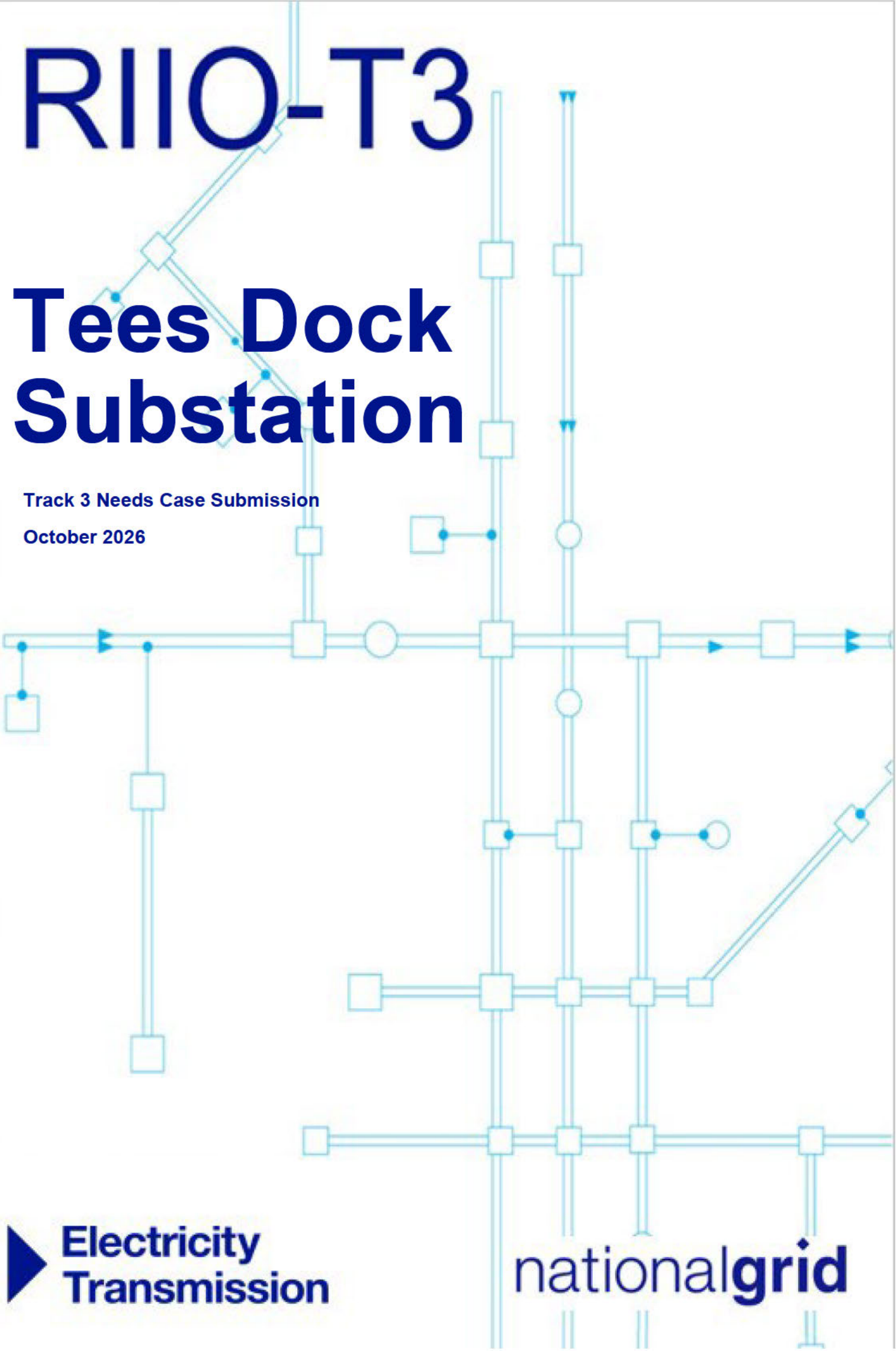
RIIO-T3

Tees Dock Substation

Track 3 Needs Case Submission

October 2026



Electricity Transmission

nationalgrid

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Reference and summary table

Field	Description
Project name	Tees Dock Substation
TO's preferred re-opener track	Track 3 Needs Case
RRP Reference	[redacted]
BPDT / Scheme Reference Number	[redacted]
Load Board Reference	[redacted]
Investment driver(s)	[redacted]
Project outputs	[redacted]
Short list of strategic options considered	• **Option E-1:** New indoor [redacted] on [redacted] (2 possible sites) • **Option E-2:** New indoor GIS substation on [redacted] (2 possible sites)
Preferred solution and explanatory narrative on the rationale	The preferred solution is a new 400 kV double busbar GIS substation on the [redacted] (Option E-2). This solution can be delivered without requiring CPO or DCO, which ensures that we can deliver the timely connection of a [redacted]. [redacted] alternative AIS options carry a CPO risk, requiring an estimated 12-24 months, which would not be consistent with delivering connections on time. The Dorman Point location is near existing OHL corridors and the customer's demand centre, which avoids DCO, facilitates simpler 400 kV OHL

	modifications & line entries and reduces 132 kV cable connections to the customer's private network. GIS is also preferred due to asset longevity policy considerations relating to the proximity (<2km) to the tidal saline Tees estuary, pollution class iv. Further, this location and technology choice allows for a more compact initial design that in turn supports greater future expansion potential, [redacted]
PASE alignment	Within the PASE framework, the preferred option is a variant option. It is an indoor double bus GIS substation at 400 kV that is in proximity (<2km) to the coast (in this case a saline estuary).
Cost (23/24 prices)	Total cost of the project is currently estimated to be [redacted] (2023/24 prices [redacted]).
Delivery year	The investment has multiple stages: • First site access for construction is scheduled for early 2027. • Initial energisation is 2029 (demand ACL), with further stages in 2030 (demand ACL), 2033 (creation of new lack enby-Tees Dock 400 kV circuit and re-configuration of Greystones-Tod Point 275 kV circuit), and 2035 (BESS ACL)
Applicable reporting tables	BPDT 10.5 ET Pipeline log and 2024-25 RRP E1.11_ET Pipeline Log.
Interactive projects	No directly interactive projects, though there are other projects that need to be completed before the connections triggering this investment can be entered into service, including the Eastern Green Link 1 (EGL1) project.
Historical funding interaction	No historical funding relating to these customer drivers. Early asset write-offs (EAWOs) to be confirmed but are expected to be minimal due to the investment proposal being predominantly new additions to the existing network.
Spend apportionment	**T2 (FY 2022- 26):** [redacted] **T3 (FY 2027-31):** [redacted] **T4+ (FY 2032-37+):** [redacted]

Executive summary

Project Summary

The project will create a new 400kV node at Tees Docks. [redacted] It is expected to have a significant socio-economic impact, contributing to the physical regeneration and economic revitalisation of the South Tees area at a regional level.

[redacted]

Submission purpose

This Needs Case and associated CBA are submitted as part of the RIIO-ET3 Load Reopener (LR) mechanism under Special Condition 3.18 (Load Re-opener and Price Control Deliverable).

This submission seeks approval of the needs case, optioneering assessment and our preferred solution to deliver the Tees Dock substation project.

The project's eligibility for the Load Re-opener and associated Pre-Construction Funding was addressed through the Eligibility Letter process and is not a determination sought through this Needs Case submission.

Project need

The investment [redacted]

- [redacted]
- [redacted]

[redacted] of this connection has been considered essential in our optioneering.

Optioneering to date

We undertook a structured, multi-factor optioneering process to identify a proportionate and deliverable solution in the interests of consumers. [redacted]

We first considered five strategic option categories, including do-minimum, market-based, whole-system, reuse or extension of existing assets, and new-build. From these, we built a longlist of nine options, from which we shortlisted two for further analysis (see summary in Table 1). These shortlisted options focussed on building new indoor substations and varied based on the switchgear technology. Indoor options are preferred due to the site's proximity to a saline estuary, which results in a pollution class IV environment and increases the risk of accelerated degradation for outdoor equipment, leading to higher lifetime intervention and replacement costs.

Table 1: Summary of optioneering longlist

Option	Details	Drivers met?	New site?	AIS/ GIS?	Short List?	Preferred Option
A	Do nothing counterfactual option	No	No	NA	No	No
B	Market-based solution	No	No	NA	No	No
C	Non-transmission, whole systems solutions (DNO)	No	No	NA	No	No
D-1	Extension or rebuild of Lackenby substation	No	No	GIS	No	No
D-2	Extension or rebuild of Greystones substation	No	No	GIS	No	No
E-1	New indoor AIS substation built on [redacted]	Yes	Yes	AIS	Yes	No
E-2	New indoor GIS substation built on [redacted]	Yes	Yes	GIS	Yes	Yes
E-3	New outdoor AIS substation built on [redacted]	Yes	Yes	AIS	No	No
E-4	New outdoor AIS substation built on [redacted]	Yes	Yes	AIS	No	No

The two shortlisted options, E-1 and E-2, are variant options in the PASE framework for non-linear builds, given that they are indoor 400kV double busbar AIS and GIS substations, respectively, in proximity (<2km) to the tidal saline Tees estuary.

Based on a qualitative assessment against the balanced scorecard criteria, Option E-2 is the preferred option because:

- [redacted] enables timely delivery of connections:
  [redacted]
- **Futureproofing**: The preferred GIS option has space for future expansion. Given the limits on what can be obtained through voluntary purchase for an AIS footprint, and given that CPO typically only covers immediate needs, there would be challenges for the future expansion of any AIS site.

Cost estimates

To assess the shortlisted options, cost estimates have been created for quantitative economic comparison (see Table 2). All capex costs are derived from NGET's latest Cost Book (23/24 prices). We have applied a [redacted], based on historical project analysis, to account for unforeseen circumstances and mitigate risks during implementation.

Table 2: Total costs including 13.8% contingency (2023/24 prices)

Option	Total Costs (£m)
E-1: New indoor AIS substation built on [redacted]	[redacted]
E-2: New GIS substation built on [redacted]	[redacted]

Indicative delivery programme

The current delivery programme is being developed to meet TOCA Appendix J commitments as closely as possible. It is being delivered as a two-staged commitment:

- **Stage 1 energisation (non-firm substation):** Target date of October 2029. Network connection of new substation via turn in of Lackenby-Norton circuit.
- [redacted]

1. Introduction

1.1 Tees Dock Substation

This Needs Case and associated CBA are submitted as part of the RIIO-ET3 Load Reopener (LR) mechanism under Special Condition 3.18 (Load Re-opener and Price Control Deliverable) of the Electricity Transmission Licence Conditions.

This submission seeks approval of the investment need, the optioneering undertaken and our preferred solution to meet the project drivers.

Subject to Ofgem approval of the needs case and our preferred option, we will continue development and intend to submit a Project Assessment in line with the Load Re-Opener process.

Project Track Statement and PASE

Our original proposed Track 2 allocation had been discussed with Ofgem. However, in Draft Determination's for the investments submitted within the May 2026 Load Re-Opener window, Ofgem decided this project should fall within Track 3.

Within the PASE framework, the preferred option is a variant option. It is an indoor double bus GIS substation at 400 kV that is in proximity (<2km) to the coast (in this case a saline estuary).

1.2 Background

Chronology of investment

Customers have applied for connection in the Teesside area, covering generation, storage and demand applications. The need for the investment is primarily driven by the [redacted] undertook an initial assessment that showed that a new substation would be required. This is because there was insufficient capacity in the existing infrastructure and the system would overload. There were also considerable DNO interactions to accommodate. Further, there were construction logistical considerations to take into account (e.g. SGT long lead times and existing wider reinforcement schedules).

