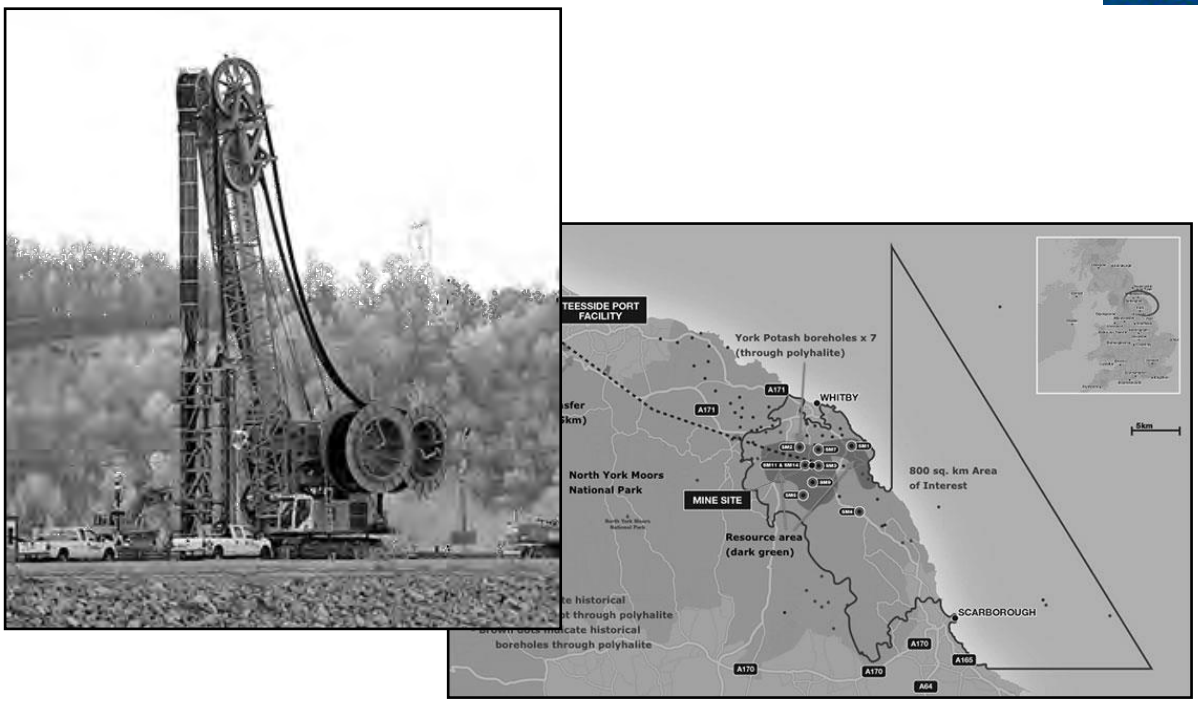
Appendix B

Method Statement - Mobilisation of Diaphragm Walling Equipment



NORTH YORKSHIRE POLYHALITE PROJECT – WOODSMITH MINE

MOBILISATION / DEMOBILISATION

Bauer: YPM-BAU-MS-04

AMC UK: 40-AMC-WS-10-SW-RA-0001

Revision	Date	Description	Made by	Checked	Signed
A	19.05.17	Original Issue	A. Khan	G. Jahnert	
B	25.05.17	AMC UK comments incorporated	A. Khan	G. Jahnert	
0	26.05.17	Final AMC UK & Sirius comments incorporated	A. Khan	G. Jahnert	

List of Contents

1. SCOPE OF WORKS 3
2. MOBILISATION OF CRAWLER CRANES 3
3. MOBILISATION OF CUTTER UNITS 6
4. INSTALLATION OF WELFARE & OFFICE 7
5. INSTALLATION OF WORKSHOP 7
6. INSTALLATION OF WELDING TENT/SHELTER 8
7. SIGNIFICANT RISKS AND CONTROLS 9
8. PLANT & EQUIPMENT 11
9. HEALTH AND SAFETY LEGLISLATION 11
10. COSHH 12
11. FIRST AID ARRANGEMENTS 12
12. PERSONAL PROTECTIVE EQUIPMENT 12
13. ENVIRONMENTAL PROTECTION 13
14. MANUAL HANDLING 13
15. ACCIDENTS, INCIDENTS AND RIDDOR 13
16. EXISTING SERVICES / HAZARDS 13
17. MANOEUVRING PLANT AROUND THE SITE 13
18. KEY CONTACTS & SITE PERSONNEL 14

APPENDIX A – DRAWINGS 15
APPENDIX B – RISK ASSESSMENT 16
APPENDIX C – BAUER POLICY FOR HEALTH, SAFETY AND WELFARE 17
APPENDIX D – COSHH ASSESSMENTS 18
APPENDIX E – PLANT REGISTER 19
APPENDIX F – PERSONNEL HISTOGRAM 20
APPENDIX G – MC96/128 AND BC40 ASSEMBLY INSTRUCTIONS 21

1. SCOPE OF WORKS

The scope of works to be constructed by Bauer Technologies Ltd. (BTL) for Associated Mining Construction UK (AMC UK) comprises the installation of three circular diaphragm wall shafts at the Woodsmith Mine site. This method statement describes the mobilisation and demobilisation of diaphragm wall cutters, crawler cranes, welfare and workshop. Site layout drawing with the location of welfare and workshop is included in Appendix A.

2. MOBILISATION OF CRAWLER CRANES

Prior to the mobilisation of any major items of plant, AMC UK will issue BTL with a Working Platform Certificate to confirm that the platform has been designed and constructed in accordance with the FPS requirements. The diaphragm wall cutter and crawler crane ground bearing pressures will be provided by BTL.

The mobilisation of plant and equipment to site will follow the Bauer Logistics Plan (40-AMC-WS-10-LG-PL-0001) which includes approved routes.

Bauer will mobilise up to six crawler cranes with capacities of 60-160t each. The following sequence details the activities undertaken during mobilisation of crawler cranes which are transported with tracks mounted e.g. up to 110t capacity (demobilisation in reverse order):

- A low loader will access the site via the Welfare Access road.
- The crane base unit will track off the low loader and onto the certified working platform.
- The crane base unit will extend its tracks.
- Jib sections are unloaded by an assist mobile crane or HIAB.
- Jib sections are pinned together on the ground.
- Base machine is married up to jib sections.
- Pendent ropes are pinned together.
- Hoist rope extended to the length of the jib and reeved to hook block.
- Limit switches are connected.
- General safety check is conducted to ensure all pins are in place and secure.
- All loose material removed from jib.
- Safe load indicator (SLI) calibrated to appropriate jib length.
- Jib raised to working height.
- Final inspection of machine.

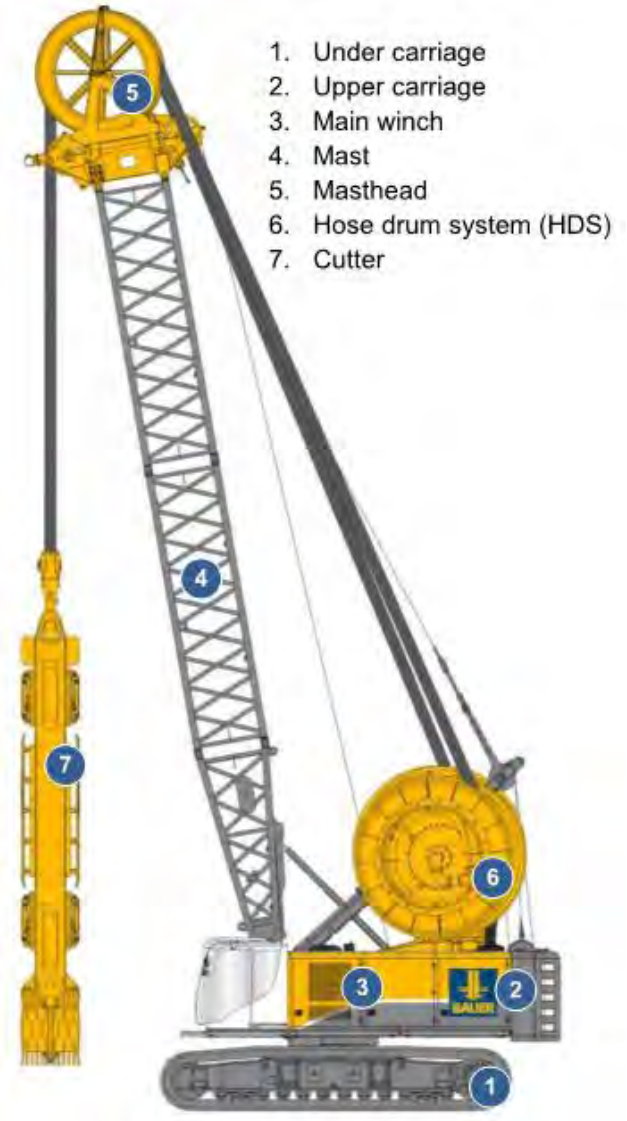
The following sequence details the activities undertaken during mobilisation of crawler cranes which are transported without tracks mounted, e.g. larger than 110t (demobilisation in reverse order):

- A low loader will access the site via the Welfare Access road.
- The crane engine will be started to raise the boom foot section
- The base assembly is then raised by the four built in hydraulic jacks until it is clear of the semi low loader deck. The semi low loader will then drive forward from under the raised crane body and leave the site. (Note that for smaller crawler cranes <110t, the base unit will be delivered with tracks mounted. In this case, the base unit will track off the low loader onto the working platform and extend its tracks to working mode before assembly of the jib commences.
- An assist crane will be positioned at approx. 3 metres from the crane base unit, and set up on its 7.5m span outriggers allowing room for vehicles to pull alongside.
- The delivery vehicle carrying the track frames will be positioned alongside the assist crane.
- The first track frame will be attached by slings to the assist crane.
- The assist crane will lift and slew the track frame through 90 degrees and place on the ground next to the crane base stub axle.
- The slings are then released from the assist crane and refitted to the crawler crane self-assembly ram fitted to boom foot section.
- Using the self-assembly ram, the track frame is lifted and slewed through 180 degrees and fitted on the stub axle at the far side.
- This procedure is repeated to fit the nearside track frame without the need to slew the load with the crawler crane.
- The car body counterweights can now be lifted and positioned in place on each side of the machine.
- Once the car body counterweights are fitted the base unit will rotate through 90 degrees to bring the tracks in line.
- The counterweights are fitted in place by the crawler cranes own built in equipment after preassembly with the assist crane. First the counterweight tray is lifted off the delivery vehicle and placed on the ground in a position in line with the crawler crane.
- Then the slab is placed on top followed by the remaining ballast weights.
- The crawler crane is positioned to attach its own lifting equipment to the A frame assembly and the assembly raised, located and locked on the rear of the crane.
- The cab access walkway sections can now be fitted.
- The machine will now be slewed to face the length of the allocated erection area boom root lowered.
- The assist crane will now reposition beyond the boom root and to one side of the boom build line, to place the boom inserts.
- After placing the first section complete with boom pendants, the section is lifted and positioned to line up the joints. The pins and ‘R’ clips are now inserted in both boom and pendants.

- Repeat this with the remaining sections and head until boom complete.
- When completed, the crane is moved forward to line up the top pin holes joining the root to the boom. When in line the upper two pins are fitted, and locked with `R` clips.
- As the crane lifts the boom the lower pin holes will come into line and the joint pins inserted and locked with `R` clips.
- The derricking system is now lowered to allow the pendant connection to the foot section to be transferred and connected to the boom pendants.
- The weight is now taken leaving the boom head just touching the ground.
- Signal cables will now be fitted and checked at this stage.
- The main hoist rope is then lowered off and pulled along the booms length and fed through point sheaves, allowing an excess amount to be fed through the hook block, rigged on the required falls, and anchored.
- All pins, ‘R’ clips, and pendants on the boom arrangement will be visually checked before lifting the boom.
- The Rated Capacity Indicator (or SLI) will now be checked for the correct mode selection, accuracy and functionality.
- The Fitter will now complete the Crane Erection Checklist.

3. MOBILISATION OF CUTTER UNITS

BAUER crawler crane types BAUER MC96 and MC128 with BC40 cutters will be deployed as diaphragm wall excavation units. The cranes and cutter units will be transported to site in sections and assembled in the work area. A low loader will access the site via the Welfare Access road. The MC base units will then track off the low loader onto the working platform. The MC units and BC cutters will then be assembled in line with the manufacturer's instructions (refer to Appendix G).



Figures 1 and 2: MC base unit (left) and BC cutter (right)

4. INSTALLATION OF WELFARE & OFFICE

Prior to mobilisation of welfare and office accommodation, AMC UK will design and install a level concrete slab. AMC UK will also excavate an area for the installation of a cesspool underground. The cesspool be a sealed tank with no outlets. The cesspool will be manufactured and maintained in accordance with a British or EU specification. The cesspool will have a high level indicator. It will be sucked out by a sewage pump truck on a regular basis, typically twice per week. The contents will be disposed of at a registered facility as per the Site Waste Management Plan.

The loads from the welfare and office structure will be provided by BTL. BTL will also provide the dimensions of the excavation for the septic tank.

The welfare & office structure is a 2 storey modulus building with approximate dimensions of 35m x 15m x 6m (L x W x H) and will come in the RAL colour 7035 (example pictures have been included in Appendix A. The welfare and office structure will be in place for the duration of the works and will accommodate approximately 100nr. staff including workers, management and BTL visitors. All BTL personal will be brought to site as outlined in the BTL Logistics Plan, ensuring that vehicles parking on site are controlled due to limited amount of parking bays.

The welfare & office block will be installed using a hiab or a crane and therefore AMC UK will be required to issue BTL with a Working Platform Certificate to confirm that the platform has been designed and constructed in accordance with the Federation of Piling Specialists (FPS) requirements. All lifts will be carried out in accordance with an approved lift plan.

It is anticipated that the installation of the welfare and office setup will take approximately 2 weeks.

A detailed method statement including the technical details and detailed risk assessment will be submitted once the supplier has been appointed and carried out a site visit. An indicative welfare office setup drawing is included in Appendix A.

