

7 MINERALS

Introduction

- 7.1 This chapter of the ES assesses the likely significant effects of the Development on the environment in respect of minerals.
- 7.2 This chapter relates to in-situ minerals which are present on the surface of the Site. The Site is in an area that has been identified by WCBC as a mineral resource area, also called a Mineral Safeguarding Area (MSA). The minerals are safeguarded by planning policies in the adopted UDP, which also contains provisos that, if satisfied, would allow development in a MSA. This chapter assesses the likely significant effects of the Development on the safeguarded mineral resources.

Policy Context

National Planning Policy Framework

- 7.3 Planning Policy Walesⁱ (PPW) sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs), Welsh Government circulars and policy clarification letters which, together with PPW, provide the national planning policy framework for Wales. The primary objective of PPW is to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales.
- 7.4 PPW sets out a number of important principles in relation to minerals which should be addressed through the development plan process. These include:

- Ensuring sustainable supply
- Safeguarding minerals for future generations
- Minimising conflict between mineral and nonmineral development
- Securing suitable restoration
- Encouraging the use of alternatives to primary resources

Planning Practice Guidance

- 7.5 As part of PPW, TANs provide further guidance on specific areas of planning. Minerals Technical Advice Note 1: Aggregates (MTAN 1)ⁱⁱ provides advice on how the land use

planning system should contribute to the sustainable supply of aggregates and sets out detailed advice on planning matters in relation to aggregates such as limestone and sand and gravel. Amongst other matters, it requires a minimum 10-year landbank of crushed rock and a minimum 7 year landbank of sand and gravel to be maintained by local authorities throughout the development plan periods.

- 7.6 In addition, in order to reduce the impact of aggregate production, local authorities are required to identify buffer zones around permitted and allocated mineral extraction sites. MTAN 1 identifies the minimum buffer zone distance that should be maintained for sand and gravel (100 metres) and hard-rock quarries (200 metres).
- 7.7 As directed by PPW, the Welsh Aggregate Working Party (AWP) produces Regional Technical Statements (RTS)ⁱⁱⁱ which identify the level of aggregate provision that should be made in each local authority area. Two RTSs are produced by the AWP, covering South Wales and North Wales. The technical statements are reviewed every five years and the latest RTS for North Wales was published in September 2020 as a Final version.
- 7.8 The RTS comprises a main document and an appendix. The two components of the RTS are intended to provide a strategy for the future supply of construction aggregates within the region, taking account of the latest available information regarding the balance of supply and demand, and current notions of sustainability. The RTS aims to ensure that an adequate and steady supply of aggregates can be maintained throughout the region, taking into account the key objectives of sustainable supply outlined in MTAN 1.

Local Planning Policy

- 7.9 The current local development plan for the area is the Wrexham Unitary Development Plan 1996–2011 (UDP)^{iv}, which was adopted in February 2005. The Site is located within a sand and gravel mineral safeguarding area identified by WCBC. The adopted UDP sets out its mineral safeguarding policy at Policy MW9:

Protection of Mineral Resources: Policy MW9

"Resources of sand and gravel, and clay, will be safeguarded from non-mineral development in order to prevent the sterilisation of unworked mineral deposits. The identification of mineral resource areas gives no presumption in favour of the working of any deposits. Within such areas, non-mineral development will be strongly resisted unless a resource assessment (or other information) is provided to demonstrate that no exploitable reserves exist within the development site. Where non-mineral development which materially prejudices mineral resources is granted planning permission on land holding mineral deposits, provision should be made for the prior removal of

mineral deposits."

Emerging mineral safeguarding planning policy

- 7.10 The UDP is due to be replaced by the emerging Wrexham Local Development Plan 2013–2028^v (LDP) which is currently at Examination stage. At the time of writing, WCBC is preparing to consult on "matters arising" changes to the LDP which is anticipated to take place in Spring 2021. Both plans contain more localised policies for mineral development in line with national policies set out in PPW.
- 7.11 The LDP's "Policy SP3 Key Strategic Housing Sites" relates to an allocated site identified as "Land East of Cefn Road", the northern part of which is the subject of this ES Chapter. The text accompanying the policy states that "*In order to minimise the loss of mineral, a Prior Extraction Assessment will be sought in accordance with Policy MW1 as it is considered that any opportunities to recover mineral prior to housing development should be sought*^{vi}."
- 7.12 A copy of emerging LDP policy MW1 is attached at Appendix 7.1. In summary, the policy states that non-mineral development will only be permitted in a MSA where it can be shown that:
- the mineral does not merit extraction; or
 - there is an overriding need for the incompatible development; or
 - prior extraction can be undertaken satisfactorily; or
 - the development is temporary; or
 - essential mineral industry infrastructure would not be compromised.

