



Environmental Licensing Programme  
Office of Environmental Sustainability  
Environmental Protection Agency  
PO Box 3000  
Johnstown Castle Estate  
Wexford

28/01/2022

IW ref: LT0542

**Re: Castletownbere Waste Water Discharge Licence Application Reg. No. D0297-02**

**Uisce Éireann**  
Teach Colvill  
24-26 Sráid Thalbóid  
Baile Átha Cliath 1  
D01 NP86  
Éire

**Irish Water**  
Colvill House  
24-26 Talbot Street  
Dublin 1  
D01 NP86  
Ireland

T: +353 1 89 25000  
F: +353 1 89 25001  
[www.water.ie](http://www.water.ie)

Dear Inspector,

In response to the Regulation 18(3)(b) request for information notice dated 07 October 2021, please see below outstanding information;

**Update the Water Quality Modelling report to include far field modelling of suspended solids having regard to the link between E.Coli and suspended solids and the proximity of shellfish waters to the proposed discharge.**

Irish Water commissioned additional modelling of suspended solids and further post processing (geometric mean analysis) of the existing model results for E. Coli, in order to further assess the impact the discharges from the proposed Castletownbere Wastewater Treatment Plant (WwTP) will have on the nearby designated Shellfish Waters area. Please find the associated report appended, entitled; Castletownbere Far Field Modelling Supplementary Report 2 – Further Assessment of the Shellfish Waters.

The report concludes there is a reduction in concentrations of E. Coli at the western boundary of the Shellfish Waters and that there is likely to be a minor reduction in the concentrations of suspended solids within the Shellfish Waters. Therefore, there is likely to be a minor improvement in the water quality of the Shellfish Waters as a result of the proposed wastewater treatment plant. This is consistent with the findings of the original water quality assessment. Thereby the proposed emission

from the Primary Treatment plant is considered to be compatible with achieving the WFD objectives for the receiving waters (Berehaven, Coastal waterbody).

**Enclosed; Appendix 1:** Castletownbere Far Field Modelling Supplementary Report 2 – Further Assessment of the Shellfish Waters.

Yours sincerely,

*Sheelagh Flanagan*

Sheelagh Flanagan

Wastewater Strategy

For inspection purposes only.  
Consent of copyright owner required for any other use.

Irish Water

**Cork UTAS**

Castletownbere Far Field Modelling  
Supplementary Report 2 – Further  
assessment of the Shellfish Waters

Issue | 20 January 2022

*For inspection purposes only.  
Consent of copyright owner required for any other use.*

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.



Job number 257589-00

**Ove Arup & Partners Ireland Ltd**

**Arup**  
50 Ringsend Road  
Dublin 4  
D04 T6X0  
Ireland  
[www.arup.com](http://www.arup.com)

**ARUP**

# Document verification

<b>Job title</b>		Cork UTAS		<b>Job number</b>		257589-00	
<b>Document title</b>		Castletownbere Far Field Modelling Supplementary Report 2 – Further assessment of the Shellfish Waters				<b>File reference</b>	
<b>Document ref</b>							
<b>Revision</b>	<b>Date</b>	<b>Filename</b>	Castletownbere Far Field Modelling Supplementary Report 2.docx				
Draft 1	18 Jan 2022	Description	First draft				
			Prepared by	Checked by	Approved by		
		Name	Lisa Condon Daniel Walsh	Kevin Barry	Catherine Buckley		
		Signature					
Issue	20 Jan 2022	Filename	Castletownbere Far Field Modelling Supplementary Report 2.docx				
		Description					
			Prepared by	Checked by	Approved by		
		Name	Lisa Condon Daniel Walsh	Kevin Barry	Catherine Buckley		
		Signature		Kevin Barry			
		Filename					
		Description					
			Prepared by	Checked by	Approved by		
		Name					
		Signature					
		Filename					
		Description					
			Prepared by	Checked by	Approved by		
		Name					
		Signature					

For inspection purposes only. Consent of copyright owner required for any other use.