Due to the location of site a satellite dish will be installed on top of the office & welfare accommodation in order to receive internet. For the installation of satellite dish please refer to the satellite dish installation procedure.

5. INSTALLATION OF WORKSHOP

In order to store spare parts and consumables and to maintain and repair diaphragm wall equipment BTL requires a workshop on site. BTL fitters and mechanics will work on equipment from this workshop in order to ensure efficiency and reduce the risk of delays by not having to take equipment off site for repair or maintenance. Please refer to Appendix A for the position of workshop.

The workshop will have openings to the sides (approximately 7 nr.) where BTL steel storage containers coloured in yellow and equipped with spare parts and hydraulic hoses will be installed. This would allow the fitters and mechanics to access the store containers from inside the workshop.

Prior to installation of the workshop AMC UK will design and install a level concrete slab with drainage. A temporary building or a tent will be installed for the workshop. The approximate dimensions of the workshop are 25m x 15m and 9m high. The workshop will be an aluminium frame on top of the concrete slab installed by AMC UK with white coloured fire resistant tarpaulin covers on

top. A method statement covering the technical details and detailed risk assessment will be submitted once the supplier has been appointed and carried out a site visit.

Figures 3: Example of workshop with store containers installed to the sides

Figures 4: Example of internal setup of workshop

6. INSTALLATION OF WELDING TENT/SHELTER

A suitable area will be required to carry out hot works in order to repair any damaged equipment. BTL will install a welding tent/shelter where hot works can be carried out safely. The tent/shelter will be erected between 2 steel storage containers coloured in yellow as shown in Figure 5 below. The approximate dimensions of the welding tent/shelter are 6m x 8m x 6m (L x W x H). The tent will be an aluminium frame on top of the concrete slab installed by AMC UK with white coloured fire resistant tarpaulin covers.

Figures 5: Example of welding tent/shelter

The details regarding the erection and the works being carried along with the associated risks & controls are covered in a separate method statement.

7. SIGNIFICANT RISKS AND CONTROLS

The following key risks have been identified for the diaphragm wall works. Risk mitigations have been planned in line with the full risk assessment for diaphragm wall construction (refer to Appendix B).

1) Risk: Slips, trips and falls

Controls: Implement solid housekeeping procedures and maintain piling platforms and walkways. Provide adequate storage facilities for small tools and consumables as well as designated material storage/laydown areas. Provide waste segregation facilities. Ensure that all operatives wear safety footwear with adequate ankle protection. Clean up slurry spillages on walkways immediately to avoid slippery surfaces. De-ice walkways as required during winter months.

2) Risk: Working platform failure causing plant to overturn

Controls: In advance of the works, Bauer have provided ground bearing pressure calculations for heavy plant. Sirius Minerals will design and install the working platform in line with the required loadings. This includes implementation of dewatering systems as required. Before offloading of any tracked plant, AMC UK will issue Bauer with a FPS Working Platform Certificate confirming suitability of the provided working platform for the specific plant items.

Subsequently, the Bauer site supervisor will inspect the condition of the piling platform before each shift. Inspections will be recorded on the supervisor's daily reports. Any defects will be reported to AMC UK immediately who will carry out maintenance as soon as possible.

3) Risk: Working at height / falls from height

Controls: The need for working at height will be eliminated as much as practicable. Where working at height cannot be avoided, adequate edge protection will be made available wherever possible. Where use of edge protection is not practicable, alternative access systems will be provided (scaffold, MEWP or similar). As a last resort, fall arrest systems will be used (e.g. safety harness and lanyard).

4) Risk: Fuel spillage

Controls: Wherever possible, refuelling is to be carried out at least 5m-10m from access to surface water and open excavations that have a pathway to groundwater. Refuel plant with a suction hose refuelling system where possible. If plant does not have suction hoses fitted, refuel with care using a pump operated refuelling system. Provide double bunded diesel bowsers and use plant nappies / drip trays as proactive measure. Have spill kits available on major plant items and in designated spill response stations around the project.

5) Risk: Emergency response time

Controls: Due to the remote location of the project, AMC UK will ensure that emergency services have been issued with the site coordinates and have been made aware of access routes and muster points. The AMC UK Construction Phase Health and Safety Plan will outline the Emergency Procedures to be followed in case of incidents on site. The emergency procedures will be communicated to all personnel during the AMC UK Project Site Induction.

6) Risk: Fatigue

Controls: Schedule shift pattern with consideration to fatigue related occupational illness. Review shift pattern with operatives and change working times if required. Ensure that adequate welfare facilities are available.

7) Risk: Lifting operations / wind speed.

Controls: Bauer will produce lift plans for all cranes and HIABs used on site. The personnel in charge of lifting operations will be competent and certified. All plant and lifting equipment will be subject to periodic thorough examination.

The slingers will inspect every load prior to lifting.

Crane operators will lift in line with the applicable lift plans and the manufacturer's instructions. Operators will monitor the wind speed through anemometers and cease lifting operations for wind speeds exceeding 14 m/s (or as per crane manufacturer's instructions).

Crane operators will not lift over personnel. Operatives will use taglines to control loads during lifting operations. The workshop building has been designed for the local wind loads provided as part of the works information.

8) Risk: Plant pedestrian interface / High number of heavy plant

Controls: All heavy plant movements will be supervised by qualified banksmen. All plant operators will be competent and certified. Site space proofing drawings will identify likely confined spaces around moving plant. Equipment and material positions have been simulated in these site layout drawings prior to mobilisation to site. During construction, the arrangement of heavy equipment on site will be constantly controlled by the BTL site supervisor.

Pedestrians and plant will be physically separated by implementing walkways as much as reasonably practical.

All movement of heavy equipment will be controlled by banksmen. All persons on site will be briefed during toolbox talks on how to move and work safely on site.

8. PLANT & EQUIPMENT

A detailed list of all plant and equipment is included in Appendix E.

It is anticipated that the below plant and equipment would require movement orders as they will come to site as abnormal loads. Further details regarding the management and movement of vehicles to site can be found in Bauer Logistics Plan (40-AMC-WS-10-LG-PL-0001).

- Cutter – 5 abnormal loads per cutter (MC base & BC cutter). 15 no. abnormal loads for 3 cutters.
- Crane – 2 abnormal loads per crane. 10 abnormal loads in total for 5 cranes.
- Desanding units – 1 abnormal load per desanding unit. 3 number in total for 3 desanding units.

9. HEALTH AND SAFETY LEGLISLATION

All works are to be carried out in accordance with this method statement and the following documents:

- AMC UK Construction Phase Health & Safety Plan Woodsmith Mine Site - Phase 4 - Diaphragm Wall Construction 40-AMC-WS-71 PM-PL-0002.
- AMC UK Environmental Management Plan (EMP) Woodsmith Mine Site - Phase 4 - Diaphragm Wall Construction 40-AMC-WS-71-EN-PL-0004
- AMC UK Environmental Emergency Preparedness Plan (EEPP) Woodsmith Mine Site - Phase 4 - Diaphragm Wall Construction and Bentonite Plant Installation and Operation 40-AMC-WS-71-EN-PL-0005
- AMC UK Site Waste Management Plan (SWMP) Woodsmith Mine Site - Phase 4 –Diaphragm Wall Construction 40-AMC-WS-71-EN-PL-0006
- Bauer Health and Safety Plan 40-AMC-WS-10-HS-PL-0001
- Bauer Environmental Plan 40-AMC-WS-10-EN-PL-0001

- Bauer Slurry Management Plan 40-AMC-WS-10-EN-PL-0002
- Bauer Policy for Health, Safety and Welfare (Appendix C)
- Risk Assessment (Appendix B)
- COSHH Assessments (Appendix D)
- All relevant regulations, HSE Guidance Notes, Environmental Agency Guidance Notes, Codes of Practice, National and International Standards.

10. COSHH

The Control of Substances Hazardous to Health Regulations, 2002, (C.O.S.H.H. Regulations), requires that an assessment is undertaken of health risks created by work involving substances hazardous to health. These refer to the use of chemicals on a site and state that the precautions to be taken are recorded on a Substance C.O.S.H.H. Record.
The C.O.S.H.H. Assessment Record is based on information obtained from a data sheet received from the substance supplier.
A copy of all the Company's Substance Identification Records are held on site and those relevant to this document are shown in Appendix D.

11. FIRST AID ARRANGEMENTS

The First Aid arrangements for the site are detailed in the AMC UK Construction Phase Health & Safety Plan Woodsmith Mine Site - Phase 4 –Diaphragm Wall Construction 40-AMC-WS-71-PM-PL-0002. Sirius Minerals provides a full time paramedic. In addition, Bauer will provide first aid kits and at least three first aiders per shift.

12. PERSONAL PROTECTIVE EQUIPMENT

- High Visibility Clothing (EN 471)
- Eye Protection (EN 166F)
- Hearing Protection (EN 352)
- Safety Helmets (EN397 MM, LD)
- Protective Gloves (EN 388)
- Safety Harness for working at height (EN 361)
- Protective Footwear (EN 345 P) – Safety boots must have steel mid sole.

All Personal Protective Equipment will be replaced as required during the contract. Safety harnesses will be stored appropriately and inspected on a regular basis as part of the lifting gear inspection regime.

13. ENVIRONMENTAL PROTECTION

All works to be compliant with AMC UK Environmental Management Plan (EMP) Woodsmith Mine Site - Phase 4 –Diaphragm Wall Construction (Doc. No. 40-AMC-WS-71- EN-PL-0004).

- Noise: There is no significant noise generated during mobilisation works however all noise is monitored by AMC UK.
- Vibration: There is no risk of vibration during mobilisation that will affect the local community
- Dust: Dust suppression will be implemented by AMC UK (e.g. dampening of dusty areas)
- Spillages: Drip trays and plant nappies to be used when fuelling or using oils. Spill kits to be available and in an unlikely event of spillage the effected are to be immediately cleaned.

14. MANUAL HANDLING

Mechanical plant is provided as far as possible to reduce manual handling to a minimum. Due to the nature of the work, cranes will be mainly used for most lifting operations and moving of plant and equipment.
Manual handling will be limited to the carrying of light steel parts, pipework, small lifting equipment such as shackles etc.

15. ACCIDENTS, INCIDENTS AND RIDDOR

The arrangements for Reporting of Injuries, Diseases and Dangerous Occurrences under the regulations are as detailed in the company safety manual, a copy of which will be held by the site supervisor. The ultimate responsibility for reporting / investigating is held by the BTL Health & Safety Manager. In the unfortunate event of any accident or near miss, the BTL Health & Safety Manager will be informed immediately and he in turn would forward details to the AMC UK Health & Safety Manager and if necessary, the HSE. This also applies to environmental incidents.

16. EXISTING SERVICES / HAZARDS

No existing services have been notified to BTL by AMC UK.

17. MANOEUVRING PLANT AROUND THE SITE

In order to carry out any major repair works to the cutters the cutter units (MC base + BC cutter) will require safe and designed access routes to track from the work areas to the workshop. Adequate space on the concrete slab in front of the workshop will be provided in order to lay down the BC cutter unit and if required the jib of the MC unit to carry out repair works as required.

A firm, dry, level all weather hard standing shall be provided as a stable working platform for the heavy plant to work off and installed to the BRE Specification, ‘Working platforms for tracked plant’. The working platform for the cutter must be installed flat at 0 degrees. The working platform for the

cranes can be inclined up to 0.5 degrees. Any ramps to access the platform, or within the platform must not exceed 1 in 10.

The appointed ganger/banksman will supervise all plant manoeuvres and direct the attendant excavator(s) in their duties.

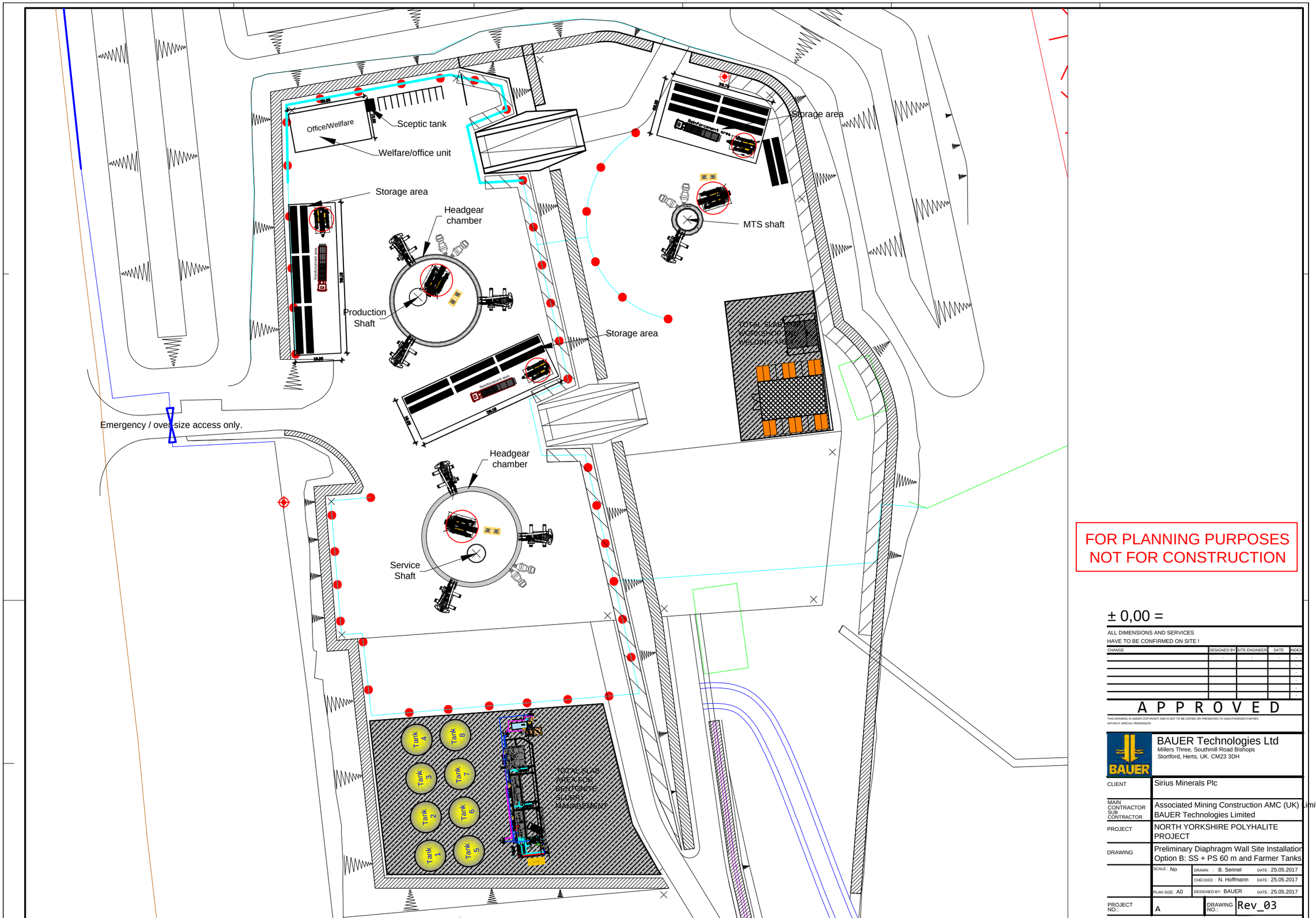
A Working Platform Certificate (FPS/WPC/1) must be issued by AMC UK to BTL prior to commencement of the site works.

