

APPENDIX TO CHAPTER 3.0
Minerals Assessment for Island Farm

1.1 Introduction

- 1.1.1 This chapter addresses the potential effects the project may have on mineral resources beneath the site and surrounding area. The assessment includes a summary of the likely resource found within the area and identifies mitigation measures where appropriate for sterilisation of important resources.
- 1.1.2 The scope of the assessment was first defined in the Council's Scoping Opinion of 13th March 2009. This was followed by various discussions between Savills and the Council planning and minerals planning officers to define the detail of the assessment.

1.2 Planning Policy

National Policy

- 1.2.1 In Wales minerals development, or development affecting mineral resources, is directed by Minerals Planning Policy Wales (MPPW)¹. The key principles to MPPW are:
- Provide mineral resources to meet society's needs and to safeguard resources from sterilisation.
 - Protect areas of importance to natural or built heritage.
 - Limit the environmental impact of mineral extraction.
 - Achieve high standard restoration and beneficial after-use.
 - Encourage efficient and appropriate use of minerals and the re-use and recycling of suitable materials.
- 1.2.2 To facilitate the first of these key principles MPPW advocates the use of safeguard zones to ensure the future supply of minerals.
- 1.2.3 For aggregates, the policy set out in MPPW is expanded on in Minerals Technical Advice Note 1 (MTAN1)². In relation to sand and gravel in South Wales MTAN1 states:

"In South Wales there is a unique dependence on marine aggregates to provide sand and gravel. About 95% of the sand used in South East Wales comes from marine derived sources.

... As a corollary, research has been completed to determine the potential land-based resources of fine aggregates in South East Wales and the comparative environment impact of different supply options. The Welsh Assembly Government issued a Position Statement on the Sand and Gravel Supply for

¹ The National Assembly for Wales. (December 2000). Minerals Planning Policy Wales.
<http://cymru.gov.uk/topics/planning/policy/minerals/mineralsplanning?lang=en&ts=1>

² Welsh Assembly Government. ((March 2004). Minerals Technical Advice Note 1: Aggregates.
<http://cymru.gov.uk/topics/planning/policy/mineralstans/2888891/?lang=en&ts=1>

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South East Wales in December 2002. This made clear that the use of marine dredged sand and gravel would probably continue for the foreseeable future but only where this remains consistent with the principles of sustainable development... There remains uncertainty about the future aggregates dredging continuing to supply the South Wales construction market.”

- 1.2.4 The future strategy for aggregates advocated by the WAG Position Statement³, MTAN1 and the Interim Marine Aggregates Dredging Policy (IMADP)⁴ is to gradually move away from the dependence on marine won aggregates to land-based resources (where these are more sustainable) and secondary/recycled aggregates.
- 1.2.5 A broad objective of MTAN1 is to increase the use of secondary/recycled aggregates for 10% of the total proportion used in 2004 to at least 25% in five years (i.e. 2009). In South Wales a proportion of 26.5% was achieved by 2005⁵. There is no doubt that as the market for secondary/recycled aggregates becomes more established, technological breakthroughs maximise its potential, and the legislation governing waste to landfill become more strict, this proportion can be expected to rise substantially over the next decade.

Local Planning Policy

- 1.2.6 Within the County Borough, the Council has recognised the importance of safeguarding potential land-based aggregate deposits. As such two policies (M4 and M14) are included in the Adopted Unitary Development Plan (UDP)⁶ relating to aggregates. M14 allocates part of the proposed development site as a sand and gravel resources and states:

“Safeguarding areas are identified on the proposals map as potential resources of sand and gravel. Proposals for permanent development within any part of these areas will be strongly resisted. The resources are located as follows:

... M14(3) Island Farm, Bridgend...”

- 1.2.7 The text accompanying this policy states that it should be read in conjunction with Policy M6 which states:

“Proposals for land-won sand and gravel will be examined against criteria in Policy M2. Extraction in statutory designated areas will only be permitted in exceptional circumstances, following the most rigorous examination of the contribution to the public interest, environmental impact and scope for mitigation.”

³ WAG. (December 2002). Sand and Gravel Supply for South East Wales – Position Statement.

<http://cymru.gov.uk/topics/planning/policy/minerals/sandandgravel?lang=en&ts=1>

⁴ WAG. (November 2004). Interim Marine Aggregates Dredging Policy South Wales.

