Canal & River Trust
Making life better by water

March Haigh Reservoir

Justification for a Permanent Access Track

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Making life better by water

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Executive Summary

The Canal & River Trust ('the Trust') seeks planning permission to construct an essential permanent access track from Blake Lee Lane to the spillway of March Haigh Reservoir. The track will be used for surveillance, operation, maintenance and emergency response.

The Trust owns and operates 72 large raised reservoirs in England which fall under the ambit of the Reservoirs Act 1975 ('The Act'). 68 of these reservoirs are classed as high-risk structures, with likely loss of life in the event of a breach.

The Trust owns several reservoirs located high on the moorland above and around the Standedge Tunnel, built to supply water to the Huddersfield Narrow Canal. The reservoirs were built in the late eighteenth and early nineteenth centuries, and now require constant monitoring and repair works to maintain their safe operation. This presents difficulty in terms of harsh weather, remote location and difficult terrain. Until recently, several of the reservoirs were not served by permanent access tracks, making routine monitoring difficult. Following the construction of access tracks to Swellands and Black Moss reservoirs in 2022, March Haigh is now the only reservoir owned by the Trust which does not have a permanent access track.

In 2019, an emergency event occurred at Toddbrook Reservoir, where the face of the spillway began to break up during high flows. The weather was clear enough to allow Chinook helicopters to be deployed, and they were able to drop sand/cement bags to improve the stability the spillway face. However, the pumps and pipes to enable critical fast dewatering had to be brought in by road as they were too large and heavy for the helicopters. Without road access the situation at Toddbrook could have escalated, and this incident demonstrates the importance of rapid implementation of emergency procedures. The government has since issued advice tightening requirements for safe reservoir management, and more onerous legislation is under preparation. Any emergency response at March Haigh Reservoir would require vehicular access for delivery of pumps, bulk materials, temporary structures and personnel. The installation of a permanent access track is essential to the safe operation of the reservoir.

March Haigh Reservoir was inspected under Section 10 of The Act in February 2021. The purpose of the statutory inspection is to assess the safety of the dam and maintain the safety of the downstream population. The Inspecting Engineer, a member of the All Reservoirs Panel of Engineers, has the authority to raise issues as Matters in the Interest of Safety (MIOS), which then become statutory obligations for the Undertaker to rectify within a set timescale. Eight measures were required to maintain the safe operation of the dam, including the provision of a permanent access track to the dam:

> *6. (a)_ Provide a permanent access track to assure vehicular access to the dam at all times to facilitate surveillance, maintenance and emergency activities. - To be completed within 3 years from the date of this report, subject to (b) temporary arrangements to facilitate safety measures being reinstated without undue delay and no later than 9 months from the date of this report.*

The Trust is therefore under a strict legal obligation to undertake the necessary works to implement this measure, and to do so by the time stipulated by the independent engineer.

The Trust recognises and will take careful account of the Protected Area designations of the South Pennines, which carries both Special Area of Conservation (SAC) and Special Protection Area (SPA) designations, as well as Site of Special Scientific Interest (SSSI). The Trust is aware that the construction of a permanent access track may negatively affect the special features identified within these designations, and that any potential impacts on the integrity of the SAC and SPA will trigger a requirement for a Habitat Regulations Assessment (HRA). As part of a planning application there will be a formal report to inform an HRA.

The application of the derogation tests under the Habitats Directive has been considered and the Trust believes that those tests would be met in the event that they apply. There are Imperative Reasons of Overriding Public Interest (IROPI) to support the track and there are no alternatives to a permanent access track at this time. The extent to which these derogation tests will be applicable will be dependant the outcome of a full HRA assessment.

The track design will be developed to reduce long term operational safety risk, reduce the risk to public safety. In designing the track, a key principle will be to minimise impact on protected species & designated areas and provide fit-for-purpose infrastructure, essential for long term access for surveillance, maintenance and emergency access to the high-risk reservoir. Where impact cannot be avoided, mitigation measures will be included. Some of these are set out later in the report.

It is important to take account of what was said about the scope and implications of The Act in (The Heath and Hampstead Society) v. City of London [2014] EWHC 3868. As Mrs Justice Lang explained, under section 10 Parliament has expressly conferred responsibility upon independent civil engineers to decide what safety measures are required for any particular dam, exercising their professional judgment and expertise (paragraph 66). In addition, she made the following findings of relevance:

> *"Neither the RA 1975, nor the ICE guidance, provides for the inspecting engineer to balance considerations of safety against competing factors such as preservation of the landscape, protection of the environment, or heritage assets. In my view, it would have been evident to Government and Parliament when the 1975 Act was passed that reservoirs and dams are situated in a wide variety of locations, including areas of outstanding beauty, and in the case of ornamental lakes, in historic settings close to heritage assets. This knowledge would also be available to the authors of the ICE guidance. So it is significant that the only legislative consideration is public safety… It can be seen that neither the Minister nor Parliament has seen fit to exempt lakes and dams in environmentally sensitive locations."*

1. Introduction

March Haigh Reservoir was constructed over 200 years ago to feed the canal network. The reservoir holds 240,070m^3 of water and therefore falls under the ambit of the Reservoirs Act 1975 ('The Act'). It is classified as high risk by the Environment Agency, and regarding the consequences of failure, the dam is assessed as Category A as described in Table 1 of the ICE guide "Floods and Reservoir Safety" 4th edition 2015. Structure, where a breach could endanger lives in a community.

This report explains:

- the challenges of safe access for maintenance and repairs, and in an emergency due to the location of March Haigh Reservoir
- the consequences of a failure of the reservoir, which would include loss of life and extensive property damage.
- why the construction of a permanent access track is essential to allow the Trust to safely continue to operate March Haigh Reservoir and explains that this essential safety measure is now a legal requirement in accordance with section 10 of The Act.
- why the Trust has no alternative other than to construct a permanent access track and the requirement for the reservoir in the public interest.

In addition, the report sets out the principles being applied for the design of the track.

2. Reservoir location, current access arrangements and consequence of failure

Environment Agency – National Protocol for the Handling, Transmission and storage of Reservoir information and Flood Maps:

Information relating to Reservoirs, in particular any potential weaknesses or structural issues that could be exploited by Terrorist action or those intent on causing serious incidents and disruption, is generally treated as sensitive information and is carefully controlled. In particular, when responding to requests for information relating the reservoirs, the Trust generally follows the Environment Agency's protocol (see Appendix 2: National Protocol June 2018) in order to ensure that sensitive information is not disclosed to the public.

However, to fully explain the importance and essential need for a permanent access track, it is necessary for the Trust to release sufficient information to support this planning application. This will assist the relevant authorities in their decision making, inform the public of the duties faced by the Trust and enable public debate and understanding of the serious impacts of reservoir failure. The Trust and its predecessors have maintained these reservoirs for decades to protect the public; a permanent access Track is needed to safely continue to do so.

March Haigh Reservoir is located approximately 3.5 km northwest of Marsden in the Metropolitan District of Kirklees, West Yorkshire. within an area designated as part of the South Pennines Site of Special Scientific Interest (SSSI), South Pennine Moors Special Area of Conservation (SAC) and South Pennine Moors (Phase 2) Special Protection Area (SPA).

It is classed as a high risk structure under The Act, and is the only reservoir owned by the Trust which does not have a permanent access track, following the construction of access to Swellands and Black

Moss reservoirs in 2022. Such tracks are essential to allow for inspection, maintenance and emergency response.

The reservoir was built in the 1838 before modern reservoir engineering techniques, technology and materials had developed. The location is challenging, and the materials used in the construction of the reservoirs included locally sourced materials, moved in part by canal and pack horses. Given the age and construction of the dam, this structure requires careful management, frequent inspection and maintenance. As with all the Trust's reservoir assets, the dam is subject to constant surveillance and monitoring, as well as visits by the Supervising Engineer.

2.1 Consequence of Failure

March Haigh Reservoir has a capacity of 240, 070m^3, and is formed behind a 300m long dam 21 m high at the midpoint, one of the Trust's highest.

Failures are most likely to occur in periods of poor weather and high rainfall. The Environment Agency assesses the consequences of failure by modelling dam breaches on a dry day and a wet day. Modelling of a wet day (poor weather and high rainfall) uses a 1 in 1000 year event. A failure of March Haigh Reservoir would be expected to result in severe loss of life – estimated at over 100 people - and extensive flooding and damage estimated at more than 2,500 properties and £100M in property damage in Marsden and along the Colne Valley. Figures 1 and 2 show the inundation map and the flood extent provided by Defra.

