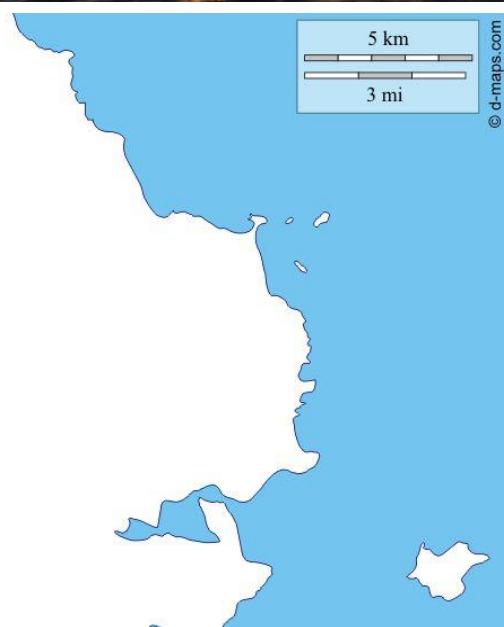


Meteodeep Publication:

Rogerstown Estuary and
South Beach Rush - Erosion,
Pollution, Geological Status
and Current Water Quality

Location and Current Environment:



Rogerstown Estuary and South Beach Rush are located adjacent to each other along the edge of a Peninsula in North County Dublin stretching slightly into the Irish Sea, The beach is located along a nearly straight piece of land stretching for nearly 3km, while the Estuary stretches nearly 4km inland and then is bisected by the Dublin-Belfast Railway Line and meanders through salt marsh on the edge of farmlands to the Ballyboughal River and its tributaries which provides water to the estuary. The Rogerstown Estuary, as all Estuaries are, is tidal and the water body is

visually very different between High Tide and Low Tide. At Low Tide the Estuary's saturated, muddy sand appears nearly over the whole landscape. But a small stream of deep water separates Rush and Portrane. At High Tide though the Estuary seems like a lake and the off-road, rocky track between Spout Road and Rogerstown Lane is completely flooded by the water. As well as numerous irrigation systems directing water off agricultural land into the Estuary (which may well contain harmful pesticides). But the main feature of the Estuary is the Balleally

Landfill, constructed on the mudflats in 1971 the landfill has now ceased operation (in 2012) and is undergoing aftercare by Fingal County Council.

Investigations into Water Quality with this plant present is available later in the report. The land in and around the estuary is composed of tidal mud slobbs/flats, Atlantic salt meadows

(Plant Example:

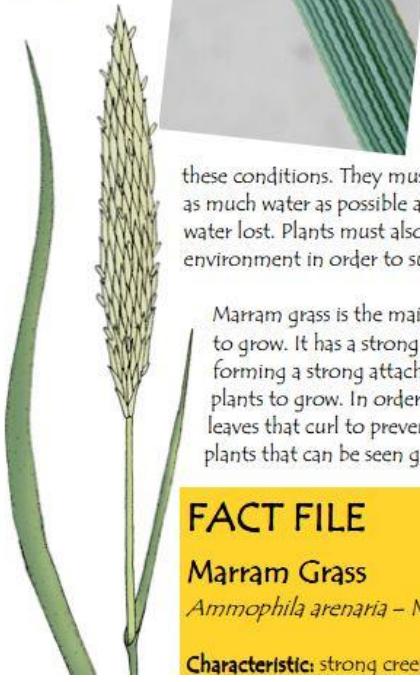
Grey Dunes (Formed when a dominant plant begins a process of stabilising a sand dune and the soil formation with underground root structures) and a wide dominance of Marram Grass which is the main plant

species present in the Estuary and the adjacent beaches. Marram Grass is a very important part of the Sand Dune ecosystem as it binds together the underground sand with strong root systems to stabilise the dunes and allow the other plants to grow. To survive in its environment (The wind dries the sand dunes causing a lot of water to evaporate therefore leaving a large amount of salt behind as, even at high tide, water does not regularly cover the dunes) the Marram Grass has thick, waxy leaves that curl up to keep moisture in the plant. I have

included a factsheet below on this species. (Credit: naturewebs.ie)



Marram Grass has tiny pores on the underside of its leaves to allow carbon dioxide to enter the plant.



For plants to survive in sand dunes they must adapt to these conditions. They must avoid drying out by taking in as much water as possible and reducing the amount of water lost. Plants must also be able to reproduce in this environment in order to survive.

Sand dunes are important as they provide a habitat for wildlife and also a defence against the sea. They are a very unstable habitat as the sand constantly shifts in the wind. The wind also dries the sand, which causes the water to evaporate, leaving a lot of salt behind. Unlike sandy shores, which are covered by water at high tide, sand dunes are not regularly covered by water.



Marram grass stabilises the sand so that other plants can grow.

Marram Grass

FACT FILE

Marram Grass
Ammophila arenaria – Muiríneach

Characteristic: strong creeping roots.

Flower colour: Greyish-green.
Height: 60–120 cm.
Leaves: Grey-green and curled.
Long, slender, flexible and waxy.
Flowering season: June to August.
Habitat: Sand dunes.

A Site Synopsis is available on the National Parks and Wildlife Service's

(NPWS) Website and Geographical Information is available on the Fingal County Council (Fingal CoCo) Website and the Irish Environmental Protection Agency's (EPA) Website (maps.epa.ie)

Here is a brief, professional description of the site by the NPWS:

Source: National Parks and Wildlife Service

Site comprises a relatively small estuarine system in north County Dublin. Receives the Ballyboghil and Ballough rivers, both of which flow through an agricultural catchment. It is a funnel shaped estuary, extending for about 6 km from east to west and up to 2 km at its widest. Has a wide salinity range, from near full sea water to near full fresh water. Estuary is bisected by a causeway and bridge which carries the Dublin-Belfast railway line. A sandy peninsula stretches across the outer part of the estuary, restricting water flow to a channel of c.200 m. In addition to salt marsh and sand dune habitats, some agricultural fields which adjoin the estuary are included in site - some of these have botanical or ornithological interests. .

