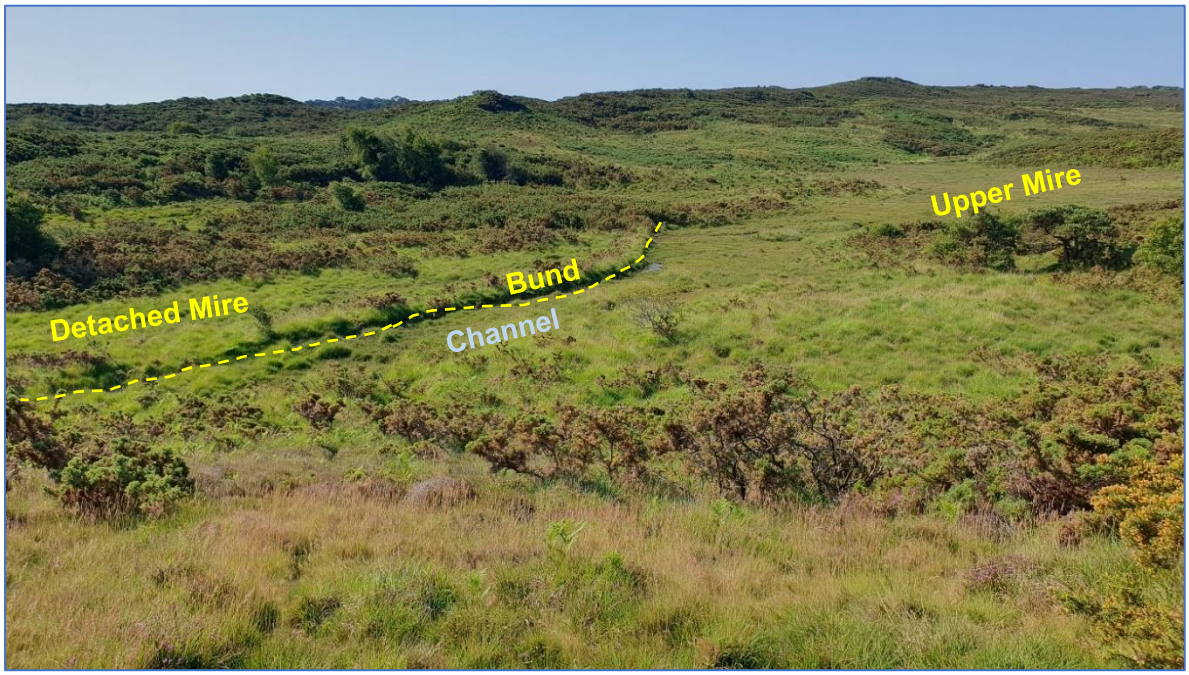
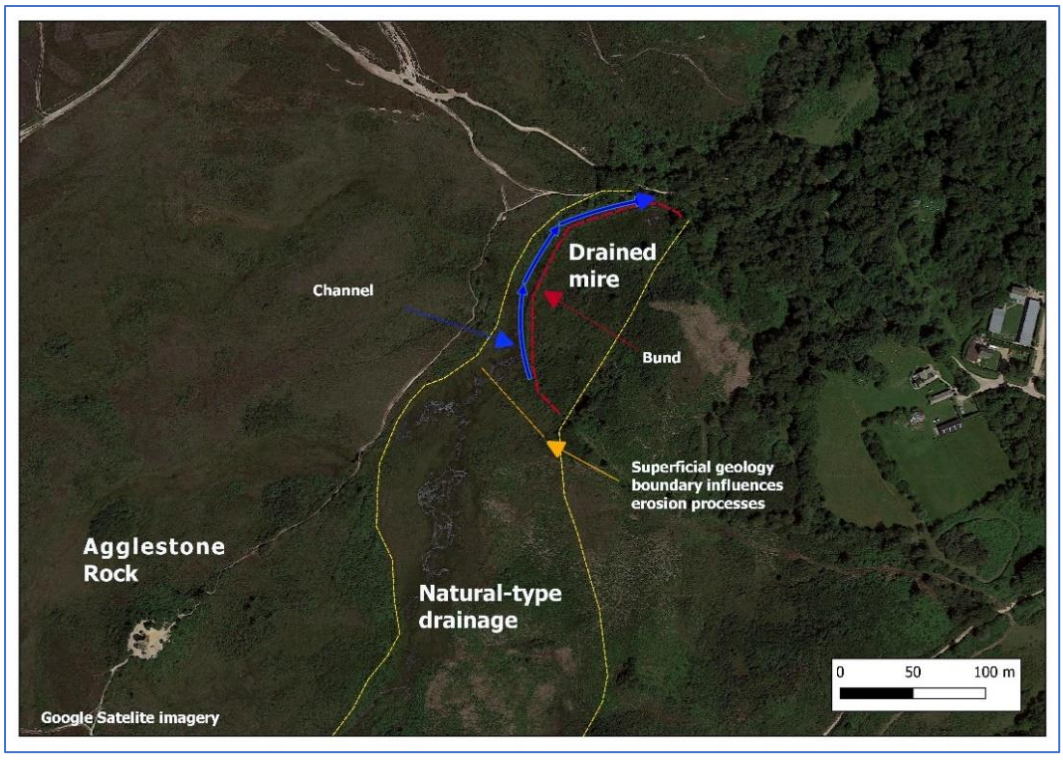
# Upper Agglestone Mire Restoration Plan

