

# **Bacton terminal site redevelopment Re-opener Submission**

**Overarching document**

**October 2024**

**Issue: 3**

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# Executive Summary

National Gas Transmission (NGT) is committed to ensuring the continued safe, efficient, and reliable operation of the National Transmission System (NTS). Bacton Gas Terminal is a critical strategic asset and has formed an integral part of the NTS for over 50 years, acting as both a Southern North Sea input hub for UK domestic supply and in recent decades a key interface between UK / EU gas supplies. It is a complex site managing gas entry and exit, across NTS Feeders, EU Interconnection points, UKCS sub terminals and NTS offtakes.

Our Final Option Selection Report (FOSR) was submitted under Special Condition 3.10 Bacton terminal site redevelopment Re-opener and Price Control Deliverable Part C of the Licence in February 2024. It set out our preferred option to take terminal operations up to 2035 to 2050 with this being Option 1 – Baseline Asset Health.

The FOSR presented and considered four options as listed below noting that in all options a basic level of baseline Asset Health (AH) works are required to maintain the plant up to 2035 and beyond.

- Option 1 – Baseline AH
- Option 2 – Baseline AH + Major rationalisation and reduce inventory
- Option 3.1 – Baselined AH + Partial New Build brownfield (3.1)
- Option 4 – Baseline AH + Partial New Build Greenfield Site Extension

| 2018/19    | 2025 – 2035 (£m) | 2035 – 2050 (£m) | Total |
|------------|------------------|------------------|-------|
| Option 1   |                  |                  |       |
| Option 2   |                  |                  |       |
| Option 3.1 |                  |                  |       |
| Option 3.2 |                  |                  |       |

**Table 1 – Bacton FOSR Options**

As part of the FOSR determination in accordance with Special Condition 3.10.9, Ofgem agreed with and decided to approve the Final Preferred Option identified by National Gas Transmission, Option 1 Base Case Asset Health. This comprising critical Asset Health works required to maintain terminal Operations to 2025 and beyond.

In order to be comprehensive, NGT are also using the submission to address various other areas of baseline works across asset health by means of true up. The scope items included in the Bacton FOSR cost Re-opener are listed in Table 2 along with the rationale for inclusion.

As part of the FOSR process, National Gas considered whether part of the terminal can be rationalised in its current state and also future states. The FOSR set out that there is a defined need case that shows Bacton operating to meet customer requirements to the late 2040’s and this supports requirement to maintain existing assets under the proposed Asset Health solution. As such there is minimal scope for rationalising the terminal in terms of process gas assets however where possible sub systems have been considered such as the Low Voltage distribution system and this is covered in the individual Engineering Justification Papers (EJP’s).

**Table 2 – Main subject areas of the FOSR Cost submission.**

| Submission component   | Rationale for inclusion   |
|--|---|
| Main Scope – CP  | Primary area of work – Short to Medium term AH classed as ‘no regrets’. This work is associated with the full removal and then replacement of the Cathodic Protection system across the Bacton Terminal.  |
| Main Scope – Valves & Actuators                              | Primary area of work – Short to Medium term AH classed as ‘no regrets’. Scope primarily covers Valves replacement and associated actuators in some cases.   |
| Main Scope – LV Distribution system plus core associated C&I | Primary area of work – Short to Medium term AH classed as ‘no regrets’. This work is associated with the full replacement of the Low Voltage Distribution system and associated equipment at the Terminal. As part of this scope there are also rationalisations being made to the equipment where possible to streamline the future LV system.   |
| Plant & Equipment and Cabs UID true up                       | UID’s that were originally planned for submission in the January 2024 AH re-opener for the NTS and were agreed to be managed through the Bacon FOSR cost re-opener process.<br>This includes CP Investigations and rectification and Firewater ring main UIDs seeking true up and further allowances. We seeking to true up the following<br>Preheater PSSR Revalidation, WBH Inspection & Major Refurbs;<br>Replacement of Failed IJs on AGIs<br>AGI Pipework Painting (Full, Partial or Patch)<br>Filters PSSR Inspection & Major Overhauls |
| FOSR true up   | Additional items being delivered with RIIO-T2 Baseline funding that require true up where the costs are different as compared to the baseline allowances awarded at the start of RIIO-T2 for the Bacton FOSR baseline position.   |

Expanding on table 2, some key details are outlined below. The main focus of the submission is to present the three Engineering Justification papers (EJP) that were positioned and covered in the FOSR submitted on 28<sup>th</sup> February 2024.

### Cathodic Protection

This paper [Cathodic Protection EJP- – Bacton FOSR Cost Re-opener] highlights the defective nature (as evidenced in two Close Interval Potential Surveys (CIPS) 2019 & 2023 respectively) of the Bacton Terminal and the consequential impact on security of supply and safety standards. Bacton as an Upper Tier COMAH establishment is one of the most strategically positioned site on the NTS, delivering significant gas volumes in and out of the United Kingdom (UK) and connects the UK to European Union (EU) markets. As identified in the Bacton Investment Strategy and the Final Option Selection Report (FOSR), this EJP sets out the necessary asset health (AH) interventions and requests [REDACTED] re-opener funding to bolster the reliability / longevity of the Bacton Terminal. With circa 95% of the Cathodic Protection systems below the minimum level of protection required, this EJP will focus on associated systems such as transformer rectifiers, electrical resistance probes, distributed anode system, reference electrodes and control and instrumentation.