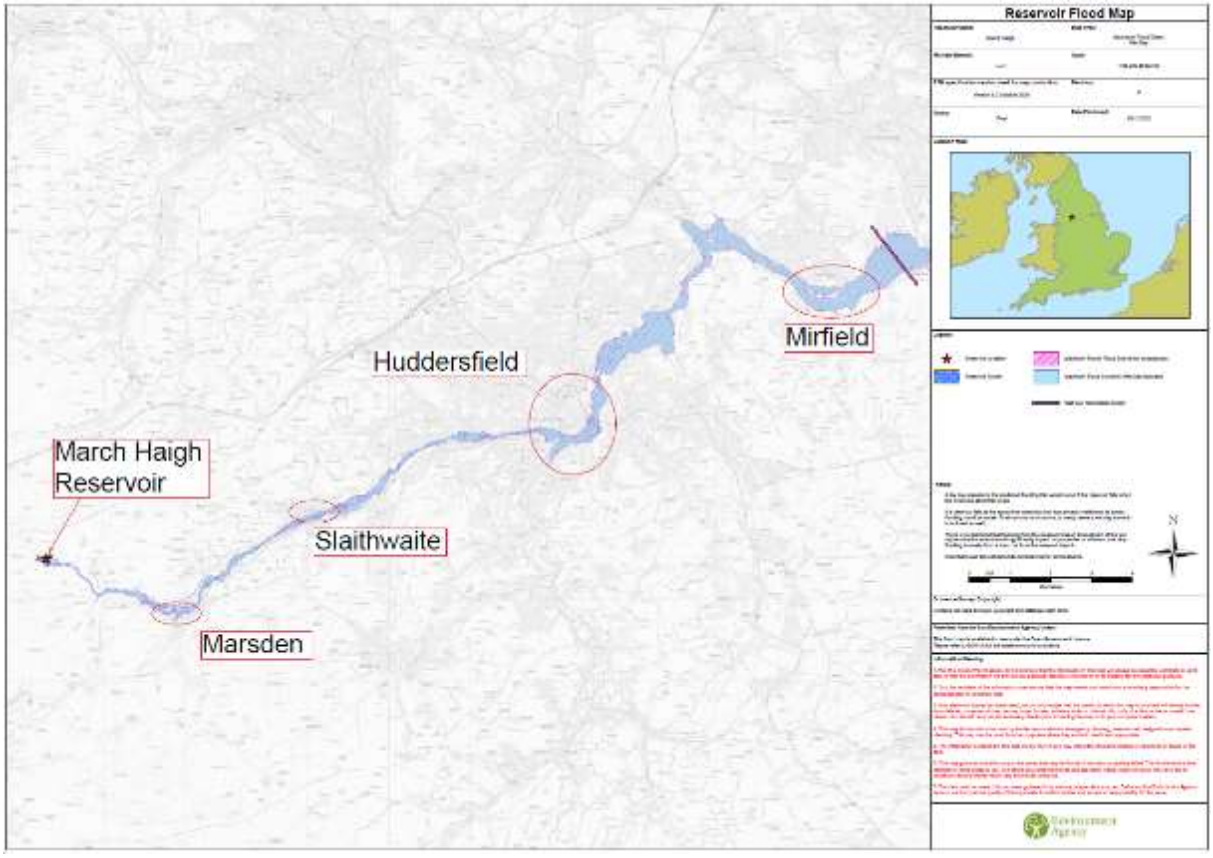

Figure 1: Defra Inundation Map modelling a wet day failure of March Haigh Reservoir.The map shows the individual flood extent for the large, raised reservoir in the event that it were to fail and release the water held on a "wet day," when local rivers had already overflowed their banks. It represents a prediction of a credible worst-case scenario.

Figure 2: Defra reservoir flood extents: This data shows the individual flood extents for all large, raised reservoirs in the event that they were to fail and release the stored water when local rivers had already overflowed their banks. It represents a prediction of a credible worst-case scenario.

Installation of a permanent access track is essential to improve the operational safety and emergency response to March Haigh Reservoir, thus protecting lives and property down the valley.

2.2 Recent (2021) incident at March Haigh demonstrating the risk to public safety from the inability to adequately access reservoirs

With no vehicle access the Trust's surveillance inspectors only means of access is to walk one kilometre across the moor to inspect the dam twice per week.

During November 2021 the inspectors saw a significant leak from a toe drain at the foot of the dam. The debris found at the foot of the dam could have been the first sign of imminent dam failure and was thought to have been the result of a culvert burst following a pipe blockage.

With over 1500 houses at risk of inundation below the reservoir on a dry day, a precautionary drawdown was called and an independent reservoir inspector asked to visit the site. Following the inspection, the reservoir engineer asked for the dam to be visited twice per day to investigate the cause of the leak.

Storm Arwen arrived that night, resulting in significant snow fall and high winds across the Pennines blocking many trunk roads and shutting the M62 motorway. The snow prevented inspections on the Saturday morning. Equally the weather was too windy and visibility too poor for helicopters. Following careful preparation, a team crossed the snow-covered moor on Saturday afternoon. Both inspections on the Sunday had to be called off as they were not safe due to heavy snow fall and poor visibility. The required surveillance was completed on the Monday, with the investigations completed on the Tuesday and Wednesday.

Holding repairs then had to be completed by hand, using shovels, due to lack of access for machinery.

In this instance the nature of the defect was a significant concern, but was not dangerous. Had the defect been an early sign of a dam breach, the inability to access the reservoir would have extended the time before first identifying the risk, potentially allowing any erosion to develop and a breach to occur. With no vehicle access to the site and with the strong winds during Storm Arwen there would be no means of preventing dam failure through bringing additional pumps or bringing in construction materials to stop the dam failure. The only action that could have been taken with no road access at this reservoir with an incident during poor weather would be a full evacuation of over 1500 properties in Marsden; potentially with an evacuation of significantly more properties towards Huddersfield.

This example explains why high risk reservoirs must be accessible by vehicles; to ensure surveillance, maintenance and emergency access is available at all times, to ensure issues can be monitored and adequate resources brought to the reservoir to prevent risks to people within communities living below a reservoir. The communities living below reservoirs expect the reservoirs to be inspected and maintained, and the Reservoirs Act was implemented to protect them, and independent inspecting engineers are appointed to consider these issues and mandate when safety works must be implemented and enforced.

2.3 Early signs of imminent reservoir failure and potential preventative actions

The majority of reservoir failures occur during storms, which are worsening due to climate change: The waves can overtop the dam wavewall and cause erosion on the face, ultimately this can lead to failure. Heavy storms can also cause saturation within the dam, and surface slips. Collapse of a draw off pipe, and subsequent erosion could also cause dam failure.

In each case, were a fault to become apparent, the Trust would need the ability to mobilise plant and pumps to draw down the reservoir quickly, and add materials to plug leakage pathways – a suitable access track is essential to undertake such emergency response measures.

Early indicators of incipient failure of embankment dams include:

- strong leakage carrying fines through or beneath an embankment,
- strong leakage carrying fines into, from or along the outside of any structure such as outlets or spillways,

- deformation and cracks over a large area of an embankment, particularly if close to the crest,
- sink holes and local depressions in an embankment, particularly if close to the crest,
- a whirlpool in the reservoir, not associated with the outlets,
- complete blockage of a sole overflow or spillway culvert which cannot immediately be cleared,
- complete erosion of the embankment between top water level and the top of the embankment, i.e. crest freeboard, which cannot immediately be made up.

By identifying these early signs through regular surveillance, actions can be taken to ensure a breach of a dam does not occur, preventing loss of life. Without early identification the defects causing these early signs can progress quickly, the water flow through the defect will accelerate as the defect enlarges increasing the rate of material erosion, resulting in a breach.

Examples of some of the many methods to prevent the signs of reservoir failure progressing include:

- Regular surveillance to identify a defect early and to take actions quickly before a defect enlarges.
- Operating draw-off valves, releasing water from the reservoir, lowering the reservoir, reducing the water load on the dam face, reducing the seepage forces through the dam structure.
- Bringing additional pumps to the reservoir to increase the drawdown rate.
- Bringing sands and gravels to the reservoir to place onto and over a leakage point. These act as a filter and can block or slow the leakage, reducing the rate of internal erosion, allowing time for the reservoir to be lowered.
- If the defect is within the drawoff pipe system (20% of dam failures) early identification can allow closure of an upstream guard valve to prevent erosion around a pipe within the dam structure.
- If the failure rate is being increased by reservoir inflow, such as damage to a spillway during a storm event, then action can be taken to divert flows away from the reservoir by closing or opening sluices on bywash systems.
- If erosion of an upstream face is identified through, for example, wave damage, then stones or sandbags can be placed in the erosion feature during the storm event. This, as with all temporary precautions, requires monitoring before permanent repairs can be installed.