## Background

The Dorset Peat Partnership is working to restore natural process in peat producing mires across the county. They are focussing on restoring drainage management interventions within Agglestone Mire in this instance. This is, in part, because modification has been made to channels on the mire to divert flow and speed drainage off the land.

The image below shows the mire (looking SW/upstream). There is a bund that crosses the mire with an associated channel running parallel (assumed dug out and the material used for the bund) which is concentrating flow away from the mire and diverting it along the fringes of peat areas.

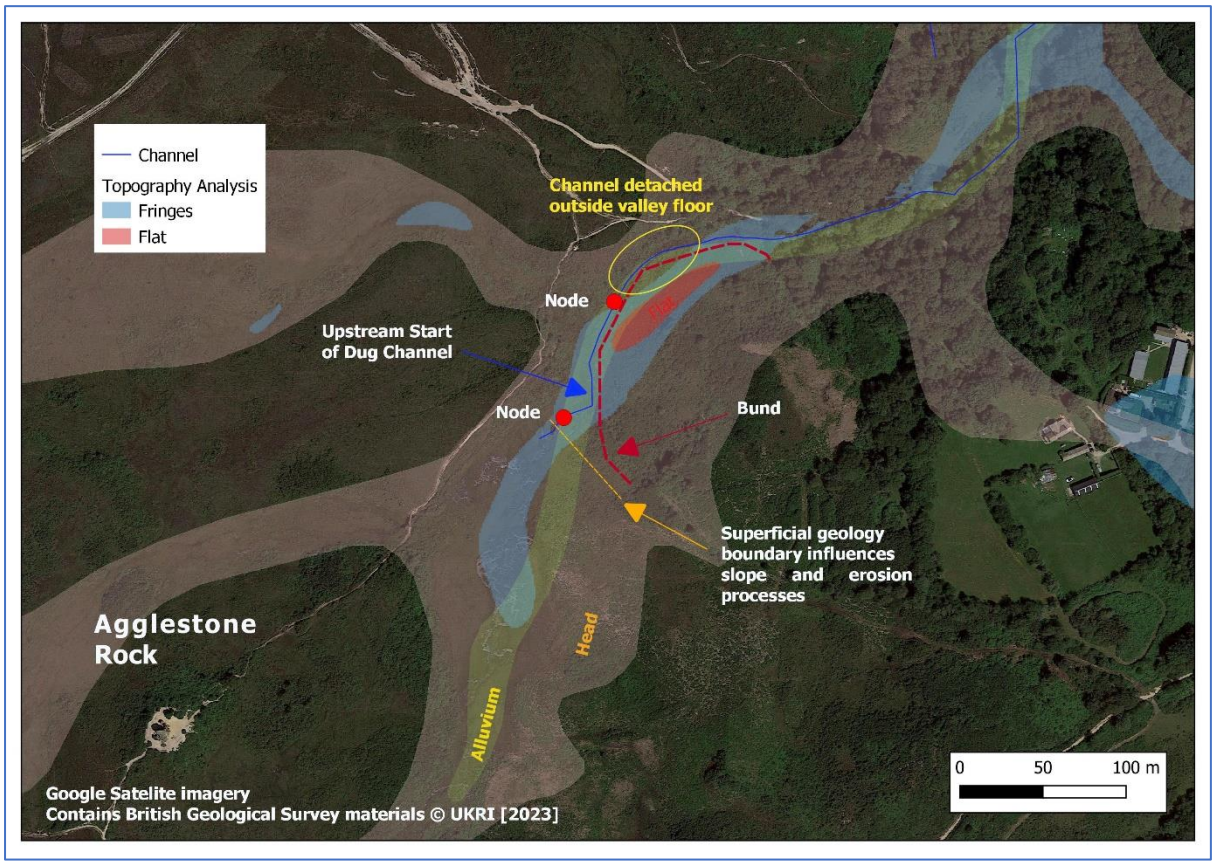


Detailed analysis of the site which looks at the superficial geology and topography identified important points or nodes within the mire that are important for understanding the restoration approach.

