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Filey
Flood Alleviation Scheme

1. History of Flooding

There is a long history of flooding in Filey caused by extreme rainfall events. These rainfall events have resulted in widespread overland flooding, overwhelming of watercourses and the urban drainage system, localised ground instabilities, and damage to properties across the town.

There are records of properties flooding from 1985 onwards. The most significant flooding occurred in October 2000, August 2002, and July 2007.

The total cost of repair works for the 2002 event was estimated at approximately £3 million.

July 2007 Event

This was the most severe flood event to occur in Filey. Over 80mm of rain fell in just one and half hours, with the water reported to be waist deep in places. Significant damage and disruption occurred, including:

- 8 people had to be rescued from the swimming pool at Filey School;
- Filey inshore lifeboat was used within the town to rescue people stranded in their homes;
- Over 30 people had to be evacuated from their homes and an emergency centre was set up in the Evron Centre and Trinity Church;
- Classrooms, swimming pool, and other buildings were flooded at Filey School, closing it for a short period;
- Both main roads into Filey (Muston Road and Scarborough Road) were closed at one stage of the flood;
- North Yorkshire Fire Service received over 150 calls in five hours seeking help;
- Over 200 homes were affected by internal flooding;
- The cost of the remedial work after the event was estimated at approximately £6.4 million.

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2. Background to Scheme

Since the major flood events of 2002 and 2007 various investigations and studies looking into the causes of the flooding and the potential solutions have been carried out.

These have confirmed that the flooding in Filey is caused by the complex interaction of overland flows from the catchment surrounding the town, the surface water runoff within the town, and the urban drainage system.

The solution to the flooding has therefore needed a multi-agency approach. The Project Steering Group was set up to help the partnership working and includes representatives from:

- Scarborough Borough Council
- Filey Town Council
- North Yorkshire County Council
- Environment Agency
- Yorkshire Water
- Filey Flood Working Group

Improvements already delivered:

Yorkshire Water has implemented £3.5million of improvements to the urban drainage network in Filey, including increasing the size of the sewer under Muston Road and installing an underground storm chamber.

The Mill Meadows development off Muston Road includes several surface water attenuation features which reduce the risk of flooding in the Seadale area of Filey.

What are we trying to achieve?

- To reduce the risk of flooding for the community of Filey.
- To slow down overland flows from the surrounding catchment during storm events and control the rate at which flows enter the existing urban drainage system in Filey to reduce the risk of it becoming overwhelmed.

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3. Recent Work

The most recent phase of work on the Filey Flood Alleviation Scheme began in October 2013 to develop the scheme concept into a final detailed design ready for construction. A staged approach was adopted to progressively refine the scheme and get a better understanding of the risks, eliminate them where possible, and provide an affordable solution to the flooding problems in Filey.

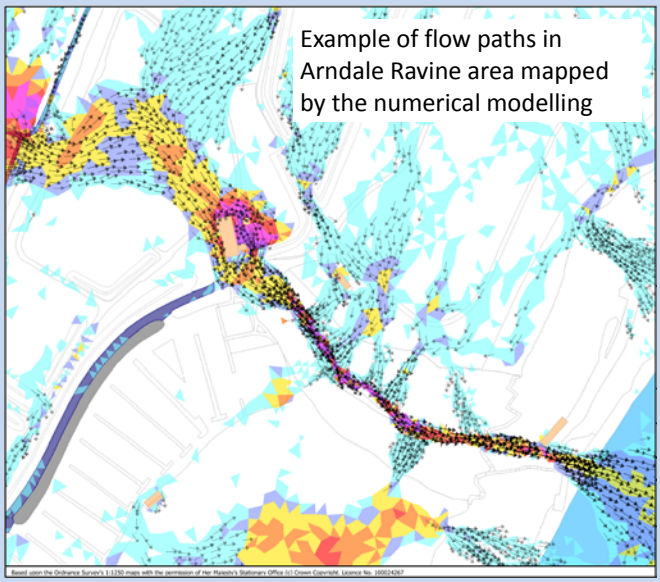
What has been happening?

There have been lots of activities happening since October 2013:

How lidar is collected

- Existing data and previous reports have been reviewed to identify gaps in knowledge and help focus the activities in this stage of the project.

- Ground level information has been collected both from the air (Lidar) and on the ground (topographic survey). This feeds into the flood mapping and design of the scheme to identify the best locations for the defences and accurately determine the height they need to be.



Example of flow paths in Arndale Ravine area mapped by the numerical modelling

- Detailed numerical modelling of the catchment has been carried out to determine the flow paths, flood extents and depths, and the volumes of water needing to be stored by the scheme. The modelling takes into account changes to the catchment since the 2007 flooding, including the improvements to the Yorkshire Water urban drainage system and the Mill Meadows development.

- Environmental surveys to identify what habitats are present and the potential for protected species.

- Archaeological surveys including Ground Penetrating Radar (GPR) to check for the presence of any historical remains.

- Ground investigation to find out what the ground is made of to determine whether the material to be excavated from the storage areas is suitable to be used for building the embankments and to identify any potential contaminations.

Example of a trial pit

- Consultation with stakeholders and landowners to help refine the locations of the defences.

