Pyle & Margam GSPs and associated 132 kV and 33 kV Network

Network Development Report – South Wales

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Electricity Distribution

nationalgrid

Contents

Pyle & Margam GSPs and associated 132 kV and 33 kV Network

1. Network Overview

Pyle and Margam GSPs supply a mixture of urban, rural and heavy industry sites centred on the large towns of Bridgend and Port Talbot. The GSPs contains 132 kV, 33 kV and 66 kV networks. The GSPs contains high amounts of demand, as well as a number of large distributed generators.

Pyle and Margam GSPs currently supplies an estimated 45,000 customers.

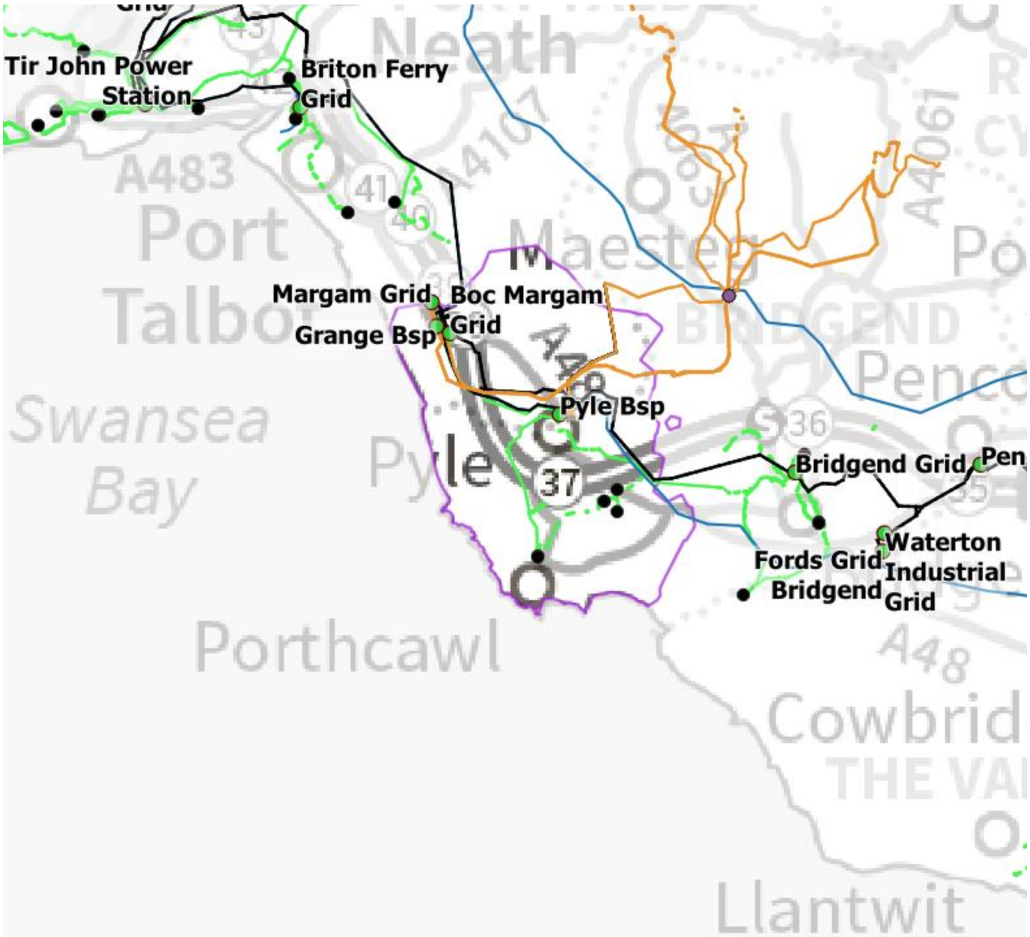

Figure 1.1.1 Pyle GSP geographic network coverage

This report discusses all existing and future network constraints over a 0-10 year horizon associated with the 275/132 kV transformers, 33/11 kV transformers, 33 kV circuits, 132/66 kV transformers, 66 kV circuits, 132/33 kV transformers and 132 kV circuits which supply and are supplied by Pyle and Margam GSPs. This uses the methodology outlined in the Network Development Plan Methodology Report with Network Operability Modelling applied as outlined below.

For the purposes of this analysis the NGED Best View Distribution Future Energy Scenario (DFES) has been used to study the years 2022 (baseline), 2028 and 2034, with consideration given to how proposals could change under the other scenarios. The two most onerous half-hours have been studied for each of the five representative days considered: Winter Peak Demand, Intermediate Warm Peak Demand, Intermediate Cool Peak Demand, Summer Peak Demand and Summer Peak Generation.

