INDEPENDENT ASSURANCE REPORT

for SSEN November 2024 DNOA Outcomes

January 2025
Version 2.0

Threepwood Consulting

Introduction

Statement of Purpose and Scope of this Report

This Report summarises key findings from independent assurance checks undertaken on a sample of DNOA outcomes taken from the DNOA Outcomes Report November 2024 published by SSEN Distribution. The scope relates to 9 DNOA outcomes with a project value above £2M (5 in SEPD and 4 in SHEPD). The conclusions from these checks have been reviewed by the DSO Advisory Board.

SSEN DNOA Reports

SSEN Distribution publishes a DNOA Outcomes Report on its website each quarter. This describes its plans for meeting network needs for the next 7 years, in the North of Scotland (SHEPD) and South of England (SEPD) distribution licensed areas. These plans (known as schemes) have been taken through the SSEN Distribution Network Options Assessment (DNOA) Methodology, published in its final version in 2023.

Requirement for independent assurance

The DNOA methodology outlines an independent assurance process for schemes with a value over £2M. The objective being to ensure that the SSEN DNOA methodology has been applied to the assessment of these schemes and that there is transparency in how outcomes are reached.

Introduction (continued)

Threepwood Consulting and our role

Threepwood Consulting has been appointed by SSEN Distribution to conduct the independent assurance checks required. We are an industry respected consultancy that has expertise in distribution network planning and audit/assurance activities. We have a proven track record in providing independent assurance of network related processes and operations like those required in the DNOA methodology.

Nature of the assurance review

This assurance review is an independent check of a selected number of schemes with a value above £2M.

Schemes are selected by Threepwood from a list of schemes provided by SSEN. They ensure that both license areas are covered, different options (flexibility procurement and/or reinforcement) are reviewed and schemes from different planning departments are checked.

There are two types of review: A ‘Sample’ type review is focused on reviewing the Engineering Justification Papers (EJPs), CBA and CEM deterministic tools associated with each scheme. A ‘Deep Dive’ type review involves greater scrutiny of the content of the EJPs, CBA and CEM and seeks further evidence of how the process has been applied and decisions have been reached. The ‘Deep Dive’ includes interviews with engineers that have evaluated the solutions and proposed the recommended solution.

Threepwood independently and randomly choose which schemes are reviewed as Samples or Deep Dives based on achieving a balance of flex and asset solution schemes across both areas.

The assurance review is carried out every quarter to align with the publication of the latest DNOA Outcome Report.




Overall Summary of Findings

	DNOA Scheme Reviewed								
Findings Topic	1	2	3	4	5	6	7	8	9
Have future forecasts of demand and generation been done and have system needs been suitably identified (capacity)?									
Have suitable flexibility and asset options been identified and developed?									
Have the options been suitably assessed taking into account strategic requirements etc?									
Does the DNOA outcome report adequately reflect the assessment carried out?									

RAG status:	
	Requirement not met (to the degree that the outcome could be materially affected or is inaccurate)
	Requirement partially met (process not robust, opportunities for improvement identified but the deficiency is not material and the outcome wouldn't change or its accuracy not affected)
	Requirement fully met

Overall Summary of Findings (…continued)

General Points:

The schemes checked were found to follow the DNOA process. All of the options proposed (flex and/or assets solutions) were determined as being correctly identified/assessed. In all cases, the “Do nothing” option is ignored in this report, as the requirement to “do something” is a given.

Good practices were common across different licensed areas and planners, including the use of a centrally managed/updated load model and cost database and considering outputs from stakeholder engagement. Several opportunities for improvement were identified in relation to the level of detail and consistency of information in the EJPs, CBA and CEM tools and the DNOA Outcome Reports. However, these do not have a material impact on the outputs. Improvement opportunities include: a more robust document version control and approval process, a need for consistency between scheme names used in EJPs and Outcome Reports (especially where options for multiple schemes are presented in one EJP), greater visibility of liaison and feedback from the DNO (in the EJP), greater visibility of social and economic considerations and alignment of estimated demand and capacity between the DNOA Outcome Report and the EJP.

The DNOA Outcome Report template is somewhat limited, particularly with respect to communicating strategic approaches and investment beyond 2031 and conveying non load related schemes. Better use of the limited available space in the report and deleting unused parts of the report, where possible, would improve communication of information. There is scope to improve descriptions in the report to better reflect the constraints and proposed options.

DFES scenario Customer Transformation (CT) has been applied in all cases. This is considered the most likely and realistic future scenario by most DSOs at present.

Throughout the assurance reports, an SSEN process known as DGIF (Distribution Governance Investment Framework) is mentioned. DGIF is a staged process which ensures that DNO input to the scheme proposals is sought at the earliest stages of a project. Meetings will take place between the DNO and DSO, where DNO engineers’ local knowledge can be considered and, if necessary, site visits will be organised.

Records of the meetings and any site visits are kept and are available to review as necessary. Outputs from this process are only recorded in the EJP by exception, i.e. high-risk issues, known operational issues, SSSIs, protected species, etc.

