

Burnley Strategic Flood Risk Assessment Level 2:

March 2017



Burnley Borough Council:

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1. Introduction

1.1 The Council is required under the National Planning Policy Framework (NPPF) 2012 to produce a Strategic Flood Risk Assessment (SFRA). The purpose of the SFRA is to identify and assess flood risk from all sources taking into account the effects of climate change. This information is then used to inform the Council's emerging Local Plan and, in line with the NPPF, to direct development to areas of least risk and ensure that development itself does not increase flood risk elsewhere.

1.2 In identifying and planning for flood risk and in compiling SFRA's local authorities are required to work closely with the Environment Agency (for coastal and 'main river' flooding), utilities (sewer flooding and some reservoirs) and other relevant bodies responsible for the management of water resources and of flood risk. Under and the Flood and Water Management Act 2010 Lancashire County Council is the lead local flood authority (LLFA) covering Burnley borough with responsibility for assessing and addressing the risks of flooding from 'local' sources. These include 'ordinary watercourses' (small streams and channels), surface water run off and groundwater.

1.3 The Burnley SFRA is in two parts: a Level 1 SFRA and this Level 2 SFRA. The two reports should be read together and, in particular, this Level 2 report should not be read in isolation.

1.4 The Level 1 SFRA provides a strategic, borough-wide overview of flood risk (from all sources), the primary purpose of which is to inform the basis for application of the Sequential Test in respect of the location of development.

1.5 The Level 1 SFRA applied the Sequential Test (see Appendix 8 of the Level 1 Report) set out in the NPPF which states that "the aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower probability of flooding. The Strategic Flood Risk Assessment will provide the basis for applying this test. A sequential approach should be used in areas known to be at risk from any form of flooding". (NPPF Paragraph 101)

1.6 The updated Level 1 SFRA was published in March 2017. In summary, the Sequential Test conclusions were as follows:

- The Council concluded that it could not meet its requirements by allocations solely within Flood Zone 1
- The Council concluded that it could not meet its requirements by allocations solely within Flood Zones 1 and 2.
- The Council concluded that it could not meet its requirements by allocations solely within Flood Zones 1 and 2 and the lowest risk sites available in Flood Zone 3
- The Council concluded that it could not meet its requirements for housing by allocations solely within Flood Zones 1 and 2 and the lowest risk sites available in Flood Zone 3 and with housing being a 'more vulnerable' the Exception Test was required following a Level 2 SFRA.
- The Council concluded that it could meet its requirement for employment allocations solely within Flood Zones 1 and 2 and the lowest risk sites available in Flood Zone 3 and with employment being a 'less vulnerable' the Exception Test was not required though in some cases a Level 2 Assessment was commissioned to better inform potential site layout, design and drainage considerations and other flood risk mitigation measures required.

2. Scope and Purpose of the Level 2 SFRA

2.1 This Level 2 SFRA addresses any proposed Local Plan allocations which, following the application of the Sequential Test in the Level 1 SFRA, are found to be within or partly within areas of medium to high fluvial flood risk (Zones 2, 3a and 3b) and/or which have significant surface water risk and/or may be required to pass the Exception Test. 9 sites have been subject to Level 2 SFRA.

2.2 This Level 2 SFRA helps the Council demonstrate that these allocations can be justified and satisfy where necessary the Exception Test. This level of understanding of flood risk at such sites is necessary in order to understand not only safety and sustainability issues to satisfy the Exception Test but also to assess the design, cost and feasibility implications of development in areas of risk. JBA Consulting was commissioned to undertake a Level 2 SFRA of the 9 sites to provide evidence and conclusions for the second part of the Exception Test (see Appendix 1 of this report). The Council has undertaken an assessment of the first part of the Exception Test (see Exception Test site assessments in Section 3 of this report).

2.3 The NPPF states that “If, following application of the Sequential Test, it is not possible, consistent with wider sustainability objectives, for the development to be located in zones with a lower probability of flooding, the Exception Test can be applied if appropriate. For the Exception Test to be passed:

- *it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared;*
- 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, will reduce flood risk overall.*

Both elements of the test will have to be passed for development to be allocated or permitted.” (NPPF 102).

2.4 Paragraph 22 of National Planning Policy Guidance Flood Risk and Coastal Change sets out how, after applying a sequential approach so that, as far as possible, development is located to where there is the lowest risk of flooding, new development can be made safe by:

- *Designing buildings to avoid flooding by, for example, raising floor levels;*
- *Providing adequate flood risk management infrastructure which will be maintained for the lifetime of the development, for example, using Community Infrastructure Levy or planning obligations, or Partnership Funding where appropriate*
- *Leaving space in developments for flood risk management infrastructure to be maintained and enhanced, and;*

2.5 In addition, when considering safety, specific local circumstances need to be taken into account, including:

- *Mitigating the potential impacts of flooding through design and flood resilient and resistant construction.*
- *The characteristics of a possible flood event, eg the type and source of flooding and frequency, depth, velocity and speed of onset.*

- *The safety of people within a building if it floods and also the safety of people around a building and in adjacent areas, including people who are less mobile or who have a physical impairment. This includes the ability of residents and users to safely access and exit a building during a design flood and to evacuate before an extreme flood.*
- *The structural safety of buildings*
- *The impact of a flood on the essential services provided to a development.*
- *While safety considerations are always very important, local planning authorities should seek to ensure that communities are sustainable, including ensuring that certain sections of society, such as the elderly and those with less mobility, are not unnecessarily excluded from areas where there is a risk of flooding.*

2.6 These considerations have been applied where appropriate as part of the Exception Tests. The Exception Test analysis summarises JBA's findings in relation to Part 2 of the Test (safety) while also addressing Part 1 (whether wider sustainability benefits to the community from development outweigh flood risk).

2.7 Of the 9 sites, 1 site has been subject to the full Exception Test. This is identified in Table 1.

2.8 In respect of 5 of the 9 sites, development layout can address the flood risk issues identified in the Level 2 SFRA flood risk assessments.

2.9 The remaining 3 sites are identified in Table 1 as* similar assessments have been completed to the Exception Test Site to balance residual flood risks with the wider sustainability benefits.

Table 1: Level 2 SFRA Sites (Level 1 Screening Results)

Local Plan Site Ref.	Site name	Site area (ha)	Flood Zone Classification (% area within zone)				Vulnerability classification	Risk of Surface Water Flooding		Is the site known to be at risk of flooding from a reservoir	Exception Test required?
			1	2	3a	3b		Over 10% of site at high or medium risk?	Over 20% of site at low risk?		
Housing Allocations											
HS1/1	Former Hameldon Schools Sites	10.10	99.96	0.02	0.02	0.00	More vulnerable	No	No	No	No (very small area of FZ3a risk can be eliminated through site design).
HS1/5	Former Baxi Site	8.23	26.70	9.00	63.12	1.17	More vulnerable	No	No	Yes	Yes
HS1/17	Former Gardner Site	1.43	100.00				More vulnerable	No	Yes	No	No
HS1/24	Land NE of Sycamore Avenue	0.77	100.00				More vulnerable	Yes	Yes	No	No*
Employment Allocations											
EMP1/3	Vision Park	5.05	47.25	51.91	0.84	0.00	Less Vulnerable	No	No	Yes	No
EMP1/5	Land South of Network 65	13.32	98.91	0.46	0.12	0.52	Less Vulnerable	No	No	No	No
EMP1/8	Thompson Centre Car Park (Mixed Use)	0.65	100.00				Less Vulnerable/ More vulnerable (A4 uses)	Yes	Yes	No	No*
EMP1/13	Shuttleworth Mead South (aka Eaves Barn Farm, Padiham)	9.27	14.11	81.86	4.03	0.00	Less Vulnerable	No	No	Yes	No*
Town Centre Allocations											
TC1/4	Curzon Street	1.65	33.14	64.05	2.81	0.00	More vulnerable (may involve A4 uses)	No	No	Yes	No (small area of FZ3a risk can be eliminated through exclusion of more vulnerable uses from this FZ.

