RIIO-T3

Elstree 132kV Extension

Track 2 Eligibility Letter Submission

October 2026



Electricity Transmission

nationalgrid

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Reference and summary table

Field	Description
Project name	Elstree 132kV Extension
TO's preferred re-opener track	Track 2 Eligibility Letter (EL)
RRP References	In the 2025-26 RRP, this investment was referenced with the following Ofgem Scheme References (OSRs) and scheme names: [redacted]
BPDT / Scheme Reference Number	In the T3 BPDT, this investment was referenced with the following OSRs and scheme names: [redacted]
Load Board Reference	Referenced in the July 2026 RIIO-3 Re-opener Pipeline Update with project name "NGET Elstree 132kV Substation Extension".
Investment driver(s)	• **Customers connections:** [redacted] customers amounting to [redacted]
Project outputs	[redacted]

[redacted]

Short list of strategic options considered	Four main options were shortlisted for detailed analysis: • **Option D-1:** 132kV AIS solution with SGT10 in decommissioned 132kV AIS compound • **Option D-2:** 132kV GIS Hall Extension with SGT10 in decommissioned 132kV AIS compound • **Option D-3:** 132kV GIS Hall Extension with SGT10 to mirror SGT9 in laydown area • **Option D-4:** New 132kV GIS Hall with SGT10 in decommissioned 132kV AIS compound
Preferred solution and explanatory narrative on the rationale	Our **preferred option is D-4** for the following key reasons: • **Cost:** Preferred option D-4 has the lowest upfront capital costs among the shortlisted options as it makes best use of the existing substation footprint, reducing the extent of new 400kV cable and civil works required. • **Futureproofing of the 400kV site:** Significantly smaller footprint than AIS option D-1, preventing the sterilisation of future projects related to the 400kV site. Unlike GIS options D-2 and D-3, our preferred option also does not rely on extending the existing 132kV GIS hall, which would require large retaining walls that create physical restrictions for future projects related to the 400kV site. • **Environment:** There is significantly less land-take than AIS option D-1. Our preferred option also overcomes the GIS hall extension impacts associated with D-2 and D-3 (excavation, land cutting, retaining walls, contaminated soil, concrete use). • **Deliverability:** Unlike the other shortlisted options, minimal outages are required as most of the work can be constructed under the Contractor's safe systems of work before being transferred under NG Safety Rules. Outages are only required for the energisation. Construction works can be carried out away from the existing building, reducing engagement and coordination requirements with third parties.
PASE alignment	The preferred option D-4 (New 132kV GIS hall with SGT10 in decommissioned 132kV AIS compound) is a variant option for substation extension interventions in the PASE framework. This is because it is an SF_6-free GIS extension. In our optioneering, we discounted shortlisted option D-1 (132kV AIS solution with SGT10 in decommissioned 132kV AIS compound), which is a primary option for substation extension interventions in the PASE framework (see reasons below in our narrative for the preferred solution).
Cost (23/24 prices)	At the time of submitting this Eligibility Letter for this mature project, we have a total cost forecast of [redacted] (23/24 prices),

	including [redacted] for risk and contingency. Please see Section 3.7 for how that percentage is calculated.
Delivery year	Target project completion date of [redacted]
Extension cost (applicable only to substations)	[redacted] (23/24 prices).
Applicable reporting tables	In the **T3 BPDT**, the project is referenced in tables <1.9 Look Up Tables>, <5.2 Scheme Output>, <6.1 Scheme C&V Load Actuals>, <6.5 T3 Baseline Load>, <9.4 CAI>, <10.2 Asset ID> and <11.10 Contractor Indirects>, <11.10 Contractor Indirects>. In the **2025-26 RRP**, the project is referenced in tables <Look Up Tables>, <Scheme_C&V_Calc_Load_Actuals>, <Scheme_C&V_Calc_Load_Allow>, <Scheme_Output>, <Scheme_Output_Allowance>, <D4.11_Asset_ID>.
Interactive projects	The project interacts with related reinforcement and connection works at Elstree and Letchmore Heath (new substation), including dependencies associated with enabling capacity for multiple customers and coordinated delivery across the wider North West London network. [redacted]
Historical funding interactions	[redacted]

Spend apportionment	**T2 (FY 2022-2026)**	**T3 (FY 2027-2031)**	**T4+ (FY 2032-2037+)**
	[redacted]	[redacted]	[redacted]

Executive summary

Project summary

Elstree 132kV Extension is a demand-driven reinforcement project in northwest London. It will deliver a new 132 kV GIS extension and associated infrastructure, including a new [redacted] GIS substation building, [redacted] and the installation and upgrade of transformers to increase capacity across the site.

Submission purpose

We are seeking Ofgem's approval, under the Load Re-opener (Special Condition 3.18 of the RIIO ET3 licence), to progress the Elstree 132kV Extension project as a Track 2 EL investment and approval of Pre Construction Funding (PCF).

[redacted]

Project need

The investment is driven by [redacted] customer connections. This consists of [redacted]

[redacted]

The investment is required to enable these contracted connections through the provision of additional substation capacity, including new bays and transformer capacity. Without this reinforcement, National Grid would not be able to fulfil its commitments to provide connections under existing customer agreements and would therefore be unable to deliver the required network access to these customers.

[redacted]

Optioneering to date

We have undertaken a multi-factor optioneering process to identify the most appropriate solution to meet the identified need. We conducted a high-level assessment of five strategic option categories, including do nothing (A), market based (B), whole system (C), use existing assets (D), or new substation (E). From this, we developed a longlist of eight potential options (see Table 1).

From this longlist, we identified four shortlist options through the following process:

- **Discounting unfeasible strategic option categories A-C, and E:** Options A-C were rejected due to their failure to deliver compliant physical connections. Option E was rejected given that there is physical and electrical space to extend the existing substation on NGET land, which means that a new substation would not provide value to consumers and would present planning and consenting risks.
- **Four shortlisted options:** Our four shortlisted options fell into our strategic option category D, which is to extend the existing substation.

Of our shortlisted options, Option D-4 is the preferred solution. This is supported by the optioneering assessment and the referenced diagrams in Section 3. The rationale is:

- **Cost:** Preferred option D-4 has the lowest upfront capital costs among the shortlisted options as it makes best use of the existing substation footprint, reducing the extent of new 400kV cable and civil works required.
- **Futureproofing of the 400kV site:** The option has a significantly smaller footprint than AIS option D-1, preventing the sterilisation of future projects related to the 400kV site[2] while also avoiding the potential planning and stakeholder risks associated with having to acquire new land on the green belt in future projects. Unlike GIS options D-2 and D-3, our preferred option D-4 also does not rely on extending the existing 132kV GIS hall, which would require large retaining walls that create physical restrictions for future projects related to the 400kV site.
- **Deliverability:** Unlike the other shortlisted options, minimal outages are required as most of the work can be constructed under the Contractor's safe systems of work before being transferred under NG Safety Rules. Outages are only required for the energisation. Construction works can be carried out away from the existing building, reducing engagement and coordination requirements with third parties.
- **Environment:** Preferred option D-4 has significantly less land take than AIS option D-1. It overcomes GIS hall extension impacts associated with D-2 and D-3 on excavation, land cutting, retaining walls, potential contaminated soil handling and concrete use.

[2] While future works were not known at the time of optioneering, this decision has proved to be valuable because, the AIS option would have prevented the two planned 400kV [redacted] extension works that are to be delivered as part of the North West London scheme.

Table 1: Summary of options

Option	Details	Drivers met?	New site?	AIS/ GIS?	Shortlist?	Preferred solution?
Option A	Do nothing counterfactual	No	N/A	N/A	No	No
Option B	Market-based solution	No	N/A	N/A	No	No
Option C	Non-transmission, whole systems solutions	No	N/A	N/A	No	No
Option D-1	132kV AIS solution with SGT10 in decommissioned 132kV AIS compound	Yes	No	AIS	Yes	No
Option D-2	132kV GIS Hall extension with SGT10 in decommissioned 132kV AIS compound	Yes	No	GIS	Yes	No
Option D-3	132kV GIS Hall extension with SGT10 to mirror SGT9 in laydown area	Yes	No	GIS	Yes	No
Option D-4	New 132kV GIS hall with SGT10 in decommissioned 132kV AIS compound	Yes	No	GIS	Yes	Yes
Option E	Construct a new substation	Yes	Yes	Either	No	No

Cost estimates

Based on the latest cost estimates at the time of submitting this Eligibility Letter for this mature project, preferred option D-4 has a total cost forecast of [redacted] (23/24 prices), including [redacted] for risk and contingency.

Given the maturity of the project, we request Pre Construction Funding (PCF) allowances that correspond to the estimated pre-construction expenditure incurred to date. Based on that estimate, we request PCF allowances of [redacted] (23/24 prices) as part of this submission under Special Condition 3.15 of the Electricity Transmission licence, which is [redacted] of the latest total forecast project costs. This is requested to cover the cost of surveys, planning and land activities, FEED, programme management, and obtaining third party services, which we undertook at risk to maintain pace in delivery while waiting for Ofgem's preferred funding route.

Indicative delivery programme

The project is currently in the delivery phase, with key elements of the scheme already constructed. The remaining activities will focus on completing connections and securing system access for energisation. The current accepted programme (P6 programme) indicates a target completion date of [redacted]

[redacted]

[redacted]

Final cost apportionment and final efficiencies will be confirmed through the Project Assessment stage.

1. Introduction

1.1 Elstree 132kV Extension

This submission, coupled with its Annexes and Cost Benefit Analysis (CBA), is made under the Load Re-Opener and Price Control Deliverable (Special Condition 3.18 of the RIIO ET3 Licence) for the Elstree 132kV Extension project.

The application seeks the following determinations from Ofgem:

- approval of project eligibility under the Load Re-Opener and Price Control Deliverable (Special Condition 3.18)
- confirmed acceptance of the preferred solution (Option D-4)
- confirmation that the project should proceed via Track 2 of the re-opener process; and
- approval of Pre Construction Funding (PCF) under Special Condition 3.15 (Pre Construction Funding Reopener, Price Control Deliverable).

The investment will deliver customer connections and is future-proofed through selecting a solution that mitigates the risk of sterilising future projects.

Eligibility, Project Track Statement and PASE

The project qualifies under Special Condition 3.18 as a load-driven investment scheduled for delivery within the RIIO-ET3 period, due to it being atypical and the total cost being greater than £40m.



[redacted]

Re-opener track

This submission proposes the Track 2 EL Load Re-Opener process for assessment. Track 2 EL is appropriate as a single preferred option is set out that is PASE aligned (variant). Further detail is provided in PASE alignment in Section 3.5.

Preconstruction funding request

Under Special Condition 3.15 of the Electricity Transmission licence, this investment qualifies for allowances. This is because, in alignment with paragraph 3.15.21 of the licence, the project "did not have funding approved on 1 April 2026".

Given the maturity of the project, we request PCF allowances that correspond to the estimated pre-construction expenditure incurred to date. Table 2 below summarises our estimated expenditure for each category of pre-construction works that is eligible to receive PCF allowances. Based on that estimate, we request PCF allowances of [redacted] (23/24 prices) as part of this submission. This equates to [redacted] of the latest total forecast project costs of [redacted] (23/24 prices).

This position will be updated and ultimately reconciled at Project Assessment stage of the re-opener. We confirm that no PCF activity included in this submission has been funded through baseline allowances, other re openers, or alternative licence mechanisms.

Table 2: Estimated costs for pre-construction activities (£m 23/24 prices)

No	Description	Total forecast costs (£m)
1	Surveys	[redacted]
2	Planning consent approvals	
3	Optioneering and Feed development	
4	Project design activities	
5	Early enabling works	
6	Stakeholder engagement and consultation activities	
TOTAL		

1.2 Background

Chronology of investment

Between 2020-2021, we received [redacted] customer connection applications from [redacted] to connect at Elstree 132kV substation.

To accommodate those connection requests, we undertook optioneering and identified a preferred option in 2022. We subsequently gained first site access in August 2023. Please refer to the delivery schedule in Section 4 for more information on key delivery dates.

[redacted]

The customer connections drivers and high-level optioneering considerations are provided in Figure 1.

Figure 1: Summary of chronology

We received [redacted] connection requests at Elstree 132kV substation in 2020-21, following which we signed connection offers.

[redacted]

To accommodate those connection requests, we undertook optioneering between 2021-22 and began works in 2023.

- **Optioneering:** We undertook optioneering between 2021-22, identifying a preferred option in 2022.
- **Works:** We subsequently gained first site access in August 2023.

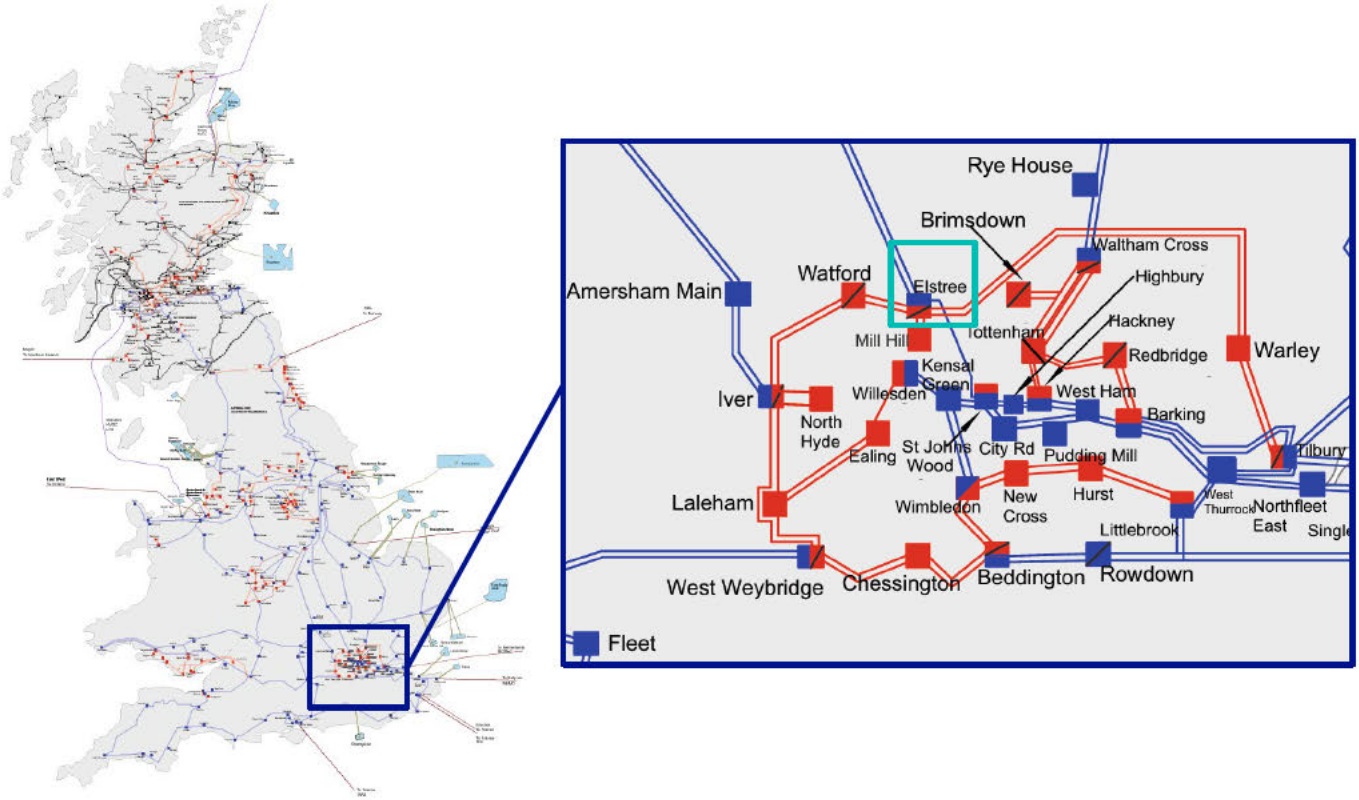
[redacted]

[redacted]

Regional and network context

The investment sits within northwest London (see Figure 2). The London and Southeast 275kV and 400kV transmission networks are designed to meet London's electricity needs and support the coastal interconnector power exchange capability. There are multiple interconnectors in this region which create dynamic network challenges that affect the infrastructure needed to manage large power flow in either direction.