[redacted]

[redacted]

[redacted]

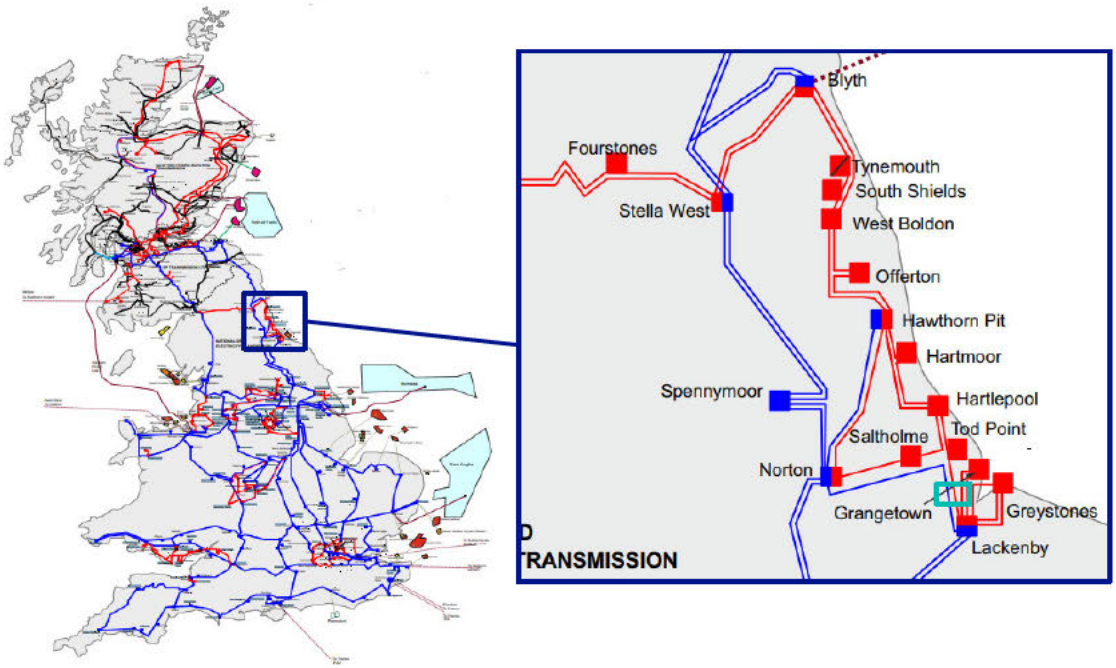
We summarise the above chronology to these connection requests and the development of the project in Figure 1, below.

[redacted]

Regional and network context

The proposed investment site sits in Teesside within the North East region of the network (see Figure 2 and Figure 3). The North East 400 kV and 275 kV transmission network is principally designed for transfer of North-to-South power flows. At present, the network supports the transfer of renewable energy from Scotland while integrating the historically high levels of fossil-fuel-based generation from power stations such as Teesside, Drax and Ferrybridge as it channels electricity south.

Figure 2: NGET network map highlighting the location of the investment in the North East region



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

[redacted]

Electricity demand is expected to grow over the next 20 years as the North East continues its decarbonisation journey. To meet these growing needs, investment in substations and network reinforcement will be required. Some examples of these investments are set out in the next subsection. Balancing demand growth with increasing embedded generation from solar and wind power will be a key focus for both the transmission and distribution networks. Based on insights we have collected from customers, users, DESNZ, the Ofl

[redacted]

This part of the network now has significant wind generation connected, and during periods of high wind, excess power naturally flows through the Midlands and towards the South East, potentially exporting via the sub-sea interconnectors. There is one existing interconnector in the region from Blyth substation to kvilldal, Norway, known as the North Sea Link. The increasing volume of intermittent generation and additional interconnectors in the region will create dynamic network challenges

Major cities in this region are significant population and economic centres, driving substantial electricity demand. Urban growth and modernisation efforts, such as the development of smart cities, further impact the electricity distribution and transmission network. Working alongside the electricity distribution networks, we understand that there

[1] While anything above 1.4 GW is still subject to future connection applications, potential demand increases can be inferred from articles such as Tees Valley Mayor Ben Houchen on region's green energy plans | The Northern Echo

is increasing electrification in transport networks in these urban areas and greater use of electric vehicles (EVs), necessitating additional infrastructure to support EV charging.

Interactive projects

[redacted]

These have clear CP2030 drivers, and delivery is being managed independently to maintain focus on CP2030 outcomes. The works are captured as enabling works for the purposes of this investment, and energisation will be scheduled accordingly.

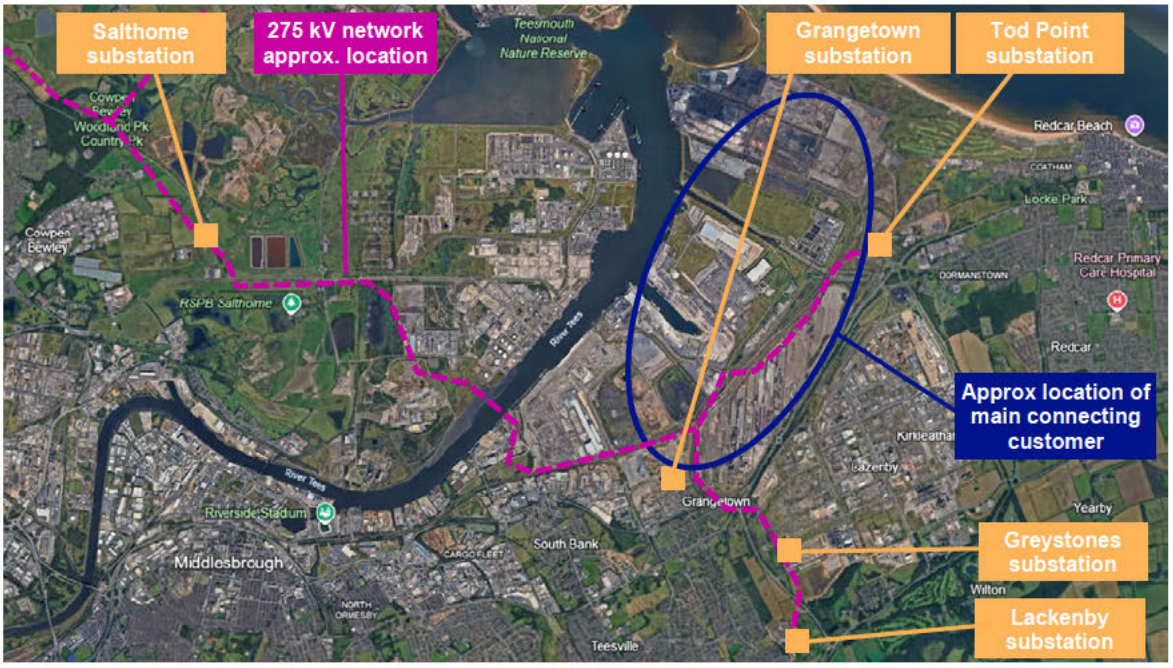
Connections Reform final outcomes may in due course change the extent of enabling and wider works required to enable connections at Tees Dock new substation.

Site background

The proposed site of the investment is in Teesside, which is an urban area around the River Tees in North East England (see map in Figure 4, below). The primary connecting customer site is within a dense industrial park that sits to the south of the River Tees in an existing industrial park, which is part of the Tees Valley industrial cluster (see map of key industries in Figure 5, below). A map of the land ownership for the proposed investment sites (discussed in Section 3.2-Siting) is provided in Appendix E-Land ownership maps.

[2] Home - Eastern Green Link 1

Figure 4: Site location



Historical funding

There is no historical funding relating to these customer drivers.

EAWO

Early asset write-offs (EAWOs) are expected to be minimal due to the investment proposal being predominantly new additions to the existing network. The ZZA OHL that will be turned in as part of this investment was re-conductored in 2012, meaning this may necessitate some EAWO.

2. Drivers and need case

The project will deliver demand and generation connections that have requested to connect in the vicinity of Teesside Connection Node A. An overview of the investment drivers is set out below in Table 3, with further information on each driver set out in the below subsections.

The customer ACL dates presented in this submission reflect the existing contract position. The testing and setting of ACL dates for customer contracts within scope of connections reform is ongoing throughout 2026. Confirmation of agreed ACL dates will therefore be presented in the next stage of submission Project Assessment.

Table 3: Investment drivers

Type	Description	Date
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

2.1 Customer

The investment is required to meet the needs of [redacted] connection applications (see Table 4, below).

[redacted]

Table 4: Details of customers with contracted connections

Customer	Project name	Tech type	MW	Voltage	Original ACL	Revised ACL	Gate 1 / Gate 2
[redacted]							
[redacted]							
[redacted]							

[redacted]

[3] UK Government, 2025. AI Opportunities Action Plan; UK Government, 2025. Industrial Strategy Policy Paper.

2.2 Asset health

[redacted]

3. Optioneering

3.1 Strategic options

We follow a structured, multi-factor optioneering process to select the most economic and efficient solution, in the interest of consumers. In line with the Electricity Transmission Design Principles, our optioneering process considers engineering, environmental, deliverability, economic and stakeholder factors. We started by assessing the most suitable strategic options (see Table 5). At an early stage, we assessed that a new substation may be required to deliver a compliant customer connection, so siting was undertaken.

Table 5: Strategic direction setting

Category	Description	Assessment
A: Do minimum	Maintaining the network its current state and not facilitating the new connections.	Compliant customer connection not delivered.
B: Market-based solution	Accommodating customer demand through the procurement and use of ancillary services only.	Compliant customer connection cannot be delivered.
C: Non-transmission, whole systems solution	The required customer connection is accommodated by a DNO instead of NGET.	Compliant customer connection cannot be delivered.
D: Making use of existing substations	Extensions or rebuilds of the substations at Lackenby and Greystones to facilitate the new connections.	At each of these substations, there is insufficient space, the construction programming is unlikely to be quick enough, and there would be complex additional connection circuits to User's network.
E: Building new substations	Options for building new substations in the shortlisted sites that differed according to the site of the substation, the switchgear technology (AIS or GIS), and whether the solution would be placed indoors or outdoors.	Offers a possible route for connecting delivering a compliant customer connection.

3.2 Siting

Overview of approach

The site (and in turn the technology type) has been chosen in a way that balances the challenge [redacted] asset management challenges of a saline estuary location, commercial considerations, and the future potential for the investment at the site.

Initially, the estate landowner associated with the main demand customer made a possible location available to us (subject to commercial negotiation). This was favourably positioned from an engineering perspective, so early-stage layout design concentrated on this location.

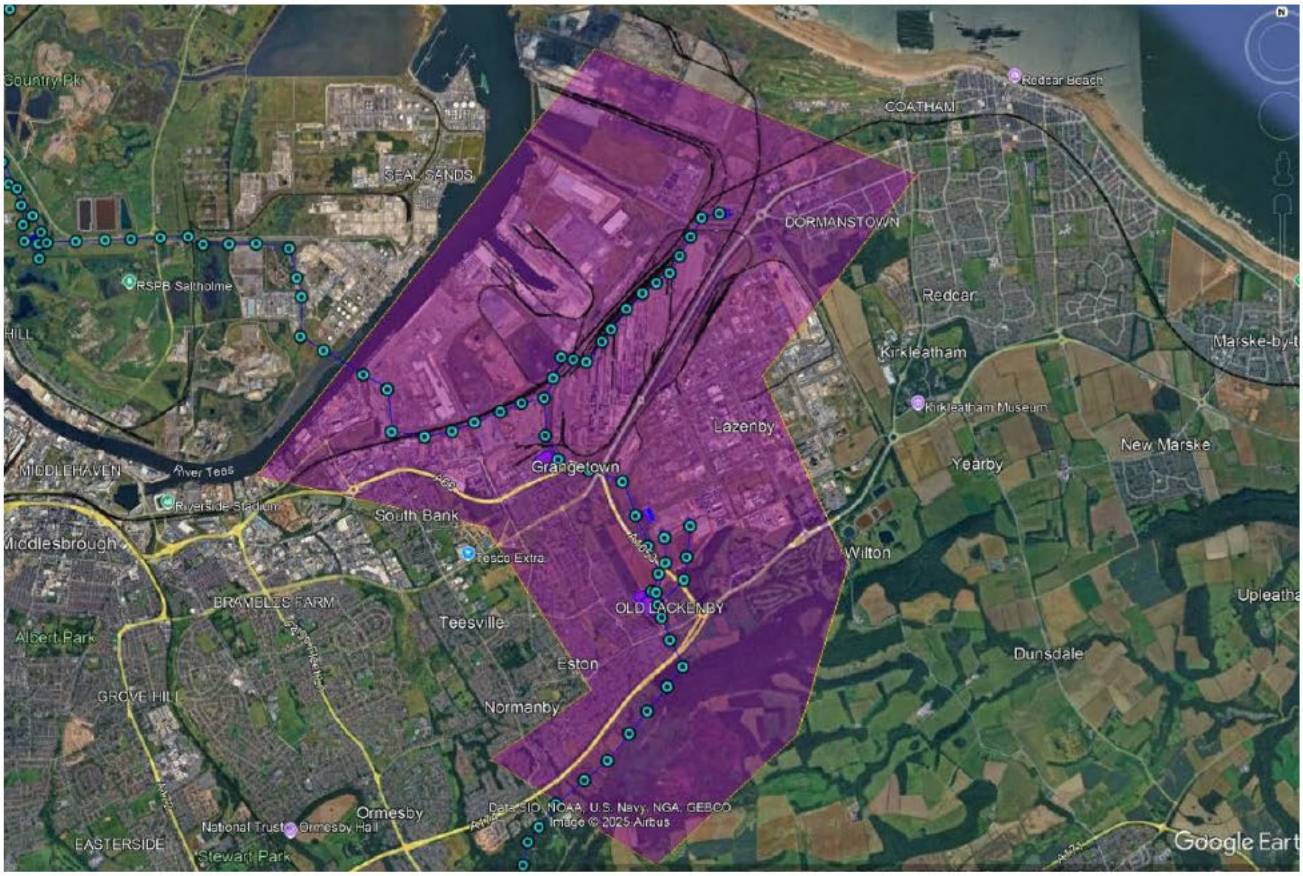
To ensure we were taking the full range of siting options into account, we also undertook a high-level siting appraisal to identify potential AIS sites. W [redacted] selection of a shortlist.

