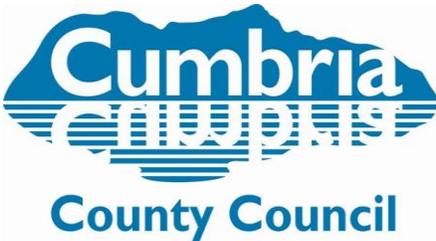


**CUMBRIA MINERALS AND WASTE LOCAL PLAN**  
**STRATEGIC FLOOD RISK ASSESSMENT**



February 2015

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## **1.0 Introduction**

### **Background information**

- 1.1 Cumbria County Council has two adopted Minerals and Waste documents – the Core Strategy and Development Control Generic Policies. Both were adopted in 2009 as part of the Local Development Framework plan preparation process. Part of the supporting evidence for these documents was a Strategic Flood Risk Assessment commissioned by the County Council in 2007; an update of the Strategic Flood Risk Assessment was produced in 2009.
- 1.2 The County Council is now preparing a Minerals and Waste Local Plan, which includes Strategic Policies, Development Control Policies and Site Allocations Policies in one document. As part of the development of this document, a new Strategic Flood Risk Assessment (SFRA) has been produced.

### **Purpose and objectives**

- 1.3 An SFRA must be carried out when preparing the Local Plan as it will assess the potential impacts that the proposed Minerals and Waste site allocations may have on current and future flood risk. This requirement is outlined in paragraph 100 of the National Planning Policy Framework (NPPF).
- 1.4 There are two levels of Strategic Flood Risk Assessments – Level One and Level Two. A Level One SFRA is carried out where flooding is not a major issue and where development pressures are low. A Level Two assessment is undertaken where land that falls into a low flood risk area cannot appropriately accommodate all of the necessary proposed development and when the Exception Test (as set out in the NPPF) needs to be applied.
- 1.5 The key aims and objectives of this SFRA are:
  - to understand the extent and severity of flood risk across Cumbria from all sources and to use the information to try to direct development away from the areas at highest risk;
  - to ensure that the potential flooding risk associated with the proposed site allocations are fully considered;
  - to update the Sustainability Appraisal and the Site Assessment documents;
  - to assist in the preparation of appropriate planning policies for the management of flood risk and site allocations;
  - to identify site-specific requirements in relation to the provision of Flood Risk Assessments;
  - to identify site-specific measures required to reduce flood risk on sites;
  - to inform the Development Control stage when planning applications are submitted to determine appropriate mitigation; and
  - to meet the obligations set out in the National Planning Policy Framework and the associated Planning Practice Guidance.

## **2.0 Policy Framework**

2.1 Since the 2009 SFRA update, the planning policy framework has changed considerably. This chapter provides a summary of the key planning and flood risk legislation and policy documents that have been used to inform the preparation of the Minerals and Waste Local Plan (MWLP).

### **European Floods Directive and Flood Risk Regulations 2009**

2.2 The European Floods Directive (2007/60/EC) came into force on 26 November 2007. This Directive required Member States to carry out a Preliminary Flood Risk Assessment by December 2011, which identified the river basins and associated coastal areas at risk of flooding. Following this, flood risk maps were to be drawn up by 2013 and flood risk management plans to be written by 2015, which focus on prevention, protection and preparedness. In order to ensure that this work is co-ordinated with flood risk management plans and river basin management plans, it should be carried out alongside the requirements of the Water Framework Directive.

2.3 The Flood Risk Regulations were enacted in December 2009 to implement the European Floods Directive. These Regulations require Cumbria County Council to prepare the following documents:

- A Preliminary Flood Risk Assessment Report
- Flood Hazard Maps and Flood Risk Maps
- Flood Risk Management Plan

2.4 In June 2011, the County Council produced a Preliminary Flood Risk Assessment (PFRA) that provides a high level overview of flood risk from local flood sources (including surface water, groundwater, ordinary watercourses and canals). The data was gathered from a variety of sources including: Cumbrian district authorities; Environment Agency; Cumbria Fire Services; Cumbria Highways; and United Utilities. The result of this study was that there are no 'Significant Flood Risk Areas' in Cumbria. The PFRA will be reviewed 2017.

2.5 As the PFRA identified no 'Significant Flood Areas', the County Council has no duty to develop Flood Hazard Maps, Flood Risk Maps or a Flood Risk Management Plan to comply with the Flood Risk Regulations 2009.

