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Slaithwaite Reservoir Spillway

Access & Lifting Report

JN Bentley Ltd

March 2025

Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
P01	23/10/24	SM	RR	AH	For Canal & River Trust Review
P02	19/03/25	SM	RR	AH	Final version following C&RT Comments

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Contents

1.0 Introduction and Aim

The Canal & River Trust (the Trust) commissioned JN Bentley (JNB) to provide early contractor involvement (ECI) on the construction of a new reservoir spillway at Slaithwaite Reservoir. As part of the ECI, JNB assessed potential access options against plant and material criteria required to deliver the scheme.

The aim of the document is to:

- record an assessment of construction access options,
- identify and explain preferred access options,
- describe how preferred access options are likely to be achieved and,
- provide information requested by the Local Planning Authority (LPA) in its pre-application response (dated 13 August 2024): With regard to Part 18 condition A.1 (b), '*based on the information provided the access routes do not appear to alter or change the means to the highway or create any new routes. However, officers would wish to see more evidence of these routes (i.e. rights of access and photographs of the routes) be submitted in support of any future Prior Approval application.'*

2.0 Scheme Overview

Under the Reservoirs Act 1975, measures in the interest of safety (MIOS) are required to improve the Slaithwaite Reservoir's spillway. To address the MIOS the proposed works include the construction of a new concrete spillway channel on the same alignment as the existing spillway and remediation of retained existing spillway structures. Access to undertake the construction works is significantly constrained by the existing site topography and proximity of neighbouring premises. As such temporary works are required to undertake the proposed construction.

The site is in an urban area on the western periphery of the town of Slaithwaite. The site is bordered by a Grade II listed mill and commercial and residential properties to the north on Bank Gate and Longlands Road. There are residential properties to the south on Holme Lane and commercial and residential properties on Nabb's Lane, and a railway viaduct to the east. To the west is the main waterbody of Slaithwaite Reservoir and a footpath traverses north-south over the dam crest.

3.0 Construction Plant and Vehicles

To build the new reinforced concrete spillway a variety of materials are required to be lifted and moved around the working area (extent circa 100 linear m):

- Concrete skips,
- Steel reinforcement,
- Concrete shutters/formwork,
- Stone facing for spillway walls,
- Small plant/tools,
- Excavated material from foundation excavations & removal of redundant spillway structure.

This section of the report identifies the plant and vehicles likely to be required to transport materials to the site and around the site.

The construction of the new spillway requires a large capacity & radius lifting solution. Due to the constraints of the site topography the only viable large capacity solution is a self-erecting tower crane. Refer to Section 7 of this report Annex: Crane Assessment for further details.

- Self-erecting tower crane (40T): due to lifting capability and radius 2no. cranes will be required, the first to enable the main construction of the upper and central spillway channel and the second to enable the construction of the downstream spillway channel. The cranes will operate from reinforced concrete crane pads (to be constructed as part of the enabling works). Refer to Figure 1. **The ability to access the proposed crane pad locations is pivotal to the delivery of the works and meet the MIOS date.**

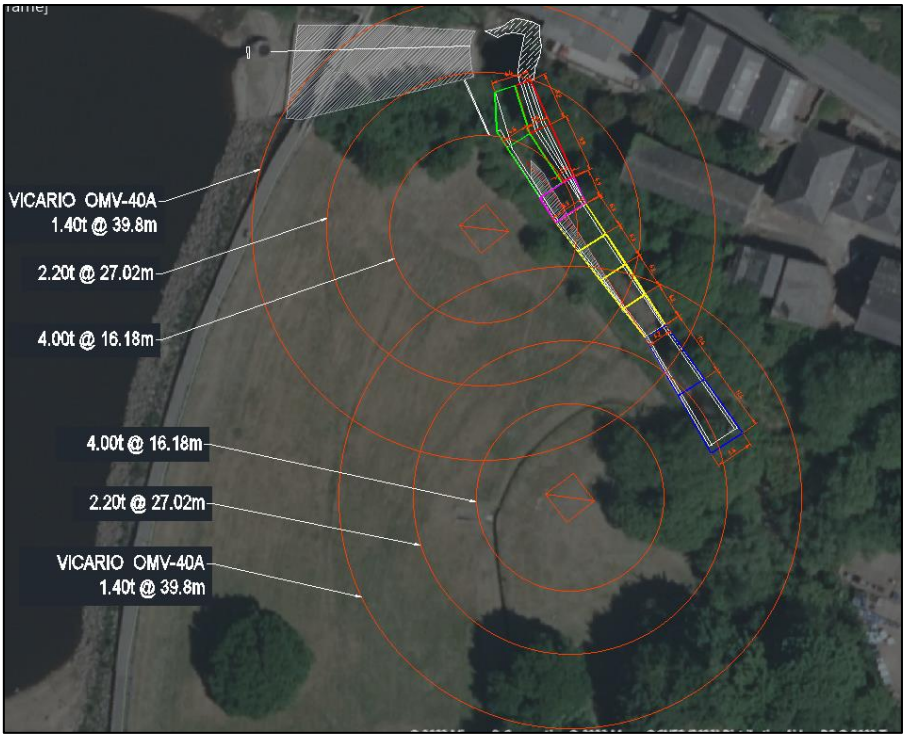

Figure 1: location of upper and lower crane pad and crane lifting radius

- 36T HIAB Loader: delivery of materials e.g. steel reinforcement, formwork etc.
- 32T tippers: delivery of materials to site e.g. stone.
- 26T Concrete wagons: delivery of concrete.

- 15T excavator is required to load ballast on the self-erecting tower crane, excavate new spillway wall foundations, load dumpers for material removal etc.
- 8T excavator: excavate new spillway wall foundations, load dumpers for material removal etc.
- 6T dumper: import and export of materials to site.
- Spider crane (10T): can be used for smaller lifting operations either within the spillway or to assist with concrete spillway works (refer to Figure 14)

4.0 Assessment of Access Options

JNB identified potential vehicular access routes for evaluation and produced a 'long list' of eight access routes as displayed in Figure 2. Each route has been evaluated and documented in Table 1 below:

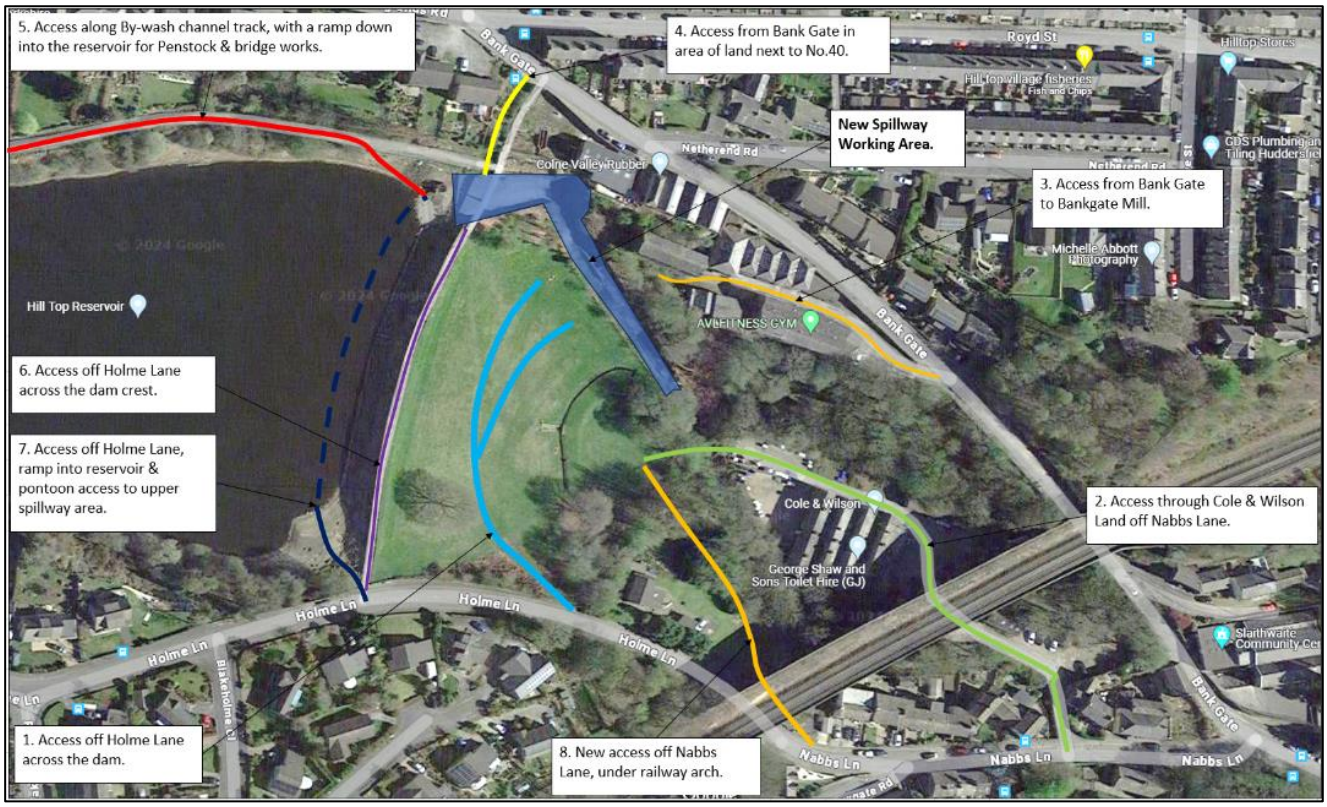

Figure 2: aerial view of reservoir detailing 'long-list' site access locations

The existing spillway is a varied construction with significant changes in elevation at discrete points along the channel. The new spillway construction is therefore divided into six sections representing the existing arrangement as listed and shown in Figure 3.

- Bellmouth weir, upper draw off culvert and concrete spillway,
- Rocky gorge,
- Upper spillway channel,
- Channel over drop shaft,
- Channel over tunnel,
- Downstream spillway channel

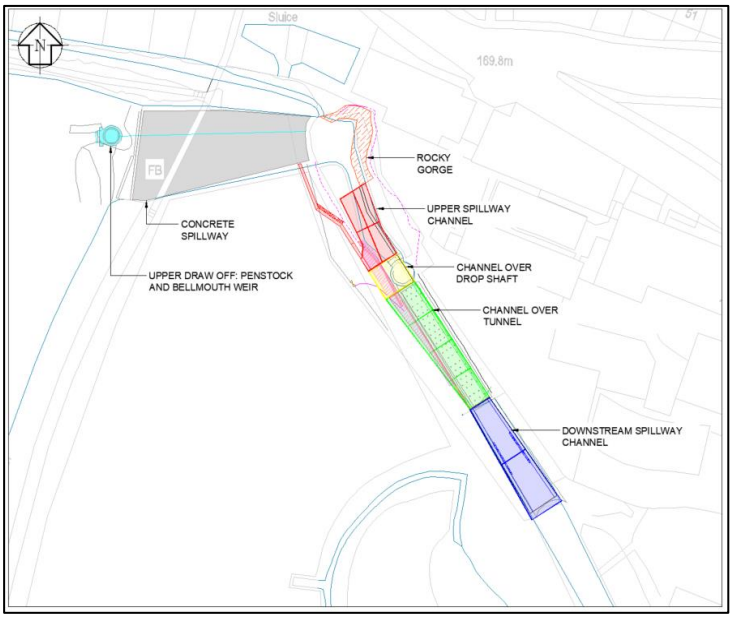

Figure 3: spillway construction plan layout

Table 1: Access Route Evaluation

Option	Which plant and vehicles can this option accommodate?	Which areas of the site can be accessed using this option?	Can suitable access from, and egress on to, the public highway be achieved?	Are any rights needed over third party land? If so, how likely will these be obtained.	Are any enabling works required? If so, describe.	Does this option involve reinstatement works? If so, describe.	Are impacts on PROWs likely? If so, are they likely to be significant?	Are impacts on ecology likely? If so, are they likely to be significant?	Are impacts on residential amenity likely? If so, are they likely to be significant?	Are impacts on visual amenity likely? If so, are they likely to be a constraint?	Are there any factors which affect buildability?	Other considerations	Evaluation
1a access off Holme Lane across the dam with temporary haul road	• Self-erecting tower crane 40T • 8 Wheeled Tipper 32T • Concrete Wagon 26T • Tracked Excavator 15T and 8T • Spider Crane 10T • Dumper 6T	• Rocky gorge • Upper spillway channel • Channel over drop shaft • Upper part of channel over tunnel	**Yes**, existing access point on Holme Lane (highway) utilised. **Is not a constraint.**	**No.** **Is not a constraint.**	**Yes.** Removal of existing timber gate and adjoining fencing at Holme Lane access point. Import of large volume of stone (2490m³) to construct haul road across the dam slope. Strengthening of lower draw off culvert may be required. **This is a constraint which can be mitigated.**	**Yes.** Removal of the stone haul road and reinstatement to current condition on completion. Reinstatement of timber gate and fencing at access point on Holme Lane on completion. **Is not a constraint.**	**No.** **Is not a constraint.**	**Yes.** Tree canopy at access point on Holme Lane. Construction of haul road across grassed dam slope. Minor loss of trees, grassland and scrub habitat. Where losses are temporary, these habitats will be reinstated on completion to at least their current condition. Where losses are permanent, suitable compensatory habitat will be created on Site. **This is a constraint which can be mitigated.**	**Yes.** Import of large volume of stone for haul road requiring multiple material deliveries. Potential disturbance & disruption from noise and other construction activities is temporary, localised and can be controlled through best practice construction methods secured and implemented via a CEMP. **This is a constraint which can be mitigated.**	**Yes.** Installation of stone haul road across the slope of the dam. The haul road will be removed and grassed slope reinstated upon completion. **This is a constraint which can be mitigated.**	**Yes.** Large volume of stone required for haul road. Buildability dependent upon availability of material. **This is a constraint which can be mitigated.**	The plant and site access (as listed) are pivotal to the buildability of the scheme. Direct access from main highway to working area. No heritage impact.	**Suitable and deliverable.** **This option meets the needs of the project and has constraints that can be mitigated.** **Option accommodates required plant pivotal to the buildability of the scheme and is the only viable option to enable access to construct the upper section of the spillway.**
1b access off Holme Lane across	• Self-erecting	• Rocky gorge	**Yes,** existing access	**No.**	**Yes.** Removal of existing	**Yes.** The stone track will be	**No.**	**Yes.** Tree canopy at access	**Yes.** Import of large volume	Ye**s.** Installation of stone haul	**Yes.** Large volume of stone required for	The plant and site access (as listed) are	**Suitable and deliverable.**