### Critical Valves

As established in the FOSR to be one of the three (3) major components to the preferred asset health solution, this EJP sets out the details for required funding i.e. [REDACTED] (2018/19) for the replacement of 50 identified valves (See Critical Valves and Actuators EJP Appendix B – Final FOSR Critical Valves Index). Whilst 56 valves were initially identified in the FOSR, NGT have conducted further volume review to determine these 50 valves as shown in Figure 1 of the EJP [Critical Valves and Actuators EJP – Bacton FOSR Cost Re-Opener]. [REDACTED] study

determined the most effective long-term option for Bacton, with especial requirement for valves replacement. Considering the extent of gas throughput and the existence of over 1000 valves with differing diameters at this terminal, mechanical integrity is an important factor for maintaining gas flow reliability. This paper highlights the criticality of these valve replacements to safety instruments and systems, safe isolation protocols, pressure protection, gas flow regulation and direction amongst others.

## Low Voltage

This EJP [Low Voltage Switchgear EJP – Bacton FOSR Cost Re-Opener] provides coverage on the operational challenges associated with the optimum performance of electrical assets namely Standby Generators, Uninterruptible Power Supply (UPS), Battery Systems, Electrical Kiosks and Distribution Board and External Lightning. In addition to these electrical assets, Control and Instrumentation (C&I) systems also fall within the scope of the asset health defects at Bacton Terminal. This paper requests [REDACTED] composed of LV Assets and C&I costs baseline funding for asset health investment on our electrical infrastructure assets. Proposed interventions for current and future requirements are contained within the Bacton [REDACTED] Report with additional Distribution Boards engineering assessments detailed in the Distribution Boards Maintenance Records.

This submission also identifies baseline UID investments where the cost is different to the baseline allowances. At the highest level these items are set out below:

**Plant & Equipment UID's (Jan 24' AH)** – these were UID's that were omitted from the January 2024 Asset Health Submission where it was deemed more logical to bring all Bacton items together under the FOSR cost re-opened.

**Fire Water Ring Main** – additional funding required to account for costs that are higher than awarded T2 allowances – supported by MWC estimates and tender process reflective of the market.

**Bacton FOSR baseline funding** – The FOSR cost submission is looking to position the current and forecast spend on the remaining £10.5m of allowances being utilised to develop the FOSR and elements of the ongoing works.

**Bacton Feeder Filtration costs** – The Feeder Filtration investment that was submitted in January and June 2023 sought [REDACTED] of funding to install filtration on feeders 02 and 04 as they enter Bacton. In developing this solution NGT have expended [REDACTED] to process that submission. This is a combination of designer and NGT costs that NGT wish to formalise as part for the FOSR development costs.

NGT's total funding request in this October 2024 Bacton Reopener submission, across all investment themes, [REDACTED]. This includes direct costs for requested funding under licence terms BTRAT and BTROT. This figure also includes true up elements as outlined in the submission where NGT are returning some allowances and requesting top up on areas that have demonstrated allowances were not high enough to cover the work based on Market prices. It also includes those Asset Health UID allowances it is proposed Ofgem will “zero out” and realign under this Bacton re-opener.

Table 5 below provides a breakdown and further details are included within this document and the cost book for the submission included in Appendix A.

# 1. Summary Table

NGT’s request for funding through this document is made against Special Condition 3.10 Bacton terminal site redevelopment Re-opener and Price Control Deliverable and is outlined in Table 1. This is aligned to the Regulatory Reporting Pack (RRP).

**Table 3: Summary Table (October 2024)**

|  |   |                |                |
|--|---|----------------|----------------|
| <b>Name of Scheme/Programme</b>                      | Special Condition 3.10 Bacton terminal site redevelopment Re-opener and Price Control Deliverable   |                |                |
| <b>Primary Investment Driver</b>                     | Resilience  |                |                |
| <b>Scheme Reference / Mechanism or Category</b>      | SpC 3.10 Bacton Terminal:<br>Adjusting the values of the following terms; <ul style="list-style-type: none"> <li>• Baseline allowance – BTRAt</li> <li>• Re-opener allowance - BTROt</li> </ul> |                |                |
| <b>October 24 Submission Cost (18/19 price base)</b> | [REDACTED]  |                |                |
| <b>Cost Estimated Accuracy</b>                       | +15%/-10%   |                |                |
| <b>Cumulative Cost request (18/19 prices)</b>        | n/a   |                |                |
| <b>Delivery Year</b>                                 | 2021- 2035  |                |                |
| <b>Reporting Table</b>                               | RRP Table 6.2 (Projects), table 6.1(Capex_Summary) and table 6.3 (Asset Health)   |                |                |
| <b>Spend Apportionment</b>                           | <b>RIIO-T2</b>  | <b>RIIO-T3</b> | <b>RIIO-T4</b> |
|  | [REDACTED]  |                |                |

# 2. Introduction

This submission comprises NGT’s Bacton terminal site redevelopment Re-opener application pursuant to Gas Transporter Licence Special Condition 3.10 Part D. Our application sets out our funding request for Bacton baseline Asset Health solutions to be incurred at Bacton for the period 2025 to 2035 Bacton terminal site redevelopment Re-opener and Price Control Deliverable (BTRt and BTROt).

NGT’s objectives for the reopener event are to:

- Request investment allowances for the three baseline asset health solutions projects set out in this application. These projects are submitted with defined scope, outputs and costed project plans which have developed since the FOSR submission in February 2024.

- Request true up and additional funding for 6 UIDs (5x Plant & Equipment;1x Cabs) and FOSR baseline funding.

The application includes a level of detail in line with Ofgem’s RIIO-2 Re-opener Guidance and Application Requirements Document: Version 3, dated (the Re-opener Guidance).

Included in the submission are the necessary details contained in supporting information files for each of the projects (or an explanation as to why such information is not available).

All costs presented in this document are in a 2018/19 price base (or an explanation provided if not).

## Application criteria

In accordance with section 2.2 of Ofgem’s Re-Opener guidance<sup>1</sup> (the Guidance), this application is accompanied by an assurance statement (Appendix B) to comply with Ofgem’s requirement for written confirmation from a suitable senior person within the company that the re-opener application has been appropriately assured.

