Coggeshall, Feering and Kelvedon Flood Alleviation Scheme

Detailed information about the proposed scheme

Background

In October 2001 Coggeshall, Feering and Kelvedon suffered from significant flooding. Since then, in May 2012 and February 2014 the villages experienced further flooding.

The 2001 flood was caused by an exceptional rainfall event which created extreme volumes of water over a short period of time, exceeding a 1 in 100 year event. The water levels created by this extreme event over-topped all structures in the River Blackwater and went beyond the natural flood plain, resulting in properties and businesses being flooded in Coggeshall, Feering and Kelvedon. This was a major flood event created by extreme river flows coming down the valley.

In 2006 we commissioned a study to explore whether a scheme would be viable for the villages.

The study demonstrated that the cost-benefit ratio for this area was low, resulting in options being too expensive to fund through our Flood Defence Grant in Aid (FDGiA) money. The study also highlighted the need to complete a hydrological model of Robin's Brook, a "Main River" under our jurisdiction which flows through Coggeshall to the Blackwater main channel, before considering a future scheme. This work was completed in 2013 allowing us to carry out further investigation.

What options have been considered?

Out of the 8 options we consulted upon in 2015, the scheme that received the greatest public support was that of providing flood storage within the River Blackwater. However, the costs of this option were initially estimated to be in excess of £6 million with no available funding. Furthermore, this option failed to achieve the levels of flood protection required because there was insufficient storage capacity available within the floodplain to manage flood flows and storage along the River Blackwater.

Table: options considered for the scheme

Option	Climate Change Considerations
Do nothing	Does not provide a long term climate change solution. Impacts likely to be worsened by this option.
Do nothing & Health and Safety	
Do minimum	May hold off climate change in the short and medium term (5 to 10 years), thereafter it is expected that this option's positive impacts will diminish.
Do something 1 – Flood Storage reservoir	This option can be designed to accommodate for long term climate change, but can be monetised in phases to reduce initial capital costs.
Do something 2 – Widening the channel	May hold off climate change in the short and medium term (5 to 10 years), thereafter it is expected that this option's positive impacts will diminish.
Do something 3 – Construction of flood walls	May hold off climate change in the short and medium term (5 to 10 years), thereafter it is expected that this option's positive impacts will diminish.
Do something 4 – Upgrade existing drainage systems	May hold off climate change in the short and medium term (5 to 10 years), thereafter it is expected that this option's positive impacts will diminish.
Do something 5 – Evapotranspiration	This option can be designed to accommodate for long term climate change, but can be monetised in phases to reduce initial capital costs.
Do something 6 – Sustainable Drainage Solutions	This option can be designed to accommodate for long term climate change, but can be monetised in phases to reduce initial capital costs.
Do something 7 – In Channel 'log jams'	May hold off climate change in the short and medium term (5 to 10 years), thereafter it is expected that this option's positive impacts will diminish.
Do something 8 – Hybrid	Through a selective approach this option can be designed to accommodate climate change with some phasing to reduce initial capital costs.

Working in partnership to find a solution

In 2015 we approached Blackwater Aggregates to ask for their support in developing a low impact and sustainable flood alleviation scheme within the Blackwater Valley which could provide the necessary 1 in 100 year flood storage across land under their control. Through discussions with Blackwater Aggregates it became apparent that by working together a long-term solution could be found.

In order to manage flooding along the River Blackwater, and deal with a 1 in 100 year flood event (inclusive of climate change), we need to create a flood alleviation scheme upstream from the communities of Coggeshall, Feering and Kelvedon. Based on our hydrological modelling, a low impact and passive scheme has been developed with Blackwater Aggregates' support that offers the best environmental, technical and economic solution to protect local businesses and residents.

We are now proposing a scheme that combines the construction of an "on-line" embankment across the River Blackwater and an "off-line" flood storage area next to the river. Together they provide protection against the 1 in 100 year flood event by storing at least 3 Million m^3 of water.

We have worked with Blackwater Aggregates to develop the "off-line" flood storage area, which would be created through their normal quarrying operations. A number of designs have been considered; however, the volume of the "off-line" flood storage area is critical to achieving the combined storage capacity of the scheme. We have modified the original designs of the "off-line" flood storage area to increase the footprint of the "off-line" flood storage and the depth of excavation to achieve the required storage capacity.

