



## Environmental Support to Drilling in Irish Waters – Financial Responsibility

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## Environmental Support to Drilling in Irish Waters Financial Responsibility

Nexen Petroleum UK Ltd

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Xodus Group  
Xodus House, 50 Huntly Street  
Aberdeen, UK, AB10 1RS

T +44 (0)1224 628300  
E [info@xodusgroup.com](mailto:info@xodusgroup.com)  
[www.xodusgroup.com](http://www.xodusgroup.com)

**xodus**  
GROUP



# Financial Responsibility

A100460-S00

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## EXECUTIVE SUMMARY

This report has been prepared based on a request from Nexen Petroleum U.K Ltd (Nexen) to carry out a study relating to the Financial Responsibility Assessment for their Iolar Exploration Well based in the Porcupine Basin, offshore west of Ireland.

The Financial Responsibility Assessment is based on the Guideline prepared by the Department of Communications, Climate Action and Environment (DCCA) "Method for Assessment of Financial Indemnity/Insurance of Petroleum Authorisation Holders". The Guidelines have been produced following the release of the EU Offshore Safety Directive 2013/30 to ensure applicants have adequate financial provision to cover liabilities potentially deriving from their offshore activities, including effective emergency response and subsequent remediation and potential economic damages

The results of the Financial Responsibility Assessment are summarised in the Table 0-1 below.

Table 0-1 Executive Summary Financial Responsibility Limits Calculation (Combined)

| FINANCIAL RESPONSIBILITY LIMITS CALCULATIONS - Combined |            |
|---|------------|
|   | FR Level € |
| Total for Well Control                                  |            |
| Total for Pollution                                     |            |
| Overall Total FR  |            |

The conclusion of this assessment is that the estimated overall financial responsibility limit costs are [redacted] Nexen has the financial resources necessary to meet its participating interest share, verified through insurance.

The rest of the report below fully details the methodology, costs and calculations that have been used to determine the financial responsibility limits presented in Table 0-1, above.



## 1 INTRODUCTION

### 1.1 Overview

Nexen Petroleum U.K Ltd (Nexen) plans to drill a single exploration well in the Iolar prospect in Licencing Option (LO) 16/7 in the Porcupine Basin offshore west of Ireland. The exploration drilling is planned for April 2019. The expected hydrocarbon type for the exploration well is oil.

The proposed well location lies approximately 231 km south west of the Irish mainland in water depths of 2,165 m (see Figure 2-1).

The well will be drilled using the floating drill ship Stena Icemax suitable for the deep water west of Ireland. The total duration of the drilling and suspension/abandonment operations (on location) is expected to be 90 to 135 days.

Since the Gulf of Mexico incident in 2010 the Irish Department of Communications, Climate Action and Environment (DCCAE) has been reviewing the systems and processes in place with the aim of improving and strengthening procedures with regard to exploration and production activity, including those demonstrating Financial Responsibility (FR). This report has been prepared based on a request from Nexen Petroleum U.K Ltd (Nexen) to carry out a study relating to the Financial Responsibility Assessment for their Iolar Exploration Well.

The Financial Responsibility Assessment is based on the Guideline prepared by DCCAE "Method for Assessment of Financial Indemnity/Insurance of Petroleum Authorisation Holders", specifically section 4 "Recommended Approach". The Guidelines have been produced following the release of the EU Offshore Safety Directive 2013/30 to ensure applicants have adequate financial provision to cover liabilities potentially deriving from their offshore activities, including effective emergency response and subsequent remediation and potential economic damages.

### 1.2 Scope

The scope of the Financial Responsibility Assessment for exploration drilling of Iolar includes:

- > Control of well cost calculations;
- > Pollution remediation and compensation cost calculations; and
- > Financial arrangements

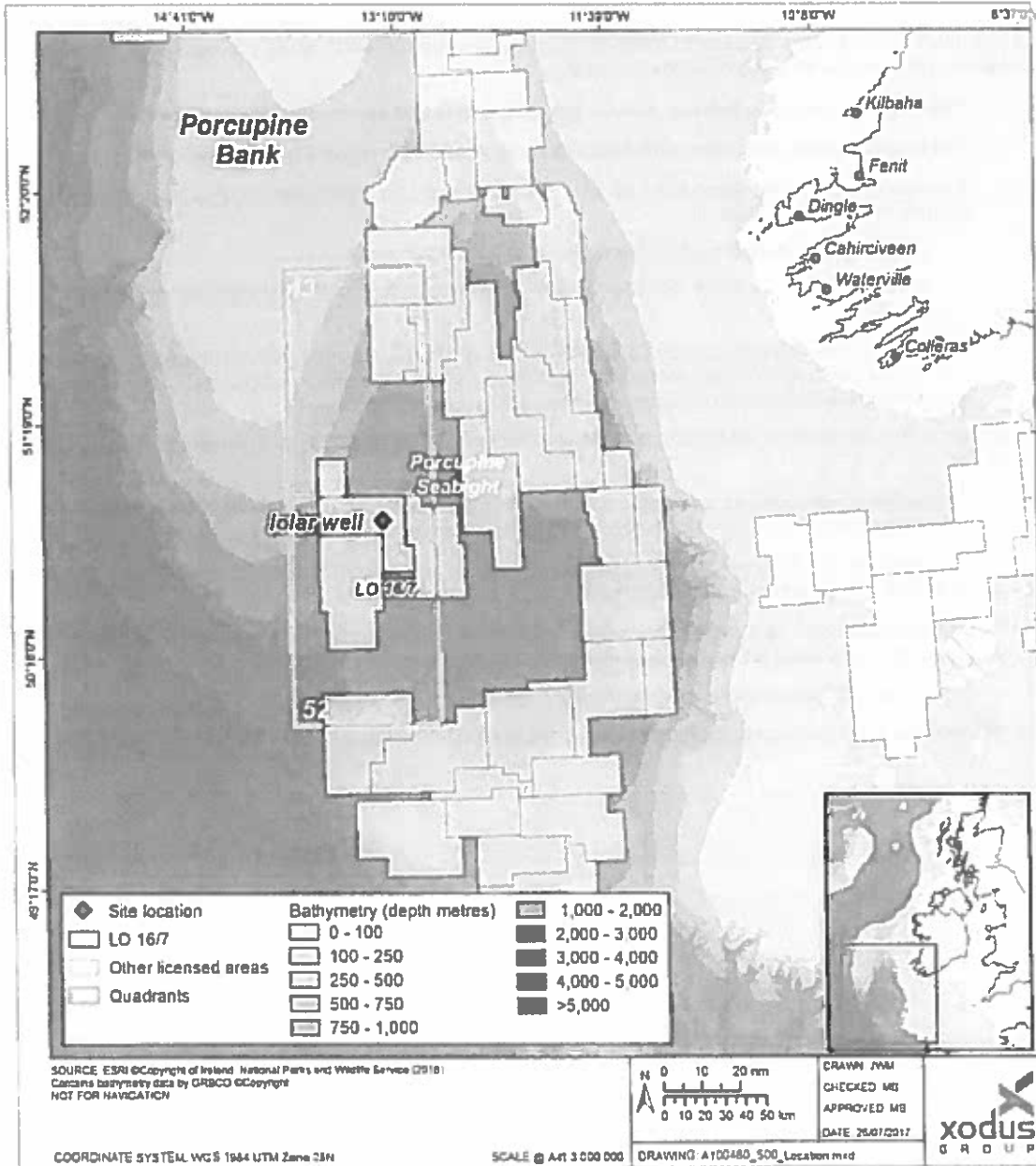
### 1.3 Structure of the Financial Responsibility Assessment