Assurance Review Methodology

Summary

- The same methodology applies to the assurance check irrespective of the type of review carried out.
- A standard question set is used to ensure all relevant requirements of the DNOA methodology are checked. There are 32 questions in total. These cover the four steps that make up the decision-making process: 'Identifying Future Load Related System Needs', 'Developing Options', 'Assessing Options' and 'Update Plan & Deliver'.
- For each scheme, an assessor reviews the EJP and supporting information and records findings.
- The findings against each question are recorded in a standard template and the assessor assigns a score depending upon the degree to which the requirement has been met. For 'Deep Dive' type reviews, the assessor documents any further evidence or clarifications required from the SSEN engineer(s).
- Scores are assigned as either 'Red', 'Amber' or 'Green' (RAG status) according to the criteria shown in the 'Overall Summary of Findings' slide in this Report.
- For each 'Deep Dive Review', the assessor conducts a detailed interview with the relevant SSEN engineer(s) to seek further clarification / evidence in order to conclude whether the process has been followed.
- Based on the recorded scores, the assessor concludes whether each key step in the decision-making process has been adequately followed and the outcome is valid.
- The outcomes from these reviews provide assurance that SSEN has followed its own processes. Whilst reviews do not specifically determine whether the correct decisions were reached, they should provide confidence that the most appropriate decisions have been reached based on the DNOA methodology having been correctly followed.
- Opportunities for improvement and enhancement are identified from the Assurance and are assigned the colour Blue to differentiate them from the RAG status. It is for SSEN to consider these suggested areas and take them forward to solutions.

DNOA Outcome Schemes Reviewed

Ref	DNOA Scheme Name	Type	Area	Type of Review
1	Forres 33kV Circuits Reinforcement	Procure Flex	SHEPD	Sample
2	Ardersier and Dalcross PSS Reinforcement	Asset Solution	SHEPD	Sample
3	Forres PSS Reinforcement	Procure Flex	SHEPD	Sample
4	Strichen 33kV Circuits Reinforcement	Asset Solution	SHEPD	Deep
5	Yarnton & Witney BSP Reinforcement	Asset Solution	SEPD	Deep
6	Rose Hill PSS Reinforcement	Procure Flex	SEPD	Deep
7	Thatcham BSP Reinforcement	Procure Flex	SEPD	Sample
8	Bilsham PSS Reinforcement	Asset Solution	SEPD	Sample
9	Southampton Central Bridge 33kV Reinforcement	Asset Solution	SEPD	Deep

All SSEN November 2024 DNOA Outcome Schemes reviewed have been developed to Strategic Justification Validation stage. This is prior to a completion of detailed asset optioneering and feasibility design.

Findings – 1. Forres 33kV Circuits Reinforcement (Sample Review)

Scheme Details

Ref:	Scheme Name:	Scheme Title:	Planning Area:
1	Forres and Kinloss	Forres and Kinloss 33kV Circuits Reinforcement	SHEPD

Identifying Future Load Related System Needs
- Future load modelled using DFES scenarios beyond ED2 (up to 2050).
- CT future scenario used for developing and assessing options.
- Future load including committed connections (load & generation) plus output from stakeholder engagement all accounted for.
- Thermal overload was identified as the key constraint along with some voltage violations.
- No fault level issues identified.

Developing Options
- Three reinforcement options, including flexibility procurement to defer reinforcement, were considered in suitable detail.
- A proactive investment allowing for future growth and extension was selected.
- Existing asset conditions and physical constraints for installing the reinforcement assets were considered in the options.

Assessing Options
- CBA tool was correctly used on two options.
- CEM tool was used to determine flexibility effects.
- The most beneficial solution, including deferment of reinforcement using flexibility, was selected as the preferred option.
- Deliverability and operability risks have been identified.
- A combined flexibility and reinforcement approach was correctly identified as the preferred option, considering whole system requirements beyond ED2 (up to 2050).

Update Plan and Deliver
- Key driver correctly identified as thermal overload.
- The DNOA Outcome Report correctly captures the use of flexibility but it is at odds with the recommendations of the EJP in that it appears to suggest reinforcement of a greater extent of the network than the EJP.
- EJP was confirmed as stating the correct solution.

Good Practices
- Stakeholder engagement feeds into load and generation forecasts.
- Future load growth takes account of the forecasted DFES scenario (CT).
- Strategic and whole system aspects have been considered beyond ED2 (up to 2050).
- High level risks have been assessed and documented in the EJP.

Opportunities for Enhancement
- More visibility of DNO liaison in EJP.
- Visibility of stakeholder engagements.
- More detail of environmental aspects.
- Grouping multiple schemes in one EJP can lead to confusion between different aspects.
- The naming of schemes in the EJP and Outcome Report should be consistent to avoid confusion.

Summary
- Future forecasts of demand and generation have been adequately considered and whole system needs have been suitably identified.
- Suitable flexibility and asset options have been identified and developed.
- The options have been suitably assessed, considering strategic requirements etc.
- The DNOA outcome report does not accurately reflect the chosen reinforcement solution due to confusion with scheme names.

