Hucknall Town Centre Flood Alleviation Project

RMA Short Form

Business Case



Version No: 2

Date: 14 July 2017

BUSINESS CASE APPROVAL SHEET

Review & Technical Approval Hucknall Town Centre Flood Alleviation Scheme								
Project title								
Authority project reference	n/a	ire County Council	Data of submission	00/06/2017				
Lead authority	nouingnamsn		Date of submission	09/00/2017				
Consultant	JBA							
'I confirm that this project meets of investment appraisal conditions, the recommend we apply to the Environment	our quality assura hat all internal ap ronment Agency f	nce requirements, opprovals, including r for capital grant and	environmental obligation nember approval, have local levy in the sum of	ons and Defra e been completed and of £ 430000				
Job title	Name		Signature	Date				
Authority Project Executive	Gary Wood			28/06/2017				
'I have reviewed this document a and Internal Drainage Board appl	nd confirm that it ications.'	meets the current b	ousiness case guideline	es for local authority				
OBC reviewer	Michael Thom	as	LThere	09/06/2017				
'I confirm that the project is ready	for assurance ar	nd that I have consu	Ited with the Director of	of Business Finance'				
Area Flood & Coastal Risk Manager	Paul Lockhart							
Assurance sign off - (Tick the a	opropriate box)							
AFCRM Assurance Projects < £100k								
Recommendation for approv	al			Date				
AFCRM or NPAS Chair								
Project total as approved (£k)			Version Number					
Project total made up of :	Capital Grant	(£k)	50					
	Levy (£k)		380					
	Other Contrib	utions (£k)						
2 Project Financia	l approval							
Financial scheme of approval	Project total	Name	Signature	Date				
Area Flood & Coastal Risk Manager	<£100k or <£1m (if GiA & Levy <£100k)	Paul Lockhart						
Director of Business Finance	All projects >£100k							
Plus:								
Area Manager	£100k- £1m							
Director of Operations	£1m -£10m							
3 Further approva	ls (if applica	able)	_					
Date sent (or N/A)			Version number (if different)					
Date approved (or N/A)			· · ·	· · · · · · · · · · · · · · · · · · ·				
Final Comments								

For FSoD Coordinator use only:

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Business Case

1. Introduction

This business case details the proposals to reduce the risk of flooding to 11 domestic properties at a total capital cost of \pounds 430k.

Hucknall is a town with a population of approximately 33,000 located 7 miles north-west of Nottingham, as shown on Figure 1 below.

In July of 2013 the town experienced significant flooding with some 70 properties and businesses reporting internal and external flooding as well as widespread flooding of highways and open spaces.

This event led to Nottinghamshire County Council (NCC), as Lead Local Flood Authority (LLFA), carrying out a detailed investigation into the causes of the flooding and possible ways of mitigating the risk to the community.



Figure 1. Hucknall Location Plan

Hucknall is served by two discreet catchments, Baker Lane Brook (main-river) catchment and Titchfield Park Brook catchment. These catchments both ultimately drain to the River Leen (main river).

The two catchments are shown below in Figure 2. This project considers flooding within the Baker Lane Brook catchment. The Titchfield Park Brook catchment is the subject of a separate project in the 6 year programme (project ref. TRC003F/000A/098A).

Early investigations identified that NCC Highways (funded via DfT) were planning a major town centre improvement scheme (TCIS) that would impact on some of the areas that had experienced the worst flooding. It also identified that Hucknall had suffered serious flooding on a number of occasions prior to 2013.

This understanding led to the flood risk project developing alongside the TCIS in an endeavour to identify the most effective and efficient approach to delivering both projects.

Figure 2: Hucknall drainage catchments



The flooding in the Baker Lane Brook catchment peaks at Thoresby Dale as shown on Figure 3. During times of heavy rain surface water follows the natural valley of the Baker Lane Brook catchment in a manner expected in a traditionally urbanised catchment. The line of the Baker Lane Brook is shown on Figure 2.