Assessment Methodology

Scope of Chapter

- 7.13 This Chapter sets out the effect of the Development on the safeguarded mineral resources present within the Site.
- 7.14 As sterilisation will occur during site preparation and construction works, any effects on the mineral resource will be limited to the construction phase only. As such, this assessment has not considered the operational phase of the Development.

Baseline Data Collection

- 7.15 A desk-based assessment has been undertaken to gather information relating to existing mineral resources within the Site, using geological maps and borehole logs published by the British Geological Survey supplemented by site investigation of the near-surface deposits on the Site using windowless sampling.

Assessment

- 7.16 The assessment of significance has been determined using criteria based on best practice techniques and professional knowledge. The final determination of significance has been derived from measures of the importance or sensitivity of the resource affected and the magnitude of the impact.
- 7.17 Assessments of the potential effects of the Development take account of the need to maintain a landbank of permitted mineral reserves as well as the current landbank in the Wrexham area.
- 7.18 The following tables set out how sensitivity, magnitude and significance are determined within this Chapter.

Table 7.1: Methodology for Determining Impact Sensitivity

Sensitivity	Examples of receptor
High	The existing mineral resource has little ability to absorb change without fundamentally altering its present character, or is of international or national importance.
Moderate	The existing mineral resource has moderate capacity to absorb change without significantly altering its present character, or is of high importance.
Low	The existing mineral resource is tolerant of change without detriment to its character, or is of low or local importance.

Table 7.2: Methodology for Assessing Magnitude

Magnitude of Impact	Criteria for assessing impact
Major	Total loss or major/substantial alteration to the existing mineral resource
Moderate	Loss or alteration to the existing mineral resource
Minor	A minor shift away from existing mineral resource.
Negligible	Very little change from existing mineral resource.

Table 7.3: Effect Significance Matrix

Magnitude	Sensitivity		
	High	Moderate	Low
Major	Major Adverse/Beneficial	Major - Moderate Adverse/Beneficial	Moderate - Minor Adverse/Beneficial
Moderate	Major - Moderate Adverse/Beneficial	Moderate - Minor Adverse/Beneficial	Minor Adverse/Beneficial
Minor	Moderate - Minor Adverse/Beneficial	Minor Adverse/Beneficial	Minor Adverse/Beneficial - Negligible
Negligible	Negligible	Negligible	Negligible

- 7.19 For the purposes of this EIA, effects assessed as being Moderate or higher are considered to be Significant.

Limitations and Assumptions

- 7.20 The principal limitation is the extent of knowledge regarding the depth of the deposit and its composition throughout the depth. The British Geological Survey^{vii} online geological map has a record of one borehole located slightly to the west of the Site centre which provides details of the geological succession in the superficial deposits on the Site to a depth of 25 metres. Site investigation records of windowless sampling provide evidence of the composition of the sand at depths of 0 to 5 metres. Published geological plans indicate that the deposit thins towards the east.
- 7.21 As a consequence of these limitations, it is necessary to make an assumption regarding the composition of the sand deposit. The evidence indicates that the near surface deposit to a depth of approximately 5m is predominantly sand with a very low gravel content (approximately 5%) with no gravel content below that and the assumption being made that this is the case across the whole Site.

Baseline Conditions

- 7.22 Geologically, a distinction is made between “superficial deposits” and “solid geology”. Superficial deposits such as sand and gravel are found at, or close to, the surface. The solid bedrock beneath the superficial deposits is called the “solid geology.” The geological succession of the Site has been investigated using published geological mapping and site investigation.

