



Guide

Non-Wires Alternatives to Network Development

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Introduction

The purpose of this document is to outline ESB Networks' plan for the introduction and development of Non-Wires Alternative (NWA) options to conventional network reinforcement. Such options could be used in situations where peak demand load exceeds, or is expected to exceed, the firm capacity of the network, as a temporary alternative to a conventional reinforcement, such as upgrading a transformer or circuit, or for deferring capital investment.

The flexibility that NWA options offer can be used to support the distribution network at times of high demand or when the network is in an abnormal configuration due to a planned or unplanned event. An additional use for this flexibility is in areas where the future development of demand load is not clear and extra time is required to clarify the level of growth expected.

ESB Networks is committed to introduce NWA options during the Price Review 5 (PR5) period (2021-2026), and to further develop this over time. The aim of the introduction of NWA options is to assist ESB Networks in delivering a safe, secure and reliable distribution network.

The initial trial (in 2020) of NWA as an option is based on reduction of real power (MW) on a contractual basis for pre-fault load management. This application represents the initial use case for the flexibility that NWA offers, however other applications and use cases for this flexibility will be considered in the future.

Future enhancements may include:

- Development of means for signalling the requirement for service provision
- Expansion of further flexibility products, e.g. post-fault load management

This document aims to explain to customers and potential service providers how NWA options are considered in the network development process and how the process to commence a request for proposal is triggered.

Additionally, a number of non-exhaustive high-level requirements for service providers are outlined.

A timeline for the development and enhancement of the NWA options process is also included.

i. Scope

This document outlines ESB Networks plan for the introduction of Non-Wires Alternative (NWA) options to conventional network reinforcement.

The document is structured as follows:

- Section 1 presents an introduction to the NWA approach for use by ESB Networks;
- Section 2 overviews the network development process used by ESB Networks and how NWA options may be used as part of this process, as determined by the 'Screening Process' described;
- Section 3 outlines high level and relevant detail for potential flexibility service providers (FSP);
- A sample case study, showing the type and scale of information to be made available to potential FSPs is covered in Annex A; and
- A roadmap showing the development and enhancement of the Flexibility services over PR5 and into PR6 (2026-2030) is detailed in Annex B.

ii. Mandatory References

There are no mandatory references in this document.

1. ESB Networks Requirements

The use of NWA, or flexibility services, can have significant impact on how distribution networks are planned and developed, and how security of supply is maintained. The flexibility provided by such services allows a further option for consideration when assessing the solution to a network need or constraint, and it is intended that this flexibility can be procured in the future (where appropriate) as a service by ESB Networks to assist in the development and operation of a safe, secure and reliable distribution system.

The availability of NWA provides a means to defer planned reinforcement projects for a period of time, to provide increased security during construction works, or an alternative to conventional reinforcement.

Flexibility services, for example, could be provided by:

- Varying the export from a suitably located;
 - Distributed Generator (DG) unit
 - Energy storage unit

- Demand response from a single site or aggregated sites, reducing or suppressing onsite demand;
 - From a single site
 - From a number of customers in a coordinated manner

The contracted action of any of the above – increasing an export, releasing/exporting stored energy or reducing customer demand, all have the same net effect on the network, in the overall load level reduction for the defined period of time. As such, in practice, there is no preference as to how the demand reduction is achieved.

A service to increase demand load or reduce export is outside the scope of this document. Additionally, the contracting and use of demand response services (Demand Side Units) by Eirgrid, as Transmission System Operator (TSO), is not covered by this document.

2. Network Development Process

2.1 Background

The network development process assesses a particular need (e.g. new demand application, general demand load increase) against the capability of the existing network, to determine what works are required to resolve constraints and maintain network and security of supply standards, ensuring a cost effective solution is arrived at, representing overall best value for the end-user and for the network.

As part of the technical study, an appropriate growth rate and timeline is applied depending on the instance and location. For example, a typical demand load application to the medium voltage (MV) network in a town or city is studied with 5 - 10 years load growth, whereas a similar application in a more rural area is studied with a lower growth rate.

A proposal for a new high voltage (HV) substation or other more strategic network development is studied with a 10 - 25 years load growth applied¹.

Typically, several options may exist to address a constraint on the network identified during a network study.

Typical constraints include:

- Thermal overload of a circuit
- Overload of a transformer or other plant
- Voltage outside allowable range
- Compliance with the required Security of Supply level²

These constraints may arise when the network is in a normal state, or an abnormal state, after a planned or unplanned event.

In order to address the constraint, an intervention is required, which could vary in complexity from reconfiguration of the existing networks, to minor new works, to a major reinforcement.

The network study assesses all conventional intervention options from a technical and economic perspective, and a Least Cost Technically Acceptable (LCTA) solution is developed which represents the preferred option to address the network need.

