Impacts and Significance of Impacts

15.5.1 Methodology Used for Assessing Baseline Value of Sites

In order to categorise the baseline environment in a systemised manner, ‘baseline values’ have been assigned to each identified site of cultural heritage significance and/or potential within the study area. The baseline value of a site is determined with reference to the ‘importance’ and ‘sensitivity’ of the site.

In accordance with NRA Guidelines, the importance of a site is determined based on the following criteria: legal status, condition, historical associations, amenity value, ritual value, specimen value, group value and rarity.

The sensitivity of a site is determined based on its susceptibility to physical impact (see Section 15.4; Methodology Used for Assessing Magnitude of Physical Impacts), as well as susceptibility to impact on setting (see Section 5.4 : Methodology Used for Assessing Impacts on Setting).

It should be noted that the National Monuments Act 1930-2004 does not differentiate between recorded archaeological sites on the basis of relative importance or sensitivity. In addition, the Local Government (Planning and Development) Act, 2000 does not differentiate between Protected Structures or Areas of Architectural Conservation on the basis of relative importance or sensitivity either. Consequently, professional judgement has been exercised to rate these features based on their perceived importance and sensitivity in relation to physical impacts and impacts on setting.

Taking the above factors into consideration, the criteria that have been defined are provided in Table 15-3 : Baseline values of sites below.

Table 15-3 : Baseline values of sites

Subject	Baseline Value
<ul style="list-style-type: none"> • Recorded Archaeological Monuments • Protected Structures 	Very High

Subject	Baseline Value
<ul style="list-style-type: none"> Architectural Conservation Areas (ACAs) 	
<ul style="list-style-type: none"> Sites listed in the NIAH that are not Protected Structures Unregistered built heritage sites that comprise extant remains which are in good condition and/or which are regarded as constituting significant cultural heritage features Unrecorded features of archaeological potential 	High
<ul style="list-style-type: none"> Unregistered built heritage sites that comprise extant remains which are in poor condition Unregistered cultural heritage sites (not including built heritage sites) that comprise extant remains Townland boundaries that comprise extant remains Marshy/wetland areas 	Medium/High
<ul style="list-style-type: none"> Unregistered cultural heritage sites for which there are no extant remains but where there is potential for associated subsurface evidence Townland boundaries for which there are no extant remains 	Medium/Low
<ul style="list-style-type: none"> Unregistered cultural heritage sites for which there are no extant remains and where there is little or no potential for associated subsurface evidence 	Low

Note: 'All other areas' collectively refers to the areas within the proposed development site that do not contain or comprise features of cultural heritage significance.

15.5.2 Type of Impacts

The following table lists the type of impacts that a proposed development may have on the cultural heritage resource:

Table 15-4 : Type of impacts

Type of Impacts	Definition
Direct	Direct impacts arise where an archaeological, architectural and/or cultural heritage feature or site is physically located within the footprint of the proposed development, or its associated physical impact zone, whereby the removal of part, or all of the feature or site is thus required.
Indirect	Indirect impacts arise when an archaeological, architectural or cultural heritage feature is not located within the footprint of the proposed development, or its associated physical impact zone, and thus is not impacted directly. Such an impact could include impact on setting or impact on the zone of archaeological potential of site whereby the actual site itself is not physically affected.
Cumulative	The addition of many impacts to create a large, significant impact.
Undeterminable	Whereby the full consequence that the proposed development may have on the cultural heritage resource is not known.
Residual	The degree of environmental change that will occur after the proposed mitigation measures have taken effect.

15.5.3 Methodology Used for Assessing Physical Impacts

The methodology used to assess the magnitude of potential pre-mitigation impacts, as well as residual impacts, of the proposed development on the baseline environment is presented in Table 15-5 below.

Table 15-5 : Criteria used for rating magnitude of impacts

Impact magnitude	Criteria
Severe	<ul style="list-style-type: none"> • Applies where mitigation would be unlikely to remove adverse effects. Reserved for adverse, negative effects only. These effects arise where an archaeology site is completely and irreversibly destroyed. • An impact that obliterates the architectural heritage of a structure or feature of national or international importance. These effects arise where an architectural structure or feature is completely and irreversibly destroyed by the proposed development. Mitigation is unlikely to remove adverse effects.
Major	<ul style="list-style-type: none"> • An impact which, by its magnitude, duration or intensity, alters an important aspect of the environment. An impact like this would be where part of a site would be permanently impacted upon, leading to a loss of character, integrity and data about an archaeological feature/site. • An impact that by its magnitude, duration or intensity alters the character and/or the setting of the architectural heritage. These effects arise where an aspect or aspects of the architectural heritage is/are permanently impacted upon leading to a loss of character and integrity in the architectural structure or feature. Appropriate mitigate is likely to reduce the impact • A beneficial or positive effect that permanently enhances or restores the character and/or setting of a feature of archaeological or cultural heritage significance in a clearly noticeable manner.
Moderate	<ul style="list-style-type: none"> • A medium impact arises where a change to a site/monument is proposed which though noticeable, is not such that the archaeological integrity of the site is compromised and which is reversible. This arises where an archaeological feature can be incorporated into a modern day development without damage and that all procedures used to facilitate this are reversible. • A medium impact to a site/monument may also arise when a site is fully or partly excavated under license and all recovered data is preserved by record. • An impact that results in a change to the architectural heritage which, although noticeable is not such that alters the integrity of the heritage. The change is likely to be consistent with existing and emerging trends. Impacts are probably reversible and may be of relatively short duration. Appropriate mitigation is very likely to reduce the impact. • A beneficial or positive effect that results in partial or temporary enhancement of the character and/or setting of a feature of archaeological or cultural heritage significance in a clearly noticeable manner.
Minor	<ul style="list-style-type: none"> • An impact which causes changes in the character of the environment, such as visual impact, which are not high or very high and do not directly impact or affect an archaeological feature or monument. • An impact that causes some minor change in the character of architectural heritage of local or regional importance without affecting its integrity or sensitivities. Although noticeable, the effects do not directly impact on the architectural structure or feature. Impacts are reversible and of relatively short duration. Appropriate mitigation will reduce the impact. • A beneficial or positive effect that causes some minor or temporary

Impact magnitude	Criteria
	enhancement of the character of an architectural heritage significance which, although positive, is unlikely to be readily noticeable.
Negligible	<ul style="list-style-type: none"> • An impact on archaeological features or monument capable of measurement but without noticeable consequences. • An impact on architectural heritage of local importance that is capable of measure merit but without noticeable consequences. • A beneficial or positive effect on architectural heritage of local importance that is capable of measurement but without noticeable consequences.

15.5.4 Methodology Used for Assessing Impacts on Setting

There is considerable debate over definitions of setting and approaches to the assessment of setting impacts (Lambrick 2008), with no standardised industry-wide approach. The assessment methodology used here has been developed in house by Rubicon Heritage Services Ltd.

The definition of setting used here is that provided by English Heritage (2008, 39):

‘Setting’ is an established concept that relates to the surroundings in which [an asset] is experienced, its local context, embracing present and past relationships to the adjacent landscape. Definition of the setting of a [cultural heritage asset] will normally be guided by the extent to which material change within it could affect (enhance or diminish) the [asset’s] significance.

Hence setting is not simply the visual envelope of the asset in question. Rather, it is those parts of the asset’s surroundings that are relevant to the significance of the asset and the appreciation thereof. The same document (ibid., 28-32) sets out a range of values that are relevant when considering an asset’s significance:

- Evidential;
- Historical (Illustrative and associative);
- Aesthetic (Design and fortuitous); and
- Communal (commemorative/symbolic, social and spiritual).

These values have been used in the current assessment in order to define the setting of the asset. The asset’s values are identified and the relationship of these values to the surroundings established. Those elements of the surroundings that contribute to the asset’s values are considered to form the setting.

In most instances setting will relate to the historical value of the asset, where an appreciable relationship between the asset and an element of its surroundings helps the visitor understand and appreciate the asset. This may be in terms of a physical relationship, such as between a castle and the natural rise that it occupies, or a more distant visual relationship, such as a designed vista or the view from, for example, one ringfort to another. The former is referred to in this assessment as immediate setting and the latter as landscape setting. Many assets will only have an immediate setting. Some assets will have aesthetic value that relates to the surrounding landscape, such as in the case of a designed view incorporating a distant hill, or that relates to the contribution the asset makes to the local landscape, for example a church spire providing a focal point in a view down a valley.

Factors to Consider When Assessing Impacts Upon Setting

English Heritage (2005) has provided a list of factors to be considered when assessing impacts upon setting. These are broad factors and have been taken into consideration when assessing magnitude of impact and sensitivity. They are summarised in Table 15-6.

Table 15-6 : Factors to be considered when assessing impacts upon setting (after English Heritage 2005)

Factor	Discussion
Visual dominance	Where an historic feature (such as a hilltop monument or fortification, a church spire, or a plantation belonging to a designed landscape) is the most visually dominant feature in the surrounding landscape, adjacent construction of the proposed development may be inappropriate.
Scale	The extent of a proposed development and the number, density and disposition of its associated elements will also contribute to its visual impact.
Intervisibility	Certain archaeological or historic landscape features were intended to be seen from other historic sites. Construction of a proposed development should respect this intervisibility.
Vistas and sight-lines	Designed landscapes invariably involve key vistas, prospects, panoramas and sight-lines, or the use of topography to add drama. Location of a proposed development within key views, which may often extend beyond any designated area, should be avoided.
Movement, sound or light impacts	The movement associated with a proposed development as well as their scale may be a significant issue in certain historic settings. Adequate distance should always be provided between important historic sites and proposed developments to avoid the site being overshadowed or affected by noise and shadow flicker effects.
Unaltered settings	The setting of some historic sites may be little changed from the period when the site was first constructed, used or abandoned. Largely unaltered settings for certain types of sites, particularly more ancient sites, may be rare survivals and especially vulnerable to modern intrusions. This may be a particular issue in certain upland areas.

Methodology used to assess magnitude of impact on setting

The magnitude of an impact reflects the extent to which relevant elements of the cultural heritage asset's setting are changed by the development, and the effect that this has upon the character and value of the asset and the appreciation thereof. Guideline criteria for magnitude defined as high, medium, low or negligible magnitude are described in Table 5.4.2. As with other criteria presented, this is intended as a general guide, and it is not anticipated that all the criteria listed will be present in every case.

The following are guides to the assessment of magnitude of impact:

- Obstruction of or distraction from key views. Some assets have been sited or designed with specific views in mind, such as the view from a country house with designed vistas. The obstruction or cluttering of such views would reduce the extent to which the asset could be understood and appreciated by the visitor. Developments outside key views may distract from them and make them difficult to appreciate on account of their prominence and movement. In such instances the magnitude is likely to be greatest where views have a particular focus or a strong aesthetic character. Sympathetic development may improve key views by removing features that obstruct or distract from key views and hence preserve or enhance the importance of the asset.
- Changes in prominence. Some assets are deliberately placed in prominent locations in order to be prominent in the surrounding landscape, for example prehistoric cairns are often placed to be silhouetted against the sky and churches in some areas are deliberately placed on ridges in order to be highly visible. Developments can reduce

such prominence and therefore reduce the extent to which such sites can be appreciated or the contribution that they make to the local landscape. Similarly, sympathetic development can enhance the setting of such sites by, for example, removing modern forestry that would otherwise compromise the setting of a cairn that had been placed on a skyline.

- Changes in landscape character. A particular landuse regime may be essential to the appreciation of an asset's function, for instance the fields surrounding an Improvement period farmstead are inextricably linked to its appreciation. Changes in land use can leave the asset isolated and reduce its value. In some instances, assets will have aesthetic value or a sense of place that is tied to the surrounding landscape character. Conversely, sympathetic development may restore or preserve the relevant landuse and hence preserve or enhance the relevant value of the asset.
- Duration of impact. Impacts that are long term or permanent are generally of greater magnitude than those that are short term.

Readily reversible impacts are generally of lesser magnitude than those that cannot be reversed.

Impacts upon the defined setting will be of greater magnitude than those that affect unrelated elements of the asset's surroundings or incidental views to or from an asset that are unrelated to the appreciation of its value.

Table 15-7 : Guideline criteria for assessment of magnitude of an impact on the setting of a cultural heritage asset

Magnitude	Guideline criteria
Major beneficial	The contribution of setting to the cultural heritage asset's significance is considerably enhanced as a result of the development; a lost relationship between the asset and its setting is restored, or the legibility of the relationship is greatly enhanced. Elements of the surroundings that detract from the asset's cultural heritage significance or the appreciation of that significance are removed.
Moderate beneficial	The contribution of setting to the cultural heritage asset's significance is enhanced to a clearly appreciable extent as a result of the development; as a result the relationship between the asset and its setting is rendered more readily apparent. The negative effect of elements of the surroundings that detract from the asset's cultural heritage significance or the appreciation of that significance is appreciably reduced.
Minor beneficial	The setting of the cultural heritage asset is slightly improved as a result of the development, slightly improving the degree to which the setting's relationship with the asset can be appreciated.
Negligible	The setting of the cultural heritage asset is only imperceptibly changed as a result of the development; the only noticeable adverse changes to the landscape are to elements that are not considered relevant to the setting of the cultural heritage asset.
Minor adverse	The contribution of the setting of the cultural heritage asset to its significance is slightly degraded as a result of the development, but without adversely affecting the interpretability of the asset and its setting; characteristics of historic value can still be appreciated, the changes do not strongly conflict with the character of the site, and could be easily reversed to approximate the pre-development conditions.
Moderate adverse	The contribution of the setting of the cultural heritage asset to its significance is reduced appreciably as a result of the development and cannot easily be reversed to approximate pre-development conditions. Relevant setting characteristics can still be appreciated but less readily.
Major adverse	The contribution of the setting of the cultural heritage asset to its significance is effectively lost or substantially reduced as a result of the development, the relationship between the asset and its setting is no longer readily appreciable.

15.5.5 Methodology Used for Assessing Significance Level of Impacts

The significance level of a construction or operation impact on a feature is assessed by combining the magnitude of the impact and baseline value of the feature. The matrix Table 15-8 provides a guide to decision-making, but is not a substitute for professional judgement and interpretation, particularly where the baseline value or impact magnitude levels are not clear or are borderline between categories. The permanence of the effects are also taken into account,

with irreversible effects being more significant while temporary or reversible changes are likely to be less significant.

Table 15-8 : Criteria for assessing significance level of impacts

Magnitude of Impact	Baseline Value				
	Very High	High	Medium/High	Medium/Low	Low
Severe	Very significant	Very significant	Significant	Moderate	Slight
Major	Very significant	Significant	Moderate	Slight	Slight
Moderate	Significant	Moderate	Slight	Slight	Negligible
Minor	Moderate	Slight	Slight	Negligible	Negligible
Negligible	Slight	Slight	Negligible	Negligible	Negligible

15.6 Baseline / Receiving Environment

A description of the proposed development site and a summary of the baseline environment are provided here in Section 6.1 and Section 6.2 respectively. Following on from this, the baseline environment has been sub-divided into four categories, each of which is addressed individually below in Sections 6.3 – 6.6 inclusive. These are as follows:

- a. Designated Archaeological Sites
- b. Designated Architectural Heritage Sites
- c. Undesignated Cultural Heritage Sites
- d. Undesignated Features of Archaeological Potential

An inventory detailing each identified feature of cultural heritage significance and/or potential within the study area is provided in Appendix 1. A discussion regarding the archaeological and historical background of the site and its receiving environment is provided in Section 15.6.7 below and following on from this, a discussion regarding the overall potential for unrecorded archaeological assets to be present within the proposed development site, based on the results from the preceding sections, is provided in Section **Error! Reference source not found..**

15.6.1 Site Description

The proposed development extends across eight townlands located along a portion of the Fealge River, and a number of its tributaries within the town of Clonakilty and the surrounding environs in Co. Cork. The site is largely located within the designated conservation area of the town of Clonakilty.

15.6.2 Summary of the Baseline Environment

Table 15-9 : Summary of baseline environment

Site Type	Summary
RMPs/ National Monuments/ Sites with Preservation Orders/ Sites listed in the Register of Historic Monuments	There are 13 RMPs incorporated by the study area. None of these RMPs are National Monuments; or have Preservation Orders placed on them.
Protected Structures	There are 65 Protected Structures incorporated by the study area.
Architectural Conservation Areas (ACAs)	There is one Architectural Conservation Areas incorporated by the study area.
Sites Listed in the NIAH	There are 56 sites listed in the NIAH incorporated by the study area.
Undesignated Cultural Heritage Sites	There are 17 undesignated cultural heritage sites incorporated by the study area. Twelve of these constitute townland boundaries which are incorporated by the study area.
Areas/features of archaeological potential	During the field survey of the study area 5 individual features or areas of archaeological potential were identified.

15.6.3 Designated archaeological sites

Record of Monuments and Places (RMPs)

Section 12 (1) of the National Monuments Act 1994 made provision the establishment and maintenance of a Record of Monuments & Places (RMP). Under this Act, each site recorded in the Record of Monuments and Places is granted statutory protection. When the owner or occupier of a property, or any other person proposes to carry out, or to cause, or to permit the carrying out of any work at or in relation to a recorded archaeological monument they are required to give notice in writing to the Minister for Arts, Heritage and the Gaeltacht 2 months before commencing that work.

There are 12 recorded archaeological monuments incorporated by the study area (please refer to Section 4.2: Study Area). Within the Record of Monuments and Places a number of areas have been designated as Zones of Archaeological Potential. It is an objective to protect the Zones of Archaeological Potential located within both urban and rural areas. The town of Clonakilty, has been designated as a Zone of Archaeological Potential, which included three recorded monuments (RMPs) within this zone and study area – Clonakilty historic town (CH#1); a brewery (CH#2); and a prison (CH#5).

A further ten RMPs were identified within the study area – a holy well (CH#3), a mill (CH#4), a graveyard (CH#6), a church (CH#7), a redundant record (CH#8), an enclosure (CH#9) and three fulachtaí fiadh (CH#10, CH#11 and CH#12).

A discussion regarding the context of the 12 recorded monuments located within the study area is provided further on in Section 0: Archaeological and Historical Context. Additionally, each site is listed in Appendix 15A and represented on Appendix 15H - Figures 4–7.

National Monuments

National monuments are broken into two categories; National Monuments in the ownership or guardianship of the state and National Monuments in the ownership or guardianship of a local authority. Section 8 of the National Monuments (Amendment) Act 1954 provides for the publication of a list of monuments, the preservation, of which, are considered to be of national importance. Two months' notice must be given to the Minister for Arts, Heritage and the Gaeltacht where work is proposed to be carried out at or in relation to any National Monument.

This is no National Monument in state or local authority care incorporated by the study area.

Sites with Preservation Orders

The National Monuments Act 1930-2004 provide for the making of Preservation Orders and Temporary Preservation Orders in respect of National Monuments. Under Section 8 of the National Monument Act 1930 (as amended) the Minister for Arts, Heritage and the Gaeltacht,

can place a Preservation Order on a monument if, in the Ministers' opinion, it is a National Monument in danger of being or is actually being destroyed, injured or removed or is falling into decay through neglect. The Preservation Order ensures that the monument shall be safeguarded from destruction, alteration, injury, or removal, by any person or persons without the written consent of the Minister.

There are no sites with preservation orders incorporated by the study area (NMS 2010).

15.6.4 Designated Architectural Heritage Sites

In 1997 Ireland ratified the Granada Convention on architectural heritage. This provided the basis for a national commitment to the protection of the architectural heritage throughout the country. The Local Government (Planning and Development) Act 2000, and the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999, made the legislative changes necessary to provide for a strengthening of the protection of architectural heritage.

Record of Protected Structures

The Clonakilty Town Development Plan (2009–2015) was consulted for schedules of Protected Structures. These are buildings that a planning authority considers to be of special interest from an architectural, historical, archaeological, artistic, cultural, scientific, social, and/or technical point of view. Protected Structures receive statutory protection from injury or demolition under Section 57 (1) of the Local Government (Planning and Development) Act 2000. Protected structure status does not exclude development or alteration but requires the developer to consult with the relevant planning authority to ensure that elements which make the structure significant are not lost during development.

There are 65 Protected Structures within the study area (please refer to Section 4.2: Study Area). These include a brewery (CH#18), three bridges (CH#22, CH#63, and CH#67), three churches (CH#21, CH#24 and CH#63), an ecclesiastical building (CH#71), a hotel (CH#33), 47 houses (CH#16, CH#20, CH#21, CH#26–8, CH#33–56, CH#59, CH#60–1, CH#64–6, CH#68, CH#71, CH#73–8 and CH#80–3), a watermill (CH#59), a national school (CH#72), an office (CH#25), a post box (CH#17), two schools (CH#13 and CH#69), a store/warehouse (CH#23) and two warehouses (CH#79 and CH#84).

These cultural heritage assets are listed in Appendix 15A and represented on Appendix 15H - Figures 4 to 7.

Architectural Conservation Areas

The Cork County Development Plan (2009) was consulted for records relating to Architectural Conservation Areas ((hereinafter 'ACAs'). The stated objective of ACAs is to conserve and enhance the special character of the area, including traditional building stock and material finishes, spaces, streetscapes, landscape and setting.