Glossary:

Estuarine: Estuary

Catchment: Area of Land

Salinity Range: Amount of Salt in Water

Causeway: A bridge over water

Bisected: Cut in half

Peninsula: Piece of land stretching out into a water body

Ornithological: Study of Birdlife

Here are a few picture and maps of Rogerstown Estuary:



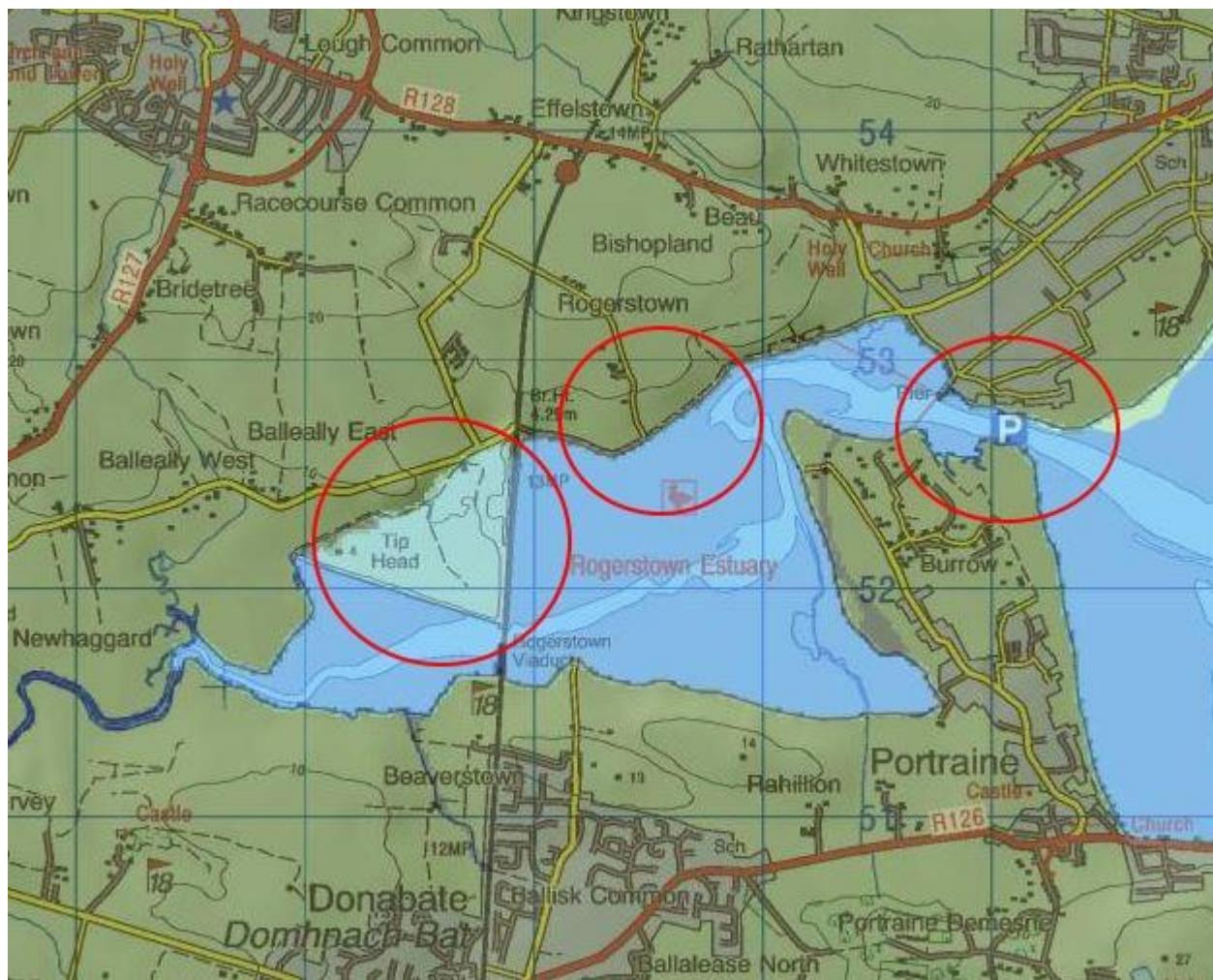
West from Rogerstown Park



West from the bottom Spout Road



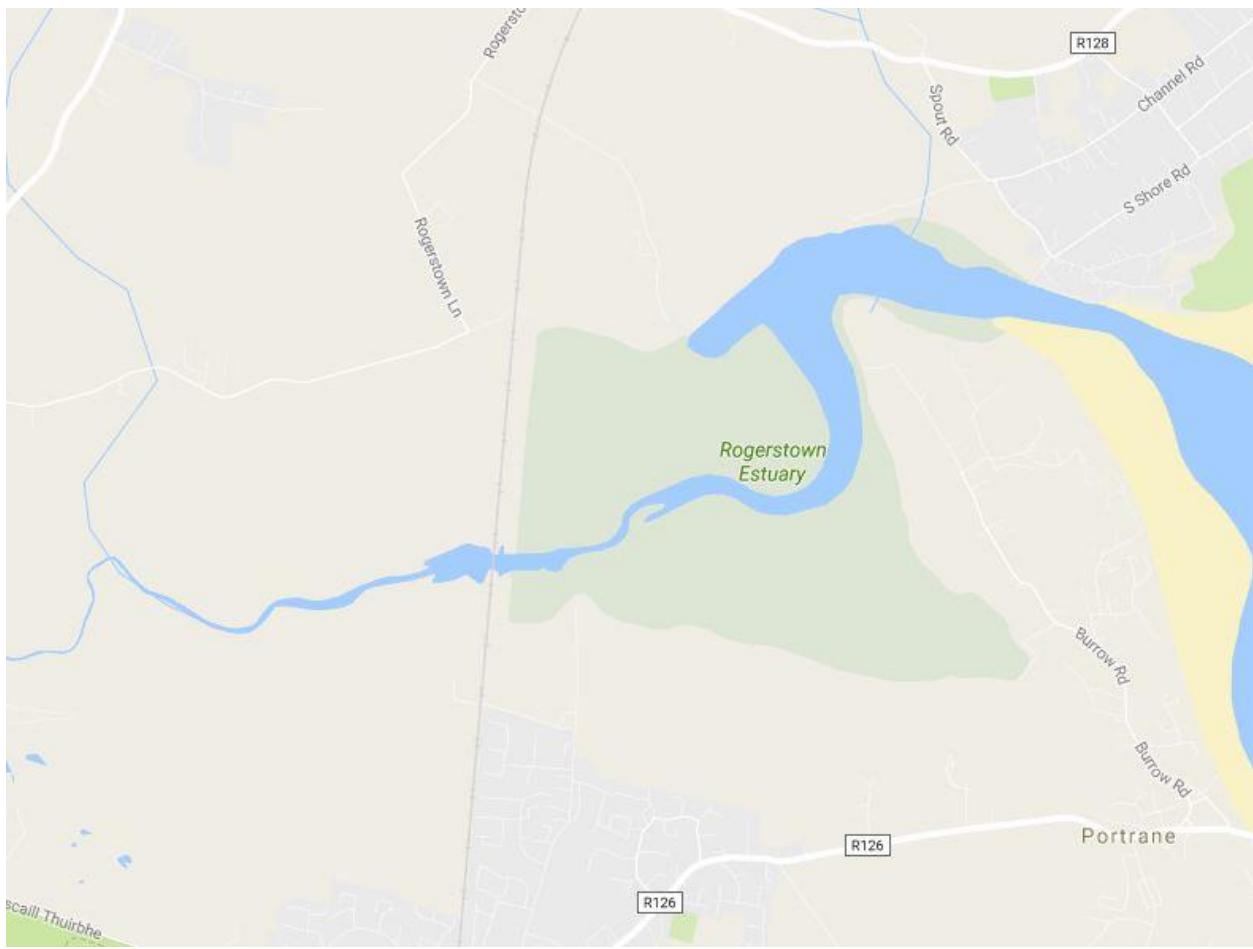
Sunset over the Balleally Landfill



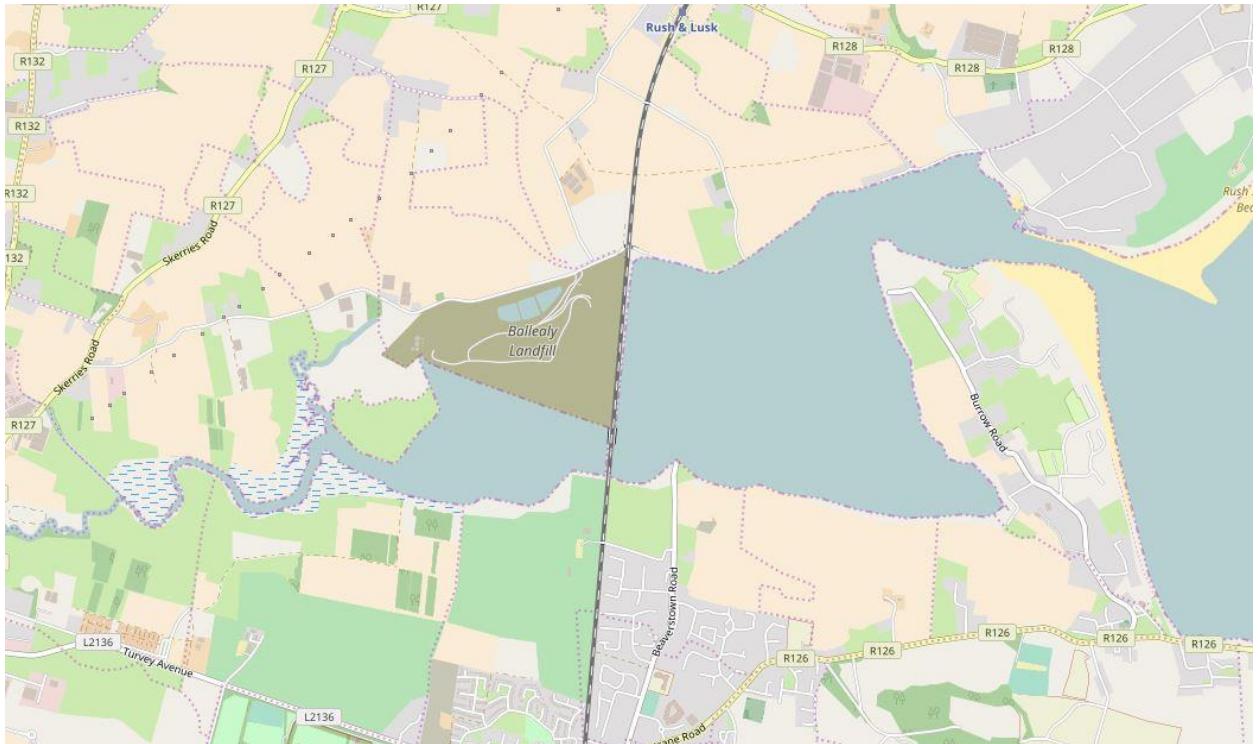
Source: Ordnance Survey Ireland (OSI)



Source: Google Earth



Source: Google Maps



Source: OpenStreetMap (OSM)

The surrounding
Hills/Elevated
Regions:

The surrounding area around Rush and Rogerstown are made of small sets of medium sized which create streams and flows of Water to drain the surrounding Land. These areas are Located towards Ballyboughal, Baldungan, The Naul and Man O'War are the sources of Streams and their tributaries which meander through the landscape and Countryside towards the Sea and Estuary. This includes streams that have their mouths located on Ballealy Lane, Spout Road, Brook Lane and Six Cross Lane. A lot of the solution that the river carries is run-off chemicals from

surrounding agricultural lands that may influence the acidity/basicity of the estuary/seawater. Two examples of these chemicals are: Nitrites and Nitrates, they may sound very alike but are completely opposite (even though they are formed both in high alkaline (+8.5 pH) water) Nitrites are very toxic and dangerous to water life. Nitrates though are a form of Nitrogen and form in high Alkaline levels. They do not harm sea life but if there is high amounts of the chemical can cause algae weed, methane production and highly acidic waters reducing the Oxygen content of the

water. The main river which provides water for the estuary is the Ballough River from the Ballyboughal direction.