18. KEY CONTACTS & SITE PERSONNEL

Name	Company	Position	Assist
Jonathan White	AMC UK	Operations Director	
Thomas Prinz	AMC UK	Site Supervisor	
Siegfried Wenninger	AMC UK	Lead Engineer - Mining	TBC
TBC	AMC UK	H&S Manager	TBC
Gustav Jahnert	Bauer	Senior Project Manager	
Asad Khan	Bauer	Site Agent	
Norbert Hoffmann	Bauer	Site Agent	
TBC	Bauer	Site Supervisor	TBC

All site personnel will have as a minimum a CSCS card and where applicable a CPCS card. All operatives will have their CSCS/CPCS cards.
Site Supervisors to hold SSSTS certification and Site Managers will hold SMSTS certification.

APPENDIX A – DRAWINGS



FOR PLANNING PURPOSES
NOT FOR CONSTRUCTION

± 0,00 =

ALL DIMENSIONS AND SERVICES
HAVE TO BE CONFIRMED ON SITE !

CHANGE	DESIGNED BY	SITE ENGINEER	DATE	INDEX
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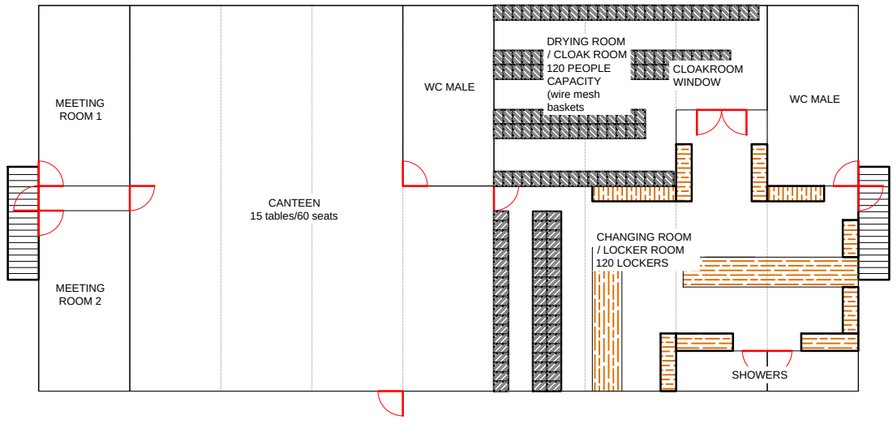
				-
				-
				-
				-

APPROVED

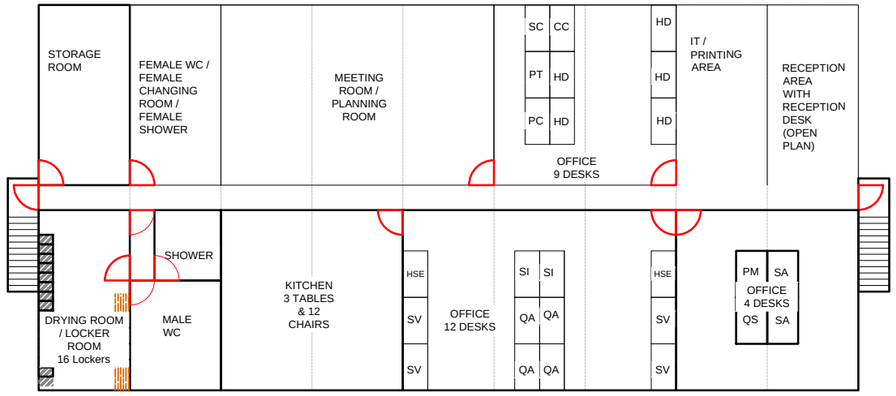
BAUER Technologies Ltd
Millers Three, Southmill Road Bishops
Stortford, Herts, UK. CM23 3DH

CLIENT	Sirius Minerals Plc
MAIN CONTRACTOR SUB CONTRACTOR	Associated Mining Construction AMC (UK) Limited BAUER Technologies Limited
PROJECT	NORTH YORKSHIRE POLYHALITE PROJECT
DRAWING	Preliminary Diaphragm Wall Site Installation Option B: SS + PS 60 m and Farmer Tanks

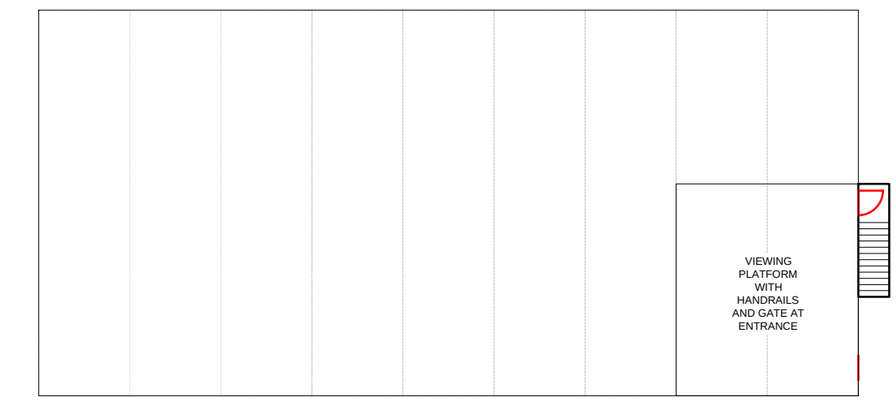
SCALE : No	DRAWN : B. Serinel	DATE : 25.05.2017	
	CHECKED : N. Hoffmann	DATE : 25.05.2017	
PLAN SIZE: A0	DESIGNED BY: BAUER	DATE : 25.05.2017	
PROJECT NO.: A	DRAWING NO.: Rev_03		



GROUND FLOOR



FIRST FLOOR



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REV	DATE	DESCRIPTION OF ISSUE	DRN	SL	ENG	BTL	CLIENT
				CHECKED		APPROVED	

CLIENT

BAUER Technologies Ltd
Millers Three
Southmill Road
Bishops Stortford
Herts
CM23 3DH

PROJECT

YORK POTASH MINE
OFFICE AND WELFARE LAYOUT

DRAWING TITLE

OFFICE AND WELFARE FOR 100 PEOPLE

SCALE	BTL DRG No.	REV
NTS		C

EXAMPLE PICTURES OF WELFARE & OFFICE BUILDING

APPENDIX B – RISK ASSESSMENT

BAUER Technologies Ltd.
General Risk Assessment Mobilisation and Demobilisation Rev 0
Project: North Yorkshire Polyhalite Project – 25/05/2017

Likelihood	Consequence				
	Insignificant (1)	LIKELIHOOD	Insignificant (1)	LIKELIHOOD	Insignificant (1)
Almost Certain (5)	M (5)	H (10)	E (15)	E (20)	E (25)
Likely (4)	M (4)	H (8)	H (12)	E (16)	E (20)
Possible (3)	L (3)	M (6)	H (9)	E (12)	E (15)
Unlikely (2)	L (2)	L (4)	M (6)	H (8)	E (10)
Rare (1)	L (1)	L (2)	M (3)	M (4)	M (5)

RISK RATING (RR)			
Score	colour	Action	Responsibility
1 – 4	Low	PROCEED – Daily Revision	Acceptable with continued data collection and trending for continuous improvement
5 – 12	Medium	MANAGE RISK – CONTINUE WITH CAUTION	Acceptable after review of the operation. Requires continued tracking and recorded action plans.
13 – 19	High	MANAGE RISK – CONTINUE WITH PROJECT MANAGERS PERMISSION	Manageable under risk control & mitigation. Requires Project Managers permission
20 – 25	Extreme	**STOP ! STOP ! STOP !**	Unacceptable under existing circumstances requires immediate rectification action

Task Description	Hazard	Risk Rating			Control	Residual Risk			Action
		L	C	R		L	C	R	
Supervisor to brief all staff on safe work procedures	Misunderstanding / communication breakdown	2	4	8	▪ Ensure correct and up to date information has been passed to all staff prior to work commencing. ▪ Use competent, ticketed operator and other personnel. ▪ Operator to undergo familiarisation training.	1	4	4	Supervisor Operator
Preparation to commence operations	Suitability of working platform	2	5	10	▪ Properly designed and installed working platform based on rig loadings. ▪ Area fenced and signed. ▪ Signed off platform certificate prior to commencement of works. ▪ Visual inspection and monitoring of the platform daily to ensure integrity of platform is maintained throughout lifting operations.	1	4	4	Supervisor Operator
Loading / Unloading the equipment	Unsuitable lifting devices and / or incorrect loading / unloading can result in the lifting device, the equipment or the transport vehicle tipping over or the load falling off. This can cause severe or fatal injury to people near the equipment.	4	4	16	▪ As a rule, the area under suspended loads must be free at all times. ▪ Only use authorised and undamaged lifting devices. ▪ Attach lifting slings only to provided lifting points. ▪ Please note the change in weight distribution and centre of gravity with suspended loads.	2	4	8	Supervisor, Operator, Banksman
Slips trips and falls	Untidy and/or poor lighted workplaces can lead to injuries of personnel.	3	2	6	▪ Clear the working area of all trip hazards before daily work commences. ▪ Maintain a clean working area. ▪ Maintain a well-lit working area at night time or in poor visibility. ▪ Remove and clean all spills of support fluid immediately.	2	2	4	Supervisor, Foreman

BAUER Technologies Ltd.
General Risk Assessment Mobilisation and Demobilisation Rev 0
Project: North Yorkshire Polyhalite Project – 25/05/2017

Task Description	Hazard	Risk Rating			Control	Residual Risk			Action
		L	C	R		L	C	R	
Slips trips and falls	Lines, pipes and electrical cables	3	2	6	▪ Proper laying of cables and pipes in conduits or shifted outside of walkways. ▪ Crossovers shall be placed in areas where pipes and cables are crossing walkways. ▪ Good housekeeping has to be maintained at all times.	2	2	4	Supervisor, Foreman
Equipment Movement	Equipment moves on the platform	4	4	16	▪ Banks man to direct machine movement as required ▪ Remove unnecessary personnel from works area. ▪ Delineate works area.	2	4	8	Supervisor, Banksman
Equipment Movement	Slewing machinery - crushing of personnel / impact with other plant platform.	3	4	12	▪ Adequate clearance to be maintained around the turning radius of the machine. ▪ Machine to be operated clear of obstacles. ▪ Banksman to direct movement of machine.	2	4	8	Operator, Banksman
Equipment Movement	Risk of accident if driver does not have an all-round view from the cab!	3	4	12	▪ The driver of the machine must be assisted by a person giving hand signals during travel.	2	4	8	Operator, Banksman
Work area protection	Errant vehicles / people entering and leaving the works area.	2	4	8	▪ Prestart meeting daily prior to commencement of work. ▪ No plant or materials to traverse on to works area.	1	4	4	Supervisor
Operating controls	Repetitive strain injury	3	3	9	▪ Carry out stretching exercises prior to operating. ▪ Stretch and exercise hands as much as possible. ▪ When not operating, take a break from the cab.	1	3	3	Operator

Task Description	Hazard	Risk Rating			Control	Residual Risk			Action
		L	C	R		L	C	R	
Check hydraulics above cutter pump	Trapping of fingers / hands	2	3	6	▪ Ensure that descent of cutter is controlled. ▪ Keep minimum amount of hand within cutter at all times. ▪ Do not place fingers / hand in areas where trapping could occur. ▪ Maintain contact between operator and mechanic during these essential checks. ▪ Have a spotter in place to check for any unintended movement.	1	2	2	Operator Mechanic
Equipment	Oil or diesel spill can cause environmental damage	4	4	16	▪ MSDS provided. ▪ Spill kit to be kept on site. ▪ Refuelling by mobile tanker.	2	4	8	Supervisor
Electricity	Improper and/or defect electrical connections, tools or cables can cause electrification of personnel.	3	4	12	▪ Inspect leads and socket for damage prior to use. ▪ Check current tag attached. ▪ Ensure sockets securely coupled (tight) and suspended above ground. ▪ Check leads placed in secure location away from potential damage. ▪ Ensure RCD's functional.	2	4	8	Electrician
Rigging / Derigging	Risk of damaging components!	4	4	16	▪ Always keep the rope and hoses lightly tensioned. ▪ Avoid pull on the cutter. ▪ Set down the guider for auxiliary crane 2. ▪ Auxiliary crane must never pull on the boom head through the guy strand. ▪ Avoid collision of the rocker with other components. ▪ Raise the cutter while slowly travelling towards the cutter with the base machine to prevent horizontal tension	2	4	8	Operator

