NETWORKS

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 development. 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 uprating 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 (2021-2025), and to further develop this over time. The introduction of NWA options will assist ESB Networks in delivering a safe, secure and reliable distribution network.

The initial trial (in 2020) of NWA as an option will be 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 NWA 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 that will be made available to potential FSPs is covered in Annex A.
- A roadmap showing the development and enhancement of the Flexibility services over PR5 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, **t**he contracting and use of demand response services (Demand Side Units) by Eirgrid, as TSO, is not covered by this document.

2. Network Development Process

2.1 Background

The network development process assesses a particular need (eg 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 will be applied depending on the instance and location, for example, a typical demand load application to the medium voltage network in a town or city may be studied with 5 - 10 years load growth, whereas a similar application in a more rural area may be studied with a lower growth rate.

A proposal for a new HV substation or other more strategic network development would be studied with a 10 - 25 years load growth applied[1].

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

Typical constraints could include:

- Thermal overload of a circuit
- Overload of a transformer or other plant
- Voltage outside allowable range
- Compliance with the required Security of Supply level[2]

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 will assess all conventional intervention options from a technical and economic perspective and a Least Cost Technically Acceptable (LCTA) solution will be arrived at, and this represents the preferred option to address the network need.

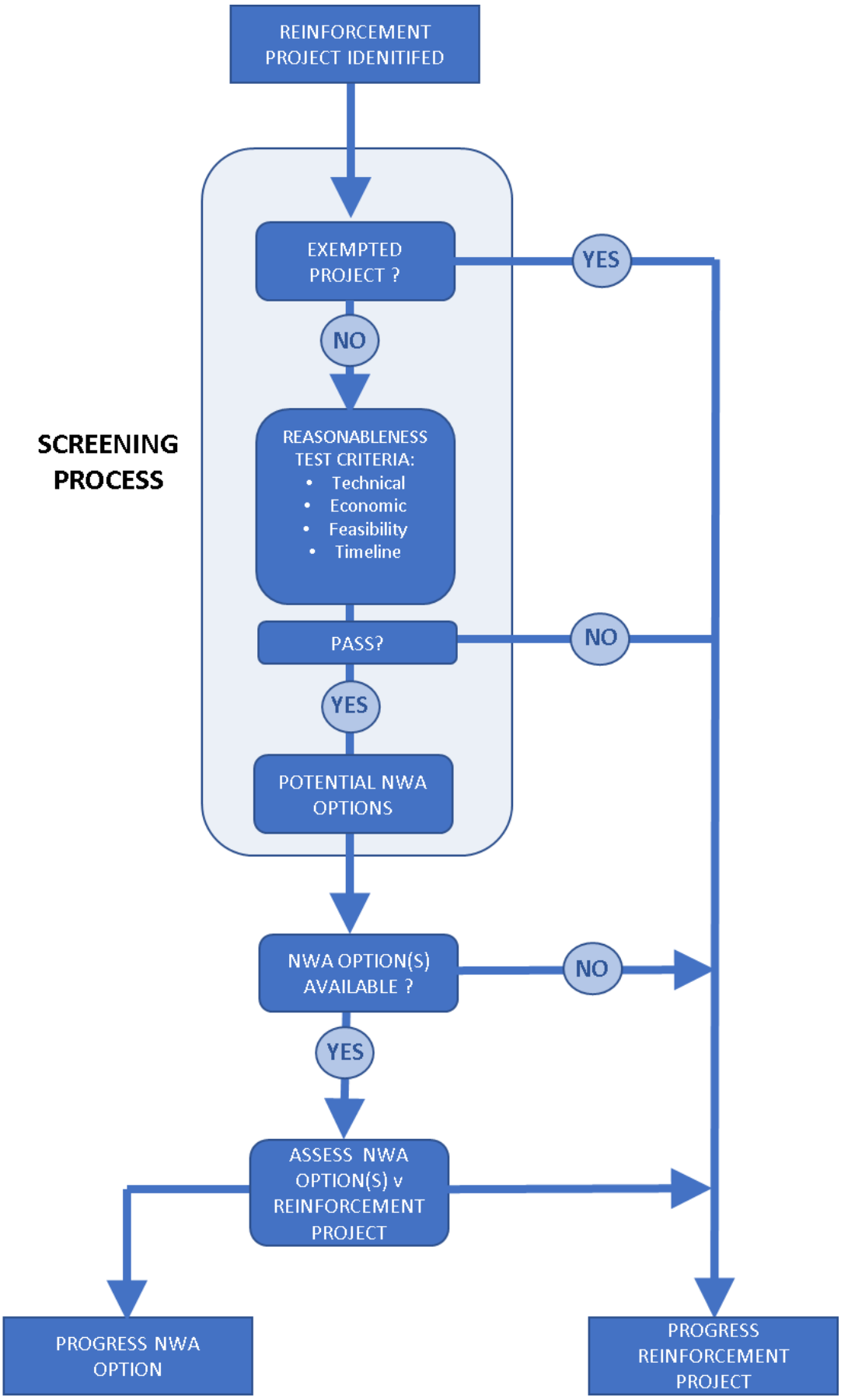
2.2 Screening Process

Following determination of the LCTA for an intervention, projects are subjected to a screening process to determine whether an 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 an NWA option being available and able to provide a flexibility service.

The screening process to be initially applied is shown in Figure 1, and this will be reviewed 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, Distribution System Security and Planning Standards.

Figure 1: Non-Wires Alternatives Screening Process



2.2.1 Exempted Projects:

Reinforcement projects that would not typically be considered for an 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 Index[3] of LI5, or a similar network situation where the constraint is very large[4]
- Where an asset replacement project for obsolescence or condition reasons supersedes the load related project
- Where safety related reasons supersedes the load related project
- Where the reinforcement cannot be technically solved or deferred by an NWA option (eg 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:	An NWA option will 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 an NWA option cannot be feasibly procured and delivered within the timeline.