3. The Level 2 SFRA Results

3.1 The Interim Level 2 SFRA by JBA (Appendix 1 of this report) examines describes the likely fluvial, ground water, canal, and surface water (both offsite impacts and runoff generated by development) flood risks for the 9 sites. Estimated flood depths are calculated within areas at risk and where modelling data is available, flood velocities and hazards are identified. Allowances for climate change are also applied to calculations. Risk mitigation options, further assessment requirements and the suitability of each site for development are described.

The Exception Tests

3.2 Table 1 identifies 1 site where an Exception Test will be required.

- As indicated in this table, it is necessary to apply the Exception Test when it is proposed to allocate a site in Flood Zone 3a for a 'more vulnerable' use, such as housing and not proposed to direct housing fully away from the part of these sites that fall within Flood Zone 3a (1 site).
- An Exception Test is not required when a 'less vulnerable' uses, such as offices, industry and storage or distribution uses is proposed on a site in Flood Zone 3a.

PART 1 of the Exception Test

It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared;

3.3 The Level 1 Report and the sequential testing therein provide some evidence relevant to this part of the Exception Test as does the Sustainability Appraisal (SA) of the Local Plan.

3.4 The SA assessed all proposed site allocations and their reasonable alternatives against a set of 18 sustainability objectives assessing likely social, economic environmental effects, both negative and positive.

3.5 The key sustainability benefits are set out in the site assessments below.

PART 2 of the Exception Test

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, will reduce flood risk overall.

3.6 The Interim Level 2 SFRA by JBA provides evidence for this part to the Exception Test and the relevant conclusions are set out in the following site assessments assessed against the points set out in paragraph 22 of National Planning Policy Guidance Flood Risk and Coastal Change.

4. Exception Test Site Assessment

Name of Site:	HS1/5 Former Baxi site (HEL/011u)
Proposed Use	Housing - more vulnerable use
Site Flood Zone	1 (26.70%), 2 (9.00%), 3a (63.1%), 3b (1.17%)
Does the site lie in the functional floodplain (Zone 3b)	A small percentage of the site (1.17%) is within Zone 3b.
Is the proposed use acceptable in this Flood Zone	The majority of the site is within FZ3a with a small percentage within FZ3b. A further 9% of the site is within FZ2. Residential use would not be acceptable in FZ3b and only in FZ3a if the Exception Test is passed.
Is the depth of flooding forecast at the site significant?	Yes. In the Flood Zone 3a area, the depth of flooding is 0.4m (average) to 0.8m (max). Climate change is likely to increase the depth of flooding by up to 800mm.
What velocity is forecast within the Flood Zones ?	No data available
What level of hazard would flooding pose?	No data available
Has appropriate allowance been made for climate change? What impact does this have on flood risk?	Yes. Climate change is likely to increase the depth of flooding by up to 800mm.
Is the site considered to be at risk from surface water flooding?	The Level 1 SFRA found the site is not at significant risk of surface water flooding (less than 10% high or medium risk, less than 20% low risk). However, surface water flood risk impacts approximately 17% of the site (4% high risk, 4% medium risk, 9% low risk) (within the 1 in 1000 year outline). Flooded areas are influenced by existing infrastructure and may change following site clearance. There is a risk of surface water flooding from outside of the site.
Is the site at risk from other sources of flooding?	A culvert runs along the northern edge of the site. EA Reservoir flood maps show the site is at risk of flooding resulting from failure of a reservoir due to the impact of such an event on the adjacent River Calder. The site is considered at low risk from canal flooding.
CONSIDERATION	
<p>Sequential Test Summary</p> <p>The opportunity to create a highly sustainable development of this size and mix within the urban area is unique in Padiham. In accommodating the quantity and quality of development proposed on previously developed land, the site will reduce pressure for further greenfield release in the countryside.</p> <p>There are no other housing sites in Padiham which could offer the opportunity this site does that are at a lower risk of flooding (i.e. wholly in Flood Zone 1 or 2) and the site is therefore considered to pass the Sequential Test.</p>	

Exception Test Part 1: evidence that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared;

The site is currently in employment use but factory buildings have been vacant since 2007. The site is identified in the current Local Plan (Second Review adopted 2006) as part of an Economic Improvement Area (EIA) (EW6/3 Wyre Street) in Padiham.

The site had been extensively marketed by agents but there had been no interest from potential occupiers. Due to its size, location and access difficulties and lack of market demand, the Council's 2016 SHLAA concluded that it was no longer viable as an employment site.

The site provides an opportunity for a significant housing development on brownfield land in an attractive and highly sustainable location close to Padiham town centre, local amenities and public transport facilities. This is the second largest proposed allocation in the Local Plan at 244 dwellings and one of only 3 in Padiham, the others being considerably smaller (41 and 56 dwellings). Padiham is heavily constrained by adjacent Green Belt, the boundary of which abuts the site.

The size of the site and its riverside, edge of town location would allow a development which creates its own sense of place, provides for a mix of housing types and a scheme of the highest quality which clearly and demonstrably contributes to increasing housing quality and choice across the borough.

Development for residential use provides an opportunity to remove industrial traffic from the surrounding residential streets and an opportunity to remediate the land.

It provides an opportunity to address current flood risk issues on the site and the adjacent areas of Padiham town centre. The Environment Agency is examining options to provide flood protection for Padiham including works along this stretch of the Calder. The development of housing on the Baxi site would provide an opportunity to contribute to this including through direct works on site and/or through planning contributions and would improve the cost benefit ratio to justify public sector investment in flood risk management measures that would protect the site and wider area.

The opportunity to create a highly sustainable development of this size and mix within the urban area is unique in Padiham. In accommodating the quantity and quality of development proposed, the site will reduce pressure for further greenfield release in the countryside.

Burnley Proposed Submission Local Plan Sustainability Appraisal (SA) 2017

The SA found that proposed residential development would have major positive effects in relation to the following sustainability objectives:

Objective 3: To reduce deprivation in urban and rural areas

Padiham Town Centre is within 250m of this site so there may be significant positive effects on the viability and vitality of the town centre by boosting population growth in the area. In addition, the site is adjacent to a Decile 1 IMD area and so new development nearby could stimulate the regeneration of that area.

Objective 4: To improve physical and mental health

The accessibility assessment that Burnley Borough Council carried out as part of the SHLAA shows that this site is within 400m of a defined on or off road cycle route and is within 1,200m of a GP which would have positive benefits for encouraging people to lead healthy lifestyles. A significant positive effect is therefore likely.

Objective 5: To improve access to a range of good quality, resource efficient and affordable housing

The site is not in a high housing vacancy rate area, but is expected to have a positive effect on this objective as it will provide new housing. As the site is relatively large (8.23ha), the positive effect is

expected to be significant. This is reinforced by the fact that the policy specifies that a mix of dwelling types will be expected.

In addition minor positive benefits would be evident in terms of:

Objective 11. To improve access to services, amenities and jobs for all groups

The accessibility assessment that Burnley Borough Council carried out as part of the SHLAA shows that this site is within 1,200m of a primary school, GP, shop and community facility but the site is not within 30 minutes travel time of the key borough services assessed. A minor positive effect is therefore likely overall.

Objective 15: To protect and improve environmental quality and amenity

Development on this site is likely to have a minor positive effect on soil quality as the site is on brownfield land, and will therefore avoid the loss of soils elsewhere in the Borough.

Objective 17: To ensure the prudent use of natural resources and the sustainable management of waste

The effects of housing development at this site on the use of materials and the production of waste will be largely dependent on construction methods and materials, which will be determined at the planning application stage. As this site is on brownfield land, it may offer more opportunities for re-using existing buildings and materials, and a minor positive effect is therefore expected on this SA objective.

Minor negative effects were only identified in relation to:

Objective 6. To reduce the need to travel and increase the use of sustainable transport modes

Uncertain minor negative effects were identified in relation to:

Objective 12. To protect and enhance the built environment and cultural heritage, including archaeological assets

Objective 13. To protect and enhance the Borough's biodiversity and geo-diversity

Exception Test Part 2: Evidence 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, will reduce flood risk overall.