Task Description	Hazard	Risk Rating			Control	Residual Risk			Action
		L	C	R		L	C	R	
Site Traffic / Equipment Movements	Ground workers or vehicles can be injured by reversing, slewing or moving equipment on site.	4	4	16	▪ Daily briefings will be conducted in order to explain the daily tasks and special risks to all people involved in the construction of the platform. ▪ Keep out general site traffic from the working are as good as possible. ▪ Banksman shall safeguard reversing or sewing machines.	2	4	8	Supervisor, Banksman
Working at height	People falling from height during assembly, operation and disassembly of the plant	3	4	12	▪ Address 'Working at Height' topic regularly during briefings. ▪ Use always man-rider baskets, MEWP, ladders and/or fall arrests when working at height. ▪ Install rigid fences and handrails at all plant walkways, ladders and stairways.	2	4	8	Supervisor
Workplace Lighting	People tripping, slipping and falling due to insufficient lighting of workplace	3	3	9	▪ Ensure proper general lighting is sufficient for the complete plant area. ▪ Install task lighting wherever specific, greater demand of lighting is required.	2	3	6	Supervisor
Manual handling	Incorrect lifting of heavy or awkward loads could result in musco-skeletal injury	4	2	8	▪ Carry out assessment for awkward lifts - generally over 25Kg; Assess load prior to lifting, protect sharp edges wherever possible; Use mechanical means where possible; Only carry loads which are comfortable for you to do so; Ask for help if need be; Keep load close to your body; Ensure that hand protection is worn; Wear foot protection and suitable gloves; If in shared lifting operation ensure that clear commands are given	2	2	4	Foreman

Task Description	Hazard	Risk Rating			Control	Residual Risk			Action
		L	C	R		L	C	R	
Substances hazardous to health	Failure to identify SHH Personal injury / longer term ill health	3	4	12	▪ Material safety data sheets (MSDS) shall be requested for all products at the procurement stage ▪ COSHH Assessment shall be generated for all hazardous substances ▪ Unsafe work with hazardous substances shall be stopped until the necessary precautions are implemented	1	4	4	PM
Substances hazardous to health	Issue / unsafe handling of substances hazardous to health without information / instruction Personal injury / longer term ill health	3	4	12	▪ COSHH Assessments shall be retained in the relevant stores. Workers issued with hazardous substances shall be verbally advised of the handling precautions and issued relevant PPE as necessary	1	4	4	PM
Substances hazardous to health	Failure to store substances hazardous to health in line with manufacturers' guidelines Personal injury / longer term sickness Fire	3	4	12	▪ Hazardous and / or flammable substances shall be stored separately from general materials. ▪ COSHH / Flammable stores shall be locked to prevent unauthorized access ▪ COSHH stores shall be temperature controlled should the local conditions / environments prevent safe storage at local temperatures ▪ COSHH stores shall be clearly marked with appropriate, highly visible signage	1	4	4	PM

Task Description	Hazard	Risk Rating			Control	Residual Risk			Action
		L	C	R		L	C	R	
Oil / fuel spills	Broken hydraulic hoses can lead to considerable damage of the environment Oil / fuel spillage during re-fuelling of equipment and / or maintenance can lead to environmental damages	2	4	8	▪ Preventive: ○ Proper maintenance of the equipment has to be documented in the maintenance reports ○ Daily pre-use equipment inspections have to be carried out by the machine operator and to be documented ○ Organize a physical check of delivery hoses ○ Drip trays shall be placed below the machine in order to hinder oils / fluids from penetrating soil. ▪ Corrective: ○ Immediate measures should be taken to contain the spill and prevent potential migration of contamination in accordance to the COSHH sheet ○ Oil spill response shall be carried out in accordance to AMC UK's Environmental Emergency Response Plan. ○ Contaminated materials / soil have to be disposed in accordance with local regulations.	1	4	4	

Task Description	Hazard	Risk Rating			Control	Residual Risk			Action
		L	C	R		L	C	R	
Spills of materials hazardous to health	Spills of solid or liquid materials can lead to Environmental damages	2	4	8	▪ Handle hazardous materials with care and in accordance with the applicable MSDS ▪ Spills of solid material - shovel excess and place contaminated material into an approved drum, cover and label ▪ Small Liquid Spills - absorb with sorbent material, including sand or clean fill. Place contaminated material into an approved drum, cover and label ▪ Large Liquid Spills - immediately dike the area surrounding the spill or create some type of obstruction to prevent the spill migration. Absorb the spill with a sorbent material, including sand or clean fill. After all free liquid is absorbed, remove the material and any contaminated soil. Place contaminated material into an approved drum, cover and label. All bags, containers, drums, etc. containing contaminated materials must be labelled.	1	4	4	
Establish site access	Traffic collisions or hold-ups	2	4	8	▪ Suitable traffic management to be in place.	1	3	3	Supervisor
	Road/ramp access	2	4	8	▪ Prior check of road/ramp access required. ▪ Ramp gradient to be maximum of 1:10.	1	3	3	
Off-loading & tracking equipment	Striking personnel	3	5	15	▪ Equipment to be operated by competent, experienced, licensed personnel only.	1	3	3	Operator Banksman
	Damage to property	3	5	15	▪ Operator only to move machine when directed to do so by signalman ▪ Appropriate traffic management to be in place.	2	2	4	
	Damage to equipment	3	5	15	▪ All lifting equipment must be visually checked by competent, experienced, certified signalman prior to use	2	2	4	

Task Description	Hazard	Risk Rating			Control	Residual Risk			Action
		L	C	R		L	C	R	
Attaching / Removing chains & slings	Falls from height	4	5	20	▪ Use secured ladder / harnesses where applicable, with ladder footed or tied off. ▪ 3 points of contact when using ladders. ▪ Use certified man-box.	1	4	4	Supervisor
Operation of excavator / service cranes	Striking personnel	3	5	15	▪ To be operated by competent, experienced, ticketed personnel only. ▪ Authorized personnel only, check sheet signed off prior to use. ▪ All lifting operations shall be carried out on levelled grounds. ▪ All operations to be controlled by the experienced, competent ticketed banksman. ▪ Use tag lines when lifting large, bulky objects. ▪ All lifting points to be certified.	1	3	3	Operator Banksman
	Damage to property	3	5	15		2	2	4	
	Damage to equipment	3	5	15		2	2	4	
Delivery of materials	Struck by reversing delivery vehicle.	3	5	15	▪ Delivery trucks to be directed by signalman at all times. ▪ All personnel involved in operations to wear appropriate PPE. ▪ Minimise reversing wherever possible. ▪ Exclusion zones, barriers and spotters to be used. ▪ A forklift will be utilised for bulk material handling on site.	1	3	3	Supervisor Banksman

APPENDIX C – BAUER POLICY FOR HEALTH, SAFETY AND WELFARE

Policy Booklet

Staying Safe & Healthy

Bauer Technologies is committed to ensuring the safety and health of our employees is not affected by the work they do. In order to ensure this we have implemented the following policies:

- Working Safely
- Working Hours
- Drugs and Alcohol
- Driving Safely

Policy Booklet

Drugs & Alcohol

We are committed to a healthy & safe working environment for our people. Accordingly the consumption or sale of alcohol or drugs at our places of work is prohibited. In order to ensure that everyone is aware of the acceptable standards and to ensure employees are treated in a fair and consistent manner we have put in place the following policy.

Employees should:

- Not present themselves for work if, due to alcohol or drugs, they are unfit,
- Not present themselves for work if they have just consumed or taken drink or drugs.
- Not be in possession of drink or drugs in the workplace (this includes in any company vehicles).
- Not consume or take drink or drugs whilst at work

If employees are on prescribed medication or are taking medicines that may make them drowsy, e.g. cold cures, Solpadine, hay fever remedies, etc. they should advise their Doctor to seek alternatives AND report the fact to the Health & Safety Manager who can check the possible effects of any medicines using the 'Chemist on Call' service provided by Healthcare Connections.

If employees are considered unfit for work then we have a legal duty to test their blood, urine or breath for drink or drugs.

For the purpose of 'general' works the drink drive limits will be adopted as the limits for detection of testing unless the work is classified as safety critical (e.g. when working on Network Rail infrastructure or similar) in which case the limits shall be:

- More than 29 milligrams per 100ml of blood;
- More than 13 micrograms of alcohol in 100ml of breath; or
- More than 39 milligrams of alcohol in 100ml of urine.

Any traces of illegal drugs, such as Cannabis, Cocaine, Amphetamines, Barbiturates, Methadone's etc. found will be deemed a positive test result.

If an employee is taking any medication they must declare this at the time of testing. If laboratory analysis reveals the presence of prohibited substances consistent with a therapeutic dosage of undeclared medication the employee will be interviewed to establish the reason for non-declaration. If the Medical Officer is satisfied a 'negative' result may be given. If the Medical Officer is not satisfied this will be recorded as a No Result and the employee must be re-tested immediately and will not be allowed to work until a negative (pass) result is achieved.

Any employee who is tested and is identified as positive for alcohol or drugs shall be subject to disciplinary action. A refusal to submit to test shall be subject to the same disciplinary action as a positive result.

All employees who hold PTS certification or are holders of Safety Critical Work posts should be aware that while working on Network Rail Managed Infrastructure, additional legislation is applicable to them and their work. In particular the Transport and Works Act 1992 Part 2 Section 27 specifically notes the need for employees to be free from the effects of Alcohol and Drugs. The requirements of Network Rail Company Standard **NR/L1/OHS/051** applies. If proved positive the individual's NCCA card will be removed and they will be immediately suspended, removed from the Contract and possibly the Company and reported to NCCA & Network Rail. Testing will be carried out by Link-Up approved medical providers.

The Company will not victimise employees who admit to having a drink or drug related problem if they approach the Company for help and are prepared to undergo an agreed form of treatment. We offer to assist any employee who voluntarily declares an alcohol or drug related problem. This will include confidential support and guidance to employees and their families. If you have or think that you may be developing an alcohol or drug related problem

then you must advise the Managing Director immediately so that the help procedures can be applied. Disclosure or discovery of a problem prompted by a positive test result or an impending test is not acceptable.

All employees are strongly advised to leave 12 hours between drinking and commencing a shift. Don't forget to take into account any on-call, weekend or night shift work. Unannounced drug & alcohol testing will be carried out annually on a random selection of staff and operatives and our sub-contractors on a no-notice basis.

All new employees (and those existing employees who wish to start work on Network Rail Managed Infrastructure) will be required to undertake full screening for drugs and alcohol before employment. We will not knowingly employ people who are either recreational or habitual users of drugs.

For-cause screening will be carried out with no notice if there are reasonable grounds to suspect that an individual is under the influence of alcohol or drugs, or if their behavior prompts it, or if there has been an incident or accident in the work area.

Many of our clients also have a policy of unannounced screening for which no notice will be given.

Martin Blower
Managing Director
January 2015

Working Hours

In order to safeguard our employees and ensure they can work safely in accordance with procedures we have implemented the following policy in relation to the hours which our employees work.

- No person shall work more than 13 consecutive turns of duty
- No person shall spend more than 72 hours at the workplace in any consecutive 7 day period.
- No turn of duty shall be rostered to consist of more than 12 hours at the workplace
- The minimum time away from the workplace between turns of duty shall be 12 hours except that a short break of 8 hours between shifts is permitted: -
    - When changing turns at weekends or
    - When there are short breaks between no more than 2 consecutive shifts
- The maximum permitted traveling time is limited such that the total time of travel plus planned shift length does not exceed 14 hours. In any case travelling time prior to the start of the shift must not exceed 3 hours.

Note: the 'time' at the workplace does not include traveling time incurred by relief staff, redundancy traveling time, or 'wash up' or 'handover' time incurred by staff in some functions. The workplace means the site of work or it's booking on point.

Where staff are called out after completing a normal day of duty then providing the call out ends before 22:30 hours with at least 9 hours rest after call out then this will not prevent the individual from taking up their normal day turn at the normal booking on time. It is not expected that these circumstances should apply more than twice during a week.

Changes to working time patterns which introduce a need to work outside of the stated limits must be subjected to a formal risk assessment. Consultation with the staff affected by the change allows an opportunity for fatigue to be discussed.

DISPENSATION FROM LIMITS
The above limits will be observed in all cases. It is recognised however that in exceptional circumstances where owing to adverse weather, emergency, equipment failure, accident or other incident, extended working exceeding these limits may be necessary in order to avoid or reduce risk to people or significant disruption to services and it is not reasonably practicable to make alternative arrangements.

If any of the above circumstances occur the Supervisor will inform the Construction Manager and the Project Manager and complete an incident form detailing the circumstance. Where required the shift supervisor will ensure that all documentation has been completed and copied to the site file.

RECORDING
For each job a working hours (timesheet) form will be completed. The form will be completed per shift by the Supervisor and will detail:

The member of staff
The total travel time for the day
The total working time – including any standing time

The form when completed will be returned to the Operations Manager for review, filing and where appropriate collating into a report. The form will be reviewed by the Project Manager, signed off and filed as appropriate. Where required by the Principal Contractor this information will be made available.

Where the records show that members of staff have exceeded the working time regulations this will be recorded

and the data made available for the regular management meetings.

MONITORING AND REVIEW

In view of the increased risk potential of staff accidents resulting from staff exceeding the working time limits it is necessary, as part of the monitoring process for the management to review the working hour reports. The statistics provided will be reviewed at management meetings and where appropriate regular exceedences are subject to discussion at this meeting.

The requirements of the Working Hour Regulations must be considered when compiling work rotas. The job sheet relating to a particular job is to be signed off in the relevant section to signify it has been reviewed and resourced for Working Hour Regulations by the Project Manager.

This policy conforms to the Working Time Regulations and Network Rail Standards NR/GN/INI/001 & NR/L2/ERG/003

Martin Blower
Managing Director
January 2015

Policy Booklet

Driving for Work

Driving is one of the most hazardous activities which many of us undertake on a daily basis. A Company Car Handbook is provided to all employees who have access to a company car. However over and above this all employees who drive are required to consider the following points in order to minimise the risk of being involved in an accident.