- Developing the scheme concept to produce detailed designs of each section of the scheme, finalising the locations and sizes of the defences needed.

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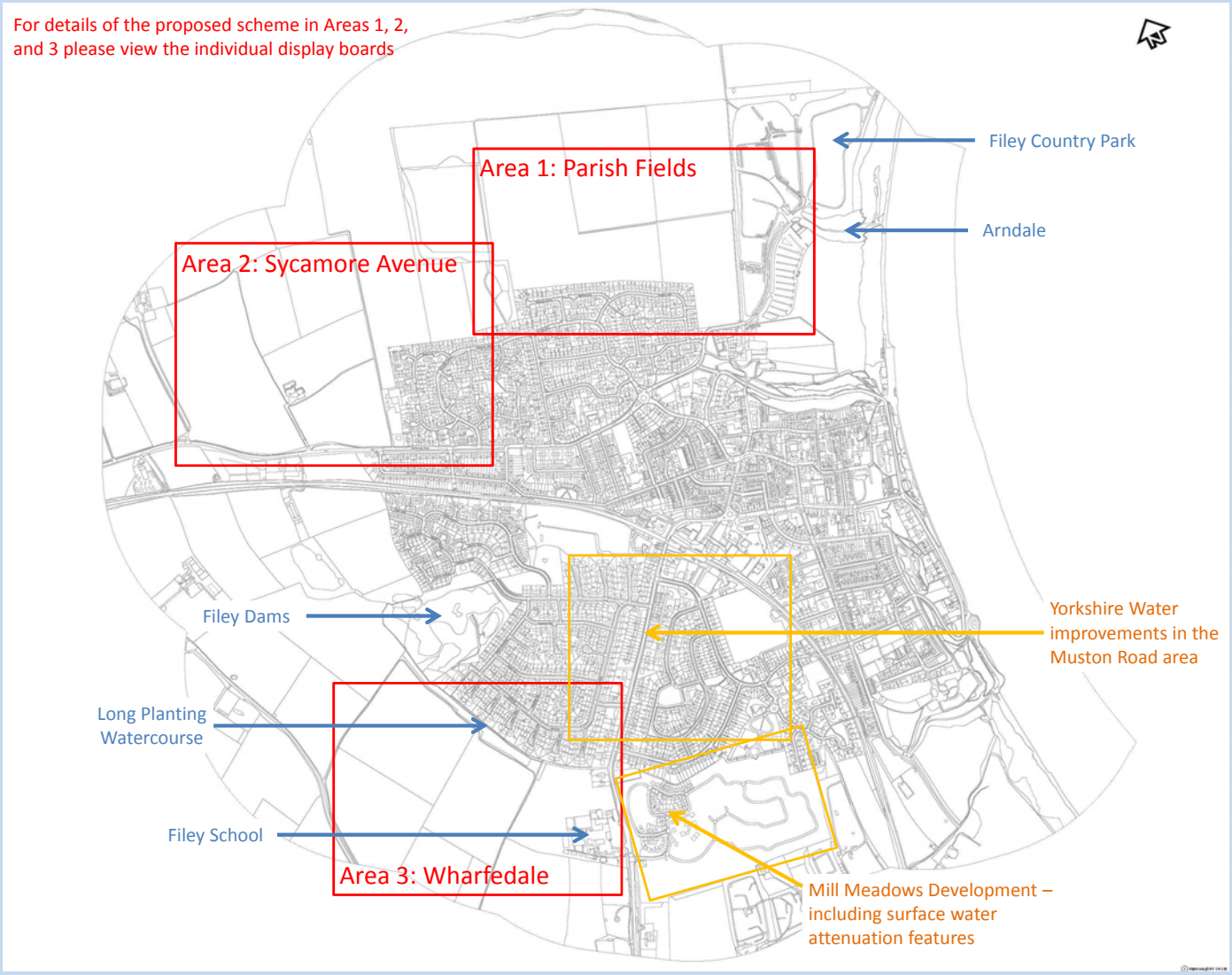
4. Proposed Scheme

What works are we proposing?

The scheme concept is a series of embankments, ditches, and temporary flood storage areas around the edge of the town to catch the overland flows before they reach the town. The flood water will be temporarily stored before being released at a controlled rate into the existing urban drainage system and ravines once the storm has passed.



When are we proposing to build it?

The scheme is currently at the detailed design and business case stage. There are still several steps to go through before the scheme can be built, these include:

- Planning permission – application is due to be submitted in July 2015.
- Funding approval – application is due to be submitted in December 2015.
- Landowner negotiations – these are ongoing.
- Procurement of the contractor – tender process is due to start in July 2016.

The construction works are expected to start in **January 2017** and take up to 1 year.

