NDA Properties Ltd

Ponsonby Tarn Dam

Reservoir On-site Flood Plan

Apr-2022: Revision 0

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Document History

Revision	Purpose Description	Originator	Reviewer	Authorised	Date
0	Issue to client	RS	DL	DL	01/04/2022

Management Information

Person responsible for preparing the plan	Richard Smith
Name of engineer certifying the plan	Richard Smith
Date of plan	01/04/2022
Who to contact about the plan	Andrew Williamson

Date for plan to be reviewed	21/04/2023
Date for testing of the plan (desk-based ands site walk over)	21/04/2023
Date for testing of the plan (full incident simulation exercise)	21/04/2032
How the plan will be tested	In accordance with the requirements found here: https://www.gov.uk/government/publications/reservoir-emergencies-on-site-plan

Source of Plan

This plan has been produced to include key features of the following:

a) Defra / Environment Agency Guidance on Reservoir Emergencies: On-site plans (April 2021), as defined in:

- Reservoir owner and undertaker responsibilities: on-site emergency flood plan
- On-site emergency flood plan template

Refer to https://www.gov.uk/government/publications/reservoir-emergencies-on-site-plan

b) Environment Agency “Guide to drawdown capacity for reservoir safety and emergency planning” (August 2017)

The Plan should be periodically reviewed and updated to ensure it conforms to current requirements and guidance. In addition, the Supervising Engineer has various duties to approve production and direct exercising of this Plan. It should be noted that the Cabinet Office have produced a corresponding series of guidance for off-site plans, for use by the local authority emergency planners and Local Resilience Forum.

Contents

1 Reservoir Information

Name		Ponsonby Tarn Dam
Location		15km south-east of Whitehaven, Cumbria
Grid Reference		NY 04605 04329
Nearest Postcode		CA20 1BP
What3Words location		///destroyer.curable.purified
Capacity (m^3)		35,700
Capacity above adjacent ground level (m^3)		35,700
Surface Area (m^2)		20,000
Catchment (km^2)		3.61
Construction Date		1901
Reservoir Type		Impounding
Use		Amenity – Visual / Recreation
Risk Category		Not High Risk
Category		**Category** C - "Where a breach would pose negligible risk to life and cause limited damage." (Floods and Reservoir Safety 4th Edition, 2015)
Current Status	**Under construction?**	No
	Under modification?	No
Dam	**Type**	Embankment – Earthfill (core)
	Maximum Height (m)	3.50
	Crest Length (m)	43
	Crest Width (m)	1.50
	Lowest Crest Level (mOD)	100.50
	Wave wall level (mOD)	N/A
	Top Water Level (mOD)	99.54

Bypass arrangements	**Available?**	No
	Bypass control location	
	Operations required to allow flows to bypass reservoir	

Inflows	
Total number of inflows	1
Name	**What3Words Location**
Stream inflow	///swear.utter.extremely

Overflows			
Total number of overflows		2	
Name	**Type**	**Width / Diameter (m)**	**Invert Level (mOD)**
Main Overflow	Fixed crest	1.83	99.54
Auxiliary Overcflow	Fixed crest	18	99.9

Outlets (Not pumped)	
Total number of outlets (Not pumped)	0

Outlet Pumps	
Total number of outlet pumps	0

2 Risk Factors and Triggers for Activating the Flood Plan

The following table sets out the typical risk factors relating to reservoirs and their possible consequences. The following definitions apply:

Threat (initiating events) – these are external phenomena that might affect the safety of a reservoir

Failure Mode – a mechanism that might lead to the failure of the reservoir

Indicator – these are defects / anomalies providing evidence of a possible impending failure mode developing

Threats (initiating events)	Failure Mode	Indicators
Aging	Internal erosion failure	• New leakage on downstream face / toe • Leakage carrying dirty water • Sinkholes / settlement of dam crest / face • Whirlpool in reservoir
	Slope failure	• Longitudinal cracks on dam crest or upstream / downstream face • Bulging and subsidence on upstream / downstream face
	Failure of dam impermeable barrier	• Cracking / desiccation of dam core • Damage to upstream face impermeable liner or concrete / bitumen facing
Flood / Significant Rainfall	Overtopping failure	• Wave slop overflowing dam crest • Flood waters overflowing of dam crest
	Spillway failure	• Spillway weir / chute cracking / settlement / erosion • Undermining at toe of spillway chute • Erosion of embankment adjacent to spillway
	Slope failure	• Longitudinal cracks on dam crest or upstream / downstream face • Bulging and subsidence on upstream / downstream face
Earthquake	Foundation liquefaction failure	• Significant deformation of dam structure, including settlement / cracking • Overflowing of dam crest following settlement • Slope instability
	Internal erosion failure	• New leakage on downstream face / toe • Leakage carrying dirty water • Sinkholes / settlement of dam crest / face • Whirlpool in reservoir
	Slope failure	• Longitudinal cracks on dam crest or upstream / downstream face • Bulging and subsidence on upstream / downstream face

Threats (initiating events)	Failure Mode	Indicators
Human Activity / Mal Operation	Instability and / or leakage due to damage to dam	• New leakage on downstream face / toe • Leakage carrying dirty water • Sinkholes / settlement of dam crest / face • Whirlpool in reservoir • Longitudinal cracks on dam crest or upstream / downstream face • Bulging and subsidence on upstream / downstream face
	Spillway collapse due to damage	• Spillway weir / chute cracking / settlement / erosion • Undermining at toe of spillway chute • Erosion of embankment adjacent to spillway
	Spillway blockage leading to dam overtopping	• Wave slop overflowing dam crest • Flood waters overflowing of dam crest
	Incorrect operation of gates / valves leading to failure of dam or spillway	• Damage to gates / valves / pipework / dam / spillway

3 Action Plan to Prevent an Uncontrolled Release of Water

A reservoir safety incident is any occurrence which might cause the dam to breach, thus releasing reservoir water rapidly downstream. Upon discovery of a potential issue on site, an initial assessment should be made of the severity and then action should be taken in accordance with the following table.

