

# ENVIRONMENTAL IMPACT ASSESSMENT REPORT

The Burrow CFERM scheme

## Appendix 10A

Volume 3



# THE BURROW COASTAL PROTECTION SCHEME

## Preliminary Risk Assessment (Desk Study) Report

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The Burrow Coastal  
Protection Scheme  
Preliminary Risk  
Assessment (Desk Study)  
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# 1 INTRODUCTION

## 1.1 Project description

RPS was appointed by Fingal County Council to undertake a Preliminary Risk Assessment (Desk Study) Report for a proposed coastal protection and beach nourishment project to reduce the flood risk that exists at the Burrow on the Donabate-Portrane peninsula in Rogerstown Estuary, north County Dublin.

This report describes the research and assessments undertaken to assess the site ground conditions and the potential for any ground contamination that may have arisen from the site's present and historical uses.

## 1.2 Report Objectives and Scope

The objectives of this report are as follows:

- Collate desk study information regarding the site and surrounds to allow the identification of potential contaminant sources, potential pathways and potential receptors in accordance with Land contamination risk management (LCRM). This will form the basis of the Preliminary Risk Assessment and production of a Conceptual Site Model (CSM).
- Collation of existing geo-environmental data to facilitate a risk assessment with regard to potential risks to human health and environmental risks.
- Assessment of the above to determine if intrusive investigation and further assessment will be necessary.

## 1.3 Previous studies

A search was conducted on the Geological Survey of Ireland Spatial Resources Webviewer to gain an understanding of any previous studies or ground investigations carried out in the vicinity of the site. This consultation search revealed that there are no verified or unverified borehole locations.

## 1.4 Sources of Information

Sources of information used in the production of this report include:

- Internet based aerial photography
- Ordnance Survey Ireland mapviewer
- (<http://maps.osi.ie/publicviewer/#V2,719558,734710,9,7>)
- Geological Survey Ireland Spatial Resources Map Viewer – Department of Communications, Climate Action and Environment

(<http://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228>)

- Environmental Protection Agency Radon Map (<http://www.epa.ie/radiation/radonmap/>)
- Geological Survey of Ireland Geotechnical Data Viewer (<http://spatial.dcenr.gov.ie/GeologicalSurvey/GeoTechnicalViewer/index.html>)
- Environmental Protection Agency map viewer (<https://gis.epa.ie/EPAMaps/>)
- Reports from previous studies and ground investigations as mentioned in Section 1.3
- Land and Soil EPA maps (Geohive maps)
- Topographical Drawing : MGT0528-RPS-00-XX-M3-C-XP0002
- Drainage Drawing : MGT0528-RPS-00-XX-DR-C-DR001
- General Arrangement Drawing : MGT0528-RPS-00-XX-DR-C-GA001
- Utilities Drawing : MGT0528-RPS-00-XX-DR-C-UT0001

## 1.5 Guidance

The following guidance documents have been used in the production of this report;

- Land contamination risk management (LCRM) - How to assess and manage the risks from land contamination. Environment Agency, October 2020.
- Redeveloping Land Affected by Contamination – A developers Guide to Planning Considerations and Environmental Responsibilities. DAERA, April 2019.

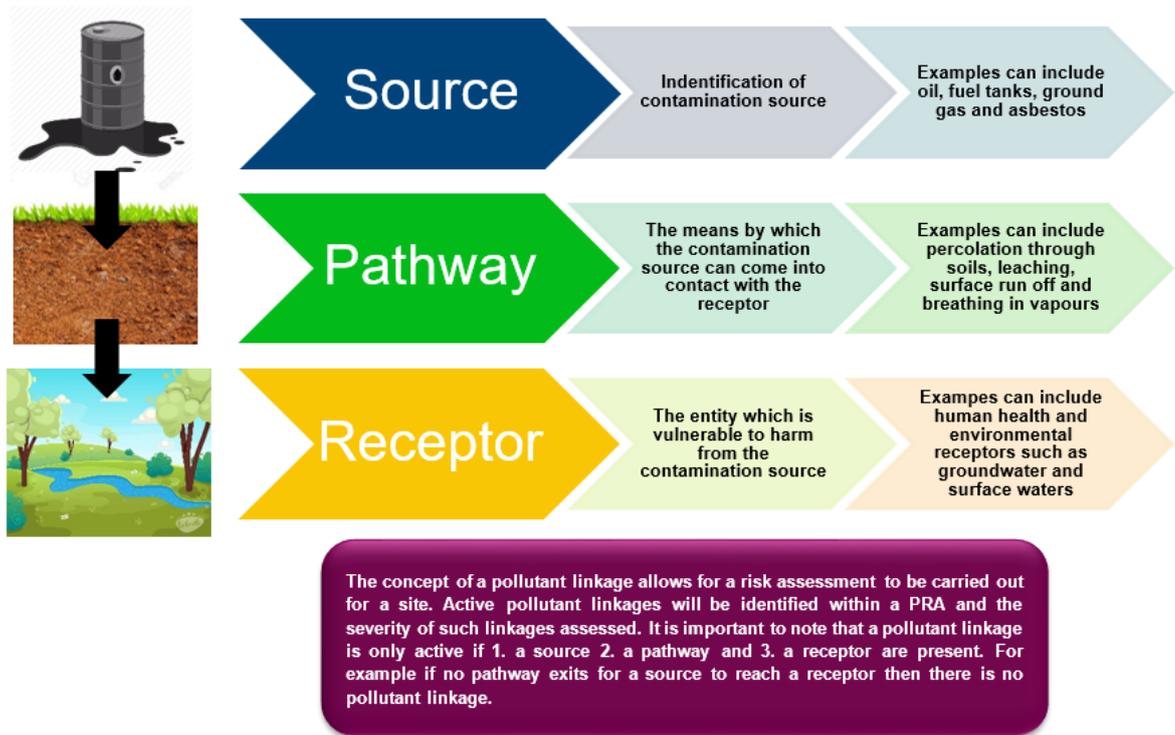
## 1.6 Risk Assessment

1. Underpinning the guidance within LCRM is a source-pathway-receptor methodology, which is used to identify Significant Pollutant Linkages (SPLs). The following definitions apply:-
2.
  - **Source:** a contaminant or pollutant that is in, on or under the land and that has the potential to cause harm or pollution;
  - **Pathway:** a route by which a receptor is or could be affected by a contaminant
  - **Receptor:** something that could be adversely affected by a contaminant, for example a person, controlled waters, an organism, an ecosystem, or Part 2A receptors such as buildings, crops or animals
3. An important thread throughout the overall process of risk assessment is the need to formulate and develop a conceptual model for the site, which supports the identification and assessment of pollutant linkages. Development of the conceptual model forms the main part of the preliminary risk assessment, and the model is subsequently refined or revised as more information and understanding is obtained through the risk assessment process. A risk is present only when a source-

pathway-receptor linkage is present and active. Without a pollutant linkage, there is not a risk, even if a contaminant is present.