South/North Beach

Rush:

The North and South beaches in Rush have the same coastal species and sand dune features. The South Beach is stretched from the mouth of the Rogerstown Estuary (Rogerstown Lane/Spout Road Junction) to the tip of the Rush Peninsula (Which includes the Rush Sandhills) and the North Beach is stretched from Rush Harbour (also Tower Street, explained later) to Six Cross Lane. From Six Cross Lane to Loughshinny the coastline boasts a

very diverse set of geological features. To the south of the town of Rush towards the Beach the land is mostly blown sand and marine deposits (An Example would be a common Seashell the Razor Shell which is a long narrow ‘pod’ like shell found on the Beach after high tide as washed up sediment) (decomposed sea life), with one small section of a mixture of Limestone, (made of organic material) sand and Gravels sediments. Towards the north though the majority of surface rock is Sandstone (created from the grains of other rocks, inorganic) and Limestone. The rock

takes up many different formations along the coastline to Skerries (Between the Holmpatrick and Tober Colleen Townlands). Most of the formations of rock are structurally deformed and have a severe zigzag appearance known as chevron folding. More information from the Geological Survey of Ireland (GSI) is available below:

Source: Geological Survey of Ireland (GSI)

FINGAL - COUNTY GEOLOGICAL SITE REPORT

NAME OF SITE	Skerries to Rush		
Other names used for site			
IGH THEME:	IGH 3, 8 (Carboniferous to Pliocene Palaeontology, Lower Carboniferous)		
TOWNLAND(S)	Numerous Townlands		
NEAREST TOWN	Skerries, Loughshinny, Rush		
SIX INCH MAP NUMBER	5, 8		
NATIONAL GRID REFERENCE	326700 258600 to 326600 253700 = O 267 586 to O 266 537		
1:50,000 O.S. SHEET NUMBER	43	1/2 inch Sheet No.	13

Outline Site Description

Coastal cliff and foreshore section.

Geological System/Age and Primary Rock Type

Lower Carboniferous (Visean) limestone, shale and conglomerate.

Main Geological or Geomorphological Interest

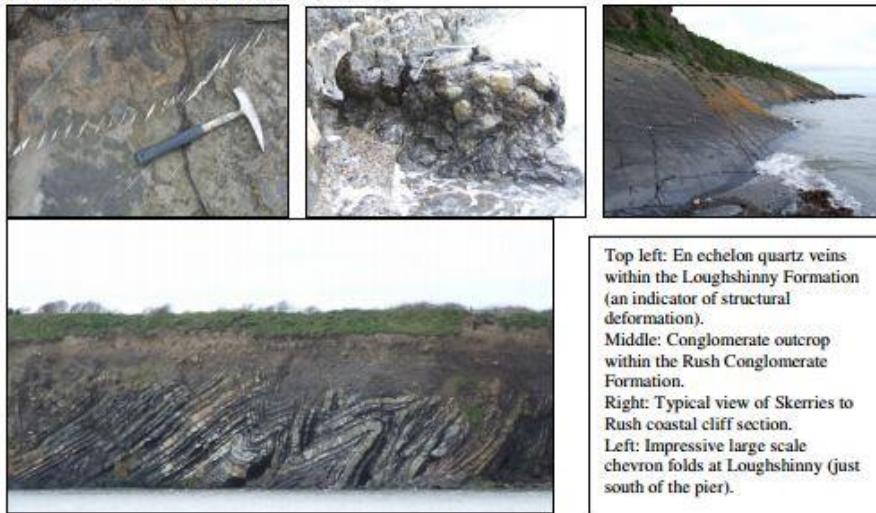
Six geological formations make up this impressive Lower Carboniferous succession between Skerries and Rush. They are seen in chronological order from the youngest, the Holmpatrick Formation, in the north to the oldest, the Tober Colleen Formation, in the south. Most of these formations are structurally deformed; at Loughshinny they have a severe zigzag appearance known as chevron folding. The section includes an important conglomerate turbidite sequence and a fossil locality.

Site Importance

The foreshore and cliff sections along the Rush-Loughshinny-Skerries area represents one of the best continuous successions of Lower Carboniferous rocks in Ireland and Britain, illustrating many sedimentary structures, tectonic structures and fauna. Of national and potentially international importance, this site is promoted here as a County Geological Site, but will be proposed as an NHA.

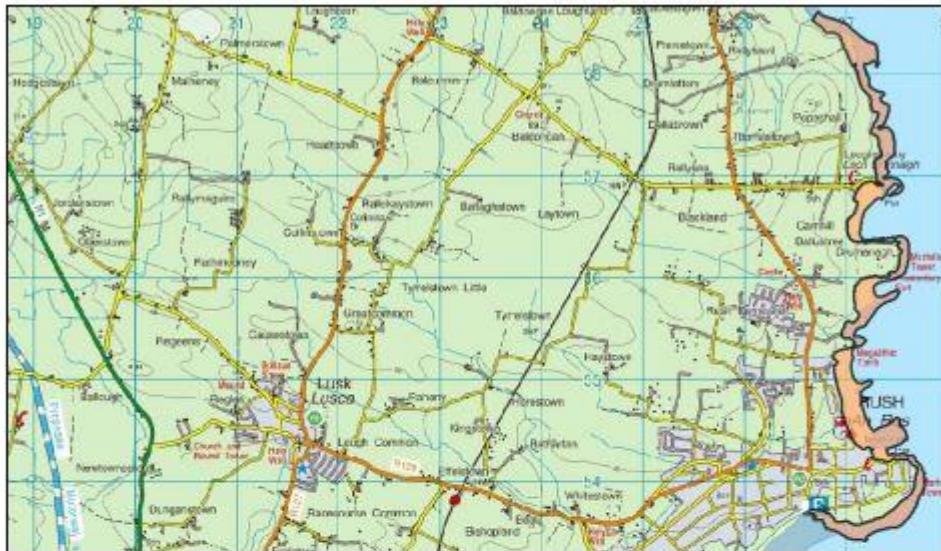
Management/promotion issues

A small part of this site (northern end) is an existing pNHA (Loughshinny Coast 2000). Much of this coastal section is backed by high cliffs and not easily accessible. The most accessible areas which are suitable for general promotion are located around the towns of Rush, Loughshinny and just south of Skerries where there are walkable beaches.



Top left: En echelon quartz veins within the Loughshinny Formation (an indicator of structural deformation).
Middle: Conglomerate outcrop within the Rush Conglomerate Formation.
Right: Typical view of Skerries to Rush coastal cliff section.
Left: Impressive large scale chevron folds at Loughshinny (just south of the pier).