Option	Which plant and vehicles can this option accommodate?	Which areas of the site can be accessed using this option?	Can suitable access from, and egress on to, the public highway be achieved?	Are any rights needed over third party land? If so, how likely will these be obtained.	Are any enabling works required? If so, describe.	Does this option involve reinstatement works? If so, describe.	Are impacts on PROWs likely? If so, are they likely to be significant?	Are impacts on ecology likely? If so, are they likely to be significant?	Are impacts on residential amenity likely? If so, are they likely to be significant?	Are impacts on visual amenity likely? If so, are they likely to be a constraint?	Are there any factors which affect buildability?	Other considerations	Evaluation
the dam with haul road remaining in situ (the same track construction as 1a)	tower crane 40T • 8 Wheeled Tipper 32T • Concrete Wagon 26T • Tracked Excavator 15T and 8T • Spider Crane 10T • Dumper 6T	• Upper spillway channel • Channel over drop shaft • Upper part of channel over tunnel	from Holme Lane (highway) utilised. **Is not a constraint.**	**Is not a constraint.**	timber gate and adjoining fencing at Holme Lane access point. Import of large volume of stone (2490m³) to construct haul road across the dam slope. Strengthening of lower draw off culvert may be required. **This is a constraint which can be mitigated.**	topsoil and grass seeded. Reinstatement of timber gate and fencing at access point on Holme Lane on completion. **Is not a constraint.**	**Is not a constraint.**	point on Holme Lane. Construction of haul road across grassed dam slope. Minor loss of trees, grassland and scrub habitat. Where losses are temporary, these habitats will be reinstated on completion to at least their current condition. Where losses are permanent, suitable compensatory habitat will be created on Site. **This is a constraint which can be mitigated.**	of stone for haul road requiring multiple material deliveries. Potential disturbance and disruption from noise and other construction activities is temporary, localised and can be controlled through best practice construction methods secured and implemented via a CEMP. **This is a constraint which can be mitigated.**	road across the slope of the dam. The haul road will be grass seeded. **This is a constraint which can be mitigated.**	haul road. Buildability dependent upon availability of material. **This is a constraint which can be mitigated.**	pivotal to the buildability of the scheme. Direct access from main highway to working area. No heritage impact.	**This option meets the needs of the project and has constraints that can be mitigated.** **Option accommodates required plant pivotal to the buildability of the scheme and is the only viable option to enable access to construct the upper section of the spillway.**
2 Access through Cole & Wilson land off Nabbs Lane	• Self-erecting tower crane 40T • HIAB Loader Crane 36T	• Lower part of channel over tunnel • Downstream spillway channel	**Yes**, existing access from Nabbs Lane (highway) utilised.	**Yes**, early stakeholder engagement required and access agreement with landowner.	**Yes.** Strengthening of Nabbs Lane bridge may be required. Highways approval and	**Yes.** Removal of stone haul road and reinstatement of grassed dam surface to at least	**No.** **Is not a constraint.**	**Yes.** Removal of trees at base of dam slope/Merry Dale Clough boundary.	**Yes.** Delivery of materials. Potential disturbance and disruption	**Yes.** All enabling works (bridge crossing, haul road etc.) will be removed and	**Yes.** Any required strengthening of Nabbs Lane Bridge for proposed weight of construction	The plant and site access (as listed) are pivotal to the buildability of the scheme. Direct access from main	**Suitable and deliverable.** **This option meets the needs of the project and has constraints**

Option	Which plant and vehicles can this option accommodate?	Which areas of the site can be accessed using this option?	Can suitable access from, and egress on to, the public highway be achieved?	Are any rights needed over third party land? If so, how likely will these be obtained.	Are any enabling works required? If so, describe.	Does this option involve reinstatement works? If so, describe.	Are impacts on PROWs likely? If so, are they likely to be significant?	Are impacts on ecology likely? If so, are they likely to be significant?	Are impacts on residential amenity likely? If so, are they likely to be significant?	Are impacts on visual amenity likely? If so, are they likely to be a constraint?	Are there any factors which affect buildability?	Other considerations	Evaluation
	• Concrete Wagon 26T • Tracked Excavator 15T and 8T • Spider Crane 10T • Dumper 6T • Large Van • Car		The approach road is narrow. Access through Cole & Wilson yard under railway viaduct archway and near buildings within the yard. **This is a constraint which can be mitigated.**	**This is a constraint which can be mitigated.**	FRAP required for these works. Removal of fencing at boundary. Installation of temporary bridge crossing from Cole and Wilson yard across Merry Dale Clough (main river). Installation of stone haul road from bridge crossing to base of the dam slope. **This is a constraint which can be mitigated.**	current condition. Removal of temporary bridge crossing. **This is a constraint which can be mitigated.**		Minor loss of trees, grassland and scrub habitat. Where losses are temporary, these habitats will be reinstated on completion to at least their current condition. Where losses are permanent, suitable compensatory habitat will be created on Site. **This is a constraint which can be mitigated.**	from noise and other construction activities is temporary, localised and can be controlled through best practice construction methods secured and implemented via a CEMP. **This is a constraint which can be mitigated.**	landscape reinstated as per current condition. **This is a constraint which can be mitigated.**	plant/material deliveries. **This is a constraint which can be mitigated**	highway to working area. Provides access to site compound. No heritage impact.	**that can be mitigated.** **The plant and site access (as listed) are pivotal to the buildability of the scheme. Access route is required to access the site compound area and to also construct the lower section of the spillway, which cannot be reached from the upper crane pad. The construction of the entire spillway cannot be undertaken via this route, as plant cannot access up the steep dam slope and the condition of Nabb's lane bridge may restrict the size of plant able to use this route.**
3. Access from Bank Gate to Bankgate Mill.	• Concrete Wagon 26T • Tracked Excavator 8T • Spider Crane 10T • Dumper 6T	• Rocky gorge • Channel over drop shaft • Part channel over tunnel	**Yes**, existing access from Bank Gate (highway) can be utilised.	**Yes**, early stakeholder engagement required and access agreement with landowner. **This is a constraint**	**Yes.** Confined working area on top of a steep slope/bank. Temporary stability of the slope will need to be	**Yes.** Reinstatement of working area on top of a steep slope/bank as per current condition.	**No.** **Is not a constraint.**	**Yes.** Minor loss of trees. Where losses are temporary, these habitats will be reinstated	**Yes.** Delivery of materials. Potential disturbance and disruption from noise and other	**No.** **Is not a constraint.**	Bankgate Mill (historic listed building) is currently under development, The site access route may coincide with redevelopment works.	Direct access from main highway to working area. No heritage impact.	**Suitable and deliverable.** **This option meets the needs of the project and has constraints that can be mitigated.**

Option	Which plant and vehicles can this option accommodate?	Which areas of the site can be accessed using this option?	Can suitable access from, and egress on to, the public highway be achieved?	Are any rights needed over third party land? If so, how likely will these be obtained.	Are any enabling works required? If so, describe.	Does this option involve reinstatement works? If so, describe.	Are impacts on PROWs likely? If so, are they likely to be significant?	Are impacts on ecology likely? If so, are they likely to be significant?	Are impacts on residential amenity likely? If so, are they likely to be significant?	Are impacts on visual amenity likely? If so, are they likely to be a constraint?	Are there any factors which affect buildability?	Other considerations	Evaluation
	• Large Van • Car		**Is not a constraint.**	**which can be mitigated.**	assessed or justified through working methodology i.e. working outside zone of influence. **This is a constraint which can be mitigated.**	**This is a constraint which can be mitigated.**		on completion to at least their current condition. Where losses are permanent, suitable compensatory habitat will be created on Site. **This is a constraint which can be mitigated.**	construction activities is temporary, localised and can be controlled through best practice construction methods secured and implemented via a CEMP. **This is a constraint which can be mitigated.**		Service overheads at access point from Bank Gate. Narrow access from Bank Gate passing very close to multiple properties. **This is a constraint which can be mitigated (site access coinciding with any redevelopment works at the Mill can be mitigated through early stakeholder engagement).**		Access may be restricted due to current redevelopment of the Bank Gate Mill site. Although limited, this access is suitable for small plant and material deliveries to support the main construction activities.
4. Access from Bank Gate in area of land next to No.40.	• Tracked Excavator 15T and 8T • Spider Crane 10T • Dumper 6T	• Bellmouth weir, upper draw off culvert and concrete spillway,	**Yes.** New accessway from highway will be needed. Access is adjacent to a busy road intersection requiring TTRO. Will require the temporary	**Yes**, early stakeholder engagement required and access agreement with landowner. **This is a constraint which can be mitigated.**	**Yes**. New accessway from highway will be needed. Access is adjacent to a busy road intersection requiring TTRO. Steep access (>15% slope) requiring	**Yes.** Reinstatement would be required for adjacent homeowner's garden. Reinstatement of Bus stop and lighting column (if required) or temporary replacement made permanent.	**Yes.** Closure of PROW footpath across the dam crest (COL/141/50 & COL/141/60) for the duration of construction 18 months. **This is a constraint**	**Yes.** Minor loss of grassland and scrub habitat. Where losses are temporary, these habitats will be reinstated on completion to at least their current condition. Where losses are	Access is adjacent to a busy road intersection requiring TTRO. Closure of PROW a primary access for local school. Will require the temporary removal of a Bus stop and	**No.** **Is not a constraint.**	**Yes.** Unknown ground conditions will need to be assessed. Steep access (>15% slope) requiring significant reprofiling within a limited available space to be suitable - t**his is a major constraint that would be**	Access is predominantly working offline of the dam. The route crosses by-wash channel and masonry culvert structures. Direct access from main highway to working area.	**Not suitable or deliverable.** **This option has major constraints that would be difficult to mitigate and limited scope for overall works access.** Provides access to a limited area (suitable for the penstock