Findings – 2. Ardersier & Dalcross 33kV Circuits Reinforcement (Sample Review)

Scheme Details

Ref:	Scheme Name:	Scheme Title:	Planning Area:
2	Ardersier and Dalcross	Ardersier and Dalcross PSS 33kV Circuits Reinforcement	SHEPD

Identifying Future Load Related System Needs
- Future load modelled using DFES scenarios beyond ED2 (up to 2050).
- CT future scenario used for developing and assessing options.
- Future load including committed connections (load & generation) plus output from stakeholder engagement all accounted for.
- Thermal overload was identified as the key constraint along with some voltage violations.
- No fault level issues identified.

Developing Options
- Three reinforcement options, including flexibility procurement to defer reinforcement, were considered in suitable detail.
- A proactive investment allowing for future growth and extension was selected.
- Existing asset conditions and physical constraints for installing the reinforcement assets were considered in the options.

Assessing Options
- CBA tool was correctly used on two options.
- CEM tool was used to determine flexibility effects.
- The most beneficial solution was found to be reinforcement without flexibility deferment.
- Deliverability and operability risks were identified.
- A pure reinforcement approach was correctly identified as the preferred option, considering whole system requirements beyond ED2 (up to 2050).

Update Plan and Deliver
- Key driver correctly identified as thermal overload with associated voltage violations.
- The DNOA Outcome Report correctly captures that use of flexibility was not economic.
- Reinforcement only approach correctly stated.
- There is confusion with scheme names between the Outcome Report and the EJP, so it is difficult to tell if the Outcome Report correctly states the extent of reinforcement.

Good Practices
- Stakeholder engagement feeds into load and generation forecasts.
- Future load growth takes account of the forecasted DFES scenario (CT).
- Strategic and whole system aspects have been considered beyond ED2 (up to 2050).
- High level risks have been assessed and documented in the EJP.

Opportunities for Enhancement
- More visibility of DNO liaison and feedback on the proposed network options, rather than just reporting on aspects by exception.
- However, notes of meetings with DNO are kept for future reference.
- Better visibility of stakeholder engagements in the EJP.
- More detail in the EJP of environmental aspects covered.
- Better visibility of social and environmental considerations in the CBA and CEM.

Summary
- Future forecasts of demand and generation have been adequately considered and whole system needs have been suitably identified.
- Suitable flexibility and asset options have been assessed and developed, although flexibility was not economic.
- The options have been suitably assessed, considering strategic requirements etc.
- The DNOA outcome report does not accurately reflect the chosen reinforcement solution due to confusion with scheme names.

Findings – 3. Forres PSS Reinforcement (Sample Review)

Scheme Details

Ref:	Scheme Name:	Scheme Title:	Planning Area:
3	Forres PSS	Forres PSS Reinforcement	SHEPD

Identifying Future Load Related System Needs
- Future load modelled using DFES scenarios beyond ED2 (up to 2050).
- CT future scenario used for developing and assessing options.
- Future load including committed connections (load & generation) plus output from stakeholder engagement all accounted for.
- Thermal overload of the transformers at Forres was identified as the key constraint with associated voltage violations.

Developing Options
- Three reinforcement options, including flexibility procurement to defer reinforcement, were considered in suitable detail.
- A proactive investment allowing for future growth and extension was selected.
- Existing asset conditions and physical constraints for installing the reinforcement assets were considered in the options.

Assessing Options
- CBA tool was correctly used on two options.
- CEM tool was used to determine flexibility effects.
- The most beneficial solution, including deferment of reinforcement using flexibility, was selected as the preferred option.
- Deliverability and operability risks were identified.
- A combined flexibility and reinforcement approach was correctly identified as the preferred option, considering whole system requirements beyond ED2 (up to 2050).

Update Plan and Deliver
- Key driver correctly identified as thermal overload, with associated voltage violations.
- The DNOA Outcome Report correctly captures the recommended solution to upgrade the existing primary transformers at Forres PSS to 20/40MVA capacity, along with deferment by flexibility.

Good Practices
- Stakeholder engagement feeds into load and generation forecasts.
- Future load growth takes account of the forecasted DFES scenario (CT).
- Strategic and whole system aspects have been considered beyond ED2 (up to 2050).
- High level risks have been assessed and documented in the EJP.

Opportunities for Enhancement
- More visibility of DNO liaison and feedback on the proposed network options, rather than just reporting on aspects by exception.
- However, notes of meetings with DNO are kept for future reference.
- Better visibility of stakeholder engagements in the EJP.
- More detail in the EJP of environmental aspects covered.
- Better visibility of social and environmental considerations in the CBA and CEM.

Summary
- Future forecasts of demand and generation have been adequately considered and whole system needs have been suitably identified.
- Suitable flexibility and asset options have been assessed and developed.
- The options were suitably assessed, considering strategic requirements etc.
- The DNOA outcome report adequately reflects the assessment carried out up to the end of ED2.