Many of these defects can be prevented by regular Planned Preventative Maintenance (PPM). These PPM actions can include:

- Regular operation and greasing of draw-off valves to ensure they are operable during an emergency. Valves that are not regularly turned, often partially once per month and fully twice per year, will seize up and not work.
- Replacing or repairing wave protection stone pitching as and when it is seen to have moved under wave action. This is an ongoing, repetitive task.
- Testing emergency plans regularly by walking through the plan and occasionally (every 5 years) by a full operational test at a reservoir to ensure the systems work and to refresh

operatives' training. A full operational test would normally involve bringing pumps to site and inviting emergency services to attend if they are available.

- Repairing or repointing damage to wave walls, tunnels and other access chambers.
- Embankment dams settle over time, typically at over 1mm per year, and will require topping up on occasion to ensure adequate flood rise and wave protection. This involves removing topsoil from the crest, placing earth, compaction and reinstating the crest.
- Good vegetation management to ensure short grass across a dam face so the early signs of erosion, soil movement and wet patches can be identified early before they progress.

2.4 Historical and current access arrangements

The method of construction and original access for March Haigh Reservoir is not known and original construction documents are no longer available. It is presumed that all construction materials were carried by cart across the moorland and up the valley utilising a track which has since been lost.

The area now has a number of important environmental designations

- South Pennine Moors SSSI (Site of Special Scientific Interest) in 1994
- South Pennine Moors (Phase 2) SPA (Special Protection Area) in 1996
- South Pennine Moors SAC (Special Area for Conservation) in 2005

Prior to these designations, the Trust could undertake maintenance works by transporting plant and materials to the reservoir via tractors and trailers as shown in Figure 3 showing similar access at Swellands Reservoir.

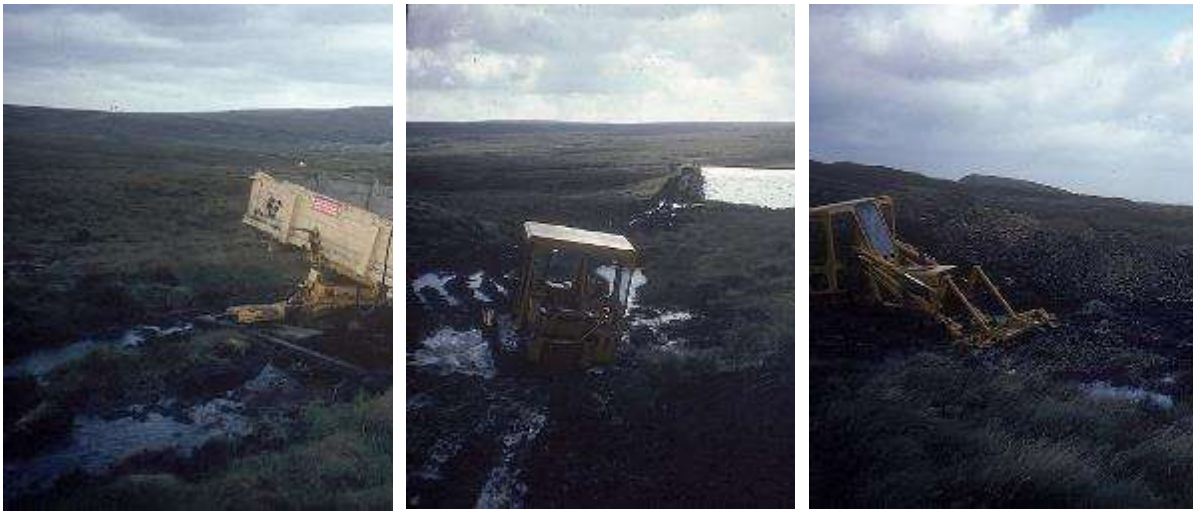

Figure 3: Archive reservoir maintenance access photographs, demonstrating difficulty crossing nearby moorland

To facilitate maintenance works to the reservoir in 1999, planning permission was granted for an access track from White Hall Barn through to the spillway. This was constructed by excavating away the upper layer of peat that was supporting vegetation and laying down a depth of compacted stone.

Following a review of the possible routes to the reservoir, this route was chosen as the most suitable with least impact. Figure 4 shows the finished track when used for the maintenance in 1999.

On completion of the work the excavated peat was placed back over the track with all stone being left in place. The temporary track is still in situ today underneath the peat.

Figure 4: Temporary access track photographs from 1999

Currently, without a permanent access track, vehicles are not used across the open moorland due to the damage/disturbance they would cause to the moorland habitats and features, including breeding birds. Therefore, the only access is via the public footpath and informal tracks over exposed moorland, a distance of 0.8km, which is frequently impassable due to poor weather or bad visibility. Routine inspection visits and minor maintenance works are often impossible as all tools and materials must be carried on foot.

Under the reservoir surveillance regime for the reservoir, it should be inspected two times per week, in order to check for developing defects and ensure the condition of the reservoir remains safe. These regular inspection visits are vital in identifying any immediate risks of failure and enabling rapid emergency access and reservoir draw down.

As well as these routine surveillance visits, the statutory regime under which the reservoir is protected requires that regular maintenance is undertaken. The grass is cut monthly during the spring and summer months, and vegetation clearance is required sometimes weekly in the growing season. These activities involve transporting the necessary machinery, and as above the weather and ground conditions can regularly preclude access, further putting the reservoir at risk. Additionally, there is an unacceptable risk to the health and safety of the inspectors and contractors, in continuing to work in these conditions.

As well as routine inspections and maintenance, assets this age require regular minor maintenance works; regular basic requirements such as installation of a valve maintenance or repair of the wave wall are not possible when equipment must be carried by hand and on foot. Early maintenance can prevent problems with the reservoir exacerbating, significantly reducing the risk of failure.

The lack of vehicular access would also prevent timely delivery of heavy plant and equipment in an emergency in order to facilitate an emergency draw down to lower water levels with pumps to augment the rate of drawdown provided by the valves, and to carry out preventative emergency

repairs. This is particularly of concern, as the reservoir is at greatest risk of failure during poor weather, precisely when access is difficult or impossible with vehicles and plant.

The Trust is no longer able to operate the reservoir in this way and a permanent access track is therefore essential, as well as now being a legal requirement.

3. Legislation of high-risk reservoirs

3.1 Background to reservoir regulations

Prior to 1930, reservoirs were largely unregulated; however, there were several dam breaches leading to significant loss of life in the late 1800's and early 1900's. The most significant of these are outlined below:

Dale Dyke Reservoir- failed in 1864, causing extensive flooding, killing 244 people and destroying 798 houses in Sheffield, with flooding effects felt over 10 miles downstream.

Bilberry Dam collapsed in 1852, causing extensive flooding in Holmfirth and the deaths of 81 people.

The Defra and Environment Agency publication, "Lessons from historical dam incidents," published in August 2011 and included in Appendix 3, provides a technical report on lessons learnt due to historical dam incidents. It notes that, "As a result of the failures of Bilberry and Dale Dyke and some serious problems encountered with other embankment dams, important lessons were learned which led to developments in design and construction during the latter half of the nineteenth century."

In 1799, floods caused 3 reservoir dams in the area of March Haigh to be washed out: One of these was Diggle Reservoir – the dam overtopped and washed away. On the same night 2 more reservoirs failed, Tunnel End reservoir, which is in cascade immediately below March Haigh, and Swineshaw Common dam embankment burst above Stalybridge causing much damage to the valley below (source: Binnie, "Early dam builders in Britain").

Eigiau and Coedty Reservoirs- in 1925, Eigiau reservoir dam failed, scouring a channel 20 metres wide and 3 metres deep, and inundating Coedty reservoir, causing a cascade failure of its dam. 16 people were killed, and a large part of the village of Dolgarrog was washed away.

Skelmorlie Reservoir in Scotland failed in 1925 when a large section of the embankment failed due to overtopping and heavy rain, killing 5 people and causing extensive flooding and property damage.

The two failures in 1925 led to the passing of the Reservoirs (Safety Provisions) Act 1930, which established the first regulation and maintenance regime for reservoirs in England and Wales. Since the passing of The Act, and improvements in maintenance and inspection regimes, there have been no reservoir failures resulting in loss of life.

The Act further improved the regulation of large raised reservoirs, and has been amended over time, most recently by the Flood and Water Management Act 2010 which implemented the recommendations of the Pitt Review 2010. Additional requirements have also been imposed on reservoir 'undertakers' since the Toddbrook incident- outlined further below.

3.2 Regulation of March Haigh Reservoir

March Haigh Reservoir is designated as a High Risk, Large Raised Reservoir under The Act. It is therefore subject to a statutory inspection and maintenance regime, which is an critical factor in the need for a permanent access track.

The Trust is the 'Undertaker' (owner or main operator) for 72 reservoirs regulated under The Act, which are all within England. As the "Undertaker", the Trust is responsible for ensuring the structural integrity of these reservoirs and to comply with the requirements of The Act.