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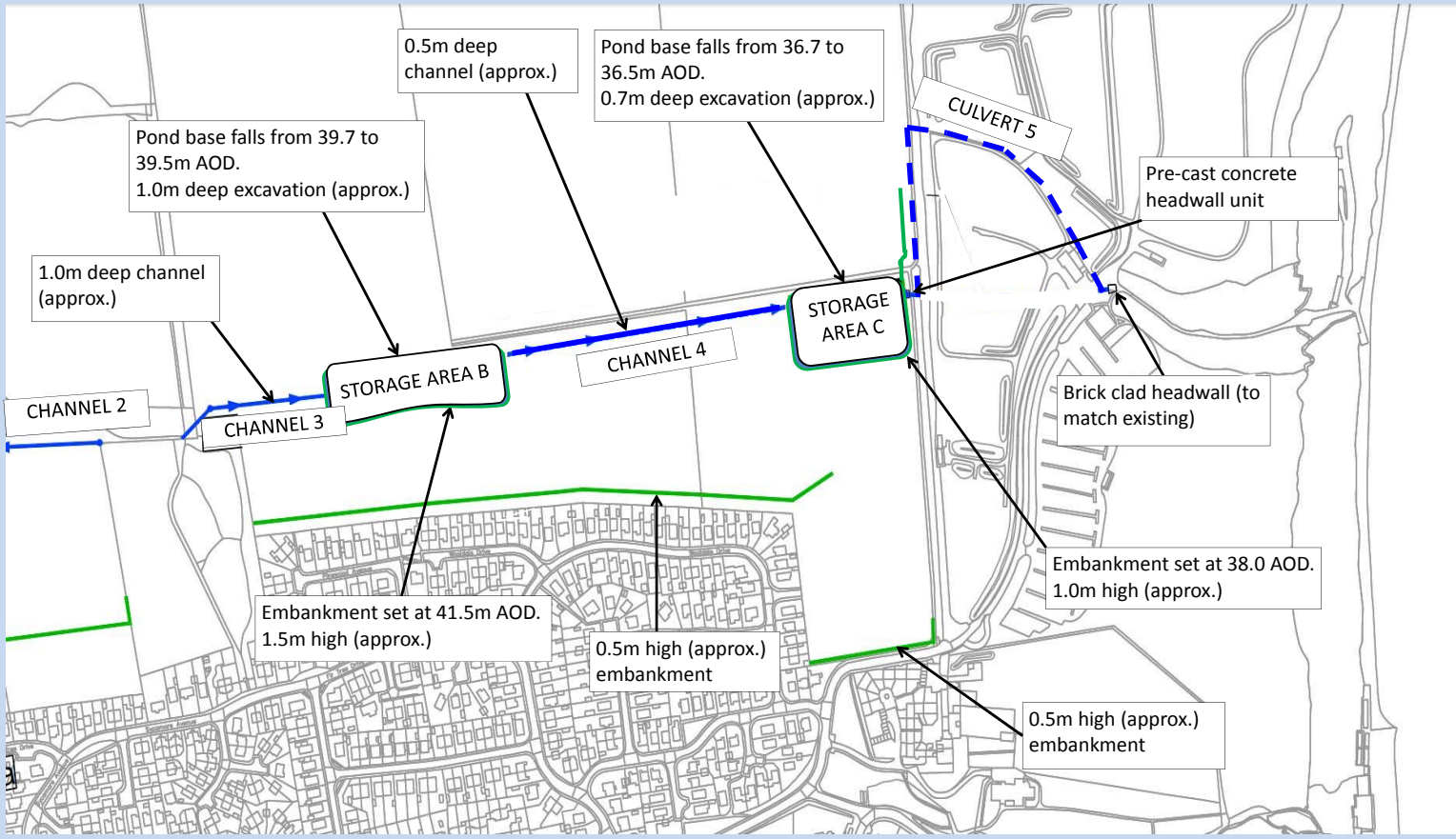
5. Area 1 – Parish Fields

This is the area located between Filey Country Park in the east, and Parish Wood and the Old Tip nature reserve in the west.

The works in this area include:

- Two temporary flood storage areas located to intercept the main overland flow paths down the hillside.
- Channels to the west and between the temporary flood storage areas to catch any other overland flow and channel it into the storage areas.
- Small embankments approximately 0.5m high along the back of the properties in Wooldale Drive and Church Cliff Drive to hold back the small amounts of rainfall to the south of the new channels and storage areas.
- An underground culvert through Filey Country Park to empty the water held in the storage areas into Arndale at a controlled rate and discharge it to the sea.



The scheme is designed to collect overland flows before they reach the edge of the housing in Parish Fields and slow them down, controlling the rate at which they are discharged into the top of Arndale. The rate of flow being discharged will be restricted to a rate at which the existing channel and culverts in the ravine can cope with it. This reduces the risk of water flooding down Arndale uncontrolled causing damage to the channel and access road.