Figure 2: Proposed location of the investment on our network



*Key: **Red** = 275 kV assets, **Blue** = 400 kV assets. Investment location shown in the **green** area*

The need for accelerated network investment in Great Britain (GB) due to the growing pipeline of connections is well established[3]. In Greater London, demand is forecast to increase by more than 170% by 2050, against a backdrop of the UK's transition towards net zero and a significant increase in the number of data centres needed to support the growing telecommunications industry[4]. In particular, the increase in data centres in and around London[5] reflects the UK's expanding digital sector, which contributed 6.5% to UK gross value added (GVA) in 2023[6]. In the UK Government's AI Opportunities Action Plan[7], the Government seeks to consider

[3] DESNZ & Ofgem, 2023. Connections Action Plan: Speeding up connections to the electricity network across Great Britain

[4] NESO, 2024. Electricity Ten Year Statement (ETYS)

[5] Data centres are concentrated around London due to the proximity of fibre optic cables and air transport connections.

[6] Department for Science, Innovation & Technology, 2025. Economic Estimates: Digital Sector Annual Gross Value Added (2019 to 2023)

[7] DCMS & Department for Science, Innovation & Technology, 2025. AI Opportunities Action Plan

measures to accelerate the buildout of data centres, which it considers to be the "engines of the AI age".

As part of Connections Reform, capacity allocations were agreed between the Government and NESO for each transmission network region for different technologies required for 2030 and 2035 to help protect the ability to connect strategically important demand.[8] For the region defined as "South East England", this was restricted to 600MW of capacity for solar, 0MW of capacity for onshore wind and 1.7GW of capacity for batteries for 2030.

[redacted]

Interactive projects

The Elstree site is expected to support a number of future reinforcement and customer connection projects, including Letchmore Heath, North West London and wider East-West London reinforcement initiatives. Interactive projects are set out in Table 3 and Figure 3, below.

Our optioneering for this investment has therefore been undertaken as part of an integrated site strategy rather than as a standalone customer connection scheme. Particular consideration has been given to future land availability, substation layout, cable routing, transformer positioning and future extension capability. This is required to minimise the risk of sterilising future development opportunities while delivering against drivers. This coordinated approach reduces the likelihood of future rework, avoids inefficient use of scarce site land and improves the long-term flexibility of the Elstree transmission node.

Table 3: Interactive projects

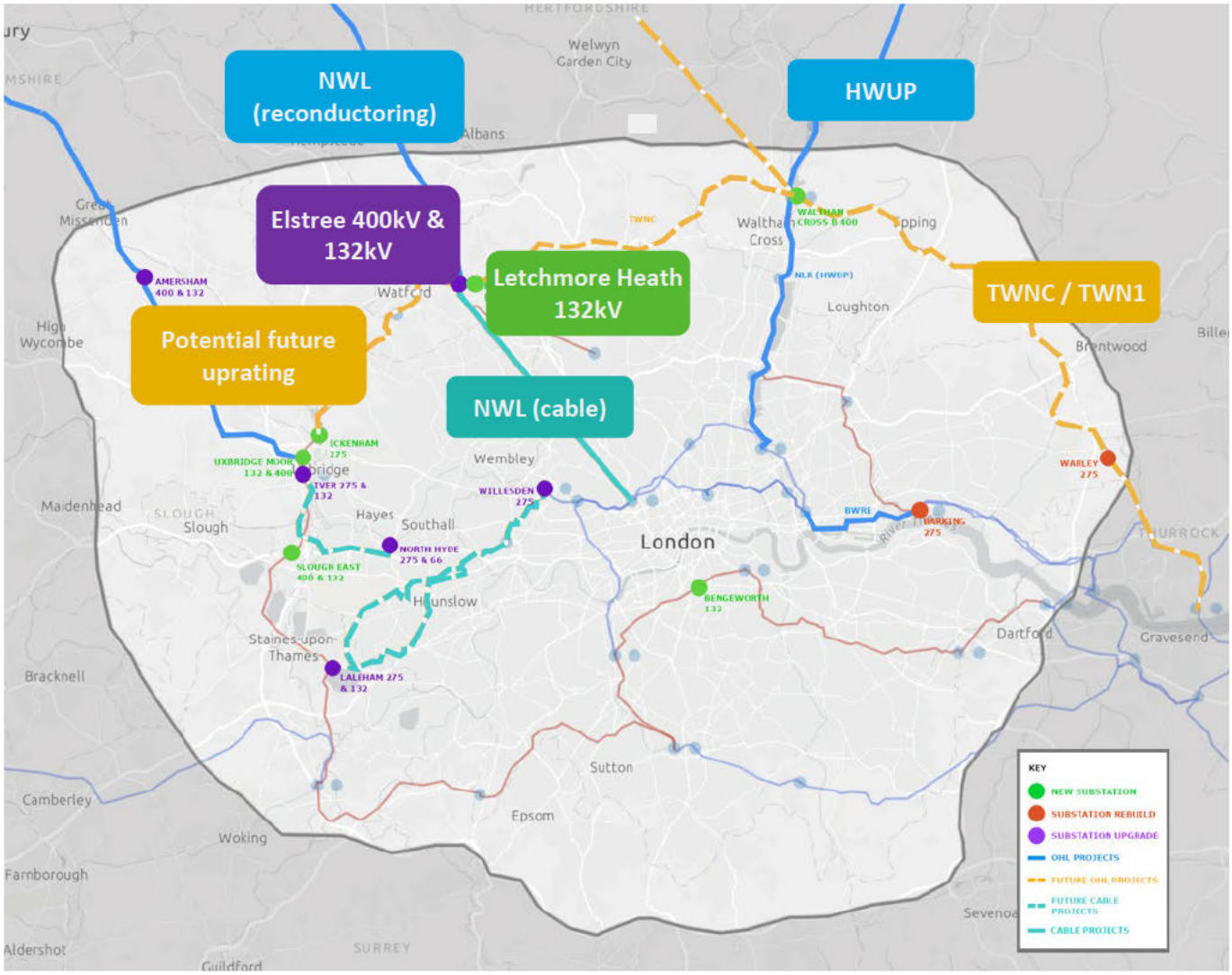
Project	Details	Status
Letchmore Heath	This investment entails the construction of the new Letchmore Heath 132kV substation, adjacent to the existing Elstree Substation. This is required to support downstream demand and connection growth. The investment also entails a 400kV SF_6-free extension to the existing Elstree substation. [redacted]	A Final Needs Case (FNC) was submitted to Ofgem through the L2 LOTI mechanism in January 2026. The connection ACL dates are [redacted]

[8] UK Government, 2026. Clean Power 2030 Action Plan: connections reform annex (updated April 2025)

Project	Details	Status
North West London (NWL)	This investment entails the delivery of two HND Essential Options SER4 (the reconductoring of the Sundon to Elstree second circuit) and ESC1 (the routeing of a second cable through the existing Elstree-Sundon cable tunnel. These are required to improve the balance of flow on the Sundon – Elstree circuits and support a boundary upgrade across [redacted], in turn reducing constraint costs to consumers. The cable delivered by ESC1 will be connected at Elstree substation through a 400kV SF_6-free GIS extension in the 132kV AIS area.	An Eligibility Letter was submitted to Ofgem through the T3 Load Re-opener mechanism in May 2026. The project is due for completion in [redacted]
Tilbury to Wymondley new Circuit (TWNC / TWN1)	This investment is a tCSNP2 reinforcement that uprates the North London 275kV corridor via new and uprated circuits to increase boundary capability, enable robust east-west power transfers and improve operability. As part of the tCSNP2 Refresh in Dec 2025, we submitted two strategic options: TWNC (extension to WALX) and TWN1 (WALX to WALX B).	TWNC was given a Proceed (Maintain) signal on 30 Jun 2026. TWN1 also received a Proceed signal. Both designs will be developed in parallel, to determine which is appropriate to progress.
North London Reinforcement (NLR / HWUP)	Strengthening of the north-east into inner-London power corridor, improving circulation and reducing congestion. The NWL investment is complementary to HWUP. Together, they increase transfer capability and improve the ability to balance flows into London.	HWUP is included as part of ASTI licence and currently in delivery phase. A Final Determination on the Project Assessment is expected from Ofgem in July 2026.
Elstree Substation Control System (SCS) Upgrade	The SCS at Elstree Substation is currently being replaced with a new system.	In progress.
Potential future uprating	In addition, the NWL works at Elstree are designed to interface with the emerging West London Strategy (400kV uprating), providing a credible pathway for continued uprating westwards from the Elstree links and enabling future staged delivery of an uprated 400kV; East to West London corridor (subject to confirmation of system	Emerging.

Project	Details	Status
	need and subsequent investment decisions). In this way, Elstree's enabling works avoid stranded uprated capability and preserve optionality for an end-to-end uprated route into West London.	

Figure 3: Location of interactive works relative to the investment

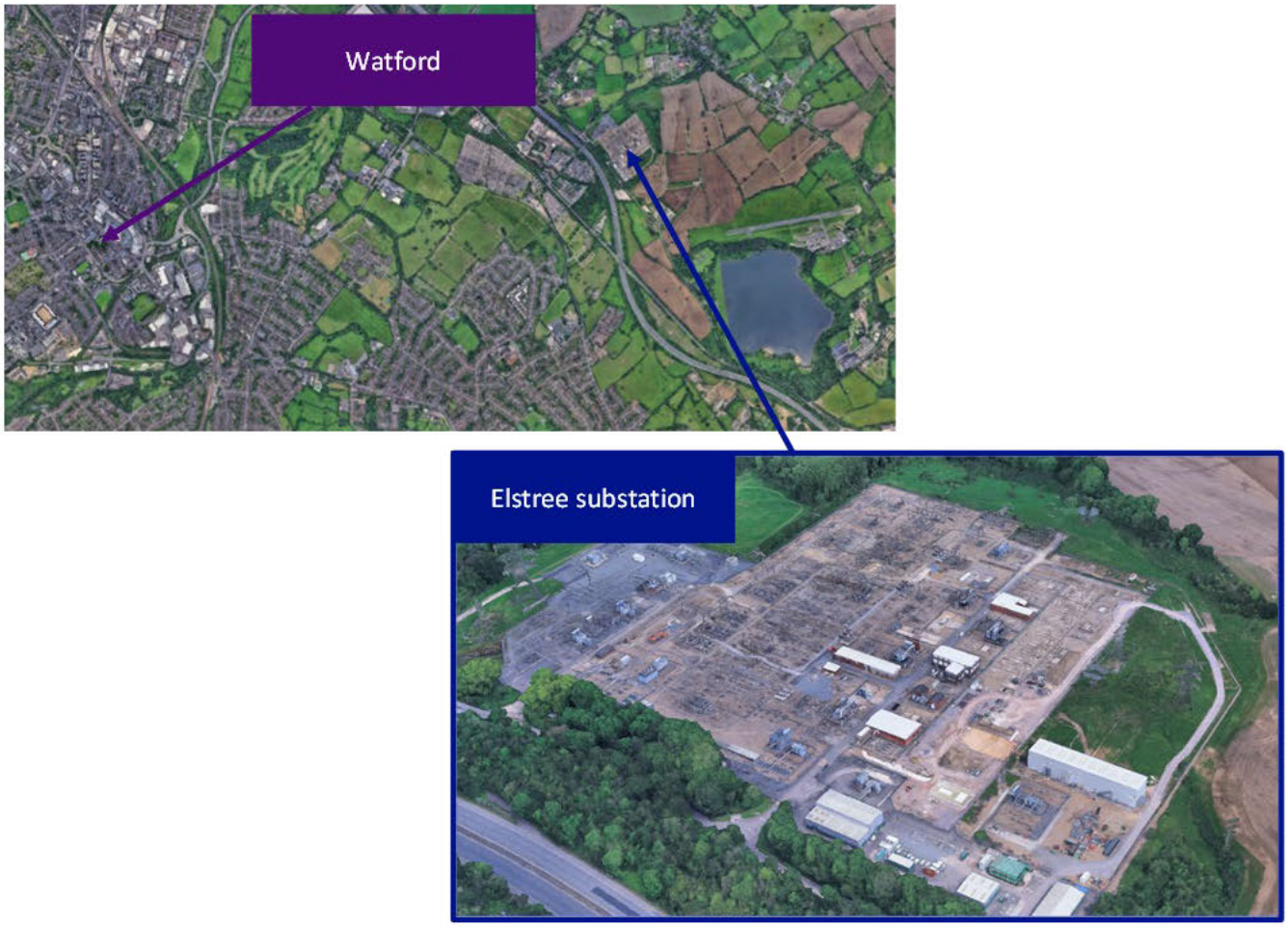


Site background

Elstree substation is located in Radlett, Watford (see Figure 4). [redacted]

Please see Appendix D for a land ownership map. The existing National Grid land and surrounding land is part of the green belt.[9]

Figure 4: Location of Elstree substation outside Watford



Historical funding

[redacted]

Early Asset Write Offs (EAWO)

[redacted]

[9] Please refer to the Letchmore Heath LOTI FNC submission for further discussion on the green belt surrounding Elstree substation.

2. Drivers and need case

The investment is triggered by [redacted] connection requirements from [redacted]

The customer ACL dates presented in this submission reflect the current accepted P6 programme from our contractor working on this scheme. The testing and setting of ACL dates for customer contracts within the scope of Connections Reform is ongoing throughout 2026. Confirmation of agreed ACL dates will therefore be presented in the next stage of submission, which is the Project Assessment.