Technical:	An NWA option will not be considered as viable where the risk of further high load growth means any NWA option would quickly become ineffective (eg 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:	An NWA option will 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: ○ The deferral period ○ Administrative and overhead costs ○ Remnant lifespan of the relevant asset(s) ○ Impacts on: ○ 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
Feasibility:	Particular NWA options may be considered as non-viable where:

[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 an 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.

	○ They cannot be reasonably provided based on the calculated available benefit, using accepted industry installation costs (eg €/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 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.

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 are 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 will be published, along with source, and used for informative purposes only. Any qualifying FSP offering will be assessed.

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 must have the ability to increase export, decrease import or release stored energy, as appropriate and within the terms of their connection agreement (i.e. MIC and 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 regularly[6].

3.2 Conditions

In order to provide a service to ESB Networks, the FSP must comply with the following non-exhaustive high-level conditions:

- The FSP must 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 shall have a valid connection agreement with ESB Networks.

- Generators or energy storage sites shall have a valid connection agreement with ESB Networks for an MEC of at least the value of the demand reduction capacity. Costs associated with application and connection shall be borne in full by the provider.

- Demand sites with on-site generation (with no export / zero MEC) shall have a valid connection agreement, should such generators operate in parallel with the distribution system.

- The FSP shall 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 shall 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 shall have the ability to act according to the requirement for the longevity required by the contract.

[6] Factors such as transaction costs and economies of scale will inform minimum FSP capability sizes (e.g. 100kW, etc.). This level will also be informed by the output of the trial.

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 shall not increase demand on the distribution network at the times the NWA service requirement contracted by ESB Networks is active
- The FSP must ensure that the contracted NWA service requirement can be delivered and maintained as required
- ESB Networks will maintain a register of active NWA service requirements and contracted FSPs

3.4 Procurement

Standard procurement processes and practices will be used by ESB Networks in procuring flexibility services. Details will be published on ESB Networks' website and on relevant procurement portals.

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

- The specific location of the flexibility service requirement, including the specific locations where service providers must be located
- The size (in MW or MVA) of the flexibility service requirement[7]
- 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
- Any other applicable terms and conditions

3.5 Payment

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

The maximum payment available will be 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 will 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 will be a requirement[8].