Issue Document verification with document



# Contents

---

	Page	
<b>1</b>	<b>Introduction</b>	<b>1</b>
<b>2</b>	<b>E. Coli geometric mean plots</b>	<b>2</b>
	2.1 Overview	2
	2.2 Results	2
<b>3</b>	<b>Suspended solids modelling</b>	<b>5</b>
	3.1 Overview	5
	3.2 Model setup	5
	3.3 Results	6

*For inspection purposes only.  
Consent of copyright owner required for any other use.*

# 1 Introduction

---

Arup was commissioned by Irish Water to advance an Untreated Agglomerations (UTAS) project for Castletownbere, Co. Cork. A detailed water quality assessment was undertaken as part of the project to determine the impact of the effluent discharges from the proposed wastewater treatment plant on the receiving waters in Bantry Bay. The findings of the study were submitted as part of the planning application for the project on 19<sup>th</sup> December 2019.

A supplementary report was issued in August 2020 to address Requests for Information (RFIs) from the Planning Authority.

Irish Water have now commissioned Arup to undertake additional modelling of Suspended Solids in order to further assess the impact that discharges from the proposed Wastewater Treatment Plant (WwTP) will have on the nearby designated Shellfish Waters area. Irish Water have also requested further post processing of the existing model results for E. Coli. This information will be used to support the application for a Wastewater Discharge Licence.

Section 2 of this report presents E. Coli geometric mean plots for the scenarios previously modelled.

Section 3 of this report presents the results of the Suspended Solids modelling.

This report is to be read in conjunction with the original Castletownbere Far Field Modelling Report<sup>1</sup> and the Castletownbere Far Field Modelling Supplementary Report<sup>2</sup>.

For inspection purposes only. Consent of copyright owner required for any other use.

---

<sup>1</sup> Arup. (2019). Castletownbere Far Field Modelling Report (Report issued for planning permission)

<sup>2</sup> Arup. (2020). Castletownbere Far Field Modelling Supplementary Report (Report issued for planning permission)

## 2 E. Coli geometric mean plots

### 2.1 Overview

As part of the original Castletownbere Far Field Modelling study, concentrations of E. Coli in the receiving waters were assessed in order to determine the impact of the proposed WwTP on the receiving water quality. This analysis included the nearby designated Shellfish Waters.

Following guidance from Irish Water, model results at the Shellfish Waters were assessed against the Bathing Water Quality Regulations 2008 (as amended) as an interim standard due to the absence of a regulatory standard in the water column for shellfish waters. The assessment included the presentation and analysis of spatial plots and monitoring point values for 95%ile E. Coli concentrations in line with the regulations.

Irish Water now require that the results of the previous modelling be assessed against a geometric mean bacteriological water quality standard which is currently being piloted for the Shellfish Assessment Programme. This section of the report therefore presents E. Coli geometric mean plots for the scenarios previously modelled in the original Castletownbere Far Field Modelling Report and the Castletownbere Supplementary Report.

### 2.2 Results

Geometric mean E. Coli concentrations have been computed at each model grid point using the last 15 days of the original model results. The geometric mean for the final timestep has been used to produce the plots. Spatial plots have been produced for the scenarios previously modelled. These are listed as:

- The existing scenario with untreated discharges from the Castletownbere agglomeration;
- The proposed scenario with the new outfall discharging primary treated wastewater;
- The proposed scenario with the new outfall discharging primary treated wastewater and the inclusion of the Dinish Wharf Expansion project.

The proposed scenario model run was also modified to include Section 4 outfalls from Dinish Island and this analysis was presented in the Castletownbere Supplementary Report. The Dinish Island outfalls do not however include E. Coli concentrations. The E. Coli geometric mean plots for this scenario are therefore not relevant.

Figure 1, Figure 2 and Figure 3 show the E. Coli geometric mean plots for the aforementioned scenarios. The designated Shellfish Waters are shown in the plots in blue hatching.