Clonakilty (CH#103) is designated as an Architectural Conservation Area in the Clonakilty Town Development Plan (2009–2015) (Appendix 15H - Figure 9). The Planning Act 2000 makes provision for designation of architectural conservation areas. The designation of an area for conservation provides for the protection and enhancement of streetscapes and public spaces and the integration of the collection of elements within the area. Within the central core of Clonakilty town there are significant groupings or concentration of heritage structures. Their value and significance may be greater than if the buildings are taken individually. The buildings in this core area have fortunately benefited from good maintenance. Some of the 18th century homes survive while the majority date from the 19th century and there has been little ribbon development, all factors which give the town cohesion. The revival of vibrant colour schemes has lent the town a lively air and acts as a backdrop for architectural features.

National Inventory of Architectural Heritage (NIAH)

The National Inventory of Architectural Heritage (hereinafter the 'NIAH') is a state initiative under the administration of the Department of Arts, Heritage and the Gaeltacht and was established on a statutory basis under the provisions of the Architectural Heritage (National Inventory) and

Historic Monuments (Miscellaneous Provisions) Act 1999. Its purpose is to identify, record and evaluate the post-1700 architectural heritage of Ireland, uniformly and consistently, as an aid in the protection and conservation of the built heritage. NIAH surveys provide the basis for the recommendations of the Minister for Arts, Heritage and the Gaeltacht to the planning authorities for the inclusion of particular structures in their Record of Protected Structures (RPS).

There are 56 structures within the study area (please refer to Section 1.3: Study Area) that are listed in the NIAH. These include a brewery (CH#18), three bridges (CH#22, CH#63, and CH#67), three churches (CH#21, CH#24 and CH#63), paving (CH#16), a hotel (CH#32), 39 houses (CH#14–5, CH#19–20, CH#26–9, CH#33–56, CH#58, CH#60–1, CH#64–6, and CH#68), a watermill (CH#59), an office (CH#25), two post boxes (CH#17 and CH#57), a school (CH#13), two store/warehouses (CH#23 and CH#30), and a water pump (CH#31).

These cultural heritage assets are listed in Appendix 15A and represented on Appendix 15H Figures 4 to 7.

15.6.5 Undesignated Cultural Heritage Sites

This section deals with sites that are considered to be of cultural heritage value but which do not fall within the above categories. These sites are divided into three sub-groups:

- a. Undesignated cultural heritage sites that comprise extant remains
- b. Undesignated cultural heritage sites that do not comprise known extant remains
- c. Townland boundaries

Undesignated Cultural Heritage Sites that Comprise Extant Remains

Undesignated cultural heritage sites which comprise extant remains are typically, though not always, post-1700 in date. The majority of these sites are represented on the 6" and/or 25" Ordnance Survey maps. Many constitute country houses and associated lodges, while others may be bridges or industrial features, hollow-ways, mass rocks etc.

There are six undesignated cultural heritage sites that comprise extant remains present within the study area (please refer to Section 15.4.2).

These cultural heritage assets are listed in Appendix A and represented on Appendix 15H - Figures 4–7. Ch#105 comprises a possible reveted dry-dock located at Deasy's Quay to the east of the town. The 1775 Admiralty chart mark this area as a shipyard. Deasy's Quay is named after a family of Deasys who were successful sea-merchants and shipbuilders in the early part of the 19th century. A shipyard was located at Deasy's Quay in the early and mid-nineteenth century when several schooners were built. The schooner 'Catherine', 87 tonnes, was built here in 1840.

Ch#106 and Ch#107 related to a culvert and regulating weir located at the western end of Clonakilty and form part of the industrial infrastructure complex built around the Feagle River. These are located adjacent to Ch#108, a bridge of possible 18th or 19th century date.

Ch#109 relates to a former millrace that is no longer visible on lands to the northeast of the town. Again, this feature was once part of the extensive industrial infrastructure built around the Feagle River.

Ch#110 relates to dry-stone revetments of possible late medieval or early post-medieval date visible along parts of the Feagle River and at Deasy's Quay. These revetments relate to an earlier cannalisation of the River channel and early development of the Quay side at Clonakilty.

Undesignated Cultural Heritage Sites that do not Comprise Extant Remains

Undesignated cultural heritage features which do comprise extant remains typically include features such as lime kilns, dwellings, outhouses, trackways etc. which are identifiable on maps such as the 6" and/or 25" Ordnance Surveys but which no longer have an above-ground presence.

There are three undesignated cultural heritage features which do not comprise extant remains present within the study area (please refer to Section 15.4.2). These cultural heritage assets

are listed in Appendix 15A and represented on Appendix 15H - Figures 4 to 7. All three sites are located to the west of Clonakilty and are shown on the Ordnance Survey 25-inch series map of 1897-1913. These sites comprise:

- CH#109 a former millrace that is no longer visible on lands to the northeast of the town
- CH#111 the site of a footbridge crossing the river Fealge to the east of the town
- CH#112 the site of a footbridge crossing the former millrace (CH#109)

Townland Boundaries

A townland is the smallest official land unit in the country. Ireland is made up of approximately 60,000 townlands. Research into the name of these land units frequently provides information relating to its archaeology, history, folklore, ownership, topography or land use. Most place names were anglicised by the time the Ordnance Survey began in the 1830s. Despite some inaccuracies in translation, the Gaelic, Viking, Anglo-Norman and English origins of place names are generally recognisable.

Examination of the First Edition 6" Ordnance Survey map demonstrates that 12 townland boundaries are incorporated by the study area (please refer to Section 15.4.2 : Study Area). These are listed in Appendix 15A and represented on Appendix 15H - Figures 4 to 7.

15.6.6 Areas of Archaeological Potential

The criteria which was applied during this study to help to identify individual low-visibility, unrecorded archaeological sites, and the sites which were identified using this criteria are addressed in the following sections.

Aerial photography

One process by which the archaeological potential of a site can be assessed is through the examination of aerial photography. These were examined in order to identify any previously unrecorded archaeological sites indicated by crop marks, soil differentiations and/or patterns of field boundaries.

There are no undesignated cultural heritage sites identifiable on the OS aerial photographs within the study area. Aerial photography does show a curvilinear cropmark (curving from north to east to south) on the south-west of the enclosure site (CH#9). The cropmark may relate to the enclosure site and has been incorporated with that site for the purposes of this assessment.

Features of Archaeological Potential Identified During the Field Survey

During the field survey of the study area (please refer to Section 15.4.2 : Study Area), four features of archaeological potential were identified. These include:

- Ch# 105 possible reveted dry-dock located at Deasy's Quay
- Ch# 106 a culvert
- Ch# 107 regulating weir
- Ch# 110 relates to dry-stone revetments of possible late medieval or early post-medieval date visible along parts of the Feagle River and at Deasy's Quay.

In addition, the River Fealge and estuary have been designated an area of archaeological potential (CH#113) for the purposes of this assessment. Rivers and estuaries are wetland environments that can contain both known and unknown archaeological features such as revetments, slipways, quays or fish weirs. Siltation deposits can preserve individual archaeological artefacts or more complex features such as ships or small boats.

Toponymy and Associated Cartographic Evidence Relating to Townlands

A search was undertaken to establish if any of the archaeological features from which a particular townland appears to have taken its name, are identifiable on historic cartographic sources. For instance, the inclusion of the term 'Killeen' (meaning 'little church' or 'children's burial ground') in the townland name 'Killeendaniel' would imply that a graveyard site is present

within the townland. If evidence for this graveyard is not identifiable on accessible historic mapping then there is potential for this feature to be present within the proposed development site. A list of the townlands where there is potential for unrecorded archaeological sites, the nature of which is implied by the toponomy of the respective townland, is provided in the following table:

Table 15-10 : Townland cartographic/toponymy evidence

Townland Name	Discussion
Desert	No evidence for a hermitage is identifiable in the cartographic sources therefore heightening the potential for uncovering evidence of such a structure within the proposed development site
Kilgarriff	Evidence for a church is identifiable in the cartographic sources

15.6.7 Cultural Heritage Background of Proposed Development Site

Toponymy of Townland/s

Research into the names (toponymy) of these land units frequently provides information relating to the townland's archaeology, history, folklore, ownership, topography or landuse. Most placenames were anglicised by the time the OS began in the 1830s. However, despite some inaccuracies in translation, the Gaelic, Viking, Anglo-Norman and English origins of place names are generally recognisable. The eight townlands within the study area are included in Table 15-11.

The online records of the Irish Placenames Commission were consulted in relation to the names of all townlands incorporated by the proposed development site (Table 15-11 : Townlands within study area). Where placenames have a clear derivation, they appear to relate largely to the natural topography of the area or structures present.

Table 15-11 : Townlands within study area

Townland (placename)	Irish origin	English translation
Desert	An Díseart	The hermitage
Kilgarriff	An Chill Gharbh	The rough church
Maulnaskehy	Meall na Sceiche	Hawthorn/thorn-bush mill
Miles	An Mhaoil	The flat-topped hill
Scartagh	Scairteach	Shouting/calling/clamorous
Tawnies Upper	An Tamhnaigh Uachtarach	The arable upland place/field
Tawnies Lower	An Tamhnaigh Íochtarach	The arable upland place/field
Youghals	Eochail	Yew wood

Cartographic sources

Cartographic sources are important in tracing land use patterns within a study area as well as providing important information on the topography and archaeological potential of a region. A number of maps were consulted for these purposes as well as for information regarding unregistered sites considered to be of cultural heritage significance.

The mapping evidence was analysed to see if there were any additional monuments or potential sites which may be impacted upon and that are no longer visible. The maps that were consulted were the 1st edition 6-inch map (1833-46) and 25-inch of 1897-1913 and the Record of Monument and Place map (1943).

There were no additional structures or sites identified from the cartographic evidence that were not already known from previous studies or surveys.

Archaeological and historical context (Troy 2014)

In order to provide a framework within which to evaluate the archaeological significance and/or potential of the proposed development site and the archaeological landscape within which it is situated, an overview of the cultural heritage of the proposed development site and its receiving

environment is provided here. The findings of a detailed desktop study, which included a review of literary and cartographic sources, results of previous archaeological investigation, as well as a field inspection of the study area are presented here.

For the purpose of this section, the receiving environment is taken as constituting the area of land extending for approximately 50 m from the proposed development site.

Mesolithic period (c. 8000–3500BC)

The Mesolithic period is the earliest time for which there is clear evidence for prehistoric activity in Ireland. During this period people hunted, foraged and gathered food and appear to have had a mobile lifestyle. Scatters of worked flint, a by-product from the production of flint implements, are the most common indicator of Mesolithic activity, with previously excavated sites showing a preference for riverine or marine locations (Waddell 2000; Cooney and Grogan 1999). In Munster, the majority of the evidence (flint scatters) for Mesolithic occupation has come from the Blackwater valley in Co. Cork (Woodman 1989, 116). Some flint have been also been found in disturbed coastal deposits at Guileen and Dunpower Head in Co. Cork. There are no identified sites from this period in the study area.

Neolithic period (c. 4000?–2450 BC)

During the Neolithic period communities appear to become less mobile, with the economy based on cereal cultivation and the rearing of stock; this transition is accompanied with major social change. The growth of agriculture resulted in the rapid clearing of forests and the construction of field boundaries and there was a greater concern for territory, which saw the construction of large communal ritual monuments called megalithic tombs (Waddell 2000; Cooney and Grogan 1999). The absence of these tombs is therefore normally associated with the absence of Neolithic occupation. However there were numerous Neolithic communities in Europe that did not build Megalithic tombs and it has been suggested that parts of Munster were associated with this non-monumental flat burial rite. However the archaeological evidence to date seems to suggest that County Cork remained uninhabited until the Late Neolithic period. There are no identified sites from this period in the study area.

Bronze Age (c. 2450–800 BC)

The Bronze Age is marked by the widespread use of metal for the first time in Ireland. As with the transition from Mesolithic to Neolithic, the transition into the Early Bronze Age is accompanied by changes in society. The coastline of West Cork is one of the most important metalliferous areas in Ireland, with extensive surface deposits of copper ore. The copper mines are concentrated in the hilly interior of the Mizen Peninsula and at the western end of the Beara Peninsula (O’ Brien 1992).

Megalithic tombs cease to be created and the burial of the individual becomes typical. Cremated or inhumed bones were often placed in cists or stone-lined graves and were often accompanied by pottery (Waddell 2000; Cooney and Grogan 1999). The portal tomb, the passage-tomb and the stone bearing passage-tomb art represent the earliest phase of human occupation so far identified in West Cork. It may be significant that all are in coastal locations (Ó Nualláin and Walsh 1992).

Bronze Age activity is further evidenced by the presence of burnt mounds or fulachtaí fiadh in the landscape. Over 4,500 fulachta fiadh have been recorded in the country making them the most common prehistoric monument in Ireland (Waddell 2000), some 2,000 of these in Co. Cork (Power et al. 1992, 79). These features are typically situated in low lying marshy areas or close to streams and are characterized by a mound of heat-shattered stone and charcoal, usually associated with troughs or pits. Fulachtaí fiadh, or burnt mounds, in Miles (CH#11, CH#12 and CH#13) within the study area, probably date to the Bronze Age: these sites are generally believed to have been cooking places at which meat was cooked in a water-filled pit which was heated by means of hot stones.

Iron Age (800 BC–AD 400)

In common with much of Ireland, the evidence for Iron Age activity in Co. Cork and in the south-west region generally is sparse. Settlement sites are few and far between as well as being difficult to identify (Woodman 2000). The transition from the later part of the Bronze Age to the Iron Age is characterised by the introduction of iron working. An increase in the production of metal objects is evidenced in the hoards of metal objects recovered around Ireland.

Early medieval period (AD 400–c. 1169)

Clonakilty is within Trícha Cét/Cantred (Figure 5), essentially it is an early medieval kingdom (Trícha) which is preserved in the Cantred for the Anglo-Norman period. It would be within the much larger kingdom of Desmond/Desmumu, which when the McCarthy's were in charge, would have included the majority of south Munster (Kerry and Cork). In more local terms, it was on the boundary of two of the three subdivisions of the kingdom of Corcu Loígde - Rosselithir on the west (from Rosscarbury) and Obathan on the east (from Uí Badama, a Corcu Loígde dynasty). The easternmost of these (Obathan) may have been subjected by the Uí Echach Muman by the 11th-12th century, although it would have been a part of the regional kingdom of Desmond which was controlled by Uí Echach previously. Clonakilty is probably in Rosselithir, which is likely to have been the most important of the three Corcu Loigde sub-kingdoms. Rosselithir Trícha Cét is part of the kingdom of Corcu Loígde, which is part of the Uí Echach, and later Meic Carthaig, controlled kingdom of Desmond (MacCotter 2008, 158-9, 162; Dr. Patrick Gleeson pers. comm.)

The early medieval documentary sources indicate a complex secular social system based on clientship during this period. Landowning commoners such as ócaire and bóaire were obligated to wealthy landowners (mruigfer), lords (flaith) and the king of a region with commoners (betaghs) bonded freemen (fuidirs) and slaves (cumal) lower down the scale but still required to pay tributes. The social system was dependant on clientelism with rents and what amounted to taxes being paid with labour, food and other commodities to the upper echelons and also to the church (Kelly 2000, 447). By the twelfth century the distinction between ócaire and bóaire diminished suggesting a change in the social order (Kelly 2000, 428). The betagh class came to refer to a servile tenant (Kelly 2000, 428).

Many of these wealthy landowners and landowning commoners inhabited ringforts. The ringfort or rath is considered to be the most common indicator of settlement during the early medieval period. The most recent study of these monuments (Stout 1997) has suggested that there are a total of 45,119 potential ringfort or enclosure sites throughout Ireland. It is clear that there exists a wide variety of circular enclosed monuments, not all of which have the same date or function.

There is one enclosure site located within the study area at Desert (CH#10). This enclosure belongs to a classification of monument whose precise nature is unclear and may in fact represent a ringfort that has either been damaged to a point where it cannot be positively recognised, or which is smaller or more irregular in plan than the accepted range for such a monument. An early medieval date is probable for the Miles enclosure, and generally likely for the Desert example, though not a certainty and a continuity of use of these sites from prehistoric times, is not unusual. The enclosure in Desert townland overlooks the estuary and the area that where the later post-medieval harbour was located. This positioning may reflect the control or protection of a natural landing point.

Ringforts are undoubtedly the most widespread and characteristic archaeological field monument in the Irish countryside. They are usually known by names ráth or lios and are basically a circular or roughly circular area enclosed by an earthen bank formed of material thrown up from a concentric fosse (or ditch) on its outside. Generally the diameter of the enclosure is between 25 and 30 m. Archaeological excavation has shown that the majority of ringforts were enclosed farmsteads, built in the early medieval period. Though not forts in the military sense, the earthworks acted as a defence against natural predators like wolves, as well as human predators. In the undulating landscape of West Cork the favoured location for ringforts are on the shoulders of ridges or at breaks of slopes. Within this study area one ringfort was identified at Cloheen (CH#5).

The practice of visiting holy wells is one of the oldest traditions of Irish Christianity and undoubtedly has its origin in pre-Christian ritual activities. Most of these ‘wells’ are in fact springs, though some are just depressions in rocks which collect rainwater. Some are still venerated and maintained for holy use, others have disappeared entirely and are not even remembered locally (Power et al. 1994, 171). The holy well (CH#3) in the townland of Miles is called “Killeen Well” is overgrown and inaccessible. Local traditions do not record it as a holy well. It is situated in a pasture field on a northeast-facing slope, at a height of 50 m above sea level. The site were covered in 2 m high brambles at the time of the visit and no additional information could be gathered (Appendix 15B). As the name suggests the well was in association with a church or burial ground but there is no tradition of veneration (Power et al. 1992, 287).

Late medieval period (AD c.1169–1540)

The Normans made Clonakilty their home and in 1292, Thomas De Roach received a charter to hold a market every Monday at Kilgarriffe, then called Kyle Cofthy or Cowhig’ s Wood, close to where the present town now stands. The area was abundant in woods, as the Irish names of the town (Cloich na Coillte) and surrounding townlands indicate.

In the 14th century a ten mile strip of fallow woodland called Tuath na gCoillte (the land of the woods) divided the barony of Ibane (Ardfield) and Barryroe and reached the sea at Clonakilty Bay. Here a castle called Coyltes Castell (Nicholls 1993, 179) as a holding of William de Barry was recorded in a 1378 plea roll. This was subsequently referred to as Cloghnykyltye, one of the phonetic spellings for Cloch na gCoillte (meaning the castle of the woods, from ‘cloth’ , the Irish for stone or stone building and ‘coillte’ meaning woods).

The earliest church surviving in West Cork is in Skeam, which is probably 12th century in date. Otherwise the church are of 15th or 16th century date, though some appear to have been built around the core of an earlier church probably 12th or 13th century in date. The majority were parish churches and went out of use in the 17th century. Graveyards are consecrated yards with inscribed grave markers, usually by a wall or bank, and often contain the ruins of a medieval parish church. Though few of the surviving inscribed grave markers pre-date the late 18th century, the yards themselves have probably been in use for many hundreds of years. A feature of most West Cork graveyards are north - south lines of low uninscribed headstones (Power et al. 1992, 334).

Within this study area there is one incidence of a medieval church within a graveyard. On top of a low cliff on the northern shore of Clonakilty estuary, in the townland of Desert, a church (CH#8) within a graveyard (CH#7), have been completely removed by Cork County Council during road widening. Human bones (CH#105) were found during these works on land between Clonakilty and Ring, a few yards from the ancient church of Desert. The bones were re-buried in the churchyard. Local tradition maintains that this was a site where lepers visited (Appendix 3). Photographs taken 1981 show the north and west walls standing c. 1 m high (Power et al. 1992, 337). Webster (1932, 273-4) illustrates unusual recess in the west gable, which he interpreted as "unusual arrangement... for ringing the sacred bell"; he gives dimensions of building as '23ft 4in x 15ft 4in'. Hurley (1980, 60) states that the site is probably early ecclesiastical. There is no record of an archaeological excavation at this site from 1970 to 2010 on the Excavations.ie database.

Post-medieval (AD 1540–1700)

Clonakilty historic town (CH#1) is located on the Feale River at the head of Clonakilty Bay within three townlands (Scartagh, Youghals, Tanwie Upper). The town does not appear to have been walled and there is no recognisable 17th-century buildings survive in the town (Zajac et al. 1995, 24). Clonakilty appears to have replaced the nearby medieval settlement of Kilgarriff as the focus for urban development when the Earl of Cork settled a hundred English families here in 1605. (Smith 1750, vol. 1, 251). Established as a market town, it was engaged chiefly in the manufacture of linen and cotton. A port was located at the eastern end of the town during the 17th, 18th and early 19th centuries. Repeated siltation of the harbour led to its eventual abandonment. The limits of the borough were measured from where Kilgarriff Church of Ireland

now stands, which is also thought to be the location of the long lost castle of Cloghnykyltye (Dúchas Clonakilty Heritage 2012-2014).

Within the Zone of Archaeological Potential for Clonakilty town, metal-detection and a probe survey (CH#98) were undertaken in 2008 of the foreshore in the area of a proposed car-park area on the east side of Clonakilty Harbour in advance of constructing a tidal barrage across the harbour to protect the town from tidal and freshwater flooding. No finds or features of archaeological significance were noted (Lane 2008).