Specific Tests

- ***The characteristics of a possible flood event, eg the type and source of flooding and frequency, depth, velocity and speed of onset***
- ***The structural safety of buildings***

Interim Strategic Flood Risk Assessment Level 2 2017

Approx. 65% of the site is located within FZ3 - the depth of flooding 0.4m (average) to 0.8m (max). Climate change is likely to increase the depth of flooding by up to 800mm.

The depth of flooding is up to 0.8m without allowance for climate change and up to 1.6m with allowance for climate change.

The Level 2 Interim SFRA Report from JBA Consulting recommended that the Council should consider reviewing the suitability of this site for redevelopment owing to current depths of fluvial flooding and future implications of climate change. Whilst part of the site is located in Flood Zone 1 (and hence is suitable for development), the remainder of the site is predominantly located within Flood Zone 3a where the typical depth of flooding is significant.

In relation to fluvial flooding, JBA's Interim Level 2 Assessment results are limited by the

availability of a 1D model only (2D may define hazards and depths more accurately). However, JBA state that additional modelling as part of a site specific Flood Risk Assessment (FRA) is unlikely to result in any significant reduction or change the extent of flooding.

Surface water flood risk impacts approximately 17% of the site (4% high risk, 4% medium risk, 9% low risk) (within the 1 in 1000 year outline). Flooded areas are influenced by existing infrastructure and may change following site clearance. There is a risk of surface water flooding from outside of the site.

In relation to surface water localised maximum flood depths are in the range 0.6-0.9m for the 1 in 30 year event and increase to 0.9-1.2m for the 1 in 1000 year event, with average depths of between 0.15m and 0.3m. The maximum hazard is Significant across all events, with the average hazard being Low to Moderate. Surface water flood extents appear to be influenced by the presence of the existing buildings and it is noted that these extents are likely to change following site clearance.

EA Reservoir flood maps show the site is at risk of flooding resulting from failure of a reservoir due to the impact of such an event on the adjacent River Calder. However, due to the active management and regular maintenance of these structures, there is a very low risk of flooding and as such, this source of flooding should not be used to determine whether development should take place at an allocation site or not.

The site is considered at low risk from canal flooding. JBA's Interim Level 2 Assessment found that whilst the site is approximately 50m lower than the Leeds Liverpool Canal, the canal is 1.9km away at the nearest point. The River Calder and Sweet Clough/Green Brook flow west and north west in the area between the development and the canal and so would potentially direct breach flows away from the development site. As a regulated water body subject to regular maintenance (Canal and River Trust), the residual risk of flooding from canal overtopping or embankment failure is considered low.

- ***Leaving space in developments for flood risk management infrastructure to be maintained and enhanced***

Proposed policy HS1/5 effectively ensures that there will be no built development in areas covered by Flood Zone 3b. Proposed policy HS1/5 requires that the southern part of the site adjoining the River Calder including all the land in Zone 3b (the functional floodplain) be retained/developed as multi-functional green infrastructure. This will also apply to the southernmost part of the land within Zone 3a. Whilst some residential development and associated infrastructure e.g. roads would take place in Flood Zone 3a, other mitigation measures will address flood risk.

- ***Mitigating the potential impacts of flooding through design and flood resilient and resistant construction: and***
- ***Designing buildings to avoid flooding by, for example, raising floor levels;***

Flood resilient design (i.e. raised electrics, boilers, storage, machinery) could be achieved. This is a large site and a mix of dwelling types is expected. Townhouses could also be used on parts of the site and ground floor uses could be restricted e.g. for garaging.

Development in areas within Flood Zone 3a may be difficult and land raising, whilst reducing risk, may result in a reduction in available flood storage and risk could be transferred to adjacent areas.

- ***The safety of people within a building if it floods and also the safety of people around a building and in adjacent areas, including people who are less mobile or who have a physical impairment. This includes the ability of residents and users to safely access and exit a building during a design flood and to evacuate before an extreme flood; and***
- ***The impact of a flood on the essential services provided to a development.***

The site has a number of potential points of access and whilst the main access would be to the

southern part of the site in FZ3a, alternative/secondary access can be provided to the north of the site on land within FZ1 to enable the site to be safely accessed/exited in times of flood. Grove Lane to the north is approximately 3m higher than the 1 in 100 year climate change flood level and so is likely to provide an appropriate access route to the site during fluvial flood events.

The Low Risk (1 in 1000 year) flood outline indicates surface water flooding entering the site across the northern boundary from Town Hill Bank Road. There is surface water flooding of the highways surrounding the site and this will need to be taken into account in consideration of emergency access and egress.

This is a large site and a mix of dwelling types is expected. Older person housing e.g. bungalows/ adaptable housing could be accommodated on the higher northern parts of the site within FZ1.

- ***Providing adequate flood risk management infrastructure which will be maintained for the lifetime of the development, for example, using Community Infrastructure Levy or planning obligations, or Partnership Funding where appropriate***

Proposed Local Plan Policy HS1/5 states that contributions will be required towards the costs of a flood alleviation scheme for Padiham, options for which are currently being developed by the Environment Agency.

In March 2015 the EA completed an Initial Assessment Report on the River Calder at Padiham to assess the costs, benefits and partnership funding requirements of a fluvial flood alleviation scheme for Padiham. The study, undertaken before the December 2015 floods in Padiham, assessed a number of options. The current preferred option is for raised defences including raising existing flood walls and an embankment on land to the east of this site. This option would protect to a 0.5% standard of protection (or a 200yr flood event) at a cost of approximately £4 million. Following the Boxing Day 2015 flood, and based on likely revisions to flood outlines in the town following that event and revised partnership funding calculations based on avoided damages, the EA is confident that it can achieve sufficient benefits from a defence scheme such that it can achieve £1m of Government Grant-in-Aid funding. This amount, together with the £3m of Local Growth Funds secured by the Council through the LEP, should be sufficient to deliver the scheme to better protect the Baxi site and other parts of the town from flooding. Following completion of a review of flood outlines and confirmation of scheme costs in summer 2017, the Council will then be in a position to enter into a formal partnership with the EA to move forward with a scheme, before progressing detailed design and engaging with suitable contractors.

The Plan timescale is up to 2032 and the site could come forward if necessary in a later phase when these issues have been addressed and a flood alleviation scheme agreed. This site may have an important role in delivering the flood alleviation scheme as well as benefitting from it.

- ***While safety considerations are always very important, local planning authorities should seek to ensure that communities are sustainable, including ensuring that certain sections of society, such as the elderly and those with less mobility, are not unnecessarily excluded from areas where there is a risk of flooding***

This is a large site and a mix of dwelling types is expected. 20% of the dwellings are required to be adaptable to support the changing needs of occupiers over their lifetimes including people with disabilities complying with the optional technical standards of the Part M(2) of the building regulations 2010 under Policy HS4. The site is in a highly sustainable location in terms of its access to services and, as such, for those no longer able to drive or who are vulnerable to the cold, it offers an opportunity for modern energy efficient housing with services in walking distance.

Other mitigation measures proposed

A detailed site specific FRA will be required to support any planning applications. This should reflect the up to date situation and demonstrate that the second part of the Exception Test can be met.

Provision for climate change should be made in the FRA ensuring the site will remain safe in the future, assuming current risk can be mitigated.

The FRA should also focus on the risk associated with the interactions between surface water and fluvial flooding and consider the impacts of surface water flooding on access and egress routes both within and outside the site (including emergency routes).

If discharge to the watercourse is proposed the FRA will need to consider outfall capacity during high fluvial flows.

The FRA should assess the potential for off-site surface water impacts on the proposed development. This will need to include consideration of inflows from adjacent sites and propose methods to manage existing offsite impacts and flow routes.