- Plan your journey to include a 15 minute break approximately every two hours of driving.
- Allow plenty of time for your journey.
- Plan your route well in advance.
- Try to avoid peak hour traffic and areas with heavy traffic congestion where possible.
- Plan your workload carefully & raise any schedule conflicts with your line manager
- Do not undertake unnecessary journeys if there is specific risk of adverse weather conditions.

If you feel tired or drowsy, find a safe place to take a stop and take a break. Feeling tired at the wheel can affect your ability to concentrate, correctly perceive, assess and respond to road hazards and to make safe driving decisions.

It is your responsibility to ensure your car is properly maintained to comply with the manufacturer's recommendations, relevant laws and regulations. You should arrange routine vehicle servicing and carry out routine checks in line with the vehicle manufacturer's recommendations.

It is illegal to use a hand held mobile phone while driving. The definition of a 'hand held phone will include any electronic device used for accessing oral, text or pictorial communications (including the internet) if the device is hand held during at least part of its operation. The definition of 'holding a phone' does not include operating a phone that is held in a cradle. You will be regarded as 'driving' if the engine is running – even if the vehicle is stationary. The law also states that drivers must have a proper control of their vehicles at all times. You can be prosecuted for careless or inconsiderate driving, or even dangerous driving, if using a phone causes you to drive in this manner.

If you are not an 'essential car user' you will not be expected to take calls when driving, but you will be expected to stop and the most convenient point within your journey and return the call. You must at all times drive with your own and others safety in mind. Essential car users are defined as those who have the use of a company vehicle or receive a car allowance.

Any accident which occurs whilst driving on company business should be reported regardless of whether the vehicle is a company car or not. Driving on company business does not include driving to or from your regular place of work.

You are required to inform your line manager if you have been convicted of a driving offence or banned from driving a vehicle. Failure to do so may lead to disciplinary action.

Martin Blower
Managing Director
January 2015

APPENDIX D – COSHH ASSESSMENTS

COSHH Assessment Form

BAUER TECHNOLOGIES LTD

COSHH Assessment Number	BTL 107
Product/Substance Name(s)	Diesel oil
Uses	Fuel oil
Risks to health Irritant Harmful Toxic	
Storage precautions	Store in double bunder diesel containers
Transport precautions	Transport in double bunded bowsers
Manual Handling precautions	None moved in double bunded containers
Factors which increase risks	Mixing with other substances
Name, address and telephone number of supplier of substance: Murco Petroleum Ltd St Albans	

HARMFUL EXPOSURE ROUTES *(tick relevant options)*

Eye Contact	☒	Ingestion	☒
Skin Contact	☒	Skin Absorption	☐
Inhalation	☒	Injection / sharps	☐

Symptoms of over exposure	Drowsiness and dizzyness
Personal protective equipment: (state type and when to be worn) Gloves Safety Boots Overalls General purpose safety glasses (EN166 F) Hard Hat Hi Visability Clothing	

EMERGENCY ACTIONS

Emergency action: first aid	Eyes <wash out Skin <wash with soap and water Ingestion <DO NOT INDUCE VOMITING. seek medical advice Inhalation <remove to fresh air seek medical advice
Emergency action: fire	Carbon dioxide, dry powder or foam
Emergency action: spillage	Spillage will be limited due to less than 5 litres held Contain spillage, do not allow into water course Treat as environmental spillage
Disposal precautions:	Via licenced waste remover
Emergency action: contact person	R. Ayres – HSEQ Systems Manager

Authorized by		Date approved	23/08/12

COSHH Assessment Form

BAUER TECHNOLOGIES LTD

COSHH Assessment Number	BTL 108
Product/Substance Name(s)	WD40
Uses	Anti squeak, moisture repellant, releasing agent
Risks to health Irritant	
Storage precautions	Store in containers provided
Transport precautions	Transport in containers provided
Manual Handling precautions	None when used in aerosol containers
Factors which increase risks	Mixing with other substances
Name, address and telephone number of supplier of substance: WD40 Company Milton Keynes	

HARMFUL EXPOSURE ROUTES *(tick relevant options)*

Eye Contact	☒	Ingestion	☒
Skin Contact	☒	Skin Absorption	☐
Inhalation	☒	Injection / sharps	☐

Symptoms of over exposure	Drowsiness, headache, nausea and dizzyness

Personal protective equipment: (state type and when to be worn)
Gloves Safety Boots Overalls General purpose safety glasses (EN166 F) Hard Hat
Hi Visability Clothing

EMERGENCY ACTIONS

Emergency action: first aid	Eyes ?wash out Skin ?wash with soap and water Ingestion ?DO NOT INDUCE VOMITING. seek medical advice Inhalation ?remove to fresh air seek medical advice
Emergency action: fire	Foam, water spray, dry checmicals, sand
Emergency action: spillage	Contain spillage, do not allow into water course Treat as environmental spillage
Disposal precautions:	Via licenced waste remover
Emergency action: contact person	R. Ayres

Authorized by	R. Ayres	Date approved	17.06.13

COSHH Assessment Form

BAUER TECHNOLOGIES LTD

COSHH Assessment Number	BTL 136
Product/Substance Name(s)	Lithium Grease
Uses	Lubricating grease

Risks to health:

☐ Flammable  ☑ Harmful  ☐ Biohazard  ☐ Corrosive 

☐ Oxidising  ☐ Toxic  ☑ Environmental  ☑ Irritant 

Storage precautions	Store away from strong oxidizing agents and elevated temperature. Keep container tightly closed
Transport precautions	Not classified as dangerous for transport
Manual Handling precautions	As per standard manual handling procedures
Factors which increase risks	Avoid extreme heat, strong oxidizers and sources of ignition

Name, address and telephone number of supplier of substance:

Solent Lubricants, Osbourne Works, Leicester, England, LE18 1AT,

HARMFUL EXPOSURE ROUTES *(tick relevant options)*

Eye Contact	☑	Ingestion	☑
Skin Contact	☑	Skin Absorption	☐
Inhalation	☑	Injection / sharps	☐

Symptoms of over exposure	Mild inflammation and irritation of skin

Personal protective equipment: (state type and when to be worn)

☑ Hard Hat ☑ Hi Visibility Clothing ☑ Safety Boots ☑ Overalls ☑ Gloves ☑ Safety Goggles

Notes:

EMERGENCY ACTIONS

Emergency action: first aid	Eye Contact AFlush eyes with water. Skin Contact Alf burned by hot material, cool skin with large amounts of water. Wash exposed skin with mild soap and water. Ingestion ARinse out mouth with water but DO NOT induce vomiting.
Emergency action: fire	Use dry chemical, foam, CO2 or water fog extinguishers. Combustion may cause toxic gases to be released.
Emergency action: spillage	Absorb spilt material with earth, sand etc and place in waste containers. Prevent area into waterways.
Disposal precautions:	Disposal in line with local regulations for hazardous material.
Emergency action: contact person	R. Ayres – HSEQ Manager Tel: 0 9

Authorized by		**Date approved**	15th July 2013

APPENDIX E – PLANT REGISTER

NORTH YORKSHIRE POLYHALITE PROJECT - DIAPHRAGM WALL WORKS

Plant register (environmental)

Author: JAG
Update: 26-May-17
Stage: Pre-construction phase

Notes: *The listed plant is indicative and may change due to operational requirements and available types of equipment at the time of construction.*
The shown durations are indicative / based on the latest time schedule and may change.

Construction phase	Activity ID	Activity	Location	Plant	Numbers	Type	Sound power level LWA [db(A)]	Sound pressure level LpA [db(A)]	Power rating [kW]	% on-time	Start	Finish	24 hour working	Comments
Diaphragm wall construction	D-WALL	Construction of diaphragm walls	Entire work area	D-wall cutter base crane	1	Bauer MC 128	117	80	709	70	July 2017	August 2018	Yes	
Diaphragm wall construction	D-WALL	Construction of diaphragm walls	Entire work area	D-wall cutter base crane	2	Bauer MC 96	112	80	570	70	July 2017	August 2018	Yes	
Diaphragm wall construction	D-WALL	Construction of diaphragm walls	Entire work area	Crawler crane, 90t	2	Kobelco CKE900G or similar	110	80	213	50	July 2017	August 2018	Yes	
Diaphragm wall construction	D-WALL	Construction of diaphragm walls	Entire work area	Crawler crane, 160t	2	Liebherr LR1160 or similar	105	70	230	50	July 2017	March 2018	Yes	
Diaphragm wall construction	D-WALL	Construction of diaphragm walls	Entire work area	Mobile crane, 110t	1	Liebherr LTM 1100 or similar	110	80	350	70	July 2017	March 2018	Yes	
Diaphragm wall construction	D-WALL	Construction of diaphragm walls	Entire work area	Desander (incl.) desilter	4	MAT BE 250	104	84	59	90	July 2017	March 2018	Yes	
Diaphragm wall construction	D-WALL	Construction of diaphragm walls	Entire work area	Desander (incl.) desilter	2	MAT BE 275	92	72	73	90	July 2017	March 2018	Yes	
Diaphragm wall construction	D-WALL	Construction of diaphragm walls	Entire work area	Decanter	3	BD 90	88	78	115	90	July 2017	March 2018	Yes	
Diaphragm wall construction	D-WALL	Construction of diaphragm walls	Entire work area	Slurry pumps	12	Various	85	80	25	90	July 2017	March 2018	Yes	Estimated average values
Diaphragm wall construction	D-WALL	Construction of diaphragm walls	Entire work area	Dry silo	3	Euromix 20t	n/a	n/a	2	90	July 2017	March 2018	Yes	
Diaphragm wall construction	D-WALL	Construction of diaphragm walls	Entire work area	Slurry Tank	8	500m3 Bauer silo	n/a	n/a	5	90	July 2017	March 2018	Yes	
Diaphragm wall construction	D-WALL	Construction of diaphragm walls	Entire work area	Slurry mixer	3	SK 11/15	n/a	n/a	30	90	July 2017	March 2018	Yes	
Diaphragm wall construction	D-WALL	Construction of diaphragm walls	Entire work area	Screw feed	3	Bauer	n/a	n/a	8	90	July 2017	March 2018	Yes	
Diaphragm wall construction	D-WALL	Construction of diaphragm walls	Entire work area	Water tank	3	MAT, 3m3	n/a	n/a	3	90	July 2017	March 2018	Yes	
Diaphragm wall construction	D-WALL	Construction of diaphragm walls	Entire work area	Slurry agitation tank	3	MAT, 3m3	n/a	n/a	3	90	July 2017	March 2018	Yes	
Diaphragm wall construction	D-WALL	Construction of diaphragm walls	Entire work area	MEWPs	3	Z45D or similar	85	80	36	25	July 2017	March 2018	Yes	
Diaphragm wall construction	D-WALL	Construction of diaphragm walls	Entire work area	Delivery Lorries	Estimated: 25 per day	various: 20' rigid, 45' artic, low loaders	85	80	150	25	July 2017	March 2018	Yes	Estimated average values
Diaphragm wall construction	D-WALL	Construction of diaphragm walls	Entire work area	Welding set	3	Miller	82	70	35	50	July 2017	March 2018	Yes	Estimated average values
Diaphragm wall construction	D-WALL	Construction of diaphragm walls	Entire work area	Compressor	2	2 tool	80	70	35	25	July 2017	March 2018	Yes	Estimated average values
Diaphragm wall construction	D-WALL	Construction of diaphragm walls	Entire work area	Jet wash	3	With water bowser	80	70	35	25	July 2017	March 2018	Yes	Estimated average values
Diaphragm wall construction	D-WALL	Construction of diaphragm walls	Entire work area	Small plant and hand tools	Various	Various	Various	Various	Various	Various	July 2017	March 2018	Yes	Estimated average values

APPENDIX F – PERSONNEL HISTOGRAM

NORTH YORKSHIRE POLYHALITE PROJECT - GUIDE WALL AND DIAPHRAGM WALL WORKS

Personnel histogram

Author: JAG
Update: 16-May-17
Stage: Pre-construction phase

Notes: *The listed numbers are indicative and may change due to operational requirements and final construction programme.*
Percentage of local labour is likely to be <5% as the availability of local skilled diaphragm wall operatives is very limited
Day shift working hours: 07am - 07pm, start Monday morning at 07am.
Night shift working hours: 07pm - 07am, finish Saturday morning at 07am.
If instructed, diaphragm wall construction working hours may be extended to 24/7 working.

Construction phase	Activity ID	Month	Site Management (DAYSHIFT)	Site Management (NIGHTSHIFT)	Site Operatives (DAYSHIFT)	Site Operatives (NIGHTSHIFT)	Suppliers / subcontractors (DAYSHIFT)	Suppliers / subcontractors (NIGHTSHIFT)	Total (DAYSHIFT)	Total (NIGHTSHIFT)	TOTAL
Mobilisation	MOB	Jul-17	6	4	15	15	15	0	36	19	55
Diaphragm wall construction	D-WALL	Aug-17	10	4	35	35	2	2	47	41	88
Diaphragm wall construction	D-WALL	Sep-17	10	4	35	35	2	2	47	41	88
Diaphragm wall construction	D-WALL	Oct-17	10	4	35	35	2	2	47	41	88
Diaphragm wall construction	D-WALL	Nov-17	10	4	35	35	2	2	47	41	88
Diaphragm wall construction	D-WALL	Dec-17	10	4	35	35	2	2	47	41	88
Diaphragm wall construction	D-WALL	Jan-18	10	4	35	35	2	2	47	41	88
Diaphragm wall construction	D-WALL	Feb-18	10	4	35	35	2	2	47	41	88
Diaphragm wall construction	D-WALL	Mar-18	10	4	35	35	2	2	47	41	88

APPENDIX G – MC96/128 AND BC40 ASSEMBLY INSTRUCTIONS

4 Assembly/mounting

WARNING **Danger of accident!**

Improper use can cause an accident. This could result in serious or fatal injuries to persons.

△ Please read and observe the following chapter on safety in the "General Safety" chapter before performing tasks or processes according to this chapter:

- Danger area and safety distance
- Safety when handling ropes
- Safety during assembly/mounting and dismantling/removing
- Safety when handling suspended loads and during transport

WARNING **Danger of equipment tipping over!**

Rotational movements of the upper carriage during assembly work can cause the equipment to tip over. This could result in serious or fatal injuries to persons.