Panel Engineers

The Act requires that inspection and maintenance must be carried out by Panel Engineers. These are Qualified Civil Engineers appointed to a panel by the Secretary of State in consultation with the Institution of Civil Engineers. There are two types of engineers particularly relevant to this application.

Supervising Engineers

A supervising engineer must be employed to supervise the reservoir and keep the undertakers advised of its behaviour in any respect that might affect safety. The supervising engineer must supervise the reservoir in accordance with The Act. This includes giving notice to the Undertaker of things which might affect the safety of a reservoir, monitoring matters directed in any current inspection or safety report and monitoring the compliance of the Undertaker.

The Trust employs a team of Supervising Engineers recruited from the Panel to carry out this role. They are required by section 12 of The Act to submit a statement at least once per year setting out the actions that they have taken in relation to supervision of the Reservoir; they can also recommend that a section 10 inspection is called (see below) if they have particular concerns over the safety of any aspect of the reservoir.

Inspecting Engineers

An inspecting engineer is appointed to inspect a high risk reservoir and identify and make recommendations to be taken in the interests of safety and maintenance. These reports are issued as "Section 10 reports". The inspecting engineer is also employed to supervise and certify the completion of Measures in the Interests Of Safety (MIOS) in an inspection report.

Inspections are required at least every 10 years, or earlier if recommended in a previous inspection report, or when requested by a supervising engineer.

If an Inspecting Engineer requires specific MIOS, the Trust, as the Undertaker is legally responsible for making sure these are carried out within the stated timescales. Failing to comply with these timescales is a criminal offence.

The Inspecting Engineer can also make recommendations in relation to the maintenance of the reservoir, such as the frequency of specific maintenance measures; failure to comply with these requirements is also a criminal offence.

3.3 Risk Assessment for Reservoir Safety Management (RARS)

The Reservoirs Act sets out the statutory framework for inspection and maintenance of High Risk reservoirs, placing legally binding requirements on the Undertaker. However, the management of reservoirs is wider than just this legal framework. The Environment Agency has established a process for risk assessment for reservoir safety management, in order to manage the risks of an uncontrolled release of the contents of a reservoir, and consequential loss of life and damage. This RARS process was published by the Agency in 2013 and is followed by the Trust as best practice in the management of risk.

The RARS process adopts a three tier approach; tier 1 uses a qualitative assessment based upon the standard approach to risk assessment, with Tier 2 and 3 more specifically targeting quantitative evidence.

A Tier 2 level of analysis provides a base quantitative estimate of reservoir risk. This would be undertaken when risk issues have been identified at a Tier 1 level, or are already known, and the risk needs to be quantified to support appropriate management actions. It would identify the possible ways in which the reservoir may fail, the likelihood of failure, and the consequences of such a failure.

The Trust carries out RARS assessment for each of its reservoirs and from these works and maintenance are brought forward where necessary to mitigate identified risks.

Although these risk assessments are not directly legally binding in themselves in the same way as a section 10 report, the consequences of not complying with the findings may nevertheless result in an identified risk causing the failure of the reservoir. This would leave the Trust exposed to liability in civil law for any death or damage caused as a result. The Trust also has duties under the Health and Safety at Work (etc) Act 1974, and the Building Act 1984, to ensure that its assets do not cause unnecessary damage or injury; prosecutions under these Acts may be considered where an identified risk has not been adequately mitigated by the Trust as Undertaker for a Reservoir.

3.4 Additional legal requirements following Toddbrook Reservoir emergency

The risks posed by reservoirs were brought into sharp focus by the Toddbrook Reservoir incident in 2019, where the partial collapse of the concrete slabs forming the auxiliary spillway chute led to the evacuation of over 1,500 local Whaley Bridge residents. As a result, the Environment Agency published an advice note which provides recommended actions for reservoir undertakers and engineers. The recommendations include improvement to inspection, supervision, operation and maintenance activities. Whilst not legally binding, it highlights the importance of regular inspection and maintenance regimes to the safety of reservoir assets; the Agency's advice note establishes good practice and must be followed by the Trust.

Please see Appendix 1: Environment Agency Advice Note Following the Toddbrook Reservoir Incident, August 2019. Under: 'Actions for reservoir undertakers', the Environment Agency's advice in the note is to: "Complete any outstanding maintenance of spillways urgently and respond promptly to the recommendations of Supervising Engineers." The principal works at March Haigh are to investigate and resolve leakage, replace valves and line the draw-off pipe, and to do these the Trust must first install the access track. Also, the advice requires, "Ensure adequate maintenance, including

the regular and prompt removal of plant growth and the consistent maintenance of any sealant to joints and cracks." A permanent access track is essential for routine maintenance.

The Secretary of State for the Environment, Food and Rural Affairs commissioned an independent review report of reservoir safety legislation, led by Professor David Balmforth. This review report, published in May 2021, provides a comprehensive assessment of the current safety regime in England. It makes recommendations for improving the safety regime and to strengthen the roles and responsibilities for the regulator, reservoir owners and engineers.

It is expected that Defra will take forward detailed work with the Environment Agency and the industry exploring the review recommendations to ensure we have a reservoir safety regime that is fit for the future.

These reviews are likely to result in more emphasis on reservoir safety and inspections, and pre-emptive maintenance and monitoring.

3.5 The Flood Plan (Reservoirs Emergency Direction) 2021

Prior to June 2021, an undertaker could be instructed to prepare a flood plan for any reservoir. However, partly in response to the Toddbrook incident, a Ministerial Direction was issued which now requires all large raised reservoirs to have an on-site emergency flood plan. The plans must outline what areas could flood in the event of an uncontrolled release of water from the reservoir, and the measures to prevent, control and mitigate such an incident.

The Flood Plans for March Haigh require that, within one hour of the concern being identified, the drawdown valves be opened to lower the reservoir level. Should the drawdown valves fail to operate, or should a more rapid drawdown be required, then the plan states pumps are to be mobilised to site. Currently this would necessarily have to be attempted by tractor and trailer across the moor, which is not a reliable method. Following this, emergency teams would need to set up on site to mitigate the damage to the reservoir and act of any advice from the reservoir engineer. Refer to section 2.3.

3.6 Relevant Case law and precedent

The Planning Court considered the scope and implications of the provisions of The Act in (The Heath and Hampstead Society) v. City of London [2014] EWHC 3868. Mrs Justice Lang explained that under section 10 Parliament had expressly given responsibility to independent civil engineers to decide what safety measures were required for any particular dam, exercising their professional judgment and expertise (paragraph 66).

In addition, the judge concluded:

> "Neither the RA 1975, nor the ICE guidance, provides for the inspecting engineer to balance considerations of safety against competing factors such as preservation of the landscape, protection of the environment, or heritage assets. In my view, it would have been evident to Government and Parliament when the 1975 Act was passed that reservoirs and dams are situated in a wide variety of locations, including areas of outstanding beauty, and in the case of ornamental lakes, in historic settings close to heritage assets. This knowledge would also be available to the authors of the ICE guidance. So it is significant that the only legislative consideration is public safety."
>
> "It can be seen that neither the Minister nor Parliament has seen fit to exempt lakes and dams in environmentallu sensitive locations."

As noted from this case, Parliament would have been aware that many reservoirs and dams are located in environmentally sensitive locations, and it is significant that, although environmental designations are considered by the inspecting engineers, the overriding legislative consideration is public safety.

4. Requirement for a Permanent Access Track

This application is for an essential permanent access track to March Haigh Reservoir for maintenance, inspection, repairs and emergency access. A permanent access track is essential in order to safely manage this high risk reservoir, and under the most recent section 10 report for March Haigh the provision of such a permanent access track is now a legal requirement.

4.1 Reservoirs Act Section 10 report

Inspecting Engineer visited March Haigh Reservoir on 27th of October 2020. His report, issued under section 10 of The Act, was issued on 25th February 2021. The report made various observations in relation to access. In paragraph 10.6, it is stated:

> There is vehicular access to within 1 km of the dam at Green Owlers Clough on Waters Road. From there, access is by foot along the footpath running next to Haigh Clough, Photograph 10-1. Alternatively access by foot can be gained over rough steep ground from the A640 which runs within 600 m of, but 100 m above the dam. A vehicular access track to the dam was constructed for the 1999 remedial works but had to be covered over on completion for environmental reasons to meet SSSI requirements. This hinders access for surveillance, maintenance or emergency purposes to a degree that I consider clearly unacceptable in the circumstances at this reservoir, and I recommend *under 12.2 Measures to be taken in the interests of safety under Section 10 (6) (a)* to **Provide a permanent access track to assure vehicular access to the dam at all times to facilitate surveillance, maintenance and emergency activities.**

The requirement for an access track is highlighted in the following paragraph regarding emergency draw-down of the reservoir (Paragraph 10.5.1)

> The reservoir has been assessed as Category A, with a resultant drawdown requirement of 5% height per day assessed over the top 30% of impounded height (subject to a minimum of 0.3 m/day and a cap of 1.0 m/day, neither of which applies at this dam with impounded depth 19.6 m). The specified inflow rate is the median (Q50) rate, but I consider that the ANSF adopted by the BW standard appears more appropriate. On this basis the required lowering would be 0.98 m per day. The outlet pipe alone would lower the water level over the top 30% of depth at a rate of about 0.72 m per day which does not meet the standard. Provision of imported pumps would increase the lowering rate to satisfy the standard, but this is prevented by the lack of a vehicle access track that is subject to a safety recommendation in this report.