This assessment is presented in the following sections

|                  |  |
|------------------|--|
| <b>Section 2</b> | <i>Methodology overview</i> – presentation of an overview of the Financial Responsibility Assessment methodology   |
| <b>Section 3</b> | <i>Well control costs methodology and calculations</i> – presentation of in more depth methodology and calculations of well costs  |
| <b>Section 4</b> | <i>Pollution remediation/compensation methodology and calculations</i> - presentation of more depth methodology and calculations for pollution remediation and compensation costs. |
| <b>Section 5</b> | <i>Results</i> – summary of results  |
| <b>Section 6</b> | <i>Financial arrangements</i> - provides details of Nexen's financial arrangements.  |
| <b>Section 7</b> | <i>Conclusions</i>   |
| <b>Section 8</b> | <i>References</i>  |



Figure 2-1 Proposed Iolar Exploration Well location





## 2 METHODOLOGY OVERVIEW

Following the recommended approach in the relevant DCCA, Nexen has already provided the following to the Commission for Energy Regulation (CER) and Irish Coastguard (IRCG) as part of the submission and assessment process for their Iolar Exploration Well

- > Description of potential reservoir, well design, programme and any 'combined operations'
- > Nexen and Nexen contractors' experience, and organisation for managing the programme
- > Assessment of the technical risks of an event occurring, describing the physical and procedural barriers in place including
  - o Maximum flow-potential in the event of loss of well control
  - o Contingency plans for 'Source Control' (Well capping and relief well planning arrangements, etc )
- > Modelling of the potential outcomes and the effect on the environment and third parties, describe emergency planning arrangements (including spill response, dispersant use & clean-up arrangements, etc.) Noting the Coast Guard guidance and required approvals of plans

In addition to this information additional analysis and information is required from Nexen to the DCCA comprising:

- > Calculation of well control costs including the mobilisation of resources, management and installation of a well capping device (where appropriate) and the drilling and completion of a relief well;
- > Calculation of the Financial Responsibility required to cover pollution remediation and compensation according to the approved Methodology.
- > Demonstration that appropriate financial resources (including liability & insurance arrangements, including indemnities) are available to meet the obligations.
- > Description of the mechanism to ensure prompt payment of compensation.

The methodology for providing each of these additional pieces of information are discussed in Sections 3-4.





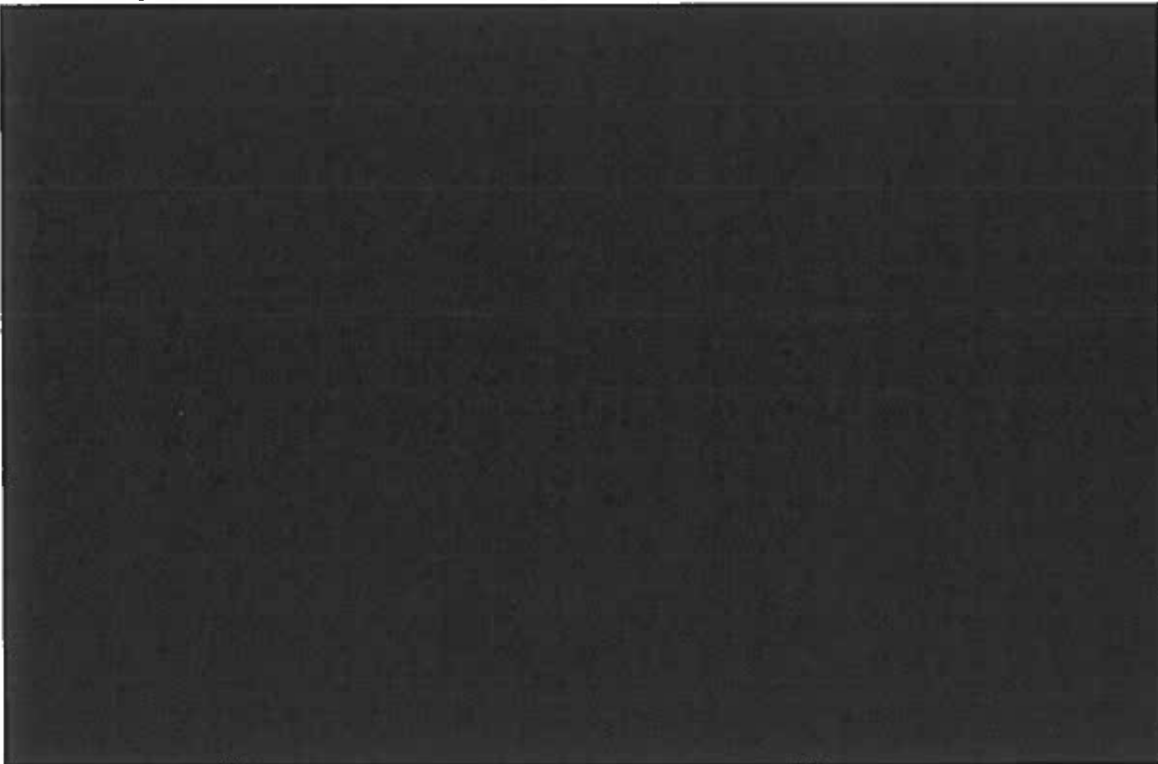
### 3 WELL CONTROL COSTS METHODOLOGY AND CALCULATIONS

#### 3.1 Well Control Costs Methodology and Calculations Overview

The Authorisation for Expenditure (AFE) information required for the planned well work and for contingency relief well operations, as well as acquisition, transport and deployment of a capping stack where appropriate has been used for helping to calculate the cost of well control.

Oil and Gas UK Guidelines for Relief Well Drilling for Offshore Wells (Issue 2, March 2013) states that a complexity assessment (in order that well is classed as basic or complex) should be conducted using the Operator's Internal assessment processes, procedures and standards, and should be used to identify the degree of complexity associated with relief well planning, equipment mobilisation and well execution.

The following methods have been used for calculating the cost of well control:



Below outlines relief drilling costs methodology and calculation selected. Results are summarised in Section 5.1.