Early modern (AD 1700–1850)

Emmet Square was laid out between 1785 and 1810 in the Georgian fashion. It was created to accommodate the wealthy merchants of the growing and prosperous town of Clonakilty. They called this place Shannon Square in honour of the earl of Shannon, lord of the borough (Dúchas Clonakilty Heritage 2012-2014). Lewis (1837) describes the centre of the square as ‘planted and laid out in walks, so as to form an agreeable promenade’.

Breweries were developed in the 18th century and corn and potatoes were exported to Cork and Dublin from the quays, formerly situated on the eastern edge of the town. Though much of West Cork is more suited to pastoralism than tillage, corn was grown plentifully in specific areas throughout the 18th and 19th centuries. In his statistical survey Townsend (1810, 247) remarks that Idane and Barryroe ‘the quantity of corn set out in this barony is very considerable’. The cereals grown were chiefly wheat and barley. This grain was processed locally though much of it was exported (Power et al. 1992, 384). An unclassified mill (CH#4) is identified in the townland of Miles. Nothing remains of this site. It was depicted on the 1st Edition Ordnance Survey of 1829-41 as lying to the southeast of Killeen well (CH#3); however, by the 3rd Edition Ordnance Survey, the site had disappeared (Appendix 3). A mill, including the millrace and millpond, is where corn is ground or where raw material is processed. This classification is used, in the context of the RMP database, when it is unclear whether the mill in question is a water mill or a windmill. These may date from the late medieval period (c. 1400 to the 16th century AD) onwards. The drystone river walls/revetments (CH#110) are most likely to relate to this period and the former shipyard/drydock at Deasy’s Quay (CH#105) provides evidence for the historic port.

Despite Clonakilty’s coastal location its full potential as a port was never realised due to the constant silting of the harbour which impeded the passage of large vessels. Townsend in 1810 described the Port of Clonakilty:

There are four large quays at Clonakilty, each of which has several lighters constantly at work during the summer months. The proximity of the ocean, though not attended with all the circumstances that favour other maritime situations is, however, of prime and permanent importance. The tide flows up to its quay navigable for small sloops and lighters and though the great accumulation of sand at its mouth renders ingress and egress often difficult and sometimes dangerous, the harbour is, at high water, accessible to brigs and sloops and when attained, a station of perfect security. The channel from the harbour to the town, the distance of which is about a mile, has received some improvement lately and is capable of much more. The trade of the port consists chiefly in the export of corn and potatoes, large quantities of which are annually sent to Cork and Dublin. The returning vessels bring goods of various kinds occasionally, chiefly those of a ponderous nature, as bricks, earthen-ware.

Lewis’ Topographical Dictionary observes in 1837:

There are 14 lighters of 17 tons burden each regularly employed in raising and conveying sand to be used in the neighbourhood as manure. The harbour is only fit for small vessels, the channel being extremely narrow and dangerous, and having at the entrance a bar, over which vessels above 100 tons can only pass at high spring tides: large vessels, therefore, discharge their cargoes at Ring, about a mile below the town. It is much used as a safety harbour by the small craft for several miles along the coast.

The Deasy family, prominent brewers and sea merchants in Clonakilty, began a shipyard at the quay, which flourished until the mid-19th century when several schooners were built. The

schooner “Catherine”, 87 tonnes, was built here in 1840. They also built up a reputation for smuggling, chiefly to the French port of Dunkirk (Zajac et al. 1995, 23). Deasy schooners regularly transported the patriot Daniel O’Connell and his family to France from nearby Galley Head (Dúchas Clonakilty Heritage (2012-2014). Their brewery (CH#2) was built in 1807 by Richard Deasy (Tuipear 1988, 25), to replace his father's old brewery on Astna Street, this industry survived until 1940. A date plaque of 1887 is present crediting builders McCarthy and Santry (Power et al. 1992, 387). The brewery is located in the townland of Youghals, on the south bank of the Fealge river.

The Bridewell prison (CH#6) is located in the southern side of Clonakilty and dates to the early/mid 19th century. It is partially destroyed. It was in use at the time of recording as yards and stores for a bakery. The remains comprise a one-storey four-bay section of the east wall which was constructed with random rubble of shelly sandstone. Cut stone was visible. The roof had been removed. The main door survived and consisted of a stone lintelled ope with a relieving arch; a remaining window also consisted of a lintel stone with a relieving arch with large iron bars still present. The high enclosing walls also survived and were connected to the east-enclosing wall of the courtyard. These east-enclosing walls consisted of coarse ashlar with blocked windows and doors. The Bridewell was also formerly used as a power station until the 1930’s (Appendix 3).

15.7 Impact on Baseline Environment Prior to Implementation of Mitigation Measures

In accordance the Environmental Impact Assessment Directive (EIA Directive 85/337/EEC as amended by 97/11/EC and 2003/35/EC) which requires that potential impacts on archaeology, architecture and cultural heritage are evaluated, this section assesses the likely significant impacts that the proposed scheme will have on the baseline environment during its construction and operation phases respectively prior to mitigation measures. The methodology used in ascertaining the baseline value of sites, the type, magnitude and significance level of impacts is set out in Section 15.4 above.

Mitigation measures to ameliorate these impacts and the residual impact that the proposed scheme will have on each site of cultural heritage significance and/or potential are provided in Section 8 below.

The following tables (Table 15-12 : Direct impacts during construction phase) details the type, nature, extent, duration, magnitude and significance level of all impacts that the proposed scheme will have on individual cultural heritage sites during both the construction and operation phases of the scheme prior to mitigation.

15.7.1 Construction Phase Impacts

Direct Impacts

Most impacts during construction phase are likely to be direct impacts as a result of sub-surface disturbance or construction works. All impacts at this phase are considered to be negative and permanent.

The proposed location of the Fluvial Storage Area incorporates the sites of five recorded monuments (RMPs). The three fulachta fiadh (CH#10-12) are close to the proposed site of the proposed storage embankment. Construction of the embankment may impact on sub-surface features relating to these three sites. Prior to the implementation of mitigation measures this is considered to be a significant impact. In addition, the former course of a millrace (CH#109) passes though the footprint of the proposed embankment. Construction works may impact on sub-surface features relating to this feature.

Construction of the spillway and sluice at the Fluvial Storage Area may require the temporary diversion of a section of the river Fealge to facilitate construction. It will be returned to its natural course on completion of construction. These works could impact on the area of archaeological potential that constitutes the river (CH#113), possibly exposing archaeological objects or features within the river. This may also impact on the site of a footbridge (CH#111) shown on

historic mapping and located immediately southeast of the proposed floodbank. Construction works may could exposed sub-surface remains relating to this structure (if such survive).

An RMP site of an enclosure (CH#9) is located close to the proposed flood embankment at Old Timoleague Road. This site has no upstanding remains, but it is possible that construction of the flood bank could impact on any surviving sub-surface remains of this site. Aerial photography shows a cropmark feature curving from north to east to south, generally to the east of the proposed floodbank. This cropmark is location within 15m of the northeast terminal of the proposed floodbank at its nearest point. The cropmark may relate to the enclosure site and appears to partially enclose the section of the field within which the floodbank will be located. Prior to the implementation of mitigation measures this is considered to be a significant impact.

The tidal defences though the town primarily involve the upgrading of existing river walls to provide an enhanced flood defence. However, it is possible that at certain sections it may be necessary for the contractor to remove the existing walling and replace it in its entirety. This could impact on the area of archaeological potential that constitutes the river (CH#111), possibly exposing archaeological objects or features within the river. It may also impact on the possible late medieval or early post-medieval drystone revetments that survive along sections of the river (CH#110), which may need to be removed in whole or in part. Prior to mitigation these are considered to be moderate impacts.

Table 15-12 : Direct impacts during construction phase

CH No.	Impact Type	Description of Impact	Magnitude of impact prior to implementation of mitigation measures	Baseline Value	Significance level of impact prior to implementation of mitigation measures
CH# 009	Direct	Ground reduction for flood embankment	Major	Very High	Significant
CH# 010	Direct	Ground reduction for flood embankment	Major	Very High	Significant
CH# 011	Direct	Ground reduction for flood embankment	Major	Very High	Significant
CH# 012	Direct	Ground reduction for flood embankment	Major	Very High	Significant
CH# 102	Direct	Ground reduction may expose previously unknown archaeological deposits or features	Major	Very High	Significant
CH# 109	Direct	Ground reduction for flood embankment	Major	Medium/ Low	Moderate
CH# 110	Direct	Construction of improved tidal defences may require removal of existing river walls/revetments	Major	Medium/ High	Moderate
CH# 111	Direct	Ground works associated with temporary river diversion and construction of slipway or sluice could expose sub-surface remains relating to the footbridge (if such survive).	Major	Medium/ Low	Moderate

CH# 113	Direct	Ground works associated with temporary river diversion and construction of slipway or sluice as well as replacement of river walls may expose previously unknown archaeological objects deposits or features	Major	Medium/High	Moderate
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Indirect Impacts

It is not proposed to consider any impacts on setting for any sites either with the development site or the wider study area during the construction phase, as construction works constitute a short-term alteration to the landscape.

No indirect impact have been identified.

15.7.2 Operational Impacts

Direct Impacts

There should be no direct impacts on archaeological, architectural or cultural heritage sites as a result of the operation of the flood relief works.

Indirect Impacts

Indirect impacts at operation stage will largely occur as a result of impacts on the setting of site (notably visual impacts) and on the integrity and character.

There are five recorded monuments within the footprint of the proposed Fluvial Storage Area (CH#3-4; CH#10-12). It is anticipated that the fluvial storage area will only reach full capacity once a century, however, partial flooding is likely to occur on a more frequent basis. The utilisation of this area for fluvial storage may impact on the setting of these five sites. Prior to the implementation of mitigation measures this is considered to be a long-term, negative and significant impact.

The tidal defences will result in new defensive walls along the course of the river through the town of Clonakilty. These defences will extend into the Architectural Conservation Area (ACA). It is possible that the addition of the tidal defences could result in visual impacts on the character of the ACA in general as well as impacts on specific architectural heritage receptors. Prior to the implementation of mitigation measures this is considered to be a long-term, negative and significant impact.

Table 15-13 : Indirect impacts during operation phase

CH No.	Impact Type	Description of Impact	Magnitude of impact prior to implementation of mitigation measures	Baseline Value	Significance level of impact prior to implementation of mitigation measures
CH# 004	Indirect	Fluvial storage may impact on setting of site; changes to water table may adversely affect the site	Moderate	Very High	Moderate
CH# 022	Indirect	Newly constructed tidal defences may impact on the setting and architectural character	Moderate	Very High	Moderate
CH# 029	Indirect	Newly constructed tidal defences may impact on the setting and architectural character	Moderate	High	Moderate

CH No.	Impact Type	Description of Impact	Magnitude of impact prior to implementation of mitigation measures	Baseline Value	Significance level of impact prior to implementation of mitigation measures
CH# 031	Indirect	Newly constructed tidal defences may impact on the setting and architectural character	Moderate	High	Moderate
CH# 059	Indirect	Newly constructed tidal defences may impact on the setting and architectural character	Moderate	Very High	Moderate
CH# 063	Indirect	Newly constructed tidal defences may impact on the setting and architectural character	Moderate	Very High	Moderate
CH# 067	Indirect	Newly constructed tidal defences may impact on the setting and architectural character	Moderate	Very High	Moderate
CH# 103	Indirect	Newly constructed tidal defences may impact on the setting and architectural character of the ACA	Moderate	Very High	Moderate
CH# 110	Indirect	Newly constructed tidal defences may impact on the setting and architectural character	Moderate	Medium /High	Moderate

15.8 Mitigation Measures and Residual Impacts

The mitigation strategies outlined in Table 15-14 in this section detail the techniques to be adopted in order to ameliorate the impacts that the proposed development may have on features of archaeological, architectural and/or cultural heritage within the study area during both the construction and operation phases of the scheme. The residual impacts that will remain once these mitigation measures have been implemented are identified in this table also.

The following proposed mitigation measures are subject to approval by Cork County Council and the National Monuments Service, Department of Arts, Heritage and the Gaeltacht:

1. In order to identify buried or unknown archaeological remains, a programme of test trenching will be carried out, in advance of construction, at the proposed floodbanks at the southeast end of the Fluvial Storage Area and at Old Timoleague Road, where the proposed flood banks are close to or within the constraint areas of RMP sites. This should be carried out by a suitably qualified archaeologist under license and in accordance with the provisions of the National Monuments Acts 1930-2004. It will provide advance information to inform the delivery of other mitigation measures outlined below, notably those relating to preservation in situ either by avoidance or design and the positioning of buffer-zones as well as any necessary archaeological excavation or other mitigation measures that might be required by the County Archaeologist or the National Monuments Service. A report on the results of any test trenching will be submitted to the Local Authority, the Heritage and Planning Division, Department of Arts, Heritage and the Gaeltacht and the National Museum of Ireland prior to the commencement of the main construction programme.
2. An underwater archaeological survey will be undertaken along the section of the river Fealge west of Clonakilty that may be affected by the temporary diversion of the river

channel and along any sections of the river where full replacement of river walls or revetments will be required. This survey will be undertaken by a suitably qualified archaeologist and should be completed prior to the commencement of the main construction programme so as to inform the delivery of any other specific mitigation measures outlined below.

3. In order to identify buried or unknown archaeological remains, archaeological monitoring of all groundworks (including any enabling works or temporary works) associated with the proposed scheme will be carried out during the construction phase. This should be carried out by a suitably qualified archaeologist under license and in accordance with the provisions of the National Monuments Acts 1930-2004.
4. Where possible, every reasonable effort will be made to preserve in situ, or reduce the impact on any identified archaeological material through design. The current policy of the Minister for Arts, Heritage and the Gaeltacht is that preservation in situ of archaeological sites is the preferred option. Where known archaeological sites are adjacent to proposed works and are to be preserved in situ, these areas will be fenced off for the duration of construction works and will not be utilised in any temporary capacity such as spoil stockpiles, site access or haul routes or site compounds/storage area.
5. Where preservation in situ cannot be achieved, either in whole or in part, then a programme of full archaeological excavation will be implemented to ensure the preservation by record of the portion of the site that will be directly impacted upon. This work should be carried out by a suitably qualified archaeologist under license and in accordance with the provisions of the National Monuments Acts 1930-2004.
6. If existing river walls or revetments are to be removed (in whole or in part) then a detailed written and photographic record of the affected section of walling or revetment should also be compiled along with a historic buildings survey (to NIAH standards) prior to its removal.
7. A condition survey should be undertaken of the five RMP sites within the Fluvial Storage Area. This survey should be repeated at regular intervals once the storage area is operational to monitor the long term effects on these monuments and their setting.
8. In order to preserve the architectural character and minimise impacts on the setting of architectural heritage sites it is recommended that new tidal defence walls be matched to the existing fabric of existing revetments and river walls. This can be achieved either through construction using similar fabric or that facing be applied to new concrete infrastructure to match the historic fabric.
9. Any alterations to or reinforcement of bridges which are protected structures should be undertaken in consultation with the Cork County Conservation Officer and following the guidance in Architectural Heritage Guidelines for the Planning Authorities.
10. The results of any archaeological monitoring and/or excavation will be submitted in a report to the Local Authority, the Heritage and Planning Division, Department of Arts, Heritage and the Gaeltacht and the National Museum of Ireland.

Table 15-14 : Residual impacts after implementation of mitigation measures

CH No.	Phase	Impact Type	Mitigation Measures	Magnitude of impact prior to implementation of mitigation measures	Baseline Value	Significance level of impact prior to implementation of mitigation measures
CH# 003	Operation	Indirect	<ul style="list-style-type: none"> A condition survey should be undertaken of the five RMP sites within the Fluvial Storage Area. This survey should be repeated at regular intervals once the storage area is operational to monitor its effects on these monuments and their setting. 	Minor	Very High	Moderate
CH# 004	Operation	Indirect	<ul style="list-style-type: none"> A condition survey should be undertaken of the five RMP sites within the Fluvial Storage Area. This survey should be repeated at regular intervals once the storage area is operational to monitor its effects on these monuments and their setting. 	Minor	Very High	Moderate
CH# 009	Construction	Direct	<ul style="list-style-type: none"> Archaeological test trenching programme in advance of construction. Archaeological monitoring of all groundworks associated with the proposed scheme should be carried out during the construction phase. Every reasonable effort should be made to preserve in situ, or reduce the impact on identified sites or features. If preservation in situ is not possible either in whole or in part, then a programme of full archaeological excavation should be implemented. 	Moderate	Very High	Moderate
CH# 010	Construction	Direct	<ul style="list-style-type: none"> Archaeological test trenching programme in advance of construction. Archaeological monitoring of all groundworks associated with the proposed scheme should be carried out during the construction phase. Every reasonable effort should be made to preserve 	Moderate	Very High	Moderate

CH No.	Phase	Impact Type	Mitigation Measures	Magnitude of impact prior to implementation of mitigation measures	Baseline Value	Significance level of impact prior to implementation of mitigation measures
			<p>in situ, or reduce the impact on identified sites or features.</p> <ul style="list-style-type: none"> If preservation in situ is not possible either in whole or in part, then a programme of full archaeological excavation should be implemented. 			
CH# 011	Construction	Direct	<ul style="list-style-type: none"> Archaeological test trenching programme in advance of construction. Archaeological monitoring of all groundworks associated with the proposed scheme should be carried out during the construction phase. Every reasonable effort should be made to preserve in situ, or reduce the impact on identified sites or features. If preservation in situ is not possible either in whole or in part, then a programme of full archaeological excavation should be implemented. 	Moderate	Very High	Moderate
CH# 012	Construction	Direct	<ul style="list-style-type: none"> Archaeological test trenching programme in advance of construction. Archaeological monitoring of all groundworks associated with the proposed scheme should be carried out during the construction phase. Every reasonable effort should be made to preserve in situ, or reduce the impact on identified sites or features. If preservation in situ is not possible either in whole or in part, then a programme of full archaeological excavation should be implemented. 	Moderate	Very High	Moderate
CH# 022	Operation	Indirect	<ul style="list-style-type: none"> The new tidal defence walls should be matched to the existing fabric of existing revetments and river 	Minor	Very High	Moderate

CH No.	Phase	Impact Type	Mitigation Measures	Magnitude of impact prior to implementation of mitigation measures	Baseline Value	Significance level of impact prior to implementation of mitigation measures
			walls. This can be achieved either through construction using similar fabric or that facing be applied to new concrete infrastructure to match the historic fabric.			
CH# 029	Operation	Indirect	<ul style="list-style-type: none"> The new tidal defence walls should be matched to the existing fabric of existing revetments and river walls. This can be achieved either through construction using similar fabric or that facing be applied to new concrete infrastructure to match the historic fabric. 	Minor	High	Slight
CH# 031	Operation	Indirect	<ul style="list-style-type: none"> The new tidal defence walls should be matched to the existing fabric of existing revetments and river walls. This can be achieved either through construction using similar fabric or that facing be applied to new concrete infrastructure to match the historic fabric. 	Minor	High	Slight
CH# 059	Operation	Indirect	<ul style="list-style-type: none"> The new tidal defence walls should be matched to the existing fabric of existing revetments and river walls. This can be achieved either through construction using similar fabric or that facing be applied to new concrete infrastructure to match the historic fabric. 	Minor	Very High	Moderate
CH# 063	Operation	Indirect	<ul style="list-style-type: none"> The new tidal defence walls should be matched to the existing fabric of existing revetments and river walls. This can be achieved either through construction using similar fabric or that facing be applied to new concrete infrastructure to match the historic fabric. 	Minor	Very High	Moderate
CH# 067	Operation	Indirect	<ul style="list-style-type: none"> The new tidal defence walls should be matched to 	Minor	Very High	Moderate

CH No.	Phase	Impact Type	Mitigation Measures	Magnitude of impact prior to implementation of mitigation measures	Baseline Value	Significance level of impact prior to implementation of mitigation measures
			the existing fabric of existing revetments and river walls. This can be achieved either through construction using similar fabric or that facing be applied to new concrete infrastructure to match the historic fabric.			
CH# 102	Construction	Direct	<ul style="list-style-type: none"> Archaeological monitoring of all groundworks associated with the proposed scheme should be carried out during the construction phase. Every reasonable effort should be made to preserve in situ, or reduce the impact on identified sites or features. If preservation in situ is not possible either in whole or in part, then a programme of full archaeological excavation should be implemented. 	Moderate	Very High	Moderate
CH# 103	Operation	Indirect	<ul style="list-style-type: none"> The new tidal defence walls should be matched to the existing fabric of existing revetments and river walls. This can be achieved either through construction using similar fabric or that facing be applied to new concrete infrastructure to match the historic fabric. 	Minor	Very High	Moderate
CH# 109	Construction	Direct	<ul style="list-style-type: none"> Archaeological test trenching programme in advance of construction. Archaeological monitoring of all groundworks associated with the proposed scheme should be carried out during the construction phase. Every reasonable effort should be made to preserve in situ, or reduce the impact on identified sites or features. If preservation in situ is not possible either in whole 	Moderate	Medium/Low	Slight

CH No.	Phase	Impact Type	Mitigation Measures	Magnitude of impact prior to implementation of mitigation measures	Baseline Value	Significance level of impact prior to implementation of mitigation measures
			or in part, then a programme of full archaeological excavation should be implemented.			
CH# 110	Construction	Direct	<ul style="list-style-type: none"> If walls or revetments are removed then a detailed written and photographic record of the affected section of walling or revetment should also be compiled along with a historic buildings survey (to NIAH standards) prior to its removal. 	Moderate	Medium/High	Moderate
	Operation	Indirect	<ul style="list-style-type: none"> The new tidal defence walls should be matched to the existing fabric of existing revetments and river walls. This can be achieved either through construction using similar fabric or that facing be applied to new concrete infrastructure to match the historic fabric. 	Minor	Medium/Low	Negligible
CH# 111	Construction	Direct	<ul style="list-style-type: none"> Targeted underwater archaeological survey in advance of construction. Archaeological monitoring of all groundworks associated with the proposed scheme should be carried out during the construction phase. Every reasonable effort should be made to preserve in situ, or reduce the impact on identified sites or features. If preservation in situ is not possible either in whole or in part, then a programme of full archaeological excavation should be implemented. 	Moderate	Medium/Low	Slight
CH# 113	Construction	Direct	<ul style="list-style-type: none"> Targeted underwater archaeological survey in advance of construction. Archaeological monitoring of all groundworks associated with the proposed scheme should be carried out during the construction phase. 	Moderate	Medium/High	Moderate

CH No.	Phase	Impact Type	Mitigation Measures	Magnitude of impact prior to implementation of mitigation measures	Baseline Value	Significance level of impact prior to implementation of mitigation measures
			<ul style="list-style-type: none"> • Every reasonable effort should be made to preserve in situ, or reduce the impact on identified sites or features. • If preservation in situ is not possible either in whole or in part, then a programme of full archaeological excavation should be implemented. 			

