Issues of Sustainability and Distributional Equity in Ensuring Mineral Supply:

The Case of High Specification Aggregates in England

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ABBREVIATIONS

List of Commonly Used Abbreviations and Acronyms:

AAV – Aggregate Abrasion Value
AONB – Area of Outstanding Natural Beauty
AWP – Aggregate Working Party
BGS – British Geological Society
CCC – Cumbria County Council
CPRE – Campaign to Protect Rural England
CS – Core Strategy
DCLG – Department for Communities & Local Government
DPD – Development Plan Document
EIA – Environmental Impact Assessment
ELC – European Landscape Convention
GSQ – Ghyll Scaur Quarry
GIS – Geographical Information System
GVA – Gross Value Added
HSA – High Specification Aggregates
HGV – Heavy Goods Vehicle
HQ – Holmescales Quarry
IDO – Interim Development Order
LA – Los Angeles Co-efficient
LULU – Locally Unwanted Land-Use
MASS – Managed Aggregate Supply System
MDF – Minerals Development Framework
MPA – Mineral Planning Authority
NIMBY – Not-In-My-Back-Yard
NPPF – National Planning Policy Framework
OMP – Old Minerals Planning Permissions
PSV – Polished Stone Value
PINs – Planning Inspectorate
RAWP – Regional Aggregate Working Party
REQ – Roan Edge Quarry
RSS – Regional Spatial Strategy
SD – Sustainable Development
SSSI – Sites of Special Scientific Interest
VHSA – Very High Specification Aggregate
YDNP – Yorkshire Dales National Park
ABSTRACT

High Specification Aggregates [HSA] are critical components of the nation’s transport infrastructure; however their extraction and conveyance create significant environmental externalities. The minerals planning system is charged with the daunting task of mediating these tensions so as to secure an adequate supply of minerals whilst best protecting the environment and meeting sustainability objectives. Yet its’ ability to do this within the context of HSA is complicated by the geological rarity and dispersed occurrence of this resource. This paper thus investigates the functionality of the system in relation to HSA, exploring the key issues and barriers to achieving a more sustainable and equitable pattern of HSA quarries whilst also meeting demand. To this end a carefully sequenced mixture of methods were employed, encompassing questionnaires targeted at Minerals Planning Authorities; desk-based policy and planning application reviews; GIS site analysis; and exploratory case studies of three HSA Quarries within Cumbria underpinned by interviews. This research revealed an uneven patchwork of local minerals planning policy approaches, a historically entrenched pattern of quarries with poor sustainability credentials and the preeminent significance of HGV traffic impacts associated with HSA extraction. The study concludes that to secure supply in a more sustainable and equitable fashion greater strategic co-ordination, steer and spatial management of supply and the current and future network of sites is required.
ACKNOWLEDGEMENTS

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On a personal note, I would also like to thank my Mum & Dad for flapjack, phonecalls and their continued unerring support and good humour.
DECLARATION

I (Edward Thomas Page) state that ‘no portion of the work referred to in the dissertation has been submitted in support of an application for another degree or qualification of this University or any other institute of learning’.
CHAPTER 1: INTRODUCTION

1.1 Background

Minerals are essential inputs in developing the physical, social and economic capital (Far Horizon, 2010) necessary for ‘the sustainable development of a modern economy’ (Highley et al, 2004, p.5). Within this, primary aggregates are instrumental in creating and maintaining the structural fabric of the built environment (Steadman et al 2008), and underpinning the construction industry which is pivotal to growth in the UK economy as evidenced by its contribution to 8.3% Gross Value Added [GVA] in 2008 (BIS, 2011).

However the physical extraction and transport of aggregates causes significant environmental impacts (Willis and Garrod, 1999) which can detrimentally affect the quality of life of neighbouring communities (Green Balance, 1996). Resultantly minerals development frequently engenders strong opposition.

The UK Government has sought to utilise the minerals planning system ‘to find a politically acceptable ‘spatial fix’ for aggregates production’ (Cowell and Owens, 1998, p.797); charging it with securing ‘an adequate and steady supply of minerals for the economy and society, commensurate with protecting the environment and securing the prudent use of natural resources’ (DCLG, 2006a, p. 9). Within this the broad concept of Sustainable Development [SD] is bestowed a vital role in resolving conflicts over minerals development, being seen as a key device to ensure the ‘best integration of social, environmental and economic costs and benefits is achieved’ (ibid).

Though the principle of SD is deeply embedded within the British Planning System through the Planning and Compulsory Act 2004 and national planning policy (DCLG, 2005d, 2006a, 2008); the unclear weighting between its’ economic, environmental and social components make it a highly contentious, subjective and politically malleable concept. SDs’ ‘definitional ambiguities’ (Haughton and Counsell, 2004, p.73) have thus resulted in a multiplicity of sustainability discourses’ often with conflicting aims. Its
application to minerals development is therefore particularly complex, especially in light of the non-renewable nature of virgin aggregate resources.

These issues raise pressing questions as regards the true equity and sustainability implications of quarrying and the minerals planning system that controls this.

1.2 Scope
This study explicitly focuses upon High Specification Aggregates [HSA]. HSAs are relatively scarce and highly specialised mineral resource which supply a crucial market. Used for highways surfacing, railway ballast, and airport runways; HSAs’ mutually dependent relationship with the nation’s transport infrastructure makes them critical to the government’s growth agenda (Clark, 2010). As such HSA production provides a unique and important context through which to investigate the sustainability and equity implications of quarrying.

Although it is recognised that a substantial proportion (approximately 38%) of English demand for HSA is met through imports from Wales, Scotland and abroad (Thompson et al, 2004), to undertake such an expansive review would require significant time and resources that are simply not available for this study. Moreover, the ever-rising costs of fuel and transport (RHA, 2010) make domestic sources of HSA increasingly important. The scope of the study is therefore geographically confined to the England. From this canvas a holistic approach that focuses principally on planning policy but also touches upon its interface with development control/management in terms of sites has been pursued.

As regards sustainability, the study provides a broad overview of this within a minerals context, but principally concentrates upon its operation at the strategic scale of aggregate logistics and at the site level in terms of externalities. Similarly, in terms of distributional equity, this is used in a limited sense to examine the effect and impacts of HSA extraction. Accordingly, it is not intended to unravel the broader debates upon sustainable development or environmental justice within this study.
1.3 Rationale of the Study
This study draws motivation from my keen interest in the tensions that permeate minerals planning and sustainability discourses. Within this, HSAs occupy a particularly complex and problematic position due to their geological rarity, dispersed occurrence and socio-economic importance. These attributes raise testing questions regarding the environmental capacity of HSA resource areas to supply this highly specialised material. The study thus seeks to unpack the issues surrounding HSA extraction and assess the sustainability and equity implications of its current pattern of sites.

My interest in HSAs was stimulated by my attendance of a special task-group meeting between the North-West and Yorkshire and Humber Regional Aggregate Working Parties [RAWPs] into the implications of uncertainty over future HSA supply from the Yorkshire Dales National Park [YDNP]. These discussions highlighted a pressing need to urgently address potential supply shortfalls and emphasised the difficulties in finding economically viable HSA deposits that are also acceptable in planning terms. Moreover they also raised profound questions concerning the equity and sustainability implications of efforts to reduce extraction within the YDNP. Given these problems, there is a clear and urgent need to review and address how the minerals planning system currently manages HSA extraction and supply.

1.4 Aim
To explore the key issues and barriers to achieving a sustainable and equitable pattern of HSA quarries to meet demand through the minerals planning system.

1.5 Objectives
The above aim has informed the identification of the following five objectives
- **O1** - To investigate the importance of HSA and critically review the key literature, policy and issues surrounding its extraction and supply.
- **O2** - To gauge how effective the minerals planning system has been in securing the required flow of HSA to date.
- **O3** - To assess how successfully minerals planning policy balances the need to meet HSA demand with wider principles of sustainability and distributional equity.
- **04** - To evaluate the impact of local minerals planning policy on the existing and potential future pattern of HSA quarries
- **05** - To identify barriers to securing supply in a more sustainable and equitable fashion and recommend how the minerals planning system can be improved to address these.

### 1.6 Structure and Content of the Report

Chapter 2 provides a literature review which first explores the key themes and impacts associated with quarrying before progressing to an examination of the role, purpose and effectiveness of the English minerals planning system, and its relationship to sustainability. This in turn feeds into a more focused examination of HSAs – providing critical analysis of the specific issues and current policy framework surrounding these.

Chapter 3 sets out the research questions and strategy devised to address the identified literature gaps and fulfil the study’s aim and objectives. Moreover this methodology establishes the research design’s rationale and details the multiple techniques utilised and their sequencing.

Chapters 4-6 then present the research results, providing running commentary, analysis and discussion of these. These chapters are arranged so as to provide clear progression from policy to practice whilst telescoping down to an increasingly fine spatial scale. Firstly a national overview of local minerals planning policies relating to HSA extraction is undertaken as a precursor to an update of the baseline data as regards the current pattern of active HSA sites within England, before focusing-in upon the issues and impacts appertaining to three HSA case-study quarries within Cumbria in the North-West of England.

Chapter 7 takes stock of these results, providing an overarching discussion of the key emerging themes and combined implications of their findings. It then proceeds to provide recommendations on how the pattern of extraction could be better managed to secure supply in a more sustainable and equitable fashion.
Finally, chapter 8 provides an overview of the study's findings, highlighting their wider implications for the minerals planning system and indicating areas in need of further future research.
CHAPTER 2: LITERATURE REVIEW

2.1 Introduction
To date there have been no studies evaluating the challenges faced in securing sustainable locations for the extraction and supply of HSAs through the emerging Minerals Development Framework [MDF] system or at a site specific level. Yet there have been a number of academic analyses and reports produced looking at the operation of the mineral planning system, its underlying assumptions, principles, and its environmental impacts. These works and their arguments frame the wider context for this study revealing the principle issues and tensions within the current system. Operating within this context, the study adopts a traditional literature review approach to explore the key issues, develops emerging ideas and identifies research gaps (Jesson et al, 2011).

This review consists of two key strands. Firstly it provides a broad overview of the significance, externalities and sustainability implications of quarrying within a practical and wider theoretical academic context. Secondly it examines the role, structure, and effectiveness of minerals planning system, before focusing on the limited, predominantly grey literature, specifically addressing HSA. As such it establishes and evaluates the current policy framework in operation for managing HSA and assesses some of its implications at the policy practice interface.

2.2 The Economic & Social Importance of Minerals Extraction
Minerals are perhaps the most important category of non-renewable natural resources (Selman, 2000) as they are essential in developing physical and economic capital (Far Horizon, 2010). Moreover, if used wisely, this transient asset can be equitably converted into durable social and environmental capital (Davis and Tilton, 2005; Richards, 2005). A modern developed society creates a demand for minerals which translates into a ‘need’ to meet this demand in the interests of the economy (Brown, 2008). However, the principle of ‘need’ in minerals planning is an imprecise and unfixed concept that hinges on the balance between the case for demand, which requires specific virgin mineral properties in productive processes, and the environmental disadvantages of supplying it
from a proposed site (Green Balance, 1996). As technological developments, demographic expansion and societal evolution have played out across the twentieth century, the tensions between these cases has risen with land-use conflict between mineral resource development and other uses steadily escalating the world over. In the UK this has been intensified by a progressive decoupling of the links between lifestyle and consumption patterns (Bloodworth et al, 2009) that have reframed rural space and accustomed citizens to an increasingly post-productive countryside (Warren and Birnie, 2009). These trends have increasingly threatened to impede the extractive industries’ ability to ensure a steady flow of minerals, contributing to growing concerns within Europe regarding access to minerals deemed critical to future economic development (Keating, 2011). Responding to this, the European Commission’s (2008) Communication “The Raw Materials Initiative – Meeting Our Critical Needs for Growth and Jobs in Europe” established securing a sustainable supply of minerals from European sources as a key objective. This has in-turn raised the profile and appreciation of the strategic importance of aggregate supply at the European Level (Ramadoo, 2011).

Within Europe construction minerals (Table 2.1) are the largest subsector in terms of value and volume. They generated an approximate turnover of €40 billion in 2004 (Tiess, 2007); whilst annual aggregate production averaged more than 3 billion tonnes (University of Leoben, 2004). The UK is the fifth highest producer of aggregates in Europe (ibid) and Brown et al (2008) calculate that the Gross Value Added [GVA] to the English economy by the primary aggregate industry is over 1 billion per year. Aggregate products also buttress the competitiveness of vital downstream industries (1bn GVA per year) and the construction sector (50bn GVA per year) (ibid) which is critical to the national economy. Whilst the intensity of use of primary aggregates within the UK has declined since the 1970s (Figure 2.1), they remain the most widely used construction materials (Highley et al, 2007). However, the relatively low value of aggregates, their bulky nature and requirement in large quantities, constrains the distance they can be transported as haulage dominates their overall price (Tiess, 2007) as costs can virtually double for each 30 miles travelled (Entec UK Ltd, 2005). Consequently most markets are local or regional. Indigenous aggregate resources are thus recognised as a highly valued natural asset providing a sustainable supply source. Yet their extraction remains locally contentious due to the immediate and long-term environmental and amenity impacts that can be created by quarrying operations.
TABLE 2.1: Summary of Construction Minerals and their Principle Uses

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<th>Uses</th>
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<tr>
<td>Aggregates, natural</td>
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<tr>
<td>&gt; sand and gravel</td>
<td>&gt; Concrete, building sand and fill.</td>
</tr>
<tr>
<td>&gt; crushed rock (limestone,</td>
<td>&gt; Roadstone, concrete and fill.</td>
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<td>sandstone, igneous rock</td>
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<td>etc.)</td>
<td></td>
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<td>– includes HSA</td>
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<tr>
<td>Clay and shale</td>
<td>&gt; Bricks, pipes, tiles and cement manufacture.</td>
</tr>
<tr>
<td>Gypsum</td>
<td>&gt; Plaster, plasterboard and cement.</td>
</tr>
<tr>
<td>Limestone and dolomite</td>
<td>&gt; Crushed-rock aggregate, cement, other industrial</td>
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<tr>
<td></td>
<td>and agricultural uses.</td>
</tr>
<tr>
<td>Building stone (dimension</td>
<td>&gt; Comprises almost any competent rock-type that</td>
</tr>
<tr>
<td>stone)</td>
<td>may be used in the form of shaped and/or sized</td>
</tr>
<tr>
<td></td>
<td>blocks for either structural or decorative purposes.</td>
</tr>
<tr>
<td></td>
<td>It normally includes roofing stone and slate.</td>
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*Source: Brown et al (2010, p. iv)*

FIGURE 2.1: Intensity of use of primary aggregates per unit (£1,000) of construction output within Great Britain, 1955–2005

![Graph](image)

*Source: Reproduced from Highley et al (2007). Graph displays data derived from the BGS UK Minerals Yearbook series*

Highley et al’s (2004, p.4) report on the economic importance of minerals to the UK also stresses their significance to social well-being, highlighting their ‘fundamental role in underpinning growth in the economy and in contributing to the UK’s high standard of living’. The contribution of the aggregate industry thus extends beyond the direct wealth and employment generated by customers purchasing aggregates (Brown et al, 2008).
This section has established the socio-economic importance of minerals, and in particular aggregates, within the context of national development and competitiveness. Yet working aggregates can generate significant environmental and human health impacts. The next sections examine the broad environmental impacts of quarrying and the geological preconditions necessary for an economic resource to be extracted; issues which specifically dovetail into wider considerations of sustainable development.

2.3 Environmental Impacts of Quarrying
The significant nature and extent of environmental and amenity impacts of quarrying are well documented within mineral planning policy (DCLG, 2005a-c) and literature (Coffey, 2000; Green Balance, 1996; Morgan, 2000). Though Bloodworth et al (2009, p.53) duly note that our knowledge of environmental and human health impacts is continually evolving.

The physical extraction of aggregates inevitably creates negative externalities. Common issues caused by quarrying include noise pollution, dust, blasting vibrations, water contamination, interference with existing surface and groundwater flows, visual intrusion, increased HGV traffic movements, landscape degradation and the destruction of habitats (Willis & Garrod, 1999). Furthermore quarries may also damage or destroy sites of scientific, archaeological, and cultural interest and can negatively affect the local tourism industry. These adverse impacts created by quarrying vary in their frequency and longevity from occasional short-term low-levels of nuisance to daily ever-present disruptions with cumulative or long-term effects and instances of irreparable damage. The scale of these externalities also varies by aggregate type with dust, blasting and HGV traffic impacts generally being greater at hard rock quarries (DETR, 1998).

Such a litany of harmful consequences would seemingly justify the Campaign for the Protection of Rural England’s [CPRE] (2006) policy position which emotively foregrounds the devastating impact of quarrying upon the countryside. This is not without grounds, due to the industry’s previously poor operational and environmental standards which left a legacy of manifold abandoned un-restored sites. So whilst CPRE acknowledge the positive influence of tightened planning controls, modern methods of operation and nature-conservation led restoration projects in mitigating and compensating for impacts...
during and after extraction; they contend quarrying can still have a profoundly disruptive impact on the local environments within which it is situated. Resultantly, a generally poor public perception of mining and quarrying persists (Bloodworth et al, 2009), with a recent study (Saint Consulting, 2009) suggesting quarrying is now seen as the most ‘Locally Unwanted Land-Use’ [LULU] in the UK. Such seemingly entrenched Not-In-My-Back-Yard [NIMBY] attitudes towards quarrying present a potent barrier to future mineral extraction.

Ultimately, the combination, extent and scale of impacts, and degree to which they can be mitigated, are uniquely configured and weighted at each site. Whilst Brown et al (2008) consider the environmental ‘costs’ of having an indigenous aggregates industry are much less than the economic benefits the industry brings to English economy, this logic should not diminish the fact that there are certain irreplacable environmental features and socio-environmental limits which no amount of mitigation can override. Furthermore, quarrying externalities spark important questions appertaining to social and environmental justice in terms of the spatial distribution of negative externalities (Cowell and Owens, 2002).

2.4 The Geological Reality: The Case of Crushed Rock
In 1980 crushed rock displaced sand and gravel to become the largest source of primary aggregates used in Britain (Figure 2.1). Douglas & Lawson (2000, p.18) consider this fundamentally altered the balance of supply patterns in Britain creating ‘large supply/demand mismatches among regions’.

The dispersed occurrence of crushed rock resources across the British Isles, means hard-rock quarries are frequently located in rural upland areas of high landscape value that are distant from the UK’s largest conurbations (Morgan, 2000). Indeed, Mankelow et al (2008) calculate that 52% of permitted crushed rock reserves currently fall within international and national environmental designations, and demonstrate that reserves outside of designated areas are declining more rapidly than those within. Resultantly aggregates extraction is increasingly likely to come into conflict with amenity-related ecosystem services (Reed, 2009).
The geologically determined and geographically fixed nature of minerals deposits thus inevitably translates into environmental impacts as it restricts the locational options for their extraction – creating pressure on scenic landscapes and spatial inequities. This latter aspect is most visible in the historic and continued clustering of quarries around known resources of proven value, logistical convenience or high geological significance (Bloodworth et al, 2009). This emphasises the economic nature of siting decisions as choices are influenced by multiple factors which determine what constitutes a commercially viable mineral resource at a given point in time - such as the quantity and quality of deposits, distance from key markets and logistics. Ultimately, however it is the conjunction of geological presence and minerals intelligence that are salient (McEvoy et al, 2007). In this respect Britain is fortunate as it has a varied geology, is largely self-sufficient in construction minerals (Entec UK Ltd, 2005), and has systematic geological data coverage courtesy of the British Geological Survey [BGS].

![FIGURE 2.2: Broad Distribution of Rock and Sand and Gravel in England and Wales](image)

Source: Entec UK Ltd (2005, p.7)

Though the isles’ geological inheritance is diverse, hard rock suitable for use as crushed-rock aggregate is unevenly distributed throughout the UK, with key areas of growth such as southern and eastern England being largely devoid of surface resources (Figure 2.2), placing pressure on resource rich areas to meet a wider demand. This threatens to divorce the carefully balanced relationship between social and environmental impacts and the socio-economic benefits arising from aggregates extraction. Subsequently Ike (2007) observes that mineral production for consumption in other regions, very often fuels strong NIMBY sentiments. These tensions surrounding crushed rock extraction are
geologically rooted but also highlight the spatial nature of decisions and propensity for systematic reinforcement of geographic inequities which can lead to strong disputes in which arguments are based on divergent perceptions of risk and sustainability (Cowell and Owens, 1998). The principle of sustainability has become critical to minerals planning, however discursive struggles over meanings of sustainable development (Haughton & Counsell, 2004) have stimulated a wide spectrum of nuanced interpretations which serve to cloud decision-making.