Note the Iolar Exploration Well will not flow without artificial lift and therefore it is not considered necessary to assess the cost of controlling the well beyond relief drilling and capping


#### 3.2 Relief Drilling Costs Methodology and Calculation

For relief drilling according to Oil and Gas UK Guidelines on Relief Well Planning Issue 2, 2013, the well has been classed as [REDACTED]. Note this guidance is also referred to by the DCCAE "Method for Assessment of Financial Indemnity/Insurance of Petroleum Authorisation Holders", specifically section 4 "Recommended



Approach, June 2017 and Oil and Gas UK Liability Provision Guidelines for Offshore Petroleum Operations, Rev 1, February 2018. The following figure, Figure 3-1, is a table extracted from the 2013 guidance, makes clear what needs to be included in relief well planning for basic and complex wells

Figure 3-1 Oil and Gas UK Guidelines Extract for Relief Well Planning for Offshore Wells

Oil & Gas UK  Guidelines on Relief Well Planning for Offshore Wells

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Table 1: Summary of basic and complex relief well plan contents

| Description   | Basic Relief Well | Complex Relief Well |
|---|-------------------|---------------------|
| High level relief well directional plan, including seabed location and point of intersection              | ✓                 | ✓                   |
| Conceptual mooring layout for semi-submersible rig or jack-up positioning                                 |                   | ✓                   |
| Assessment of surveying positional uncertainty for existing wells   |                   | ✓                   |
| Relief well anti-collision scan and close approach plan   |                   | ✓                   |
| Wellbore surveying programme  |                   | ✓                   |
| Ranging-in procedures and required search instruments   |                   | ✓                   |
| Casing setting depths and sizes (which may be the same as for the original well plan)                     | ✓                 | ✓                   |
| Casing design, including weights and grades, and planned cement tops                                      |                   | ✓                   |
| Wellhead requirements   | ✓                 | ✓                   |
| Intersection point and method of establishing communication with the blowout well                         |                   | ✓                   |
| Kill fluid, kill design and required pumping equipment, storage volume and mixing capability              |                   | ✓                   |
| Drilling fluids selection   |                   | ✓                   |
| Relief well schematic   | ✓                 | ✓                   |
| High level rig specification (i.e. water depth and pressure rating) and UK Safety Case status             | ✓                 | ✓                   |
| Means of rig provision and country location of suitable units   | ✓                 | ✓                   |
| Long lead and relief well drilling equipment list and means of provision                                  | ✓                 | ✓                   |
| Specialist relief well drilling and well kill equipment, and the sources from which these may be obtained |                   | ✓                   |
| Project schedule  | ✓                 | ✓                   |

Issue 2 March 2013

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Nexen drilling team confirm that their original AFE has included for these complexities where relevant, therefore 2 x AFE should be sufficient for relief well drilling cost estimate



The currency values were converted using XE currency converter at a rate of 1 US \$ =0.87 EUR (XE, 2018)  
The cost breakdown of Iolar Exploration Well AFE is as follows in Table 3-1:

Table 3-1 Breakdown of Iolar Exploration Well AFE Costs

| Iolar Exploration Well AFE Costs | US \$ | Converted to € |
|----------------------------------|-------|----------------|
| Management and Well Planning     |       |                |
| Surveys                          |       |                |
| Drilling                         |       |                |
| Sub-total                        |       |                |
| Contingency                      |       |                |
| Total with Contingency           |       |                |

### 3.3 Capping Device Methodology and Calculation

Capping assumptions are made using DCCAE "Method for Assessment of Financial Indemnity/Insurance of Petroleum Authorisation Holders", specifically section 4 "Recommended Approach, June 2017 and Oil and Gas UK Liability Provision Guidelines for Offshore Petroleum Operations, Rev 1, February 2018. Within the Irish guidance it is specified that changes for the Irish market should be considered.

The currency values were converted using XE currency converter at a rate of 1 US \$ =0.87 EUR (XE, 2018) and are summarised in Table 3-2 below.

Table 3-2 Estimated Capping Costs

| Estimated Capping Costs                                | US \$ | Converted to € |
|--|-------|----------------|
| Standard capping costs from Oil and Gas UK Guidance    |       |                |
| Additional logistics costs to deploy to Iolar location |       |                |
| Total  |       |                |



## 4 POLLUTION REMEDIATION/COMPENSATION METHODOLOGY AND CALCULATIONS

### 4.1 Pollution Remediation/Compensation Methodology and Calculations Overview

The Pollution Remediation/Compensation methodology and calculation used within the section follows the DCCAE "Method for Assessment of Financial Indemnity/Insurance of Petroleum Authorisation Holders", specifically section 4 "Recommended Approach, June 2017.

This section of the report breaks down methodology and calculation of costs for pollution remediation and per the guidance referred to above includes the following subtopics:

- > Impact Assessment
- > Oil Spill Response & Clean Up
- > Fisheries
- > Aquaculture
- > Other Economic Impacts

Results are also summarised below in Section 5.2.

### 4.2 Impact Assessment Methodology and Calculations

Under the United Nations Convention on the Law of the Sea (UNCLOS), Ireland is obligated to protect and preserve the marine environment. Ireland is also signatory to the International Convention on Oil Pollution, Preparedness, Response and Co-operation Convention 1990 (OPRC), which requires a National Contingency Plan (NCP). Under the NCP, if oil and chemical spills are expected to have a significant impact, arrangements should be made to begin to monitor and assess the long-term, as well as the short- and medium-term, impacts (DTTAS, 2013).

Based on expert judgement from previous oil spill impact assessment experience, the cost of the impact assessment was split between intertidal and offshore work.

For intertidal work, Xodus Group found that surveying, analysis and reporting were the three main drivers when estimating the cost of scientific studies to determine the extent and nature of environmental impact.

Table 4-1 Estimated cost per team required for intertidal work

| Component of Oil Spill Study Impact Assessment         | Estimated cost (€) |
|--|--------------------|
| Surveyors, equipment, vehicle, accommodation, expenses |                    |
| Analysis   |                    |
| Reporting – including drafts                           |                    |

For offshore work, Xodus Group found common drivers with intertidal work when estimating the cost of an impact assessment but also determined that seabird/cetacean specialists would be required.

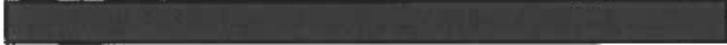


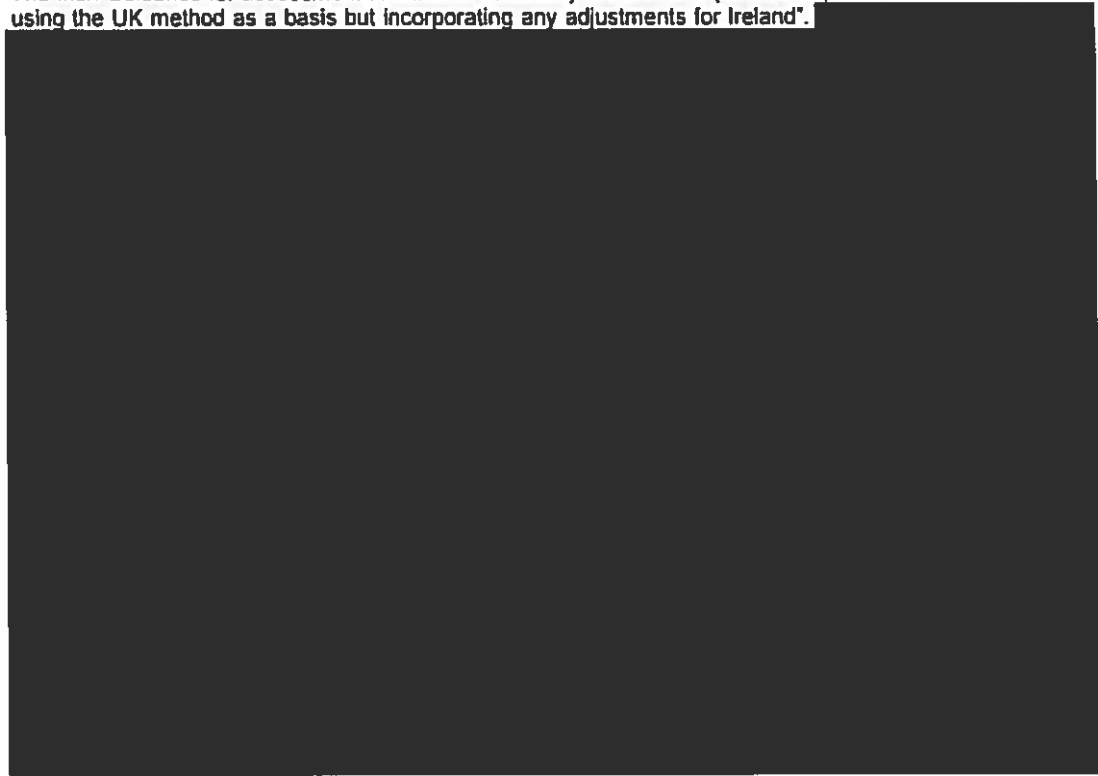
Table 4-2 Estimated cost per team required for offshore work