16 Landscape and Visual Assessment

16.1 Introduction

This chapter is the Landscape and Visual Assessment (LVIA) for the proposed flood alleviation scheme at Clonakilty. It sets out the potential impacts of the scheme relating to the landscape and visual amenity and outlines the recommended mitigation.

It includes a review of planning policy and guidance where relevant to the site study area including existing, published landscape character assessments and designated landscapes, views and scenic routes.

A constraints study and assessment of options was prepared as a precursor to this assessment, which concerns the preferred option.

The assessment has involved the following key stages:

- Desk based research to determine the scope of the study
- Desk-based research to establish the landscape and visual baseline and identify potential receptors, including planning policy and published studies.
- Field work to verify the baseline studies, determine the likely visual influence of the options and ascertain how the landscape and visual resource will change
- Outline of potential mitigation elements
- Assessment and reporting of potential impacts and effects, including construction, operation and residual effects that may remain if mitigation is implemented.

16.2 Description of the Development

16.2.1 Location

The proposed works are located along the River Fealge and can be grouped into three main locations:

- Dam and flood storage, upstream of the Dunnes Store and N71, to the western edge of the town
- Through the centre of the town, between the Bridge Street and Clarke Street bridges
- Along the harbour to the east of the town, from the Clarke Street bridge to Facksbridge roundabout and the a short section of the Ring Road

The baseline descriptions of these areas are provided in detail within the Local Landscape Character section, Section 5.2.3.

16.2.2 Proposed Development

The proposed works are required in order to alleviate tidal and fluvial flooding in the town of Clonakilty. Following a constraints study and options appraisal stage, the preferred scheme of a fluvial embankment and tidal defence walls was selected. A full description of the works is included in Chapter 6.

A summary of the elements is as follows:

- Upstream storage reservoir, with an earth embankment up to 6m high, flow control structure (likely to be a manually-operated sluice gate) and spillway. When operational, water will be retained at maximum levels to a distance of around 750m upstream and to the 13.8m contour
- Construct 1.1m high flood walls on both banks between Bridge Street (Michael Collins) Bridge and the Library, along Kent Street
- Replacement of railings with solid parapets to the Credit Union pedestrian bridge (or removal of bridge), on Kent Street
- Construct 1.1m high flood walls to both banks of the Fealge river, between the Library and Rossa Street Bridge, along Kent Street

- Construct 1.1 to 1.3m high flood walls to both banks between Rossa Street Bridge and William A. Houlihan Bridge (Seymour Street)
- Replace railings with solid parapets to William A. Houlihan Bridge (Seymour Street)
- Construct new 1.3m high flood walls on both banks between Seymour Street Pedestrian Bridge and Clarke Street Bridge
- Strengthen and raise parapets of Clarke Street Bridge
- Construct 1.1m to 1.3m high flood walls along Croppy Road between Clarke Street and Facksbridge
- Construct 1.2m high flood walls from Clarke Street along the south bank, through the Waterfront Development and former GAA site to boundary of Waste Water Treatment Plant
- Construct 0.75m high flood defence embankment at boundary of Waterfront Development and Waste Water Treatment Plant. Embankment to run north south tying into existing ground levels
- Construct 1.6m high flood wall and 1.7m raised road level along 220m of the Ring Road from Facksbridge
- Construct 1.4m high flood embankment behind houses on the Old Timoleague Road
- Construct 1.3m high flood walls behind a number of properties on Convent Road
- Construct minor fluvial defence measures (embankments and flood walls) at Killgarraff Bridge and on the Ballyhalwick Stream. Note that no assessment has been made in relation to these works, due to absence of information and likely localised nature.
- Construct underground pumping stations at Kent Street, Rossa Street, Croppy Road (2no.) and at the former GAA pitch.

16.2.3 Proposed Changes to the Landscape

Construction phase

During construction the main activity and infrastructure would include:

- Removal of vegetation, including sections of hedgerows and trees
- Demolition of existing walls (where required) and removal of fences, railings and balustrading
- Possible demolition of pedestrian bridge at Credit Union building.
- Ground clearance and creation of areas for storage of plant, materials and welfare facilities
- Temporary closures to pedestrian and vehicle access routes, including use of fencing/barriers
- Construction of elements listed above in Section 1.2.2. These may include piling and groundworks (earth moving, clay importation, spreading, piling); construction of walls etc, raising of road levels.
- Excavation to allow construction of pumping stations
- Movement of vehicles and plant; delivery and storage of materials

Operational phase

During operation the main aspects will include:

- New and/or raised defences, predominantly walls but also earth embankments
- Raised road levels
- Presence of large new earth embankment to dam and spillway with bare banks and control structure
- Temporary loss of agricultural land when water retained behind dam
- New underground pumping stations

16.3 Site Survey

A site survey took place on 16th and 17th April 2014 by a Chartered Landscape Architect. This encompassed the key areas likely to be impacted upon by the scheme from details available at the time of visit.

16.4 Limitations of the Assessment

The assessment and the prediction of impacts during the construction, operation and decommissioning of the development are based on the available background information and supplied drawings of the proposals at the preferred option stage.

The measures described and the assessment of likely impacts should therefore be considered as a broad summary which will be refined during the detailed design stage.

Surveys took place when trees were in full leaf and the effects of screening were at their highest. Consideration of impacts during the winter months has been included within this assessment.

Residential effects are based on site observation and use of aerial photography. Visits to individual properties were not undertaken.

16.5 Methodology

The assessment methodology for the Environmental Impact Statement is described in Appendix 16A.

The methodology is based on a number of sources. These include the document Guidelines on the Information to be contained in Environmental Impact Statements (EAP, 2002).

More specific guidance relating to LVIA is contained with Landscape and Landscape Assessment: Consultation Draft of Guidelines for Planning Authorities (Department of the Environment and Local Government, June 2000).

A comprehensive methodology is contained within Guidelines for Landscape and Visual Impact Assessment - 3rd edition (GLVIA3), (Landscape Institute and the Institute of Environmental Management and Assessment, 2013). This detailed methodology is reflected here.

A distinction is made between landscape and visual effects:

- Landscape: changes in the fabric, physical character or quality of the landscape resulting from the proposed development
- Visual: changes in view of the proposed development and the visual amenity of both private and publically accessible spaces

The assessment includes an initial appraisal of the landscape and visual baseline, which describes the landscape elements and components at present and the nature of current views. The sensitivity to change of these landscape and visual 'receptors' is described.

The potential construction effects on these receptors are considered and the magnitude of change is assessed. Through the use of a defined methodology, the scale of effect at each stage can then be described.

Where mitigation is possible, this is described. The assessment also considers operational effects. Mitigation may reduce effects immediately (e.g. if appropriate materials and design is implemented as part of the scheme) or more slowly, over time, e.g. as screening planting matures. Residual effects are those that remain after mitigation.

Impacts and effects that may be material to the planning process are described as significant. However whilst an impact may be significant, it does not necessarily mean that such an effect would be unacceptable. Account is taken of the impact that any mitigation measures—for example planting or materials—may have in terms of minimising potentially detrimental impacts or improving the landscape composition of the area.

16.6 Landscape Policy

16.6.1 National Planning Policy

16.6.1.1 Irish National Spatial Strategy 2002-2020 (NSS)

The NSS provides an overall framework for planning in Ireland. It provides strategic planning guidance for a range of Government policies and Plans at regional and local level (e.g. Development Plans), which must have regard to the NSS.

The NSS highlights the need for sustainable development and the need to avoid adverse environmental impacts on landscapes, as well as ensuring that design is of a high quality and appropriate to the scale and context of the surroundings.

The importance and tourism value of scenic landscapes are noted, particularly for parts of County Cork. The attractiveness and integrity of landscapes and townscapes are considered to be central to Ireland's tourism industry.

The Strategy states that environmental quality—the natural and cultural heritage—is most visibility evident in landscapes. The quality and character of Ireland's environment makes a major contribution to national identity and to the 'green' image of the country. Historic buildings and structures also contribute to the overall picture. It contributes to recreational, economic, social and overall 'quality of life' issues, providing the immediate surroundings of a home and the wider setting of neighbourhood and town.

16.6.1.2 National Guidelines

The Department of Environment, Community and Local Government produces a number of guidelines designed to help planning authorities influence and encourage good development. These include:

- Best Practice Urban Design Manual (2009)
- Design Manual for Urban Roads and streets (2013)
- Guidelines for Planning Authorities & An Board Pleanala on carrying out Environmental Impact Assessment (2013)
- Landscape and Landscape Assessment (Consultation Draft, 2000)
- The Planning System and Flood Risk Management (2009)

16.6.1.3 NSS Regional Guidelines

Regional Planning Guidelines are intended to support the implementation of the high-level NSS to achieve effective planning strategies at a regional level. The country is divided into 10 Regional Authorities, each being a statutory body with the responsibility for strategic planning. The site is within the South West Regional Authority (SWRA).

The Regional Planning Guidelines for SWRA were published in May 2004. Within the 'key elements', in notes that Planning Policies should *"...in a balanced fashion, seek to retain and protect the unspoilt landscape of the Region and promote environmental care and enhancement..."*.

Clonakilty lies with the Zone 3 - Urban, Inter-urban and Rural Areas. The guidance notes the 'highly scenic and/or sensitive environmental areas within Zone 3, which act as economic drivers to tourism and promote high quality of life. The high quality architectural and historical characters of towns should also be 'protected and respected', with a need for a 'mini green belt' around service towns such as Clonakilty. The Strategic Environmental Assessment (SEA) for these guidelines indicates 'significant, direct, beneficial impacts' on landscape in relation to these two aspects of plan implementation.

16.6.2 Regional Planning Policy

16.6.2.1 Cork County Development Plan (2009) (CCDP)

The development plan is the County's principle strategic planning policy document. The CCDP is a six-year plan expected to remain in force until early 2015. It comprises a written statement—including a Core Strategy—and maps; it has also been subject to an SEA. For planning

purposes, the County has been divided into four strategic planning areas. Clonakilty lies within the West Strategic Planning Area.

The key aims of the core strategy include:

"Enhanced quality of life for all, based on high quality residential, working and recreational environments...[and]..wise management of the County's environmental, heritage and cultural assets".

Key goals for the West Strategic Planning Area include the recognition of the international importance and importance to the tourism economy of the scenic and landscape qualities of the coastal areas. The attractive town centre to Clonakilty is noted, alongside the importance of ensuring that future development is *"...sympathetic to the architectural and historic character of the town"*.

Chapter 7, 'Heritage and Environment' states that the natural and built environment—particularly those elements that are non-renewable and most valuable—need to be properly protected, managed and enhanced. This should be promoted as an important element of the long-term economic growth and development of the County.

Objective ENV 1-1 states the intention to implement the County Heritage Plan in partnership with relevant stakeholders.

Objective ENV 1-2 Natural Heritage outlines the need to conserve, manage and where possible enhance the County's natural heritage, including landscapes.

Objective ENV 1-10 Tree Preservation relates to the preservation and enhancement of tree cover, ensuring that proposals do not compromise important trees and include an appropriate level of new trees planting. It also notes the protection of trees, groups of trees and mature hedgerows that are not formally protected under Tree Preservation Orders.

Section 7.2 'Landscape' provides information on how the special landscapes of the County will be protected and enhanced through planning policy, including details of the Draft County Cork Landscape Character Strategy (Section 5.2.1).

Objective ENV 2-2 Landscape states:

"It is an objective of the Planning Authority that landscape issues will be an important factor in all land-use proposals, ensuring that a pro-active view of development is undertaken while maintaining respect for the environment and heritage, generally in line with the principle of sustainability".

Objective ENV 2-3 Landscape Character Assessment states:

"It is an objective to raise awareness and promote appreciation of the landscape through Landscape Character Assessment [which] allows for a more inclusive approach to landscape management and enables Cork County's landscape to be identified for its capacity to accommodate development".

Objective ENV 2-4 Draft Landscape Strategy states:

"It is an objective to ensure that the management of development throughout the County will have regard for the value of the landscape, its character, distinctiveness and sensitivity as recognised in the Draft Landscape and its recommendations, in order to minimise the visual and environmental impact of development, particularly in areas designated as sensitive landscapes where high development standards (layout, design, landscaping and materials) will be required".

The Draft Landscape Strategy is a County-wide Landscape Character Assessment. This is described in Section (Section 5.2.1).

Objective ENV 2-5 Landscape Character Assessments highlights the need to continue the LCA process in line with National recommendations.

The section goes on to describe the importance of the County's scenic quality, which is reflected in the identification of 'scenic routes' and 'scenic landscapes'. These represent the most highly valued views and areas of natural beauty. Areas designated as Scenic Landscapes are noted as being currently under review but a number of Scenic Routes are identified. A number of objectives relate to Scenic Routes:

Objective ENV 2-6 General Visual and Scenic Amenity highlights the importance of protecting the visual and scenic amenity within the County's built and natural environment.

Objective ENV 2-7 Scenic Landscape is a particular objective to preserve the visual and scenic amenities of areas identified as 'Scenic Landscapes'.

Objective ENV 2-9 General Views and Prospects aims to preserve the character of all such locations, particular sea views, river or lake views, views of unspoilt mountains, upland or coastal landscapes, views of historical or cultural significance (including buildings and townscapes) and views of natural beauty as recognised in the Landscape Strategy.

Objective ENV 2-10 Development on Approach Roads to Towns and Villages is intended to protect such key locations from inappropriate development that would detract from the setting and historic character.

Objective ENV 2-11 Scenic Routes looks to preserve the character views and prospects from such routes. .

Objective ENV 2-12 Details of Scenic Routes is intended to protect the character and quality of those particular stretches of scenic route that have very special views and prospects.

Objective ENV 2-13 Development on Scenic Routes seeks to ensure that there will be no adverse obstruction or degradation of views towards and from vulnerable landscape features. It notes that in such areas, *"...the appropriateness of the design, site layout, and landscaping of the proposed development must be demonstrated along with mitigation measures to prevent significant alterations to the appearance or character of the area"*.

It goes on to state that appropriate landscaping and screen planting should be implemented along scenic routes. Where these run through settlements, streets trees and ornamental landscaping may also be required.

Section 7.2 Built Heritage is concerned with the protection and enhancement of the County's heritage of buildings that are of architectural, historical, archaeological and cultural importance. It also outlines the need to protect non-structural elements.

Objective ENV 4-5 Protection of Non-structural Elements of Built heritage states the requirement to protect these features, which may include historic gardens or designed landscapes; stone walls; landscapes and demenses; curtilage features such as stone walls and ditches; and street furniture.

The Plan provides objectives in relation to the design requirements for new buildings. Although these are generally intended for housing development, the principles could apply to this scheme.

Objective ENV 4-13 Design and Landscaping of New Buildings states that these should *"...respect the character, pattern and tradition of existing places, materials and built forms and fit appropriately into the landscape"*. It wishes to foster an approach that considers the potential for 'innovative design' and the promotion of amenity and environmental value of good design.

The objective goes on to state the requirement for appropriate landscaping and screen planting using predominantly indigenous or local species and groupings, alongside protection of existing hedgerows in rural areas.

Section 8.4 Open Space and Recreation includes reference to the Urban Design Manual and includes objectives that highlight the importance of open spaces and outdoor recreation areas to all sectors of the population.

Volume 2 of the CCDP provides lists of heritage and amenity assets, including the Record of Protected Structures and Architectural Conservation Areas and Nature Conservation Areas.

A list of scenic routes is provided. For each Scenic Route, a description of the local Landscape Character Type (Section 5.2.1) through which the route runs is provided, alongside a summary of key aspects or sensitivities of the route. The following are located within the study area; for each, the relevant details from Appendix 3 of the CCDP are provided.

Table 16-1 : Scenic routes, Cork County Development Plan

S72	
Local Roads between Clonakilty and Dunworly via Ballinglanna and Lisrimeen. Views of Dunworly Bay, Clonakilty Bay and harbour, Inchydoney Island and rural landscape	
Does route run through or adjoin Special Landscape Area?	Yes
Does route adjoin a NHA, pNHA, cSAC	pNHA Seven Heads and Dunworly Bay and pNHA, SAC and SPA Clonakilty Bay
Landscape Types route runs through	Type 3 Indented Estuarine Coast
Overall landscape value	Very High
Main features of land cover	Agricultural Settlement and Hills
Structures of Historic or Cultural Importance Visible from the route	Inchydoney Island and the settlement of Clonakilty
Key characteristics of Land Use	Urban area, agricultural, residential and fishing
Is there a sense of remoteness as you travel the route?	Yes
Rural Character	Prevalent

S73	
R600 Regional Road and N71 National Secondary Road between Timoleague and Clonakilty. Views of surrounding hillsides, rural landscape and the settlement of Clonakilty.	
Does route run through or adjoin Special Landscape Area?	Yes
Does route adjoin a NHA, pNHA, cSAC	No
Landscape Types route runs through	Type 3 Indented Estuarine Coast and Type 7a Rolling Patchwork Farmland
Overall landscape value	Very High-medium
Main features of land cover	Hills, valleys, pastoral landscape and settlement
Structures of Historic or Cultural Importance Visible from the route	St. Mary's Church and Lettercollum House, both protected structures
Key characteristics of Land Use	Urban area, agriculture, tourism and residential
Is there a sense of remoteness as you travel the route?	No
Rural Character	Prevalent

S74	
Local Coastal Road from Clonakilty to Inchydoney and Ardfield. Views of Inchydoney Island, Clonakilty Bay, Muckruss Head, Duneen Bay and rural coastal landscape.	
Does route run through or adjoin Special Landscape Area?	Yes
Does route adjoin a NHA, pNHA, cSAC	pNHA, SPA and SAC Clonakilty Bay
Landscape Types route runs through	Type 3 Indented Estuarine Coast
Overall landscape value	Very High
Main features of land cover	Clonakilty Bay, Muckruss Strand, Inchydoney Island, hills and coastline.
Structures of Historic or Cultural Importance Visible from the route	Inchydoney Island
Key characteristics of Land Use	Urban area, residential and tourism related activities
Is there a sense of remoteness as you travel the route?	No
Rural Character	Prevalent

16.6.2.2 Draft Cork County Development Plan 2013 (DCCDP)

The emerging DCCDP will replace the CCDP by January 2015. It will set out the overall planning and sustainable development strategy towards 2022. It is currently undergoing public

consultation. Whilst objectives within this plan are do not constitute current policy, there may be some consideration of this draft plan during the determination of planning applications.

Where objectives include additional or updated information relevant to this scheme, these are noted below.

Draft Objective HE 2-5 Trees and Woodlands includes a reference to the 'amenity or historic value' of trees that may be of risk of development.

Draft Objective HE S-1 Protection of Archaeological Sites make specific reference to the setting of archaeological sites.

The protection and enhancement of Landscape is now included with Chapter 13, Green Infrastructure and Environment. This includes an outline of Green Infrastructure (GI) and the importance of protecting, managing and developing GI assets in a sustainable manner. Draft Objectives GI 2-1, GI 3-1 and GI 3-2 reinforce this, through the requirement that a GI strategy for Cork County is developed and 'significant new developments' submit a green infrastructure plan as an integral part of the planning application.

Draft Objective GI 4-2 Rights of Way state that consideration should be given to the need to preserve public rights of way which give access to riverbank or other places of natural beauty or recreational utility.