Appendix C highlights NGT’s mapping to Ofgem requirements.

NGT’s designated point of contact for this re-opener application is Jessica Lang, Regulatory Development Manager, email [REDACTED]

In line with section 2.4 and 2.5 of the Guidance, this application document and supporting business case documents will be published in their entirety within five days of submission, with only necessary redactions where appropriate. Publication will include an explanation for any redactions.

## 3. Background and Context

As part of our RIIO-T2 submission in December 2019, we proposed to redevelop Bacton through the construction of a new brownfield site within the existing site fence line. Noting the early stage of project development, Ofgem provided funding to complete the options selection, including engineering assessments, within this FOSR and to complete a re-opener submission.

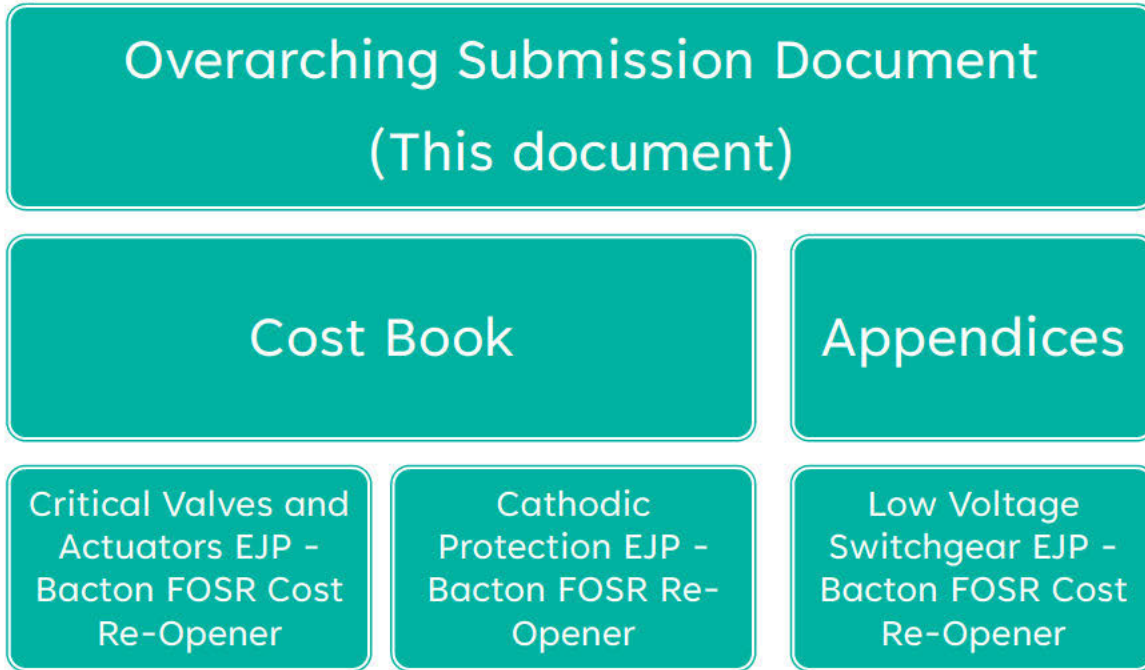
NGT subsequently submitted a FOSR submission in February 2024 which our preferred option for managing the Terminal up to 2050. The preferred option was base case Asset Health and post submission and after bilateral engagement with Ofgem this was agreed by Ofgem in August 2024.

This cost re-opener sets out NGT’s funding request for the FOSR preferred solution and comprises several components as outlined in Figure 1 below. As alluded to in Section 1 ‘executive summary’ and section 4 ‘licence conditions and outputs’, NGT are also utilising this submission via agreement with Ofgem to true up and reconcile a number of other Bacton items and investments in one consolidated approach.

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<sup>11</sup> [Re-opener Guidance and Application Requirements Document: Version 3 | Ofgem](#)

Figure 1 – FOSR Cost Submission Structure



### Rationalisation

In its direction approving our recommended option, Ofgem noted that this option does not prevent available rationalisation opportunities. During the post submission Supplementary Question (SQ) process for the FOSR, NGT provide additional confirmation as to regards the fact that rationalisation of the terminal does not add value to consumers owing to the high cost of removing equipment from site (buried equipment) but at the same time removing operational resilience and flexibility to juggle a range of scenarios. For more detail, [REDACTED] can be referred to. NGT have however revisited this in light of the cost submission being the next stage in the process and sought to rationalise where possible.

The submission also sets out the specific funding requests by discipline area and presents various details on the need case, evidence base and also justification for investment.

## 4. Licence Conditions and Outputs

Special Condition 3.10 of the NGT Licence relates to the Bacton terminal site redevelopment Re-opener and enables NGT to request adjustment to the value against the following licence terms:

- Baseline allowance - *BTRAt*
- Re-opener allowance - *BTROt*

The Bacton terminal site redevelopment Re-opener (*BTROt*) provides the mechanism for the submission.



In accordance with licence condition 3.10 NGT's submission seeks to modify the values within the Gas Transmission RIIO-2 Price Control Financial Model (PCFM).

## 5. Funding Request

This section provides information on the overarching funding request made through our Re-opener submission, comprising the CP, LV and Valves EJPs and true up/further funding requests for six Bacton related UIDs.