In all cases, the Supervising Engineer should always be the first point of contact.

No.	Description	Responsibility	Comments / source
1	Contact Supervising Engineer (SE)	Undertaker	Refer to Section 5 for relevant contact details
2	Contact All Reservoirs Panel Engineer (ARPE)	SE / Undertaker	
3	Risk assessment(s)	SE / ARPE	
4	Appoint Incident Controller (IC)	Undertaker	Refer to Appendix A for incident management roles
5	Assign incident management roles	IC	
6	Communications and media engagement	IC	See notes below
7	Increase monitoring & surveillance	IC	(SE / ARPE to advise)
8	Divert / stop reservoir inflows	IC	(SE / ARPE to advise) Block reservoir inlet and divert inflows to by-wash channel; switch off inlet pumps
9	Divert / stop spillway flows if spillway is damaged	IC	(SE / ARPE to advise) Block or partially block spillway and divert inflows
10	Precautionary drawdown	IC	(SE / ARPE to advise) Refer to Section 7 for emergency drawdown instructions
11	Arrangements for bringing temporary equipment (pumps / siphon pipes) to site to speed up drawdown	IC	
12	Arrangements for emergency repairs	IC	(SE / ARPE to advise) Arrange for materials to be brought to site; granular fill, clay, sandbags, polyethylene sheeting, grout / concrete
13	Contact Category 1 Emergency Responders (Police, Local Resilience Forum and Environment Agency)	IC	(SE / ARPE to advise) Refer to Section 5 for relevant contact details

Notes:

- All questions posed by the **media** regardless of type (local, national etc.) shall in the first instance be directed to **Andrew Williamson or nominated alternative**.
- The Reservoir Panel Engineers employed by the Undertaker will not provide information or comment to any form of the media unless specifically requested to do so by **Andrew Williamson.**
- All technical queries relating to the reservoirs should be directed to the All Reservoirs Panel Engineer who is assisting with the incident.

4 Action Plan to Control and Mitigate a Flood

On imminent dam breach, as directed by the All Reservoirs Panel Engineer, an assessment should be made of the possible severity and then action should be taken in accordance with the following table to reduce / minimise the downstream flooding impacts of the breach.

In all cases, the All Reservoirs Panel Engineer should always be the first point of contact, in consultation with the Category 1 Emergency Responders.

No.	Description	Responsibility	Comments / source
1	Ongoing risk assessment(s) to assess likelihood and scale of dam failure	SE / ARPE	
2	Liaise with Category 1 Emergency Responders (Police, Local Resilience Forum and Environment Agency)	IC	(SE / ARPE to advise)
3	Carry out emergency drawdown	IC (SE / ARPE to advise)	(SE / ARPE to advise) Refer to Section 7 for emergency drawdown instructions
4	Provision of materials to site to reduce flood impact	IC	(ARPE to advise) Materials might include granular fill, clay, sandbags, polyethylene sheeting, grout / concrete
5	Provision of high volume pumps to site	Category 1 Emergency Responders	(ARPE to advise)
6	Carry out actions to reduce flood impact	Category 1 Emergency Responders	(ARPE to advise) This might include: • placing granular fill / sandbags / concrete on sinkholes / areas of erosion • placing sheeting on embankment to reduce overtopping erosion • redirecting water into temporary storage areas
7	24 hour incident management to be implemented	Category 1 Emergency Responders / IC	(ARPE to advise) Includes setting up marshalling area
8	Ongoing incident response with Category 1 Emergency responders	Category 1 Emergency Responders / IC	(ARPE to advise)

5 Contact Details for Key Personnel, Cat 1 Emergency Responders and Contractors

5.1 Key Personnel / Emergency Contact Details

Role	Name / Organisation	Contact Details	
Undertaker / Owner			
Land Agent	Mr Andrew Williamson Avison Young	Office	01514 716702
		Home	N/A
		Mobile	07802 985416
		Email	Andrew.Williamson@avisonyoung.com
Sellafield Shift Manager	Various Sellafield Ltd	Office	01946 677462
		Home	
		Mobile	
		Email	
Site Controller	Emergency Controller/24hrs Security NDA	Office	03302 235901
		Home	01925 802018
		Mobile	07814 389799
		Email	
Reservoir Panel Engineers			
This reservoir has been designated as a 'High Risk' reservoir and therefore has an appointed Supervising Engineer listed below. An alternative Supervising Engineer and All Reservoirs Panel Engineer are also listed below if the appointed engineer cannot be contacted in the first instance.			
Reservoir Supervising Engineer	Richard Smith Stillwater Associates Otley, West Yorkshire	Office	01737 768237
		Home	01943 463861
		Mobile	07904 439187
		Email	richard.smith@stillwater-associates.co.uk
Alternative Reservoir Supervising Engineer	David Littlemore Stillwater Associates Redhill, Surrey	Office	01737 768237
		Home	01737 270301
		Mobile	07740 432292
		Email	david.littlemore@stillwater-associates.co.uk
All Reservoirs Panel Engineer	Tom Wanner Stillwater Associates Ewhurst, Surrey	Office	01737 768237
		Home	01483 276604
		Mobile	07799 607148
		Email	tom.wanner@stillwater-associates.co.uk
Emergency Planning			
Local Resilience Forum	Cumbria Dial 999 and ask for the Fire and Rescue Service	Location	Penrith, Cumbria
		Phone	
		Email	crf.secretariat@cumbria.gov.uk
Regulating Authority	Environment Agency Exeter, Devon	General	0370 850 6506
		Incident	0800 80 70 60
		Flood Line	0345 988 1188
Emergency Services	Police, Fire, Ambulance 24 hours / 7 days	Emergency	999
		Non-emergency	101

