

May 3, 2019

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Reference: Modification Request No. 12

Milne Port Ore Stockpile #1 and Water Management Expansion
Mary River Project, Water Licence 2AM-MRY1325 - Amendment No. 1

1 - INTRODUCTION

Baffinland Iron Mines Corporation (Baffinland) is pleased to submit this request for approval for a planned modification to the Mary River Project (the Project), in accordance with Part G of Type A Water Licence 2AM-MRY1325 - Amendment No. 1 (Type A Water Licence). As part of this modification request, consistent with guidance from the Nunavut Impact Review Board (NIRB), Baffinland has completed a self-assessment to demonstrate that the change proposed does not constitute a significant modification to the Project as originally approved under Project Certificate No. 005 (as Amended) and that the potential ecosystemic and socio-economic effects associated with the modification are not significant.

On November 1, 2018, Baffinland submitted its 2019 Work Plan to the Nunavut Water Board (NWB) and the Qikiqtani Inuit Association (QIA) (Baffinland 2019). The Work Plan included scope of work items that are considered approved under the Project Certificate, but require a Type "A" Water Licence modification. This Modification Request No. 12 is for activities related to 2019 Work Plan Item No. 6, Expansion of the Milne Port Ore Stockpile and Water Management, to optimize stockpiling and ship loading operations, resulting in an additional 140,000 m² of stockpile area and a new 15,000 m² lined sedimentation pond, to be completed in two stages. Note that the areas presented in the 2019 Work Plan have been updated following detail design work and are now 143,352 m² of additional stockpile area and a new 19,249 m² sedimentation pond.

The work is to be completed in two stages based on differing permitting requirements for different spatial areas of the planned expansion. The Stage 1 area is subject to approval as part of a Modification Request submitted to the NWB. The Stage 2 area is also subject to approval of this Modification Request, but is also subject to a Request for Review by Fisheries and Oceans Canada (DFO) as the footprint of the Stage 2 area extends across a pond and portion of a stream that may comprise fish habitat. This modification request is for both Stage 1 and Stage 2 of the work. A Request for Review will be submitted to DFO for advice on the Stage 2 works following approval of this Modification Request. Attachment 1 shows the site plan for the stockpile expansion works and staging.

The main scope of work includes:

- Construction of a drainage ditch within the Stockpile No. 1 footprint to convey water to Settling Pond
 No. 1
- Construction of a new Settling Pond (No. 3) this will be completed in two (2) stages to match the twostage development of the Stockpile expansion
- Grading and leveling to expand the Stockpile No. 1 footprint, in two stages.



2 – SELF-ASSESSMENT OF PROPOSED MODIFICATION

Baffinland has undertaken a self-assessment of the proposed modification in accordance with the *Process for Seeking Approval for Modifications to Previously-Approved Projects* (NIRB 2018). This self-assessment consists of four main components:

- Comparison of the modification with the scope of the Approved Project
- An assessment of significance applying the factors set out in Section 90 of the Nunavut Project Planning and Assessment Act (NuPPAA)
- Identification of other new or modified permits, licences or approvals necessary to complete the proposed modification
- Determination as to whether or not reconsideration of the existing Project Certificate is appropriate, considering Nunavut Agreement Section 12.8.2 and NuPPAA Section 112.

2.1 COMPARISON OF MODIFICATIONS TO APPROVED PROJECT

Baffinland undertook a comparison of the proposed modification with the scope of the Approved Project, as described in the Final Environmental Impact Statement (FEIS) and the FEIS Addendum (Baffinland 2012 and 2013) for the Early Revenue Phase (ERP) of the Project, and the Production Increase Proposal (2018). In completing this review, Baffinland considered the following question:

Was the modification activity assessed previously, or does it represent a reasonably expected modification or optimization of that which was assessed in the FEIS or FEIS Addendum?

This modification request has been assessed previously. The results of this review are presented in Table 1.

Table 1 Comparison of Proposed Modification to the Scope of the Approved Project

Item No.	Activity/Infrastructure	rastructure Comparison to the Scope of the Approved Project					
6	Expansion of the Milne Port Ore Stockpile and Water Management	An optimization consistent with the scope of the Approved Project and its assessment by NIRB.	FEIS Addendum Vol 3, Section 2.3				

2.2 SIGNIFICANCE ASSESSMENT

A screening-level assessment of potential changes to the assessment of the Approved Project effects was completed for each of the valued ecosystem components (VECs) and valued socio-economic components (VSECs) identified in the FEIS. This assessment is presented in Table 2.