Study area and longlist site options

The AIS siting study focussed on overhead lines (ZZA and XA) within proximity to Lackenby Substation, which is the nearest substation to the customer connection locations (see map in Figure 6 and location of the study area on the network in Figure 7). The study area was bounded in the north by the River Tees, given that any river crossing would be considered time and cost-prohibitive, and in the south by areas with sensitive ecological and landscape designations.

The study area was also limited to less than 2km from the existing OHL to avoid triggering a Development Consent Order (DCO), which has a statutory timescale of 16-18 months for decision-making, excluding pre-application. This would be prohibitive to hitting target gates for the [redacted]

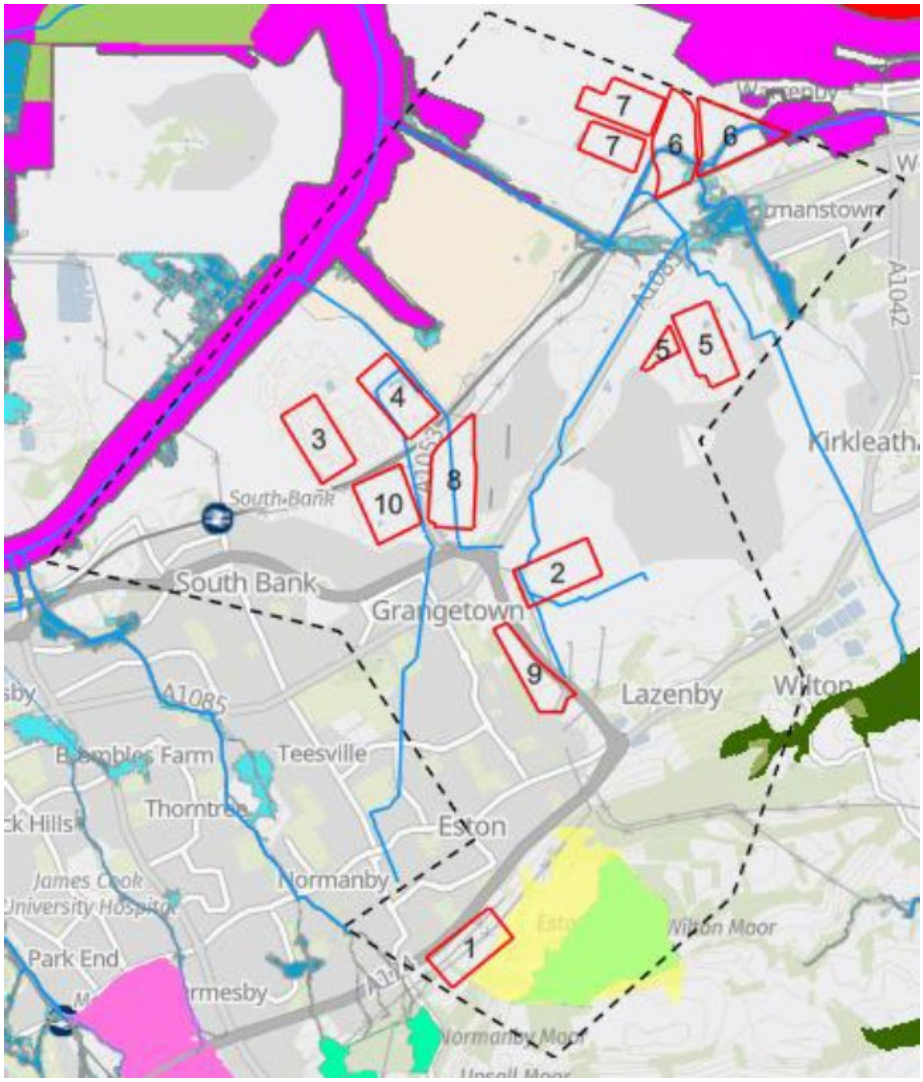
Figure 6: Study area



Within this study area, we identified a longlist of 10 possible site locations for the investment (see Figure 8). Initial criteria for identifying longlist options included:

- **Ability to accommodate AIS:** Each plot had to be able to accommodate an AIS substation [redacted].
- **Standoff from residential properties** and community facilities (no defined set distance because each site option will be assessed on its own merits and on the basis of what is required).
- **Within proximity to the local road network** to avoid the need to construct new long access roads.
- **Avoidance of key environmental and socio-economic constraints**, including: Sites of Special Scientific Interest (SSSI); Special Protection Areas (SPA); Special Areas of Conservation (SAC); Ancient Woodland; World Heritage Sites; Scheduled Monuments; planning applications including DCOs; Flood Zones 2 and 3; Main Rivers; strategic land allocated in planning documents such as green belt; and commons and recreational areas, National Trust land, and CRoW land.

Figure 8: Longlist areas of search



Shortlisting of site options

Within the longlist, three sites (TD01, TD06 and TD07) were quickly ruled out due to technical and consenting challenges.[4] The remaining seven sites were then appraised based on eight considerations (see Table 6 below, with further details provided in Appendix C-Site optioneering longlist appraisal). Based on that appraisal, three proposed sites (TD02, TD08 and TD10) were taken forward to the siting short list.

Key insights from the appraisal include:

- [redacted] There is a greater CPO risk [redacted] creates the risk of cost increase.
- **TD03 - TD04:** Ruled out on technical grounds because the OHL would cross a railway. Also ruled out due to the presence of a historical landfill in proximity that is still in use.
- **TD05:** Ruled out on technical grounds due to the technical solution requiring an OHL exceeding 2.5km and in turn requiring DCO, which is not compatible with delivering timely connections.
- **TD08 (Lackenby** [redacted] There is a lot of information already known about the site, which allows for greater cost certainty. [redacted] However, the option presents more difficulties for the electrical design due to the existing structures on site. Dependent on intersecting planning applications – noted to be available for development through National Grid discussions with the landowner.
- **TD09:** Ruled out on socio-economic and planning grounds and technical grounds. On the former, the northern section of site is on a "green wedge", creating a barrier to development.[5] On the latter, it is intersected by the 400 kV route ZZA and 275 kV route YYV, and the site does not fit the substation spatial requirements in practice.
- **TD10 (Dorman Point** [redacted] Preferrable from a layout perspective. [redacted]

[4] TD01 has an environmental designation. TD06 & TD07 would likely require Section 37 for OHL extensions and are also in the area [redacted]. TD06 & TD07 are also split sites, which would introduce technical design constraints.

[5] "Green wedge" is a local plan designation applied to open land around and/or between settlements to maintain separation and prevent coalescence, helping retain the open/undeveloped character and links between urban areas and surrounding countryside. Green wedges are generally a local designation (not specifically defined in national planning policy) and therefore typically carry less policy weight than nationally designated constraints, whilst still being a material consideration in planning.

Table 6: Appraisal topics and RAG

Site option	TD02	TD03	TD04	TD05	TD08	TD09	TD10
Access							
Ecology							
Water							
Landscape and ground conditions							
Heritage							
Socio-economic and planning							
Technical							
Other							

*Key: **Green** = limited challenges; **Amber** = intermediate challenges; **Red** = insurmountable challenges*

Preferred sites

Of the three highest scoring sites, TD08 and TD10 are preferable because they have a lower risk of CPO. They have the same acquisition terms, given they are both the same landowner and have common landowner/customer interaction. The project programme does not have sufficient time to accommodate CPO, which would be estimated to require 12 months, meaning we are relying on voluntary negotiations to secure our land rights. The landowner of site TD02 has expressed that they do not desire to sell the site, this creates challenges for that option.

Between these choices the Dorman Point site TD10 would be the preferred site, given that it is on the correct side[6] of the existing OHL and line entries, and it satisfies the customer 132 kV siting expectations. The landowner's masterplan has been adapted in line with

[6] The ZZA OHL has 400 kV on one side and 275 kV the other, and we need to turn-in the 400 kV circuit. Having the sub on the 400 kV side of the OHL makes the line entries simpler to arrange (i.e., without crossings).

most of our preferences; therefore, aligning with the landowner's masterplan is preferred to avoid risk of delays and other relationship complications.

The Dorman Point site benefits from partial remediation that could potentially improve the overarching programme, subject to agreeable concurrent remediation and construction activities. However, in terms of remediation effort, Dorman Point is broadly equivalent in area [redacted] and as such, remediation is not an appropriate differentiator.

[redacted]

3.3 Longlist of options considered

Within each of the five option categories, set out in Section 3.1-Strategic options, we designed nine options and assessed them based on the balanced scorecard categories.

[redacted] timely delivery of this connection has been considered essential in our optioneering. A key determining factor when shortlisting our options was therefore whether the option would avoid CPO (estimated to add 12-24 months to project timelines). As discussed in the

siting, we also only selected sites that avoid DCO (which has a statutory timescale of 16-18 months for decision-making, excluding pre-application).

An overview of the assessment of our longlist options is provided in the table Table 7 below. Layout drawings are provided in Appendix D-Images of longlist options to this document. Appendix D of this document contains a single line diagram (SLD) for our preferred option, which is broadly the same for all viable options, although this is still subject to confirmation once the CR outcomes are clearer.

Table 7: Assessment of longlist options

Option	Technical Description	Relevant diagrams, layout or SLD reference	Consenting & Land Risks & Environmental Constraints	Rationale for rejecting or taking forward the option
Option A: Do minimum[7] **Not progressed**	The network is kept in its current state, and no new connections are facilitated.	N/A	N/A	**Engineering:** Compliant customer connection not delivered.
Option B: Market-based solution **Not progressed**	Increased customer demand is accommodated through the procurement and use of ancillary services only.	N/A	N/A	**Engineering:** Compliant customer connection not delivered.
Option C: Non-transmission, whole systems solution **Not progressed**	The required customer connection is accommodated by a DNO instead of NGET.	N/A	N/A	**Engineering:** Compliant customer connection not delivered. Whole system solutions depend on a DNO's ability to accommodate further physical customer connections on their infrastructure. NGET discounted this option early in the optioneering process as our insight from Connections Reform with respect to existing DNO embedded connections established tha [redacted]
Option D-1: Extension or rebuild of	Extension or rebuild of the existing Lackenby substation.	N/A	**Land:** Insufficient space. Site TD09 considered land immediately adjacent to Lackenby substation, which was not carried forward to the siting shortlist	**Engineering:** Following initial connection requests in late 2023, we undertook an initial assessment that showed that a new substation would be required:

[7] In line with the Re-opener Guidance and Application Requirements Document, our do minimum option acts as "as a counterfactual to demonstrate the financial impact of no additional investment or programme expenditure taking place". The minimum intervention to remain compliant with applicable laws and regulations would be represented in practice by our viable infrastructure options in category E.

Option	Technical Description	Relevant diagrams, layout or SLD reference	Consenting & Land Risks & Environmental Constraints	Rationale for rejecting or taking forward the option
Lackenby substation **Not progressed**			due to consenting and environmental constraints (the northern section of site is on a "green wedge", creating a barrier to development).[8]	• There is **insufficient capacity** in the existing infrastructure and the system would overload. • The **complexity** of transferring all existing circuits and connections (existing DNO, multiple offshore windfarms and proposed new connections) would be practically and commercially complex and would require a delivery programme that could not satisfy connection timely connections. Several OHL and cable line entries would need to be relocated/diverted to support the re-wiring, all while keeping existing network and connections energised in compliance with SQSS. **Land:** Available land is considered unlikely to be sufficient to provide for the additional new connection requirements and new connection requirements if it were all to be delivered in AIS. **Deliverability:** The construction programming is unlikely to be quick enough due to the above factors.
Option D-2: Extension or rebuild of Greystones substation	Extension or rebuild of the existing Greystones substation.	N/A	**Land:** Insufficient space.	**Engineering:** Following initial connection requests in late 2023, we undertook an initial assessment that showed that a new substation would be required. There is insufficient capacity in the existing infrastructure and the system would

[8] "Green wedge" is a local plan designation applied to open land around and/or between settlements to maintain separation and prevent coalescence, helping retain the open/undeveloped character and links between urban areas and surrounding countryside. Green wedges are generally a local designation (not specifically defined in national planning policy) and therefore typically carry less policy weight than nationally designated constraints, whilst still being a material consideration in planning.