Figure 3. Flooding at Thoresby Dale



Over many years the Baker Lane Brook has been altered, built over and culverted resulting in an asset whose hydraulic efficiency is hampered in a number of locations. Surface water from the catchment is conveyed along the network of highways and through the various drainage assets (highway drainage, surface water systems and watercourses) and the surface flow paths follow the natural valley of the Baker Lane Brook. Due to the urbanised nature of the catchment these flow paths inevitably lead to properties and businesses, causing flooding and damage on their journey.

The flooding problem manifests itself on Thoresby Dale, primarily as this is a low spot on the catchment. This is evidenced on the maps shown in Figure 4, where it is clear that the Thoresby Dale estate was built on the site of the old Mill Pond and is an area shown at risk of surface water flooding. The grid reference for the flooding location is SK 53753 49404.

The proposal to mitigate the risk of flooding to the properties is to install a surface water drainage system that will take the surface flows from the low spot on Thoresby Dale downstream into the Baker Lane Brook. This proposed design is shown in Figure 5.

Figure 4. Thoresby Dale - Mill Pond Location and surface water flood risk



Figure 5. Proposed Surface Water System



2. Strategic case

Strategic context

The case for change

As Lead Local Flood Authority NCC has a duty under the Flood and Water management Act 2010 to prepare, publish and deliver a Local Flood Risk Management Strategy (LFRMS). The overall aim of the LFRMS is stated in the document as:

"This Local Flood Risk Management Strategy outlines how we, Nottinghamshire County Council, will manage flooding from local sources in our area and work with other authorities to manage all sources of flooding, now and in the future."

The LFRMS is supported by an Action plan that identifies objectives and targets that will allow NCC to monitor progress as the strategy is implemented.

The overarching objective is:

To reduce flood risk to people, properties and critical infrastructure wherever possible, maximise multiple benefits and ensure that the inequalities gap does not widen.

The following are specific objectives and measures contained within the action plan that are relevant to this project:

Objective	Measure
To pursue new solutions, partnerships and alleviation schemes to manage future flood risks and adapt to climate change in Nottinghamshire	Develop a robust approach to the prioritisation of schemes to manage flood risk
	Seek external funding opportunities whenever possible
	Collaborate with local stakeholders to achieve common goals
	Progress capital schemes identified for flood alleviation
Table 1-1: Object	tives of the Study

Objectives

• This project sets out to reduce flood risk to a total of 11 properties in the catchment through the installation of a surface water system in the Thoresby Dale / Perlethorpe Drive estate. The proposed benefits are summarised below in Figures 6 and 7.

Figure 6. Qualifying benefits table from Partnership Funding Calculator

2. Qualifying benefits under Outcome Measure 2: households better protected against flood risk										
Number of households in:		Before				After		Char	nge due to sch	ieme
20% most deprived areas								0	0	0
21-40% most deprived areas	1	11	8		12	5	3	11	-6	-5
60% least deprived areas								0	0	0
A	f: Moderate	Significant	Very		Moderate	Significant	Very	Moderate	Significant	Very
	risk	risk	significant		risk	risk	significant	risk	risk	significant
			risk				risk			risk



Figure 7. Plan showing properties that will benefit from the scheme ★

Critical success factors

No.	Critical Success Factor	Measurement Criteria	Importance (1-5)
1	11 properties with increased level of protection against flooding	Number of properties at various levels of risk reduces. This is evidenced through hydraulic modelling carried out by JBA	1
2	Community engagement and confidence in solution	Customer engagement through the feasibility and design process	2
3	Reduce risk of flooding to the highway	Reduce frequency of flooding	3
4	Provide a cost beneficial solution	Minimum requirement of a whole life cost neutral scheme	2

Table 1-2: Critical success factors for the project

3. Economic case

The economic appraisal has followed the principles of the Flood and Coastal Erosion Risk Management – Appraisal Guidance (FCERM-AG) (Defra, 2010), as updated by supplementary guidance on the Defra website. Depth damage data has been taken from the Multi-Coloured Manual (MCM) (Flood Hazard Research Centre, 2015). In accordance with Treasury guidance a 100 year appraisal period has been used and the Treasury variable discount rate has been applied.