Within the section describing the CCLCA, it notes that "LCTs which have a very high or high landscape value and high very high landscape sensitivity and are of county or national importance are considered to be our most valuable landscapes and therefore it is proposed to designate them as High Value Landscapes (HVL)." This is supported in Draft Objective GI 6-2, which states that "high development standards (layout, design, landscaping, materials)" will be required in HVL. The HVL area broadly follows the extent of LCT 3 Indented Estuarine Coast, as described in Section 5.2.1.

Draft Objective GI 6-1, amongst principles which are noted within the current plan, a more specific statement that development that necessitates "...the removal of extensive amounts of trees, hedgerows and historic walls or other distinctive boundary treatments" should be discouraged.

16.6.3 Local Planning Policy

16.6.3.1 Clonakilty Development Plan 2009-2015 (CDP)

The CDP was made by Clonakilty Town Council and came into effect on 23rd July 2009. It provides a planning framework for the town that is consistent with national and county plans and policies, whilst protecting, conserving and enhancement the environmental quality of the town within a sustainable pattern of growth.

Section 3 relates to development in the Town Centre. Under **Section 3.3.1. [Town Centre] Strategic Objectives** it states the need to *"...to preserve the old town centre's heritage character..."*. **Section 3.3.2. [Town Centre] Development Management Objectives** states that development should *"...respect the proportion and character of the existing streetscape"*.

Section 3.3.5 states that the quality of civic design and hard and soft landscaping should be improved. It goes on to note:

"All Developments shall conform to the scale, massing, layout, height and urban grain of the streetscape as far as possible to ensure continuity of street frontage and definition of public and private space. Developments should not restrict important views/vistas or landmarks within the townscape..."

Chapter 4 is concerned with Heritage, Architecture, Conservation and Amenity. Objective 4.1.1 state that street frontages should be protected through the use of sympathetic building materials, textures and tones. The ambience and character of streets should be preserved along the Clonakilty Heritage Trail.

Section 4.4 Archaeological Survey lists locations of archaeological interest and states that the setting of these sites should be protected and enhanced.

Section 4.5 Architectural Conservation Areas outlines the additional protection afforded by the Architectural Conservation Area (ACA) within the town centre. Objectives within this area include the sympathetic consideration of scale, massing, proportions, design and materials in order to maintain the special character of the historic core of the town.

Section 4.7 Trees in Clonakilty provides a list of trees and groups of trees that are to be preserved. These include:

- Tree in grounds of Bushmount House
- Trees along Western Road (Michael Collins Road)
- Trees in Emmet Square
- Trees in grounds of properties adjoining Emmet Square (rear gardens)
- Trees situated along the river bank and Catholic Church
- Trees in Kent Street
- Trees along Convent Road
- Trees in Orchard Gardens
- Trees in Scartagh adjacent to Community College
- Arboretum in Inchydoney Road
- Trees along field boundaries and avenue at Tawnies Cottage together with industrial specimen examples
- Any tree with a girth exceeding 100mm within the Architectural Conservation Zone

Section 4.8 relates to the protection of features of Landscape and Natural Heritage Importance.

Section 4.8.2 [Scenic Views] Development Management Objectives states the requirement to *"...preserve the scenic and amenity features of the shoreline around the town and other scenic landscapes and vistas in the town"*.

"Development should have cognisance to the A89, A90 and A91 Scenic Routes as outlined in the Cork County Development Plan 2003 (S72/S73/S74 Scenic Routes in the Draft Cork County Development Plan 2007)".

Under **Section 4.8.3 [Scenic Views]**, it is an objective to preserve the natural heritage features at the following locations:

"Views of harbour approach and agricultural land alongside estuary Youghals and Desert

Bushmount Grounds: grounds to nursing home and landscape links through the town."

Section 4.8.4 Scenic Landscape states that it is an objective to:

"...retain the areas of scenic landscape within the town boundary and to co-ordinate the areas of the coastal zone with that of the Draft County Development Plan"

"...retain and enhance soft landscaping and amenity areas within the town, specifically the development of the riverside walk and urban renewal of public open spaces".

16.7 Mitigation

16.7.1 Mitigation: overview

The scheme is currently at the outline design stage. No detailed proposals are available. However, for the purposes of this report, preliminary mitigation strategies can be proposed. As the scheme develops, these may be subject to further refinement and iteration, depending on the specific elements, constraints and engineering requirements of the scheme.

A number of mitigation proposals are presented throughout this report. Where implemented, mitigation has the potential to reduce operational impacts, or result in long-term neutral or beneficial effects. Some may be immediate, such as the use of appropriate hard landscape materials. Other may result in a change in impact or effect over time, such as the growth of trees and maturity of planting schemes.

No mitigation proposals or subsequent assessment of effects have been put forward for the construction phase. This is due to the lack of information available at this initial design stage. However, it is anticipated that the construction will follow best practice and statutory requirements that will minimise noise, disruption and reduce landscape and visual effects.

16.7.2 Mitigation: proposed elements:

Potential mitigation elements are outlined below:

- Avoidance of tree loss or damage. This may be through detailed design development that avoids trees or tree root protection zones, the use of tree protection strategies to avoid construction damage, the use of innovative systems to avoid underground root damage such as those that might arise through construction of river wall foundations; competent supervision and professional input to arboriculture services.
- Replacement of trees and vegetation including hedgerows to mitigate losses. This may be within the immediate site area or—if this is not feasible or appropriate—within nearby areas where there will be amenity and visual benefit. For example, the creation of a new flood wall along the Croppy Road may leave limited space for new tree planting. Where ornamental planting may require removal, such as adjacent to the Convent Road, this should be replaced on at least a like-for-like basis, but with potential—at relatively low cost—to introduce enhanced schemes. Replacement species should be appropriate for the site, such as salt-resistant trees close to the harbour and native, locally-sourced species at the rural dam site. Examination of potential visual impacts could inform new planting at locations such as along the N71 road west of Clonakilty, which could help create a more attractive entrance to the town from this direction, screening the spillway and control structure.
- The design of the dam, whilst inevitably incongruous in relation to the rolling nature of the River Fealge valley, should look to tie into to existing levels in a natural manner where possible. Sharp changes in slope or truncations of features should be avoided.
- The dam should be seeded with grass seed mix. Given the requirements for inspection, the dam is likely to be cut regularly and the use of wildflower seed mixes may not be suitable here. However, away from critical areas and—subject to landowner consent, future land use and management—some areas may be developed into more naturalistic, flower-rich native meadows that will have ecological and biodiversity benefits.
- The visual impacts of the control system should be considered. Although it is likely that views from existing publically accessible locations are limited, future development on the site adjacent to Dunnes may alter this. Stone cladding (as noted below) may be appropriate in this instance. Any alterations to the channel should use the Dunne's development, slightly further downstream, as an exemplar, where naturalistic planting and modified channel morphology has resulted in a visually appealing and ecologically valuable reach.
- Facing, cladding and coping to new walls should be used where possible, avoiding the use of concrete or artificial materials that do not reflect the sensitivity of the site. Locally sourced slate and stone should reference historic examples through finish, dimensions, colour, mortar and bond. Vernacular designs such as the vertical laying of slate—as illustrated in recently built walls to Deasy's Quay—may be preferable. Historic features such as the thick field boundary walls with vegetated tops around the Ring Road could act as a reference point. Within lower-sensitive locations, such as east of Charles Street Bridge, it may be more acceptable to use concrete or piled walls.
- Particular care should be taken where walls will replace balustrading. Views of the river will inevitably be reduced, so the design and specification within this areas will impact on the visual amenity of what are often more highly-valued pedestrian routes within attractive, historic parts of the town that are subject to local planning policy and guidance.
- Consideration to existing public art such as the 'headless' water feature outside the Credit Union and the 'Whale's Tail' at the Waterfront should be made during both construction and as part of the design. It may be necessary to remove and safely store such features, as well as any valued historic elements, during the works. Reinstatement

should be specified within contract documents in such a way as to avoid any damage. Designs should look to ensure that the value of these features, particularly the water feature, is not diminished by new walls.

- Opportunities may arise for location-specific interventions, treatments and public art to reflect the historic and cultural importance of the river within the townscape, the Archaeological Conservation Area, the setting of Protected Buildings alongside recreational and amenity value. For example, there could be potential to highlight the Clonakilty Heritage Trail with features along walls and paving such as inlaid mosaics or plaques. Given that works will most likely include removal of pavement surfacing, small-scale schemes to use more appropriate, natural materials could be implemented at the same time in order to reduce contractor overhead costs and site preliminaries.
- Although the Croppy Road is effectively a by-pass to the town and carries heavy traffic, it offers rare views of the harbour from the N71 and allows an appreciation of the historic relationship between the town of Clonakilty and the sea. The route has amenity value and may be seen as an opportunity to provide a positive impression to passing travellers, particularly tourists heading for West Cork. The extensive nature of the wall and the reduction in harbour views should prompt a considered design response at this location. Inclusive design could incorporate access over the walls to the foreshore as well as raised 'viewing' areas. The potential loss of trees will be a noticeable feature; replacement may be a challenge due to the footprint of wall foundations and loss of open ground away from sea water influences but all possibilities should be explored. The current, rather haphazard distribution of seating and paraphernalia could be replaced by something more structured and representative of the town.
- The wide, slate-built field and road boundary walls with vegetated tops along the Ring Road could inform design around these more sensitive scenic routes and landscapes. Where the Ring Road requires raising, there may be potential to incorporate aspects of this vernacular style within new walls.
- Where walls run close to or within gardens, such as to properties along the north of Old Timoleague Road, discussions with residents should take place to ensure retention of features where possible. New gardens should be reinstated on a like-for-like basis, but ensuring that detailing, design and any replacement planting is commensurate with the value of residential views and amenity.

16.8 Landscape: Baseline and Assessment of Effects

16.8.1 Landscape: overview

Landscape character is the distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape and how this is perceived by people. It reflects particular combinations of geology, landform, soils, vegetation, land use and human settlement but also encompasses its perceptual and aesthetic qualities. It creates the particular sense of place of different areas of the landscape. Assessment of the effect of the development on landscape character is a crucial element of the landscape assessment.

For further details of methodology in relation to landscape receptor and resource sensitivity and assessment of effects, refer to Appendix 16A.

To avoid repetition and cross-referencing, both baseline assessment, mitigation and assessment of effects are included for each receptor or element.

The scheme will affect the character of the landscape and fabric by:

- Reducing tranquillity and imposing uncharacteristic movements of materials and machinery within open, rural areas and intimate, historic, townscape areas during the construction phase.
- Temporary removal of street furniture including public art during works period
- New and increased height of landform associated with the earth embankment
- Introduction of new elements at dam, including channel control feature
- Temporary retention of water within farmland during high flows
- Loss of trees and hedgerows within rural areas

- Loss of ornamental trees along the Croppy Road
- New walls and raised roads through the town centre and east to the Ring Road
- Replacement of timber fencing, balustrading and railings with solid walls
- New, minor landforms to the Ring Road and rear of Old Timoleague Road

16.8.2 Landscape character

One published landscape character study covers the site area, the draft County Cork Landscape Strategy, published in 2007.

16.8.2.1 Draft County Cork Landscape Strategy (CCLS): baseline

The CCLS provides a Landscape Character Assessment (LCA) for Cork County. It identifies 16 Landscape Character Types (LCT), which are large-scale areas with similar physical and visual characteristics. The LCT are sub-divided into 76 Landscape Character Areas, representing more detailed areas of similar character.

The methodology included an assessment of Landscape Value and Landscape Sensitivity.

Landscape Value was based on three considerations:

- 'Nature Value' indicators include proposed Natural Heritage Areas, candidate Special Areas of Conservation, Special Protection Areas, Areas of Geological Interest, landform and landcover characteristics
- 'Scenic Value' include scenic landscapes and scenic routes.
- Cultural Indicators include Architectural Conservation Areas, Archaeological sites and Gaeltacht areas.

Each LCA was ranked into 5 categories of landscape value: very low, low, medium, high and very high.

Landscape Sensitivity was defined through the combination landscape and visual sensitivity.

Landscape Character Sensitivity considers the ability for a landscape to accommodate change without adverse impacts on its character. This included an evaluation of forces for change (types of pressure on the landscape) and vulnerability of the landscape to these changes.

Visual Sensitivity considers the visual impacts that development pressure may have on the landscape, based on visual values of the LCT.

Each LCA was ranked into 4 categories of landscape sensitivity: low, medium, high and very high.

LCT 7a: Rolling Patchwork Farmland (Bandon-Clonakilty-Leap environs)

LCA 49 - Connonogh (Rolling Intimate Mosaic Farmland with Scrub Outcrops)

This LCT runs inland from LCT3 (described below), from Leap in the west to Ballinspittle in the east. The rolling verdant patchwork of hill is described as 'classic Irish farmland'. Key characteristics include:

- Patchwork field boundaries as the defining feature of the landscape
- A rolling landform characterised by low and subtly defined rounded hills and interweaving shallow valleys
- A mosaic of small to medium-sized fields
- Mature but relatively low broadleaf hedgerows, many of which are tightly clipped, and some post and wire fencing defining fields.
- Occasional broadleaf clumps and copses or conifer shelterbelts punctuating the landscape, with small swathes of coniferous plantation on slopes to higher ground.
- Gorse and bracken within the more incised 'galleried' valleys
- Intensive dairy and tilling as the main land use on gently sloping fields
- Farmsteads are most invisible and scattered throughout the landscape, or peep out from behind the hill slopes and mature hedges and broadleaf hedgerows
- Houses and settlements generally on lower ground, closer to roads

Recommendations include the following:

- Protect the existing rural character and attractive setting of villages
- Ensure that approach roads to Clonakilty are protected from inappropriate development which would detract from the setting of these settlements
- Maintain the visual quality of the prominent hill slopes by appropriate siting of new development in visually unobtrusive sites
- Promote agriculture as the major land use in order to maintain existing features of the landscape
- Minimise disturbance of mature hedgerows in rural areas. Encourage appropriate landscaping and screen planting of proposed developments by using predominantly indigenous/local species and groupings.

LCT 7a is assigned the following values:

Medium landscape value

Landscapes with positive characters and with local or county importance

Medium landscape sensitivity

Landscapes that can accommodate development pressure, but with limitations in the scale and magnitude of the development. In this rank of sensitivity the landscape can accept some changes while others are more vulnerable to change. If pressure exceeds the landscapes limitation the character of the landscape may change.

It is considered to be a landscape of County importance

LCT 3: Indented Estuarine Coast

LCA 46 - Inchydoney, Incised Patchwork and Wooded Estuary with Mudflats and Islands

This LCT stretches from along the coastline from Baltimore in the west to the mouth of Cork harbour in the east. It comprises gently undulating topography incised by shallow river estuaries or 'drowned' valleys. Key characteristics include:

- A coastline comprising bays and promontories, the former include Clonakilty Bay
- Estuaries with shallow tidal mudflats and occasional grassy areas
- Moderate size fields that gently rise and fall with topography, creating a patchwork further articulated by bounding broadleaf hedgerows of generally low height as well as post and wire fencing. Land use is typified by intensive dairying and tillage.
- Built environment of farmsteads, houses and outbuildings throughout the landscape, visible due to low hedgerow heights.
- Urban centres such as Clonakilty take advantage of shelter afforded by inlets

Recommendations include the following:

- Retain undeveloped areas of estuary for the scenic and ecological value
- Protect sea views from coast roads and recognise the importance of restricting development where it would be injurious to the character of the area
- Minimise the disturbance of hedgerows in rural areas and encourage appropriate landscape or screen planting through predominantly indigenous or local species and groupings

LCT is assigned the following values:

Very High landscape value

Scenic landscapes with highest natural and cultural quality, areas with conservation interest and of national importance.

Very High landscape sensitivity

Extra vulnerable landscapes (for example, seascape area with national importance) likely to be fragile and susceptible to change)

It is considered to be a landscape of National importance.

It should be noted that the Draft Cork County Development Plan describes LCT 3 as a 'High Value Landscape'.

16.8.2.2 Draft County Cork Landscape Strategy (CCLS): assessment of effects

The scheme lies on the edge of the urban area of Clonakilty and not within the 'core' areas described by the County Cork Landscape Strategy Study. Given the areas covered by LCT 7a and LCT3 and the localised nature of impacts, the Local Landscape and townscape Character provided within this report (Section 5.2.3) assessment is considered more appropriate in this instance.

Impacts on **LC3** are expected to be limited to the area around the Ring Road and the dam site, which is adjacent to the modified, urban fringe of Clonakilty and does not fully display the rural qualities and elements that result in the high sensitivity described. Given the extent of LCA 3, impacts are expected to be slight adverse at most, but largely negligible, particularly if mitigation is implemented.

Impact on **LC7a** are also restricted to a very small area to the periphery, where inundation may occur at maximum retention of flows. The impact on the LCA as a whole is considered to be negligible.

16.8.2.3 Local Landscape and Townscape Character: baseline

Although the CCLS (Section 5.2.1) does not differentiate between urban and rural areas and the town of Clonakilty lies within LCT3 on published plans, these LCTs are generally applicable to broad, rural areas. For the purposes of this study and for the reasons noted above, a local landscape/townscape character assessment was undertaken in order to assess the sensitivity of the site and inform the design and mitigation. This is outlined in Section 5.2.3 below.

Character Area 1 (CA1): Fealte valley upstream from Clonakilty

This site is within LCT 7a and LCA 49, described in Section 5.2.1. The character and scale of this area is more in keeping with the assessment scope of the CCLS study, but given the relatively contained area of the site, a more focused character area is included here.

The large dam site covers a relatively extensive area within the broad valley of the Fealte upstream from the town. This land is predominantly open and rural in character, dominated by pasture but with some degree of modification through residential and equestrian use.

The landscape is considered to be of medium value and sensitivity within published local assessments. Baseline studies accord with this; whilst it does not include any landscape, cultural or recreational features of great significance, it has local value as an area of relatively quiet, gently attractive countryside that contrasts with the built form of Clonakilty town. Although there is no direct public access to the site area, it is visible from quiet local roads that offer opportunities for informal recreation and are easily accessible to local residents. The high ground to the north provides expansive views across the site, most notably from the Fernhill House Hotel, which incorporates an outside decking area and terraced gardens which take advantage of these views (Fig. 22). The gardens are also used by the hotel as an outdoor venue.

Key elements:

- Broad, open valley with elevated ground to N from which expansive views are available from publically-accessible locations, including Kilgariffe (Fig. 21). More limited views from smaller area of elevated ground to the south.
- Predominantly open farmland but with scattered residences and proximity to Clonakilty providing an element of urban/settlement fringe character.
- Network of low hedgerows and scattered hedgerow trees, with taller, more dense planting around residential properties to SE of area, closer to the N43 at Miles (Fig. 20). This includes a prominent conifer shelter belt alongside the channel. The Fealte River is also associated with bankside tree and shrub growth, particularly on the south (right) bank.
- Stone and/or earth embankments which form distinctive field boundaries, often highly vegetated and representing the historic enclosure of farmland.
- Modified landscape to the N of the Fealte River around Craanmore, with extensive mown grassland surrounding a landscaped detached property with stables, floodlit equestrian facilities and estate fencing (Fig. 21). A section of the grassed area is maintained as an airstrip for occasional or emergency use by light aircraft.

- Residential properties bordering the east of the site, with gardens and mature planting. Mature trees also border the Capeen stream.
- Unmanaged and disturbed former agricultural land close to the N71 and Dunnes stores, with a slightly scruffy appearance through pioneer scrub and woodland (Fig. 19).
- No public access within the site area.

Value is medium as an undesignated but broadly rural area that has amenity value through the presence of countryside in close proximity to the town. Susceptibility is medium-low, given some of the modifications that have occurred, such as development around Dunnes and Craanmore. Overall, landscape sensitivity is **medium** at most.

Character Area 2 (CA2): Clonakilty town: Bridge Street and Clarke Street bridges

The town of Clonakilty (of which the Historic Centre is a Cork County Archaeological Site and Monument) was centred on the Fealge River, being located on a historic crossing point. The river therefore forms a key linear element that provides a natural, flowing contrast with the dense, historic streetscape and built form of the historic town. The contribution of the river varies from fleeting glimpses to more extensive views, such as along Kent Street. Here, these views have been incorporated into public realm improvements that allow access along the river and take advantage of views up and downstream (Figs. 12-17).

Where the presence of the river has precluded more dense development, the open views allow some 'breathing space' within the town, opening up vistas towards prominent buildings such as the Catholic Church, Post Office and the Old Mill (library). This space has also allowed the growth of mature trees, which soften and add a green dimension to the street scene, including the setting of Emmet Square.

Materials reflect the varied nature of this townscape. These include prominent, visually impressive, high rubble/semi-coursed stone walls that provide a historic context around Seymour Street, relics of vertical slate walls along Kent Street and use of sympathetic stone cladding to modern walls. Whilst there are reaches with a unified appearance, there are also poor quality treatments and features, such as close-boarded timber fencing, concrete blockwork as retaining walls and patched repairs.