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

For the initial trial, as the exact requirements will be defined contractually, no automated signalling or communication system will be required[9].

Each FSP site must be able to demonstrate their provision of the service at the required time. As such, additional monitoring equipment with sufficient accuracy (up to one second interval[10]), will be required at each site, to enable ESB Networks to confirm the service was provided.

This monitoring equipment will be 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, will be 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 will be defined in the request for tender and contract.

[8] Exact requirements to be determined and will also be informed by the output of the trial and will be published once determined.
[9] Development of signalling and communications systems is intended for future use cases.
[10] Exact requirements to be determined and will also be informed by the output of the trial and will be published once determined.

Annex A. (Informative) Sample Case Study

A.1. Sample Case Study – NWA Requirement

A sample case study is set out here 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 that will 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.

Multi-year charts will be provided where applicable.

A.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.

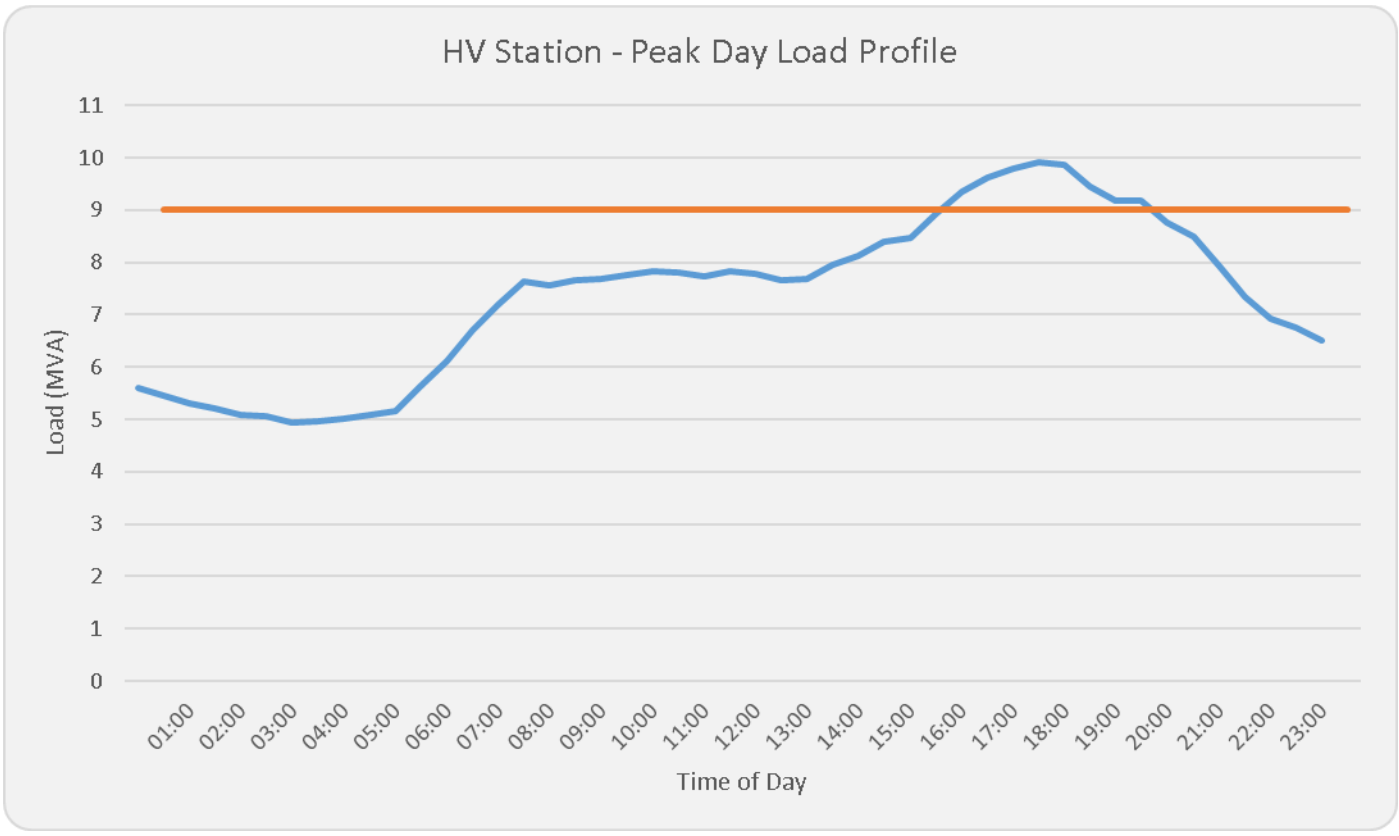
Flexibility services are required to reduce the peak demands on **<HV Station>** at the following times:

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 2,4,5 and 6 below.

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

Figure 2: Estimated maximum daily load profile (2026)



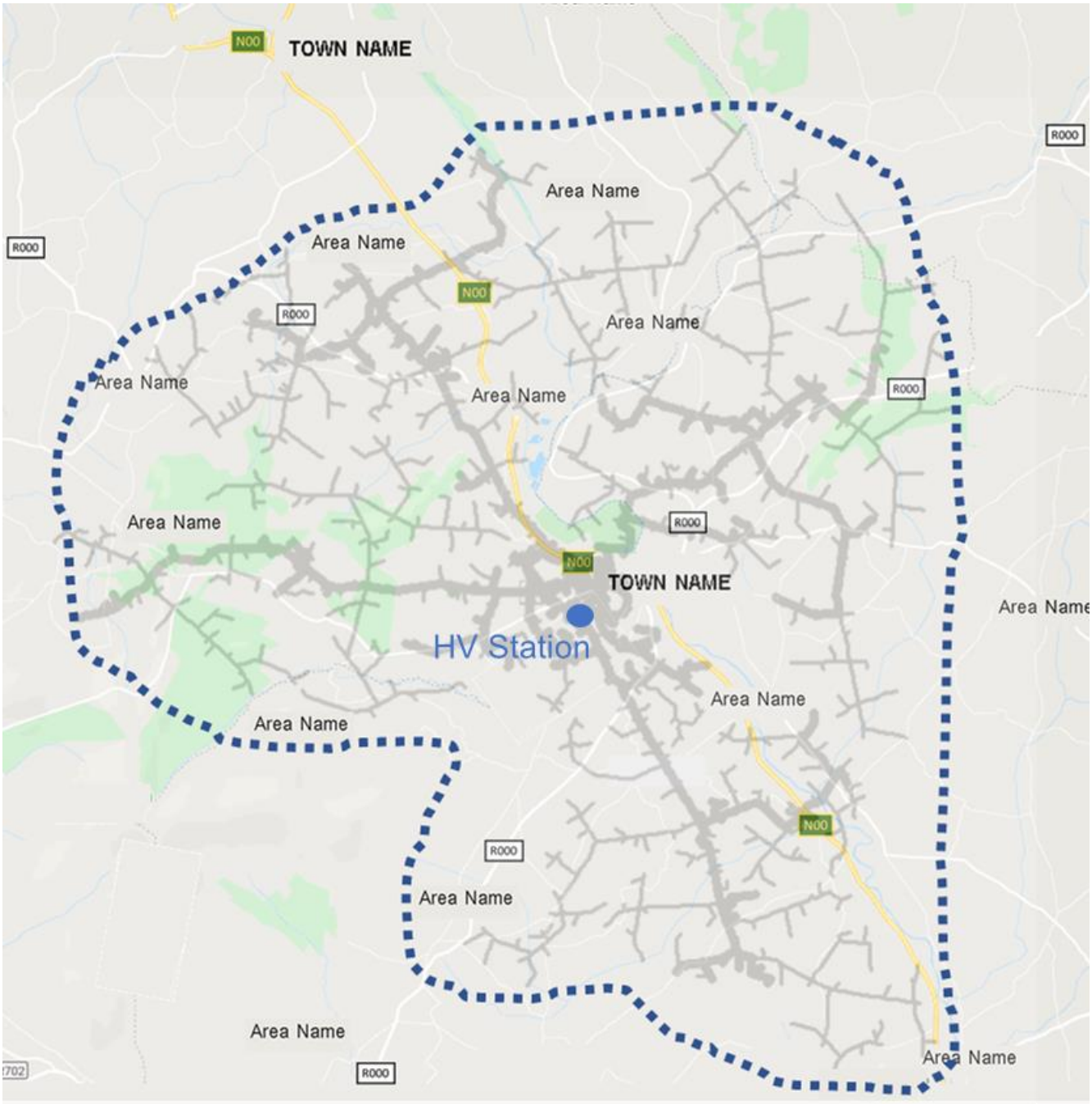
[11] The charts shown represent the expected worst-case year (2026) as an example, including the projected load growth, for illustrative purposes. In practice, multi-year charts will be provided showing the flexibility requirement increasing per year.