The economic flood assessment included a calculation of residential property damages for the Thoresby Dale study area, defined using the following methods:

- Used the National Receptor Database (NRD) (version 3, 2011) and MasterMap building outlines to derive the property dataset;
- Used maximum flood depth extracted at each property location from the hydraulic model results for a range of design flood events;
- Applied the MCM methodology and depth damage curves (as updated in 2016);
- Applied assumed threshold levels for properties 185mm for residential properties.
- Evacuation costs for residential properties experiencing above floor level flooding using the MCM data.
- Duration of flooding assumed as less than 12 hours.

Long list of options considered

Option	Description	Benefits delivered / Risks involved	Reason for short list or rejection
1	Do nothing	Do nothing, cease all current maintenance regimes effectively walking away.	SHORT LISTED This would leave a community at risk of significant flooding from surface water.
2	Do minimum – continue regular maintenance only.	No improvement in level of protection.	SHORT LISTED This would leave the community at risk of flooding.
3	Provide surface water systems throughout the catchment to contain flows locally	Potential to deliver some benefits but confidence low due to difficulties in ensuring these systems would capture flows.	REJECTED Considered on short list as had potential to deliver benefits.
4	Provide surface water storage at Leisure Centre site	Potential to deliver benefits but needed to understand whether the storage would capture flows	SHORT LISTED Considered on short list as had potential to deliver benefits.
5	Provide pumped surface water system	Confident that this will deliver benefits but risks are cost and maintenance based	SHORT LISTED Considered on short list as would deliver benefits.
6	Provide gravity surface water system	Confident that this will deliver benefits but risks are whether the pipeline will fit in existing road without major service diversions.	SHORT LISTED Considered on short list as would deliver benefits.
7	Construct overflow on Baker Lane Brook	This option was delivered as part of a highway project and did not deliver a reduction in flood risk to these benefits	REJECTED Was delivered as part of highway scheme so remove from short list.
8	Install Property Level Resilience (PLR).	This would provide short term protection and is reliant on property owners utilising PLR as a whole otherwise properties at increased risk.	REJECTED Short term solution that could increase risk. Was delivered using Repair and Renew grant and partnership contributions.
9	Upgrade combined sewer system	Could deliver benefits. Risks are that the flooding is surface water / run off based and upgrading would not deliver benefits.	REJECTED No STW drivers for investment and early feasibility showed surface run off as key issue.
10	Install additional highway gullies	No confidence in delivery of benefits as this option had been attempted some years prior and was unsuccessful.	REJECTED Had been attempted previously so rejected from short list.

Short list of options considered

Six options were transferred to the short list including do nothing and do minimum, they are detailed below:

Do nothing. This option was rejected as it is unacceptable to leave the properties at risk of flooding.

Do minimum. This would involve regular maintenance of the highway gullies and sewer systems. This work is already carried out and does not increase the level of protection afforded to the properties.

Option 1. Provide surface water systems throughout the catchment to contain flows 'locally'. This option was considered at a very simple level and without any hydraulic modelling. The thought was that by providing surface water systems throughout the catchment it would prevent the water getting to Thoresby Dale and therefore prevent flooding. When considering this approach on a plan of the catchment it became evident that this option would be incredibly complex due to the size of the catchment and in trying to ensure the systems were put in the correct locations. This was further complicated by the fact the storm events may cross the catchment in many different ways which removed any confidence in this as a solution. Finally it was considered that constructing such a solution was likely to be massively compromised by underground statutory undertaker's equipment. This option was rejected for these reasons.

Option 2. Provide surface water attenuation storage. In order to protect the properties on Thoresby Dale provision of surface water storage in the grounds of Hucknall Leisure Centre (adjacent to and upstream of Thoresby Dale) was considered. This option was discounted as feasibility proved the storage would not likely to deliver the benefits as was not in the correct location to intercept flows. This was confirmed by basic hydraulic modelling. Feasibility also identified a number of other possible difficulties in delivering this as an option including construction in third party land, disruption to busy leisure centre car park, long term maintenance issues of below ground storage and construction costs estimated at £700k. This option was rejected for these reasons. It must also be noted that during feasibility it was identified that flows provide a pedestrian crossing and this work has been carries out.