The total ask for Bacton to deliver the associated work at Bacton is contained in Table 4 below. In summary the costs are made up from:

- Asset Health works determined by the Bacton Terminal Redevelopment Reopener
- Netting off the baseline allowances provided within RIIO-T2  
Together with true-up requirements for existing Bacton UIDs

Table 4 - October 24 Bacton terminal site redevelopment Re-opener Funding Request

|  |              | £18/19m PRICES                                 | Direct Cost | Direct inc. CAI Escalator |
|--|--------------|--|-------------|---------------------------|
| FOSR Project Costs                         | Forecast     | Cathodic Protection                            |             |                           |
|  |              | Electrical                                     |             |                           |
|  |              | Valves   |             |                           |
|  |              | <b>TOTAL</b>                                   |             |                           |
| FD Returned allowances in scope of project | FD Allowance | FOSR   |             |                           |
|  |              | ██████████ CP Investigations & Rectification   |             |                           |
|  |              | ██████████ - Replacement of Failed IJs on AGIs |             |                           |
|  |              | <b>TOTAL</b>                                   |             |                           |
| True up of existing FD Allowances          | Forecast     | ██████████ Firewater Ringmain Replacement      |             |                           |
|  |              |  |             |                           |
|  | FD Allowance | ██████████ - AGI Pipework Painting             |             |                           |
|  |              | ██████████ - PSSR Inspection                   |             |                           |
|  |              | ██████████ - Preheater PSSR                    |             |                           |
|  |              | ██████████ Firewater Ringmain Replacement      |             |                           |
|  |              | ██████████ - AGI Pipework Painting             |             |                           |
|  |              |  |             |                           |
|  |              |  |             |                           |
|  |              |  |             |                           |
|  |              |  |             |                           |
|  |              | <b>TOTAL NET REQUEST</b>                       |             |                           |

## Bacton FOSR Baseline Funding

NGT were awarded £10.5m to undertake FEED feasibility and conceptual for FOS and develop the options to land at a preferred solution, with the outputs being to deliver the Final Option Selection Report (FOSR) and then the cost re-opener aligned to UID [REDACTED] – Bacton Terminal Redevelopment FEED. The FOSR position has been quantified within the cost book stating where the current spend is up to.

NGT propose to align additional funding under this allowance as set out below with brief explanation of why this is being proposed / undertaken.

### 1. Bacton Filters on Feeders and Incomers

- Work was originally undertaken on this project at risk when it was believed OFGEM would support the costs for further filter work on the feeders 02 and 04. Subsequently it was determined that OFGEM would not support any further work, and so the costs incurred to date have been aligned to this as development works.
- [REDACTED] has been spent to date on this and aligned to the UID [REDACTED]

### 2. Bacton Buried Pipework Condition (ER Probes)

- Surveys on buried pipework at Bacton were undertaken to feed into the FOS option selection, and as such was funded through the FEED baseline.
- [REDACTED] has been spent to date, pending ongoing compensation events.

## 6. Bacton UIDs

### Summary

As part of Ofgem's Final Determinations in December 2020, NGT received Baseline funding for investments at Bacton. This included funding for five Plant and Equipment (P&E) UIDs and 1 Cabs UID.

No true up or additional funding for these UIDs has been requested through any of the Asset Health re-opener windows to date. We proposed in our Asset Health Re-opener submission of January 2024 that the required 5 P&E UIDs would be progressed through the Bacton Special Condition 3.10 Bacton terminal site redevelopment as they align better with the works proposed at the terminal as a grouping. We also noted that as part of this process, we would review the NARM funding category in line with the process described in the Asset Health Re-opener submitted in January 2024.

In Ofgem/NGT bilateral meetings it was proposed that for those UIDs NGT seeks additional funding for, the Asset Health UIDs will be reduced to zero and the true up/additional allowances requested via SpC 3.10. For the remaining UIDs, NGT to provide details of true up for inclusion in Ofgem’s Plant & Equipment January 2024 direction.

A summary of the allowance treatment position for each of these UIDs is set out below.

**Table 5 – Allowance Treatment Position by UID**

| UID        | Intervention Type   | EJP                        | Baseline Allowance | PCD  | Approach  |
|------------|---|----------------------------|--------------------|------|---|
| [REDACTED] | CP Investigations & Rectification                           | Bacton - Plant & Equipment | 1.219              | NARM | Reduce baseline allowances volumes to 0, true up to be requested via SpC 3.10 |
| [REDACTED] | Preheater PSSR Revalidation, WBH Inspection & Major Refurbs | Bacton - Plant & Equipment | 0.972              | NARM | True up via P&E Jan 24 Ofgem direction (detail to be provided by NGT)         |
| [REDACTED] | Replacement of Failed IJs on AGIs                           | Bacton - Plant & Equipment | 0.269              | NARM | True up via P&E Jan 24 Ofgem direction (detail to be provided by NGT)         |
| [REDACTED] | AGI Pipework Painting (Full, Partial or Patch)              | Bacton - Plant & Equipment | 0.867              | NARM | True up via P&E Jan 24 Ofgem direction (detail to be provided by NGT)         |
| [REDACTED] | Fire water ringmain replacement                             | Bacton - Cabs              | 0.099              | NARM | Reduce baseline allowances volumes to 0, true up to be requested via SpC 3.10 |
| [REDACTED] | Filters PSSR Inspection & Major Overhauls                   | Bacton - Plant & Equipment | 0.056              | NARM | True up via P&E Jan 24 Ofgem direction (detail to be provided by NGT)         |

Set out below is the current status and where relevant true up and request for further funding under the Bacton licence term: -

**[REDACTED] – CP Investigations and Rectification**

We have received baseline funding for this Asset Health UID of £1.219m. The true up and additional funding request for this UID is detailed in the CP EJP [Cathodic Protection EJP- – Bacton FOSR Cost Re-opener] and cost book at Appendix A [v2.0 Bacton FOSR Cost book - FINAL - Oct24.xlsx]. As discussed in bilateral engagement sessions with Ofgem, it is proposed that the Asset Health UID is

reduced to zero and allowances awarded under the Bacton terminal site development Re-opener decision.