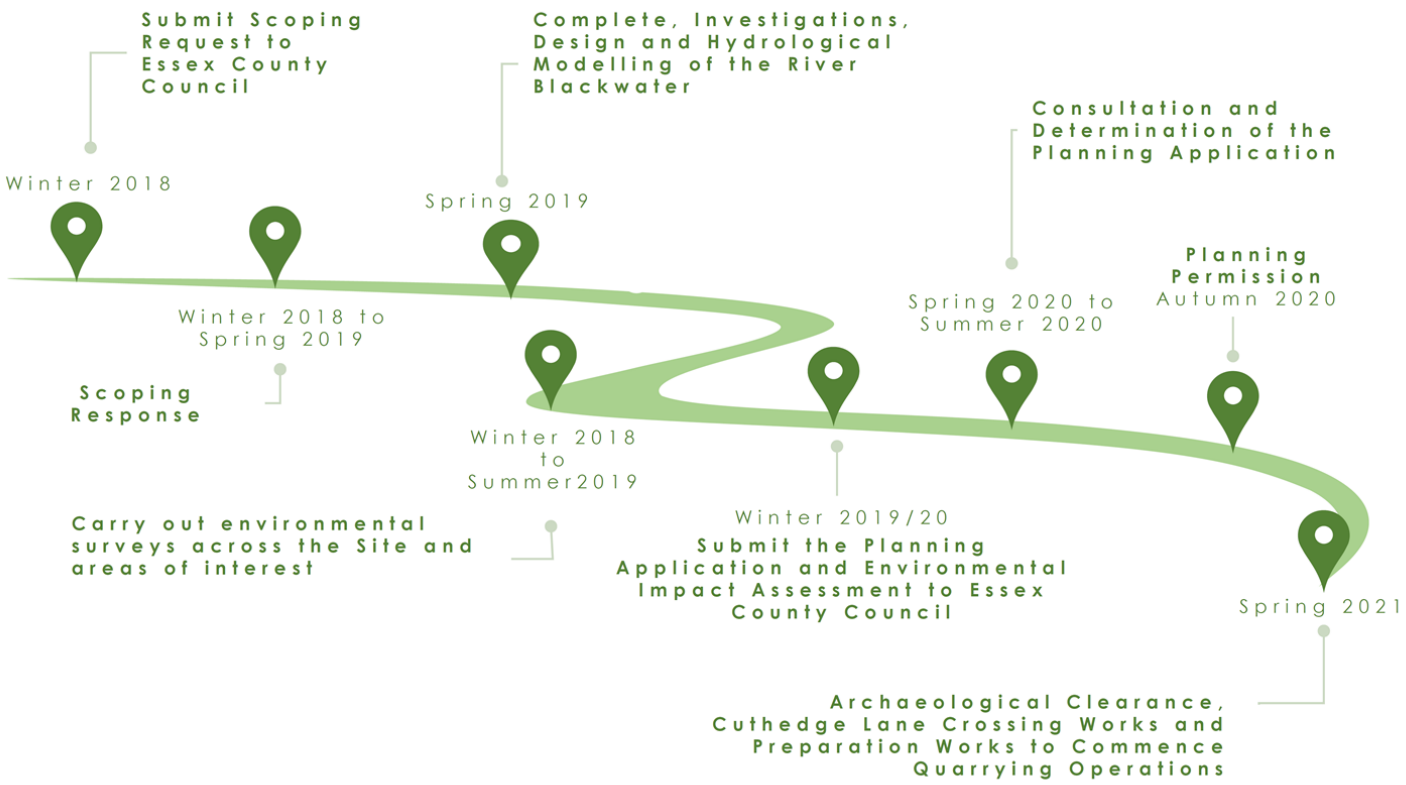
What's next?

The Environment Agency and Blackwater Aggregates are working in partnership to develop the flood alleviation scheme across land under their joint control.

We are working to develop a planning application and Environmental Impact Assessment for the scheme which will be submitted to Essex County Council Minerals and Planning Team early in 2020.

The flood alleviation scheme will provide flood protection to the villages of Coggeshall, Feering and Kelvedon through the creation of an "on-line" dam and "off-line" flood storage area.

Further details of the proposed scheme are outlined in this document. **The scheme can only progress with planning approval from Essex County Council.** Based on our existing programme, we anticipate that public consultation on the proposed planning application will be carried out in the first quarter of 2020.



Initial design considerations

The initial work by Blackwater Aggregates provided details of an “off-line” flood storage area adjacent to the River Blackwater. However, it soon became apparent that an “off-line” flood storage area alone would not provide the necessary levels of protection against a 1 in 100 year flood event. Therefore, a hybrid scheme was developed which combined “on-line” storage within the natural flood plain and a large “off-line” flood storage area adjacent to the river. We have worked closely with Blackwater Aggregates to maximise the volume of the “off-line” flood storage area to provide the required storage capacity of the flood alleviation scheme.

Our initial hydrological modelling showed that an estimated 3 Million m^3 of on and off line flood storage was needed to create a viable scheme.

We have investigated a number of potential “on-line” dam options through modelling a 1 in 100 year flood event using the “off-line” storage area initially developed by Blackwater Aggregates.

Three locations were considered: the Vineyard, the Football Ground and the Bridge along the access road into Coggeshall Quarry.