Table 4: Investment drivers

Summary of drivers		ACL date
Customer	[redacted] customers amounting to [redacted]	[redacted]
Asset health	[redacted]	-

2.1 Customer

Table 5 provides an overview of customer connections for this investment and the impacts of Connections Reform. A map showing customer locations is provided in Figure 5.



As evidenced in the above table, the investment is primarily driven by contracted customer connection requirements associated with [redacted]. Wider regional demand growth, data centre development and emerging northwest London network strategies are not required to justify the investment but have informed the selection of the preferred option. This approach ensures that the investment remains efficient based on contracted need while maintaining flexibility for future network developments.

[redacted]

2.2 Asset health

[redacted]







3. Optioneering

We have applied a staged, multi-factor optioneering process to identify the preferred option.

1. We start by determining the most suitable strategic option. Strategic optioneering determines the *type* of investment we should develop.
2. We then consider a *longlist of technical* options within each investment type, down selecting to a shortlist of options.
3. We then consider a *shortlist of technical options*, selecting a preferred option based on a qualitative balanced scorecard of considerations: engineering, environmental, deliverability, economic/consumer value and consenting/stakeholder.
4. We then assess quantitatively all shortlisted options in a CBA to determine which technical option provides greater Net Present Value.
5. We then consider the outputs of both step 3 and 4 to provide a final preferred option.

This paper uses lettered design options (A–E) (with sub variants) to describe what could be built. The preferred solution is therefore the selected design option.

3.1 Strategic options

In line with our standard optioneering process, we considered the following broad strategic options:

Table 7: Strategic direction setting

Option	Description
Option A: Do nothing	This option involves making no changes and therefore doing nothing to facilitate the connection of customers.
Option B: Market based solution	This option involves accommodating increased customer demand through the procurement and use of ancillary services only.
Option C: Non-transmission, whole systems solution	This option involves addressing the identified need without constructing new transmission assets, instead relying on coordinated interventions across the wider electricity system.
Option D: Make use of existing assets	This option involves extending the existing substation.
Option E: New substation	This option involves construction of a new substation.

We discounted option categories A, B and C due to their inability to facilitate the connection requests and therefore fulfil our licence obligation, Transmission Licence (Licence Condition C8). Option category E was also discounted as we had space at the existing substation. The preferred strategic direction is therefore to extend the existing substation (Option D).

3.2 Siting

Our preferred strategic direction is to extend the existing substation. Given that we were able to utilise NGET-owned land on the existing site, a siting study was not conducted.

3.3 Longlist of options considered

In line with our internal processes and Ofgem's Load Re-Opener Guidance, we have undertaken a proportionate multifactorial assessment of the options to identify the option that offers the best overall outcome for consumers.

A descriptive rationale for rejection or progression from the longlist is explained in Table 8, below.

Table 8: Assessment of longlist options

Option name and status (progressed/not progressed)	Technical Description	Relevant diagrams, layout or SLD reference	Consenting risk and environmental constraints	Rationale for rejecting or taking forward the option
Option A: Do minimum **Not progressed**	Maintaining the network its current state and not addressing the investment drivers.	N/A	N/A	**Engineering:** Rejected as this option does not meet the investment drivers for the project. Compliant customer connection not delivered.
Option B: Market-based solution **Not progressed**	The investment drivers are met through the procurement and use of ancillary services only.	N/A	N/A	**Engineering:** Rejected as this option does not meet the investment drivers for the project. Compliant customer connection not delivered.
Option C: Non-transmission, whole-systems solutions **Not progressed**	The investment drivers are met through DNO flexibility rather than through NGET infrastructure investment.	N/A	N/A	**Engineering:** Compliant customer connection not delivered. Engagement with [redacted] confirmed that additional demand growth in the area could not be accommodated solely through the existing distribution network without further reinforcement. While flexibility services and operational measures may assist with utilisation of existing assets, they would not provide the enduring physical connection capability required to satisfy contracted customer requirements.
Option D-1: 132kV AIS solution with	132kV AIS solution with SGT10 in decommissioned 132kV AIS compound.	Please see Section 3.4 for diagrams.	This 132kV extension can be built on NGET land. However, it may create challenges for future expansion of the	**Engineering:** Technically feasible AIS arrangement that meets drivers.

Option name and status (progressed/not progressed)	Technical Description	Relevant diagrams, layout or SLD reference	Consenting risk and environmental constraints	Rationale for rejecting or taking forward the option
SGT10 in decommissioned 132kV AIS compound **Progressed to shortlist**			400kV site, given that AIS technology has a larger footprint than GIS, leaving limited room for future expansion on existing NGET land. The local planning authority (LPA) has stated that they will not provide planning permission for substation works on the green belt, which would be required if we purchased new surrounding land for future expansion. Please refer to Appendix 8 Letchmore Heath LOTI FNC submission for more information.	**Stakeholders, planning and consent:** While there are futureproofing challenges, the current need can be met on existing NGET land. The extension will take the Elstree 132kV site to full electrical capacity.
Option D-2: 132kV GIS Hall extension with SGT10 in decommissioned 132kV AIS compound **Progressed to shortlist**	Extend the existing 132kV GIS Hall to accommodate the additional non-SF_6 GIS bays, while placing SGT10 in the former 132kV AIS compound.	Please see Section 3.4 for diagrams.	Can be built entirely on NGET land.	**Engineering:** Technically feasible GIS arrangement that meets drivers. **Stakeholders, planning and consent:** Can be built entirely on NGET land. The extension will take the Elstree 132kV site to full electrical capacity.
Option D-3: 132kV GIS Hall extension with SGT10 to mirror SGT9 in laydown area **Progressed to shortlist**	The same basic GIS Hall extension scope as Option 2 - i.e. an extension to the existing 132kV GIS Hall to house the additional non-SF_6 GIS bays - but relocates SGT10 to the south of the existing GIS Hall, effectively	Please see Section 3.4 for diagrams.	Can be built entirely on NGET land.	**Engineering:** Technically feasible GIS arrangement that meets drivers. **Stakeholders, planning and consent:** Can be built entirely on NGET land. The extension will take the Elstree 132kV site to full electrical capacity.

Option name and status (progressed/not progressed)	Technical Description	Relevant diagrams, layout or SLD reference	Consenting risk and environmental constraints	Rationale for rejecting or taking forward the option
	mirroring the existing SGT9 arrangement.			
Option D-4: New 132kV GIS hall with SGT10 in decommissioned 132kV AIS compound **Progressed to shortlist**	Construct a new, separate 132kV SF_6-free GIS Hall in the demolished / decommissioned 132kV AIS compound.	Please see Section 3.4 for diagrams.	Can be built entirely on NGET land.	**Engineering:** Technically feasible GIS arrangement that meets drivers. **Stakeholders, planning and consent:** Can be built entirely on NGET land. The extension will take the Elstree 132kV site to full electrical capacity.
Option E: Construction of a new substation **Not progressed**	Construct a new substation.	N/A	To accommodate the connections, a new substation would need to be built on surrounding land that we do not presently own, which would also be on the green belt. Please refer to section 5.2.2 of the Letchmore Heath submission for the challenges this creates for planning and consents.	**Consumer value:** Given that there is physical and electrical space to extend the existing substation, this option would not provide value to consumers. **Stakeholder/consenting:** See left.

In summary, Options A-C were rejected due to their failure to deliver compliant physical connections. Option E was rejected given that there is physical and electrical space to extend the existing substation on NGET land, which means that a new substation would not provide value to consumers and would present planning and consenting risks.

Our four shortlisted options fell into our strategic option category D, which is to extend the existing substation.

Given the requirement to connect customers at the existing Elstree site and the availability of existing NGET land, the feasible solution space was inherently constrained. The principal area of optionality therefore related to technology selection, building configuration, transformer location and future site development implications rather than fundamentally different strategic solutions. NGET adopted a proportionate optioneering approach focused on identifying the solution that best balanced customer requirements, future flexibility, environmental impacts, land utilisation and delivery risk. Consumer value is delivered through efficient utilisation of existing Elstree infrastructure and avoidance of future site reconfiguration costs.

Stakeholder influence on shortlisting

The existing Elstree site is located on a plot of NGET land in an area of greenbelt land. Undertaking substation works on that existing NGET land constitutes a permitted development and therefore would not require planning consent. However, if we were to build a new substation on surrounding land, we would need to overcome two obstacles: (i) acquiring the land, and (ii) obtaining planning consent from the local planning authority. The local planning authority has explicitly stated that they would not grant planning consent for substation works on the green belt. This presented challenges for the progression of option category E. For more information, please refer to the Letchmore Health LOTI FNC submission, which was shared with Ofgem in January 2026.

3.4 Shortlisted options

We have shortlisted four options, which are described in the subsections that follow:

- **D-1:** 132kV AIS solution with SGT10 in decommissioned 132kV AIS compound
- **D-2:** 132kV GIS Hall extension with SGT10 in decommissioned 132kV AIS compound
- **D-3:** 132kV GIS Hall extension with SGT10 to mirror SGT9 in laydown area
- **D-4:** New 132kV GIS hall with SGT10 in decommissioned 132kV AIS compound

The System Design Table (SDT) for each option is provided within Appendix B

Description of short-list options considered

Option D-1: 132kV AIS solution with SGT10 in decommissioned 132kV AIS compound

Scope of work: The works entail a 132kV AIS extension to the existing substation, bringing the 132kV site to full electrical capacity and providing the following bays:

[redacted]

Drawings: Layout drawings are provided in Figure 6 and Figure 7, below. A single line diagram (SLD) that applies to all shortlisted options D-1 to D-4 is provided in Figure 8, below.

[redacted]





Option D-2: 132kV GIS Hall extension with SGT10 in decommissioned 132kV AIS compound

Scope of work: This option would extend the existing 132kV GIS Hall to accommodate the additional non-SF_6 GIS bays, while placing SGT10 in the former 132kV AIS compound. It would bring the 132kV site to full electrical capacity.

Bays: The GIS Hall extension is assumed to provide the following bays:

[redacted]

Dimensions: The indicative combined footprint is 15m x 28m for the GIS Hall extension plus 62m x 32m for the SGT10 area, giving an area of 2,404m² and excavation volume of 1,688m³.

Drawings: Layout drawings are provided in Figure 9 and Figure 10 below. A single line diagram (SLD) that applies to all shortlisted options D-1 to D-4 is provided in Figure 8, above.

[redacted]



Option D-3: 132kV GIS Hall extension with SGT10 to mirror SGT9 in laydown area

Scope of work: This option uses the same basic GIS Hall extension scope as Option 2 - i.e. an extension to the existing 132kV GIS Hall to house the additional non-SF_6 GIS bays - but relocates SGT10 to the south of the existing GIS Hall, effectively mirroring the existing SGT9 arrangement. It would bring the 132kV site to full electrical capacity.

Dimensions: The indicative footprint is 15m x 28m for the GIS Hall extension plus 43m x 48m for the SGT10 area next to the GIS Hall, giving an area of 2,484m² and excavation volume of 1,688m³.

Drawings: Layout drawings are provided in Figure 11 and Figure 12 below. A single line diagram (SLD) that applies to all shortlisted options D-1 to D-4 is provided in Figure 8, above.





Option D-4: New 132kV GIS hall with SGT10 in decommissioned 132kV AIS compound

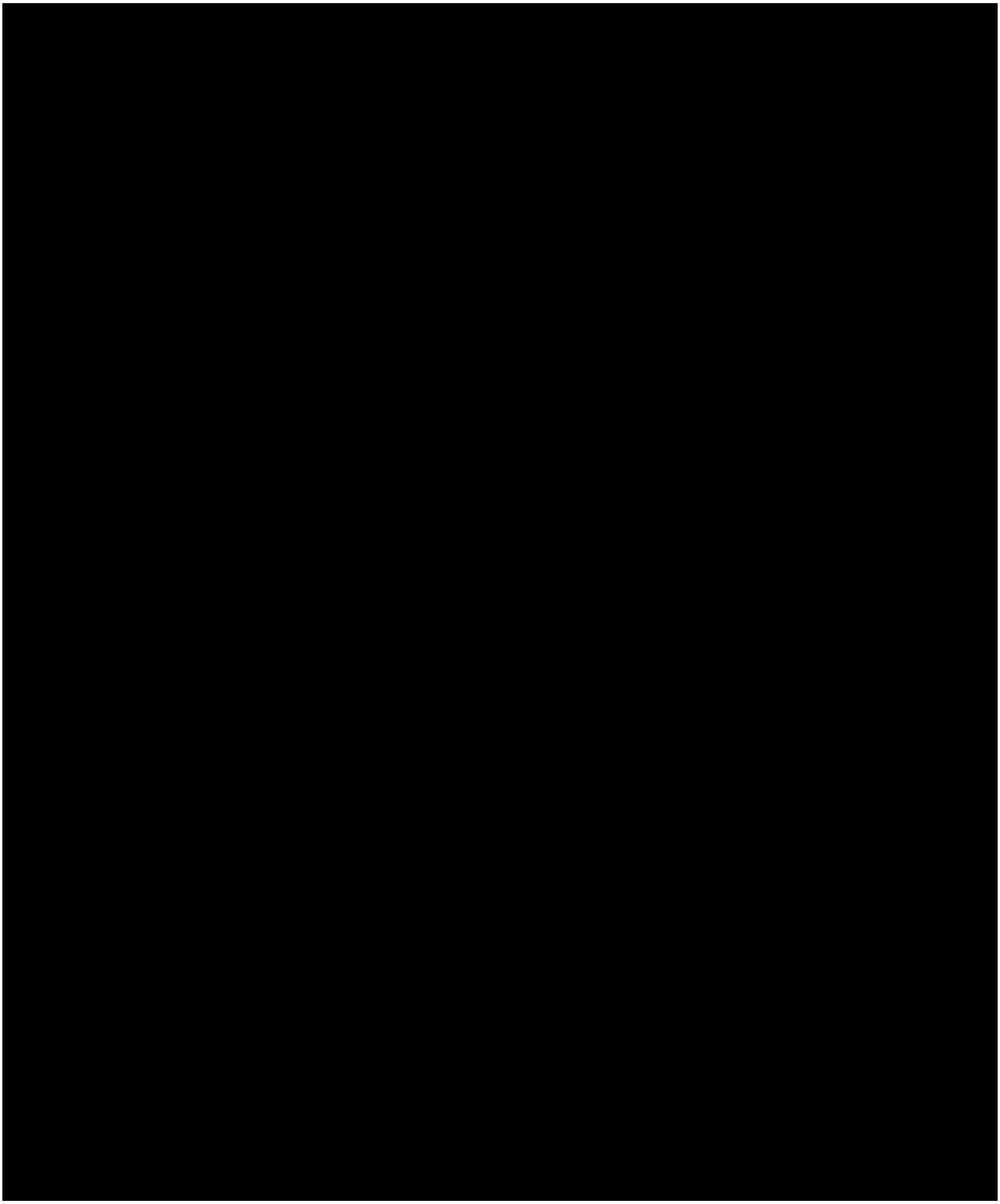
Scope of work: This option would construct a new, separate 132kV SF_6-free GIS Hall in the demolished/decommissioned 132kV AIS compound. It would bring the 132kV site to full electrical capacity.