Option	Which plant and vehicles can this option accommodate?	Which areas of the site can be accessed using this option?	Can suitable access from, and egress on to, the public highway be achieved?	Are any rights needed over third party land? If so, how likely will these be obtained.	Are any enabling works required? If so, describe.	Does this option involve reinstatement works? If so, describe.	Are impacts on PROWs likely? If so, are they likely to be significant?	Are impacts on ecology likely? If so, are they likely to be significant?	Are impacts on residential amenity likely? If so, are they likely to be significant?	Are impacts on visual amenity likely? If so, are they likely to be a constraint?	Are there any factors which affect buildability?	Other considerations	Evaluation
			removal of a Bus stop and lighting column on Bank Gate. **This is a major constraint that would be difficult to mitigate.**		reprofiling to be suitable. Will require the temporary removal of a Bus stop and lighting column on Bank Gate. **This is a major constraint that would be difficult to mitigate.**	**This is a constraint which can be mitigated.**	**which can be mitigated.**	permanent, suitable compensatory habitat will be created on Site. **This is a constraint which can be mitigated.**	lighting column on Bank Gate. **This is a major constraint that would be difficult to mitigate.**		**difficult to mitigate.** The route crosses by-wash channel and masonry culvert structures. Structures will need to be assessed and crossing designed.	No heritage impact.	and/or bridge works only), and this site area can be accessed via other suitable and deliverable options evaluated. Adjacent to busy road intersection, traffic management (TTRO) would be required for the duration of the works, along with removal of the Bus stop and road lighting column on Bank Gate Unknown ground conditions, with access on a very steep slope and over the By-wash channel & masonry culvert structures. Ground and structural assessment of assets required. Adjacent to dam crest footpath which would require closure.

Option	Which plant and vehicles can this option accommodate?	Which areas of the site can be accessed using this option?	Can suitable access from, and egress on to, the public highway be achieved?	Are any rights needed over third party land? If so, how likely will these be obtained.	Are any enabling works required? If so, describe.	Does this option involve reinstatement works? If so, describe.	Are impacts on PROWs likely? If so, are they likely to be significant?	Are impacts on ecology likely? If so, are they likely to be significant?	Are impacts on residential amenity likely? If so, are they likely to be significant?	Are impacts on visual amenity likely? If so, are they likely to be a constraint?	Are there any factors which affect buildability?	Other considerations	Evaluation
5. Access along By-wash channel track, with a ramp down into the reservoir for Penstock & bridge works.	• Tracked Excavator 15T and 8T • Spider Crane 10T • Dumper 6T	• Bellmouth weir, upper draw off culvert and concrete spillway,	**Yes.** Access from highway on Clough House Lane. **This is not a constraint.**	**Yes**, early stakeholder engagement required and access agreement with landowner. **This is a constraint which can be mitigated.**	**Yes.** Improvement to the current footpath to ensure it is suitable for required plant to traverse. **This is a constraint which can be mitigated.**	**No.** Footpath improvements can remain in situ upon completion with prior approval or current reinstated. **This is a constraint which can be mitigated.**	**Yes.** Closure of PROW footpath along the north edge of the reservoir (COL/141/20) for the duration of construction 18 months. **This is a constraint which can be mitigated**	**Yes.** Minor loss of grassland and scrub habitat. Where losses are temporary, these habitats will be reinstated on completion to at least their current condition. Where losses are permanent, suitable compensatory habitat will be created on Site. **This is a constraint which can be mitigated.**	**No.** **This is not a constraint.**	**No.** **This is not a constraint.**	**Yes.** No space for vehicle movement/turning - single width track. **This is a constraint which can be mitigated.**	Access is offline of the dam. Access track is approx. 600m long, extent of track upgrade unknown. No heritage impact.	**Not suitable.** **This option has limited scope for overall works access.** Provides access to a limited area (suitable for the penstock and/or bridge works only), and this site area can be accessed via other suitable and deliverable options evaluated. Access track is approx. 600m long, extent of track upgrade unknown. The track has a restricted width and unknown weight limit/condition. Temporary closure of PROW required. No space for vehicle turning - single width track.
6. Access off Holme Lane across the dam crest.	• Spider Crane 10T	• Bellmouth weir, upper draw off culvert and concrete spillway,	**Yes**, existing access from Holme Lane	**Yes.** Early stakeholder engagement required and access	**No.** However current restricted width of footpath and	**Yes.** Reinstatement as per current required.	**Yes.** Closure of PROW footpath across the dam crest	**No.** Existing surfaced footpath.	**Yes.** Closure of PROW a primary access for local school.	**No.** **This is not a constraint.**	**Yes.** Restricted width and weight limit for plant.	No heritage impact. Limited scope for overall works access.	**Not suitable or deliverable.** Limited scope for overall works access.

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			(highway) utilised. **This is a constraint which can be mitigated.**	agreement with landowner. **This is a constraint which can be mitigated.**	weight limit for plant. Near vertical drop downstream face of dam. **This is a major constraint that would be difficult to mitigate.**	**This is a constraint which can be mitigated.**	(COL/141/50 & COL/141/60) for the duration of construction 18 months. **This is a constraint which can be mitigated.**	**This is not a constraint.**	Diversion required with significant detour from current route. **This is a major constraint that would be difficult to mitigate.**		A near vertical drop downstream face of dam. Partial access as footbridge has steps up to the deck. **This is a major constraint that would be difficult to mitigate.**	**This is a major constraint that would be difficult to mitigate.**	Provides access to a limited area and this site area can be accessed via other suitable and deliverable options evaluated. Restricted width and weight limit for plant. Near vertical drop downstream face of dam. Partial access as footbridge has steps up to the deck.
7. Access off Holme Lane, ramp into reservoir & pontoon access to upper spillway area.	• Tracked Excavator 15T and 8T • Spider Crane 10T • Dumper 6T	• Bellmouth weir, upper draw off culvert and concrete spillway,	**Yes**, existing access from Holme Lane (highway) utilised. **This is a constraint which can be mitigated.**	**Yes.** Early stakeholder engagement required and access agreement with landowner. **This is a constraint which can be mitigated.**	**Yes.** Partial take down of dam wave wall. Construction of stone access ramp to pontoon sited in the reservoir. **This is a constraint which can be mitigated.**	**Yes.** Removal of stone access ramp and reconstruction of the reservoir wave wall. **This is a constraint which can be mitigated.**	**Yes.** Closure of PROW footpath across the dam crest for the duration of construction 18 months. **This is a constraint which can be mitigated.**	**No.** Existing surfaced footpath at access point. **This is not a constraint.**	**Yes.** Closure of PROW a primary access for local school. Diversion required with significant detour from current route. **This is a major constraint that would be difficult to mitigate.**	**No.** Access used previously for lower draw off culvert works. **This is not a constraint.**	**Yes.** A near vertical drop downstream face of dam. **This is a constraint which can be mitigated.**	No heritage impact. Limited scope for overall works access. High water level required for ramp pontoon access to spillway, whereas a low water level is required for the construction works. **This is a major constraint that would be**	**Not suitable or deliverable.** **This option has major constraints that would be difficult to mitigate and limited scope for overall works access.** Large amount of imported stone required for ramp in reservoir. High water level required for ramp