## 1.7 Pollutant Linkage Diagram

Figure 1.1 Pollutant Linkage Diagram



## 1.8 Limitations

This report is for the use of Fingal County Council only and should not be relied upon by other parties unless specifically advised by RPS in writing. Furthermore, new information, design changes, changed practices or new legislation may necessitate revised interpretation of the report after its date of submission.

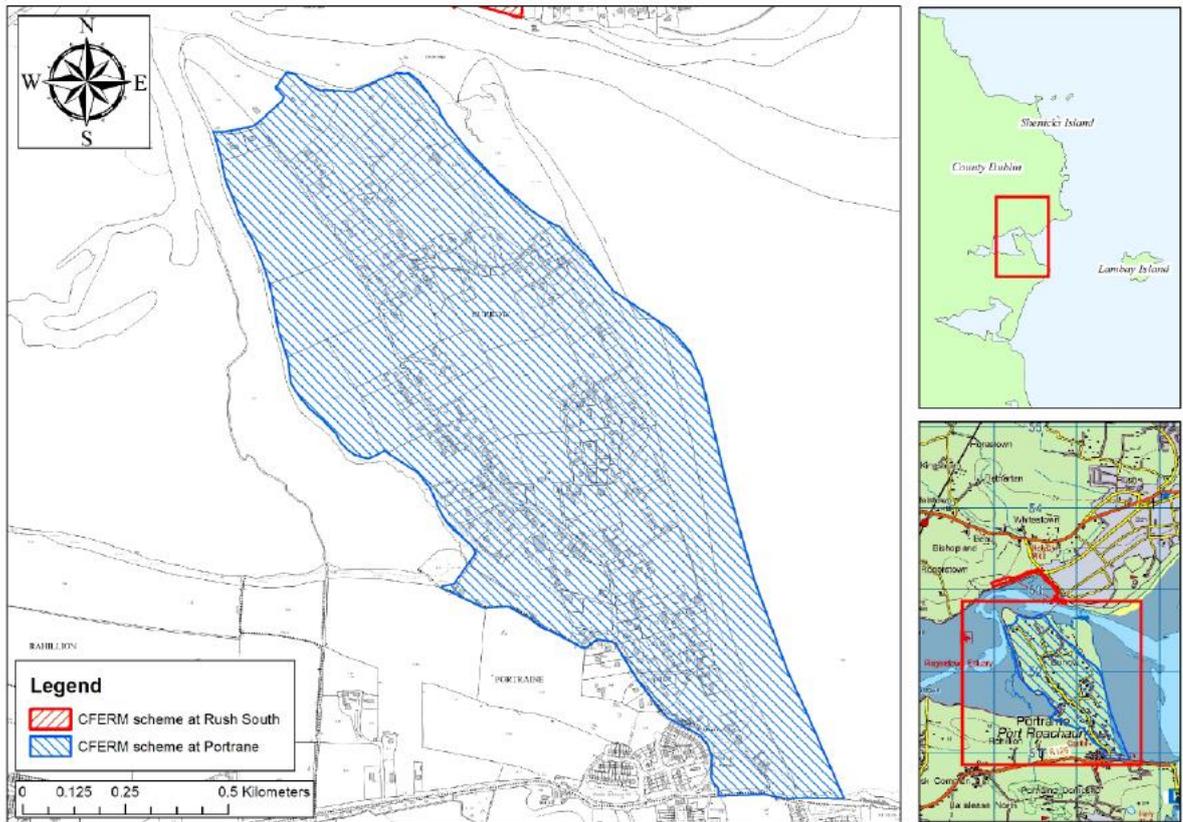
This report has been prepared by RPS on the basis of the available information received during the study period. Although every reasonable effort has been made to obtain all relevant information, all potential contaminants, environmental constraints or liabilities associated with the site may not necessarily have been revealed. A robust site walkover survey would have been beneficial to identify any onsite and offsite contamination sources such as fuel tanks. This was not possible due to Coronavirus restrictions imposed by the Irish Government on limiting travel across the Northern Ireland Republic of Ireland border.

## 2 SITE DESCRIPTION

### 2.1 Site Location

As shown in Figure 2.1, the site is located at the Burrow on the Donabate-Portrane peninsula in Rogerstown Estuary, north County Dublin. The burrow is a sandy spit that separates the inner part of the Rogerstown Estuary from the Irish Sea.

**Figure 2.1 Site Location**



## 2.2 Study Area

The existing site layout is shown in Figure 2.2. A site walkover was completed at the site by RPS personnel on the 11<sup>th</sup> of June 2021.

The location of the coastal protection scheme encompasses a number of areas around the Burrow, these will be subject to a number of protective measures such as groynes, beach nourishment, seawalls and embankments.

**Figure 2.2 Existing Site Layout**



### 2.2.1 Current Site Use

The site currently comprises a large sandy spit, with Portrane beach to the east. The site has an extensive number of properties a portion of which have been constructed without consent from local planning authorities. The site is of conservation value with tourism associated with this such as bird watching. A caravan park area is located in the northern portion of the site.

### 2.2.2 Ground Cover

Ground cover within the eastern portion of the site is surfaced primarily in sandy beach deposits. The majority of the remaining area of the site is made up of amenity grass cover, hardstanding is present on access roads and around residential properties.

### 2.2.3 Localised site topography

Given the coastal nature of the site being so close to the shoreline the overall site topography is generally level, with localised variations in topography across the site.

### 2.2.4 Contamination Sources

Possible sources of contamination may be associated any above ground fuel storage tanks used to heat properties. Made ground is likely present around built up areas which is likely of unknown nature and quantity, this may have the potential to house a range of contaminants and be a source of ground gas.

### 2.2.5 Application Site Details

**Table 2.1 Application Site Details**

Site Address	Grid Reference	Approximate Site Area
Valley Lane East, Donabate ED, Portrane, Fingal, County Dublin, Leinster, K36 YA47, Ireland	324855 Easting, 251993 Northing	c.121 Hectares

## 2.3 Surrounding Land-use

The pertinent surrounding land uses of the site are listed in Table 2.2.

**Table 2.2 Surrounding Land Uses**

Boundary	Surrounding Land Uses of the Proposed Development
North	The north of the site is bound by the narrow channel where the Irish Sea meets the Rogerstown Estuary. The Rush area is located to the north of the site.

Boundary	Surrounding Land Uses of the Proposed Development
East	The Irish Sea occupies the east of the site.
South	Lands to the south comprise the area of Portrane with various residential and commercial premises.
West	The west of the site is occupied by the Rogerstown Estuary

---

## 2.4 Proposed Development

This Preliminary Risk Assessment has been prepared for the proposed development which focuses on an extensive coastal protection scheme encompassing a number of areas around the Burrow, these will be subject to a various measures such as groynes, beach nourishment, seawalls and embankments. Details of the project can be consulted in Appendix C.