Table 2

Comparison of Effects of Requested Modification to Approved Project

Theme	FEIS VEC	FEIS Key Indicator	Change in Effect and Significance	Description of Change in Potential Effects	Additional Mitigation Measures
	Climate change	Greenhouse gases significant (GHGs)		One-time minor increase in annual GHG emissions of ERP that during construction is immeasurable in the context of the Life-of-Mine (LOM) GHG estimate of the Approved Project.	No additional mitigation required
Atmospheric		Climate change	Change; not significant	Immeasurable minor increase.	No additional mitigation required
Environment	Air quality	Particulate matter, SO ₂ , NO _X	Change; not significant	Site characteristics and effects pathways are unchanged. Short-term localized increases in particulate matter and gaseous emissions associated with additional earthworks, entirely mitigated once modification is complete.	No additional mitigation required; implement existing Air Quality and Noise Abatement Management Plan.
	Noise and vibration	Atmospheric noise levels, marine noise levels, vibration	Change; not significant	Short-term localized noise increase associated with additional earthworks, entirely mitigated once modification is complete.	No additional mitigation required; implement existing Air Quality and Noise Abatement Management Plan.
	Landforms, soil and permafrost	Sensitive landforms	No change	There are no sensitive landforms identified within the existing Project Development Area (PDA) where the modification will be undertaken.	No additional mitigation required; implement existing Environmental Protection Plan (EPP).
	Vegetation	Plant abundance and diversity Plants important to Inuit Plant health	No change	Assessment of the Approved Project assumed complete loss of vegetation within the PDAs. Since modification will occur within the existing PDA, no change to vegetation will occur relative to the Approved Project.	No additional mitigation required; implement existing EPP.
Terrestrial Environment	Terrestrial wildlife and habitat	Caribou	No change	Assessment of the Approved Project assumed complete loss of terrestrial habitat within the PDA. Since modification will occur within the existing PDA, no change to terrestrial wildlife habitat will occur relative to the Approved Project.	No additional mitigation required; implement existing Terrestrial Environment Mitigation and Monitoring Plan (TEMMP).
	Migratory birds and habitat	Peregrine Falcon, Snow Goose, Eider, Red-throated Loon, shorebirds, songbirds, species at risk	No change	Assessment of the Approved Project assumed complete loss of habitat within the PDA. The footprint of the modification will be surveyed for bird nests prior to work if being undertaken during the nesting season, in accordance with the TEMMP and EPP.	No additional mitigation required; implement existing TEMMP and EPP.



Theme	FEIS VEC	FEIS Key Indicator	Change in Effect and Significance	Description of Change in Dotential Effects Additional Mitigation M.						
Freshwater Aquatic Environment	Surface water include freshwater quality and quantity	Water quantity Water and sediment quality	Change; not significant	Additional earthworks have some potential for increase in sedimentation effects to local freshwater watercourses. Construction of Stage 2 of the ore stockpile expansion area will involve the infilling of a section of Stream M05 and all of Pond ML-01. Stream M05 will be rerouted around the east edge of the expanded stockpile area and the flow returned to the existing tributary.	Water flows in Stream M05 will be maintained by constructing a permanent diversion channel around the south side of the stockpile expansion, returning the flow to the existing channel of Stream M05 upstream from its confluence with Phillips Creek. Surface water within the new stockpile area that would otherwise have drained to Stream M05 will be directed to Pond #3, where the treated runoff will be released downstream via a spillway where it can enter M05. Water management measures will be installed consistent with Baffinland's Civil Design Criteria and with applicable management plans: Surface Water and Aquatic Ecosystems Management Plan, Freshwater, Sewage and Wastewater Management Plan, and EPP. Stormwater management plans for construction have been developed for both stages (Attachment 3), and existing ponds 1 and 1A have sufficient capacity to allow for the construction of the expansion (Hatch 2019b; Attachment 4)					
	Freshwater fish, fish habitat and other aquatic organisms	Arctic char	Change; not significant	Construction of Stage 2 of the ore stockpile expansion area will involve the infilling of a section of an unnamed tributary (Stream M05) of Phillips Creek and all of Pond ML-01. Field surveys conducted in support of the FEIS indicated a low potential for fish habitat or presence. Nonetheless, project design will maintain water flow and mitigation will be in place to protect habitat and water quality. Field surveys in 2019, and input from DFO on the Request for Review will confirm the mitigation requirements.	Water flows in Stream M05 will be maintained by constructing a permanent diversion channel around the south side of the stockpile expansion, returning the flow to the existing channel of Stream M05 upstream from its confluence with Phillips Creek. Implement existing Surface Water and Aquatic Ecosystems Management Plan, Freshwater, Sewage and Wastewater Management Plan, and EPP.					