Findings – 4. Strichen 33kV Circuits Reinforcement (Deep Dive Review)

Scheme Details

Ref:	Scheme Name:	Scheme Title:	Planning Area:
4	Strichen	Northeast Aberdeenshire (Strichen 33kV Circuits) Reinforcement	SHEPD

Identifying Future Load Related System Needs

- Future load modelled using DFES scenarios beyond ED2 (up to 2050).
- CT-W future scenario used for developing and assessing options.
- Future load including committed connections (load and generation) and output from stakeholder engagement accounted for.
- Thermal overload (P2 compliance) and voltage issues have been identified as key constraints at Strichen.
- No fault level issues were identified.

Developing Options

- Three possible reinforcement options were considered in reasonable detail.
- All three options were taken forward to CBA.
- Flexibility was discounted for the optimum solution, as the use of flexibility did not solve the voltage violations.
- The optimum solution with the lowest NPV was found to be the straightforward reinforcement of existing circuits and replacement of switchgear, without deferral.

Developing Options (…continued)

- Engagement with regional councils and community energy groups was conducted to ensure alignment of aspirations.
- Information on the age and condition of existing network assets is included and is available to the DSO via the DNO INVEST asset database.
- A strategic and proactive investment approach was chosen, allowing for future load growth and extension.
- Site input by the DNO was not transparent in the EJP.
- It is assumed that no major issues were raised by the DNO, as issues are usually only reported in EJPs by exception.
- Meeting notes are kept for future reference in any case.

Assessing Options

- The CBA tool was correctly used to support the proposed solution.
- There is scope to populate more detail in the CBA, although this would not materially affect the outcome.

Assessing Options (…continued)

- The CEM tool was correctly used to assess flexibility for all three options, but flexibility did not resolve the voltage issues for the chosen option and so cannot be applied.
- A reinforcement only approach was the preferred option.
- As flexibility was not practicable, deferral was not possible.
- Meeting whole system requirements beyond ED2 (up to 2050) was a factor in the proposed solution.
- Social and environmental aspects were not covered in detail. However, it is recognised that SSEN's DGIF process addresses this in more detail at the next stage.
- No social or environmental aspects are believed to materially change the decision.
- DNO feedback on the proposed options was not specifically mentioned in the EJP. However, the planner confirmed that DNO staff had input at the initial stage, as described in the DGIF process.
- The engineer confirmed that the DNO had not highlighted any safety concerns.
- It was not initially possible to confirm if the correct signature protocol for approving the EJP had been followed. It was later confirmed to have been followed.

Findings – 4. Strichen 33kV Circuits Reinforcement (Deep Dive Review)

continued...

Scheme Details			
Ref:	Scheme Name:	Scheme Title:	Planning Area:
4	Strichen	Northeast Aberdeenshire (Strichen 33kV Circuits) Reinforcement	SHEPD

Update Plan and Deliver

- Key driver correctly identified as thermal overload with associated voltage violations.
- Three practicable options that addressed these constraints were put forward to CBA.
- The preferred solution was network asset reinforcement.
- Flexibility was not practicable, so the constraint management timeline only includes operational management of the thermal and voltage constraints.

Good Practices

- System model includes DFES forecasts, committed connections etc.
- NDR is centrally owned and managed by the Modelling and Reporting Team.
- Stakeholder engagement feeds into load and generation forecasts.
- Future load growth takes account of DFES scenario CT.
- Strategic and whole system aspects have been considered beyond ED2 (up to 2050).
- Flexibility has not been exploited to defer reinforcement, as it did not solve voltage issues.
- Deliverability and operability issues have been adequately considered.
- High level risks have been assessed and documented in the EJP.

Opportunities for Enhancement

- Output from DNO liaison under DGIF process and feedback on the proposed network options are not generally shown in the EJP.
- Issues are only reported by exception.
- Capturing DNO feedback in EJP – noting this is recorded in meeting notes, which are available for future reference.
- Better visibility of social and environmental considerations from the DGIF process in the EJP and CBA.
- Completeness of fields and detail in the CBA tools.
- There appears to be an issue with version control and approval protocol.

Summary

- Future forecasts of demand and generation beyond ED2 (up to 2050) have been suitably considered and whole system needs (i.e. network capacity) have been suitably identified.
- Flexibility options were not developed, as it did not solve the voltage violations.
- The presented options were suitably assessed, considering strategic requirements, etc.
- The DNOA outcome report generally reflects the assessment carried out, given the limited space available on the report template.