### 3 SITE HISTORY

#### 3.1 Historical Development of the Site

A review of available historical ordnance survey maps was undertaken to ascertain the development history of the site. Table 3.1 provides a summary of potentially contaminating activities during the history of the site and its surrounding area; snapshots of the maps are included in Appendix B.

**Table 3.1 Historical Site and Surrounding Area Development**

Date	Site History	Surrounding Land Use History
1829-41	The site is mostly undeveloped within this time period apart from a number of unnamed isolated dwellings within the middle portion of the site. A Coast Guard Station is present to the south east of the site and 'sand hills' are annotated to the east. The north of the site has many field boundaries.	Given the site is a large sandy spit known at the Burrow the lands surrounding the north, east and west of the site are water bodies of the Irish Sea and Rogerstown Estuary, as a result there is no change to this surrounding land use.  The south of the site however is known as the Portrane townland which is this period is undeveloped.
1897-1913	As above	Portrane experiences increased development with infrastructure such as housing, Portrane Mental Hospital, a recreation ground with a bowling green.
Aerial 2005 - 2012	The site experiences growth in the number of residential properties throughout with the majority focused to the southern portion of the Burrow, a caravan park area is located to the north.	The surrounding area around Portrane experiences growth in infrastructure mainly residential dwellings.

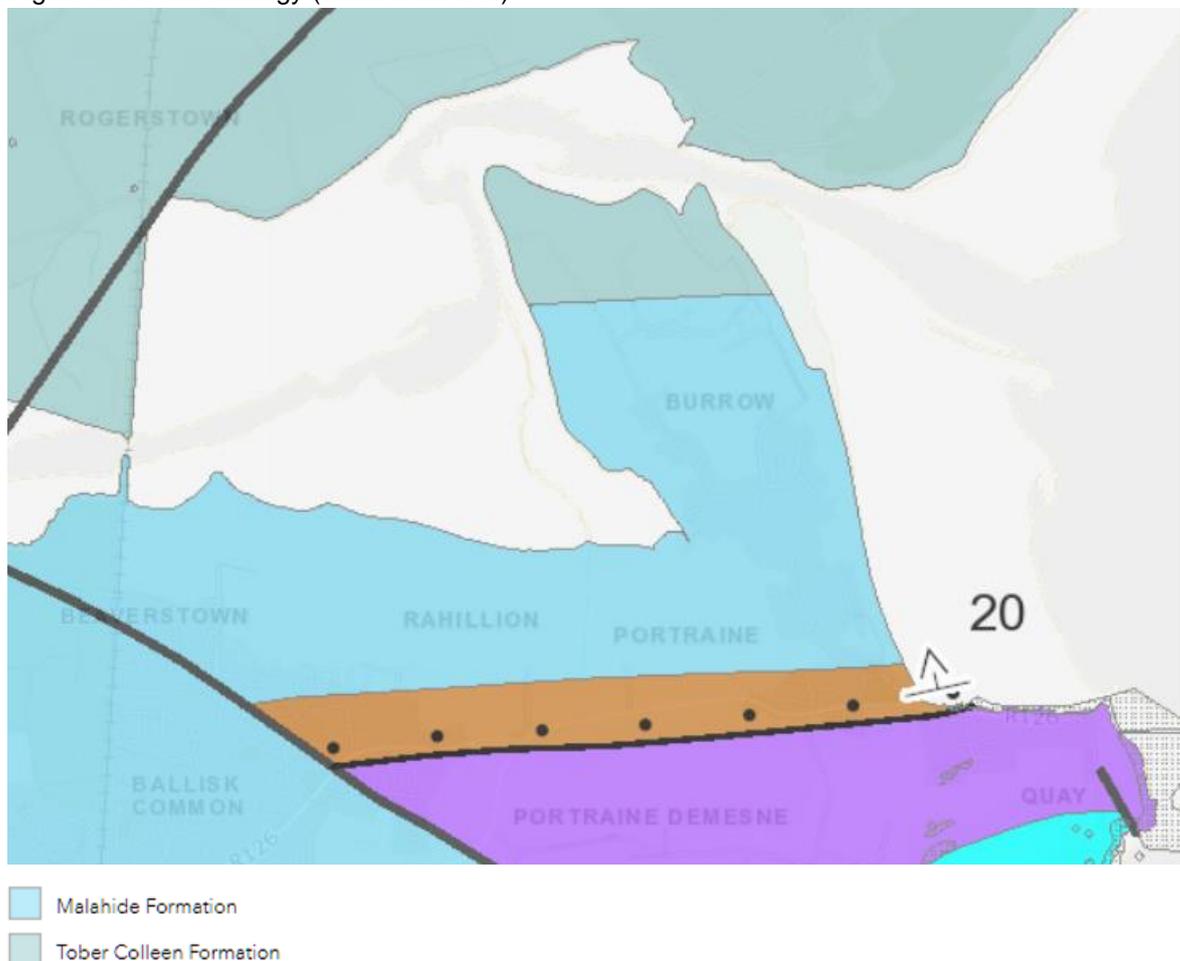
## 4 SITE GEOLOGY AND HYDROGEOLOGY

A desk study of published material held on Geological Survey Ireland Spatial Resources (online portal) was undertaken to provide an initial overview of ground conditions at the site. The following describes the findings of this preliminary research.

### 4.1 Solid Geology

The geology of The Burrow is mostly made up of Argillaceous bioclastic limestone and shale of the Malahide Formation, a portion of the northern area of the site is made up of Calcareous shale, limestone conglomerate of the Tober Colleen Formation. This is observed from the Geological Survey of Ireland (GSI), 1:100,000 mapping (Figure 4.1).