In addition a new UID is to be used following the Bacton Re-opener decision as follows: -

- [REDACTED] – Bacton STRR CP System Replacement

**[REDACTED] - Replacement of failed IJ’s on AGIs**

We provide details of the true up position in the cost book in the tab ‘AH FD true up’. NGT to provide details of true up for inclusion in Ofgem’s Plant & Equipment January 2024 direction.

**[REDACTED] - AGI Pipework Painting (Full, Partial or Patch)**

We provide details of the true up position in the cost book in the tab ‘AH FD true up’.

**[REDACTED] - Filters PSSR Inspection and Major Overhauls**

We provide details of the true up position in the cost book in the tab ‘AH FD true up’.

**[REDACTED] Preheater PSSR Revalidation, WBH Inspection and Major Refurbs**

We provide details of the true up position in the cost book in the tab ‘AH FD true up’.

**[REDACTED] – Firewater ring main replacement**

In addition to the five Plant & Equipment UIDs identified in our Bacton FOSR submission of February 2024, we seek further allowances in respect of Bacton Cabs UID related to Firewater ring main replacement. Baseline allowances were awarded in RIIO-T2 for this asset and during the process of review and set up ahead of deliver there are now external cost pressures associated with delivering the work within the allowances.

**Table 6 – Fire Water Ring Main details**

| UID   | Submission Window    | Funding Request (excl. Baseline allowance) 18/19 | Baseline allowance (18/19) |
|---|----------------------|--|----------------------------|
| [REDACTED] Fire water ring main replacement | Bacton FOS Re-opener |  | 0.867                      |

Table 7 sets out the high-level position on baseline allowances versus the required funding to deliver the replacement. The need for Fire water ring main replacement has already been identified through our 2019 Business Plan submission and an initial baseline allowance granted with an associated uncertainty mechanism to seek further funds.

The original solution looked to utilise a traditional open cut and replace process which when investigated further, we have established would take costs significantly higher than the proposed allowances. Based on this situation NGT reviewed all existing options as set out below:

**Option 1 - No investment in firewater ring main. [REDACTED], rejected)**

The firewater ring main is ageing and leaking. If the issues are not addressed, it will continue to deteriorate which will increasingly result in inability to perform its duty when required to do so. Failure of this type of asset is not necessarily known until it is required to operate. The HSE's technical measures for active fire suppression at COMAH sites would not be met and would also impact Interconnector whilst they are dependent on our ring main for supply to their fire suppression system.

**Option 2 - Construct new firewater ring main, with no supply to Interconnector Limited [REDACTED] rejected).**

As well as the higher cost, the programme of works would run into late 2025/early 2026 with a possibility of not delivering the output within the RIIO-2 period. There would be more extensive work on site, with higher potential for impact on site operation. Also, Interconnector may not have installed their own firewater supply, adding to the risk of delays.

**Option 3 - Construct new firewater ring main, retaining supply to Interconnector Limited [REDACTED] rejected).**

This removes the cost of control system updates that are required if the Interconnector supply is disconnected, and also removes the risk of delays associated with Interconnector's plans for an independent system. However, the timescale and impact on site operation are as Option 3.

**Option 4 – Replace via suaging or pipe jack methodology [REDACTED] Accepted)**

The revised proposed solution will reduce the costs of replacement by using a 'pipe jack' methodology similar to how Gas Distribution mains are replaced – this removes the footprint of work at site and allows a permanent replacement to be achieved in line with the original intention but would still exceed the baseline allowances. This can all be achieved without the need to disrupt the entire site over a prolonged period.

We are requesting a further [REDACTED] over the baseline funding (of £0.867) to complete the work.

The scope of works will include: -

- The initial baseline funding will be used to complete design phase and one quarter of the ring main repair and replace 2 fire hydrants.

- The additional funding requested will be used for the remaining three quarters of the scope to undertake ring main repairs, replace 6 fire hydrants and for project closeout activities.

This will be delivered by the end of the RIIO-2 period.

## NEW UIDs

We propose to use the following new UIDs aligned with our Re-opener request to apportion out the cost at delivery stage:

Table 7 – New Proposed UID’s

| New OFGEM UID | Funding Type | Intervention Type   | Option Name   | Unit of Measure        | Business Theme | Delivery Theme | Uncertainty Mechanism |
|---------------|--------------|---------------------|---|------------------------|----------------|----------------|-----------------------|
|               | UM           | Replacement         | Bacton STRR - Transformer Replacement                   | Per Transformer        | Bacton         | Bacton STRR    | Yes                   |
|               | UM           | Replacement         | Bacton STRR - Standby Generator Replacement             | Per Standby Generator  | Bacton         | Bacton STRR    | Yes                   |
|               | UM           | Replacement         | Bacton STRR - Replace External Lighting Columns on Site | Per Project            | Bacton         | Bacton STRR    | Yes                   |
|               | UM           | Replacement         | Bacton STRR - Replace Electrical Kiosk Structure        | Per Kiosk              | Bacton         | Bacton STRR    | Yes                   |
|               | UM           | Replacement         | Bacton STRR - Replace UPS                               | Per UPS                | Bacton         | Bacton STRR    | Yes                   |
|               | UM           | Replacement         | Bacton STRR - Replace Transmitters                      | Per Project            | Bacton         | Bacton STRR    | Yes                   |
|               | UM           | Replacement         | Bacton STRR - Locally Actuated Valve Replacement        | Per Valve              | Bacton         | Bacton STRR    | Yes                   |
|               | UM           | Major Refurbishment | Bacton STRR - Refurbish Terminal CP System              | Per Site               | Bacton         | Bacton STRR    | Yes                   |
|               | UM           | Replacement         | Bacton STRR - Distribution board replacement            | Per Distribution Board | Bacton         | Bacton STRR    | Yes                   |

## 7. Cost Build up and Estimation Methodology

To ensure robustness of the FOSR costs, NGT employed the use of a Designer / Main Works Contractor (MWC) to validate scope, understand some of the engineering challenges associated and to help refine details as well as building up an externally priced estimate showing how the market would cost works of this nature. NGT Utilised [REDACTED] to undertake this work as they were already in contract with NGT for the first stage of work undertaken to supplement the FOSR submission in February 2024.