Findings – 5. Yarnton & Witney BSP Reinforcement (Deep Dive Review)

Scheme Details

Ref:	Scheme Name:	Scheme Title:	Planning Area:
5	Yarnton & Witney BSP	Yarnton & Witney BSP Reinforcement	SEPD

Identifying Future Load Related System Needs

- Future load modelled using DFES scenarios beyond ED2 (up to 2050).
- CT future scenario used for developing and assessing options.
- Future load growth including committed connections (load and generation) and output from stakeholder engagement were all accounted for in the process.
- Growth in PV generation, EV charging and heat pump installations is cited.
- P2/8 compliance (Thermal Overload) was identified as the primary driver, with forecasted future voltage issues.
- No operational issues were highlighted.
- The need to acquire additional land at Witney BSP was cited as a constraint.
- The ability of existing 132kV towers to take the required new conductor was also cited as a potential issue to be checked.
- Some of the assets to be replaced as part of the proposed reinforcement are nearing the end of their expected operational lives and have high HI and CI scores. This further supports the need for investment.

Developing Options

- Four reinforcement options were evaluated.
- Flexibility was considered to defer investment, but there was not sufficient availability to give the required duration of deferral, so flexibility was not included as part of the preferred solution.
- Engagement with regional councils and community energy groups was conducted to ensure alignment of aspirations.
- Information on the age and condition of existing network assets is available to the DSO via the DNO INVEST asset database.
- Identified risks include the requirement for extra land at Witney and a condition assessment of existing 132kV towers to withstand a different conductor size.
- Strategic and economic aspects were considered for the reinforcement options, i.e. asset ratings and cost.
- Site input by the DNO is not mentioned but would only be captured in the EJP if any high risks had been identified under DGIF.
- It was confirmed that liaison with the DNO had taken place, which comprehensively considered the merits of the options put forward.
- Notes of meetings with the DNO are kept for future reference as part of DGIF.
- No environmental issues were mentioned.

Assessing Options

- CBA and CEM tools were used correctly to evaluate two of the asset solutions considered.
- Deliverability and operability risks were identified.
- Reinforcement by uprating existing 132kV circuits to Witney, plus adding an additional 132/33kV transformer and associated 132kV switchgear at Witney BSP was recommended as the optimum solution with the lowest NPV.
- Deferral by flexibility was uneconomical due to a lack of availability for the duration required.
- The chosen solution accounts for whole system requirements beyond ED2 (up to 2050).
- Environmental aspects were not covered in detail. However, it is recognised that the DGIF process addresses this in more detail at the next stage.
- No environmental aspects were believed to materially change the decision.
- DNO feedback on the proposed options was not specifically mentioned in the EJP but notes of meetings with DNO staff are kept for future reference.
- It was confirmed that DNO staff had an input at this initial stage, as described in the DGIF process.
- The engineer confirmed that the DNO had not highlighted any safety concerns.
- It was not possible to confirm if the correct signature protocol for the EJP was followed, as a signed final copy of the EJP was not available.

Findings – 5. Yarnton & Witney BSP Reinforcement (Deep Dive Review)

continued…

Scheme Details			
Ref:	Scheme Name:	Scheme Title:	Planning Area:
5	Yarnton & Witney BSP	Yarnton & Witney BSP Reinforcement	SEPD

Update Plan and Deliver

- Key driver correctly identified as P2/8 compliance (thermal overload) with forecasted future voltage issues.
- Two practicable options that address these constraints were put forward to CBA.
- The preferred solution did not include flexibility to defer investment, due to insufficient flexibility availability for the required duration.
- Constraint Management Timeline in the Outcome Report correctly shows operational management of the constraints until reinforcement is carried out.
- Estimated peak MW firm network capacity was shown as exceeded under all DFES scenarios by 2028.

Good Practices

- System model includes DFES, contracted connections, etc.
- The network model is centrally owned and managed by Modelling and Reporting Team.
- Stakeholder engagement feeds into load and generation forecasts.
- Future load growth takes account of DFES CT scenario.
- Strategic and whole system aspects have been considered beyond ED2 (up to 2050).
- Deliverability and operability have been adequately considered.
- High level risks have been assessed and documented in the EJP.

Opportunities for Enhancement

- Better visibility of DNO liaison (site visits, etc.) and feedback on the proposed network options, rather than just reporting on aspects by exception.
- Notes of meetings with DNO are however kept for future reference.
- Visibility of stakeholder engagements in EJP.
- More detail in the EJP of environmental aspects covered.
- Visibility of social and environmental considerations in the EJP and CBA.
- There are multiple drafting errors in the EJP which suggest a lack of robustness in document checking and approval process.
- There appears to be an issue with version control and approval protocol.

Summary

- Future forecasts of demand and generation have been suitably considered and whole system needs have been suitably identified.
- Suitable asset options have been identified and developed. Deferral using flexibility was not feasible.
- The options have been suitably assessed, considering strategic requirements etc.
- The DNOA outcome report generally reflects the assessment carried out, given the limited space available on the report template.

Findings – 6. Rose Hill PSS Reinforcement (Deep Dive Review)

Scheme Details

Ref:	Scheme Name:	Scheme Title:	Planning Area:
6	Rose Hill PSS	Sandford-on-Thames (Rose Hill PSS Reinforcement)	SEPD

Identifying Future Load Related System Needs

- Predicted load and generation growth, with DFES future scenario (CT), used for developing and assessing options.
- Committed new connections were considered.
- Outputs from stakeholder engagement were accounted for in the process.
- Load, voltage and fault level were all analysed.
- Main driver was identified as thermal overload plus an associated fault level issue on the 11kV switchgear at Rose Hill PSS.