2.5 Sustainable Development in a Minerals Context
The issue of sustainability in minerals planning is multi-dimensional in nature and continues to generate extensive debate and analysis (Giurco et al 2009; Hammersley, 1995; Hilson, 2000; Owens and Cowell, 2002; Petterson et al 2005). Sustainable development in a minerals context can be seen to play-out at three levels: theoretical considerations of natural non-renewable resource management (Selman, 2000); a strategic scale of efficient supply logistics (Green Balance, 1996); and at the local site-specific level in terms of the environmental impacts of working a particular deposit (Owens & Cowell, 1996).

The theoretical level essentially takes an ethical perspective that questions the very principle of extraction of a finite mineral resource from the lithosphere. This queries whether humans have the right to readily remove common mineral resources and if so whether the pursuit of progress or personal wealth justifies over-exploitation, or whether such resources should be used sparingly, foregrounding issues of generational equity and responsible environmental stewardship. Although theoretically a finite resource, Bloodworth et al, (2009, p.s321) do not conceive resource scarcity as an issue, considering the UK’s indigenous aggregate resource are ‘effectively infinite’. However the rising orthodoxy of the Brundtland definition of Sustainable Development (WCED, 1987), fuelled the gradual adoption of resource conservation principles into UK policy, encouraging progressive improvements in the efficiency of extraction, utilisation of quarry fines and appropriate end-use controls for primary mineral assets so as to moderate demand. This has been reinforced by fiscal measures (e.g. Landfill Tax and the Aggregates Levy) which have encouraged product substitution and increased aggregate recycling of construction and demolition waste streams. Resultantly the amount of
virgin aggregate used per unit of construction output has significantly declined in the last decade with the UK becoming the largest consumer of recycled aggregates in Europe (Brown et al., 2008). Bloodworth et al. (2009) project that these trends can have a major impact on minerals consumption and may reduce demand for land use for extraction; however they note the limited practical potential for the further minimisation of demand as recycled and alternative materials struggle to replicate the same strength and qualities of primary minerals. Thus the need for virgin aggregate remains undisputed.

Demand for virgin aggregate, whilst fluctuating, is ongoing. While there is a readily available indigenous stock - the bulkiness of the product, exacting technical specifications and carbon footprint issues combine to support the likelihood that native mineral products will continue to be extracted and used for generations to come (Thomas et al., 2008). Consequently policies and guidelines (DCLG, 2006a; McEvoy et al., 2007) have been devised to safeguard mineral resource against unnecessary sterilisation by other development so as to ensure sufficient supplies remain for future generations, though the implementation and efficacy of such measures is locally variable (Bloodworth et al., 2009). These measures thus contribute to addressing the idea of intergenerational equity embedded in the Brundtland definitions’ (WCED, 1987) conception of SD.

Overall, Morgan (2000, p.11) considers the Government policies have been ‘successful in altering the supply and demand for aggregates towards more efficient resource use in line with sustainability concepts’. Yet sustainable development also requires that minerals extraction is strategically and sensitively sited so that the working, refining and transportation are efficient, performed close to the markets they support and are done without damaging ecosystems.

At the strategic scale the practicalities of supply and demand mechanics tend to dominate debates on sustainable minerals development (Cowell and Owens, 1996). At the heart of this is the question of aggregate logistics – in particular the pattern of the quarry network in relation to market hubs and growth-areas, and their connectivity to transport infrastructures. These issues are seen as key in reducing the carbon footprint of mineral extraction, as the UK Mineral Forum (2009) calculates that transporting
minerals accounts for just over 32 per cent of the industry’s CO$_2$ output. This is unsurprising considering the fact that over 90% of the total volume of aggregates sales were transported by road in England and Wales in 2001 (Entec UK Ltd, 2005). Reducing road transportation would also stem the cumulative negative impacts (e.g. noise, dust, vibration, road damage and disruption of rural tranquillity) associated with Heavy Goods Vehicles [HGV] movements which can spread the impact of minerals working far beyond a quarry’s site boundary. This is especially pertinent in the case for crushed rock, as the volume and dispersal of interregional flows is far higher and wider than that of sand and gravel due to its geological distribution (Figure 2.3).

Government policy strongly favours diverting transport of aggregates to rail and water (DCLG, 2006a), however industry’s responsiveness to this is inhibited by the economies of scale required. Moreover concerns abound that stimulating such modes of transport encourages longer-distance haulage heightening the disconnection between production and market - transferring externalities to distant localities and increasing pressure for intensification of mineral development at such strategic nodes (Thomas et al, 2008). Recent research advocates that sustainable locational choices should centre upon the proximity principle (Treleven et al, 2004) as a low cost policy measure to improve the sustainability of decisions regarding aggregate supply. However there is irresolvable tension between this and sourcing crushed rock due to the underlying geology.

A third key tenet of sustainable development is that there should be minimal negative impacts to the environment and society. The myriad impacts that can arise from quarrying have already been summarised. Their extent hinges on regulatory measures and the limits of project design within site specific contexts. The challenge for a sustainable minerals policy is therefore to find a balance between securing minerals supply and protecting the environment (Tiess, 2007); however achieving an acceptable point of balance is complex and highly subjective. Therefore negotiation and compromise at a site level become integral to establishing a viable dynamic equilibrium (Petterson, 2005). Here the planning process becomes a key filter through with sustainability principles are distilled.

In this respect Environmental Impact Assessment [EIA] can be seen as a vital instrument of SD, raising awareness of key environmental issues (Glasson, 1999), scrutinising the
FIGURE 2.3: Comparison of Inter-Regional Flows of Crushed Rock (left) and Sand & Gravel (right) within England & Wales in 2009

Source: Maps taken from DCLG (2011)
duration and cumulative effects of externalities and ensuring the most sustainable outcomes practicable are implemented. Though sceptics have questioned whether EIA is an appropriate tool to evaluate sustainability conformance and regulators have noted instances where developer bias influences decisions at project level compromising sustainability goals. Yet it has played a vital role in ensuring that mineral companies recognised and incorporated sustainability into their operating assumptions over a relatively short timeframe (Fitzpatrick et al 2010). Most importantly EIA elevates the need for carefully considered siting decisions that take into account impacts on essential ecological services and less tangible quality of life factors; serving to temper rushed responses to sudden shortages in landbank reserves. This presents a partial antidote to the demand-led ‘predict-and-provide’ mentality of the minerals planning system. Despite this, the UK’s land ethic remains strongly utilitarian in nature (Selman, 2000); with the human need of the many for aggregates often overriding the impacts on the few and voiceless.

A number of authors (Humphreys, 2002; Richards, 2005; Davis and Tilton, 2005) have stressed the crucial nature of good corporate and civic governance structures in determining whether mineral extraction promotes sustainable economic, environmental and social development. Owens and Cowell (1996) posit that for minerals development to be sustainable it must respect environmental capacities and that these must be integral to the system. As will be discussed later, this thinking has influenced MPS1 (DCLG, 2006a) in seeking to reduce the incidence of excavations, gradually relocate quarrying away from sensitive receptors protected by landscape and wildlife designations and align restoration with biodiversity objectives, placing quarrying on a more environmentally progressive and sustainable footing. However Fitzpatrick et al (2010) discerns a definitional shift within industry from a holistic approach to sustainability to a narrow one focused on performance issues such as reducing energy in processing of aggregate. This is illustrative of the diversity, flexibility and constant flux of officially adopted SD definitions. Despite this, Van der Meulan (2005) astutely perceives that it is often the public perception rather than political definitions that define sustainability and dictate its implementation at the local-level. Within this the concept of distributional fairness is frequently invoked by local communities. Subsequently
Wolsink (2004) observes that perceptions of fairness in decision-making about siting LULUs are strongly connected with perceived environmental risk and strongly deviating core values about how society should take such decisions. In light of this Owens (1994) conceives principles of sustainability as sitting uneasily with the utilitarian notion of ‘balance’ in decision making. These issues are emblematic of how sustainability interpretations ‘do not quietly coexist in a situation of stasis; they serve both to ameliorate conflict and to expose tensions in wider agendas for sustainability’ (Cowell and Owens, 1998, p. 807).

This section has examined the complex linkages between sustainable development and mineral resource supply. It has demonstrated that to encourage more sustainable modes and patterns of mineral development, a holistic approach that encompasses a range of regulatory measures (legislation, policy instruments, taxation, codes) and cuts across policy arenas is essential (Morgan, 2000). It has also revealed that there is a need to better manage sustainability in terms of the practical realities of supply and demand. This is particularly pertinent in relation to HSA and its current position within the English Minerals Planning System.

2.6 Supply & Demand – The Case of High Specification Aggregate
A recent study by Carter Jonas (2011) cites the central issues relating to crushed-rock supply as being its uneven geological distribution and the complexity of progressing proposals for extraction of suitable minerals through the planning system. These issues are amplified in the case of HSAs as they are a highly specialised product with rigorously specified technical properties that occur relatively rarely.

HSA has been well defined by the Capita Symonds Report (Thompson et al, 2004) as:

- natural and artificial coarse aggregates (≥3mm) that are suitable for use in road surfacing (including surface dressing) applications at the more difficult and/or heavily trafficked sites where high levels of skidding resistance and aggregate durability are required.

HSAs are produced from very specific deposits of igneous rock or sandstone, with their technical suitability being determined by evaluating their physical and mechanical
properties (Al Harthi, 2001). HSA is judged in terms of crushing strength, porosity and resistance to impact, abrasion and polishing (Steadman et al, 2005). Whilst strong and durable aggregates are fairly common, it is the conjunction of these properties with a high Polished Stone Value [PSV], which ensures a high degree grip, that make these aggregate resources particularly distinct and rare. Consequently Thompson et al (2004) have established four key thresholds that aggregates must meet to be utilised as HSA (Table 2.2). These combined criteria ensure HSAs possess sufficient strength, grip and durability to withstand heavy traffic and weathering. Resultantly HSA is considered to be a premium crushed-rock product by the quarrying industry (Mankelow et al, 2008). As such it is utilised for only the most demanding applications – ranging from motorway slip roads to airport runway surfaces to use as railway ballast and as highly engineered concrete used for containment of nuclear materials.

**TABLE 2.2: Specification Criteria for HSAs**

<table>
<thead>
<tr>
<th>Property</th>
<th>Limiting Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polished Stone Value [PSV]</td>
<td>≥ 58</td>
</tr>
<tr>
<td>Aggregate Abrasion Value (AAV)</td>
<td>≤16</td>
</tr>
<tr>
<td>Los Angeles Co-Efficient (LA)</td>
<td>≤30</td>
</tr>
<tr>
<td>Magnesium Sulphate Value (MS)</td>
<td>≤25%</td>
</tr>
</tbody>
</table>

Yet such optimum combinations of resistance to polishing and strength are found in a very limited number of geological formations in the North and West of England (Thompson, 2008). Even the occurrence of aggregate meeting such criteria itself is no guarantee of a viable resource, as areas containing HSA deposits can be constrained by other geological characteristics such as a variable consistency and inter-bedding with inferior quality rock types that make them unsuitable for commercial exploitation. Artificial aggregates offer an alternative source, however only Basic Oxygen Steel [BOS] Slag has been found to meet HSA criteria, and whilst Thompson et al (2004) consider that it could be used more extensively, they acknowledge that at best it can only ever account for a small fraction of total demand.
In recognition of issues of sourcing HSA, the Department of the Environment [DoE] commissioned a report on HSA supply and demand (Travers Morgan Ltd, 1993). This was the first ever systematic study of a particular sector of the aggregates market produced in the UK (Thompson, 2008), but despite wide use of its findings by mineral operators and Mineral Planning Authorities [MPAs] (Green Balance, 1996), its recommendations for separate policies and landbanks for dealing with HSA were not progressed. Moreover the report quickly became outdated by technological innovations such as new thin-surfacing techniques which increased consumption, and the rise of the sustainability agenda. Consequently Capita Symonds was commissioned to update the report so as to quantify current demand, examine the current supply pattern in England and highlight the sustainability issues involved. The resulting report (Thompson et al, 2004) surveyed local authority highways engineers to examine demand, as well as mineral operators to assess the sources of supply, thus painting a rich picture of their relationship and the uncertainty surrounding future supply. Consequently it re-asserted the importance of HSA, calling for more detailed monitoring of supply, its recognition as a national strategic resource and recommending that MPAs establish separate landbanks. Though the extent to which MPAs have taken-up these recommendations is currently unknown.

The Capita Symonds report provided both a convincing argument and comprehensive snapshot of supply and demand in 2002-2003; however its focus on sustainability was principally from a technical end-use perspective focusing on issues such as minerals sacrilege. So whilst it contains a useful wealth of spatial and quantative site data; it has little qualitative information concerning the pattern of HSA supply, the socio-environmental impacts associated with its quarrying, or the logistical challenge of transporting it to markets. As such there is an absence of analysis of the key role of the planning system in contributing to sustainability objectives, regulating impacts and enabling or restricting the delivery of supply.

The main drivers for HSA demand are road transport infrastructure construction and the maintenance of the UK’s 230,000 miles of road network (Entec UK Ltd, 2005). As such HSA supply and demand is bound within planning and transport policies. The paradigm shift in transport policy from an unsustainable predict-and-provide model that sought to match road capacity to rising demand; to one of better management of the existing
strategic road network to improve the flow of traffic (Butcher, 2010) can be directly linked with the declining demand in road building materials (Morgan, 2000). Yet this trend has become disconnected from HSA consumption due to the advent and ascendance of thin surface dressings (which require a high concentration of HSA to be used per square metre) as the predominant highways orthodoxy. Consequently the Capita Symonds report calculates a total specified demand for HSA within England of 6.126 Million tonnes [Mt] in 2002 – a 130% increase on Travers Morgan Ltd’s figure of 2.63Mt for 1992. Moreover it highlights growing import dependence, with the proportion of English demand supplied from English sources falling from 65% in 1992 to 62% in 2002. Furthermore the English landbank of HSA reserves has fallen by 20% between 1992 and 2002. These declines partly reflect the geological rarity of HSA within England, but it also suggests the presence of more deep-rooted reasons inhibiting industry’s ability to develop native HSA deposits. The inability of industry to replenish reserves thus portends that dependence on imports from Wales, Scotland and France will continue to rise, exporting negative environmental impacts to these neighbouring territories.

Thompson et al (2004) perceive the improved efficiency of use and durability of surfacing material as having temporarily offset the impact of increase in demand for HSA; but still detect a high-level of over-specification resulting in inappropriate HSA use. However, whilst they observe that most signals as regards future trends in HSA demand suggest minimal change or a slight reduction they note the considerable uncertainty in this market area due to the confluence of so many variable factors (e.g. traffic forecasts; material design, transport policy, vehicle design) and prudently advise that instead a modest increase in demand should be anticipated. Unfortunately no further data regarding the national supply, demand, usage or pattern of flows of HSA has been collected or produced since this 2004 report. To undertake a further update would be too large a task in terms of time and resources for this research. Moreover it would also continue to unduly neglect unexplored questions regarding the effect of minerals policy upon the pattern and security of HSA supply.
2.7 The Minerals Planning System in England

Minerals planning plays a critical role in influencing the pattern of HSA supply. This section will examine the theoretical and practical role of the English Minerals Planning System as a basis for a critical exploration of its current minerals planning policy framework.

The broad objective of the planning system in the UK is to make best use of land for society as a whole so as to contribute to sustainable development (DCLG, 2005d). Acting within this context, the minerals planning system seeks to balance maintaining an adequate and steady supply of aggregates to meet national needs with the imperative to sustain the natural environment (DCLG, 2006a). However the system’s reliance on a predict-and-provide approach, predicated on aggregates demand forecasting and landbanks of consented reserves, has been heavily criticised as embedding economic assumptions in the system that lend the argument of ‘need’ for mineral resources a primacy over other concerns - thus favouring development from the outset (Cowell & Owens, 1996). Cowell and Murdoch (1999, p.662) perceive this prior weighting as producing a ‘dominant strategic line’ that is legitimated in technically derived policy goals and bestowed overriding validity in regulatory arenas, restricting discursive spaces. Forecasts of aggregates demand are afforded a ‘solidity’ in the planning process as rational and immutable, while surrounding environmental and social considerations ultimately have a more negotiable status, often being rendered irrational, soft and open to manipulation in order to achieve particular policy outcomes (Owens and Cowell, 1996, p.63). Sustainability discourses have raised critical awareness of such in-built inequities and have been instrumental in recalibrating the system’s guiding principles and affecting a shift from predict and provide to a new regime of “Plan, Monitor and Manage”. Yet demand forecasts and regional apportionments still remain integral, playing a vital role in informing landbanks of permitted reserves. Representing a practical mechanism that takes into account the long timeframes for developing new mineral reserves, landbanks have successfully been operated to ensure continuity of supply. Resultantly landbanks are central in Ike’s (2007) positive assessment of the functionality of British minerals planning system.
Recent UK Minerals Forum (2009) discussions revealed strong industry support for the fundamental principles of the present system whereby new quarry sites or extensions are individually assessed based on a balance of planning considerations rather than by an inflexible set of weighted criteria. This verdict suggests a degree of satisfaction with the quality of decision making – but also embodies the tension between industries’ conflicting craving for both certainty and flexibility within the planning process. As such the present plan-led system, aligned with the discretionary nature of planning decisions, goes some way to satisfying these oxymoronic impulses.

2.8 MPS1 – Objectives, Policy and Internal Tensions

In recent years the government has put minerals planning policy on a more sustainable footing (CPRE, 2006). This is evident within Minerals Policy Statement 1’s [MPS1] (DCLG, 2006a, p.5), advocacy of ‘prudent, efficient and sustainable use of natural resources’ and the strong weighting it affords to the natural environmental – in-particular designated areas where it excludes major mineral development except in ‘exceptional circumstances’ (ibid, p.7). This strong spatial parameters’ foregrounding of environmental capacities has been praised, however such an approach conflicts with the European Landscape Convention’s [ELC] (Council of Europe, 2000) egalitarian and inclusive ethic which emphasises that all landscapes matter. MPS1 thus reinforces a tendency to ‘museumise’ certain protected islands of space whilst devaluing non-designated countryside and making it more vulnerable to minerals development. This has the potential to polarise landscape quality and in doing so create greater inequitable disparities in the distribution of impacts to communities in ‘lower-value’ non-urban areas. Consequently it has profound implications for the equity of the future pattern of supply.

In this respect, MPS1 reveals the internal contradictions embedded within its central concept of sustainability, as on the one hand the policy conserves and protects certain landscapes and mineral resources for the enjoyment and use of future generations; while on the other it paves the way for an uneven pattern of development that contradicts the proximity principle and disrupts potential for a sustainable supply network. The impact of this policy has been examined in a recent quantitative study by Bee et al (2010) which concluded that the strict policy requirements of MPS1 are
successfully discouraging aggregate working within designated areas and thereby exerting greater pressure on land outside designated areas to provide primary aggregates. In the case of HSA, this threatens key sources of available supply such as those within the Yorkshire Dales National Park (Lusty et al, 2011) and could impact upon continuity of supply in the medium-term. This situation points to a clear internal inconsistency within MPS1 as its policies ultimately advocate contradictory trajectories as regards environmental protectionism and supply. Consequently, where and how the nation’s HSA should be supplied in the future merits attention.

MPS1’s core principles are supplemented by the provision of an annex focusing explicitly on aggregate matters. This establishes ancillary objectives and reinforces the role of the Managed Aggregate Supply System [MASS], stressing the continued importance of Regional Aggregate Working Parties [RAWPs] apportionments and of the need for at least a ten year landbank for crushed rock due to the long lead-in-times to develop such sites. As such the underlying demand-led mechanics remain intact, albeit tempered by wider attempts at demand reduction and greater presence of environmental constraints.

Specifically in terms of HSA, Annex1 of MPS1 contains a vital signal: stating that where there is a distinct and separate market for specific types or quality of aggregates, such as HSA, ‘then separate landbank calculations and provisions for these may be appropriate’ [emphasis added] (DCLG, 2006a, p.15). This fleeting mention represents a step forward, as it offers a clear indicator to regional and local tiers of government of an approach to address the specific the circumstances of HSA. However the impact of this is diminished by its flexibly phrased wording and the fact that it is not an explicit policy in itself being relegated to body text. Consequently the influence of this directive upon emerging development plans is unclear and would benefit from investigation.

2.9 Strategic Planning for Minerals at the Regional & Local Scale
The multi-scalar distribution of mineral planning competencies is set out by government through national legislation. These defer statutory mineral policymaking functions to both regional planning authorities and upper-tier local authorities; with the latter also
being delegated regulatory and decision making power as regards applications for minerals operations.

At the regional tier of government, Regional Spatial Strategies [RSS] have provided a statutory platform in which mineral apportionments could be enshrined, whilst facilitating a policy cascade to provide greater certainty and strategic steer to guide decision-making. Though addressing and reinforcing crushed rock apportionments, RSS’s are silent as regards HSA (Table 2.3). In the absence of a firm national line or any regional progression on HSA; local MPA policy and decisions become key to the issue of access to HSA deposits.