Option 3. Provide pumped surface water drainage system. This option considered providing a surface water pumping station at the low point on Thoresby Dale and pumping surface water into the surface water sewer in Station Street. This option could deliver the benefits but would introduce long term maintenance costs. It was further complicated due to the potential size of wet well required with outline costs for construction estimated at £557k. It was discounted due to cost/benefit issues and ongoing maintenance liabilities.

Option 4. Preferred Option - Provide gravity surface water drainage system. This option is the most cost effective and provides a gravity fed surface water drainage system in Thoresby Dale. The system has been designed to maximise the potential of getting flows below ground and into the new sewer. A total of 7 double size gullies are to be located in the low spot of Thoresby Dale that feed a 450mm dia. concrete pipe. This pipe then outfalls into the surface water sewer on Station Street. As part of the aforementioned Highways scheme a new sewer was installed in Station Street that was designed to accept surface flows from Thoresby Dale in the hope that this project would go ahead. The pipeline has been designed to deliver self-cleansing velocities. Maintenance will be as per NCC Highways Network Management Plan which allows for annual cleansing of gullies and a 5 yearly cleanse / inspection of the carrier pipe (£6415.20 for lifetime of system). These figures have been included in the PFC. This option has been through detailed design including ground investigation and risks to delivery are low, restricted to untraceable underground services and pockets of hard / made ground. Services have been located in detail to ensure the line of the proposed pipe was achievable. Ground conditions have been investigated using localised trial pits and knowledge gained from the work already carried out in the vicinity as part of the Town Centre Improvement Scheme (TCIS). The receiving manhole has already been constructed as part of the TCIS. It must also be noted that the very simple engineering nature of this solution and its close proximity to the affected properties gives a high degree of confidence to the residents.

Option	S	Description	Technical, Environmental & Social matters		
1	Do nothing	Do nothing	REJECTED		
			This would leave a community at risk of significant flooding from surface water		
2	Do minimum	Routine maintenance of	REJECTED		
		assets(sewers and gullies)	This would leave the community at risk of flooding.		
3	Do something 1	Provide surface water systems	REJECTED		
		throughout the catchment to contain flows locally	This option is not viable due to lack of confidence in being able to contain flows in a manner that would provide consistent protection to the properties most at risk and likely difficulties in providing connections to brook and issues with underground stats.		
4	Do something 2	Provide surface water storage at	REJECTED		
·		Leisure Centre site	This option did not provide the necessary protection to the properties and therefore was not cost beneficial, it was also going to create		

Option	S	Description	Technical, Environmental & Social matters
			long term maintenance issues and complications due to being on third party land.
5	5 Do something 3 <i>Provide pumped surface water</i>		REJECTED
		System	This option was considered cost prohibitive as would require a significant wet well volume, it would also create long term maintenance issues /costs. The capital costs were £127k more than the preferred option with annual maintenance costs of approx. £4k.
6	Do something 4	Provide gravity surface water	PREFERRED OPTION
		system	This proposal provides the most consistent and confident solution by containing the flows at the point of the flooding. This will also give the affected residents confidence as the solution is very visible to them. It is gravity fed using a traditional piped system so long term maintenance costs are minimal .

Table 1-4: Short listed options

Key findings

0	ption	Present Value costs (£'000)	Present Value damages (£'000)	Present Value benefits (£'000)	Average benefit: cost ratio (BCR)	Incremental benefit: cost ratio (IBCR)	Option for incremental calculation
1	Do nothing	0	825				
2	Do minimum	0	825				
3	Do something 1	n/a *	n/a*				
4	Do something 2	n/a*	n/a*				
5	Do something 3	557000	460000	460000	0.83		
6	Do something 4	436415	460000	460000	1.05		

Table 1-5: Cost benefit of options.

* Do something 1 and 2 rejected earlier in report so no further analysis was undertaken

Preferred way forward

The provision of a gravity fed surface water system that contains flows in the vicinity of the worst flooding is identified as the preferred option.

It provides an increased level of protection to 11 properties and delivers a cost benefit ratio of 1.05.

