Commercial Assessment Methodology

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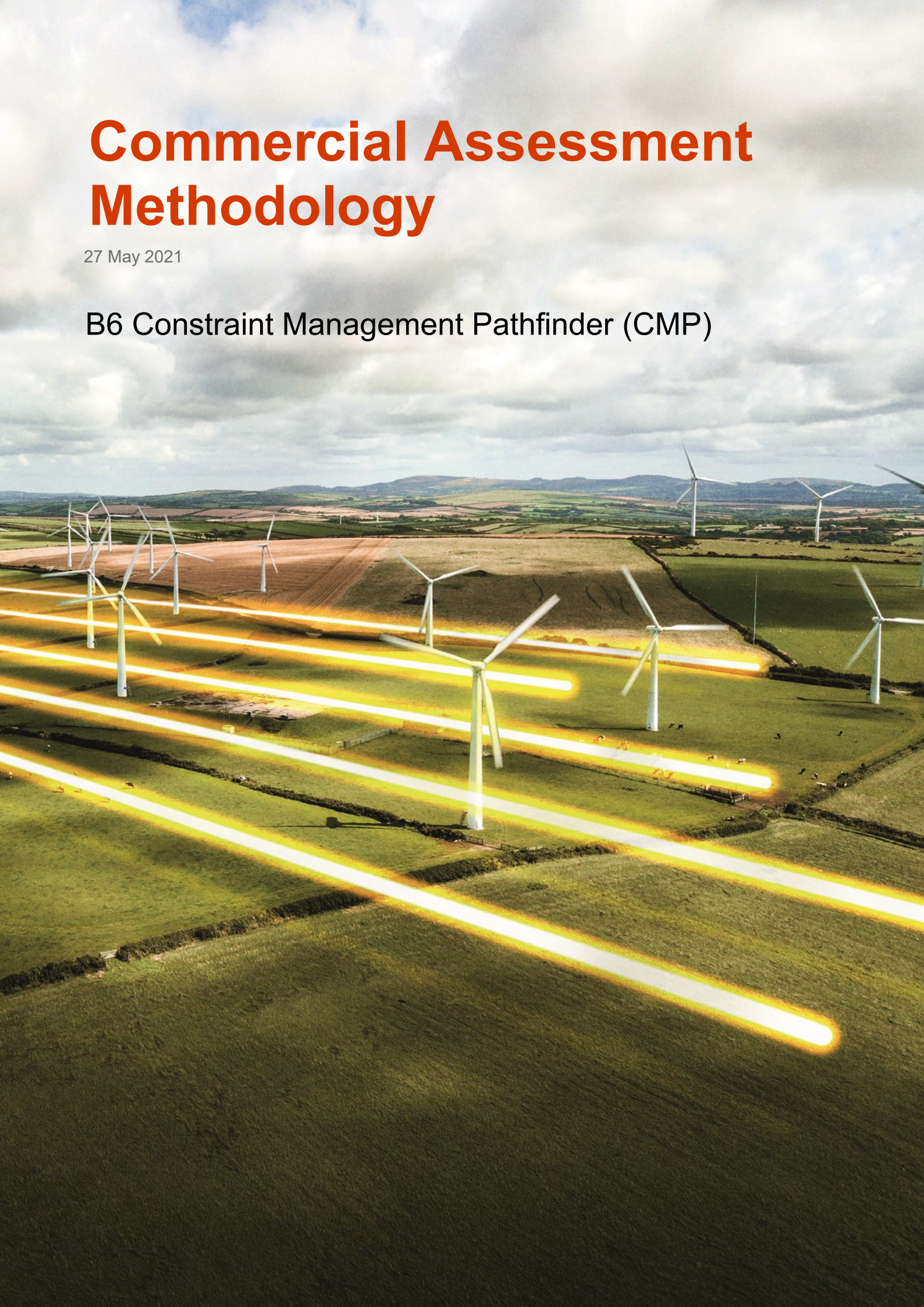
B6 Constraint Management Pathfinder (CMP)



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1. Introduction

The B6 Constraint Management Pathfinder (CMP) is looking to procure generation that can be connected to the Anglo-Scottish Intertrip Scheme and disconnected in the event of a network fault. The volume and sources of generation to be procured for B6 CMP are to be decided through a commercial tender. NGESO aim to run a B6 CMP commercial tender periodically to increase market competition. This way NGESO can ensure a transparent, competitive procurement method exists that increases value for consumers. This publication outlines the methodology and process NGESO will adopt to conduct the B6 CMP commercial assessment, thus making the process more transparent by allowing stakeholders to better understand ways of working and parameters to be used in the commercial assessment.