Developing Options

- Three investment options were analysed in adequate detail.
- Options included reinforcement by adding an additional 132kV circuit from Cowley GSP to Cowley BSP, adding a third 132/33kV transformer at Cowley BSP and installing replacement larger 33/11kV transformers at Rose Hill PSS.
- Load transfers to defer reinforcement were considered but ruled out, as doing this caused issues elsewhere on the network.

Developing Options (…continued)

- Engagement with regional councils and community energy groups was conducted to ensure alignment of aspirations.
- The age and condition of existing network assets were considered; this information is available to the DSO via the DNO INVEST asset database.
- Strategic and economic aspects were considered for the reinforcement options (i.e. asset ratings and cost) as part of the stakeholder engagement process.
- Input by the DNO (including site visits) is not mentioned in the EJP, but feedback from the DNO would only be included by exception in nay case.
- Any high risks would be highlighted.
- The engineer confirmed that liaison with the DNO had taken place, which considered the merits of the options put forward comprehensively.
- Notes of meetings with the DNO are kept for future reference.
- Environmental risks of retaining the 33kV fluid-filled cables between Cowley Local Main and Rose Hill were identified.
- Flexibility was correctly considered to defer investment and was included in the preferred option.

Assessing Options

- Two asset investment options were taken to CBA, one with and one without flexibility.
- The CEM tool was correctly applied to check the viability of flexibility.
- Separate CEM evaluations were carried out for each phase of the proposed reinforcement.
- Deliverability and operability risks were identified.
- Meeting whole system requirements beyond ED2 (up to 2050) were a factor in the proposed future proof solution.
- A rigorous process (DGIF) considers social, economic and deliverability issues (although this was not all recorded in the EJP, as issues are only recorded by exception).
- Environmental impacts, including, for example, land use, protected land, SSSIs noise mitigation, nearby residential properties, public rights of way, using non-SF6 equipment where possible, etc, are all captured in the DGIF process.
- Only one environmental issue (existing fluid-filled cables) was raised.
- It was confirmed that the DNO had not highlighted any safety concerns.
- The correct approval protocol appears to have been followed.

Findings – 6. Rose Hill PSS Reinforcement (Deep Dive Review) *continued...*

Scheme Details			
Ref:	Scheme Name:	Scheme Title:	Planning Area:
6	Rose Hill PSS	Sandford-on-Thames (Rose Hill PSS Reinforcement)	SEPD

Update Plan and Deliver

- Key driver correctly identified as thermal overload. The fault level issue at Rose Hill is not mentioned in the Outcome Report.
- Only two of the three investment options fully addressed both network constraints.
- These two options were taken to CBA.
- The preferred option included the use of flexibility to defer investment, giving slightly better value in the CBA.
- The constraint management timeline was correctly completed showing flexibility being utilised to defer the works in a phased manner.
- The estimated peak load was shown as exceeding the network capacity from 2030.

Good Practices

- The system model includes all DFES, connection projections and load growth
- The model is centrally owned and managed by the Modelling and Reporting Team.
- Stakeholder engagement feeds into the load and generation forecasts.
- Strategic and whole system aspects have been considered beyond ED2 (up to 2050).
- Flexibility was correctly exploited to defer reinforcement.
- Deliverability and operability issues have been adequately considered.
- High level risks have been considered and documented in the EJP.
- Environmental impacts were considered.

Opportunities for Enhancement

- Better visibility in EJP of DNO liaison (site visits, local knowledge, etc.) and feedback on the proposed network options, rather than just reporting on aspects by exception.
- However, notes of meetings with DNO are kept for future reference.
- Visibility of social and environmental considerations would be beneficial.
- Completeness of fields and more detail in the CBA tool.
- Grouping multiple schemes in one EJP can lead to confusion between different aspects.
- The naming of schemes in the EJP and Outcome Report needs to be consistent to avoid confusion.

Summary

- Future forecasts of demand and generation have been suitably considered and whole system needs have been correctly identified.
- Due to the nature of the scheme, only two practicable asset investment options were taken through to CBA.
- Flexibility was correctly applied to defer investment.
- The DNOA outcome report adequately reflects the chosen asset intervention.

Findings – 7. Thatcham BSP Reinforcement (Sample Review)

Scheme Details

Ref:	Scheme Name:	Scheme Title:	Planning Area:
7	Thatcham BSP	Thatcham BSP Reinforcement	SEPD

Identifying Future Load Related System Needs

- Future load / generation growth, including committed connections and output from stakeholder engagement accounted for.
- DFES scenario CT used in forecasts.
- Main driver identified as P2/8 compliance (thermal overload).
- Load, voltage and fault levels were analysed.
- No Fault level or voltage constraints were identified.