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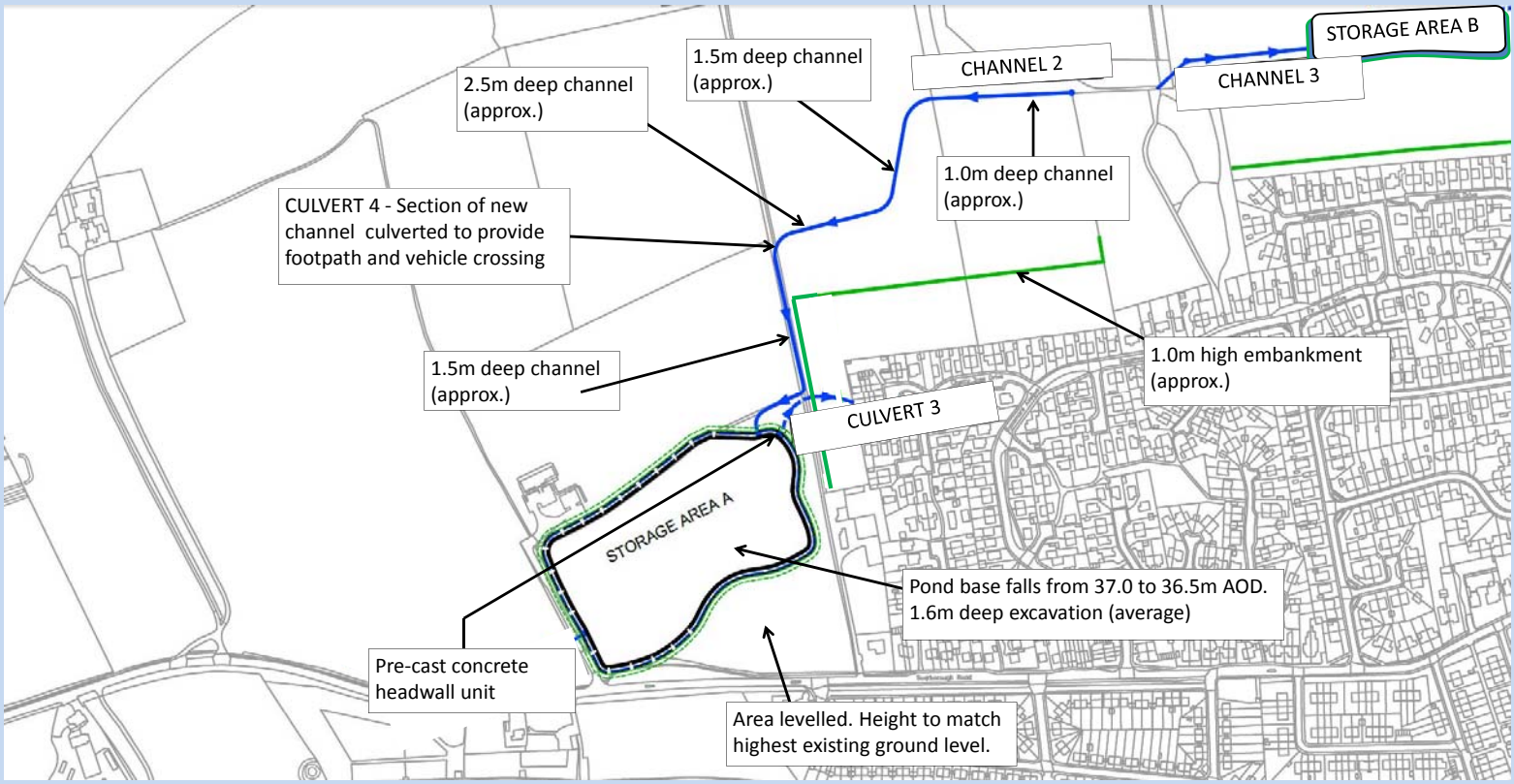
6. Area 2 – Sycamore Avenue

This is the area located between Parish Wood and the Old Tip nature reserve in the east, and the Filey Community Sports Club in the west.

The works in this area include:

- One larger temporary flood storage area (approximately 250m by 110m) fed by channels.
- Channels to the east of the temporary flood storage area to catch the overland flow and channel it into the storage areas.
- A small embankment approximately 1.0m high along the back of the properties in Sycamore Avenue to hold back the small amounts of rainfall to the south of the new channel.
- A connection to empty the storage area into the existing Yorkshire Water drainage system under Cherry Tree Drive at a controlled rate.



The scheme is designed to collect overland flows before they reach the edge of the housing in the Sycamore Avenue and slow down the input of surface water into the Yorkshire Water system. The water will be discharged into the existing drainage system at a controlled rate which is low enough that the existing drainage system can cope with it. This reduces the risk of the existing drainage system being overwhelmed and causing flooding within the town.