2. Technical and Commercial Assessments

The process for procuring providers is two staged:

1) Expression of Interest (EOI) – Determines the feasibility of connection of the provider;
2) Commercial Tender – Identifies the most economic method of achieving the required intertrip generation volume.

Following the feasibility study stage, successful parties shall enter the commercial tender. This involves providing the relevant arming and utilisation (tripping) fees to determine the most economical way to achieve the required volume. Any parties that are unsuccessful at the feasibility study stage will not progress any further in the process.

3. Feasibility (Technical) Study

During this stage of the assessment, a feasibility study will be commissioned between NGESO and the Scottish transmission owners (TO) to determine whether the participants can be connected to the Intertrip Scheme ahead of the October 2022 service commencement date. NGESO will provide the EOI responses to the Scottish TOs who will advise NGESO:

1) If the participant can be connected to the Intertrip Scheme;
2) If so, whether connection will be completed by October 2022 along with the costs involved. NGESO's intent is to be able to connect as many parties as possible to the Intertrip Scheme, but if the cost of a provider's connection is excessively high and shows a significant deviation from the average connection cost of other providers, then NGESO can reject the tender as the cost of connection cannot outweigh any constraint cost benefits from the contract.

Because the Intertrip Scheme is connected to TO circuit breakers (CBs) it is possible that multiple applicants could be connected behind a single CB. If multiple parties are connected behind the same TO CB, then NGESO will inform the relevant parties prior to tender launch, as this dependency could affect the commerciality of a party's submission as the relevant parties must be tripped simultaneously.

If a participant is preferable from a technical perspective but is not expecting to connect to the Intertrip Scheme and/or is not expecting to connect to the transmission network before October 2022 then NGESO will work with the relevant TO and the participant to understand how this can be facilitated. Moving forward, NGESO is looking to tender further in-advance of the estimated service delivery start date to ensure parties that are expected to take longer than 1-year to connect to the Intertrip Scheme can participate. For this reason, NGESO is including a 1-year extension option in the 2022/23 B6 CMP contract to also cover service delivery in 2023/24 so more providers can participate in the next tender (expected mid-2022 for 2024/25 service delivery) as more time is provided to connect to the Intertrip Scheme.

4. Commercial Assessment

Participants included in this stage of the assessment will have successfully cleared the feasibility stage in this process.

At this stage in the tender we will have received the output from the feasibility study undertaken by the TOs. This will identify the number of channels available to NGESO on the Intertrip Scheme and the possibility of extending the Intertrip Scheme to accommodate more parties. The total number of intertrip channels already present and potential new additions will be stated at the tender stage to all participating providers.

The channels in the current Intertrip Scheme are assigned to specific TO networks and cannot be redirected to alternate networks in the time frame of this initial Pathfinder tender. NGESO are awaiting confirmation from the TOs on the location of each intertrip channel as this could affect the number of parties that can be contracted with from each transmission zone/location.

In the commercial assessment stage, participants are expected to submit arming and utilisation (tripping) prices to NGESO. To determine the cheapest volume available to provide the service, the following process will be used:

1) Identify all possible plant size combinations across the available numbers of intertrip channels;
2) If required, apply an average outturn factor to the submitted output capacity of the relevant plant – refer to Table 1 below;
3) Filter and remove combinations which do not meet the volume requirement;
4) The arming and utilisation (tripping) fees are used to identify the cheapest combination and the parties in the smallest price combination will be awarded the contracts.

4.1.1. Identification of all possible combinations

Due to the expected limit on the number of intertrip channels available and the generators interested in providing this service, NGESO expects numerous possible combinations for achieving the volume outlined above. The number of combinations is given by the following formula, where:

$$\sum_{r=1}^{r\leq n} nCr$$

1) n = The total number of parties involved in the commercial tender;
2) r = The total number of channels available on the Intertrip Scheme.

For example, if there are five parties who submitted the expression of interest and four of them are successful following the feasibility study (as shown below):

Table 1: Example

Plant	Type	Size (MW)	Feasible (Yes/No)	Arming Fee (£/MW/SP)	Tripping Fee (£)
A	Wind	700	Yes	2.00	15,000
B	Hydro	1,150	Yes	1.50	8,000
C	Wind	950	Yes	4.00	20,000
D	CCGT	700	Yes	2.00	3,000
E	Wind	400	No	N/A	N/A

In the commercial tender, if there are three channels on the Intertrip Scheme and four qualifying plant, there are fourteen options available, as shown below:

$$\sum_{r=1}^{r=3} 4Cr = \sum 4C1 + 4C2 + 4C3 = (4 + 6 + 4) = 14$$

Note: NGESO reserves the right to procure more or less than the requirement volume outlined (≥800MW) if it is efficient to do so.