2.2 Screening Process

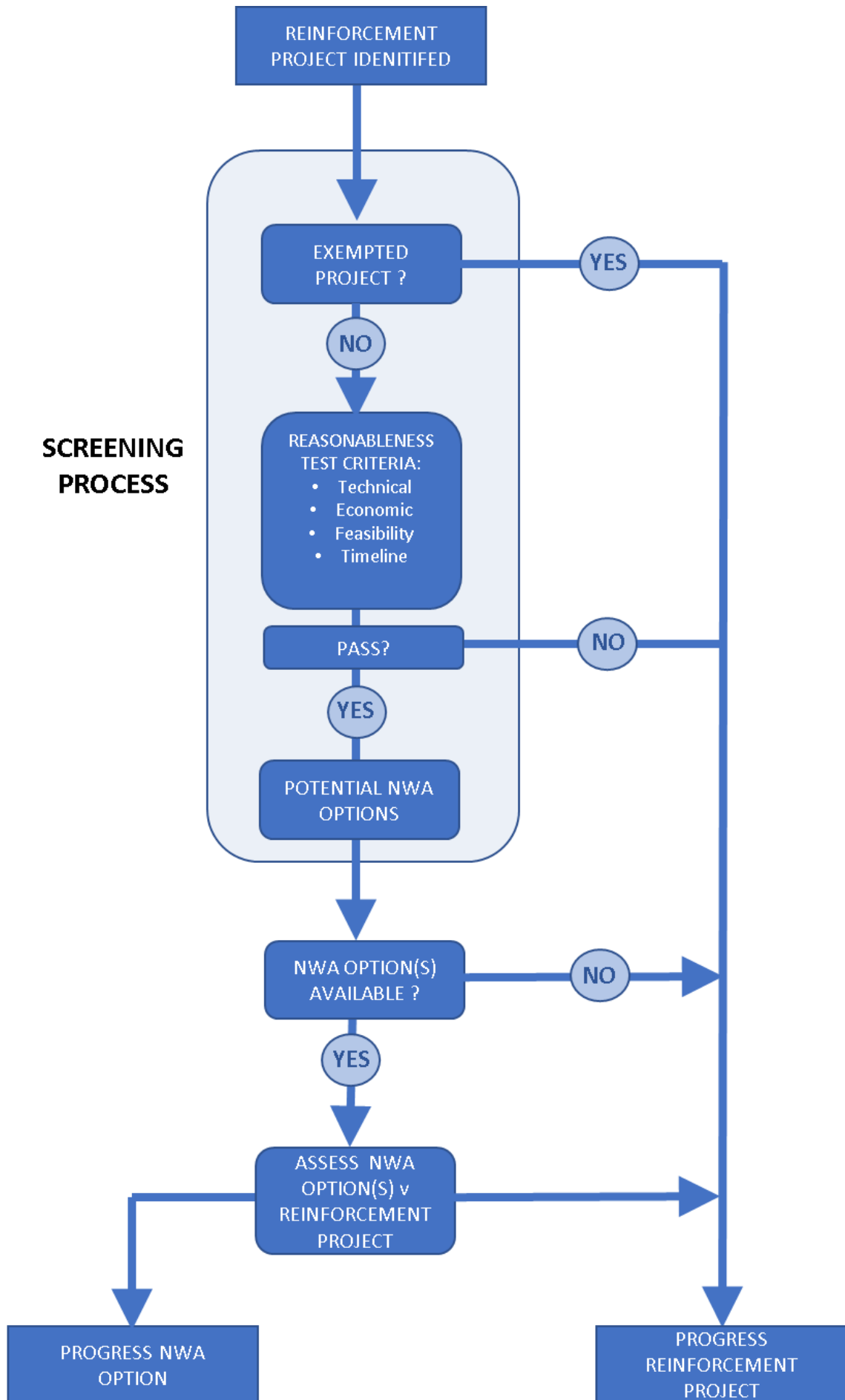
Following determination of the LCTA for an intervention, projects are subjected to a screening process to determine whether a NWA option could reasonably be applied to defer or delay the project, or whether the preferred conventional option should proceed. The aim of the screening process is to discount non-viable NWA options and assess the likelihood of a NWA option being available with the ability to provide a flexibility service.

The screening process to be initially applied is shown in Figure 1. The proposal is to review the screening process regularly.

¹ Options for more strategic network developments are tested on these longer timelines to ensure the optimum long-term planning solution is achieved, accounting for construction costs, losses, future developments and reinforcements at different voltage levels, etc.

² See Chapter 4 in the 'Distribution System Security and Planning [Standards](#)' [DOC-170220-FOM](#) for further information on Security of Supply.

Figure 1: Non-Wires Alternatives Screening Process



2.2.1 Exempted Projects

Reinforcement projects that would not typically be considered for a NWA option (and therefore treated as exempted projects) include, but are not limited to the following:

- A HV station reinforcement project with an associated Load Index³ (LI) of LI5, or a similar network situation where the constraint is very large⁴
- Where an asset replacement project for obsolescence or condition reasons supersedes the load related project
- Where safety related reasons supersede the load related project
- Where the reinforcement cannot be technically solved or deferred by a NWA option (e.g. provision of additional arc suppression coil capacity, or resolution of a fault level issue)

2.2.2 Reasonableness Test

Projects are then assessed on four reasonableness criteria (Timeline, Technical, Economic and Feasibility) to determine whether potential NWA options are likely to be credible for further consideration, as set out in Table 1.

Table 1: Reasonableness Test Criteria

Timeline:	A NWA option may not be considered where time is of the essence in providing a connection to a new customer, or in resolving an urgent reinforcement requirement, and a NWA option cannot be feasibly procured and delivered within the timeline.
Technical:	A NWA option may not be considered as viable where the risk of further high load growth means any NWA option would quickly become ineffective (e.g. an area with significant new application activity / zoned and being actively promoted for development), or where the identified constraint is very large and / or complex (e.g. the constraint interacts with other constraints at other network locations or stations).
Economic:	<p>A NWA option may only be considered viable where the lifetime economic value of the NWA option is less than the corresponding value of the deferral or delay of the reinforcement project, taking into account:</p> <ul style="list-style-type: none"> ○ The deferral period ○ Administrative and overhead costs ○ Remnant lifespan of the relevant asset(s) ○ Impacts on: <ul style="list-style-type: none"> ○ Losses ○ Security of supply ○ Operation and maintenance costs ○ Impact of the deferral on the capability to make new connections or to ultimately carry out the reinforcement

³ A load index (LI) is applied to HV stations, which is a measure of peak loading on the HV station against its firm capacity. A five-point scale is used; LI1 representing a lightly loaded station, to LI5 representing a heavily loaded station, and at which a reinforcement is required.