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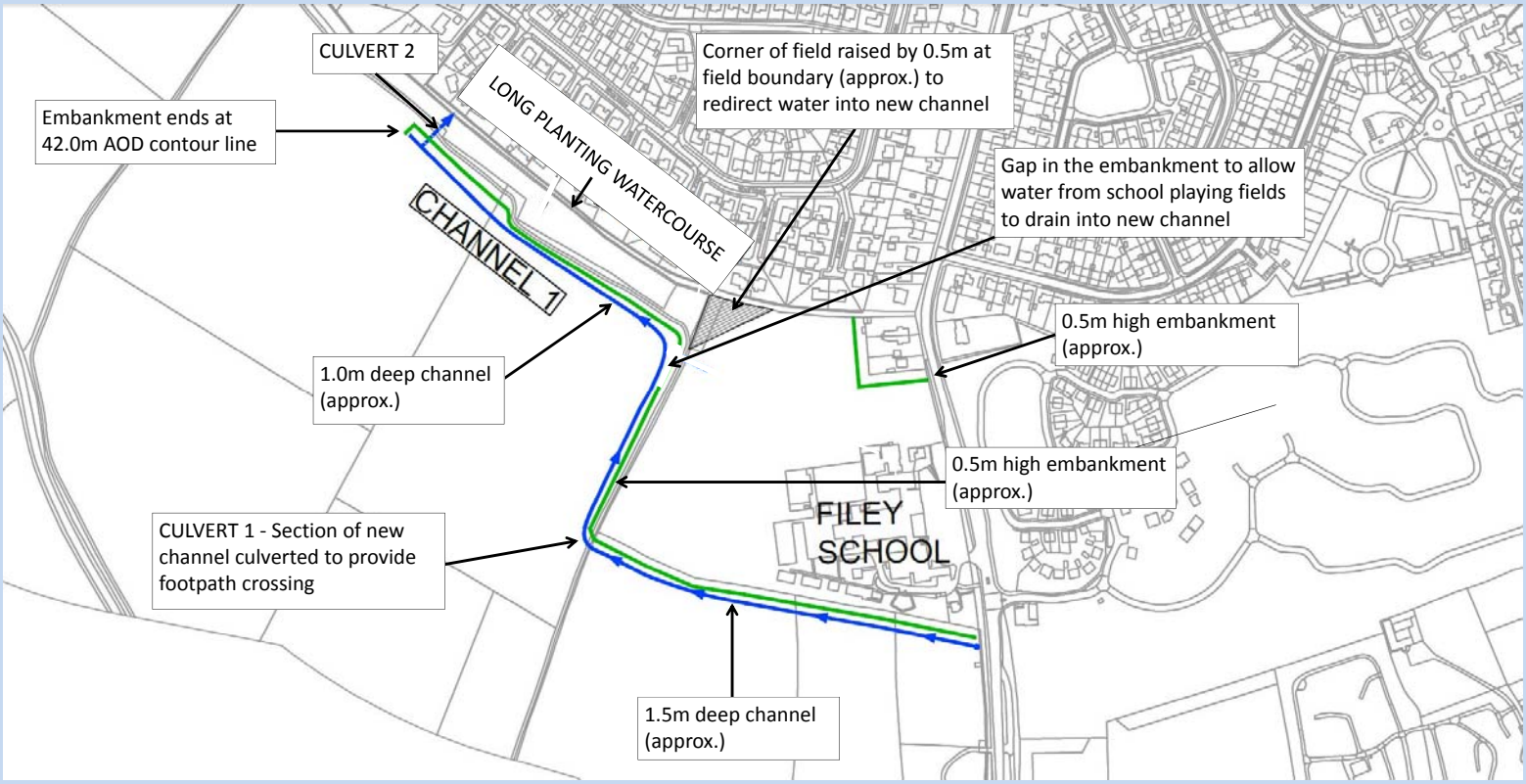
7. Area 3 - Wharfedale

This is the area located to the south of Wharfedale, around Filey School. The works in this area include:

- A small embankment approximately 0.5m high around the edge of Filey School and Long Planting Wood.
- A channel approximately 1.0-1.5m deep alongside the embankment to collect overland flow and control its flow towards the existing Long Planting Watercourse.
- A connection from the channel through the embankment to discharge into the existing Long Planting Watercourse at a restricted rate.
- A small embankment approximately 0.5m high around the back of the Muston Road properties to hold back any rainfall from the Filey School playing field.
- Raising of the corner of the Filey School playing field and a culvert through the embankment to direct the surface water caused by rainfall on the playing field to the new channel rather than straight into the existing Long Planting Watercourse.



The scheme is designed to collect overland flows before they reach the edge of Filey and slow them down to a rate which the existing urban drainage system can cope with. The water will be discharged into the existing Long Planting Watercourse at a controlled rate which is restricted. Long Planting Watercourse feeds into Filey Dams, which are then connected into the existing Yorkshire Water drainage system.

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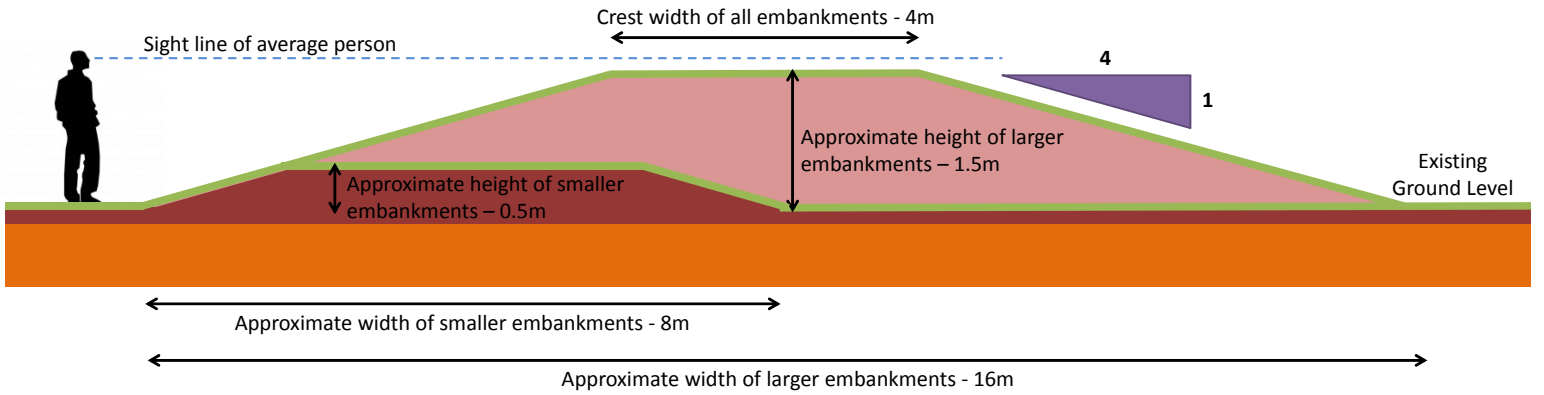
8. Embankment Details