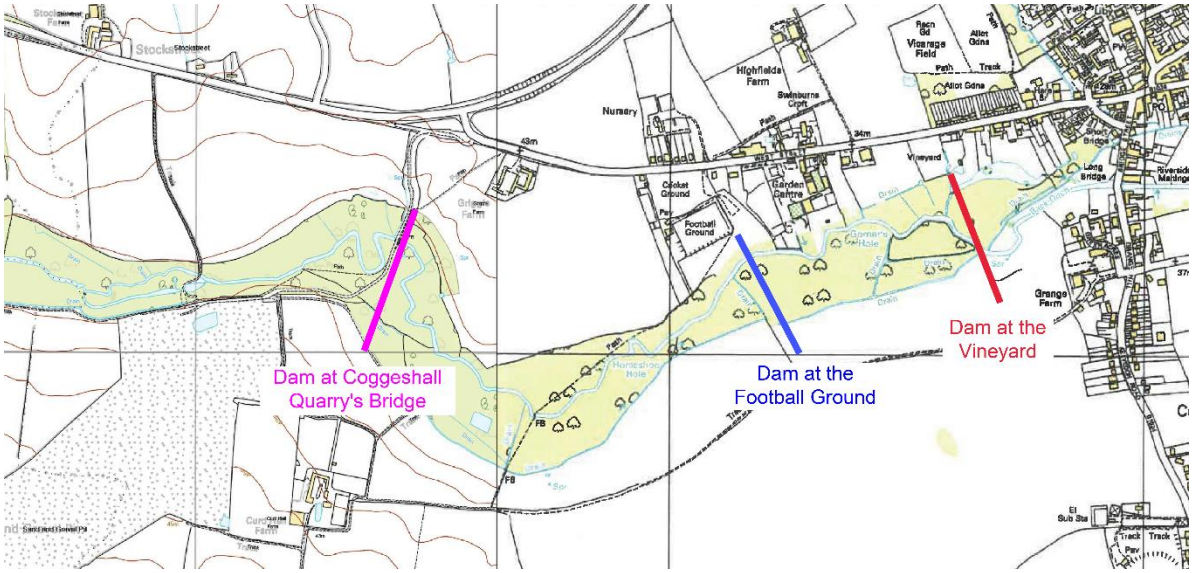
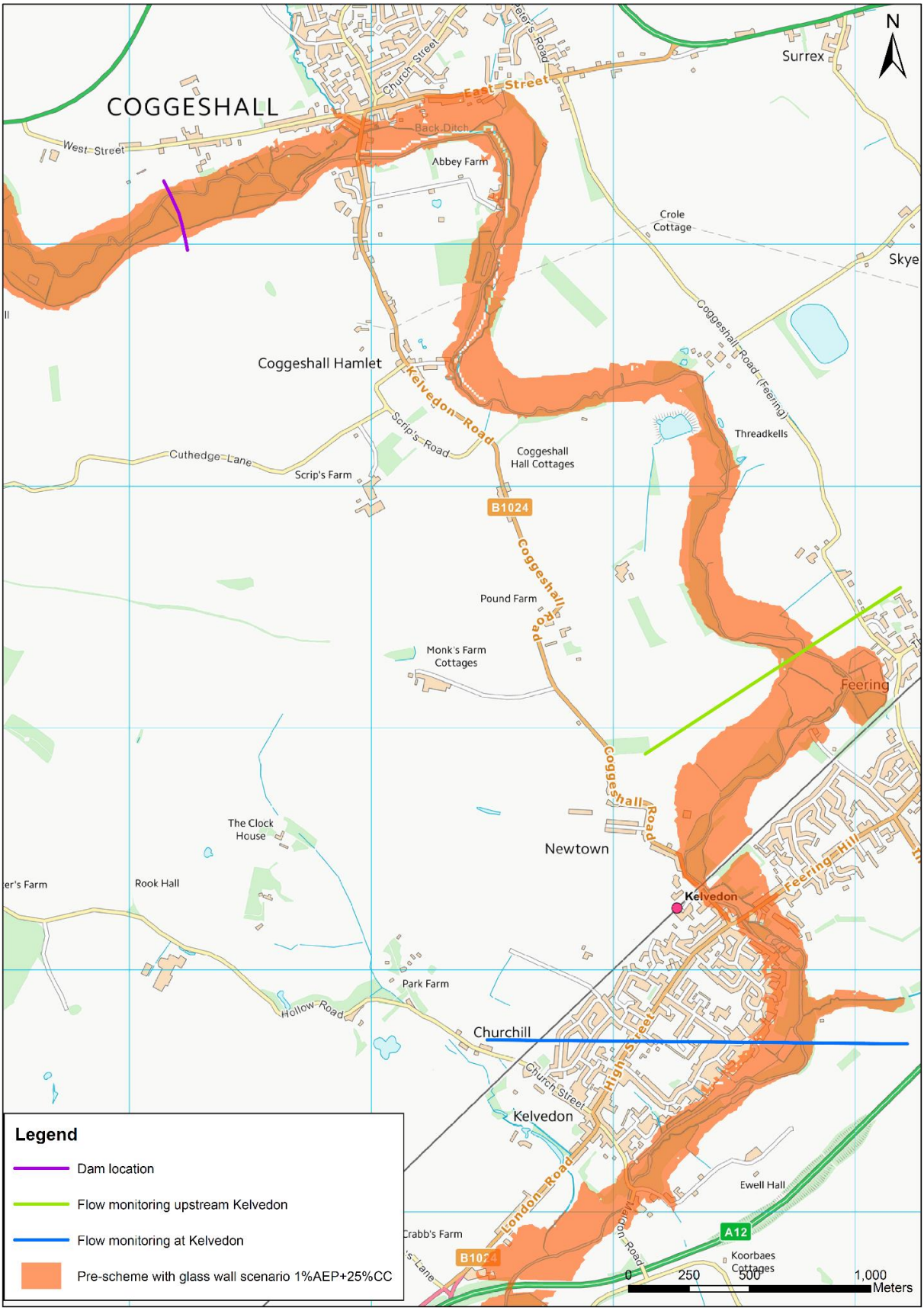