Option	Technical Description	Relevant diagrams, layout or SLD reference	Consenting & Land Risks & Environmental Constraints	Rationale for rejecting or taking forward the option
Not progressed				overload. There would also be complex additional connection circuits to the User's network and to the transmission network (275 kV to 400 kV uprating would probably be required to service the demand level requested). **Land:** There is insufficient space. **Deliverability:** The construction programming is unlikely to be quick enough.
Option E-1: New [redacted] **Progressed to shortlist**	Construct a new 400 kV [redacted] • [redacted]	**Site location:** Lackenby or Dorman Point site from siting study (TD08 or TD10 from the siting study). **Layout and SLD:** Appendix 2.2.	**Environment:** All sites are within proximity to designated ecology sites (including Teesmouth SPA). **Consent:** Town and Country Planning Act (TCPA) planning application would be needed for a new substation. Development Consent Order (DCO) not needed for OHL, given that we are within a 2km envelope of the existing OHL. **Land:** [redacted] However, those early discussions were based on a GIS footprint (making it a subset of site TD08 / TD10), which is smaller than what would be needed for AIS.	**Engineering:** Site is located <2km from a tidal saline estuary, meaning it is pollution class iv. The indoor design overcomes challenges with being close to a saline estuary (outdoor AIS has a risk of accelerated asset deterioration and operational problems due to more aggressive atmospheric conditions). **Land acquisition and deliverability:** However, AIS option may face challenges due to the size of the footprint and its associated limited future expansion potential. The risk of CPO on timelines also requires further analysis (estimated to add 12-24 months to project timelines). **Consumer value / economic performance:** AIS technology typically also has lower upfront capital costs and a lower carbon-equivalent impact than its GIS counterpart.

Option	Technical Description	Relevant diagrams, layout or SLD reference	Consenting & Land Risks & Environmental Constraints	Rationale for rejecting or taking forward the option
Option E-2: New indoor [redacted] **Progressed to shortlist**	Construct a new indoor 400 kV SF_6-free GIS substation adjacent to Tees Dock Road, broadly comprising: • [redacted]	**Site location:** Lackenby or Dorman Point site (TD08 or TD10 from the siting study). **Layout and SLD:** Appendix 2.2.	**Environment:** All sites are within proximity to designated ecology sites (including Teesmouth SPA). **Consent:** TCPA planning application would be needed for a new substation. DCO not needed for OHL, given that we are within a 2km envelope of the existing OHL. **Land:** [redacted] However, those early discussions were based on a GIS footprint (making it a subset of site TD08 / TD10), which is smaller than what would be needed for AIS.	**Engineering:** GIS overcomes challenges with being close to (<2km) a saline estuary and within pollution class iv (which adds risk of accelerated asset deterioration and operational problems due to more aggressive atmospheric conditions). **Land acquisition and deliverability:** [redacted] **Consumer value / economic performance:** GIS technology is typically associated with higher upfront capital costs than AIS although typically have lower land acquisition costs due to smaller footprint.
Option E-3: New outdoor AIS substation built on third party land. **Not progressed**	Construct a new outdoor AIS substation on other grantors' land, broadly comprising: [redacted]	**Site location:** [redacted] **Layout and SLD:** None provided.[9]	**Environment:** All sites are within proximity to designated ecology sites (including Teesmouth SPA). **Consent:** TCPA planning application would be needed for a new substation. DCO not needed for OHL, given that	**Land acquisition and deliverability:** AIS may face challenges due to the substantial risk of entailing a CPO, and the implications of CPO for the land available for a future-proofed AIS

[9] Following the shortlisting of this option, after establishing that the landowner of the site was unwilling to agree to a voluntary sale/lease, we did not undertake the engineering activity of producing layout drawings.

Option	Technical Description	Relevant diagrams, layout or SLD reference	Consenting & Land Risks & Environmental Constraints	Rationale for rejecting or taking forward the option
	[redacted]		we are within a 2km envelope of the existing OHL. **Land:** [redacted] Land obtained through CPO would likely only be able to cover immediate needs, creating future-proofing challenges.	solution footprint and its associated risk of entailing a CPO.[10] **Engineering and consumer value / economic performance:** The proximity of the saline estuary (<2km), placing the site in pollution class iv, may reduce the asset life of an outdoor AIS substation at a cost to the consumer.
Option E-4: [redacted] **Not progressed**	Construct a new 400 kV [redacted]	**Site location:** Lackenby or Dorman Point site from siting study (TD08 or TD10 from the siting study). **Layout and SLD:** Section 3.4.	**Environment:** All sites are within proximity to designated ecology sites (including Teesmouth SPA). **Consent:** TCPA planning application would be needed for a new substation. DCO not needed for OHL, given that we are within a 2km envelope of the existing OHL. **Land:** [redacted]	**Engineering and consumer value / economic performance:** The proximity of the saline estuary (<2km), placing the site in pollution class iv, would reduce the asset life of an outdoor AIS substation at a cost to the consumer. **Engineering, land acquisition and deliverability:** [redacted]

[10] Our siting study has explored plots that could accommodate an AIS solution. However, a CPO would likely only grant sufficient space for an AIS solution for current needs rather than accounting for future requirements. This presents a risk of the solution becoming physically constrained by other developments in the estate, restricting future-proofing potential.

Option	Technical Description	Relevant diagrams, layout or SLD reference	Consenting & Land Risks & Environmental Constraints	Rationale for rejecting or taking forward the option
	[redacted]		[redacted] arly discussions are based on a GIS footprint (making it a subset of site TD08 / TD10), which is smaller than what would be needed for AIS.	[redacted] limited future expansion potential.

The rationale for our identified shortlist includes:

- The do-minimum option and the market-based and non-transmission options (options categories A, B and C) were ruled out on engineering grounds because they would not be able to deliver a compliant customer connection.
- The two substation extension options (options D-1 and D-2) were ruled out on engineering and deliverability grounds. There is insufficient space, the construction programming is unlikely to be quick enough, and complex additional connection circuits may be needed.
- One new-build option (E-3) was ruled out because the landowner was unwilling to sell, and CPO is inconsistent with timely delivery.
- The remaining option (E-4) was ruled out because of the proximity to a saline estuary (<2km), placing the site in pollution class iv, which would reduce the asset life of the substation at a cost to the consumer.
- We shortlisted two indoor new-build options (options E-1 and E-2) that differ based on technology type.

Stakeholder influence on shortlisting

We have shortlisted two option [redacted]

Given that CPO is estimated to add 12-24 months to the project programme, our programme for delivering strategic demand in a timely manner cannot accommodate this. As set in the project chronology in Section 1.2, we have faced pressure [redacted]

3.4 Shortlisted options

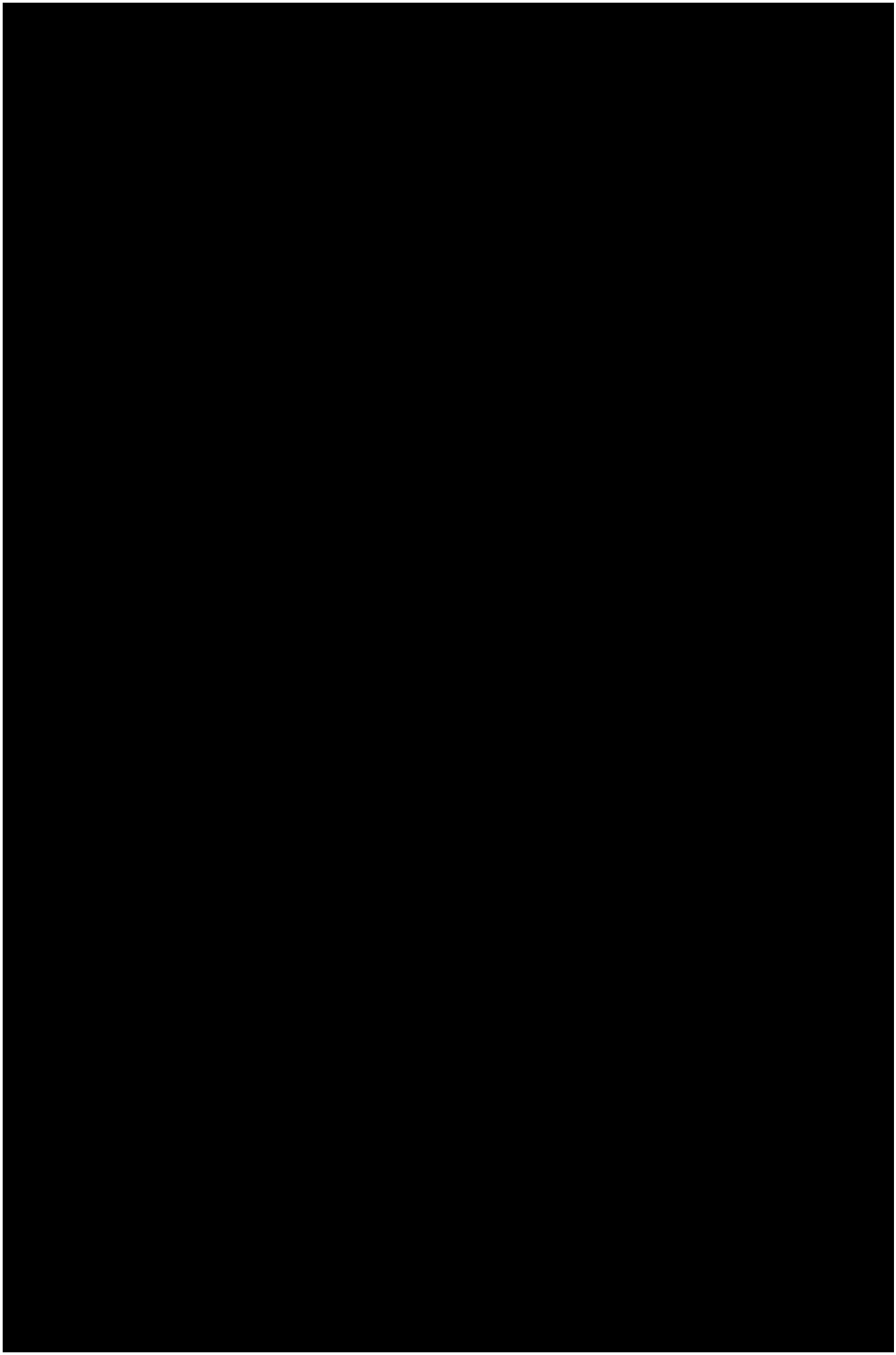
We have shortlisted two options, which are each described in the subsections that follow:

- **E-1:** New indoor AIS substation built on [redacted]
- **E-2:** New indoor GIS substation built on [redacted]

Please refer to the system design table in Appendix B-System design table, which is the same for all shortlisted options.

Description of short-list options considered

[redacted]