The Measures in the Interest of Safety under Section 10 (3) (c) are shown below, and the timescales available for the measures to be carried out is now fixed. The shorter term measures were suitable to be carried out using foot access and helicopter lifts of the required materials. Other measures will require an access track to be available before commencement, due to large loads and plant requirements.

1. a) Investigate and control the tunnel leakage by further grouting of the core taking account of improved methods available since the 1999 works - to be completed within 5 years of the date of this report. (To be completed by February 2026)
   (b) I also recommend as an interim measure to drill and insert one or more relief holes with filters local to the leakage point in the culvert - without undue delay and no later than 9 months of the date of this report, (To be completed by November 2021) and
   (c) Maintain the water level as initially lowered to the bottom of the stoplogs at the main weir, and subject to further review and direction by the appointed Qualified Engineer - commencing without delay.

2. Replace the hydraulically operated upstream scour valve with a more robust installation; this should comprise a good quality valve and an upgraded and robust actuation system. - To be completed within 5 years of the date of this report. (To be completed by February 2026)

3. Line the original cast iron outlet pipe and its connection to the upstream HDPE pipe where ingress is occurring. - To be completed within 5 years of the date of this report. (To be completed by February 2026)

4. Fit reduction gearing to the downstream (service) outlet valve to make it possible to operate it under reservoir head. - To be completed within 3 years of the date of this report. (To be completed by February 2024)

5 Provide means and a safe system of work to facilitate control of water level at the main overflow, currently provided by the stoplogs, including under conditions of substantial overflow, and update the On-site emergency plan accordingly. This should be done in conjunction with the recommendation made in this report for review of adequacy of the overflow arrangements and dam freeboard - To be completed within 3 years of the date of this report. (To be completed by February 2024)

6 (a)_ Provide a permanent access track to assure vehicular access to the dam at all times to facilitate surveillance, maintenance and emergency activities. - To be completed within 3 years from the date of this report (To be completed by February 2024), subject to
(b) temporary arrangements to facilitate safety measures being reinstated without undue delay and no later than 9 months from the date of this report ((To be completed by November 2021).

7 Review the flood and wave calculations and take such measures as may be appropriate to ensure adequacy of the overflow arrangements and margin at the dam for floods.

8 Make further provisions for monitoring (including additional drainage) as included under 12.7 Directions in respect of records under Section 11. - Each measure to be completed within a period as determined by the appointed qualified Engineer.

4.2 Other reservoir works required

Whilst the Section 10 report for March Haigh establishes legally binding obligations on the Trust, with criminal sanctions for failure to comply by the deadline set by the inspecting engineer, there are other important safety works that have been identified by the Trust as Undertaker as being required, which need a permanent access track to facilitate.

The Section 10 report also sets out two “Matters of Maintenance”, which are legally binding requirements under section 10(3)(b). These are ongoing requirements with no specific deadline, however failure to comply is a criminal offence. The routine maintenance of dams typically requires tools, machinery and materials which currently need to be manually transported to the site.

Matters of maintenance under section 10 (3) (b)

General maintenance of the dam and ancillary works shall be to industry standard as appropriate to a dam of its assigned risk category, and as considered by the Supervising Engineer appropriate to facilitate surveillance and ensure safety in the circumstances at the reservoir. Aspects noted as currently or potentially having particular need of maintenance are as follows:

1. Keep a basic degree of maintenance of the remaining by-pass catch drain and its adjacent access track.
2. Local maintenance of the upstream facing and elimination of tree growth.
3. Fencing off the dam to exclude cattle, clearance of the remaining bracken, reinstating trampled areas on the downstream dam face, and control of vegetation by cutting.
4. Install manholes for rodding the left mitre toe drain.
5. Install a toe drain and a V-notch gauge at the Right mitre.
6. At the main overflow, sufficient repair and vegetation clearance to ensure structural adequacy and limit impedance to flow.
7. Repair displaced cope stones on the Right retaining wall downstream of the tunnel portal and repoint the retaining walls (with gaps left for pressure relief).

4.3 Routine maintenance

In addition to the works identified above, there are many routine inspection, monitoring and maintenance activities carried out to ensure ongoing protection.

The current inspection regime involves reservoir surveillance inspections twice per week and regular maintenance activities which can currently only be completed using wheelbarrows, strimmers and hand tools transported on foot some 0.8km each way. This is not acceptable in terms of health and safety for the operatives and inspectors due to the isolated location and rough terrain.

March Haigh Reservoir is visited by Reservoir Surveillance Inspectors (RSI) and staff are trained to identify any immediate risks. However, the current poor access regularly precludes routine inspection visits due to poor weather and/or bad visibility which makes the route to site impassable. This presents a health and safety risk to the RSI - highlighted in a recent accident to a member of staff who fell on similar terrain and sustained a broken hip, requiring emergency evacuation.

Regular grass/vegetation cutting is required in order for the inspecting engineers to have visual confirmation of dam profile, so that defects can be spotted. The reservoir and the surrounding moorland, managed by the National Trust, are designated common land. Cattle grazing during the summer months in this area has caused damage to the dam face and as such permanent fencing will be installed to prevent cattle access and allow for the continued maintenance activities.

A wide variety of vehicles are needed for ongoing inspection and maintenance works to ensure safe operation of the reservoir: vans and trailers and light goods vehicles for minor inspection and maintenance; moving materials such as masonry, cement, sealants, replacement valves, oils, tools, waste vegetation and debris for disposal; dumpers for earth moving equipment and larger scale maintenance works; lorries and cranes for carrying emergency pumps, pipes and welfare facilities. The below table summarises activities required to maintain the structures in a safe condition.

Activity	Frequency	Vehicle	People	Duration
Reservoir Surveillance Inspector (RSI)	3 times a week*	Welfare van (3 Tonne)	2 people	4 Hours
Routine maintenance (Minor repairs) – ie repair vandalism damage, pitching repairs	Biannually	Tipper vehicle (7.5 tonne) and Welfare van (3 Tonne)	2 to 4+ people	1 – 5 Days
Operation - Valve adjustment to set discharge rate	Weekly	Welfare vehicle	2 People	1 Hour
Grass cutting (Embankments)	4 times per year	Welfare vehicle and trailer (7.5 Tonne)	2 to 4 people	1 Day
Vegetation clearance from structures, trash screens and removal	4 times per year	Welfare van (3 Tonne), Tipper vehicle (7.5 Tonne)	2 to 4 people	1 Day
Planned Preventative Maintenance (PPM) within Confined spaces access to drawoff tunnel– Mechanical cleaning, oiling and replacing	Annually	Welfare van (3 Tonne), Tipper vehicle (7.5 Tonne)	2 to 4 people	1 Day
Supervising engineer inspections - including annual S12 Inspection (Legal requirement)	Biannually	3 x Private vehicles (2 Tonnes), Welfare vehicle (3 Tonne)	4 to 8 people	1 Day
S10 Inspection (Legal requirement)	At least every 10 Years	3 x Private vehicles (2 Tonnes), Welfare vehicle (3 Tonne)	4 to 10 people	2 Days
Duty Officer (Access out of hours, all weather, any time, to operate valves)	Emergency	Private vehicle	1 to 2 people	As required
Major maintenance construction works	As a result of defect discovered during routine inspection	28 Tonne cranes/wagons 20 Tonne dumpers	In excess of 10 people	Expect 1-6 months
Major emergency	Defect requiring emergency drawdown	28 Tonne wagon to transport pumps and pipes 20 Tonne dumpers	In excess of 10 people	Expect 1- 6 months

Table 1: Reservoir routine maintenance table

*reducing to twice weekly once the safety and access works are complete.

Regular inspection visits, requiring a permanent access track, are vital in identifying any immediate risks of failure and enabling rapid emergency evacuation and draw down to be effected.

There are also welfare requirements when undertaking certain works; for example when minor works, such as masonry pointing and stone repairs are carried out, using the tools and materials required, regular vegetation cutting, maintenance of the dam faces or clearing vegetation from the spillways. There is currently no location to site these welfare facilities.