Image indicating the dam locations considered

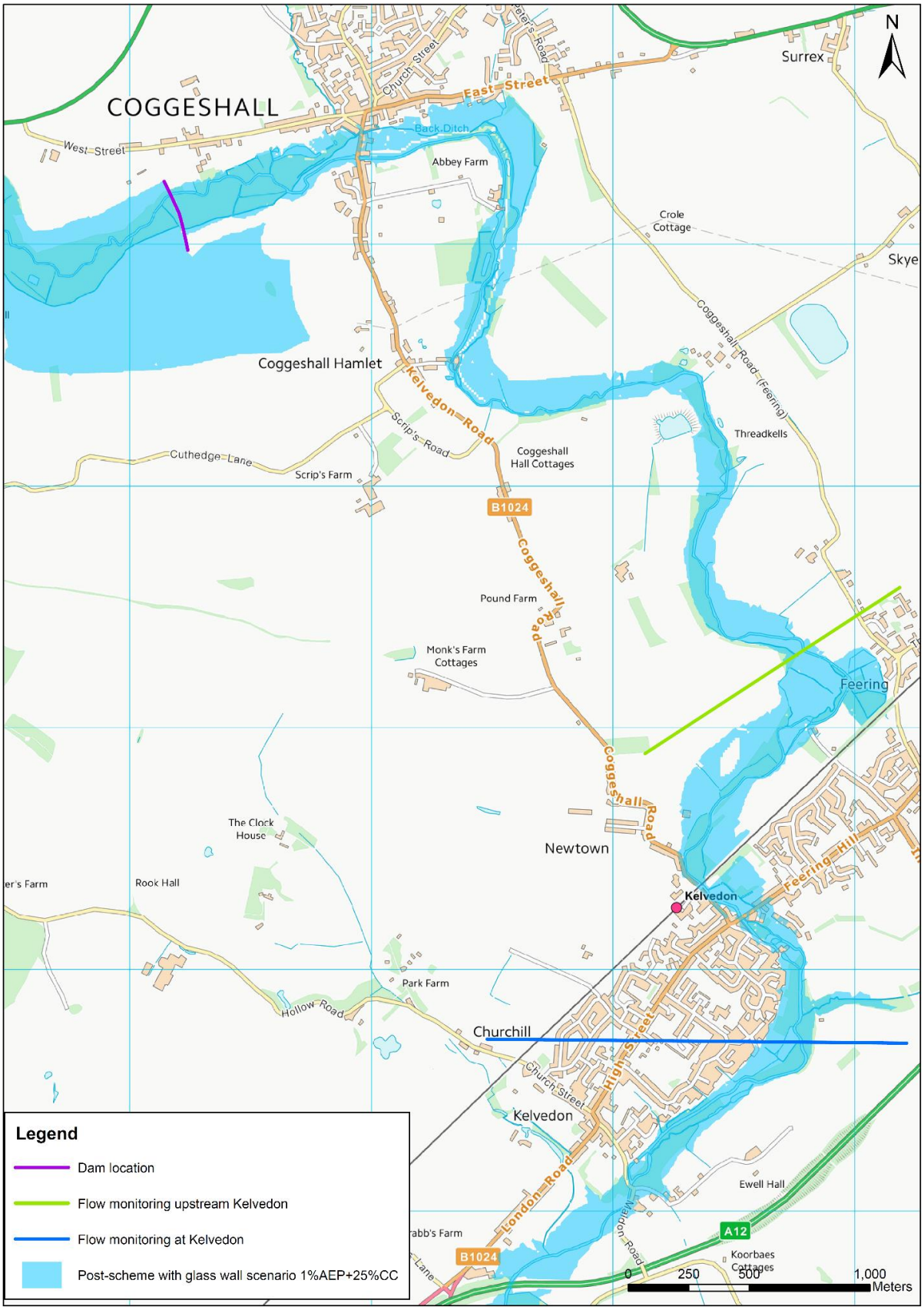
Our modelling showed that the Coggeshall Football Ground and Vineyard locations could have potentially achieved the 3 Million m³ flood water storage capacity required, but the water level behind the “on-line” dam would need to reach a level of 31mAOD. This meant that at the Vineyard water levels behind the dam could potentially result in flooding of a number new build properties planned at the Dutch Nursery Garden Centre site on West Street (for reference: the football pitch level is 33mAOD).

The modelling showed that the most suitable site for the “on-line” dam would be by Coggeshall Football Ground. As a yardstick, ground levels across the football pitch at Coggeshall Football Ground are 33mAOD, and the hydrological modelling has shown that by developing the “on-line” dam and “off-line” flood storage area at that location flood protection against a 1 in 100 year storm event, including an allowance of 25% increase for Climate Change, could be achieved.



Modelled 1 in 100 Year Flood Event without the Scheme[1]

[1] Detailed modelling results are available on the website



Modelled 1 in 100 Year Flood Event with the Scheme[2]

[2] Detailed modelling results are available on the website

The modelling data outputs for a 1 in 100 year event allowing for climate change (an additional allowance of 25%) has shown that:

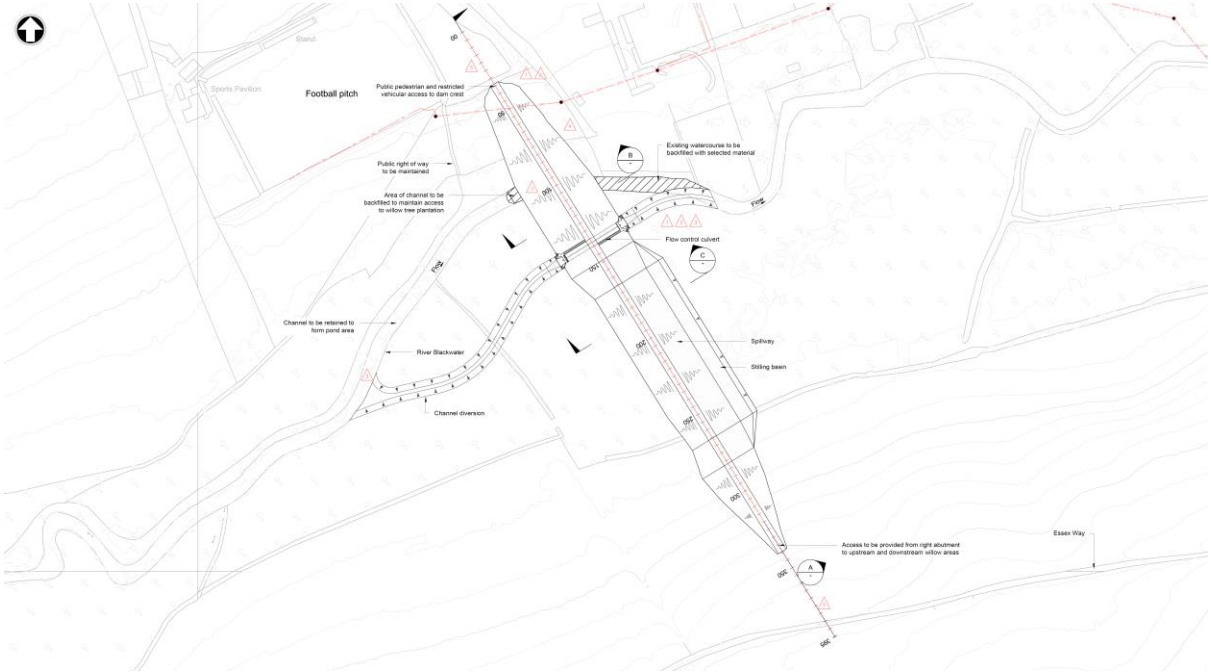
- Flows are limited at the dam to allow water to pass through at a controlled rate, and use the natural downstream floodplain to protect properties from flood
- The combined flood storage is over 3 Million m^3
- Bradwell flood levels are not affected by the scheme
- Following a flood event, water will flow back into the river through the dam in a controlled manner due to the culvert

