

## 10 Air Quality and Climate

---

### 10.1 Introduction

This chapter describes and assesses the potential impacts of the proposed Douglas Flood Relief Scheme (including Togher culvert), on air quality and climate. The receiving environment and the characteristics of the proposed scheme for construction and operation are described. The potential impacts of the scheme during the construction and operational phases are evaluated, and the mitigation measures for these potential impacts are presented. The chapter concludes with the predicted residual impacts of the proposed scheme.

### 10.2 Methodology

This chapter has been prepared sourcing the most relevant and recent air quality data for the proposed scheme works area. The following sources were used to source local air quality information:

- Environmental Protection Agency (2003) Advice Notes on Current Practice in the Preparation of Environmental Impact Statements.
- Environmental Protection Agency (2002) Guidelines on the Information to be contained in Environmental Impact Statements.
- Environmental Protection Agency (2015) Revised Guidelines on the Information to be Contained in Environmental Impact Statements Draft, September 2015
- Environmental Protection Agency (2015) Advice Notes for Preparing Environmental Impact Statements Draft, September 2015.
- Met Éireann ([www.met.ie](http://www.met.ie)) The Irish Meteorological Service Online
- The Environmental Protection Agency – EPA Map Viewer Envision ([www.gis.epa.ie/Envision](http://www.gis.epa.ie/Envision))

This chapter also has regard to the requirements of the Transport Infrastructure Ireland (TII), formerly the National Roads Authority (NRA) document '*Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes*' (TII, 2011). These guidelines provide an assessment methodology for construction sites which can be adapted for all construction works depending on the nature of the works. As the proposed scheme is a linear development, these guidelines are deemed appropriate for this assessment.

#### 10.2.1 Ambient Air Quality Standards

In order to reduce the risk of poor air quality, National and European statutory bodies have set limit values for ambient air for a range of air pollutants. These limit values are set for the protection of human health and ecosystems.

The Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011) transposed EU Directive 2008/50/EC into Irish law. The 2011 Regulations revoked the relevant previous Regulations.

The purpose of the 2011 Regulations is to establish limit values and alert thresholds for concentrations of certain pollutants, to provide for the assessment of certain pollutants using methods and criteria common to other European Member States, to ensure that adequate information on certain pollutant concentrations is obtained and made publically available and to provide for the maintenance and improvement of ambient air quality where necessary.

The limit values established under the 2011 Regulations are included in **Table 10.1** below.

**Table 10.1: Air Quality Standards (AQS) from the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011)**

Pollutant	Limit value for the protection of:	Averaging period	Limit value ( $\mu\text{g}/\text{m}^3$ )	Basis of application of limit value	Limit value attainment date
NO <sub>2</sub>	Human Health	1-hour	200	≤ 18 exceedances p.a. (99.79 %ile)	1 January 2010
		Calendar year	40	Annual mean	1 January 2010
NO <sub>x</sub>	Vegetation	Calendar year	30	Annual mean	1 January 2010
PM <sub>10</sub>	Human Health	24-hours	50	≤ 35 exceedances p.a. (90%ile)	1 January 2005
		Calendar year	40	Annual mean	1 January 2005
PM <sub>2.5</sub>	Human Health	Calendar year	25	Annual mean	1 January 2010
		Calendar year	20	Annual mean	1 January 2020

There are no national or EU limits for dust deposition. However, the TA Luft *Technical Instructions on Air Quality* (TA Luft, 2002) provide a guideline for the rate of dust deposition of 350 mg/m<sup>2</sup>/day averaged over one year. The Environmental Protection Agency (EPA) concurs that this guideline may be applied, although applied as a 30-day average, in its document *Environmental Management in the Extractive Industry (Non-Scheduled Minerals)* (EPA, 2006).

