**From:** Hutton, Laura-Beth [mailto:Laura-bethHutton@eversheds.com]
**Sent:** 07 December 2015 13:25
**To:** York Potash Harbour; Robert Ranger
**Cc:** Thomson, Morag; Stella Perrett
**Subject:** 151207 TR030002 York Potash Ltd - Constructability Notes

Dear Rob

At the recent DCO hearing, the ExA asked for submissions to be made earlier than Deadline 6 where possible.

I therefore attach updated Constructability Notes which have been agreed with BP CATS in relation to the CATS pipeline.

We will include hard copies with our submission for Deadline 6, unless you would like to receive them earlier – please let me know.

Kind regards
Laura-Beth

Laura-Beth Hutton | Senior Associate | Planning and Infrastructure Consenting

T: 44 207 919 4779
M: 44 7788 427 909

Royal HaskoningDHV
Enhancing Society Together

# Technical Note

**HaskoningDHV UK Ltd.**
**Maritime & Waterways**

To: James Barrie
From: RHDHV
Date: 03 December 2015
Copy:
Our reference: PB1586 - N030 - Rev 7
Classification: Project related

**Subject:** **Constructability Issues in respect of the BP CATS Pipeline SOUTHERN ROUTE**

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|---|---|---|---|---|
| 7 | 03/12/2015 | CDJ | DB | DB |
| 6 | 23/11/2015 | RP | DB | RP |
| 5 | 20/11/2015 | CDJ | DB | RP |
| 4 | 17/11/2015 | CDJ | DB | RP |
| 3 | 05/11/2015 | CDJ | RP | RP |
| 2 | 23/10/2015 | CDJ | DB | RP |
| 1 | 19/10/2015 | CDJ | RP | RP |
| **Revision** | **Date** | **Drafted by:** | **Checked by:** | **Approved by:** |

## 1.0 Introduction

**1.1** The York Potash Harbour Facilities Project is currently at a stage whereby formal consultation has been undertaken with the Consultees including Landowners and Third Party Asset Owners as part of the Development Consent Order (DCO) application process. A number of Consultees have raised similar issues and concerns. These generally fall into two categories; firstly, there are points associated with legal matters such as concerns over Compulsory Acquisition, etc. Secondly there are concerns associated with constructability issues including the interface with existing assets and infrastructure throughout the construction and operational phases.

**1.2** The purpose of this document is to address the constructability issues we believe BP, a Consultee in the DCO process, has regarding the overland conveyor. These issues will need to be addressed prior to and reviewed throughout the construction period of the project.

**1.3** Below summarises our understanding of the main constructability issues as raised by a number of Consultees and consideration as to how they could be addressed by the Principal Contractor, appointed for the construction of the overland conveyor and the harbour facility for Phase 1 and Phase 2 of the project. It is not exhaustive but will assist in future discussions and development with BP. This information will be provided to the Principal Contractor as part of the pre-construction information which they will be contractually obliged to comply with.

## 2.0 BP assets within the Order Limits

**2.1** BP has a 36 inch high pressure gas major accident hazard pipeline, referred to as the BP CATS pipeline. There is also a CATS Tunnel for the River Tees crossing.

**2.2** The BP CATS pipeline is located underground, within an infrastructure corridor operated by SembCorp, and is in the vicinity of the overland conveyor route. Within the SembCorp corridor the BP CATS pipeline is protected by an easement that varies in width from 3m to 10m.

**2.3** The proposed overland conveyor runs above the BP CATS pipeline for approximately 2000m of its length, with three crossing points.

## 3.0 Understanding of the Issues

**3.1** A number of Consultees are concerned that the construction of the overland conveyor works could damage or compromise their ability to maintain and operate their pipeline assets in the infrastructure corridor.

**3.2** We have provided comments in the following sections on:

- Safe System of Work
- Control of traffic near linklines, near and over easements
- Inspection, repair, replacement and general maintenance of pipelines by BP
- Working above the BP CATS easement
- Excavating and Piling in the proximity of the buried assets
- Roads
- Site Security

## 4.0 Safe System of Work

**4.1** The construction project will be notifiable and carried out in accordance with 'The Construction (Design and Management) Regulations 2015'.

**4.2** The Principal Contractor is to conduct site inductions for all of its staff and sub-contractors. It is also its duty to appoint and engage contractors and workers, and provide management and supervision whilst monitoring the hazards on site.

**4.3** York Potash will engage an independent construction QA to oversee critical construction activities relating to the CATS pipeline during the construction phase.
The critical construction activities are defined as:

- All excavation works within the BP CATS easement
- All piling within 10m either side of the BP CATS pipeline
- All backfilling and compaction work within the BP CATS easement
- Erection of crash mats above the BP CATS pipeline
- All lifting over the BP CATS easement.

**4.4** For 95% of its route, the overland conveyor is within an existing infrastructure corridor, operated by SembCorp. All work within this corridor is controlled by SembCorp under their Safe System of Work (SSoW) as detailed in SembCorp Management Procedure "Safe Systems of Work and Risk Assessment – 1301". This is a permit to work based system. Historically, SembCorp have insisted on the application of this process to ***ALL*** works within the infrastructure corridor regardless of whether it be a small maintenance task or a major capital project. The SSoW is rigorous, but given the highly hazardous nature of the assets in the area it is appropriate. The Principal Contractor appointed for the overland conveyor and the harbour facility will need to adhere to the SSoW and its requirements for works and operations within the infrastructure corridor, including access.

**4.5** Identified below are the SembCorp Management Procedures which will be applied to the management of the construction activities under SembCorp's SSoW:

- Control of ignition sources and fire permits - 1303
- Lifting Activities Management and Control - 1448
- Construction operation maintenance and modification of link and vein lines - 1342
- Entry into Confined Spaces - 1304
- Lone and Isolated Workers - 1404
- Safe Systems of Work and Risk Assessment - 1301
- Management of Roads including Mobile Cranes and Abnormal Loads - 1309
- Control of Modifications - 1601
- Use of Work Control Permits - 1360
- Linkline Emergencies - 1215
- Management of Site Drainage and Effluent Systems – 1701
- Avoidance of Danger near Overhead Power Lines – 1452
- Excavations – 1308
- Review of Risk Assessments and Method Statements – 1320
- Control of Ionising Radiation for Industrial Radiography – 1424
- Prevention of River Pollution – 1217
- Prevention of Contamination of Soil and Groundwater – 1703
- Disposal of Waste Materials – 1702
- Environmental Control and Compliances with The Environmental Permitting (England and Wales) Regulations – 1746
- Management of Work Covered by the Construction regulations – 1426

**4.6** There are more Procedures within SembCorp's full suite of Management Procedures, but those listed above are the ones which are most likely to be applicable to the York Potash Harbour Facilities Project.