The surficial geological analysis identifies a boundary between Head deposits and Alluvium deposits. At the boundary there is a change in slope within the mire floor but also a deep pool has been eroded by flow. It is likely there is a change in erosion resistance at the boundary and it is possible that concentration of flow has enhanced a headward erosion process, undermining the softer material.

The analysis of topography identified areas of flatness within the landscape which represent the natural low-lying "floodplain" which water will occupy. The flattest valley floor is represented in red below, with blue the wider extent. The bund feature not only concentrates flow into a channel but also diverts flow outside of the natural low-lying land, meaning the channel sits perched above the valley floor. Where the channel is fully detached from the lower topography, there is an erosion response by the concentrated flow through downcutting the bed of the channel to attempt to adjust level.




## Restoration Approach

The restoration of drainage at Agglestone Mire requires the following activities:

1. Reducing the height of vegetation
2. Re-distribution of flow in the upstream mire.
3. Addressing enhanced erosion at the superficial geology boundary; and
4. Partial removal of the bund feature

## 1. Reducing the height of vegetation

Part of the disconnected valley floor has become dried out and dominant in Molinia vegetation.

The area currently cut off by the bund measures around 0.3 ha (0.34Ha). An area of 0.2-0.3 ha of Molinia tussocks will require reducing to ground level. (See location in restoration work maps below).

**Aims**

The current tussocky nature of the Molinia means that in many cases the tops of the tussocks lie above the predicted water level even after the bund is removed, and re-wetting may not be enough to kill the Molinia. In order to address this the Molinia will be flailed to remove all above ground growth and the root tussocks themselves will be lowered sufficiently to ensure permanent waterlogging post- works. While some continued Molinia growth is expected, its dominance will be reduced, and enough open water space created for Sphagnum to become the dominant vegetation.

**Methodology**

The Molinia tussocks are to be flailed to ground level in two stages.

The Studland peninsula was used by allied troops as a training ground during WW11. The National Trust are experienced with dealing with this legacy and have safe methods of working to enable works to proceed.

As a precaution a qualified and experienced Explosive Ordnance Disposal Engineer from Safelane Global will work alongside the contractor as a watching brief. A toolbox talk will be given by the EOD prior to works starting on site. They will survey the area prior to works including vegetation cutting and ground penetration, and as the work proceeds. If any anomalies are found the EOD will mark the area to be avoided.