1.1 Network Topology

The Pyle GSP network is arranged as follows:

- SGT1 (180 MVA) and SGT2 (240 MVA) run in parallel supplying Pyle 132 kV main 1 and main 3 respectively
- Two 132/33 kV 90 MVA grid transformers supply the Pyle 33 kV network
- Two 132/66 kV transformers supply the 66 kV circuits that connect several distributed generation customers.
- Interconnection is provided with Margam GSP via two 132/66 kV transformers at Margam BSP.
- Outgoing 132 kV circuits from Pyle GSP supply several BSPs situated across the Pyle 132 kV network
- Pyle GT6 and GT7 supply the Pyle 33 kV network.
- The Pyle 33 kV network consists of Pyle Primary, directly supplied from the 33 kV busbar at the BSP. Nottage primary is supplied from both sides of the Main 33 kV busbar, on its own ring that is shared with an interconnector to Bridgend as well as several distributed generators.

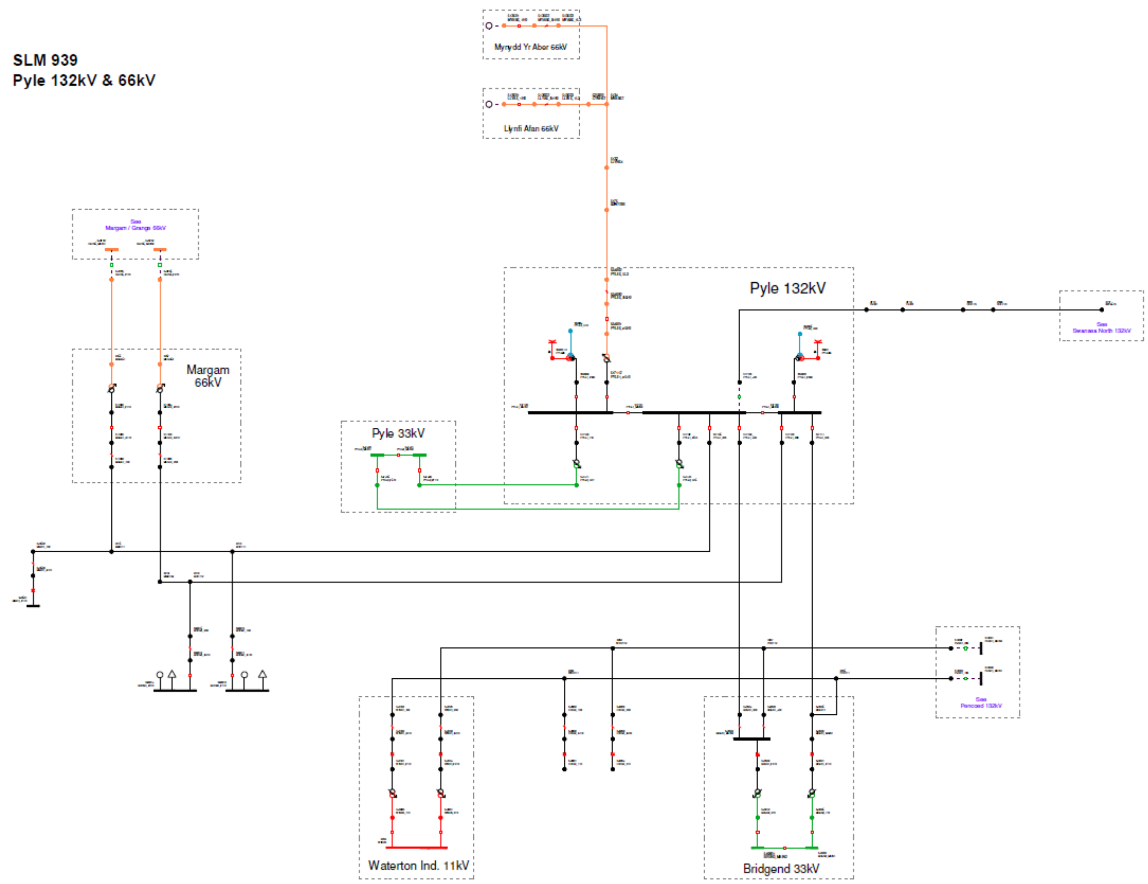

Figure 1.1 Pyle 132 kV network single line diagram

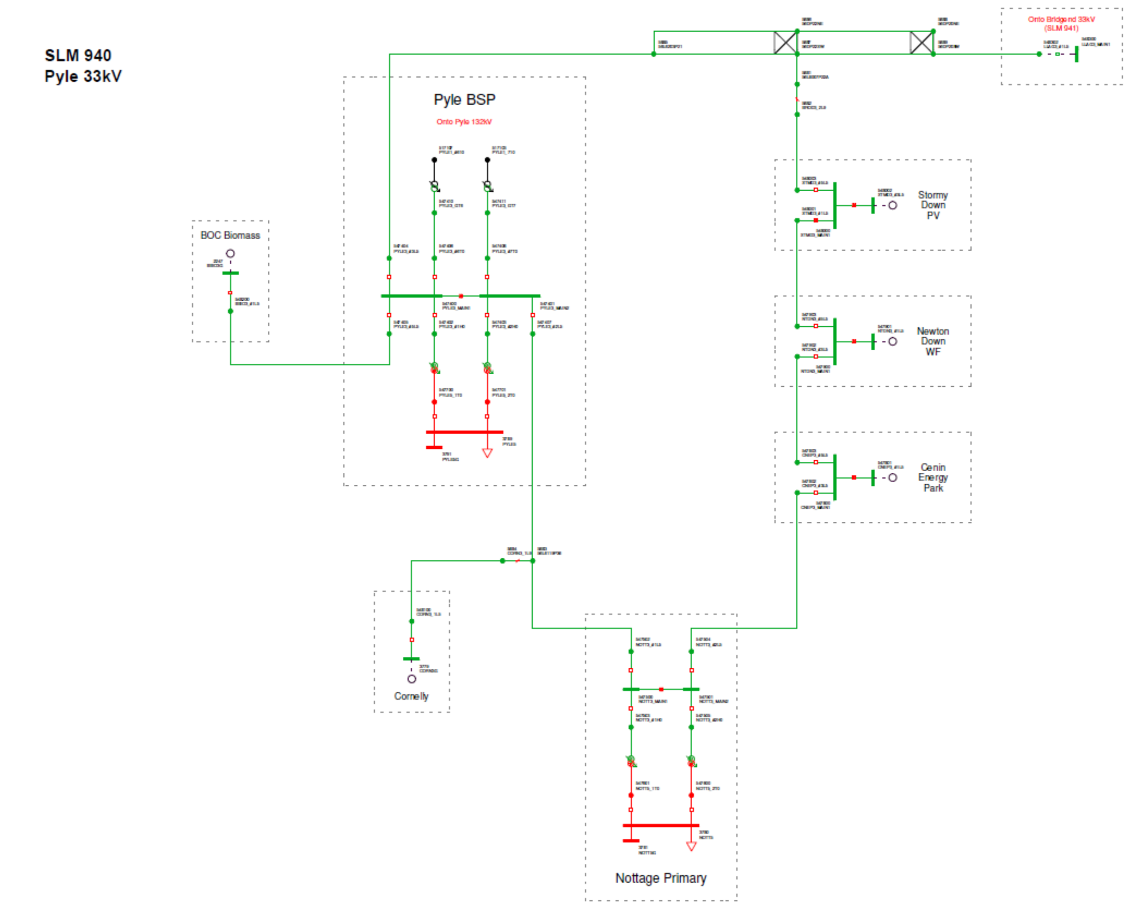

Figure 1.1 Pyle 33 kV network single line diagram

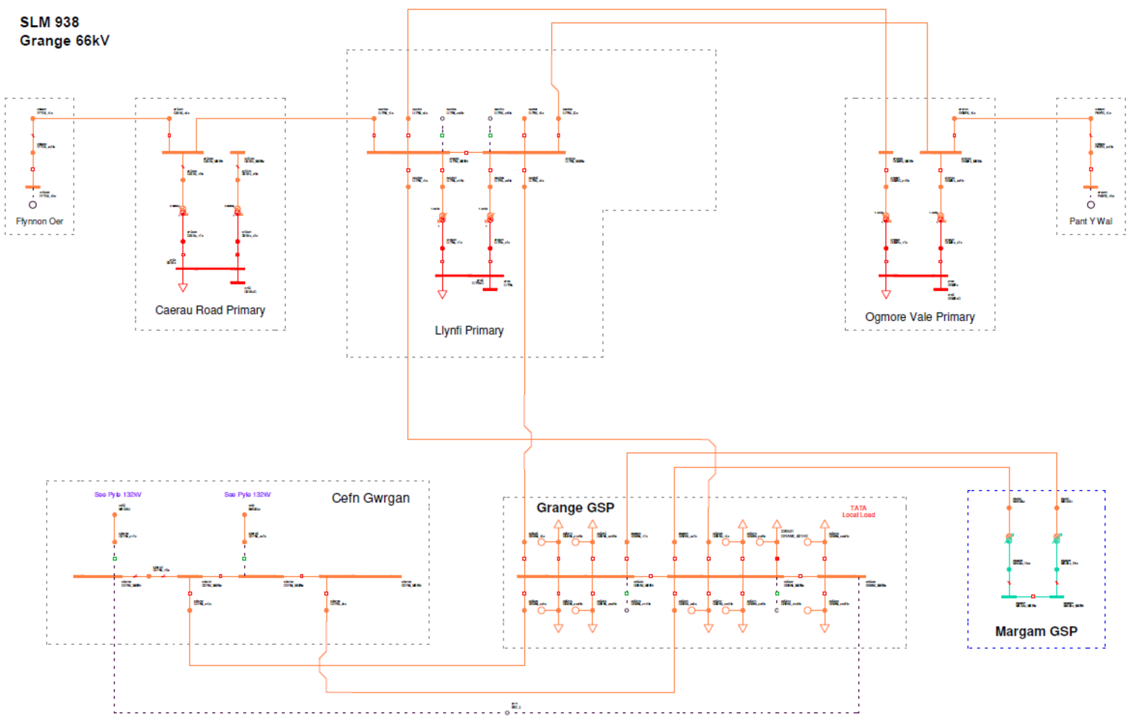

Figure 1.1 Margam 66 kV network single line diagram

1.2 Network Operability Modelling

The following network automation and manual switching schemes have been modelled in the analysis of this area, aligning to how the network is currently operated.