A.1.2. Location of Service Requirement:

Any prospective FSP must 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:

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

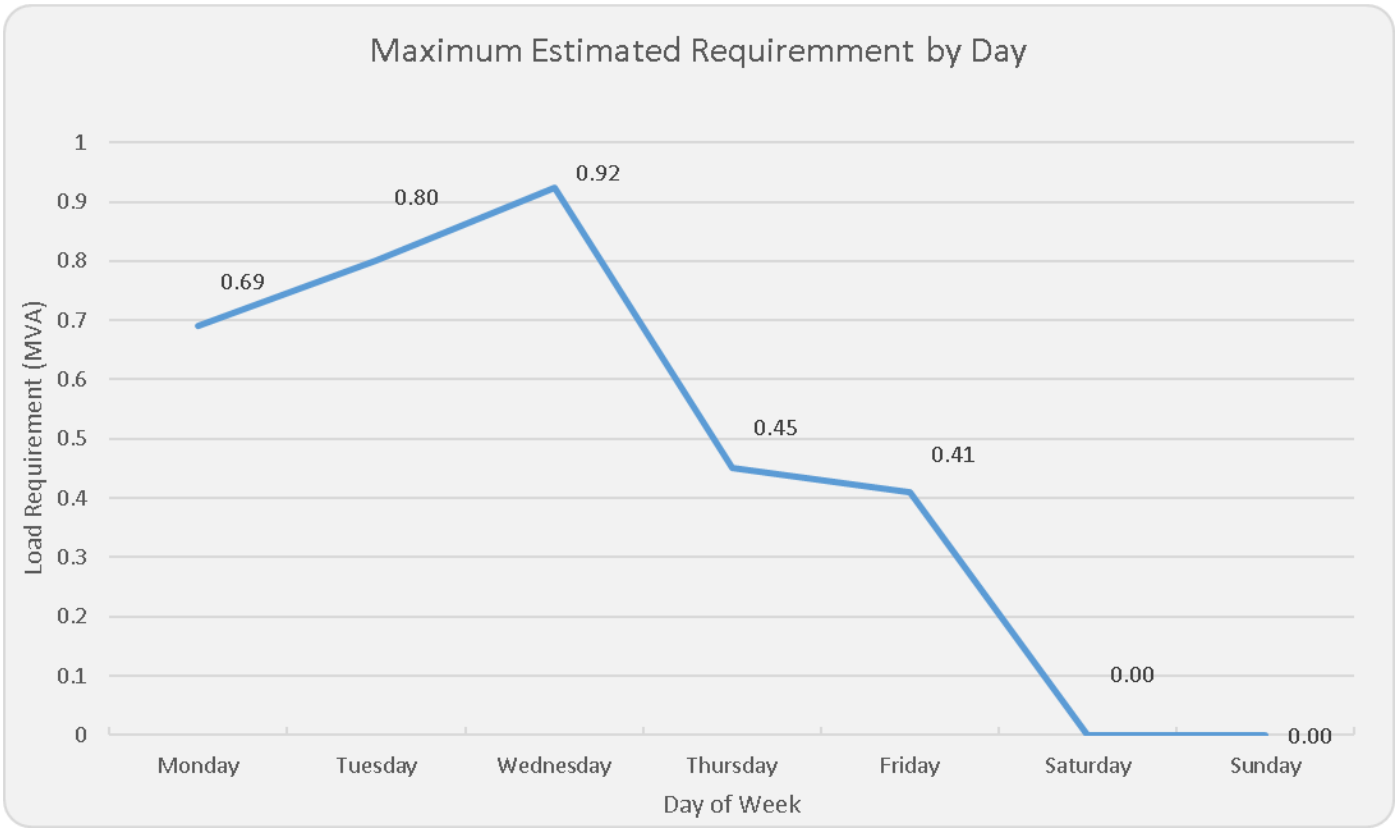


Figure 5: Maximum estimated FSP requirement by month (2026)