### **Pitt Review and Flood and Water Management Act 2010**

2.6 Following the floods of summer 2007, Sir Michael Pitt was instructed to undertake a review, in order to determine what could be learnt from these events. As part of this review, a number of recommendations were made in order to improve the way similar future events could be managed if they occurred. The 92 recommendations addressed issues with: prediction; warning of flooding; prevention; emergency management; resilience; and recovery.

2.7 Paragraph 6.7 of the Pitt Review states that "upper tier and unitary authorities should be given the new co-ordinating responsibilities and hence become

accountable for managing local flood risk". In order to develop this, and the recommendations, the Flood and Water Management Act came into force in April 2010.

- 2.8 One of the outcomes of the Flood and Water Management Act is that Cumbria County Council was designated as a Lead Local Flood Authority. This means that the County Council has responsibility for managing floods from local sources (e.g. ordinary watercourses, surface water and groundwater) in its administrative area within Cumbria.
- 2.9 The key responsibilities of Cumbria County Council as a Lead Local Flood Authority are:
- To develop and maintain a Local Flood Risk Management Strategy for Cumbria. This must be done by working in partnership with local bodies and communities through public consultation and joint working. The County Council's Flood Risk Management Strategy is due to be published in April 2015.
  - To maintain a register of assets, which are structures or features that are considered to have a significant effect on flood risk in the area. The County Council has developed a register based on increasing knowledge in local flood risk management arising from new statutory duties.
  - To record and investigate significant floods in Cumbria and publish a report of any findings. To date, the County Council has published 40 detailed reports on flooding affecting whole communities. Another 100 flood incidents have been investigated and reports are being produced.
  - To establish an approval body to assess and monitor the design, building and operation of Sustainable Drainage Systems (SuDS). The County Council is expected to become a Statutory Consultee on drainage matters for new development to Planning Authorities from April 2015.
  - To work with stakeholders and organisations in emergency planning and recovery when a flood event occurs. The County Council is a member of the Cumbria Resilience Forum Flooding sub-Group.
  - To deal with applications for the alteration, removal or replacement of structures or features from ordinary watercourses. Since this duty was enacted in April 2012, the County Council has provided over 350 consents for this work.
- 2.10 Between 19 May and 23 June 2014, the Lead Local Flood Authority consulted on the Strategic Environmental Assessment Scoping Report for the Local Flood Risk Management Strategy for Cumbria. This identified what the Strategic Environmental Assessment will need to consider in terms of potential environmental issues and also identified key objectives for the document.

### **The National Flood and Coastal Erosion Risk Management Strategy for England**

- 2.11 This national strategy was written by the Environment Agency and was published in May 2011. Whilst the majority of the strategy focusses on the role of bodies such as the Environment Agency, Lead Local Flood Authorities and Internal Drainage Boards, there is reference made to the links between preparing Local Plans with reducing flood risk.

- 2.12 The key message is that the use of land should be effectively managed to avoid increasing flood risk and worsening coastal erosion. This should be done by ensuring that new developments take flood and coastal erosion into account and are safe from, do not increase and, where possible, reduce risk over their lifetime. Local planning authorities should work with Lead Local Flood Authorities and the Environment Agencies in the production of Local Plans in order to achieve this. SuDS should be used in all new developments and, where appropriate, re-developments. The design and layouts of such developments should be done in such a way that reduces the risk to life and damages from flooding and coastal erosion. The use of Strategic Flood Risk Assessments in plan preparation will assist the work of Lead Local Flood Authorities.

### **Water Framework Directive and Water Environment Regulations**

- 2.13 In October 2000, the Water Framework Directive (2000/60/EC) came into force to commit all European Union Members to improving the quality of all water bodies by 2015. Each country is required to: protect and improve the ecological conditions of water bodies; promote the use of water as a natural resource; conserve habitats and species that depend directly on water; mitigate the effects of floods and droughts; seek to reduce pollutants to water bodies and groundwater; and aim to achieve at least 'good' status for all water bodies by 2015 (or if this is not possible, by 2021 or 2027).
- 2.14 The Directive was transposed into UK legislation through The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003. The delivery of this has been tasked to the Environment Agency in England and the Scottish Environment Protection Agency in Scotland. Both of these organisations are producing river basin management plans to aid this delivery. These management plans seek to identify issues facing the water environment in the river basins and identifies actions to address them. The management plans will be updated every six years. Cumbria is covered by three different management plans:
- North West River Basin Management Plan (Environment Agency);
  - Northumbria River Basin Management Plan (Environment Agency); and
  - Solway Tweed River Basin Management Plan (Scottish Environment Protection Agency).