Option	Which plant and vehicles can this option accommodate?	Which areas of the site can be accessed using this option?	Can suitable access from, and egress on to, the public highway be achieved?	Are any rights needed over third party land? If so, how likely will these be obtained.	Are any enabling works required? If so, describe.	Does this option involve reinstatement works? If so, describe.	Are impacts on PROWs likely? If so, are they likely to be significant?	Are impacts on ecology likely? If so, are they likely to be significant?	Are impacts on residential amenity likely? If so, are they likely to be significant?	Are impacts on visual amenity likely? If so, are they likely to be a constraint?	Are there any factors which affect buildability?	Other considerations	Evaluation
												difficult to mitigate.	pontoon access to spillway, whereas a low water level is required for the construction works.
8. New access off Nabb's Lane, under railway arch.	• Self-erecting tower crane 40T • HIAB Loader Crane 36T • Concrete Wagon 26T • Tracked Excavator 15T and 8T • Spider Crane 10T • Dumper 6T	• Lower part of channel over tunnel • Downstream spillway channel	**No.** New access required off Nabbs Lane. **This is a constraint which can be mitigated.**	**Yes** Early stakeholder engagement required and access agreement with landowner. **This is a constraint which can be mitigated.**	**Yes.** Potential removal of residential garages. Preparation of access track across third party land. **This is a constraint which can be mitigated.**	**Yes.** Reinstatement of residential garages and land as per current. **This is a constraint which can be mitigated.**	**No.** **This is not a constraint.**	**Yes.** Minor loss of grassland and scrub habitat. Additional tree removal required (TPO). Where losses are temporary, these habitats will be reinstated on completion to at least their current condition. Where losses are permanent, suitable compensatory habitat will be	**Yes.** Potential removal of residential garage.	**Yes.** Change in ground levels along route requiring cut and fill and suitable ground/track preparation. Proximity to buildings (residential property) and structures (railway viaduct) restrict access for preparing accessway. **This is a constraint**	In very close proximity to residential dwellings. Nabbs Lane narrows on approach. **This is a major constraint that would be difficult to mitigate.**	No heritage impact. This option would remove the requirement to construct the temporary crossing over Merry Dale Clough.	**Not suitable or deliverable.** Unknown land access (Network Rail). Relatively narrow access between viaduct archways. Network Rail/Arch Co approval required. Greater Impact upon adjacent residential properties. Additional tree removal required (TPO).

Option	Which plant and vehicles can this option accommodate?	Which areas of the site can be accessed using this option?	Can suitable access from, and egress on to, the public highway be achieved?	Are any rights needed over third party land? If so, how likely will these be obtained.	Are any enabling works required? If so, describe.	Does this option involve reinstatement works? If so, describe.	Are impacts on PROWs likely? If so, are they likely to be significant?	Are impacts on ecology likely? If so, are they likely to be significant?	Are impacts on residential amenity likely? If so, are they likely to be significant?	Are impacts on visual amenity likely? If so, are they likely to be a constraint?	Are there any factors which affect buildability?	Other considerations	Evaluation
								created on Site. **This is a constraint which can be mitigated.**		**which can be mitigated.**			

5.0 Conclusion of Assessment

The site topography at Slaithwaite Reservoir and proximity of neighbouring premises is a significant constraint at this Site. Self-erecting tower cranes have been identified as the required large capacity & radius lifting solution to deliver the scheme and meet the MIOS date. The position of the upper and lower crane pads has been selected such that self-erecting tower cranes can work across the full extent of the main spillway construction.

Table 1 provides an evaluation of the initial 'long list' of access options. The primary access routes identified as suitable and deliverable for delivery of the main spillway channel works are access routes 1a, 1b and 2. Access route 1a and 1b provide access to the upper crane pad to facilitate works to the rocky gorge, upper spillway channel, channel over the drop shaft and upper section of channel over tunnel. Access route 2 provides access to the site compound and lower crane pad enabling works to the lower section of the channel over the tunnel and downstream channel. These access routes are depicted in Figure 4 below.

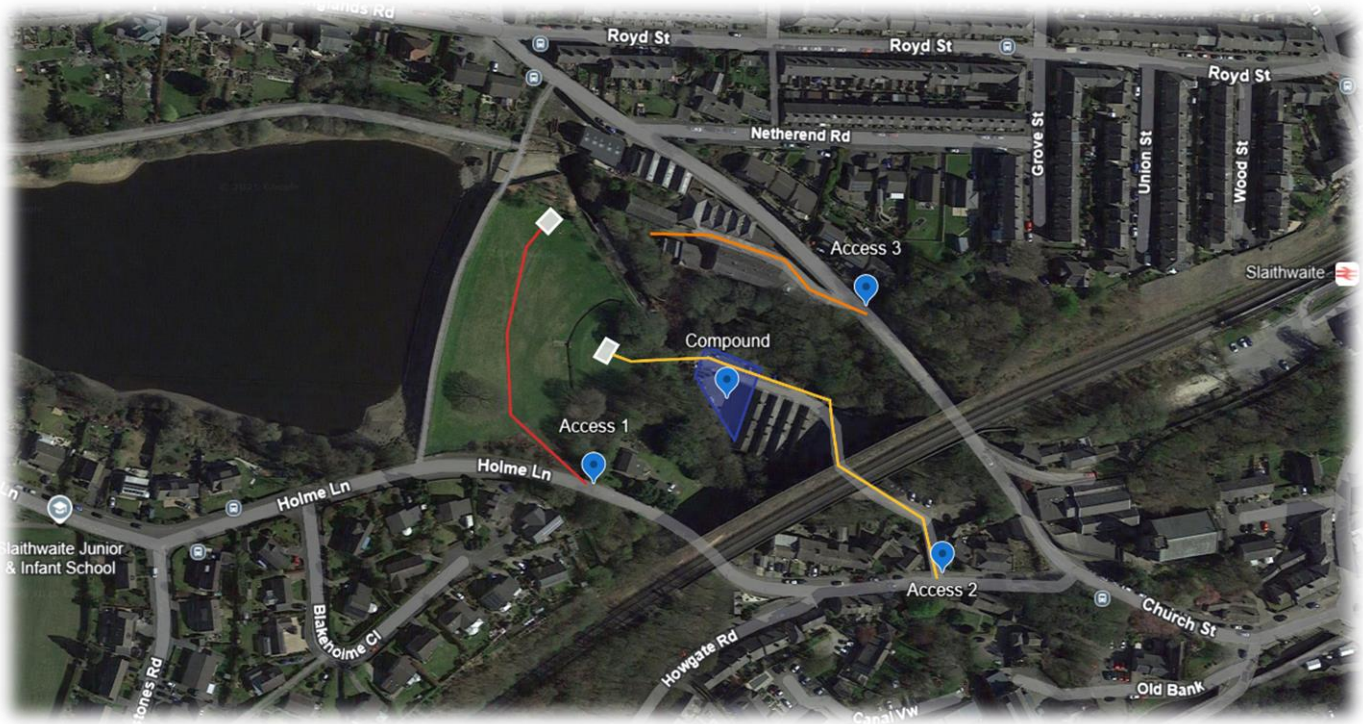


Figure 4: Identified access routes

Access route 3 has been selected to provide subsidiary access to the rocky gorge, channel over drop shaft and channel over tunnel (refer to Figure 2). Although limited, this access is suitable for small plant and material deliveries to support the main construction activities.

All selected routes have the benefit of having an existing access point from the main highway. All other routes are discounted for the main spillway construction.

6.0 Delivery of Access Routes

Access routes 1a, 1b will require the construction of a stone haul road across the face of the dam from the access point on the highway (Holme Lane) to the upper crane pad (to be constructed as part of the enabling works). This will require the import of a large volume of stone (2490m^3) for the haul road. In option 1a, the haul road is a temporary structure that will be removed upon completion of the spillway construction. In option 1b, the stone haul road will remain in situ upon completion but will be top dressed and grass seeded such that the accessway blends with the current surroundings. Crown lifting of tree group G5 required at the accessway from Holme Lane.

Access route 2 will require the strength/capacity assessment of Nabbs Lane bridge at the immediate access from the highway on Nabbs Lane. The Site compound will be within the existing Cole & Wilson yard. A temporary bridge crossing (Mabey bridge) across the Merry Dale Clough will be installed to provide access to the base of the dam and proposed location of the lower crane pad. The crossing from the Site compound to the base of the dam will require the removal of trees and preparation of the ground and installation of a stone haul road and temporary flume crossing.

The proposed access road and crane pad general arrangement is shown in Figure 5 with Sections.