5. Habitats Directive: Alternative solutions, Imperative Reasons of Overriding Public Interest (IROPI) and compensatory measures.

The Trust recognises and will take careful account of the Protected Area designations of the South Pennines, which carries both SAC and SPA designations, as well as SSSI. The Trust is therefore aware that the construction of the permanent access track may negatively affect the special features identified within these designations, and that any potential impacts on the integrity of the SAC and SPA will trigger a requirement for a Habitat Regulations Assessment (HRA). As part of a planning application there will be a formal report to inform an HRA.

The purpose of the Habitats Directive is to enhance Europe's biodiversity by protecting its most important habitats and species. This is achieved, in part, through the designation of protected sites.

The Directive is enacted in England and Wales under the Conservation of Habitats and Species Regulations 2017 (as amended) ("the Regulations"). The regulations require competent authorities (those with decision making powers) to assess the impact of plans or projects that may have a significant effect on these "European sites", either alone or in combination with other plans or projects. Competent authorities cannot consent to plans or projects they determine may have an "adverse effect on the integrity of a European site" following such an assessment.

However, the Regulations provide 'derogation tests' under regulation 64 and 68 which allow such plans or projects to be approved provided three tests are met:

- There must be no alternative solutions to the plan or project which are less damaging (Regulation 64).
- There are IROPI for the plan or project to proceed (Regulation 64).
- Compensatory measures are secured to ensure that the overall coherence of the network of European sites is maintained (Regulation 68).
- Developments which may result in an adverse effect on the integrity of a European Site can only be authorised once the above tests have been met.

The Government expects the statutory nature conservation bodies to have a role in helping the competent authorities to identify adequate compensatory measures.

The following section includes an assessment of the proposed development against the derogation tests should they be required, on a without prejudice basis.

5.1 Test 1: Consideration of Alternatives to a Permanent Access Track

The Trust is legally required to provide a permanent access track to March Haigh Reservoir as it is required as a measure in the interest of safety (MIOS) under Section 10 of The Act.

In order to operate March Haigh Reservoir, there is no legal alternative to the construction of a permanent access track. A permanent access track is considered by the Defra appointed Inspecting Engineer to be an essential requirement to ensure the safety of the reservoir, and to enable other

safety critical works to be undertaken. A MIOS is a legally binding obligation; failure to provide the track is a criminal offence.

Therefore, the only potential alternatives to be considered are:

- An alternative choice of route for the access track; or
- Reservoir discontinuance, if this were to be approved by the Environment Agency as the regulator, and all other necessary approvals were in place to enable works to be completed prior to the February 2024 MIOS deadline.

5.1.1 Alternative Routes

A thorough assessment of alternative routes was completed for the temporary track constructed in 1999 and the proposed permanent track will largely follow the same alignment. The appropriateness of this route was considered in the assessment of the planning application for that track. It was acknowledged in the planning officer's assessment that the alternative routes would require longer tracks and the crossing of bog areas adjacent to steep ravines.

There are no alternative routes which would provide appropriate access required for the vehicles and equipment needed during an emergency or for maintenance. Using the same alignment as the temporary track reduces the need to construct on undisturbed land.

5.1.2 Reservoir Discontinuance

If the reservoir was discontinued and drained, with the dam removed so that no substantive residual risk remained, this would preclude the practical need for a permanent access track. It should be noted that a substantial temporary access track would be required to facilitate the significant physical works associated with discontinuance.

The Trust has reviewed the need for March Haigh Reservoir and has reviewed high-level issues around discontinuance. Please see below the reasons why discontinuance is not currently considered viable by the Trust, due to adverse consequences of public importance:

Discontinuance and the Huddersfield Narrow Canal:

The discontinuance of March Haigh Reservoir would jeopardise the Trust's reciprocal arrangement with Yorkshire Water Services Limited (YWSL) who, under the Scammonden Agreement, provides 75% of the water to the Huddersfield Narrow Canal in exchange for public water supply from the reservoirs to YWSL. Loss of water supply to the canal through the Scammonden Agreement could lead to closure of the canal. This is discussed in further detail in section 4.2.2.

Without the water supply from YWSL the Trust would need to obtain the full water supply from the Scammonden Reservoirs: Tunnel End, Redbrook, Swellands and Black Moss. These reservoirs currently have very small direct catchments. Historically, when the reservoirs fed directly to the canal, they had very large indirect catchments using water channels cut across the moors to feed water into each reservoir. These channels are not maintained as the surface water flows are now allowed to flow past the channels and to feed directly into the Yorkshire Water reservoirs in the valleys below. For the Trust to re-use the Scammonden dams we would need to reinstate these catchwaters to feed our reservoirs. To repair the catchwater channels would require significant earthworks across

large areas of the moorlands, works that we do not expect would be acceptable, and would have a significantly larger impact than the proposed access track which is the subject of this paper.

Without March Haigh, and through this without the YWSL supply, loss of the Huddersfield Narrow Canal would result in loss of habitat, flora and fauna on this SSSI canal route, and loss of aquatic life. Additionally, there would be loss of amenity for local residents on this green corridor through urban areas. This would also impact on local economies. The Huddersfield Narrow Canal, as part of the inland waterways network, is an asset to the nation and plays an important part of Climate Emergency plans, providing sustainable travel routes.

Five miles of the Canal is designated as a SSSI between Ashton Under Lyme and Roaches (near Mossley). The site is designated and therefore protected under the Wildlife and Countryside Act 1981 for its habitat of standing waters, and the species that rely upon this habitat. Loss of water would result in damage to the SSSI.

The Trust cannot discontinue March Haigh Reservoir without potentially putting water supply to the Huddersfield Narrow Canal at risk. The access track is essential for the retention of March Haigh Reservoir.

Discontinuance – high level consequences of public interest:

- Failure to act upon the legally binding Recommendations as to Measures in the Interest of Safety by the statutory deadline;
- Loss of public water supply via both reservoir storage and catchment area under the Scammonden Agreement;
- Potential for loss of reservoir water attenuation and the increased risk of flooding, due to flows from the 3.1km^2 catchment area;
- A significant reduction in the security of supply of water to the Huddersfield Narrow Canal, with navigational and environmental impacts;
- Direct impact on the South Pennines SSSI, SPA and SAC, where the reservoirs are located. In particular, mitigation would be required for reduction in water table and the potential for peat drying out, with consequences for climate change and possible increased wildfire hazard in the susceptible area (two large wildfires happened in 2020, one being on Black Moss).
- The requirement to construct a substantial temporary access track given the significant scale of the discontinuance works;
- Future access required to allow the Trust to fulfil any ongoing inspection, and maintenance obligations;
- Impact on the landscape and visual receptors.

Discontinuance – Practical Implications:

If the reservoir was discontinued and drained, with the dam removed so that no substantive residual risk remained, this would preclude the practical need for a permanent access track, although it should also be noted that a substantial temporary access track would be required to facilitate the significant physical works associated with discontinuance.

Until the discontinuance works were completed, the Trust would continue to supervise and maintain the reservoir under The Act including requirements to comply with the MIOS as detailed in section 4.1. Unless the discontinuance works could be completed by February 2024, a permanent access track would still be required to comply with the MIOS. As outlined above, the permanent access track has been required by an independent Inspecting Engineer in order to ensure the continued safety of the March Haigh Reservoir. Given the complexities involved with discontinuance, both legal and practical, and the consents that would be required, the Trust considers that even if discontinuance were viable, it is unlikely to be completed by February 2024.

Discontinuance of the reservoir presents the following practical issues in addition to issues associated with the security of water supply to the Huddersfield Narrow Canal:

- Construction. The discontinuance works would require the excavation of large volumes of material. Reuse of the dam material within the reservoir bed may be possible for reprofiling or silt stabilisation, however this may not be acceptable due to the habitat designations and sensitive environment. The discontinuance works in themselves would require the construction of a temporary access track for the construction vehicles and arisings.

- Access. Vehicular access to the reservoir is currently not possible. Following the discontinuance, the Trust would retain strict liability for the land and any residual assets, which would require a safe access route for ongoing inspection and maintenance.

- Ecology and environment. Removal of the reservoir is a significant change to the local area which is protected by numerous environmental designations, and would of itself require a Habitat Regulations Assessment. Silt stabilisation and managed revegetation are likely to be required to make safe the large quantities of silt in the reservoir bed.

- Flooding. The reservoir provides flood protection to the downstream area. The large surface area of the reservoir provides a storage area for water that is throttled back as it passes over the reservoir overflow weir. If the reservoir were removed in full there will be larger peak storm events arriving downstream.

- Community and amenity. The scale of the discontinuance works may face objections from the public due to the change of amenity value.