5.2 Contractors to assist with site operations

Contractor Name:	Mr Fawcett	G & A M Lawson
Address:		
Phone:	07798 641847	01946 830305
Out of hours:	07798 641847	01946 830305
Type of Service	Provision of operatives, plant and materials	Provision of operatives, plant and materials

5.3 Pump Suppliers

Contractor Name:	Andrew Sykes	Selwood
Address:	7 Mardale Rd, Penrith, Cumbria, CA11 9EH	Unit 2, Prospect Garage, Distington, Cumbria, CA14 5XJ
Phone	01768 867143	01900 68694
Out of hours:	0800 211 611	0333 142 000
Type of Service	Specialist nationwide pump distributors	Specialist nationwide pump distributors

5.4 Plant, Tool and Welfare Hire

Contractor Name:	Brandon Hire Station	Sunbelt Rentals
Address:	Unit 14, Montgomery Way, Rosehill Ind. Est. Carlisle, CA1 2RW	Red Lonning Industrial Estate, Red Lonning, Hensingham, WHITEHAVEN, CA28 6SJ
Phone:	01228 623400	01946 64613
Type of Service	Plant, tool and welfare facilities hire	Plant, tool and welfare facilities hire

6 Access Details

6.1 Reservoir Location

The reservoir is located approximately 15km south-east of Whitehaven, Cumbria as shown in the figures below.

6.2 Access Arrangements

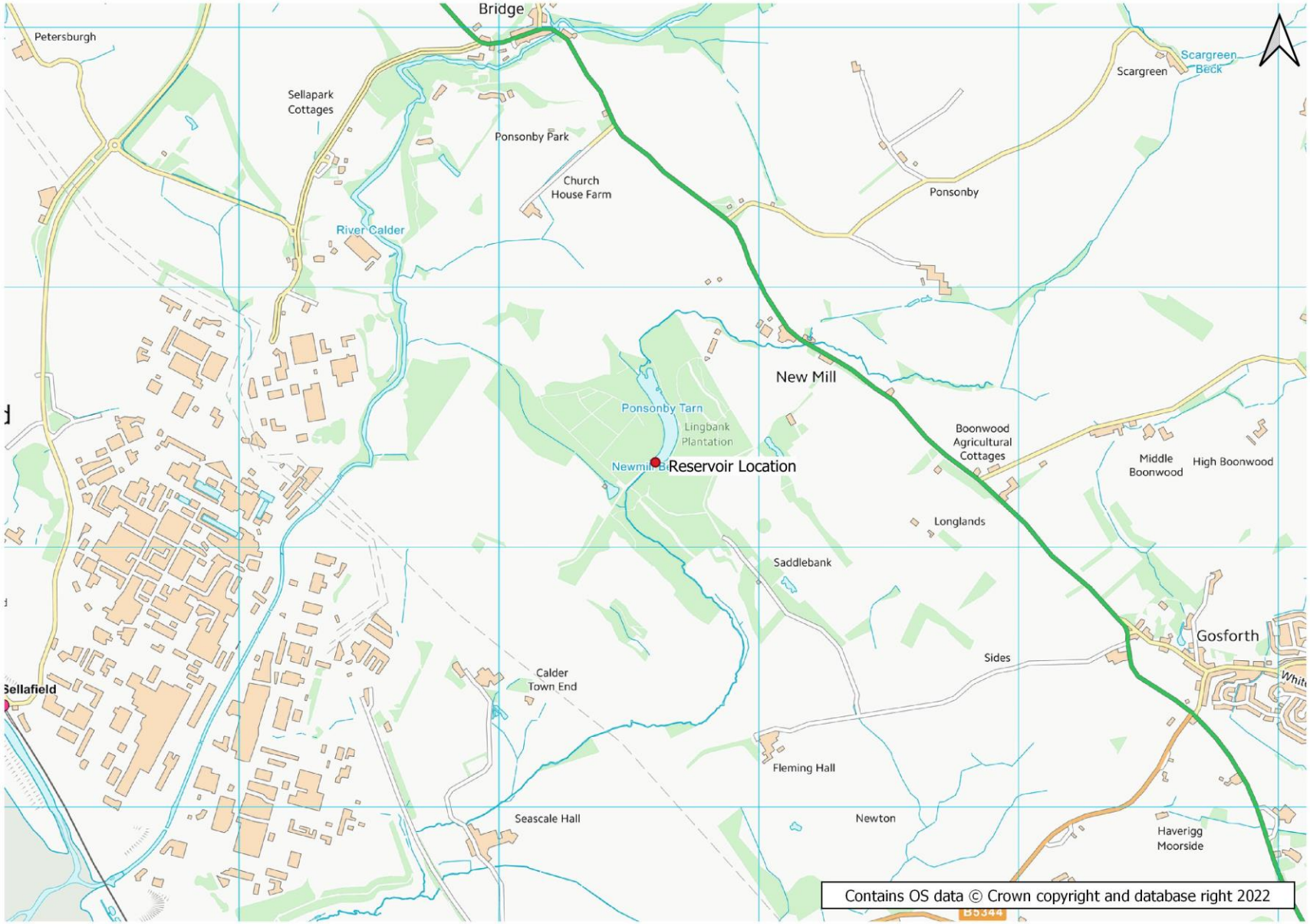
Description of access from public road to reservoir	Access to the reservoir can be made from the public highway (A595) at Gosforth via a stone track to the reservoir
Public road access point - Grid Reference	NY 06406 03632
Public road access point - What3Words	///compacts.shipwreck.buzzing
Alternative road access point - Grid Reference	NY 05303 04723
Alternative road access point - What3Words	///star.umbrellas.sensitive
Description of vehicular access to the reservoir **(Is it possible to use vehicles from the public road to the reservoir?)**	Stone track suitable for 4 x 4 vehicles only.
Description of access around the dam **(Describe the levels of foot and vehicle access around the dam and reservoir)**	Pedestrian access only to dam. 4 x 4 vehicle access to inlet.