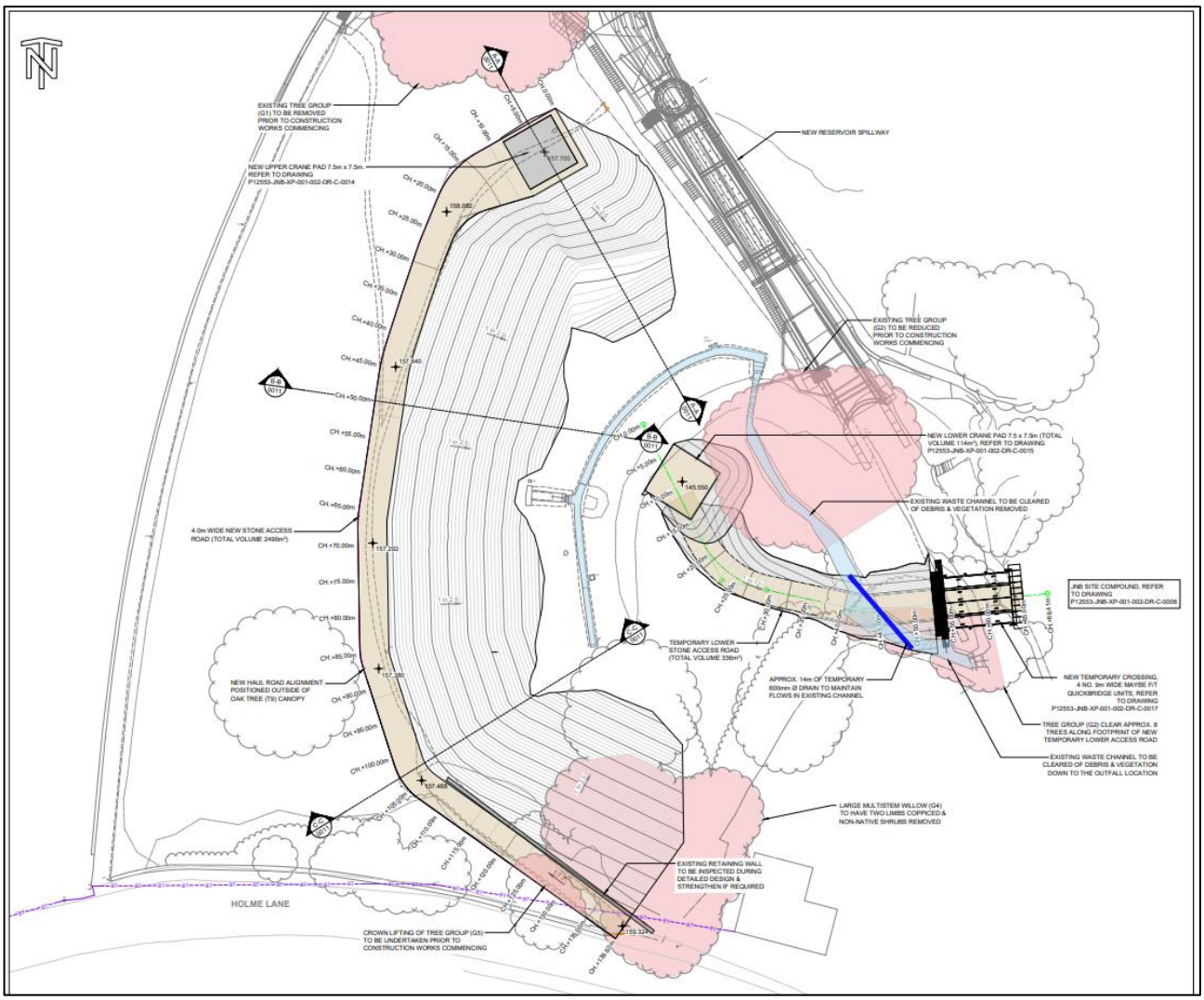
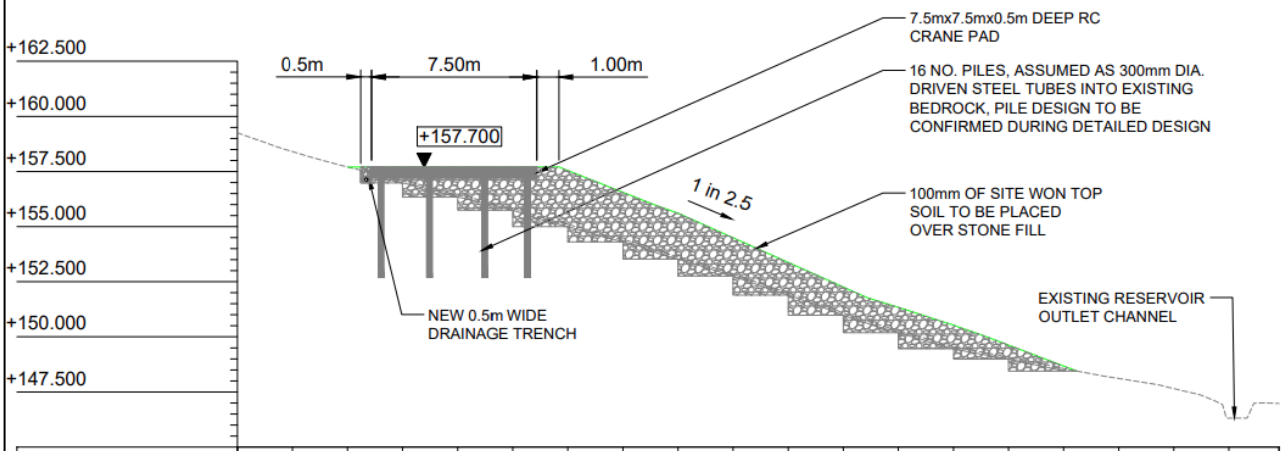


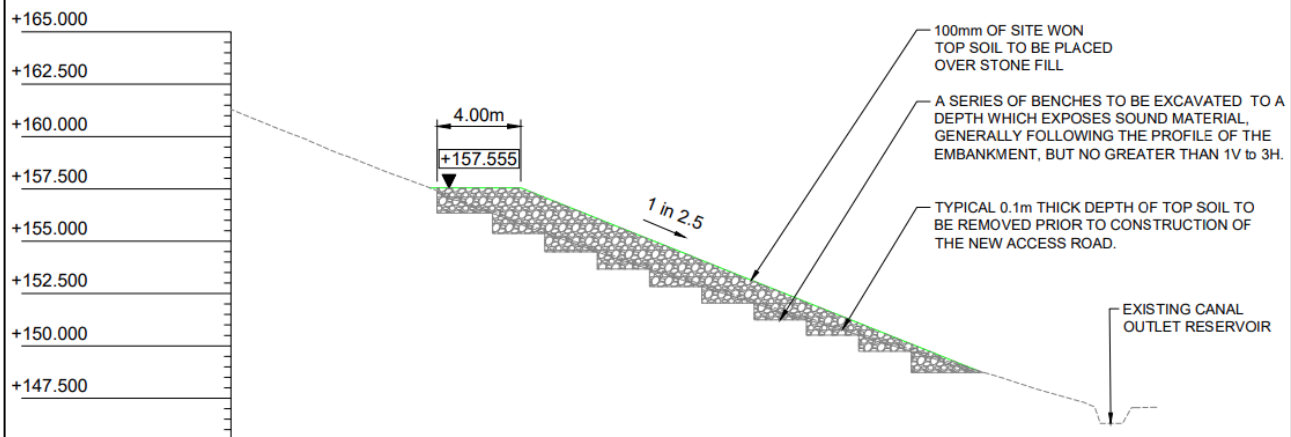
Figure 5: access road and crane pad general arrangement (GA sections provided below)