Figure 1: Existing scenario - E. Coli geometric mean plot

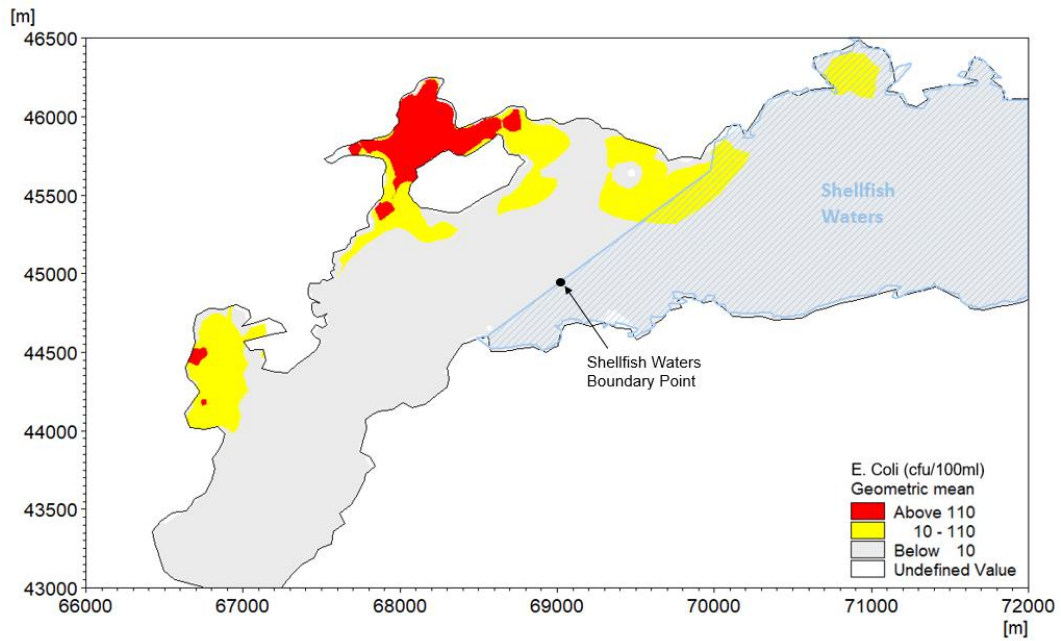


Figure 2: Proposed scenario - E. Coli geometric mean plot

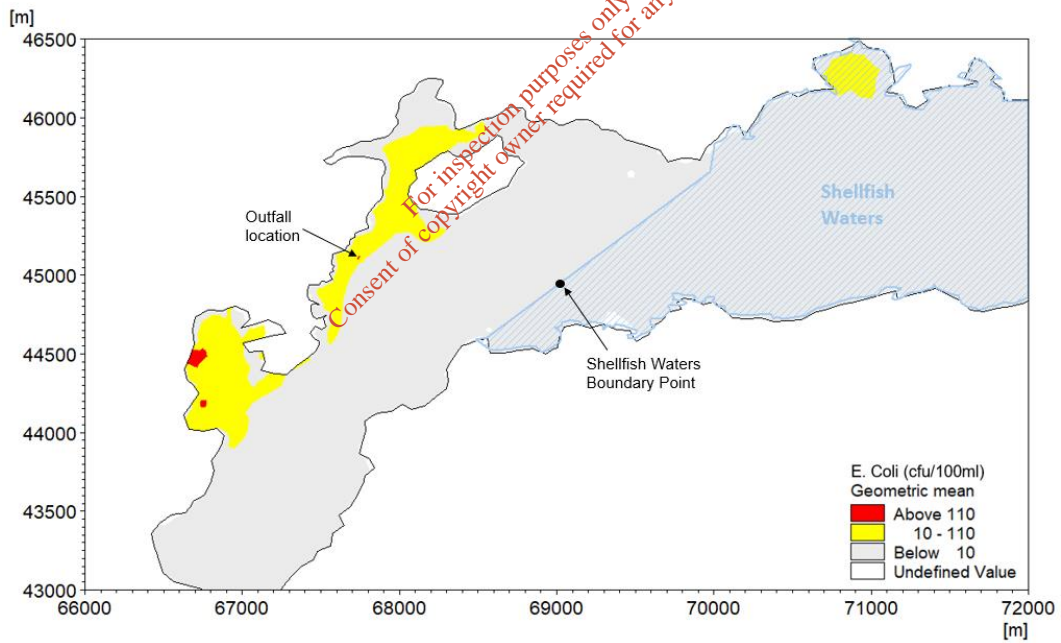
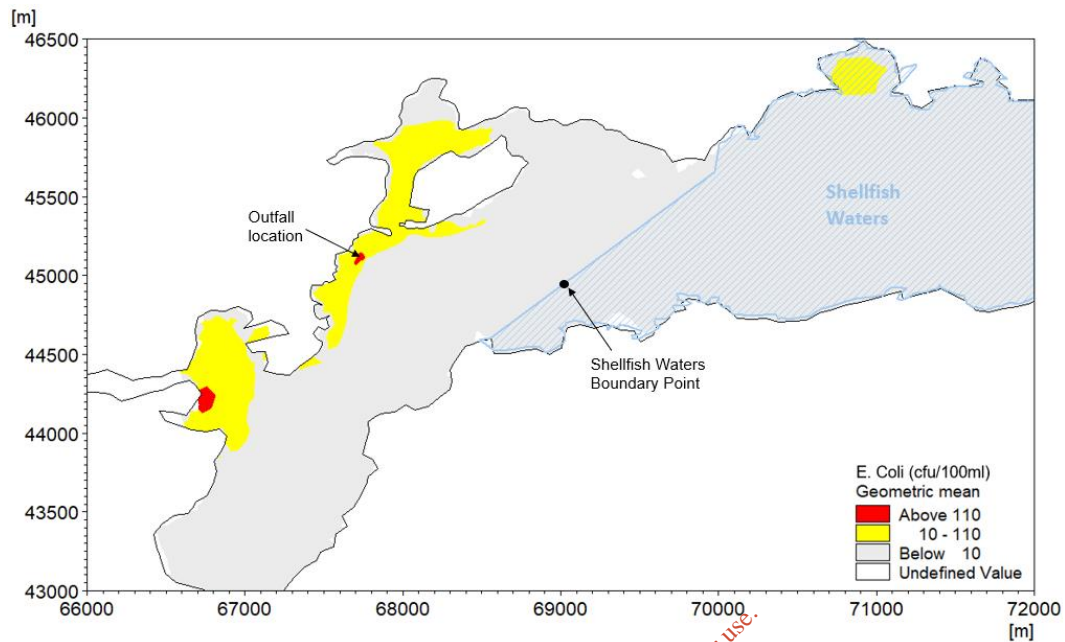




Figure 3: Proposed scenario with Dinish Island Wharf Expansion - E. Coli geometric mean plot



It can be seen from the plots that there is generally a reduction in concentrations of E. Coli as a result of the proposed WwTP being in place, both with and without the Dinish Island Wharf Expansion. This is consistent with the findings of the original water quality assessment.

It is evident that with the proposed WwTP in place, there is a reduction in E. Coli concentrations at the western boundary of the Shellfish Waters. In the existing scenario results plot, there is a 10 – 110cfu/100ml plume at the northern end of the Shellfish Waters boundary. This plume does not exist in either of the proposed scenarios. This is a consequence of the removal of an existing untreated wastewater discharge at this location, as the wastewater is conveyed to the treatment plant in the proposed scenario.