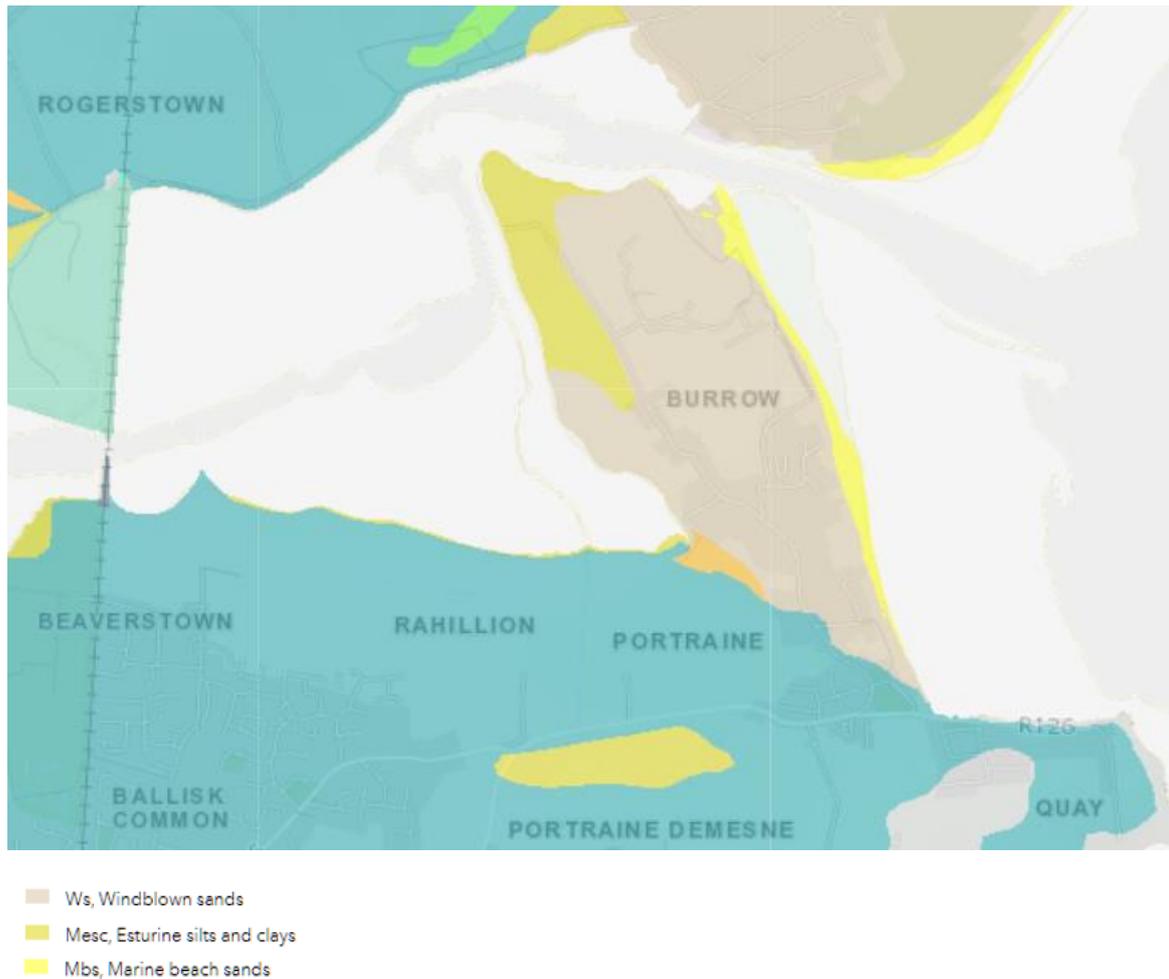
Figure 4.1 Solid Geology (taken from GSI)



## 4.2 Drift Geology

Review of the quaternary sediments map for the area shows that the inner site is made up of marine windblown sands. The yellow shade on the eastern flank and to the north west of the site is made up of Esturine silts and clays. Quaternary sediments mapping for the study area are presented in Figure 4.2.

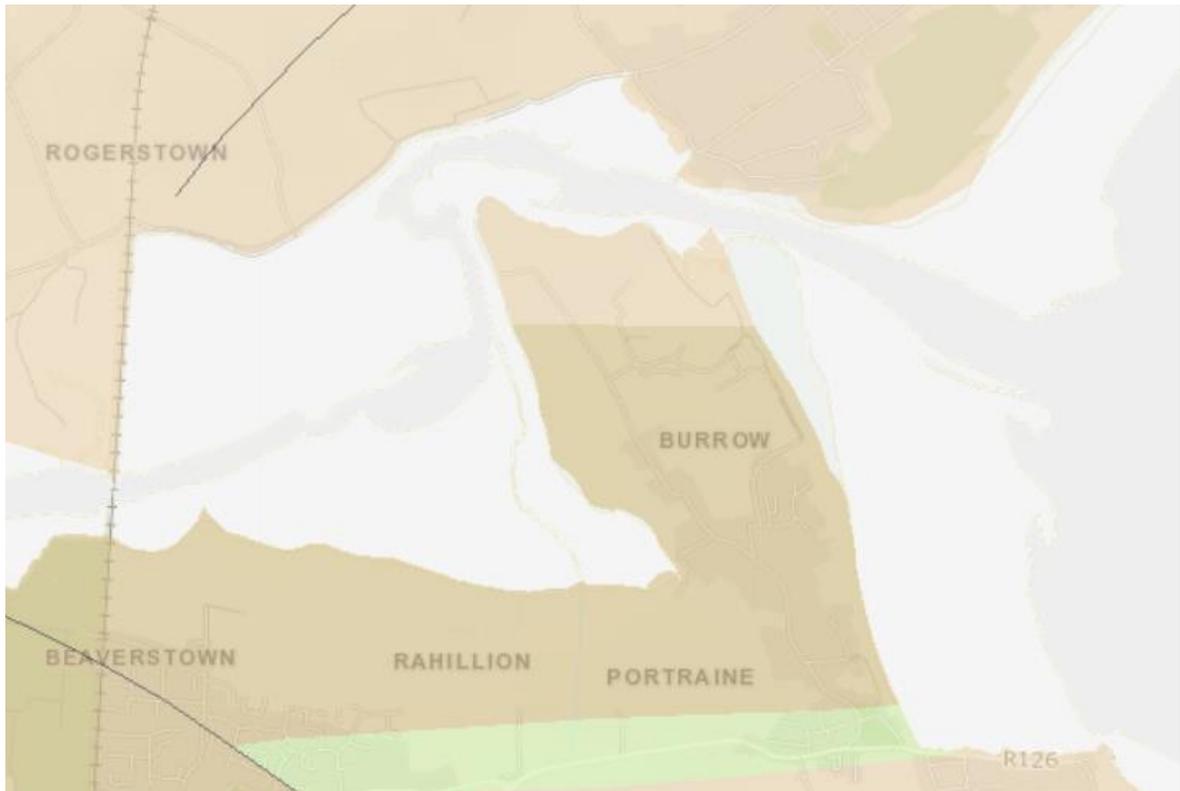
**Figure 4.2 Drift Geology (taken from GSI)**



### 4.3 Hydrogeology

The GSI map for bedrock aquifers (Figure 4.3), characterises mid to southern portion of the site as 'LI' being a locally important aquifer - Bedrock which is moderately productive only in Local Zones. The northern portion is characterised as 'PI' being a poor aquifer - Bedrock which is generally unproductive except for local zones.