- For the loss of an infeed to a transformer at any of the primaries fed from within the Pyle 33 kV network under arranged outages, the lower voltage side circuit breaker is opened to prevent back-energisation.
- Curtailment of all connected load management schemes within the group are modelled at a variety of outage conditions, as outlined in customer connection agreements.
- Various winter arranged outages not permitted due to SCO overloads.
- Various SCO overloads solved by network reconfiguration for arranged outages.

2. Summary of Network Constraints

The following constraints were identified for the Best View Scenario, for which mitigation options will be discussed:

- Pyle SGT capacity constraints
- Pyle Primary transformers constraint
- Pyle Primary to Nottage Primary circuit constraint

3. Network Constraint Details and Solution Options

3.1 Pyle SGT capacity constraints

Constraint Overview

Generation | **Demand**

The table below outlines the nature of the network constraints identified in the network analysis, with the worst overloads seen at winter peak demand.

Table 3.1.1 constraint(s) and condition under which constraint occurs

Constraint	N-1 Condition	Subsequent N-2 Condition	First year constraint is observed in each season under Best View			
			Winter	Int Cool	Int Warm	Summer
Pyle SGT1	Pyle SGT2 fault	None	2026	2028	2028	-
Pyle SGT2	Pyle SGT1 fault	None	2034	2034	-	-

Uncertainty under other Distribution Future Energy Scenarios: The constraints above are identified under Best View and worsened under some of the other Distribution Future Energy Scenarios. The demand in the region is generally on an upward trend indicating constraints are potentially getting worse if not addressed, but the trigger year may vary depending on how quickly demand and/or generation materialises.

Solution Options

A list of each of the options considered for this constraint is given in the table below.

Table 3.1.2 solution options to solve constraint(s)

Solution Options	Description	Solves Constraint	Wider Area Benefit	Potential to be cost effective	Viable or Discounted
0	No Intervention	×	×	×	Discounted
Reinforcement					
1	Install a 240 MVA SGT at Pyle GSP	✓	×	✓	Viable

2	Install 360 MVA SGTs at Pyle GSP	✓	✓	✓	Viable
3	Install a 240 MVA SGT at Pyle GSP and a remote 240 MVA SGT	✓	×	×	Discounted
4	Energise 66 kV lines at 132 kV and provide a new SGT infeed at Llynfi	✓	✓	✓	Viable
5	New GSP at Upper Boat	✓	✓	✓	Viable
Operational Mitigation					
6	Automatically switch in VE route to Swansea North under an SGT outage.	✓	×	✓	Viable
Flexibility services					
7	Procure flexibility at Pyle GSP.	×	×	×	Discounted

Solution Development

These options have been assessed on their technical viability and their likely cost-effectiveness pending a full cost benefit analysis (CBA). This CBA will be subsequently carried out by the DNO to determine the optimal reinforcement solution, which will then be tested against market provided flexibility by the DSO as part of the Distribution Network Options Assessment (DNOA) process.

Option 0 – No Intervention

Capacity Released for constraint(s) considered: 0 MVA — Discounted

Detailed description: Pyle SGT 1 has a six hour rating of 240 MVA. As the constraint arises in 2026, utilising the short term rating of the SGT could be viable in the short term, either until the fault can be cleared or the VE route from Swansea North can be switched in, or alternatively, the Bridgend circuits can be transferred to Upper Boat GSP.

New limiting factor for constraint(s) considered: If the six hour rating of SGT1 at Pyle is exceeded then the solution could result in a P2 violation.

Option 1 – Install a 240 MVA unit to replace the existing SGT1.

Capacity Released for constraint(s) considered: 60 MVA — Viable

Detailed description: Upgrading the existing SGT up to a 240 MVA unit (to match SGT2) would be a suitable solution in the medium term to cope with the additional loading projected on Pyle GSP. By 2034 however, this solution could become obsolete (unless temporary ratings are used) as the load may grow above 240 MW under Best View forecasts. Overloads are seen under First Circuit Outage (FCO) for the current 240 MVA unit as the load has grown to a peak of 248 MW.