- Negative impact on downstream water quality. Silt can become mobile in periods of high rainfall. With the reservoir in place, this leads to migration of silt towards the invert of the reservoir, but with the reservoir discontinued, this could lead to silt being washed downstream. This situation would resolve after a few years when the silt had revegetated, but in the short/medium term there would be a risk of pollution to local watercourses.

5.1.3 Alternatives methods if the access track were not a MIOS

For completeness, it is worth noting that prior to the access track becoming a legal requirement, the Trust had investigated alternative options for access for maintenance works at the reservoir, all of which had been discounted as not feasible. It must be emphasised, however, that none of these previously explored options are now available to the Trust as an alternative way of overcoming the safety issues that have been identified. Pursuant to the Section 10 report, the Trust is under a strict legal obligation to provide a permanent access track.

The options considered, but no longer available, were:

- Use of low ground pressure all-terrain vehicles;
- Helicopter access.
- Temporary access track for the planned major civil engineering works;

Low Ground Pressure All-terrain Vehicles

Regular use of alternative vehicles such as a Hagglund/Softrack, would form informal irregular tracks and impact on the moorland habitats, with informal tracks likely to evolve and widen over time in an unmanaged way as vehicles sought to avoid ruts and damaged areas, thereby likely causing greater damage over the long term than a well-designed access track. All-terrain vehicles do not satisfy all access requirements nor can they carry the pumps and plant required to provide maintenance or emergency access.

Helicopter Access

It would not be possible to use helicopters in bad weather, when access would be more likely to be required in an emergency. Helicopters have insufficient load capacity for the equipment required. Also the altitude and location of the reservoir can mean that helicopter access is prevented by wind or cloud and cannot be relied upon as the primary means of emergency response. The method is also not feasible for the regular small scale maintenance that is necessary and does not resolve safety concerns with the surveillance visits require two times per week as a minimum.

It is also worth noting that the landing area required would need to be large and be sited within the SAC/SPA which in itself may require work requiring a planning application, and/or a Habitat Regulations Assessment.

Chinooks were mobilised at Toddbrook Reservoir, however these were only used to transport sandbags, and the pumping equipment had to be brought in by road. Chinooks are subject to similar constraints as helicopters, they cannot fly in poor visibility conditions, so they are also not acceptable from a reservoir safety emergency planning point of view.

Temporary Access Track

A temporary access track has been used previously at March Haigh in order to complete major maintenance at the reservoir in 1999 . Further details about the temporary track are provided in section 2.4. Using a similar approach going forward would not address access requirements for regular inspection and maintenance, outlined in section 3.10. Failure to complete regular routine

maintenance can lead to defects developing with an increased risk of dam failure. A temporary track would also not be a practicable means of access in case of an emergency.

Therefore, if the derogation tests were to be applied, the Trust considers that the first derogation test would be met, in that there are no alternatives to a permanent access track at this time.

5.2 Test 2: Imperative Reasons of Overriding Public Interest (IROPI)

Should there be a requirement for IROPI, the Trust considers that the construction of a permanent access track is necessary for IROPI (as defined in regulation 63 of the 2017 regulations). The Trust recognises that the South Pennine Moors SAC protects a priority habitat and therefore only reasons related to "human health, public safety or beneficial consequences of primary importance to the environment, or other imperative overriding public interest only after having regard to the opinion of the Secretary of State" can be considered (Defra 'Habitat Directive: guidance on the application of article 6(4)').

5.2.1 Human Health and Public Safety

For the reasons outlined above, a permanent access track is imperative to ensure the safe operation and maintenance of March Haigh Reservoir, and to allow for emergency works and draw down if necessary. The consequence of failure of the reservoir, and resultant loss of life, loss of property (including residential dwellings) and flooding provide overwhelming justification for the permanent access track. The Trust is not entitled to consider an alternative to providing a permanent access track as it has been legal required to construct the track by a government appointed engineer. Nevertheless, the consideration alternatives has been addressed above.

5.2.2 Public Water Supply – Scammonden Agreement

The Scammonden Agreement was completed in 1965 and has an initial contract term of 60 years with a 5 year notice period for termination, so the agreement will be in place until at least 2030. The agreement allows Yorkshire Water Services Limited (YWSL) to divert water from the Trust's reservoirs and associated catchments to increase the yield of their own reservoirs for public water supply. In compensation for the loss of water YWSL supplies water directly to the HNC summit.

The Trust's general obligations under the agreement are to maintain the reservoirs so that the yield to YWSL does not decrease over time due to a lack of investment.

March Haigh Reservoir, owned by the Trust, is one of the reservoirs that is operated under the Scammonden Agreement, with the Agreement relying on the combined Black Moss, Swellands and March Haigh catchment areas.

The Scammonden Agreement is a legal Agreement for the reservoirs at March Haigh, Redbrook, Tunnel End and Swellands to support public water supply to YWSL in exchange for a constant supply of water from the Borough of Huddersfield to the Huddersfield Narrow Canal at Marsden. This arrangement allows the effective sharing of water resources, to ensure statutory public water supply requirements can be met, and the Huddersfield Narrow Canal can receive water. This reflects the importance of continuity and security of supply to both the Trust and YWSL.

YWSL supplies a water feed to the Huddersfield Narrow Canal at Marsden under the Scammonden Agreement, and this equates to a total of 1,273 million litres per year, with a maximum abstraction rate of 163.6 million litres in any consecutive period of 28 days and 9.1 million litres in any one day.

The feed received is the principal source of supply to the Huddersfield Narrow Canal summit, constituting 75% of the overall supply of resource to the canal.

Were March Haigh Reservoir to be discontinued, this would result in loss of storage and loss of catchment for YWSL and would adversely impact on YWSL's public water supply duties under section 37 of the Water Industry Act 1991. The Water Act 2014 imposed a duty on Ofwat to ensure resilience of water systems and water services. Also, it must be considered that YWSL will have additional and more onerous requirements to satisfy through the development of their next Water Resources Management Plan (WRMP'24) as specified by the Environment Agency Water Resources Planning Guideline, requiring companies to achieve a 1:500 year event water resources reliability.

According to YWSL's Drought Plan 2022 (published 2021), YWSL manage available water supplies as part of their normal day-to-day operation. In winter and spring, river resources are used to preserve reservoir and groundwater storage. In summer, releases from upland reservoir and groundwater storage are used to offset lower availability of river resources. In 2018 and 2022, YWSL used March Haigh as part of it's drought response.

The water that YWSL supply is vital for households and businesses across Yorkshire, and they supply water to 5 million domestic and 140,000 business customers, 24 hours a day. This means supplying an average of 1.3 billion litres of water to customers each day, and they monitor water resources including reservoir storage levels on a weekly basis.

5.2.3 Public Interest – Canal Feed

The value of the waterways is now appreciated to be wider than its industrial past and operational functionality, providing as it does amenity, recreation, environmental, cultural and health and wellbeing benefits for the many people who use and live near the Trust's inland waterways. Nationally, the Trust estimates that 650 million visits are made to its 3,000 kilometres of waterways each year.

The Huddersfield Narrow Canal is one such waterway and depends on the water from March Haigh Reservoir Scammonden Agreement to maintain its navigational status, maintain its SSSI corridor and remain an attractive destination for those who live alongside it. The Canal itself is 32 km long, stretching from Huddersfield in the north to Ashton-under-Lyne in the south. Along its length, the Trust estimates that nearly 127,393 people live within 1km and many more visitors come from further afield to experience the benefits offered by the Canal.

A key feature of the Huddersfield Narrow Canal is Standedge Tunnel. Over 200 years old, it is the longest canal tunnel in Britain, stretching over three miles deep beneath the Pennine hills. Having been closed in the mid-1940s, the tunnel was restored and reopened in 2001.

The Trust estimates usage at two key points along its length as follows:

- Nearly 25,000 visits are made to Standedge Tunnel each year.
- At least 30,000 visits to the Huddersfield Narrow Canal per annum.

It is essential water levels are maintained in the canal network to ensure navigation of commercial and leisure traffic. The Huddersfield Narrow Canal is prone to low water levels. Analysis of the Trust's boat sightings database estimates that 400 boating visits are made each year to the Huddersfield

Narrow[1]. There are 17 mooring sites along the Huddersfield Narrow and four businesses who rely on navigation of the canal for their income. This boating activity results in tourism expenditure and jobs creation within the local economy that would almost certainly be lost if water levels were too low to permit navigation.

The Huddersfield Narrow Canal is an invaluable environmental asset for those who live nearby and who visit it. The canal itself is designated a SSSI for much of its length. The Huddersfield Narrow Canal provides easily accessible green and blue space for the 226,500 people who live nearby[2], providing opportunities to spend time in and appreciate the natural environment. The benefits of the Huddersfield Narrow Canal aren't confined to easily observable benefits. Others include utilities buried in the towpath, flood mitigation and provision of water.