Developing Options

- Three asset investment options analysed.
- Options considered were; replacing existing 132kV transformers with larger units or adding an additional 132kV transformer and additional 132kV switchgear, plus an option with deferment using flexibility.
- A proactive investment allowing for future growth and extension was selected.
- Existing asset conditions and physical constraints for installing the reinforcement assets were considered in the options.

Assessing Options

- CBA tool correctly applied on two options to determine most beneficial whole system solution.
- CEM tool used to check viability of flexibility.
- Operability/deliverability risks identified and addressed.
- Existing asset conditions were considered.
- Transparency of DNO feedback on network options could be improved in the EJP, including commentary on safety aspects.
- DNO feedback is recorded in meeting notes.
- Strategic and economic aspects considered.
- Meeting whole system requirements beyond ED2 (up to 2038) were a factor in the proposed solution.
- DGIF process considers social, economic and deliverability issues, but issues only reported by exception.
- Use of correct EJP signature/approval protocol was not apparent, as a final signed version not available.

Update Plan and Deliver

- Key driver correctly identified as thermal overload leading to P2 compliance.
- The DNOA Outcome Report correctly captures the flexibility and reinforcement solution up to 2038.

Good Practices

- Stakeholder engagement feeds into load and generation forecasts.
- Future load growth takes account of the forecasted DFES CT scenario.
- Strategic and whole system aspects have been considered beyond ED2 (up to 2038).
- High level risks have been assessed and documented in the EJP.

Opportunities for Enhancement

- More visibility of DNO liaison and feedback on the proposed network options, rather than just reporting on aspects by exception.
- However, notes of meetings with DNO are kept for future reference, as part of DGIF.
- Visibility of stakeholder engagements in EJP.
- Better visibility of social and environmental considerations in EJP, CBA and CEM.
- There are multiple drafting errors in the EJP which suggest a lack of robustness in document checking and approval process.
- There appears to be an issue with version control and approval protocol.

Summary

- Future forecasts of demand and generation have been suitably considered and whole system needs have been correctly identified.
- Two of the three asset investment options were further developed and taken through to CBA and CEM assessment.
- Flexibility was correctly assessed but was not put forward as part of the chosen solution, due to poor availability.
- The DNOA outcome report correctly reflects the chosen asset intervention.

Findings – 8. Bilsham PSS Reinforcement (Sample Review)

Scheme Details

Ref:	Scheme Name:	Scheme Title:	Planning Area:
8	Bilsham PSS	Arundel & Yapton (Bilsham PSS) Reinforcement	SEPD

Identifying Future Load Related System Needs

- Future load forecast and modelled beyond ED2 (up to 2050) based on DFES CT scenario, which is deemed most appropriate scenario.
- Future load includes committed connections and load growth, identified through stakeholder engagement.
- Thermal overload identified as primary driver.
- No voltage or fault level issues were identified.

Developing Options

- Four reinforcement options were adequately considered, plus one flexibility option.
- There was however insufficient flexibility available on the network to defer investment.
- No material environmental, social or economic aspects were stated in EJP.
- Strategic proactive options were considered to create headroom beyond ED2 (up to 2037.
- Existing asset conditions and physical constraints for installing the reinforcement assets were considered in the options.

Assessing Options

- CBA tool correctly used to determine the most beneficial whole system solution.
- CEM tool was not used as there was insufficient availability of flexibility.
- Optimum solution was reinforcement of assets without deferral, due to lack of flexibility.
- Operability and deliverability risks were clearly identified and addressed.
- Existing asset conditions were accounted for.
- The transparency of DNO feedback on the network options could be improved in the EJP including commentary on safety aspects.
- DNO feedback is recorded from meeting notes.
- Correct approval protocol appears to have been used.

Update Plan and Deliver

- The DNOA Outcome Report correctly captures the scheme and reinforcement solution correctly, addressing network shortfalls up to 2037.
- It states that flexibility has already been allocated to accelerate new connections and was not viable.

Good Practices

- Stakeholder engagement feeds into load and generation forecasts.
- Future load growth takes account of the forecasted DFES scenario (CT).
- Strategic and whole system aspects have been considered beyond ED2 (up to 2037).
- High level risks have been assessed and documented in the EJP.

Opportunities for Enhancement

- More visibility of DNO liaison and feedback on the proposed network options, rather than just reporting on aspects by exception.
- However, notes of meetings with DNO are kept for future reference.
- Better visibility of stakeholder engagements in the EJP.
- Better visibility of social and environmental considerations in EJP, CBA and CEM.

Summary

- Future forecasts of demand and generation have been suitably considered, and system capacity needs have been suitably identified and addressed.
- Suitable asset options were identified, evaluated and developed.
- There was insufficient flexibility available on the network for this scheme.
- The options have been suitably assessed, considering strategic and whole system requirements, etc.