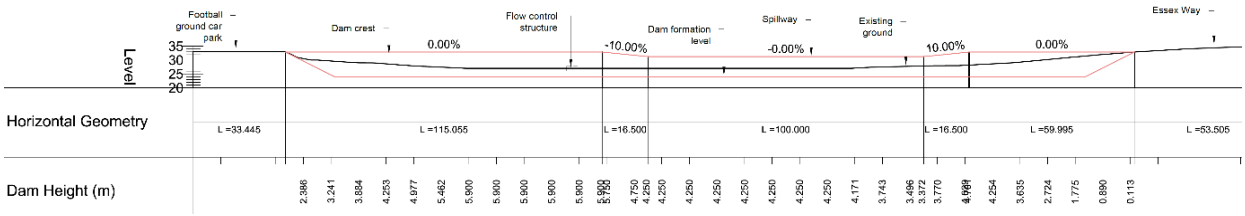
The proposed flood alleviation scheme has been modelled on a 1 in 100 year event (including an allowance for climate change), and has been developed to offer flood protection against multiple long term rainfall events over extended periods of time. Even though the exceptional rainfall during the 2001 flood exceeded the 1 in 100 year event, our modelling has shown that if this flood alleviation scheme had been in place at that time, no flooding would have occurred to the properties and businesses in Coggeshall, Feering or Kelvedon.

Outline design

A number of features that have been considered to reduce the overall impact of the flood alleviation scheme and provide added benefits to the local communities.
For the “on-line” storage, we will need to build a small clay embankment (or dam) across the valley upstream of Coggeshall. This will include a passive concrete control structure within the river, allowing water to flow through in normal conditions, but to be held back during times of flood.

The purpose of the dam is to hold flood waters back within the natural floodplain and allow it to flow into the “off-line” flood storage area.





Initial design details of the “on-line” dam[3]

The financing and materials to construct the “on-line” embankment dam would become available during the fifth year of the quarrying operations. The construction of the “on-line” embankment, 5 years after the start of the scheme, would provide flood protection against a significant flood event to the villages of Coggeshall, Feering and Kelvedon on an interim basis, with the 1 in 100 year protection level increasing incrementally as each phase of the “off-line” flood storage area is created.

The height of the “on-line” dam will be limited to a maximum elevation of 33mAOD. This means that it will be approximately 4m to 5m in height within the valley’s flood plain around 800m upstream of Coggeshall Bridge; and it will be around 300m in length across the valley floor.

By restricting the height of the dam, the amount of water that is held within the flood plain will be controlled to mitigate any upstream impacts.

The connection point between the river and the “off-line” storage area will comprise a shallow cutting to extend the level of the existing flood plain into the base of the site. This will allow flood water to passively drain to and from the flood storage area.
As the “on-line” dam crosses the river and is more accessible to walkers and ramblers than Nunn’s Bridge, the plan is to link the existing footpath at the Football Ground to the route of the Essex Way. This will provide a circular walk from the village and provide an alternative link between the National Trust’s Grange Barn and Paycocke’s House visitor attractions.

Access for construction plant and equipment will be via Bradwell Quarry and the “off-line” flood storage area to the south of the River Blackwater. This means access to the site by heavy plant and machinery will be through the existing quarry which will limit any disturbance and impact on the Football Ground, Coggeshall village and nearby residents.

Once construction is complete, the “on-line” dam will be landscaped and grassed over to blend into the River Blackwater Valley and the willow plantation.

A key feature of the “on-line” dam is that in storm events it will continue allow the River Blackwater to flow through at a rate equivalent to a 1 in 20 year storm event which will maintain the use of the natural flood plain beyond the structure, without any risk of flooding to downstream properties. The scheme will be designed so that the impacts that result from its construction and operation on the terrestrial and wetland environments will not be significantly different from the effects of the flooding

[3] Initial design details are available on the website

that already occurs within the Blackwater valley. This will be achieved by using a twin box culvert similar to that shown in the image below.

Image showing an example of twin box culvert (Source: Northpoint Engineering)

This culvert will act as a passive flow control structure, which will allow flows within the River Blackwater to be controlled as the “off-line” flood storage area drains following a storm event.

The “off-line” flood storage area will be developed across a 155ha site to west of Coggeshall across large open fields on the southern site of the Blackwater Valley across land that is farmed under a commercial farm tenancy contract agreement.