**4.7** Guidance has been provided by BP, these are contained within Annex A and Annex B. Annex A provides guidance on working practices for activities in close proximity to pipelines and Annex B relates to guidance on lifting operations over live plant.

**4.8** BP will be given the opportunity to review the design and drawings for the overland conveyor and will provide a watching brief on site to supervise works in close proximity to the BP CATS pipeline. BP will be able to comment and discuss any constraints that they feel may be imposed as a result of the overland conveyor design and construction in limiting access of maintenance activities, during the detailed design stage. Any construction drawings showing the BP CATS pipeline will reference the appropriate BP drawing; this will enable BP to confirm that the latest and most up to date drawings are being used at the detailed design stage. In order to facilitate this, BP will be included on the design distribution list. Details of York Potash and the Principal Contractors management of change procedures and compiling audit results will be provided to BP for review. The Principal Contractor's management of change procedures will be an important element of the tender review process. An emergency procedure for liaison between BP and York Potash Facility and the Principal Contractor will also be developed as part of the pre-construction information.

**4.9** The BP CATS pipeline runs below ground in close proximity to the above ground pipelines (generally known as "link lines") which run on existing common infrastructure. The pipelines on these link lines are

owned by several different companies and carry a mix of hydrocarbon products, industrial gases, and industrial effluents.

**4.10** The route of the overland conveyor runs through an area which is intended for use as an infrastructure corridor, as such there are many assets running through the area that the project will need to take into account during the design.

**4.11** As part of the Statutory Consultation undertaken by York Potash, the Health and Safety Executive has confirmed that the overland conveyor and the harbour facility do not fall within the 'Consultation Zone of Major Accident Hazard Pipelines'.

**4.12** At the detailed design stage a dropped object study will be undertaken to determine the implications of dropped objects due to conveyor blockage/ failure and provision of safeguards should they be required.

**4.13** The conveyor electrical design is to be reviewed by a specialist to determine whether AC interference, which could cause damage to the BP CATS pipeline or pipeline coating, is possible. Modifications to the electrical design may be required to mitigate the effect should it be present.

## 5.0 Control of traffic near linklines, near and over easements

**5.1** A major concern working near or over these assets will be how to protect the linklines and below ground pipelines from accidental damage from construction traffic and during lifting activities. Lifting activities are discussed separately below.

**5.2** A detailed traffic management plan will define vehicle access routes in the construction and operational phases. It will assess the risk from vehicle movement and provide safeguards for the risks identified. The traffic management plan will be developed by the Principal Contractor at the pre-construction phase of the project.

**5.3** Several guidance notes exist within the pipelines and gas industries which detail steps that should be taken to protect pipelines from damage associated with traffic movement; these will be referenced in the detailed traffic management plan:

- International Institution of Gas Engineers and Managers – IGE/SR/18 Edition 2 – Safe working practices to ensure the integrity of gas pipelines and associated installations.
- Linewatch – Special Requirements for Safe Working in close proximity to high pressure pipelines.
- Northern Gas Networks – Safe working in the vicinity of high pressure gas pipelines and associated installations.

**5.4** All notes contain similar advice and guidance on the protection of pipeline easements from traffic and construction activities, using the following steps:

- The easements of each buried pipeline will be marked out well in advance to clearly delineate the easement. The location of the buried pipeline will be positioned by referring to the asset owner's drawings and verified by other means on site e.g. using a cable avoidance scanner, physically locating the crown of the pipeline in accordance with the appropriate BP guidance given in Annex A and visually locating the asset owner pipeline markers. Additional marker posts will be installed with the asset owner present, to provide a visual reference as to the alignment of the asset. The type and suitability of the marker post will be agreed with the asset owner. Backfilling of the trial pits to locate the crown of the pipeline within the easement will be carried out in accordance with the appropriate BP guidance given in Annex A, including the need to carry out compaction testing.

- Where practical the easements will be fenced off with nominated crossing points open and clearly signed and identified.
- Protective measures such as load plates or bog mats should be placed across the easement at the crossing points. However, load plates or bog mats would only be considered following design checks to determine that the loading on the pipeline is within acceptable limits, these limits will be determined in consultation with the asset owner/ operator.
- Where heavy loads or high volumes of traffic are to cross the easement of the buried pipelines, protective measures such a reinforced concrete slab or steel platforms bridging over the easement will be constructed at the crossing. Design checks will be made to determine the loading on the pipeline is within acceptable limits determined in consultation with the asset owner/ operator.

**5.5** BP design standards or industry design standards will be followed in dealing with protection of their asset.

## 6.0 Inspection, repair, replacement and general maintenance of pipelines by BP

**6.1** For all pipelines, access will be provided to enable inspection, repair, replacement and general maintenance by BP throughout the construction phase. This will be controlled and managed by the Principal Contractor through routine and regular dialogue with SembCorp as the operators of the infrastructure corridor.

**6.2** Technical Note N028 entitled 'Pipeline construction method and conveyor interface with the BP CATS Pipeline' has been prepared specifically for the Southern Route, explains the installation techniques for pipelines and how maintenance on the pipeline can be undertaken under the overhead conveyor during the operational phase. BP will have the opportunity to review and comment on the design during the detailed design stage of the project. BP will be able to identify any safeguards that may be required as a result of the conveyor arrangement or construction activity limiting access for maintenance. To inspect or repair the BP CATS pipeline, BP require an excavation approximately 4.1m in depth, to provide a minimum 0.6m clear working space under the pipeline with the vertical sides of the excavation at least 2.0m from the centreline of the pipe- details are shown on drawing PB1586-SK1082 Rev D, contained within Annex C.

**6.3** At the detailed design stage a dynamic analysis of the structure and refinement of the conveyor and conveyor support structure and careful consideration of operational procedures will be undertaken to ensure that vibration in the transition zone are not induced.

## 7.0 Working above the BP CATS easement

**7.1** A key concern is the protection of the buried assets. A lifting study will be developed looking at the issues of protecting assets below the ground (i.e. crane platforms, double stropping, etc.) and determining the envisaged loads expected during the construction of the overland conveyor. There will be no lifting over any exposed section of the BP CATS pipeline or live or vulnerable plant containing hazardous substances or pressure energy. The following methodology has been developed for carrying out the lifting study.