Key elements:

- Dense, layered urban form with network of often narrow streets and courtyard areas with an intimate character
- Varied ages, heights and styles of buildings typical of a historic townscape, offering visual variety and interest
- Within the Architectural Conservation Area, including setting and views from a number of Protected Structures.
- River views along the Fealge, including the Fealge Riverwalk and bridges within the centre of the key routes within the historic and commercial centre of the town. These views contribute to the amenity and tourism value, particularly where mature trees and the natural flow of the river complements and contrasts with the dense streetscape and built form.
- Existing river walls and defence of varying design style, materials and quality. These including historic walls, more recent flood defences, pedestrian balustrades and emergency repairs relating to recent flood events. Materials include rubble, stone and slate; reconstituted stone and concrete blocks.
- Small rear gardens to residential properties, commercial premises, bars and restaurants where the presence of the river and associated landscapes contributes to the overall quality of landscape.
- Areas of both formal and informal car parking to rear of buildings.
- Mature street trees, particularly along Kent Street, which add further dimension and contrast with the hard landscape and built form

Value is high, given the historical significance of the townscape, reflected in local designations. Susceptibility is medium-high, reflecting the varied quality of streetscape features and landscape elements. Overall, landscape sensitivity varies, but is generally high.

Character Area 3 (CA3): Clarke Street Bridge to Facksbridge including Croppy Road

This area has a more fringe character, representing the transition from the more constricted built form of the town centre to the open and rural countryside to the east of Clonakilty. It has a fragmented appearance, dominated by the busy road, roundabout and with adjacent areas of development interspersed with areas of public open space, relic farmland and foreshore.

However, it is informed by open views across the harbour, complemented by further glimpses towards both the town centre and the surrounding rural countryside. In combination, these provide a reference for the historic setting of the town, including the crossing point of the River Fealte and the economic importance of the harbour.

Views of these elements are notable for travellers heading W along the inland N76 from Bandon and Cork; it is effectively the first 'sea view' along this key route. This and the Ring Road to the E side of the harbour are both Scenic Routes within the Cork County Plan. In addition, the views also represent a 'gateway' to the town, reinforced by smaller-scale managed greenspace such as that to the east side of the N76 approaching the roundabout.

Although the Croppy Road is a relatively recent by-pass and subject to occasional congestion, it has high amenity value in offering an attractive pedestrian route with open, slightly elevated views of the harbour, alongside the smells and atmosphere that offers a link with the nearby sea. The route is bordered by a functional timber fence and heavily managed ornamental shrubs, with a largely grassy bank down to the tidal foreshore.

The former GAA pitch is zoned for mixed-use development; part of the site has already been developed including a riverside pedestrian realm. However, the general character of this site is mainly of an area in transition, with unmade areas of car parking, fly tipping and poorly managed planting. Non-native evergreen trees are a prominent feature along the southern edge of the river at this point.

Value is considered to be medium, as it can be argued that it provides a legible setting to the archaeological conservation area within the town centre and the relationship with the sea, alongside amenity benefits for local residents and tourists. However, this area has been fragmented and partially degraded, including through the presence of traffic and infrastructure along what is effectively the town's 'ring road'. Susceptibility is medium-low. Overall, sensitivity is **medium-low**, but locally medium.

Key landscape elements:

- Contrast and transition between townscape and harbour characters, divided by The Croppy Road (Fig. 7).
- Busy traffic along The Croppy Road, which acts as a by-pass to Clonakilty town centre but has an open and attractive aspect across the harbour (Figs. 6, 8). Footway along south (harbour) side is noted as an 'Amenity Walk' in Clonakilty Development Plan. Timber post-and-rail fence along edge of harbour, with occasional feature seating; ornamental and native trees and shrub planting.
- Traffic-dominated roundabout at Facksbridge, with popular retail centre to north and residential areas to W, adjoining open fields.
- Two locations noted as 'Conservation Area (Clonakilty Development Plan), E and W of Facksbridge roundabout.
- Derelict and unkempt former GAA pitch between the Waterfront development and waste water treatment works. Evergreen (non-native) hedge along south side of river and mixed tree/hedge along edge of treatment works
- Recent mixed-use development with riverside 'whale' sculpture and semi-public pedestrian frontage at Croppy Quay (The Waterfront) (Fig. 9).
- Attractive and historic slate and/or rubble walls, often with vertical coursing and grassed/vegetated tops, along Deasy's Quay (Ring Road), forming boundaries along an attractive rural route along the harbour and towards the coast (Figs 4, 5).

- Small, grassed area with ornamental planting adjacent to N71 immediately E of Facksbridge, alongside un-named and tributary, with small 'gateway' landscape features (e.g. tractor, table) and dense shrub/tree growth alongside channel.
- Domestic, residential and urban-fringe character along Convent Road and Old Timoleague Road
- Open field to rear of properties along Old Timoleague Road

16.8.2.4 Local landscape character assessment: impacts, mitigation and residual effects

CA1: Fealte valley upstream from Clonakilty

Sensitivity medium at most.

Construction impacts

During construction work will involve tree and hedgerow removal, temporary diversion or overpumping of the river, provision of access tracks, storage areas and compounds; movement of vehicles and construction of new earthwork dam. The magnitude is medium-high and the effect short-term, **moderate-substantial**, adverse. This is a **significant effect**.

Operational impacts

The loss of tree cover and presence of a new earth dam with spillway and control structure will result in an atypical feature within the LCT and LCA, likely to comprise of bare earth immediately post-construction. However, it is relatively localised within the character area as a whole and within a part that displays a more fragmented urban fringe quality. The flooding through retained water would be very short term and localised. The magnitude of change is medium and the effect moderate (at most), adverse.

Mitigation and residual effects

- Operational mitigation measures include:
- New tree planting along field boundaries and roadsides
- Gapping-up and new hedgerow planting
- Seeding of embankment and spillway with appropriate local meadow species, where maintenance requirements allow
- Removal and reinstatement of compound and site access area
- Compensatory planting of native species along channel upstream and downstream of embankment

The embankment will remain a feature within the LCA but planting and seeding, when established and mature, should result in an effect that is less than slight-moderate at most, adverse or neutral.

CA2: Clonakilty Town: Bridge Street to Clarke Street bridges

Sensitivity varies but is generally high.

Construction impacts

During construction work will involve demolition and reconstruction of new walls, removal of balustrading, repairs to and possible removal of bridges, temporary closure of footways, pedestrian routes and roads; possible tree pruning or removal (subject to detailed design); movement of vehicles and workers within a confined townscape. The magnitude is medium and the effect short-term, moderate-substantial adverse. This is a **significant effect**.

Operational impacts

The presence of raised walls and replacement of balustrading and railings with solid features will result in the presence of new or modified elements, but will not significantly alter the character of the area. Some of the views between the town and river that inform this character may be altered or obscured, but overall the fundamental elements of the townscape are not expected to be affected. There may be some loss of trees (subject to final design) along Kent Street, or more naturalised vegetation east of Rossa Street. However, it should be noted that any new walls may appear visually different from existing features, with mitigation (outlined

below) expected to limit these effects. The magnitude of change is medium at most and the effect moderate-substantial, long-term adverse, at most.

Mitigation and residual effects

Operational mitigation measures include:

- Avoidance of tree or vegetation removal
- Use of appropriate designs that reflect local vernacular and materials, or more contemporary styles in certain contexts such as the Credit Union building
- Retention and careful repositioning of sensitive elements such as the 'headless' water feature, where thoughtful design should accommodate these valued features
- Designs should reflect the immediate setting, such as protected structures along Kent Street, or visual and public amenity along the pedestrian walkway and William A. Houlihan bridge.
- Opportunities to incorporate new public art or imaginative features at key locations
- Consideration of new or improved street furniture, particularly where walls or loss of view results in decreased amenity

Any finishes and designs to new flood alleviation structures should—as far as possible—reflect the aspirations of the cultural and historic aspirations of this architecturally significant part of the town. If the above elements were to be incorporated, the effect should be reduced to moderate at most, neutral or with the potential to be beneficial.

CA3: Clonakilty Town: Bridge Street to Clarke Street bridges

Sensitivity: varies, but overall high.

Construction impacts

During construction work will involve tree and hedgerow removal, provision of access tracks, storage areas and compounds; movement of vehicles; demolition and reconstruction of new walls; removal of balustrading; repairs to bridges; and temporary closure of footways, pedestrian routes and roads. The magnitude varies, but overall is medium and the effect short-term, moderate, adverse.

Operational impacts

The introduction of new walls and localised raised road levels will result in a change in landscape elements but not one that will fundamentally alter the character of the area. Some views of harbour that inform the sensitivity of the area may be reduced. The loss of trees and shrubs to the Croppy Road may be more significant, but the value of these features as elements within the landscape is not high. It should be noted that any new walls may appear visually different from existing features, with mitigation (outlined below) expected to limit these effects. The magnitude of change is medium at most and the effect moderate, long-term adverse, at most.

Mitigation and residual effects

Operational mitigation measures include:

- Replanting of appropriate tree and shrub species where space allows, or as mitigation in other nearby areas
- Avoidance of unnecessary tree removal, particularly between the Convent Road and Old Timoleague Road
- Use of appropriate designs that reflect local vernacular and materials, such as the slate, earth-topped walls along the Ring Road
- Consider sympathetic treatment to ensure setting of and access to the 'whale' structure is not compromised.
- Incorporate steps or ramps to allow viewing or access of the harbour from the Croppy Road
- Opportunities to incorporate new public art or imaginative features at key locations, replacing those lost along the Croppy Road and around Facksbridge. These would reflect the 'gateway' aspect of these routes, as well as the significant coastal views from the N71.

- Use of appropriate landform and seeding or planting to embankments at the rear of properties on the Old Timoleague Road.
- Consideration of new or improved street furniture, particularly where walls or loss of view results in decreased amenity

Any finishes and designs to new flood alleviation structures should - as far as possible - consider the nature of the N71 and Facksbridge area as a reflection of Clonakilty for passing road users, many of which are tourists heading towards West Cork. If the above elements were to be incorporated, the effect should be reduced to slight or slight-moderate, neutral or with the potential to be beneficial.

16.8.3 Landscape fabric and elements

The **landscape fabric or elements** comprises physical landscape elements present within the landscape such as landform, land cover, boundary features and trees and woodland. These elements that make up the landscape we see, and that may be affected during the construction, operation and decommissioning of the proposed development.

Only those areas which will be directly impacted upon by the scheme are assessed here.

16.8.3.1 Landform: baseline

Upstream from the town (within Character Area 1), the broad valley and gentle slopes of the Fealge are typical of the undulating countryside described in the CCLS (Section 5.2.1). Along the Croppy Road (Area 3), the raised embankment reflects human influence along the harbour edge at this point.

Sensitivity of landform to this type of development within CA1 is **medium-low** and **low within CA2 and CA3**.

16.8.3.2 Landform: impacts, mitigation and assessment of effects

Construction impacts

Storage of materials and stockpiles of soil/subsoil will result in temporary changes in landform around the dam site. The magnitude of change is medium and the effect is moderate, short-term adverse at most.

Operational impacts

The new embankment and spillway will represent an un-natural and incongruous landform feature, but one with a relatively localised footprint and close to more fragmented areas of development that are of lower sensitivity. The magnitude of change is medium-low at the effect is slight-moderate, permanent, adverse.

Mitigation and residual effects

The embankment will be of the minimum size to retain peak flows in order to satisfy the required level of flood alleviation. It will tie into existing topography at both ends. The residual effect will remain slight-moderate, permanent, adverse.

16.8.3.3 Land use: baseline

CA1 is of a rural character and land use is dominantly improved grassland, with some more managed and domesticated areas around Craanmore. Sensitive to this type of development is low.

CA2 is largely urban and comprises the historic core of Clonakilty. Affected areas include bridges, footways, roads, car parks (public and private) and riverside walkways. Some of these have historic or amenity value. The sensitivity varies, but is considered to be medium overall.

CA3 has a more fragmented character, comprising areas of hard open space (such as the Waterfront development), informal public open space along the harbour edge, roads and footways, improved grasslands, areas of reclaimed mudflats and undeveloped 'fringe' sites such as the former GAA pitch. The sensitivity varies, but overall is considered to be medium-low.

16.8.3.4 Land use: impacts, mitigation and residual effects

Construction impacts

Storage of materials and stockpiles of soil/subsoil will result in the temporary loss of improved grassland around the dam site, including access for machinery and compounds. Small-scale temporary losses of car parks, footways, open space (public and private; the latter may include the area to the post office and former GAA pitch) may also occur. The change is medium-low at most and the effect is moderate, short-term, adverse at most.

Operational impacts

No major changes to land use are expected at the operational stage. There will be a loss of grazing grassland to the dam site, but other areas are expected to function in the same manner as previous to the scheme. The change is medium-low at most and the effect is slight, permanent, adverse or neutral.

Mitigation and residual effects

No mitigation is proposed. The residual effect will remain slight, permanent, adverse or neutral.

16.8.3.5 Water bodies: baseline

The River Fealge flow east to west into the harbour below Clonakilty. It has the rural quality of a gently meandering, tree-lined stream to the west of the town (CA 1), but is heavily modified through the town centre CA2 where it runs through lined channels. However, even here, it still displays the qualities of a small river. To the east of Clarke Street, it discharges into the tidal Clonakilty Bay. This is dominated by mud flats at low tide, with the margins exhibiting human influence through localised reclamation and construction of embankments.

The sensitivity of the water bodies to this type of development is medium at most.

16.8.3.6 Water bodies: impacts, mitigation and residual effects

Construction impacts

Construction at the dam site will require diversionary works to the river. However, these are localised in relation to the length of the Fealge. Smaller-scale interventions will be required further downstream, but generally works are to the walls, rather than the waterbody itself. The change is medium at most, therefore the scale of effect is moderate, short-term, adverse.

Operational impacts

The new dam will result in a notable but localised (c.40m) change in the morphology of the Fealge river where it passes through the control structure. When retaining flows, there will be an increase in standing water upstream, which will temporarily alter the nature of the water body. The change is low and the effect is slight, permanent, adverse. Other effects downstream are expected to be negligible.

Mitigation and residual effects

No mitigation is proposed. The residual effect will remain slight, permanent, adverse or neutral.

16.8.3.7 Woodland, trees and hedgerows: baseline

Trees and hedgerows are subject to policy protection within the Clonakilty Development Plan (Section 3.3.1). None of the designated areas are within the scheme extends. However, there are prominent mature trees along both field boundaries, the Fealge river and tributary channels within CA1. Mature street trees are located along the south (right) bank of the channel, within the footway to Kent Street in CA2, between Bridge Street and the library. These are noted as protected trees within the Clonakilty Development Plan (Section 3.3.1).

The River Fealge flow east to west into the harbour below Clonakilty. It has the rural quality of a gently meandering, tree-lined stream to the west of the town (CA 1), but is heavily modified through the town centre CA2. However, even here, it still has the fundamental qualities of a river. To the east of Clarke Street, it discharges into the tidal Clonakilty Bay. This is dominated by mud flats at low tide, with the margins exhibiting human influence through localised reclamation and construction of embankments.

Ornamental tree and shrub planting is located along the south (harbour) side of the Croppy Road, where it has been used to soften the impact of the original road scheme. The shrubs are

largely non-native species. Mature trees and shrubs are present along the channel that runs between Convent Road and Old Timoleague Road.

The sensitivity of woodland, trees and hedgerows is medium within CA1, high in CA2 and medium-low in CA3.

16.8.3.8 Woodland, trees and hedgerows: impacts, mitigation and residual effects

Construction impacts

Construction within the dam site area will result in the loss of c.50m of trees or shrubs along the line of the Fealge river, under the footprint of the dam. Some other localised tree loss may occur where plant access is required. Works will also take place very close to street trees along Kent Street in the centre of the town, although it is not known at this stage if this will require any tree removal.

Around 20 semi-mature ornamental trees are located along the line of the proposed new wall along the Croppy Road. These may require removal, along with associated ornamental shrubs. Limited removal of mature trees may also be necessary to the rear of Convent Road.

Overall, the change is medium-low. The effect varies, depending on location. Overall, it is considered to be moderate, short-term, adverse. If trees to Kent Street are lost, this effect may be greater and could be considered moderate-substantial, which would be a significant effect.

Operational impacts

The loss of trees and channel-side shrubs is as described for construction. There will be a permanent, slight-moderate, adverse effect. Again, if trees to Kent Street are lost, this effect may be moderate-substantial and significant.

Mitigation and residual effects

Mitigation within the upstream flood storage area may include the planting of replacement, compensatory trees at appropriate locations close to the site. This may include additional screen planting along the N71 to the south.

Detailed designs for the walling to Kent Street and Croppy Road are not yet available, but it would be anticipated that loss of trees will be avoided where possible. There may be potential to undertake ground works and construct foundations that avoid damage to root protection zones. However, where loss is unavoidable, replacement tree planting should be incorporated into the scheme. For the Croppy Road, this would require species that are resilient to the salt spray and location, planted at a spacing and size that would provide an attractive visual feature but without obscuring the views towards the harbour.

Works to the area east of Facksbridge roundabout will also look to avoid root-zone damage and specify replacement trees as appropriate.

A slight-moderate, short-term adverse residual effect may remain following construction. However, over time (around 15 years), this will reduce to slight. Once new trees establish, this may result in beneficial effects.

16.8.3.9 Built elements: baseline

CA1 includes very few built features, other than minor agricultural elements such as field gates and small-scale river crossings. The sensitivity of these features is low.

The channel of the River Fealte through CA2 is associated with a large number of built elements that reflect the modified and settled nature of the town centre and previous attempts to reduce flooding. These include stone, slate and concrete walls and retaining structures, stone and steel bridges, railings, pavements, public and private parking and storage areas, roads, balustrades and a 'headless statue' water feature outside the Credit Union. The sensitivity of these features varies, but overall is medium-high.

Built elements in CA3 include roads, pavements, timber fencing, street lighting, small-scale sculptures and decorative features (such as historic agricultural implements and a water pump), benches and seating, concrete and stone walls and retaining structures; hard-landscaped public open space, a whale sculpture close to the Charles Street bridge; balustrading; traditional field

boundary walls (comprising slate with earth tops); garden boundary features. The sensitivity varies, but overall is medium.

16.8.3.10 Built elements: impacts, mitigation and residual effects

Construction impacts

Construction will involve the loss and reconstruction of wall and balustrade through the town and to the east of Clarke Street bridge. This may also impact upon adjacent features such as street furniture, lighting and the sculptures outside the Credit Union building and the Waterfront development. Such features may need to be stored off-site during the construction period. There will also be loss of traditional walls (including slate and grass-topped features) along the Ring Road and further street elements around the Facksbridge roundabout.

The change is moderate. The effect will vary from moderate-substantial (which would be a **significant effect**) in the more sensitive, town centre locations, to slight-moderate; adverse, short-term.

Operational impacts

The loss, relocation and replacement of existing built features is largely described as for construction, although operational impacts will be reduced as it is anticipated that temporarily stored street furniture will be reinstalled. Overall there will be a permanent, moderate, adverse effect.

Mitigation and residual effects

Mitigation should primarily reduce any loss of visual amenity through the specification of suitable cladding materials and designs, particularly in sensitive locations such as along Kent Street, to the walkway around the William A. Houlihan Bridge, where balustrading will be replaced by walls.

The scheme may offer an opportunity to incorporate public art features or installations at locations where these will present a positive impression of the town, such as around the Facksbridge roundabout and along the Croppy Road.

If suitable mitigation were to be implemented, residual effects should reduce to slight-moderate, permanent at most. These may be neutral or beneficial, for example along the Croppy Road, where a new sensitively-designed wall may be a more positive feature than the current timber post and rail fence.

16.9 Visual Receptors: Baseline Review and Assessment of Effects

16.9.1 Visual receptors: overview

Visual impacts relate to how the development may affect the views available to people and their visual amenity. Visual amenity is the visual quality of a site or area as experienced by residents, workers or visitors. Visual receptors are people that experience the view. Development can change people's direct experience and perception of the view depending on existing context, the scale, form, colour and texture of the proposals, the nature of the activity associated with the development, and the distance and angle of view. Visual impacts can be experienced through development intruding into existing views experienced by residents and day to day users of the area, and the views of tourists and visitors passing through or visiting the area.

For further details of methodology in relation to visual receptor sensitivity and assessment of effects, refer to Appendix 16A.

To avoid repetition and cross-referencing, both baseline assessment, mitigation and assessment of effects are included for each receptor.

Each receptor or group of receptors is referenced with a number and illustrated on Figure 16-4 and Figure 16-5.

The 'visual envelope' describes the extent of the area from which views of the scheme are theoretically possible. The more open, rural character within the dam site area (CA1, as described in Section 5.2.3), allow longer-distance views, particularly from elevated areas to both side of the valley where the screening effect of hedgerows and trees is reduced. Within the town

centre (CA2) views are much more constrained, due to built form. Further east (CA3), views again become more open, due to the influence of the harbour and the more fragmented, less built-up character of the area.

16.9.2 Residential receptors

The assessment of visual effects on residential receptors is an outline assessment only; it is not a detailed Residential Amenity Assessment. Assumptions have been made about the types and use of rooms within houses and are based on site-based observations and aerial photography. Without undertaking the assessment from inside each room it is not possible to be certain that the assessment is completely accurate.

Value for residential receptors is generally assumed to be high. However, the context of the view may vary and may include visual detractors. Some properties may appear to have a view or garden designed to take advantage of a valued view. Within the assessment, it is assumed that the sensitivity is medium-high unless otherwise noted. Susceptibility may be influenced by screening or orientation.