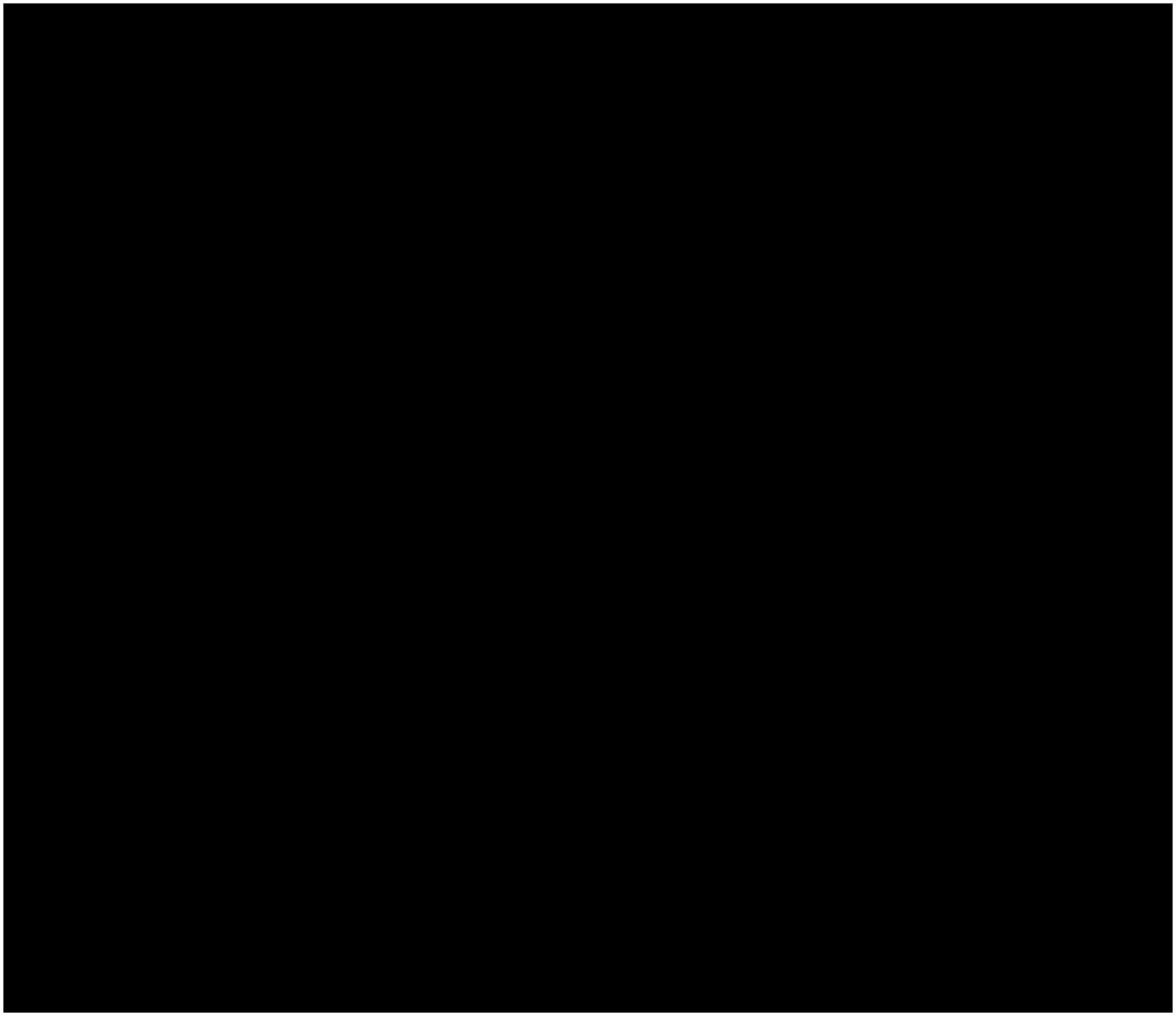
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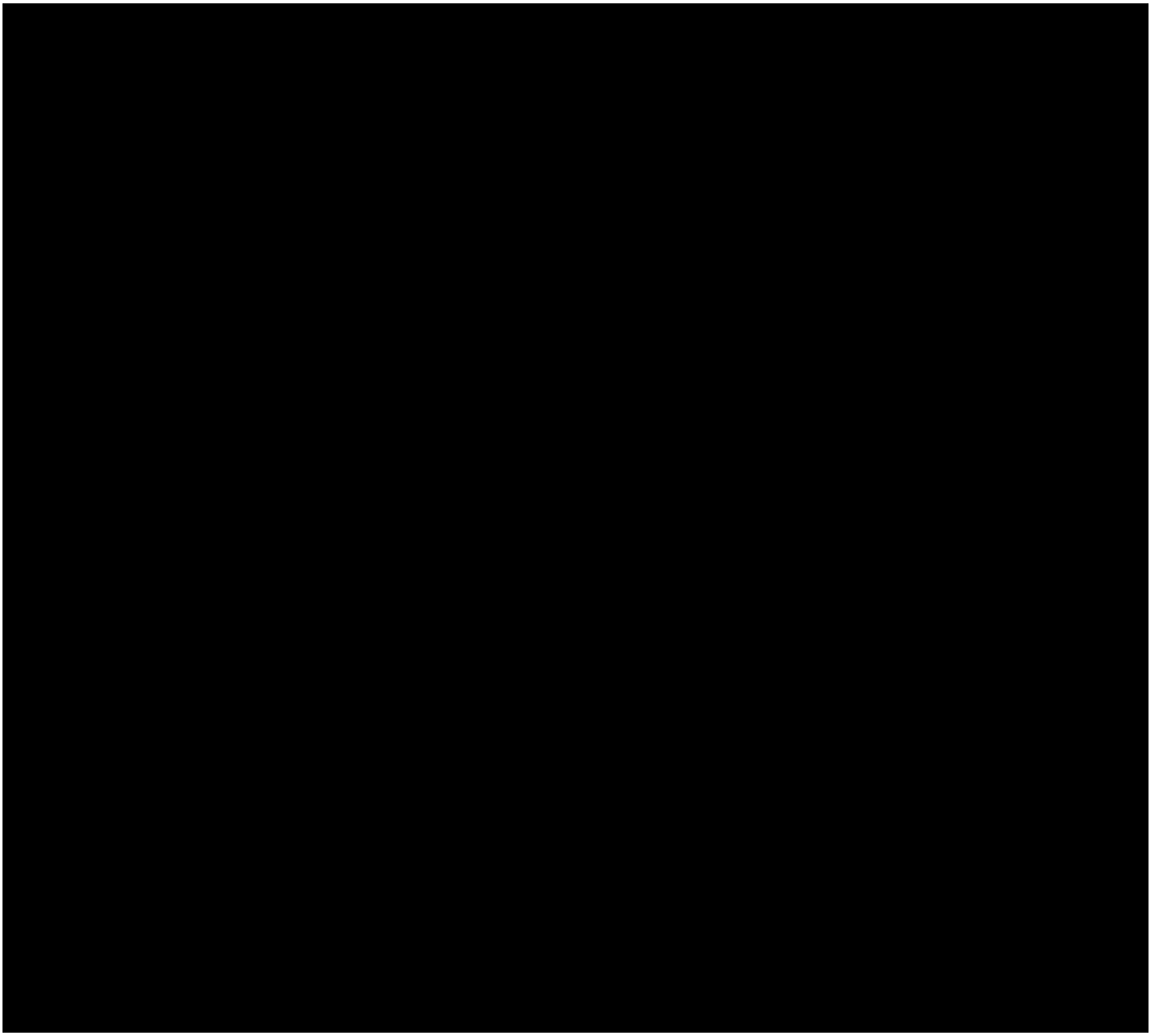
Option E-2: New indoor GIS substation built on [redacted]land

[redacted]

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]

[redacted]





3.5 Qualitative assessment of shortlist

Table 8: Multifactorial analysis

Option	Optioneering Categories				
	Engineering	**Environmental**	**Deliverability**	**Economic/Consumer Value**	**Consenting /Stakeholder**
All shortlisted options	• Asset life risk due to proximity to a saline estuary is mitigated through indoor design.	• Construction will take place on brownfield land, which has lower ecological value than greenfield. • Carbon costs of construction are broadly equivalent across options (see quantitative analysis in Section 3.6).		• Given the brownfield nature of the site, environmental and possible geotechnical improvement works are required with associated cost. • Indoor design overcomes challenges of being close to a saline estuary, preventing unfavourable lifetime asset lifecycle risk and additional cost risks of outdoor options.	• The construction of a new substation will require a Town & Country Planning Act (TCPA) consent application.[11]

[redacted]

Option	Optioneering Categories				
	Engineering	**Environmental**	**Deliverability**	**Economic/Consumer Value**	**Consenting /Stakeholder**
Option E-1 New indoor AIS substation built on [redacted]	• While there are examples of indoor AIS already in operation (e.g. at Aberthaw), indoor AIS is used less frequently than outdoor AIS. Asset Operations' technical operational concerns will therefore need to be appropriately considered (especially if wrap-around busbar designs and through-wall bushing equipment is required). • Requires fewer long duration system accesses.	• Limited carbon-equivalent impact of AIS.	• If more land is required than the customer has made available, CPO may be needed (requiring ~12-24 months). This would not be compatible with contracted dates. [redacted] • The construction of a climate-conditioned building for indoor AIS would create further pressure on the project programme that places contracted dates at risk.	• AIS typically has lower capital costs than GIS, which is reflected in the quantitative analysis in the next section. • The construction of a climate-conditioned building large enough to accommodate AIS creates additional capital costs relative to the outdoor AIS alternative.	• Early [redacted] were for a GIS solution, which has a smaller footprint. [redacted]
	Supporting Evidence: SWOT analysis, supplier communications.	**Supporting Evidence:** CBA.	**Supporting Evidence:** CPO estimates based on previous NGET projects and align with estimates in previous regulatory submissions.	**Supporting Evidence:** Cost estimates for the building reflected in the CBA.	**Supporting Evidence:** Record of stakeholder engagement.
	Detractor	**Benefit**	**Detractor**	**Neutral**	**Detractor**

Option	Optioneering Categories				
	Engineering	**Environmental**	**Deliverability**	**Economic/Consumer Value**	**Consenting /Stakeholder**
Option E-2 New indoor GIS substation built on [redacted]	• Requires fewer long duration system accesses. • Plenty of space for large construction compound adjacent to build site.	• Use of SF_6-free GIS technology significantly reduces the environmental impact relative to traditional GIS technology.	• Fits into the space offered by the customer, meaning land can be acquired voluntarily. This is consistent with delivering connections in line with contracted dates.	• GIS typically has greater upfront capital costs than its AIS counterpart, which is reflected in the quantitative analysis in the next section.	• [redacted] ncluding space for future expansion.
	Supporting Evidence: SWOT analysis, supplier communications.	**Supporting Evidence:** CBA.	**Supporting Evidence:** CPO risk informed by stakeholder engagement record.		**Supporting Evidence:** Record of stakeholder engagement.
	Benefit	**Neutral**	**Strong Benefit**	**Benefit**	**Strong Benefit**

Qualitative assessment output

Based on the qualitative assessment, **Option E-2 is the preferred option** because:

- **Voluntary land purchase enables timely delivery of connections:**
  - GIS option E-2 is located on land [redacted].
  - AIS option E-1 is located on land [redacted]

PASE alignment

Within the PASE framework, the preferred option is a variant option. It is an indoor double bus GIS substation at 400 kV that is in proximity to the coast (in this case a saline estuary).

3.6 Quantitative assessment of shortlisted options

Cost estimates of shortlisted options

To assess the shortlisted options, cost estimates have been created for quantitative economic comparison. All capex is derived from NGET's latest Cost Book [redacted] project analysis, to account for unforeseen circumstances and mitigate risks during implementation.

Table 9: Cost estimate breakdown (£m, 23/24 prices)

Option	OHL	Cables	Substation	Total (exc. contingency)	[redacted]	Total (inc. contingency)
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
E-2: [redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Cost drivers

The project's cost estimates are based on current market conditions, with ongoing work to refine requirements. The baseline funding request is supported by high-cost confidence and robust EUL (Estimating Units Lines) assessments.

Using the cost book, the main factors driving the costs for the shortlisted options are:

- The upfront capital costs for AIS technology are typically lower than for GIS, which is reflected in our cost estimates.
- The costing for indoor AIS option E-1 includes a [redacted] building.

Cost-benefit analysis

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.
- [redacted] 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 five 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 costs

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 two shortlisted options.

- E-1: New indoor AIS substation built on [redacted]
- E-2: New indoor GIS substation built on [redacted]

CBA outcome

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

Table 10: Lifetime CBA (2023/2024 base prices, central carbon pricing, discounted values)

Option	Initial Investment (£m)	PV of Lifetime Costs (£m)	PV of Monetised Benefits (£m)	NPV (£m)
Option E-1	[redacted]			
Option E-2				

On the basis of the discounted lifetime CBA results (see Table 10), Option E-1 has the [redacted]) making it the most cost-effective option. This analysis is subject to confirmation through deliverability, consents/land, outage and risk considerations, and any CBA sensitivities set out in the assumptions below.

Assumptions of the CBA analysis

Core assumptions and sensitivities. 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: 2023/2024 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, SF6/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 11: Summary of all additional Capex costs (2023/2024 base prices)

Option	Capex		Total costs (£m)
	Initial works (£m)	Future replacement (40yr) (£m)	
Option E-1	[redacted]	[redacted]	[redacted]
Option E-2	[redacted]	[redacted]	[redacted]

Benefits

The following benefits have been included within the CBA:

- SF6 / Alternative gas leakage reduction
- Carbon cost of construction reduction
- Transmission loss reduction
- Summary of all Benefits

Table 12 presents the summary of all (undiscounted) benefits, including environmental and non-environmental benefits, considering the central base case carbon price.

Table 12: Summary of all benefits

Option	Environmental Benefits		Non-Environmental Benefits	Total Benefits (£m)
	Carbon costs of construction (£m)	Gas leakage (£m)	Transmission loss (£m)	
Option E-1	[redacted]			
Option E-2				

3.7 Preferred solution

The **preferred option is a 400 kV indoor [redacted] (Option E-2)**, which has various benefits:

- **Voluntary land purchase enables timely delivery of connections:** [redacted]
- **Avoiding DCO enable timely delivery of connections:** This is close to both the end user location and to the existing NGET existing circuit infrastructure, reducing the scale of intervention required and the cost to consumers. Importantly, the option avoids DCO, which would not be compatible with the timely connection of customers.
- **Indoor option in the vicinity of a saline estuary:** We only shortlisted indoor options due to asset longevity policy considerations relating to the proximity (<2km) to saline estuary, pollution class iv.
- **Futureproofing:** The location and technology choice allows for a more compact initial design that in turn supports greater future expansion potential. This covers [redacted]

The scope of work for the preferred solution includes the creation of a complete new 400 kV substation, broadly comprising:

- [redacted]
  - [redacted]
  - [redacted]
  - [redacted]
  - [redacted]
  - [redacted]
  - [redacted]
  - [redacted]

[redacted]

- [redacted]

The connection is to be engineered to comply with all relevant engineering standards as applicable. It is also intended to design the substation to have extension potential at each end of the main switchgear board.