| Component of Oil Spill Study Impact Assessment  | Estimated cost (€) |
|---|--------------------|
| Surveyors, equipment, vessel, expenses – approximately required for 2 weeks at €35,000/day                      |                    |
| Analysis – mix of benthic and water sampling, approximately required for 10 days at €20,000/day                 |                    |
| Reporting – including drafts  |                    |
| Seabird/Cetacean Specialists – approximately 3 specialists required to do 24 hours of work, including reporting |                    |

The total cost of scientific studies to determine the extent and nature of environmental impact was predicted to equate to approximately . However, additional survey effort may be required depending on initial results and therefore influencing the total cost of an impact assessment.

### 4.3 Oil Spill Response & Clean Up Methodology and Calculations

The Irish Guidance for assessment of financial indemnity states "that spill clean-up costs could be estimated using the UK method as a basis but incorporating any adjustments for Ireland".

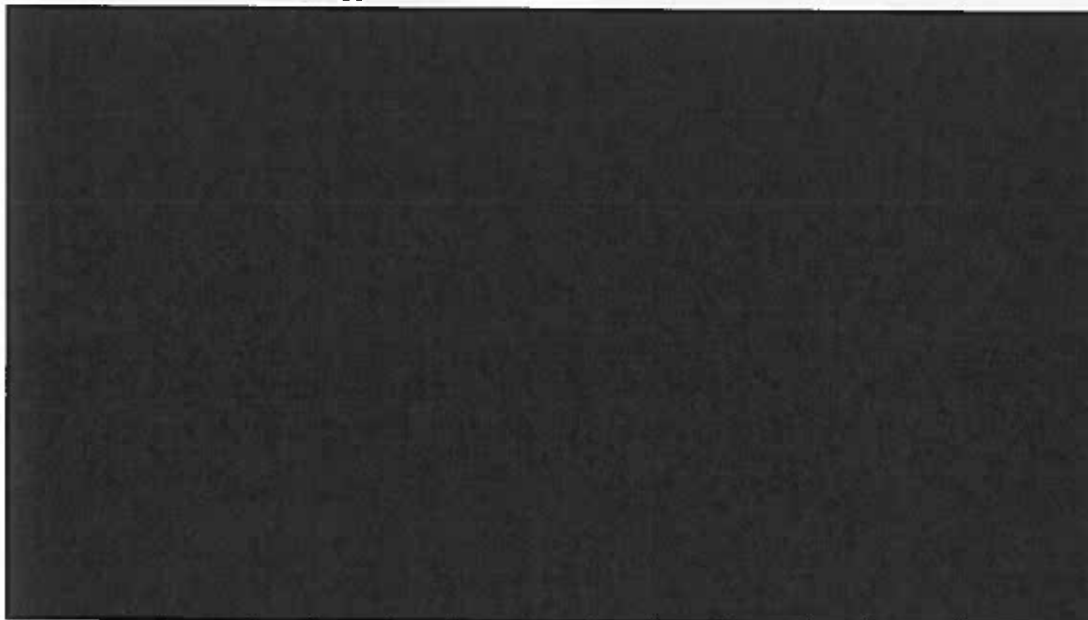


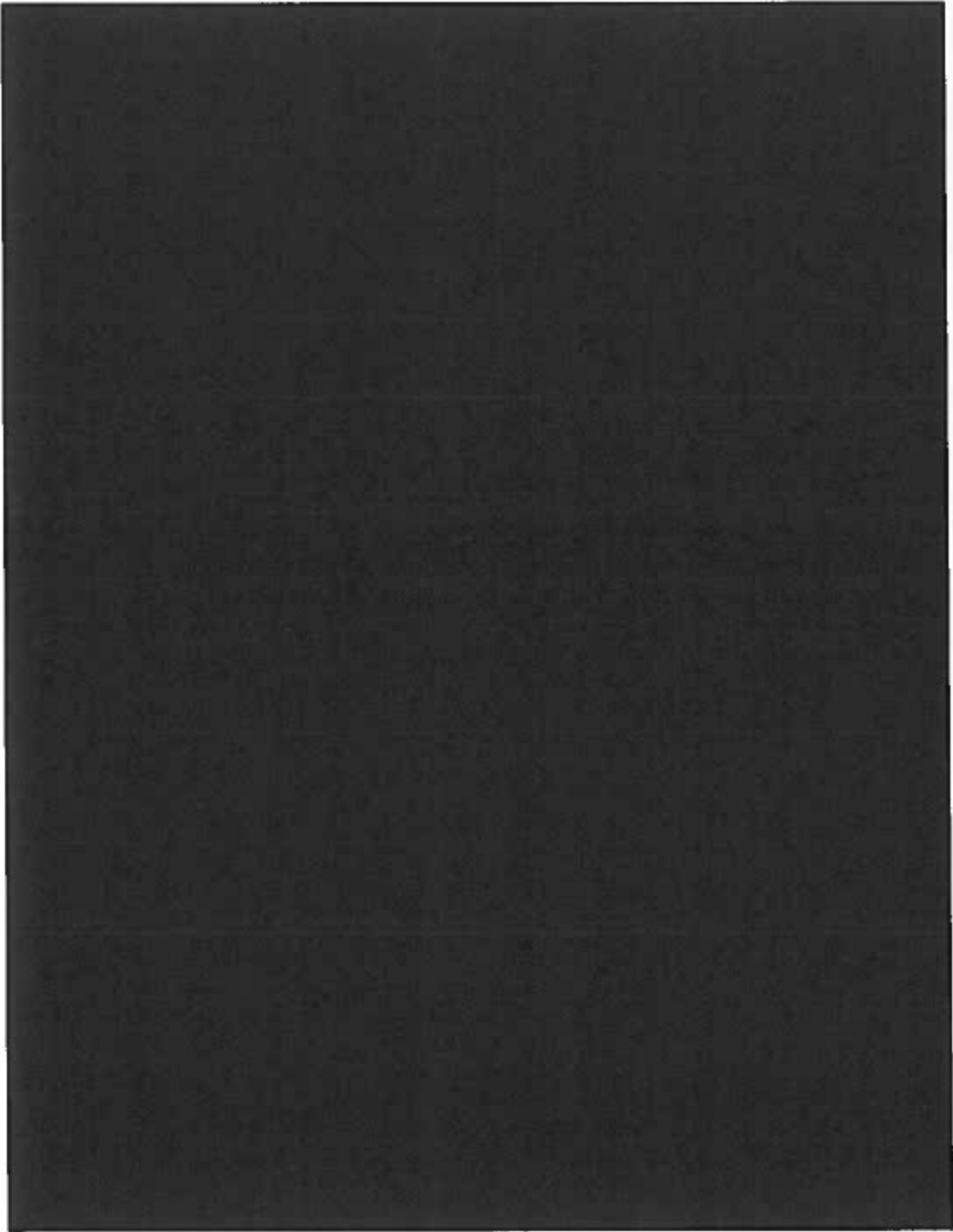


**Clean up cost calculations:**

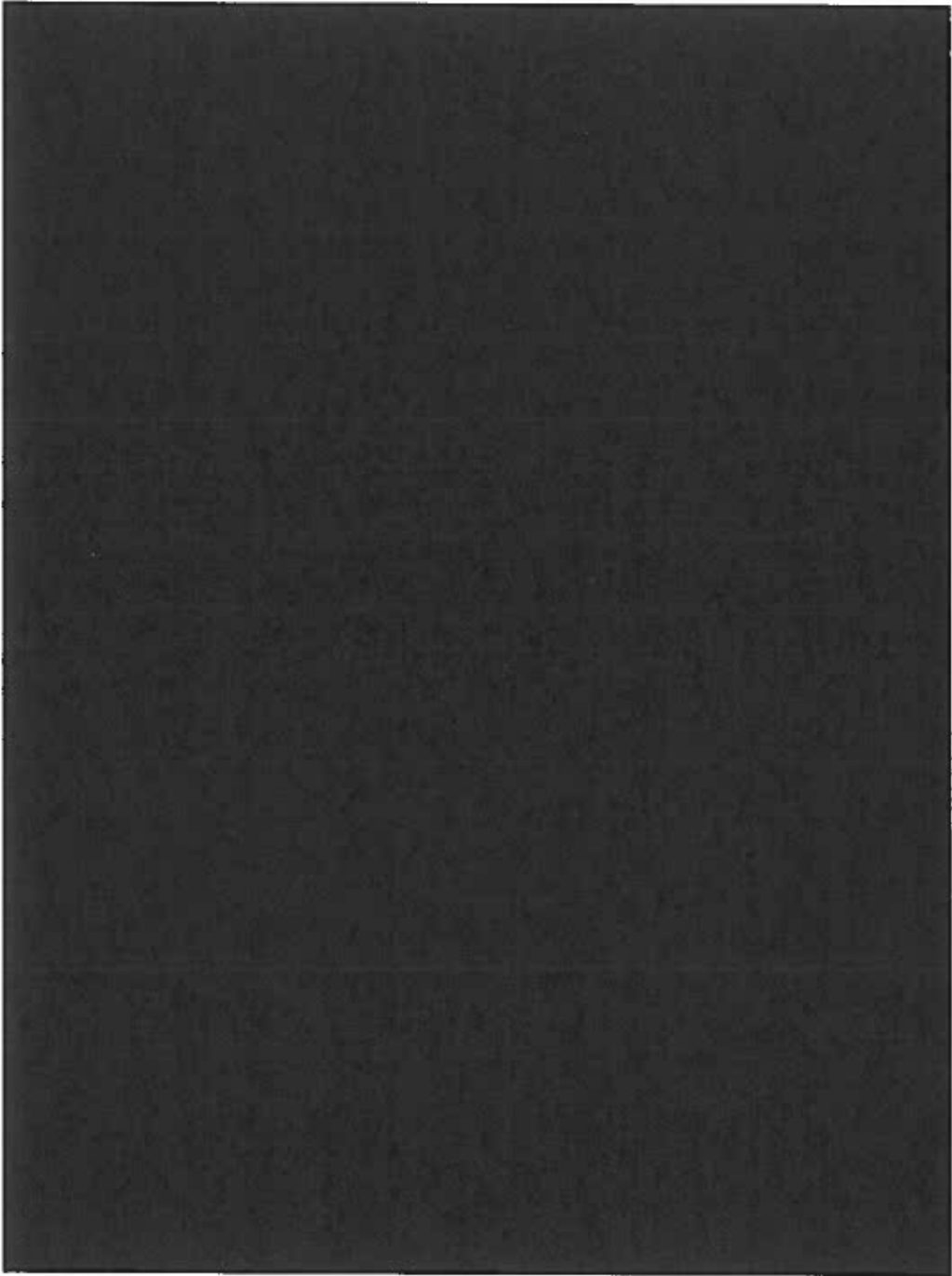