<http://cymru.gov.uk/topics/planning/policy/minerals/interimmarine?lang=en&ts=1>

⁵ South Wales Regional Aggregates Working Party. (October 2008). Regional Technical Statement. <http://www.swrawp-wales.org.uk/Html/publications.html>

⁶ Bridgend County Borough Council. (May 2005). Adopted Unitary Development Plan. <http://www.swrawp-wales.org.uk/Html/publications.html>

1.2.8 The criteria in Policy M2 are:

“Proposals for mineral extraction and associated development, including mineral waste tipping, will be permitted only where all of the following criteria are satisfied:

1. Measures can be taken to reduce damage or disturbance to the environment to acceptable levels with specific reference to:

A) Pollution or disturbance to ground or surface water supply or drainage;

B) The impact on the landscape of the area;

C) The effect on nature conservation and wildlife interests of the site and adjoining land with particular regard to sites designated for protection;

D) The effect on agricultural interests particularly on high quality agricultural land;

E) The effect on sites of archaeological importance; and

F) The impact on the stability of adjoining land.

2. Measures can be taken to reduce damage or disturbance to neighbouring land uses to acceptable levels including:

A) The effects of excessive noise, dust, vibration arising from the methods of working; and

B) The impact of traffic generated to and from the site.

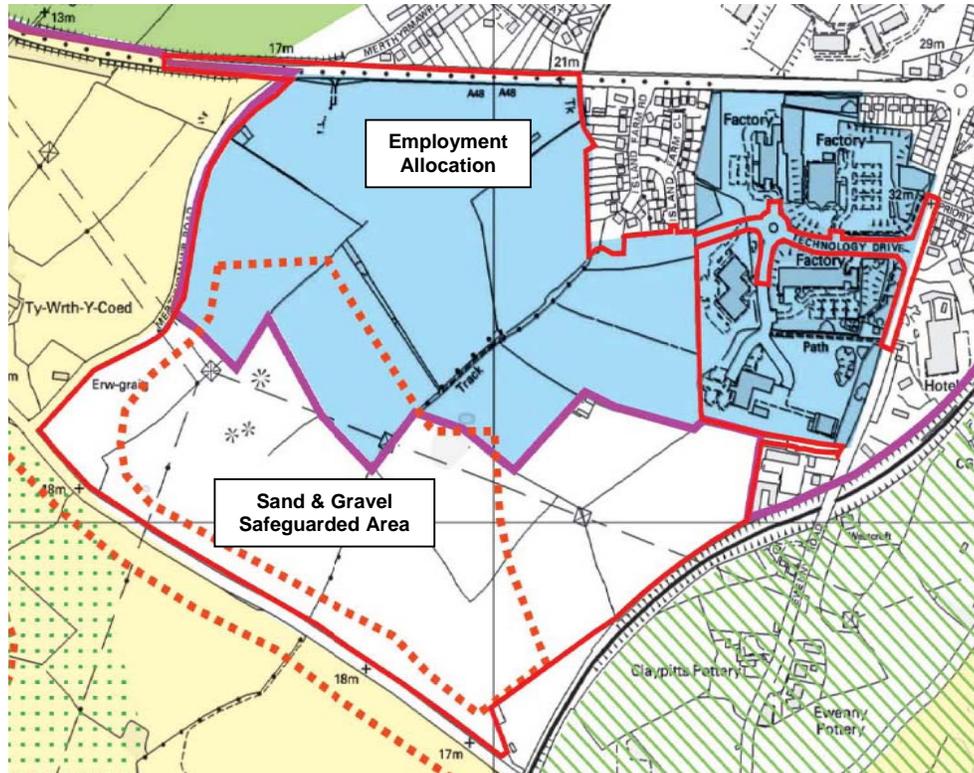
3. Proposals for the duration and phasing of operations, restoration, beneficial after-use and aftercare are acceptable.”

1.2.9 Despite the strength of wording in Policy M14 that proposals for permanent development would be resisted, part of the sand and gravel allocation is also allocated for employment development in Policy E6:

“Land is allocated and safeguarded for the establishment of high quality ‘special employment sites’. Such sites must be developed to the highest design and environmental standards and are reserved specifically for high technology business and manufacturing, research and development and related office development, and for no other purpose. In this respect the following sites are allocated at:

...E6(1) Bridgend Science Park/Island Farm...”

- 1.2.10 The proposals map is show below with the area of tension shown between policies M14 and E6.



