

Slaithwaite Reservoir Spillway Temporary Access & Lifting Report

JN Bentley Ltd.

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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, and
- describe how preferred access options are likely to be achieved.

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 (refer to Section 6 of this report Annex: Crane Assessment for further details), which will consist of one of the following two options:

- 1) A single 135T Crawler crane: due to the lifting capacity and radius 1no. crane could be utilised to facilitate the construction of the entire main spillway. The crane will operate from a reinforced concrete crane pad (to be constructed as part of the enabling works). Refer to Figure 1. **The ability to access the proposed crane pad location is pivotal to the delivery of the works and meet the MIOS date.**

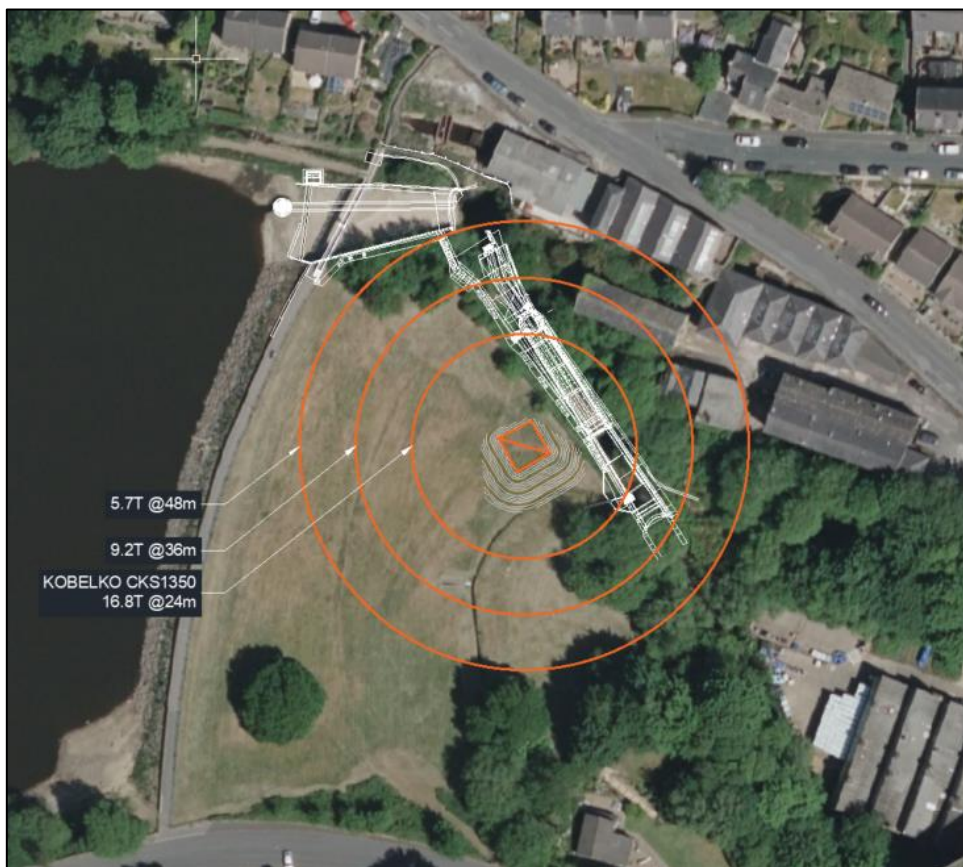


Figure 1: location of crane pad and crawler crane lifting radius

- 2) Self-erecting tower cranes (40T): due to lifting capability and radius 2no. cranes would 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 2. **The ability to access the proposed crane pad locations is pivotal to the delivery of the works and meet the MIOS date.**