New limiting factor for constraint(s) considered: 240 MVA firm capacity of the site

Option 2 – Install 360 MVA units for both SGT2 and SGT1, as well as reprofile/reinforce interconnectors

Capacity released for constraint(s) considered: — Viable

300 MW of generation capacity and 180 MW of demand capacity

Detailed description: SGT2 will exceed its firm capacity by 2034. Unless load can be transferred away from Pyle permanently, most likely to Upper Boat if the proposed GSP in the Hirwaun area materialises, SGT2 will need to be replaced. As the only size greater than 240 MVA, 360 MVA units would be proposed. This comes with the downside however, as due to P2 stating that a group with more than 300 MW demand needs to have 2/3 restorable instantaneously in the event of an Second Circuit Outage (SCO), which is not possible with only 2 SGTs being available at Pyle.

The VE/U route can only accommodate 112 MW of demand (on top of Briton Ferry), this would be less than what is required to instantaneously restore 2/3rds of the demand under the double SGT outage (if it ever were to grow above 300 MW). There is the additional problem of the VE route not necessarily being available to supply Pyle as it cannot be used when Pembroke is also being fed from Swansea North. The VE route has several limiting sections that would need to be uprated to make the rating of the circuit close to 200 MVA, but this could provide a viable solution. In total, approximately 22.3 km of limiting 132 kV circuit would need to be reprofiled to 75 degrees in order to alleviate the constraint, as well as a 370 m section of underground cable requiring reconductoring. It is worth noting that the U route from Swansea North would become an issue in 2034 as due to load growth at Briton Ferry BSP and Pyle GSP, overloads start appearing when Pyle is under SCO SGT faults. Long term it is not viable to rely on the VE route to support Pyle, even with the Bridgend circuits transferred to Upper Boat.

Furthermore, significant 132 kV sections of the route to Upper Boat to Bridgend would need to be reinforced/reprofiled. Two 7 km 132 kV circuits would need reprofiling on the UE route between Talbot Green and Upper Boat, on both sides of the tower circuit. Two 4 km overhead 132 kV circuits need replacing between Pontyclun and Pencoed from existing Lynx conductor to 300 Upas @ 75 degrees. 4 km of 132 kV circuit between Pencoed and Pontyclun need reprofiling to 75 degrees. These circuits have more than enough capacity once the proposed solutions are added to the network model.

New limiting factor for constraint(s) considered: Group demand exceeding 300 MW

Option 3 – Replace Pyle SGT1 with a 240 MVA unit, and install a remote third SGT

Capacity Released for constraint(s) considered: 300 MVA **Discounted**

Detailed description: This solution is based on firstly, Pyle SGT1 being uprated to a 240 MVA unit in order to match SGT2, and secondly installing a third remote SGT (similar to the Aberthaw SGT that can be used to restore Upper Boat GSP). The logical place for this would be somewhere along the VE/U route as this already has an infeed to Pyle main busbar 2. An extra SGT could be added to Swansea North GSP that is dedicated to feeding Pyle. This has the dual advantage of being able to feed Swansea North, or even Pembroke if needed under an arranged condition at either of those GSPs.

New limiting factor for constraint(s) considered: Capacity of three SGTs, as well as limitations of the VE/U route form Swansea.

Option 4 – Energise the Pyle to Llynfi Valley lines at 132 kV and install third/fourth SGT infeed from 400 kV circuits

Capacity Released for constraint(s) considered: Minimum 240 MVA **Viable**

Detailed description: The 66 kV lines that form the “WF” route between Pyle and Llynfi valley could be reprofiled and run at 132 kV. This could lead to a new Llynfi GSP, where the two 132 kV infeeds would terminate. Alternatively, the 66 kV circuits from Llynfi to Grange GSP could be reprofiled at 132 kV, with a section of 66 kV cable replaced. The circuits would then need an extra 2 km section to terminate them at Pyle. The reasoning behind this location is that 400 kV circuits pass in close proximity to Llynfi primary. Two 400/132 kV 240 MVA SGT units could be installed. The 132/66 kV GTs currently at Pyle could then be moved up to this new site and used to feed Llynfi primary and the surrounding 66 kV network. This has the dual benefit of deloading Grange 66 kV network and leaving Cefn Gwrgan to be fed from Margam GSP. This frees up extra capacity at Margam GSP in the event of increased demand being required. As the 66 kV circuits between Llynfi primary and Grange 66 kV network are overloaded from generation increase under intact conditions by 2034, having a new GSP that could take the generation increase would be highly beneficial.