Skerries to Rush



The two beaches are publicly accessible and both boast a medium

sized car park and are popular for the local pier and sandy beaches with great views. To the east of the two beaches is Tower Street. Currently at this location there is a non-treated sewage plant where raw sewage is being pumped into the sea of the two main beaches. This has cause major health and safety warnings at the two adjacent beaches (the two beaches are one of only a few strands in Ireland that has a ‘poor’ rating because of high E. Coli (hazardous bacteria) count in the water, resulting in bathing warnings (bathing unsuitable) and the beach being close

for swimmers during the summer season) This caused public outcry after the ‘Splash EPA’ reports were published and the media got involved. As of January 2017, (the writing of this report) construction has begun on a sewage pipe that will transport raw sewage from the town of Rush to a treatment center in Portrane/Donabate to be properly treated.

Below are a few pictures and maps of the beach and surrounding areas and cliffs:



From the South Beach Car Park



A Spring Day!



South Beach Dunes



Lambay Island at Sunrise



Waves at Sunset



Towards Loughshinny



Storm on South Beach!



North Beach Rush





High Tide at North Beach Rush





Deposited Sand near South Beach Dunes



Rogerstown Estuary Entrance Passage



Chevron Folding Cliff Faces



Low Tide at South Beach Rush



Looking East up the 'Sandhills'



Light Snow on South Beach Rush



South Beach Rush

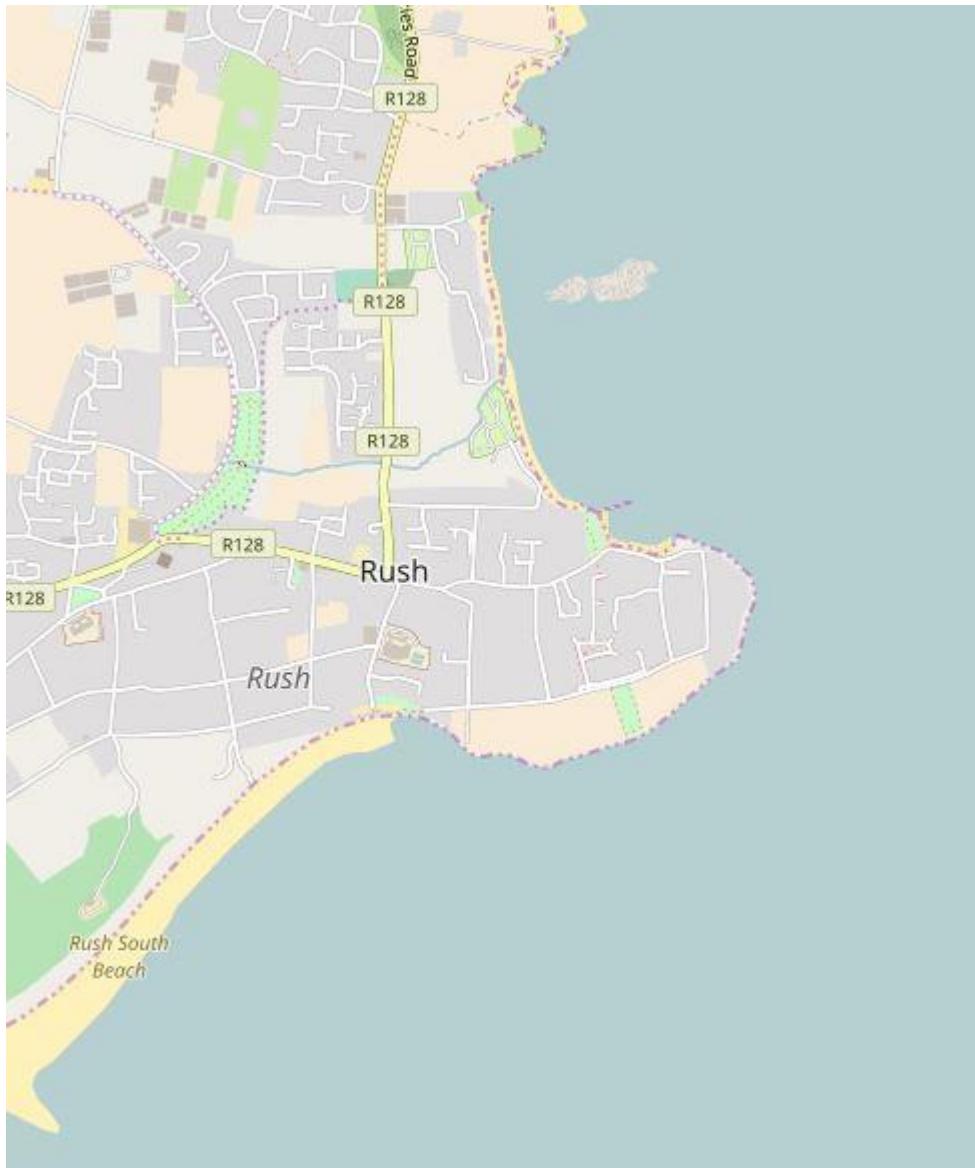


Tower Street



North Beach Rush

Source: OpenStreetMap (OSM)



The three areas on a similar Map

Source: Ordnance Survey Ireland

What is Happening:

1. Firstly, the Ballealy Landfill (which is now decommissioned) is leaking out toxic chemicals which are seeping into water bodies in the locality. The Local Council have been partially successful in stopping this process but after many years of rubbish being buried in the ground here the results were imminent to happen.
2. Chemicals (which are transported in water solution) are seeping or flowing in huge

amounts into local streams and tributaries from agricultural land run-off. These chemicals which are used to speed up arable (cereal) and market gardening crop growth a.k.a. Pesticides are very harmful and toxic to water life as they contain nitrites (discussed earlier) and can damage and destroy ecosystems and habitats of any kind.