- 1.2.11 The Council are in the process of producing a Local Development Plan (LDP) under the new planning system for the period 2006 to 2021. The Pre-Deposit Proposals⁷ set out two strategic policies on minerals (SP6 and SP7) regarding supply and protection respectively. SP6 seeks to strengthen the requirements for using secondary/recycled aggregates as a preference over land or marine won primary resources.

1.3 Assessment Methodology and Criteria

Mineral Supply

- 1.3.1 The analysis of mineral supply will comprise two parts. The first is a desk-top assessment of the current and predicted future supply of minerals in the Region. Second, this will be supplemented by onsite investigations to determine the likely size of the mineral deposit beneath the site.

⁷ Bridgend County Borough Council. (February 2009). Local Development Plan Pre-Deposit Proposals.
http://www.bridgend.gov.uk/web/groups/public/documents/services/009560_hcsp

Mineral Demand

- 1.3.2 The demand for minerals is largely dictated by the economic cycle. When in a period of economic growth it can be assumed that the demand for minerals will also grow. A sharp reduction in mineral demand is often one of the clearest signs of an economic downturn given its importance to both the industrial and construction sectors.
- 1.3.3 There are other factors that can affect demand. In particular, the current push of Government policy towards the use of secondary/recycled aggregates is likely to have some effect in devaluing the market for primary aggregates.
- 1.3.4 The analysis of demand will be based on desk-top assessment.

Social and Environmental Implications of Mineral Extraction

- 1.3.5 In considering whether mineral extraction is viable, it is necessary to consider any social or environmental features in or around the site that might be sensitive to it. For example, households located close to the site may be subjected to unacceptable levels of noise within appropriate mitigation, or the site might be occupied by protected species.
- 1.3.6 This analysis will use information available from the rest of the Environmental Statement to ascertain if mineral extraction would likely be acceptable in the absence of the proposed development.

Extraction Prior to Development

- 1.3.7 Where the viability and social and environmental implications of extraction are considered acceptable, further consideration will be given to the practicality of extracting the mineral prior to developing the site as proposed.

Assessment Criteria

- 1.3.8 The nature of a minerals assessment does not lend itself well to a series of criteria that measure the significance of sterilising a resource. Instead it is necessary to consider a number of 'sustainability' factors:
- Environmental Sensitivity: Mineral can only be extracted where it is found and therefore it often comes into conflict with sensitive environments. A balance therefore needs to be made between protecting the environment and extracting the mineral. In some cases, such as in statutorily protected sites for nature conservation, it is likely that the sensitivity would be too high to allow extraction to occur.
 - Management of Natural Resources: There are some minerals that are particularly rare and it is therefore important that they are managed appropriately. An example of this is Bath stone where there is a high demand for a stone of limited resource.
 - Economic Influence: This includes many issues of supply and demand. Where demand is high it maybe possible that a previously unviable deposit can be extracted. Other issues such as the availability of secondary/recycled aggregates can influence the viability of primary resources.

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- **Social Sensitivity:** This can reflect two aspects. First, there can be issues of construction being delayed or prevented due to limited and/or overpriced aggregate supplies. Second, the location of settlements in relation to mineral deposits may result in a more direct conflict whereby a balance needs to be reached on the level of disturbance that is acceptable.

1.4 Baseline Conditions

Local Setting

- 1.4.1 The proposed development site is located on the southeast boundary of Bridgend with open countryside to the south and west. To the north of the site is the A48 'By Pass Road' with the White Rock residential area beyond. To the east is a small residential area and the existing science park employment development. This small residential area is the closest sensitive receptor to the sand and gravel allocation at approximately 350m.
- 1.4.2 The site currently comprises a series of fields in agricultural use and the remnants of a World War II Prisoners of War camp.
- 1.4.3 Published sources of geological information suggest that the bedrock geology is of Lower Jurassic age comprising interbedded limestones and shales. This is overlain by boulder clay then glacial sands and gravel with made ground and topsoils at the surface. (see Chapter 9 for further details).
- 1.4.4 The limestone is affected by fractures and fissures caused by tectonic pressures and expanded by groundwater. Where such cavities are located near to the surface there is the potential for structural collapse of the deposits above, creating what is commonly known as 'sink holes'. A number of these have been identified within the site and in areas to the west.
- 1.4.5 Current theory suggests that these sinkholes were created prior to the last glacial period. During the last ice age the voids within the limestone were filled with glacial deposits, in this case, most likely boulder clays. Subsequent movement of groundwater would have gradually eroded the deposits with the voids, de-stabilising the deposits above.
- 1.4.6 In addition to these naturally occurring voids, it is understood that some man made tunnels exist beneath the site. These date to WWII and the operation of the Prisoners of War camp when a number of escapes via tunnelling were attempted.
- 1.4.7 Groundwater appears to be limited to the limestone, which is defined by the Environment Agency as a Major Aquifer. However, given the relatively thick deposit of boulder clay above the limestone, there is potential for a perched water table to occur. This may exist in depressions within the clay or across the entire site. It could also occur all year or just during the wetter times of the year.