Superficial deposits

Published geological mapping

- 7.23 An inspection of the British Geological Survey (BGS) 1:50,000 online geological plan shows that the superficial deposits on the Site are glaciofluvial sand and gravel. The deposits in this area are variable and generally comprise a coarse-grained Upper Layer and a fine grained Lower Layer. The online geological plan contains the log of a borehole located slightly to the west of the centre of the Site. An extract of the log is attached at Appendix 7.2 and it shows the presence of 0.3 metres of soil above 1.5 metres of clayey sand at the surface, followed by 23.2 metres of sand to the end of the borehole at 25 metres depth. The borehole log shows that the average composition of the deposit is 91% sand,

2% gravel and 7% fines. It also shows that the gravel content occurs predominantly in the uppermost 3 metres from 1.8m to 4.8m depth and is virtually absent below that depth. This indicates that the coarse Upper Layer is not present on the Site. This is the only deep borehole on the Site. The geological sequence shown on the geological plan indicates that the sand deposit becomes thinner to the east and historic OS maps show that it was being worked in the field immediately to the east of the north-eastern field in the Site before 1954.

Site investigation

- 7.24 A preliminary site investigation was undertaken by the Appellants' contractor between 30 and 31 March 2017, comprising 12 windowless sample boreholes. The boreholes were drilled to 5m depth or refusal. A borehole location plan and the borehole logs are attached at Appendix 7.3.
- 7.25 The ground conditions encountered in the boreholes generally confirmed the published mapping and comprised topsoil to a depth of between 0.28m – 0.40m overlying generally loose to medium dense, slightly silty, slightly gravelly sands. The site investigation also reported that there are some areas of looser sand where the material contains more silt and clay. Water was encountered in three boreholes located towards the south west corner of the Site at depths of between 1m and 2m.
- 7.26 In October 2018, the Appellants commissioned the excavation of seven soakaway pits at locations shown on the plan attached at Appendix 7.4. Samples of sand and gravel were taken from the pits at depths of up to 7m for analysis. The laboratory analysis is shown on 11 Particle Size Distribution graphs which are attached at Appendix 7.5. The composition of the samples is shown in the box beneath the graphs on the right-hand side of the page. The average of the composition figures shows average values of 11% gravel, 84% sand and 5% silt. These compositions are broadly consistent with the analysis on the BGS borehole and demonstrate a low proportion of gravel. The superficial deposit that is mapped as sand and gravel is actually a very fine sand with a low proportion of gravel.

Mineral quality

- 7.27 Glacial deposits of sand and gravel can vary significantly, both laterally and vertically. It can be of commercial interest in some circumstances, providing that it has an acceptably high proportion of gravel, with a low proportion of silt. This is because the mineral is used to manufacture concrete, and the manufacturing process requires approximately twice as

much gravel as sand. The gravel content is therefore of critical importance in determining whether a deposit is commercially viable. The deposit on the Site has a low proportion of gravel so it would not be considered commercially viable as a standalone mineral resource and it would have to be mixed with a high proportion of gravel to be of use in manufacturing concrete.

- 7.28 The requirement for a ratio of 2 gravel to 1 sand for manufacturing concrete means that many sand and gravel pits have a surplus of sand, as the demand for gravel is greater than the demand for sand. The consequence of this is that sand and gravel pits do not usually import sand from other sites.
- 7.29 Sand and gravel is worked locally at Borrás quarry which is located approximately 1km to the north of the Site. The BGS has published the logs of several boreholes that have been drilled in Borrás quarry which show the sand and gravel deposit there contains an average gravel content in excess of 40%. A gravel content at that level is fairly typical to meet the industry's requirements.

Solid geology

- 7.30 The solid geology of the Site beneath the superficial deposits is shown on the BGS geological plans as being interbedded mudstones, sandstones and conglomerate of the Salop Formation, of Permian age. These strata are not of commercial interest and are not safeguarded.

Sand and gravel landbanks

- 7.31 The Wrexham UDP contains limited landbank data indicating a landbank of at least seven million tonnes of permitted sand and gravel, although the date of that landbank estimate is not clear. It appears that the planning authority relied on data from the North Wales Regional Aggregates Working Party.
- 7.32 In January 2018, WCBC published Background Paper BP11 Minerals^{viii} in connection with the emerging LDP. The purpose of the paper was to explain how the housing allocations had been developed taking into account the underlying mineral resources. An initial review of all candidate sites was undertaken in 2013 which found that the majority of candidate sites were underlain by surface minerals of economic importance. The Site is part of allocated site reference WR004AS and WR19(a) CS (candidate site references), also known as KSS2: Land east of Cefn Road in the LDP. WCBC's reasoning for selection is set out on page 156 of the Background Paper 11 which is attached at Appendix 7.6.