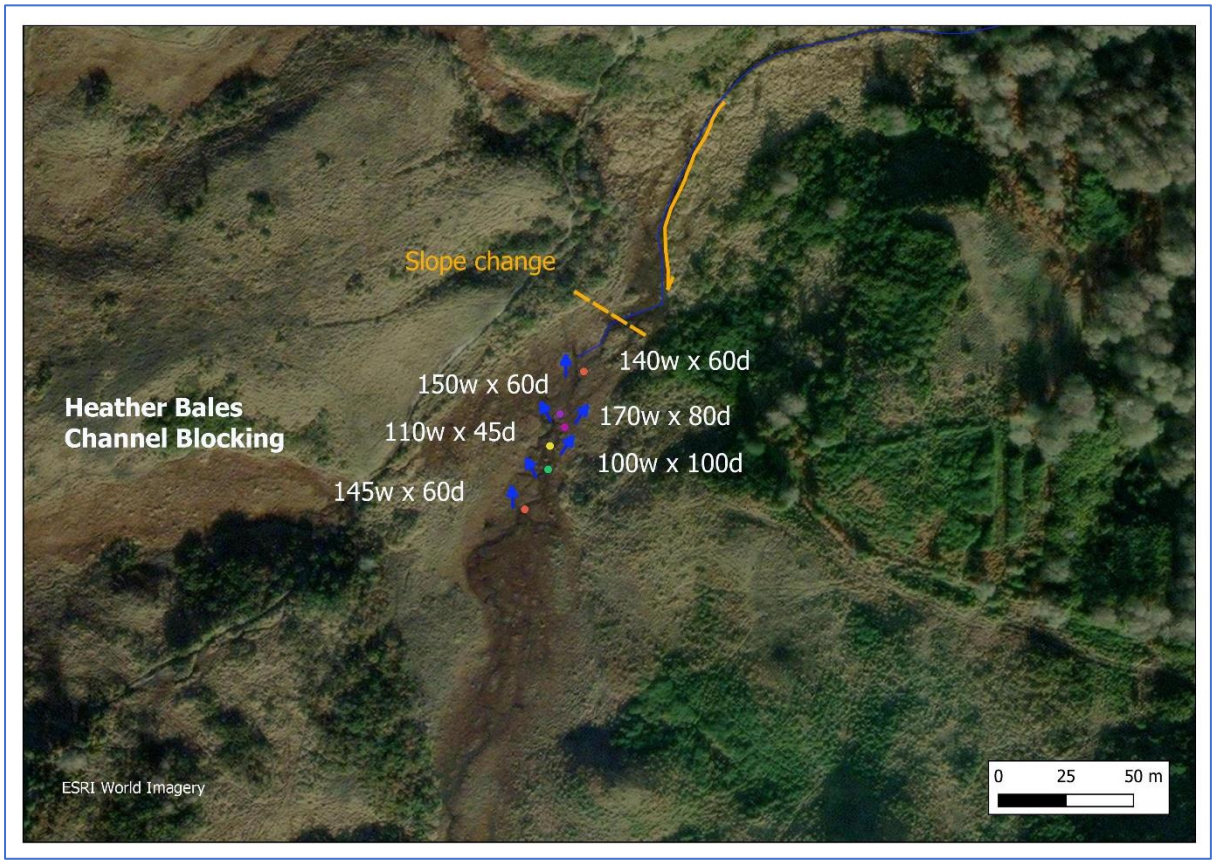
The methodology for reducing the Molinia tussocks to ground level will be carried out as follows:
1. All vegetation to be cut down to 200mm.
2. EOD will scan the cut vegetation and mark any anomalies to be avoided.
3. Once the vegetation has been scanned the contractor will cut the vegetation down to ground level. Any areas that have been marked by the EOD will be left uncut.

## 2. Redistribution of flow

To manage flow distribution over the width of the upper mire area, deeper channel sections which concentrate flow need to be blocked to allow water to spill more frequently onto the adjacent valley floor and spread in a network of shallow flow paths.

The approach will block deeper channels with heather bales secured within the channel.

Six locations along the deep channel are initially proposed for adding bales to the channel. The sites are all upstream of the slope change on the upper mire valley floor. Locations are chosen where the channel is deepest and more defined.




The intention of the blocks is to cause backing up of flow which then spills outside of the channel onto the adjacent valley floor, creating shallow flow over the surface. In addition to spilling flow, the bales prevent a downstream transport of sediment and leading to a natural infill of the channel to raise bed levels.

The leaky dams will be fixed in place by digging in to the banks of the channel and using posts in the banks and within the channel to secure the bales.

Flow will overtop the structure when the water levels are at their highest but will hold back much of the water under mid range flow conditions. The intention is to create storage of water within the channel by backing up, along with slowing the delivery of downstream flow. The blockage will be within the channel and the crest should be flush with the adjacent bank height to allow water to spill onto the adjacent valley floor.

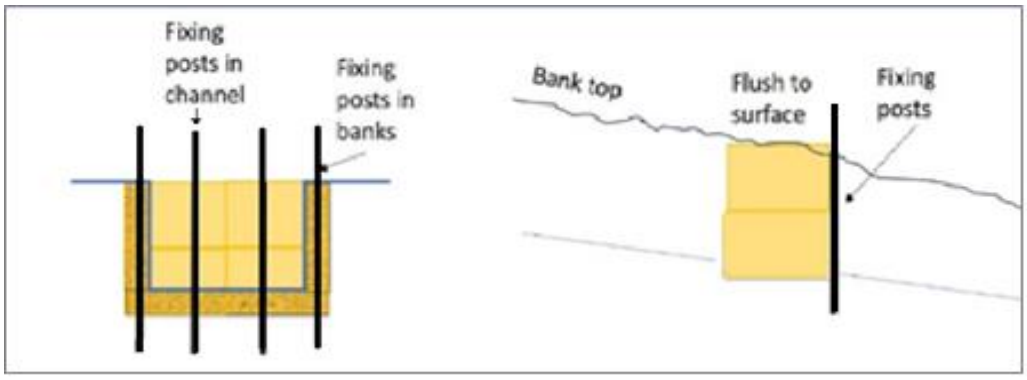
**Method of Installation**

The heather bales will be installed manually. Any fixings will be manually installed. Heather bales will be provided by the client by the end of November; all other materials will be supplied by the contractor.