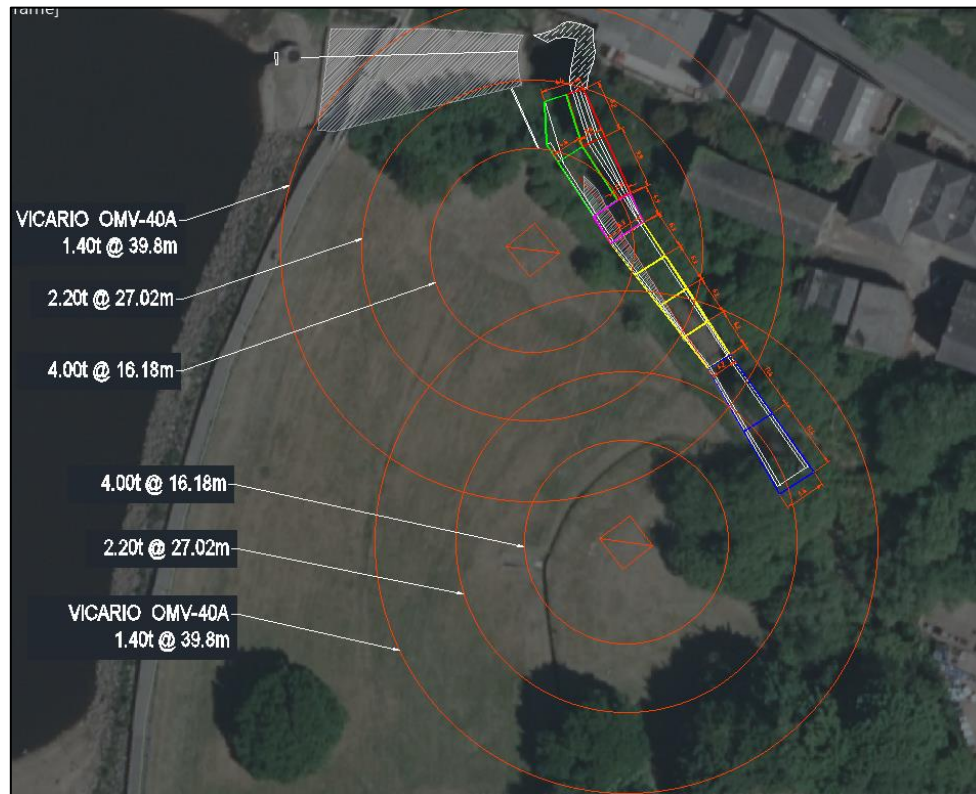


Figure 2: location of upper and lower crane pad and self-erecting crane lifting radius

These additional items of construction plant will also be required to construct the new spillway:

- 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.

4.0 Assessment of Access Options

JNB identified potential vehicular access routes for evaluation and produced a 'long list' of nine access routes as displayed in Figure 3. Each route has been evaluated and documented in Table 1 below:

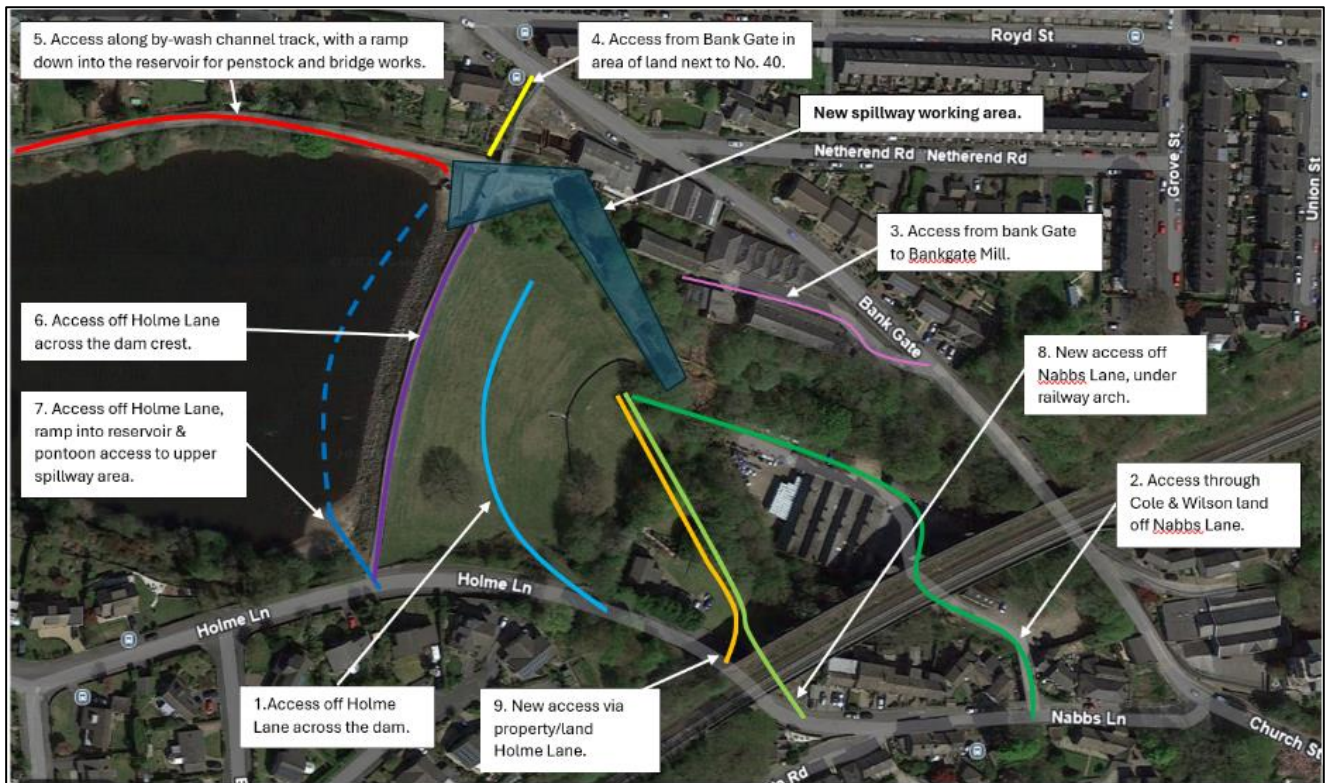


Figure 3: aerial view of reservoir detailing 'long-list' site access locations

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 4.

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

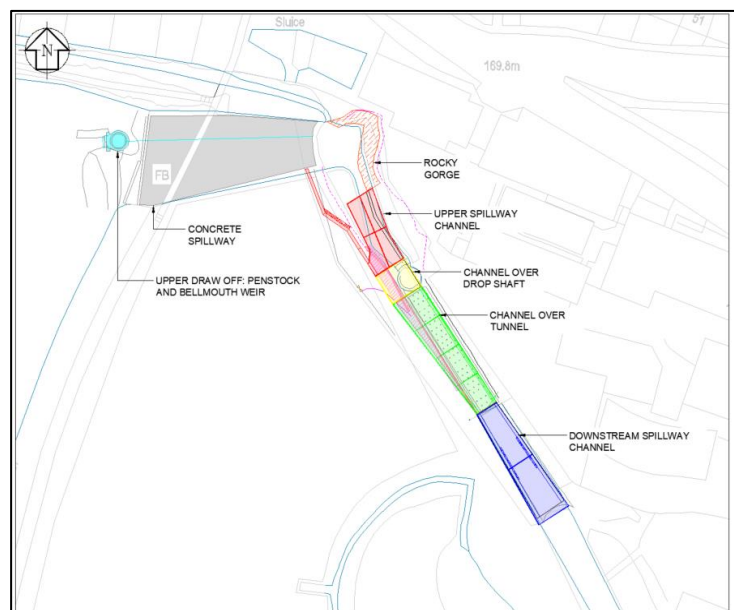


Figure 4: spillway construction plan layout

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 significant?	Are there any factors which affect buildability?	Other considerations	Evaluation
1a access off Holme Lane across the dam with temporary haul road - main spillway construction	- 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, pollution and other construction activities is temporary, localised and can be controlled through best practice construction methods secured and implemented via a Construction Environmental Management Plan (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.	This access is only viable for the construction of the upper section of the spillway with limited scope for the overall site works access. A viable access route to facilitate the lower section of the spillway works has not been verified. This is a major constraint which cannot be mitigated.	Not suitable or deliverable. This access is only viable for the construction of the upper section of the spillway with limited scope for the overall site works access. An alternative viable option (Access 9) can facilitate the construction of the entire main spillway.