## 10.2.2 Climate

The Climate Action and Low Carbon Development Act 2015 is Ireland's first dedicated climate change law. The Act makes provision for requiring the Minister, as specified in the Act, to submit a National Mitigation Plan and a National Adaptation Framework to the Government for approval. At the time of issuing this document the Department of Communications, Climate Action and Environment is the responsible Minister. These documents and framework are:

“[f]or the purpose of enabling the State to pursue, and achieve, the transition to a low carbon, climate resilient and environmentally sustainable economy by the end of the year 2015...”

The Minister is required to submit the national mitigation plan within 18 months after the passing of the act and not less than once every five years. The draft National Mitigation Plan was published in December 2016 for public consultation. The first National Mitigation Plan is due to be published in June 2017.

The Act refers to the National Adaptation Framework, which is to be known as the National Climate Change Adaptation Framework (NCCAF). This framework will develop a national strategy for the application of adaptation measures in different sectors and by local authorities to reduce the State's vulnerability to the negative effects of climate change, avail of the positive effects that may occur as a result of climate change and take into account existing obligations of the State under the EU or any international agreements. The 2012 NCCAF document published by the then Department of the Environment, Community and Local Government stated the projected impacts of climate change Ireland as being:

- increasing average temperatures;
- more extreme weather conditions including storms and rainfall events;
- an increased likelihood of river and coastal flooding;
- water shortages, particularly in the east of the country;
- changes in types and distribution of species; and
- the possible extinction of vulnerable species.

In the design of any flood relief scheme, it is important that the flood mitigation measures are considered in the context of a long term strategy which is flexible and adaptive to changes in the climate and its potential impact on flood risk. The proposed scheme has been designed to ensure it is readily adaptable to climate change.

The proposed scheme for Douglas (Areas 1 to 3) is designed to provide protection to properties in the study area from the 1 in 100 year fluvial/1 in 200 year tidal flood events. An allowance for freeboard has also been incorporated into the design. This standard is in line with the OPW's national standard for constructing flood defence schemes in Ireland.

The scheme incorporates the construction of direct defences through Ravensdale and direct defences/channel regrading through the community park for the current scenario. It would be feasible for the heights of the defence walls to be further increased as part of a climate change adaptation strategy in the future without involving a significant impact on environmental and landscape features. This measure would increase the capacity of the channel and allow it convey a greater flow through the reach.

Conveyance improvements could also be implemented as part of the climate change adaptation strategy as the channel could be deepened in the future without involving a significant impact on the environment. The channel could also be widened where space is available to facilitate widening.

The proposed scheme for Togher (Area 4) consists of a replacement culvert which has been designed to meet with OPW Section 50 requirements. It is therefore designed to accommodate the 1 in 100 year fluvial flood plus an allowance for climate change and freeboard.

## 10.2.3 Construction and Operational Phase Impact Methodology

### 10.2.3.1 Significance Criteria

Significance criteria were adopted from the TII air quality guidelines, ‘*Guidelines for the treatment of air quality during the planning and construction of National Road Schemes*’ (2011) to assess the traffic impact of the construction phase of the scheme on air quality.

**Table 10.2** includes significance criteria for the assessment of the potential impact of construction dust off-site.

**Table 10.2: Assessment criteria for the impact of dust emissions from construction activities with standard mitigation in place**

Source		Potential distance for Significant Effects (Distance from Source)		
Scale	Description	Soiling	PM <sub>10</sub> <sup>a</sup>	Vegetation Effects
Major	Large construction sites, with high use of haul routes	100 m	25 m	25 m
Moderate	Moderate sized construction sites, with moderate use of haul routes	50 m	15 m	15 m
Minor	Minor construction sites, with limited use of haul routes	25 m	10 m	10 m

Note: <sup>a</sup> Significance based on the PM<sub>10</sub> Limit Values specified in SI No. 180 of 2011, which allows 35 daily exceedances/year of 50 µg/m<sup>3</sup>

The impact of dust emissions during the construction phase is assessed by considering the proximity of sensitive receptors to the works. TII guidance defines sensitive receptors as residential housing, schools, hospitals, places of worship, sports centres and shopping areas. The impact of construction dust on sensitive habitats is also considered, and additional mitigation measures proposed, as required.