Residential receptors are grouped according to geographical location to avoid repetition.

Only properties that have views towards the site or are expected to receive impacts are described.

The Miles, off N71 to W of Dunnes

3 properties are located off a side access road from the N71, around 420m west of the Dunnes roundabout. Two are expected to receive views:

[1] The Miles, Property to north (150m from dam footprint) with views that are heavily constrained by mature trees and other vegetation to the garden and boundary.

- *Construction*: negligible.
- *Operation*: Glimpsed views of water at maximum retention. Change: slight, temporary, neutral.
- *Mitigation*: new screen planting and seeding of embankment. Residual effects after mitigation: negligible.

[2] The Miles, Brookfield House (75m from dam footprint, c.50m to maximum inundation level) with more open views to the northeast, towards the site, although these are heavily filtered by mature trees and hedgerows. Views to the southeast are likely to be screened at ground level by hedging. Some views may be available from the first floor windows. Sensitivity: medium-high

- *Construction*: possible views of plant, earthworks, moving traffic. Change: low. Impact: slight-moderate, short-term, adverse.
- *Operation*: slight. Glimpsed views of dam and water at maximum retention. Change: slight, permanent, adverse.
- *Mitigation*: new screen planting and seeding of embankment. Residual effects after mitigation: slight or negligible, adverse to neutral.

Tawnies Lower

The following properties are expected to have views of the site:

[3] Glen House (290m from dam footprint and around 75m from maximum inundation levels), has direct views to the inundation area with limited screening and oblique views, with garden and boundary screening, towards the dam site. *Sensitivity*: medium-high.

- *Construction*: views of plant, earthworks, moving traffic. Change: medium. Impact: moderate-substantial, short-term, adverse.
- *Operation*: Filtered views of dam and water at maximum retention. Change: low. Impact: slight-moderate, permanent, adverse.
- *Mitigation*: new screen planting and seeding of embankment. Residual effects after mitigation: slight or negligible, adverse to neutral.

[4] Detached property west of Glen House (375m from dam footprint, around 40m from maximum inundation level), with rural views towards the dam filtered by intervening mature trees and hedgerows. Sensitivity: medium-high.

- *Construction:* glimpsed views of plant, earthworks, moving traffic. Change: low. Impact: moderate, short-term, adverse.
- *Operation:* Filtered views of dam and water at maximum retention. Change: low. Impact: slight-moderate, permanent, adverse.
- *Mitigation:* new screen planting and seeding of embankment. Residual effects after mitigation: slight or negligible, adverse to neutral.

[5] Nos. 10 and 11 Ard Alainn (560m from dam footprint, 260m from maximum inundation level) have open, elevated views across the river valley but filtered by mature trees and garden vegetation. Sensitivity: medium-high

- *Construction:* glimpsed views of plant, earthworks, moving traffic; winter only due to tree screening. Change: low. Impact: slight-moderate but generally slight, short-term, adverse.
- *Operation:* Filtered views of dam and water at maximum retention. Change: low to negligible. Impact: slight-moderate at most to negligible, permanent, adverse.
- *Mitigation:* new screen planting and seeding of embankment. Residual effects after mitigation: negligible, temporary when water retained.

Kilgarriff Cottages

2nr bungalows to the north of the road are expected to have views screened by boundary hedging.

[6] Craanmore (570m from dam footprint, 125m from maximum inundation level) has very open, unscreened views across a mown grass area (used as an airstrip), with views towards the dam site generally screened by mature hedgerow and riverside trees.

[7] A detached property (780m from dam footprint, 300m from maximum inundation level) with open views across an equestrian centre and managed grassland, towards the upper part of the flood storage area.

Sensitivity: medium-high.

- *Construction:* possible glimpsed views of plant, earthworks, moving traffic; winter only due to tree screening. Change: low to negligible. Impact: slight-moderate but generally slight, short-term, adverse.
- *Operation:* Views of water at maximum retention. Views of dam likely to be screened by existing trees. Change: low. Impact: slight-moderate, adverse or neutral.
- *Mitigation:* none. Residual effects: no change from operational.

[8] 4no. detached bungalows at an elevated location have long-distance views across the flood storage area (440m) and grassland associated with the equestrian centre.

[9] Around 6nr detached properties with lower-level views towards the flood storage area (380-400m), along with the grassland associated with the equestrian centre.

Sensitivity: medium-high.

- *Construction:* negligible. Views of dam site likely to be screened by existing trees.
- *Operation:* Views of water at maximum retention. Change: low. Impact: slight-moderate, adverse or neutral.
- *Mitigation:* none. Residual effects: no change from operational.

Clonakilty Town

[10] 13no. three-storey properties to **Emmet Square** (nos. 7-19, odds), (70-100m), with oblique views across the square towards the Kent Street walls, filtered by mature trees within the square. Sensitivity: **high**.

- *Construction:* Change: low. Views of wall works but generally filtered. Impact: moderate, short-term, adverse.
- *Operation:* Glimpsed views of raised walls. Change: low. Impact: slight-moderate, adverse or neutral.
- *Mitigation:* use of appropriate finishes to walls, matching existing where possible. Avoid loss of street trees. Residual effects: slight, neutral.

[11] Around 5no. properties to **Kent Street** (0 to 15m), with direct, front elevation or rear elevation views of the Kent Street walls and minimal or no screening. Sensitivity: medium-high.

- *Construction:* Change: medium to high. Views of works, including traffic movement and material storage, in close proximity. Construction of an underground pumping station. Impact: moderate to moderate-substantial, short-term, adverse. This is a **significant effect**.
- *Operation:* Views of walls raised to 1.1m. Changes to balustrading, possible loss of public art. Change: medium. Impact: moderate, permanent, adverse.
- *Mitigation:* use of appropriate finishes to walls, matching existing where possible, such as slate or stone cladding. Consider retaining and enhancing setting of public art. Avoid loss of street trees. Residual effects: slight, neutral.

[12] Residential properties to **Rossa Street** (c. 5no, including any upper storey flats) (0-15m) that have views to the river and bridge, both upstream and downstream. Sensitivity: medium-high.

[13] Up to 8no. Apartments to **Harte's Courtyard**, with riverside views to the rear. Sensitivity: medium-high.

[14] Nos. 8,9 and 10 **Clarke Street** (0-20m), with front elevation views along the Croppy Road or (within no. 10) views of the adjacent river and Clarke Street bridge. Sensitivity: medium.

- *Construction:* Views of works, including traffic movement and material storage, sometimes in close proximity but more elevated from Harte's Courtyard. Construction of an underground pumping station in Rossa Street. Parapet strengthening to Clarke Street Bridge. Change: medium. Impact: moderate, short-term, adverse.
- *Operation:* Views of walls raised to 1.1m (west of Rossa Street) and 1.3m (along Riverside Walkway). Infilling of balustrading. Change: medium at most. Impact: moderate at most, permanent, adverse.
- *Mitigation:* use of appropriate finishes to walls, matching existing where possible, such as slate or stone cladding. Particular attention to replacement balustrading along pedestrian walkway. Residual effects: slight-moderate, permanent, neutral.

[15] Up to 6no. apartments within the **Waterfront development** (10-50m), some of which are expected to have views of the river and walls from Clarke Bridge and along the Croppy Road towards the harbour. Sensitivity: medium or medium-high.

- *Construction:* Views of works, including traffic movement and material storage, but generally away from the more elevated lines of sight. Some views may be in context of former GAA development site. Change: low. Impact: slight-moderate, short-term, adverse.
- *Operation:* Limited views of new walls to river. Change: low or negligible. Impact: low or negligible, permanent adverse.

- *Mitigation:* use of appropriate finishes to walls, matching existing Waterfront designs and cladding. Consider setting of whale sculpture, enhancing or retaining views along river. Residual effects: slight, permanent, neutral.

[16] Apartments to the eastern end of **Long Quay** (50m), which have open and sometimes elevated views across a small public green space towards the Croppy Road and the harbour. *Sensitivity:* medium-high.

[17] A single detached property (25m) at the corner of **Long Quay and the Croppy Road** with open views from first floor windows towards the harbour, but more screened by a boundary hedge from the ground floor. *Sensitivity:* medium-high.

- *Construction:* Limited views of works including loss of trees. Disruption of views to harbour, but in context of existing moving traffic. Change: medium. Impact: moderate overall, short-term, adverse.
- *Operation:* Filtered views of new flood walls, with possible reduction of views to harbour, particularly from ground floor properties. Change: medium-low. Impact: moderate to slight-moderate, permanent, adverse.
- *Mitigation:* possible replacement tree planting. Use of appropriate finishes to walls, such as slate or stone. Residual effects: slight, permanent, neutral.

[18] A single detached property on the **Ring Road** (25m), facing Facksbridge roundabout, with largely open views west along the Croppy Road. *Sensitivity:* medium.

- *Construction:* Direct views of tree loss and wall works, but in context of existing traffic movement to roundabout. Change: medium. Impact: moderate overall, short-term, adverse.
- *Operation:* Views of new walls and tree loss along Croppy Road. Change: medium-low. Impact: slight-moderate, permanent, adverse.
- *Mitigation:* possible replacement tree planting. Use of appropriate finishes to walls, such as slate or stone. Residual effects: slight, permanent, neutral.

[19] 2no detached properties to the north side of **Old Timoleague Road** (2m), with rear elevations in close proximity to the tributary parallel to the N71. *Sensitivity:* medium-high.

- *Construction:* Direct views of possible tree loss and wall works within or adjacent to rear gardens. Change: high. Impact: moderate-substantial, short-term, adverse.
- *Operation:* Views of new walls and tree loss in close proximity to rear windows. Change: high. Impact: moderate-substantial, permanent, adverse.
- *Mitigation:* sensitive cladding and design of walls, avoidance of tree and vegetation loss and reinstatement of garden features. Residual effects: moderate, permanent, neutral, reducing over time to slight.

[20] 6no. detached properties to the south side of **Old Timoleague Road** (2m), with rear elevations having generally expansive views across an open field towards the harbour, which forms part of the designated Scenic Landscape within the Cork County Development Plan (Section 3.2.1). *Sensitivity:* high.

- *Construction:* Direct and close-proximity views of earthworks within open, rural views. Close-proximity views of road raising and new walls for 1no. property to corner of Old Timoleague and Ring Roads. Possible loss of historic field boundary walls. Change: medium to high. Impact: moderate-substantial to substantial, short-term, adverse.
- *Operation:* Views of new, bare earth embankments, new walls raised road. Change: medium. Impact: moderate-substantial, permanent, adverse or reducing to neutral for embankment.
- *Mitigation:* sensitive cladding and design of walls. Seeding of embankment. Residual effects: moderate, permanent, neutral, reducing over time to slight.

16.9.3 Recreational receptors

Impacts on Scenic Routes, as described in Cork County Development Plan (Section 3.2.1) are noted within the Road receptors section. S72 and S73 both run along the Croppy Road (reference receptor 29), with S72 along the Ring Road (ref. 30) and S73 along the N71 Convent Road (ref. 31). Impacts are very localised in relation to the full length of these routes.

[21] Fernhill House Hotel (225m from maximum water retention level, 500m from dam footprint site) takes full advantage of the elevated location and extensive views to the south, across the valley and towards the coast. These are available from the entrance, car park area and terraced gardens. The gardens are a recreational attraction in themselves, as well as a wedding venue and outdoor seating for food and drink. *Sensitivity* is high.

- *Construction*: glimpsed views of plant, earthworks, moving traffic; more likely during winter due to tree screening. Change: low. Impact: moderate but generally slight, short-term, adverse.
- *Operation*: Filtered views of dam and more open views of water at maximum retention. Change: low. Impact: moderate at most, permanent, adverse or neutral.
- *Mitigation*: avoid tree removal along channel course and around dam site. No mitigation likely for views to storage area. Residual effects after mitigation: slight-moderate at most, largely neutral.

[22] Emmet Square (25m), recently renovated with seating areas and with views towards the Kent Street bridge. Within the setting of Protected Buildings, the Michael Collins Statue and in the Architectural Conservation Area. *Sensitivity* is high.

- *Construction*: Views of wall works with potential for tree loss along Kent Street. Generally filtered by trees and restricted to certain viewing directions. Change: low. Impact: moderate, short-term, adverse.
- *Operation*: Glimpsed views of raised walls. Change: low. Impact: moderate, adverse or neutral.
- *Mitigation*: use of appropriate finishes to walls, matching existing where possible. Avoid loss of street trees. Residual effects: slight, neutral.

[23] Public open space at corner of Croppy Road and Long Quay (15m): mown grass with trees and benches, with views towards the harbour. *Sensitivity* medium-low.

- *Construction*: Limited views of works including loss of trees. Disruption of views to harbour, **but** in context of existing moving traffic. Change: medium. Impact: slight-moderate overall, short-term, adverse.
- *Operation*: Views of new flood walls and tree loss. Change: medium. Impact: slight-moderate, permanent, adverse.
- *Mitigation*: possible replacement tree planting. Use of appropriate finishes to walls, such as slate or stone. Residual effects: slight, permanent, neutral.

[24] Model Railway Village (40m to embankment, 150m to Ring road): local visitor attraction. Views are generally screened by vegetation although more open aspect from playground area across harbour to Ring Road. *Sensitivity* medium-low.

- *Construction*: Limited views of works to Ring Road, including plant and moving traffic. Change: low. Impact: slight-moderate at most, short-term, adverse.
- *Operation*: Glimped views of new flood walls across harbour, as new features along shoreline. . Change: low at most. Impact: slight-moderate at most, permanent, adverse.
- *Mitigation*: Use of appropriate finishes to walls, such as slate or stone, to blend within existing views. Residual effects: negligible.

16.9.4 Public footpaths

A number of amenity routes are indicated on the Clonakilty Development Plan map. Some of these routes follow existing road pavements and are assessed under the roads section (Kent Street ref. 28; Croppy Road ref. 29; Ring Road ref. 30). Others were not observed during site visits and are considered to be long-term aspirational projects, such as the route from the cemetery at Tawnies Lower Fernhill Road via Beechgrove; these are not assessed here.

[25] Pedestrian bridge over Fealte River at the Credit Union Building (0m), has open views up and down the river within the setting of Protected Structures and within Architectural Conservation Area. *Sensitivity* is medium-high.

- *Construction:* Closure of bridge likely during works, with possibility of complete removal. Views of works, including traffic movement and material storage, in close proximity. Possible loss of street trees. Change: high. Impact: moderate-substantial overall, short-term, adverse.
- *Operation:* Possible loss of bridge. Views of walls raised to 1.1m. Changes to balustrading, possible loss of public art. Change: high at most. Impact: moderate-substantial, permanent, adverse.
- *Mitigation:* Retain bridge where possible. Use appropriate finishes to walls, matching existing, such as slate or stone cladding. Consider retaining and enhancing setting of public art. Avoid loss of street trees. Potential to improve boundary treatments to adjacent car park area. Residual effects: slight, neutral to beneficial.

[26] Riverside Walkway (0m), between Rossa Street and Clarke Street, via Harte's Courtyard. Denoted as an amenity route in Clonakilty Development Plan (Section 3.3.1). *Sensitivity* is medium-high.

- *Construction:* Closure of bridge and walkway expected during works. Views of works, including traffic movement and material storage. Removal of balustrading. Change: high. Impact: moderate-substantial, adverse.
- *Operation:* Reduction in river views through walls raised to 1.1m (west of Rossa Street) and 1.3m (along Riverside Walkway). Infilling of balustrading. Change: medium at most. Impact: moderate at most, permanent, adverse.
- *Mitigation:* use of appropriate finishes to walls, matching existing where possible, such as slate or stone cladding. Particular attention to design of walling to replace balustrading. Residual effects: slight-moderate, permanent, adverse or neutral.

16.9.5 Road receptors

[27] Kilgarriff Cottages and associated rural roads (170m to maximum retained water level), with rural, often open views of the upper part of the storage area. *Sensitivity* medium.

- *Construction:* possible glimpsed views of plant, earthworks, moving traffic; winter only due to tree screening. Change: low to negligible. Impact: slight-moderate but generally slight, short-term, adverse.
- *Operation:* Views of water at maximum retention. Views of dam likely to be screened by existing trees. Change: low. Impact: slight-moderate, adverse or neutral.
- *Mitigation:* none. Residual effects: no change from operational.

[28] N71 west of Dunnes store (20m to footprint of dam spillway). Open or filtered views across fields. *Sensitivity* low.

- *Construction:* Views of plant, earthworks, moving traffic, possible tree loss; generally screened by trees. Change: medium-high. Impact: moderate at most, short-term, adverse.
- *Operation:* Views of earthwork dam through trees, with bare earth. Views of dam likely to be screened by existing trees. Change: low. Impact: slight, adverse or neutral.

- *Mitigation*: avoid removal of trees to field boundaries to retain screening. New tree planting for additional screening, seeding of dam and spillway to reduce impacts. Residual effects: slight or negligible, neutral.

[29] Bridge Street, Kent Street and Rossa Street (0m), with views of the river and walls, within the setting of protected structures, within the Architectural Conservation Area and forming part of the Historical Walk. Kent Street noted as an amenity route in Clonakilty Development Plan (Section 3.3.1). *Sensitivity* medium-high.

- *Construction*: Change: medium to high. Views of works, including traffic movement and material storage, in close proximity. Construction of an underground pumping station. Impact: moderate to moderate-substantial, short-term, adverse.
- *Operation*: Views of walls raised to 1.1m. Changes to balustrading, possible loss of public art. Change: medium. Impact: moderate overall, permanent, adverse.
- *Mitigation*: use of appropriate finishes to walls, matching existing where possible, such as slate or stone cladding. Consider retaining and enhancing setting of public art. Avoid loss of street trees. Residual effects: slight, neutral.

[30] Charles Street, The Croppy Road, Facksbridge Roundabout (0m), with open and close-proximity views to the river and harbour. Croppy Road forms part of S72 and S73 Scenic routes, as described in Cork County Development Plan (Section 3.2.1), although this section is not considered here to be less sensitive than the longer, rural sections. Croppy Road also forms amenity route in Clonakilty Development Plan (Section 3.3.1) *Sensitivity* medium (for Croppy Road) to low.

- *Construction*: Views of works including loss of trees and construction of extensive new wall. Disruption of views to harbour, but in context of existing moving traffic. Change: medium. Impact: moderate overall, short-term, adverse.
- *Operation*: Views of new flood walls and tree loss. Change: medium. Impact: slight-moderate, permanent, adverse.
- *Mitigation*: possible replacement tree planting. Use of appropriate finishes to walls, such as slate or stone. Residual effects: slight, permanent, neutral.

[31] Ring Road (0m), with open and close-proximity views to the harbour. Forms part of Scenic Route 72 in Cork County Development Plan (Section 3.2.1) and amenity route in Clonakilty Development Plan (Section 3.3.1). Views of open fields, harbour and areas within Scenic Landscape (Cork County Development Plan). *Sensitivity* medium-high.

- *Construction*: Road likely to be closed during raising works. Close proximity views of including loss of historic field boundary walls, raising of road and construction of extensive new wall. Disruption of views to harbour. Change: high, but localised to within 200m section. Impact: moderate-substantial, short-term, adverse.
- *Operation*: Raised road, views of new flood walls, localised loss of historic walls. Change: medium. Impact: moderate-substantial at most, localised, permanent, adverse.
- *Mitigation*: Use of appropriate finishes to walls, such as slate or stone. Designs of walls to reflect local vernacular, as demonstrated in recent works close to Facksbridge roundabout. Opportunities to enhance recreational and visual amenity through introduction of new signage, public art. Residual effects: slight-moderate, permanent, neutral.

[32] Convent Road (N71) and Old Timoleague Road (30m): oblique views towards the harbour and Croppy Road. Localised views of wall site from Convent Road close to Facksbridge roundabout. Convent Road forms part of Scenic Route 73 in Cork County Development Plan (Section 3.2.1), but sensitivity along this very short section is much reduced by urban development. *Sensitivity* low.

- *Construction*: Short-term views of plant, machinery, particularly during raising of adjacent Ring Road. Possible localised tree loss and small amenity planting area to

Convent Road. Change: medium-low. Impact: slight-moderate at most, short-term, adverse.

- *Operation:* Short-term views of raised Ring Road. Glimpsed views of new wall close to Convent Road. Change: low. Impact: slight, permanent, adverse.
- *Mitigation:* Use of appropriate finishes to walls, such as slate or stone. Avoid loss of trees and planting; replace any losses where appropriate. Residual effects: negligible.

16.9.6 Commercial and other receptors

[33] Commercial and government properties to Kent Street, Charles Street, Bridge Street and Rossa Street, including the Post Office, Town Hall and Library (0m; adjacent or over River Fealte). *Sensitivity* generally low, but medium-low in case of Town Hall, Library where there may be an appreciation of the setting and historical value of the town centre.

- *Construction:* Views of works, including traffic movement and material storage, in close proximity. Construction of an underground pumping station. Temporary removal of public art (e.g. 'headless' water feature). Possible closures to pedestrian routes. Potential loss of trees. Change: medium to high. Impact: moderate to moderate-substantial at most, short-term, adverse.
- *Operation:* Views of walls raised to 1.1m. Changes to balustrading, possible loss of public art. Change: medium. Impact: moderate at most, permanent, adverse.
- *Mitigation:* use of appropriate finishes to walls, matching existing where possible, such as slate or stone cladding. Consider retaining and enhancing setting of public art. Avoid loss of street trees. Residual effects: slight, neutral.