During review of the scope and project development stage, as a deeper level of detail and evidence burden was considered there were several items that came out of scope and also some that were requiring inclusion, with this process helping to refund cost accuracy to the nominal +15/-10% criteria expected at this stage in the process.

The full cost submission does contain some NGT internally estimated costs from historical project data as well as externally validated items however the former is a relatively small component of the funding request with 7.65% of internally estimated on scope items that were not re-priced by [REDACTED]. Of the overall cost submission this equates to 92.35% based on ECC Total.

In Feb 2024, NGT submitted a proxy cost for the works at Bacton in the region of [REDACTED] with a further split on future works via the T3 / AMP submission totalling £27m. Subsequently the works undertaken have refined NGT scope and costs and as such the submission is requesting [REDACTED] overall with a balancing figure yet to be submitted for T3/ AMP in the region of [REDACTED].

Figure 2 depicts the key changes that have taken place between the FOSR and this submission with a brief narrative on the specific areas of variance.

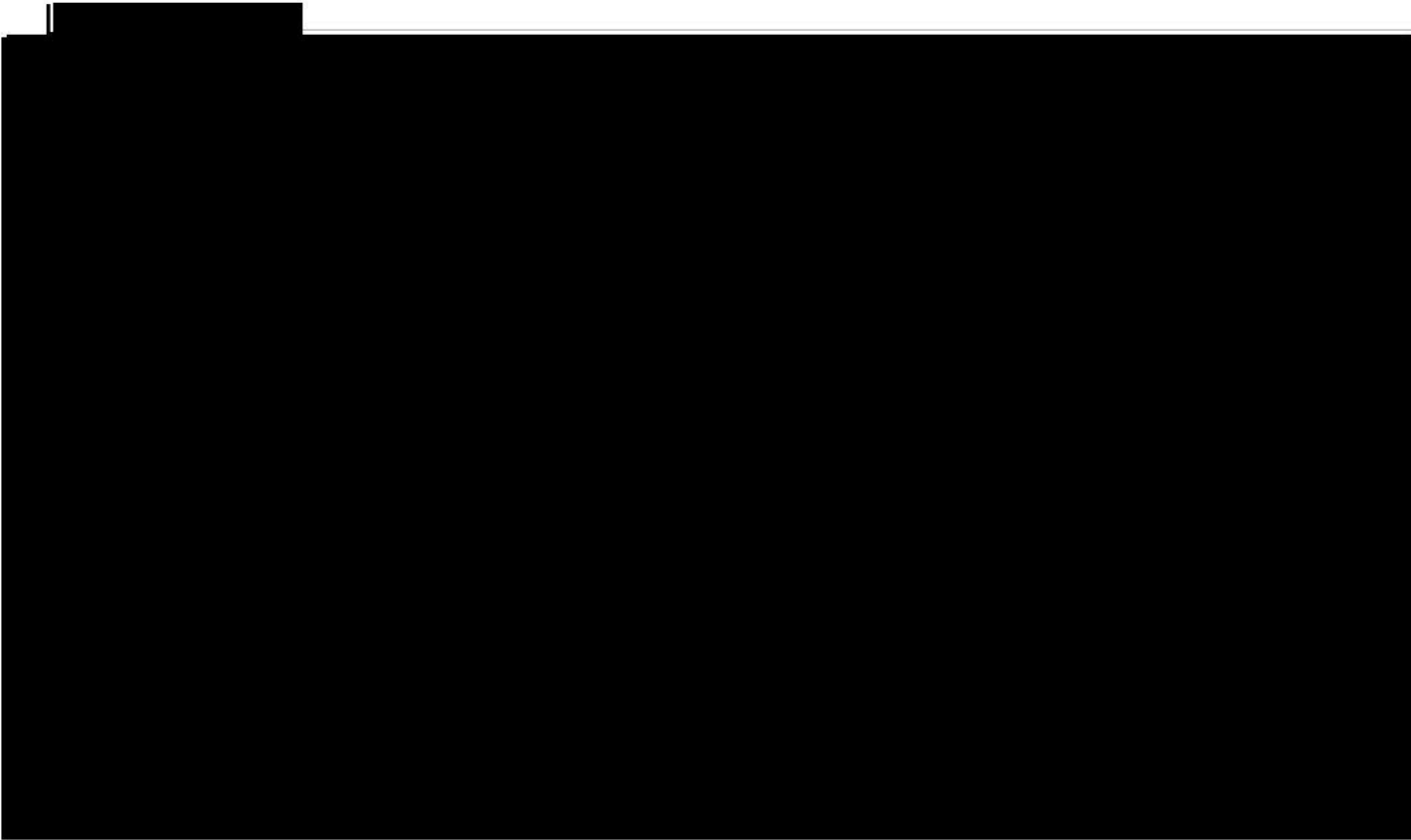


Figure 2 depicts the ECC level comparison between Feb 24' FOSR and this Oct 24' cost submission with specific details narrated below. The FOSR in Feb 24' did not go to the same level of detail as this submission as such with full cost book detail hence for simple comparison ECC has been utilised.