Bays: The new GIS Hall would house the additional GIS equipment required for the customer bays, including:



Dimensions: The indicative footprint is 32m x 86m for the SGT10 and GIS Hall compound, with an area of 2,752m² and excavation volume of 2,708m³.

Drawings: Layout drawings are provided in the figures below. These include an original layout from early in project development and a revised layout during later project development.[12] A single line diagram (SLD) that applies to all shortlisted options D-1 to D-4 is provided in Figure 8, above.









3.5 Qualitative assessment of shortlist

In appraising these four options, we undertook a proportionate, multi factor qualitative assessment to determine which option delivers the best overall outcome for consumers, while meeting the investment drivers. The results are summarised in Table 9.

Table 9: Multifactorial analysis

Optioneering categories					
Option	**Engineering**	**Environmental**	**Deliverability**	**Economic/consumer value**	**Consenting/stakeholder**
Option D-1: 132kV AIS solution with SGT10 in decommissioned 132kV AIS compound	• **Cabling:** Requires diversion of an existing cable and may require a larger footprint to avoid cable conflicts. × **Enabling and remedial works:** Significant enabling and remedial works are required within the former 132kV AIS compound. ✓ **Buildings:** Does not require a GIS hall extension or new GIS building, relying primarily on a new AIS compound arrangement. × **Foundations:** AIS equipment has less stringent settlement tolerances and may not require piled foundations, subject to confirmation through ground investigation.	× **Land take and excavation:** Largest land take at 9,016m² and excavation volume of 2,708m³. ✓ **Emissions:** Uses AIS for main new bay arrangement and SF_6-free GIS bay(s) in the existing GIS Hall for the interconnector bay. This reduces the risk of SF_6 emissions relative to standard SF_6 GIS equipment. ✓ **Land cutting:** Does not require significant land cutting. Only a shallow excavation (0.3m) assumed for the AIS compound area. ✓ **Retaining wall works:** No requirement for new retaining walls. ✓ **Contaminated soil:** Not a material concern for this option.	• **Estimated timeline** o[redacted] months ([redacted] longer than D-4). Relative to D-4, extra remedial works in the former AIS compound; cable diversion; GIS interface works, commissioning and integration. Shorter than D-2 and D-3 due to minimal outages. ✓ **Outages:** Minimal outages would be required, mainly during the extension of the existing GIS to connect the new interconnector GIS bay.	× **Upfront capital cost:** Due to the scale of the works for the AIS option, this has higher up-front capital costs than the alternative shortlisted options. × **Futureproofing:** Option can be accommodated within the former 132kV AIS compound, but the large footprint may sterilise future projects related to the 400kV site. This has implications for long-term consumer value.	× **Futureproofing:** AIS technology has a larger footprint than GIS. This creates challenges for future projects related to the 400kV site, given that the local planning authority (LPA) has stated that they will not provide planning permission for substation works on the green belt, which would be required if we purchased new surrounding land. Please refer to appendix 8 and section 5.2.2 of the Letchmore Heath LOTI FNC submission for more information.
	Neutral	Neutral	Neutral	Strong detractor	Strong Detractor

Optioneering categories					
Option	**Engineering**	**Environmental**	**Deliverability**	**Economic/consumer value**	**Consenting/stakeholder**
Option D-2: 132kV GIS Hall extension with SGT10 in decommissioned 132kV AIS compound	• **Cabling:** Benefits from a shorter cable route and fewer service/HV cable interfaces than Option D-3. × **Enabling and remedial works:** Requires removal of decommissioned HV plant foundations and development of a transformer access route, including haul road improvements and fence reinstatement. × **Buildings:** Requires extension of the existing 132kV GIS hall, involving significant civil, structural, piling and retaining wall works together with integration into the existing building. × **Foundations:** Requires piled foundations adjacent to an existing piled GIS hall, management of differential settlement, retaining structures and consideration of piling access and vibration effects on operational equipment.	✓ **Land take and excavation:** Smallest land take at 2,404m^2, joint-lowest excavation volume of 1,688m^3 (same as D-3). • **Emissions:** While the extensions would be SF_6-free, there would be one new section in SF_6 is the conversion section from the existing SF_6 to clean gas, which carries the risk of SF_6 emissions. × **Land cutting:** Significant land cutting required along the full length of the GIS hall extension to accommodate site level changes. × **Retaining wall works:** Existing retaining walls would need to be replaced with three extra retaining walls, requiring significant concrete use. Existing gabion walls are potentially unsuitable for reuse. × **Contaminated soil:** If excavated material is contaminated, this would require appropriate treatment, decontamination and off-site disposal.	× **Estimated timeline** of [redacted] months ([redacted] longer than D-4). Relative to D-4, extra structural design and verification works for the GIS hall; excavation, retaining walls and piling; temporary works and live building interface management; complex HV cable entry/exit services interfaces; and outage and commissioning risk. Longer than D-1 because GIS extension works create more delivery complexity and outage requirements. ✓ **Outages:** Likely that minimal outages would be required, although this would need to be explored further during detailed design.	• **Upfront capital cost:** More complex works than D-4 mean higher upfront capital costs. Less complex and lower upfront capital costs, however, than D-1. • **Futureproofing:** The 132kV GIS hall can be extended into the decommissioned AIS compound, and overall land take is substantially smaller than AIS Option D-1. This allows space for future bays for the 400kV site and HV cable corridors in existing NGET land. However, the SGT10 location could constrain the future extension of the 400kV GIS hall to the south (although there may be an opportunity to reposition SGT10 to create a future corridor).	✓ **Futureproofing:** GIS technology has a smaller footprint than AIS. This overcomes some of the consenting and futureproofing challenges associated with Option D-1.
	Detractor	Detractor	Detractor	Neutral	Benefit

Optioneering categories					
Option	**Engineering**	**Environmental**	**Deliverability**	**Economic/consumer value**	**Consenting/stakeholder**
Option D-3: 132kV GIS Hall extension with SGT10 to mirror SGT9 in laydown area	× **Cabling:** Least favourable cable arrangement, with significant interfaces with existing services and 400kV/132kV cables, a longer cable route and more complex installation requirements. ✓ **Enabling and remedial works:** Benefits from minimum such works for transformer delivery because the existing SGT9 delivery route can potentially be reused. × **Buildings:** Requires the same complex extension of the existing GIS hall as Option D-2, including excavating, piling and structure integration works. × **Foundations:** GIS hall extension has same challenges as D-2.	✓ **Land take and excavation:** Land take of 2,494m^2, which is significantly lower than D-1, and joint-lowest excavation volume of 1,688m^3 (same as D-2). • **Emissions:** While the extensions would be SF_6-free, there would be one new section in SF_6 is the conversion section from the existing SF_6 to clean gas, which carries the risk of SF_6 emissions. × **Land cutting, retaining wall works and contaminated soil:** Shares the GIS Hall extension impacts as option D-2 around excavation, land cutting, retaining walls, potential contaminated soil handling and concrete use.	× **Estimated timeline** of [redacted] months ([redacted] more than D-4). Relative to the alternative GIS hall extension option D-2, extra time is likely needed for the more complex cable installation and temporary works and for outage and sequencing risk associated with SGT9 and other circuits. × **Outages:** May require an outage on SGT9 and potentially outages on other cable circuits east of the GIS hall.	• **Upfront capital cost:** More complex works than D-4 mean higher upfront capital costs. Less complex and lower upfront capital costs, however, than D-1. ✓ **Futureproofing:** Space within the existing site boundaries, using the existing laydown area south of the GIS hall. The design does not constrain the 400kV GIS hall for future extension and cable corridors through the 132kV AIS compound.	✓ **Futureproofing:** GIS technology has a smaller footprint than AIS. This overcomes some of the consenting and futureproofing challenges associated with Option D-1.
	Detractor	Detractor	Strong detractor	Neutral	Benefit

Optioneering categories					
Option	**Engineering**	**Environmental**	**Deliverability**	**Economic/consumer value**	**Consenting/stakeholder**
Option D-4: New 132kV GIS hall with SGT10 in decommissioned 132kV AIS compound	✓ **GIS interface:** Requires connections between the new and existing GIS facilities, but avoids the significant cable interface issues associated with D-3. • **Enabling and remedial works:** Less enabling works compared with the extension options D-2 and -3, although additional infrastructure such as LV services and drainage connections are required. ✓ **Buildings:** Constructs a completely new GIS hall, avoiding the need to modify or structurally integrate with the existing GIS hall. • **Foundations:** Foundation design is simpler than the GIS hall extension Options D-2 and D-3 as the new building can be founded independently of the existing GIS hall, although piling is still needed.	• **Land take and excavation:** Land take of 2,752m^2, which is significantly lower than D-1, and an excavation volume of 2,708m^3. ✓ **Emissions:** Uses SF_6-free GIS technology, which significantly reduces the risk of SF_6 emissions. ✓ **Land cutting, retaining wall works and contaminated soil:** Significantly reduced ground excavation because no embankment cutting is required. Overcomes the GIS hall extension impacts associated with D-2 and D-3 around excavation, land cutting, retaining walls, potential contaminated soil handling and concrete use.	✓ **Outages:** No outages required on existing circuits, meaning works can be carried out offline (unlike the other options). Outages only required for the energisation. ✓ **Estimated timeline** of [redacted] months. This option is the most favourable from a deliverability perspective as it benefits from improved constructability, ease of access, less interface coordination, and minimal outages required on existing circuits.	✓ **Upfront capital cost:** Due to its simpler design, the option has the lowest upfront capital costs. ✓ **Futureproofing:** Space within the decommissioned AIS compound to accommodate the new GIS hall and SGT10. Allows for future GIS bay extensions within the building design, and the position of the GIS hall avoids constraining 400kV GIS extension for Elstree B.	✓ **Futureproofing:** GIS technology has a smaller footprint than AIS. This overcomes some of the consenting and futureproofing challenges associated with Option D-1.
	Neutral	Benefit	Strong benefit	Strong benefit	Benefit

Qualitative assessment output

Based on the qualitative assessment, the preferred option is Option D-4 (New 132kV GIS hall with SGT10 in decommissioned 132kV AIS compound), because:

- **Futureproofing of the 400kV site:** The option has a significantly smaller footprint than AIS option D-1, preventing the sterilisation of future projects related to the 400kV site[13] while also avoiding the potential planning and stakeholder risks associated with having to acquire new land on the green belt in future projects. Unlike GIS options D-2 and D-3, our preferred option D-4 also does not rely on extending the existing 132kV GIS hall, which would require large retaining walls that create physical restrictions for future projects related to the 400kV site.
- **Environment:** There is significantly less land-take than AIS option D-1. Our preferred option also overcomes the GIS hall extension impacts associated with D-2 and D-3 around excavation, land cutting, retaining walls, potential contaminated soil handling and concrete use.
- **Deliverability:** Unlike the other shortlisted options, minimal outages are required as most of the work can be constructed under the Contractor's safe systems of work before being transferred under NG Safety Rules. Outages are only required for the energisation. Construction works can be carried out away from the existing building, reducing engagement and coordination requirements with third parties.

PASE alignment

The preferred option D-4 (New 132kV GIS hall with SGT10 in decommissioned 132kV AIS compound) is a variant option for substation extension interventions in the PASE framework. This is because it is an SF_6-free GIS extension.

In our optioneering, option D-1 (132kV AIS solution with SGT10 in decommissioned 132kV AIS compound) is a primary option for substation extension interventions in the PASE framework. However, this is not the preferred option for the reasons set out above.

3.6 Quantitative analysis of shortlist options

Cost estimates of shortlist options

To assess the shortlisted options, cost estimates were created for quantitative economic comparison at the optioneering stage. These are the costs we present in the CBA to reflect our perspective at the time of optioneering and to ensure like-for-like comparison across shortlisted options. The cost estimates in our CBA differ from our present view of cost forecasts for this mature project, which is currently in delivery. We present our current cost forecast for our preferred option in Section 3.7.

All capex costs are derived from NGET's latest Cost Book (23/24 prices). Estimating Units Lines (EULs) have been used to generate cost estimates based on the scope of work and the new assets to be acquired for each option. For each EUL, we have applied a [redacted]% contingency,

[13] While future works were not known at the time of optioneering, the AIS substation would have sterilised the two planned 400kV [redacted] extension works that are to be delivered as part of the North West London scheme. See the regional context for futureproofing needs in Section 1.2.

based on historical project analysis, to account for unforeseen circumstances and to mitigate risks during implementation.

The [redacted]% risk and contingency factor represents our view at the time of early optioneering and development and is a proportionate representation of remaining project uncertainty at that time. A project-specific Quantitative Schedule Risk Assessment (QSRA) and Quantitative Cost Risk Assessment (QCRA) will be completed as part of Project Assessment and the allowance requested will be updated accordingly.

Because the project has already progressed into delivery, residual uncertainty has reduced. Our present view of the risk and contingency factor is [redacted], which is discussed in Section 3.7.

Table 10: Cost estimate breakdown

Shortlist Options	OHL (£m)	Cables (£m)	Substation (£m)	Total (exc. risk (£m))	Biodiversity ([redacted])	Total (incl. [redacted] risk (£m))
Option D-1: 132kV AIS solution with SGT10 in decommissioned 132kV AIS compound	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Option D-2: 132kV GIS Hall extension with SGT10 in decommissioned 132kV AIS compound	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Option D-3: 132kV GIS Hall extension with SGT10 to mirror SGT9 in laydown area	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Option D-4: New 132kV GIS hall with SGT10 in decommissioned 132kV AIS compound	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Option D-4 represents the lowest-cost solution as it makes best use of the existing substation footprint, reducing the extent of new 400kV cable and civil works required. The option requires only c.50m of new 400kV cable compared with c.200-300m for the alternative options, resulting in lower cable supply, containment and installation costs. The reduced asset footprint and simplified cable routing also lower associated engineering and construction costs, driving the overall cost advantage of the option.

Cost Drivers

The project's cost estimates are based on current market conditions, with ongoing work to refine requirements:

- GIS Hall / Switchgear Buildings
- SGT 400/132kV 460MVA transformer
- Cut and Fill earthworks
- GIS equipment (feeder, bus coupler, and bus section bays)
- Piling works
- FEED / EPC design activities
- Feeder protection
- Busbar protection

Cost Benefit Analysis (CBA)

Purpose and approach

Our Cost Benefit Analysis (CBA) evaluates the economic efficiency and consumer value of the proposed transmission investments. This analysis aligns with Ofgem's Load Re-Opener Guidance and Submission Requirements.