**Figure 4.3 Bedrock Aquifer (taken from GSI)**



#### Groundwater Resources (Aquifers)

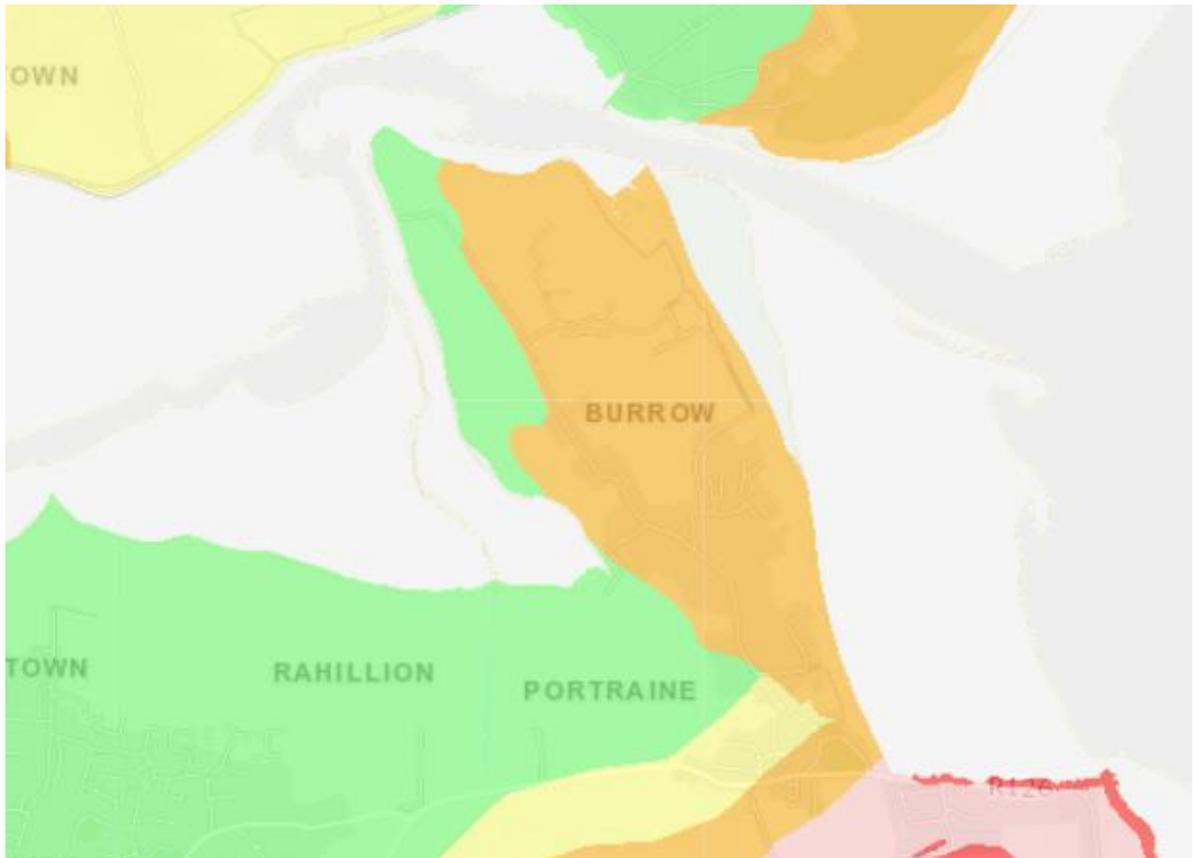
##### Bedrock Aquifer

- Rkc - Regionally Important Aquifer - Karstified (conduit)
- Rkd - Regionally Important Aquifer - Karstified (diffuse)
- RK - Regionally Important Aquifer - Karstified
- Rf - Regionally Important Aquifer - Fissured bedrock
- Lm - Locally Important Aquifer - Bedrock which is Generally Moderately Productive
- Lk - Locally Important Aquifer - Karstified
- LI - Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones
- PI - Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones
- Pu - Poor Aquifer - Bedrock which is Generally Unproductive
- Lake

## 4.4 Groundwater Vulnerability

According to the GSI map for groundwater vulnerability (Figure 4.4), the majority of the site has a high groundwater vulnerability indicating that the natural groundwater may be easily contaminated by human activities. A small portion of the site to the west and north west is classified as being of low vulnerability.

**Figure 4.4 Groundwater Vulnerability (taken from GSI)**



### Groundwater Vulnerability

National Groundwater Vulnerability Ireland

- Rock at or near Surface or Karst
- Extreme
- High
- Moderate
- Low
- Water

## 4.5 Surface Water Hydrology

To the immediate west of the site is the Rogerstown Estuary, to the immediate east of the site is the Irish Sea. There are no known river surface waters nearby.

**Figure 4.5 Surface Water Features (Mapping by GSI)**



## 5 LICENSES AND PERMITS

A search was undertaken on the Environmental Protection Agency map viewer to investigate if any Industrial Emission Licences (IELs) and Integrated Pollution Control (IPC) sites which are present surrounding the site within a 500m radius. As seen from Figure 6.1 below no IELs or IPCs are present within a 500m radius of the Burrow.

**Figure 5.1 Industrial Emission Licences (IELs) and Integrated Pollution Control (IPC)**



## 6 OVERVIEW OF POTENTIAL CONTAMINATION

### 6.1 Introduction

The nature of potential contamination that may have arisen from the past activities on and surrounding the site is considered below.

### 6.2 On Site Sources

#### 6.2.1 Current Land Use

Current on site land use contamination sources have been identified at the Burrow, a number of above ground fuel storage tanks are present associated with home heating oil. If contamination is present an active pollutant linkage is likely absent due to the sites end use being a coastal protection scheme with the introduction of groynes, beach nourishment, seawalls and embankments. Another possible source of contamination may include made ground beneath any buildings such as residential properties. This made ground is likely of unknown nature and quantity. Made ground underlying the site would have the potential to contain contamination and generate elevated concentrations of ground borne gases such as Methane and/or Carbon dioxide and the depletion of Oxygen levels. Due to the end use of the site being a coastal protection scheme the likelihood of ground gas impacting any receptors is low. Ground gas is also unlikely to be a risk given no new buildings are proposed.

#### 6.2.2 Previous Land Use – Historical Development

A review of historical mapping shows that a portion of the inner site has experienced development over time, mainly in the form of a large number of residential properties of which a proportion have been constructed without planning permission. Lands to the east form the main Portrane beach area which has been undeveloped overtime. There are no historical contaminative land uses on site.

#### 6.2.3 Radon Gas

As demonstrated on the Environmental Protection Agency (EPA) Radon Map, the site falls within a 10km grid square with less than one per cent of the homes are estimated to be above the Reference Level.

### 6.3 Off site sources

#### 6.3.1 Surrounding Land Uses – Current

The surrounding land use to the south of the site comprises predominantly commercial and residential properties in the main Portrane townland. Current offsite contamination sources are

limited but may be associated with any fuel tanks in the site vicinity. Given the sites end use as the likelihood of hydrocarbon contamination associated with any fuel tanks impacting human health receptors or groundwater/surface waters is deemed to be minimal.

The site will be subject to a number of coastal protection measures such as beach nourishment, a suitable sand source will be brought to the site from dredged material from a licensed dredging programme in Liverpool Bay. The material will be clean and inert, having been tested as part of the dredge programme and will be transported by sea to the Burrow over the summer months and delivered to the beach by pipe. A source of contamination associated with this dredged material for beach nourishment can be ruled out of this assessment.