**TABLE 2.3: Survey Overview of RSS Documents and Implications for HSA**

<table>
<thead>
<tr>
<th>Regional Spatial Strategy [RSS] Name</th>
<th>Current/Last Adopted Version</th>
<th>Time Horizon</th>
<th>Area Contains HSA?</th>
<th>HSA referenced in RSS?</th>
<th>How are Crushed Rock Apportionments Handled?</th>
</tr>
</thead>
<tbody>
<tr>
<td>The North West of England Plan</td>
<td>September 2008</td>
<td>2021</td>
<td>Yes</td>
<td>No</td>
<td>Policy EM8 states provision must be made in accordance with the sub-regional apportionments and provides a table of these.</td>
</tr>
<tr>
<td>The North East of England Plan</td>
<td>July 2008</td>
<td>2021</td>
<td>Potential</td>
<td>No</td>
<td>Embedded within Policy (Policy 43)</td>
</tr>
<tr>
<td>The Yorkshire and Humber Plan</td>
<td>May 2007</td>
<td>2026</td>
<td>Yes</td>
<td>No</td>
<td>Policy ENV4 states provision must be made in accordance with the sub-regional apportionments and provides a table of these.</td>
</tr>
<tr>
<td>The East Midlands Regional Plan</td>
<td>March 2009</td>
<td>2026</td>
<td>Yes</td>
<td>No</td>
<td>Table provided: and stipulates LDFs must reflect these figures</td>
</tr>
<tr>
<td>The West Midlands Regional Spatial Strategy</td>
<td>June 2004</td>
<td>2021</td>
<td>Yes</td>
<td>No</td>
<td>Embedded within Policy (Policy M2)</td>
</tr>
<tr>
<td>The East of England Plan</td>
<td>May 2008</td>
<td>2021</td>
<td>No</td>
<td>No</td>
<td>Embedded within Policy (Policy M1)</td>
</tr>
<tr>
<td>The South East Plan</td>
<td>May 2009</td>
<td>2026</td>
<td>No</td>
<td>No</td>
<td>Embedded within Policy (Policy M3)</td>
</tr>
<tr>
<td>The South West Regional Spatial Strategy (Submitted in 2006)</td>
<td>Thrown-Out following Judicial Review in 2009</td>
<td>Yes</td>
<td>No</td>
<td>Policy RE11 states provision must be made in accordance with the sub-regional apportionments and provides a table of these.</td>
<td></td>
</tr>
</tbody>
</table>

*Source: Prepared by Author following systematic review of RSS Documents.*
To date academic research into local Development Plan Documents [DPDs] has predominantly provided either qualitative assessments (Rozee, 2008; Shaw & Lord, 2009) or investigations into more structural issues associated with their timely progression through to adoption (RTPI & DCLG, 2008). These works have highlighted a number of chronological, cultural and procedural difficulties. Yet the extent to which these findings are representative for Minerals Development Framework [MDF] DPDs is unclear, as there has been no separate quantitative or qualitative analysis of any of these emerging documents.

DPDs containing minerals related policies make-up 17% of plans submitted for determination to date (Table 2.4). Of these, 48 minerals related plans have been determined with 34 (70.8%) being found sound. This percentage of adopted documents is notably lower than that for all other types of DPDs determined, which stands at 82.1%. This suggests that the complex and controversial nature of minerals extraction and its associated policy framework weakens the chance of a document being judged ‘sound’. In this, the fine point of balance between environmental limits and need is often key.

**TABLE 2.4: Progress on Examination and Adoption of Minerals and Non-Minerals Related DPDs: Documents Submitted to the Planning Inspectorate for Determination up Until 26 June 2011**

<table>
<thead>
<tr>
<th>Type of Development Plan Document [DPD]</th>
<th>Total Submitted</th>
<th>Determined</th>
<th>Total Determined</th>
<th>Pending Determination / Examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minerals Related DPDs</td>
<td>61</td>
<td>34 Sound</td>
<td>14 Withdrawn</td>
<td>48 Withdrawn 13</td>
</tr>
<tr>
<td>All other DPDs</td>
<td>300</td>
<td>198 Sound</td>
<td>13 Unsound</td>
<td>30 Unsound 241 Withdrawn 59</td>
</tr>
<tr>
<td>All DPDs (Combined)</td>
<td>361</td>
<td>232 Sound</td>
<td>13 Unsound</td>
<td>44 Unsound 289 Withdrawn 72</td>
</tr>
</tbody>
</table>

Source: Information derived from Authors review of PINs (2011) cross-checked against MPA websites in order to get the most up-to-date information;

Recent guidance (PINs, 2007; DCLG, 2008) has emphasised the primacy of the Core Strategy [CS] as providing the overarching steer for MDFs. Resultantly CSs embody the conflicting demands of strategic policy and local democracy (Owens and Cowell, 2002). However they have the flexibility to mediate these tensions as the evidence-bases they are underpinned by can factor-in key contextual characteristics and trends alongside local sensitivities and community derived aspirations. This daunting task is made all the more problematic by the contested and contradictory nature of a sustainable minerals policy, which inevitably pulls such a document in multiple directions, heightening the
difficulty of achieving an acceptable balance between often disparate aims. Resultantly it is unsurprising that only 35 out of the 129 (i.e.27% of) English MPAs outside of London currently have a CS in place that is dedicated to or deals with minerals policy issues. Moreover this means the majority of MPAs will be utilising saved policies from dated Minerals Local Plans.

Yet the quantity of sound minerals related DPDs is gradually increasing (Figure 2.4) as experience is accumulated and the system matures. But there are still serious shortfalls in MDF plan-coverage, thus inhibiting a more up-to-date and progressive policy approach. The effects of emerging MDFs and this uneven policy terrain on influencing more sustainable patterns of minerals development is currently unknown and has not been subject to any investigation. This is symptomatic of a wider lack of review into MDF content, progress or scope – all of which have important implications for the future working of HSA, especially in the absence of HSA from regional policy or any formal separate mechanism of monitoring supply and demand via RAWPs or national government. Going forward, there is a need for an overview of how the current network of local plan policies is, or is not, addressing the question of HSA demand. It also raises the question of how planning practice is handling the increasing pressure for the release of new HSA deposits.

**FIGURE 2.4:** Graph of End-Status of Minerals DPD’s Submitted to PINs Over Time (Including Trend Lines)

![Graph of End-Status of Minerals DPD's Submitted to PINs Over Time (Including Trend Lines)](source: Information derived from authors’ analysis Development Plan Documents submitted to PINS for Examination dated up until 20 June 2011.)
2.10 Decision-Making at the Policy-Practice Interface
In England the authorisation process for mineral extraction projects in policy-allocated sites is significantly shorter than that of windfall proposals (University of Leoben, 2004) as the principle of development has already been established. The failure of the majority of MPAs to get to the site allocations stage of MDFs threatens to delay the delivery of the optimum combination of sites. This situation raises the prospect of a proliferation of windfall sites, which are seldom the most sustainably located or environmentally acceptable propositions, but can be propelled through the system, often on appeal, when a clear argument of need can be made as they are the only practicable options forthcoming.

The unique position of HSA adds a further level of complexity to the decision-making process as the appreciation of its geological rarity seems to tip the balance in favour of development in many officers’ reports. Yet, ultimately, the decision making process is politically determined. Recent research by Bee et al (2010) has reinforced the reality of this fact – charting the high proportion of quarrying applications where officer recommendations for approval are overturned by committee. In this they note that councillors’ perceptions of the impact of the proposals on local amenities frequently outweigh strategic issues such as landbank considerations. Such a political focus on socio-economic impacts at the site specific level thus demands greater focus on the barriers and issues associated with individual minerals sites.

2.11 The Site Level Grain.
Ultimately the measure of the minerals planning system is the sites it permits – in terms of their justifying locational rationales and the quality of their mitigation and management in relation to their impacts. Moreover, the configuration of externalities is unique within each individual site-context and an understanding of these can contribute to a clearer picture of the key issues and barriers to securing a more sustainable and equitable pattern of HSA supply.

Much of the published literature involving case studies of mineral sites tend to be technical assessments of site investigation and quarry design (Barrett, 1992) or, more
commonly in recent decades, restoration practices (Gunn & Bailey, 1993; Davies, 2006; Williamson et al, 2003). These are supplemented by a number of monographs looking at specific environmental impacts ranging from Bio-diversity (Lameed and Ayodele, 2010) to Blasting (Pegden & Birch, 2005). A more comprehensive approach is applied by Coffey (2000), whose EIA audit of three quarries observes notable disparities in relation to anticipated traffic and visual impacts. While a recent study by Lusty et al (2011) provides an insightful examination of current and alternative supply scenarios for a range of aggregates in different regions, its discussion of impacts takes a generalist frame that does not engage with the reality of the impacts associated with individual sites. Thus to date, no analysis of the sustainability of the broader pattern of minerals sites nor any case studies examining the externalities and sustainability implications of HSA quarrying upon and/or beyond their local host communities have been forthcoming.

2.12 Conclusion
This literature review has highlighted the economic and social importance of the products of aggregate extraction within England, drawing attention to the specialised nature of HSA whilst highlighting the wider environmental impacts and sustainability implications of ensuring a steady supply of this geologically scarce mineral resource. It also provides an overview of the minerals planning system, establishing its structure, purpose, and key principles as it seeks to construct ‘policies that endeavour to balance society’s need for virgin minerals with their non-renewable nature and the environmental implications of their extraction’ (Morgan, 2000, p.3). The ensuing critique of the strengths, weaknesses and internal tensions of this system, and the framework this creates for decisions around HSA, flags-up a number of important questions as regards its functionality, ethics and sustainability. Within these the alignment of minerals planning with SD emerges as a recurrent theme and tension. SD itself is revealed to be enshrined in UK policy, yet its’ definition is shown to be diverse, constantly evolving, and frequently contradictory. Though complex, it provides a vital unifying concept that also acts as an incisive analytic tool to inform policy development and siting rationales.

The literature review also provides a snapshot of the current position of the plan-led system which reveals poor MDF plan coverage. The supply, sustainability and equity implications of this uneven policy terrain urgently requires investigation so as to
ascertain how MPS1 directives relating to HSA are being applied in MDFs and the broader impact of local minerals planning policy upon sites coming forward as these have profound spatial implications on the current and future patterns of supply and of environmental impact. Not only this, but it could detrimentally affect the nation’s ability to meet demand. As such the review reveals notable literature gaps as regards the impacts of local minerals planning policy, the broader pattern of sites and externalities of individual sites.
CHAPTER 3 - METHODOLOGY

3.1 Introduction
Informed by the analysis contained in the literature review, this chapter sets out the key research questions of this study before articulating the methodology employed to address these. The various research techniques utilised are set out sequentially. The grounds for these are interweaved within this to provide justification. The limitations and ethical implications of these techniques are also set out across these.

3.2 Implications of the Literature Review
The literature review appraisal revealed a number of policy-tensions (internally within MPS1 and between geographic administrative levels) and variable MDF policy coverage. These issues raise pressing questions as regards their impacts – particularly at the policy-practice interface in terms of the distribution of negative externalities, sustainability of HSA quarries and MPA’s ability to monitor and meet HSA demand. These questions correlate with some notable research gaps with regard to analysis of minerals policy content and its impact in shaping the pattern of HSA extraction. In light of these, and in order to assist the overarching aim and objectives set-out in the introduction the following research questions were constructed:

3.3 Research Questions

- **RQ1** - How are MPAs approaching the issue of HSA supply from a policy perspective?
- **RQ2** - What are the spatial and sustainability implications of MPA’s approaches to managing and planning for HSA quarrying?
- **RQ3** - What are the sustainability implications of the current, and potential future pattern of HSA sites?
- **RQ4** - What are the key barriers to ensuring HSA supply meets both demand and sustainability principles?
- **RQ5** - How can the minerals planning system be improved to better manage HSA supply and ensure the most sustainable and equitable outcomes?
3.4 Research Design
This evaluative research project has taken a pragmatic standpoint in devising a strategy of inquiry as it is felt that this is the optimal approach for addressing the complexity of real-world social research in a clinical and empirical fashion (Robson, 2011). Consequently I adopted a range of methods due to the multifaceted nature of the research questions which address both policy and practice. This multi-strategy approach was pursued so as to provide a comprehensive picture and inbuilt triangulation to enhance the validity of findings (Bryman, 2006). The research strategy adopted for this project is primarily qualitative, but a certain amount of quantitative research was also required to establish the current position within England against which case studies could be contextualised and benchmarked. I have therefore carefully integrated and sequenced both quantitative and qualitative methods.

3.5 Desk-Based Policy Review
Building-upon the quantative data assembled within the literature review as regards the status and progress of MPA’s MDFs, a desk-based policy review was undertaken so as to scope the current policy approaches toward virgin HSA by MPAs with active HSA Quarries (Thompson et al, 2004, pp.97-101). This review provided a vital contextual background, offering a national snapshot of policy approaches against which individual MPA responses could be compared and contrasted. It also informed the construction of questionnaires and interviews.

3.6 Questionnaires
Questionnaires with a mix of open and closed questions were employed as the foremost method in the research project as they provided an effective means of collecting descriptive factual data alongside attitudes and personal experiences (Simmons, 2001) quickly and cost-effectively across a geographically dispersed array of MPAs. It was decided that Questionnaires should be targeted at Minerals Planning Officers within MPAs which have been indicated as having an existing, known or potential HSA resource (Figure 3.1 & Table 3.1) so as to gauge the approach of those decision-makers who are ‘custodians’ of this scarce resource. Consequently a
FIGURE 3.1: Map of Geological Formations Capable of Yielding HSA within Great Britain. N.B. Class 1 (highest spec) = PSV ≥ 68; Class 5 = PSV of 57-59.9.

Source: Figure 6.1 from the Capita Symonds Report (Thompson et al, 2004, p. 85)
### TABLE 3.1: MPAs with Potential HSA Resources Whom Questionnaires were Distributed To and Returns

<table>
<thead>
<tr>
<th>MPA</th>
<th>Questionnaire Returned</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Cornwall</td>
<td>Yes</td>
</tr>
<tr>
<td>2 Cumbria</td>
<td>Yes</td>
</tr>
<tr>
<td>3 Derbyshire</td>
<td>No</td>
</tr>
<tr>
<td>4 Devon</td>
<td>Yes</td>
</tr>
<tr>
<td>5 Durham</td>
<td>Yes</td>
</tr>
<tr>
<td>6 Lancashire</td>
<td>Yes</td>
</tr>
<tr>
<td>7 Leicestershire</td>
<td>Yes</td>
</tr>
<tr>
<td>8 Northumberland</td>
<td>Yes</td>
</tr>
<tr>
<td>9 Shropshire</td>
<td>Yes</td>
</tr>
<tr>
<td>10 Somerset</td>
<td>Yes</td>
</tr>
<tr>
<td>11 South Gloucestershire</td>
<td>Yes</td>
</tr>
<tr>
<td>12 Telford &amp; Wrekin</td>
<td>No</td>
</tr>
<tr>
<td>13 Warwickshire</td>
<td>Yes</td>
</tr>
<tr>
<td>14 Yorkshire Dales National Park</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Source: List derived from MPA areas that correlate with Figure 3.1 above

A high quality professional questionnaire design was essential in order to collect relevant and reliable data (Simmons, 2001) and engage the time and commitment of respondents. Accordingly, questions were carefully sequenced. Quicker closed and pre-coded questions were frontloaded to draw respondents in and speed-up the time for completion. These also provided a flexible space for an ‘other’ answer/option so as not to preclude alternatives where the categories offered were not necessarily exhaustive. They also served to flag-up a range of relevant key issues at stake for respondents, focusing their mind on the topic area for the more open-ended analytical questions. Whilst open questions may produce ambiguous answers and are more time consuming to analyse, I felt that this qualitative source of data was essential in furthering my understanding of perceptions of HSA and attitudes as to its management and place within a spectrum of planning considerations. To these ends, I invited the respondent to explain the reasoning behind their answers on a number of questions in order to gain a deeper understanding of their attitudes. A draft
version of the questionnaire was trialled on a small sample of planning officers within an MPA to ensure questions were clear, concise and answerable.

This pilot exercise was used to make refinements and confirmed that, although quite detailed information was being requested at points, the questionnaire was not unreasonably onerous or time-consuming. Phone-calls were made to each targeted MPA so as to establish a named contact within their minerals planning teams and secure their participation before obtaining their contact details. Questionnaires were then administered to each relevant MPA by email with covering text outlining the research topic and purpose, the response timeframe and my contact details. The emails offered a choice of response mechanisms to facilitate ease of response including a web-link to an interactive online version of the questionnaire which incorporated skip patterns, and a form within a Word-Document attachment which could be completed electronically or by hand. The electronic distribution of questionnaires to collect data was used to ensure receipt, speed-up the process by avoiding transcription and facilitate prompt and easy follow-up actions for non-returns. This latter aspect was aided by the small proportion of MPAs targeted. Resultantly the problem of securing involvement was less intractable here than it tends to be in the case of most social research (Robson, 2011). Thus of the 14 questionnaires administered, 12 completed returns were obtained (Table 3.1). Despite this, there were a number of limitations. The small number of relevant MPAs meant the sample size precluded the use of statistical analyses for data generated; a few of the returned-questionnaires gave the impression that responses had been rushed with little reflection on the more open questions; and some interpretational misunderstanding of instructions and terminology emerged. Despite these issues, the responses showcased a strong grasp and knowledge of issues surrounding HSA, while the use of standardised questions ensured high reliability of response. In hindsight, the questionnaire may have benefitted from more open theoretical questions examining attitudes towards equity and sustainability in the minerals planning process. It would also have been interesting to deploy a wider sampling frame so as to canvas the attitudes of MPAs without HSA resources towards separate provisions for HSA.
3.7 Desk-Based Site Reviews and GIS Analysis

Factual site data contained in the Capita Symonds report was cross-referenced with that obtained from the questionnaires, so as to corroborate and update its site inventory. This was also checked against policy and planning application information available online from MPA websites. This information was then compiled and plotted on a Geographical Information System [GIS] so as to examine the pattern and interrelationships of data and identify any broad supply/resource areas within England. The value of GIS in planning research and analysis, due to its digital data handling capabilities and representational power, is widely acknowledged. To provide an overview of the sustainability and equity implications of this current network of sites, various spatial queries were constructed to examine active HSA sites in relation to key designated sites, transport infrastructure and key markets. Moreover this coarse grained investigation helped form an important backdrop for a finer more detailed site focused investigation.

3.8 Case Studies

A case-study approach was adopted as it allowed both multiple methods and sources to be utilised to obtain valuable insights at a finer spatial grain - facilitating the examination of a number of HSA quarries within one distinct supply/resource area so as to better understand their impacts across spatial scales alongside their individual intricacies and broader inter-relation. To this end, case-studies were seen as providing important practical real-world examples that allow the externalities of HSA extraction to be investigated alongside their sustainability and equity implications at a local level. Indeed, case studies are recognised as an exemplary means for empirical enquiry, ideal for investigating contemporary phenomenon in a real-life context (Yin, 2003) and as offering a comprehensive and in-depth account of relationships, experiences or processes occurring in a particular instance (Denscombe, 2007). A multiple case design has been progressed as the evidence this provides tends to be considered more compelling and robust, and also provides a better platform for analytic generalisation (Robson, 2011) as it employs replication logic to address external validity issues (Yin, 2003). To achieve this, a further mix of methods was employed.
3.9 Case Studies Identification and Selection
The North-West resource/supply area was selected principally due to the diverse mix of sites and circumstances evident there, though its proximity and the concomitant convenience of access this would provide for face-to-face interviews was also an ancillary consideration. It was originally intended that sites be drawn from across two different MPA’s, however the availability of key personnel at the Yorkshire Dales National Park [YDNP] became constrained, ironically, by the submission of applications for time extensions to two HSA sites within the park. Consequently the study focused on the three existing sites within Cumbria, but made efforts to relate these to the ongoing developments in the YDNP due to the wider implications of these decisions on the pattern of HSA extraction in this resource area. Shifting the focus onto Cumbria also provided the benefit of examining sites within the context of an adopted MDF Core Strategy.

The three existing HSA sites within Cumbria – Ghyll Scaur Quarry [GSQ], Holmescales Quarry [HQ] and Roan Edge Quarry [REQ] - provide a variety of siting rationales, environmental impacts and degrees of connectivity. Because of the extremely high level of PSV (68+) associated with the HSA that GSQ contains, this provides a particularly exceptional instance in which the influence of HSA’s geological rarity can potentially be more easily seen. Elsewhere, HQ and REQ represent more typical instances, possessing material of a more comparable quality. Although each site is unique in many respects, they are all one of a type, exhibiting certain traits and commonalities as regards their key impacts and problematic relation to sustainability principles.

3.10 Case Studies’ Methodologies: Data Analysis & Interviews
Information as regards the planning application history of each site was firstly collected by interrogating MPA records. Key permissions were then identified and inspected, with content analysis focusing in on planning application supporting statements, environmental statements; committee reports, decision notices, and site-monitoring reports to establish the case history of each site. Map analysis to appraise the site locations and settings were also undertaken along with the use of GIS to check relevant key constraints.
This was then followed-up with a series of interviews with a wide spectrum of key stakeholders (Table 3.2) so as to draw-out qualitative experiential information and honest insight that is normally removed from the formal application process. The mix of viewpoints and narratives these presented provided greater depth of information and facilitated greater triangulation.