4.1.2. Application of the average outturn factor

NGESO have a requirement for the Electricity National Control Centre (ENCC) to be able to arm up to 800MW of generation to be tripped in order to manage the B6 boundary (see section 4). As a significant proportion of the generation is likely to come from wind and other renewable generation, contracting a capacity significantly greater than 800MW (as renewables are rarely at 100% output) is required to ensure that the volume requirement is always achieved. Therefore, flexible plant shall be given an average outturn factor in accordance with Table 2.

Table 2: Average outturn factors

Technology Type	Average Outturn Factor
Wind	65%
Hydro	50%

Note: These statistical values are taken from operational planning data where depending on the system condition, the constraint is most likely to be active (i.e. when the expected transfer becomes greater than the constraint limit) when generation from these plant types are at or in excess of these outturn factors.

NGESO will use the plant sizes shown in Table 1 and apply the average outturn factor to flexible plant. The new size is shown in Table 3 below:

Table 3: Updated example with average outturn

Plant	Type	Size (MW)	Size (MW) (Incl. Average Outturn Factor)
A	Wind	700	455
B	Hydro	1,150	575
C	Wind	950	617.5
D	CCGT	700	700

The assessment on which plant to be armed will be dependent on system conditions, which considers factors like output being generated in real-time, the effectiveness of the plant if tripped, and the counterfactual cost in real time.

4.1.3. Filtering the combinations

During this stage of the assessment, the combinations that do not meet the volume requirements will be eliminated.

Next, to ensure no single plant (N-1) being unavailable leaves the remaining volume available on the Intertrip Scheme below NGESO's requirement, then the largest plant in a stack of generators will be removed from the combination to see if the requirement is still met/exceeded. The pass/fail criteria is established by:

$$\text{Sum of all plant sizes in stack (after avg. outturn factor)} - \text{Largest plant in the stack} \geq 800\text{MW}$$

For example, using the plant defined in Table 3, a few of the combinations could be:

Table 4: Filtering combinations

	Example Plant Combination	Volume of the combination excluding largest plant in that combination	Outcome of the Combination
1	A, B (where plant B is the largest at 575MW)	(455 + 575) – 575 = 455MW	<800MW – Fail
2	A, B, C (where plant C is the largest at 617.5MW)	(455 + 575 + 617.5) – 617.5 = 1030MW	≥800MW – Pass

From Table 4, combination 1 does not meet the volume requirement after removing the largest plant in the combination and so that combination will be filtered out and not considered.

Note: NGESO reserves the right to ignore this condition dependent on the volume of responses received in the commercial tender.

Table 5 shows the output of applying the filter to the stack outlined in Table 3.

Table 5: Application of the compensation criteria

#	Combination	Combination Size (MW) (Excl. Average Outturn Factor)	Combination Size (MW) (Incl. Average Outturn Factor)	Requirement of Stack (MW) (Incl. Average Outturn Factor)	Requirement Met? (Yes/No)	Plant Compensation Criteria Met? (Yes/No)
1	A	700	455	1,255	No	No
2	B	1,150	575	1,375	No	No
3	C	950	617.5	1,417.5	No	No
4	D	700	700	1,500	No	No
5	A+B	1,850	1,030	1,375	Yes	No
6	A+C	1,650	1,072.5	1,417.5	Yes	No
7	A+D	1,400	1,155	1,500	Yes	No
8	B+C	2,100	1,192.5	1,417.5	Yes	No
9	B+D	1,850	1,275	1,500	Yes	No
10	C+D	1,650	1,317.5	1,500	Yes	No
11	A+B+C	2,800	1,647.5	1,417.5	Yes	Yes
12	B+C+D	2,800	1,892.5	1,500	Yes	Yes
13	A+B+D	2,550	1,730	1,500	Yes	Yes
14	A+C+D	2,350	1,772.5	1,500	Yes	Yes

Table 5 demonstrates that only combinations eleven through to fourteen can be taken through to the commercial evaluation.

4.1.4. Calculating prices for all the combinations

In the commercial tender, parties must submit an arming and utilisation (tripping) fee. The assessment assumes the following use case:

1) Plant will be armed between 1500-and 3000-hours a year. For the purposes of the tripping fee assessment, NGESO will assume 1500-hours of arming per annum;
2) Statistically, NGESO expects the network fault to be a rare occurrence. Subject to all involved parties adhering to network policy for asset and maintenance and assumed historical weather conditions, the fault is forecasted to occur once every 25-years.