Mineral Supply and Demand

- 1.4.8 The South Wales Regional Aggregates Working Party (SWRAP) Annual Report⁸ indicates that in Gwent, Glamorgan and Powys just .001mt of sand and gravel was extracted from land in 2007, with a reserve of 0.36mt (figures are not available just for Bridgend). In total just 0.24mt of sand and gravel were land won in South Wales with a reserve of 10.75mt. As a very approximate figure overall figure, this suggests there is currently a 45-year reserve of sand and gravel in South Wales.
- 1.4.9 In contrast, 1.07mt of marine won sand and gravel was landed in South Wales in 2007, up from 0.95mt in 2006, equating to an increase of 12.6%. Over the last five years however the annual totals largely fluctuated between these two figures. The land won statistics for 2007 are about average for the last five years.
- 1.4.10 The 2008 SWRAP Regional Technical Statement provides details specific to Bridgend, although the apportionment is made jointly with the Vale of Glamorgan for reasons of confidentiality. This shows that Bridgend is a major producer and exporter of high quality limestone but does not currently produce any sand and gravel; nor does the Vale of Glamorgan. Furthermore, there are currently no significant sources of secondary aggregate other than the turnover of construction and demolition waste in the County Borough, although a very large resource is available in the Vale of Glamorgan. Within the Valleys there are extensive areas of Pennant Sandstone.
- 1.4.11 Despite the current lack of sand and gravel extraction within the County Borough, previous strategic level studies have suggested that there are several deposits that could yield as much as 5Mt each. It is believed that it was on the basis of these studies that the site was safeguarded for extraction. However, as explained below, this yield is significantly overestimated.
- 1.4.12 Overall, Bridgend and the Vale of Glamorgan are required to supply at most 32.9mt of aggregate over the next 15 years. The generous supply of limestone and sandstone suggest that there is no issue in this apportionment being met. However, the sand and gravel element of this is most likely to be limited to marine won resource.
- 1.4.13 Over the 15 year period it is anticipated that there will be a gradual transition from marine won sand and gravels to land based resources and secondary/recycled sources, as set out in MTAN1. However, it is considered likely that the market will still require a considerable proportion of high quality fine sand and gravels that are only likely to be viable from marine sources for the foreseeable future. Therefore it will be the lower grade end of the market that will make the transition first, most likely to secondary/recycled sources than land-won deposits. With the implementation of a new environmental permitting regime that will subject inert waste to landfill tax, it is anticipated that the price of secondary/recycled aggregates will fall significantly relative to primary sources.
- 1.4.14 Consequently, the whilst there is a continued need to safeguard land-based sand and gravel deposits for the very distant future (i.e. several decades), it is highly unlikely that these resources would be required within the current apportionment.

Site Investigations

- 1.4.15 Terra Firma has undertaken an intrusive investigation of the site, which comprised 19 trial pits (HD1-3 and TP1-16) and four boreholes (WS1-4). These show that most of the site comprises:
- Topsoil and/or Made Ground: 0 – 0.40m thick
 - Silt (including some sand and gravel): 0.80m – 3.10m+ thick
 - Gravels: 0 – 1.90m thick
 - Clays: at least 2.10m thick
- 1.4.16 It was noted in Borehole WS3 that there were *Gryphea* fossil fragments, a distinctive type of Jurassic mollusc that is commonly found within the limestones of South Wales. These fossils would have been eroded from the top of the limestone bedrock and re-worked into the clay drift deposits. This is therefore considered robust evidence that the clays lie directly on top of the limestones without any further coarser beds in between. This reflects the conceptual geo-technical model set out in Chapter 7.
- 1.4.17 Assuming the gravel bed is an average thickness of 1.5m across the whole sand and gravel safeguarding area (covering approximately 17.6ha) included within the site, it is estimated that there would be a resource of just 0.39mt, without taking account of wastage. Some sand and gravel could also be derived from the silts above although this would require considerable sorting with much wastage.
- 1.4.18 The gravel deposit is described as unsorted gravel and cobbles with occasional boulders. These are largely rounded to sub-rounded in a very silty matrix.