⁴ While a NWA option may not be considered for a deferral or delay of a project required to reinforce a HV station with a load index of LI5, or similar network situation, it may be separately considered during the pre-construction or construction phase to increase security of the network / mitigate the risk of a low probability event, before completion of the reinforcement project.

Feasibility:	<p>Particular NWA options may be considered as non-viable where:</p> <ul style="list-style-type: none"> ○ They cannot be reasonably provided based on the calculated available benefit, using accepted industry installation costs (e.g. €/kVA or €/kWh for storage, generation, etc.)⁵ ○ Where existing land use / built environment in the relevant area would be considered unsuitable for particular technologies ○ Customer type, numbers and distribution is such that the NWA requirement is unlikely to be available for the time period defined <p>A proposed NWA option using non-proven or novel technology may not be considered a credible option, however such a proposal potentially may be considered separately as part of an Innovation Project.</p>
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2.2.3 Next Steps after the Reasonableness Test

Where it is determined that NWA options are considered as viable alternatives to defer the reinforcement project, such services can be sought (see Section 3.4), and offered services are then compared to the conventional reinforcement to determine the outcome, i.e. contract the NWA option or progress with the reinforcement project.

⁵ Accepted industry installation costs to be published, along with source, and used for informative purposes only, however the assessment includes all qualifying FSP offerings.

3. Flexibility Service Providers (FSPs)

3.1 Providers

Suitable FSPs can include any new and existing demand customers, distributed generators, energy storage, or other proven technology, connected to the distribution system. Demand customers can provide a flexibility service either individually or collectively, through an aggregator.

Such parties should have the ability to increase export, decrease import or release stored energy, as appropriate and within the terms of their connection agreement, (i.e. Maximum Import Capability (MIC) and Maximum Export Capability (MEC) levels, and any other conditions described), during the contractually defined time periods, or in the future, when instructed to do so, thereby changing the load profile as seen by the distribution system.

The minimum capability size, for a directly contracted FSP, or an FSP made up of aggregated sites, will be stated in the request for tender, and this minimum capability size will be reviewed regularly⁶.

3.2 Conditions

In order to provide a service to ESB Networks, the following non exhaustive high-level conditions apply:

- The FSP should be connected to the distribution system at a location where the NWA service is required or be in a position to be connected in reasonable time to be available for the contracted service duration. ESB Networks can verify if an existing site is suitably located (based on the site MPRN) in advance if necessary.
- Demand sites providing an on-site demand reduction should have a valid connection agreement with ESB Networks.
- Generators or energy storage sites should have a valid connection agreement with ESB Networks for a MEC of at least the value of the demand reduction capacity. Costs associated with application and connection are borne in full by the provider.
- Demand sites with on-site generation (with no export / zero MEC) should have a valid connection agreement, should such generators operate in parallel with the distribution system.
- The FSP should have the ability to act according to the contracted requirement, reliably and consistently, for the duration of the contract, after which no enduring rights for future service provision remain.
- The FSP should deliver and manage the agreed capacity change as seen by the distribution system, i.e. decrease the site demand or increase the site export or release stored energy, in relation to what the demand or export would have been if the requirement had not issued.

This requirement may be communicated via:

- A contractual definition, or
 - In the future, an instruction sent either manually or automatically
- The customer should have the ability to act according to the requirement for the longevity required by the contract.

⁶ Minimum FSP capability sizes (e.g. 100kW, etc.) to be informed by the output of the trial and other factors such as transaction costs and economies of scale.

3.3 Interactions with Other Service Provision

- The NWA service requirement will be processed through any future distribution system congestion management platform developed and/or adopted by ESB Networks.
- The FSP can participate in other available service provision schemes, however such other service provision should not increase demand on the distribution network at the times the NWA service requirement contracted by ESB Networks is active.
- The FSP should ensure that the contracted NWA service requirement can be delivered and maintained as required.
- A register of active NWA service requirements and contracted FSPs is to be maintained by ESB Networks.

3.4 Procurement

Standard procurement processes and practices are to be used by ESB Networks in procuring flexibility services, with details to be published on ESB Networks' website and on relevant procurement portals.

The request for tender should clearly define, at a minimum:

- The specific location of the flexibility service requirement, including the specific locations where service providers are to be located;
- The size (in MW or MVA) of the flexibility service requirement⁷;
- The duration of flexibility service requirement including the year(s), month(s), day(s) of week, times and time period(s), for which the response is required;
- Any technical specifications; and
- Any other applicable terms and conditions.

3.5 Payment

The terms, defined in the request for tender, may differ from location to location, depending on the requirement.

The maximum payment available is primarily based on the deferral value of the capital expenditure for the deferred or delayed reinforcement, taking transactional costs, administrative / overhead costs, impact of future reinforcement costs, and other factors, into account. Guidance on how the payment available is calculated may be provided in the request for tender documentation.

Depending on how the flexibility service is contracted, this may be a fixed payment for a defined service provision, or in the future, based on a combination of an ongoing availability payment and an additional activation payment, payable when the service is called.

⁷ ESB Networks may include an over-commitment on the requirement to ensure risk of operational non-availability is mitigated.

3.6 Performance Monitoring

Monitoring of performance of service delivery is a requirement⁸.

Any applicable penalty for non or partial delivery is to be defined in the request for tender.

For the initial trial, as the exact requirements are to be defined contractually, no automated signalling or communication system is required⁹.

Each FSP site is required to demonstrate their provision of the service at the required time. As such, additional monitoring equipment with sufficient accuracy (up to one second interval¹⁰), is required at each site, to enable ESB Networks to confirm the service was provided.