△ Only unlock the upper carriage and undercarriage when assembly work is complete.

WARNING **Danger of equipment tipping over!**

Working on or with the equipment with the telescoping cylinders of the crawlers retracted can lead to the equipment tipping over. This could result in serious or fatal injuries to persons.

△ Extend the telescoping cylinders of the crawlers immediately after unloading the equipment and before any further assembly work.

WARNING **Danger of getting crushed, danger of getting cut!**

Crushing surfaces and cutting edges are produced, primarily during raising and lowering of the cutter, turning and swinging of the cutter, movement of the hose guide wheel, and slewing and tilting of the Boom. If persons get between these edges, they can receive serious or fatal injuries.

△ Do not insert any body parts between moving components.

△ Maintain adequate safety distance.

4.1 General

4.1.1 Assembly sequence / Mounting sequence

The following table shows whether the respective activity to be performed is described in the associated instruction manual or in this supplement.

Task	Instruction manual	Supplement
• General	●	●
• Mounting the undercarriage.	●	
• Mounting the upper carriage.	●	
• Mounting the boom.	●	
• Adjusting the boom.		●
• Mounting the boom top.		●
• Mounting guard rails on the boom.		●
• Mounting guy ropes.	●	
• Adjusting the guy rope and backstay strand.		●
• Establishing electrical connection.	●	
• Establishing hydraulic connection.	●	

Task	Instruction manual	Supplement
• Mounting the cutter rope.		●
• Mounting the mud hose drum.		●
• Mounting the hydraulic hose drum.		●
• Mounting the flow rate meter.		●
• Raising the boom.		●
• Mounting the Remote control - Cutting.		●
• Mounting the cutter on the pulley block.		●
• Raising the cutter.		●

✓ Assembly procedure/mounting procedure is complete and correctly performed.

4.2 Attachment

4.2.1 Adjusting the boom

1 Boom top

2 Boom insert

3 Boom butt

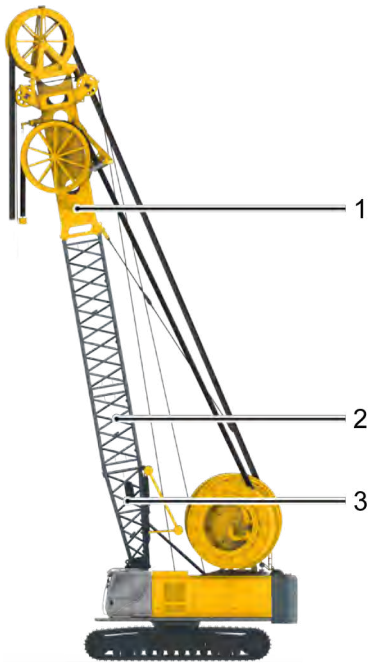
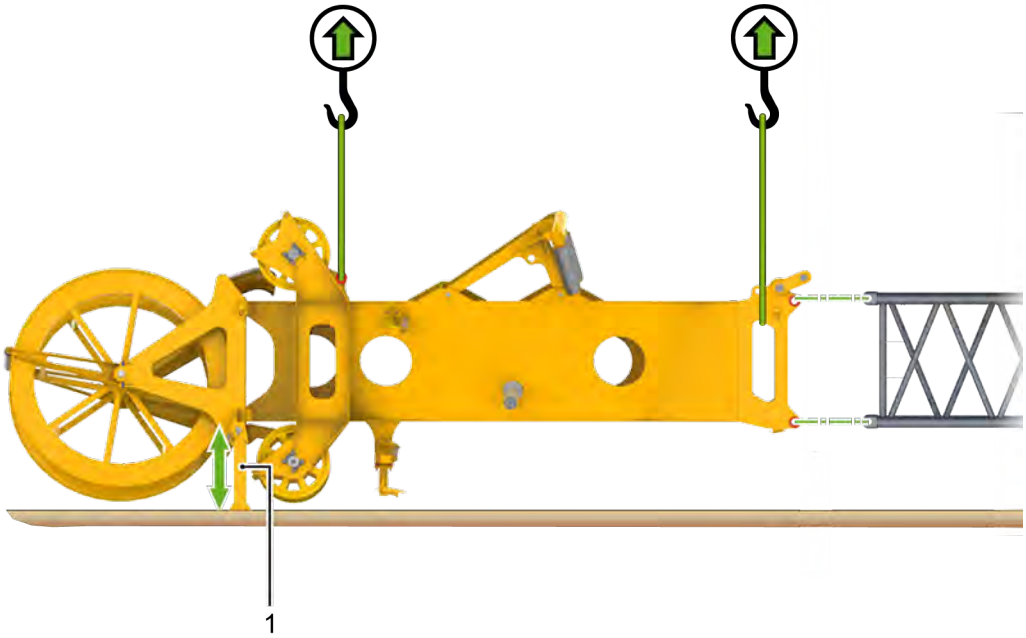


Table of boom segments:

HDS T				
Cutting depth [m]	Boom butt (quantity)	Boom insert [m]		Boom top (quantity)
100	1	6 (1 piece)	3 (1 piece)	1

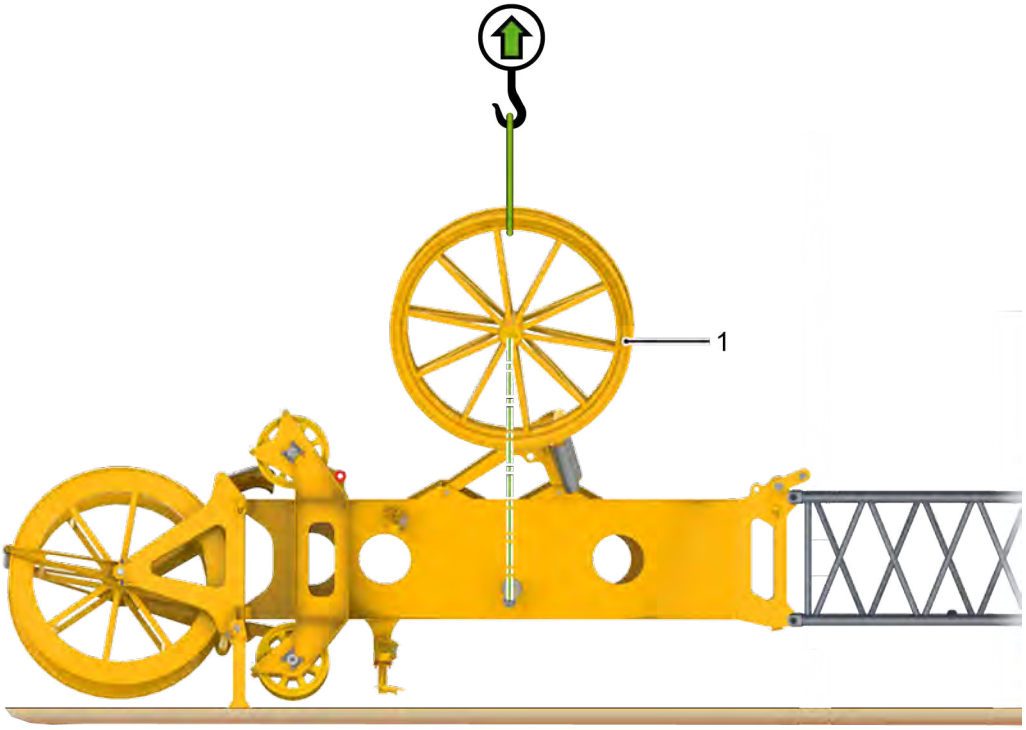
4.2.2 Mounting the boom top



- Mount a suitable lifting device on the boom top.
- Lift the a boom top onto the boom insert.
- Mount the specially provided locking elements on the plug connections.
- Swing out the support (1).
- **NOTICE** Risk of causing damage to components! If the support is fully extended and the boom top is set down on the ground, the support may become damaged. Mount boom top on the boom insert before extending the support.
- Adjust the length of the support (1).
- Lower the boom as far as possible.
- Remove all lifting devices.

✓ Boom top is mounted.

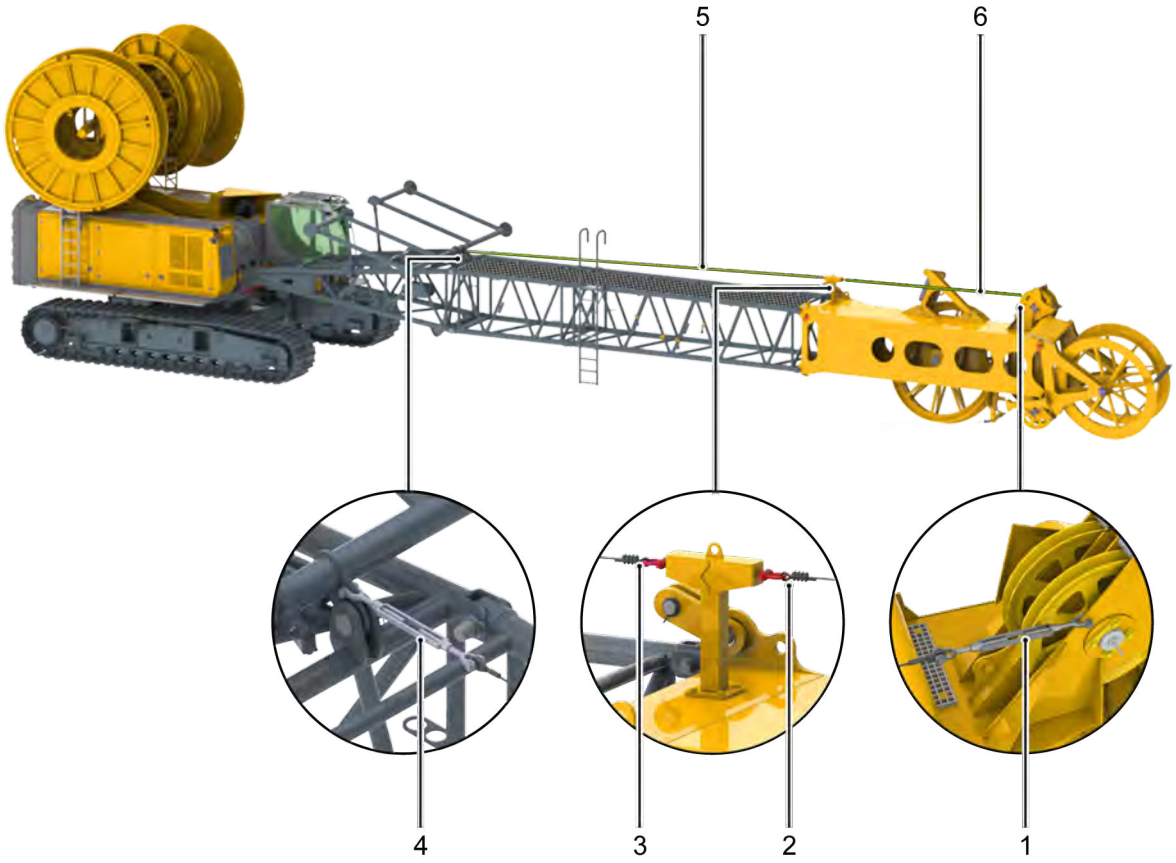
Mounting the hose guide wheel



- Attach a suitable lifting device to the hose guide wheel (1).
- Mount the hose guide roller (1) to the boom top with the specially provided screw connections.
- Remove the lifting devices from the hose guide roller (1).

✓ Hose guide roller is mounted.

4.2.3 Mounting guard rails on the boom



Prerequisite:

– The boom is mounted.

- Mount slinging rope (5) on the hose guide (4).
- Mounting the holding bracket on the boom top.
- Mount slinging rope (5) on the holding bracket (3).
- Mount slinging rope (6) on the holding bracket (2).
- Mount slinging rope (6) on the boom top (1).
- Tension both slinging ropes (5) and (6) appropriately.

✓ Guard rail is mounted on the boom.

4.2.4 Adjusting the guy rope and backstay strand

Adjusting the backstay strand

The length of the backstay strand depends on the base machine and on the process equipment. In order to adapt the backstay strand to the process, an extension can be mounted. Whether and which extension must be installed can be found in the table "Mounting the backstay strand extension".

If the backstay strand extension is not required can be mounted on the holding bracket on the boom butt.

The symbols listed below have the following meanings:

"-" = backstay strand extension must **not** be mounted.
"●" = backstay strand extension must be mounted

Table Mounting the backstay strand extension

Base machine	Process equipment HDS	Process equipment HTS	Length of backstay strand extension [mm]
MC 64	-	-	-
MC 96	-	●	1110
MC 128	-	-	-

NOTICE **Risk of causing damage to the equipment or the components!**

Improperly mounting the backstay strand extension can damage the equipment components.
△ Mount the backstay strand extension as shown in the table "Mounting the backstay strand extension".

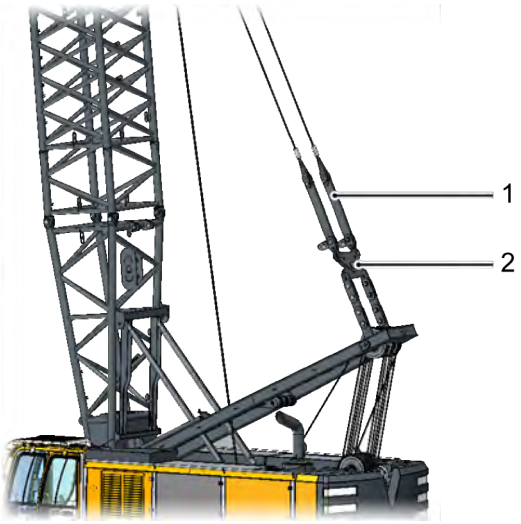
Prerequisite:

– Boom is fully lowered.

– The guy ropes are removed from the backstay strand.

- Mount the backstay strand extension (1) to the backstay strand (2) using the plug connections provided for this purpose.
- Mount the corresponding locking elements on the plug connections.
- Mount the guy rope (see base machine instruction manual).