3. The sand dunes and hills stretching along the North and South beaches in Rush are being eroded away by high winds, choppy seas, high spring tides,

human activities and ‘alien’ plants. Storms that happen during High Tide are called ‘Storm Surges’ and can cause extensive damage along the dune, eroding it away and causing surface flooding on the base of the dunes where the Marram Grass and other species grow. Heavy Rain and winds can wash or blow sands away and also disfigure the dunes substantially. The erosion occurs when the high seas and wind bring in rocks and pebbles in a process called Corrasion, (Waves picking up pebbles and

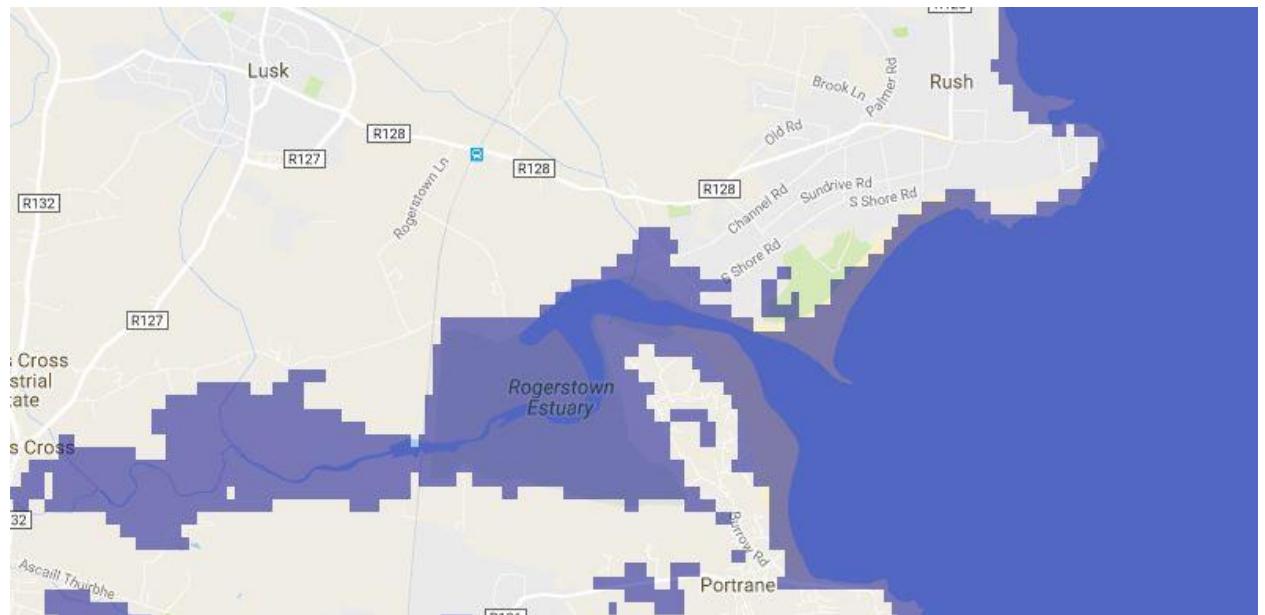
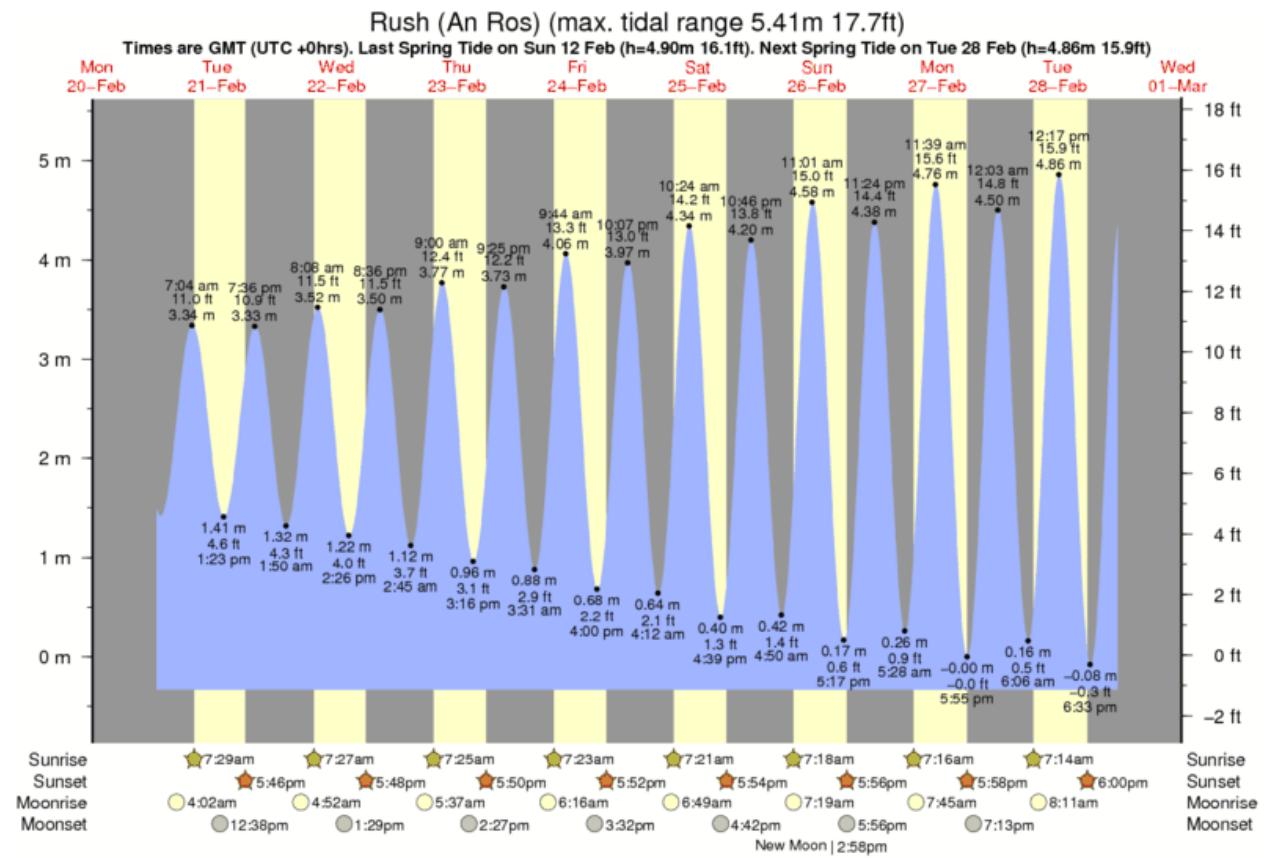
hurling them at dunes bases)
Abrasion, (When waves smash into dunes and slowly causes compression and weaknesses in the sand which then eventually collapses, this is called Hydraulic Action) and Attrition (when waves cause rocks and pebbles to crash into the dune and break it up). Severe, Rare storms like those in Winter 2015/2016 are caused by the ongoing global problem of climate change. Huge Low Pressure cyclones/ depressions are created over the Atlantic Ocean in a front which is

the meeting point of the Polar (cold) and Tropical (warm) fronts at about 60 Degrees North latitude. These two different fronts have different temperatures, humidity and pressure so do not mix very well. This causes the Warm air to move upwards, the effect of this is that the pressure falls quickly and significantly, causing high winds and when the warm air cools and condenses it creates large heavy rain showers or thunderstorms. These weather systems have