## 10.3 Receiving Environment

### 10.3.1 Air Quality Zones

The EPA categorises Ireland into Air Quality Zones as is required under the Clean Air for Europe (CAFE) Directive (2008/50/EC) whereby member states must designate air quality zones for the purposes of managing air quality. Four ‘Air Quality Zones’ were defined for Ireland under the Air Quality Standards Regulations (2011). There are currently four zones defined in Ireland:

- Zone A: Dublin
- Zone B: Cork
- Zone C: Other cities and large towns comprising Limerick, Galway, Waterford, Drogheda, Dundalk, Bray, Navan, Ennis, Tralee, Kilkenny, Carlow, Naas, Sligo, Newbridge, Mullingar, Wexford, Letterkenny, Athlone, Celbridge, Clonmel, Balbriggan, Greystones, Leixlip and Portlaoise.
- Zone D: Rural Ireland, i.e. the remainder of the State excluding Zones A, B and C.

The Scheme is included in Zone B (Cork). **Table 10.3** outlines the monitoring data provided by the EPA for Zone B (Cork) for pollutants relevant to this Study Area. Where no data is available for Zone B, Zone C or Zone D data is used. Air quality monitoring took place adjacent to the South Link Road at the Cork City Council Civic Amenity Centre and approximately 2km west of Douglas village.

**Table 10.3: Baseline Monitoring Data for Zone B for 2014**

Pollutant	Annual mean 2014 Zone B	Air Quality Directive Limit Values
NO <sub>2</sub>	22 µg/m <sup>3</sup>	40 µg/m <sup>3</sup> /year
NO <sub>x</sub>	49 µg/m <sup>3</sup>	30 µg/m <sup>3</sup> /year (critical level or target value)
SO <sub>2</sub>	4 µg/m <sup>3</sup>	125 µg/m <sup>3</sup> /day
CO	300 µg/m <sup>3</sup>	10,000 µg/m <sup>3</sup> as 8 hour mean
PM <sub>10</sub>	15 µg/m <sup>3</sup> <sup>1</sup>	40 µg/m <sup>3</sup> /year
PM <sub>2.5</sub>	7 µg/m <sup>3</sup>	25 µg/m <sup>3</sup> /year

Note 1: Zone C data applied (Zone B monitoring data incomplete).

### 10.3.2 Study Area

Construction works for the proposed scheme will take place in four separate areas along the Tramore River and Ballybrack Stream as follows:

**Area 1:** Ballybrack Stream through Douglas.

**Area 2:** Tramore River through St Patrick's Mills, Douglas

**Area 3:** Grange Stream (tributary of Ballybrack Stream) through Donnybrook Commercial Centre

**Area 4:** Tramore River through Togher

The general study area is shown in **Figure 1.1**. **Figures 1.2a** and **1.2b** in **Chapter 1** provide key plans of the proposed flood defence works in Douglas and Togher.

#### **Area 1: Ballybrack Stream through Douglas**

The Ballybrack Woods area is used for recreation with a combined cycle and footpath through the woods that runs parallel to the Ballybrack Stream. Refer also to Chapters 1 and 3 for further details on the surrounding environment. In Ravensdale, there are a number of one off residential houses adjacent to the stream.

Where Church Road crosses over the Ballybrack Stream, the surrounding area is a mix of retail, residential and recreational facilities. The Irish Countrywomen's Association (ICA) Hall is located on the left bank of the stream near Church Road (Refer to **Figure 3.1** in **Chapter 3**). There is a retirement home and a number of retail units to the west of the ICA Hall. North of Church Road is St Luke's National School and Douglas Community Centre. The Ballybrack Stream flows under Church Road and north through Douglas Community Park towards Douglas village. There are a number of residential houses along the left bank of the stream opposite the Community Park. Many of these houses are approximately 10m from the stream. On the right bank of the Ballybrack Stream is Douglas Community Park that runs parallel to the stream. The park contains a playground, large green areas, adult exercise equipment, as well as a cyclepath and footpath that run parallel to the stream connecting Church Road and Church Street. At Church Street the stream is culverted.