### 6.3.2 Surrounding Land Uses – Historical

Historical potentially contaminating activities are absent in the area surrounding the site. The south of the site around the area of Portrane has experienced development overtime but this is not of a contaminative nature.

## 7 CONCEPTUAL SITE MODEL AND RISK ASSESSMENT

### 7.1 Conceptual Site Model

Risk estimation involves detailed evaluation of source - pathway - receptor scenarios to determine whether a linkage exists between any sources of contamination and potential receptors. A risk exists where a receptor is exposed to a source of contamination, via a pathway. If any element of the source-pathway-target linkage is absent, then no risk is present.

In order to consider potential risks at the site, a conceptual site model was developed, to examine the potential source - pathway - receptor linkages that may exist on the site. The conceptual model and the risk assessment for the site are illustrated in Table 7.1.

**Table 7.1 Risk Assessment & Site Conceptual Model**

Source	Potential Pathway(s)	Potential Receptor(s)	Relevant Source – Pathway – Receptor Linkage	Further Investigation Required
<b>On site sources</b>				
Soil gas: Made Ground or highly organic soils may contain high organic content that is degrading and producing Methane, Carbon dioxide and depleted Oxygen gases.	Migration along cracks in foundations and service trenches Breaking ground surface to facilitate works.	Humans in the form of current and future site users.	No SPR linkage identified as there will be no buildings proposed and therefore risk to future site users is minimal	No
Fuel storage tank/s.	Direct contact, ingestion and inhalation of vapours.  Subsurface infiltration, leaching from sub-soils and groundwater flow.	Humans in form of future site users  Shallow groundwater, bedrock aquifer, Rogerstown Estuary and the Irish Sea.	No SPR linkage identified and therefore risk to future site users is minimal	No
<b>Off site sources</b>				
Possible fuel storage tank/s.	Direct contact, ingestion and inhalation of vapours.  Subsurface infiltration, leaching from sub-soils and groundwater flow.	Humans in form of future site users  Shallow groundwater, bedrock aquifer, Rogerstown Estuary and the Irish Sea.	No SPR linkage identified and therefore risk to future site users is minimal	No

## 8 CONCLUSIONS AND RECOMMENDATIONS

### 8.1 Conclusions

The desk study has highlighted that no significant pollutant linkages are considered to be present within the Burrow site. The proposed development which focuses on an extensive coastal protection scheme encompassing a number of areas around the Burrow, these will be subject to various measures such as groynes, beach nourishment, seawalls and embankments.

### 8.2 Recommendations

During construction works, should unexpected contamination be encountered in soils or groundwater with visual or olfactory signs of contamination, samples of the potentially contaminated material should be obtained and sent for chemical analysis. An updated risk assessment should be completed to assess risks to human health and environmental receptors. Should unacceptable risks be identified then appropriate remedial works will be conducted and agreement sought from the relevant regulatory bodies.

## Appendix A

### Site walkover photographic record

Plate 1: Photograph taken looking north west from Quay Road at the south of the site;



Plate 2: photograph taken from the Quay Road looking east towards the Irish Sea;



Plate 3: Photograph taken on Portrane Beach showing existing coastal defences;



Plate 4: Photograph taken on Portrane beach showing coastal erosion at the shoreline;