Key locations related to this access route are provided in the figures below:

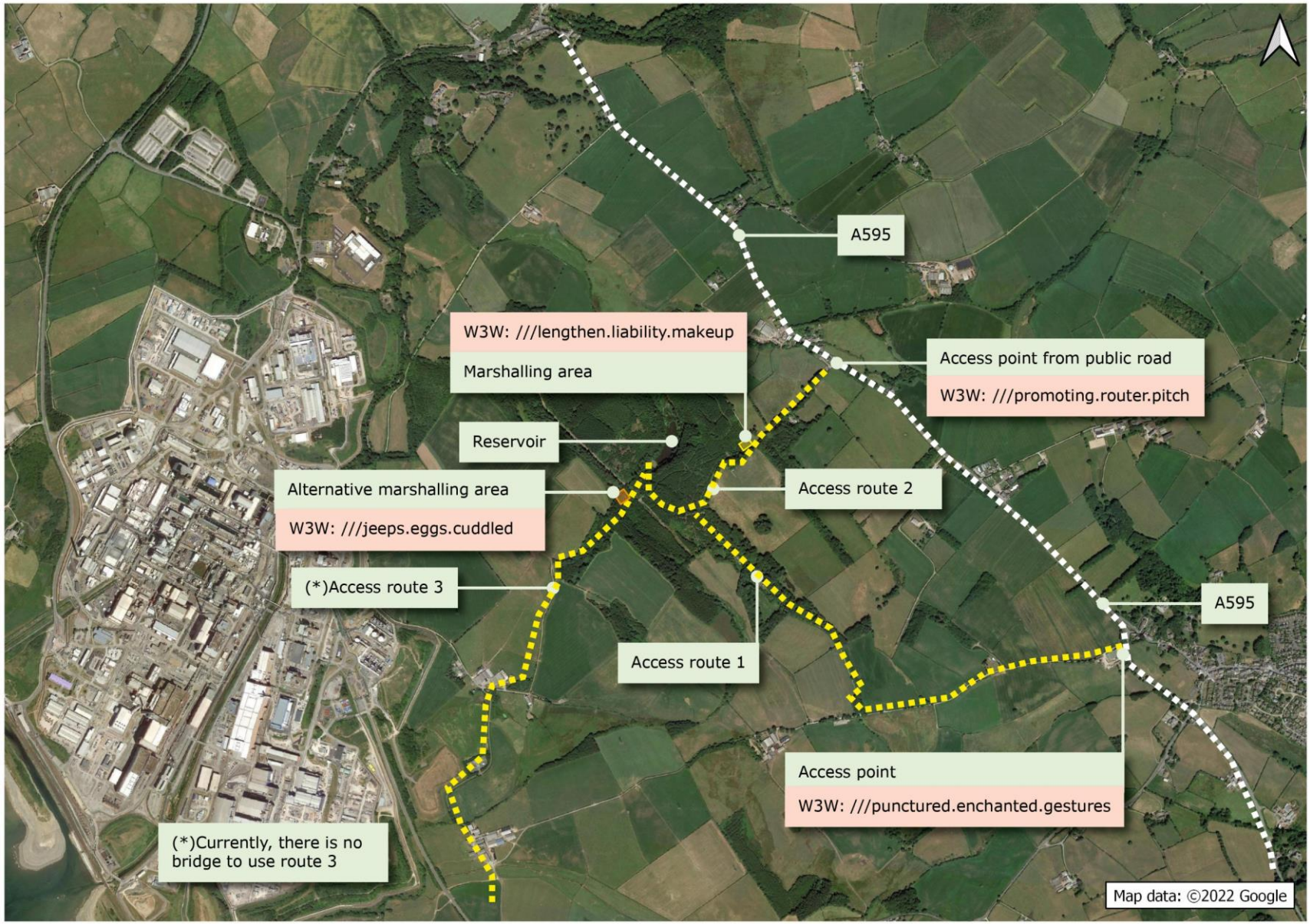
6.3 Marshalling Areas

Suggested on site marshalling areas and locations for mobile incident response units is as follows: (See figures below):