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Organisation Type</th>
<th>No. of Interviewees</th>
<th>Interviewee Role(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggregate Industries</td>
<td>Minerals Operator</td>
<td>1</td>
<td>Estates Manager</td>
</tr>
<tr>
<td>Cemex UK</td>
<td>Minerals Operator</td>
<td>1</td>
<td>Planner</td>
</tr>
<tr>
<td>Cumbria County Council</td>
<td>MPA</td>
<td>3</td>
<td>Development Control, Monitoring &amp; Enforcement, and Planning Policy Officers</td>
</tr>
<tr>
<td>Cumbria Wildlife Trust</td>
<td>Environmental Group</td>
<td>1</td>
<td>Planner</td>
</tr>
<tr>
<td>Environment Agency</td>
<td>Regulatory NDPB</td>
<td>1</td>
<td>Planner</td>
</tr>
</tbody>
</table>

The interviews conducted were one-to-one and semi-structured in nature so as to provide scope for emerging ideas to be developed. The range and format of questions (Appendix 2) loosely imitated the questionnaire but with the addition of various components tailored to interviewees, addressing specific issues with particular sites and more open questions so as to gain more detailed information and candid views. The interviews were mostly conducted in person, with a venue being established with the participant in which they would be comfortable to talk freely; however a few interviews were dealt with by phone due to distance and work schedules. All interviews were typed-up, numbered and labelled. Open-coding was used to delineate emerging themes. Quotes were used in the research in order to accurately convey the exact meaning of the interviewees.

Throughout the above research processes, I was mindful that procedures should adhere to ethical principles and the need for an open-minded and self-reflective approach. I made clear to all participants, verbally and in writing, the purpose of the research, levels of confidentiality and what data would be used for. Such informed consent is a crucial component of ethical research and was essential in gaining access to minerals companies for whom commercial confidentiality is imperative.
3.11 Conclusion
The Multi-Strategy methodology detailed above provided a firm basis for addressing the studies aim, objectives and research questions, focusing the study down from a broad quantitative contextual canvas to a more detailed series of case studies providing greater depth of information from which wider conclusions can be drawn and recommendations derived.
4. RESEARCH RESULTS & ANALYSIS (PART-1):
Local Minerals Planning Policy and HSA

4.1 Introduction
The literature review highlighted the important role played by local minerals planning policy and the lack of research into and analysis of these documents. In the context of planning for an adequate and sustainable supply of HSA, and in light of the regional and national level at which supply of this commodity functions, an overview of local minerals planning policy approaches is essential to assess the spatial implications this may have upon the provision of supply and the equitable distribution of impacts. This chapter thus surveys the currently adopted minerals planning frameworks in place in MPAs whom possess currently viable deposits of such a mineral resource (Table 4.1) so as to distil their policy stances toward HSA and evaluate the degree of consistency or variation in approach (Tables 4.4 & 4.5; Appendix 2). This in turn informs a review of the potential future policy terrain (Table 4.6) and wider implications of this policy landscape and MPA attitudes.

<table>
<thead>
<tr>
<th>MPA Name</th>
<th>Authority Type</th>
<th>Region / RAWP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cornwall</td>
<td>Unitary</td>
<td>South West</td>
</tr>
<tr>
<td>Cumbria</td>
<td>County</td>
<td>North West</td>
</tr>
<tr>
<td>Devon</td>
<td>County</td>
<td>South West</td>
</tr>
<tr>
<td>Leicestershire</td>
<td>County</td>
<td>East Midlands</td>
</tr>
<tr>
<td>Shropshire</td>
<td>Unitary</td>
<td>West Midlands</td>
</tr>
<tr>
<td>South Gloucestershire</td>
<td>Unitary</td>
<td>South West</td>
</tr>
<tr>
<td>Telford and Wrekin</td>
<td>Unitary</td>
<td>West Midlands</td>
</tr>
<tr>
<td>Warwickshire</td>
<td>County</td>
<td>West Midlands</td>
</tr>
<tr>
<td>Yorkshire Dales</td>
<td>National Park</td>
<td>Yorkshire &amp; Humber</td>
</tr>
</tbody>
</table>

Source: Compiled by author in July 2011 - based upon the Capita Symonds Report (2004) and updated information derived from the questionnaires.

4.2 Policy Position & Approaches of MPAs Towards HSAs
Figure 4.1 highlights the geographical concentration of viable deposits of HSA across a small number of dispersed MPAs. From this it is possible to delineate four broad resource/supply areas (Table 4.2). It also draws attention to the uneven nature of the policy landscape in terms of the form, chronology and progress of documents –
with a number of MPAs currently operating with saved policies from out-of-date minerals local plans (Table 4.3).

**FIGURE 4.1:** Map Showing Boundaries of MPAs with active HSA Resources in Relation to the Type of Currently Adopted Minerals Planning Policy Documents in Force in those areas

*Source: Map Generated by Author Utilising Survey and Questionnaire Data - July 2011*
**TABLE 4.2:** Broad resource/supply areas of HSA within England

<table>
<thead>
<tr>
<th>Broad Resource-Supply Area</th>
<th>Constituent MPAs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Midlands</td>
<td>Leicestershire &amp; Warwickshire</td>
</tr>
<tr>
<td>North-West</td>
<td>Cumbria &amp; Yorkshire Dales National Park</td>
</tr>
<tr>
<td>South-West</td>
<td>Cornwall, Devon &amp; South Gloucestershire</td>
</tr>
<tr>
<td>Welsh Borders</td>
<td>Shropshire &amp; Telford and Wrekin</td>
</tr>
</tbody>
</table>

Source: List based on historic and currently active pattern of sites which meet HSA specification.

**TABLE 4.3:** Currently adopted Minerals Planning Policy Document of MPAs with active HSA quarries as of July 2011

<table>
<thead>
<tr>
<th>MPA</th>
<th>Current Adopted Policy Document</th>
<th>Year Adopted</th>
<th>Time Horizon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cornwall</td>
<td>Minerals Local Plan (Saved Policies there-of)</td>
<td>1998</td>
<td>2011</td>
</tr>
<tr>
<td>Cumbria</td>
<td>Core Strategy &amp; Generic Development Control Policies</td>
<td>2009</td>
<td>2020</td>
</tr>
<tr>
<td>Devon</td>
<td>Minerals Local Plan (Saved Policies there-of)</td>
<td>2004</td>
<td>2011</td>
</tr>
<tr>
<td>Leicestershire</td>
<td>Core Strategy &amp; Development Control Policies</td>
<td>2009</td>
<td>2021</td>
</tr>
<tr>
<td>Shropshire</td>
<td>Core Strategy</td>
<td>2011</td>
<td>2026</td>
</tr>
<tr>
<td>South Gloucestershire</td>
<td>Minerals Local Plan (Saved Policies there-of)</td>
<td>2002</td>
<td>2011</td>
</tr>
<tr>
<td>Warwickshire</td>
<td>Minerals Local Plan (Saved Policies there-of)</td>
<td>1995</td>
<td>2006</td>
</tr>
<tr>
<td>Yorkshire Dales</td>
<td>Minerals Local Plan (Saved Policies there-of)</td>
<td>1998</td>
<td>2006</td>
</tr>
</tbody>
</table>

Green signifies ‘new style’ Development Framework DPD  
Red signifies ‘old style’ Minerals Local Plans

Source: Compiled by author in July 2011 – based upon PINs (2011) data and published information on MPAs websites

All the documents in table 4.3 have strong environmental strands that foreground the idea of environmental capacity, seek to direct working away from designated areas, and utilise landbanks to limit future extraction. Despite their shared general direction of travel, the variable provenance of existing policy documents inevitably fosters a variety of approaches towards HSAs. In light of the critical role planning policy plays in determining the responsiveness of market actors this heterogeneous policy landscape has the capacity to distort the future pattern of sites, countering
sustainability objectives and attempts to achieve greater equity in the distribution of impacts.

**TABLE 4.4: Current MPA policy approaches to HSA**

<table>
<thead>
<tr>
<th>MPA</th>
<th>Current Policy Approach Toward HSA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cornwall</strong></td>
<td>Assessed on a site specific basis, having regard to the specialist nature of the mineral and criteria based policies of the plan.</td>
</tr>
<tr>
<td><strong>Cumbria</strong></td>
<td>Considers HSA separately from general crushed rock aggregate and establishes a separate landbank.</td>
</tr>
<tr>
<td><strong>Devon</strong></td>
<td>It is treated as a distinct sub-group of crushed rock with its own unique characteristics that allow flexibility across the sequential framework the plan sets out.</td>
</tr>
<tr>
<td><strong>Leicestershire</strong></td>
<td>Dealt with via a general crushed rock policy.</td>
</tr>
<tr>
<td><strong>Shropshire</strong></td>
<td>For the need for HSA to be assessed on a site specific basis, having regard to the specialist nature of the mineral and criteria based policies of the plan.</td>
</tr>
<tr>
<td><strong>South Gloucestershire</strong></td>
<td>Has a specific policy on proposals for HSA working which foregrounds national and regional need and quantity of on-specification material.</td>
</tr>
<tr>
<td><strong>Telford &amp; Wrekin</strong></td>
<td>Dealt with via a generic crushed rock policy.</td>
</tr>
<tr>
<td><strong>Warwickshire</strong></td>
<td>Dealt with via a generic crushed rock policy.</td>
</tr>
<tr>
<td><strong>Yorkshire Dales</strong></td>
<td>Dealt with via a general crushed rock policy.</td>
</tr>
</tbody>
</table>

*Source: Information derived from author’s review of currently adopted minerals planning documents (See Appendix 2) and questionnaire responses.*

Table 4.4 identifies three broad sets of approaches towards HSA which range greatly in their level of specificity and potential implications. The most common approach across MPAs has traditionally been to keep HSAs grouped within the crushed rock landbank (which is often large and significantly over-capacity due to continued legitimacy of historic consents). Such a non-discriminatory strategy ensures that HSA proposals are treated even-handedly with other minerals resources, with need for extraction first being referred to the landbank, and if required as a shortfall is present or imminent, then being judged by a fixed-set of policy-criteria that focuses on an assessment of the degree of acceptability of its potential impacts. This ethically sound formula is ideally suited for sand and gravel quarrying, as this resource is generally abundant, meaning it can be utilised to meet demand, minimises incidences of extraction and ensures proposals are sensitively located. It is less appropriate for the diverse range of crushed rock resources and the geological reality of their distribution in England as certain specialist products such as HSA can become swamped in large landbanks and considered less favourably as they are often located
in more sensitive upland areas by the virtue of their geology. Consequently such an approach that does not distinguish HSA or recognise its geological rarity, potentially discourages naturally risk averse operators from bringing sites forward in these areas as it creates uncertainty which deters the significant investment required in exploration, appraisal and development of potential new deposits. The new evidence-based MDF system does present vital opportunities for developers to put forward grounds and arguments for the circumstances surrounding HSA to be included in plans, but this is hindered by inability of the majority of MPA’s to progress these in a timely fashion (Table 4.5).

**TABLE 4.5: Traffic-Light Table of the current stage of progress of the DPDs containing Minerals Policy within MPAs with active HSA sites**

<table>
<thead>
<tr>
<th>MPA Name</th>
<th>Current MDF Progress / Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cornwall</td>
<td>• Core Strategy Issues &amp; Options consultation ended April 2011.</td>
</tr>
</tbody>
</table>
| Cumbria           | • Core Strategy & Generic DC Policies Adopted April 2009. – N.B. Subject to early review due to evolving radioactive waste policy situation.  
| Devon             | • Core Strategy Issues & Options consultation ended April 2011.                                                                                             |
|                   | • No work is planned for the allocation of mineral sites.                                                                                                    |
| Shropshire        | • Core Strategy Adopted February 2011  
                    • Site Allocation & Development Management Issues & Options consultation took place summer 2010. Consultation on draft version scheduled for November 2011. |
| South Gloucestershire | • Core Strategy is pending examination.                                                                                                                 |
| Telford & Wrekin  | • Core Strategy Adopted December 2007 but the inspector’s report considered its proposed minerals policies unsound – consequently they were deleted in order to make the strategy sound.  
                    • Work was scheduled to commence in September 2011 upon a Minerals DPD; however the inspectorate’s requirement for further work on the Central Telford Area Action Plan (CTAAP) following the commencement of its hearing looks likely to further delay work on this. |
| Warwickshire      | • Minerals Core Strategy - Revised Spatial Options consultation took place in Spring 2009; however this has now been suspended as the authority are prioritising the Waste Development Framework ahead of this due to DCLG guidance. The MDF is now unlikely to be recommenced before the summer of 2012. |
| Yorkshire Dales   | • Not yet commenced a Core Strategy. The Authority is currently prioritising a Housing Development Plan. CS Programmed for late 2012 in LDS |

**KEY:** Green = Adopted; Orange = In Progress; Red = Work Stalled or Not Yet Commenced; Grey = General Note  
**Source:** Information derived from Interrogation of MPA websites and Questionnaires undertaken July 2011.
A second more flexible and pragmatic approach has been to recognise HSA within the main-body text of documents and provide scope to handle proposals on a site specific basis assessing them against the plan criteria whilst having regard to its rarity and specialist-use. More often than not this is progressed with the delineation of a specific preferred site or area-of-search within the Site Allocations Process – thus providing a presumption in favour of development subject to a satisfactory planning application. This stance works well with proposed extensions (in time, laterally or vertically) at existing sites, but is less favourable to new greenfield sites. So whilst it provides greater developer confidence and encourages sites to come forward through the site allocation policy process so as to provide greater certainty and legitimacy; the thorny issue of need is not explicitly dealt with upfront in a strategic manner. This reduces capacity for the fair and rational management of HSA supply across MPA boundaries as the balance between need and socio-environmental considerations becomes unclearly weighted, especially in the event of windfall sites, placing greater onus on the discretion and rationales of planning officers and political decision-makers.

The approach alluded to by MPS1, which suggests that separate landbank calculations and provisions may be appropriate for HSA, has had scant uptake, with only Cumbria progressing a discrete landbank for HSA. Nonetheless MPS1 has added greater weight for specific policies dealing with HSA, as seen in the proposals being advanced within Devon and currently considered in Cornwall (Table 4.6). A specific policy on HSA increases the transparency of how proposals will be dealt with, while providing a clear mechanism for monitoring and managing supply. Yet the danger is that this could lend HSA quarrying proposals a preferential weighting which could potentially override sustainability principles and other environmental constraints allow quarrying into otherwise unacceptable locations.

Table 4.6 suggests this fragmented policy landscape governing HSAs shows no sign of becoming more consistent in the near future. This is reinforced by the variety of differently nuanced positions towards HSA recounted in questionnaire responses, reflecting the wide scope facilitated by MPS1. Thus the continued spatial
juxtaposition of these three differing approaches threatens to distort the already geologically uneven supply as they emit different market signals.

### TABLE 4.6: Proposed Future Directions as regards HSA within MDFs of MPAs (with active HSA sites) still utilising Minerals Local Plans

<table>
<thead>
<tr>
<th>MPA</th>
<th>Future Policy Approach Toward HSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cornwall</td>
<td>One option put forward in the Core Strategy Issues and Options Paper was whether to identify future HRSA sites or give favourable consideration to HRSA proposals. The responses to this are currently being considered.</td>
</tr>
<tr>
<td>Devon</td>
<td>Seeking to evolve a specific policy that allows for new HSA resources to be developed within Devon (although this is hindered by a lack of detailed resource data).</td>
</tr>
<tr>
<td>South Gloucestershire</td>
<td>In the absence of any developer interest in a new HSA quarry, they do not intend on having any specific policy in their Core Strategy or any other minerals related DPD. Any HSA proposal coming forward would therefore be dealt with via a specific crushed rock policy.</td>
</tr>
<tr>
<td>Telford &amp; Wrekin</td>
<td><em>Not Known</em></td>
</tr>
<tr>
<td>Warwickshire</td>
<td>To continue to deal with HSA via a generic crushed rock policy.</td>
</tr>
<tr>
<td>Yorkshire Dales</td>
<td>No decision yet taken whether to have a specific policy to address HSA in the future.</td>
</tr>
</tbody>
</table>

*Source: Information derived from questionnaire responses*

### 4.3 Discussion: Implications of Policy & MPA Attitudes

In the context of the HSAs uneven geological distribution and regional imbalances in its supply and demand (Thompson *et al*, 2004), shortages in any one of the four broad resource/supply areas within England would have important knock-on implications for the remainder, exporting the burden of supply in terms of environmental impacts to them or neighbouring nations, and concomitantly increasing the distance and costs of conveying HSA to markets. This is clearly not an equitable scenario. Consequently greater strategic intervention to co-ordinate and manage supply is required.

The decision of the North-West RAWP (2011) to monitor and apportion HSA separately is testimony to this logic and signals a step toward better management of the issue at an appropriate scale. Such an arrangement would be likely to gain the support of MPAs as all respondent MPA officers equated HSA as serving a
national/regional scale market (Figure 4.2). Two-thirds of respondents also considered that national minerals planning policy should provide distinct arrangements for HSA, citing its limited occurrence as the principle justification for this, with one respondent expanding that national policy should exhibit ‘recognition of the uneven distribution of potential resources and the need to provide for intra- or inter-regional flows’ (MPA Respondent #4). Yet a feeling also persisted amongst some respondents that the specialist nature of HSA ‘can be dealt with as a subset of crushed rock...’ and that ‘requiring separate landbanks would complicate the issue’ (MPA Respondent #8). Underlying this division is the question as to whether HSA should be defined as a critical mineral of ‘national importance’, with one MPA officer carefully distinguishing between the national levels of need/supply from their level of criticality and importance.

**FIGURE 4.2: Pie-Chart Showing MPA Officer’s perception of the geographic scale at which HSA operates**

![Pie-Chart showing MPA Officer’s perception of geographic scale](image)

*Source: Information derived from questionnaire responses.*

MPAs were further divided as regards the steer provided by MPS1 on HSA, with seven respondents considering it adequate whilst the remaining five criticised its provisions, with suggestions for improvements including inclusion of a clear technical specification/definition of HSA and a mandatory separate landbank. Minerals operators were particularly sceptical of MPS1’s flexible wording as regard HSA,
observing that it provided plenty of scope for MPAs to determine their preferred course and noting that this could lead to spatial disparities – providing an effectively two-tier system as regards HSA (Minerals Operator #1). This lack of firm national direction on HSA has led to an uneven, poorly co-ordinated policy terrain that threatens to destabilise HSA supply and promote increasingly unsustainable and inequitable pattern of quarrying. Moreover the variable status of importance attached to HSA threatens to blur and weaken the assurance of environmental constraints.

4.4 Conclusions
Overall the questionnaires convey MPA officers’ firm grip of key issues surrounding HSAs. Yet they also showcase strongly disparate views as to the best approach of dealing with the wicked-problem HSA presents – with each shaping uniquely nuanced policy approaches grounded within their knowledge of local constraints. So whilst the significance and geographic scale of HSA is recognised, MPA’s pragmatic interpretations of MPS1’s flexibly worded direction have created a mosaic of policy responses that are likely to sharpen spatial inequities.
5. RESEARCH RESULTS & ANALYSIS (PART-2):

Patterns of HSA Supply and Impacts within England

5.1 Introduction

To date the MASS has successfully met demand for HSAs. However its continued ability to do so has been questioned in light of a number of recent and impending closures of HSA quarries. This combined with progressively diminishing reserves and anecdotal reports that suggest HSA sales have generally been holding-up at a consistent level throughout the period of recession project a bleak picture of the minerals industry’s prospects for securing sufficient supply to meet continuing demand. Moreover these issues raise systematic questions as to how this situation has arisen and what factors/barriers are behind the lack of sites coming forward.

An understanding of the existing spatial distribution of HSA sites and assessment of their relation to markets, transport infrastructures and nature and landscape designations is thus required at a broad strategic level so as to facilitate analysis of their sustainability implications and the identification of the key barriers to securing a more sustainable supply of HSA. This also serves to establish a broad national context against which future patterns can be benchmarked and assessed. For this purpose, the Capita Symonds report’s list of HSA sites within England has been updated.