A culvert runs along the northern edge of the site. No development should take place within 8m of this culvert. An 8m buffer is required along the southern boundary (adjacent to the River Calder) where development is prohibited. This is an Environment Agency requirement to allow access to the watercourse for maintenance purposes.

Policy CC5 requires SuDS to address surface water run off which should be limited to QBAR rates. As part of the FRA an appropriate drainage / attenuation strategy will be required. There are a variety of appropriate techniques which could be adopted to manage site runoff ranging from oversized pipes or underground storage tanks to SuDS techniques and attenuation basins. The Interim Level 2 report by JBA sets out attenuation volumes required to achieve QBAR run off rates and the land take required for an appropriate surface storage pond. SUDs and attenuation requirements should be considered at the master planning stage. Most of the surface water risk is within fluvial Flood Zone 2 and therefore any SuDS system would be inundated during an extreme fluvial event.

Further more detailed site specific assessments in relation to reservoir and canal flood risk should be considered as part of the FRA.

Conclusion

The site clearly has the potential to deliver significant wider sustainability benefits. It is envisaged that the flood alleviation scheme for Padiham in conjunction with mitigation measures set out above will enable the Council to allocate this site safely and sustainably for residential development in the Local Plan thus satisfying the Exception Test.

5. Other Level 2 Site Assessments

5.1 Eight of the 9 Level 2 sites do not formally require an Exception Test.

5.2 For all but 3 of these sites, site layout can address the flood risk issues identified in the Level and 2 SFRA assessments.

5.3 For three sites, these cannot be fully addressed by site layout alone and similar assessments have therefore been completed to the Exception Test Site to balance residual flood risks with the wider sustainability benefits.

Name of Site:	HS1/24 Land NE of Sycamore Ave
Proposed Use	Housing - more vulnerable use
Site Flood Zone	1 (100%)
Does the site lie in the functional floodplain (Zone 3b)	No
Is the proposed use acceptable in this Flood Zone	Yes. The site is wholly within FZ1 where residential development is acceptable in terms of fluvial flood risk. However, see surface water flood risk below.
Is the depth of flooding forecast at the site significant?	Yes. Maximum surface water flood depths exceed 1.2m with average depths 0.3-0.6m.
What velocity is forecast within the Flood Zones ?	n/a
What level of hazard would flooding pose?	Significant.
Has appropriate allowance been made for climate change? What impact does this have on flood risk?	Yes. The existing 1:1000 year outline provides an indication of the likely increase in depth and extent for the lower risk more frequent events as a consequence of climate change impacts.
Is the site considered to be at risk from surface water flooding	Yes. More than 21% is at high risk of flooding from surface water, a further 31% is at medium risk and a further 5% is at low risk.
Is the site considered to be at risk from other forms of flooding	The site is not at risk of flooding resulting from failure of a reservoir but could be at risk in the event of a breach in the Leeds Liverpool Canal which is only 30m from the site and is some 1-2m higher. A culvert runs under the highway close to the southern boundary of the site.
CONSIDERATION	
<p>Sequential Test Summary</p> <p>Outline Planning permission on a wider site had been granted for 100 dwellings and the area to the east of this site developed for 58 dwellings in the first two phases. A further planning permission for 34 dwellings was granted in 2012 on this part of the site, but this permission has now lapsed. The site is entirely within Flood Zone 1 and fluvial flood risk is therefore low. Surface water flood risk is significant and extensive.</p> <p>Given that residential use on the site has previously been approved, the site provides an opportunity for additional housing on brownfield land which will contribute positively to the regeneration of the area. The site is in a highly sustainable location within the urban area and</p>	

currently detracts from the streetscene being in a semi derelict state. The development of modestly sized urban brownfield sites such as this helps reduce pressure for further greenfield release both within the urban area and in the countryside. The sites owner fully supports its inclusion on the Local Plan.

Given the site's location within FZ1 and that other reasonable alternatives within this area of Burnley include other former industrial sites facing similar challenges in terms of surface water risk, culverts etc, or are poorer in relation to other planning considerations, the site is considered to pass the Sequential Test.

Exception Test Part 1: evidence that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared;

Residential use on the site has previously been approved and the site provides an opportunity for additional housing on brownfield land which will contribute positively to the regeneration of the area.

The site is in a highly sustainable location within the urban area and currently detracts from the streetscene being in a semi derelict state. The development of modestly sized urban brownfield sites such as this helps reduce pressure for further greenfield release both within the urban area and in the countryside. The sites owner fully supports its inclusion in the Local Plan.

Burnley Proposed Submission Local Plan Sustainability Appraisal (SA) 2017

The SA found that proposed residential development would have major positive effects in terms of the following sustainability objectives:

Objective 3 To reduce deprivation in urban and rural areas

The site is within a Decile 1 IMD area; therefore new housing development here may have significant positive effects on deprivation, but uncertainty exists over the ability of deprived groups to access the new housing. In addition, the site is close to Burnley Town Centre so there may also be positive effects on the viability and vitality of the town centre.

Objective 6 To reduce the need to travel and increase the use of sustainable transport modes

The proximity of housing sites to sustainable transport links could affect levels of car use for accessing work and services. The accessibility assessment that Burnley Borough Council carried out as part of the SHLAA shows that the site is within 400m of a bus stop and within 800m from a railway station. A significant positive effect is therefore likely for this SA objective.

Objective 7 To improve physical and mental health and reduce health inequalities

The accessibility assessment that Burnley Borough Council carried out as part of the SHLAA shows that the site is within 400m of a defined on or off road cycle route and is within 1,200m of a GP. This would encourage residents to lead more healthy lifestyles and so a significant positive effect is likely.

Objective 8 To improve access to a range of good quality, resource efficient and affordable housing

The site is relatively small (0.77ha) but is immediately adjacent to a high housing vacancy rate area; therefore housing development here is expected to have a significant positive effect on this objective. This is reinforced by the fact that the policy specifies that a mix of dwelling types will be expected.

Objective 11: To improve access to services, amenities and jobs for all groups

The accessibility assessment which Burnley Borough Council carried out as part of the SHLAA shows that the site is within 1,200m of a GP, a primary school, a shop and a community facility. The site is also within 30 minutes public transport time of key Borough services. A significant

positive effect is therefore likely for this SA objective.

In addition minor positive benefits would be evident in terms of:

Objective 15 To protect and improve environmental quality and amenity

Development on this site is likely to have a minor positive effect on soil quality as the site is on brownfield land, and will therefore avoid the loss of soils in the Borough.

Objective 17 To ensure the prudent use of natural resources and the sustainable management of waste.

This site is on brownfield land and therefore may offer opportunities to re-use existing buildings and materials, reducing demand for raw materials. A minor positive effect is therefore likely.

Uncertain major negative effects were only identified in relation to:

Objective 12. To protect and enhance the built environment and cultural heritage, including archaeological assets

Exception Test Part 2: Evidence 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, will reduce flood risk overall.

Specific Tests

- ***The characteristics of a possible flood event, eg the type and source of flooding and frequency, depth, velocity and speed of onset.***
- ***The structural safety of buildings***

Interim Strategic Flood Risk Assessment Level 2 2017

The site is entirely within Flood Zone 1 and fluvial flood risk is therefore low.

The issue with this site is surface water flooding. Compared to tidal or fluvial risk surface water flooding is generally considered more manageable. However, in this instance the extent of surface water flooding is significant.

Approximately 52% of the site is at medium or high risk. The average depth of flooding is significant at 0.3-0.6m with the maximum depth of in excess of 1.2m across all flood events. Climate change is expected to increase depth and extent for the lower risk more frequent events to the 1:1000yr outline. The subsequent maximum hazard is Significant for the 1 in 30 and 1 in 100 year events, rising to extreme for the 1 in 1000 year event. On average, hazards are significant across all events.

The flood outlines indicate surface water flooding crosses all site boundaries with an associated risk from or to adjacent sites.