WCBC recognised that the allocation would sterilise the mineral in the Site and considered that the loss of mineral could be mitigated by investigating the amount of mineral that could be extracted prior to the non-mineral development.

- 7.33 In April 2019, WCBC published a Composite Version of the Deposit LDP (KSD 05). At paragraph 6.193 (attached at Appendix 7.7) it states that the Regional Technical Statement "*does not identify any further need for sand and gravel in Wrexham*".
- 7.34 In September 2020 the Regional Aggregates Working Party published its Regional Technical Statement which included a table (attached at Appendix 7.8) showing the allocations that would be required to have a landbank of sand and gravel sufficient for 22 years. The table demonstrates that Wrexham has a landbank of permitted sand and gravel reserves sufficient for 19.6 years. That is an unusually high figure since the "Guidance on the Managed Aggregate Supply System^{ix}" published by the DCLG advises Mineral Planning Authorities to aim to maintain a landbank of at least 7 years for land-won sand and gravel.

Future baseline

- 7.35 The future baseline is an explanation of how the baseline position would be expected to change in the absence of the Development. We would expect the Site to remain in its current use and condition if the Development did not take place. We would not expect the Site to be used for mineral extraction because coarse aggregate (gravel) would need to be imported to mix with the sand to make a useable product, or the sand would need to be exported to a gravel pit with an excess of gravel. Both of those scenarios would involve abnormal costs for excavation, haulage and double handling which is likely to render excavation of the sand non-viable since the profit margins on sand and gravel are not large enough to bear that additional cost when compared with production from a pit containing mineral of acceptable commercial composition.

Likely Significant Effects

Construction Phase

Sensitivity of Resource

- 7.36 As set out above, Wrexham has a landbank of permitted sand and gravel reserves sufficient for 19.6 years. That is an unusually high figure since most planning authorities aim to have a landbank sufficient for 7 to 10 years.

- 7.37 Appendix 7.9 comprises an extract from a BGS geological plan of the Wrexham area at scale 1:50,000. The sand and gravel deposit is shaded pink on the plan and its gross unconstrained area (i.e. not built upon) to the north, east and south of Wrexham is approximately 1,000 ha. The Site covers less than 3% of that area.
- 7.38 It is considered that the existing mineral resource is tolerant of change without detriment to its character due to the unusually high landbank of permitted sand and gravel reserves within Wrexham. As such, it is considered that the sensitivity of the receptor is Low.

Magnitude of Impact

- 7.39 The quantity of mineral that would be sterilised by the Development would depend on the extent and depth of excavation. It would not be practicable to excavate the sand to its full depth of 25m. An assumption has therefore been made that the sterilised mineral is the 3m thickness of gravel-bearing deposits between 1.8m and 4.8m depth mentioned above. The notional excavation area is assumed to be 16 ha after allowing for buffer zones to protect houses to the west and soil storage bunds around the perimeter. On that basis the volume of sterilised mineral would be approximately 480,000 m³ of sand which is approximately 770,000 tonnes. This figure does not include the tonnage of mineral already indirectly sterilised by the houses to the west.
- 7.40 With regards to the magnitude of this sterilisation, the geology of the Site demonstrates that the glacial sand and gravel deposits are predominantly sand and lack gravel so they are not suitable for commercial use. It is therefore considered that the sand and gravel deposits do not constitute an exploitable mineral reserve, and the Development would be compatible with the mineral planning policy on avoiding unnecessary mineral sterilisation.
- 7.41 In addition to the above, there are a number of considerations which should be taken into account when considering the magnitude of this sterilisation:
- The extraction of sand and gravel involves the use of excavators and dump trucks, which generate noise, and the formation of a quarry floor is a source of fugitive dust. The deposit is already subject to extensive indirect sterilisation due to the standoffs which would be necessary from existing residential properties along the Site's western boundary. There are no universally accepted distances for such standoffs as they tend to be site-specific. However, it is reasonable to assume that standoff distances should be at least 100m from residential dwellings for sand and gravel operations.
 - If the entire thickness of sand and gravel were to be excavated, the Site would not

subsequently be useable for the proposed Development. Prior extraction of the minerals would lower the development platform to a depth equal to the depth of the minerals extracted, and the excavated landform would be unsuitable for residential development unless the void was infilled. It would not make commercial sense to infill the void with virgin aggregates or secondary aggregates as this would defeat the object of prior extraction, as well being financially unviable.