5.2 Current Patterns of HSA Supply

Though the Capita Symonds report (Thompson, et al, 2004) provides a comprehensive, in-depth and masterful analysis of the supply and demand of HSA across its life-cycle from earth to asphalt; it became apparent during the research process that the document’s inventory of HSA sites contains a number of factual errors and inaccuracies (Appendix 4). The new updated inventory produced has focused exclusively on sites that currently meet HSA criteria and has also incorporated data directly relevant to minerals planning such as the levels of consented reserves, throughput limits, permission expiry dates and the main planning issues/impacts associated with each sites (Table 5.1). The transposition of
### TABLE 5.1: Active, Inactive and Dormant HSA Sites within England as of July 2011

<table>
<thead>
<tr>
<th>Quarry Name</th>
<th>MPA</th>
<th>Current Status</th>
<th>Rock-Type 🅱️</th>
<th>Typical PSV 🅲️</th>
<th>Typical AAV 🅳️</th>
<th>Max. Permitted Annual Output (T)</th>
<th>Permitted Reserves (M-T)</th>
<th>Permission Expiry</th>
<th>Principle Planning Issue with Site</th>
<th>Other Key Planning Issues with Site</th>
<th>Landscape &amp; Wildlife Designation Constraints 🅴️️</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arcow</td>
<td>Yorkshire Dales</td>
<td>Active</td>
<td>Greywacke/Siltstone</td>
<td>66</td>
<td>4.1</td>
<td>260,000</td>
<td>0.9</td>
<td>2011</td>
<td>Road Traffic Impact</td>
<td>Landscape</td>
<td>Within NP &amp; SSSI</td>
</tr>
<tr>
<td>Bardon Hill</td>
<td>Leicestershire</td>
<td>Active</td>
<td>Andesite &amp; Dacite</td>
<td>60</td>
<td>2.5</td>
<td>3,000,000</td>
<td>45</td>
<td>2028</td>
<td>Dust</td>
<td>Traffic, Noise, Blasting</td>
<td>Adj. SSSI</td>
</tr>
<tr>
<td>Bayston Hill</td>
<td>Shropshire</td>
<td>Active</td>
<td>Greywacke</td>
<td>65</td>
<td>3.5</td>
<td>1,200,000</td>
<td>20yrs+</td>
<td>2060</td>
<td>Blasting, Dust</td>
<td>Noise</td>
<td>Within SSSI &amp; Ramsar</td>
</tr>
<tr>
<td>Bray Valley Complex</td>
<td>Devon</td>
<td>Active</td>
<td>Siltstone</td>
<td>Low 60s</td>
<td>4</td>
<td>Confidential</td>
<td></td>
<td>2042</td>
<td>Adequate Reserves</td>
<td></td>
<td>Adj. NP</td>
</tr>
<tr>
<td>Clee Hill</td>
<td>Shropshire</td>
<td>Active</td>
<td>Dolerite</td>
<td>62</td>
<td>3.6</td>
<td>500,000</td>
<td>50yrs+</td>
<td>2060</td>
<td>Common Land.</td>
<td>Ecology</td>
<td>Within AONB &amp; SSSI</td>
</tr>
<tr>
<td>Dry Rigg</td>
<td>Yorkshire Dales</td>
<td>Active</td>
<td>Siltstone</td>
<td>60+</td>
<td>6</td>
<td>350,000</td>
<td>2011</td>
<td>Adj. Swarth Moor SSSI</td>
<td>Blasting &amp; Dust</td>
<td>Within NP; Adj. SSSI</td>
<td></td>
</tr>
<tr>
<td>Ghyll Scar</td>
<td>Cumbria</td>
<td>Active</td>
<td>Volcanic Tuff</td>
<td>68</td>
<td>6</td>
<td>440,000 (110,000) ³</td>
<td>3.5</td>
<td>2021</td>
<td>Traffic Impact</td>
<td>Visual Impact</td>
<td></td>
</tr>
<tr>
<td>Haughmond Hill</td>
<td>Shropshire</td>
<td>Active</td>
<td>Greywacke</td>
<td>65</td>
<td>4.7</td>
<td>500,000</td>
<td>7yrs+</td>
<td>2020</td>
<td>Amenity</td>
<td>Ecology</td>
<td></td>
</tr>
<tr>
<td>Holmescales</td>
<td>Cumbria</td>
<td>Active</td>
<td>Siltstone</td>
<td>62</td>
<td>8</td>
<td>100,000</td>
<td>0.2</td>
<td>2042</td>
<td>Road Traffic Impact</td>
<td>Noise, Blasting</td>
<td></td>
</tr>
<tr>
<td>Ingleton</td>
<td>Yorkshire Dales</td>
<td>Active</td>
<td>Greywacke</td>
<td>60+</td>
<td>4</td>
<td>370,000</td>
<td>2018</td>
<td>Road Traffic Impact</td>
<td>Landscape</td>
<td>Within NP; Adj. SSSI</td>
<td></td>
</tr>
<tr>
<td>Leaton</td>
<td>Telford &amp; Wrekin</td>
<td>Active</td>
<td>Dolerite</td>
<td>62</td>
<td>400,000</td>
<td>5.3</td>
<td>2034</td>
<td>-</td>
<td>-</td>
<td>Adj. SSSI</td>
<td></td>
</tr>
<tr>
<td>Mancetter</td>
<td>Warwickshire</td>
<td>Active</td>
<td>Lamprophyre</td>
<td>60+</td>
<td>6.4</td>
<td>400,000</td>
<td>2025</td>
<td>Hours Of Operation</td>
<td>Accessibility &amp; Odour</td>
<td>Adj. SSSI</td>
<td></td>
</tr>
<tr>
<td>Pigsdon</td>
<td>Cornwall</td>
<td>Active</td>
<td>Shale &amp; Sandstone</td>
<td>65+</td>
<td>Unknown</td>
<td>3.35</td>
<td>2023</td>
<td>Noise</td>
<td>Dust</td>
<td>Adj. SSSI</td>
<td></td>
</tr>
<tr>
<td>Quartzite</td>
<td>S. Gloucestershire</td>
<td>Active</td>
<td>Quartzite (Proto)</td>
<td>65</td>
<td>2.6</td>
<td>70,000</td>
<td>0.14</td>
<td>2012</td>
<td>Road Traffic Impact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roan Edge</td>
<td>Cumbria</td>
<td>Active</td>
<td>Siltstone</td>
<td>65</td>
<td>2.6</td>
<td>Unknown</td>
<td>15</td>
<td>2038</td>
<td>Landscape Impact</td>
<td>Visual Impact</td>
<td></td>
</tr>
<tr>
<td>Blodwell</td>
<td>Shropshire</td>
<td>Inactive</td>
<td>Keratophyre</td>
<td>62</td>
<td>7.6</td>
<td>Unknown</td>
<td></td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Callow Hill</td>
<td>Shropshire</td>
<td>Dormant</td>
<td>Greywacke</td>
<td>68</td>
<td>7</td>
<td>N/A</td>
<td>+7yrs+</td>
<td>2013</td>
<td>N/A</td>
<td>Subject to Romp Review</td>
<td></td>
</tr>
<tr>
<td>Horton</td>
<td>Yorkshire Dales</td>
<td>Inactive</td>
<td>Siltstone</td>
<td>60</td>
<td>8.5</td>
<td>600,000*²</td>
<td>2042</td>
<td>Road Traffic Impact</td>
<td>Landscape</td>
<td>Within NP; Adj. SSSI</td>
<td></td>
</tr>
<tr>
<td>More (Squilver Green)</td>
<td>Shropshire</td>
<td>Dormant</td>
<td>Greywacke</td>
<td>59</td>
<td>Unknown</td>
<td></td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tredinnick Quarry (Grampound)</td>
<td>Cornwall</td>
<td>Inactive</td>
<td>Greywacke</td>
<td>63</td>
<td>Unknown</td>
<td>2020</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Source: All data taken primarily from MPA Questionnaire Returns, with additional data sourced from Planning Application Documents, Committee Reports & Decision Notices available from MPA websites.

*1 Figures and Data derived solely from Capita Symonds Report. / *2 Figures Derived from Questionnaire Returns where provided. Otherwise figures taken from Capita Symonds Report. / *3 110,000 tonnes of the 440,000 tonnes is restricted to rail or water transportation / *4 Reserves are overlain by consented limestone and not yet accessible. / *5 Adj. Refers to approx 5km radius in this instance.
this information onto GIS (Figure 5.1) and its juxtaposition with England’s largest population centres (which tend to broadly correlate with areas of most trafficked roads and congestion) reveals the extent of the gulf between source and markets (Figure 5.2). Moreover Figure 5.3 shows the poor relation of these nodes of supply to transport infrastructure and the actual practical distances to market. The significance of these large distances is magnified by the fact that Bardon Hill Quarry in Leicestershire is the only HSA quarry in England with a full-time direct rail-link. Yet only 30% of its annual output of 3m Tonnes is despatched by rail (King, 2008). Though rail is widely promoted by regulators and recognised by industry as a more environmentally sound mode of transport than road for aggregates (Bond et al, 2005), the cost of establishing rail-sidings is often prohibitive and access to rail-track difficult to negotiate.

HSA’s geological properties mean it is often constrained by virtue of its associated landscape and wildlife value. Currently, there are three active sites within a National Park, and one within an Area of Outstanding Natural Beauty [AONB] (Figure 5.4). Similarly, Figure 5.5 indicates that a substantial proportion of the existing sites coincide with significant nature designations with three active quarries within Sites of Special Scientific Interest [SSSIs] and a further seven in close proximity. Yet virtually all the existing sites are in close proximity to the effectively fuzzy boundaries of landscape or wildlife designations. As such the tensions between the need for HSA extraction and its environmental impacts are particularly acute. Yet aggregates working can also be connected with the creation of valuable new habitats through restoration which can contribute to a net gain in biodiversity and the exposure of geological faces which may warrant Regionally Important Geological Site [RIGs] or SSSI status in themselves. Despite these potential benefits, it is the disruptive nature of quarrying processes and their connection to permanent landscape change that incite opposition and thus present a barrier to extraction. Consequently the negative impacts will be focused upon here.
FIGURE 5.1: Map of Active HSA Quarries within England
FIGURE 5.2: Map of Active HSA Quarries in Relation to the 13 Largest Cities and Built-up Areas within England

Map of Active HSRA Quarries in Relation to the 13 Largest Cities and Built-up Areas within England

Legend
- Green dot: Active HSRA Quarries
- Blue dot: 13 Largest Cities in England
- Gray area: Built-up Areas (2001)

1 centimeter equals 24 miles

FIGURE 5.3: Map of Active HSA Quarries in Relation to the Trunk Road and Railway Networks and 13 Largest Cities and Built-up Areas within England
FIGURE 5.4: Map of Active HSA Quarries in Relation to Landscape Designations

Map of Active HSRA Quarries in Relation to Landscape and Heritage Designations within England

LEGEND
- Active HSRA Quarries
- National Parks
- Areas of Outstanding Natural Beauty
- Scheduled Ancient Monuments

1 centimeter equals 24 miles

FIGURE 5.5: Map of Active HSA Quarries in Relation to Biodiversity & Geo-diversity Related Designations
The fact that HSA resources coincide with protective designations and are concentrated to a small number of locales that are distanced from their markets inevitably intensifies conflict concerning their continued operation and potential extensions. As such existing and potential future HSA resources are heavily constrained. In view of this a clear and consistent steer is required as a cursory review of recent planning officer reports on HSA related applications conveys that differing degrees of weighting are assigned to HSA proposals against such constraints in view of its geological rarity. This inconsistency is problematic, as it can override sustainability and environmental agendas in some areas and not others.

It should be noted that the current pattern of sites are mostly historically consented, with Roan Edge Quarry being the most recent site to be developed, being permitted in 1989. The majority of existing permissions relate to historical Interim Development Order [IDO] (pre-1948) and Old Minerals Planning Permissions [OMPs] (1948-1982) which generally have time ceilings of 2042. Policy preference for extensions to existing sites over new greenfield proposals tends to reinforce this pattern. This approach is confirmed by the questionnaire responses which reveal that approximately six new extension applications could be forthcoming by 2020-2025. In contrast only one potential new site was reported as being upon the horizon – though data confidentiality issues may have inhibited respondents from divulging full figures on both accounts.

5.3 Projected Future Pattern of HSA Supply

In view of a minimum 8-10 year lead-in to bring new deposits online, a 2020 time horizon has been selected to examine the potential future pattern of sites and need for further HSA resource development. Utilising the permission expiry dates and reserves levels of currently active sites shown in table 5.1; table 5.2 and figure 5.6 illustrates that a further six sites could potentially have expired and closed by 2020. So whilst the pattern of remaining sites is fairer and more even in relation to supply regions, the potential shortfalls create an increased pressure for new resource working which, allied to HSA’s rarity, threatens to sway the balance between economic and environmental factors, overriding considerations of equity, sustainability and designated status which may otherwise preclude working in certain locations. This pressure can thus result in sub-optimal siting decisions.
FIGURE 5.6: Potential Pattern of HSA Sites within England by 2020

Source: Data compiled from Capita Symonds Report (Thompson et al, 2004), Questionnaire returns data and investigation of planning application documents, reports and decision notices.

N.B. It is anticipated that Horton Quarry may be extracting HSA around 2020-2021.
### TABLE 5.2: Active HSA Quarries over Time (2002-2020)

<table>
<thead>
<tr>
<th>HSA Supply Area</th>
<th>Number of Active HSA Sites</th>
<th>2002-2003 (Based on Capita Symonds Report Data)</th>
<th>2011 (Based on MPA Survey Data)</th>
<th>2020 Projection (Based on MPA Survey Data &amp; Reserve)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Midlands</td>
<td></td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>North-West</td>
<td></td>
<td>7</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>South-West</td>
<td></td>
<td>5</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Welsh Border</td>
<td></td>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>18</strong></td>
<td><strong>15</strong></td>
<td><strong>9</strong></td>
</tr>
</tbody>
</table>

*Source:* Data compiled from Capita Symonds Report (Thompson et al, 2004), Questionnaire returns data and investigation of planning application documents, reports and decision notices.

Moreover, within the context of varying MPA policy approaches this could lead to an unjust intensification of HSA extraction in one of the supply-resource areas.

### 5.4 Discussion: Sustainability Implications

Due to HSA’s relative geological rarity within England, the locational options for its working are restricted to a greater extent than any other virgin aggregate. Consequently, confirmation of a HSA deposit which meets the technical specification in sufficient quantities often becomes justification in itself for its proposed exploitation, subject to a few remaining a-priori environmental limits.

Outside of the geological quality, quantity and rarity of HSA resource; proximity to markets and the interrelated aspect of transport connectivity are seen as prime factors in siting decisions by MPAs (Figure 5.7) and all interviewees. This shared weighting reflects how these intertwined factors of logistics represent a convergence of some of the key interests of minerals operators and regulators alike, as they embody both economic and sustainability imperatives. Reducing minerals miles is seen as win-win as it reduces the high costs of transportation of bulky aggregate products and the correlated carbon-footprint of their conveyance alongside the level of nuisance generated by HGV traffic. The conjunction of mineral resource with proximity to markets and an intermodal transport hub is thus an ideal equation which satisfies economic, sustainability and social-justice agendas. Yet HSA seldom coincides with these criteria, presenting a logistical conundrum as it is frequently remote from markets and poorly related to transport infrastructure.
FIGURE 5.7: Stacked Bar Chart of Factors Ranked by MPA Officers to be Most Important in Influencing the Location of HSA Working (Other than the fact of is geological presence)

Source: Information derived from questionnaire responses.

The fact that the above issues are prioritised over matters such as landscape impact, habitat destruction and human amenity in siting decisions reflects the pervasiveness of a technocentric mentality which perceives that such issues can be overcome. Thus high quality quarry design, screening and restoration proposals can potentially reduce, mitigate and compensate for the visual and landscape impact in the medium and long-term; while sensitive working practices incorporating mixed strategies of technical fixes, social controls (e.g. time-limited activities and outputs), and environmental stewardship (e.g. translocation and care of wildlife and soil resources) can minimise negative impacts on sensitive receptors to an acceptable minimum. However mitigation can only ever go so far, as certain landscapes and habitats are irreplaceable like-for-like and though adverse effects are considered temporary, the generally long-life of permissions mean they can last a citizens’ lifetime.

To date planning policy has largely sought to restrict and confine HSA quarrying to existing locations rather than encourage development of greenfield sites. This has
been aided by a large stock of existing IDO and OMP permissions. However the location of these sites is often less than ideal and their reserves are rapidly being depleted. This approach has embodied the pre-eminence of a development control mentality rather than more proactive development management approach now being embraced by government (DCLG, 2009), but it is also mirrored by a conservative ‘industry inertia’ (MPA officer #11). The inherited pattern of sites is thus one barrier to a more equitable and sustainable pattern of supply.

5.5 Conclusion
The geological scarcity of HSA is undoubtedly the prime barrier to ensuring more sustainable patterns of supply. Beyond this, transport infrastructure connectivity and environmental planning constraints are rightly commonly seen as the next greatest barriers to a more sustainable pattern of supply (Figure 5.8). Overcoming these barriers requires a more strategic co-ordinated approach.

**FIGURE 5.8:** Stacked Bar Chart of Factors Ranked by MPA Officers as the Key Barriers to Ensuring a Sustainable Supply of HSA

Source: Information derived from questionnaire responses.
6. RESEARCH RESULTS & ANALYSIS (PART-3):

**HSA Supply in the North of England – Case Studies of Cumbria’s Three HSA Quarries**

### 6.1 Introduction

As detailed in the methodology, case-studies have been employed as both an exploratory and explanatory device to illuminate the reality of the principle environmental impacts of HSA extraction at a site level and the wider implications of these in terms of sustainability and distributional equity. As such they highlight key tensions in decision-making, contributing to a better understanding of the interplay of policy and planning practice, and uncover key barriers and challenges moving forward to a more sustainable and equitable pattern of HSA resourcing. This chapter thus focuses upon three existing HSA quarries within Cumbria in the North-West of England.

### 6.2 Contextual Overview – Cumbria

Cumbria is the second largest county in England and possesses a relatively small but geographically dispersed population. The county possesses a high quality, widely valued and diverse landscape resource which stretches from the western coastal peninsulas of the Irish Sea across the uplands of the Cumbrian massif, to broad valleys flanked by the Pennine ranges to the east. This in turn hosts rich biodiversity. There are good north-south communications along the M6 motorway and the west coast mainline railway, but east-west communications are more problematic due to topography, with the A65, A66, A69 and A590 routes generally congested and rail infrastructure limited. Meanwhile its three remaining operational ports have steadily declined. In terms of its economic structure, agriculture and tourism are key pillars, but it is the industrial sectors upon which the county is most reliant. Cumbria County Council [CCC] is prioritising growth within this sector (CCC, 2010a) but recognises that it ‘has to be achieved without damaging the County's fragile environment’ (CCC, 2009a, p.3). As such there is a fine balance between development aimed at addressing the counties significant economic and social problems, and protecting its environmental assets which are recognised as underpinning the tourism industry, and being vital in attracting business and investment into the area, and contributing to the quality of life of residents (CCC, 2006).
Cumbria is largely self-sufficient in terms of native aggregate resources and also supplies regional and national markets for more specialised products such as industrial lime, specialist brick-clays and gypsum (CCC, 2009a). As such CCC’s Core Strategy equates HSA with a national/regional importance and considers it separately from aggregates for general use despite a very large crushed rock landbank.

6.3 Overview of Sites

There are currently three active HSA sites within Cumbria – Ghyll Scaur Quarry [GSQ], Holmescales Quarry [HQ] and Roan Edge Quarry [REQ]. These are all located in the south of the county and provide varying siting rationales, quality of HSA, environmental impacts and degrees of connectivity.

Table 6.1 provides a brief comparative summary of each site’s current planning permissions, while Figures 6.1-6.2 show the sites together in their broad context, related to transport infrastructure and key designations to provide an overview of their constraints.