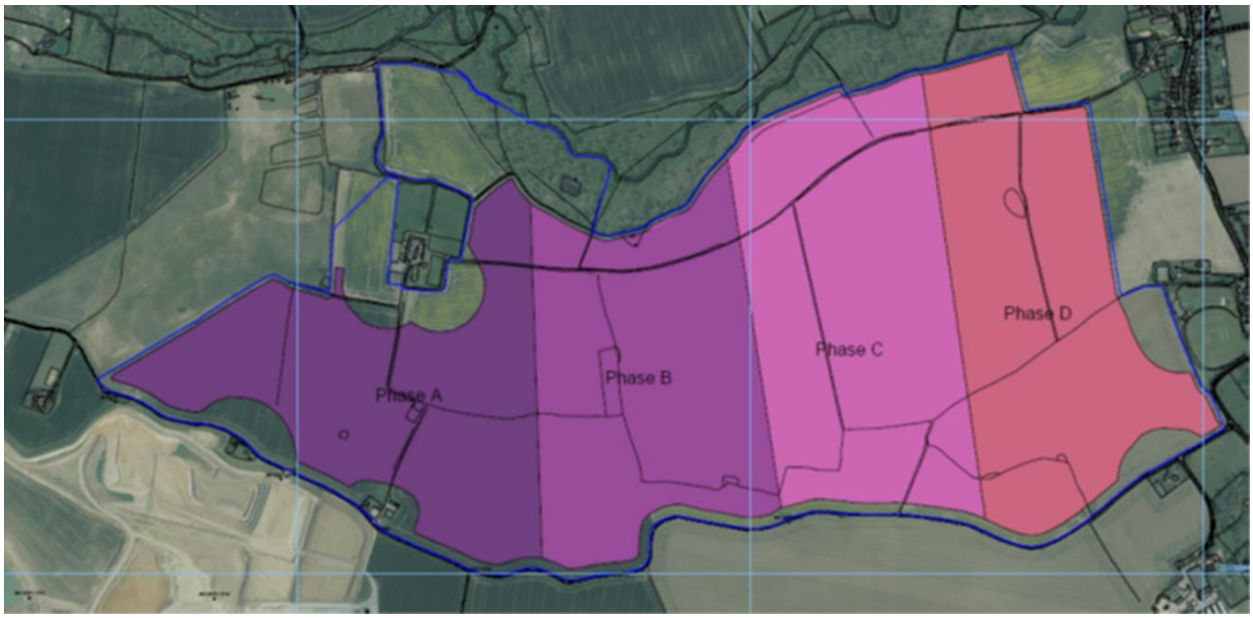


Image showing the quarrying phases

Quarrying operations

The quarrying operations will be designed to allow the sequential release of the “off-line” flood storage area, which would provide an increase in the interim flood storage capacity offered by the flood alleviation scheme every fifth year, with the entire scheme completed within 20 years. The works would create a new 62 ha flood meadow within the Blackwater Valley.

Blackwater Aggregates’ quarrying operations across the flood storage area will be carried out in four main phases, each of which will be worked over a period of approximately five years, yielding an estimated 3.25 Million tonnes of sand and gravel. Quarrying operations would progress in a planned and systematic manner in an easterly direction from the boundary of the former Coggeshall Quarry towards Coggeshall. This includes construction of the “on-line” embankment dam at the end of year 5.

By progressing across the site in an easterly direction, views of the operational quarry will be screened by unexcavated phases and a sequence of perimeter screening mounds which will be created adjacent to the eastern and northern phase boundary.

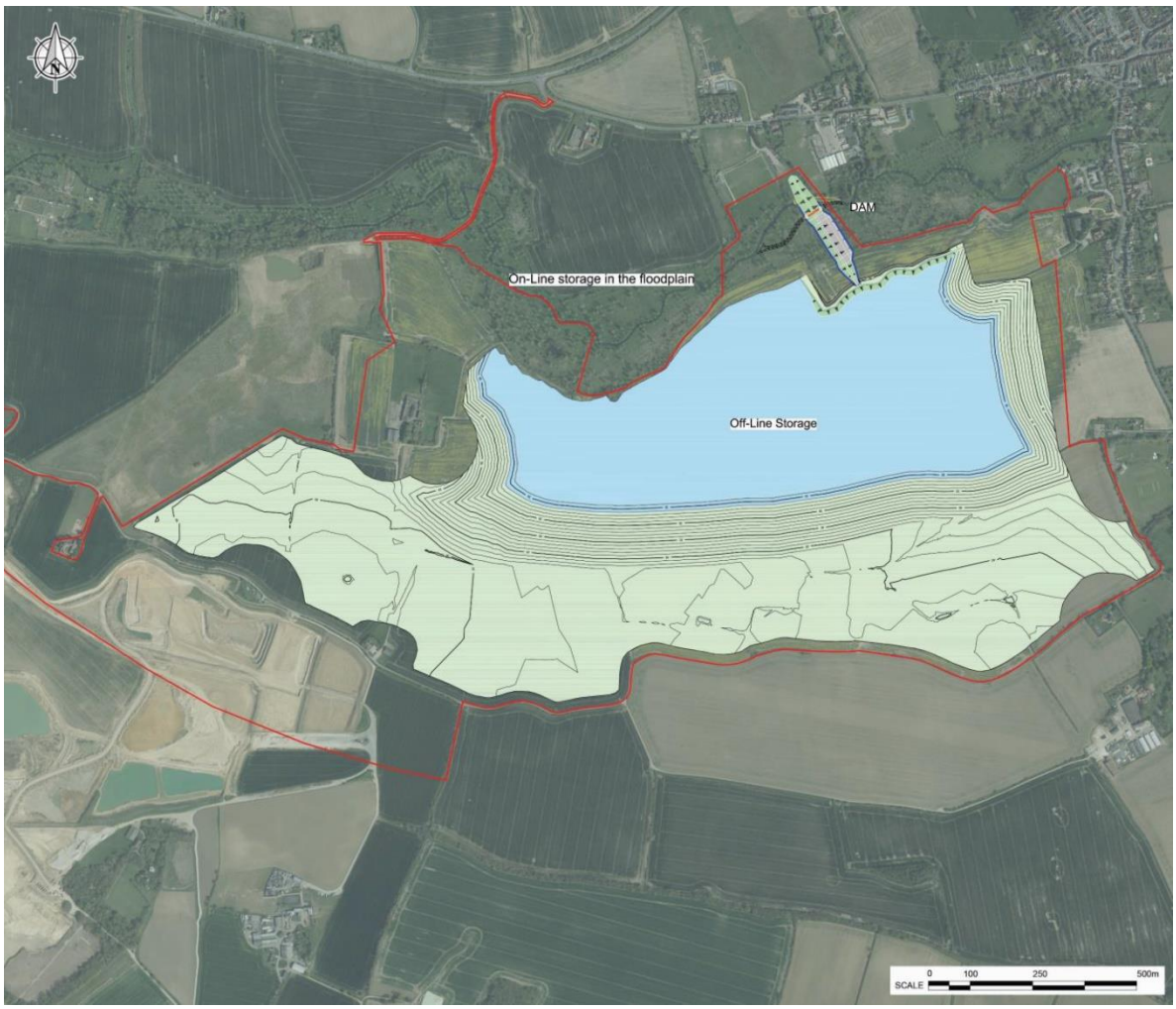


Image of the flood alleviation scheme

Quarrying operations would progress in a planned and systematic manner and the restoration works will be developed to return the land back into beneficial agricultural use at the earliest opportunity.