The current view is to use a two-phase approach to delivery:

- [redacted]

Project benefits and outputs

The investment at Teesside will deliver key outputs for consumers and the wider network, summarised in Table 13.

Table 13: Summary of outputs and benefits

Output and Proposed PCD	Deliver multiple new connections at the new 400 kV substation [redacted]
	• [redacted] • **Demand capacity:** [redacted] • **Boundary capability:** Improvements to boundary capability remain subject to Connections Reform system studies following final outcomes. • **Socio-economic benefits:** The investment will support the long-awaited physical and economic regeneration of the South Tees area, which is expected to bring significant socio-economic benefits at a regional level.

Futureproofing

The following futureproofing considerations have been made when designing and selecting the preferred option:

- **Provision for future substation expansion:** The GIS substation we initially construct will allow for the addition of one further SGT [redacted]
- [redacted]

- [redacted]

Maintaining relationships with landowners: Our siting study review and other discussions with landowners in the area have highlighted that suitable land for infrastructure is scarce. [redacted]

4. Delivery

4.1 Delivery year and indicative timeline

The current delivery programme is being developed to meet TOCA Appendix J commitments as closely as possible (see Figure 15). It is being delivered as a two-staged commitment:

[redacted]

The original programme offer was accelerated at customer request. There have been further enquiries about other potential acceleration opportunities, which we have not been able to satisfy. The delivery programme is being actively reviewed as part of development phase activity.

Our internal planning tools indicate that longer timelines may be required. [redacted] For this reason, we are focussing on developing bespoke programmes with early engaged delivery contractors to mitigate the risk of delay. [redacted]

[redacted]

4.2 Procurement and contracting strategy

[redacted]

[redacted]

4.3 Risks and risk management

We have identified a range of risks to the delivery of our project (see Table 14, below). For each of these risks, we have put in place mitigations. The impact of these risks manifesting as real issues could range from adjustment to delivery schedules (covering both minor changes not affecting connection energisation or major impacts resulting in connection date delays) up to a change of preferred option.

Table 14: Delivery risks and mitigations

Risk	Mitigation
Funding uncertainty: Failure to obtain funding means we would be unable to deliver the investment drivers.	This submission through the Load Re-opener seeks to mitigate this risk.
Land acquisition: Failure to obtain the land required for the project to go ahead. A further risk is the need to use CPO, which would place the project programme at significant risk.	[redacted]

Risk	Mitigation
[redacted]	[redacted]
Land quality: Brownfield remediation impacts.	Mitigated in part through landowner pre-sale activities to deal with environmental remediation requirements.
[redacted]	[redacted]
Equipment long lead-times: Equipment procurement long lead times could delay the project programme.	Mitigated in part through bulk purchasing programme for ordering of SGTs, but switchgear commitments also need to be made very soon. We also plan to use the Advanced Procurement Mechanism (APM) and have requested allowances for bespoke procurement as part of the APM Re-opener window in April 2026, which is subject to Ofgem pre-approval.
Resource availability: There are notable concerns about construction industry staffing levels, limitations in commissioning specialist resources and restrictions on network outage availability.	This can be mitigated through early commitment and appropriate prioritisation of this project.

5. Conclusion

This submission sets out the preferred solution to address the investment drivers for the Tees Dock substation project. The submission seeks approval of the investment need as well as formal endorsement of the optioneering undertaken and our preferred solution.

The preferred solution is a new 400 kV double busbar GIS substation on the Teesworks Dorman Point site (Option E-2). This solution can be delivered without requiring CPO or DCO, which ensures that we can deliver the timely connection of a customer that is an anticipated AIGZ.

Table 15: Submission summary

Submission summary	
Main drivers	Demand connections. The primary connecting customer is [redacted] which is contracted for non-firm energisation in [redacted]
Preferred option	The preferred solution is a new 400 kV double busbar GIS substation on the [redacted] (Option E-2).
Estimated cost and timing	Total cost of the project is currently estimated to be [redacted] The investment has multiple stages: • First site access for construction is scheduled for early **2027**. • Initial energisation is **2029** (demand ACL), with further stages in **2030** (demand ACL), **2033** (creation of new Lackenby-Tees Dock 400 kV circuit and re-configuration of Greystones-Tod Point 275 kV circuit), and **2035** (BESS ACL)
Outputs	[redacted], targeted to support AI Growth Zone ambitions in the region, underpinning UK Government national strategy. [redacted] providing additional flexible capability in support of de-carbonisation of the industry and future network needs.
Proposed PCD	Delivery of the above outputs. Delivery date to be confirmed at the PA stage.

Appendix A
Glossary

Abbreviation	Description
ACL	Available for commercial load
AIS	Air-insulated switchgear
BESS	Battery energy storage system
BPDT	Business Plan Data Template
CBA	Cost-benefit analysis
CCGT	Combined-cycle gas turbine
CION	Connection and Infrastructure Options Note
CPO	Compulsory purchase order
CP2030	Clean Power 2030
CRoW	Countryside and Rights of Way
DCO	Development Consent Order
DNO	Distribution network operator
EAWO	Early asset write-off
ECI	Early contractor involvement
EEW	Early enabling works
EJP	Engineering Justification Paper
EPC	Engineering, procurement and construction
ESO	Electricity System Operator
EUL	Estimating Units Line
ET2/ET3	The names of the price control periods used by Ofgem (equivalent to RIIO-ET2/RIIO-ET3)
FEED	Front-end engineering design
FSA	First site access OR Final site acceptance
FY	Financial year
GB	Great Britain
GIB	Gas-insulated busbar

Abbreviation	Description
GIS	Gas-insulated switchgear
GW	Gigawatt
HND	Holistic Network Design
HV	High voltage
HVDC	High-voltage direct current
ISS	Integrated security system
LV	Low voltage
LVAC	Low-voltage alternating current
MVA	Megavolt-ampere
MVAR	Megavolt-ampere reactive
MW	Megawatt
NGET	National Grid Electricity Transmission
NC	Needs Case
NESO	National Energy System Operator
NETS	National Electricity Transmission System
NOA	Network Options Assessment
NPV	Net present value
NSIP	Nationally Significant Infrastructure Project
OfI	Office for Investment
OHL	Overheat line
OSR	Ofgem scheme reference
OSW	Offshore wind
OTS	Operational tripping scheme
PA	Project Assessment
PASE	Pre-approval of Solutions by Engineering
PCF	Pre-Construction Funding
PWS	Pre-works sanction
RIIO-ET2/ET3	The names of the price control periods used by Ofgem (equivalent to ET2/ET3)

Abbreviation	Description
RRP	Regulatory Reporting Pack
SAF	Sustainable Aviation Fuel
SF_6	Sulphur hexafluoride
SGT	Super grid transformers
SLD	Single line diagram
SPA	Special Protection Area
SQSS	Security and Quality of Supply Standard
SSSI	Site of Special Scientific Interest
S/S	Substation
TCPA	Town and Country Planning Act
TCSNP	Transitional Centralised Strategic Network Plan
TNCC	Transmission Network Control Centre
TO	Transmission Operator
UK	United Kingdom