**7.2** All large lifts will be pre-planned in detail (lift plan), taking into account the working environment. Some of the elements considered as part of the working environment are wind speed limits, weather, ground conditions, load being lifted, shape of load and centre of gravity, nearby assets, working activities in the vicinity, lifting equipment and method. BP will be part of the review of the lifting plan and be able to input

into this plan. BP will be able to check the level of detail and competences of the crane hire company (qualifications, CV's and accredited membership of industry recognised body). The verification and approval of the lifting plan will be the responsibility of the Principal Contractor. It is likely that the Principal Contractor will subcontract all major lifts and these will be carried out under the "CPA Contract Lifting Services Agreement" where the crane supplier supervises and takes responsibility for the lift.

**7.3** The size of crane would be selected to allow additional spare capacity for all lifts and any tandem lifts would have a 50% down-rating in capacity rather than the normal 25% required in the codes of practice. As part of the lift plan the siting of crawler tracks or outrigger pads (outside of the easement) will be checked to avoid excess loading on the pipeline. If necessary suitable foundations (ground bearing or piled) will be designed so that they are capable of supporting the crane outriggers or track loads, positioned outside of the easement. Lifting gear would also have a greater than normal factor of safety and the use of double stropping would be required.

**7.4** The lifting of loads will be carefully planned to eliminate any possibility of the load swinging over the easement. As mentioned in section 5.0, the easement will be marked and where practical fenced off, in advance, to clearly delineate the easement. When loads are lifted over the easement these will be controlled and the risks eliminated by technical procedures, by limits set within the crane's operational parameter (e.g. setting slew, sway/ working zone) and by the skill and experience of the crane operator and banks man.

**7.5** Any construction works above the buried pipeline will require the protection of the pipeline. This could be achieved by a temporary platform made with steel crane mats, these would typically be supported on steel sections fabricated to form a grillage packed up on bearers, spaced sufficiently wide apart to spread the load to the ground outside of the easement. The load applied to the ground will be calculated and within the limits agreed with the asset owner. Additional timber mats or fill material could be provided on top of the steel crane mats to cushion impacts. However, the construction of the temporary platform has to be balanced by the risk that erection and removal of the protective measures may themselves introduce. Construction plant will either work from similar platforms or be positioned sufficiently distant from the easements to avoid loads being imparted onto the pipeline in agreement with the asset owner.

**7.6** Reusable temporary works, specially designed for the purpose, could be fabricated both to safely support the overland conveyor support legs and the overhead conveyor structure during erection. Hydraulically operated cross heads could be used to prevent any part of the conveyor from falling from height in the unlikely event of a lifting equipment failure.

**7.7** During the operational phase any maintenance works to the conveyor above the buried pipeline will require the protection of the pipeline from falling objects. This would be over the full width of the easement under the section of conveyor being worked upon. A dropped object study will be developed looking at the issues of protecting assets below the ground (i.e. protection mats etc.) and determining the envisaged loads expected during the operational phase of the overland conveyor. A lifting study will also be developed looking at the issues of protecting assets below the ground (i.e. crane platforms, double stropping, etc.) and determining the envisaged loads expected during the operational phase of the overland conveyor, similar to that for the construction phase. The adequacy of the study will also be checked to ensure it is representative of all locations along the route of the overland conveyor. This information will be contained within the Operation and Maintenance Manual (O&M Manual). This manual will be prepared by the Principal Contractor appointed for the construction of the overland conveyor and the harbour facility and in conjunction with York Potash Limited. Having a prepared representative dropped object and lifting study will enable it to be pre agreed with the asset owner so that emergency/ emergent works can be reviewed and carried out more efficiently. BP will have a watching brief on site to

supervise maintenance works in close proximity to the BP CATS pipeline. BP must be able to provide a representative on site within an agree timescale to oversee planned and emergent or emergency tasks. York Potash will provided BP with details of maintenance activities, frequency, strategy and methodology prior to the operational phase. BP will be part of the review of the lifting plan and be able to input into this plan. BP will be able to check the level of detail and competences of the crane hire company (qualifications, CV's and accredited membership of industry recognised body) being used during the operational phase.

**7.8** As a minimum, "Lifting Operations and Lifting Equipment Regulations 1998 (LOLER)" Approved Code of Practice and Guidance will be followed at all times regarding the extensive lifting activities which will be associated with the overhead conveyor construction activities. The use of work equipment regulation "Provision and Use of Work Equipment Regulations 1998 (PUWER)" Approved Code of Practice and Guidance will also be adhered to. SembCorp Management Procedure "Lifting Activities Management and Control – 1448" will also need to be considered in the control of lifting activities, although it is worth noting that this document is based on the LOLER Approved code of practice. BP's guidance given in Annex B which relate to lifting operations over live plant will also be followed.

## 8.0 Excavating and Piling in proximity of the buried assets

**8.1** There will be no piling or excavation within the easement except for excavation associated with the location of the crown of the pipeline subject to the conditions below. Any proposed piling operations within 10m of the centreline of the BP CATS pipeline, will require the crown of the pipeline to be physically exposed so its location can be confirmed in the presence of the asset owner (refer to drawing PB1586-SK1082 Rev D, contained within Annex C). Excavating above the pipeline can initially be carried out by machine excavation using a toothless bucket. The machine may excavate to within 1500mm of the pipeline with the excavation being carried out in layers not exceeding 150mm. The exact location of the pipeline must be checked by probing prior to each machine excavated layer being removed. When the excavation is within 1500mm of the crown of the pipeline, the remaining soil is to be removed by hand digging.

**8.2** Any proposed piling operations within 5m of the centreline of the BP CATS pipeline, will in addition to exposing the crown of the pipeline by the method described above, require excavating at the location of the piling to a level equal to the depth of the pipeline (refer to drawing PB1586-SK1082 Rev D, contained within Annex C) this can be done by mechanical means. This operation is required to ensure that no materials are present that could damage the pipeline if disturbed this operation would be carried out in the presence of the asset owner.

**8.3** The assets initial location will be positioned by referring to the asset owner's drawings and verified by other means on site e.g. using a cable avoidance scanner and visually locating the asset owner pipeline markers, as noted in section 5.0. It may be necessary to install some form of physical separation between the asset and pile/ excavations during construction, such as a sheet piling between the pile and the buried asset. The means and need for separation will be agreed with the asset owner prior to the start of the construction activities. The Principal Contractor may wish to carry out multiple excavations at any one time; notification as to the location, timing and duration of works will be pre-planned to enable the asset owner sufficient time to mobilise in order to witness the activities. Any backfilling operations within the easement will be carried out in accordance with the appropriate BP guidance (see Annex A), including the need to carry out compaction testing.