The restoration profile of the “off-line” flood storage area will shaped into the existing landscape, so the high point along the horizon of Cuthedge Lane will remain and the bank (green area on the map above) graded down to create a 62ha the floodplain meadow across the base of the flood storage area in the basin (blue area on the map above).

An example of the proposed restoration arrangements already exists across the former Coggeshall Quarry.

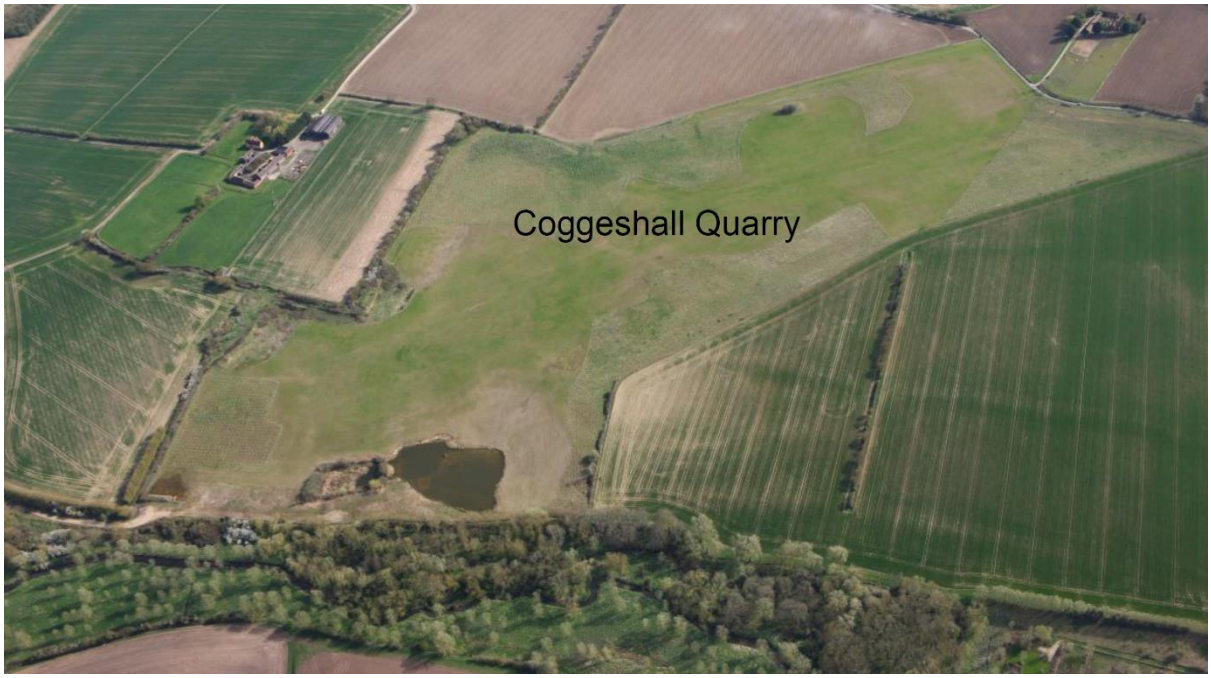


Image of the existing restoration works across Coggeshall Quarry

The overarching restoration objective in developing the off-line flood storage area will be that of creating an extension to the natural flood plain to form a floodplain grassland within the Blackwater Valley.

Example of a Floodplain Grassland

As the quarrying operations progress across the site, existing public rights of way (such as the Essex Way) will be temporarily diverted around the working area. The interconnection of the various public rights of way which provide north, south, east or west access will be maintained throughout the works, albeit through temporary diversion. They will be reinstated to either their original or an agreed alternative definitive alignment, as the restoration works progress across the site.

Access to and from the site will principally be via Bradwell Quarry's existing access road to and from the A120; however, the planning application area also includes other areas of Bradwell Quarry which could potentially allow a future connection to the new A120 to the south of the site, if it comes forward. All HGV vehicular access to and from the site would be via either the existing or realigned A120.

Aggregate bearing material recovered from the flood storage area would be transported to the Bradwell Quarry processing plant via a haul road which will cross Cuthedge Lane.

Access to the site for private vehicles used by Blackwater Aggregates' earthworks staff, Light Goods Vehicles used by the earthworks maintenance staff, fuel deliveries and general support vehicles to the flood storage area is proposed to be via the former Coggeshall Quarry access road via West Street and/or via Cuthedge Lane adjacent to Haywards Cottage. All HGV vehicular access to and from the site would be via either the existing or new A120.

Once the “on-line” dam is constructed we will routinely inspect and maintain the dam. Access for this work is planned to be via an access route either from the Football Ground car park or via the Essex Way.

Project funding

This project has received £1 million from central government (via the Environment Agency), and £8 million in direct funding contributions through the Blackwater Aggregates partnership.

Blackwater Aggregates’ normal quarrying operations across the site will ultimately support in the delivery of a flood alleviation scheme that would otherwise mean the public purse would need to contribute in excess of a further £25 million.

Project costs in more detail, excluding the cost of aggregate removal:

- Blackwater Aggregates: Over-dig of clay - £6 million
- Blackwater Aggregates: Dam construction - £1.5 million
- Blackwater Aggregates: Planning process - £0.5 million
- Environment Agency: Project delivery - £1 million

Footpaths

As the flood storage area is constructed across the site, existing public rights of way (such as the Essex Way) will be temporarily diverted around the working area. The interconnection of the various public rights of way which provide north, south, east or west access will be maintained throughout the works, albeit through temporary diversion. They will be reinstated to either their original or an agreed alternative definitive alignment, as the restoration works progress across the site.
As the design of the scheme develops, opportunities to enhance the existing public rights of way will be investigated.