- 2.15 All Local Plan documents should seek to continue to protect and enhance all river basins. Local planning authorities should work with the Environment Agency to ensure that the Local Plan effectively takes into account the objectives of these management plans through the adoption of appropriate policies. This could include reducing the physical impacts of development on water bodies and promote the use of SuDS in proposed developments.

### **National Planning Policy Framework and Planning Policy Guidance**

- 2.16 There are 12 core planning principles identified in the NPPF; two of these make reference to flood risk. One of the core planning principles is to "support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change", whilst another core planning principle is to

recognise “that some open land can perform many functions (e.g. flood risk mitigation)”.

- 2.17 Section 10 of the NPPF provides a focus on meeting the challenge of climate change, flooding and coastal change. Within this, it provides guidance on what local planning authorities should do in order to address these challenges. With regard to flood risk, local planning authorities are required to adopt proactive strategies that take flood risk fully into account, and they should also take into account the long term effects of flood risk. Such planning policies and strategies should be developed to manage flood risk from all sources, and local planning authorities should work with the relevant flood risk management bodies (e.g. Environment Agency, Lead Local Flood Authority, etc.) in their preparation.
- 2.18 When allocating land for development, local planning authorities should always seek to avoid placing inappropriate development in areas at high risk of flooding. This should be done by applying the Sequential Test and, where necessary, the Exception Test. Local planning authorities should also seek to safeguard land that is currently required, or will be required in the future, for flood management purposes. Where possible, all new development should be encouraged to reduce the causes and impacts of flooding.
- 2.19 The Planning Practice Guidance (PPG) was introduced in March 2014 to provide technical support to the NPPF. Together, these documents set out the Government’s national planning policies and guidance for development.
- 2.20 PPG chapter 7 covers flood risk and coastal change. This is a broad area including: the definition of flood risk and flood risk zones; detailing the Sequential Test and Exception Test processes; how flood risk should be addressed in planning applications; the involvement of the Lead Local Flood Authority; how the causes and impacts of flooding could be reduced; how flood risk should be considered in the preparation of Neighbourhood Plans; and considerations that must be given to proposed development in Coastal Change Management Areas.
- 2.21 Chapter 7 also provides guidance that is more relevant to the process of preparing the Cumbria Minerals and Waste Local Plan.
- Section 2 identifies how flood risk should be taken into account when a Local Plan is prepared. All local planning authorities should prepare Local Plan policies whilst giving regard to SFRA. Minerals and Waste authorities should give particular attention to sand and gravel workings as they are often located in functional floodplains. When creating policies, local planning authorities should seek to identify any potential benefits associated with the restoration and afteruse of minerals and waste sites in reducing flood risk.
  - Section 3 provides guidance on what local planning authorities should do in preparing an SFRA. This includes liaison with the Environment Agency and Lead Local Flood Authority, and identification of areas at risk of surface water flooding and the functional floodplain.
  - Sections 6 and 8 refer to the use of Sequential and Exception Tests in preparing Local Plan documents. The Sequential Test should be used to

ensure that land allocated for development is in the lowest flood risk areas. The Exception Test is to be used where land is allocated for essential development in areas of higher flood risk. In order for these allocations to be acceptable, two conditions must be met; the wider sustainability benefits to the community must outweigh the flood risk and it must be proven that the development will be safe for its lifetime without increasing flood risk elsewhere and, where possible, reduce flood risk overall.

### **Localism Act**

- 2.22 The Localism Act was enacted in November 2011 and sets out a series of measures that seek to achieve a shift in power away from Central Government to local authorities and communities. One of the requirements of the Localism Act is for local planning authorities to undertake a Duty to Co-operate with other local authorities and key stakeholders on a range of issues – including flooding. This means that in the preparation of a Local Plan, officers should engage with bodies in order to effectively plan for and deal with cross-boundary issues.