This monitoring equipment is additional to, and independent of, the ESB Networks revenue meter at the site.

Costs associated with the procurement and installation of the monitoring equipment, and data retention and provision, are borne by the FSP.

3.7 Operational Considerations

The NWA service requirement may increase or reduce due to increasing underlying demand, a new load application or other network developments.

The implications of such an increase or reduction for a contracted FSP are not expected to be material for the initial trial, but any implication for a contracted FSP arising in future use cases may be defined in the request for tender and contract.

⁸ Exact requirements to be determined and published, based on and informed by the output of the trial.

⁹ Development of signalling and communications systems is intended for future use cases.

¹⁰ Exact requirements to be determined and published, based on and informed by the output of the trial.

Annex A. (Informative) Sample Case Study

A.1. Sample Case Study – NWA Requirement

A sample case study is set out in this section and it should be noted that this data and information is illustrative only and does not represent a request for tender.

The intention is to provide an example of the type of information to be made available to prospective FSPs, including a brief description of the service requirement, the location of the requirement, the load requirement and required time periods per year, with multi-year charts provided, where applicable.

A.1.1.1. Service Requirement Definition

Flexibility services are sought from prospective FSPs at < **HV Station**>, a 2x5MVA, 38/MV substation, which is located in <**TOWN NAME**>, as shown on attached map, which defines normal feeding area.

The projected maximum demand profile, including expected load growth over the period, is shown in Figure 2. In this case, the maximum demand is expected to exceed the post outage load limit (short time) of 9MVA, during certain periods.

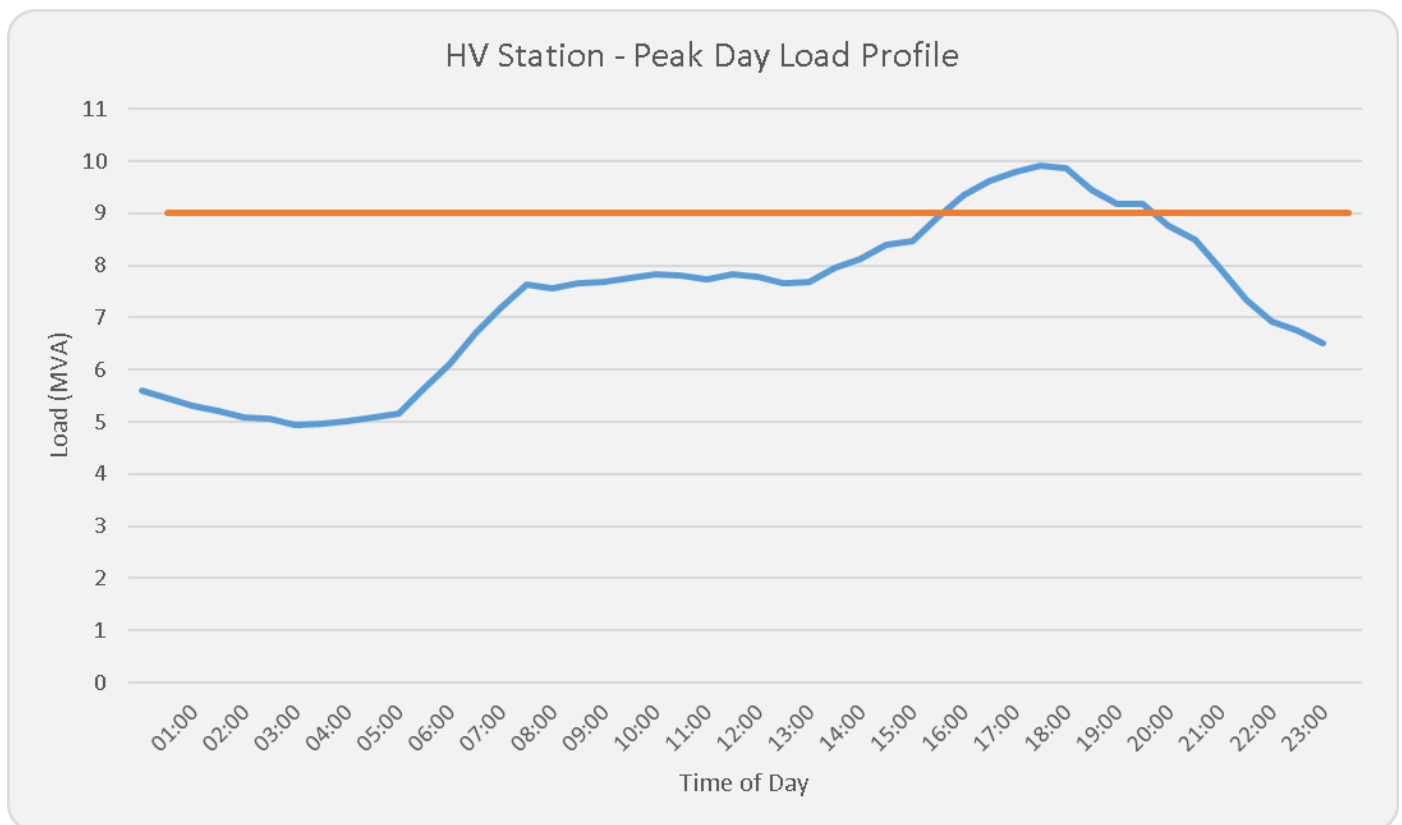
Flexibility services are required to reduce the peak demands on <**HV Station**> at the following times:

Year:	2026 ¹¹
Months:	November, December, January, February, March
Days of Week:	Weekdays only (Monday - Friday)
Time Periods:	Maximum window of 15:00 – 20:00, depending on month
Maximum FSP requirement:	0.92MW

Details are as set out in Figures 2, 3, 4, 5 and 6 below.