The site is not at risk of flooding resulting from reservoir failure but would be at risk of a breach in the Leeds Liverpool Canal. JBA's Interim Level 2 Assessment states that the site is slightly lower (within 1-2m) of the canal level and at approximately 30m away is the closest of all sites to the Leeds Liverpool Canal. In this area whilst the canal is generally constructed on the raised slope, from initial review of ground levels the gradient is very slight and there appears to be a relatively wide section of ground on the northern side of the canal which would potentially reduce the risk of a breach occurring.

Levels of flood risk are dependent upon factors such as the location and extent of the canal breach, the volume of water released and the local ground profile. Based on the outline modelling applying the parameters and methodology described in Appendix B of JBA's Interim Level 2 report (with a breach located immediately adjacent to the site) depths of flooding across the site would be up to 1.5m with velocities around 0.7m/s. From initial examination and comparison of outline

modelled breaches, the impact of flooding on the site would be significant. It should be noted that no condition survey has been undertaken at this location and the potential risk of failure would need to be considered further.

As a regulated water body subject to regular maintenance (Canal and River Trust), the residual risk of flooding from canal overtopping or embankment failure is considered low.

- **Leaving space in developments for flood risk management infrastructure to be maintained and enhanced**

57% of the site (not including existing buildings/footprint in the wider site) is currently at risk. It is proposed that surface water flooding be offset to one area of the site (where possible use would be car parking and landscaping). Lower risk areas are likely to be suitable for development subject to the developer's FRA.

- ***Designing buildings to avoid flooding by, for example, raising floor levels; and***
- ***Mitigating the potential impacts of flooding through design and flood resilient and resistant construction.***

Whilst this would be possible it would not be necessary as dwellings (houses or flats) in the risk areas could be avoided.

- ***Providing adequate flood risk management infrastructure which will be maintained for the lifetime of the development, for example, using Community Infrastructure Levy or planning obligations, or Partnership Funding where appropriate***

Major flood risk management infrastructure would not be necessary as dwellings (houses or flats) in the risk areas could be avoided.

- ***The impact of a flood on the essential services provided to a development; and***
- ***The safety of people within a building if it floods and also the safety of people around a building and in adjacent areas, including people who are less mobile or who have a physical impairment. This includes the ability of residents and users to safely access and exit a building during a design flood and to evacuate before an extreme flood.***

There is surface water flooding of the highways surrounding the site and this will need to be taken into account in consideration of emergency access and egress. Dwellings (houses or flats) and access to them could be avoided in the risk areas.

Additional Mitigation

As the site is within Flood Zone 1 and less than 1Ha, a site specific FRA is not required on the basis of fluvial flood risk alone, however an up to date FRA should be completed to support any planning application on the basis of surface water flood risk. A site specific detailed surface water assessment and drainage strategy will be required as part of any FRA.

The FRA will need to mitigate climate change impacts across the lifetime of the development.

The FRA will also need to take account of surface water impacts from and to adjacent sites and propose methods to manage these.

Policy CC5 requires SuDS to address surface water run off which should be restricted to QBAR Rates.

As part of the FRA an appropriate drainage / attenuation strategy will be required. There are a variety of appropriate techniques which could be adopted to manage site runoff ranging from oversized pipes or underground storage tanks to SuDS techniques and attenuation basins. The Interim Level 2 report by JBA sets out attenuation volumes required to achieve QBAR run off rates and the land take required for an appropriate surface storage pond. SUDs and attenuation

requirements should be considered at the master planning stage.

The FRA will need to consider the impacts of surface water flooding on access and egress routes (including emergency routes).

Development should take account of the culvert below the highway close to the southern boundary of the site.

Canal flooding is an unlikely occurrence and should be considered a residual risk. Due to the potentially numerous locations for failure scenarios and potential effect of factors such as impounded volumes, the canal assessment in the Interim Level 2 is considered indicative only and will need to be reviewed and updated as part of any detailed site specific FRA.

- ***While safety considerations are always very important, local planning authorities should seek to ensure that communities are sustainable, including ensuring that certain sections of society, such as the elderly and those with less mobility, are not unnecessarily excluded from areas where there is a risk of flooding.***

20% of the dwellings are required to be adaptable to support the changing needs of occupiers over their lifetimes including people with disabilities complying with the optional technical standards of the Part M(2) of the building regulations 2010 under Policy HS4. The site is in a highly sustainable location in term of its access to services by public transport for those who do not or can no longer drive.

Conclusion

Sustainability benefits of development at the site have been demonstrated and it is envisaged the mitigation measures set out above will enable the Council to allocate this site safely and sustainably for residential development in the Local Plan. The site is therefore considered to satisfy the Exception Test.

Name of Site:	EMP1/13 Shuttleworth Mead South
Proposed Use	Employment
Site Flood Zone	1 (14.11) , 2(81.86), 3a (4.03%) 3b(0.00%)
Does the site lie in the functional floodplain (Zone 3b)	No.
Is the proposed use acceptable in this Flood Zone	Yes. Employment uses are generally classed as less vulnerable and are acceptable in FZ1, FZ2, and FZ3a.
Is the depth of flooding forecast at the site significant?	Yes. Average depths of fluvial flooding are in excess of 1m across the site under the 1 in 1000yr (FZ2) event with maximum depths of around 3m in the lower area towards the southwest. Climate change will potentially increase depths by around a further 480mm.
What velocity is forecast within the Flood Zones ?	No data available
What level of hazard would flooding pose?	No data available
Has appropriate allowance been made for climate change? What impact does this have on flood risk?	<p>Yes. Fluvial climate change impacts have been assessed by increasing peak flows by the total potential change anticipated for the '2080s' (2070-20115) (highest specified % allowance) corresponding with the highest risk Flood Zone and the proposed development Vulnerability Classification.</p> <p>The River Calder modelled 100 year +35% on peak river flows indicates an increase of approximately 800mm from the current day modelled depths. There is a small increase in the Flood Zone 3a outline. Dependent upon confirmation of the possible embankment (extents and crest level) adjacent to the watercourse, Flood Zone 3a may remain confined to the main river channel. Flood Zone 2 is likely to cover a similar area of the site, but average flood depths are likely to exceed 1.48m.</p>
Is the site considered to be at risk from surface water flooding	The Level 1 SFRA found the site was not at significant risk of surface water flooding: less than 10% of the site area is at high or medium risk; less than 20% of the site is at low risk. However, surface water flood risk impacts approximately 14% of the site (3% high risk and 6% medium risk) (within the 1 in 1000 year outline) and depths in these areas are significant. There is a risk of surface water flooding from adjacent areas.
Is the site considered to be at risk from other forms of flooding	<p>Yes. EA Reservoir flood maps show the site is at risk of flooding resulting from failure of a reservoir due to the impact of such an event on the adjacent River Calder.</p> <p>The site is considered to be at low risk of canal flooding.</p>
CONSIDERATION:	
Sequential Test Summary	
A small percentage of the site area is within FZ3a. Less vulnerable employment uses are generally compatible in this FZ and relevant Local Plan policy will exclude any employment uses which would be classed as 'more vulnerable'. It is considered that risk within FZ3a could be effectively negated	

by appropriate layout and design e.g. by incorporating the affected area into landscaping, parking or the easement required within 8m of the River Calder where an environmental permit may be required for flood risk activities. However, one of the two possible access points, a bridge over the River from the existing business park, would pass through/over FZ3a.

Over 80% of the site is within Flood Zone 2. Employment uses are generally less vulnerable and are compatible in this FZ.

Surface water flood risk impacts approximately 14% of the site (3% high risk and 6% medium risk) (within the 1 in 1000 year outline) and depths in these areas are significant. There is a risk of surface water flooding from adjacent areas.

Only one possible alternative employment site, Blackburn Road, Padiham, was identified which would be sequentially preferable in terms of flood risk i.e. located within FZ1. While both Shuttleworth Mead and Blackburn Road are Green Belt sites (due to a shortage of other developable land available to meet the Council's employment land requirement), in terms of site suitability and sustainability as a whole, Shuttleworth Mead South was considered to bring greater benefits in terms of its offer and its reduced development impacts and it is therefore considered that there are no other reasonable alternative sites and that Shuttleworth Mead South therefore passes the Sequential Test.