### **Adopted Core Strategy, Generic Development Control Policies and the draft Minerals and Waste Local Plan**

- 2.23 In April 2009, the County Council adopted its Core Strategy and Generic Development Control Policies documents. The Core Strategy identifies 10 Strategic Objectives. Objective 1 states that minerals and waste developments will take due account of the issues of climate change and any adverse impacts on the environment will be minimised with potential benefits maximised. Objective 9 states that the environmental impacts of minerals and waste developments will be kept to a minimum by siting facilities appropriately, and that any unavoidable harm will be mitigated. The site location criteria identifies that functional floodplains should be avoided when identifying areas for development. It also recognises that there will be the need to use the Sequential Test for areas in Flood Zones 2 and 3, with the possible need for the application of the Exceptions Test.
- 2.24 Policy DC3 in the Generic Development Control Policies, states that cumulative impacts of any minerals and waste developments will be assessed – this includes the potential cumulative effects of flood risk. Policy DC13 is a dedicated policy about flood risk. This encourages development to be located in areas with the lowest probability of flooding wherever possible. If there are no reasonably available sites in Flood Zone 1, a flood risk assessment will be required and account must be taken of the flood vulnerability of the development. The policy identifies what kind of development may be acceptable in areas of higher flood risk. The local list for planning applications includes a requirement for a flood risk assessment where appropriate.
- 2.25 The draft Local Plan has been issued for public consultation in February 2015. This draft document retains the detail from the adopted Core Strategy and Generic Development Control Policies, but provides additional policy references. There is reference to the County Council's role as the Lead Local Flood Authority and its responsibilities. Draft Policy DC10 refers to the need

for applicants to demonstrate that proposals for new or extended inert waste landfill do not conflict with the County Council's culverting policy as the Lead Local Flood Authority. In addition, minerals and waste development proposals must be accompanied by assessments where the development could lead to increased flood risk and impacts on the flow and quantity of surface and ground water (draft Policy DC2). Draft Policy SP16 states that the County Council will seek s106 agreements where flood and surface water management schemes are required.

### **3.0 Sustainable Management of Flood Risk**

#### **Overview**

- 3.1 National guidance and legislation seeks to ensure that development is sustainable and minimises the impact it has on the environment. One aspect of this is to ensure that proposed development does not exacerbate flood risk in an area and, if possible, it should seek to reduce localised flood risk. Such prevention and enhancement should be designed to last for at least the lifetime of the proposed development.

#### **Planning Applications**

- 3.2 When developments are proposed, applicants should seek to embed SUDs in the design, in order to reduce the potential impact of the development on surface water discharges. A Flood Risk Assessment will need to accompany the planning application where its size/use/location meets the requirements set out below. Applicants are encouraged to contact Cumbria County Council for pre-application advice on this matter.
- 3.3 When assessing planning applications, planning officers will apply the Sequential Test to development proposals that have not been allocated in a development plan and to developments located in Flood Zone 1, unless evidence suggests that there may be flooding issues now or in the future.
- 3.4 Planning officers will also assess the proposal for the compatibility of the proposed use against the flood zone in which the proposed development will be located. This will ensure that development is not located in inappropriate flood zones.

#### **Sustainable Drainage Systems (SuDS)**

- 3.5 SuDS are used on development sites to manage rainfall on hard surfaces. A Sustainable Drainage System is an alternative to traditional underground, piped systems and it replicates the natural drainage of the site before the development occurred. This typically soft engineering approach, can be used on any development site to: reduce flood risk (to the site and neighbouring areas); reduce pollution; and provide landscape and wildlife benefits.
- 3.6 Any SuDS design should capture rainfall and allow as much as possible to evaporate or soak into the ground close to where it falls. Where this is not possible, the rest of the rainfall should be directed to the nearest watercourse to be released at the same rate and volume as before the erection of the development.
- 3.7 SuDS may improve the sustainable management of water for a site by:
- reducing peak flows to watercourses or sewers and potentially reducing the risk of flooding downstream;
  - reducing volumes and the frequency of water flowing directly to watercourses or sewers from developed sites;

- improving water quality over conventional surface water sewers by removing pollutants from diffuse pollutant sources;
  - reducing potable water demand through rainwater harvesting;
  - improving amenity through the provision of public open space and wildlife habitat;
  - replicating natural drainage patterns, including the recharge of groundwater so that base flows are maintained.
- 3.8 The appropriate application of a SuDS scheme to a specific development is heavily dependent upon the topography and geology of the site (and its surrounds). Careful consideration of the site characteristics must be undertaken to ensure the future sustainability of the adopted drainage system.
- 3.9 There are many different ways that SuDS can be incorporated into a development and the most commonly found components of a SuDS system are described below:
- Pervious surfaces – surfaces that allow inflow of rainwater into the underlying construction or soil
  - Green roofs – vegetated roofs that reduce the volume and rate of runoff and remove pollution
  - Filter drain – linear drains consisting of trenches filled with a permeable material, often with a perforated pipe in the base of the trench to assist drainage, to store and conduct water; they may also permit infiltration
  - Filter strips – vegetated areas of gently sloping ground designed to drain water evenly off impermeable areas and to filter out silt and other particulates
  - Swales – shallow vegetated channels that conduct and retain water, and may also permit infiltration; the vegetation filters particulate matter
  - Basins, ponds and wetlands – areas that may be utilised for surface runoff storage
  - Infiltration devices – sub-surface structures to promote the infiltration of surface water to ground; they can be trenches, basins or soakaways
  - Bio-retention areas – vegetated areas designed to collect and treat water before discharge via a piped system or infiltration to the ground
  - Pipes and accessories – a series of conduits and their accessories normally laid underground that convey surface water to a suitable location for treatment and/or disposal (although sustainable, these techniques should be considered where other SuDS techniques are not practicable).