**8.4** The guidance notes referred to in section 4.0 suggest that the proximity of piling activities to pipelines of this nature does vary, but all state that piling can be carried out near to the pipeline, provided that an

assessment of the vibration levels at the pipeline is carried out. It is the intention that bored or CFA (Continuous Flight Auger) piling will be used where necessary to minimise vibration. The guidance notes suggest that the peak particle velocity at the pipeline should be limited to a maximum level of 75 mm/sec. Where the peak particle velocity is predicted to exceed 50mm/sec, the ground vibration shall be monitored using a typical monitoring device such as the Vibrock V801 seismograph and tri-axial geophane sensor. Random vibration monitoring will be carried out at an early stage of the construction works. Where ground conditions are of submerged granular deposits of silt/sand, an assessment of the effect of any vibration on settlement and liquefaction at the pipeline will be carried out. Trial piling will be carried out on site and vibration limits established in accordance with BS 5228-2: 2009, and in consultation with BP. Research into maximum allowable peak particle velocity values for various assets will be undertaken and agreed with the asset owners. This method of monitoring vibrations will also be adopted should there be a need to use impact breakers to remove areas of hard standing over the piles or at pile caps locations. If the limits are likely to be exceeded, other methods of removing hard material will be used, such as high pressure water jetting or concrete coring using diamond drills or diamond sawing.

**8.5** In terms of excavations for pile caps near buried assets, the guidance documentation referred to in section 4.0 suggests that when excavating within 3m or less of the pipeline asset, the asset owner/operator recommends a representative present or available on site. The crown of the asset is to be physically exposed by hand digging so its location can be confirmed.

**8.6** A ground study will be undertaken prior to any piling operations or excavations and will include settlement assessment and/or stress analysis. The adequacy of the study will also be checked to ensure it is representative of all locations along the route of the overland conveyor. The ground study will determine the zones of influence on the buried asset, as this may identify the need for additional protection (i.e. temporary propping). Any additional protection will be subject to the approval of BP. Should there be a need to use piling platforms these will be designed and constructed in accordance with BRE 470. A safe method of working will be developed to minimise risk to the BP CATS pipeline. The safe method of working will taking into account the working environment some of the elements considered as part of the working environment are wind speed limits, weather, nearby assets, working activities in the vicinity.

**8.7** The BP CATS pipeline is protected with a cathodic protection system. A functional test/survey will be undertaken within the limits of the site prior to any construction work, to establish baseline data. Further monitoring will be undertaken during (frequency to be agreed with BP) and at the end of the construction works. The monitoring will be undertaken by the Principal Contractor in conjunction with the BP Site Representative. The monitoring will identify any changes to the cathodic protection system and possible damage from construction activities. During the operational phase the cathodic protection will continue to be monitored by BP to test the effectiveness of the cathodic protection system and to test for stray currents. If shielding occurs or stray currents are identified as a consequence of the overland conveyor, mitigation and/or modifications to the cathodic protection are to be implemented such as the installation of sacrificial anodes. Additional test facilities will need to be installed. During the operational phase York Potash Limited will undertake soil and groundwater tests to check for ground contamination from Potash dust.

**8.8** The locations of the cathodic protection system test positions will be added to the construction drawings at the detailed design stage, based on information provided by BP. As noted in section 4.0 BP will be given the opportunity to review the construction drawings and verify the information shown.

**8.9** When working near ducts the main concern will be cable strikes when breaking ground. SembCorp's excavation permit system incorporates a cable search as part of the application process. SembCorp MP "Excavations – 1308" will need to be adhered to in order to control this.

**8.10** In conjunction with the guidance notes, SembCorp procedure "Excavations – 1308" and the appropriate BP guidance given in Annex A will need to be followed for all excavations. Excavations are defined as "any work involving breaking ground".

## 9.0 Roads

**9.1** There are a number of roads (surfaced and unsurfaced) within the infrastructure corridor. The Principal Contractor will be required to interface with the owners and provide access for the asset owners during the construction works.

**9.2** Any roads requiring temporary closure to enable construction of the overland conveyor will be planned well in advance and coordinated with the owner and asset owners. No 2 Tunnel at Bran Sands requires 24 hour unfettered access for emergency services; this requirement will be maintained throughout the construction of the overland conveyor.

**9.3** A number of the roads in and around the infrastructure area are in poor condition and are not suited to large volumes of construction traffic which a project of this nature will require. The roads will be assessed by the Principal Contractor and if necessary will be upgraded in advance of the construction works. At the end of the construction works remediation works may be necessary. Development of the traffic management plan will address these issues.

**9.4** SembCorp procedure "Management of Roads including Mobile Cranes and Abnormal Loads – 1309" will be adhered to, to ensure that crossing over culverts and road bridges are controlled appropriately.

## 10.0 Site Security

**10.1** There are a number of existing fences and gates associated with providing security and control of access onto the Wilton Site, and especially the infrastructure corridor. Keeping the construction site secure will be the responsibility of the Principal Contractor during the works, and will need careful consideration. The current level of security provided by SembCorp must be maintained throughout the construction works. A security review will be undertaken prior to the construction works to help prevent unauthorised access and theft of equipment and materials from the construction area, BP security requirements will be sought at this stage. The current security of the Wilton site is the responsibility of Falck, who have a wealth of experience in security in and around the Teesside Industrial Complexes and their assistance may be sought with the security review.

**10.2** Of concern to BP is deliberate violation of pipeline marking due to a breach in security. BP will be able to conduct regular verification of the pipeline marking throughout the construction period of the project to ensure no unapproved changes are made to pipeline markings. It will be the responsibility of BP to carry out this procedure.

## 11.0 Conclusion

**11.1** This technical note provides BP with guidance on how constructability and operational interface issues between the overland conveyor works and the BP CATS pipeline will be managed. The information contained within this and other technical notes on constructability will be reflected in the design and provided to the Principal Contractor as part of the pre-construction information which they will be

contractually obliged to comply with. The Principal Contractor appointed for the overland conveyor and the harbour facility will be required to comply with, as a minimum, SembCorp's operating requirements and those in this technical note (including those provided by BP in Annex A and B). This technical note is intended to form the basis of future design and construction supervision and be further developed with BP input to address their concerns. BP will be consulted throughout the life of the project.

# Annex A
## BP Guidance on Working Practices for Activities in Close Proximity to Pipelines

## 1. Supervision of Works

A BP representative shall be responsible for protecting the company's interest and shall supervise all works in close proximity to the pipeline. He shall have the power to stop work proceeding if, in his opinion, safety of personnel or the integrity of the pipeline is being threatened as a result of these activities. The actions of the representative do not remove the responsibility of the promoter, his servants, agents and contractors from complying with the requirements of these conditions.

## 2. Construction Traffic

*2.1 Crossing the Pipeline*
Construction traffic and other plant shall cross BP pipelines only by public roads or at previously agreed and clearly marked crossing points and crossing lanes that conform with all requirements of 2.1 to 2.4 inclusive.