The E. Coli geometric mean concentration at the Shellfish Waters Boundary point is 0.67cfu/100ml for the existing scenario and 0.55cfu/100ml for the proposed scenario. The E. Coli geometric mean at this point for the proposed scenario with the Dinish Island Wharf Expansion in place is 0.14cfu/100ml. These concentrations are below the limit of detection for E. Coli (1cfu) and therefore deemed to be low.

## 3 Suspended solids modelling

### 3.1 Overview

The existing Castletownbere far field model has been utilised to assess the impact of the discharge from the proposed WwTP on the nearby Shellfish Waters with respect to suspended solids (SS). This section details the model setup, source concentrations used, and presents the results of the assessment.

### 3.2 Model setup

As part of this study, the transport of suspended solids in the water column has been modelled by assuming that the sediment consists of neutrally buoyant particles. The transport of the sediment in the water column can therefore be represented using advection and dispersion processes with the decay set to zero. This approach is deemed to be conservative as it does not allow for the loss of concentration through the settling of sediment to the bed. This approach has been agreed with Irish Water.

The Castletownbere far field model used in the original study has been utilised to undertake this additional sediment modelling. Two scenarios have been considered:

- The existing scenario with untreated discharges from the Castletownbere agglomeration;
- The proposed scenario with the new outfall discharging primary treated wastewater;

For the purpose of these additional simulations, SS concentrations have been applied to all of the input sources in the model (Section 3.2.1). All other model parameters and inputs remain the same. A total simulation period of 53 days was used for each model run. This includes an initial warmup period of 38 days which was specified to ensure that SS concentrations reached a dynamic equilibrium across the Shellfish Waters before commencement of the second 15-day period, over which the impact of the proposed WwTP upgrade was assessed.

#### 3.2.1 SS concentrations

The values of SS used in the model were derived from a number of sources: monitoring data, emission limit values (ELVs) and the scientific literature. The values were also agreed with Irish Water. The values are presented in Table 1.

Table 1: SS source concentrations

Source of Suspended Solids	Concentration (mg/l)	Source
Rivers discharging to Bantry Bay	4	The mean SS concentration of EPA monitoring data for the River Finnihy
Existing WwTP outfalls discharging to Bantry Bay (Glengariff and Bantry)	35	The ELV licence requirements for these WwTPs
Existing Castletownbere untreated wastewater discharges	200	Table 3.18 from Metcalf & Eddy Inc., et al <sup>3</sup> suggests a range of 120-400mg/l for untreated domestic wastewater. A medium strength influent value is assumed.
Proposed Castletownbere WwTP outfall discharge	100	As per the proposed primary treatment which includes a 50% reduction in SS concentrations

No monitored SS concentration values were available for the rivers discharging into Bantry Bay. The value used in the model for the river sources were therefore derived from EPA monitoring data<sup>4</sup> for the River Finnihy which discharges into the adjacent Kenmare Bay.

### 3.3 Results

The results from the existing and proposed models have been presented as geometric mean concentration plots in Figure 4 and Figure 5. The delta plot (the relative difference between the existing and the proposed scenarios) is shown in Figure 6. All plots have an overlay of the Shellfish Waters area for context.

<sup>3</sup> Metcalf & Eddy Inc., et al. Wastewater Engineering: Treatment and Resource Recovery. 5th ed., McGraw-Hill Professional, 2013

<sup>4</sup> From [www.catchments.ie](http://www.catchments.ie)