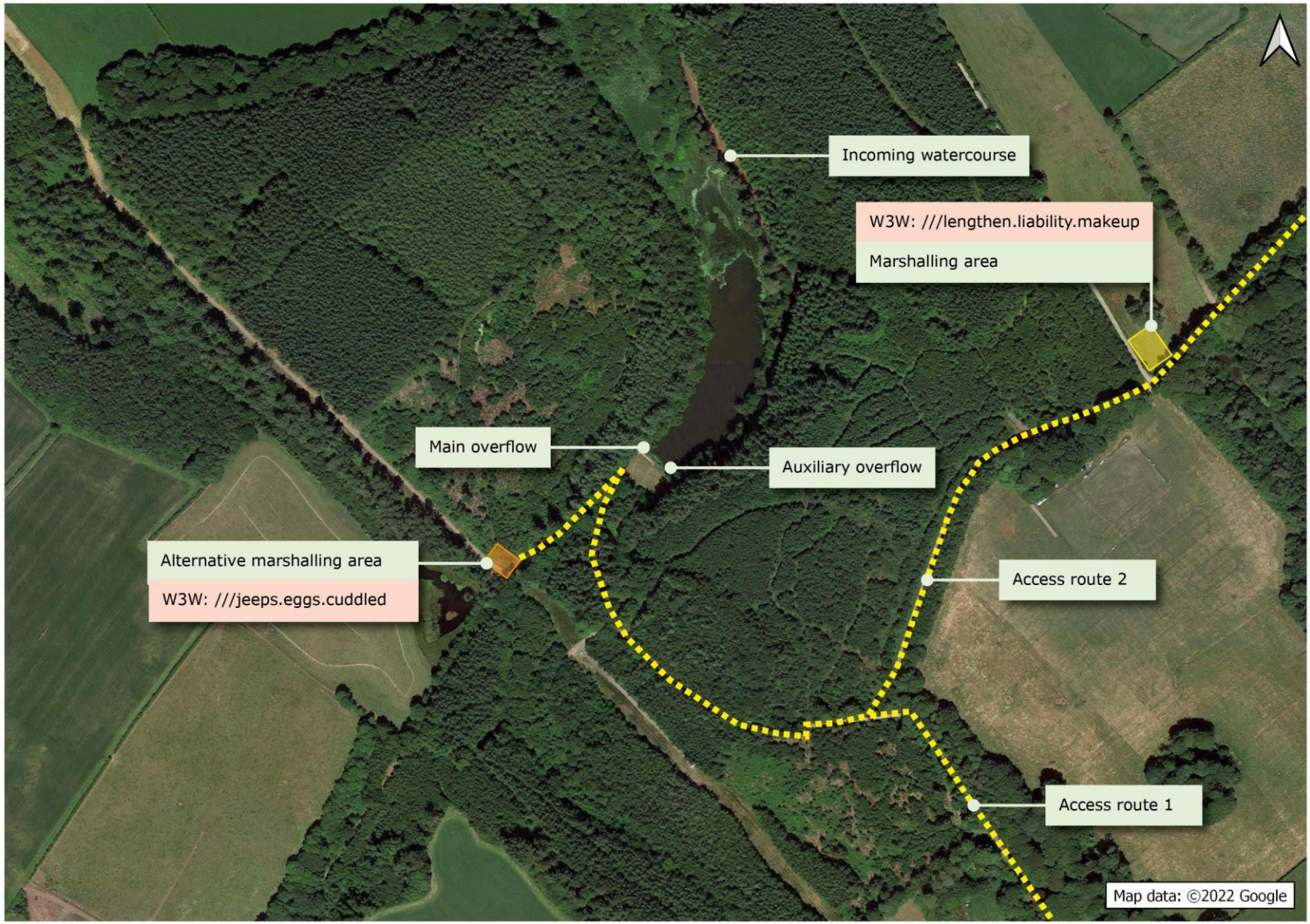
Marshalling Area - Description	The proposed marshalling area is an area used for forestry work on secondary access.
Marshalling Area - National Grid Reference	NY 04984 04444
Marshalling Area - What3Words	///folders.paddocks.fixated
Alternative Marshalling Area – Description	N/A
Alternative Marshalling Area - Grid Reference	
Alternative Marshalling Area - What3Words	



Reservoir Location


A595
W3W: ///lengthen.liability.makeup
Marshalling area
Access point from public road
W3W: ///promoting.router.pitch
Reservoir
Alternative marshalling area
W3W: ///jeeps.eggs.cuddled
Access route 2
(*)Access route 3
A595
Access route 1
Access point
W3W: ///punctured.enchanted.gestures
(*)Currently, there is no bridge to use route 3
Map data: ©2022 Google

Site Access


Incoming watercourse
W3W: ///lengthen.liability.makeup
Marshalling area
Main overflow
Auxiliary overflow
Alternative marshalling area
W3W: ///jeeps.eggs.cuddled
Access route 2
Access route 1
Map data: ©2022 Google

Site Layout

7 Instructions for Emergency Draw-down

7.1 Specific Information

7.1.1 Authorisation for Draw-down from:

Undertaker / Owner (with advice from All Reservoir Panel Engineer when available)

7.1.2 Inform (Internal)

Action normally undertaken by the Incident Controller or Police Silver Command.

7.1.3 Inform (External)

This action normally undertaken by the Police, Local Authority Emergency Planning Unit and the Environment Agency.

7.2 Existing Drawdown Operating Instructions – Permanent outlets including permanent pumped outlets

There are no operational outlets or permanently installed pumped outlets at this reservoir.

7.3 Existing Drawdown Capacity

There are no operational outlets or permanently installed pumped outlets at this reservoir.

7.4 Target Drawdown Rate

The target rate of drawdown should be determined using the latest guidance (Guide to Drawdown Capacity for Reservoir Safety and Emergency Planning-Environment Agency, 2017).

The target rate was calculated in the table below. In an emergency this target rate may be increased, where practicable with advice from an All Reservoirs Panel Engineer.

Summary of required drawdown rate based on EA guidance

Symbol	Item	Units	Value	Source / comment
H	Maximum reservoir depth	m	2.54	Difference between reservoir top water level to lowest ground level at the downstream toe.
Q_{10}	Inflows exceeded 10% of days in a typical year	m^3/s	0.13	Hinks Formula
		m^3 / day	10,830	
a	Surface area of reservoir (at TWL)	m^2	20,000	Last S10 Report
		ha	2	
D_i	Recommended minimum drawdown rate	m / day	0.0508	2017 Environment Agency guidance
	Upper cap on practical drawdown rate	m / day	0.3	2017 Environment Agency guidance
	Precedent practice - minimum rate to empty a significant portion of the reservoir	m / day	0.121	Canal & River Trust approach (2017 Environment Agency guidance)
	Suggested Target Rate based on precedent and good practice	**m /day**	**0.30**	**Precedent for this reservoir**
V	Volume to be evacuated based on target rate	m^3 / day	16,830	Q_{10} (m^3/d) + 10 x a x D_i (mm/d)

7.5 Assessment of Installed Drawdown Arrangements

Consideration	Units	Value
Total installed drawdown capacity	m^3 / day	0
Target drawdown capacity	m^3 / day	16,830
Shortfall in drawdown capacity	m^3 / day	16,830

7.6 Additional Drawdown Arrangements: Mobile Pumps and Siphons

Depending on the rate and depth of draw-down required, temporary pumps or siphon pipes may be required to be brought to site to supplement the abstraction of water achieved by the existing drawdown arrangements.

