Case Information

Reference/Case ID	300018468

Scheduled Monument	Union Canal, River Almond to River Avon		
Index no	SM8954	**Grid ref**	NS 96800 75700

Date application validated	21 September 2016
Summary of proposed works	Ground Investigation to Canal Embankments in Linlithgow

1. Summary recommendation

This report recommends that approval for the Intrusive ground investigation (boreholes) of Union Canal embankments be granted without conditions.

2. Background

The monument is of national importance because, as an integral part of the Union Canal, and an important piece of Georgian civil engineering. Designed by a noted Scots Engineer, Hugh Baird, and built 1818-23, its continuous watercourse was without need of a single lock, and was graced by three major aqueducts inspired by another great Scots civil engineer, Thomas Telford.

This application relates to the stretch of Canal at Linlithgow.

Atkins has been appointed by Scottish Canals to undertake a geotechnical study of a series of Union Canal embankments in Linlithgow. This study includes a geophysical survey for which Section 42 consent (separate application) has been granted and an intrusive ground investigation which is the subject of this application.

The intrusive investigation will consist of boreholes that will be drilled from the canal towpath in order to allow the embankment materials to be characterised. Samples will be taken from the boreholes for geotechnical laboratory testing and in situ testing will also be undertaken in order enable characterisation of the ground. A Contractor for the ground investigation works has not yet been appointed; however, Atkins will specify that the boreholes are completed using a small Window Sampler rig such as a Dando Terrier due to access constraints along the towpath. Rigs of this kind form small diameter boreholes (approximately 100 mm) and are relatively compact when

in operation. Given that rigs of this kind are relatively small there are limitations on the depth that can be achieved during the investigation - a maximum depth of approximately 6 m is typical although this will vary according to the exact plant that the Contractor elects to use. The use of air and water flush will be prohibited during drilling operations to ensure that preferential flow pathways are not created during the works.

A number of boreholes may be selected for the installation of groundwater monitoring equipment. The majority of boreholes will be backfilled with pre-mixed bentonite cement in order to ensure that a rapid seal is formed and the intrusive works do not affect the integrity of the embankments.

Indicative borehole positions are shown on the drawings that form part of this application. It is noted that the final positions of boreholes is dependent upon:

- Access restrictions.
- Avoidance of public utility apparatus.
- Findings of geophysical surveys.
- Comments received from HES.

Additional to the proposed boreholes on the canal embankments it is hoped that probing of the canal bed will be undertaken from the canal in order to measure the thickness of sediment build-up above the canal lining.

The final borehole positions cannot yet be determined, the applicant has suggested meeting with HES to finalise positions prior to commencement of the ground investigation. The ground investigation is currently programmed to commence on 31 October 2016 with a duration of three weeks.

The works are being undertake as part of a larger project to inform the overall management of the canal embankment in this area.

Project Details:

The earth embankments through Linlithgow are in poor condition due to canal leakage and have a very high consequence of failure due to their location, proximity to residential and commercial properties and the potential damage to third party infrastructure, including a railway station and track.

It is important for Scottish Canals to gain a better understanding of the risk in order to:

- Understand the risk to stability of a canal leak on the embankment/s,
- Understand the susceptibility of the canal embankments to piping failure,
- Target resources most effectively for repair and reduce risk,

- Make cases for additional investment for more pro-active maintenance and repair to improve resilience and reduce risk,
- Determine the most effective, innovative, robust, best value, workable and quality mitigation /remediation strategies and techniques.

In order to better understand the risk of these assets to SC and the local community we are looking to undertake a comprehensive study to include the following tasks:

1) Review existing information

2) Consider what additional investigative information is required in order to gain an understanding of the risk and to answer the following statements.

- A best assessment of the current factor of safety with current repair regimes.
- A best assessment of time to embankment failure
- A best assessment of the need for and timing of stabilisation and/or repair works

3) Carry out additional ground investigation work (boreholes)

4) Undertake seepage and slope stability analysis

5) Based on the seepage and stability analysis review the validity of SC current maintenance approach to deal with the problems. Recommend a suite of appropriate, effective, innovative, robust, best value, workable and quality mitigation /remediation strategies and techniques to improve the FoS of the embankments (if required)

6) Where intervention is required, design the selected permanent solution according to framework prices.

3. Proposals

Consented works - Intrusive ground investigation (boreholes) of Union Canal embankments.