The approach to installation will be:

- Dams should be keyed into the grip/gully sides to prevent side-cutting;
- The blockage should be full channel height and bales dug into the bed of the channel by a third to a half of the height of the bale (see Figure below);
- Ideally the heather stalks will lie parallel to the gully and the baling twine lies across the gully. It is important that the bale abuts tightly to the surrounding peat in order to prevent scouring around the sides of the dam;
- Peat removed during excavation should be used to re-fill the hole around each bale, compacted to further ensure a good fit, and any spare peat should be compacted on the upstream side of the dam to aid water retention;

- Tufts of grasses, sedges or other vegetation can also be used to seal the joints between bales, where any of the above works have required their removal; and
- Stakes securing the bales should be on the downstream side, angled so the top of the stake is pointing upstream.




Initially six locations are proposed:

| ID | Dimensions (w x d) | Heather Bales | Stakes | X-Y Coordinates | Grid |
|---|---|---|---|---|---|
| 1 | 145cm x 60cm | 12 (4x3) | 6 | 402570 82951 | SZ 02570 82951 |
| 2 | 100cm x 100cm | 9 (3x3) | 5 | 402578 82966 | SZ 02578 82966 |
| 3 | 110cm x 45cm | 9 (3x3) | 5 | 402579 82974 | SZ 02579 82974 |
| 4 | 170cm x 80cm | 15 (5x3) | 7 | 402584 82981 | SZ 02584 82981 |
| 5 | 150cm x 60cm | 12 (4x3) | 6 | 402583 82986 | SZ 02583 82986 |
| 6 | 140cm x 60cm | 12 (4x3) | 6 | 402592 83002 | SZ 02592 83002 |
| | | **69*** | **35** | | |

* A contingency is recommended meaning an order of 75 bales total will allow extra

Assumes a heather bale is 75cm x 50cm x 40cm (l/w/d) – binding is along the long axis; 170cm fixing posts should suffice.

Securing the bales in-channel will require the installer to enter the channel to secure the leaky dam. The associated disturbance of sediment on the bed will be minimal and any disturbed material will be transported in suspension with a minimal local impact. Where possible installation will be in reaches with minimal fine-grained sediment deposited on the surface of the bed of the channel.

**Maintenance**

Following installation, an inspection will be required following the first spate event to review how the leaky structure has established. The first inspection will be carried out by the Dorset Peat Partnership (DPP).

Following initial establishment, annual inspections by DPP will be required to ensure fixing to banks and retaining post in-channel are secure for erosion and prevent removal downstream. DPP has agreed to monitor the structures.

Whilst Ordinary Watercourse Consent has been granted on a risk-based approach, details of the installations will be provided to Dorset Council.

## 3. Addressing enhanced erosion at the superficial geology boundary

To address erosion and the potential for development of deeper channel sections at the change in slope/superficial geological boundary, a leaky structure is proposed which will help to trap sediment transported downstream, reduce any headward erosion but importantly will not lead to further erosion in an area that is susceptible to channel adjustment.

The leaky dam will be located within an incised (over deepened) channel that currently does not have connectivity with the adjacent land. The intention is to allow some redistribution of flow connectivity but also to trap downstream sediment delivery and prevent further erosion. By creating upstream storage, any impact of flow downstream should be moderated.

The approach will be to create a leaky dam using logs secured within the channel.

Only one location is initially proposed for adding woody material to the channel. The site is within the slope change zone on the upper mire valley floor. The location chosen is where the channel is deepest and more defined.


The leaky dam will be fixed in place by digging logs or gate posts into the banks of the channel and using fence posts in the banks and within the channel to secure the wood.