In the event that the existing drawdown arrangements are not operational during an emergency, then the drawdown will rely solely on temporary pumps or siphon pipes.

Note: as the reservoir draws down the suction (reservoir end) of siphon pipes will need to be extended further into the reservoir, and the downstream ends of siphon pipes extended to keep the level below the prevailing reservoir water level.

7.6.1 Mobile Pumps

The number of mobile pumps required to achieve the target drawdown capacity listed according to pump size.

Pump size	Existing drawdown arrangements fully operational (N/A if no existing drawdown facility exists)	No existing drawdown arrangements or Existing drawdown arrangements not operational
80mm pumps (No.)	N/A	10
150mm pumps (No.)	N/A	4
200mm pumps (No.)	N/A	2

The typical pumping rates used to calculate the number of pumps above have been taken from Andrew Sykes pump specification sheets and site-specific assumptions regarding the required lengths of suction and delivery hoses.

7.6.2 Mobile Siphon Pipes

The number of mobile siphon pipes required to achieve the target drawdown capacity listed according to pipe diameter.

Siphon pipe size	Existing drawdown arrangements fully operational (N/A if no existing drawdown facility exists)	No existing drawdown arrangements or Existing drawdown arrangements not operational
75mm siphon pipes (No.)	N/A	Not practical - too many pipes required
100mm siphon pipes (No.)	N/A	Not practical - too many pipes required
150mm siphon pipes (No.)	N/A	10

The discharge rates used to calculate the number of siphon pipes above have been determined various hydraulic calculations and site-specific assumptions regarding the required lengths of siphon pipes.

The additional equipment required for setting up mobile pumps and siphons is Appendix B.

8 Areas at Risk of Flooding

8.1 Valley Downstream of the Reservoir

The main features downstream of the reservoir are summarised in the following table.

Table 8-1: Features on flow path downstream of dam

Distance d/s (km)	Feature at start of reach	Details
1.00	Calder Hall Farm	Farm and outbuildings
1.13	Fleming Hall Farm	Farm and outbuildings
1.13	Seascale Hall	Empty Hall

8.2 Likely Extent of Flooding

The extent of flooding downstream in the event of dam failure would depend on factors including:

- The quantity of flow in the watercourse at the time of failure
- How quickly the dam erodes, and the "breach" is enlarged (which needs geotechnical / material information on the dam).

There are two flooding scenarios shown on the reservoir flood inundation maps (if available). These are a '**dry-day'** scenario and a '**wet-day'** scenario.

The '**dry-day'** scenario predicts the flooding that would occur if the reservoir failed when at its Top Water Level and the downstream watercourse is at normal levels.

The '**wet-day'** scenario predicts how much worse the flooding might be if the reservoir failed when the downstream watercourse is already experiencing an extreme natural flood (Fluvial Flood).

The 'wet-day' scenario inundation map shows the following two outlines:-

- Maximum Flood Extent which combines fluvial flooding and flooding caused by reservoir failure.
- Maximum Fluvial Flood Extent which shows only fluvial flooding

Any difference between the maximum flood extent and the maximum fluvial flood extent is termed the incremental increase caused by the reservoir failing.

In most cases reservoir failure is unlikely to cause a significant increase in the flood extent as the areas downstream are already significantly flooded by the extreme natural flood (fluvial flood).

In terms of evacuation of properties the conservative approach would be to use the 'wet-day' scenario maps as they are likely to show a greater 'inundation area' when compared to the 'dry-day' scenario maps.

A 'Dry Day' Reservoir Inundation Map is included in Appendix D of this On-site Flood Plan

A 'Wet Day' Reservoir Inundation Map is included in Appendix D of this On-site Flood Plan

Online copies of the maps (if available) can be found here https://environment.data.gov.uk/reservoir-flood-maps.

9 Supporting Information and Data

9.1 Documents

The following historical reservoir drawings and reports for the reservoir are available:

Report / Drawing No.	Report / Drawing Title
Peter Kite Associates	Section 10 Report (April 2011)

The supplementary information listed above is held electronically by the Undertaker and by the Supervising Engineer

9.2 Materials available to Undertaker

The following materials and plant are immediately available to the Undertaker.

Material	Available?
Clay	No
Sand	No
Gravel	No
Rock	No
Sandbags	No
Plastic Sheeting	No
Timber	No
Other materials immediately available to the Undertaker	
Plant immediately available to the Undertaker	

Appendix A – Incident Management Roles

The Undertaker would appoint an Incident Controller (IC) – see duties in **Table A1** below.

For Ponsonby Tarn Dam it is anticipated that the **IC will be Andrew Williamson.**

It should be noted that the IC can only authorise activities on the Undertaker's land. They should not take any off-site actions, which should be carried out by the Police or personnel authorised by the Police.

The IC will appoint personnel to cover particular on-site roles. Individuals may be asked to cover more than one role. Additional members may need to be drafted into the area to undertake roles. If a role cannot be filled locally the IC should resource it from a third party which could be a contractor or consultancy with relevant reservoir experience.

An important part of responding to an incident is assessing that could be taken to reduce the risk of dam failure. The assessment process should include consideration of health, safety and environmental implications of proposed actions.