Each option has been compared against the "Do Minimum" baseline. The option benefits are the damages avoided by implementing that option. The table above summarises the option costs, damages and benefits for the options considered for Thoresby Dale.

The Do Minimum option captures £825k in damages avoided from residential properties. The Do Something 1 option captures £460k worth of benefits when compared against the Do Minimum option.

The economic appraisal has concluded the short-listed Do Something Option 4 to be the economically preferred option for providing an increased level of protection to 11 residential properties.

The solution relies on a traditional piped system to contain flows below ground and pass them forward to the receiving watercourse. The localised nature of the solution will provide the greatest level of confidence both from a design perspective and public perception.

All site investigations and feasibility have been completed and the risks to delivery are considered low. The solution is contained entirely within existing public highway which results in low environmental impacts / risks and removes the need for any third party access negotiations. Sensitivity of this option to variations in key assumptions is low, the route for the pipeline is straight forward with all services and statutory undertakers apparatus mapped out and the sizing of the pipe is finalised.

It is therefore recommended that the scheme is taken forward with funding secured from The Trent RFCC and FDGiA.

The Do Nothing and Do Minimum options are not acceptable as they do not meet the objectives.

4. Commercial case

Procurement strategy

The construction element of the project will be delivered by Via East Midlands on behalf of Nottinghamshire County Council. Via East Midlands provides highways and fleet management services in Nottinghamshire. The company was set up in partnership between Nottinghamshire County Council and Cornwall Council.

The organisation became fully operational in July 2016. The company is supported by both NCC and CORSERV, a company owned by Cornwall Council. It is based in existing Nottinghamshire County Council highways buildings and is wholly owned by the public sector.

The contractual arrangement between Via East Midlands and Nottinghamshire County Council (NCC) complies with all NCC Financial Regulations and is considered the most efficient method for delivery. This delivery method removes the need for a lengthy and costly procurement process and contractually caps the profit margin at 3%.

Key contractual terms and risk allocation

All construction risks will be allocated to Via East Midlands as contractor – this would cover all elements including design and construction.

Efficiencies and commercial arrangements

The use of Via East Midlands as contractor will remove the need for an external procurement exercise. It is estimated that this delivers a minimum £20k of efficiencies through saving of staff time and resources alone.

5. Financial case

Summary of financial appraisal

	Cost for economic appraisal (PV)	Whole-life cash cost	Total Project cost (approval)
Costs up to OBC	N/a – sunk costs		Exc previous app
Costs after OBC			
Existing staff costs	20000	20000	20000
Further staff costs			
Consultants' fees	35000	35000	35000
Contractors' fees			
Cost consultants' fees			
Site investigation and survey			
Construction	326000	326000	326000
Site supervision			
Environmental mitigation			
Environmental enhancement			
Land purchase & compensation			
Other			
Risk Contingency			
Optimism Bias	49000	49000	49000
Risk - Monte Carlo 95%ile or similar	N/a	N/a	
Risk - Monte Carlo 50%ile or similar			N/a
Inflation	N/a	N/a	0*
Future costs	<u>(PV)</u>	(Cash)	
(construction + maintenance)	6415	6415	N/a
Optimism Bias on future costs	U	U	
Project total cost	436415	436415	430000

Nb. * as project delivery this financial year so zero inflation. ** as future efficiencies considered to balance increase in costs and value very low)

Table 1-6: Breakdown of scheme costs

Funding sources

The Partnership Funding score provides an indication of the scheme costs which will be eligible for central Government funding and hence likely economic viability of the option. The results of the PF calculator with contributions are presented in the table below.

The duration of benefits was set to 60 years for the design life of the new assets. The PV costs for approval were taken from Table 1-6 above and the PV benefits match the economic appraisal presented in the Economic Case.

Outcome Measures (OM2s) were taken from the "Do Minimum" (existing) scenario and from the "Do Something" options. All of the properties at risk within the study area are located within the 21-40% most deprived band.