SECTION A-A - CH4.5m UPPER CRANE PAD

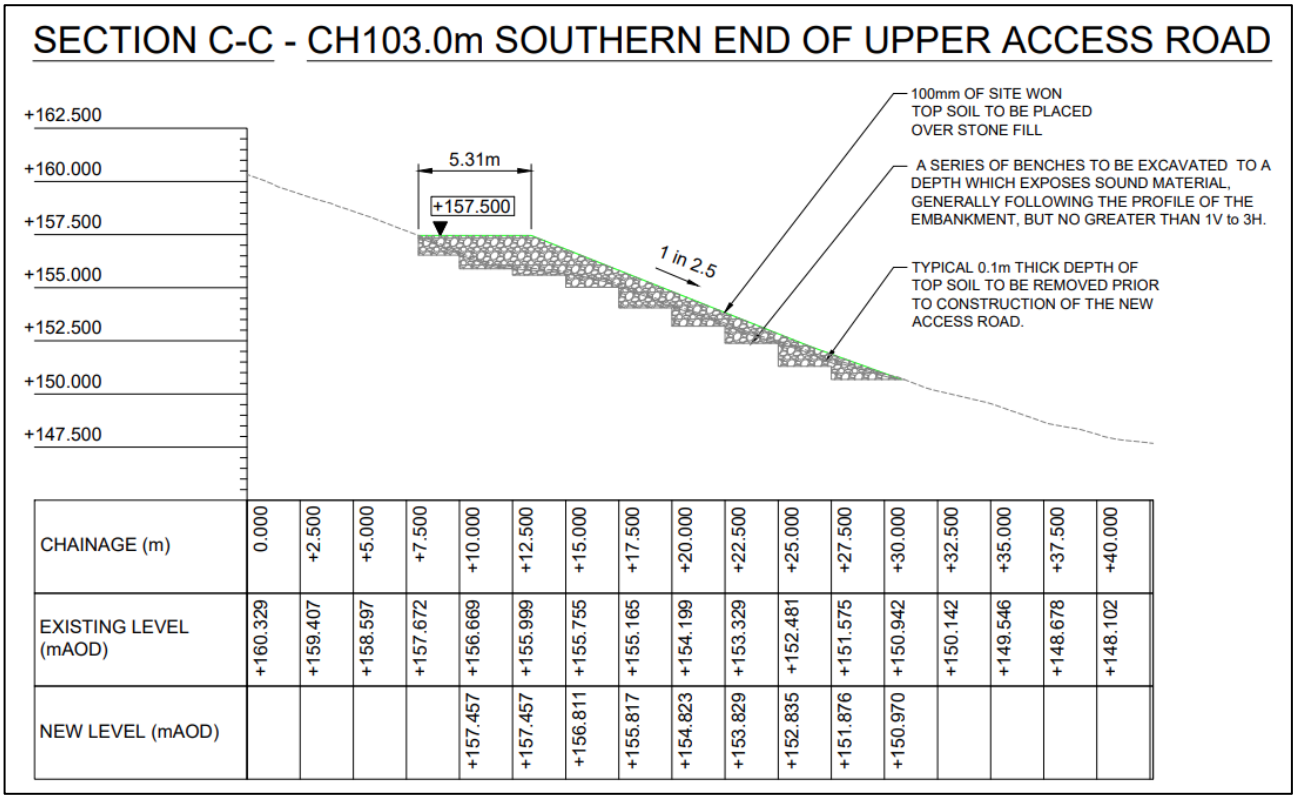


CHAINAGE (m)	0.000	+2.500	+5.000	+7.500	+10.000	+12.500	+15.000	+17.500	+20.000	+22.500	+25.000	+27.500	+30.000	+32.500	+35.000	+37.500	+40.000	+42.500	+45.000
EXISTING LEVEL (mAOD)	+159.258	+158.403	+157.706	+157.080	+156.441	+155.845	+155.096	+154.409	+153.624	+152.858	+151.994	+151.081	+150.289	+149.567	+149.089	+148.560	+148.111	+147.652	+146.310
NEW LEVEL (mAOD)			+157.700	+157.700	+157.700	+157.700	+157.539	+156.552	+155.608	+154.493	+153.376	+152.529	+151.339	+150.527	+149.627	+148.674			

SECTION B-B - CH50.0m MID-POINT OF UPPER ACCESS ROAD



CHAINAGE (m)	0.000	+2.500	+5.000	+7.500	+10.000	+12.500	+15.000	+17.500	+20.000	+22.500	+25.000	+27.500	+30.000	+32.500	+35.000	+37.500	+40.000	+42.500
EXISTING LEVEL (mAOD)	+161.297	+160.280	+159.248	+158.287	+157.334	+156.436	+155.492	+154.594	+153.769	+152.934	+152.144	+151.345	+150.614	+149.844	+149.022	+148.262	+147.513	+146.298
NEW LEVEL (mAOD)					+157.553	+157.553	+157.092	+156.092	+155.092	+154.086	+153.087	+152.088	+151.089	+150.090	+149.091			



CHAINAGE (m)	0.000	+2.500	+5.000	+7.500	+10.000	+12.500	+15.000	+17.500	+20.000	+22.500	+25.000	+27.500	+30.000	+32.500	+35.000	+37.500	+40.000
EXISTING LEVEL (mAOD)	+160.329	+159.407	+158.597	+157.672	+156.669	+155.999	+155.755	+155.165	+154.199	+153.329	+152.481	+151.575	+150.942	+150.142	+149.546	+148.678	+148.102
NEW LEVEL (mAOD)					+157.457	+157.457	+156.811	+155.817	+154.823	+153.829	+152.835	+151.876	+150.970				

Access route 3 may require improvement to existing surfacing and preparation of ground outside Bank Gate Mill, adjacent to the spillway, for proposed plant and vehicular access and material laydown area.

7.0 Annex - Crane Assessment

7.1 Tower Crane

A Tower Crane (see Figure 6) would provide a good lifting capacity & radius, however large concrete foundations would need to be constructed and left in-situ.

The only viable location to site the tower crane would be at the base of the dam, with site access for mobilisation required via the narrow 3rd party lane where bridge improvement works would be required. Figure 7 shows the potential location of a tower crane along with the lifting radius and capacity of various models circled in green.

Figure 6 – typical tower crane

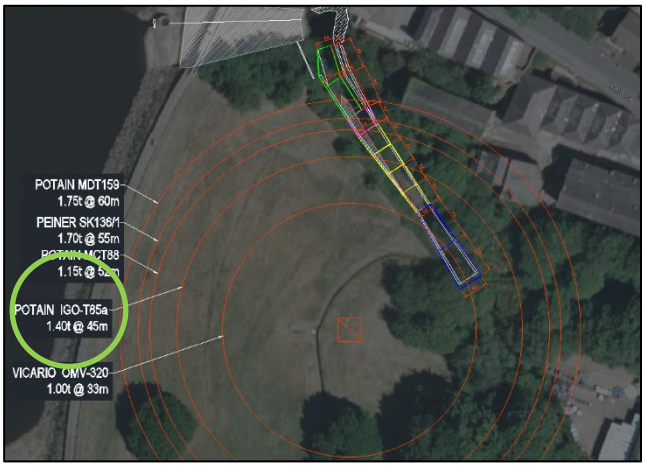


Figure 7 – tower crane location and lifting radius

A large mobile crane would be required to erect the tower crane jib, on a large, level area (circa 65m) which is not available in this location. The tower cranes assessed would not be able to service the entire spillway construction, however as the smaller radius tower cranes could not be utilised, the larger capacity cranes were not assessed any further.

The process of installing the Tower Crane and mobilising large plant over the Nabbs lane bridge, effectively discounted the Tower Crane option.

7.2 Crawler Cranes

Crawler Cranes are like Tower Cranes (see Figure 8), in that they also provide a good lifting capacity & radius, JNB have commonly used Crawler Cranes to construct historic reservoir spillway projects, where it is possible for the crawler crane to access a working platform adjacent to the Spillway. 90T crawler cranes would be required to provide the required lifting capacity/radius, with two crawler cranes required to cover the extent of the working area (crane locations indicated on Figure 9).