The embankments will be between 0.5m and 1.5m high, and therefore small enough for most people to be able to see over them. They will have gently sloping sides so that they blend in to the surrounding rural landscape.

The embankments will be constructed from the material excavated to form the channels and flood storage areas. This reduces the amount of material which will need to be disposed of off-site and also reduces the need to import material to build the embankments, keeping the costs of the scheme down.

They will be finished with topsoil, which will be removed from underneath the footprint of the embankments before they are constructed and reused. The topsoil will be seeded with grass so that the embankments will become green and blend in with the surrounding rural landscape.

Example from the Elgin Flood Alleviation Scheme, Scotland

This example shows a small embankment in an agricultural setting similar to Filey. Although the schemes are similar the embankments for the Filey scheme will have a wider crest width and more gently sloping sides.

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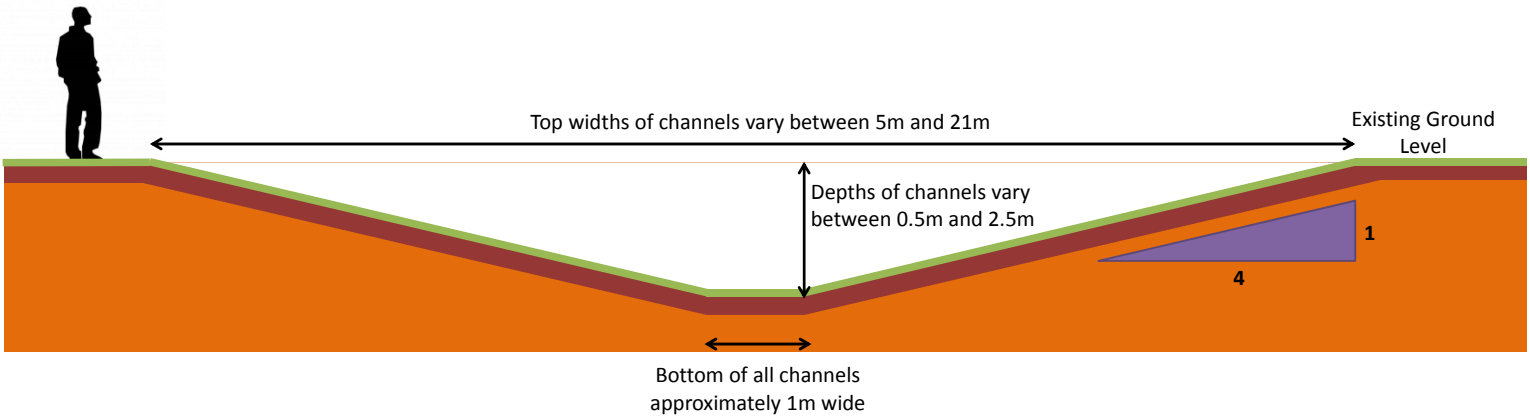
9. Channel Details



The channels will be between 0.5m and 2.5m deep. They will have gently sloping sides so that they blend in to the surrounding rural landscape.

The material excavated from the channels will be used to construct the embankments. This reduces the amount of material which will need to be disposed of off-site and also reduces the need to import material to build the embankments, keeping the costs of the scheme down.

The channels will be finished with topsoil, which will be removed from the top width of the channels before they are excavated and reused. The topsoil will be seeded with grass so that the channels will become green and blend in with the surrounding rural environment.

In normal weather conditions the channels should mainly be dry; they will only contain water during storm events as they catch the overland flows and divert them away into the new flood storage areas and Long Plantation Watercourse.

What the scheme may look like when it is operating during a storm:

Example from the Elgin Flood Alleviation Scheme, Scotland

Although the schemes are similar, the channels in the Filey scheme will generally be dry in normal conditions, and only contain water during storm events. Where channels will run alongside embankments they will be closer together in the Filey scheme than shown in the example photo.