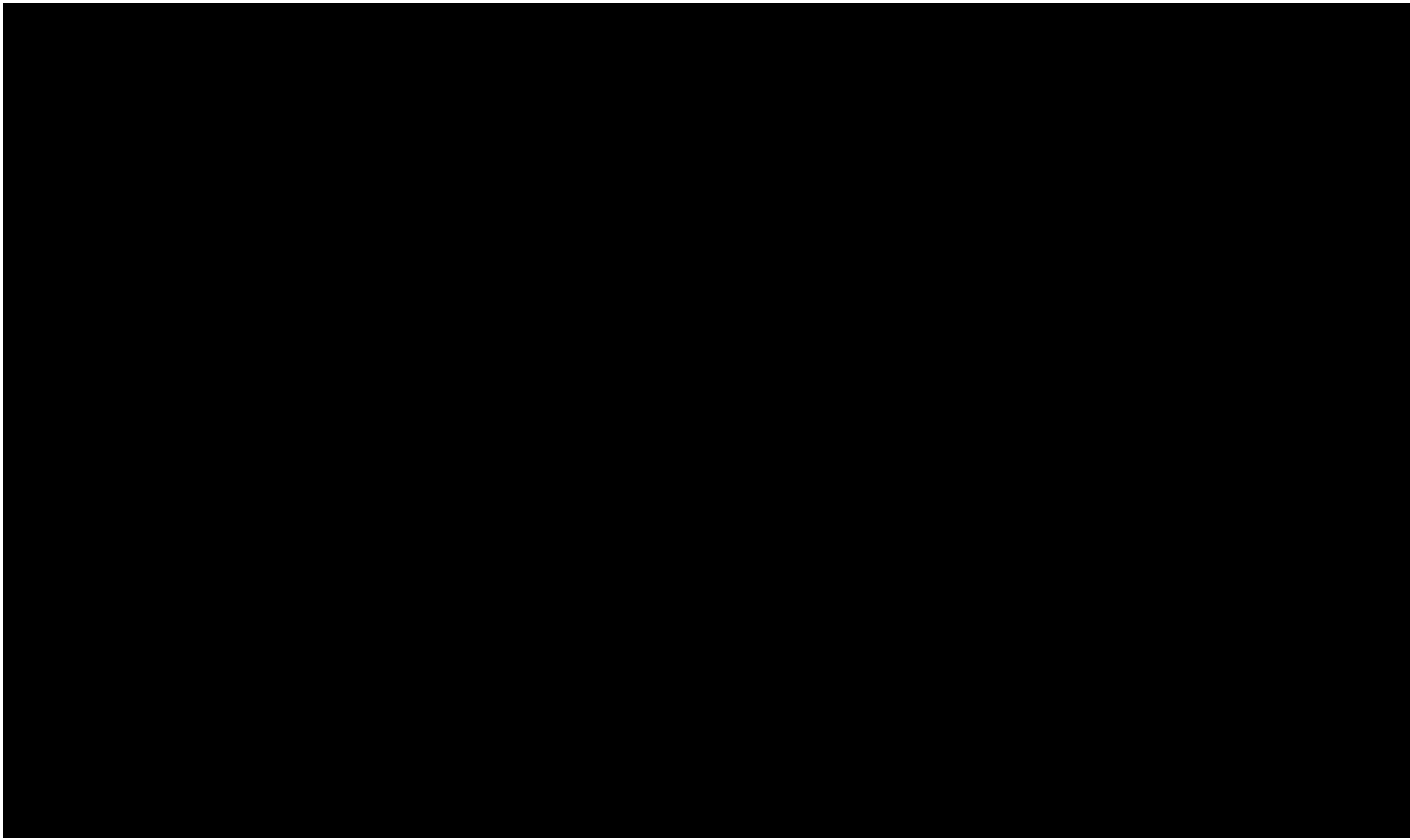
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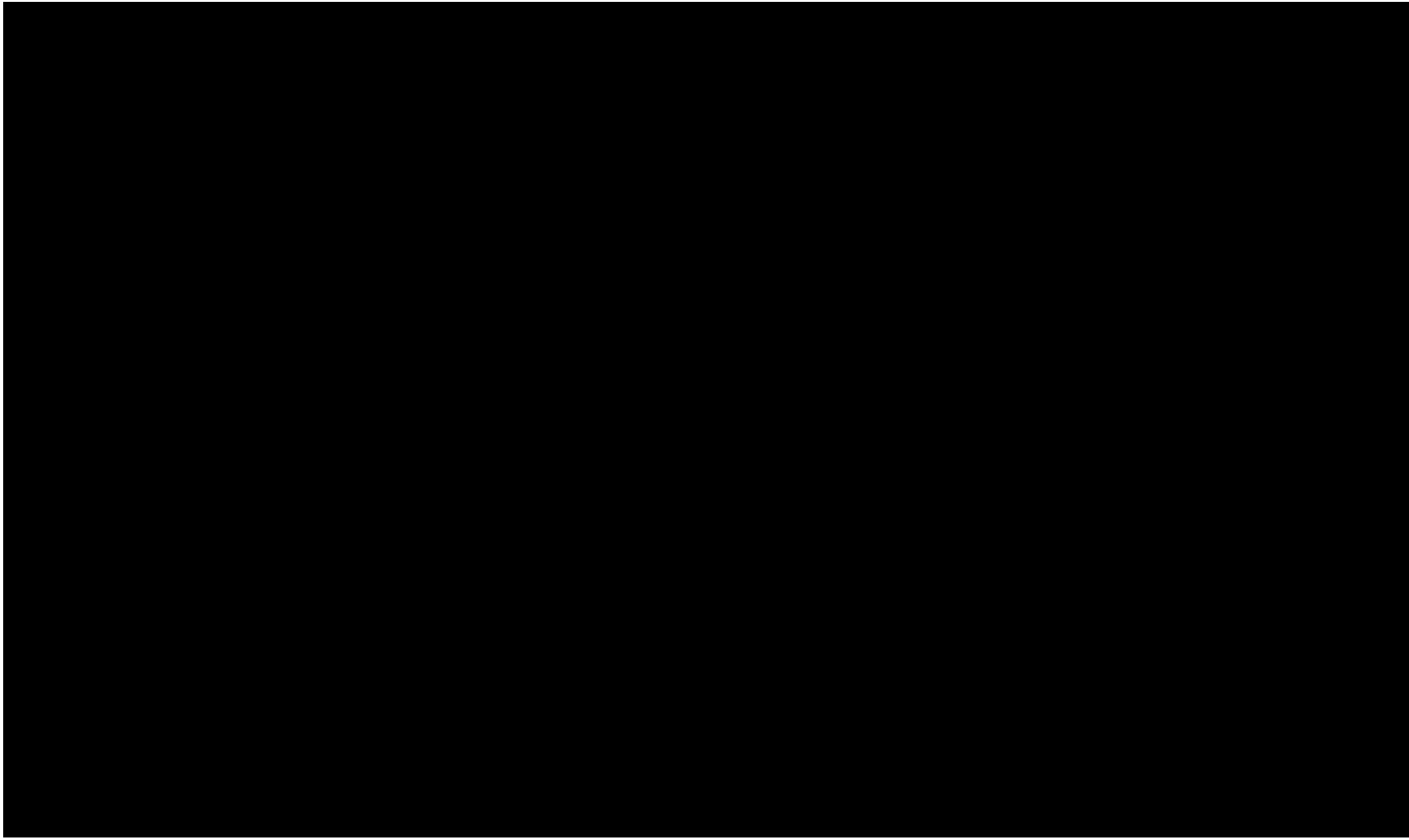
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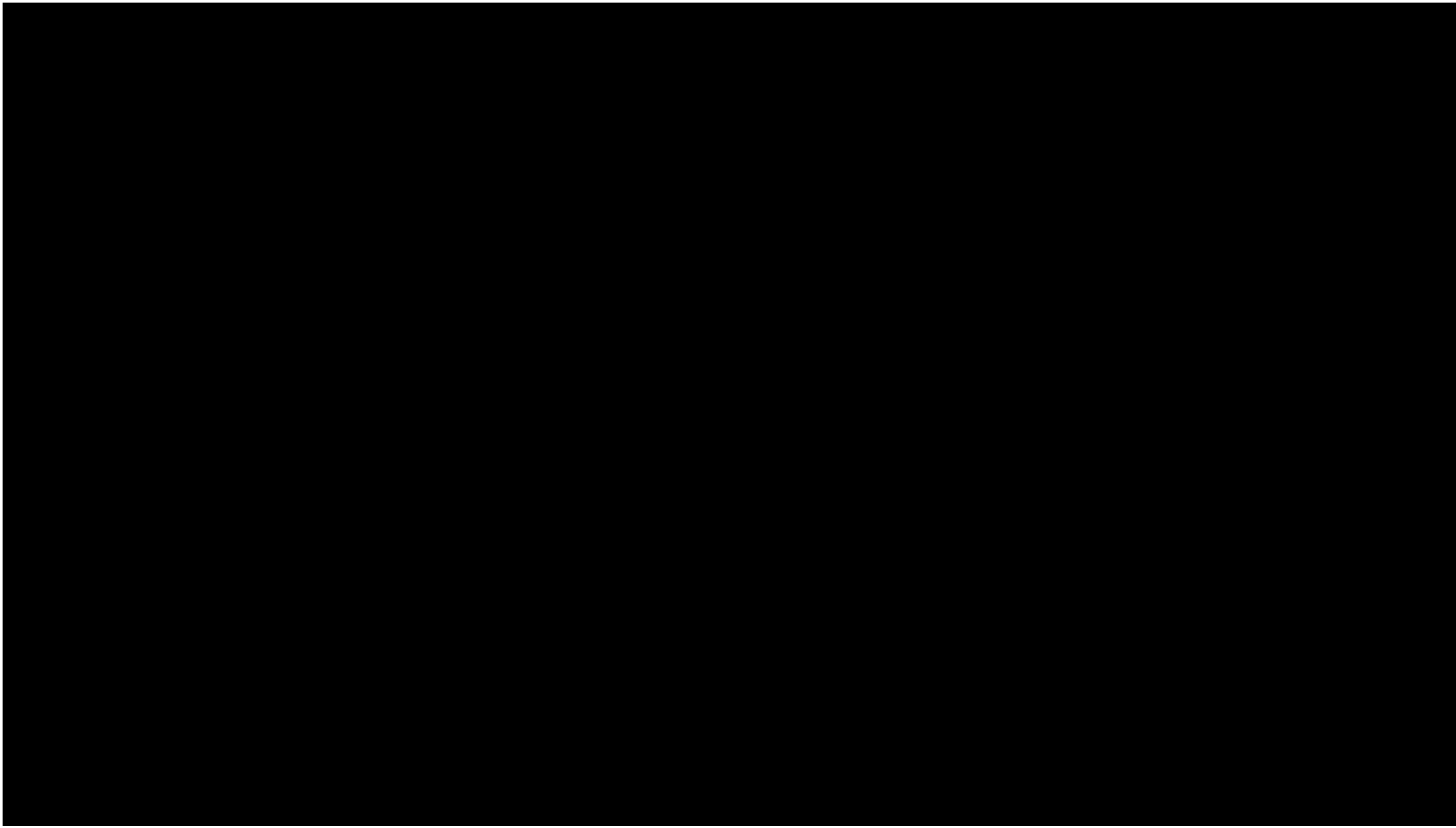
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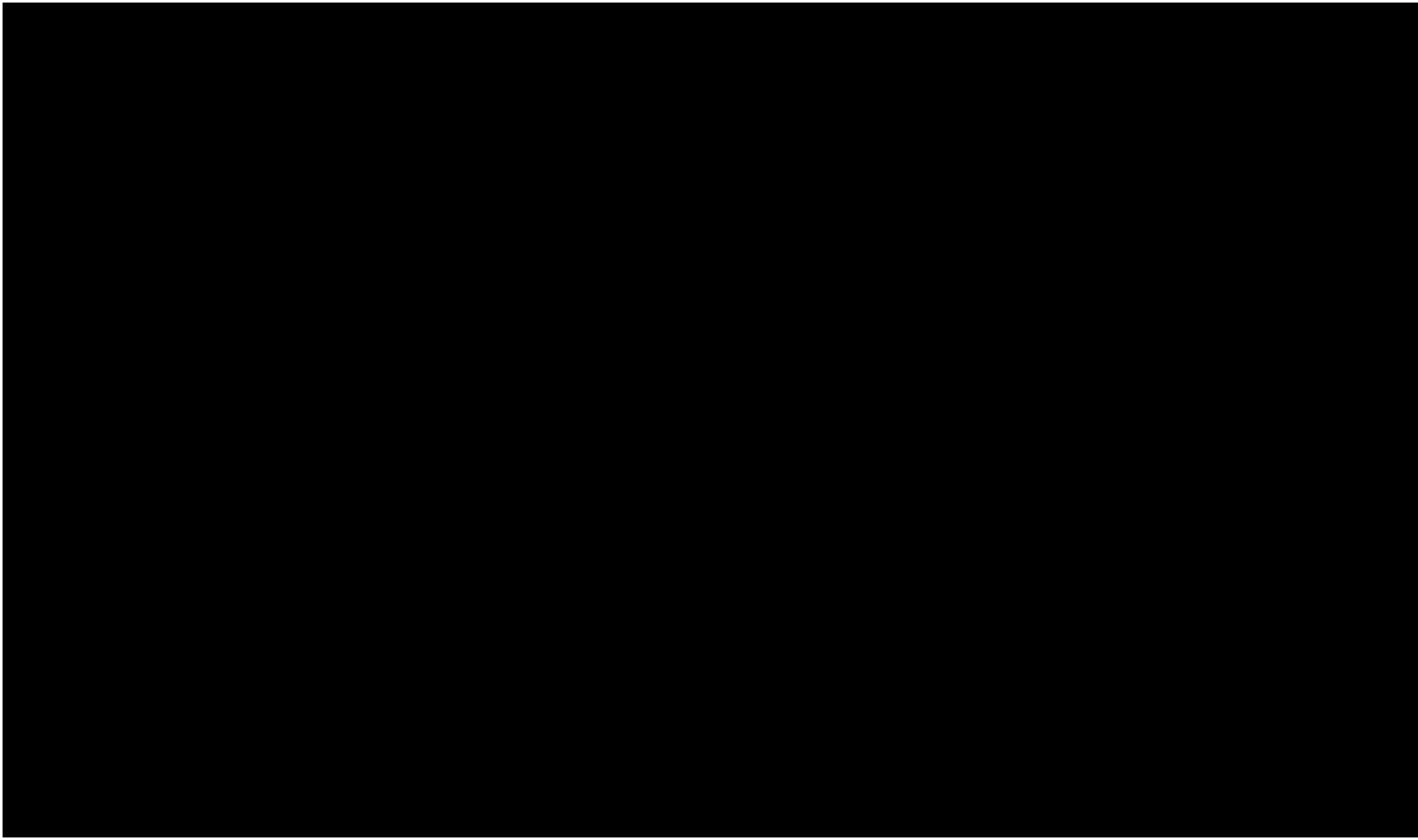
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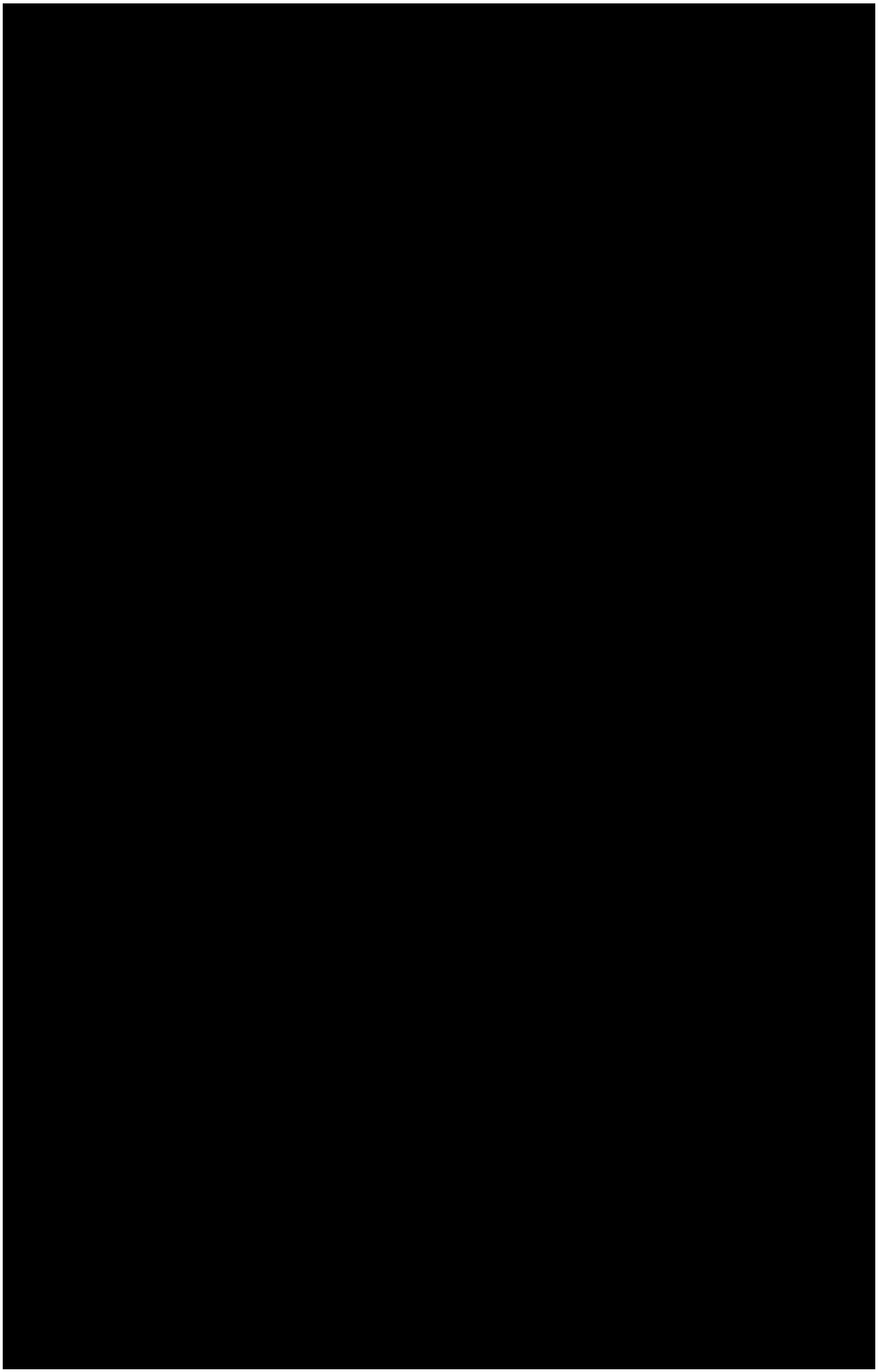