- It would also be unrealistic to consider that the Site could be reinstated to a condition suitable for building residential development by infilling with imported inert waste because the Site would then be recorded as a landfill site and hence subject to “stigma” which is a reduction in value due to buyers’ concern about a site’s history.
- In any event, even if sufficient waste could be sourced, it would not provide adequate stability to support buildings and underground utilities.
- A significant sand and gravel mineral resource is currently being commercially exploited at Borrass quarry, which is located approximately 1 km to the north of the Site. WCBC states in LDP2 Topic Paper: 5 Minerals^x that planning permission for an extension to Borrass quarry was granted in 2007, and it is considered that this is sufficient to meet the Council’s obligations to provide a land bank of at least seven years.
- In consideration of the planning balance, if an application for housing on the Site is refused due to mineral sterilisation, the deposit would still not be worked because the proximity of existing residential development and land of high landscape and visual sensitivity in the north east of the Site would make mineral extraction unacceptable, due to the limited site area that would remain accessible. Prior extraction is inappropriate as it would preclude the ultimate built development for which it was undertaken. Consequently, in the context of mineral safeguarding, the development choice for the Site is either much-needed houses (possibly with limited prior extraction), or no houses but the retention of a safeguarded sand deposit that is of no economic importance.

7.42 As it is not proposed to extract the mineral within the Site it could reasonably be considered that the Development would have a Negligible magnitude of impact, as there will be no loss from Wrexham’s existing landbank of permitted reserves.

7.43 However, on a worst-case scenario basis (i.e. assuming that extraction could take place), it is considered that the sterilisation of the mineral resource within the Site would have a Moderate magnitude of impact. There will be a loss to the existing mineral resource, although this loss will be relatively minor in the context of Wrexham’s overall landbank.

Significance of Effect

- 7.44 It is concluded that the sterilisation of this resource would have a Moderate magnitude of impact on a resource of Low sensitivity. As such the Development would have a Minor Adverse effect on the mineral resource, which is considered to be Not Significant.

Completed Development

- 7.45 The operation of the Development will not affect mineral resources.

Mitigation Measures

- 7.46 Although the assessment concludes that the Development will not have a significant effect on the mineral resources of Wrexham, mitigation measures have been considered and will be incorporated in the design of the Development where possible. These measures will reduce the effect of the Development on the mineral resource in the area.
- 7.47 The only practicable mitigation measure that could be implemented would be to undertake limited prior extraction to an extent which did not jeopardise the establishment of the Development platform. It would not be practicable to process the sand on the Site as processing requires a significant amount of plant and other infrastructure. However, it would be practicable to haul the excavated sand to Borrass quarry which is located approximately 1 km to the north of the Site.
- 7.48 The quantity of mineral that could be recovered by the mitigation measures would depend on the thickness of mineral that could be excavated without jeopardising the Development platform, and which is not needed as part of the cut and fill exercise to create that Development platform – noting that it would be more sustainable to re-use excavated material during regrading of parts of the Site, as opposed to importing additional material at greater cost to the environment. Each 1m thickness of sand excavated would yield approximately 16,000 tonnes of sand per hectare, so if an average 1m thickness of sand could be recovered from 10 ha of the 28.5 ha Site, that would yield approximately 160,000 tonnes of sand. That would be 20% of the assumed sterilisation of 770,000 tonnes referred to above. The actual amount of sand and gravel that could be recovered in mitigation is dependent on the detailed design and engineering requirements of the Development. It is likely that any sand removed from the Site would only be extracted from above the floor of the 3m thick gravel-bearing deposit.

Residual Effects

- 7.49 As the above mitigation measures are not yet confirmed, the residual effects would remain as set out within the assessment section of this chapter, namely a minor adverse effect which is Not Significant.
- 7.50 If the above mitigation measures are implemented, then the magnitude of effect would reduce to Minor-Moderate, resulting in a residual minor adverse effect on the mineral resource, which is considered to be Not Significant.

Cumulative Effects

- 7.51 This section of the Chapter assesses the cumulative effect of the Development in combination with other committed developments on the mineral resource within Wrexham.
- 7.52 Following consultation with the Council, there are no cumulative schemes from a mineral safeguarding perspective that need to be considered as part of the EIA process.