The 2026 peak day load profile is shown in Figure 2.

Figure 2: Estimated maximum daily load profile (2026)



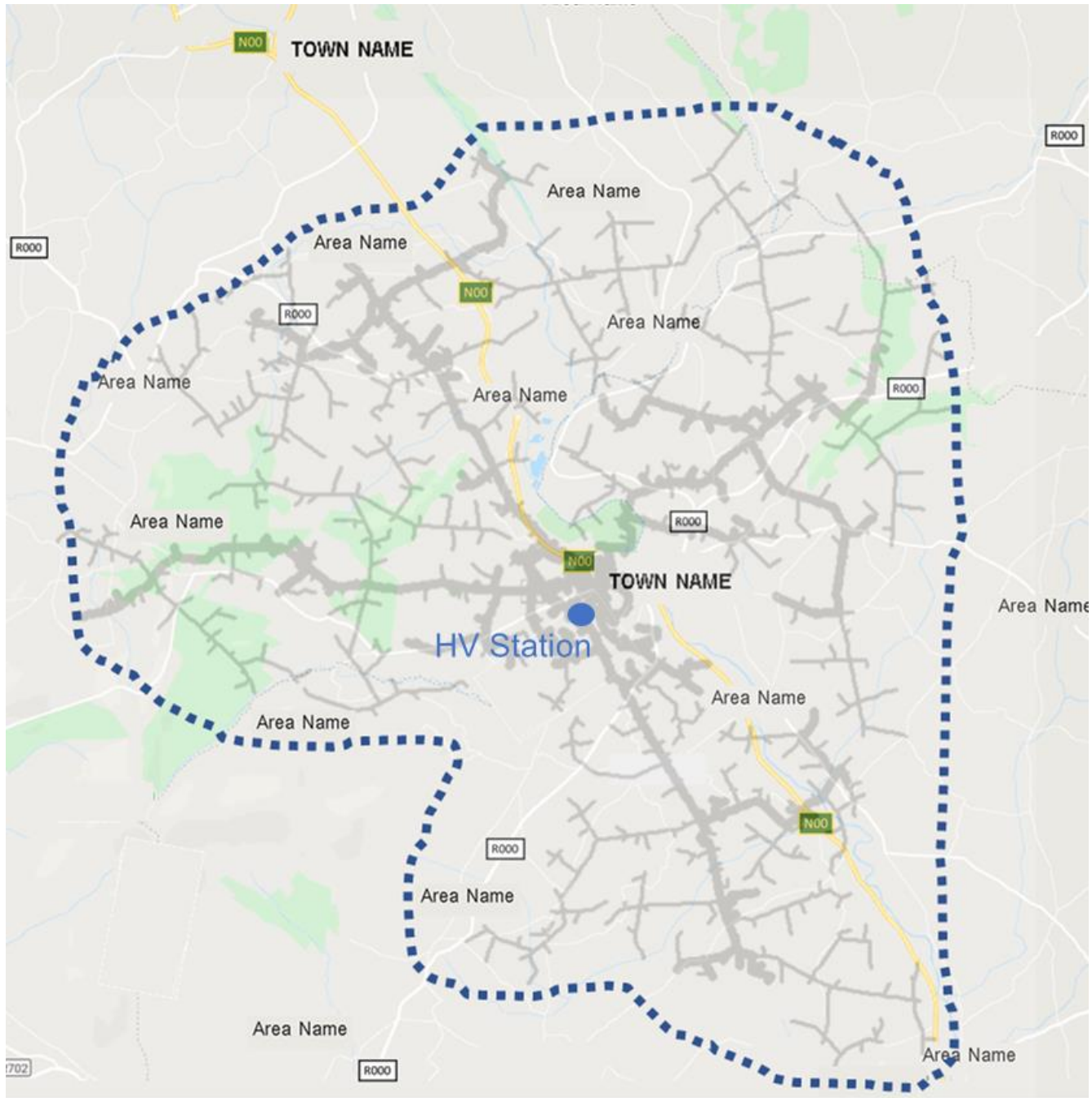
¹¹ The charts shown represent the expected worst-case year (2026) as an example, including the projected load growth, for illustrative purposes. In practice, multi-year charts to be provided showing the flexibility requirement increasing per year.

A.1.2. Location of Service Requirement

Any prospective FSP should be located in the area served by **<HV Station>**, as shown by the dashed line in Figure 3.

Any prospective FSP can check suitability of their location by contacting ESB Networks with their MPRN.