*2.2 Temporary Fencing*
Crossing points shall be fenced on both sides over a width not less than the full wayleave and shall be returned along the wayleave corridor away from the crossing for a distance specified by the BP representative.

*2.3 Temporary Protection*
It may be necessary at crossing points to install temporary protection over the wayleave. Such protection may, at the discretion of the BP representative, consist of the laying of steel plates of adequate thickness on a hard-core base, or an approved sleeper raft, or other approved method. The design and construction of such protection is to be approved by the BP representative. The protection installed shall be maintained in good condition to the satisfaction of the BP representative for the duration of the works.

*2.4 Warning Notices*
Any temporary crossing must be clearly marked by appropriate warning notices and flags which draw attention to the danger of not using the crossing. Additionally the crossing should be provided with lights at dusk, at night or in poor visibility conditions. All notices should be erected and maintained in a clearly legible condition.

## 3 Support of Pipeline

Where it is necessary to excavate below a BP pipeline, the pipeline shall be supported, during all stages of the operation, and protected against damage to the satisfaction of the BP site representative. On completion permanent supports shall, if necessary, be constructed to avoid future settlement.

## 4 Protection of Exposed Pipeline

To avoid damage during work, any exposed part of the pipeline shall be protected by cladding (e.g. timber) as directed by the BP representative and any damage to the protective wrap/coating of the pipeline, whether existing or caused by excavation work, etc. shall be brought to his notice.

## 5 Security

It is BP standard practice that, whenever a pipeline has to be left exposed overnight or during non-working periods, security personnel be employed to provide a continuous presence at the excavation site. The cost of these security personnel, who can if necessary be supplied by BP, shall be met by the promoter of the works.

The security personnel should be acceptable to the BP representative and must be equipped with suitable shelter including lighting, heating, cooking and toilet facilities. He must also be equipped with appropriate mobile communications and contact details.

## 6 Demarcation of Wayleave

Where excavation machinery or any construction traffic is operating within the pipeline wayleave but in close proximity to it, a temporary fence shall be erected to demarcate the wayleave and exclude access.

## 7 Locating the Pipeline

Unless this has already been performed in advance of the excavation operation, the pipeline should be physically located and the crown exposed to determine the exact position and depth of cover.

Although trial holes are generally hand dug, mechanical excavation may be permitted to within 1500mm of the crown of the pipe in particular circumstances where:
• the BP representative has been able to obtain an approximate depth using his pipe locating tool (CAT) and
• ground conditions are suitable for him to use a probe to ascertain safe excavation depths ahead of mechanical earth removal.
• A toothless excavating bucket is deployed.

N.B.
*Prior to commencing this machine operation, the BP representative will need to satisfy himself of the competency of the machine operator. Should his competency be suspect, then use of the machine close to the pipeline will not be allowed.*

## 8 Excavating the Pipeline

• The exact location of the pipe must be checked by probing prior to each machine excavated layer being removed.
• The machine may excavate to within 1500mm of the top of the pipe with the excavation carried out in layers not exceeding 150mm. The remaining soil is to be removed by hand.
• Soil removed from below the pipe shall be by hand although an excavator can be used to uplift the soil from the trench.

## 9. Storing of Soil

During these excavations (hand and mechanical), the following shall be observed:
• All top soil shall be stored for re-use away from the side of the excavation.
• Sub soil shall be stored separate from the top soil.
• Soil should not be stored under power lines.

## 10. Shoring of Trench

Depending on the depth of the pipeline and therefore the depth of the excavation, the sides of the trench shall be suitably shored or special trench boxes used to comply with statutory requirements.

## 11 Protection of Pipe

Where a pipeline has been exposed by excavation, it shall be protected by cladding (e.g. timber) as directed by the BP representative to prevent damage occurring. If damage is caused or is found when the pipeline is excavated, this shall be brought immediately to the attention of the BP representative.

## 12 Pipe Support

If the support beneath the pipe has been removed, temporary support shall be provided to the satisfaction of the BP representative if deemed to be necessary. On completion of works, permanent support shall, if necessary, be constructed to avoid future settlement.

## 13 Foreign Services

It is the responsibility of the promoter of the new work to ensure that adequate provision is made for the protection of any foreign services that may be uncovered within the extent of the excavation.

## 14 Statutory Regulations

The promoter is also responsible for ensuring that all aspects of the excavations are in compliance with the appropriate local and national safety regulations governing such work.

## 15. Backfilling Operations

A BP representative shall be in attendance during the whole of the backfilling operations and shall advise as to the suitability and degree of consolidation of backfill material around the pipeline.

Any accidental damage to the coating of a BP pipeline, however slight, shall be brought to the attention of the BP representative so that he can arrange for the coating damage to be inspected and repaired. Backfilling cannot take place until the BP representative confirms that the coating damage repair has been accepted.

Work shall be carried out during daylight hours wherever possible, if it is essential to continue work beyond daylight hours, then the BP representative must be advised and the following additional precautions shall be taken:
- the excavation shall be cordoned off with suitable safety barriers.
- mobile lighting towers shall be provided to illuminate the excavation location.
• Work shall be suspended and rescheduled during periods of severe or inclement weather.
• Portable diesel driven dewatering pump(s) with suitable lengths of discharge hose shall be available to keep the excavation free of water as necessary.
The following general requirements apply:
• Adequate notice shall be given to BP of the intention to backfill within the pipeline wayleave.
• A BP representative shall be present during the backfilling operation within the pipeline wayleave and will supervise and approve the materials being used and the method of consolidation around the pipe. The promoter will provide a method statement for BP approval.
• Any damage to the pipeline coating shall have been brought to the attention of the BP representative and shall have been satisfactorily repaired before backfilling is allowed to proceed.
• Backfilling shall not commence without BP approval.
• All water shall be removed from the trench before backfilling commences.

### *15.1 Backfilling Requirements*

The following requirements shall be applied:
• The bottom of the trench shall be padded with suitable backfill material to a depth up to 300mm from the bottom of the pipe.
• A minimum of 300mm of suitable imported granular material padding (typically, building sand) shall be infilled around the pipe and suitably consolidated to the satisfaction of the BP representative.
• Before final backfilling the pipe shall be checked to ensure it is evenly bedded throughout its exposed length.
• Backfilling operations should be organised in such a manner so as to avoid heavy loads passing over the pipeline.
• Backfilling should be in well compacted layers with allowance made for sufficient overfilling or mounding of the filled trench to compensate for subsequent settlement.
• No perishable materials such as vegetation, timber, bush, etc. are to be used in the backfill material.
• Special care must be taken to prevent any stones, cinders, slag, debris from made-up ground or other harmful matter, such as may set up corrosion if it comes into contact with the pipe, from being used for backfilling.
• The original topsoil is to be replaced in the top of the trench.