**4.4 Fisheries Methodology and Calculations**

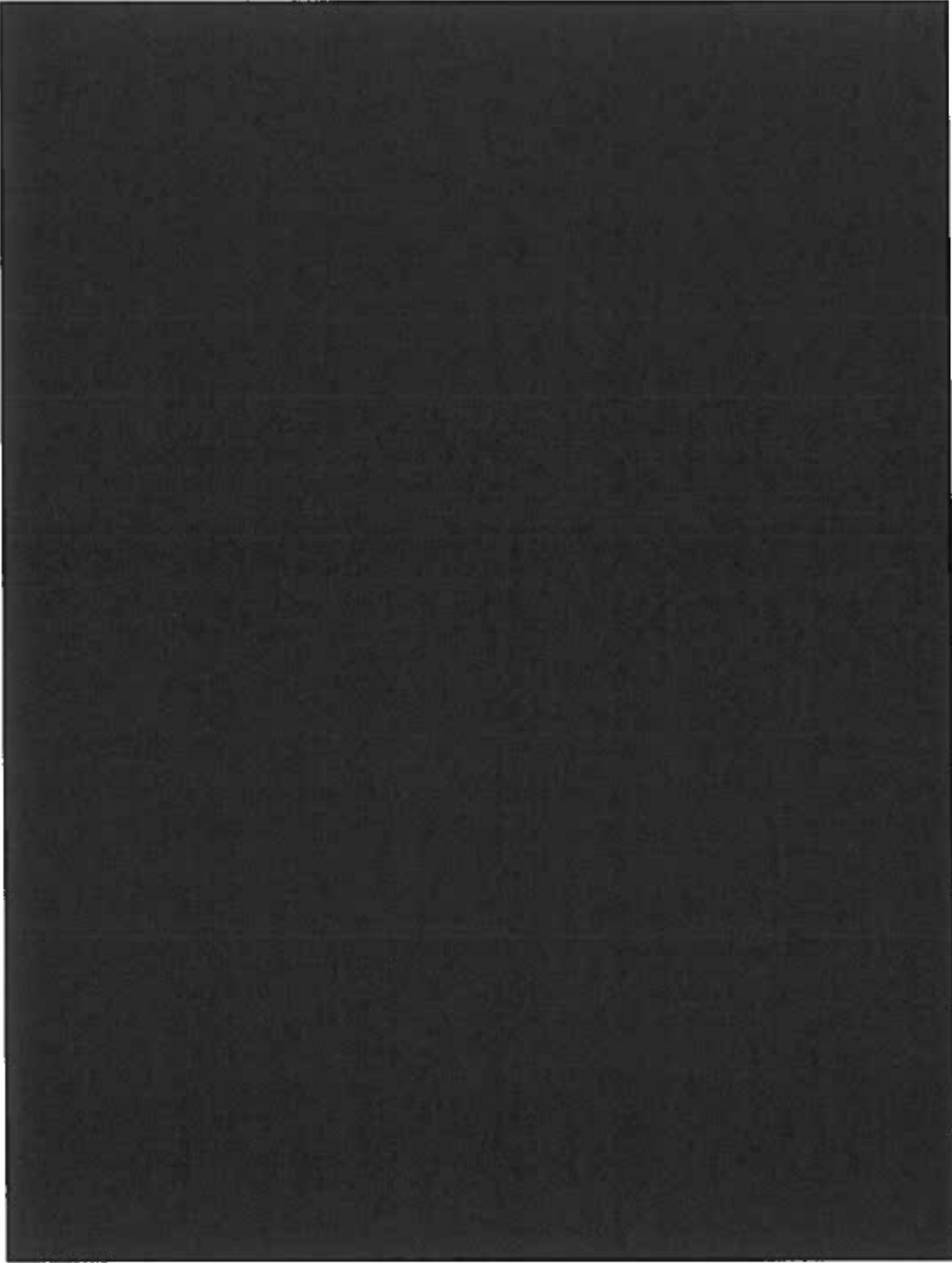




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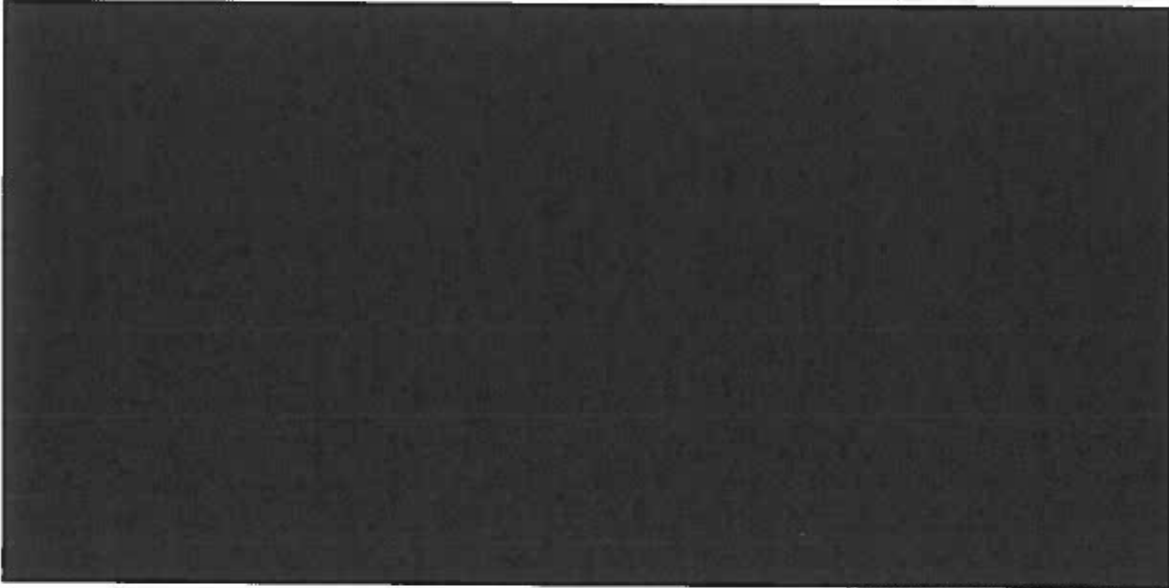




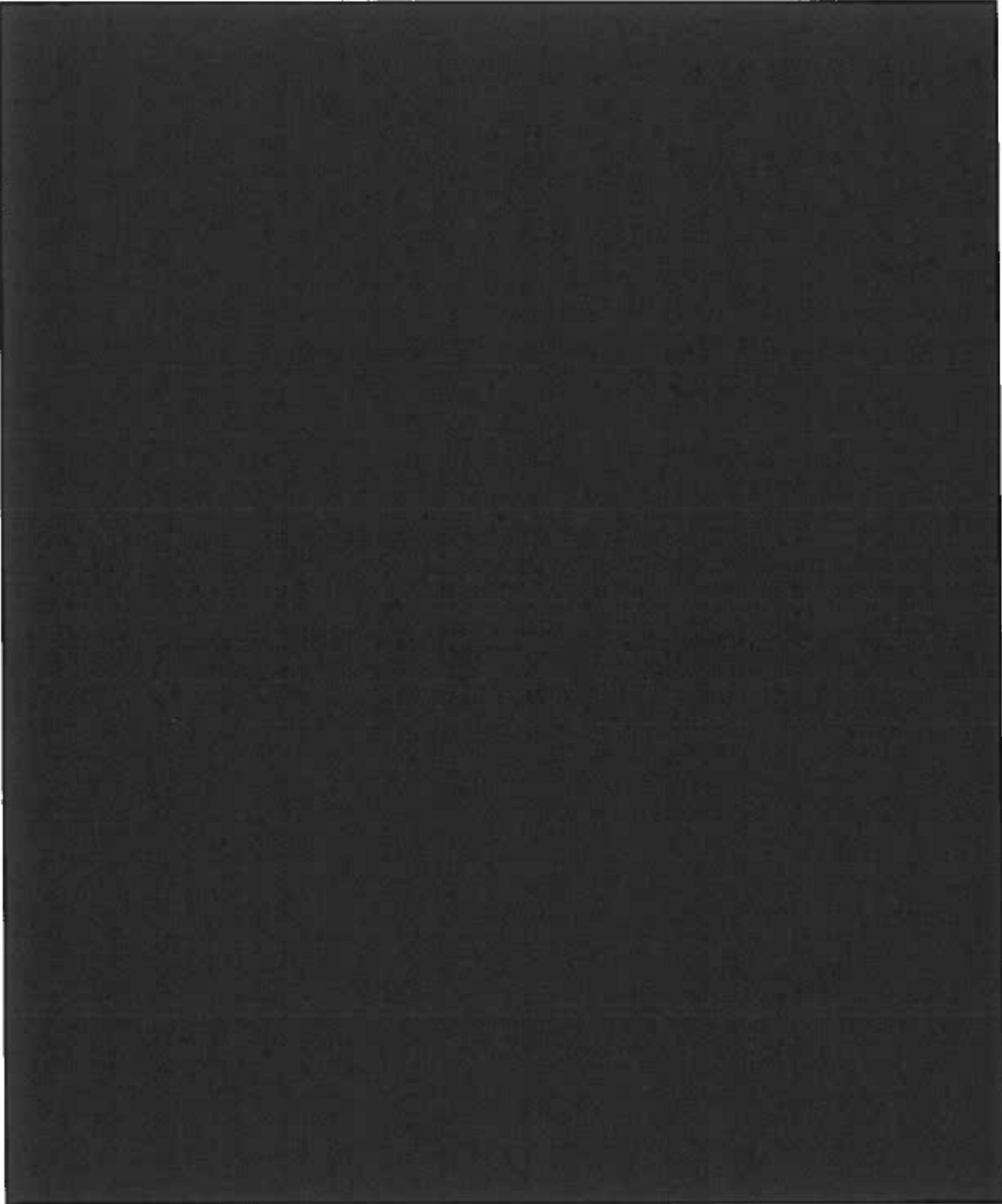


#### 4.5 Aquaculture Methodology and Calculation

The Irish Guidance for assessment of financial indemnity suggests the use of total value of aquaculture production by county sourced from BIM (BIM, 2018; Waite, *et al.*, 2017). The impacted shoreline layer was exported from OSCAR into a Geographical Information System (GIS) to determine the impacted counties.