Figure 3: Target location area for FSPs

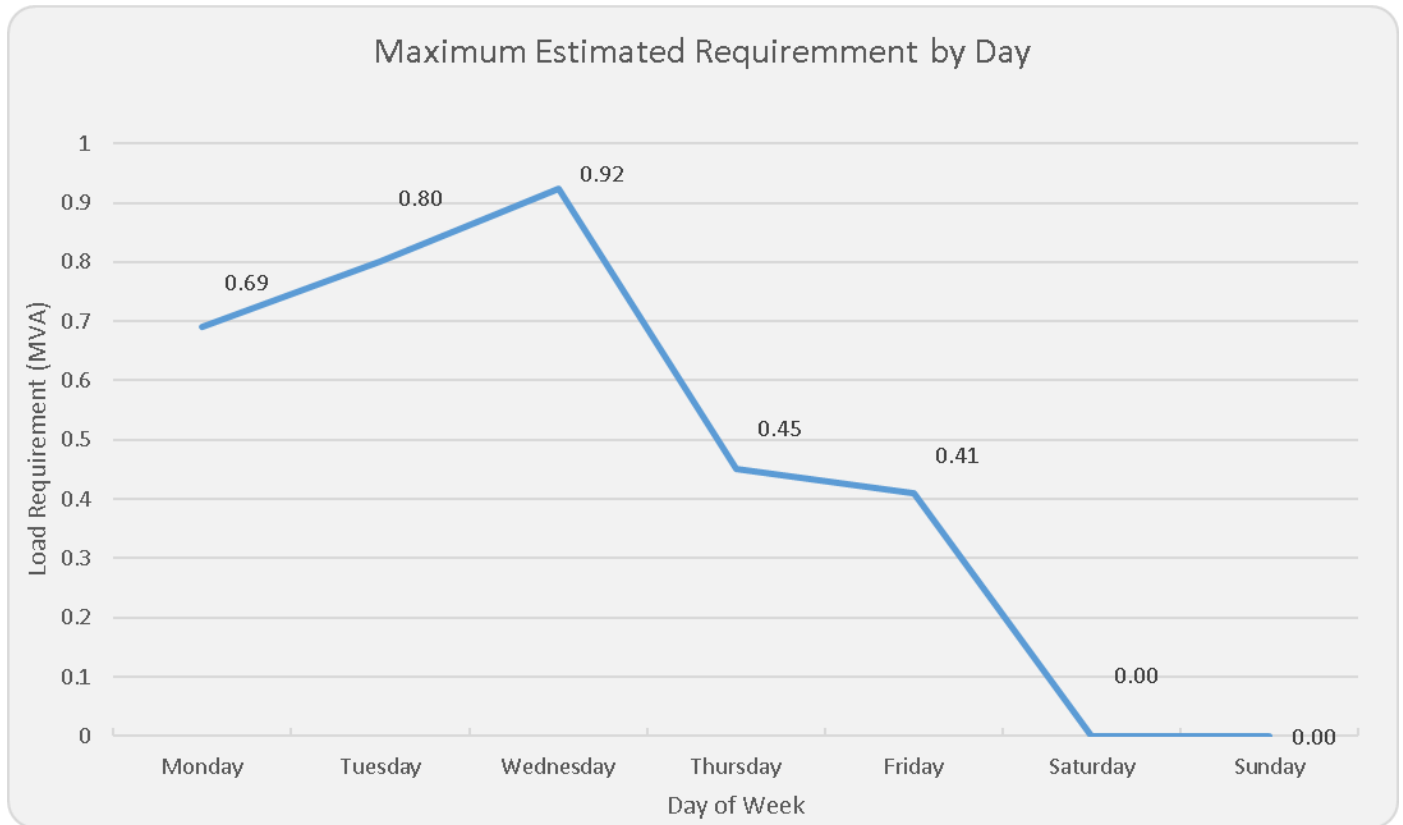


The dashed line shows boundary of network fed from **<HV Station>**. Customers connected within this area are potential FSPs.

A.1.3. Service Requirement Details

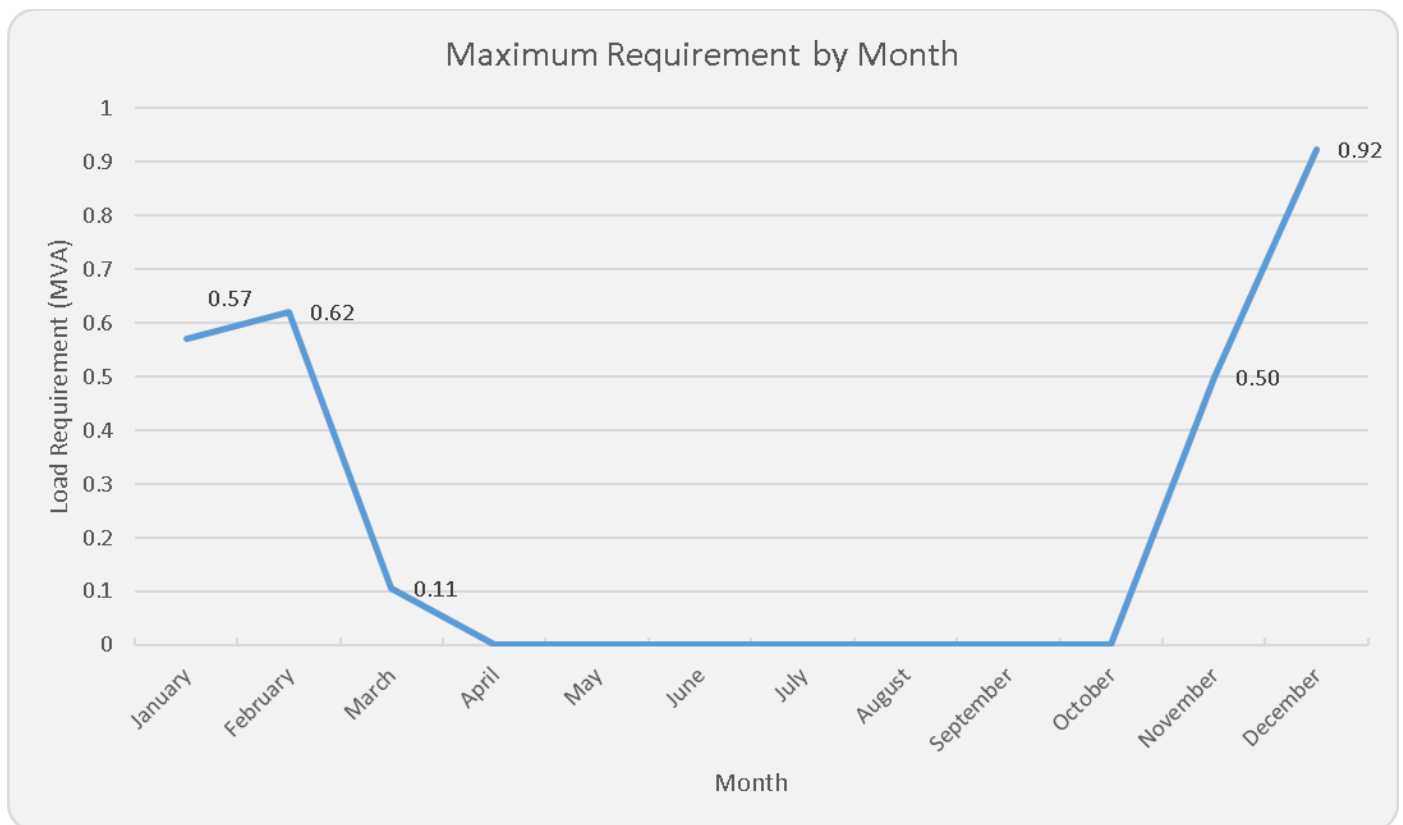
The maximum estimated FSP requirement by day is shown in Figure 4.