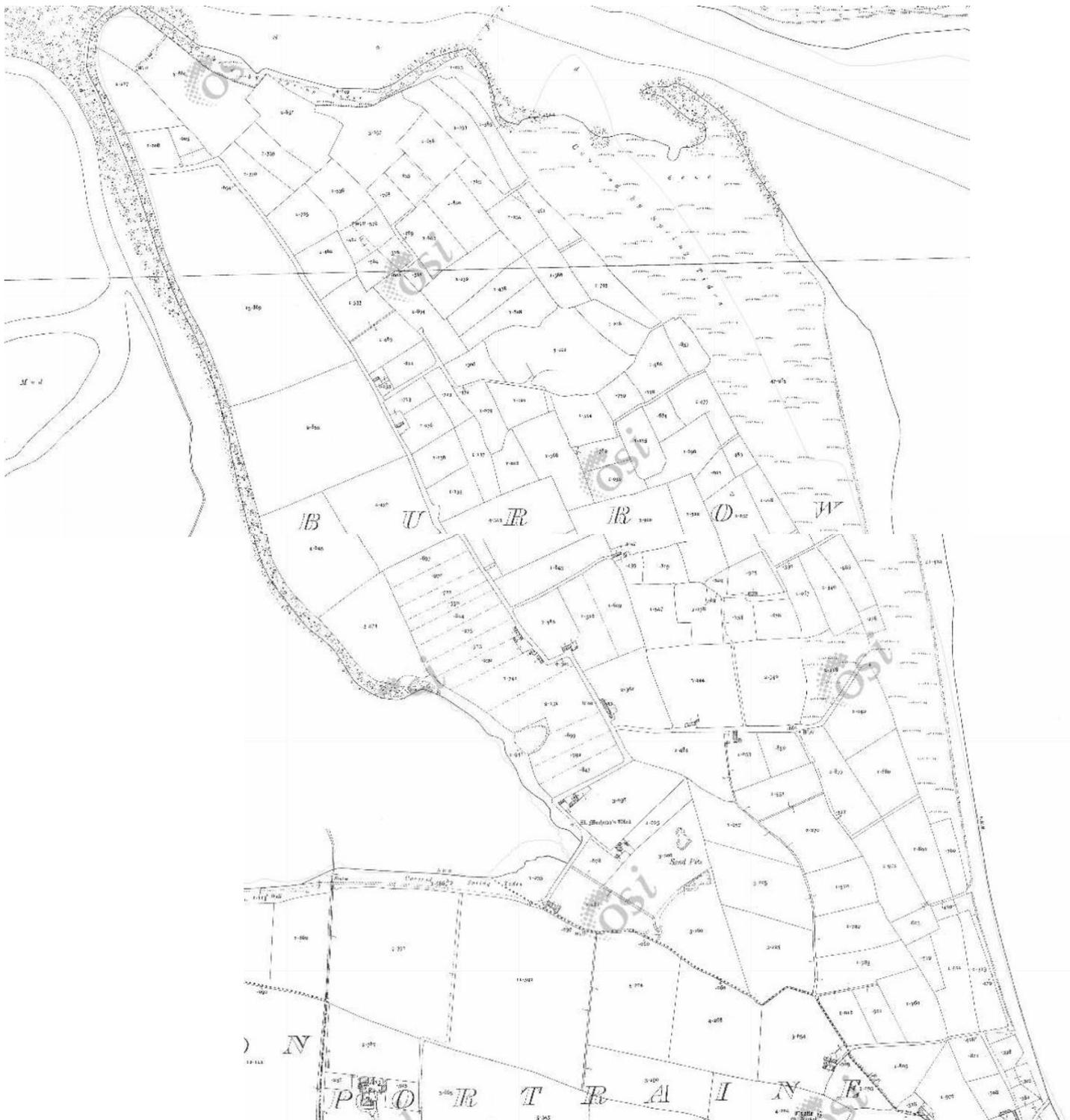
## Appendix B

### Historical Maps

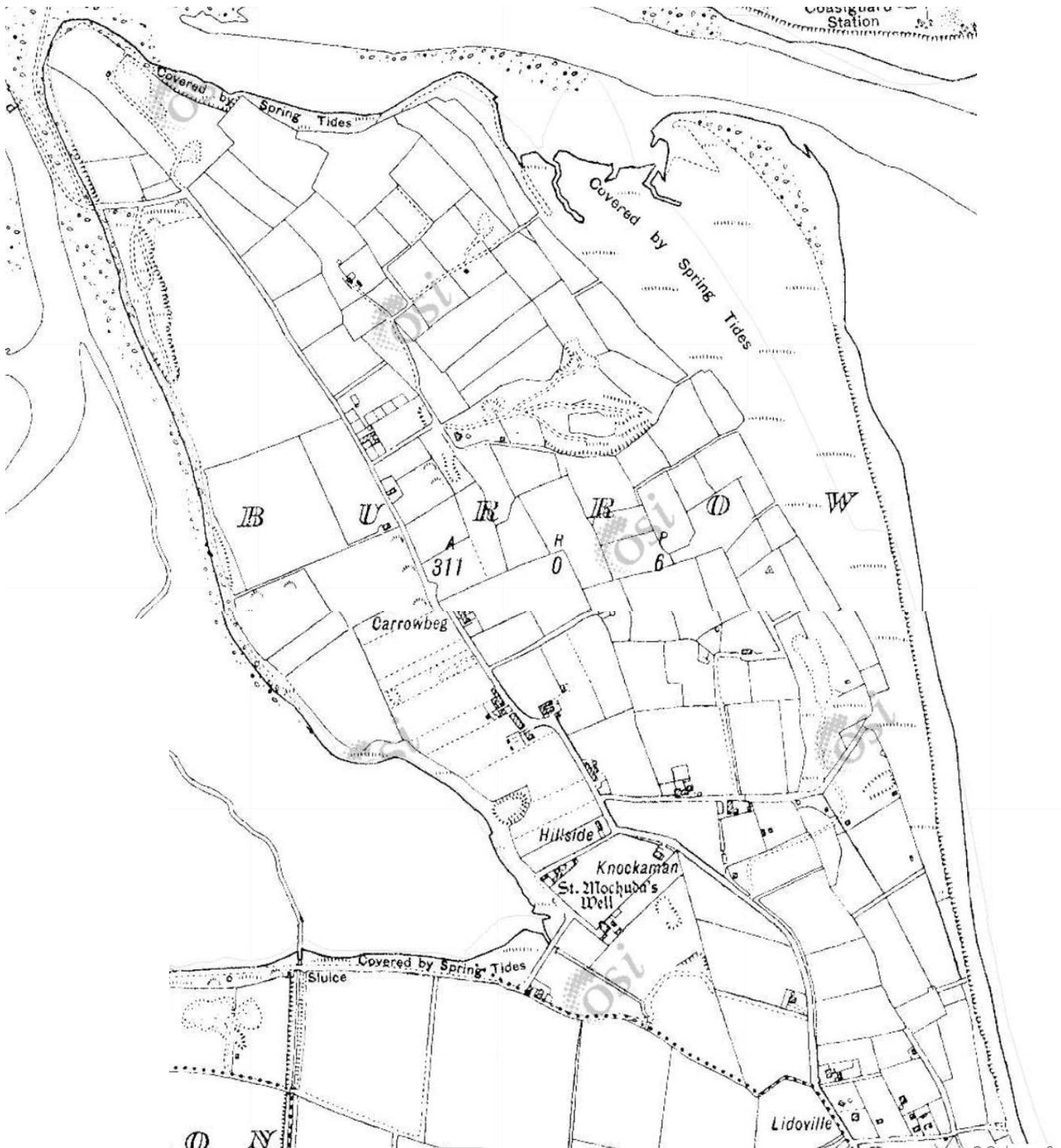
**OSI Historical map, 1829-1841**



**OSI Historical map, 1897-1913**



**OSI Historical map 1913**



**Aerial Imagery 2005**



## Appendix C

### Proposed plans

# 1 PROPOSED DEVELOPMENT AT THE BURROW

## 1.1 Location of the Proposed Development

The proposed development is located at the Burrow on the Donabate-Portrane peninsula in Rogerstown Estuary, north County Dublin.

The Burrow is a sandy spit that separates the inner part of the Rogerstown Estuary from the Irish Sea. It stretches across this outer part of the Estuary and is subject to coastal erosion processes. Due to prolonged exposure this ecosystem has changed in response to tidal action and prevailing weather conditions. The site is of conservation value owing to the range of Annex I species and the Annex II habitats for which it is designated. It is also an area where a considerable amount of unplanned development has occurred over the years. The environmental sensitivity of the Burrow has been recognised in the Fingal County Development Plan 2017-2023, where the gradual removal of temporary homes is encouraged, whilst the replacement with permanent dwellings is discouraged. However, there is a perception locally that all properties should be protected from storm events and coastal erosion.