• It is the responsibility of the promoter of the works to ensure that all surplus excavated materials, rock, waste and all unwanted materials are removed from the site of the works and the site left in a tidy condition.

# Annex B

## BP Guidance on Lifting Operations over Live Plant

## Lifting over Live Plant Philosophy

### Hierarchy of control

Priority must be given to hazard elimination or reduction rather than placing reliance on a presumption of a low probability of failure. Any proposal for lifting over live plant should be tested by applying the principle of the hierarchy of control summarised below.

***Elimination***

- Avoid lifting over live plant.

***Reduction***

- Reduce the weight and energy of the load and lifting equipment so that it cannot cause harm. Use of very reliable and redundant lifting methods. Minimising the number of people involved or exposed to the consequences of an incident.

***Isolation***

- Separate the lifting operation from live plant by de-pressuring equipment and removing the inventory/energy. (Note hazards may include pressure or electrical energy as well as hydrocarbons and toxic substances.)

***Control***

- Of the lifting operation and interactions with process, marine and other conflicting activities.

***Protection***

- Of vulnerable plant, lifting equipment and personnel. This requires a formal design assessment.

***Management systems (procedural control, working practices)***

- Lift planning, procedures, competence assurance, equipment integrity assurance.

### Lifting hazard identification and risk reduction

The following is a discussion of the principal sources of hazards from the lifting operation which should be considered in the hazard management process.

***Load***

The nature of the load must be defined to assess the potential consequences of failure.
This includes:

***Weight***

- The confidence required in the accuracy of measured and estimated weights increases as the reserve capacity in the lifting system reduces.
- Estimated weights should include an explanation of how the potential error has been estimated.
- Detailed inspection by NDE and calculation may be required.
- An initial test lift with a load cell may be possible before lifting over live plant.

***Centre of gravity***

- Where a load may be potentially unstable the centre of gravity must be known with much greater precision than for inherently stable loads.
- Calculations may be required to estimate the position of the centre of gravity.

- It may be possible to confirm the position of the centre of gravity by a test lift before lifting over live plant.

***Stability***

- The position of the centre of gravity relative to the lifting points may make the load potentially unstable.
- Minor snagging of some loads may cause a loss of stability.

***Integrity***

- If the load can break or bend during lifting it may change the weight and centre of gravity leading to catastrophic failure. Lifting for demolition work requires very thorough planning.
- A bundle of scaffold tubes can turn into many sharp ended missiles if they are not secured properly. If they are properly secured and lifted in a carried there is only a single potential dropped object which is comparatively blunt.
- Shape
- Sharp edged loads like isolating spades may sever small lines if they are dropped from height. Transporting a spade to the place where it will be fitted in a carrier can significantly reduce the possibility of damage to the plant it is lifted over.
- Wind may have very significant effects on large light loads.
- Shape is a dominant factor in assessing the behaviour of sub-sea dropped objects.

***Lifting method***

The method of lifting the load should be chosen to minimise the chance of failure and the consequences of failure. Hand operated lifting equipment with multiple load paths may in some cases be less hazardous than a single crane lift. Single crane lifts are usually preferable to tandem lifts.

- Lifting with excavators, telehandlers, forklifts and Hiabs over live plant requires very strict control.
- The hazards from the lifting equipment must be considered. This should include its mobilisation, set up and removal as well as the lifting operation.
- Rigging arrangements for lifting over live plant should be designed conservatively and should where practicable provide redundancy without over complication. For example the use of spreader or lifting beams may cause instability.
- In some cases a single ‘golden’ component carries the entire load because multiple independent methods of support are not practical. Additional assurance may be required as many lifting accessories that are not subject to individual proof load testing by the manufacturer. Using new components avoids the possibility of previous overloading and hidden damage. Proof load testing, non-destructive examination and thorough examination may be justified.
- When loads are slung using a chain block or ratchet lever hoist to adjust a sling length the tension should, where practicable, be taken off the chain block or ratchet lever hoist whilst lifting over live plant. It may be transferred to a lifting accessory like a sling of the correct length, turnbuckle or an adjustable chain sling with a positively secured locking clutch before being lifted over live plant.
- The following restrictions should be applied:
    - Endless round slings will not be shortened by hitching for lifts over live plant. Site rigging lofts should keep sufficient slings to ensure the right lengths of slings are available.
    - Where it is necessary to adjust the length of slings using a chain block or ratchet lever hoist to trim a load a parallel safety sling must be used to mitigate the risk from failure of the braking mechanism. The rigging arrangement should be designed to avoid any additional work at height or prolonging the time the load is over or in proximity to live plant.
    - Where practicable before such loads are lifted over live plant the load must be taken off the chain block or ratchet lever hoist and transferred to a lifting accessory like a sling of

the correct length, turnbuckle or an adjustable chain sling with a positively secured locking clutch.
    - Snagging hazards should be eliminated if possible. The lifting method must ensure that a snag does not cause a loss of control of the load.
- Adjustable chain slings without positively secured locking clutches must not be used for lifting over live plant. Chain slings with locking clutches of a type authorised by the MHC on behalf of the RPU TA may be used where they are demonstrated to be the ALARP solution and the lifting plan is endorsed by the MHC.

**Rigging by hand operated equipment**

Hand operated lifting equipment like chain blocks provide a slow and gentle method of moving loads where any overloading or snagging is obvious allowing the operation to be stopped before any harm is done. Multiple load paths may also provide extra redundancy. Loads tend to be lifted just high enough to perform the task so reducing the energy involved.

**Powered lifting equipment**

Powered lifting equipment including cranes and powered chain blocks may apply excessive force if not controlled very carefully. Crane lifting operations may lift the load higher than necessary increasing the potential energy hazard and potential damage to plant.

**Mobile cranes**

Mobile cranes are the largest, heaviest vehicles allowed into operating process areas. The hazards may be considered in stages.

- Mobilisation of the crane to its operating position
- collision with plant (typical mobile cranes weigh 30t to 100t)
- overloading culverts
- obstruction of firefighting access
- Setting up the crane
- Toppling
- Overloading of ground
- Damage to services
- Collision with plant
- Performing the lifting operations
- Setting up rigging like spreader beams
- Collision with plant
- Lifting the load to an excessive height
- Failure of the load path
- De rigging
- Toppling
- Overloading of ground
- Damage to services
- Demobilisation

The lifting operation is not always the highest hazard activity.