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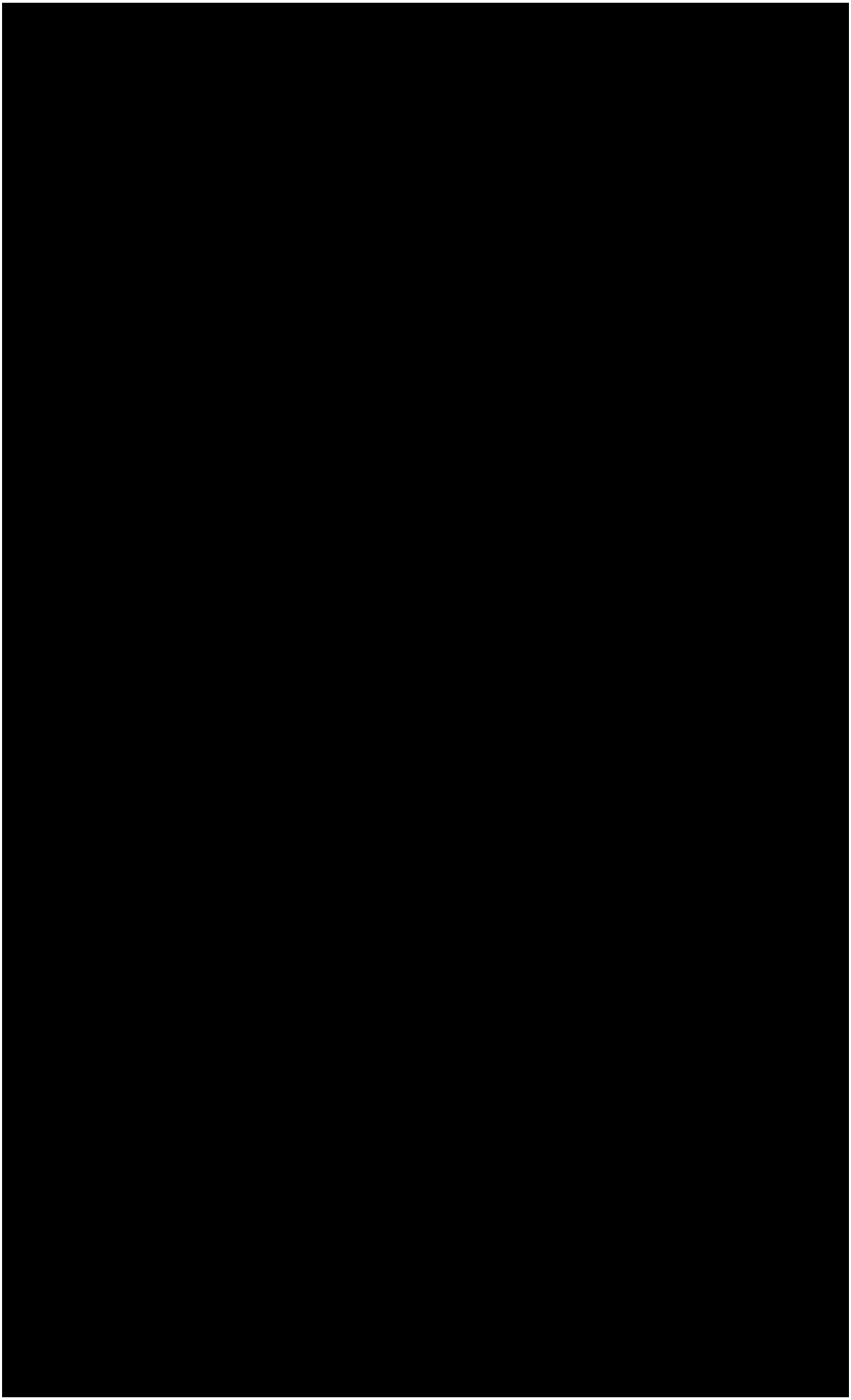


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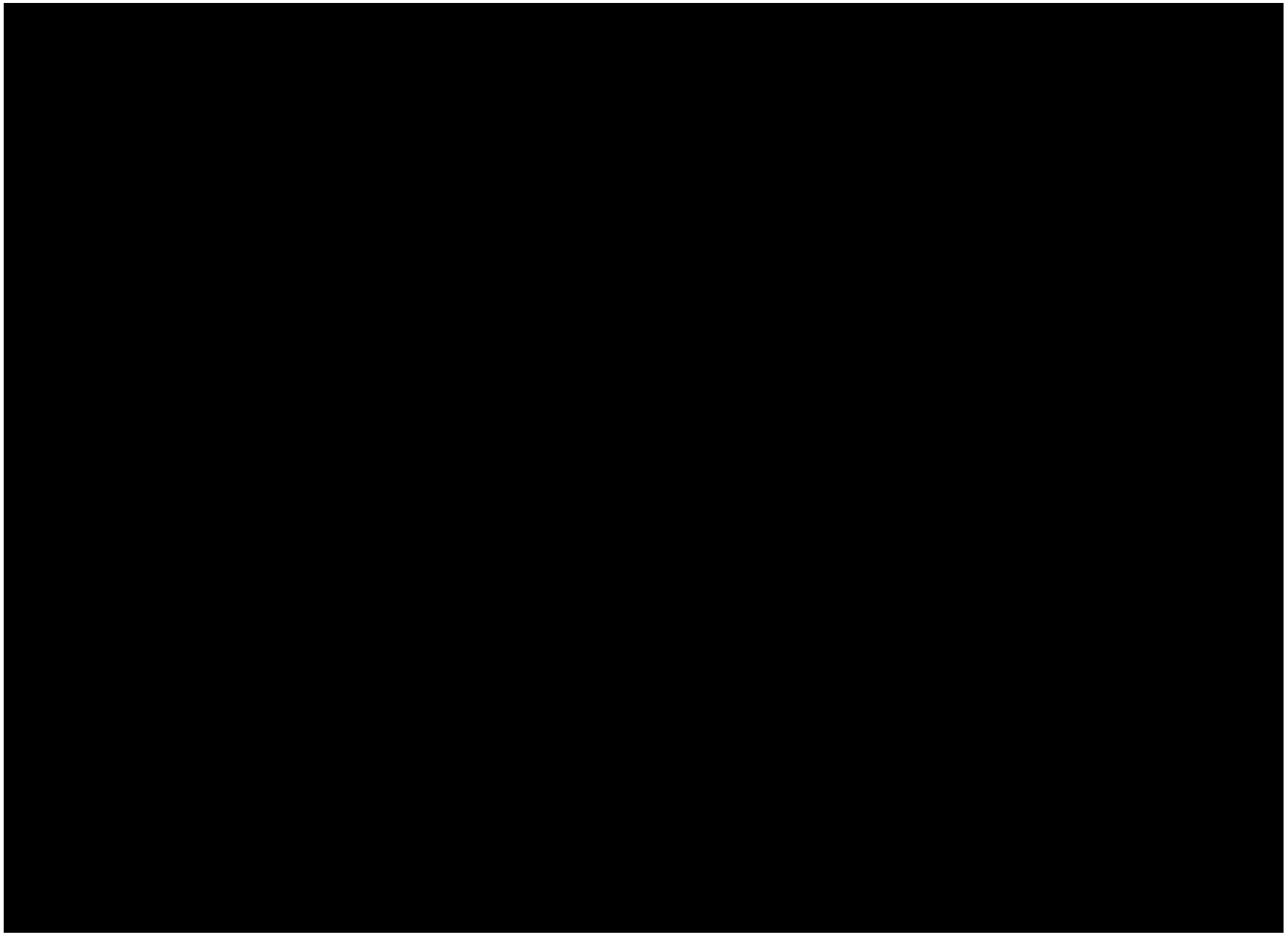
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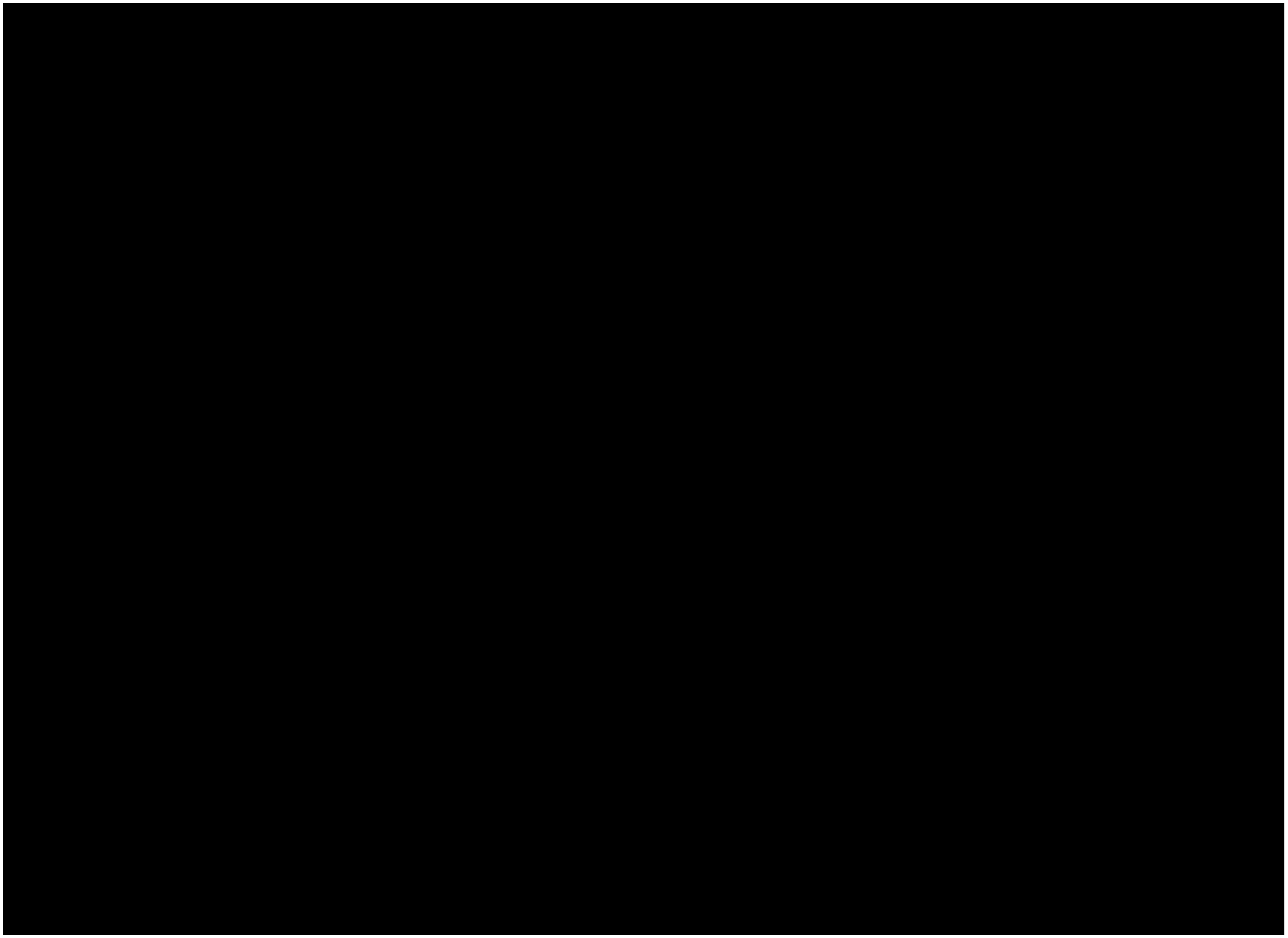
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