### **Area 2: St Patricks Mills**

Area 2 consists of construction works at St Patrick's Mills, north of Church Street and on the right bank of the Tramore River. The N40 national primary road or South Link runs over West Douglas Street and is a significant source of traffic noise in the area. East of Saint Patrick's Mills is the Douglas Village Shopping Centre which attracts significant traffic including cars which park in the multi-level car park.

### **Area 3: Donnybrook Commercial Centre**

The centre comprises of both purpose built commercial units and older structures some of which are protected. The purpose built units are in closest proximity to the proposed works. The Grange Stream currently runs through part of this centre before being culverted. There are a number of buildings to the east of the culvert and included in the commercial centre. Some of these buildings are listed on the National Inventory of Architectural Heritage or as National Monuments. The Jesus Christ Centre Church is located in one of these protected structures to the east of the culverted stream. There are a number of residential areas surrounding the commercial centre; Grange Park north and behind the commercial units; to the south, Bromley Park and on Donnybrook Hill. The closest residence is approximately 45m north of the Grange Stream culvert and behind the commercial units in Grange Park.

### **Area 4: Togher**

As detailed in Chapter 3, the existing culvert between Lehenaghmore Industrial Estate and Greenwood Estate will be replaced and extended with a new reinforced concrete culvert. Lehenaghmore Industrial Estate is located at the southern and upstream end of Area 4 (Togher). A small number of commercial properties, as well as the housing estate at Brooke Avenue lie in close proximity to the river bank.

The existing culvert runs partially along the Lehenaghmore Road, through Togher cross and along Togher Road. The culverted section of the Tramore River is beneath the Togher Rd, which is lined with housing estates, the Togher Girls' National School, Togher Boys' National School and the Church of the Way of the Cross. The noise environment in this area is characterised by road traffic, which experiences school- and work-related peaks.

At the northern (downstream) extent of the scheme lies Greenwood Estate, which is a residential estate where numerous residential properties back onto the Tramore River before it is culverted. A number of commercial properties including Griffin's piano shop are located on the river bank. The noise environment in this area is characterised by road traffic.

## 10.4 Characteristics of the Proposed Scheme

### 10.4.1 Construction Phase

Construction activities which are of relevance for air quality include excavations, general construction activities, movement of vehicles on site during construction and air emissions arising from additional traffic. A detailed description of the proposed works to be constructed for the proposed scheme is presented in **Chapter 4 Construction Activities**. Refer to section 10.5 below for details on potential impacts.

The proposed scheme consists of a number of construction activities as described in detail in Chapter 3 of this EIS. The main aspects of the proposed scheme in relation to noise and vibration include the following:

- Construction of new flood defence walls and/or replacement of existing walls with new flood defence walls
- Replacement of and/or extension of existing culverts
- Removal of and/or replacement of bridges
- Removal of existing trash screens and construction of new coarse screens
- Local channel widening, deepening, realignment and regrading
- Construction of new earthen flood defence embankment
- Provision of civil works such as road/footpath regrading at a number of locations;
- Removal of vegetation and trees to facilitate construction works

### 10.4.2 Operational Phase

**Chapter 3 Description of the Scheme** details the flood defence infrastructure that will be in operation once the scheme is complete. There are no activities which are of relevance for air quality during the operational phase of the scheme.

## 10.5 Evaluation of Impacts

### 10.5.1 Construction Impacts on Air Quality

#### 10.5.1.1 Dust Generation

The construction phase of the flood relief works may have a short-term impact on air quality in the immediate vicinity of the site due to the following activities that may generate some dust emissions. This activities include:

- Excavations,
- embankment works,
- general construction activities and,
- vehicle movements on-site during construction.

Dust emissions can lead to elevated PM<sub>10</sub> and PM<sub>2.5</sub> concentrations. The potential for dust emissions will only arise during site clearance and excavation in dry weather, and during such activities the levels of dust are likely to be small. Dust may be raised by wind from dry surfaces and stockpiles.