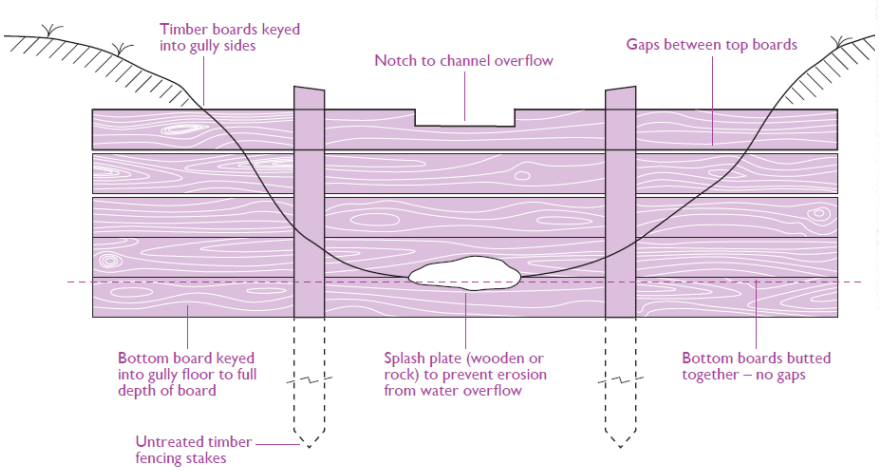
Flow will overtop the sturcture when the stream is fully swollen and but will hold back an element of the mid range flows that pass through the channel. The intention is to create storage of water within the channel by backing up, along with slowing the delivery of downstream flow. The dam will be within the channel and their crest not exceed the full bank height.

A basic design proposed is shown below. Given the depth of water and incised nature of the channel it is proposed the strucutre will be constructed using logs rather than boards secured into the banks of the channel rather than sitting on top. The aim is to create a secure, leaky woody dam which looks naturalistic and not highly engineered.

**Method of Installation**

The proposed location is at coordinates 402603,83018, grid ref SZ 02603 83018.

The leaky woody dam will be installed manually. Works will be undertaken using a chainsaw and logs/posts manually manoeuvred into place. Any fixings will be manually installed.




The approach to installation will be:

- Lever the pre-cut logs or gate posts into the channel;
- Secure the head of the trunk within the bank by digging in and fixing with chestnut stakes
- Stakes securing the tree should be on the downstream side, angled so the top of the stake is pointing upstream;

**Maintenance**

- Following installation, an inspection will be required following the first spate event to review how the leaky structure has established. The first inspection will be carried out by DPP.
- Following initial establishment, annual inspections will be required of the fixing to banks and retaining post in-channel by DPP to ensure the structure is secured from removal downstream.

# 4. Partial Removal of the Bund/Channel Infill

A length of 80m of the linear bund feature can be removed to restore the level of the valley floor to continuity with the adjacent surface. It is assumed that the bund was originally created by excavation of material to create the channel that runs around the outside of the bund. As such the bund material can simply be used to infill the channel. The current channel is ca. 2m wide and whilst infilled with soft sediment, up to 1m deep. These dimensions are similar to the bund feature.

**Method of installation**

*The final detail of the approach needs to be confirmed with the contractor and will be based on machinery being used for the restoration works.*

An excavator will be required to pull the bund material back and infill the channel. No new material will be brought to site to infill the channel. The excavator should work from the north-eastern side of the bund to minimise disturbance to the valley floor and central mire. There may be an old barbed wire fence buried within (or at least part along of) the bund feature which will be used to infill the channel. Contractors should remove any barbed wire from the surface prior to pulling the bund in and remove any after completion.

Vehicular access to the Agglestone mire system is relatively straightforward, either via Wadmore Lane or the main 4x4 track running south from the Greenlands farm/ferry road junction.

Low ground pressure vehicles and bog mats will be used for vehicular access on the mire itself. However, all works on the channel itself will be accessible from the relatively dry northern bank. Machines and vehicles will need to use agreed routes for access.

Refuelling and storage of materials

- Bio-fuel to be used.
- Contractors will use a site compound at Greenland's Farm to store materials, vehicles and for refuelling.
- Storage of materials at Greenland's Farm, and on gravel tracks.
- Fuel will be stored in double-bunded storage containers. Spill kits will be present on site whilst work being undertaken.