The works undertaken between submissions has majored on ratification of scope and assuring a deliverable work plan which as will be noted in the cost phasing sees spend in T4 which was initially not anticipated. The need to balance a realist volume of work (specifically valves) which governs the overall programme due to isolation / outage requirements has extended the programme and as such all associated NGT and MWC costs over a longer duration.

Notes on movement and variance:

**Civils & Painting** – This element of scope was removed during the FOSR post submission review and when other aspects of baseline works were re-checked alongside the MWC process to validate detailed scope.

**Preliminary Spend** – Similarly to the extension of project time / duration based on the review of scope and deliverability, by connection to the MWC cost increase preliminaries are also increased as the mobilisation is over a longer period.

**CP Development** – CP costs increased post FOSR as the project progressed further to the detailed design process and is now included in the costs associated with the final funding request where's prior to this it was covered in baseline funds.



**Materials** – Materials costs have decreased overall, due to moving costs out of NGT direct procured to the Main works contractor costs to ensure that accountability and risk management is clear with the MWC.

**Main Works Contractor costs** – These costs have increased overall as the revalidation exercise has taken place. Costs for the works in FOSR have now extended into RIIO-T4 after a detailed deliverability of valve replacement works was undertaken looking at what can be achieved across the RIIO-T2 and T3 period. Subsequently costs through extension of the works have increase the overall cost. MWC costs are also increased due to increased scope: Associate LV and C&I Works as defined and validated by NGT subject matter experts and covered in the respective EJP's.

**Specialist services** – Costs have been removed and incorporated into the MWC element of costs.

**Vendor Package costs** – these remain [REDACTED] for the submission so no movement.

**Direct Company costs** – Direct costs have also increase in line with the extension of the works into T4 and which also coincide with the corresponding increase in MWC costs for the same reason.

**Engineering Design** – Conceptual and detailed design for the defined scope of works for the valves replacement, electrical architecture and the C&I assets have been adjusted in line with works that have already been completed in prior phases and re-set in line with MWC externally priced estimates for the remaining costs for this grouping.

**Project Management** – Overall duration of the project has increased from the original FOSR submission as well as reviewing how the works will be executed in the deliverability assessment.

**Indirect company costs** – These costs have been calculated as part of NGT's cost reopener and are a product of the direct cost allocation which Ofgem will apportion. These costs have been shown for completeness of process noting that Ofgem would apply the correct percentage and flow the costs through accordingly.

**Risk and contingency** – Based on the FOSR stage estimate the risk / contingency cost has increased but note that overall risk at [REDACTED] is still proportional to that of the overall project at funding request level and within what NGT deem to be appropriate risk coverage for this type of work. The additional level of detailed work undertaken allowed more robust updates to be made to the QRA which ultimately drives this cost element. Also, noting that execution now spans in to RIIO-GT4 which is of considerable length of time in the future to allow high degree of accuracy.

At bulk level whilst overall costs have increased, referring to Table 1 it can be noted that in all options considered, base case or baseline asset health is required to ensure that the terminal can be maintained to 2035 and beyond. All FOSR options can be scaled in line with the costs presented in this submission in turn re-validating that the lowest cost to consumers has been selected.

## 8. Deliverability

Bacton is a complex site and the proposals outlined in the cost submission are to undertake works that have a high interaction level with each other as well as site operational activities including maintenance and other major works associated cyber and security. As such a comprehensive deliverability approach has been taken to ensure that the works can be executed across the regulatory periods which it will span.

There are four key stages to the process deployed to assess deliverability carried out in sequential order to allow a bottom-up build programme to be created:

- **Operationally critical maintenance activities** – Maintenance activities that are undertaken at Bacton on fixed intervals driven by Legislative requirements such as Pipeline Safety Regulations (PSR) and Pressure Systems Safety Regulations (PSSR) were loaded into a schedule based on the current due dates as these are fixed items that cannot move in our overall plan and require adherence.
- **Valve and Isolation groupings** – Based on the fact that many valves are requiring replacement during the works and isolation plan and philosophy was required to ensure that NGT could undertake the works in a sequence that facilitated gaining access to the valves in question and validating any known defects on the ‘sealing valves’ to ensure that this formed part of the works. This work included optimisation to pick work zones that could provide a manageable chunk of work in a mini outage as well as isolation of only a set part of the plant to ensure continuous gas flow.
- **Outage block planning** – When core sections of the plan were identified that could be grouped together, a review of all existing know NGT and customer / interfacing partner outages was undertaken to develop a working model that can allow outages to be scheduled in a way that minimises risk to operations – i.e., ensures that gas can continue to flow and safe access to work fronts can be provided.
- **Layering and grouping of works at plan level (including T3 / AMP)** – This process was then referred to as ‘match and slot’ for all non-outage related works that could be planned and sequenced around the major shutdowns. This ensures that an efficient delivery takes place ensuring the MWC has a constant stream of works to drive productivity.

Caveats to this process centre on the fact that durations have been built from prior project experience and NGT intelligence with regards to system access and shut down requirements. A full and detailed Main Works programme would be developed in partnership with the successful Contractor in Detailed Design and build to optimise this plan further.

It is also noted at this stage that NGT is also in the process of producing and submitting a T3 Business plan and as such the works for Bacton FOSR have also been fed into the overall deliverability review process that has been undertaken. Bacon Terminal is nominally ring fenced as being able to manage its own network outage and access to plant and equipment but in cases where feeder outages to and from the Terminal need to be accounted for – these have been fed in to ensure that any additional constraints on the network and T3 plan have been considered.

## Broader delivery risks, opportunities and mitigations

On top of the QRA conducted to validate the project risks there are several risks that sit across the top of this project which are to some extent un-quantifiable but could have an impact if these manifest during the execution of the works. These have been listed in Table 9 and form the basis of high-level assumptions made in terms of planning the works for the FOSR.