When rainfall has occurred, dust emissions are significantly reduced due to the cohesion created between dust particles and water, removing the suspended dust particles from the air. Rainfall data collected from Cork Airport Meteorological Station (1962-2014) showed that the average year has 210 wet days (rainfall greater than 0.2mm) Therefore, just over 57% of time, no significant dust generation will be likely due to average meteorological conditions.

**Table 10.2** from the TII guidelines provides a semi-quantitative approach to determining the likelihood of a significant impact from dust in combination with the proposed mitigation measures. During the construction phase of the works, the scale of works sites will typically be ‘*Minor*’, described as ‘*minor construction sites, with limited use of haul routes*’ (see **Table 10.2**) (TII, 2011). The TII guidelines state that under standard mitigation measures, the size and nature of the works sites proposed have the potential for significant effects by dust soiling for areas within 25m of the works. For areas within 10m of the works sites the guidelines state there is the potential for significant effects on vegetation and from PM<sub>10</sub>.

### **Area 1: Ballybrack Stream through Douglas**

In Area 1 there are approximately 20 sensitive receptors within 25m of the proposed scheme that may be subject to soiling effects. There are approximately 15 sensitive receptors within 10m of the proposed scheme that may be subject to PM<sub>10</sub> effects.

At locations where in-stream works will be required the excavated riverbank and stream material will have a higher moisture content due to the proximity to the stream. This will reduce the potential for soiling and significant effects by PM<sub>10</sub> particles. It will be a particular priority to keep the duration of these works to a minimum in this part of the scheme as restrictions on vehicular access will be required for some properties.

The works along the stream in Douglas Community Park will be on the right bank only. In-stream works will also be required at this location. The construction machinery, associated movements and compound will be on the right bank. While the construction site will be cordoned off from the public, members of the public utilising Douglas Community Park will be in proximity to the works.

### **Area 2: St Patrick’s Mills**

In Area 2 there are approximately 10 sensitive receptors within 25m of the proposed scheme that may be subject to soiling effects. There are 5 sensitive receptors within 10m of the proposed scheme that may be subject to PM<sub>10</sub> effects.



No excavation activities will be necessary in Area 2. The proposed flood defence wall will be built upon the existing wall. The proposed 1.2m high bridge parapet, adjacent to West Douglas Road over the culvert, will be built after the removal of the current metal railing.

### **Area 3: Donnybrook Industrial Estate**

There are no sensitive receptors located within 25 m of the proposed scheme in this area.

### **Area 4: Togher Culvert**

In Area 4 there are approximately 30 sensitive receptors within 25m of the proposed scheme that may be subject to soiling effects. There are approximately 10 sensitive receptors within 10m of the proposed scheme that may be subject to PM<sub>10</sub> effects.

Excavation works will be required for the channel realignment, trash screen installation and culvert construction. However, in-stream works will be required here where a new culvert is being installed. The excavated riverbank and stream material will have a higher moisture content due to the proximity to the stream. This will reduce potential for soiling and effects by PM<sub>10</sub> particles.

The duration of works in this part of the scheme will be particularly prioritised as there will have to be traffic restrictions on this road. This should limit the construction period to a minimum.

#### **10.5.1.2 Construction Traffic**

During construction there is also the potential for impacts on air quality from exhaust emissions generated by construction machinery on site and the transport of materials. Construction machinery movement generates exhaust fumes that can potentially increase the concentrations of nitrogen dioxide, PM<sub>10</sub> and PM<sub>2.5</sub> (as listed in **Table 10.3**) in the vicinity of the works sites. However, given the nature and scale of the works, the short-term duration and the number of construction vehicles required on the sites, exhaust emissions generated are not envisaged to have a significant impact. **Chapter 14 Roads and Traffic** describes the construction of the proposed scheme as having an imperceptible impact on the transport infrastructure in the area with mitigation measures implemented.