✓ The backstay strand extension is mounted.

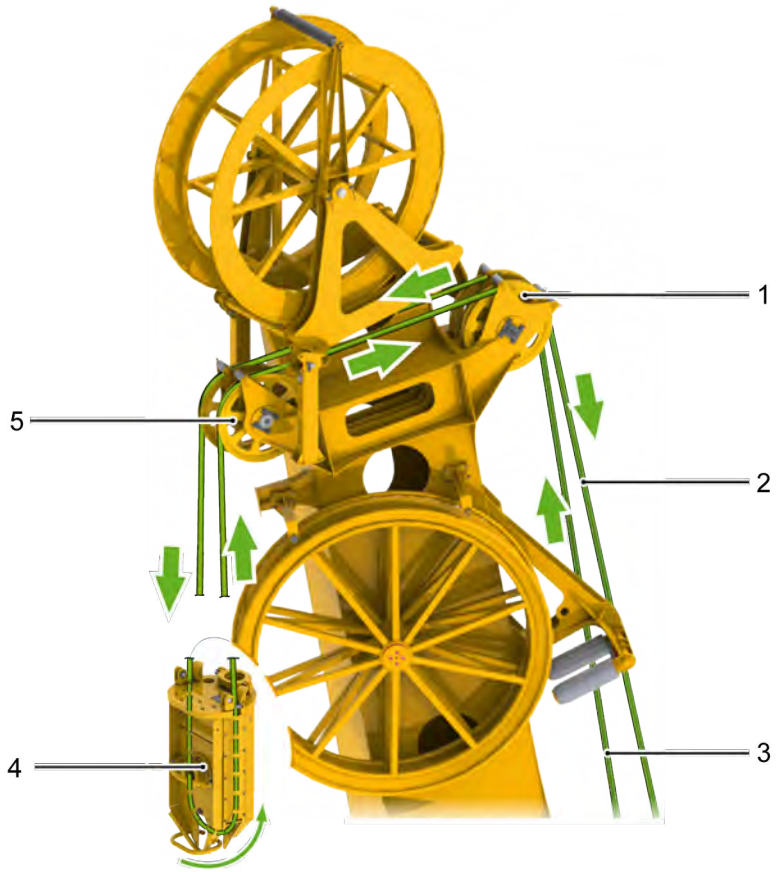


Adjusting the guy rope

Further information can be found in the associated instruction manual.

4.3 Process fitting

4.3.1 Mounting the cutter rope



Rope is mounted in the following sequence:

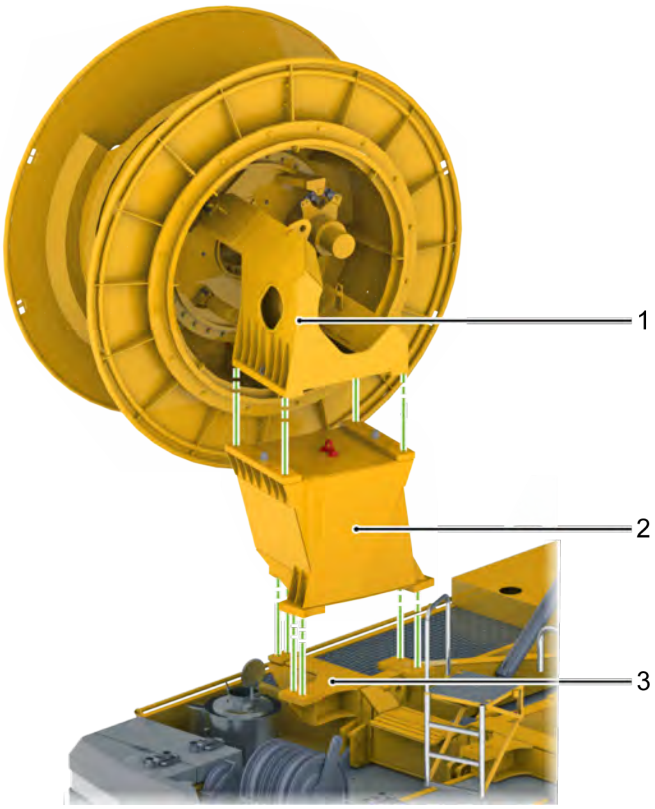
- Cutter winch 1 (3)
- Rope sheave on the boom head (1) and (5)
- pulley block (4)
- Rope sheave on the boom head (5) and (1)
- Cutter winch 2 (2)

4.3.2 Mounting the mud hose drum

Mounting the mud hose drum on the base machine

- Attach a suitable lifting device to the box (2).
- Mount the box (2) on the base frame (3) using the specially provided screw connections.
- Remove all lifting devices from the box (2).
- Attach a suitable lifting device to the mud hose drum (1).
- Mount the mud hose drum (1) on the box (2) using the screw connections provided for this purpose.
- Remove all lifting devices from the mud hose drum (1).
- Establish electrical and hydraulic connections to the base machine.

✓ The mud hose drum is installed.



Mounting the mud hose on the mud hose drum

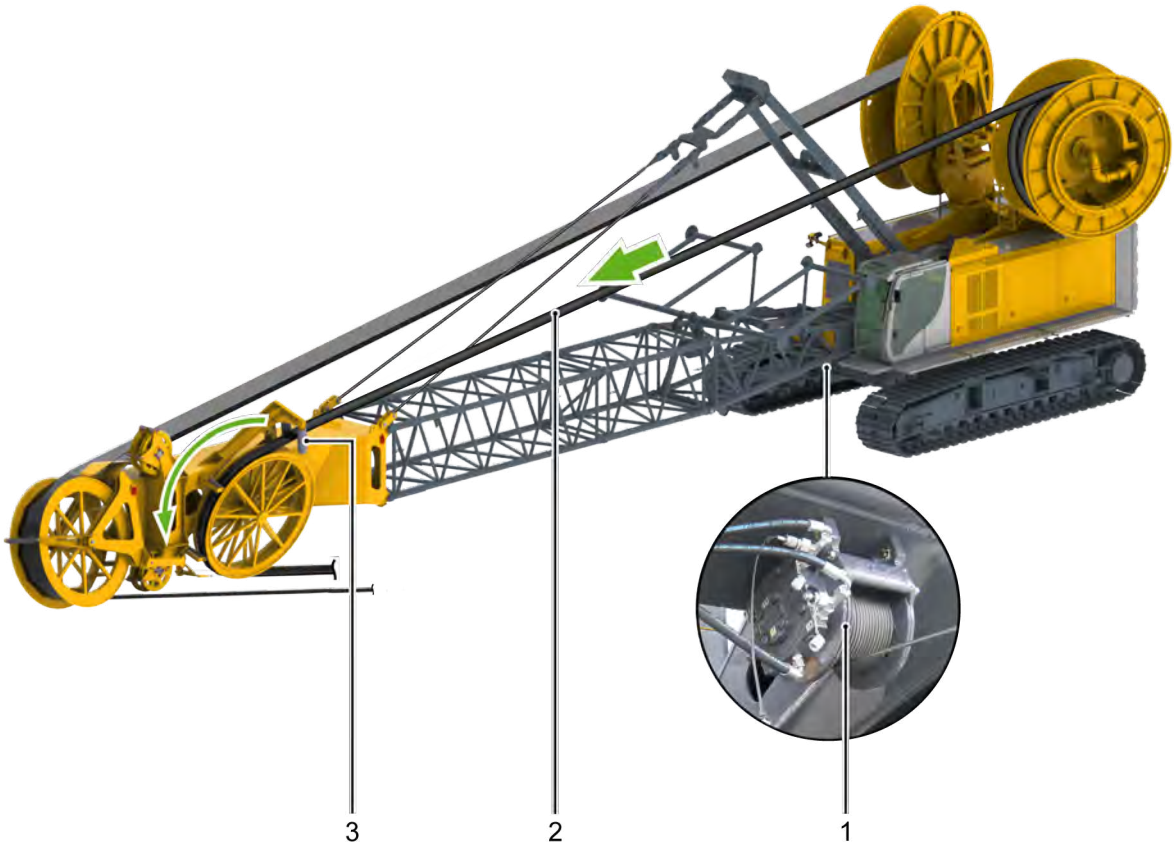
Table of mud hose segments

HDS 100 T							
Cutting depth [m]	**Operating position**	**Segment lengths of the mud hose [m]**					
100	Cutter lateral to the upper carriage	Cutter	7 (1 piece)	16.5 (6 piece)	33 (1 piece)	-	Mud hose drum
100	Cutter parallel to the upper carriage	Cutter	7 (1 piece)	16.5 (6 piece)	33 (1 piece)	-	Mud hose drum

- Establish connection between the mud hose segment (see table "Mud hose segments").
- Mount the mud hose on the rotary union of the mud hose drum.
- Wind the mud hose belt onto the mud hose drum.

✓ Mud hose is mounted onto the mud hose drum.

Mounting the mud hose on the boom



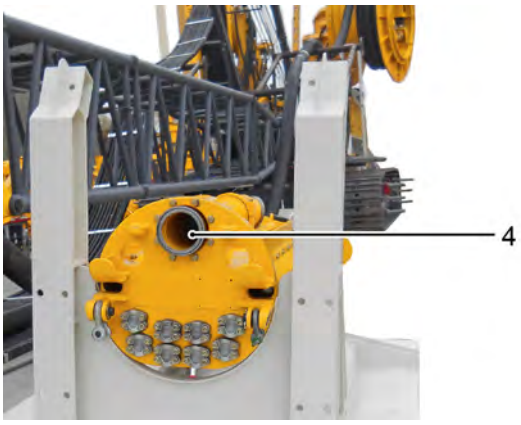
Prerequisite:

– Boom is lowered.

– Mud hose is wound onto the mud hose drum.

- Remove the locking element (3).
- Attach suitable lifting devices to the mud hose (2).
- Slowly unwind the mud hose (2) from the mud hose drum.
- Pull the mud hose (2) through the guide (3).
- Pull the mud hose (2) over the house guide wheel.
- Attach the mud hose (2) to the auxiliary winch rope (1).
- Mount the locking element (3).
- Mount the mud hose (2) on the pulley block (4).
- Remove all lifting devices from the mud hose (2).

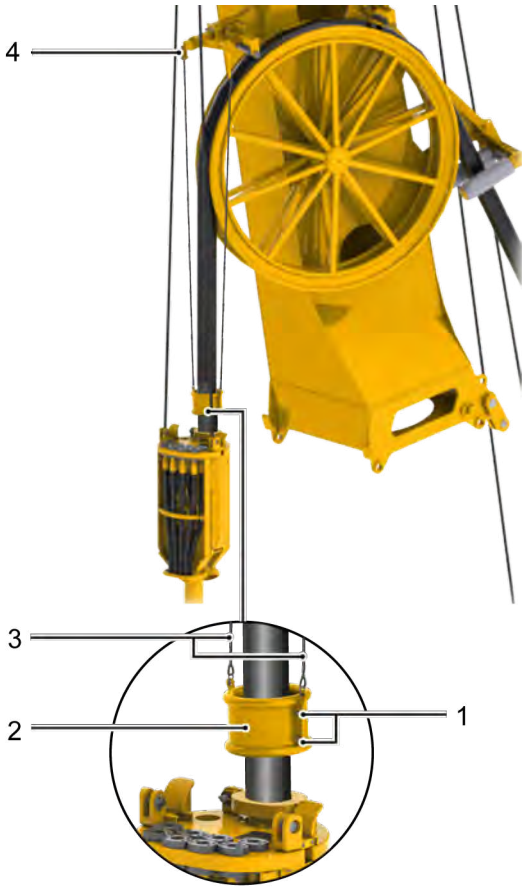
✓ Mud hose is mounted.



Mounting the weight for the hoist limit switch

- Mount the weight (2).
- Mount the screw connection (1).
- Mount the rope (3) on the weight (2).
- Mount the rope (3) on the hoist limit switch (4).

✓ The weight for the hoist limit switch.is mounted.

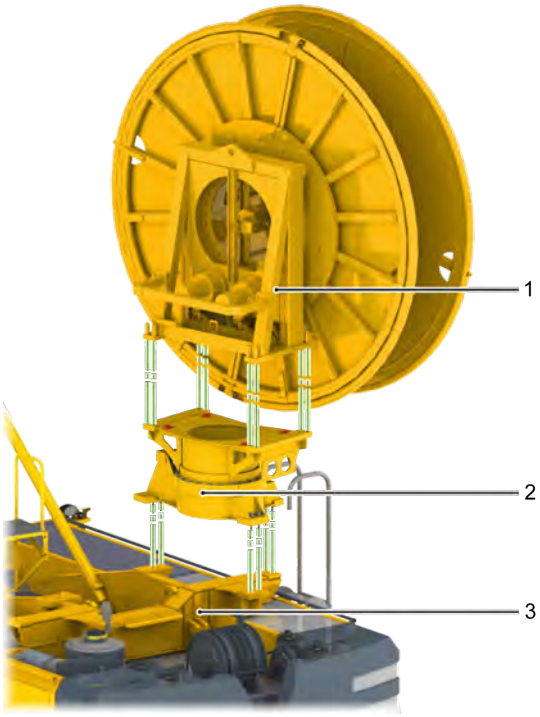


4.3.3 Mounting the hydraulic hose drum

Mounting the hydraulic hose drum on the base machine

- Attach suitable lifting devices to the box (2).
- Secure the box (2) to the base frame (3) with the specially provided screw connections.
- Remove all lifting devices from the box (2).
- Attach suitable lifting devices to the hydraulic hose drum (1).
- Mount the hydraulic hose drum (1) on the box (2) using the screw connections provided for this purpose.
- Remove all lifting devices from the hydraulic hose drum (1).
- Establish electrical and hydraulic connections to the base machine.

✓ Hydraulic hose drum is mounted.