From the above assumptions, the utilisation (tripping) fee will be calculated on a pro-rata basis and added to the arming fee per settlement period (SP).

$$\text{Combination price} = \sum_{n=1}^{n=n} \left(Arming\ Fee\ per\ SP + \left(\frac{Tripping\ fee}{3000 \times 25} \right) \right)_n$$

Once the price for every option is determined, the prices will be sorted in ascending order to find the cheapest option that meets the requirement, and thereafter all parties in the combination will be awarded contracts.

Table 6: Combination price stack

No.	Combination	Combination Price Formula	Total Price (£/SP)
11	A+B+C	$(455 \times 2.00) + (575 \times 1.50) + (617 \times 4.00) + \left(\frac{15000 + 18000 + 20000}{3000 \times 25}\right)$	4,243.21
12	B+C+D	$(575 \times 1.50) + (617 \times 4.00) + (700 \times 2.00) + \left(\frac{18000 + 20000 + 3000}{3000 \times 25}\right)$	4,733.05
13	A+B+D	$(455 \times 2.00) + (575 \times 1.50) + (700 \times 2.00) + \left(\frac{15000 + 18000 + 3000}{3000 \times 25}\right)$	3,172.98
14	A+C+D	$(455 \times 2.00) + (617 \times 4.00) + (700 \times 2.00) + \left(\frac{15000 + 20000 + 3000}{3000 \times 25}\right)$	4,780.51

From Table 6, the optimum combination is stack thirteen with £3,172.98 per SP and so all parties – parties A, B and D – that form part of this combination will be awarded contracts.

The approach outlined above shows that a provider could be a cheap individual option but once considered as part of a combination of providers, is no longer commercially preferable and therefore not contracted with. This circumstance is likely to occur because of the limited number of intertrip channels available to NGESO or because multiple parties are connected behind the same CB and as a result are dependent on each other's submissions – refer to section 4 (Commercial Assessment) for further information. The most economically advantageous tender (MEAT) principle in this case is therefore applied to the combination of providers rather than the individual provider. Further information related to the above will be given to providers before the tender is launched.

5. Counterfactual

NGESO operates the system in accordance with the SQSS and must secure the system for credible faults (single circuit faults, double circuit faults etc.). The amount of power that can be securely transferred across a boundary post fault, will set the pre-fault transfer limit (the *Constraint limit)* and is calculated by power flow studies using the typography of the system at a given point in time. The transfer across a boundary is defined as:

$$\text{Transfer} = \text{Generation within a group} - \text{Demand with the group}$$

$$(\text{where Transfer} < \text{Constraint Limit})$$

When the transfer is greater than the calculated Constraint limit, NGESO must act to reduce the transfer by decreasing generation or increasing demand within a group, by trading, enacting contracts or taking Bids/Offers in the Balancing Mechanism (BM).

An intertrip is used as a tool by NGESO to manage constraints, by raising the Constraint limit pre-fault, thereby reducing the volume of power needed to be constrained off the system.

The cost of using an intertrip for constraint management must show significant benefit when compared to our current methods of managing constraints for the tenders to be accepted. Please refer to the National Grid Data Portal for historic constraint costs.

6. Use of Intertrips in Operational Timescales

The arming and disarming of an intertrip is a decision taken in operational timescales based on the transfer flow across the boundary and the cost of alternative actions. As the predominate generation within Scotland is renewable generation, consideration needs to be given for the changing output of these generators. Generators do not have to be at full output to be beneficial and will be armed whenever the cost of arming is more economic than the total costs of reducing generation within the constraint boundary. The ENCC will select providers on a cost basis although there are other factors that the ENCC will consider in arming providers. The outcome of the commercial tender may lead to NGESO securing a greater volume of intertrip capacity than is expected to be regularly armed to manage B6 boundary constraints. Because providers are only paid once armed, this will not lead to any inefficient spend from NGESO. However, this could lead to circumstances where a provider is accepted in the most economically advantageous combination of providers but rarely economic to arm.

Intertrips are one of several tools that NGESO utilises to manage interactive network issues. Therefore, this Intertrip Scheme may not be the most optimal solution to manage the B6 constraint in all circumstances.

7. Indicative Timeline

Table 7: Indicative timeline

Indicative Date(s)	Stage
Early- to Mid-July 2021	Launch Commercial Tender
Late-July 2021	Close Commercial Tender
August 2021	Evaluate Commercial Tender Responses
September 2021	Confirm Results from Commercial Tender
October 2021 to September 2022	Connect Successful Parties to Intertrip Scheme or Service Delivery Period (If Existing Connection to Intertrip Scheme)
October 2022 to September 2023	Initial Service Delivery Period
October 2023 to September 2024	Extended (Optional) Service Delivery Period