Other Considerations

- 1.4.19 There are two other factors that need to be considered when determining the relative importance of this mineral deposit.
- 1.4.20 First, part of the sand and gravel resource safeguarding area allocation (Policy M14) in the Adopted UDP is also safeguarded for employment uses (Policy E6). There is a clear tension between these two allocations.
- 1.4.21 The analysis of sand and gravel supply set out above makes it clear that it is unlikely that there will be a substantial change from marine won resource to land won resource in the next fifteen years. Given the limited size of the deposit beneath the proposed development site, it is unlikely that it would be considered particularly viable until the market for land-based resources had established at least equal par with that of marine based resources, which tend to be of superior quality. Therefore it is unlikely that extraction of this site would occur during the UDP period.

⁸ SWRAWP. (2007). Annual Report 2007. <http://www.swrawp-wales.org.uk/Html/publications.html>

- 1.4.22 Such a scenario is acceptable for a minerals safeguard allocation since it is simply recognition that there is a resource there to utilise any time in the future. Employment allocations however are usually identified on the basis that it is required to meet the employment needs to the County Borough within the UDP period.
- 1.4.23 In this scenario the implementation of the employment policy appears to be jeopardised by the lack of foreseeable demand for land won sand and gravel. The alternative scenarios are that the mineral is extracted at an economic loss or it is sterilised to facilitate development on the employment allocation land.
- 1.4.24 Such sterilisation already appears to have been accepted by both the Council and WAG. Planning application P/03/58/OUT covered the entire sand and gravel allocation with a sports-led development relatively similar to that now proposed. The County Borough Planning Committee determined that the application should be approved subject to completion of a legal agreement. This was subsequently referred to WAG as a departure from the Development Plan. The main issues that were considered by the First Minister did not include the sterilisation of the mineral resource. In May 2003 the First Minister determined not to call in the planning application.
- 1.4.25 Due to various reasons a legal agreement was never reached and the Council finally refused the application. The list of reasons for refusal did not include sterilisation of the mineral resource.
- 1.4.26 Therefore the position of the Council to date has been that, whilst it would be ideal to extract the sand and gravel beneath the site, the sterilisation of it is not a material consideration in determining whether permanent development should be allowed on the site.

1.5 Predicted Effects

Environmental Sensitivity

- 1.5.1 The following is measured against the criteria set out in Adopted UDP Policy M2:

A) Pollution or disturbance to ground or surface water supply or drainage

- 1.5.2 Groundwater was not encountered within any of the site investigations undertaken in July 2009. It is therefore assumed that groundwater is limited to the limestone beneath the boulder clay for much of the year. There is however potential for a perched water table to occur in the gravels above the clays during wetter months.
- 1.5.3 This is envisaged to occur through two means. First, it could occur simply through water filtering through from the surface. Alternatively, it may also occur through artesian pressure from the limestone utilising the sink holes features.
- 1.5.4 Overall it is considered that there is moderate risk to the Major Aquifer should the site be subject to mineral extraction. It is highly likely that the voids created by extraction would be partially filled by the considerable amount of silt sludge that would be generated. Whilst measures can be implemented to minimise its effect, it is likely that some of this sludge would enter the Major Aquifer via sink holes.

B) The impact on the landscape of the area

- 1.5.5 The landscape and visual assessment for the proposed development has shown that the surrounding area has the capacity to accept further built development. The site is surrounded by mature vegetation that would help to screen any mineral workings with only the taller elements likely to be seen from the south and west.
- 1.5.6 Overall it is considered that the impact on the landscape could be largely mitigated and the residual effect would not be sufficient to make mineral extraction unacceptable.

C) The effect on nature conservation and wildlife interests of the site and adjoining land with particular regard to sites designated for protection

- 1.5.7 The site is known to include protected species such as Dormouse and Bats. Whilst the proposed development has sought to minimise the adverse effects on protected species and habitats, and indeed includes a number of ecological enhancements (including 30 acres of land set aside as a nature reserve), it is difficult to imagine how the mineral resource beneath the site could be extracted without substantially higher adverse effects.
- 1.5.8 On this basis it is envisaged that mineral extraction on this site would fail against this criteria.