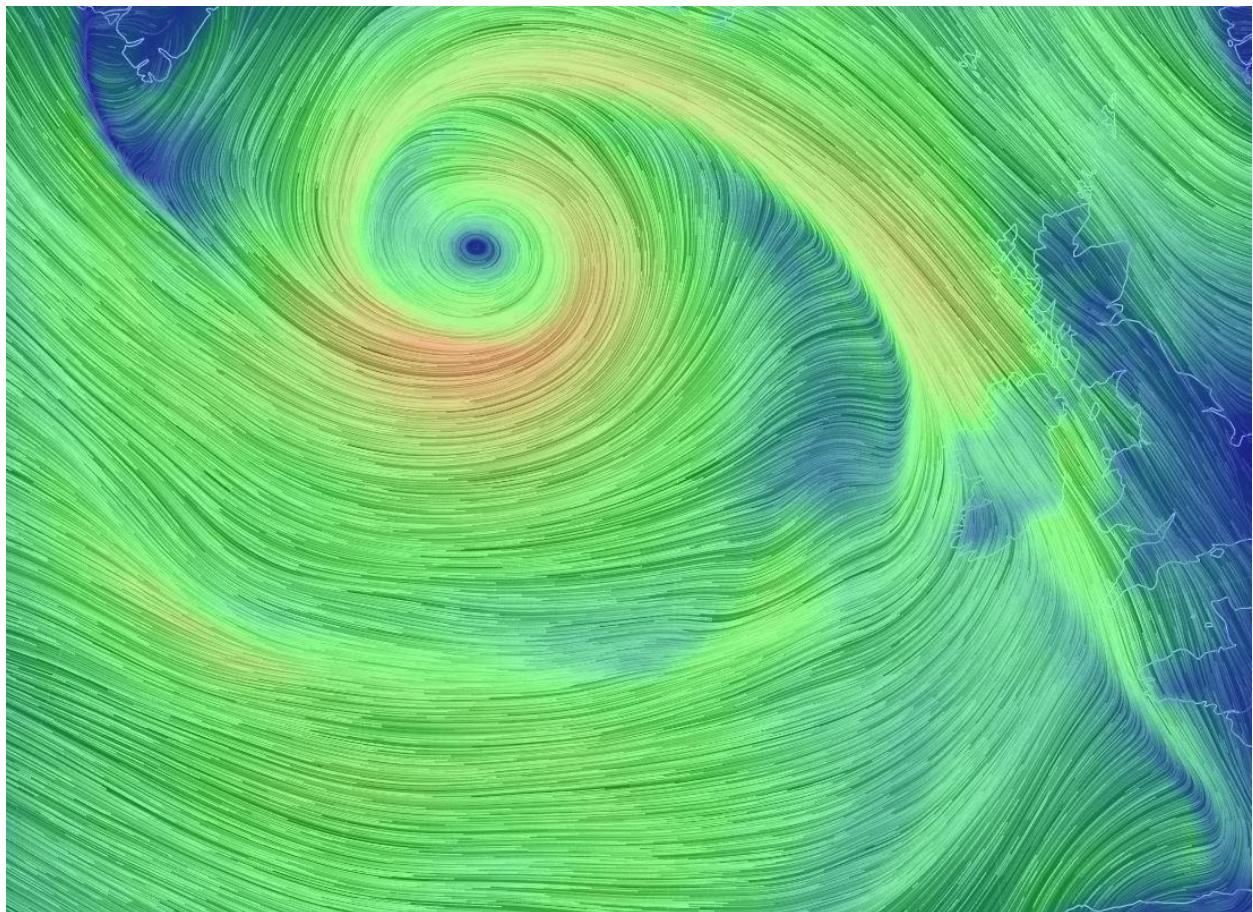
become increasingly common because of Climate Change. A 3m water rise in this area would be devastating. Sand dune protection initiatives like the Rush Beach Monitoring Program are trying to protect the beach.

Tide Times

Source: Tides Forecast



Source: Geology.com:



A deep cyclone over the Atlantic ocean. Source: Nullschool Earth

Survey Results:

I surveyed 6 locations around the Town of Rush (estuary and beach) on the 24th of February 2017. I picked the following locations as they were the most predominant locations in the area for public recreation/bathing and in my own vicinity. Here is a map of the locations I studied.

1. Spout Road
2. Links Road
3. South Beach Rush
4. Tower Street
5. North Beach Rush
6. Six Cross Lane



The Weather Conditions:
Air Temperature: 7.5 Degrees Celsius

Precipitation: Scattered Showers throughout the day with about %60 cloud cover

Humidity: %95

Atmospheric Pressure: 1012hPa
(Hectopascals)