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 significant?	Are there any factors which affect buildability?	Other considerations	Evaluation
1b access off Holme Lane across the dam with permanent haul road – post construction of the main spillway (the same track construction as 1a for on-going client operations consisting of routine inspections and maintenance)	- Tracked Excavator 15T and 8T - Dumper 6T - Van - Car	- Rocky gorge - Upper spillway channel - Channel over drop shaft - Channel over tunnel - Downstream spillway channel	Yes, existing access from 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. Stone material to be utilised from Access 9 post construction of the spillway. Strengthening of lower draw off culvert may be required. This is a constraint which can be mitigated.	Yes. The stone track will be topsoil and grass seeded. 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 and disruption from noise, pollution 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 grass seeded. This is a constraint which can be mitigated.	No. This is not a constraint.	Direct access from main highway to working area. No heritage impact. This is a constraint which can be mitigated	Suitable and deliverable. This option meets the needs of the project post spillway construction 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 significant?	Are there any factors which affect buildability?	Other considerations	Evaluation
2 Access through Cole & Wilson land off Nabbs Lane – site compound access only.	• HIAB Loader Crane 36T • Large Van • Car	• Site compound (Cole & Wilson yard)	Yes, existing access from Nabbs Lane (highway) utilised. 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.	Yes, early stakeholder engagement required and access agreement with landowner. This is a constraint which can be mitigated.	Yes. A condition assessment of Nabbs Lane bridge has found the structure to be in poor condition. Minor temporary works required facilitate use of this access for required plant and vehicles. Strengthening of Nabbs Lane bridge may be required. This is a constraint which can be mitigated.	No.	No.	Yes. 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. Potential disturbance and disruption from noise, pollution 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.	No.	This is not a constraint. Any required strengthening of Nabbs Lane Bridge for proposed weight of construction plant/material deliveries. This is a constraint which can be mitigated	Direct access from main highway to the Site Compound. No heritage impact. This is not a constraint.	Suitable and deliverable. Provides access to the Site Compound for required plant and vehicles.
3. Access from Bank Gate to Bankgate Mill.	• Concrete Wagon 26T • Tracked Excavator 8T • Spider Crane 10T • Dumper 6T • Large Van • Car	• Rocky gorge • Channel over drop shaft • Part channel over tunnel	Yes, existing access from Bank Gate (highway) can be utilised. Is not a constraint.	Yes. Early stakeholder engagement required and access agreement with landowner. This is a constraint which can be mitigated.	Yes. Confined working area on top of a steep slope/bank. Temporary stability of the slope will need to be assessed or justified through working methodology	Yes. Reinstatement of working area on top of a steep slope/bank as per current condition. This is a constraint which can be mitigated.	No.	Yes. Minor loss of trees. Where losses are temporary, these habitats will be reinstated on completion to at least their current condition.	Yes. Delivery of materials. Potential disturbance and disruption from noise, pollution and other construction activities is temporary, localised and can be	No.	Is not a constraint. Bankgate Mill (historic listed building) is currently under development. The site access route may coincide with redevelopment works. Service overheads at	Direct access from main highway to working area. No heritage impact. This is not a constraint.	Suitable and deliverable. This option meets the needs of the project and has constraints that can be mitigated. Access may be restricted due to current redevelopment of the Bank Gate Mill site.

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 significant?	Are there any factors which affect buildability?	Other considerations	Evaluation
					i.e. working outside zone of influence. This is a constraint which can be mitigated.			Where losses are permanent, suitable compensatory habitat will be created on Site. This is a constraint which can be mitigated.	controlled through best practice construction methods secured and implemented via a CEMP. This is a constraint which can be mitigated.		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).		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	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)	Yes. Reinstatement would be required for adjacent homeowner's garden. Reinstatement of Bus stop and lighting column (if required) or temporary replacement	Yes. Closure of PROW footpath across the dam crest (COL/141/50 & COL/141/60) for the duration of construction 18 months.	Yes. Minor loss of grassland and scrub habitat. Where losses are temporary, these habitats will be reinstated on completion to at least their	Access is adjacent to a busy road intersection requiring TTRO. Will require the temporary removal of a Bus stop and lighting column on Bank Gate.	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	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 and/or

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 significant?	Are there any factors which affect buildability?	Other considerations	Evaluation
			temporary removal of a Bus stop and lighting column on Bank Gate. This is a major constraint that would be difficult to mitigate.		requiring 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.	made permanent. This is a constraint which can be mitigated.	This is a constraint which can be mitigated.	current condition. Where losses are permanent, suitable compensatory habitat will be created on Site. This is a constraint which can be mitigated.	This is a major constraint that would be difficult to mitigate.		space to be suitable - this is a major constraint that would be 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. This is not a constraint.	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 significant?	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. This is a constraint which can be mitigated.	Not suitable or deliverable. 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.