### TABLE 6.1: Comparative Summary of Site Planning Permissions and Resource

<table>
<thead>
<tr>
<th>Quarry Name &gt;</th>
<th>Ghyll Scaur</th>
<th>Holmescales</th>
<th>Roan Edge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Area (Hectares) &gt;</td>
<td>29.9ha</td>
<td>9.2ha</td>
<td>42.7ha</td>
</tr>
<tr>
<td>Operator &gt;</td>
<td>Aggregate Industries</td>
<td>Aggregate Industries</td>
<td>Cemex</td>
</tr>
<tr>
<td>Initial Permission Ref &gt;</td>
<td>MIA64</td>
<td>WCC250/20</td>
<td>5/89/2654</td>
</tr>
<tr>
<td>Principle/Operating Permission Ref &gt;</td>
<td>4/08/9009</td>
<td>5/99/9012</td>
<td>5/05/9005</td>
</tr>
<tr>
<td>Principle/Operating Permission Date &gt;</td>
<td>09-Feb-2010</td>
<td>24-Mar-2005</td>
<td>30-May-2008</td>
</tr>
<tr>
<td>Principle Permission (Type) &gt;</td>
<td>Time Extension</td>
<td>ROMP</td>
<td>Lateral Extension</td>
</tr>
<tr>
<td>Rock Type &gt;</td>
<td>Volcanic Tuft</td>
<td>Siltstone</td>
<td>Siltstone</td>
</tr>
<tr>
<td>PSV &gt;</td>
<td>68</td>
<td>62</td>
<td>65</td>
</tr>
<tr>
<td>AAV &gt;</td>
<td>6</td>
<td>8</td>
<td>2.6</td>
</tr>
<tr>
<td>Max. Annual Output Restriction (Tonnes) &gt;</td>
<td>440,000 (+110,000 by sea or rail)</td>
<td>100,000</td>
<td>No limit specified</td>
</tr>
<tr>
<td>Approx. Permitted Reserves &gt;</td>
<td>3.5 M-T</td>
<td>0.2 M-T</td>
<td>15 M-T</td>
</tr>
<tr>
<td>Site Permission Expiry &gt;</td>
<td>12-Dec-2021</td>
<td>21-Feb-2042</td>
<td>30-Dec-2038</td>
</tr>
<tr>
<td>MWDF Site Allocations Status &gt;</td>
<td>Potential Lateral Extension Area Not included within Site</td>
<td>Potential Lateral Extension Area Designed as an Area of Search</td>
<td></td>
</tr>
</tbody>
</table>

Source: Interrogation of Cumbria County Council Planning Application Records
FIGURE 6.1: Map of Active HSA Quarries within Cumbria in Relation to National Landscape Designations & Key Infrastructure
FIGURE 6.2: Map of Active HSA Quarries within Cumbria in Relation to International & National Wildlife Conservation Designations
6.4 Case Study 1 – Ghyll Scaur Quarry

6.4.1 Background

Ghyll Scaur Quarry [GSQ] (Plate 6.1) is located just off the western side of the Duddon Estuary and approximately 2km to the north of Millom, a small remote coastal town situated on the southerly peninsula of Copeland in South-West Cumbria (Figure 6.3). GSQ is situated on the eastern slope of Millom Park Hill which is extensively clothed in commercial conifer plantations which screen the majority of the site (Plate 6.2).

PLATE 6.1: Photograph of Ghyll Scaur Quarry taken from southern corner of site looking north-east, May 2008

Source: Photograph supplied by CCC and reproduced here courtesy of Aggregate Industries

PLATE 6.2: Aerial Image of Ghyll Scaur Quarry within its Local Context

The mineral produced from the quarry is comprised of volcanic lava and ash (Tuff) (Plate 6.3). This yields the highest value PSV stone in England, resulting in the production of a particularly hard-wearing and high-grip aggregate product (Plate 6.4) appropriate for the most demanding highways applications – being utilised on
heavily trafficked routes where frequent sharp breaking takes place such as motorway slip-roads and trunk-road roundabout junctions. It is the only quarry within the country that supplies such high-grade HSA, with comparable quality material only being available in the dormant Callow Hill Quarry in the West Midlands and a few constrained sites within Wales. Resultantly GSQ’s output is recognised as serving a national market and is distinguished as a very high specification roadstone aggregate [VHSA] within CCC’s Core Strategy which makes separate provisions for this site in Policies 7, 13 and 14. The site pro-forma (Table 6.2) highlights that working aggregate
**TABLE 6.2: Site Pro-Forma for Ghyll Scaur Quarry**

<table>
<thead>
<tr>
<th>SITE NAME:</th>
<th>Ghyll Scaur Quarry</th>
<th>LOCATION:</th>
<th>The Hill, Millom</th>
</tr>
</thead>
</table>

**ENVIRONMENTAL**

**ENVIRONMENTAL ASSETS / CONSTRAINTS – WITHIN OR ADJ. TO SITE**
- Falls within the Duddon Estuary & Duddon Mosses SSSI consultation area.
- The exposed faces of the quarry have been designated as a Regionally Important Geomorphological Site [RIGS].
- Cragfield Wood Ancient Woodland, which is also semi-natural woodland UK priority habitat, is adjacent to the north west boundary of the site.

**ENVIRONMENTAL ASSETS / CONSTRAINTS – IN PROXIMITY TO SITE**
- Morecambe Bay SAC, Duddon Estuary SPA and SSSI lies 1.4km away.
- The Lake District National Park boundary is 900m away.
- There are four County Wildlife Sites [CWS] within a 800m radius. A further four CWSs and a number of patches of Ancient Woodland lie within 1.4km of GSQ.
- The natterjack sites potential zone lies 720m away.
- There are records in the vicinity for barn owls, common pipistrelles, slow worms, badgers, polecats and Wall butterflies.

**HERITAGE ISSUES:**
- There is the potential for prehistoric remains on site.
- Closest Scheduled Ancient Monument, Millom Castle, is 1.3km away.

**FLOOD RISK:**
- No Flood Risk Identified

**AGRICULTURAL LAND CLASSIFICATION:**
- Grade 4 for eastern section of existing site - less than 20% likelihood that this is the Best and Most Versatile land. Grade 5 for proposed Area of Search.

**CURRENT SITE RESTORATION PROPOSALS:**
Current scheme is designed to meet nature conservation after-uses. The proposed restoration is centred upon a lake, with surrounding wetland area and species rich habitat such as calcareous grasslands, rocky crags and wooded slopes and benches. It is intended that the educational “Rock-Park” facility will be maintain.

**SOCIAL FACTORS**

**RIGHTS OF WAY:**
- A public footpath runs through the middle of the site.

**RESIDENTIAL RECEPTORS:**
- Approximately 46 Address Point Nodes within a 500m buffer of the site and proposed area of search.
- A further 67 nodes are with a 1,000m buffer of the site and proposed area of search.
- Majority of Properties Located within the Village of the Hill 400 metres to the North-East of the site.
- Located approximately two kilometres (one mile) north east of Millom town centre.

**ACCESSIBILITY FACTORS**

**ROAD ACCESS:**
- Site connects directly onto the A5093

**ALTERNATIVE TRANSPORT OPTIONS:**
- Potential for a permanent rail-loading facility on Salthouse Road approximately 1,500m to the South-East of the road.
- Potential for transportation by sea via road transport to Millom Pier which is approximately 2,600m to the South-East.

**Source:** Derived from Authors’ GIS constraint analysis of sites and examination of CCC MWDF Policy Documentation
within GSQ has generally low potential to impact on human and wildlife receptors and that the site has a range of potential transport options.

6.4.2 Key Site Issues

Whilst table 6.2 highlights the site’s proximity to the trunk-road network, interviews revealed that one of the site’s ‘principle disadvantages is that it’s an hour from the motorway and that the road network between Greenodd and GSQ is not ideal for large articulated lorries’ (Interviewed MPA Officer #2). Accordingly the same MPA officer conceives that GSQ’s ‘main negative is transport and impact on local communities of large lorries thundering through 6 days a week’. In this vein, the local parish council, whilst having no objection in principle to the quarry’s recent time extension, raised similar concerns over the ‘continuing problems with traffic from the quarry arising from numbers, convoying and inappropriate speeds’ (CCC, 2009b, Para 3.3).

The only other immediate externalities of note were that GSQ occasionally generates complaints due to blasting and noise caused by secondary breaking of oversize material (Interviewed MPA Officer #2). Overall, interviews and reports conveyed the significance of GSQ’s material and highlighted that it is a well-run quarry of notable local economic importance which is well-screened within its locale and generally supported by the local community.

6.4.3 Observations

GSQ provides a fairly exceptional instance due to the VHSA it produces. However it is poorly located, in a strategic sense, to serve its national market by road transport with its material being used as far as Scotland and the South-East of England. Although GSQ is remotely located, the site has a range of alternative transport options, the exploitation of which are supported by planning conditions (CCC, 2010b) and policy. Yet despite the good will of the operator in actively pursuing alternatives and keeping them under review, there are a number of economic, logistical and systematic barriers to a diversification of transport options at GSQ. In terms of sea-transportation, Millom pier has been used to ship limited amounts of VHSA, however capacity is very restricted and the cost currently uneconomic (Mineral Operator #2). Although GSQ is not presently rail-linked, the Cumbria Coastal railway line passes within about one mile of the site.
Yet rail transport options are similarly unfeasible with there being little realistic prospect of a permanent rail-siding development unless external funding can be levied to contribute to the considerable costs of land assembly, construction and for connection to the rail network. Moreover rail transport is further complicated by difficulty gaining train-paths (access to tracks for journeys to reach markets), issues with the physical capacity of given lines to accept heavy and prolonged traffic, and general desire of network operators reduce number of sidings and connections (Thomas et al, 2008). Resultantly Mineral Operator #2 considers ‘primary output from GSQ will always be by road’.

GSQ thus highlights the gap between a wide consensus (spanning local and green interest groups, government and industry) that recognise and supports aggregate transportation by rail as a more environmentally friendly alternative to road-haulage; and the ability to deliver this. The extent to which planning intervention can solve this is limited, as it is beyond the remit of development control to ‘reasonably’ require increased percentage of distribution by rail, especially as issues surrounding rail traffic economics are commercially sensitive in nature. In the case of a nationally important quarry such as GSQ, a more holistic, strategic and co-ordinated response is clearly required to transfer movement of freight from the highway to the rail network and thereby improve the sustainability of supply so as to reduce carbon emissions, road congestion and negative externalities caused by HGV traffic. These concerns thus echo those of Thomas et al (2008, p.45) that:

“There appears to be a real danger that if concerted action is not taken, more or less immediately to bring together the rail freight and infrastructure concerns with quarry operators, the government and planners on a strategic basis, rail will fail to be able to deliver... a large and integral (and highly popular) component of the government’s aggregates policy.”
6.5 Case Study 2 – Holmescales Quarry

6.5.1 Background

Holmescales Quarry [HQ] (Plate 6.5) lies between the villages of Old Hutton and Gatebeck, 5km south east of Kendal (Figure 6.4). It sits within the rolling farmland and

FIGURE 6.4: Site Location Plan of Holmescales Quarry

Source: Map produced by Author from GIS data provided by Cumbria County Council
PLATE 6.5: Photograph of Holmescales Quarry

Source: Photograph taken May 2008. Image supplied by CCC and reproduced here courtesy of Aggregate Industries

PLATE 6.6: Photograph of Holmescales Quarry within its landscape context

Source: Photograph taken May 2008. Image supplied by CCC and reproduced here courtesy of Aggregate Industries


<table>
<thead>
<tr>
<th>SITE NAME:</th>
<th>Holmescales Quarry</th>
<th>LOCATION:</th>
<th>Old Hutton, Kendal</th>
</tr>
</thead>
</table>

**ENVIRONMENTAL**

**ENVIRONMENTAL ASSETS / CONSTRAINTS – WITHIN OR ADJ. TO SITE**

- Important Great Crested Newt habitat adjacent to site.
- The exposed faces of the quarry have been designated as a Regionally Important Geomorphological Site (RIGS).

**ENVIRONMENTAL ASSETS / CONSTRAINTS – IN PROXIMITY TO SITE**

- Cocklet Wood Ancient Woodland, which is also semi-natural woodland UK priority habitat lies 825m away;
- Birkriag Park Wood County Wildlife Site (CWS), which is also Ancient Woodland and UK priority habitat, lies 1.3km away;
- Blease Hall Wood CWS is 1.7km.

**HERITAGE ISSUES:** None Identified.

**FLOOD RISK:** No Flood Risk Identified.

**AGRICULTURAL LAND CLASSIFICATION:**

Grade 4 - less than 20% likelihood that this is Best and Most Versatile land.

**CURRENT SITE RESTORATION PROPOSALS:**

Scheme designed to meet nature conservation and landscape objectives by restoring quarry floor to a combination of willow carr woodland, improved grassland and shallow water surrounded by marginal aquatic habitats designed to provide an extension to the habitats in the adjacent former quarry.

**SOCIAL FACTORS**

**RIGHTS OF WAY:** None Affected

**RESIDENTIAL RECEPTORS:**

- One property (Robinson Rock) is within 250m of the site.
- Approximately 8 Address Point Nodes lie within a 500m buffer of the site, with a further 17 being within a 1,000m buffer.
- Located approximately five kilometres south east of Kendal.

**ACCESSIBILITY FACTORS**

**ROAD ACCESS:** The Site is remote from the trunk-road network. Consequently the site is subject to a Section 106 legal agreement securing a routing agreement and set of ‘Haulier Rules’ (to which all drivers and haulage contractors must adhere). The agreed HGV Route established a one-way circuit with departing vehicles passing through Gatebeck onto the A65, while returning traffic travels from the A65 along Helmside Road, Oxenholme and through the villages of Middleshaw and Old Hutton to the site.

**ALTERNATIVE TRANSPORT OPTIONS:**

- Potential for a direct link-road onto the M6 motorway has been mooted in the past.
- No nearby rail access or facilities.

*Source: Derived from Authors’ GIS constraint analysis of sites and examination of CCC MWDF Policy Documentation*

heath of the intermediate moorland plateau (CCC, 2011) (**Plate 6.6**) to the east of the M6 motorway, however it has no direct access onto this. The roads leading to the site are narrow (single track in places), consequently HGVs servicing HQ have to adhere to a strict routing agreement. In 2007 an appeal against CCC’s refusal to allow an increase
in vehicle movements was dismissed by the planning inspectorate (Lyon, 2007). An extension to the site was proposed by the operator as part of the site allocation process however this was not progressed by CCC due to HQ’s poor accessibility.

HQ works an outcrop of high quality gritstone material within the Kirkby Moor formation. It is adjacent to a former quarry which has naturally regenerated to wet woodland and supports a significant population of Great Crested Newts. The site is relatively small and has limited consented reserves remaining.

6.5.2 Site Issues

The principle issue with HQ is the adverse impact of HGV traffic on the local road network. The severity of this has been verified at appeal as refusal for an application for increasing vehicle movements was upheld on grounds of ‘unacceptable impact on highway safety and the convenience of other road users’ (CCC, 2007a); with the Planning Inspector’s report (Lyon, 2007, para.5) eloquently describing the trajectory of existing quarry vehicles as ‘uncompromising and overbearing through villages’ and recounts the intimidating effect of HGV traffic on other road users.

The relative remoteness of HQ means that the actual working of minerals is reported to raise no amenity issues (Interviewed MPA Officer #2); however it also dictates HQ’s dependence on bulk road haulage to convey its HSA freight. Consequently HQ is duly constrained by the limited capacity of a local road network characterised by many narrow sections with minimal verges or no footways where the carriageway is very close to wall and hedges and has generally poor forward visibility. Despite the operator’s best efforts to carefully manage HGV movements and restrict their impact (evident in the presence of a one-way routing agreement and sensitive operating practices which include measures such as avoiding the local primary school in Old Hutton at peak drop-off and pick-up times); HQ’s ‘diabolical’ site access (Interviewed MPA Officer #2) means HGV traffic will inevitably create significant negative impact across the communities that lie on the haul route. Though the possibility of direct access onto the M6 has been investigated, such a solution has been obstructed by the Highways Agency, who do not tend to allow private sites to have a private access onto motorways (Minerals Operator #2). Subsequently, no viable alternative access has been forthcoming.
6.5.3 Observations

Like GSQ, the negative impact of HGV traffic is the dominant issue at HQ. However in the case of HQ, the wider transport options are more restricted and adverse highways impacts rendered more acute by HQs abominable access. The nuisance and danger generated by HGVs utilising minor roads and passing through villages is clearly an emotive issue and has generated strong opposition across the communities it affects (CCC, 2007a) – substantially reducing their quality of life. As such HQ presents a stark example of the wider impact of quarrying, as HGV traffic spreads negative externalities into neighbouring settlements.

With permitted reserves due to expire in 2013 and further HSA resource known to exist on site, CCC is presented with a complex cornelian dilemma in which both choices have a detrimental effect upon notions of sustainability. Thus the potential premature closure of HQ raises the prospect of greenfield development being brought forward and increases the likelihood of mineral sacrilege – with VHSA material being used for works that could have been done with lesser materials. Conversely, to allow continued quarrying, would perpetuate the unacceptable traffic impacts upon the local road network. Yet this could be resolved if a more strategic and integrated spatial planning approach that recognises the reciprocal relationship between highways infrastructure and HSAs rarity was present as this could facilitate an understanding by which direct motorway access may be achieved.
6.6 Case Study 3 – Roan Edge Quarry

6.6.1 Background

Roan Edge Quarry [REQ] (Plate 6.7) is located less than 400 metres away from Junction 37 of the M6 Motorway (Figure 6.5) and is remote from residential receptors (Table 6.4). It is situated within a landscape characterised by rolling low fells, ridges and rocky outcrops interspersed with open grassland with small woodland clusters (CCC, 2011).

PLATE 6.7: Photograph of Roan Edge Quarry within its landscape context

![Plate 6.7: Photograph of Roan Edge Quarry within its landscape context](image)

Source: Photograph taken April 2004. Image supplied by CCC and reproduced here courtesy of Cemex UK Ltd.

REQ is a relatively new quarry, having only been active for 20 or so years. It was granted a substantial extension in June 2007, providing the release of sufficient permitted reserves to last until 2018 based on current rates of extraction. Cumbria’s MWDF recognises REQ as an important source of HSA and identifies a potential extension area to the east of the site as an area of search (Figure 6.5) so as to provide sufficient provision of HSA for the plan period.
<table>
<thead>
<tr>
<th>TABLE 6.4: Site Pro-Forma for Roan Edge Quarry</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SITE NAME:</strong></td>
</tr>
</tbody>
</table>

**ENVIRONMENTAL**

**ENVIRONMENTAL ASSETS / CONSTRAINTS – WITHIN OR ADJ. TO SITE**
- None

**ENVIRONMENTAL ASSETS / CONSTRAINTS – IN PROXIMITY TO SITE**
- Killington Reservoir County Wildlife Site [CWS] is 260 metres away, on the opposite side of the M6 motorway.
- An area of calcareous grassland UK priority habitat lies 460m away, whilst a heathland area of UK priority habitat lies 900m away.
- A number of CWSs are within a 1km range of the site. These include: Firbank Fell CWS which lies 940m away; Hutton Park Mire CWS which is 950m away; Brundrigg Moss CWS which is 1.2km away; Lily Mere & New Park Mosses CWS, & Lambrigg Tarn & Fell CWS are both 1.4km away.
- The site is just over 2.5km from the proposed boundary for a north-eastern extension to the Yorkshire Dales National Park [YDNP].
- The current YDNP boundary is approximately 4km to the east of the site.

**HERITAGE ISSUES:** None Identified.  **FLOOD RISK:** No Flood Risk Identified.

**AGRICULTURAL LAND CLASSIFICATION:** Grade 5 - less than 20% likelihood that this is Best and most Versatile land.

**CURRENT SITE RESTORATION PROPOSALS:**
To create a lake and connected flooded valley feature comprising islands and shallows, scree slopes and buttresses, to increase the lake’s wildlife potential. Upper quarried faces would be restored to slopes of grass heathland which would integrate them with adjoining land. The western screening bund would be incorporated into existing screening landforms to create a large ridge of grass heathland with small areas of wetland along the north western boundary.

**SOCIAL FACTORS**

**RIGHTS OF WAY:** A bridleway runs between the eastern boundary of the existing quarry and proposed area of search. The same bridleway continues to the north of the quarry towards Docker Fell and Lambrigg Fell.

**RESIDENTIAL RECEPTORS:**
- The closest residential properties are Big Park Farmhouse located about 450 metres to the north of the site boundary.
- Several properties are situated at Hutton Park about 520m to the west of the site.
- A total of 10 OS Address Point nodes lie within a 1km buffer of the existing quarry.
- The nearest village is New Hutton situated approximately 2 km to the south west.
- The site is located approximately seven kilometres east of Kendal.

**ACCESSIBILITY FACTORS**

**ROAD ACCESS:**
Access from the site is directly onto a ‘C’ class road for a distance of 50m, where all traffic turns right onto the A684, following this for 500m before connecting onto the M6 at Junction 37.

**ALTERNATIVE TRANSPORT OPTIONS:**
- None available nearby, however the site operators Cemex possess permanent rail-sidings at Shap Blue Quarry just off Junction 39 of the M6 which is an approximately 26km trip north by road.
The site lies within British Waterways Kendal-Lancaster Canal safeguarding consultation area. Any such future reopening and transportation of aggregate by barge is both extremely unlikely and unfeasible.

Source: Derived from Authors’ GIS constraint analysis of sites and examination of CCC MWDF Policy Documentation

FIGURE 6.5: Site Location Plan of Roan Edge Quarry & Proposed Site Allocations

Source: Map produced by Author from GIS data provided by Cumbria County Council
6.6.2 Site Issues

The committee report for the recent site extension succinctly identifies the main planning issues at REQ as being its impacts upon the landscape and visual amenity, local hydrology and ecology, and of noise, blasting, dust and increased traffic (CCC, 2007b). Interviews revealed its landscape and visual impact to be one of its most problematic issues, with a range of key viewpoints registering significant to moderately adverse visual impacts of varying longevity. Though, in terms of potential visual receptors, there are relatively few residential properties in the area, REQs visibility is more prominent in relation to the M6 motorway and network of footpaths and bridleways. Though concerns have also been raised by the parish about the landscape impact of overburden mounds (Interviewed MPA Officer #2), but in general workings are currently well screened by the topography.