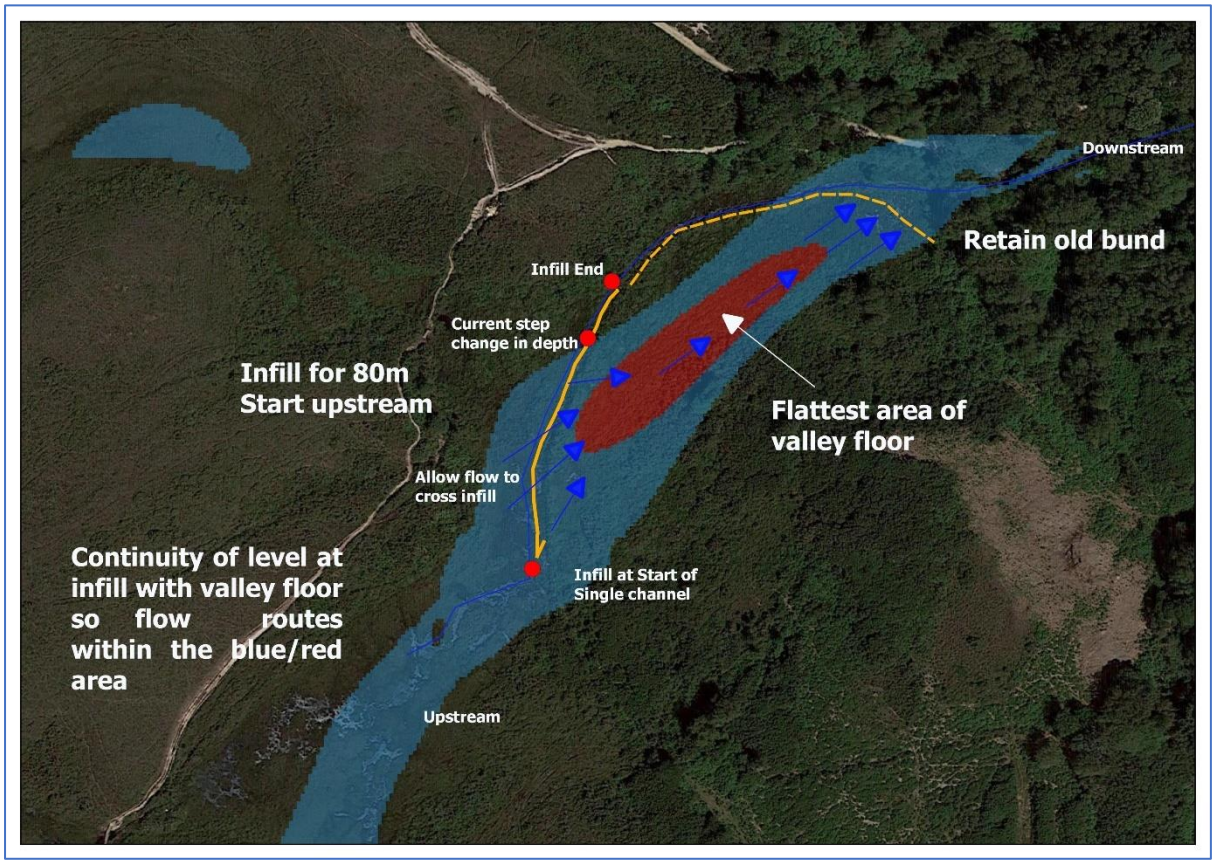
**Care should be taken to minimise the impact of any tracks created by machinery. The micro topography created by tracks should be orientated to create flow paths within the valley floor where possible.**

Bund material will be used to infill an 80m section of the channel starting from the upstream end of the channel. The currently concentrated flow within the channel will then be allowed to spread naturally over downstream valley floor in multiple shallow threads.