Figure 4: Maximum estimated FSP requirement by day (2026)



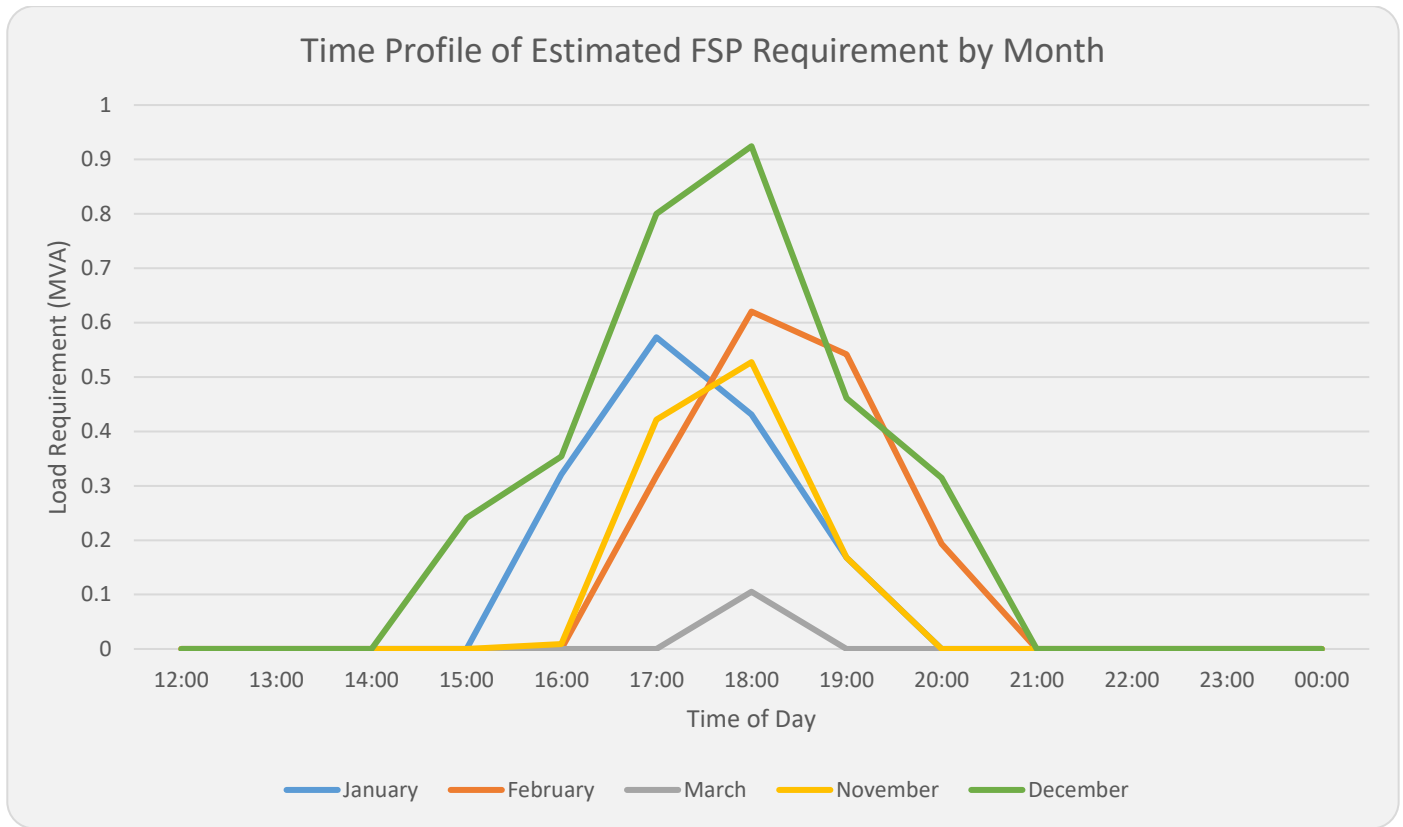
The maximum estimated FSP requirement by month is shown in Figure 5.