For the reasons outlined above the Trust considers that the track is required for reasons of Human Health and Public Safety in relation to the risks presented by March Haigh Reservoir. In addition, the reservoir indirectly enables public water supply to Yorkshire Water and facilitate the continued feed of water to the Huddersfield Narrow Canal. Whether those factors are considered individually or collectively, they amount to imperative reasons of overriding public interest.

5.3 Test 3 Compensatory habitat

In the event that the derogation tests apply, the Trust would identify compensatory habitat proposals and there are a number of options available to achieve this outside of the South Pennine Moors SPA and SAC. Proposals for compensation would be discussed with Natural England and the Local Planning Authority to ensure their acceptability.

5.4 Habitats Directive: Conclusions

In the event that the derogation tests apply, the Trust considers that they would be met. The extent to which these derogation tests will be applicable will be dependant the outcome of a full HRA assessment. The planning application will include a report to inform a HRA assessment.

6. Access Track Design

6.1 Route

To facilitate maintenance works to the reservoir in 1999, an access track was constructed from White Hall Barn through to the spillway. It was constructed by excavating away the upper layer of peat that was supporting vegetation and laying down a depth of compacted stone. This allowed maintenance vehicles to drive to the reservoir. On Completion of the work the excavated peat was placed back over the track with all stone being left in place.

The permanent access track will approximately follow the same alignment of the temporary track and where possible will reuse the stone that remains in place to provide additional foundation support. This minimises the impact on the environment by reducing the need to construct on undisturbed land.

[1] This figure is based on average lock usage on the canal using lock gate sensor telemetry
[2] ONS population estimate for Tameside local authority (including Ashton and Stalybridge)

6.2 Design principles

The design concept has been selected following a robust optioneering assessment that considered how to provide satisfactory essential access requirements whilst minimising the environmental impacts.

The design will be developed according to three principles:

- Reduce long term operational safety risk and reduce the risk to public safety ;
- Deliver an environmentally sensitive project which minimises impact on protected species and designated areas;
- Provide fit-for-purpose infrastructure, essential for long term access for surveillance, maintenance and emergency access to the high-risk reservoir, ensuring safety of the public and Trust staff.

The track design will allow for maintenance and emergency works as and when required, when vehicles such as dumpers and cranes would need to transport equipment and material. It should be noted that were a problem to develop with the dam (section 2), such works may last between 1 and 6 months (see Table 1) and may require pumping equipment and pipes and large volumes of material to be transported. It is essential that the access track be fit for purpose for such emergency events.

6.3 Track design

The proposal is for a 4m wide track, with materials that will be selected to minimise impacts on hydrology and to blend with the landscape. A general arrangement of the proposed track is provided in Appendix 4.

The track will be designed to be capable of transporting the vehicles required for the Trust to ensure the safe operation of March Haigh Reservoir, as detailed in Table 1.

The design basis and specification will be detailed in the planning application:

- The 'running' width of the track is 4m which is the minimum width to allow all vehicles to utilise the track without detriment to the edges. It allows natural edges to be formed with no kerb line or retained edge and facilitates the softening of the edges over time. The alignment will match the previous track as closely as possible, although the previous track was only 3m wide. 4m will also provide suitable width for slow moving vehicles to safely pass any pedestrians who may be walking along the track.
- The track will be designed for regular use by 7.5T vehicles. During maintenance works, construction and for emergencies, larger vehicles, up to 28T, will use the track, with any damage caused by additional wheel load being repaired as soon as practicable.
- The depth of the stone track will vary across the track length dependent on the condition of the existing stone, the strength of the sub-strata and the horizontal alignment. Stone usage will be reduced as far as is practicable by use of geogrid and geotextile layers. This will improve durability and reduce the volume of material required.
- The temporary track will be fully uncovered in the first instance to review condition. The permanent track construction will incorporate approximately the same alignment, minimising impact to undisturbed land and will take advantage of any residual strength in the existing track.

- Stone for the permanent track will be selected for its chemical makeup as well as strength characteristics in order to for it to be suitable within the environment which it going to be used. It will be designed to maintain hydrological continuity across the peat.

6.4 Passing places

Due to the number of construction vehicles using the track during planned maintenance or in an emergency, passing places will be located at strategic positions along the track which aim to give optimal sight distance between them. The topography of the land and alignment of the track dictate where they will be positioned, and the number will be minimised as far as practicable whilst maintaining appropriate levels of safety.

6.5 Visual impact

A Landscape and Visual Impact Assessment will be completed for the planning application as the visual impact will be an important consideration of the track design. Where possible, peat excavated from the temporary track will be utilised to obscure the edges of the permanent track. Snow poles will be provided. Further detail regarding the visual impact is provided in the Landscape and Visual Impact Assessment.

6.6 Unauthorised access

The access track is situated on open access land, near to and in some cases intersecting with public footpaths and public bridleways. The Trust will include signage to encourage walkers to the public right of way as there will be locked gates at each end of White Hall farm to physically prevent access for cars and make access difficult for pedestrians/cyclists. During any inspections, maintenance activities, or in emergencies, all personnel will be briefed to ensure these gates remain locked and thorough checks will be completed prior to leaving the site.

7. Environmental Mitigation

The Trust recognises and has taken careful account of the sensitivity of the environment in which these works need to be undertaken. The planning application will be accompanied by an Environmental Impact Assessment which will set out mitigation measures in detail. This is an iterative process and a range of surveys have already been undertaken to provide baseline data through which a number of mitigation measures have already been identified. These include:

- Minimised stone depth through incorporation of a geogrid and increased maintenance requirements to mitigate visual and ecological impacts;
- Locally appropriate and ecologically considerate construction materials;
- Maintenance of hydrological continuity across the track
- Retention of material on site, including re-use of peat for habitat creation/sensitive landscaping where possible;
- Precautionary Working Methods to avoid impacts on protected species, such as common lizard, nesting birds.

In addition, documents such as a Construction Environment Management Plan, including Precautionary Working Method Statements for sensitive ecological and environmental features, and

a Construction Traffic Management Plan will be developed to ensure suitable mitigation is embedded in the construction phase of the works.

An archaeological watching brief will also be required, subject to the finding of the full archaeology and cultural heritage assessment.

8. Programme of Works

The programmed timescale for access track and reservoir safety works is dependent on planning approval. The Trust would seek to make the earliest possible start on the access track to ensure that works are completed before the MIOS deadline of February 2024. To avoid construction delays due to bad weather, and with due consideration for nesting birds etc. the construction needs to begin in August 2023 to be completed by November 2023. This allows sufficient programme float to ensure completion before the deadline.

Due to the weather there are limitations on when works can happen in constructing the track. When the temporary track was constructed in 1999 it was found that works had to stop during periods of high rainfall. This is because flows within the track combined with the weight of plant caused the track to fail during heavy rain. Specific issues reported were:

- Safety: In periods of heavy rainfall visibility became a significant issue, particularly for dumper drivers. At these times the Contractor was unable to work.
- Moisture Content: Saturated stone does not compact well and so placing and compacting it in the rain is a problem.
- Use of the track in wet conditions is also less desirable. When it is very wet the Contractor may need to be instructed to stand down to prevent excessive damage to the track due to stone movement and erosion.

9. Conclusion

The Canal & River Trust seeks planning permission to construct an essential permanent access track from Blake Lee Lane to the spillway of March Haigh Reservoir The track will be used for surveillance, operation, maintenance and emergency response.

This document has been written to provide a detailed justification for a permanent access track taking into consideration:

- The current difficulties with access to the reservoir
- The consequences of poor access with regards to maintenance of the reservoir
- The legal framework and requirements for maintaining the reservoir
- The legal requirement for a permanent access track

The application of the derogation tests under the Habitat Regulations has been considered and the Trust believes that those tests would be met in the event that they apply. There are Imperative Reasons of Overriding Public Interest (IROPI) to support the track and there are no alternatives to a permanent access track at this time. The extent to which these derogation tests will be applicable will be dependant the outcome of a full HRA assessment.

This document has set out the principles of the track design including the aim of minimising to reducing the visual and environmental impact and mitigating any unavoidable impacts.

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Appendices

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Appendix 1

Environment Agency Advice Note Following the Toddbrook Reservoir Incident, August 2019

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Appendix 2

National Protocol for the Handling, Transmission and Storage of Reservoir Information and Flood Maps, June 2018

Appendix 3

Environment Agency “Lessons from historical dam incidents”

Appendix 4

General arrangement drawings:

- 10058105-ARC-GEN-ZZ-DR-CE-00008 General Arrangement 1 of 3

- 10058105-ARC-GEN-ZZ-DR-CE-00009 General Arrangement 2 of 3

- 10058105-ARC-GEN-ZZ-DR-CE-00010 General Arrangement 3 of 3