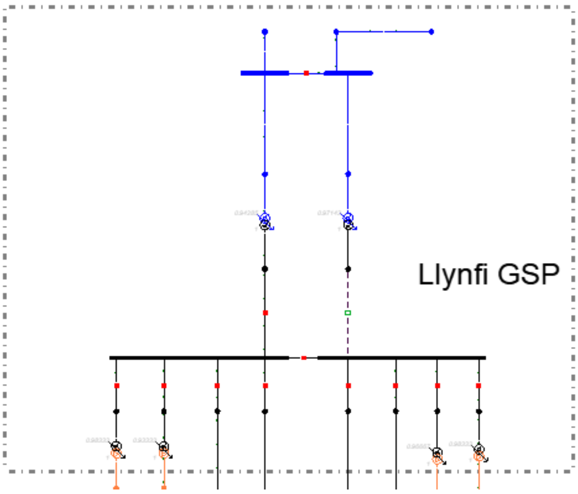

Figure 3.1.1 - Concept design for Llynfi GSP

This solution would be highly effective in futureproofing the network as it allows for much greater security of supply as 3/4 SGTs would be feeding the group. One SGT at Llynfi could be left on hot standby, with the two interconnectors run solid to Pyle GSP. Upon conducting fault level studies, the existing I60 20 kA rated switchgear should be replaced with I60 gear rated to 40 kA. This is due to a three SGT arrangement causing the existing 132 kV circuit breakers at Pyle being overstressed, at 105% and 110% of their make and break rating respectively. This proposed fault level reinforcement would alleviate the fault level issue and allow more room for fault contribution from new connections, as well as to allow for both SGTs to be run solid with the two existing at Pyle if needed. Furthermore, it would greatly decrease curtailment that current connection offers experience. In addition to this, fault level capacity is gained at Pyle GSP. Alternatively, this GSP could be designed at 66 kV with 3 x 400/66 kV SGTs, which would likely be a more cost effective solution however, there would be less capacity to support Pyle via the interconnectors.

There could be loose coupling issues between the 400 kV and 275 kV networks, however these have not been identified as part of this study. There are other issues however with running these networks solid, such as cascading intertripping. It is recommended to run these networks split, and switch in the interconnectors in the event of an FCO of a Pyle SGT or for a Llynfi SGT.

Lastly, In terms of generation curtailment estimation (for a 10 MW generator), using a 240 MVA transformers only shifts the curtailment estimation from 100% (for the 180 MVA unit) to 98%. Using 360 MVA transformers lowers the curtailment to around 42%. If a new injection point is added and the generation in the Llynfi Valley is moved away from Pyle, then the curtailment would be reduced to 34% for 240 MVA transformers (less if the existing 66 kV connections that are energised are also moved) and 2% for 360 MVA transformers.

New limiting factor for constraint(s) considered: Ability to reprofile the 66 kV circuits from Pyle to Llynfi and rating of the subsequent 66 kV circuits once reprofiled.

Option 5 – New GSP between Upper Boat and Pyle GSPs

Capacity Released for constraint(s) considered: 480 MVA **Viable**

Detailed description: A new GSP could be built between Upper Boat and Pyle GSPs, with the following BSPs transferred to it: Waterton Industrial, 132 kV connected customer, Pencoed and Pontyclun. This would have the dual benefit of deloading both Upper Boat and Pyle GSPs. This GSP would have two 240 MVA units supplying the group. This arrangement would be highly beneficial when looking at future demand growth, however for generation growth it isn't as helpful as the demand in summer months on these BSPs helps reduce the amount that the TANM system at Pyle is operating.

New limiting factor for constraint(s) considered:

132 kV circuit capacity on the Pontyclun-Waterton industrial circuits.

Option 6 – Automatically switch in the VE route under fault conditions on a Pyle SGT

Capacity Released for constraint(s) considered: 198 MVA **Viable**

Detailed description: Currently, the "VE" route from Pyle to Swansea North is switched in for an arranged outage of a Pyle SGT. For baseline loadings, the GSP can be supported by a single SGT in the event of a fault. However, due to predicted loadings on Pyle GSP by 2028 this is no longer the case and the 180 MVA unit will be overloaded in the event that the 240 MVA unit is lost on a fault condition.

Whilst the six hour rating of 240 MVA could be used, this would prematurely age the SGT. As a short/medium term fix, the VE route could be set up on an automatic switching scheme that automatically gives Pyle another infeed in the event of an SGT fault. This would help alleviate the issues surrounding firm capacity, however the VE route can only be used when Swansea North is not supporting Pembroke.

New limiting factor for constraint(s) considered:

Availability of the VE route to support Pyle GSP, as well as the capacity of the VE route.

Option 7 – Procure flexibility at Pyle GSP

Estimated Flexibility Required (MVA): 32 MVA + (2028) **Discounted**

Detailed description: This solution would not be viable due to the high amount of flexibility needed.

Solution Recommendation

The recommended solution depends on a number of factors. Firstly, the implications of decarbonisation plans for the Port Talbot region, as significant demand increases at the site may necessitate the deloading of Margam GSP, meaning the Llynfi circuits would likely be moved to their own GSP. If this is occurs, then building the proposed Llynfi GSP, or another site in a similar area would be beneficial in transferring generation away from Pyle GSP, easing the very high curtailment currently experienced by Pyle.

In the short term (before 2028) the 180 MVA SGT at Pyle is recommended to be replaced with at least a 240 MVA unit due to overloads caused by firm demand connections and load growth. By 2034 however, the SGTs are over their firm capacity under an FCO SGT fault. As a result, 360 MVA units are recommended to be installed at Pyle GSP. As the predicted load growth is slightly below 300 MVA for 2050, this should secure the site long term against FCO SGT outages.