Findings – 9. Southampton Central Bridge 33kV Reinforcement (Deep Dive Review)

Scheme Details

Ref:	Scheme Name:	Scheme Title:	Planning Area:
9	Central Bridge 33kV Reinforcement	Southampton Central Bridge 33kV Reinforcement	SEPD

Identifying Future Load Related System Needs

- Predicted load and generation growth, using DFES scenario CT to develop and assess options.
- Contracted connections were allowed for in the load forecasts.
- Output from stakeholder engagement was also taken into accounted.
- Load, fault level and voltage studies carried out.
- Main driver for investment was identified as load related P/28 compliance.
- No voltage or fault level issues were identified.

Developing Options

- A single multi-part asset reinforcement scheme, comprising a new BSP, 33kV network reinforcement and a 6.6kV switchboard replacement was assessed.
- The new BSP is presented as a separate DNOA Outcome to the 33kV reinforcement.
- No material environmental, social or economic aspects were stated in EJP.
- The option chosen was proactive to create headroom beyond ED2 (up to 2047).
- The physical constraints for installing a new 33kV switchroom were listed as a risk, which needs to be assessed in detail for the new BSP.

Developing Options (…continued)

- Engagement with regional councils and community energy groups was conducted to ensure alignment of aspirations.
- The age and condition of existing network assets were considered, this information is available to the DSO via the DNO INVEST asset database.
- Strategic and economic aspects were considered for the reinforcement options as part of the stakeholder engagement process.
- DNO input was not directly mentioned in the EJP, but any high risks would have been identified and highlighted.
- The engineer confirmed that liaison with the DNO had taken place, and this considered the merits of the options put forward comprehensively.
- Notes of DNO meetings are kept for future reference as part of DGIF.
- Deferral with flexibility was only possible for the Chapel 6.6kV switchboard replacement and the upstream 33kV Central Bridge – Chapel circuit.
- Flexibility was uneconomical for the new BSP and the rest of the 33kV network reinforcement.

Assessing Options

- A single multi-part asset investment scheme was put through CBA and the same scheme, but with deferral with flexibility, was assessed against it.
- The CEM tool was utilised to assess the feasibility of flexibility to defer investment.
- Flexibility was only economical for deferring the Chapel 6.6kV switchboard replacement and the upstream 33kV Central Bridge – Chapel circuit.
- The chosen strategy was to include this limited flexibility to defer parts of the investment.
- Deliverability and operability risks were identified.
- Meeting whole system requirements beyond ED2 (up to 2047) was a factor in the proposed future proof solution.
- A rigorous process (DGIF) considers social, economic and deliverability issues (although this was not all recorded in the EJP, as issues are only recorded by exception).
- Environmental impacts, including, for example, land use, protected land, SSSIs noise mitigation, nearby residential properties, public rights of way, using non-SF6 equipment where possible, etc, are all captured in the DGIF process.
- The engineer confirmed that the DNO had not highlighted any safety concerns.
- It was not possible to confirm if the correct EJP signature/approval protocol was followed, as a final signed PDF copy was not provided.

Findings – 9. Southampton Central Bridge 33kV Reinforcement (Deep Dive Review) *continued…*

Scheme Details			
Ref:	Scheme Name:	Scheme Title:	Planning Area:
9	Central Bridge 33kV Reinforcement	Southampton Central Bridge 33kV Reinforcement	SEPD

Update Plan and Deliver

- Key driver correctly identified as load related P/28 compliance.
- A single multipart investment strategy was put forward to fully address all the network constraints.
- This was taken to CBA to compare with the same option but using flexibility.
- The preferred option, giving the best financial benefit, was network reinforcement with use of flexibility for parts of the investment.
- Flexibility was uneconomic for the other parts of the chosen scheme.
- The estimated peak load on the Outcome Report shows capacity exceeded by 2028.
- The Constraint Management table shows operational management only of the constraint, as flexibility was not viable for all parts of the proposed investment.

Good Practices

- The system model includes all DFES, connection projections and load growth and is centrally owned and managed by the Modelling and Reporting Team.
- Stakeholder engagement feeds into the load and generation forecasts.
- Strategic and whole system aspects have been considered beyond ED2 (up to 2047).
- Flexibility was not viable to defer reinforcement on all parts of the proposed scheme.
- Deliverability and operability issues have been adequately considered.
- High level risks have been considered and documented in the EJP.
- Environmental impacts were assumed to be considered.

Opportunities for Enhancement

- Better visibility in EJP of DNO liaison (site visits, local knowledge, etc.) and feedback on the proposed network options, rather than just reporting on aspects by exception.
- However, notes of meetings with DNO are kept for future reference.
- Visibility of social and environmental considerations would be beneficial.
- Completeness of fields and more detail in the CBA tool.
- More robust version control and availability of correctly signed and approved document versions.

Summary

- Future forecasts of demand and generation have been suitably considered and whole system needs have been correctly identified.
- Due to the widespread nature of the network constraints, only one multi-part asset investment option was taken to CBA.
- Flexibility was only feasible to defer investment on a small part of the overall scheme.
- The DNOA outcome report adequately reflects the chosen asset intervention, given the limited space available on the report template.