Figure 4: Existing scenario - Suspended solids geometric mean plot

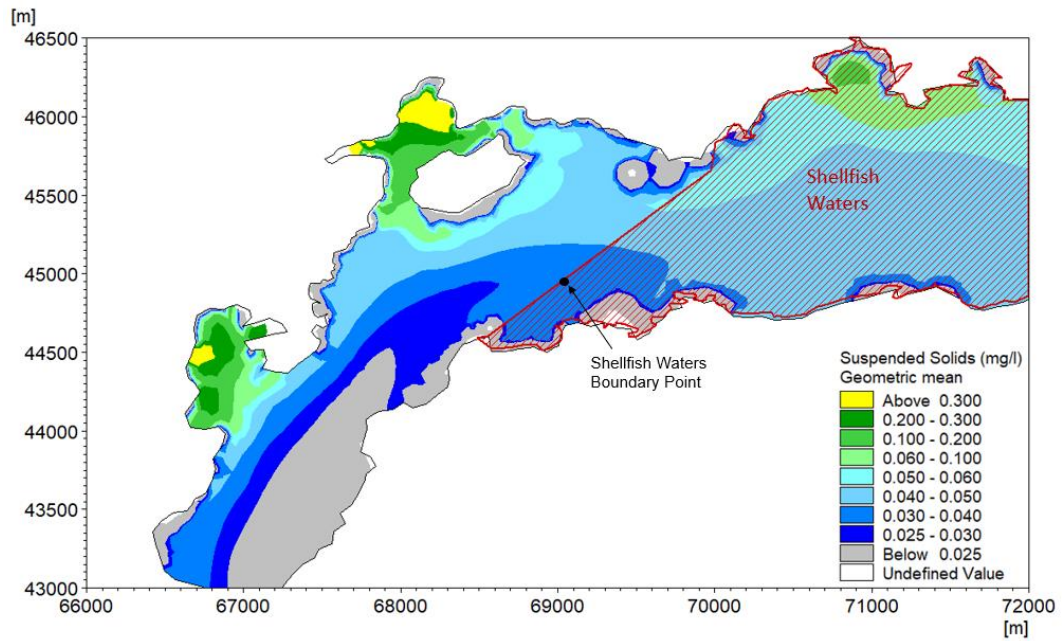


Figure 5: Proposed scenario - Suspended solids geometric mean plot

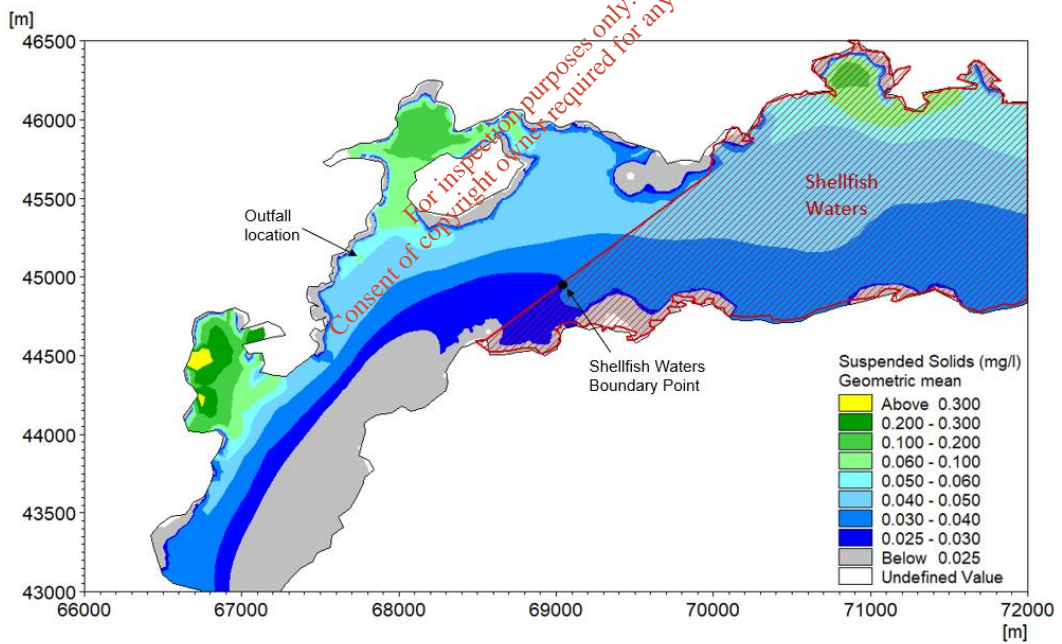
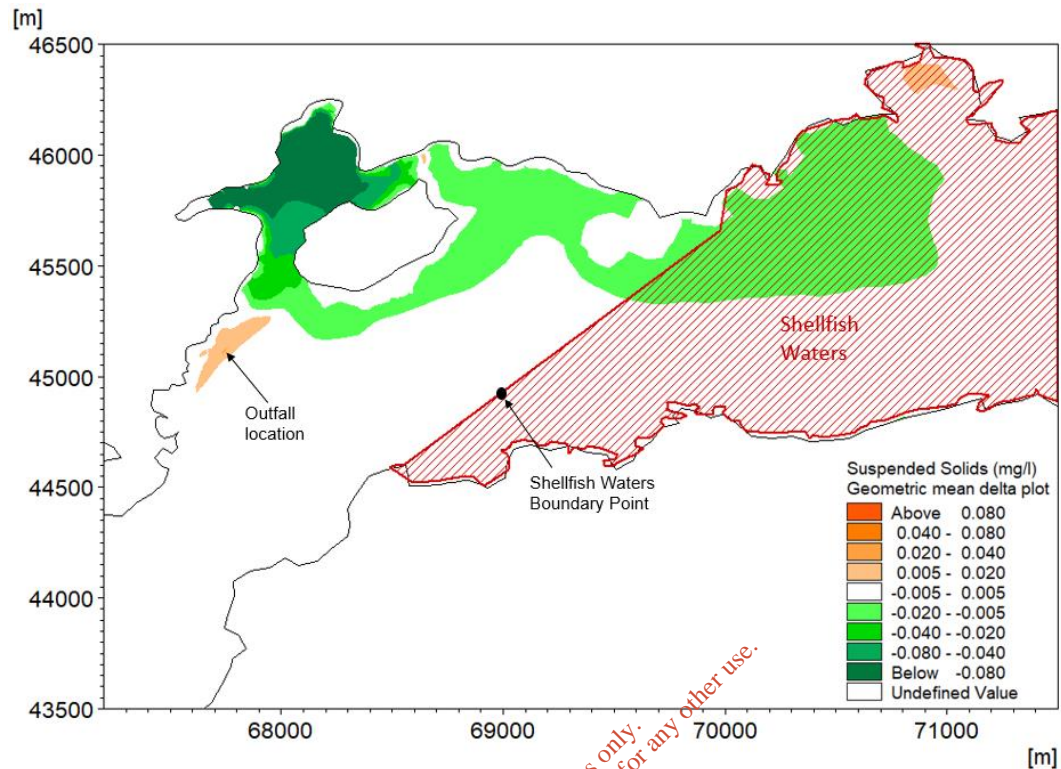


Figure 6: Suspended solids geometric mean delta plot



It can be seen from the results plots that with the proposed WwTP in place, SS concentrations are reduced in the receiving waters, particularly in the vicinity of Castletownbere. There is a localised increase in the SS concentrations in the immediate vicinity of the proposed outfall location i.e., within the near field of the proposed outfall.

The SS geometric mean concentration at the Shellfish Waters Boundary point is 0.033mg/l for the existing scenario and 0.030mg/l for the proposed scenario. This represents a 9% decrease at this point with the proposed WwTP in place. These concentrations are however both below the limit of detection for SS monitoring (2.5mg/l) and are therefore deemed to be low. A large area of the delta plot, represented in white, show differences of between -0.005 and 0.005mg/l. These differences are very low in the context of the limit of detection.

The results of the model show that with the proposed WwTP in place there will be a minor reduction in the concentrations of SS within the Shellfish Waters. It can therefore be concluded that the proposed WwTP will improve the water quality of Berehaven and the Shellfish Waters by reducing SS concentrations. This is consistent with the key findings of the original Castletownbere Far Field Modelling Report which demonstrated that the concentrations of the water quality parameters modelled were reduced in the receiving waters with the proposed WwTP in place.