### **Flood Risk Assessments**

- 3.10 A Flood Risk Assessment helps to ensure that any proposed development is sustainable and includes all the mitigation measures necessary to contribute to the safety of the scheme. It will need to be submitted with a planning application when a proposed development meets one of the following criteria:
- it is larger than one hectare;
  - it includes building or engineering work in flood zones 2 or 3 at risk of flooding from rivers or the sea;

- includes building or engineering works on land classified by the Environment Agency as having critical drainage problems;
- it changes the use of land or buildings in a location at risk of flooding from rivers or the sea, or with critical drainage problems; or
- it changes the use of land or buildings in a way that increases flood vulnerability of the development where it may be subject to other sources of flooding.

3.11 If a planning application for a proposed development needs to be accompanied by a Flood Risk Assessment, the developer should be aware that the objectives of a Flood Risk Assessment are to:

- identify whether a proposed development is likely to be affected by current or future flooding from any source;
- identify whether or not a proposed development will increase flood risk elsewhere;
- identify whether the measures proposed to deal with predicted flood risk effects are appropriate;
- allow the Local Planning Authority to identify if the application of the Sequential Test is necessary; and
- whether the proposed development will be safe.

3.12 The Flood Risk Assessment is required to contain certain details and address a number of issues, including:

- a description of the proposed development and details about the proposed location;
- details about the potential flood hazards on the proposed development site;
- the probability of a flood event occurring on the proposed development site;
- the potential effects of climate change on the proposed development site;
- a detailed description of the development proposals, including an explanation of how the proposed site layout takes the flood risk into account; and
- the identification of any potential off site impacts.

3.13 For minerals and waste schemes in particular, Flood Risk Assessments should also meet the following requirements:

- establish baseline hydrological conditions within and surrounding a site;
- for minerals sites only, establish baseline hydrogeological conditions within and surrounding a site;
- identify the potential impacts that the proposed development may have upon groundwater and surface water processes (and conditions) within and surrounding the site, throughout the anticipated lifetime of the operation;
- identify the likely impact that these potential changes to existing flow regimes may have on water resources, sensitive environments and existing or planned development within adjoining areas;

- minimise the potential impact upon the environment and adjoining areas through the use of appropriate mitigation techniques, including (for example) the application of SuDS;
- monitor groundwater and surface water conditions (i.e. water levels and water quality) throughout the lifetime of the operation;
- maximise the potential benefits to be gained post cessation from mineral extraction, for example the creation of parks, nature reserves or voids for landfill; and
- the operator should ensure that there is a dedicated emergency response plan in place during times of flood to ensure that public (worker) safety is not compromised.

3.14 Further information and up-to-date guidance on the preparation and contents of a Flood Risk Assessment can be found in the Planning Practice Guidance.

### **Sequential Test and Exception Test**

3.15 Where the site location of a proposed development has not been assessed through a development plan, is a departure from the development plan or where the site is located in Flood Zones 2 or 3, the planning officer will perform a Sequential Test on the planning application. In certain circumstances, it will also be carried out when the proposed site location is located in Flood Zone 1.

3.16 The purpose of a Sequential Test is to locate development in areas of lower flood risk. The planning officer will assess if there are more suitable and practical locations for the proposed development. The Sequential Test will look at the likelihood of flooding from all sources on the proposed location site and the effect of potentially increasing flood risk elsewhere.

3.17 If the development cannot be accommodated in an area of lower flood risk, the planning officer will carry out an Exception Test to allow the officer to determine if the development can be permitted. There are two criteria set out in the NPPF that the development must meet before permission could be granted. These criteria are:

- the applicant must demonstrate that their development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment; and
- a site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime, taking account of the vulnerability of its users, without increasing flood risk elsewhere and, where possible, reduce flood risk overall.

### **Flood Risk vulnerability and flood zone compatibility**

3.18 The Planning Practice Guidance sets out the flood risk vulnerability classification, identifying what type of development is acceptable in each flood zone (see Table 1).