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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 (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.	No. However current restricted width of footpath and weight limit for plant. Near vertical drop downstream face of dam. This is a major constraint that would be difficult to mitigate.	Yes. Reinstatement as per current required. This is a constraint which can be mitigated.	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 which can be mitigated.	No. Existing surfaced footpath. 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. This is not a constraint.	Yes. Restricted width and weight limit for plant. 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.	No heritage impact. Limited scope for overall works access. This is a major constraint that would be difficult to mitigate.	Not suitable or deliverable. Limited scope for overall works access. 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 difficult to mitigate.	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 pontoon access to spillway, whereas a low water level is required for the construction works.

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 significant?	Are there any factors which affect buildability?	Other considerations	Evaluation
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 (stone haul road to base of the dam slope). 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 created on Site. This is a constraint which can be mitigated.	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 which can be mitigated.	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. This is not a constraint.	Not suitable or deliverable. Limited scope for overall works access. Access provided to lower spillway only. Does not provide access to compound or upper spillway. Unknown land access (Network Rail). Relatively narrow access between viaduct archways. Network Rail/ArchCo 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 significant?	Are there any factors which affect buildability?	Other considerations	Evaluation
9. New access via property/ land 15 Holme Lane.	• Crawler crane 135T • 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 • Channel over tunnel • Downstream spillway channel	No New access required off Holme 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. Removal of low masonry boundary wall. Preparation of access track across third party land (stone haul road to base of the dam slope crane pad). This is a constraint which can be mitigated.	Yes. Reinstatement of low masonry boundary wall 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 created on Site. This is a constraint which can be mitigated.	Yes The haul road will traverse across the garden at property Holme Lane. (predominantly at the perimeter of the garden). Access from the highway to the driveway of property Holme Lane will not be affected.	Yes. Change in ground levels along route requiring cut and fill and suitable ground/track preparation. This is a constraint which can be mitigated.	In proximity to residential dwelling and Network Rail boundary. This is a constraint which can be mitigated	No heritage impact. Direct access from the highway. Lesser enabling works required as a single access track and crane pad are required for the scheme (improves programme, lesser impact on the local community). This is not a constraint.	Suitable and deliverable. This option meets the needs of the project and has constraints that can be mitigated. The plant and site access (as listed) are pivotal to the buildability of the scheme. The construction of the entire main spillway can be undertaken via this route. Provides access for all plant and material deliveries. Liaison with Network Rail required. Additional tree removal required (TPO).

5.0 Conclusion of Assessment

The site topography at Slaithwaite Reservoir and proximity of neighbouring premises is a significant constraint at this Site.

Table 1 provides an evaluation of the initial 'long list' of access options. To deliver the scheme and meet the MIOS date access to facilitate the use of a large capacity and radius lifting solution is required (refer to Section 6 of this report Annex: Crane Assessment for further details).

The access routes that have been identified as suitable and deliverable are:

- Access 9 provides a single access point for construction of the entire main spillway. A single 135T crawler crane can be utilised as the large capacity & radius lifting solution operating from a single crane pad central to the works area. The use of a single crane for the construction minimises the enabling works required for delivery of the scheme, reducing the construction programme timescale and resulting in less construction time on site and less disruption to the local community.
- The new access will require the removal of a boundary wall, trees and the preparation of the ground for installation of a stone haul road to the proposed location of the central crane pad as shown in Figure 5.