\*rounded to three significant figures





## 4.6 Other Economic Impacts Methodology and Calculation

Other contributing factors were considered and justified for inclusion or exclusion to the overall economic impact.

### 4.6.1 Tourism

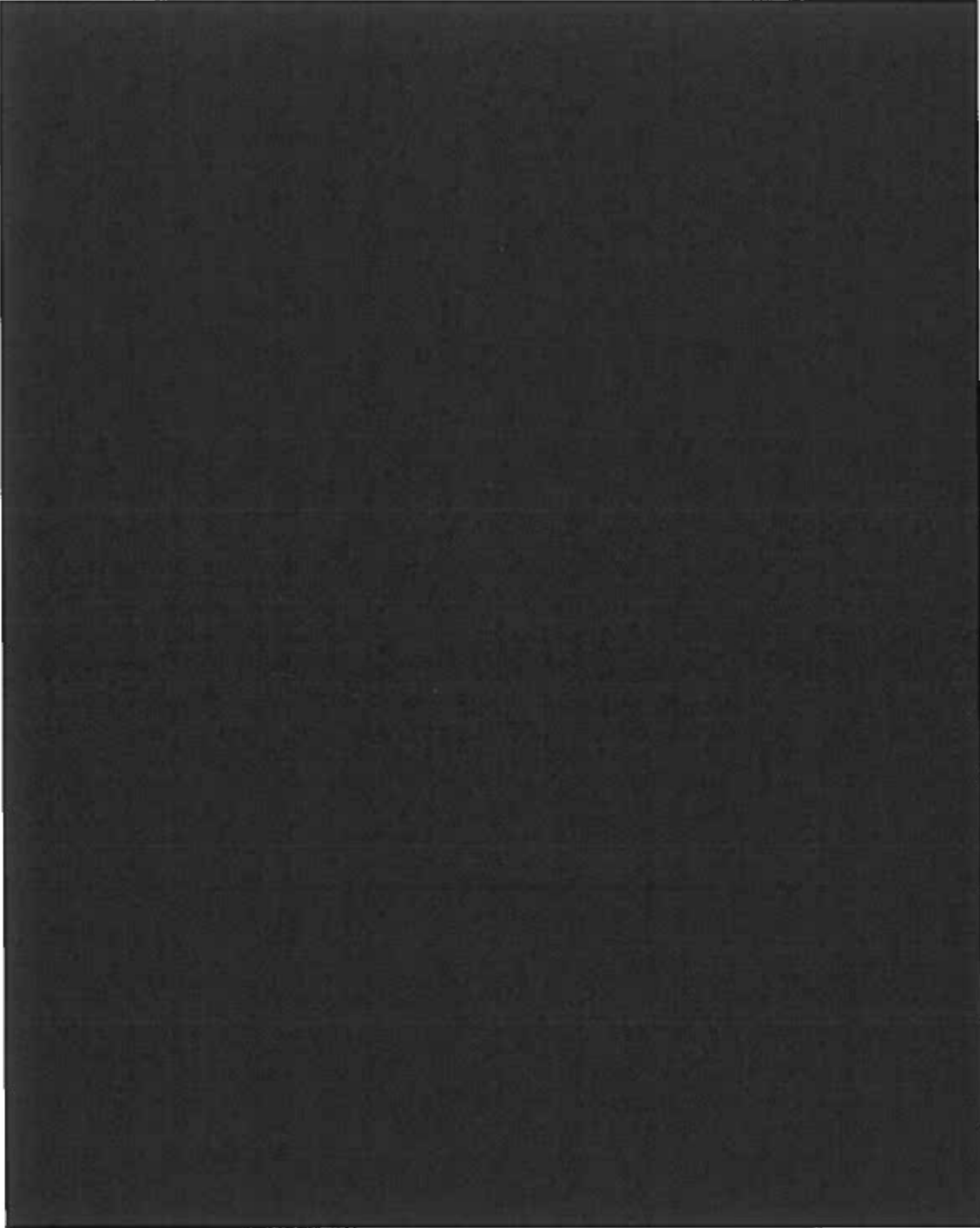
The Irish Guidance for assessment of financial indemnity suggests using "Overseas Tourism Revenue" from Fáilte Ireland dataset to account to economic impact on tourism for each county (Waite, *et al.*, 2017). The updated UK Guidance considers both overseas and domestic spending per trip over 3 years to calculate economic impact (BMT Cordah, 2017).

This report used the average tourism revenue over a 3-year period (2014-2016), including overseas and domestic tourism, for each county sourced from Fáilte Ireland dataset (Fáilte Ireland, 2018). The impacted shoreline layer was exported from OSCAR into a Geographical Information System (GIS).

The updated UK guidance for financial responsibility for oil spill clean-up suggests calculating 10% of the total tourism revenue to represent a loss of direct tourism business (BMT Cordah, 2017). Using this assumption, the economic impact is predicted to be [REDACTED]

Table 4-5 Average tourism revenue over 3 years for each county

| County   | Average tourism revenue over 3 years (€) |
|----------|--|
| Galway   | [REDACTED]                               |
| Kerry    | [REDACTED]                               |
| Limerick | [REDACTED]                               |
| Clare    | [REDACTED]                               |
| Mayo     | [REDACTED]                               |
| Sligo    | [REDACTED]                               |
| Cork     | [REDACTED]                               |
| Donegal  | [REDACTED]                               |





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#### 4.6.2 Coastal Power stations

[Redacted content]

#### 4.6.3 Renewables

[Redacted content]