#### **10.5.2 Construction Impacts on Climate**

Impacts on climate during the construction phase include the generation of greenhouse gas emissions from the transport of materials to and from site and vehicle movement on site. Traffic movements on-site will be limited and at low speeds as set out in the Construction Management Plan. These emissions will be short-term and will not likely to be significant.

#### **10.5.3 Operational Impacts**

There are no impacts on air emissions or climate envisioned once all the scheme works are complete and operational. Channel maintenance may be necessary in the future along the works areas.

The heights of the defence walls may also be further increased and conveyance improvements may be implemented as part of a climate change adaptation strategy in the future. However, it is not envisaged that these activities will impact on air quality or climate.

## 10.6 Mitigation Measures

### 10.6.1 Construction Mitigation Measures

The construction mitigation measures are described in **Chapter 4 Construction Activities**. These measures include mitigation measures specifically to mitigate the impact of dust during construction. A traffic management plan will be put in place to mitigate any temporary traffic disruptions during construction.

The following measures will be implemented as part of the dust minimisation plan:

- Limiting vehicle speeds on the construction site;
- During very dry periods, spraying surfaces with water will control dust emissions from heavily trafficked locations;
- All vehicles exiting the site will make use of wheel wash facilities prior to entering onto public roads, to ensure mud and other wastes are not tracked onto public roads. Public roads outside the site will be regularly inspected for cleanliness, and cleaned as necessary. Wheel-washing facilities will be located away from sensitive receptors;
- Topsoil and other dusty material being moved onsite will be transported in covered trucks, where the likelihood of emitting dust is high, and during dry weather conditions the area of removal will be sprayed with water from a mobile tanker on a regular basis to control dust emissions;
- Exhaust emissions from vehicles operating within the site, including trucks, excavators, diesel generators or other plant equipment, will be minimised through regular servicing; and
- Dust monitoring will be carried out at the site boundary throughout the construction phase.
- Control of vehicle speeds and speed restrictions; and
- Sweeping of hard surface roads.

In addition, the following measures will be implemented for the proposed scheme:

- A 2.4m hoarding will be provided around the site works to minimise the dispersion of dust from the working areas;
- Generators will be located away from sensitive receptors.
- Stockpiles will be located as far as possible from sensitive receptors and covered and/or dampened during dry weather.
- Employee awareness is also a most important way that dust may be controlled on any site. Staff training and the management of operations will ensure that all dust suppression methods are implemented and continuously inspected.

Dust monitoring will be undertaken at the site boundary throughout the construction phase. The TA Luft dust deposition limit values of 350 mg/m<sup>2</sup>/day (averaged over one year) will be applied as a 30-day average.

## 10.6.2 Operational Mitigation Measures

As there will be no emissions generated during the operational phase, no mitigation measures for air quality or climate are proposed.

## 10.7 Residual Impacts

No significant residual impacts are predicted on air quality during the construction or operational phase of the proposed scheme having regard to the effectiveness of the mitigation measures proposed above.

Dust deposition monitoring will be carried out to ensure the effectiveness of mitigation measures during the construction phase. The provision of a hoarding around the construction works areas will reduce the dust impact on the sensitive receptors listed in Section 10.5.1.1

## 10.8 References

Department of the Environment, Community and Local Government (2012) *Building Resilience to Climate Change*

Environmental Protection Agency (2002) Guidelines on the information to be contained in EIS

Environmental Protection Agency (2003) Advice Notes on Current Practice in the Preparation of EIS

Environmental Protection Agency (2015) Revised Guidelines on the Information to be contained in Environmental Impact Statements Draft September 2015

Environmental Protection Agency (2015) Advice Notes for Preparing Environmental Impact Statements Draft September 2015

Environmental Protection Agency (2016). Air Quality in Ireland 2015 – Key Indicators of Ambient Air Quality. EPA, Wexford, Ireland.

TA Luft, 2002. Technical Instructions on Air Quality.

Transport Infrastructure Ireland (TII), (formerly the National Roads Authority (NRA)) (2011). Guidelines for the Treatment of Air Quality during the Planning and Construction of National Roads Schemes. TII, Dublin, Ireland.