Concerns regarding potential hydrological impacts are also prescient at REQ as its working and restoration have the potential to detrimentally affect water-flows, water quality and ecology of local watercourses. This is especially pertinent as REQ lies within the catchment of Saint Sunday’s Beck which provides an important habitat to native white-clawed crayfish (Interviewed EA Officer). To date no issues have arisen, though there remains uncertainty about the local hydrology.

6.6.3 Observations

REQ’s virtually direct access onto the M6 Motorway and remoteness from residential receptors means it could not be better located in planning terms. So whilst landscape and hydrology are thorny issues, it is possible to carefully manage and mitigate against them in these circumstances.

REQ’s sustainability credentials are more mixed, as it is dependent on road-haulage and is distanced from the key markets it serves. Some past operational practices have been particularly unsustainable, for example Cemex’s transportation of the raw aggregate north to Shap Blue Quarry to be washed/sorted which resulted in a 54.7km round trip for 80% of the material (approximately 270,000 tonnes per annum). Cemex calculate these unnecessary movements released of some 2,660 tonnes of CO$_2$ per year (CCC, 2007b). The recent upscaling of operations has provided the economic certainty to
invest and halt this practice through the installation of crushing, washing and screening plant in-situ, which also provides concomitant advantages as the washing plant provides dust suppression and enables the recovery of higher percentage of material for HSA use (from 70% to 80%). This improved resource management makes both economic and environmental savings. This example is illustrative of a wider problem related to reducing minerals miles – that of corporate supply infrastructure in terms of mineral processing, storage and distribution to point-of-sale. This can be seen in the tendency of the big five minerals operators to produce HSA solely for use in their own asphalting plants and network of sites (Minerals Operator #1), thus significantly increasing the movement and carbon-footprint of aggregates.

6.7 Case Study Overview Discussion & Conclusion

Across all three case-studies the accessibility of each site has been key in determining their acceptability, productivity and range of externalities. The impact of HGV traffic in particular have emerged as a contentious and problematic issue as it exports externalities far beyond a quarry's physical extent and releases significant quantities of greenhouse gases. Figure 6.6 illustrates that the significance of this issue is well recognised by MPA officers, while interviews with operators echoed that the sustainable transport of minerals is one of the most difficult challenges the industry currently faces.

**FIGURE 6.6:** Bar-Chart of Negative Impacts Most Associated with HSA Quarrying in England as Ranked by MPA Officers

Source: MPA Questionnaires
Of all the sites in the North-West supply/resource area, REQ is undoubtedly ‘the best placed to supply HSA given its close proximity to the M6 motorway and its remoteness from residential dwellings’ (CCC, 2007b). Whereas GSQ is of clear national importance due to the particularly high grade, REQ presents a site that is strategically located and of wider inter-regional importance. In both of these sites the status of HSA, seemed to provide their applications with an added momentum. Though in the case of HQ this was not sufficient to overcome its’ *diabolical* access. Yet within industry, there is a sense that HSA can tilt potentially unacceptable quarries to being acceptable, with Minerals Operator #1 recounting that, in relation to a proposed extension to Ghyllfach Quarry in Wales, ‘HSA’s position made the difference between the site being acceptable and not acceptable’.
CHAPTER 7 - OVERVIEW DISCUSSION & RECOMMENDATIONS

7.1 Introduction
This chapter draws together the emerging themes, key findings and implications from the analysis and discussion in the results sections and then feeds them into a series of recommendations of how the minerals planning system could be improved to better provide adequate HSA in a more sustainable and equitable manner.

7.2 Overview Discussion
The current network of HSA sites within England is largely the legacy of historic patterns of quarrying. As such there is no overriding spatial or strategic logic governing their location beyond the geological occurrence of commercially viable deposits that meets HSA criteria. This situation is symptomatic of local minerals planning policy approaches that have sought to stymie the proliferation of new quarry sites and their correlative environmental externalities by establishing a policy preference for horizontal and lateral extensions to existing sites. This rationality is rooted in an environmental preservationist logic that seeks to protect pristine landscape and confine impacts to existing locales. However, in doing so, it can embed unsustainable and disruptive patterns of long-distance bulk mineral-flows by road freight. Conversely a new virgin greenfield site, whilst requiring greater development capital and causing more disjunctive landscape change, can often offer more sensitively and strategically located sites – with REQ being a prime example of this. This choice presents a seemingly cornelian dilemma for sustainability and embodies the fundamental tension within Minerals Planning between a conservative development control mentality that seeks to restrict and prevent environmental damage, to an emerging strategic pragmatism that seeks more proactive spatial fixes. The most sustainable solution would be the pragmatic use of both approaches so as to ensure an optimal mix of HSA sites that achieves both a net-reduction in externalities and more equitable spatial pattern. Mechanisms for strategic overview, coordination and management are essential to achieving such a mix.

The need for such management and monitoring mechanisms is made all the more pressing by the continuing decline in permitted reserves and projected fall in number of sites. Yet minerals companies seem either reticent or unable to progress such proposals.
HSA’s relative rarity, synonymy with designated landscapes and generally poor relation to strategic transport infrastructure networks and markets are clearly the key barriers. However it is contended that a root of this inertia is a lack of certainty arising from geological and policy shortcomings.

The lack of sufficiently detailed indicative geological data as regards quality and volume of potential HSA deposits (Fry and Waymen, 2008) presents a substantial hurdle. Moreover developer confidence in initial geological survey data has been recently shaken by the discovery of variable bedding within a number of existing deposits at sites in Wales and the South-West which fundamentally compromises the quantity of commercially viable aggregate available. In view of the considerable time and expense of developing a site, this geological uncertainty creates high levels of commercial risk.

MPAs’ struggle to progress MDFs in an expedient or timely fashion, particularly site allocations documents, has also caused considerable uncertainty and delay in bringing sites forward. This has been exacerbated by the uneven patchwork of local minerals planning policy approaches towards HSA. In this latter aspect the loose steer of MPS1 as regards landbanks appears principally culpable. Although the unclear level of weight attached to HSA also adds to uncertainty as regards its position relative to the status of environmental constraints/designations.

Certainty is also essential for providing the necessary investment to tackle the recurrent issue of transport infrastructure connectivity that emerged from the case studies and questionnaires and unsustainable operational practises such as those previously present at REQ. In particular the negative impacts of HGV road-haulage on the quality of life of local communities and upon the atmospheric system in terms of their high CO₂ emissions have been highlighted as being in urgent need of address. Diverting aggregate conveyance from highways to ships and rail-freight can substantially reduce these adverse effects.

Future decisions on new HSA working should be taken more strategically, with connectivity a prime, possibly overriding, consideration. The research has highlighted that opportunities also exist to improve the connectivity of existing HSA sites, but that
financial and logistic barriers impede this. To achieve sustainable transport goals the existing network of HSAs quarries need to be planned for more strategically and dealt with in a more integrated and joined-up fashion with transport policy. So, whilst planning can encourage and enable such optimal arrangements, as seen in CCC’s safeguarding of rail-sidings for GSQ; it cannot deliver these or make them economically viable solutions. An integrated policy-approach therefore needs to be combined with clear financial incentives and funding streams to facilitate delivery of more equitable and sustainable modes of conveying bulk freight. Guaranteeing a percentage of the Aggregate Levy Sustainability Fund [ALSF] for more sustainable minerals transport-infrastructure would be an effectively self-financing redistributive measure. Though, uncertainty over the future of the fund following the Comprehensive Spending Review [CSR] could rule this out. Yet the danger persists that improving HSA supply networks can also encourage increases in the distances resources are exported – thus inadvertently reinforcing the pressure for further extraction and expansion at such a strategic node.

Across the study, a number of key themes and issues thus recur. The lack of firm strategic co-ordination, direction or overview as regards HSA repeatedly arises as a weakness of current system, as does the broader absence of targeted investment to back-up policy and deliver improvements that will drive-up sustainability standards and reduce impacts. This links into another key theme to emerge from the above discussion of the importance of certainty within the minerals planning system. A final continual underlying theme has been the internal contradictions and conflicts of competing sustainability agendas which complicate decision making processes revealing cornelian dilemmas that encourage inertia and uncertainty.

7.3 Recommendations

**Recommendation #1:**

HSA supply needs to be better monitored if future shortfalls are to be avoided and would be better managed at a geographic level synonymous with its scale of supply. As such co-ordination is clearly required at an inter-regional/national level. **To this end a National Aggregate Working Party task-group devoted specifically to monitoring and**
managing HSA should be established. This would provide a familiar mechanism that could act as a communicative forum between a dispersed array of HSA custodians and industry. It would facilitate pragmatic deliberatively reached solutions and establish a sense of joint responsibility resulting in even-handed apportionments of supply reasonably adjusted to market sources. As such it would be well placed to establish agreement for a nationally consistent standard by which HSA data can be separately gathered through MPAs Annual Monitoring Surveys in line with Brown et al’s (2011) analysis and recommendations as regards the rationalisation of minerals data collection. Furthermore it would provide a vital platform for influencing national policy.

Recommendation #2:  
The National Planning Policy Framework [NPFF] must provide a firm steer on HSAs, and clarity as regards their status. A core element of this is establishing a mandatory separate landbank for HSAs for all MPAs who possess such a resource. These landbanks can be locally set through MDFs with their soundness and alignment with apportionments being examined at a Hearing in Public. A requirement that new HSA sites or extensions demonstrate how they will convey a certain percentage of HSA by sustainable modes of transport should also be investigated. The NPPF would also need to set clear guidelines as to the relative weight of HSAs importance in relation to environmental constraints and considerations. These measures would ensure the burden of HSA production is evenly distributed and demand met within local environmental limits as well as provide a more even policy basis across MPAs. The NPPF should also provide clear justification of HSAs separate treatment on grounds of the resources’ relative rarity and importance as the fabric of the nations’ transport infrastructure.

Recommendation #3:  
Steadman et al (2005) have stressed the case for and utility of GIS analysis to inform approaches for the sustainable planning for the provision of aggregates. In line with this thinking, the transport infrastructure connectivity options of HSA sites, and the wider processing and supply infrastructure across companies should be reviewed and mapped to inform efforts to reduce unnecessary minerals road miles. This could
encourage joint operational working practises such as shared strategic depot facilities and rail freight akin to Mendip rail joint venture (Bond et al, 2005). Ensuring any recommendations arising are implemented will require their alignment with funding mechanisms and a nationally co-ordinated collaborative multi-agency approach supportive to making best-use of infrastructure capacity. The intended scrapping of the ALSF and its Freight Facility Grants present a substantial barrier to achieving any improvements and should be reviewed.

**Recommendation #4:**

Existing geological data currently consists of British Geological Survey (BGS) Mineral Resource Maps which are considered adequate for broad strategic level planning (Lusty et al, 2011), however Steadman et al (2005) note the absence of finer grain data regarding consistency and quality for different aggregate sources across the UK. The exacting criteria for HSA, their relative rarity and problems with variable bedding, magnify this problem. More detailed mineral exploration to identify a stock of commercially viable deposits on a national basis should be undertaken. This could take the form of a strategic map analysis which refines the broad geological resource shown in figure 3.1 and overlay this with key constraints and infrastructures that can be utilised to inform the delineation of strategic areas of search which, subject to sustainability appraisal to screen-out potentially unacceptable locations, can be used for targeted finer grain geological exploration.

**7.4 Conclusion**

The key theme emerging from the results and analysis is a lack of strategic overview and co-ordination in handling HSA. Though efforts to improve this within North-West RAWP are admirable, HSA needs to be looked at more holistically and better monitored and managed at a national level so as to secure future supply whilst ensuring the optimal configuration of sites. In light of a number of physical and systematic barriers to securing supply and more sustainable and equitable arrangements, there is scope for significant improvements in terms of rationalising operations and better strategic management. The MASS can play a pivotal role in this.
CHAPTER 8. CONCLUSION

8.1 Overview of Study and its Key Findings
This exploration and analysis of the key issues and barriers associated with the extraction of HSA enables conclusions to be drawn as regards the functionality and capacity of the minerals planning system to secure supply and deliver more sustainable and equitable outcomes.

It has shown that to date the minerals planning system has worked well to secure sufficient HSA to meet demand. However the pessimism surrounding its future prospects to do this seems justified as the downward trend in the current lifetime of permitted reserves identified within the Capita Symonds Report (Thompson et al, 2004) has continued unaddressed. The geological rarity and heavily constrained nature of potential HSA deposits inevitably represent a strong barrier. Yet it has been argued that this barrier has been reinforced by tensions in national minerals planning policy and uncertainty fostered by the drawn-out transition to MDFs, with the uneven mosaic of local minerals policies and lack of co-ordinated monitoring and review of the issue substantially contributing to industry inertia. Firmer direction, consistent monitoring and strategic overview are urgently required to better manage supply. It is posited that a HSA specific AWP operating at a national scale would facilitate this, offering a more proactive forum which would provide a vital deliberative platform to co-ordinate and steer a measured response that secures the most equitable and sustainable arrangement of sites and mineral flows to meet demand.

Minerals planning policy’s continued preference for site extensions over new working has served to perpetuate a historically determined pattern of HSA sites with generally poor levels of connectivity, thereby entrenching existing spatial inequities. This is compounded by MPAs’ struggles to progress sustainability objectives and alleviate transport impacts at existing sites as highlighted in the case studies. In light of HSAs symbiotic relationship with transport infrastructure it would seem a mutually beneficial undertaking to promote greater dialogue and joint-working between MPAs, Mineral Operators and transport infrastructure managing bodies to realise more
equitable and sustainable logistic solutions. A more integrated cross-sectoral policy approach is required to support this. However to achieve any meaningful actions, it must be aligned with financial mechanisms to incentivise the diversion of aggregates to more sustainable transport modes and establish a strategic bulk-aggregate depot infrastructure.

This research suggests that collaborative strategic approaches are essential to drive sustainability objectives forward and address the prescient traffic externalities of HSA extraction. Yet these positive, progressive ‘development management’ style solutions, are not without their own negative sustainability and equity implications as they can encourage and reinforce the export of externalities to distant locales. Consequently there must be clear community support and acceptance of the local economic and environmental trade-offs before measures such as rail-linking take place. The measures advocated above are also problematic in the respect that they reinforce the much disputed technocratic rationalism of the MASS system (Cowell and Owens, 1996). If AWPs are to be given a strategic role as regards HSA, the privileged enclave of governmental and commercial interests that form these will have to be made highly transparent, and their apportionments and decisions subject to sustainability appraisals to ensure that environmental capacities are respected. To this end, they must be open to input from key environmental stakeholders so as to counter local critiques regarding the democratic legitimacy of their apportionments.

8.2 Wider Implications of the Study

The study reinforces the pragmatic and valuable role of strategic planning at a spatial scale relative to the market, geological scarcity and/or significance of the mineral resource; to tackle complex and dynamic problems relating to supply, sustainability and equity. This adds weight to the Town and Country Planning Association’s (TCPA)’s (2010) broad case for strategic spatial planning within the English planning system to provide analytical overview and better address and co-ordinate policy responses to functional realities. The research also signals that, although holistic cross-sectoral policy integration is endemic within minerals planning policy documents, minerals planners need to exert greater influence upon other policy silos such as transport policy to achieve the integration necessary to deliver sustainability objectives.
This study addresses a clear research gap into minerals planning at the policy-practice interface as there have been no academic case studies centring on MDFs or the variety of planning issues at specific mineral extraction sites and their wider sustainability implications. Indeed, minerals issues seem to have slipped down the academic agenda in the last decade, instead being overtaken by investigations into the passionate opposition and siting controversy generated by the visual and landscape impacts of wind farms (Mander, 2008). Consequently recent studies concerning quarrying and planning have predominantly comprised technical research reports commissioned via the Aggregate Levy Sustainability Funding [ALSF] and authored largely by BGS affiliated experts, creating space for more reflective academic root-and-branch review of the minerals planning system.

This study thus provides a timely reminder to policy practitioners and academics alike of the tensions and conflicts still manifest in the minerals planning system. Moreover, with the Coalition Government’s efforts to reform and streamline national planning policy through the NPPF still at an early stage, its findings and recommendations have the potential to inform and influence future policy.

8.3 Limitations of Research/Methodology

The geographic parameters of the project impede a holistic and functional view of supply and its environmental impacts across Britain. However principles of mineral security, issues surrounding the exporting of impacts, and spiralling transport costs lend the confined focus of this study a certain economic and ethical resonance. Some caution must also be exercised in generalising findings from the case-studies, as Cumbria’s policy approach to HSA is currently the exception rather than the rule, and is the only area neighbouring an active resource situated in a national park.

In methodological terms, the variety of research techniques employed provided a strong degree of triangulation to mitigate against any potential knowledge gaps, though this can never be totally assured. Other limitations relate primarily to the relative inexperience of the author in conducting interviews and the dangerous creep of interpreter bias. With greater resources the research would have benefitted from
follow-up interviews to build-upon information obtained from the research questionnaires and a wider sample of case-studies across MPAs so as to provide a more representative variety of policy contexts.

8.4 Future Research Agendas

The results have demonstrated a wide recognition of the importance and significance of HSA across MPAs and minerals operators; though the extent this has been communicated to politicians, other professions and the wider public is unclear and would benefit from future investigation. In this respect the research adds weight to calls for a full update of the Capita Symonds report (Thompson et al, 2004) on supply and demand. Such a review, renovated to incorporate information on HSA flows and a long-term strategic assessment of supply up to and beyond 2042, would provide a vital analysis to inform MDF evidence bases and future supply options, as well as disseminating the importance of HSA to a wider audience.

The study also reveals opportunities for further research into the wider impacts of emerging MDFs and their influence at the policy-practice interface; the sustainability and operational efficiency of minerals supply networks; and, in-particular, improving transport infrastructure connectivity and diverting aggregate supply from roads. Moreover, there has been very little research conducted in the UK into public perceptions and attitudes toward quarrying, nor investigations of its social impacts (Bloodworth, 2009). Such examinations would provide elucidating additions to knowledge regarding barriers to and equity implications of extraction. Case Studies examining mineral extraction and the totality of its impacts are also few in number, with those that do exist tending to focus on cases of controversy such as Scottish Super Quarries (Cowell and Owens, 1996), and ‘rarely directly capture public attitudes’ (Bee et al, 2010, p.38).

The extent to which the views and findings expressed in this study are shared by the wider MPA policy community also represents a potential subject for future research, though it could alternatively be gauged from any future consultation on any proposed efforts to implement a more consistent and integrated approach to dealing with HSA at the regional/national level. Either way, the wider MPA consensus on the matter of
separating HSA out from other minerals in the crushed-rock landbank would be particularly key, as such a move has the potential to create a precedent that could instigate a complex situation whereby all types of virgin aggregate material are gradually separated-out into their own landbanks on grounds of differential markets should the rarity of HSA not be instated as the focal point.

8.5 Future Challenges

As it is not uncommon for crushed rock sites to take 10-12 years from initial site appraisal to coming online, there is a startling urgency to secure better monitoring arrangements and more co-operative joint-working approach to ensuring the right sites to meet supply are brought forward in a timely fashion. The recommendations made above, as well as improvements in the geological information regarding possible deposits and efforts to streamline the planning process and synchronise it with other key consenting regimes, proffer a potent potion to remedy supply concerns and secure a more sustainable and equitable pattern of sites. In these latter aspects, there is a need to establish a sustainable balance between application of the proximity principle and sourcing from a small number of highly efficient strategic sites (Lusty et al, 2011; Thomas et al, 2008). Strategic spatial planning, in the sense defined by Albrechts (2006) as a geographically focused transformational and integrative governance tool, will be key in achieving such a balance and moving sustainability objectives forward. However it must be emphasised that it is essential that this takes place within a governance structure built-around prudent-use of HSA, environmental justice, meaningful participation, and a considered long-term view – otherwise quarrying will ultimately be viewed as unsustainable and illegitimate in the eyes of those who brunt the impacts as it will have no valid social license to operate.
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APPENDIX 1 – Questionnaire Distributed to MPAs

Issues of Sustainability and Distributional Equity in Ensuring Mineral Supply: The Case of High Specification Aggregates

Approaches to Sustainable High Specification Aggregates (HSA) Supply in England

Mineral Planning Authorities’ Questionnaire

July 2011

If you require any additional space to complete questions or have any other comments to make as regards the questionnaire or research, please provide your answers in the sheet at the rear of this survey.