Mean Wind Speed: 18km/h

Wind Direction: Southwest

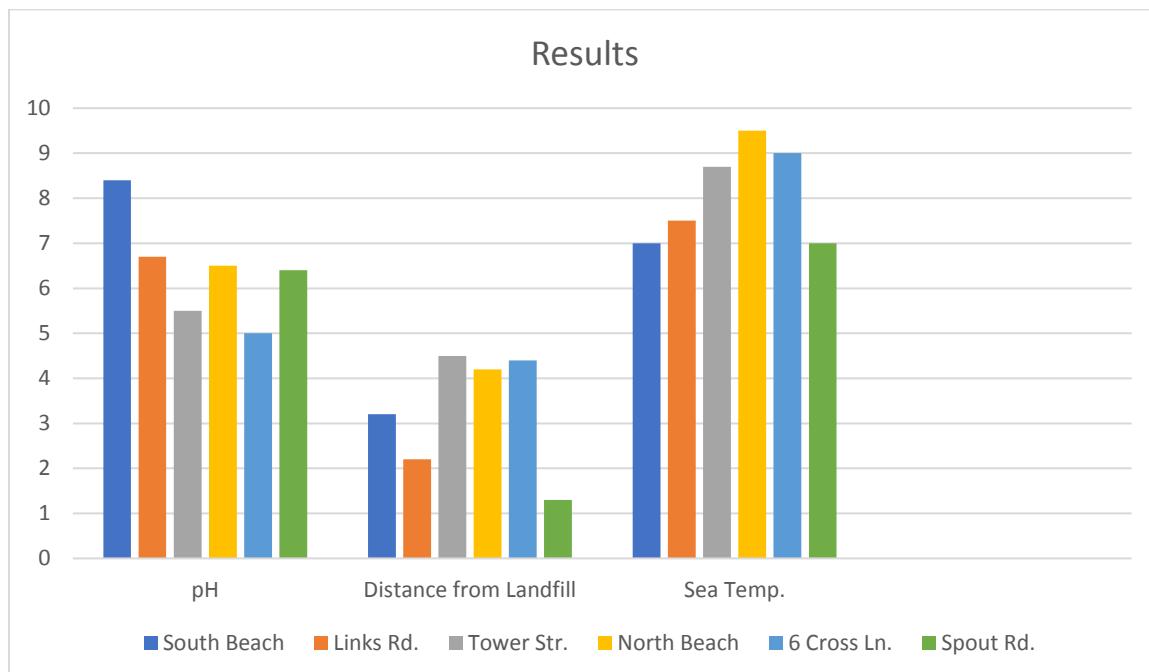
Equipment:

The equipment I was using to measure the Variables in this Local survey were the Following:

- Thermometer > Temperature (Sea/Air)

- Barometer > Atmospheric Pressure
- Hygrometer > Humidity
- Anemometer > Wind Speed
- Universal Indicator Paper > Water pH

Results:



Location:	pH:	Temp.	Distance from Lanfill
Tower St.	5.5	8.7C	4.5
N. Beach	6.5	9.5C	4.2
6 Cross Ln	5	9C	4.4
S. Beach	8.4	8C	3.2
Spout Rd.	6.4	7C	1.3
Links Rd.	6.7	7.5C	2.2

This Data is the Early Spring pH and Water Temperature Readings from Rush Co. Dublin.

- pH > Acidity/ Basicity
- Water Temperature > Degrees Celsius
- Distance from Landfill > Kilometers (Km)

Conclusion:

The outcome of the survey is quite what I expected in the Southwest of the Research area (Spout Road/Links Road) there is quite a low pH reading (Acidic) which is realistic as these two sites are closest to the landfill site. They also have cooler water which may be because of Stagnant water which could in the near future cause algae/weed buildup (loss of Oxygen content). In the South of the Town at South beach Rush the pH is quite high as this area may be protected by currents of affected water by its fortunate Geographic location. In

further studies, I will investigate Plant ecology in this area. To the East of the Region (Tower Street) the pH is low and the most probable cause of this phenomena is the Raw Sewage discharge plant at this location. Hopefully this problem will be soon be solved with new Sewage developments. Towards the North of the Town (Six Cross Lane and North Beach Rush) the pH level is Low also. As these two locations are the furthest away from the Ballealy Landfill, I predict that this Acidic water from Agricultural run-off as there is two streams discharging

solution into the Irish Sea, which is also causing higher water temperatures. In further projects and Research, I would like to investigate and survey further upstream on these tributaries and investigate other issues that may arise from agricultural activities in the region. I am very competent in the results I have gained from the publication of this project and I think this knowledge of the end of these rivers journeys is just the start of this long term investigation into environmental/climate issues. I think the data collected is a great base for further research.

Credits:

Met Eireann

Ordnance Survey Ireland

EPA Ireland

Geological Survey of Ireland

Google Earth/Maps

OpenStreetMap

D-Maps

NatureWebs.ie

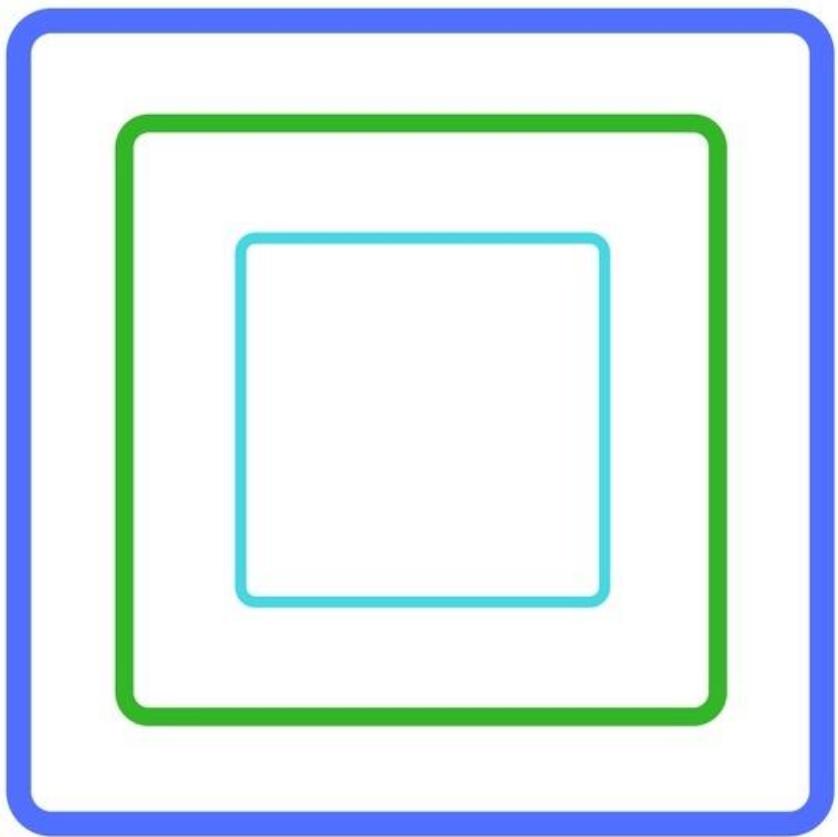
USGS

Internet Geography

Nullschool Earth

National Parks and Wildlife Service

Geology.com



M E T E O D E E P

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