Eventually, due to increased demand from both firm demand connections and load growth (around 2034) the VE/U route is unable to adequately supply Pyle under SGT SCO conditions without needing to be almost completely reconductored. Due to this, having another GSP nearby that can easily support Pyle in the event of an SCO SGT fault would present the optimal way to develop the site in the longer term. This would both help with demand growth, as well as generation growth by adding significantly more capacity as well as flexibility.

3.2 Pyle Primary transformers constraint

Constraint Overview

Generation **Demand**

The table below outlines the nature of the network constraints identified in the network analysis.

Table 3.2.1 constraint(s) and condition under which constraint occurs

Constraint	N-1 Condition	Subsequent N-2 Condition	First year constraint is observed in each season under Best View			
			Winter	Int Cool	Int Warm	Summer
Pyle T1 and T2	Loss of Pyle T2 and T1	None	2034	2034	2034	-

Uncertainty under other Distribution Future Energy Scenarios: The constraints above are identified under Best View and worsened under some of the other Distribution Future Energy Scenarios. The demand in the region is generally on an upward trend indicating constraints are potentially getting worse if not addressed, but the trigger year may vary depending on how quickly demand and/or generation materialises.

Solution Options

A list of each of the options considered for this constraint is given in the table below.

Table 3.2.2 solution options to solve constraint(s)

Solution Options	Description	Solves Constraint	Wider Area Benefit	Potential to be cost effective	Viable or Discounted
0	No Intervention	×	×	×	Discounted
Reinforcement					
1	Install a 20/40 CMR units at Pyle primary	✓	×	✓	Viable
2	Install additional 33 kV circuits to a new primary	✓	✓	✓	Viable
3	Reinforce 11 kV circuits to transfer demand to other Primaries	✓	✓	✓	Viable
Flexibility services					
4	Procure flexibility at Litchard Primary	✓	×	✓	Viable

Solution Development

These options have been assessed on their technical viability and their likely cost-effectiveness pending a full CBA. This CBA will be subsequently carried out by the DNO to determine the optimal reinforcement solution, which will then be tested against market provided flexibility by the DSO as part of the DNOA process.

Option 0 – No Intervention

Capacity Released for constraint(s) considered: 0 MVA **Discounted**

Detailed description: Doing nothing to mitigate the constraint would result in overloads for the conditions described above. This would lead to an inability to meet the Security of Supply requirements of Engineering Recommendation P2 for Pyle primary substation.

New limiting factor for constraint(s) considered: N/A

Option 1 – Install 20/40 MVA transformers at Pyle primary

Capacity Released for constraint(s) considered: 15 MVA **Viable**

Detailed description: Currently, there are 2 x 12/24 MVA transformers at Pyle Primary. Based on the projected load growth for Pyle primary, it is proposed that the primary transformers are uprated to 20/40 MVA units by 2034.

This will alleviate the overloads observed.

New limiting factor for constraint(s) considered: New firm capacity of Pyle primary

Option 2 – Install additional 33 kV circuits to a new primary

Capacity released for constraint(s) considered: 23 MVA **Viable**

Detailed description: A new 33/11 kV primary substation could be established on a dedicated 33 kV ring from Pyle 33 kV BSP. This would be used to both deload Pyle, as well as take projected generation growth away from Nottage. This would help futureproof both Pyle and Nottage primaries, by providing extra headroom for demand and generation growth.

New limiting factor for constraint(s) considered: Firm capacity of new primary

Option 3 – Reinforce 11 kV circuits to transfer demand to other Primaries

Capacity Released for constraint(s) considered: up to 7 MVA **Discounted**

Detailed description: Demand could be transferred to Nottage primary, however this would be difficult as 7 MVA would need to be transferred away from Pyle in order to alleviate the constraint. This, combined with the distance between Pyle and Nottage means that significant works would be required on the 11 kV network in order to accommodate the constraint and also give extra capacity for post 2034 load growth.

New limiting factor for constraint(s) considered:

Capacity of 11 kV interconnection between Pyle and Nottage primary

Option 4 – Procure flexibility at Pyle Primary Substation

Estimated Flexibility Required (MVA): 7 MVA+ (2034) **Viable**

Detailed description: Flexibility services could be to help alleviate the projected overloads. This could rise up to 7 MVA by 2034. It is unlikely that sufficient flexibility could be procured as a long-term solution. The amount required will continue to grow as demand grows meaning this would likely only defer the reinforcement.

The viability of utilising flexibility will be further considered as part of the DNOA process.

Solution Recommendation

It is recommended to firstly consider flexibility as an option to gauge the level of procurement available within the area, subject to a cost benefit analysis and confirmation through the DNOA process.

Following this, it is recommended to install 20/40 MVA transformers at Pyle primary. This would not only alleviate the constraint, but it would be a cost effective way to ensure security of supply for post 2034 load growth. Building a new 33/11 kV primary would also be an effective way to ensure capacity is available for future load growth, as well as having the potential to transfer generation to it.