The CBA process integrates monetised benefits such as constraint cost savings, system efficiency improvements, and consumer bill impacts, alongside a comprehensive Whole-Life Cost Analysis (WLCA) that captures capital expenditure, operational and maintenance costs, replacement cycles, carbon impacts, and future extendibility. This dual approach ensures a balanced assessment of both short-term economic benefits and long-term cost efficiency, avoiding the risk of asset stranding or future inefficiencies.

Our CBA considers:

- Robust optioneering and sensitivity testing: We have evaluated credible alternatives, including 'do nothing' and 'do minimum' scenarios, to confirm that the preferred solution delivers the optimal balance of technical performance, environmental impact, and economic benefit.
- Quantification of constraint cost reductions: Using system operator modelling outputs and historical data, we quantify expected savings from reduced system constraints, which translate into direct consumer bill benefits.
- Assessment of delay impacts: The financial consequences of potential project delays on constraint costs and consumer bills are modelled through risk-adjusted scenarios, providing a clear understanding of the value of timely delivery.
- Inclusion of socio-economic benefits: Where quantification is challenging, qualitative evidence supported by stakeholder engagement and regional development plans highlights the wider economic benefits, including job creation and inward investment.
- Consideration of non-monetised benefits: We explicitly identify benefits that are qualitative or not readily monetisable, such as enhanced system operability, resilience, and environmental improvements, ensuring full transparency of the value proposition.

- Alignment with policy and government targets including Net Zero and AI Growth Zones: The CBA reflects the influence of national and local policies, including Clean Power 2030, net zero commitments, and economic growth plans demonstrating how the investment supports the broader energy transition.

We have assessed consumer value by comparing the whole-life costs and benefits of four shortlisted connection and substation delivery options using Ofgem's RIIO-ET3 CBA template. The assessment is completed relative to a counterfactual and on a discounted basis over a 50-year appraisal period (2027–2076), consistent with the CBA methodology.

For each option considered, we have quantified:

i. Initial CAPEX investment required

ii. Future end of life replacement cost

The supporting CBA model quantifies the costs and benefits for this project. Using the Ofgem RIIO-ET3 CBA template spreadsheet, the CBA compares the discounted cost and benefits for consumers for the following four shortlisted options.

- **D-1:** 132kV AIS solution with SGT10 in decommissioned 132kV AIS compound
- **D-2:** 132kV GIS Hall extension with SGT10 in decommissioned 132kV AIS compound
- **D-3:** 132kV GIS Hall extension with SGT10 to mirror SGT9 in laydown area
- **D-4:** New 132kV GIS hall with SGT10 in decommissioned 132kV AIS compound

CBA outcome

Lifetime Cost-Benefit Analysis: The lifetime costs and benefits refer to a 50-year period starting from 2027 until 2076

Table 11: Lifetime CBA (2023/24 prices, central carbon pricing, discounted values)

Option	Initial investment (£m)	PV of lifetime costs (£m)	PV of monetised benefits (£m)	NPV (£m)
Option D-1	[redacted]			
Option D-2				
Option D-3				
Option D-4				

On the basis of the discounted lifetime CBA results (Table 11), Option D-3 delivers the highest NPV ([redacted], 2023/24 base prices) and therefore represents the preferred option on consumer value grounds. Options D-1, D-2 and D-4 delivers a lower NPV than D-3. This recommendation analysis is subject to confirmation through deliverability, consents/land, outage and risk considerations, and any CBA sensitivities (e.g. carbon price trajectories) set out in the

assumptions below. Option D-4 has been selected as the preferred option because it provides the best overall balance of cost, deliverability, environmental performance and protection of land and development corridors for future 400kV works. While Option D-3 has a marginally higher NPV in the like-for-like CBA, by £[redacted] in 2023/24 prices, this difference is outweighed by D-4's lower delivery and outage risks, simpler cable interfaces and stronger future-development benefits

The lower lifetime NPV for the AIS option D-1 than the three GIS options is driven primarily by the higher capital costs associated with the AIS solution. Due to the complexity of its design, the AIS option requires greater upfront investment than the alternative options, and these higher capital costs are reflected in the whole-life assessment through both the initial investment and the associated future replacement costs.

Given that this is a mature project in delivery, in Appendix E, we share an alternative CBA based on our latest view of costs. In that CBA, the costs for D-1 to D-3 remain the same and are based on cost-book values and a risk and contingency factor of [redacted]%, while the cost for selected option D-4 is based on our current view at this late stage of delivery, which is [redacted] (23/24 prices), including [redacted]% for risk and contingency based on current project risks. In that alternative CBA, the selected option D-4 delivers the highest NPV.

Assumptions of the CBA analysis

The CBA results are based on the following high-level assumptions (with sensitivities used to test robustness where appropriate):

- Appraisal period of 50 years (2027–2076), with costs and benefits discounted and presented relative to the counterfactual.
- Cost base: 2023/24 prices, aligned to the Ofgem RIIO-ET3 CBA template inputs (including treatment of replacement CAPEX and maintenance).
- Carbon: central base case carbon price applied for monetising construction carbon, SF_6/alternative gas leakage and losses, with scenario testing for alternative carbon price trajectories.
- Benefits scope applied consistently across options; where option-specific benefits exist (e.g. constraints), the basis and evidence are documented and applied consistently.
- Key sensitivities considered (as applicable): timing/phasing, CAPEX uncertainty ranges, delivery/outage risk, and benefit parameter uncertainty (including losses and leakage assumptions).

Costs

Table 12: Summary of all additional Capex costs (2023/24 base prices)

Option	Initial works (£m)	Future replacement (40yr (£m))	Total costs (£m)
Option D-1	[redacted]		
Option D-2			
Option D-3			
Option D-4			

Benefits

The following benefits have been included within the CBA:

- SF_6/Alternative gas leakage reduction
- Carbon cost of construction reduction
- Summary of all Benefits

Table 13 presents the summary of all (undiscounted) benefits, including environmental and non-environmental benefits, considering the central base case carbon price.

Table 13: Summary of all benefits

Option	Environmental benefits			Total benefits (£m)
	Carbon costs of construction (£m)	Gas leakage (£m)	Transmission loss (£m)	
Option D-1	[redacted]			
Option D-2				
Option D-3				
Option D-4				

3.7 Preferred solution

Based on the outputs of our multifactorial analysis and CBA, our preferred option is to deliver Option D-4 (New 132kV GIS hall with SGT10 in decommissioned 132kV AIS compound). While D-3 delivers a marginally superior NPV (by a margin of [redacted] in 23/24 prices), the difference is not considered material when compared with the substantially greater delivery risk and outage requirements, the implications for the futureproofing of the 400kV site, and cable interface

complexity associated with that option. A 3D image of the preferred solution is provided below in Figure 16.



While this option does not have the most favourable outcome in the CBA, this was by a small margin, which is significantly outweighed by the considerations in our qualitative analysis:

- **Cost:** Preferred option D-4 has the lowest upfront capital costs among the shortlisted options as it makes best use of the existing substation footprint, reducing the extent of new 400kV cable and civil works required.
- **Futureproofing of the 400kV site:** The option has a significantly smaller footprint than AIS option D-1, preventing the sterilisation of future projects related to the 400kV site[14] while also avoiding the potential planning and stakeholder risks associated with having to acquire new land on the green belt in future projects. Unlike GIS options D-2 and D-3, our preferred option D-4 also does not rely on extending the existing 132kV GIS hall, which would require large retaining walls that create physical restrictions for future projects related to the 400kV site.
- **Deliverability:** Unlike the other shortlisted options, minimal outages are required as most of the work can be constructed under the Contractor's safe systems of work before being transferred under NG Safety Rules. Outages are only required for the energisation. Construction works can be carried out away from the existing building, reducing engagement and coordination requirements with third parties.
- **Environment:** Preferred option D-4 has significantly less land-take than AIS option D-1. Our preferred option also overcomes the GIS hall extension impacts associated with D-2 and D-3 around excavation, land cutting, retaining walls, potential contaminated soil handling and concrete use.

[14] While future works were not known at the time of optioneering, the AIS substation would have sterilised the two planned 400kV [redacted] works that are to be delivered as part of the North West London scheme. See the regional context for futureproofing needs in Section 1.2.

The preferred solution represents the most efficient whole-system outcome because it facilitates customer connections, increases transformation capability and supports wider network operability through a single coordinated intervention at an existing strategic transmission node.

Importantly, the solution has been developed to align with wider northwest London reinforcement activity, including Letchmore Heath, North West London, TWNC/TWN1 and emerging west London network developments. The preferred layout preserves land, access routes and development corridors required for these future investments and avoids creating constraints that could require future reconfiguration of the site or acquisition of additional green belt land.

This project is mature and in development. Our current cost forecast at the time of submitting this Eligibility Letter is [redacted] (23/24 prices). This includes [redacted] % for risk and contingency based on [redacted]

Project benefits and outputs

Table 14: Summary of outputs and benefits

Output and proposed PCD:	Description
Outputs and benefits	[redacted]

4. Delivery

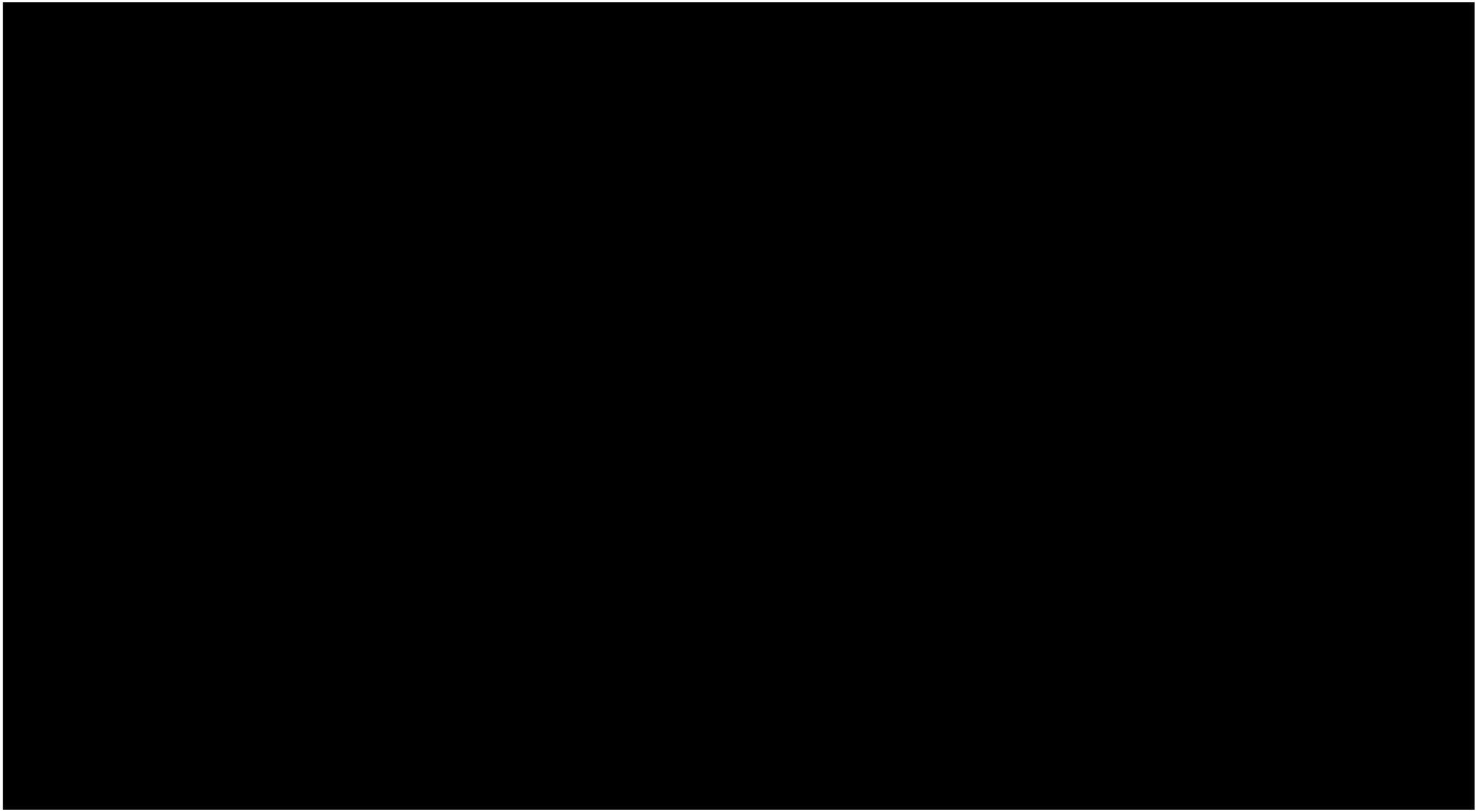
4.1 Delivery year and indicative timeline

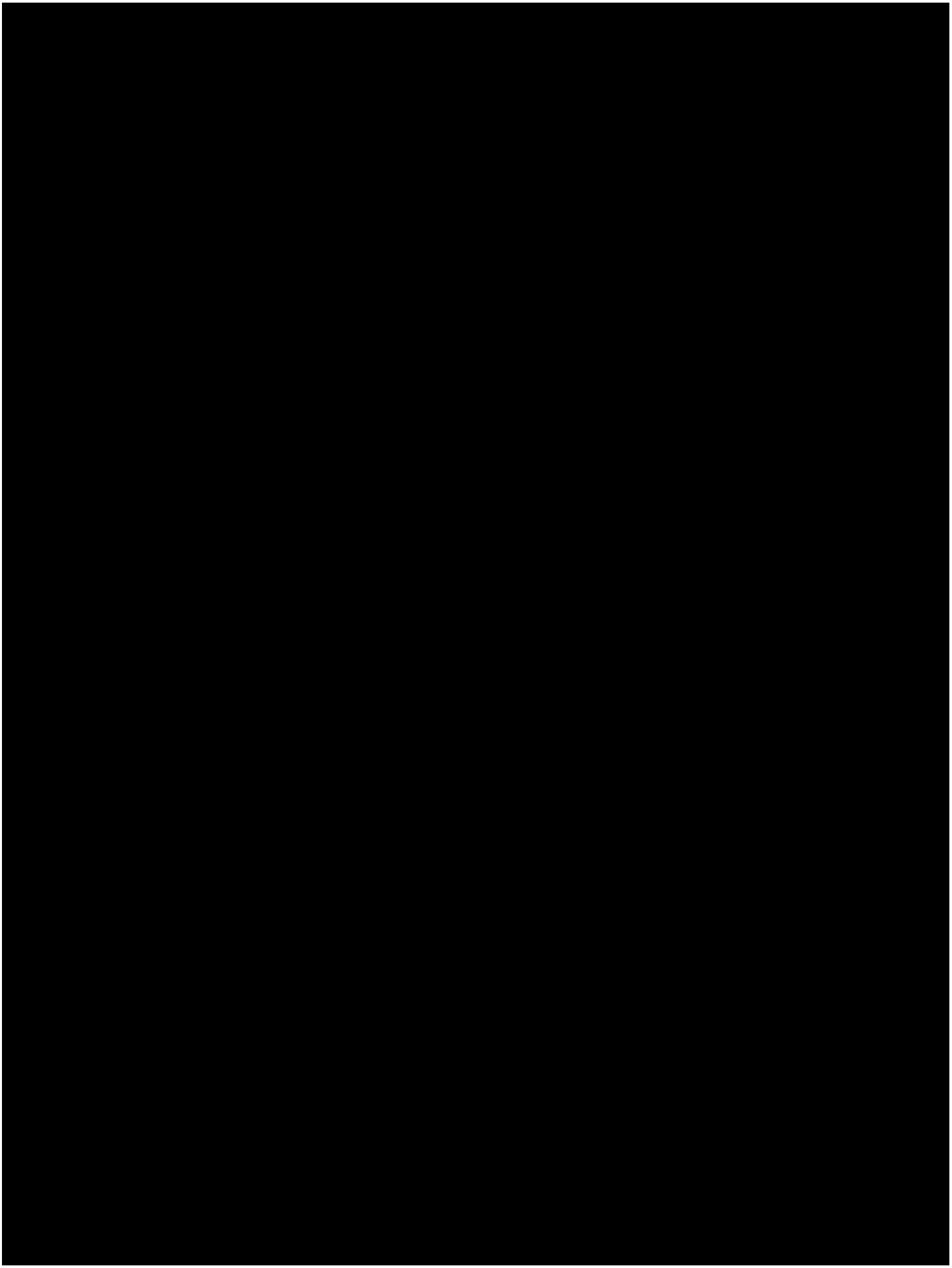
The project is currently in the delivery phase, with key elements of the scheme already constructed and remaining activities focused on completing connections and securing system access for energisation.