Exception Test Part 1: evidence that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared;

The site is located on agricultural land within the Green Belt adjacent to the southern bank of the River Calder, opposite Shuttleworth Mead Business Park which is to the north side of the river.

The Burnley Strategic Housing and Economic Land Availability Assessment (SHLAA) 2016 indicates that over the plan period there is sufficient 'developable' land to provide approximately 46.94 hectares of employment development on a range of sites outwith the current Green Belt (as identified in the saved Burnley Local Plan 2006).

In order to meet the identified requirement however, a further 15.8 hectares of employment land needed to be identified and the Council undertook a Green Belt Review to inform a decision on the effects of releasing any land within the Green Belt, including this site, for development. Only one alternative employment site - the Blackburn Road site (also in the Green Belt) was identified which would be sequentially preferable in terms of flood risk i.e. located within FZ1, but in terms of site suitability and sustainability as a whole, Shuttleworth Mead South was considered to bring greater benefits in terms of its offer and its reduced development impacts. As such it is considered that there are no reasonable alternative sites to meet the plan requirement.

Burnley Proposed Submission Local Plan Sustainability Appraisal (SA) 2017

The SA found that proposed residential development would have minor positive effects in terms of the following sustainability objectives:

Objective 1

All employment site allocations are expected to have a positive effect on this objective, although as this site is relatively small (9.27ha), the positive effect is expected to be minor as it will provide fewer job opportunities and fewer opportunities for economic growth.

Objective 3

This site is within 1km of a Decile 1 IMD area (775m to the north east), and employment development here may therefore have a minor positive effect on improving conditions in that area by offering new job opportunities. In addition, Padiham Town Centre is within 1km to the north east so positive effects on the viability and vitality of the town centre may occur as a result of the

new development supporting businesses and services there.

Objective 6:

This site is within 400m of a bus stop but is not within 800m of a railway station; therefore a minor positive effect is expected overall. This is reinforced by the fact that the policy requires new walking and cycling facilities and routes to be provided on site, connecting the new development to the existing route network in particular the public right of way to the north of the site and also to the road network via Shuttleworth Mead. In addition, contributions will be sought towards the signposting of the Padiham Greenway from both Shuttleworth Mead South and the existing Shuttleworth Mead Business Park.

Objective 7:

This site is within 400m of a defined on or off road cycle route which may offer opportunities for employees at the site to commute via cycling, to the benefit of health, and a minor positive effect is likely. This is reinforced by the fact that the policy requires new walking and cycling facilities and routes to be provided on site, connecting the new development to the existing route network in particular the public right of way to the north of the site and also to the road network via Shuttleworth Mead. In addition, contributions will be sought towards the signposting of the Padiham Greenway from both Shuttleworth Mead South and the existing Shuttleworth Mead Business Park.

Objective 11:

The location of employment sites will not have a direct effect on the quality of and access to facilities and services. However, as this site is within 1,200m of residential areas, people living there will have improved access to job opportunities. Due to uncertainties about the nature of the job opportunities provided and whether nearby residents will be appropriately qualified, any positive effect is expected to be minor.

In addition uncertain minor positive benefits would be evident in terms of:

Objective 4

This site is located away from the areas of high unemployment in the Borough, although the site is within 400m of a bus stop which could result in a minor positive effect on increasing accessibility to jobs. This is uncertain, however, depending on whether this provides linkages with areas of high unemployment.

Objective 5

All employment site allocations are expected to have a positive effect on this SA objective, due to the nature of the development proposed. As this site is relatively small (9.27ha), it will offer fewer opportunities for market workbased training and skills development and a minor positive effect may occur. However, the nature of these opportunities is unknown at this stage and there is therefore some uncertainty.

Significant negative effects were only identified in relation to:

Objective 15. To protect and improve environmental quality and amenity

Objective 14. (Uncertain) To protect and enhance the Borough's landscape and local character.

Uncertain minor negative effects were identified in relation to:

Objective 12. To protect and enhance the built environment and cultural heritage, including archaeological assets

Objective 13. To protect and enhance the Borough's biodiversity and geo-diversity

Exception Test Part 2: Evidence 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, will reduce flood risk overall.

Specific Tests

- ***The characteristics of a possible flood event, eg the type and source of flooding and frequency, depth, velocity and speed of onset***
- ***The structural safety of buildings***

Interim Strategic Flood Risk Assessment Level 2 2017

The main sources of flooding to the site are fluvial and surface water.

Fluvial flood risk (Flood Zone 2 and 3a) impacts just under 86% of the site and will require more detailed assessment and identification of mitigation measures through a site specific drainage strategy and Flood Risk Assessment (including assessment of impacts of climate change and on / off site impacts over the life of the development).

The development area is at highest risk of fluvial flooding from the north where it adjoins the River Calder. EA flood zone mapping indicates that Flood Zone 3a covers a 4% strip of land adjacent to the watercourse (potentially constrained to the riverward side of the embankment and therefore would be within the area of maintenance easement). The presence of the embankment / ridge of high ground adjacent to the watercourse requires further investigation as this may impact the extents of Flood Zone 3a as the in channel water levels are potentially close to the undefended bank levels. It is noted that the Flood Zone 3a in channel water levels are generally higher than the site ground levels and if the embankment / high ground was removed there would be resultant flooding across the site, particularly under climate change scenarios.

Whilst the FZ2 risk area is more extensive, it is the likely depth of flooding that is of concern having a predicted average depth in excess of 1m (not including climate change) with maximum depths of 3.0m in the south western part of the site.

The potential impact of the embankment on Flood Zone extents requires further investigation and if confirmed this may increase the extents of Flood Zone 3a. The FRA will need to include breach and overtopping assessments to demonstrate safe development.

2D inundation modelling as part of a Site Specific FRA may help identify areas at lesser risk.

Surface water flood risk impacts approximately 14% of the site (within the 1 in 1000 year outline) and depths are significant. There is a risk of surface water flooding from adjacent areas.

Surface water flooding is generally limited to an area of low lying ground to the southwest, a corridor across the northeast of the site and localized ponding. Development in this area should be avoided.

In the southwest area, maximum flood depths are locally in the range 0.3-0.6m for the 1 in 30 and 1 in 100 year event and increase to 0.6-0.9m for the 1 in 1000 year event. The subsequent maximum hazard is Significant across all events. Average flood depths are in the range of 0.15-0.3m for the 1 in 30 year and 0.3-0.6m for the 1 in 100 year outline. In the northeast area maximum flood depths are locally in the range 0.3-0.6m for the 1 in 30 year event and increase to 0.6-0.9m for the 1 in 1000 year event. The subsequent maximum hazard is Significant across all events. Average flood depths and hazards are similar to the southwest area. The southwest area is potentially impacted from surface water flooding from adjacent areas. A drainage ditch to the southwest appears to be culverted beneath the A6068 and this should be explored further as part of the FRA.

A detailed drainage assessment and site specific FRA (including assessment of impacts of climate change and on / off site impacts) will be required to assess and manage surface water flood risk.

This will need to be in combination with a more detailed assessment of mitigation to limit surface water runoff to specified levels to minimise off site impacts associated with the proposed development.

EA Reservoir flood maps show the site is at risk of flooding resulting from failure of a reservoir due to the impact of such an event on the adjacent River Calder. However, due to the active management and regular maintenance of these structures, there is a very low risk of flooding and as such, this source of flooding should not be used to determine whether development should take place at an allocation site or not.

- ***Leaving space in developments for flood risk management infrastructure to be maintained and enhanced***

Ideally no development should take place in Flood Zone 3a, otherwise e.g. if the site access is through this area, the FRA should investigate mitigation measures. An 8m buffer is required along the northern boundary (adjacent to the River Calder) where development is prohibited. This is an Environment Agency requirement to allow access to the watercourse for maintenance purposes. It is noted that the currently indicated extents of Flood Zone 3a are within this area. Areas subject to surface water flooding should ideally be kept free from development or alternatively flows should be redirected across the site using SuDS.