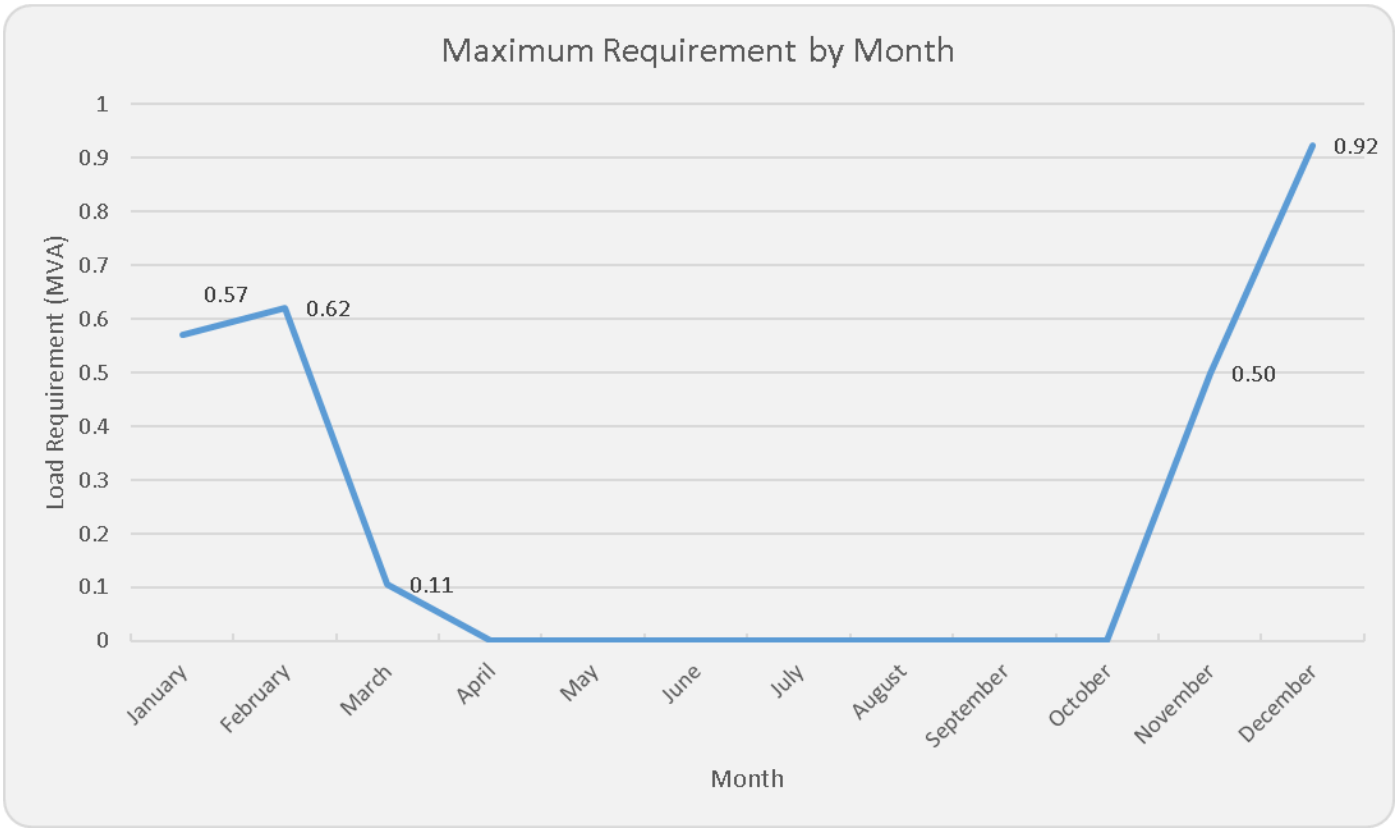
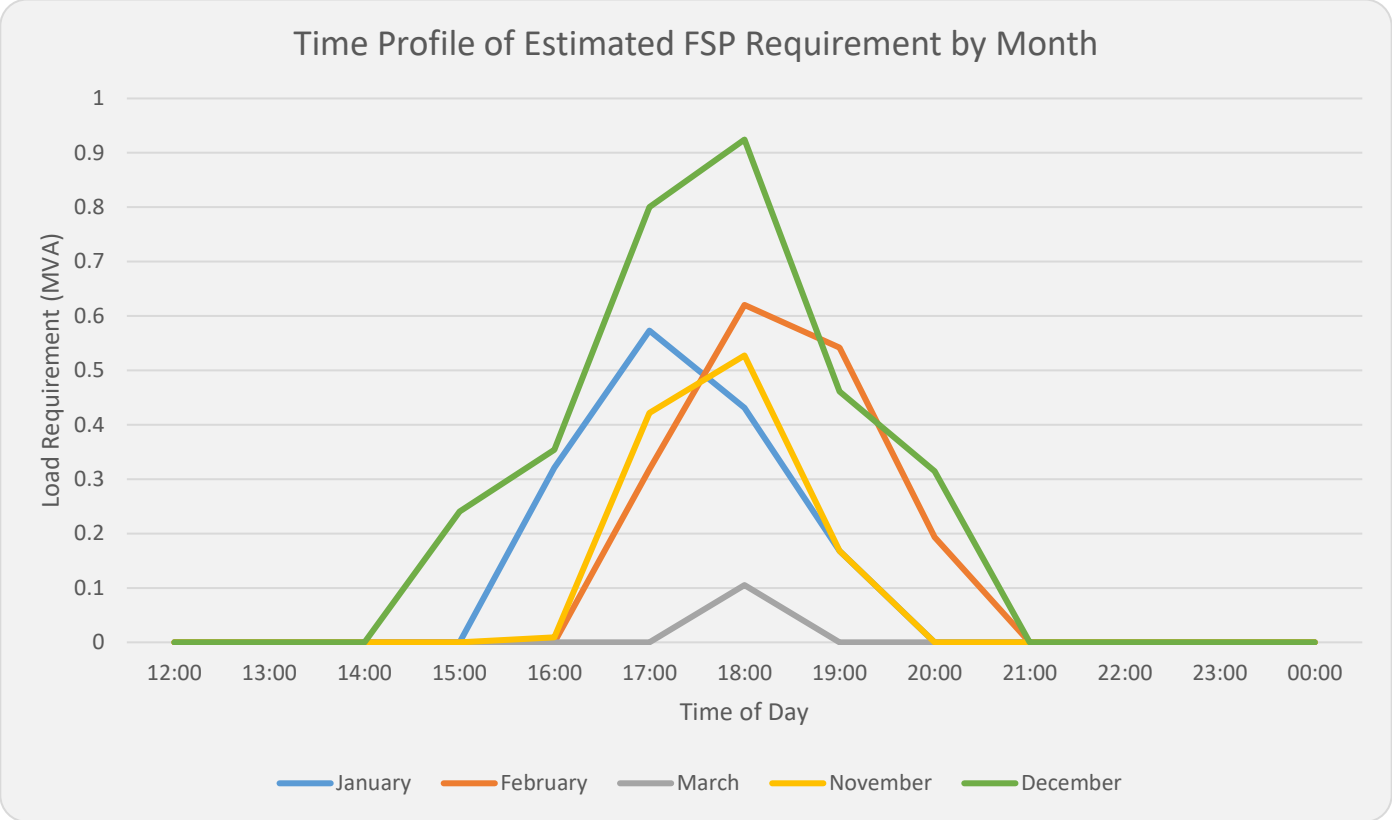