***Ground bearing capacity***

The maximum expected ground loadings at the outriggers must be specified in the lift plan with an allowance for errors in weight and radius estimates. The basis of these loads must be explained in the lift plan.

- Mobile and crawler cranes may only be used in accordance with the restrictions and procedures specified by the Civil / Structural TA or their delegate for the maximum safe ground loading from cranes. Other types of powered lifting equipment that impose loads on the ground will comply with the Civil / structural TAs requirements.
- Care must be taken to select the correct type and size of mats required to support the outriggers. They must be positioned and installed correctly.
- If a crane is to be substituted with another crane that is not identical to the crane in the lifting plan then the lifting plan must be completely revised for the new crane and resubmitted to the LOLER Rep for authorisation. Cranes of similar size may have very significant differences in capacity, geometry and outrigger loads. If a larger crane is offered as a substitute for a smaller crane then significant changes may be required to remain within the allowable ground loading.
- The location of buried services that might affect the positioning of the crane or the ability of the ground to support the load should be described in the lift plan. Any buried services that might be vulnerable to damage by a crane should be identified. Any uncertainty in the location or type of buried services should be described in the lift plan.
- If there is a possibility of significant voids further ground investigation may be required. The Civil / Structural TA should be consulted.

**Pick and carry not using cranes**

Where practicable fork lifts and telehandlers in process areas should travel with loads on the forks rather than suspended by rigging which is inherently less stable

**Transport of loads on process areas**

Where it is necessary to transport loads in process areas it is important to ensure that they remain adequately stable at all times. Where practicable road transport vehicles should be loaded and unloaded away from vulnerable plant. If this is not practicable detailed planning and controls are required. Once load securing devices are removed the vehicle must not be moved.

The transport of loads on trolleys requires care to avoid them overturning.

Skidding operations will be planned and controlled as lifting operations.

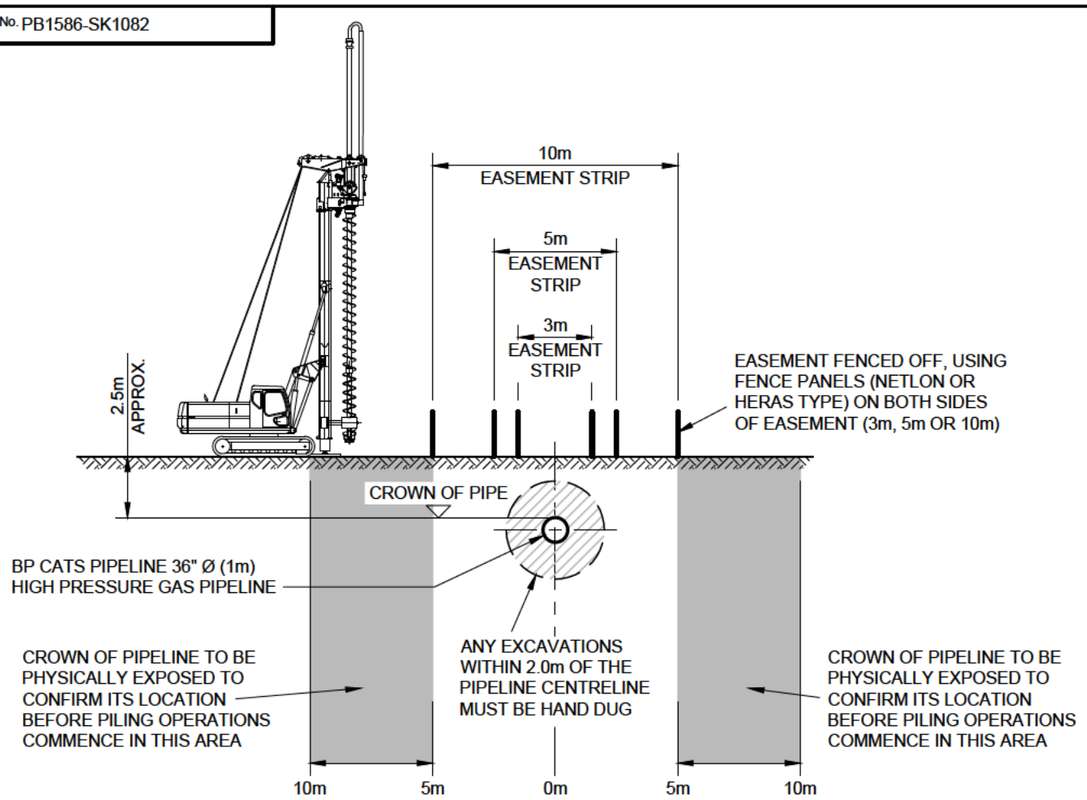
**Working environment**

The vulnerability of the plant under and in proximity to the load and the lifting equipment should be assessed. The lifting method and route chosen will usually be determined by the need to minimise any potential damage. The interaction with concurrent and potentially conflicting operations should be managed through the control of work system.

## Annex C

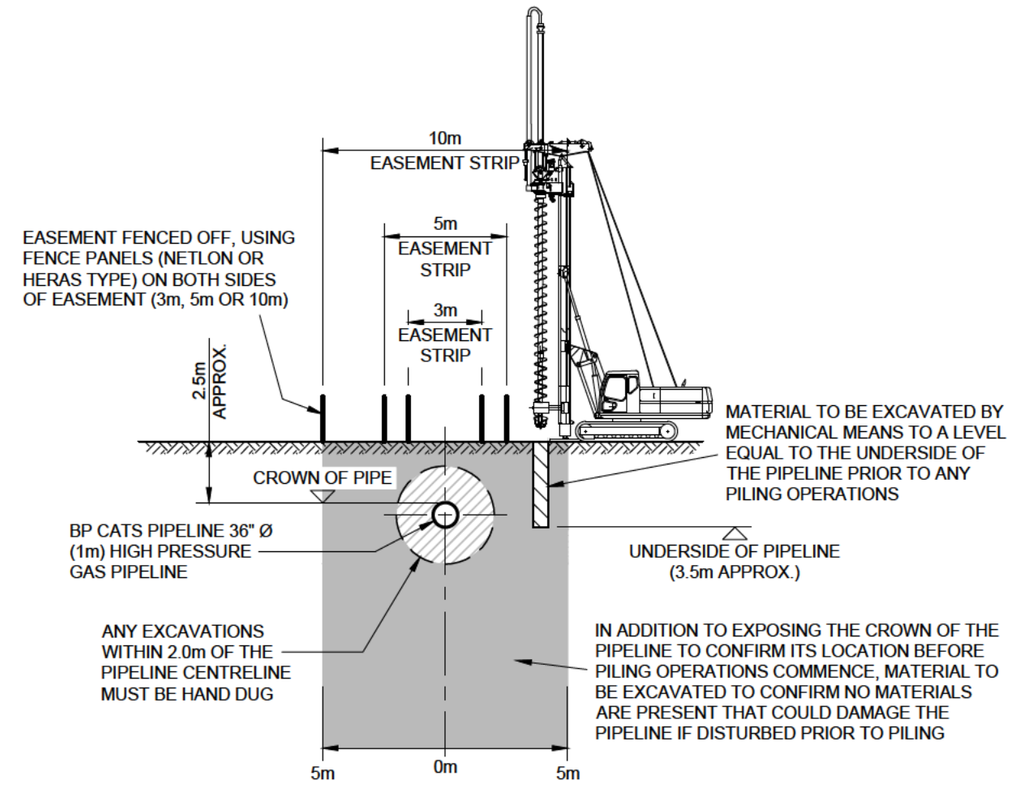
### Drawing PB1586-SK1082 Rev D ‘Typical Section Through BP CATS Pipeline Along The Route Of The Overland Conveyor’