- ***Designing buildings to avoid flooding by, for example, raising floor levels***
- ***Mitigating the potential impacts of flooding through design and flood resilient and resistant construction.***

Raising floor levels could be challenging for employment uses and could affect development viability. The approach of raising overall site levels may be more appropriate providing this could be achieved without increasing flood risk elsewhere.

- ***Providing adequate flood risk management infrastructure which will be maintained for the lifetime of the development, for example, using Community Infrastructure Levy or planning obligations, or Partnership Funding where appropriate.***

On the north-west edge of the site, there is a flood embankment which extends to the main road (A6068). According to the Environment Agency (EA) this is believed to have an estimated standard of protection of 1-in-100yrs, and a crest level at its upstream and downstream ends of 71:10m AOD (although levels may vary locally between those points). It currently meets the EA's (EA) target condition of 3 ('fair') and could potentially assist in protecting the site, subject to breach/overtopping assessments being carried out as part of an FRA at the site. However, the EA emphasise that this is not an embankment on which they carry out annual maintenance, probably due to it not being deemed as critical for the protection of residential properties compared with other embankments in the EA Area. While the EA do not rule out ever carrying out maintenance on it, if it fell below its target condition, it is not currently on the Environment Agency's annual maintenance programme and any future EA maintenance would be based on available funds and DEFRA priorities. The EA are under no obligation to carry out such maintenance.

Moving upstream are stretches of naturally high ground along the river, rather than an embankment. It is believed that this high ground along the river is of an elevation of between 70.8 – 71.4m AOD moving upstream.

- ***The safety of people within a building if it floods and also the safety of people around a building and in adjacent areas, including people who are less mobile or who have a physical impairment. This includes the ability of residents and users to safely access and exit a building during a design flood and to evacuate before an extreme flood***
- ***The impact of a flood on the essential services provided to a development.***

Proposed use is for employment so there would be no residents. Access (including emergency

access) across the site will need to take account of future flood levels. There are two potential points of access: either via the existing junction on Blackburn Road with a bridge to the south of the existing business park; or directly off the A6068; or both. A bridge would require an FRA to demonstrate through design that flood levels and conveyance is not impeded. The elevated approach roads and the potential for these to impede floodplain conveyance and influence the depth of flooding would also need to be considered.. A site specific FRA will need to be demonstrate how this can be achieved safely and without adding to flood risk elsewhere.

- ***While safety considerations are always very important, local planning authorities should seek to ensure that communities are sustainable, including ensuring that certain sections of society, such as the elderly and those with less mobility, are not unnecessarily excluded from areas where there is a risk of flooding.***

Proposed use is for employment so there would be no residents on site. The site is within 400m of a bus stop with a regular service including to the existing Shuttleworth Mead Business Park. However, the level of public transport accessibility may depend on the choice of main access location (s) as part of site design.

Further Mitigation Measures

An up to date site specific FRA should be completed to support any planning application. Provision for climate change should be made in the FRA ensuring the site will remain safe in the future, assuming current risk can be mitigated. The FRA should also focus on the risk associated with the interactions between surface water and fluvial flooding and should explore suitable options to mitigate existing surface water issues and mitigate climate change impacts across the lifetime of the development.

Access (including emergency access) across the site will need to take account of future flood levels.

The site is subject to a surface water flood hazard and a site specific detailed surface water assessment and SuDS drainage/attenuation strategy will be required in accordance with proposed policy CC5. There are a variety of appropriate techniques which could be adopted ranging from oversized pipes or underground storage tanks to SuDS techniques and attenuation basins. The Interim Level 2 report by JBA sets out attenuation volumes required to achieve QBAR run off rates and the land take required for an appropriate surface storage pond. SuDS and attenuation requirements should be considered at the master planning stage. Most of the surface water risk is within fluvial Flood Zone 2 and therefore any SuDS system would be inundated during an extreme fluvial event. If discharge to the watercourse is proposed the FRA will need to consider outfall capacity during high fluvial flows.

The FRA will need to include consideration of inflows from adjacent sites and propose methods to manage existing offsite impacts and flow routes.

Conclusion

The site clearly delivers wider sustainability benefits. The flooding risk is significant and requires further investigation during design phase to ensure that the development can be made safe.

Name of Site:	EMP1/8 Thompson Centre
Proposed Use	Employment or Town Centre (less vulnerable uses only)
Site Flood Zone	1 (100%)
Does the site lie in the functional floodplain (Zone 3b)	No
Is the proposed use acceptable in this Flood Zone	Yes
Is the depth of flooding forecast at the site significant?	(Surface water) flood depths within the 1 in 100 year outline are on average in the range 0.3-0.6m and locally up to 1.2m. The extent and depth of surface water flooding may impact on the development suitability of the site.
What velocity is forecast within the Flood Zones ?	n/a
What level of hazard would flooding pose?	n/a
Has appropriate allowance been made for climate change? What impact does this have on flood risk?	Yes. The existing 1 in 1000 year outline provides an indication of the likely increase in depth and extent for the lower risk more frequent events as a consequence of climate change impacts.
Is the site considered to be at risk from surface water flooding	Yes. Surface water flood risk impacts approximately 94% of the site (1% high risk 36% medium risk, 57% low risk) (within the 1 in 1000 year outline).
Is the site considered to be at risk from other forms of flooding	Yes. The site is approximately 13m lower and 120m away from the Burnley Embankment section of the Leeds Liverpool Canal. From initial examination and comparison of outline modelled breaches, the impact of flooding on the site would be significant. It should be noted that no condition survey has been undertaken at this location and the potential risk of failure would need to be considered further. EA Reservoir flood maps show the site is not at risk of reservoir flooding.

CONSIDERATION

Sequential Test Summary

This is a brownfield site in Burnley Town Centre, currently in use as a car park. Located entirely within Flood Zone 1, it has a highly sustainable location directly adjacent to Burnley bus station and within walking distance of two railway stations. The River Calder flows in culvert below the southern part of the site. The site is 120m from the Burnley Embankment of the Leeds Liverpool Canal. Given its Town Centre location outwith the primary shopping area, it is sequentially preferable for town centre non retail uses including B1a office under national planning policy.

There are few reasonable alternative sites to accommodate B1a uses in the Town Centre. One alternative site at Curzon Street is proposed to be allocated to accommodate the Plan's identified retail requirement being better related to the current Primary Shopping Area than this site. The Curzon Street is not sequentially preferable in flood risk terms, being located largely within FZ2.

The other reasonable alternative, Parker Lane/Croft Street, located close to the Thompson Centre site in Burnley Town Centre is not currently available for redevelopment and is partly in retail use.

Given its prominent Town Centre location and the lack of reasonable alternative sites to accommodate B1a office use at a lower risk of flooding, the site is considered to pass the Sequential Test.

Exception Test Part 1: evidence that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared;

The site is a brownfield site in the town centre of Burnley currently in use as a car park and is in a highly sustainable location directly adjacent to Burnley bus station and within walking distance of two railway stations. Given its Town Centre Location outwith the primary shopping area, it is sequentially preferable for town centre uses non retail uses including B1a office under national planning policy.

The site is prominently located on a Key Gateway into Burnley town centre and is proposed to complete the civic square of Burnley.

Burnley Proposed Submission Local Plan Sustainability Appraisal (SA) 2017

The SA found that proposed employment development would have major positive effects in terms of the following sustainability objectives:

Objective 2 To develop and market the Borough's image

The site is opposite the bus station, and will enhance the quality of the built environment by reducing the number of vacant sites and buildings at the key gateway which is located at the bus station. The site is on brownfield land; therefore a significant positive effect is expected.