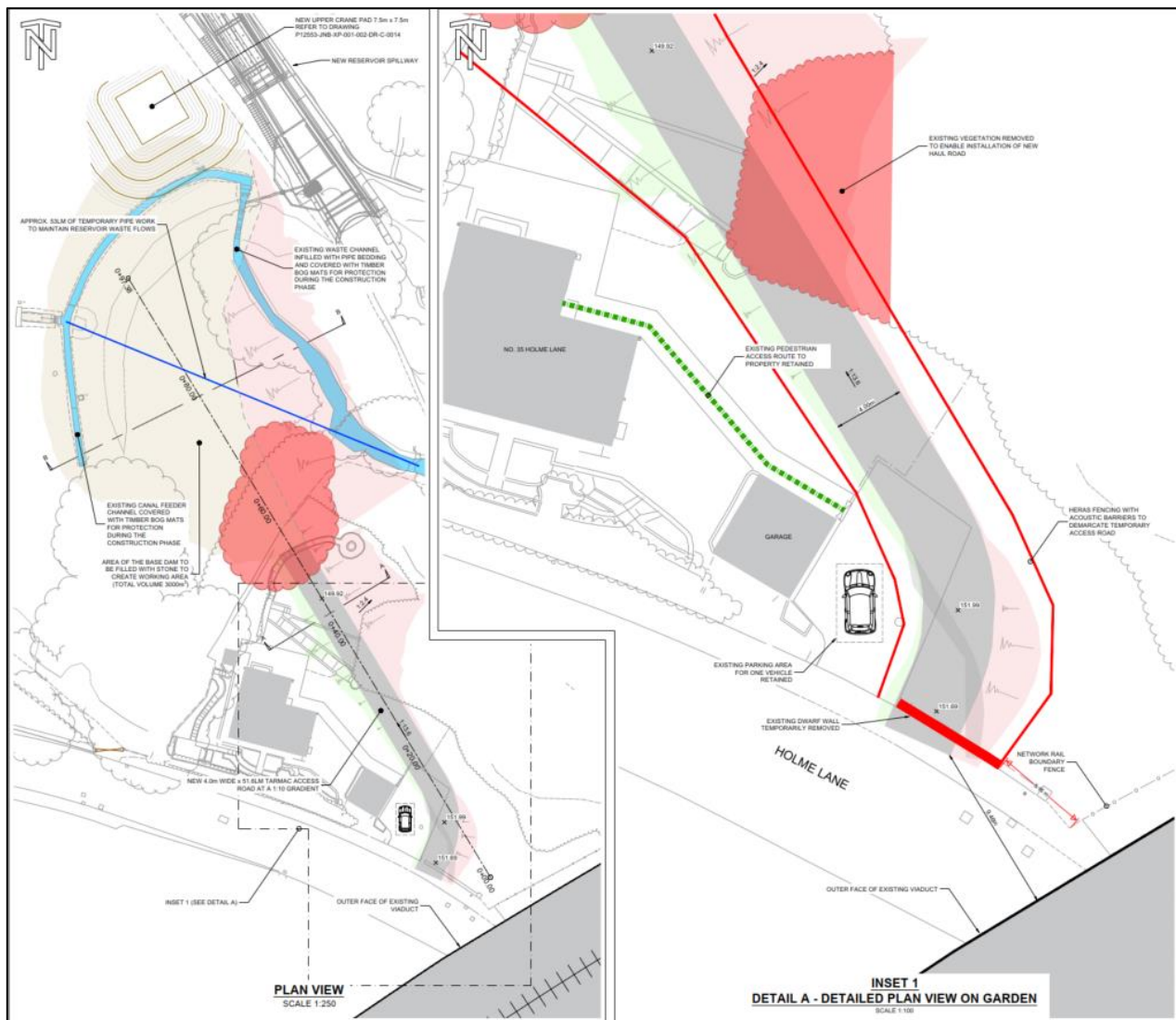


Figure 5: Access Road for Option 9 plan (sketch)

- Access 3 provides subsidiary access to the rocky gorge, channel over drop shaft and channel over tunnel (refer to Figure 3). 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.
- Access 2 provides access to the proposed Site Compound area sited within the existing Cole & Wilson yard. Access route 2 may require improvement to existing surfacing and preparation of ground for proposed plant and vehicular access and material laydown area. Temporary works to support use of Nabbs Lane bridge may be required.

All other routes are discounted for facilitating construction of the main spillway.

- Access 1b across the reservoir embankment will be required as a permanent access for the Trust for ongoing future inspection and maintenance. This access is proposed to be installed on completion of the main spillway construction with stone for the new accessway utilised from the Access 9 haul road. The new permanent stone road 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.

6.0 Annex - Crane Assessment

6.1 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 8 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 (potentially over the Nabbs lane bridge) effectively discounted the Tower Crane option.