DRG No. PB1586-SK1082




## TYPICAL SECTION IN ACCORDANCE WITH PARAGRAPH 13(2)a OF THE PROTECTIVE PROVISIONS

1:250




## TYPICAL SECTION IN ACCORDANCE WITH PARAGRAPH 13(2)b OF THE PROTECTIVE PROVISIONS

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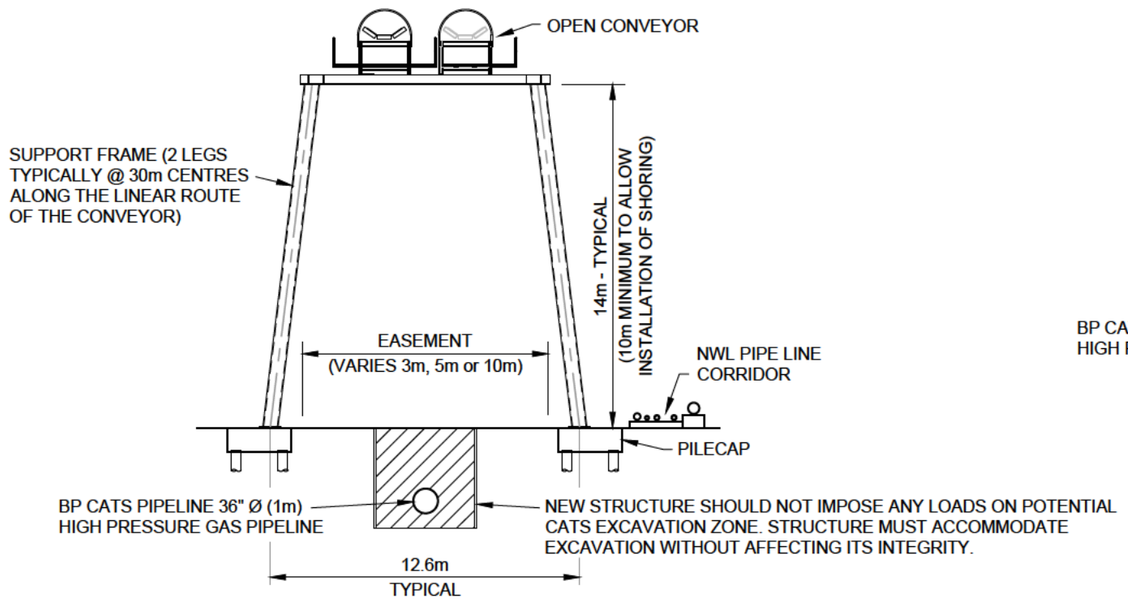
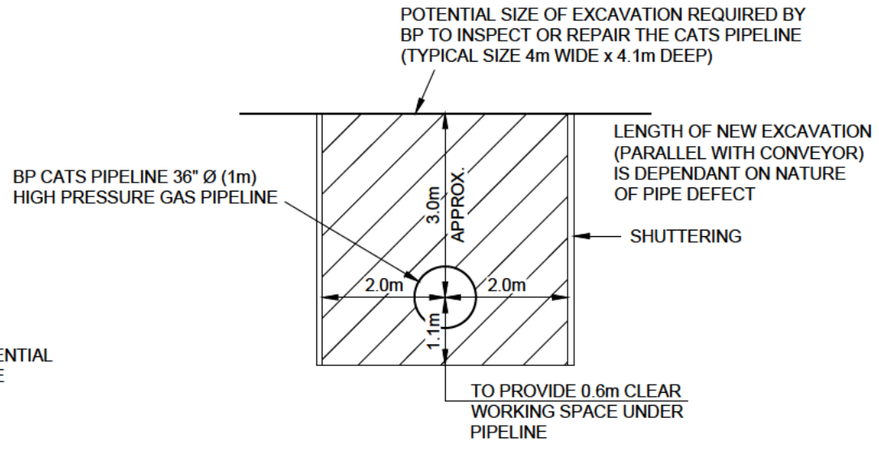



## TYPICAL SECTION SHOWING EXCAVATION REQUIRED BY BP UNDER THE PROPOSED CONVEYOR FOR INSPECTION OR REPAIR

1:250




## DETAILS OF BP CATS EXCAVATION

1:100

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH CONSTRUCTAB LITY TECHNICAL NOTES : PB1586 N029 & PB1586 N030

| REV | DATE | DESCRIPTION | BY | CHK | APP |
|---|---|---|---|---|---|
| D | 03/12/15 | NOTE ADDED | DC | CDJ | CDJ |
| C | 23/11/15 | UPDATES | PAW | DB | DB |
| B | 19/11/15 | UPDATES | PAW | CDJ | CDJ |
| A | 17/11/15 | ADDITIONAL NOTES & SECTIONS ADDED | PAW | CDJ | CDJ |
| - | 09/11/15 | ISSUED FOR INFORMATION | SA | CDJ | CDJ |

REVISIONS

YORKPOTASH
A Sirius Minerals Project

PROJECT

YORK POTASH

TITLE

TYPICAL SECTION THROUGH BP CATS PIPELINE ALONG THE ROUTE OF THE OVERLAND CONVEYOR


Royal HaskoningDHV
Enhancing Society Together

HASKONINGDHV UK LTD
MARITIME & WATERWAYS
Marlborough House
Marlborough Crescent
Newcastle upon Tyne NE1 6E
(0) 191 211 1300 Telephone
(0) 191 211 1313 Fax
info@newcastle.royalhaskoning.com E-mail
www.royalhaskoningdhv.com Internet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| DRAWN | SA | CHECKED CDJ | PASSED CDJ |
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REVISION D