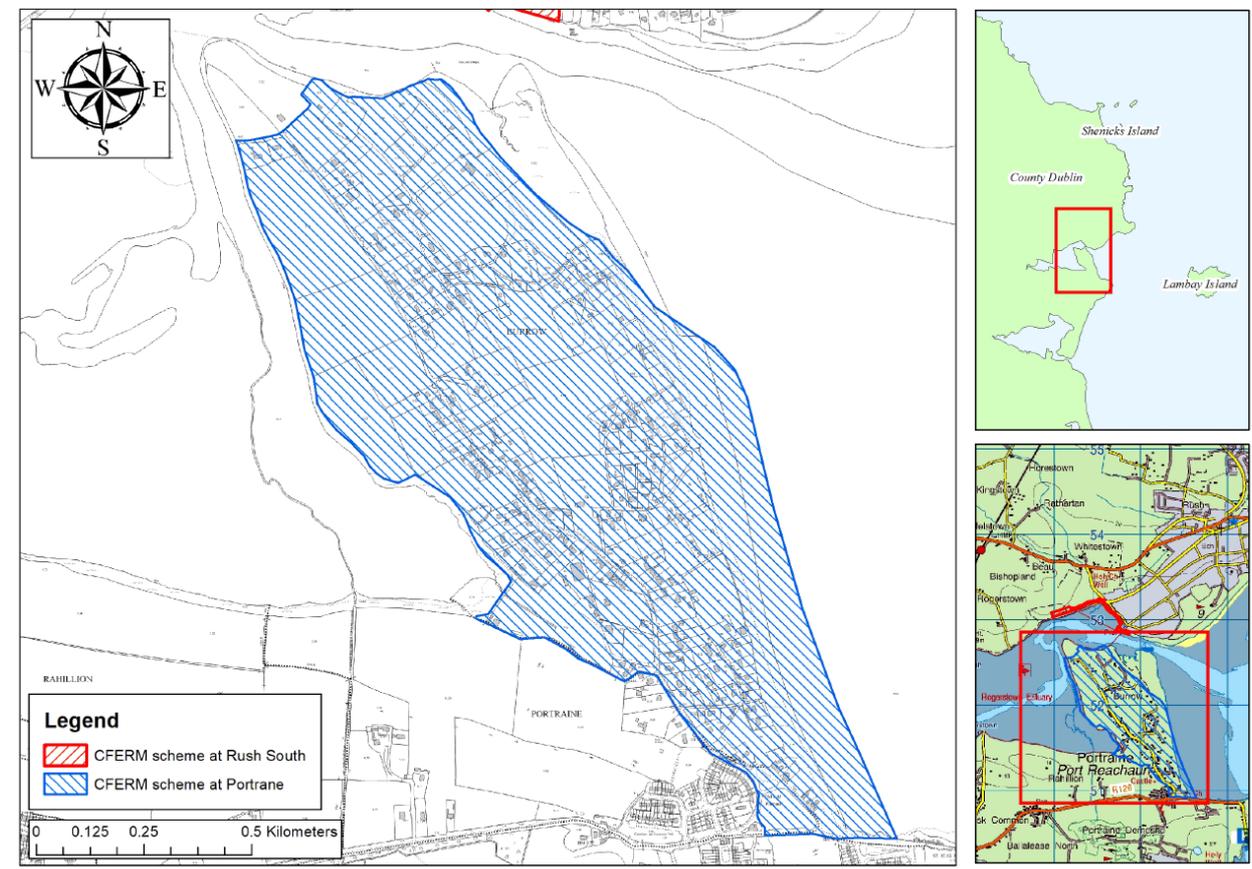


Figure 1: Location of Proposed Development at the Burrow

## 1.2 Background

In March 2018, RPS assisted FCC in assessing the feasibility of a localised, coastal defence scheme to reduce the flood risk that exists in the region of the Rogerstown Outer Estuary in North County Dublin, with a view to developing a technically effective scheme to reduce the risk of coastal flooding at key locations. Following a number of arduous meteorological events in 2017/18, RPS and FCC developed further interim emergency coastal protection measures, to provide short term mitigation for coastal erosion along the

Burrow. Since then, FCC have implemented the interim coastal emergency protection measures which are currently installed along the worst affected stretch of shoreline at the Burrow.

FCC and RPS have since developed a detailed coastal management plan for the Burrow including a preliminary environmental assessment of options in the context of the EIA and Habitats Directives. The findings were subsequently used to inform an Optioneering Report that identified and assessed the technical, environmental and economic viability of potential coastal flooding and erosion risk management solutions.

Based upon the preferred option within the Optioneering Report, an EIA Screening Report was prepared, which concluded that the preferred option (the proposed development) does not trigger any of the thresholds in Schedule 5 Part 1 for mandatory EIA, however it does exceed the thresholds that trigger the mandatory requirement for EIA under the category within Schedule 5 Part 2 b (10); Infrastructure Project “(k) Coastal work to combat erosion and maritime works capable of altering the coast through the construction, for example, of dikes, moles, jetties and other sea defence works, where the length of coastline on which works would take place would exceed 1 kilometre, but excluding the maintenance and reconstruction of such works or works required for emergency purposes”.

### **1.3 Description of the Proposed Development**

The details and an indicative layout of the proposed development is outlined on Drawing IBE 1480 Burrow Opt 003. In summary, the proposed development comprises the following elements:

- The construction of ‘Y’ shaped groyne structures and an associated beach re-nourishment scheme. These groyne structures will help control the longshore and cross-shore elements of the prevailing littoral drift across the Burrow. Each groyne will extend seaward for approximately 70m at a spacing of c.175m to create seven sediment sub-cells along The Burrow. The total footprint of the proposed groynes will equate to c.0.4 hectares;
- Import of sand. Beach re-nourishment will involve transporting dredged material from a licenced dredging programme in Liverpool Bay. The material will be clean and inert, having been tested as part of the dredge programme and will be transported by sea to the Burrow over the summer months and delivered to the beach via pipe;
- The construction of c.100m of seawall at Marsh Lane to mitigate flood risk;
- The construction of c.135m of wall along a section of the Burrow and Quay roads to reduce wave overtopping as well as the construction of strategically placed embankments across the Burrow which would total c. 1,430m in length.
- The proposed embankments at Marsh Lane, Burrow Road and Porter’s Road will be constructed using fine materials (i.e. sand or clay) to a height of approximately 3.70m OD. Subject to the findings of ground investigation works, it may be necessary to reduce the permeability of these structures by installing sheet piling through the centre of these embankments. If sheet piling is required, it would be installed within and completed covered by the embankment structure.

The combined length of coastline on which works will take place at The Burrow equates to 1,665m (c.100m seawall at Marsh Lane, c.135m wall along a section of the Burrow and Quay roads, and embankments across the Burrow which would total c.1,430m in length). The total footprint of the beach re-nourishment works will equate to c. 9.2 hectares. Subject to detailed design, the cumulative total footprint of the seven groyne structures will equate to c. 0.50 hectares.

### **1.4 Indicative Construction Programme / Phasing**

The various measures within the proposed development will most likely be delivered over number of phases, however the detail, duration, timing, and programme for each has not yet been confirmed. Key phases are likely to include advance works, construction and operation as outlined below.

## **Advance Works**

- Landowner liaison;
- Preparation of site compounds – likely on existing made ground in various locations owing to the number of areas requiring coastal defence works;
- Fencing of working areas;
- Traffic management measures on live roads as necessary; and
- Pedestrian traffic management measures/closing off of the area along Portrane beach as necessary.

## **Construction:**

- Bulk earthworks as necessary - excavation and preparatory groundworks at the Burrow to facilitate the construction and positioning of the groyne structures.
- This will also include the movement of suitable sand materials to site for the purposes of beach nourishment (In total it is expected that c.175,000 m<sup>3</sup> of sand material would need to be placed over an area of c.9.2 hectares to create suitable beach levels);
- Bulk earthworks as necessary – movement of materials to facilitate the construction of embankments;
- Installation of new seawalls and embankments;
- Potential facilitation of ingress and egress between each groyne from a health and safety perspective; and
- Collection, transportation and depositing of dredged sediment to nourish beach.

## **Operational:**

- Periodic beach nourishment utilising clean, inert dredged material transported by barge from Liverpool Bay, or other suitable approved source and piped onto the beach at regular intervals (c. every 5 – 10 years depending on wave conditions);
- Maintenance of groynes as necessary;
- Maintenance of floodgates and culverts as necessary; and
- Seawall and embankment repairs and maintenance as necessary.