The current accepted delivery programme (P6 programme) for Option D-4, detailed in Figure 17, indicates a target completion date of [redacted].

[redacted]

Given that the project is in delivery, we are able to provide images of the investment in Figure 18.





4.2 Procurement and contracting strategy

[redacted]

4.3 Risks and risk management

An overview of current delivery risks is listed below in Table 15 along with mitigations. As risks continue to evolve, an updated detailed view of risk and mitigations will be supplied within the Project Assessment submission.

Table 15: Summary of risks and mitigations

Risk	Mitigation
Outage availability: Outage requests have been submitted to NESO, but, if the required outage windows are not approved or become unavailable, this could delay energisation and overall delivery. Programme changes and	The programme is being managed to reflect outage constraints and the impact of long-lead equipment. We have interacted with NESO on outages through our planning teams. NESO has also intermittently attended our monthly Commission Panel meetings, which

[redacted]

Risk	Mitigation
long-lead equipment have already affected outage planning.	commenced in April 2023 and form part of an agreed process for how we commission assets onto the live system in a controlled manner.
Availability of authorised operational and commissioning staff: Delivery depends on suitably authorised operational and commissioning personnel being available to support switching, safety arrangements, testing and energisation. If these specialist resources are unavailable when required, key activities could be delayed.	Resource requirements are identified through the project programme and coordinated with Asset Operations and commissioning teams. Specific delivery allowances have been included for operational and commissioning resource constraints, recognising that these activities need active management.
[redacted]	[redacted]
Customer and third-party interface dependencies: Delivery depends on coordinated activities with [redacted] and their associated delivery programmes. This includes customer works, cable duct provision, commissioning activities, land and consent dependencies, and alignment of customer milestones. Delays to these activities could affect the overall programme.	Monthly customer review meetings have been held with our customers, [redacted] which have taken place since 2023. Customer milestones are being monitored, and customers have been kept informed of programme and cost developments.
Design development and technical interface complexity: The project involves interfaces between new and existing GIS assets, transformer works, protection and control systems, and customer connection works. Design delays or unresolved technical interfaces could affect cost and programme delivery, particularly where new SF_6-free GIS must interface with existing SF_6 GIS infrastructure.	Delivery team integrated earlier into development; [redacted] provided a P6 programme; [redacted]

5. Conclusion

This submission outlines a preferred solution to satisfy the investment drivers. It seeks confirmation of eligibility under Special Condition 3.18, confirmation of eligibility of PCF under Special Condition 3.15, confirmation of re-opener Track 2 EL and formal approval of the Needs Case and preferred solution.

The preferred option D-4 consists of a new 132kV GIS hall with a new SGT10 in the decommissioned 132kV AIS compound, along with the replacement to SGT1 with a larger capacity unit.

Table 16: Submission summary

Submission summary	
Main drivers	[redacted]
Preferred option	Our **preferred option is D-4** for the following key reasons: • **Cost:** Preferred option D-4 has the lowest upfront capital costs among the shortlisted options as it makes best use of the existing substation footprint, reducing the extent of new 400kV cable and civil works required. • **Futureproofing of the 400kV site:** Significantly smaller footprint than AIS option D-1, preventing the sterilisation of future projects related to the 400kV site. Unlike GIS options D-2 and D-3, our preferred option also does not rely on extending the existing 132kV GIS hall, which would require large retaining walls that create physical restrictions for future projects related to the 400kV site. • **Environment:** There is significantly less land-take than AIS option D-1. Our preferred option also overcomes the GIS hall extension impacts associated with D-2 and D-3 (excavation, land cutting, retaining walls, contaminated soil, concrete use). • **Deliverability:** Unlike the other shortlisted options, minimal outages are required as most of the work can be constructed under the Contractor's safe systems of work before being transferred under NG Safety Rules. Outages are only required for the energisation. Construction works can be carried out away from the existing building, reducing engagement and coordination requirements with third parties.

Submission summary	
Estimated cost and timing	At the time of submitting this Eligibility Letter for this mature project, we have a total cost forecast of [redacted] (23/24 prices), including [redacted] for risk and contingency. Target project completion date of [redacted]
Outputs	[redacted]
Proposed PCD	Delivery of the above outputs by [redacted]

Appendix A
Glossary

Table 17: Table of abbreviations and definitions

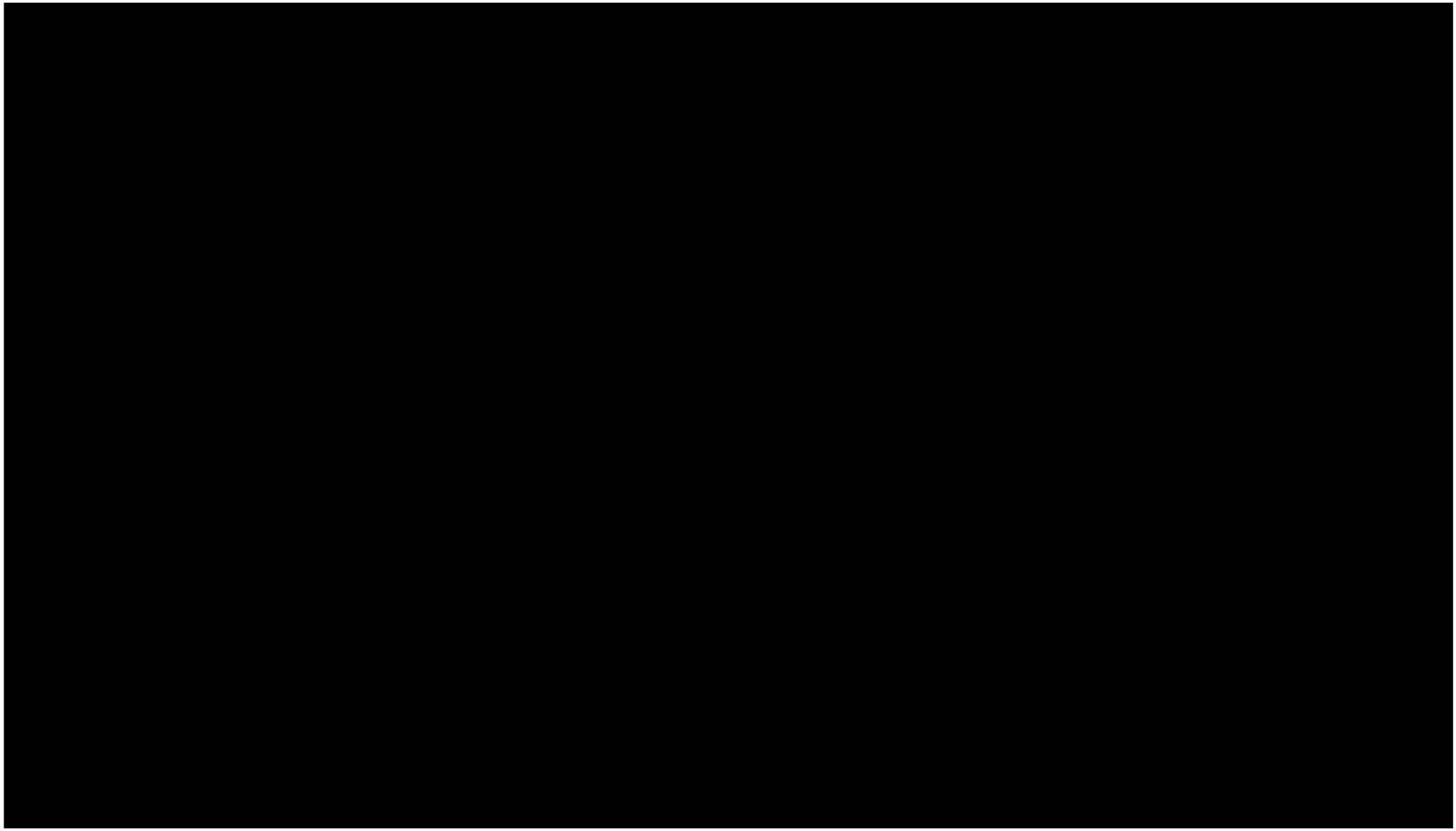
Abbreviation	Description
AI	Artificial intelligence
AIS	Air-insulated switchgear
AO	Asset Operations
ASTI	Accelerated Strategic Transmission Investment
B14	Transmission boundary reference used in the document
BPDT	Business Plan Data Template
C&V	Cost and volume
CBA	Cost Benefit Analysis
Capex	Capital expenditure
[redacted]	[redacted]
Conn Works	Connection works
DC	Data centre
DNO	Distribution Network Operator
EAWO	Early Asset Write-Offs
EEW	Early enabling works
EJP	Engineering Justification Paper
EL	Eligibility Letter
ELST	Elstree
EoL	End of life
EPC	Engineer, procure and construct / Engineering, Procurement and Construction framework
ESC1	HND Essential Option relating to the routing of a second cable through the existing Elstree-Sundon cable tunnel
ET	Electricity Transmission
EUL	Estimating Unit Line
FNC	Final Needs Case

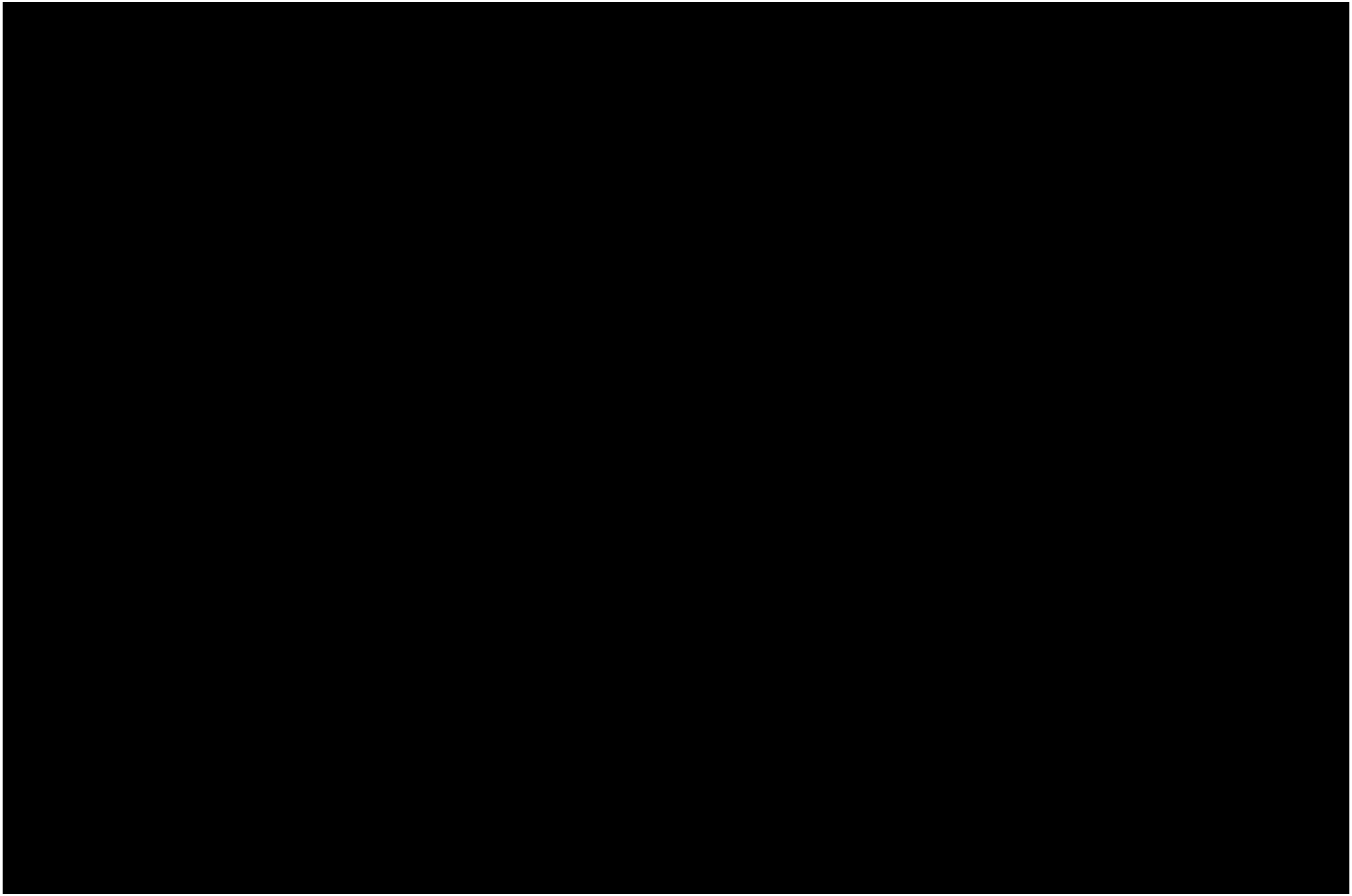
Abbreviation	Description
FP	Fleet point / asset reference used in the T1 and T2 asset interventions table
FY	Financial year
GB	Great Britain
GIS	Gas-insulated switchgear
GVA	Gross value added
GVA.s	Gigavolt-ampere seconds
GW	Gigawatt
HND	Holistic Network Design
HV	High voltage
HWUP	North London Reinforcement / HWUP scheme referenced as part of interactive projects
INF Works	Infrastructure works
kA	Kiloampere
kV	Kilovolt
LE1	Transmission boundary reference used in the document
LOTI	Large Onshore Transmission Investment
LPA	Local planning authority
LV	Low voltage
m^2	Square metres
m^3	Cubic metres
Mod App	Modification application
MVA	Megavolt ampere
MVAR	Megavolt ampere reactive
MW	Megawatt
NEC4	New Engineering Contract, fourth edition
NESO	National Energy System Operator
NGET	National Grid Electricity Transmission
NGT	National Grid Transmission / scheme reference prefix used in Ofgem Scheme References
NLR	North London Reinforcement

Abbreviation	Description
NPV	Net present value
NWL	North West London
Ofgem	Office of Gas and Electricity Markets
OHL	Overhead line
OOW	One-off works
OSR	Ofgem Scheme Reference
P6	Primavera P6 programme
PASE	Projects, alternatives, strategic optioneering and engineering framework referenced in the document for substation extension interventions
PC	Price control
PCD	Price Control Deliverable
PCF	Pre-Construction Funding
PV	Present value
RAV	Regulatory Asset Value
RIIO	Revenue = Incentives + Innovation + Outputs
RIIO-ET3 / RIIO-T3	RIIO electricity transmission price control period 3
RRP	Regulatory Reporting Pack
SAP	Senior Authorised Person
SCS	Substation Control System
SDT	System Design Table
SER4	HND Essential Option relating to reconductoring of the Sundon to Elstree second circuit
SF_6	Sulphur hexafluoride
SGT	Super Grid Transformer
SLD	Single line diagram
T1	RIIO-T1 price control period
T2	RIIO-T2 price control period
T3	RIIO-T3 price control period
T4+	RIIO-T4 and later price control periods
tCSNP2	Transitional Centralised Strategic Network Plan 2

Abbreviation	Description
TO	Transmission Owner
TWNC/TWN1	Tilbury to Wymondley new Circuit
[redacted]	[redacted]
VD	Volume Driver
WLCA	Whole-Life Cost Analysis.