D) The effect on agricultural interests particularly on high quality agricultural land

- 1.5.9 Whilst the loss of agricultural was identified as a significant issue in the referral of the 2003 planning application to WAG, it was considered that the limited inclusion of Grades 2 and above within the site meant that this should not be an obstacle to development.
- 1.5.10 As with the proposed development, it is likely that any mineral extraction would safeguard the topsoil and re-use it onsite during the restoration phase. Consequently, it is considered likely that mineral extraction on the site could comply with this criteria.

E) The effect on sites of archaeological importance

- 1.5.11 As with the development proposed mineral extraction would lead to the loss of existing archaeology. The major difference however is that in the case on mineral extraction this would be total, whilst in some areas the proposed development would simply cover it (i.e. the football pitches where no cutting into the ground is anticipated).
- 1.5.12 Based on the analysis in Chapter 8 it is considered that (despite the total loss of the archaeological resource) with appropriate mitigation prior to extraction, the effect would not be considered significant and it could comply with this criteria.

F) The impact on the stability of adjoining land

- 1.5.13 There are no existing structures sufficiently close to the safeguarded area that would likely be affected by instability from mineral extraction.

Conclusions

- 1.5.14 It is considered that the groundwater issues caused by the karstic terrain and the important ecological features on the site would bring into question the appropriateness of the site for mineral extraction. The analysis is however not clear cut and it is possible that measures could be formulated to sufficiently mitigate these effects.

Social Sensitivity

- 1.5.15 The following is measured against the criteria derived from MTAN1:

Buffer Zone

- 1.5.16 MTAN1 suggests a minimum buffer zone of 100m between sensitive land uses and areas used for extracting or processing sand and gravels. The closest houses to the safeguarded area are approximately 350m to the north. It is likely that in order to achieve the maximum level of extraction, processing facilities would be located outside of the safeguarded zone. However, it is considered likely that these could be located with sufficient space to achieve this minimum requirement.

Dust

- 1.5.17 Dust generated from mineral workings can have a significant impact on local air quality and human health. Given the location of the safeguarded area in relation to the residential area to the north, it is considered likely that dust could be a major issue.
- 1.5.18 The predominant wind direction is from the southwest and would direct dust from the workings towards the residential area and the town centre beyond. The relatively dry nature of the deposits could further exacerbate this.
- 1.5.19 Whilst this could be mitigated to a degree, particularly by maximising the size of the buffer zone to the north, it is inevitable that dust will continue to be an issue for nearby residents.

Noise

- 1.5.20 It is anticipated that the minimum buffer zone plus the use of mounds created using topsoil could satisfactorily mitigate the effects of noise on nearby residents.

Conclusions

- 1.5.21 Overall it is considered that social sensitivities are not sufficiently great to suggest that mineral extraction would be inappropriate on this site.

1.6 Supply and Demand

- 1.6.1 The site investigations suggest a deposit of approximately 0.39mt of gravel beneath the site with an overburden of at least the same quantity. It is likely given the very silty nature of the matrix that considerable sorting would be required with a high proportion of wastage. This would comprise a silt sludge of no economic value that would need to be re-deposited on site.
- 1.6.2 Based on these complications alone for what is a relatively small deposit, it is anticipated that

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it would not be viable to extract the resource at the present time, or indeed within the current 15-year apportionment period. When taking account of the supply and demand scenario described previously with secondary/recycled aggregates largely taking over the low grade of the market from marine sources, it is also highly unlikely that extracting from this source would be competitive.

1.7 Summary and Conclusions

- 1.7.1 On the above analysis, it is therefore considered that the sand and gravel resource is not viable at the current time or indeed for the foreseeable future. It is therefore not considered appropriate for the safeguarding of the resource to be a material consideration in determining if more permanent development would be appropriate. This is in line with the position held by the Council and WAG for the previous planning application on the site.
- 1.7.2 Since the resource is not considered viable at this stage, it would be inappropriate for the Council to seek extraction prior to development of the site as this would inevitably be at a loss. This is without taking into account the likely substantial issues extraction would cause for the design of the proposed development.
- 1.7.3 It should also be noted that much of the gravel resource will be located beneath playing pitches. Should the resource be needed in the distant future, it maybe be appropriate on balance to extract the mineral at that stage.