Description of works:

- Drilling approximately 29 boreholes along the canal embankment. The boreholes are 100mm in diameter and up to 6m in depth. The exact locations of the boreholes are yet to be determined and will be informed by the geophysical survey. The accompanying plan indicates the approximate locations of the borehole.

4. Representations received

No representations were received.

5. Report

a) Policy considerations

The application should be considered with the following legislative and policy considerations in mind:

Ancient Monuments and Archaeological Areas Act 1979

Part 1 Section 2: Control of works affecting an ancient monument.

Historic Environment Scotland Policy Statement June 2016

3.14. A monument is included in the schedule to secure the long-term legal protection of the monument in the national interest, in situ and as far as possible in the state it has come down to us. Scheduled monuments have an intrinsic value as monuments, not related to any concept of active use. It is the value of the monument to the nation's heritage, in terms set out in the section on Scheduling in Chapter 2 of this policy statement that is the primary consideration in determining applications for scheduled monument consent.

3.16. Works on scheduled monuments should therefore normally be the minimum level of intervention that is consistent with conserving what is culturally significant in a monument.

3.17. As each monument will require treatment specific to its individual nature, characteristics, significance and needs, any proposed change to it must be fully and explicitly justified.

3.18. Scheduled monument consent applications must be considered in terms of the cultural significance of the monument and the impact that the proposals would have upon this cultural significance. The more important particular features of the monument are to its cultural significance, the greater will be the case against interventions which modify these features.

3.19. Extensive intervention will only be allowed where it is clearly necessary to secure the longer-term preservation of the monument, or where it will clearly generate public benefits of national importance which outweigh the impact on the national cultural significance of the monument. Such public benefits could come

from, for example, interventions which make public access to scheduled monuments easier, or assist public understanding, or will produce economic benefits once the works are completed.

3.20. Where change is proposed, it should be carefully considered, based on good authority, sensitively designed, properly planned and executed, and where appropriate in the context of an individual monument, reversible.

3.22. Where consent for the range of works set out in paragraph 3.4 is granted, conditions are normally applied to ensure the works are undertaken in an appropriate manner. Common requirements are:

a. the use of appropriate assessment methodologies to determine the full impact of any proposed management, use or development;
b. the avoidance of irreversible change particularly wherever its effects cannot be adequately assessed;
c. that where change is necessary, strategies should be adopted to mitigate its impact and limit intervention;
d. that the management and execution of alteration, including remedial work, is sympathetic to the historic character;
e. that appropriate skills and techniques, materials and construction techniques are specified where appropriate;
f. that an appropriate level of record is made before, during and after any work and deposited in local and national archives, and, where appropriate, published;
g. that it is possible, on close inspection, to differentiate new work from old particularly on masonry structures;
h. that any archaeological excavation or other intrusive investigation should be based upon a detailed research strategy, with adequate resources, using appropriately skilled and experienced archaeologists with a satisfactory record of the completion and publication of projects; and
i. that the design, planning and execution of works on scheduled monuments are undertaken by people with appropriate professional and craft qualifications, skills and experience.

b) Assessment

The drilling of the boreholes along the canal embankment will have a very small physical impact on the monument and a minimal impact on its cultural significance. The boreholes are only 100mm in diameter, and once filled would not be visible. I am content that the method statement covers the procedures which will be followed and these are acceptable and conform to industry standards.

The works will add a significant safety benefit as they will manage risk associated with the leaking canal embankments.

c) Other material considerations, including impact of the works on Protected Species and Places

None

d) Conclusion

These works represent additions and alterations to the monument under Part 1.2.2.b. of the Act and as such scheduled monument consent is required.

The works involve a very minor alteration to the canal, in the form of a series of small boreholes that are each 100mm in diameter. I consider these works to represent a minimal impact on the cultural significance of the monument and to therefore accord with 3.16 of the policy statement.

The accompanying information indicates that the boreholes are to inform a larger project to addition of these timber safety gates has been carefully considered and is sensitively designed. I am content that the detailed description of the works provided in the application complies with 3.20 of the policy statement. I am therefore content that no conditions are necessary.

6. Recommended decision

The works proposed are considered acceptable in meeting the terms of national policy for scheduled monuments, and also accounting for other material considerations.

I recommend consent is **granted without conditions**.

7. Conditions

No conditions have been attached to this decision.

8. Approval

Case officer	James Bruhn	**Date**	27 October 2016
Approved by	George Findlater	**Date**	28 October 2016

Annex A – list of supporting documents

- Maps 1_Linlithgow site plan
- Maps 2_Preliminary GI Layout