Table A1: On-site Roles & Responsibilities

Role	Typically undertaken by	Responsibilities Include
Incident Controller (IC)	Reservoir Owner	a) Direction of ALL people associated with any aspect of the incident response. b) Assesses the problem. c) Agrees technical solutions with Panel Engineer and Incident Manager. d) Agreement of overall response & recovery strategy with Incident Manager (Police to appoint). e) Implement a range of measures to avert failure including the on-site plan. f) Providing ongoing surveillance and situation assessments. g) Overall H&S of all personnel addressing incident. h) Notification of and liaison with emergency service leaders on site. i) Communications and media engagement. j) Maintaining a log. k) Record keeping.
Marshalling Officer (MO)	The IC or their appointee	a) All people arriving on site must 'check in' with the marshalling officer and 'check-out' when leaving. b) Checking on continuity of response i.e. that if someone is leaving site their responsibilities are either fully executed or properly handed over. c) Providing of safe approach routes to the emergency services. d) Assists in information flows to incident team via the Information Officer. e) Establishing an emergency control location and monitoring personnel requirements.
Practical works	Undertaker staff or External Contractor	a) Erect barriers, control traffic, prevent public access. b) Arrange over-pumping and digging ditches as instructed by MO or IC.

Appendix B – Equipment required for setting up mobile pumps and siphons

The equipment required for one mobile pump is typically as follows:

Item	Description	Purpose / comment
Pump	See Section 7.0 above for pump details and the Site Layout Plan for possible pump location.	Install as per supplier recommendations.
Suction line (upstream hose to pump)	As per suppliers' recommendation. Length of pipes to be determined considering the depth of the reservoir, the surrounding topography and possible discharge points.	Install as per supplier recommendations.
Delivery line (downstream hose from pump)	As per suppliers' recommendation. Length of pipes to be determined considering the depth of the reservoir, the surrounding topography and possible discharge points.	Install as per supplier recommendations.

The equipment required for one siphon is typically as follows:

Item	Quantity for one siphon	Purpose / comment
75mm / 100mm / 150mm diameter flexible plastic twinwall pipe	Length of pipe to be determined considering the depth of the reservoir, the surrounding topography and possible discharge points.	Siphon inlet needs to be well submerged, even when target drawdown reached.
Bungs for ends	One for each end i.e., two number.	So once the pipe is full of water it can be lifted into position before commencing siphoning.
Waders	Two sets of chest waders	Normally a minimum of two people is required for installation, and they will have to walk into the water. Life jackets should be worn.
Sandbags	Four number	To hold down intake hose and where it passes over dam.
Paving slab	Two	To put under intake, to stop scour at intake.
PPE for working in water	As per H&S risk assessment	

The procedure for siphon setup is typically as follows:

Task	Step	Comment
1	Decide location of siphon to be installed, including consideration of: • Ease of installation • Minimum depth of water at intake (depth to be drawn down, plus 2 x pipe diameter so prime is not lost)	Siphon pipes could be located over the embankment and spilling into the adjacent field at a suitable distance away from the embankment.
2	Put pipe into reservoir, with upstream end at agreed intake position	
3	Secure intake (paving slabs below, sandbags above)	
4	Fill siphon pipe with water in the reservoir	Make sure no air left in the pipe
5	Install bungs at each end with pipe underwater at upstream end	
6	Lift downstream end of pipe over embankment, secure in position	
7	Remove bungs, and the pipe should start siphoning. If it doesn't work review the process, amend and repeat as necessary until the siphons are operating	

Appendix C – Photographs

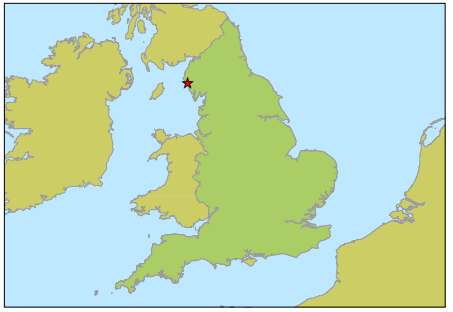
Photo 1: Overflow

Appendix D – Reservoir Inundation Maps

Reservoir Flood Map

Reservoir Name: Ponsonby Tarn	**Map Type:** Maximum Flood Extent Dry Day
Multiple Breach: 1 of 1	**Scale:** 1:4,200 at ISO A0
RFM specification version used for map production: Version 1.2 October 2020	**Revision:** A
Status: Final	**Date Produced:** 21/11/2020

Location Map:



Legend:

- Reservoir Location
- Reservoir Extent
- Maximum Wet Day Flood Extent (for comparison)
- Maximum Flood Extent for Dry Day Scenario
- Wet Day Termination Extent

Notes:

A dry day scenario is the predicted flooding that would occur if the reservoir fails when the rivers are at normal levels.

If a reservoir fails at the same time when the river has already overflowed its banks, flooding could be worse. To show how much worse, in many cases a wet day scenario is included as well.

There is no likelihood that flooding from the reservoir breach downstream of the wet day termination extent would significantly impact on properties or infrastructure. Any flooding is mostly from a river, not from the reservoir breach.

Note that a wet day scenario has not been run for all reservoirs.

N

0 0.075 0.15 0.3 0.45 0.6

Kilometres

Information Warning:

1. We (the Environment Agency) do not promise that the information in this map will always be accurate, complete or up to date or that the information will provide any particular facilities or functions or be suitable for any particular purpose.

2. You, the recipient of the information must ensure that the map meets your needs and are entirely responsible for the consequences of using the map.

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4. This map is intended to be used by bodies responsible for emergency planning, reservoir risk designation and spatial planning. This map may be used for other purposes where they are both lawful and appropriate.

5. The information contained in this map DOES NOT in any way reflect the structural integrity or likelihood of failure of the dam.

6. This map gives an indication only of the areas that may be flooded if the dam completely failed. The flood extent is best estimate for multi-purpose use. It is based on a simplified modelling approach. Actual reservoir failure may give rise to conditions (flood extents) which vary from those indicated.