Figure 5: Maximum estimated FSP requirement by month (2026)



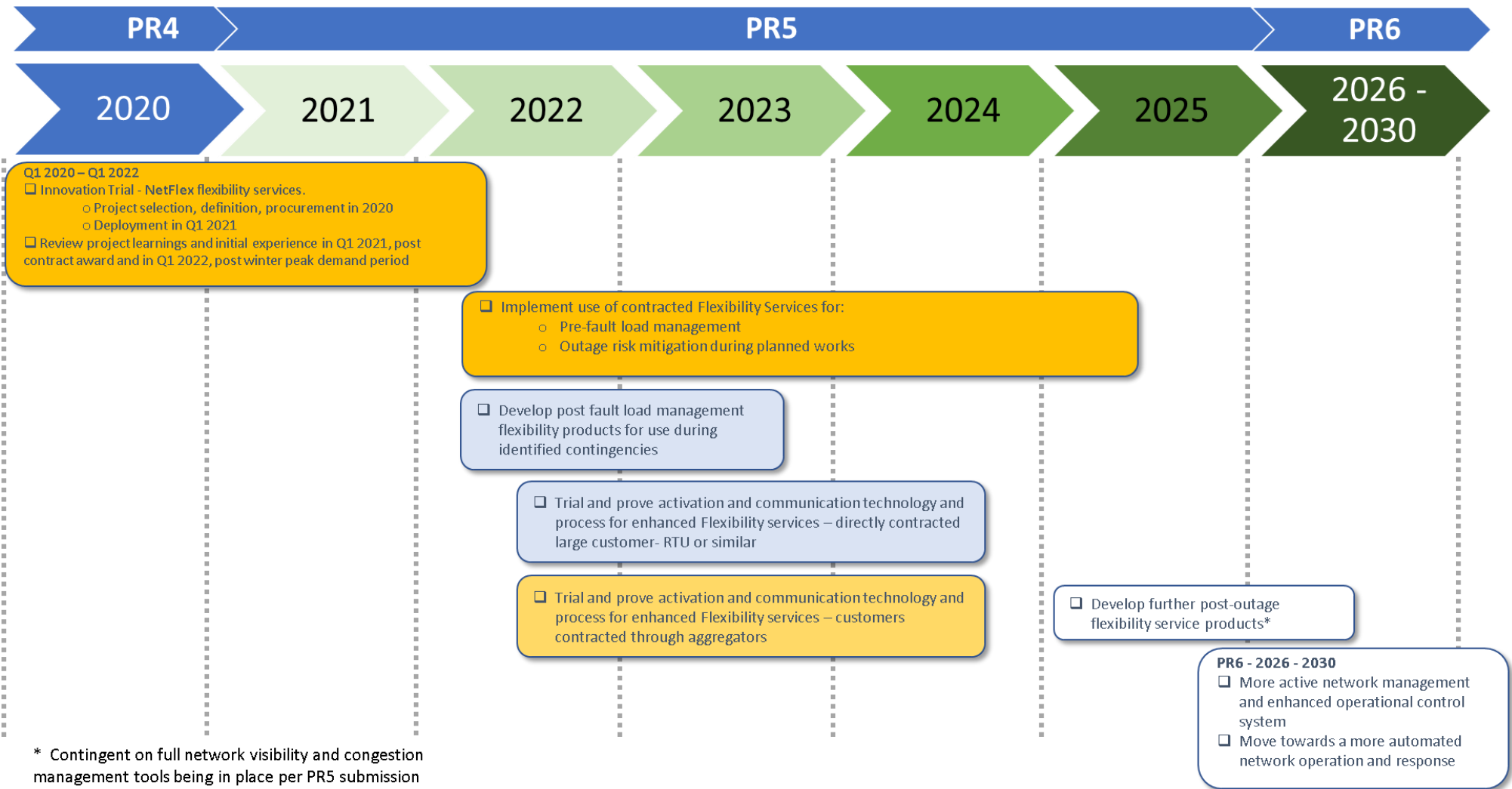
The time profile of estimated FSP requirement by month is shown in Figure 6.

Figure 6: Time profile of estimated FSP requirement by month (2026)



Annex B. (Informative) Indicative NWA / Flexibility Service Development Roadmap over PR5 (2021-2025)

Figure 7: Roadmap for development of NWA / Flexibility Services over PR5 (2021-2025)



Derogations

No Derogations are recorded against the Requirements of this document.

Terms and Definitions

For the purposes of this document, the following terms and definitions apply.

Figure 8: Terms and Definitions

Term	Definition
Shall	Designates a Company Requirement, hence conformance is mandatory.
Should	Designates a Company Recommendation where conformance is not mandatory but is recognised as best practice.
May	Designates a Permissive Statement - an option that is neither mandatory nor specifically recommended.
Distributed Generation (DG)	Generation capacity connected to the distribution networks, e.g. CHP, wind farms, small hydro, etc.
Firm Capacity of Station	The full emergency / contingency load rating of all remaining transformers after loss of the largest transformer in a station. A single transformer station thus has no firm capacity.
High Voltage (HV)	The lower limit varies but for distribution systems this is normally a class of nominal system voltage in excess of 35kV and up to 138kV.
Least Cost Technically Acceptable (LCTA)	In the context of network development projects, the LCTA solution is defined as the option which is technically acceptable, and which results in the minimum charge to the end-user, considering the long-term economic development of the electricity network in the area.
Load Index (LI)	A load index (LI) is a measure of peak loading on the HV station against its firm capacity. A five-point scale is used to assign a Load Index to a HV Station; LI1 representing a lightly loaded station, to LI5 representing a heavily loaded station.
Maximum Export Capacity (MEC)	The maximum power that a customer is permitted to export via their ESB Networks electricity connection.
Maximum Import Capacity (MIC)	The maximum power that a customer is permitted to import via their ESB Networks electricity connection.
Meter Point Reference Number (MPRN)	This is the unique 11-digit identifier given to every metering location.
Medium Voltage (MV)	The upper limit varies but for distribution systems this is normally a class of nominal system voltages in excess of 1,000 volts up to 35kV.
Non-Wires Alternative (NWA)	An alternative option available to conventional network reinforcement.
Price Review (PR)	A financial review process led by the regulator - the Commission for Regulation of Utilities (CRU).
Transmission System Operator (TSO)	The licensed operator of the Transmission System. Eirgrid in its capacity as licensed operator of the Transmission System under its TSO Licence.

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