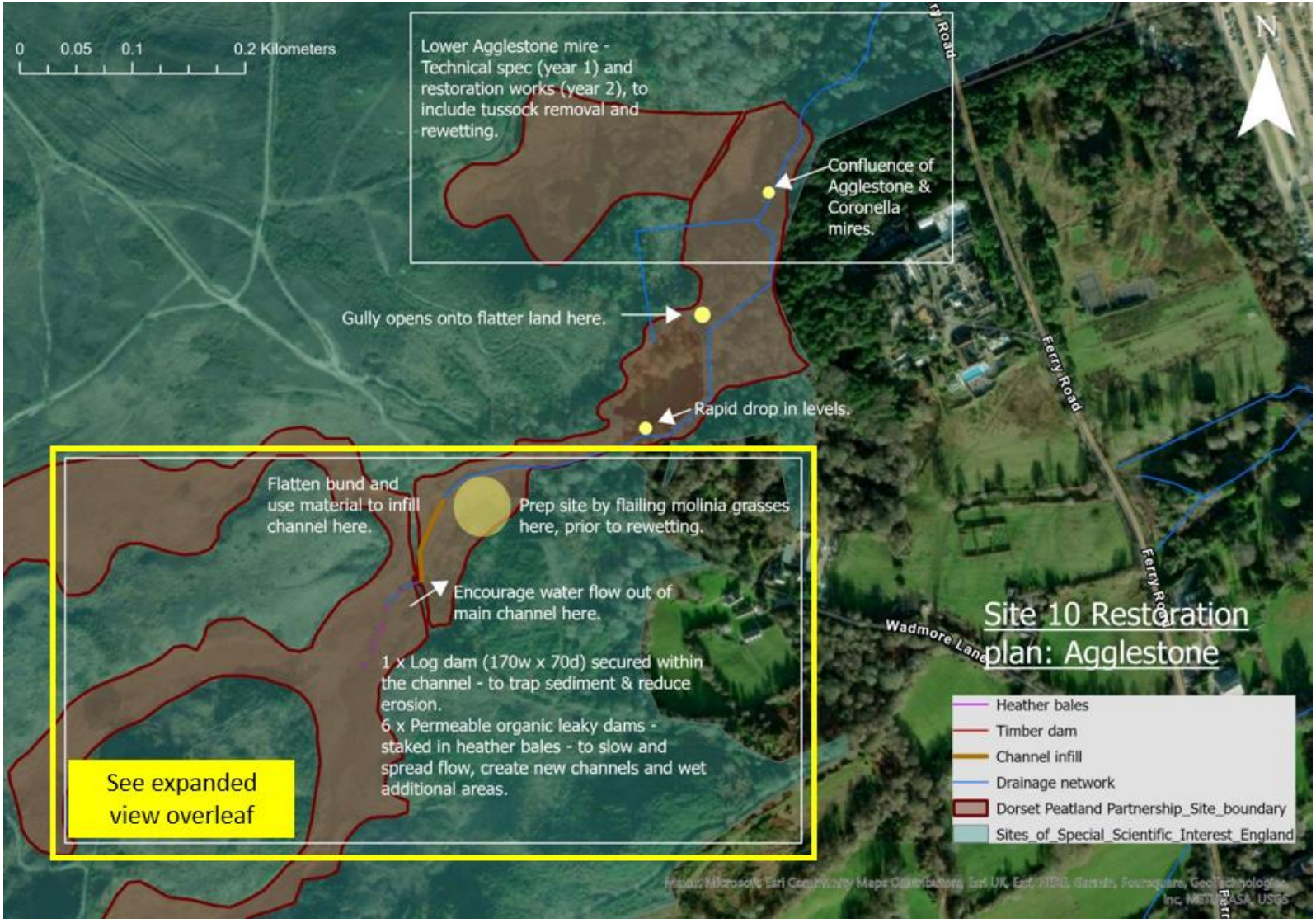
Moving downstream, the infill will be levelled to be in continuity with the floodplain surface on the right bank (looking downstream) to allow a multiple thread surface flow to occupy the flatter area which was previously detached. Flow from the left bank side should be allowed to cross the infill.

The section of the bund feature below the defined 80m for infill should remain. At the downstream of the valley floor which is being restored, the bund feature is leaky and will help retain water on the mire but also works well to concentrate flow back into a single channel downstream of the mire.

Infill of the bund is proposed from (upstream) 402623,83029 SZ 02623 83029 to 402644,83097 SZ 02644 83097, approx. 80m.


Downstream
Retain old bund
Infill End
Current step change in depth
Infill for 80m Start upstream
Flattest area of valley floor
Allow flow to cross infill
Continuity of level at infill with valley floor so flow routes within the blue/red area
Infill at Start of Single channel
Upstream

## Overview


0 0.05 0.1 0.2 Kilometers
Lower Agglestone mire - Technical spec (year 1) and restoration works (year 2), to include tussock removal and rewetting.
Confluence of Agglestone & Coronella mires.
Gully opens onto flatter land here.
Rapid drop in levels.
Flatten bund and use material to infill channel here.
Prep site by flailing molinia grasses here, prior to rewetting.
Encourage water flow out of main channel here.
1 x Log dam (170w x 70d) secured within the channel - to trap sediment & reduce erosion.
6 x Permeable organic leaky dams - staked in heather bales - to slow and spread flow, create new channels and wet additional areas.
See expanded view overleaf
Ferry Road
Wadmore Lane
N
Site 10 Restoration plan: Agglestone
Heather bales
Timber dam
Channel infill
Drainage network
Dorset Peatland Partnership_Site_boundary
Sites_of_Special_Scientific_Interest_England

# Upper Agglestone mire restoration works