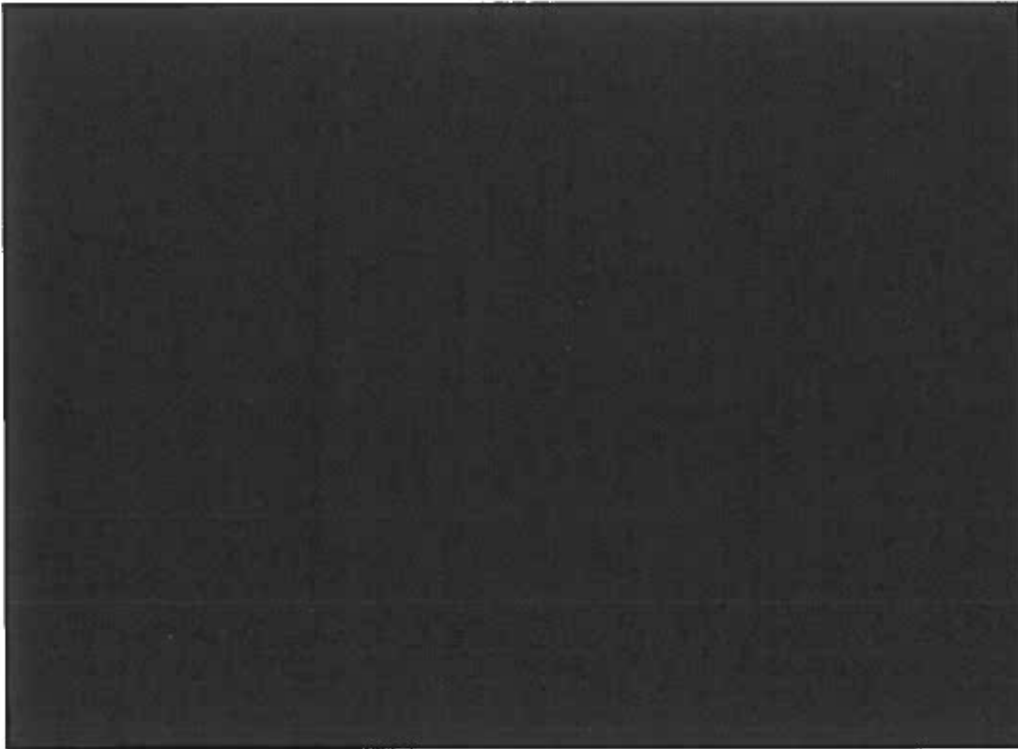
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#### 4.6.4 Agriculture

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#### 4.6.5 Ferries and ports

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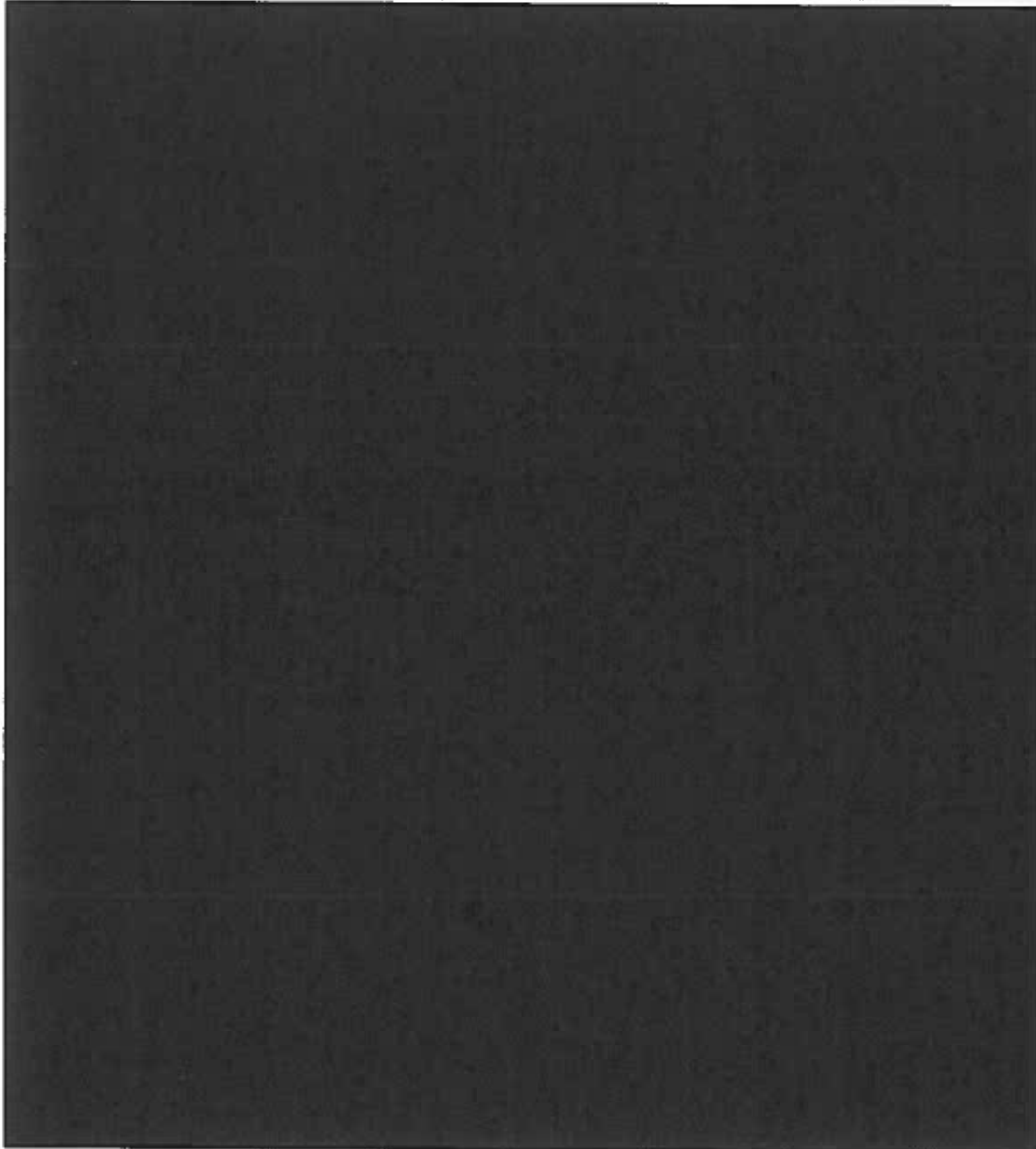


## 5 RESULTS

### 5.1 Control of Well

The control of well financial responsibility limits calculations has been calculated using the methodology described in Section 3 and are presented in Table 5-1 below consistent with the DCCAE guidance.

All background calculations are available and justifications are discussed in Section 3 above







### 5.3 Overall Financial Responsibility

The overall financial responsibility is calculated from totals from Table 5-1 and Table 5-2 above and presented below in Table 5-3.

Table 5-3 Financial Responsibility Limit Calculations – Combined

| <b>FINANCIAL RESPONSIBILITY LIMITS CALCULATIONS - Combined</b> |                   |
|--|-------------------|
|  | <b>FR Level €</b> |
| Total for Well Control   |                   |
| Total for Pollution  |                   |
| <b>Overall Total FR</b>  |                   |



---

## 6 FINANCIAL ARRANGEMENTS



### 6.1 Demonstration of Appropriate Financial Resources

The following methods for demonstration of appropriate financial resources selected are:

Verification of Insurance

### 6.2 Description of Prompt Compensation Payment Mechanism

The following methods used to help describe the prompt compensation payment mechanism are:

- 
- 
- Nexen places insurance with insurers whom have a minimum financial strength rating and good reputation for claims payment.



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## 7 CONCLUSIONS

The conclusion of this report is that the estimated overall financial responsibility limit costs are [REDACTED]. Nexen has the financial resources necessary to meet its participating interest share, verified through insurance.



## 8 REFERENCES

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