Summary

- 7.53 The baseline data relating to minerals on the Site were obtained using geological plans and borehole records published by the British Geological Survey. This was supplemented by data obtained from boreholes drilled on the site and the excavation of pits. These investigations provided data relating to the composition of the mineral resource on the Site. The effect on minerals has been assessed using best practice techniques and professional knowledge, with the significance of effect determined from the sensitivity of the resource (i.e. current mineral supply in Wrexham) and the magnitude of impact.
- 7.54 The site investigation established that the mineral resource on the Site is predominantly fine sand to a depth of approximately 25 metres. There is a small proportion (5-10%) of gravel in the uppermost 3 metres but the gravel is scarce or absent at greater depths. Commercially viable deposits of sand and gravel normally have a significant proportion of gravel, so the absence of gravel in the mineral resource means it is less commercially attractive than a resource with a high gravel content.
- 7.55 Wrexham has a landbank of permitted sand and gravel reserves sufficient for 19.6 years. That is an unusually high figure since Government guidance is for Mineral Planning Authorities to maintain a landbank of at least 7 years for land-won sand and gravel.

- 7.56 The only practicable mitigation measure is for a limited amount of prior extraction to an extent that does not jeopardise construction of the Development. This will remove some of the more gravelly sand, that is not needed to achieve a Development platform, and it would be possible for it to be hauled from the Site to Borrás quarry which is approximately 1 km to the north of the Site; should the operators of Borrás quarry wish to receive the mineral.
- 7.57 The residual effect would be that the remaining sand would be permanently sterilised. However, this remnant is fine sand with no significant gravel content so it is of very little commercial use or value. To put it in context, the area of sterilisation is approximately 3% of the existing area of unconstrained sand and gravel to the north, east and south of Wrexham.
- 7.58 Prior to mitigation, there would be no significant residual effects on mineral resources. Mitigation measures, if implemented, would further reduce the residual effects.
- 7.59 Following consultation with WCBC, there are no cumulative schemes from a minerals perspective that need to be considered.
- 7.60 Table 7.5 contains a summary of the likely significant effects of the Development.

Table 7.5: Table of Significance – Minerals

Potential Effect	Nature of Effect (Permanent/Temporary)	Significance (Major/Moderate/Minor) (Beneficial/Adverse/Negligible)	Mitigation / Enhancement Measures	Geographical Importance*							Residual Effects (Major/Moderate/Minor) (Beneficial/Adverse/Negligible)	
				I	UK	E	R	C	B	L		
Construction												
Sterilisation of Mineral Resource	Permanent	Minor Adverse	N/A					C			Minor Adverse	
Completed Development												
N/A												
Cumulative Effects												
Construction Phase												
N/A												
Completed Development												
N/A												

*** Geographical Level of Importance**

I = International; UK = United Kingdom; E = England; R = Regional; C = County; B = Borough; L = Local

REFERENCES

- ⁱ Welsh Government, (2018), Planning Policy Wales, Edition 10.
- ⁱⁱ Welsh Government, (2004), Minerals technical advice note Wales 1: Aggregates (MTAN 1).
- ⁱⁱⁱ Welsh Government, (2020) Regional Technical Statements for the North Wales and South Wales Regional Aggregate Working Parties 2nd Review (Main Document), Final.
- ^{iv} Wrexham County Borough Council, (2005), Unitary Development Plan 1996–2011 (UDP).
- ^v Wrexham County Borough Council, (2019) Local Development Plan 2013–2028 Composite Version Deposit Plan with Focussed Changes/Minor Editing Changes KSD05
- ^{vi} 5.29 of the Deposit Version of the LDP (April 2019)
<https://www.wrexham.gov.uk/service/development-plans-and-other-planning-policy/wrexham-local-development-plan-2-ldp2-2013-2028>.
- ^{vii} British Geological Survey 1:50,000 scale online geological plan SJ 35 SE
- ^{viii} Wrexham County Borough Council, (2018), Local Development Plan 2013-2028, Background Paper BP11 Minerals, page 156, Allocation WR004AS and WR19(a) CS, also known as KSS2 or Land east of Cefn Road.
- ^{ix} https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/14721/2238394.pdf
- ^x Wrexham County Borough Council, (2014), Local Development Plan 2013-2028, Topic Paper: 5 Minerals, Edition 2.