Figure 8 – typical 90T crawler crane

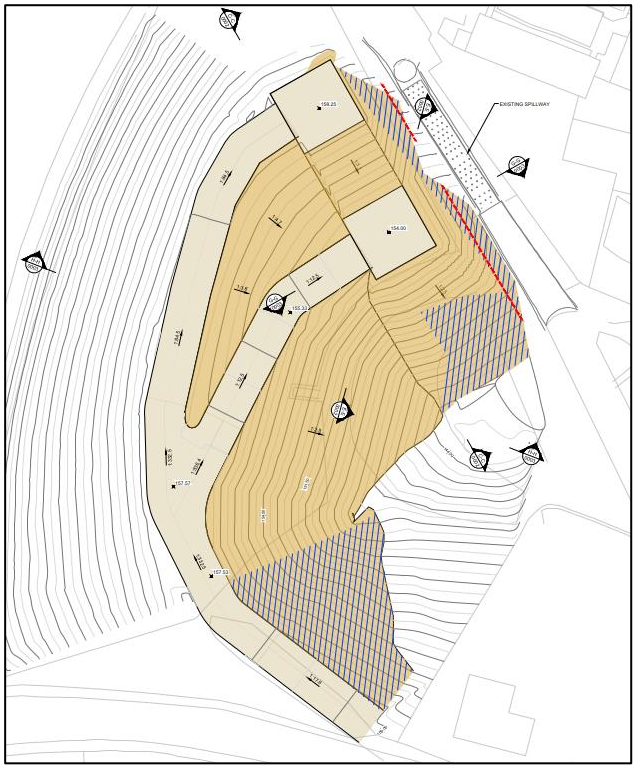


Figure 9 – proposed crawler crane locations

To mobilise the crawler cranes to the required working platforms, a stone haul road would need to be constructed across the existing dam from the existing access off Holme Lane. The crawler cranes can only traverse a maximum gradient of 1 in 10, therefore, to access both crane pads, approximately 8,225m3 of stone would be required to build the haul road, which would also effectively bury the discharge channel structure at the toe of the dam.

This excessive volume of stone and impact upon the reservoir discharge channel, effectively discounted the Crawler Crane lifting option.

7.3 Self-Erecting Tower Crane

Following confirmation that the Tower Crane & Crawler Cranes were not suitable for this project, the option of installing two Self-Erecting Tower Cranes were investigated.

JNB have used Self Erecting Tower Cranes on Reservoir Spillway Projects where it has not been possible to access with a Crawler Crane (see Figure 10 & 11). Self-Erecting Cranes can traverse up steeper slopes and on narrower access routes, when compared to Crawler Cranes.

The Self-Erecting Tower Crane also only requires a telehandler or excavator to load its ballast, not a mobile crane, so can easily be erected on site.

Figure 10 – self-erecting tower crane spillway construction

Figure 11 – self-erecting tower crane

Two locations have been selected for siting the self-erecting cranes, to ensure lifting provision is available over the entire working area, as shown on figure 12 below:

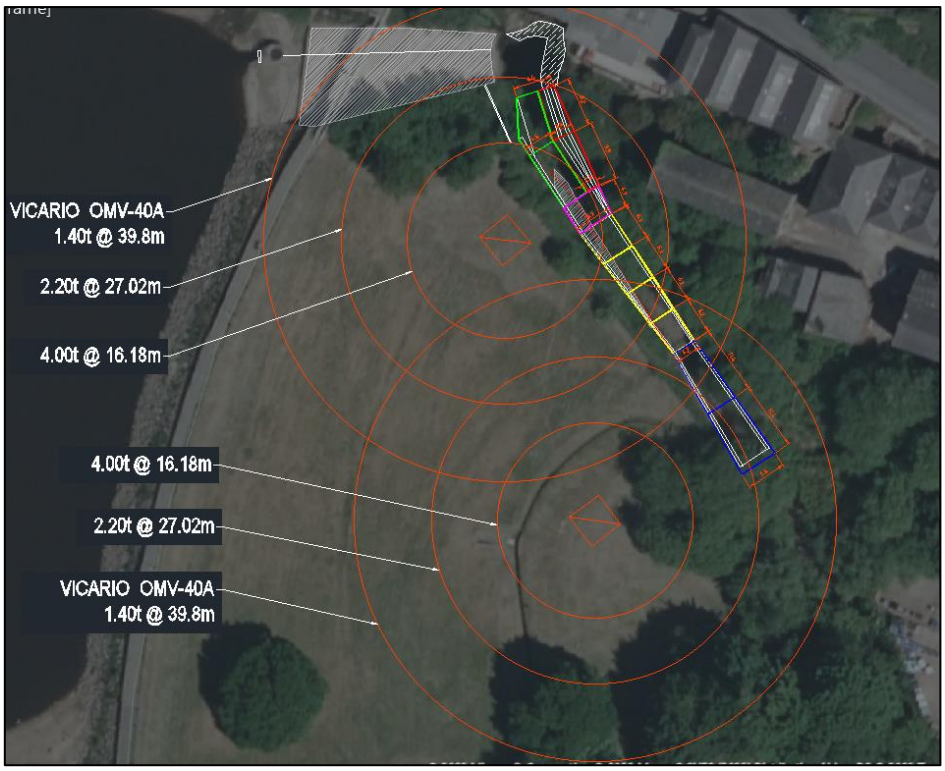


Figure 12: proposed self-erecting tower crane locations

The revised haul road configuration (as shown in figure 5) is narrower, does not impact upon the reservoir discharge channel and provides access for plant and materials to enable construction of the new spillway i.e. a self-erecting tower crane is able to meet the project needs.

7.4 Cable Crane System

The use of a cable crane system (see Figure 13) to construct the spillway was investigated, as these systems are used on large dam construction projects, usually in inaccessible locations. However, the temporary works required to install the support towers would be considerable and far outweigh the benefits that this solution could provide.

Figure 13: typical cable crane

Although a smaller winching system could be utilised for smaller lifting requirements, it would not be cost effective to install a lifting solution of this magnitude, on a project of this size, therefore this option was discounted.

7.5 Additional Lifting/Access Solutions

The construction of the new spillway does require a large capacity & radius lifting solution as detailed within the four options within sections 7.1 to 7.4, however smaller lifting alternatives will be investigated as the design progresses to understand whether there are opportunities to reduce the construction programme and temporary works construction costs.

The lifting options detailed below cannot be relied upon to construct the whole project, however they will be considered to construct certain elements of the project.

7.6 Spider Crane

Spider Cranes (see Figure 14) can perform lifting operations on challenging terrain, due to their versatile outrigger configuration, which are designed to stabilise the crane even when working on uneven surfaces. The crane would potentially be able to:

- Undertake Lifts on the dam slope.
- Be lifted into the new spillway to perform smaller lifting activities.
- Track along the dam crest and be used for the penstock actuation/bridge lifting activities.

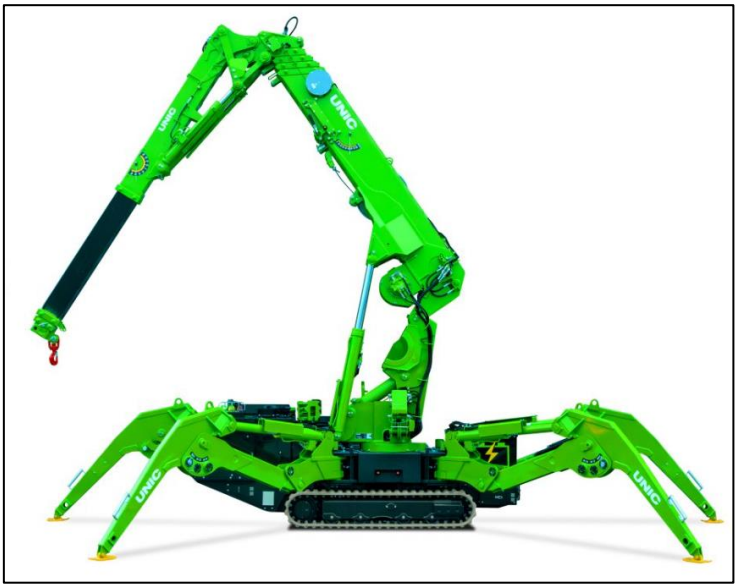


Figure 14: typical spider crane

7.7 Small Gauge Rail System

The Slaithwaite dam crest footpath cannot have a haul road constructed upon it, as it is narrow and has a load limit due to the steep side slopes. One option to work around this issue would be to construct a narrow-gauge rail line (see figure 15) to transport materials, operated via a pulley system.

Figure 15: narrow gauge rail system

As per the spider crane solution, the option could not be relied upon to service the entire project, although could be incorporated to facilitate certain tasks.