	%	Description	Total £k
Raw Partnership Funding score	19		
Funding:			
Contributions (list)			
Other: (list)			
Local Levy			380
Non GiA contributions			
Adjusted Partnership Funding score	107		
Grant in Aid			50
Project total cost (approval)			430

Table 1-7: Partnership Funding

The raw PF score is 19% with the funding calculation suggesting that \pounds 349,553 of external contributions is required to bring the adjusted PF score to 100% and for the preferred option to be implemented. It is proposed that £380,000 will come from Local Levy.

Table 1-7 shows the funding sources. This shows £50k from Grant in Aid and a further £380k contributions from Local Levy. This totals £430k of up-front costs required to implement the option.

The PF calculator includes £55k of appraisal and design costs awarded to Nottingham County Council for the preparation of the business case and detailed design. The construction costs are £375k.

A copy of the PF Calculator is attached as a separate document

Overall affordability

Annualised spend profile (£k)	Yr 0 2017	Yr 1 2018	Yr 2 2019	Yr 3 2020	Yr 4+	Total
Staff costs	55k					
Construction & other costs	375k					
Optimism bias & risk contingency						
Inflation						
Project total cost						
Less: Costs not eligible						
Less: Contributions						
Less: Local Levy being claimed	380k					
Capital grant claim	50k					
Grant rate						
Table 1-8: 5	Spend Profile	e (cash cost	s)			

6. Management case

Project management

The scheme will be project managed by Via East Midlands. Via East Midlands will continue to engage with the local community and Nottinghamshire County Council will manage the communications plan for the overall scheme. The Hucknall Town Centre Improvement project has already built up a lot of local goodwill and it is expected that current practices will be duplicated for the flood mitigation scheme.

Activity	Date (DD/MM/YYY)	Comment
Planning permission received		n/a
Other (detail as necessary)		
Work to be started on site	15/08/2017	Tbc on NPAS approval
Work substantially completed by	1/11/2017	As above

Table 1-9: Outline Delivery Programme

Benefits realisation

Contributions to outcome measures				
Outcome 1 – Ratio of whole-life benefits to costs				
Present value benefits (£k)	460000			
Present value costs (£k)	430000			
Benefit: cost ratio	1.05			
Outcome 2 – Households at reduced risk				
2a – Households moved to a lower risk category (number – nr)	11			
2b – Households moved from very significant or significant risk to moderate or low risk (nr)	11			
2c – Proportion of households in 2b that are in the 20% most deprived areas (nr)	0			
Outcome 3 – Households with reduced risk of erosion				
3a – Households with reduced risk of erosion (nr)	0			
3b – Proportion of those in 3 protected from loss within 20 years (nr)	0			
3c – Proportion of households in 3b that are in the 20% most deprived areas (nr)	0			
Outcome 4 – Water framework directive				
4a – Hectares of water-dependent habitat created or improved (ha)	0			
4b – Hectares of intertidal habitat created (ha)	0			
4c – Kilometres of river protected (km)	0			
Table 1-10: Contributions to Outcome measures				

Risk management

	Key Risks	H/M/L	Owner	Mitigation
1	Unknown underground stats	L	Via	Full underground radar survey and multiple trial holes have been taken to ensure proposed pipeline can be constructed
2	Flooding of site during construction	L	Via	Timing of works programmed to avoid winter working period
3	Archaeological find / remains discovered on site during construction	L	Via	Desk study identified that the area is of low archaeological value
4	Grant in Aid funding not secured	L	Via	Close consultation with EA to ensure funding stream are viable and meet programmed deadlines. Scheme unlikely to go ahead without funding.
5	Consents, traffic management & landowner permissions.	L	Via	Permissions have been made to mitigate disruption and identification of requirements to progress consent approvals.

Assurance, approval & post project evaluation

The project has been managed as part of the wider Hucknall Town Centre Improvement Project. The options and feasibility has been carried out using staff from NCC Flood Risk Management team, Via East Midlands and JBA Consulting to ensure we identify the most effective proposal for the community at risk.

The project is funded through Local Levy and FDGiA and as such the key approval milestone is NPAS.

Post project benefits management will be through continued liaison with residents of properties currently at risk.

7. Recommendation

It is recommended that the project is approved for delivery in 17/18 as detailed in this business case. The project requires £50k FDGiA and £380k Local Levy and will deliver increased protection against flooding for 11 properties