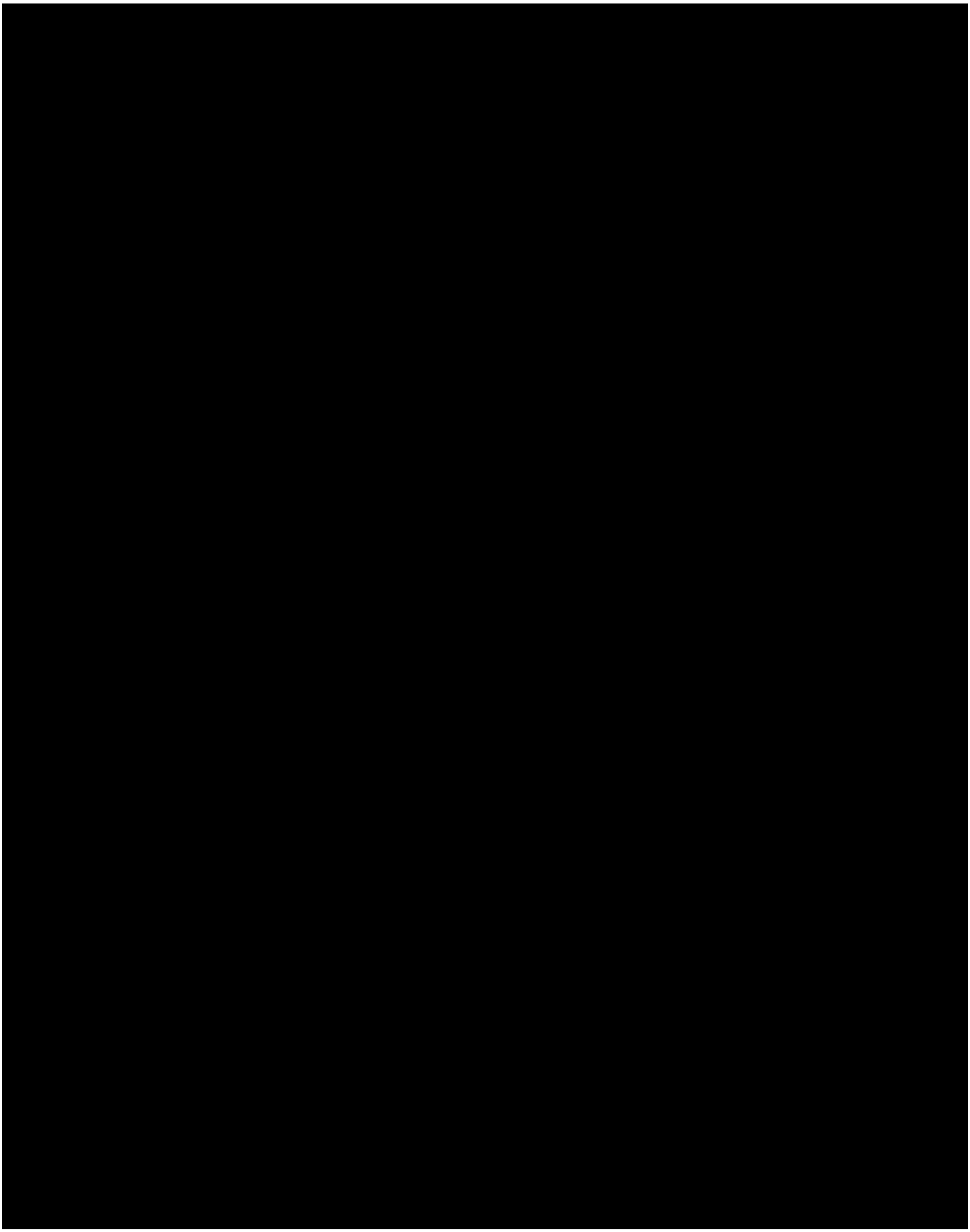
Appendix B
System design table

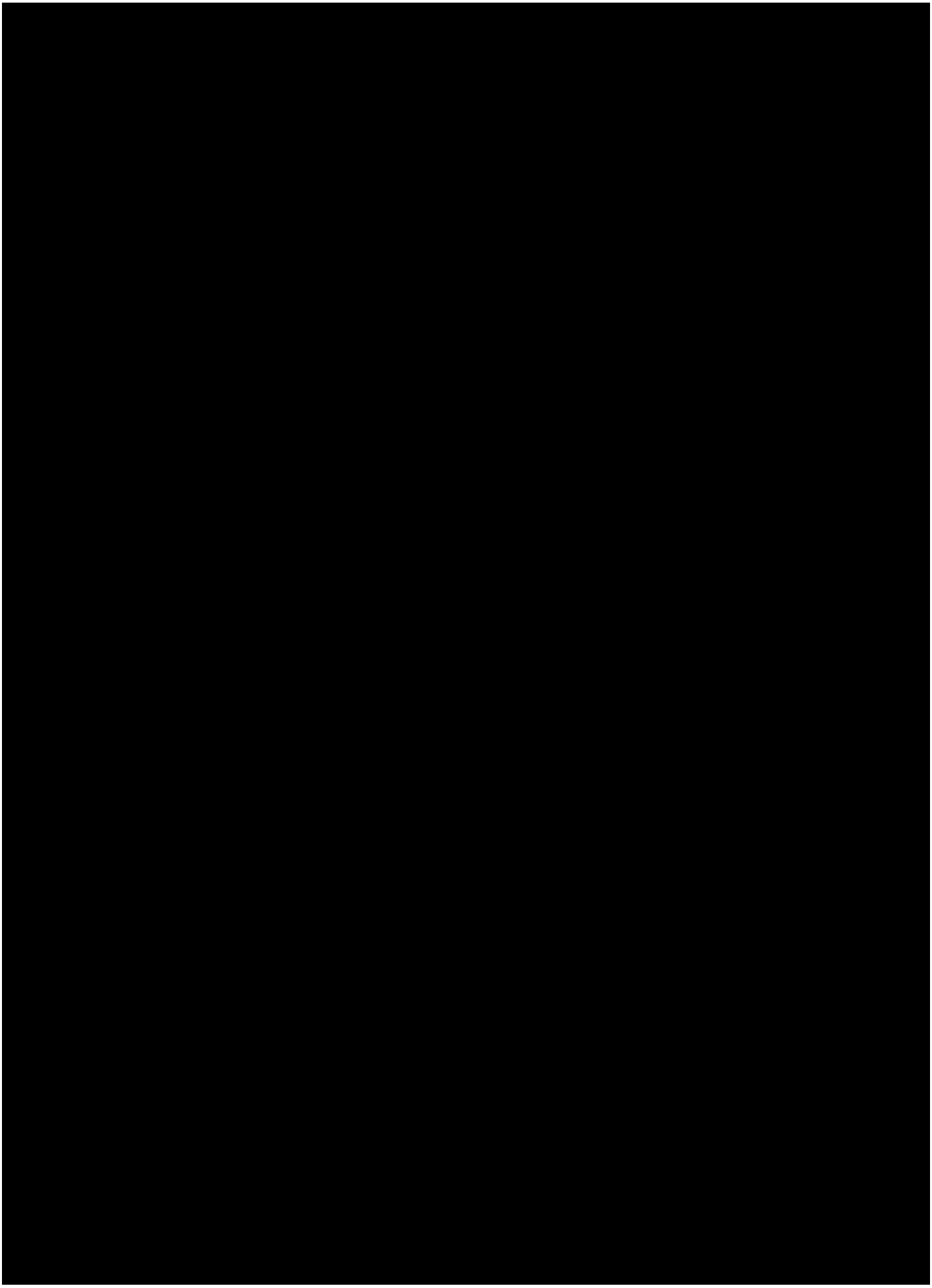


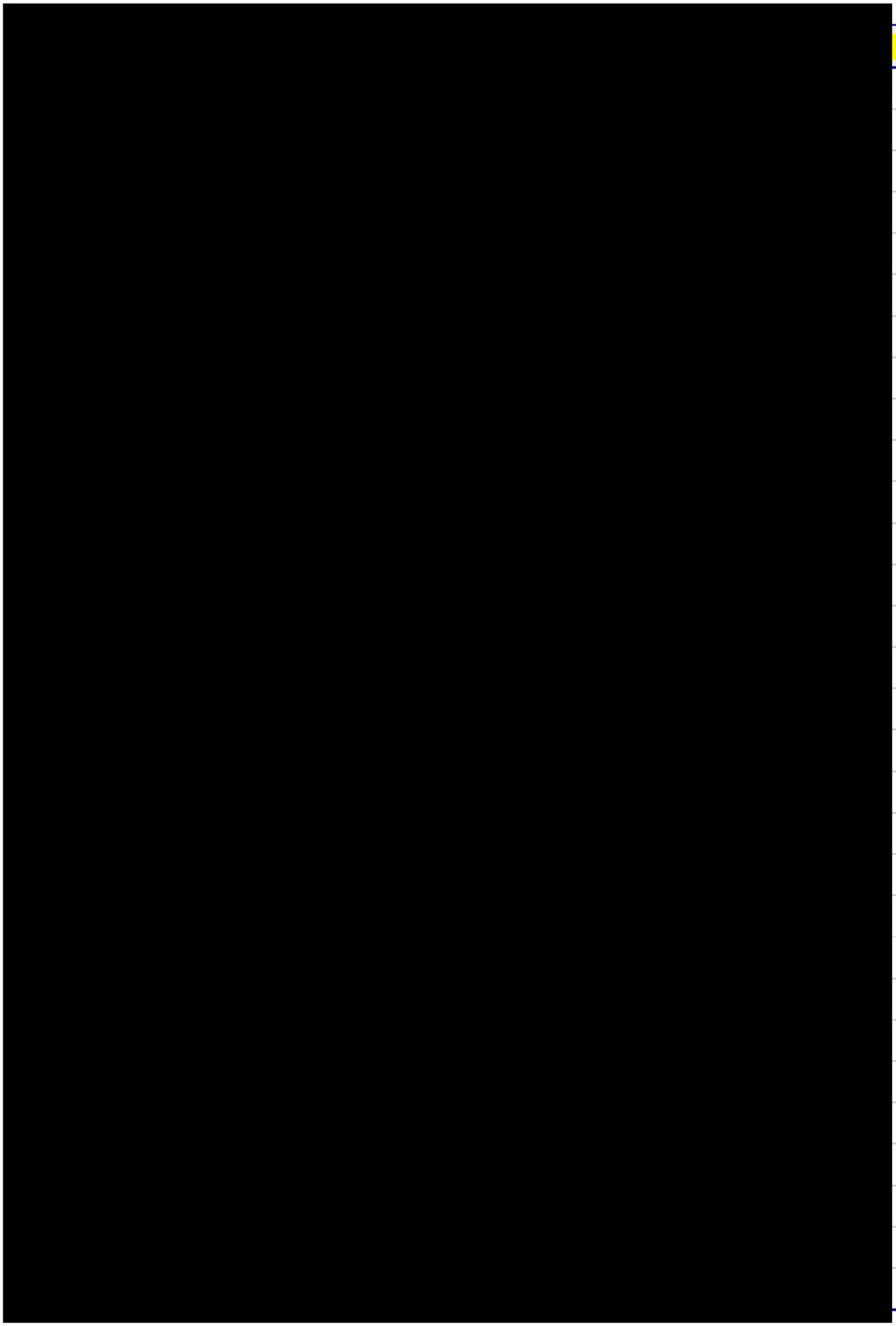


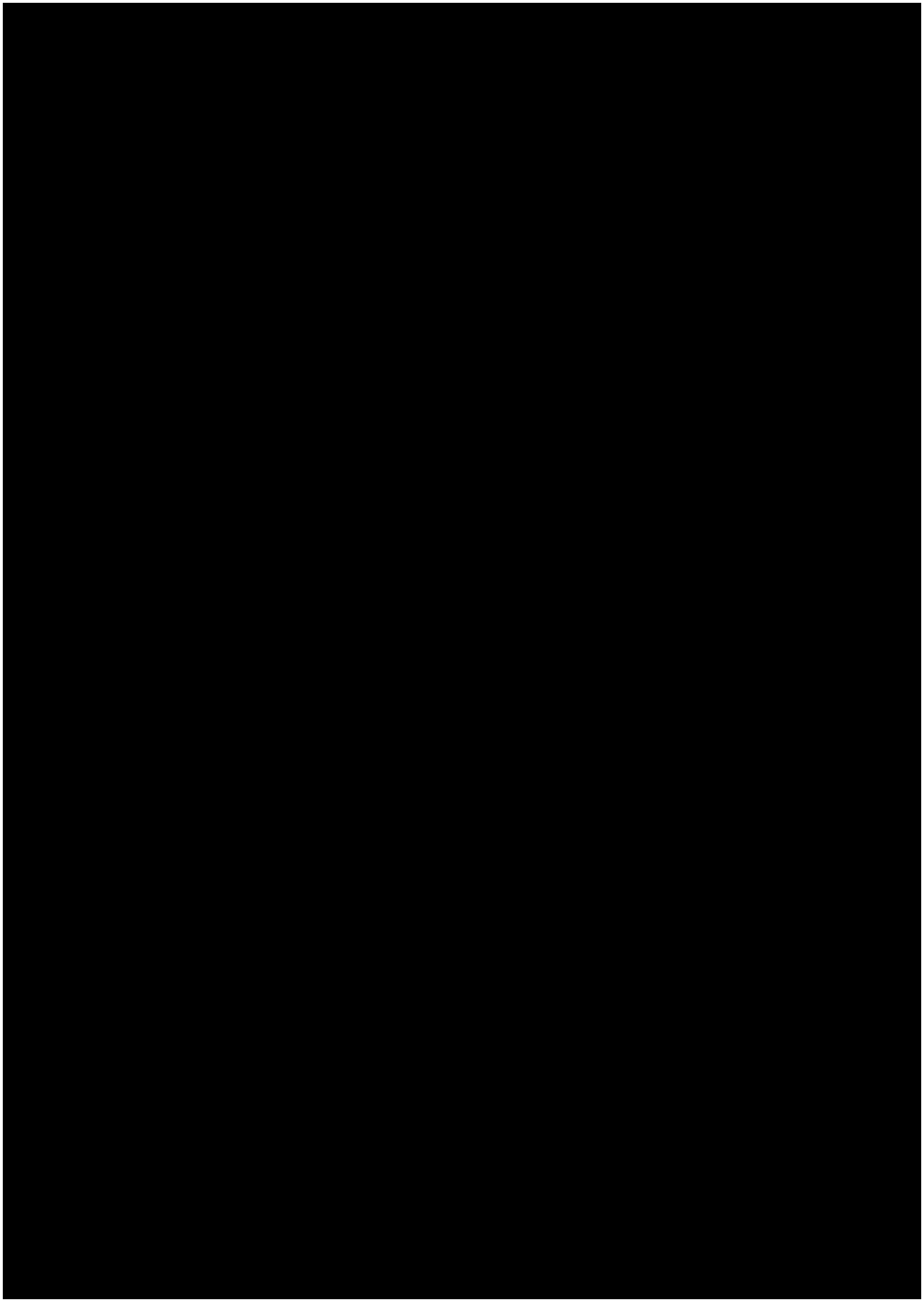


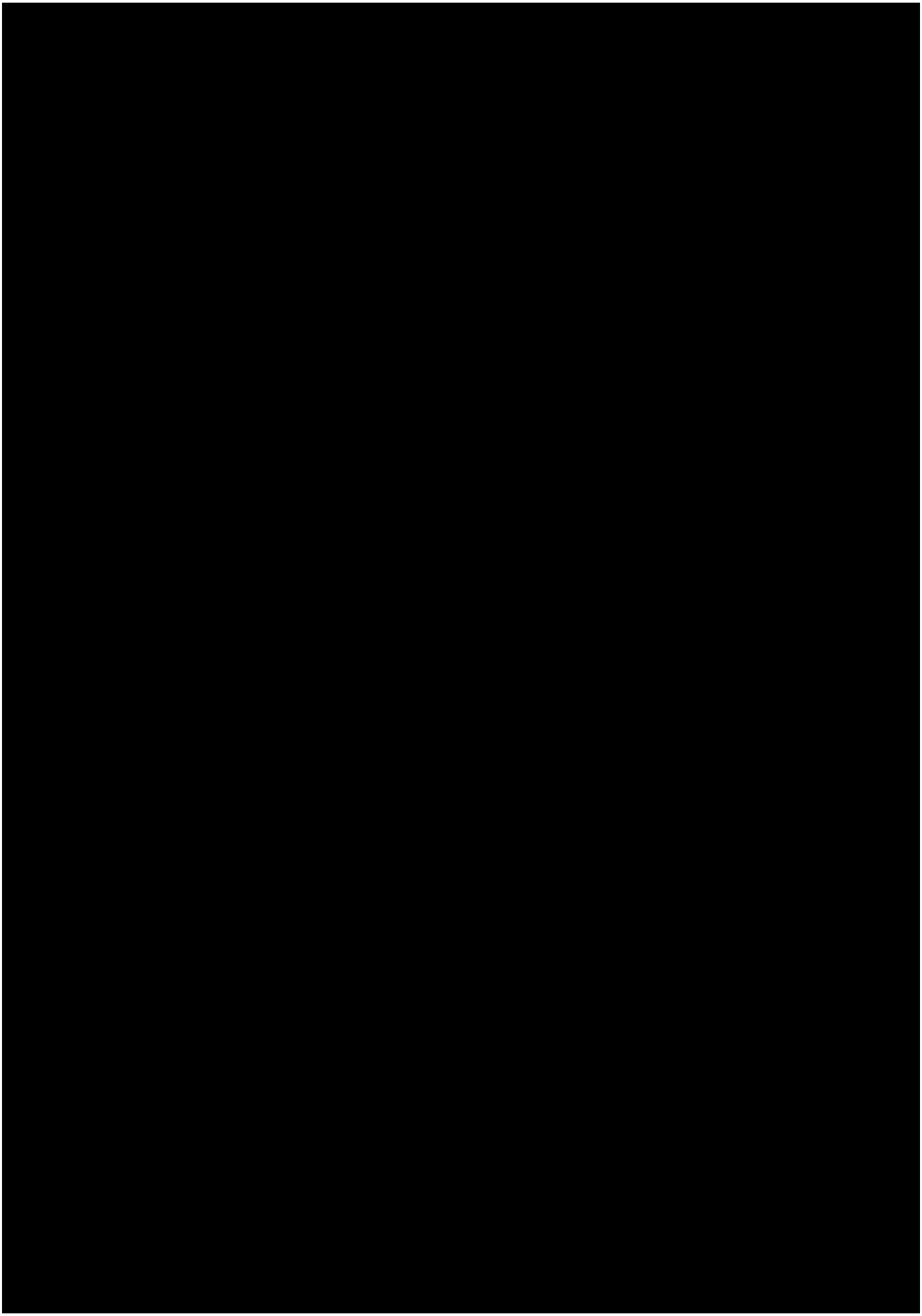
Appendix C
T1 and T2 asset interventions

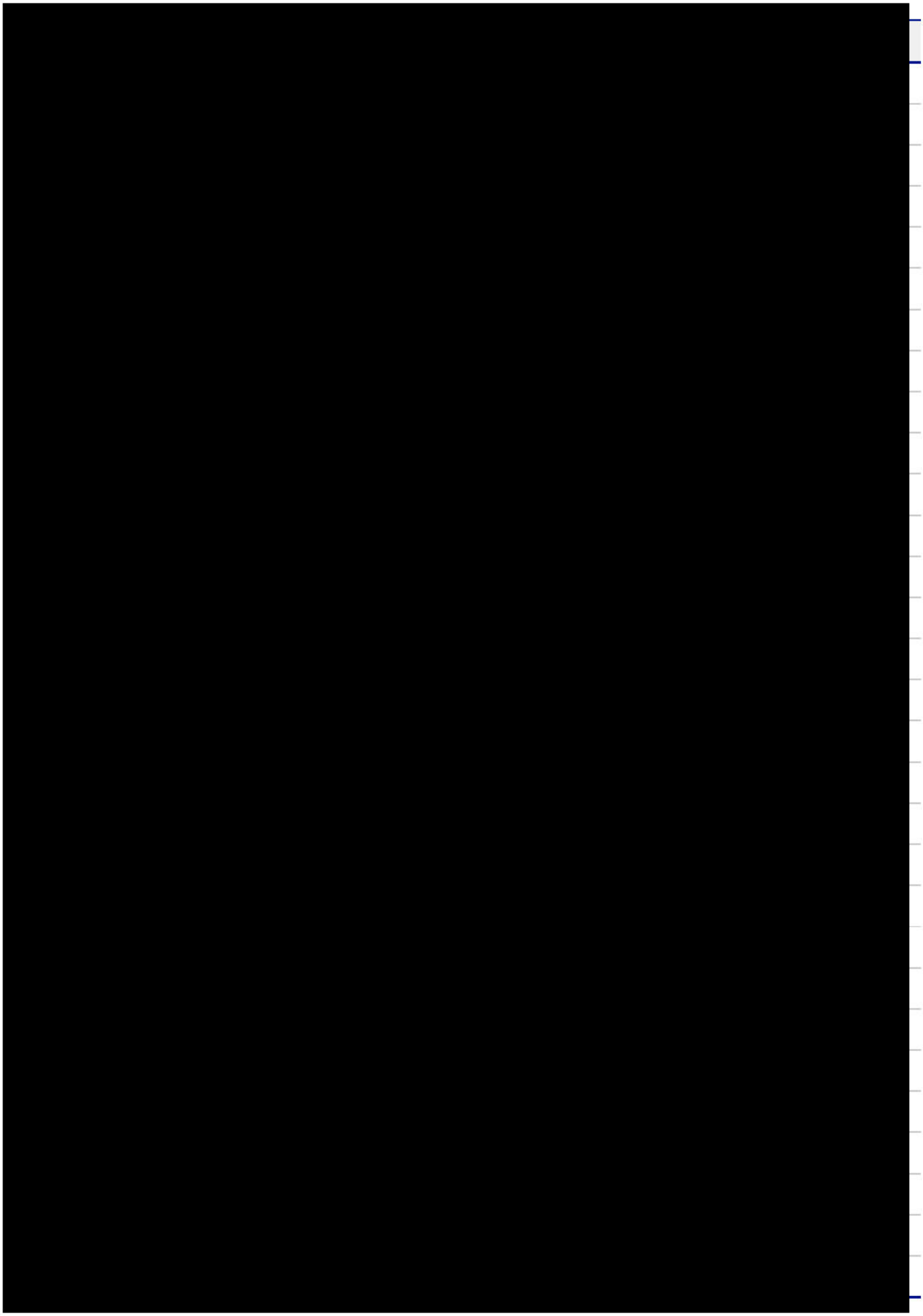


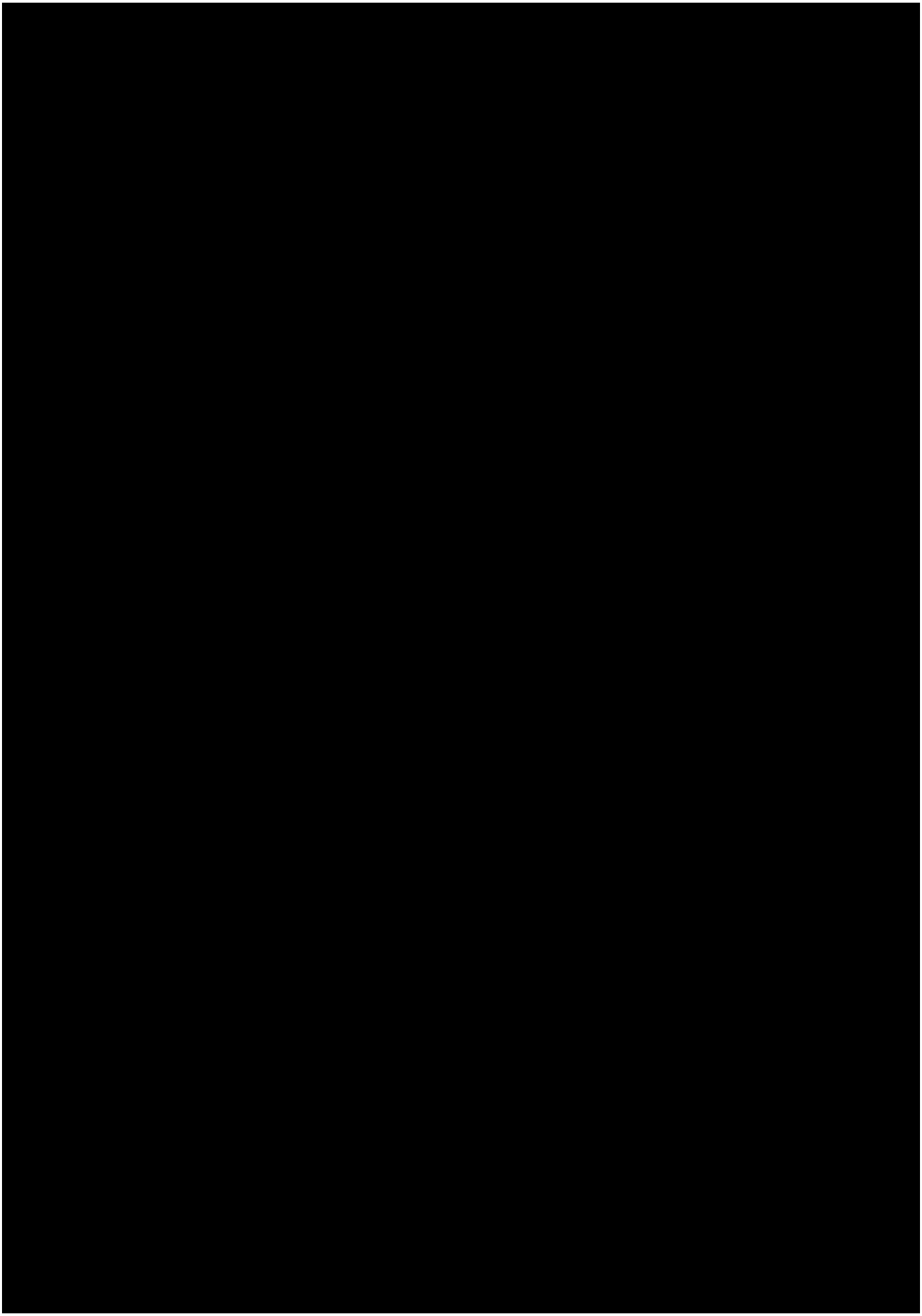














Appendix D
Land ownership map

A land ownership map for the Elstree site is provided in the figure below.



Appendix E
CBA with latest cost for option D-4

Given that this is a mature project in delivery, we share an alternative CBA based on our latest view of costs. In this CBA, the costs for D-1 to D-3 remain the same and are based on cost-book values and a risk and contingency factor of [redacted]%, while the cost for selected option D-4 is based on our current view at this late stage of delivery, which is [redacted] (23/24 prices), including [redacted] for risk and contingency based on current project risks. In this alternative CBA, the selected option D-4 delivers the highest NPV.

The CBA is summarised below in Table 20. This is based on central carbon pricing and has discounted values.

Table 20: Lifetime CBA with latest cost for option D-4 (2023/24 prices)

Option	Initial investment (£m)	PV of lifetime costs (£m)	PV of monetised benefits (£m)	NPV (£m)
Option D-1	[redacted]			
Option D-2				
Option D-3				
Option D-4				

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