Objective 3 (uncertain) To reduce deprivation in urban and rural areas

The site is within a Decile 1 IMD area and may therefore have a significant positive effect on improving conditions in that area by offering job opportunities. However, the ability of local people to access the jobs will be dependent on other factors, such as the nature of the jobs and whether there are appropriately qualified people locally, creating uncertainty. The site is also adjacent to Burnley Town Centre, so positive effects on the viability and vitality of the town centre would be expected, by supporting businesses and services there, particularly because the policy states that any development should accord with the Burnley Town Centre Public Realm Strategy SPD and be of the highest quality of architecture and design using a palette of materials which respects the character and appearance of the surrounding listed and locally listed buildings and conservation area.

Objective 6: To reduce the need to travel and increase the use of sustainable transport modes

This site is within 400m of a bus stop and 800m of a railway station; therefore a significant positive effect is likely.

In addition minor positive benefits would be evident in terms of:

Objective 1: To exploit the growth potential of business sectors and reduce disparities between local and sub-regional economic performance

All employment site allocations are expected to have a positive effect on this objective, but as this site is relatively small (0.65ha), the positive effect is expected to be minor as it will provide fewer job opportunities and fewer opportunities for economic growth.

Objective 4: To secure economic inclusion

As this site is located within an area of high unemployment, a minor positive effect is expected on increasing access to jobs by providing new employment opportunities in those areas. In addition, the site is within 400m of a bus stop and 800m of a railway station which could have further minor

positive effects on this objective.

Objective 5 (uncertain) : To develop and maintain a healthy labour market

All employment site allocations are expected to have a positive effect on this SA objective, due to the nature of the development proposed. As this site is relatively small (0.65ha), it will offer fewer opportunities for work-based training and skills development. The nature of these opportunities is unknown at this stage and there is therefore some uncertainty.

Objective 7: To improve physical and mental health and reduce health inequalities

This site is within 400m of a defined on or off road cycle route which may offer opportunities for employees at the site to commute via cycling, to the benefit of health, and a minor positive effect is likely.

Objective 11: To improve access to services, amenities and jobs for all groups

The location of employment sites will not have a direct effect on the quality of and access to facilities and services. However, as this site is within 1,200m of residential areas, people living there will have improved access to job opportunities. Due to uncertainties about the nature of the job opportunities provided and whether nearby residents will be appropriately qualified, any positive effect is expected to be minor.

Objective 15: To protect and improve environmental quality and amenity

Development on this site is likely to have a minor positive effect on soil quality as the site is on brownfield land, and development here will therefore avoid the loss of soils elsewhere in the Borough. The policy also requires that a contaminated land investigation and relevant remediation will be required in accordance with Policy NE5 and this reinforces the minor positive effect.

Uncertain major negative effects were only identified in relation to:

Objective 12. To protect and enhance the built environment and cultural heritage, including archaeological assets

Exception Test Part 2: Evidence 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, will reduce flood risk overall.

Specific Tests

- ***The characteristics of a possible flood event, eg the type and source of flooding and frequency, depth, velocity and speed of onset.***
- ***The structural safety of buildings***

Interim Strategic Flood Risk Assessment Level 2 2017

Fluvial flood risk is low as the site is entirely within FZ1. A culverted section of the River Calder crosses the southern boundary of the site and it is likely an Environmental Permit for flood risk activities would be required.

The main source of flood risk to the site is surface water. Compared to tidal or fluvial risk, surface water flooding is generally considered more manageable. However, in this instance the extent of surface water flooding is the issue.

Surface water flood risk impacts approximately 94% of the site (within the 1 in 1000 year outline). Flood depths within the 1 in 100 year outline are on average in the range 0.3-0.6m and locally up to 1.2m. The extent and depth of surface water flooding may impact on the development suitability of the site. Approximately 37% of the site is at medium or high risk. The average depth of flooding is significant at 0.3-0.6m with the maximum depth of 0.9-1.2m. A further 57% of the site is located within low risk outline (note not including high and medium risk extents on the

mapping) then typical depths are approximately 0.3m. Climate change is not included in the above.

There is a risk of surface water flooding from adjacent areas. A detailed drainage assessment, drainage strategy and site specific FRA (including assessment of impacts of climate change and on/off site impacts) will be required to assess and manage surface water flood risk. This will need to be in combination with a more detailed assessment of mitigation to limit surface water runoff to specified levels to minimise off site impacts associated with the proposed development.

The site is approximately 13m lower and at approximately 120m away is the closest of all sites to the Burnley Embankment section of the Leeds Liverpool Canal. Levels of flood risk are dependent upon factors such as the location and extent of the canal breach, the volume of water released and the local ground profile. Based on the outline modelling applying the parameters and methodology described in Appendix B (with a breach located immediately adjacent to the site) depths of flooding across the site would be 400mm with velocities around 0.8m/s. From initial examination and comparison of outline modelled breaches, the impact of flooding on the site would be significant. It should be noted that no condition survey has been undertaken at this location and the potential risk of failure would need to be considered further.

EA Reservoir flood maps show the site is not at risk of flooding resulting from failure of a reservoir.

- ***Leaving space in developments for flood risk management infrastructure to be maintained and enhanced, and;***

Areas subject to surface water flooding should ideally be kept free from development or alternatively flows should be redirected across the site using SuDS.

Any mitigation to offset surface water, such as lowered basins/areas, is unlikely to work as flooding is predicted to such a wide interconnected area that extends across adjacent development areas. Any benefits associated with surface water flood mitigation will, therefore, be lost to interconnected areas of inundation.

Lower risk areas of the site would be, sequentially, more suitable for development (approximately 60%) however, risk would still need to be managed.

- ***Designing buildings to avoid flooding by, for example, raising floor levels***
- ***Mitigating the potential impacts of flooding through design and flood resilient and resistant construction.***

Buildings on the site will be for less vulnerable employment or town centre uses. They will be multi-storey with the potential, if required, for lowest risk functions to occupy ground floors, subject to safe access and egress routes being identified and flood resilient/resistant construction to be applied as appropriate.

- ***Providing adequate flood risk management infrastructure which will be maintained for the lifetime of the development, for example, using Community Infrastructure Levy or planning obligations, or Partnership Funding where appropriate***

Fluvial flood risk is low as the site is entirely within FZ1. No additional flood risk management infrastructure is required. No development should take place within 8m of the culvert which runs through the site. Local Plan and EA policy encourages deculverting where practicable.

- ***The safety of people within a building if it floods and also the safety of people around a building and in adjacent areas, including people who are less mobile or who have a physical impairment. This includes the ability of residents and users to safely access and exit a building during a design flood and to evacuate before an extreme flood.***
- ***The impact of a flood on the essential services provided to a development.***

Surface water flood risk on the site is significant and extensive, affecting the majority of the site. However, it is considered that this risk can be effectively reduced by appropriate layout and design

a sustainable drainage strategy.

An up to date site specific FRA will be required to include a detailed surface water assessment. The FRA will need to mitigate climate change impacts across the lifetime of the development. The FRA will also need to take account of surface water inflows from adjacent sites and propose methods to manage these. The FRA will need to consider the impacts of surface water flooding on access and egress routes, with significant flooding to local routes indicated.

As part of an FRA an appropriate drainage /attenuation strategy will be required in accordance with proposed policy Local Plan Policy CC5. There are a variety of appropriate techniques which could be adopted ranging from oversized pipes or underground storage tanks to SuDS techniques and attenuation basins. The Interim Level 2 report by JBA sets out attenuation volumes required to achieve QBAR run off rates and the land take required for an appropriate surface storage pond. SuDS and attenuation requirements should be considered at the master planning stage.

- ***While safety considerations are always very important, local planning authorities should seek to ensure that communities are sustainable, including ensuring that certain sections of society, such as the elderly and those with less mobility, are not unnecessarily excluded from areas where there is a risk of flooding.***

The proposed use is commercial so there would be no residents. The site is in a highly sustainable town centre location in terms of its providing access to jobs services by public transport for those who do not or can no longer drive.

Conclusion

The site clearly delivers wider sustainability benefits. The surface water flooding risk is significant and requires further investigation during design phase to ensure that the development can be made safe.

Appendix 1: Interim Level 2 SFRA JBA Consulting March 2017

See Separate Appendix File