Mounting the hydraulic hose belt on the hydraulic hose drum

Table of hydraulic hose segment lengths

HDS 100 T							
Cutting depth [m]	**Operating position**	**Segment lengths of the hydraulic hose belt [m]**					
100	Cutter lateral to the upper carriage	Cutter	22 (1 piece)	19.0 (6 piece)	-	-	Hydraulic hose drum
100	Cutter parallel to the upper carriage	Cutter	22 (1 piece)	19.0 (6 piece)	-	-	Hydraulic hose drum

More detailed information on pivoting the hydraulic hose drum can be found in section “Operating the HDS”

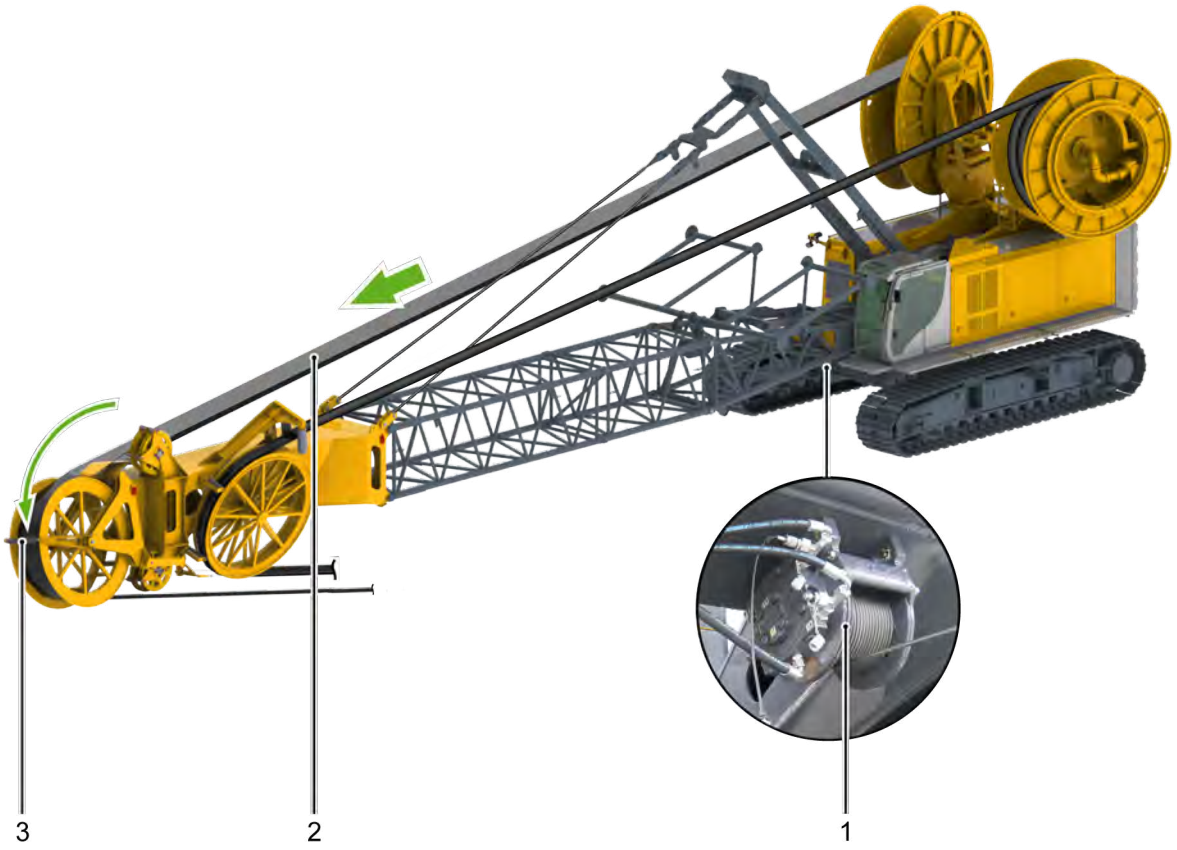
Prerequisite:

– Hydraulic hose drum is in the rigging position.

- Establish connection between the hydraulic hose belts (see table "Hydraulic hose segments").
- Establish connections between the hydraulic hose drum and hydraulic hose belt.
- Wind the hydraulic hose belt onto the hydraulic hose drum.

✓ Hydraulic hose belt is mounted on hydraulic hose drum.

Mounting the hydraulic hose belt on the boom

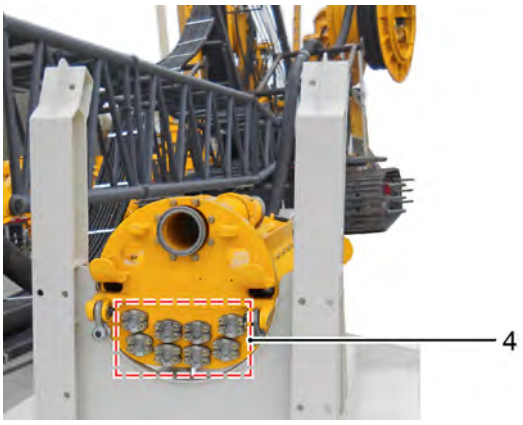


Prerequisite:

- Boom is lowered.
- Hydraulic hose belt is wound onto the hydraulic hose drum.
- Hydraulic hose drum is in the rigging position.

More detailed information on pivoting the hydraulic hose drum can be found in section “Operating the HDS”

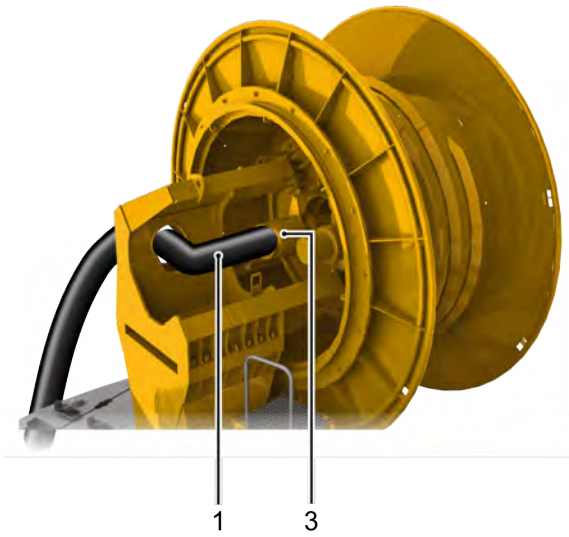
- Remove the locking element (3).
- Attach suitable lifting devices to the hydraulic hose belt (2).
- Slowly unwind the hydraulic hose belt(2) from the hydraulic hose drum.
- Pull the hydraulic hose belt (2) through the guide (3).
- Pull the hydraulic hose belt(2) over the hose belt guide wheel.
- Attach the hydraulic hose belt (2) to the auxiliary winch rope (1).
- Mount the locking element (3).
- Mount the hydraulic hose belt (2) on the pulley block (4).
- Remove all lifting devices from the hydraulic hose belt (2).



✓ The hydraulic hose belt is mounted.

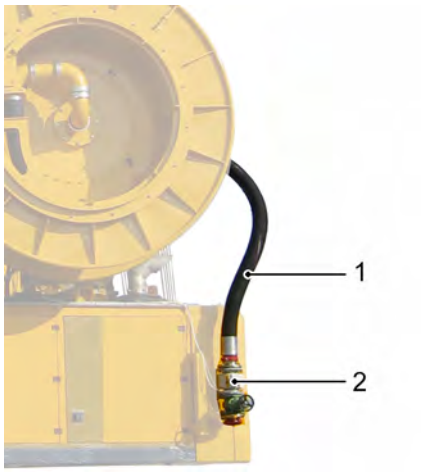
4.3.4 Mounting the flow rate meter

- Mount the mud hose (1) on the rotating union (3).



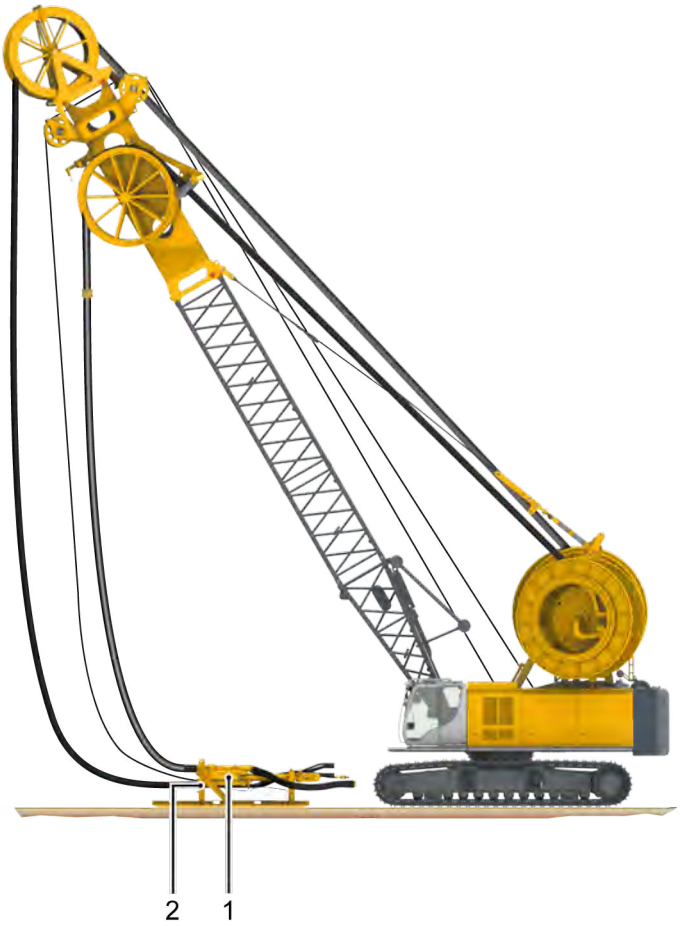
- Mount the flow rate meter (2) on the base machine.
- Mount the mud hose (1) on the flow rate meter (2).

✓ Flow rate meter is mounted.



4.3.5 Raising the boom

Further information can be found in the enclosed instruction manual for the base machine.



Prerequisite:

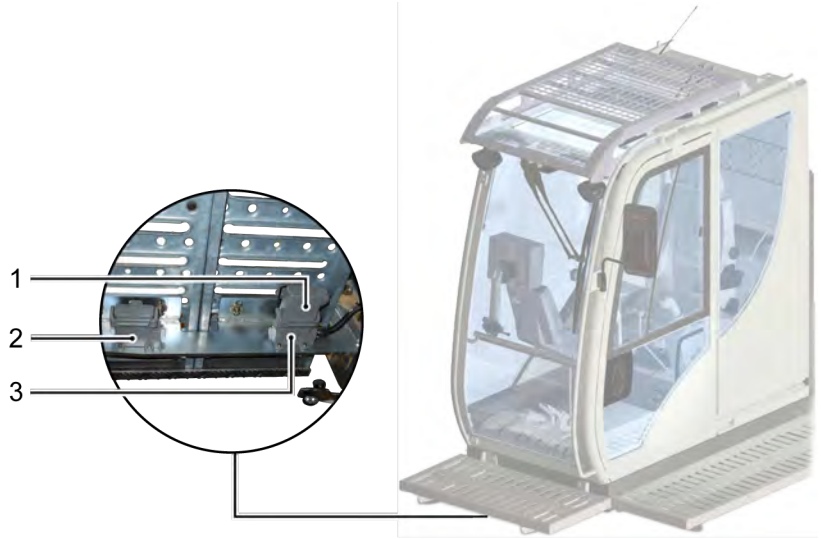
– The pulley block is mounted on the hydraulic hose belt and the mud hose.

– The pulley block is in the transport rack.

- Raise the boom and simultaneously slowly wind the cutter rope onto the rope winch.
- **NOTICE** Risk of causing damage to components! Manually winding the hydraulic hose belt and the mud hose onto the hose drums can exert excessive force on the process equipment. This can damage HDS components. Do not apply tension to the hydraulic hose belt and mud hose when raising the boom.
- If necessary wind in the hydraulic hose belt and mud hose.
- Lift the pulley block (1) out of the transport rack (2).

✓ Boom is raised.

4.3.6 Mounting the Remote control - Cutting



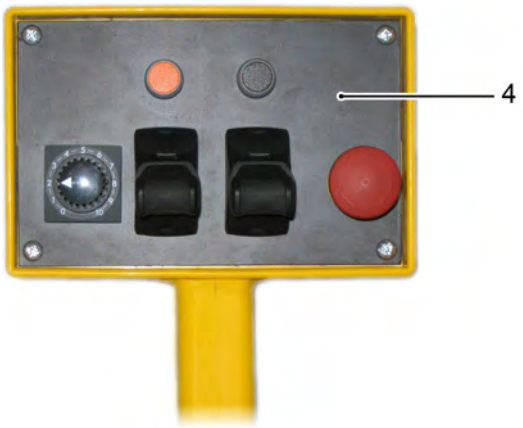
Prerequisite:

– The diesel engine is switched off.

– Hydraulic pilot control is switched off.

- Remove the plug (1) from the coupling (3).
- Insert the plug (1) in the coupling (2).
- Insert the plug of the remote control (4) in the coupling (3).

✓ The remote control is properly mounted.



4.3.7 Mounting the cutter on the pulley block

Prerequisite:

– The cutter is laid down in front of and parallel to the base machine.

– The pulley block is mounted.

- Mount the hose guide frame (2) using the specially provided screw connections.

✓ Hose guide frame is mounted.

- Mount the pulley block(1) o the cutter using the specially provided screw connections (3).
- Establishing electrical connection.(4).
- Mount the mud hose (4) on the cutter.
- Establish the hydraulic connections (5) according to the bulkhead pate layout.

✓ Cutter is mounted.

Abbreviation	Designation
FPP	Mud pump: Feed
FPR	Mud pump: Return
EK	Electrical cable
FRR	Right cutter wheel: Return
FRP	Right cutter wheel: Feed
FLR	Left cutter wheel: Return

Abbreviation	Designation
FLP	Left cutter wheel: Feed
LO	Leak oil

4.3.8 Raising the cutter

Prerequisite:

- The cutter is mounted on the pulley block.
- HDS automatic mode is activated .

- Slowly wind the cutter rope onto the rope winch.
- Raise the cutter as shown in the figure and slowly approach the cutter with the equipment at the same time.
- If necessary wind in the hydraulic hose belt and mud hose.

✓ Cutter is raised.