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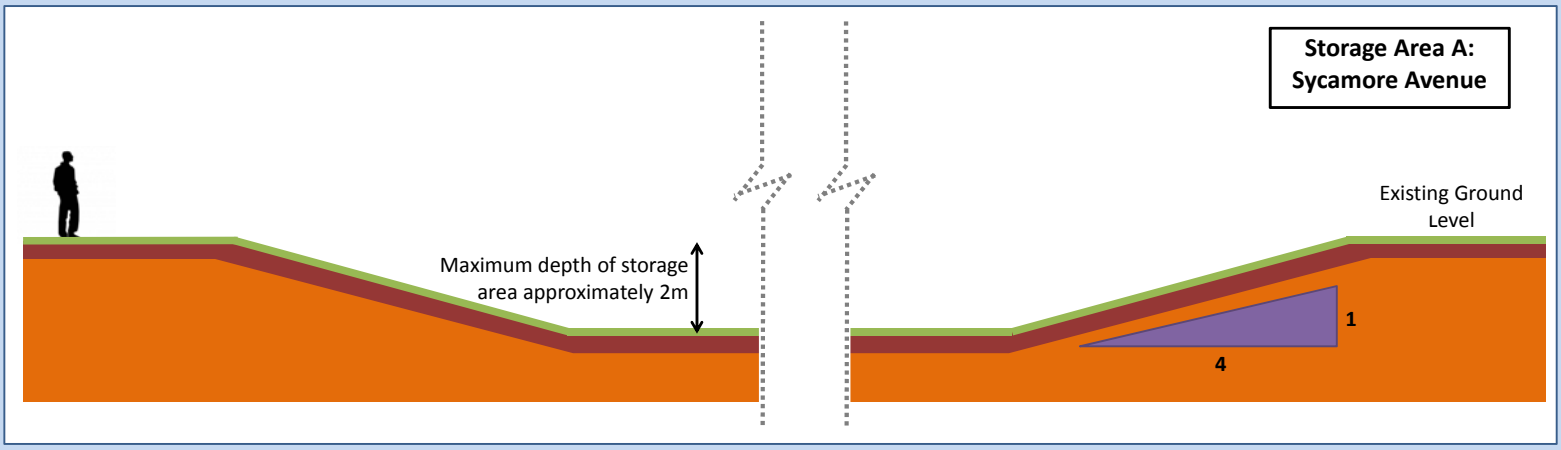
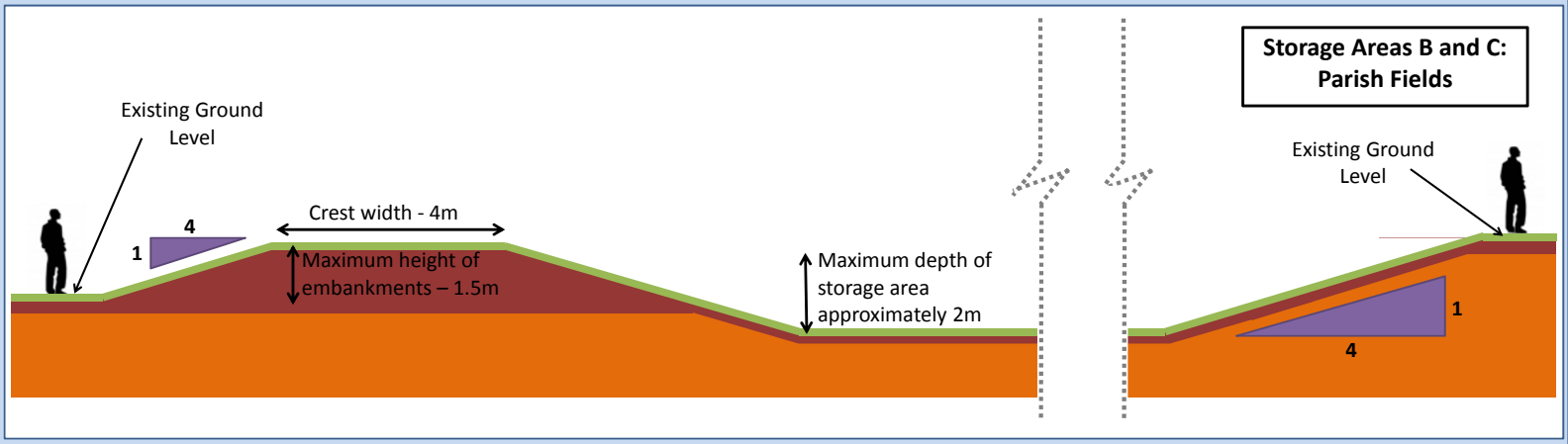
10. Storage Areas Details



Storage Area A will be approximately 250m long by 130m wide, with a maximum depth of approximately 2m. It will be excavated below the existing ground level.

Storage Area B will be approximately 185m long by 50m wide, with a maximum depth of approximately 2m. Storage Area C will be approximately 115m long by 60m wide, with a maximum depth of approximately 1.5m. As Storage Areas B and C will be located on a slope they need embankments around three sides as well as being excavated below the existing ground level to hold the required volume of water within the storage areas. The embankments will be biggest on the south side, and will be a maximum of approximately 1.5m for Storage Area B and 1m for Storage Area C. The embankments will get gradually smaller along the east and west sides until they meet the higher ground on the north side, which will be the open side.



The storage areas will have gently sloping sides, will be irregular in shape, and will be finished with topsoil and grass seed so that they blend in with the surrounding rural landscape. In normal weather conditions the storage areas will be dry and will only fill during storm events.

The material excavated from the storage areas will be reused to build the embankments, to reduce the amount of waste which will need to be disposed of off-site. However there will be too much material than is needed and we are currently investigating the most cost effective and beneficial ways of reusing the material elsewhere.