6.2 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. The minimum size of crawler crane required would be 135T, to service the entire main spillway construction.



Figure 8 – Typical 90T crawler crane

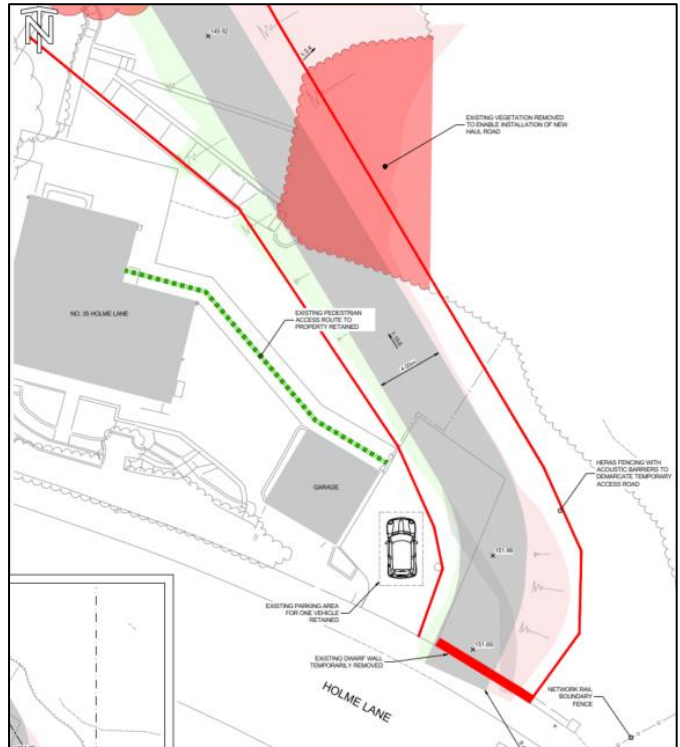


Figure 9 – Proposed crawler crane access route no.9

Crawler cranes can only traverse a maximum gradient of 1 in 10. A 1 in 10 gradient access ramp can be created through the garden of property Holme Lane down to the central crane pad area as indicated in Figure 5 above, this would enable a large crawler crane to access the working area, with a similar amount of stone to what would be required to build an access route across the dam.

The use of a Crawler Crane is only suitable for Access No.9 where a 1 in 10 gradient access ramp can be created through the garden of property Holme Lane down to the Central Crane Pad.

6.3 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:

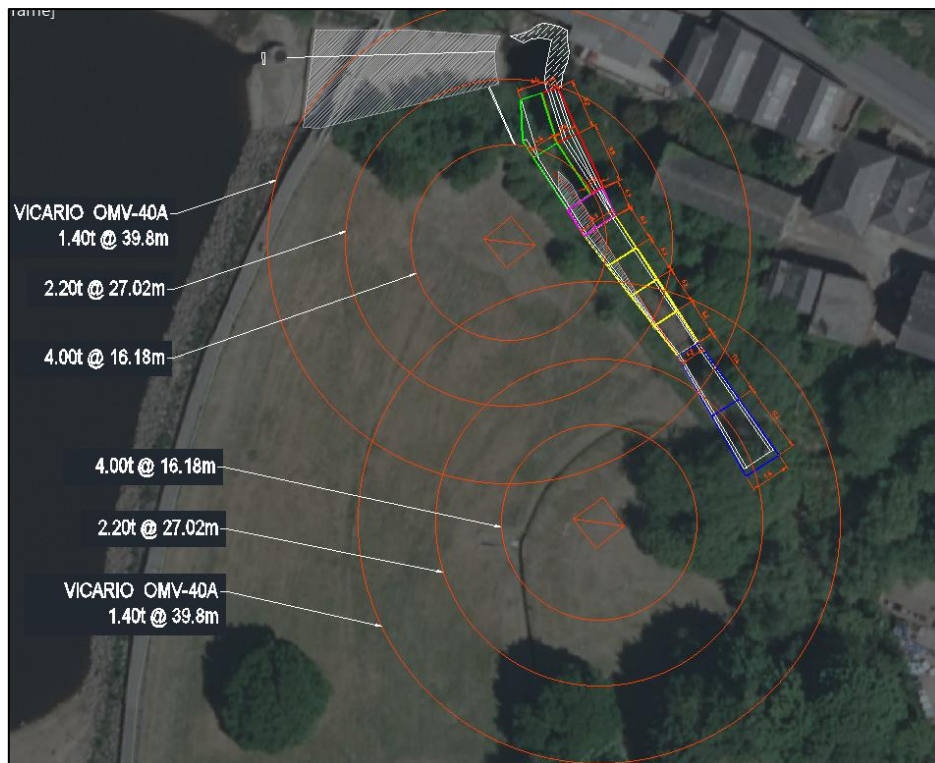


Figure 12: Proposed self-erecting tower crane locations

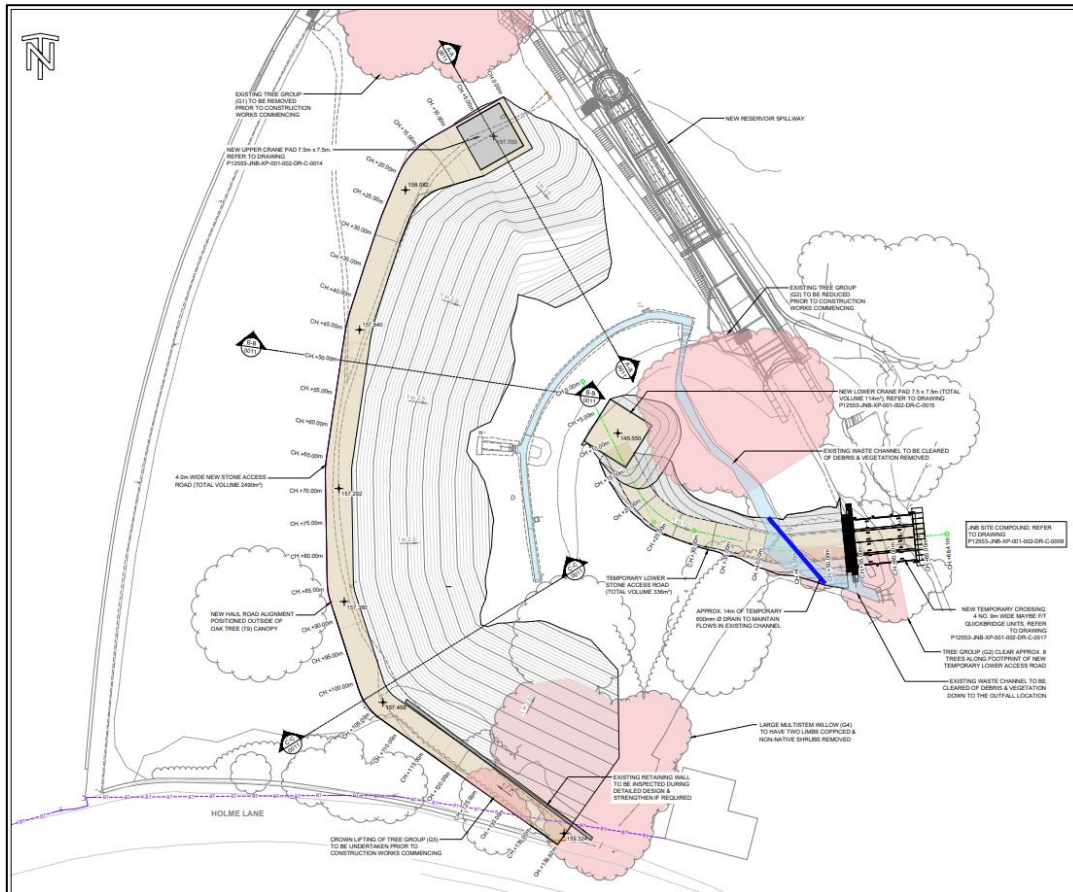


Figure 13: Access Road 1a/b, 2 and crane pad general arrangement

The haul road configuration (as shown in Figure 13) 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.

6.4 Cable Crane System

The use of a cable crane system (see Figure 14) 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 14: 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.

6.5 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 6.1 to 6.4, 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.

6.6 Spider Crane

Spider Cranes (see Figure 15) 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 15: Typical spider crane

6.7 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 16) to transport materials, operated via a pulley system.



Figure 16: 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.