7. The data used to create this map were gathered from various independent sources. Defra and the Environment Agency have no control over the quality of the input data from third parties and accept no responsibility for the same.

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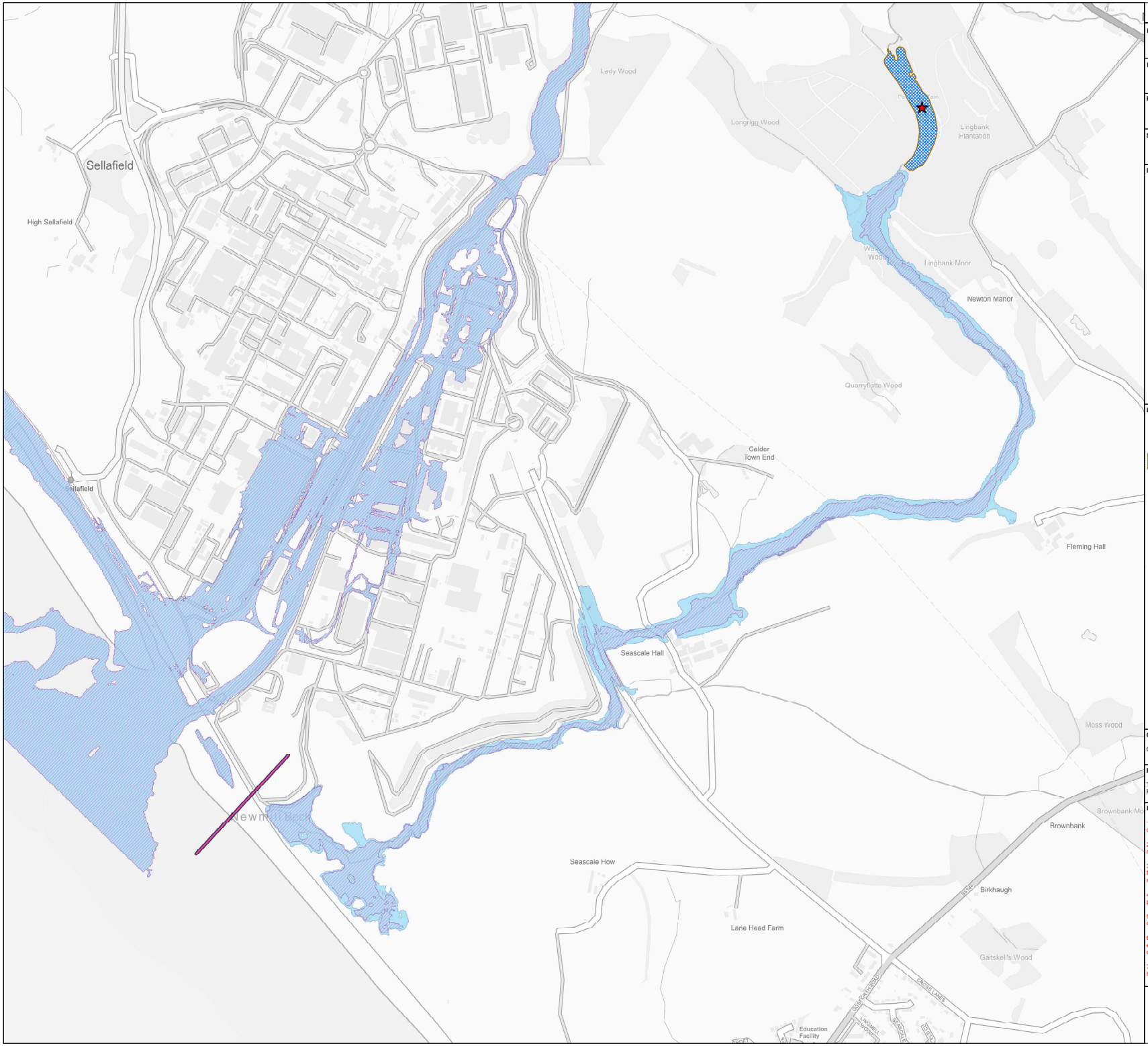
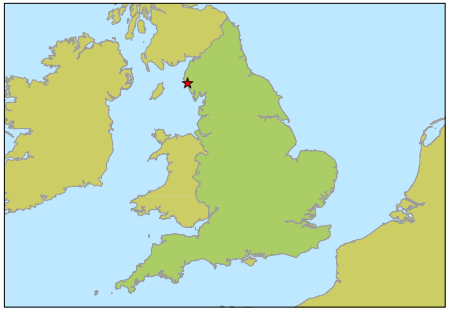


Reservoir Flood Map

Reservoir Name: Ponsonby Tarn	**Map Type:** Maximum Flood Extent Wet Day
Multiple Breach: 1 of 1	**Scale:** 1:3,800 at ISO A0
RFM specification version used for map production: Version 1.2 October 2020	**Revision:** A
Status: Final	**Date Produced:** 21/11/2020

Location Map:



Legend:

- Reservoir Location
- Reservoir Extent
- Maximum Fluvial Flood Extent (for comparison)
- Maximum Flood Extent for Wet Day Scenario
- Wet Day Termination Extent

Notes:

A dry day scenario is the predicted flooding that would occur if the reservoir fails when the rivers are at normal levels.

If a reservoir fails at the same time when the river has already overflowed its banks, flooding could be worse. To show how much worse, in many cases a wet day scenario is included as well.

There is no likelihood that flooding from the reservoir breach downstream of the wet day termination extent would significantly impact on properties or infrastructure. Any flooding is mostly from a river, not from the reservoir breach.

Note that a wet day scenario has not been run for all reservoirs.

N

0 0.075 0.15 0.3 0.45 0.6
Kilometres

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Appendix E – Supplementary Information

(Not Used)