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11. Environmental Aspects

Environmental Impact Assessment

As the scheme has been developed we have had to consider the impact on the environment and identify the appropriate mitigation measures needed. This is done through the Environmental Impact Assessment (EIA) process, with the final report submitted alongside the Planning Application. The EIA is currently being undertaken to consider the impacts of the proposed scheme on the following:

- Habitats and protected species
- Soils, hydrogeology and hydrology
- Birds
- Air quality
- Noise and vibration
- Soils and land use
- Archaeology and cultural heritage
- Landscape and visual
- Socio-economic
- Tourism and recreation

Surveys

We have carried out a range of surveys in order to enhance our understanding of the existing environment within the study area. This provides the baseline against which the scheme is assessed to identify potential environmental impacts. The surveys which have been carried out include:

- Phase 1 habitat survey and targeted protected species surveys (on-going), including bats, badgers, water voles, and great crested newts;
- Baseline noise survey;
- Ground investigation with collection of soil samples for laboratory analysis;
- Geophysical survey for archaeology; and,
- Site walkovers in order to determine viewpoints to the scheme from the surrounding areas.

Example viewpoint (looking north from footpath off A1039 Scarborough Road)

The surveys and assessment work carried out to date has not identified any significant environmental impacts so far which could affect the viability of the scheme.

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12. The Process

Major flood event

Initial investigations into causes of flooding

Major flood event

Filey Ravines Flood Alleviation Strategy Study

Environment Agency approval of Strategy Study and approval of funding for development of design

Filey Flood Alleviation Scheme Design

Surveys and investigations

Flood modelling

Business case for scheme

Design of scheme

Environmental Impact Assessment

Planning application

Filey Flood Alleviation Scheme Project Appraisal Report

Environment Agency approval of scheme

Final funding arrangements

Scarborough Borough Council Cabinet approval of scheme

Procurement of Contractor

Construction of Scheme

2002 2007 2011 2012 2013 2014 2015 2016 2017

Key:

- **Major flood event**
- Studies, investigations and reports
- Approvals
- Scheme development
- Procurement
- **Construction**

13. Funding the Scheme

The cost of the scheme

The estimated cost of constructing the works is £5.1 million . This includes a risk allowance of £1.4 million. Once constructed the maintenance cost for the scheme is estimated to be £3,700 a year.

Partnership Funding Approach

Flood and coastal erosion risk management schemes are eligible to receive central government funding through the Partnership Funding system administered by the Environment Agency. Schemes are not automatically fully funded through this system and instead receive a grant towards the cost of the scheme. The amount of grant available is dependant on the number of properties protected by the scheme and the value of the benefits delivered by the scheme.

The shortfall in funding has to be met by contributions from elsewhere and these contributions need to be obtained before the grant from the Environment Agency can be secured.

The Partnership Funding approach is intended to help make the money available from central government for flood and coastal risk management to go further; by requiring contributions to schemes, less grant is needed for each scheme, and therefore more schemes can be funded in any one year.

The principle behind the Partnership Funding approach is that the beneficiaries of the scheme should be contributing to the costs of the scheme. Contributions to schemes can be sought from several sources:

- Industry and businesses which benefit from the scheme;
- The local community which benefits from the scheme;
- The local authorities whose area and residents the scheme benefits;
- The owners of land or assets which benefit from the scheme; and/or
- The Regional Flood and Coastal Committee for the area which benefits from the scheme.

How are we funding the project?

The project will seek funding from a variety of sources:

Under the Partnership Funding system for Flood and Coastal Erosion Risk Management grants may be available from the Environment Agency, the Yorkshire Regional Flood and Coastal Committee Local Levy, and further contributions from other interested parties and beneficiaries may be required.

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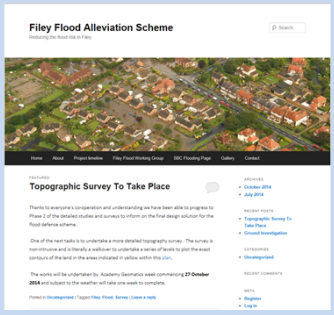
14. Consultation

What consultation have we done so far?

There has been consultation carried out historically with the public, landowners, interested parties, and statutory consultees following the major flood events and during the previous studies and stages of the scheme.

As part of this design development stage of the scheme we have consulted with interested parties including:

- Regular monthly progress meetings with the Project Steering Group
- Provided information for the newsletters distributed to residents by the Filey Flood Working Group
- Presentations to and discussions with affected landowners
- Discussions with Natural England on environmental aspects
- Site visit and discussions with Filey Bird Observatory and Group
- Discussions with various departments in Scarborough Borough Council and North Yorkshire County Council, including the County Archaeologist



- Various press releases to local and regional press and local radio stations
- Responses to correspondence received from members of the public
- Development of a project website: **http://fileyfloodalleviationscheme.wordpress.com**

Why are we doing this public exhibition?

This public exhibition is intended to explain the details of the scheme before the planning application is submitted in July to make sure the local community are aware of the scheme, understand why it is needed, and are comfortable with what it will look like.

What consultation will we do as the scheme progresses?

We will:

- Continue to meet regularly with the Project Steering Group
- Keep the project website up to date
- Continue to provide information for the Filey Flood Working Group newsletters
- Continue discussions with statutory consultees and affected landowners