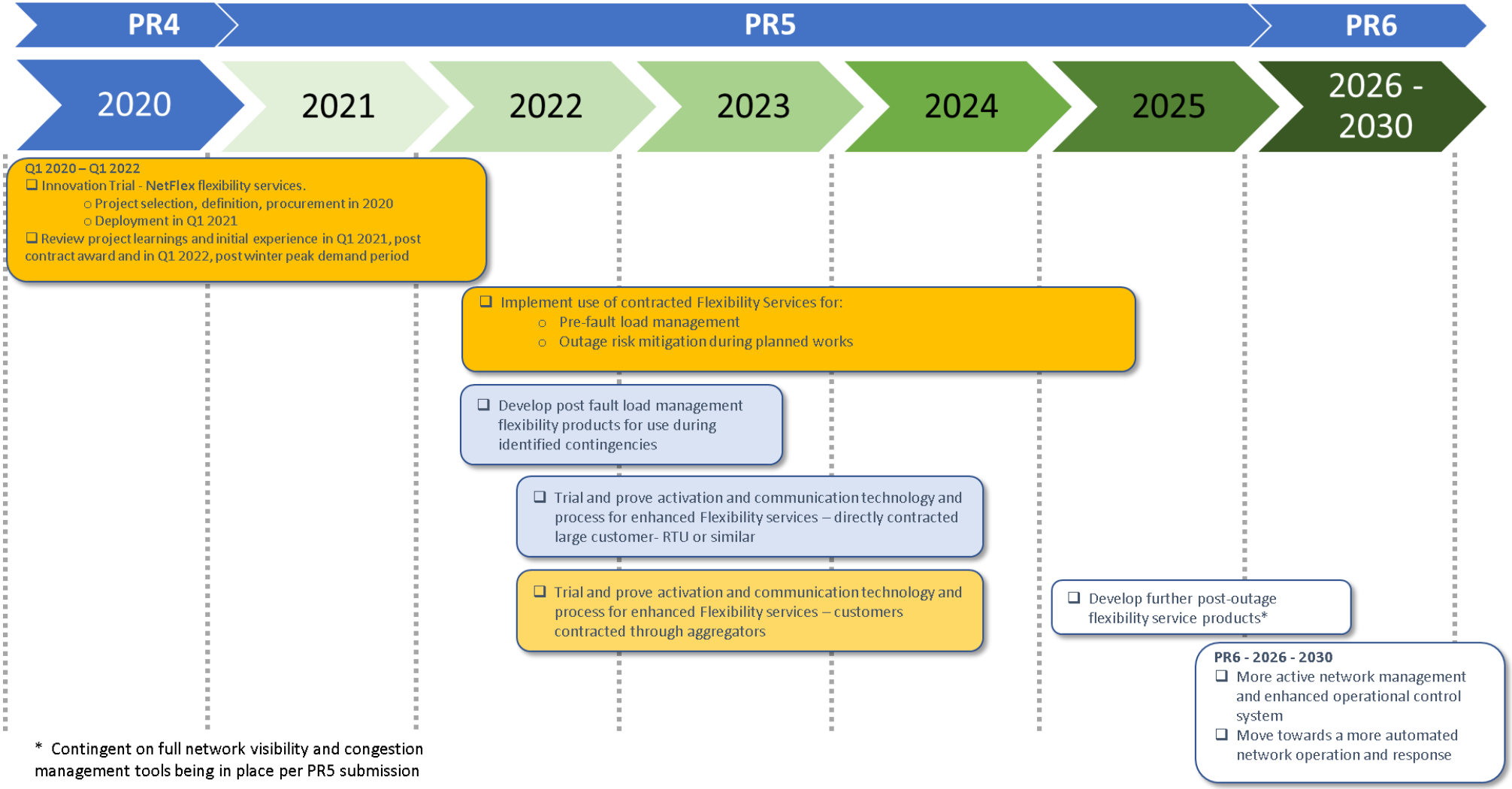


Figure 6: Time profile of estimated FSP requirement by month (2026)



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



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