**Table 8 – Broader delivery R/O**

| Risk / Op | Title  | Description   | Potential Impact   | Mitigation / Action   |
|-----------|--|---|--|---|
| RISK      | Bacton Feeder Filtration                       | To date the FOSR works have been developed on the basis that this additional work <span style="background-color: black; color: black;">[REDACTED]</span> CAPEX is not going ahead based on previous decisions by Ofgem on submissions made in 2023/ | If the work is given the green light to progress, via any other direction i.e., UK Government / DESNZ based on UK / EU drivers then this will have an impact on the way work is delivered and executed at site, Requiring re-work of the plan and leading to cost / programme extension. | Further dialogue to be entered with Ofgem if the project is determined as funded.<br><br>Short term action to review all investments from FOSR and how these can be flexed around the outage plan requirements of feeder filtration on Feeders 02 and 04. |
| RISK      | Un planned operational constraints and outages | For example, blocked filters to Interconnectors or incomers (UMCS) and or Feeder / network constraints.   | Can affect configurations at site and then in turn knock on to outage availability which can then affect delivery and cost / programme extension.  | Continual monitoring and liaison with network operations and control as well as site ops.<br><br>Review contract provisions for dealing with force majeure situations and also contract mechanisms for sharing challenges.                                |
| RISK      | Wider industry constraints on resources        | Large volume of work in the geographical and remote area of the Terminal – Both NGT and designer / contractor resources are competing in the same industry for  | Inability of the supply chain to meet both NGT and their own needs.  | Collaborative working with MWC's and designers to ensure that mutually beneficial arrangements can be explored in contract setup.   |

|     |                           |   |   |   |
|-----|---------------------------|---|---|---|
|     |                           | highly skilled individuals to undertake the works.  |   |   |
| OPP | Potential for T3 bundling | As AMP / T3 plan progresses through submission and then Final Determination there is potential for work that come later to be added to the scope of the on site MWC and delivery partner. | Competition for resources which can have negative impact on delivery of the works in line with programme and costs to the required quality standards. | Early recruitment and review of resources with project teams and skills to ensure that gaps are identified early and due to long nature of the overall project a succession plan to be developed to ensure continuity of the works. |

**Contracting strategy**

[REDACTED]

[REDACTED]

National Gas has engaged [REDACTED] to complete the detailed design for cathodic protection, and conceptual design for valves & actuators. It is proposed that [REDACTED] will be engaged via the MWC to undertake the conceptual design for the LV distribution system.

[REDACTED]

[REDACTED]

## 8. Interaction with T3 AMP

When the FOSR was in its early stages of development NGT recognised that there is an interaction with the wider T3 BP submission and how the two investment proposals overlapped. At the early onset of confirmation that Bacton Gas Terminals preferred option was going to be base case asset health the view was taken to focus the strategy on short, medium and long-term investments to ensure that the works are completed in an effective and logical manner.

NGT have broken the two investments out along the following principles:

- FOSR – Short and Medium term ‘no regrets’ investments where it has been proved that investment is required now. These are items that span RIIO-T2, T3 and T4.
- T3/AMP – This process is picking up longer term / rolling investments whereby we know there is life left in assets but in the T3 period some of these items will expire and require intervention but would be monitored during the FOSR execution process. The 10 Year AMP is a rolling process re-visited annually.

This iterative process has been managed during the T3 submission development stages and ultimately some of the contractor work bundling opportunities may need to combine aspects of scope from both areas.

## 9. Stakeholder Engagement

This reopener draws on our initial stakeholder engagement as part of FOSR and builds on the key findings proposed in the FOSR. The key findings conclude on the industry reliance and strategic importance of the Bacton Terminal to the [REDACTED] and other interested parties, stakeholders, organisations and to the security of gas supply to the United Kingdom (UK). Following the FOSR, NGT have continued engagement with Ofgem, however, during the development of options, NGT held 1-1 group workshops with key stakeholders such as:

Sub Terminals at Bacton  
Interconnectors  
Producers and Offshore Pipeline Operators  
[REDACTED]  
Local offtakes [REDACTED]  
Local councils, authorities, and residents

## 10. Conclusion

This document summarises the separate products that constitute our September 2024 Bacton Uncertainty Mechanism reopener submission and the overall funding being requested through this submission. Ofgem are invited to assess the funding requests against the applicable license terms as defined within this document.

NGT's overall funding request predominantly covers investments associated with the short to medium term needs at Bacton Terminal and dovetails with longer term items which are to be submitted via the T3 business plan / AMP noting that the larger proportion of work will be handled via the FOSR.

The investment spans 3 price control / regulatory periods. We urge Ofgem to consider relative benefits and impacts of funding works that stem into T4 and from a MWC contract design and build perspective to ensure that a clearly visible and sizeable workbook is available to the market which will inherently drive efficiencies into the work. We welcome more dialogue with Ofgem on this as part of the post submission engagements.

NGT's total funding request within the Reopener submission, [REDACTED] with the cost book for the submission in Appendix A. All associated appendices have been included within the respective EJP's where applicable.

We would be happy to discuss our submission with you and any points of clarification or further information required once Ofgem has had an opportunity to review.

Contact:

[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]

[nationalgas.com](http://nationalgas.com)

## APPENDIX A – Cost Book



## Appendix B – Assurance Statement

## Appendix C – NGT / OFGEM Mapping



## Appendix D – List of Supporting Documents

| Document                      | Filename  |
|-------------------------------|---|
| Cost Book                     | Appendix A - v2.0 Bacton FOSR Costbook - FINAL - Oct24.xlsx |
| Assurance Letter              | Appendix B - Assurance Letter.docx                          |
| Mapping to Ofgem Requirements | Appendix C - Mapping of Ofgem Requirements.docx             |

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