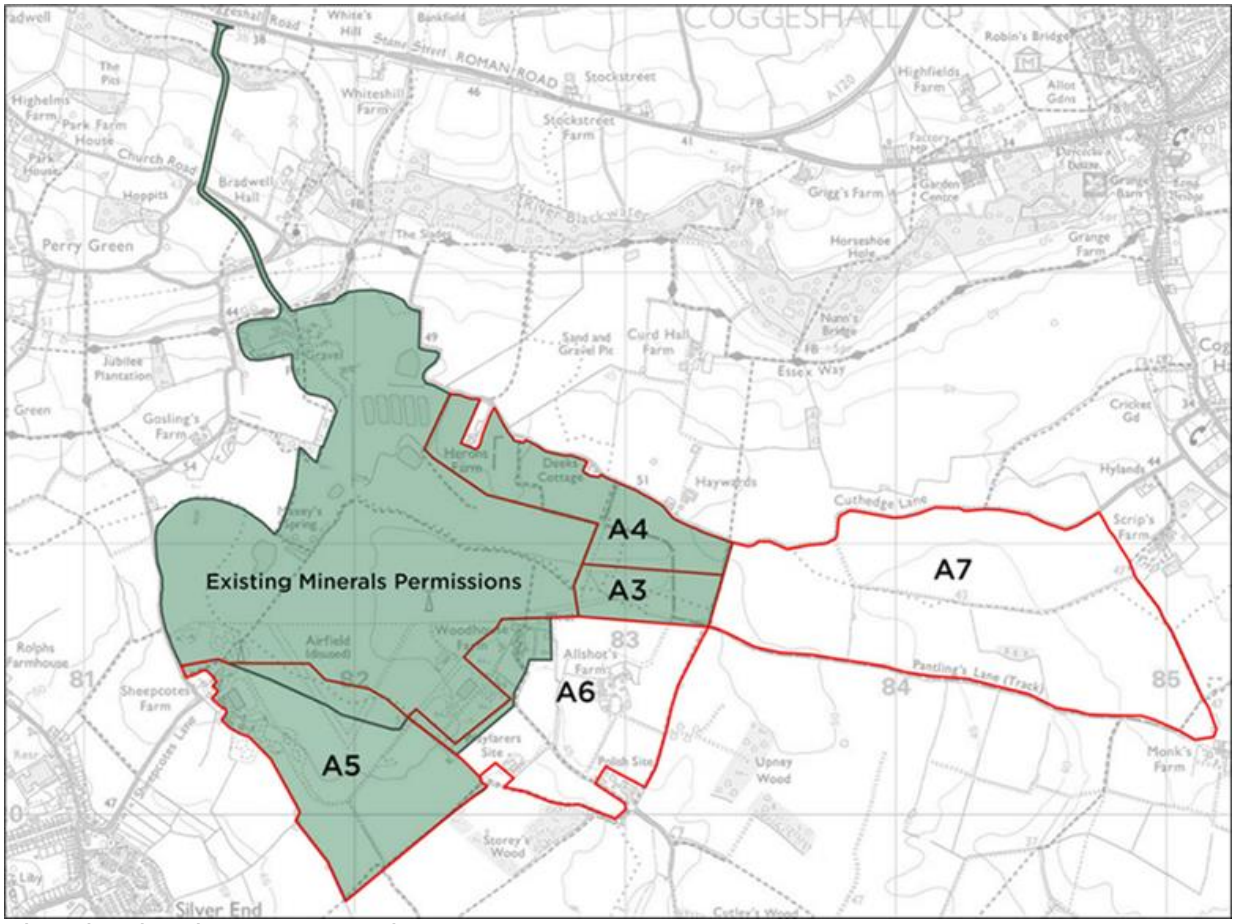
Site A7

Whilst working in partnership with the Environment Agency, Blackwater Aggregates are also preparing an application to potentially move its operations into Site A7.

The reason for progressing both applications at the same time is that Blackwater Aggregates require a constant supply of minerals to maintain continuity in their quarrying operations.

Blackwater Aggregates will only carry out quarrying operations in either the Flood Alleviation Scheme or Site A7, not both at the same time.

If our joint application for the flood alleviation scheme is successful and able to proceed within the required timescales, the Site A7 application will be mothballed.



Plan showing the aggregate sites

Engaging with communities

In 2015 we held two drop-in events for local communities in Coggeshall and Kelvedon. This offered an opportunity for local residents and councillors to feed back to us on what work had been done to investigate options for the local area. Out of that process the favoured option was flood storage; however, a cost benefit analysis concluded that the costs of the scheme were too high for it to secure public funding. Therefore we considered alternative options linked to potential partnership funding to finance a scheme.

By working in partnership, we are proposing to construct a passive and low impact flood alleviation scheme that is environmentally, technically and economically viable across land under their joint control.

The new solution also offers a high standard of protection with an initial output of the “on-line” dam providing interim flood protection before the entire scheme is completed. This proposal has been presented to the local stakeholder groups and the parish councils for all 3 villages, ahead of further public engagement in May 2019.

We hope to offer an opportunity for local people, in the Blackwater Valley, to find out about our project and learn more about their flood risk and how they can protect

themselves. We would also like to give local people an opportunity to tell us how flooding impacts them, which will help us better understand flooding from the River Blackwater in Coggeshall, Feering and Kelvedon.

Seeking your views

We would like your feedback on the flood alleviation scheme and comments relating to the proposed solution.

https://consult.environment-agency.gov.uk/east-anglia-c-e/coggeshall-feering-and-kelvedon-flood-alleviation/