Flood Zone	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a	Exception Test required	x	Exception Test required	✓	✓
Zone 3b	Exception Test required	x	x	x	✓

**Table 1: Flood Risk Vulnerability Classification**

3.19 PPG also provides definitions of the vulnerability classifications. The definitions are extensive, so for the purpose of this document, the summary below only includes references to development that could be affected by the Cumbria Minerals and Waste Local Plan.

- Essential infrastructure
  - essential transport infrastructure
  - essential utility infrastructure
  - wind turbines
- Highly vulnerable
  - installations requiring hazardous substances consent
- More vulnerable
  - landfill
  - sites used for waste management facilities for hazardous waste
- Less vulnerable
  - waste treatment facilities (except for those classified as ‘more vulnerable’)
  - minerals working and processing (except sand and gravel workings)
  - water treatment works that do not need to remain operational during times of flood
  - sewage treatment works (if adequate measures to control pollution and manage sewage during flooding events are in place)
- Water compatible
  - water transmission infrastructure and pumping stations
  - sand and gravel working
  - amenity open space, nature conservation and biodiversity

## **4.0 Assessment**

### **Overview**

- 4.1 A considerable amount of knowledge exists with respect to flood risk within Cumbria, including:
- Historical river flooding information;
  - Information relating to localised flooding issues (surface water, groundwater and/or sewer related), collated in consultation with the Council and the Environment Agency;
  - Detailed flood risk mapping;
  - Environment Agency Flood Zone Maps;
  - Topography (LiDAR).
- 4.2 All of this data has been sourced from the relevant Team within the County Council and also from the Environment Agency, forming the core dataset that has informed the SFRA process.
- 4.3 The proposed sites have been considered by the Environment Agency, United Utilities and the Lead Local Flood Authority. Comments are included in Table 2.

**Table 2: Assessment of Sites**

Site ref	Site name	Flood Zone	Proposed site use	Relevant comment from spring 2013 consultation	Lead Local Flood Authority Response	EA FRCM Response
AL3	Oldside, Workington	1	Waste treatment and management facility	Little or no flood risk	1% probability of marine flooding alongside coast and dock areas	Site is located in Flood Zone 1
AL8	Lillyhall Waste Treatment Centre	1	Waste treatment and management facility	Little or no flood risk	Minimal surface water flood risk	No additional comment
AL18	Port of Workington	1/3	Waste treatment and management facility; and Safeguard existing port and rail infrastructure		1% probability of marine flooding alongside coast and dock areas	Site is partly in Tidal Flood Zone 3. Tidal events in December 2013 and January 2014 were observed but there are no records of any significant flooding, The River Derwent and Soapery Beck, designated Main Rivers, flow through the site.
AL32	Siddick Potential Rail Sidings	3	Safeguarding area for a potential railhead		Some areas of the site at risk of surface water flooding (1% probabaility)	Site is located in Tidal Flood Zone 3. Tidal events in December 2013 and January 2014 were observed and there was some erosion close to the railway embankment.
AL37	Lillyhall HWRC	1	Household Waste Recycling Centre	Little or no flood risk	Very small area of surface water flood risk (1%) on northern fringe of site	No additional comment
AL38	Innovia Rail Sidings, Wigton	1	Safeguarding of existing rail sidings		Minimal surface water flood risk	Wiza Beck, Main River flows through the site
AL39	Silloth Port	1/3a	Safeguarding of existing wharves		Minimal risk from surface water flooding but the western side of the site is at risk (1%) from coastal flooding - Zone 3.	Site is partially located in Tidal Flood Zone 3

BA26	Barrow Port and Rail Sidings, Barrow	3a	Safeguarding of existing railheads and wharves		Isolated small areas of surface water flood risk (1%) away from dock areas. Potential for marine flooding (1% Zone 3) on southern and western fringes of site alongside Walney Channel.	Site in Flood Zone 3 tidal
CA11	Willowholme Industrial Estate, Carlisle	3	Waste treatment and management facility		Minimal risk from surface water flooding, but this site is wholly within Flood Zone 3 (fluvial flooding)	Site is wholly in Flood Zone 3, but is located in area benefitting from defences as part of Caldew and City Centre Flood Alleviation Scheme. Site has confluence of Main Rivers - Caldew and Eden - to north, River Eden to the west and Parham Beck to south. Refer to Carlisle City Council level 2 SFRA final report for breach/ overtopping analysis.
CA30	Kingmoor Road Recycling Centre, Carlisle	1	Waste treatment and management facilities		Small areas of surface water flood risk (1%) in northern part of site	Sluggish drainage around site. Ponding water.
CA31	Kingmoor Park East, Carlisle	1	Waste treatment and management facility	Zone 1 little or no flood risk	Minimal risk of surface water flooding in railway sidings area. Small area in the centre of site to the south of Kingmoor Park Road with risk of surface water flooding (1%)	There are 3 designated main rivers in this site area. Cargo Beck Tributary North, Cargo Beck Tributary south and Cargo Beck. Surface water from Cargo Beck and tributary south passes through Kingmoor Park northern and southern flood storage ponds respectively. The WCML culvert restricts flows to 3 cumecs. Surface water from Kingmoor Park east of the WCML must be managed upstream of this restriction otherwise flooding will occur. Flood Map shows the natural