Respondent Overview

| Respondent Name: |  |
| Respondent Position: |  |
| Respondent Authority: |  |

High Specification Aggregates [HSA] have been defined as:-

“natural and/or artificial coarse aggregates (>3mm) that meet the physical test criteria [see box]... that are suitable for use in road surfacing (including surface dressing) applications at the more difficult and/or heavily trafficked sites where high levels of skidding resistance and aggregate durability are required”

Part A) MPA Perception of HSA Supply and Associated Planning Issues

1. Please rate on the scale below how important a planning issue you consider HSA supply to be? (Please check/tick one option) To do this in Word double click your preferred box and then set the default value to check

<table>
<thead>
<tr>
<th>Not Important</th>
<th>Relatively Important</th>
<th>Quite Important</th>
<th>Very Important</th>
<th>Not Sure</th>
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2. On which geographical scale do you most associate HSA supply? (please check/tick one option)

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<thead>
<tr>
<th>Global</th>
<th>International</th>
<th>National</th>
<th>Regional</th>
<th>Local</th>
<th>Not Sure</th>
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3. In your view what are the key barriers to ensuring a sustainable supply of HSA?
   (Please Rank your Top 3 – with 1 being the biggest/largest barrier) Please Circle or Highlight Rank Number

   1  2  3 > Community/NIMBY Opposition;
   1  2  3 > Environmental Planning Constraints
   1  2  3 > Financial Cost & Commercial Risks of Developing ‘economically viable’ sites
   1  2  3 > Geological Scarcity and the uneven distribution of HSA
   1  2  3 > Lack of Policy Recognition
   1  2  3 > Lack of separate landbank
   1  2  3 > Lack of Strategic spatial steer from government
   1  2  3 > Long Lead-in time for developing new sites for virgin mineral extraction
   1  2  3 > Technical Unsuitability of secondary or recycled aggregates
   1  2  3 > Transport Infrastructure and Connectivity
4. Other than the fact of its geological presence, which of the factors listed below do you believe are most important in influencing the location of HSA workings? 

(Please Rank your Top 3 – with 1 being the most important)

1 2 3 > Landscape Value/Character
1 2 3 > Low Likelihood of strong Local and/or NIMBY opposition
1 2 3 > Proximity to Markets
1 2 3 > Quality of Resource
1 2 3 > Quantity of Resource
1 2 3 > Scarcity of Resource
1 2 3 > Supportive Policy Framework
1 2 3 > Technical Accessibility of Resource
1 2 3 > Transport Infrastructure
1 2 3 > Other (Please specify):

5. Drawing from your experience, what negative impacts do you most associate with the quarrying of HSA? 

(Please Rank your Top 3 most problematic issues – with 1 being the Highest)

1 2 3 > Adverse socio-economic impact (e.g. upon the local tourism industry)
1 2 3 > Blasting Vibrations
1 2 3 > Damage or destruction to sites of scientific, archaeological, and cultural interest
1 2 3 > Destruction of habitats and harm to the local wildlife they support
1 2 3 > Dust
1 2 3 > Landscape Degradation & Visual Impact
1 2 3 > Noise Pollution
1 2 3 > Transport and Traffic - e.g. from High Volumes of HGV Movements
1 2 3 > Water Environment (negative effect on Hydrology & Hydrogeology)
1 2 3 > Other (Please specify & justify your reasoning):

Part B) Policy Overview

6. Should National Minerals Planning Policy treat HSA differently from other sources of crushed rock? 

Yes ☐ No ☐ (Please Justify and expand upon your answer)

Please put the cursor in the centre of the below grey answer box to type your response (it is easiest to do this with the arrow keys).

7. Does MPS1 provide sufficient steer for dealing with HSA? 

Yes ☐ No ☐

If you have answered No to 7, How do you think it could be improved?

8. Will the revocation of Regional Spatial Strategies have any impact upon your MPA and its’ approach to HSA supply?

9. Has the 1993 Travers Morgan Ltd or 2004 Capita Symonds’ reports on HSA formed part of your minerals Development Framework evidence base? 

Yes ☐ No ☐

MPS1 notes that where there is a distinct and separate market for specific types or quality of aggregates, such as HSA, then separate landbank calculations & provisions for these may be appropriate.
10. Does your authority’s existing and/or emerging policy framework have a specific policy on HSA?
   Yes ☐   No ☐

   Y1. What is your authority’s position as regards HSA?
   (E.g. is it recognised as nationally important or given any preferential weight due to scarcity issues?)

   Y2. Do you feel the policy has been effective and delivered better decisions?

   Y3. Has its’ effect been as expected?

   No ☐

   N1. How are matters relating to HSA currently addressed within your MPA area?
   (E.g. within a specific crushed-rock oriented policy or generalist DC/DM policy)

   N2. Do you intend to develop a policy to specifically address HSA in the future?
   Yes ☐   No ☐

   N3. If you have answered Yes to N2, how do you envisage that policy operating?
   (E.g. A Specific Policy, Separate Landbank, or favourable Site Allocation)

**Part C** Current HSA Quarries within your MPA area

11. Do you consider the current pattern of HSA quarries and supply in your area to be adequate and sustainable? (Please provide reasons for your answer)
   Yes ☐   No ☐

   Reason(s):

12. Please complete the below table for each existing HSA site within your MPA area to the best of your ability/knowledge.

<table>
<thead>
<tr>
<th>Site Name</th>
<th>Site Status i.e. Active, Inactive, Dormant or Closed</th>
<th>Typical PSV Value (if known)</th>
<th>Annual Output (M/T) (if known)</th>
<th>Permitted Reserves (M/T) (if known)</th>
<th>Permission Expiry Date</th>
<th>Principle Planning Issue with Site</th>
<th>Planning with site</th>
<th>Key Issues</th>
</tr>
</thead>
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13. **Future Sites/Extensions:** What is the likelihood of any new HSA sites, or vertical or lateral extensions to existing sites, coming forward within your MPA in the next 20 years?
   (Please provide brief background information to accompany your answer if it does not breach operator confidentiality)

**Please Complete the Participant Consent Form on the following page and** return the completed questionnaire to me by **Friday 22 July 2011**.
Completed questionnaires can be emailed to me at Edward.page@cumbria.gov.uk or faxed to: 01539 713 439 or it can be posted to Edward Page, 2 Lambrigg Terrace, Kendal, LA9 4BB.

**Please Provide any Additional Answers and/or Further Comments on the Questionnaire Here:**
APPENDIX 2 Questions Used in Interview Scripts

The below is a list of the range of questions that shaped the interview prompt sheet.

N.B. Not all questions were necessarily utilised for all interviewees.

Part 1: Overview and Attitudes towards HSA

1. Can you please provide a few brief words to clarify what your understanding/definition of HSA is
2. How important a planning issue you consider HSA supply to be?
3. On which geographical scale do you most associate HSA supply?
4. In your view, what are the key barriers to ensuring a sustainable supply of HSA?
5. Other than the fact of its geological presence, which factors do you believe are most important in influencing the location of HSA workings?
6. Drawing from your experience, what negative impacts do you most associate with the quarrying of HSA?
7. What’s the most recent quarry that has been brought into production? Or are they all post-war permissions?
8. What’s the standard lead-in time for a quarry at the moment?

Part 2: Policy Overview

9. Should National Minerals Planning Policy treat HSA differently from other sources of crushed rock?
10. Does MPS1 provide sufficient steer for dealing with HSA?
11. If no to above, how would you change that?
12. Do you think HSA should be addressed within NPFF or some other form of associated documents?
13. Do you think the current draft of the NPFF is more useful to developing quarries in general?
14. Do you think NPFF is more favourable than MPS1 to working and consents in landscape designations?
15. Do you mourn the loss of regional planning, was it useful for providing direction or not?
16. Do you feel MWDFs should have a policy on HSA?
17. Have you found the new MWDF system useful?

18. Has Annual Monitoring helped the new system? If so, are you worried that it may fall by the wayside in light of the comprehensive spending review?

19. Do you find Cumbria Core Strategy’s policies to be supportive to development, helpful, more positively framed?

**Part 3: Site Specifics**

20. If you were, hypothetically, looking at you’re looking at new quarries what sort of spec would you be looking at?

21. Do you consider the current pattern of HSA quarries and supply Cumbria/North-West to be adequate and sustainable?

22. What are the benefits/strengths of site X from a planning perspective?

23. Do you consider site X to be sustainable?

24. Do you think site X could be improved to be made more sustainable. If so, how?

25. What are the principle difficulties you have had with site X, if any?

26. How have you found progressing applications at site X?

27. What is the current position of the market for HSA?

28. What is the likelihood of any new HSA sites, or vertical or lateral extensions to existing sites, being progressed in the next 20 years? Please provide details of these if you can.
APPENDIX 3 - Review of Current Minerals Policy Frameworks of MPAs with active HSA sites

Table-Series Reviewing Current Adopted Minerals Planning Policy Document of Minerals Planning Authorities with Active HSA Resources as of July 2011.

<table>
<thead>
<tr>
<th>MPA</th>
<th>Current Adopted Minerals Development Plan</th>
<th>Year Adopted</th>
<th>Time Horizon</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Notes and Observations on Plan Approach and Position as regards HSA</strong></td>
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</tbody>
</table>

Cornwall  | Minerals Local Plan (Saved Policies there-of) | 1998 | 2011 |
- Plan’s approach is to be self-sufficient in terms of all aggregate production and consumption during the plan period, with the exception of HSA.
- Plan notes that it has been indicated there exists shortages of supply of HSA within Cornwall.
- Plan states in body text that where need can be demonstrated and quality of geology proven, new HSA sites may come forward during life of plan and that each application will be judged on its merits and in relation to the other policies in the document.
- **Generally contains negatively worded conditions**

Cumbria  | Core Strategy & Generic Development Control Policies | 2009 | 2020 |
- Plan considers HSA separately from aggregates for general use despite very large crushed rock landbank.
- Establishes HSA landbank of 15 years based on annual sales of 740,000. Currently, would not fall below this until around 2018.
- Equates HSA with a national/regional importance
- Notes that increased production from Cumbria may be needed within the plan period HSA quarries in the Yorkshire Dales National Park close.
- **Provides positively framed strategic policies and criteria based development control policies.**
<table>
<thead>
<tr>
<th>MPA</th>
<th>Current Development Plan</th>
<th>Adopted Minerals Local Plan</th>
<th>Year Adopted</th>
<th>Time Horizon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Devon</td>
<td>Minerals Local Plan</td>
<td>(Saved Policies there-of)</td>
<td>2004</td>
<td>2011</td>
</tr>
</tbody>
</table>

- Provides detailed breakdown of Sandstone sales figures and notes that 32% of sandstone is used as roadstone.
- The sandstones of the Bray Valley Complex and Venn Quarry are recognised as producing HSA and are identified as Mineral Working Areas in this Plan.
- Recounts that a recent small extension and rationalisation of all other existing operations in the Bray Valley resource area means that reserves are sufficient for the duration of the Plan at current levels of production. Therefore it states there is no need to allocate additional land here for future working.
- Notes issue of large volume of associated waste material (almost 60% at Venn).
- Takes a sequential approach to permitting extraction, focusing firstly on Identified Minerals Working Areas (Existing Quarries) and site extensions to these, then site extensions to other sites followed by new sites. Incorporates flexibility into this by highlighting certain circumstances/properties
  - Provides comprehensive review of sites and resource areas along with criteria based policies.
  - HSA is not separated out within landbanks, but exception clause regarding grade and quality of aggregate delivers some flexibility across the sequential approach adopted – thereby it is effectively treated as a distinct sub-group.

| Leicestershire      | Core Strategy & Development Control Policies | 2009 | 2021 |

- Acknowledges absence of rock resources suitable for road making purposes south of the county. Thus recognises Leicestershire’s significant importance to these markets (as reflected in sub-regional apportionments).
- It reasons that, given the level of landbank and quantity of permitted reserves, together with the objective of protecting the natural environment, there is no need to make specific provision in this period for future crushed rock extraction. However it does provides flexibility for release of further aggregates through extensions that may come forward dependent on specific circumstances. It rules out the quarrying of any new greenfield sites. Recognises the relatively small areal extent of igneous rock resources around the flanks of Charnwood Forest and to the south-west of Leicester and notes that extraction is now concentrated at 4 main sites: Bardon; Cliffe Hill; Croft; and Mountsorrel.
  - Does not explicitly mention or distinguish HSA, however provides a flexible and generally positive approach to provision of crushed rock.
<table>
<thead>
<tr>
<th>MPA</th>
<th>Current Adopted Minerals Development Plan</th>
<th>Year Adopted</th>
<th>Time Horizon</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Notes and Observations on Plan Approach and Position as regards HSA</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Shropshire

- **Core Strategy**
- 2011
- 2026
- Reports that evidence base has revealed sufficient crushed rock aggregate resources are already available from permitted sites for the plan period.
- Devolves majority of fine-grained decisions to Site Allocations Minerals DPD (such as the practicality and environmental acceptability of delivering any revised sub-regional apportionment for Shropshire).
- **No mention of HSA or specific circumstances under which shortages of nationally or regionally important resources may be addressed.**

### South Gloucestershire

- **Minerals Local Plan**
- 2002
- 2011
- Plan considers HSA separately and pulls out key conclusions from the Travers Morgan Report (1993).
- Policy 34 specifically addresses proposals for the extraction of HSA – requiring the additional demonstration of regional/national need and evidence of the presence of sufficient quantity of on-specification aggregates to warrant the case for their removal and meet market demand/criteria.
- Policy 34 is cross-referenced as an exception to the general approach to crushed rock set-out in Policy 33 which opposes crushed rock extraction.
- In light of a number of HSA quarries in close proximity in the South West Region and Wales at the time of plan-production and the low output of Quartzite Quarry, the Plan did not consider it necessary to identify any area for the future working of HSA.
- However, it is recognised that proposals may come forward for a new quarry to replace Cromhall Quartzite during the Plan period and subsequently puts Policy 34 to cover specific considerations in addition to the usual environmental considerations.
- **The plan provides a strong steer and pragmatic approach that recognises**
### Notes and Observations on Plan Approach and Position as regards HSA

<table>
<thead>
<tr>
<th>MPA</th>
<th>Current Adopted Minerals Development Plan</th>
<th>Year Adopted</th>
<th>Time Horizon</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Minerals Local Plan [Joint with Shropshire] (Saved Policies there-of)</strong></td>
<td>2000</td>
<td>2006</td>
</tr>
</tbody>
</table>

- States that two-thirds of crushed rock sales are used for roadstone and observes that the plan area exports approximately 50% of the crushed rock it produces.
- Reports that evidence base has revealed sufficient crushed rock aggregate resources are already available from permitted sites (approximately 81M-tonnes). This sits within the context of a ten year crushed-rock landbank and annual apportionment of 3.5m-tonnes.
- Policy M12 reinforces the pre-eminence of the Landbank in whether applications should come forward, however Policy M16 provides an exception whereby a demonstrated ‘need’ outweighs material planning objections.

- Document notes two quarries within Shropshire which produce HSA, but does not provide any expansion of the specialised nature of this or its rarity. Nor does it connect this resource to Leaton Quarry, suggesting its evidence base is incorrect or out-of-date.

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<table>
<thead>
<tr>
<th>Warwickshire</th>
<th><strong>Minerals Local Plan (Saved Policies there-of)</strong></th>
<th>1995</th>
<th>2006</th>
</tr>
</thead>
</table>

- Plans for increased sales and production of crushed-rock but notes severely constrained nature of resources due to the limited geographical extent of the outcrop and its overlap with the key restraints developed in the plan. Paragraph 4.17 states that consequently each proposal will need to be justified by its own particular circumstances.
- Policy M6 foregrounds economic and operational needs as an exception, but provides litany of potential environmental restraints which could weigh against this.
- The section on economic geology in Appendix 4 recognises the use of Cambrian Quartzite of Hartshill and adjoining igneous intrusions are used for roadstone and currently worked in a chain of large and deep quarries from Mancetter to Bedworth.

- The plan does not mention HRSA within its main body.
- Neither does it have a firm strategy for crushed-rock, providing no details of a landbank and only delineating preferred areas and areas of search for sand and gravel.
- Provides restrictive negatively worded policies that focus on constraints.
Yorkshire Dales National Park | Minerals Local Plan (Saved Policies there-of) | 1998 | 2006

- Notes use of gritstone from the park’s quarries for HSA.
- Plan distinguishes and separates out sales figures for gritstone from other the park’s other crushed-rock resource of carboniferous limestone and also sets out the permitted reserves for each as of January 1994.
- Saved Policy MLP2 states that new hard-rock sites will only be permitted in exceptional circumstances and that extensions to existing quarries will be permitted only where they would result in overall benefits (e.g. to the environment or residential amenity).

- The plan in itself provides a strong practical framework for managing the park’s HSA resource in accord with the environmental objectives and policies of the park as set out in the structure plan.
- The small number of saved-policies will presumably be reviewed as it removes a significant number on the grounds of them being superseded by policies in the Yorkshire & Humber RSS.
APPENDIX 4: Summary of Inaccuracies and Updates to the Capita Symonds Report

<table>
<thead>
<tr>
<th>Quarry Name</th>
<th>MPA</th>
<th>Status (2002)</th>
<th>Category</th>
<th>Typical PSV</th>
<th>Status Change</th>
<th>Current Status</th>
<th>Update/Corrections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blackhill</td>
<td>Cornwall</td>
<td>Active</td>
<td>1</td>
<td>60</td>
<td>Y Exhausted</td>
<td>Now Closed</td>
<td>Wrongly Plotted</td>
</tr>
<tr>
<td>Lean</td>
<td>Cornwall</td>
<td>Active</td>
<td>1</td>
<td>58</td>
<td>Y Now Closed</td>
<td>Site is now Landfill</td>
<td></td>
</tr>
<tr>
<td>Barton Wood</td>
<td>Devon</td>
<td>Active</td>
<td>1</td>
<td>60</td>
<td></td>
<td>Active</td>
<td>Amalgamated to become Bray Valley Quarry</td>
</tr>
<tr>
<td>Venn Quarry</td>
<td>Devon</td>
<td>Active</td>
<td>1</td>
<td>65</td>
<td>Y Now Closed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Griff</td>
<td>Warwickshire</td>
<td>Active</td>
<td>1</td>
<td>63</td>
<td></td>
<td>Active</td>
<td>Now on Griff 4 - PSV of material below thresholds.</td>
</tr>
<tr>
<td>Jamestone</td>
<td>Lancashire</td>
<td>Active</td>
<td>2</td>
<td>61</td>
<td>N/A (Active)</td>
<td></td>
<td>Inaccurate AAV. Too weak to be used as roadstone</td>
</tr>
<tr>
<td>Callow Hill</td>
<td>Shropshire</td>
<td>Inactive</td>
<td>2</td>
<td>68</td>
<td>Y Dormant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>More</td>
<td>Shropshire</td>
<td>Dormant</td>
<td>2</td>
<td>59</td>
<td></td>
<td>Dormant</td>
<td>Also known as Squilver Green</td>
</tr>
<tr>
<td>Ingleton Old Quarry</td>
<td>Yorkshire Dales</td>
<td>Dormant</td>
<td>2</td>
<td>60</td>
<td>Y Revoked</td>
<td></td>
<td>Revoked &amp; Restored in 2007</td>
</tr>
<tr>
<td>Grampound</td>
<td>Cornwall</td>
<td>Active</td>
<td>3</td>
<td>63</td>
<td>Y Inactive</td>
<td></td>
<td>Primary name = Tredinnick Quarry</td>
</tr>
<tr>
<td>Ball Eye</td>
<td>Derbyshire</td>
<td>Active</td>
<td>3</td>
<td>65</td>
<td>N/A (Active)</td>
<td></td>
<td>Not Used for Aggregates MINIMAL</td>
</tr>
<tr>
<td>Whitworth</td>
<td>Lancashire</td>
<td>Active</td>
<td>3</td>
<td>70</td>
<td>N/A (Active)</td>
<td></td>
<td>Too weak to be used as roadstone</td>
</tr>
<tr>
<td>Castle-an-Dimas</td>
<td>Cornwall</td>
<td>Active</td>
<td>4</td>
<td>57</td>
<td>Unknown</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greystone</td>
<td>Cornwall</td>
<td>Active</td>
<td>4</td>
<td>57</td>
<td>Unknown</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barrowsford</td>
<td>Cumbria</td>
<td>Active</td>
<td>4</td>
<td>56</td>
<td></td>
<td>Active</td>
<td>Located in Northumberland</td>
</tr>
<tr>
<td>Clee Hill</td>
<td>Shropshire</td>
<td>Active</td>
<td>7</td>
<td>54</td>
<td></td>
<td>Active</td>
<td>Higher PSV Quality than previously recorded</td>
</tr>
<tr>
<td>Belford</td>
<td>Northumberland</td>
<td>Inactive</td>
<td>8</td>
<td></td>
<td></td>
<td>Inactive</td>
<td></td>
</tr>
<tr>
<td>Brayford</td>
<td>Devon</td>
<td>Inactive</td>
<td></td>
<td>65</td>
<td>Y Active</td>
<td></td>
<td>Not on Capita Symonds list</td>
</tr>
<tr>
<td>Hillhead</td>
<td>Devon</td>
<td>Dormant</td>
<td>58+</td>
<td></td>
<td>Y Mothballed.</td>
<td></td>
<td>Substantial reserves. Not on Capita Symonds list.</td>
</tr>
<tr>
<td>Swinburne</td>
<td>Northumberland</td>
<td>Inactive</td>
<td></td>
<td>53</td>
<td></td>
<td>Inactive</td>
<td>Not on Capita Symonds list</td>
</tr>
</tbody>
</table>