Considering the loadings on the 33 kV circuits, as well as the loading at Pyle primary, it is likely to be a more efficient and more cost effective solution to upgrade the transformers over establishing a new 33/1 kV primary substation and the associated works required to facilitate this connection.

3.3 Pyle Primary to Nottage Primary 33 kV circuit constraint

Constraint Overview

Generation Demand

The table below outlines the nature of the network constraints identified in the network analysis.

Table 3.3.1 constraint(s) and condition under which constraint occurs

Constraint	N-1 Condition	Subsequent N-2 Condition	First year constraint is observed in each season under Best View			
			Winter	Int Cool	Int Warm	Summer
Nottage to Pyle circuit	Loss of Pyle 33 kV main 1 busbar	None	-	-	-	2034

Uncertainty under other Distribution Future Energy Scenarios: The constraints above are identified under Best View and worsened under some of the other Distribution Future Energy Scenarios. The demand in the region is generally on an upward trend indicating constraints are potentially getting worse if not addressed, but the trigger year may vary depending on how quickly demand and/or generation materialises.

Solution Options

A list of each of the options considered for this constraint is given in the table below.

Table 3.3.2 solution options to solve constraint(s)

Solution Options	Description	Solves Constraint	Wider Area Benefit	Potential to be cost effective	Viable or Discounted
0	No Intervention	×	×	×	Discounted
Reinforcement					
1	Overlay 33 kV circuit to accommodate the constraint	✓	×	✓	Viable
2	Install additional 33 kV circuits to a new primary	✓	✓	✓	Viable
3	Reinforce 11 kV circuits to transfer demand to other Primaries	✓	✓	×	Discounted
Flexibility services					
4	Procure flexibility at Nottage Primary	✓	×	×	Discounted

Solution Development

These options have been assessed on their technical viability and their likely cost-effectiveness pending a full CBA. This CBA will be subsequently carried out by the DNO to determine the optimal reinforcement solution.

Option 0 – No Intervention

Capacity Released for constraint(s) considered: 0 MVA

Discounted

Detailed description: Doing nothing to mitigate the constraint would result in overloads for the conditions described above. This would lead to an inability to meet the Security of Supply requirements of Engineering Recommendation P2 for Nottage primary substation.

New limiting factor for constraint(s) considered: N/A

Option 1 – Reconductor 33 kV circuit to accommodate the constraint

Capacity Released for constraint(s) considered: 1 to 6 MVA

Viable

Detailed description: Due to the generation growth at Nottage Primary under 2034 Best View forecasts, a busbar outage at Pyle 33 kV main 1 leads to generation overloading the remaining in service circuit on the Nottage - Pyle 33 kV ring. This constraint can be solved by reprofiling two 33 kV sections totalling 2.7 km from 50 degrees to 75 degrees. This will increase the rating of the circuit from 20.3 MVA under summer cyclic to 23.4 MVA. This would alleviate the constraint, as well as being cost effective and allowing for future generation growth at Nottage Primary. Eventually, generation growth will mean the conductor will have to be replaced, however this is not forecasted under best view to be the case until around 2040.

New limiting factor for constraint(s) considered: New 33 kV circuit rating.

Option 2 – Install additional 33 kV circuits to a new primary

Capacity released for constraint(s) considered: 23 MVA

Viable

Detailed description: A new 33/11 kV primary substation could be built on a dedicated ring from Pyle 33 kV BSP. This would be used to both deload Pyle, as well as take projected generation growth away from Nottage. This would help futureproof both Pyle and Nottage primaries, by providing extra headroom for demand and generation growth. This would alleviate the circuit constraint as the generation growth forecasted for Nottage could be shifted to this new primary.

New limiting factor for constraint(s) considered: Firm capacity of new primary.

Option 3 – Reinforce 11 kV circuits to transfer demand to other Primaries

Capacity Released for constraint(s) considered: up to 7 MVA

Discounted

Detailed description: Generation could be transferred to Pyle primary, this is not unrealistic due to only 2 MVA being required to be permanently shifted away from Nottage to alleviate the constraint. However the distance between Pyle and Nottage means that significant works would be required on the 11 kV network in order to accommodate the constraint and also give extra capacity for post 2034 load growth.

New limiting factor for constraint(s) considered: Firm capacity of uprated 11 kV interconnectors.

Option 4 – Procure flexibility at Nottage Primary Substation

Estimated Flexibility Required (MVA): 2 MVA+

Discounted

Detailed description: Flexibility services are not recommended for this constraint.

Solution Recommendation

It is recommended to reprofile the 33 kV circuit from Nottage to Pyle. This not only alleviates the generation constraint, but is highly cost effective and allows for future load growth. Adding in a new 33/11 kV primary substation on a dedicated 33 kV ring is a worthwhile solution, however it is definitely more efficient to reprofile the circuit rather than implement this solution, even when considering the constraints that are projected on Pyle primary substation.

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