						flooding that would occur and only where there is a minimum of 3km <sup>2</sup> catchment upstream. Hence for this site there may be known flood problems that are not reflected by Flood Zones. Rockcliffe Beck is over 3km <sup>2</sup> and an indicative flood constraint is reflected. Flood is known to occur within Kingmoor Park Sidings Nature reserve as a result of undersized culvert and debris build up on upstream side of redundant on railway branch line.
CO11	Bridge End Industrial Estate, Egremont	1	Waste treatment and management facility	Zone 1 little or no flood risk. United Utilities have an easement in place, which allows for a water main to cross the site	Minimal risk of surface water flooding	No additional comment
CO32	Land adjacent to Sellafield	1	Treatment, management, storage and/or disposal of Low Level Waste	Zone 1 little or no flood risk. Solid radioactive waste disposal must be in line with Environment Agency guidance published in Feb 2009. The site is on a major aquifer and an Outer Groundwater Source Protection Zone, where a risk assessment would be needed, and the Agency would normally object if this shows that active long term site management is essential to prevent long term groundwater pollution. The Agency would take account of the long term plans for Sellafield site. United Utilities has a service reservoir installation within the site and there is a public right of way that is used to service the apparatus.	Minimal risk of surface water flooding	No additional comment

CO35	Low Level Waste Repository, near Drigg	1 (and 2/3)	Treatment, management, storage and/or disposal of Low Level Waste	A very small section of land at the southern boundary of the site is affected by Zone 2 and 3 flooding – this will not impact on operations at the site	Minimal risk of surface water flooding. Southern tip of site has 1% risk of flooding from River Irt	Small section of site within Flood Zone 3
CO36	Sellafield site	3a	Treatment, management, storage and/or disposal of Low Level Waste	The River Calder flows through the site and its flood risk is satisfactorily managed	Minimal risk of coastal flooding. Some risk of localised flooding (probability 1%) alongside watercourses within and adjacent to site	No additional comment
ED31	Flusco Landfill complex, Flusco, Penrith	1	Waste treatment and management facility	Zone 1 little or no flood risk	Minimal risk of surface water flooding	No additional comment
SL1	Kendal Fell Quarry, Kendal	1	Household Waste Recycling Centre	Zone 1 little or no flood risk  It is important to establish the relationship with the water table and active or passive dewatering	Small area of surface water flood risk (1%) in northern tip of site	No additional comment
M5	High Greenscoe Quarry	1	Area of search (mudstone)	Zone 1 little or no flood risk.	Minimal risk of surface water flooding	No additional comment
M6	Land between Overby & High House Quarries	1	Area of Search (sand and gravel)	Little or no flood risk		No additional comment
M8	Cardewmires Quarry, near Dalston	2/3a	Area of Search (sand and gravel)	Although the quarry lies in flood zones 2 and 3a, the extraction of sand is water compatible	Most of this site lies within fluvial flood Zone 3 and has a surface water flood risk of 1% probability over a small area in the southern half of the site	The Wampool River is a designated main river which passes through site. Currently the river is diverted to the south and southwest of the western lagoon as deposits are mined out elsewhere. Stability of the lagoon side has been flagged up as a possible flood risk concern. The site is mainly