[34] Commercial properties to Harte's Courtyard (3m), with views to the river. *Sensitivity* medium-low.

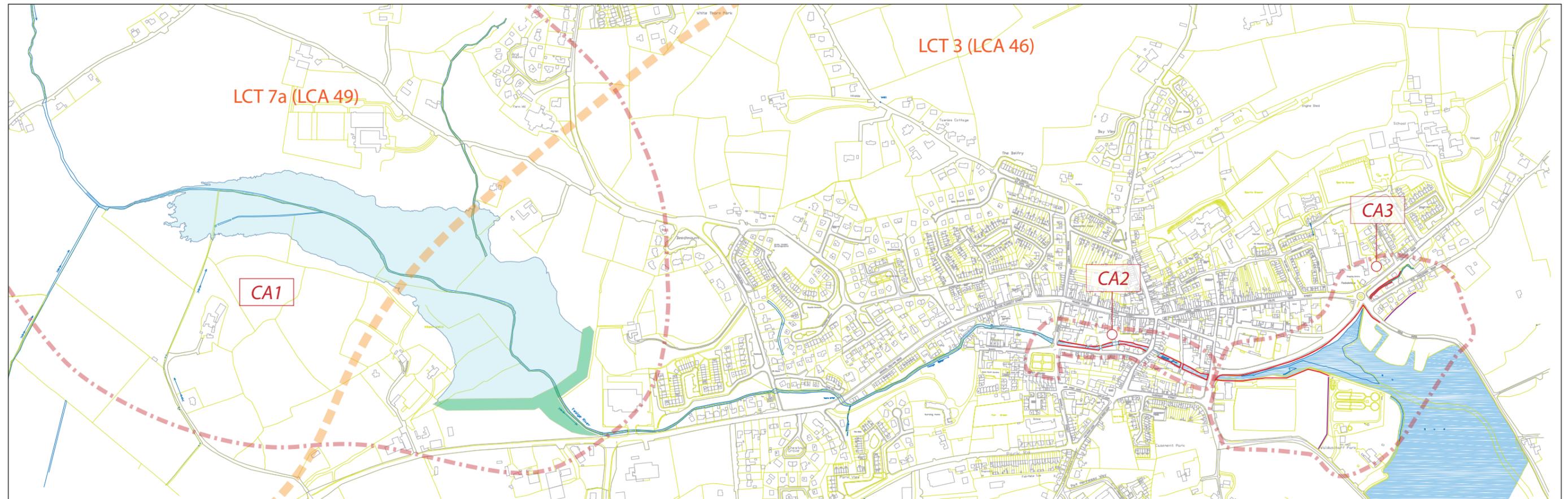
- *Construction:* Closure of bridge and walkway expected during works. Views of works, including traffic movement and material storage. Removal of balustrading. Change: high. Impact: moderate-substantial at most, temporary, adverse.
- *Operation:* Reduction in river views through walls raised to 1.1m (west of Rossa Street) and 1.3m (along Riverside Walkway. Infilling of balustrading. Change: medium-low. Impact: slight-moderate at most, permanent, adverse.
- *Mitigation:* use of appropriate finishes to walls, matching existing where possible, such as slate or stone cladding. Particular attention to design of walling to replace balustrading. Possible loss of river views may remain. Residual effects: slight, permanent, adverse or neutral.

[35] Commercial properties to Waterfront development (5m), with views across the public open space to the river and harbour. Most of the units are unlet at present. *Sensitivity* medium-low at most, given that riverside views and location are likely to be selling point of development.

- *Construction:* Views of works, including traffic movement and material storage, but generally localised and dependant on orientation of premises. Some views may be in context of former GAA development site. Change: medium-low. Impact: slight-moderate, short-term, adverse.
- *Operation:* Possible views of new walls, loss of views to river. Change: low. Impact: slight or negligible, permanent adverse.
- *Mitigation:* use of appropriate finishes to walls, matching existing Waterfront designs and cladding. Consider setting of whale sculpture, enhancing or retaining views along river. Residual effects: slight or negligible, permanent, neutral.

Proposed scheme

- Proposed new and raised walls
- Proposed embankments
- Proposed earth storage embankment and spillway
- Maximum inundation extent of upstream water storage



Not to standard scale

Draft Cork County Landscape Strategy

- LCT 7a: Rolling Patchwork Farmland
LCA 49: Connonogh (Rolling Intimate Mosaic Farmland with Scrub Outrops)
- LCT 3: Indented Estuarine Coasts
LCA 46: Inchydoney, Incised Patchwork and Wooded Estuary with Mudflats and Islands

JBA Local Landscape and Townscape Character

- CA1: Fealge valley upstream from Clonakilty
- CA2: Clonakilty town: Bridge Street to Clarke Street bridges
- CA3: Clarke Street bridge to Facksbridge: including Croppy Road

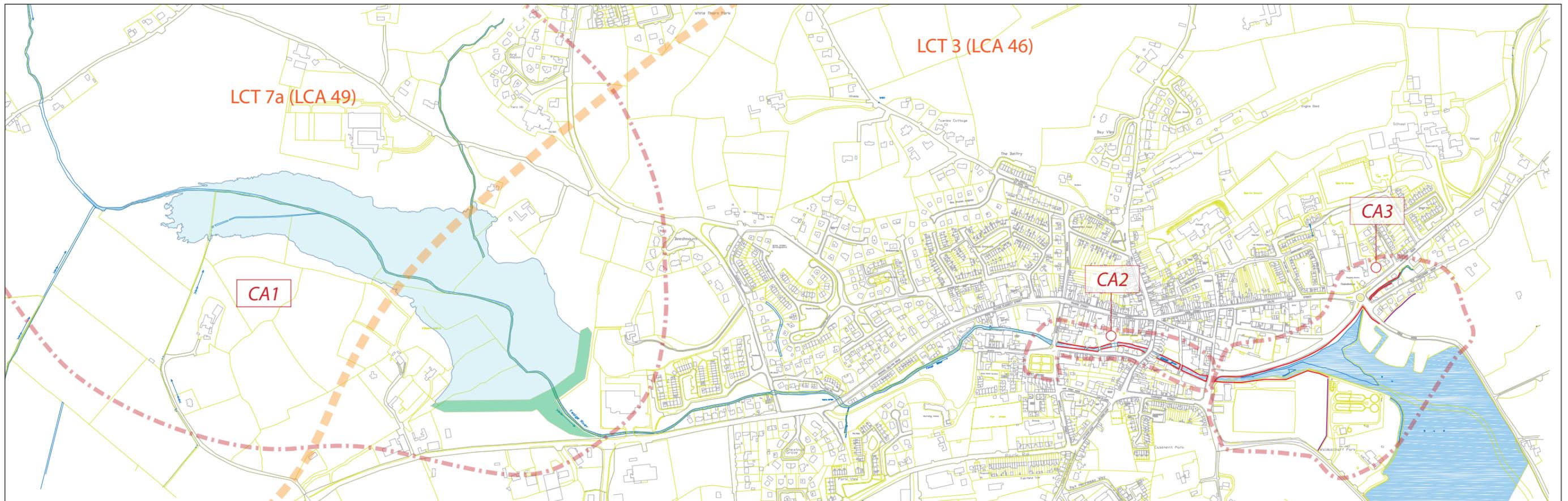
Figure 16-1
Landscape character

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- Proposed new and raised walls
- Proposed embankments
- Proposed earth storage embankment and spillway
- Maximum inundation extent of upstream water storage



Not to standard scale

Cork County Development Plan

- Scenic Routes:
S72: Local roads between Clonakilty and Dunwoly
S73: R600 and N71 between Clonakilty and Timoleague
S74: Local coastal road from Clonakilty to Inchydoney
- Scenic landscape

Clonakilty Development Plan

- Elevated Scenic Landscape
- Trees and hedgerows protection
- Architectural Conservation Area
- Amenity walks
(note: some are schematic and are not in place)
- Historic Town Trail

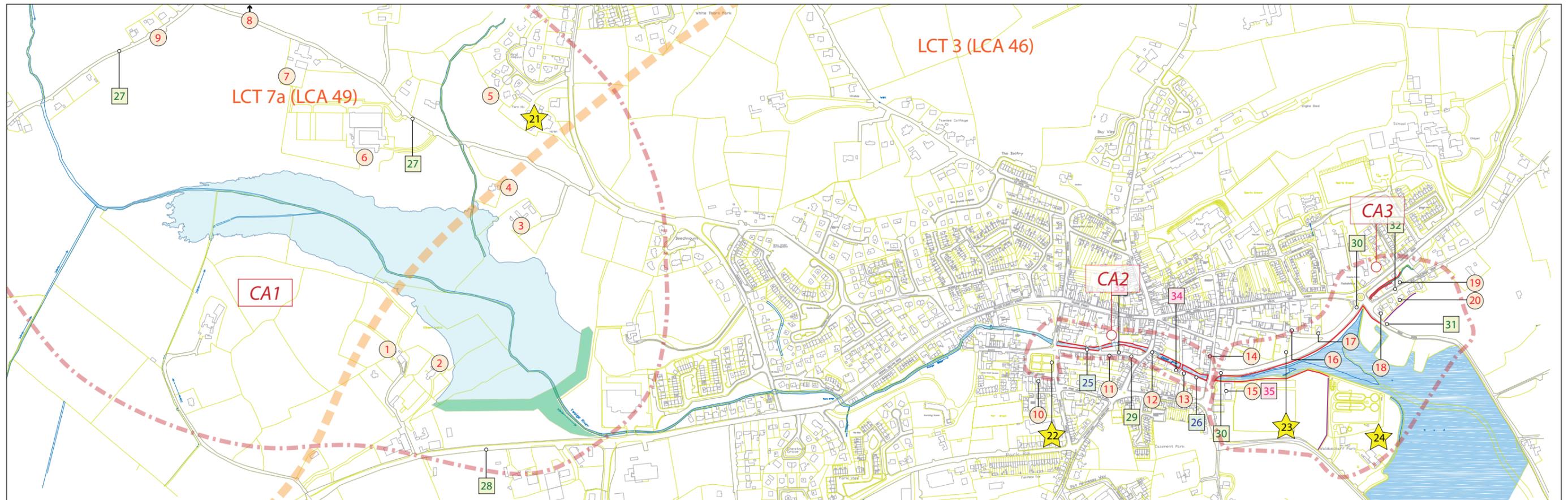
Figure 16-2
Landscape designations

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- Proposed new and raised walls
- Proposed embankments
- Proposed earth storage embankment and spillway
- Maximum inundation extent of upstream water storage



Not to standard scale

Residential receptors*

- ① The Miles (property to north)
- ② The Miles, Brookfield House
- ③ Tawnies Lower: Glen House
- ④ Tawnies Lower: detached property W of Glen House
- ⑤ Tawnies Lower: nos. 10 and 11 Ard Alainn
- ⑥ Kilgarriff Cottages: Craanmore
- ⑦ Kilgarriff Cottages: detached property
- ⑧ Kilgarriff Cottages: 4no. detached bungalows
- ⑨ Kilgarriff Cottages: c. 6no. detached properties
- ⑩ Emmet Square (nos. 7-10, odds)

- ⑪ Kent Street: c. 5no. properties
- ⑫ Rossa Street: c. 5no. properties
- ⑬ Harte's Courtyard: up to c.8no. properties
- ⑭ Clarke Street: nos. 8,9,10
- ⑮ Waterfront development: c. 6no. properties
- ⑯ Long Quay apartments
- ⑰ Detached property, Long Quay
- ⑱ Detached property, Ring Road
- ⑲ Old Timoleague Road: 2no. properties
- ⑳ Old Timoleague Road: 6no. properties

Recreational receptors

- ★ 21 Fernhill House Hotel Gardens
- ★ 22 Emmet Square
- ★ 23 Open space, Croppy Road/Long Quay
- ★ 24 Model Railway Village

Public footpaths

- ②5 River bridge, Credit Union building
- ②6 Riverside walkway

Road receptors

- ②7 Kilgarriff Cottages
- ②8 N71, west of Dunnes
- ②9 Bridge Street, Kent Street and Rossa Street
- ③0 Charles Street, Croppy Road, Facksbridge
- ③1 Ring Road
- ③2 Convent Road, Old Timoleague Road

Commercial/other receptors

- ②7 Kent/Charles/Bridge St (Post office, Town Hall, Library etc)
- ②8 Harte's courtyard
- ②9 Waterfront development

Figure 16-3
Principal visual receptors

*Assessment of residential receptors is based on observations from public locations and aerial photography. Property names are derived from available information and may be subject to change.

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Figure 16-4-a. Water pump and modern planters at Facksbridge roundabout. This busy junction acts as a western 'gateway' to Clonakilty along busy N71 coastal route. New walls will be constructed along the channel behind the hoarding.



Figure 16-4-b. Historic walls and possible gate features at Deasy's Quay, with distinctive vertical stone coursing reflecting the local vernacular field boundary style. A proposed embankment will run parallel to the property boundary in the background.



Figure 16-4-c. Recently constructed wall at Deasy's Quay with stone facing that reflects traditional local style. New walls to the Ring Road and Croppy Road should reflect this treatment.



Figure 16-4-d. Seating to The Croppy Road that illustrates the amenity value of views across the harbour from this elevated route. The timber post-and-rail fence will be replaced by solid feature to prevent tidal flooding, which may impact on views.

Figure 16-4-e [above right]

Certain specific and sensitive elements within the landscape will require consideration in terms of removal and reinstatement.

Figure 16-4-f [right]

Historic walls are typically characterised by the growth of distinctive local species, such as Navelwort (*Umbilicus rupestris*), pictured here. Although vegetative growth would compromise structural integrity, there may be potential to encourage such features in certain non-critical locations.

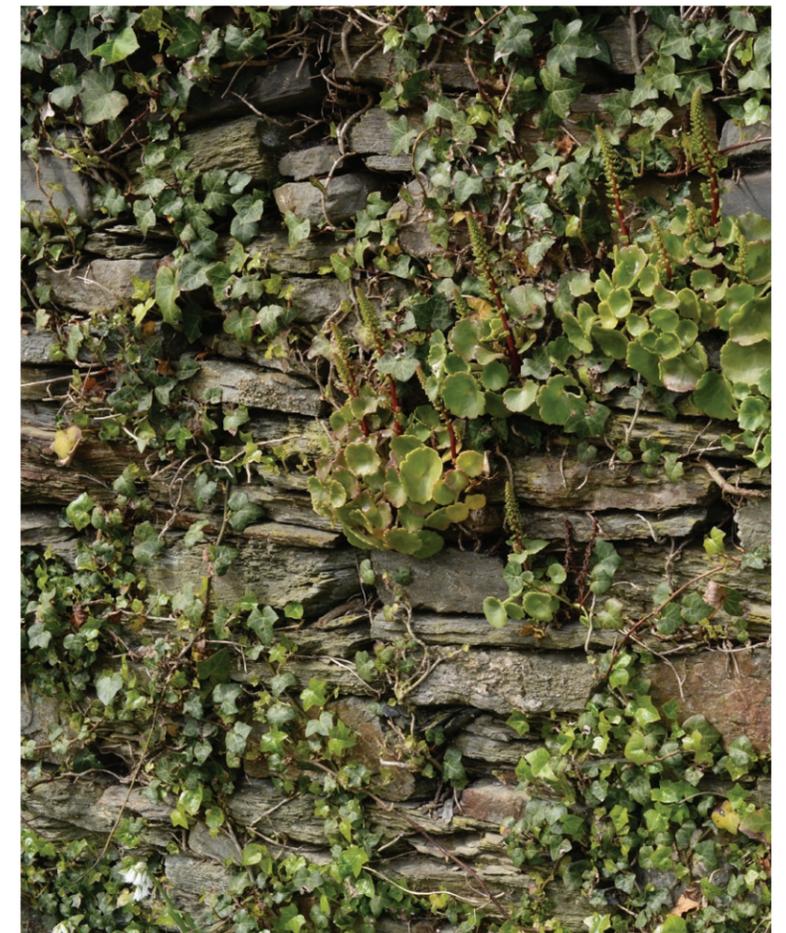




Figure 16-4-g. View looking west from the Ring Road and Deasy's Quay towards The Croppy Road, illustrating the contrasting and varied views of the harbour, town centre and rural hinterland. The Ring Road will be raised, with new walls approaching Facksbridge roundabout, as well as along the Croppy Road.



Figure 16-4-h. View looking west along The Croppy Road. The N71 is the principal route from Cork city to West Cork; this view offers travellers the first impression of a coastal view when travelling west. Although it acts as a by-pass to the town, the amenity value is reflected in the seating (illustrated above). As noted above (Figure 6), tidal defence options would include the removal of the post-and-rail fence and replacement with a solid defensive structure, which would impact on these key views.



Figure 16-4-i. Croppy Quay and the Waterfront development with the whale sculpture and semi-public open space. The variety of finishes to the channel retaining walls and bridge are visible. The timber post-and-rail fence to The Croppy Road and the stainless steel balustrade are likely to require replacement with solid flood walls, which will restrict views of the river.

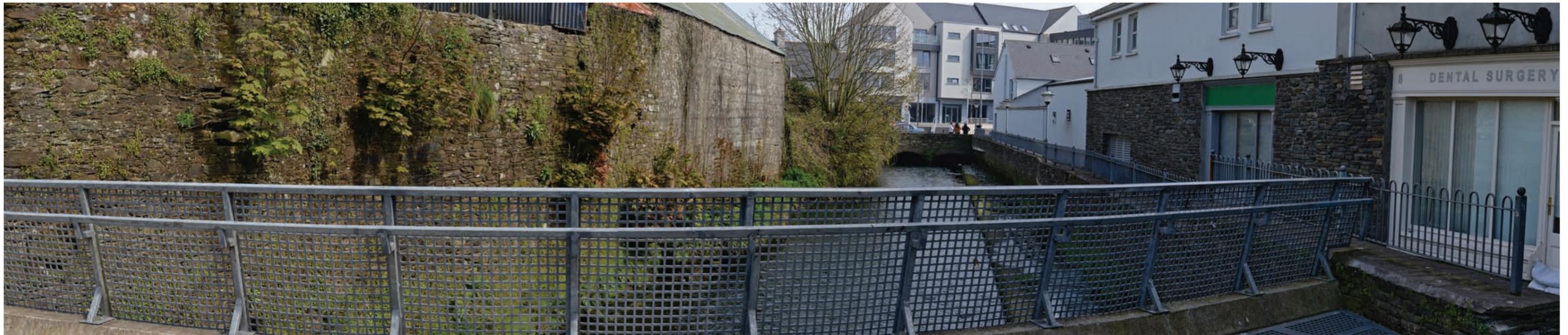


Figure 16-4-j. View east along the Fealge River from the William A. Houlihan pedestrian bridge at Seymour Street. The 'river walkway' offers an attractive traffic-free route where the modern railings balustrade contrasts with the high rubble walls that reflect the historic quality of the town centre. Depending on the final height of any flood walls, the existing railings and balustrade may require replacement with solid flood walls. This would restrict views of the river and may result in an overly-enclosed pedestrian experience in some situations.



Figure 16-4-k. Use of traditional vertical stone coursing at the base of the sculpture on Croppy Quay.



Figure 16-4-l. Use of imprinted concrete blockwork and timber-faced planters as flood walls adjacent to the library car park. The mass and finish of these features is not in keeping with the quality of the public realm and obscures views of the river.



Figure 16-4-m. River view with ornamental feature to a property on Kent Street. Within the town, valued and/or sensitive riverside locations such as this may be adversely affected by increased wall heights and restrictions to access or views.



Figure 16-4-n. Kent Road, looking east, with high-quality streetscape including pedestrian bridge and water feature. New walls will be required to replace the fence, whilst existing walls may be strengthened and/or raised.



Figure 16-4-o. View west along Kent Street. The short section of pedestrian walkway to the left (north) bank allows open views of this attractive streetscape. Railings and balustrades will be replaced with solid walls.



Figure 16-4-p. General townscape view along Kent Street, illustrating the relationship between the building frontages, Fealge River, mature street trees, former Presbyterian church (now the post office) and Catholic Church. Increased wall heights, flood gates and tree loss would have potential to result in adverse impacts on this distinctive view.



Figure 16-4-q. View from car park towards Emmet Hotel on Kent Street. The timber fence is a poor quality features within this important town centre location; replacement walls would offer some opportunity for a more appropriate finish in this



Figure 16-4-r. Recent flood walls to the car park adjacent to the Catholic Church. Although the stone facing reflects the qualities of the adjacent buildings, the wall disrupts the visual relationship between the town and Fealge river .



Figure 16-4-s. Main storage embankment site, viewed from the rear of Dunnes Store car park. The immediate foreground comprises a scrubby, unmanaged that contrasts with the mature field boundary trees in the distance.



Figure 16-4-t. Main storage embankment site, viewed from the N71 west of the Dunnes store, looking NW. The open aspect is apparent, with view towards elevated ground around Kilgarriff. Field boundary trees provide structure, with more mature planting screening residential properties.