						within Flood Zone 3 (fluvial flooding) from Wampool River
M10	Silvertop Quarry, Brampton	1	Area of Search (limestone)	Zone 1 little or no flood risk	Minimal risk of surface water flooding	Minor surface water issues
M12	Roosecote Quarry, Barrow	1	Preferred Area (sand and gravel)	Zone 1 little or no flood risk	Minimal risk of surface water flooding	No additional comment
M14	Land adjacent to Kirkby Slate Quarry, near Kirkby-in-Furness	1	Area of Search (slate)	Small area of surface water flood risk (1%) within existing quarry in centre of site		No additional comment
M15	Peel Place Quarry, Holmrook	1	Area of Search (sand and gravel)	Zone 1 little or no flood risk	Minimal risk of surface water flooding	No additional comment
M16	Land adjacent to Holmescales Quarry, near Kendal	1	Area of Search (high specification roadstone)	Small areas of surface water flood risk (1%) within site		No additional comment
M17	Ghyll Scaur Quarry, Millom	1	Area of Search (very high specification roadstone)	Zone 1 little or no flood risk	Minimal risk of surface water flooding	Minor surface water issues
M18	Stamphill, Long Marton, Appleby	1 (and 2/3)	Preferred Area (gypsum)	Small finger of zone 2/3 cuts into north part of site, but this does not form part of extraction area and could be avoided	Minimal risk of surface water flooding	Small section of site within Flood Zone 3
M24	Derwent Howe Slag Bank, Workington	1 (and 3)	Mineral Safeguarding Area for its resource of secondary aggregate	Great majority of site lies within Zone 1, little or no flood risk. Part of site important for protection against coastal flooding	Minimal risk from surface water flooding but risk of coastal flooding (1% probability) on shoreline	Small section of site within Flood Zone 3
M30	Roan Edge Quarry, New Hutton	1	Area of Search (high specification roadstone)	Zone 1 little or no flood risk	Minimal risk of surface water flooding	No additional comment

M31	Potential rail sidings, Salthouse Road, Millom	3a	Safeguarding of potential rail loading facilities	Zone 3a; however, operation is water compatible	Western and eastern tips of site at 1% risk of coastal flooding	Small section of site within Flood Zone 3
M34	Kingmoor rail sidings, Carlisle	1 (and 2/3)	Safeguarding of existing rail sidings		Sparse areas at risk of surface water flooding (1%) but northern tip of this site is within flood Zone 3 of Rockcliffe Beck (1% probability of fluvial flooding)	From north to south a number of designated main rivers pass under the West Coast Main Line and the sidings via a series of culverts that restrict the flow through. Flood Map shows the natural flooding that would occur and only where there is a minimum of 3km <sup>2</sup> catchment upstream. Hence for this site there may be known flood problems that are not reflected by Flood Zones. Rockcliffe Beck is over 3km <sup>2</sup> and an indicative flood constraint is reflected.
M35	Shap Beck Quarry rail sidings, Shap	1 (and 2/3)	Safeguarding of existing rail sidings		Potential (1% probability) for small areas of surface water flooding throughout site, particularly alongside Shap Beck	Small section of site within Flood Zone 3
M36	Shapfell Quarry rail sidings, Shap	1 (and 2/3)	Safeguarding of existing rail sidings		Small areas of surface water flood risk (1%). Northern tip lies within Flood Zone 3 of Force Beck	Extreme northwest tip lies within Flood Zone 3 of Force Beck
M37	Shap Blue Quarry rail sidings, Shap	1	Safeguarding of existing rail sidings		Minimal surface water flood risk	No additional comment
M38	Kirkby Thore gypsum works rail sidings, Kirkby Thore	1	Safeguarding of existing rail sidings		Minimal surface water flood risk	Minor surface water issues

## 5.0 Conclusions and Recommendations

- 5.1 There is a clear requirement for Cumbria County Council to allocate waste management facilities and mineral extraction sites for the sustainability and economic needs of the county.
- 5.2 A considerable proportion of Cumbria is at risk of flooding, including sites being considered for allocation in the Minerals and Waste Local Plan. The flood risk arises from a number of sources including river flooding, coastal flooding, localised runoff, sewer and groundwater flooding.
- 5.3 A collation of potential sources of flood risk has been carried out in accordance with the NPPF, developed in close consultation with both the Lead Local Flood Authority and the Environment Agency. The County has been broken down into zones of 'high', 'medium' and 'low' probability of flooding in accordance with the NPPF, providing the basis for the application of the Sequential Test.
- 5.4 A planning solution to flood risk management should be sought wherever possible, steering vulnerable development away from areas affected by flooding, in accordance with the Sequential Test.
- 5.5 Where other planning considerations must guide the allocation of sites and the Sequential Test cannot be satisfied, specific recommendations must be sought to assist the Council and the proposed operator to meet the Exception Test. These should be reviewed in detail as part of the development control process.
- 5.6 Council policy is essential to ensure that the recommended development control conditions can be imposed consistently at the planning application stage. This is essential to achieve future sustainability within the county with respect to flood risk management. The County Council will ensure that specific policies are in place relating to mineral extraction and waste management, which reduce the potentially adverse impacts of these activities on groundwater and surface water conditions.