Theme	FEIS VEC	FEIS Key Indicator	Change in Effect and Significance	Description of Change in Potential Effects	Additional Mitigation Measures
	Sea ice	Area of shore fast ice in Steensby Inlet No change Not		Not applicable to the requested modification.	No additional mitigation required.
Marine Environment	Water and Water and Sediment		quality parameters with established quidelines in sedimentation effects to the shoreline of Milne Inlet. imple Aquat Freshv		No additional mitigation required; implement existing Surface Water and Aquatic Ecosystems Management Plan, Freshwater, Sewage and Wastewater Management Plan, and EPP.
	Land and resources use	Wildlife harvesting by Inuit Travel and camps	No change	The scale of the modification is minor and entirely confined to the existing PDA and Commercial Lease boundaries. Changes to how Baffinland manages visitors and hunters will not be necessary.	No additional mitigation required.
	Cultural resources Archaeological sites		No change	Effects to archaeology are not expected, as modification is located in an area previously surveyed (and mitigated, if necessary).	No additional mitigation required; implement existing Cultural Heritage Protection Plan and EPP.
Human Environment	 Education ar Human healt Community in public servic Governance Livelihood ar Economic designance Contracting and opportunitie 	eCs): Idemographics and training th and wellbeing infrastructure and es and leadership and employment evelopment and and business	No change	Any additional employment and contracting will be undertaken in accordance with the provisions of the Inuit Impact and Benefit Agreement (IIBA) with the Qikiqtani Inuit Association (QIA).	No additional mitigation required.



The modification request was evaluated against the significance criteria presented in Section 90 of the *Nunavut Project Planning and Assessment Act (NuPPAA)*:

- (a) The size of the geographic area, including the size of wildlife habitats, likely to be affected by the impacts
- (b) The ecosystemic sensitivity of that area
- (c) The historical, cultural and archaeological significance of that area
- (d) The size of the human and animal populations likely to be affected by the impacts
- (e) The nature, magnitude and complexity of the impacts
- (f) The probability of the impacts occurring
- (g) The frequency and duration of the impacts
- (h) The reversibility or irreversibility of the impacts

An assessment of the requested modification in relation to Section 90 of the NuPPAA is presented in Table 3.

Table 3 Significant Modification Self-Assessment Using NuPPAA S.90 Significance Criteria

NuPPAA Section 90 Significance Criteria	Evaluation of Modification Request No. 12
(a) the size of the geographic area, including the size of wildlife habitats, likely to be affected by the impacts	Proposed modification is located within the PDA and Commercial Lease Boundaries; the geographic extent of the Project remains unchanged.
(b) the ecosystemic sensitivity of that area	Proposed modification confined to the existing project boundaries; no new environmental sensitivities have been identified.
(c) the historical, cultural and archaeological significance of that area	Proposed modification confined to the existing project boundaries; no new features of historical, cultural or archaeological significance will be affected.
(d) the size of the human and the animal populations likely to be affected by the impacts	No change.
(e) the nature, magnitude and complexity of the impacts	Proposed modification has effects that are consistent with the Approved Project.
(f) the probability of the impacts occurring	Proposed modification has effects that are consistent with the Approved Project.
(g) the frequency and duration of the impacts	Proposed modification has effects that are similar in frequency and duration to effects assessed for the Approved Project.
(h) the reversibility or irreversibility of the impacts	The proposed modification has effects that range from fully reversible to irreversible, consistent with the Approved Project.
(i) the cumulative impacts that could result from the impacts of the project combined with those of any other project that has been carried out, is being carried out or is likely to be carried out	Marginal potential increases in the effects to air quality, noise, water quality and consequently fish and fish habitat are confined to the local study areas, and do not overlap with other past, present or reasonably foreseeable activities that would constitute new cumulative effects.
(j) any other factor that the Board considers relevant to the assessment of the significance of impacts	This criterion is not applicable to a proponent self-assessment.

The activities are confined within the boundaries of Baffinland's Commercial Lease and the PDA, and therefore do not represent a change to the previously assessed geographic extent of the Project. These activities will not be located in an area of particular ecosystem sensitivity and the areas of disturbance do not impact areas of historical, cultural or archeological significance. Humans and wildlife are not likely to be adversely affected. Potential effects



to aquatic life within the water bodies in the Stage 2 area will be resolved through the Request for Review process with DFO prior to construction of Stage 2. The activities will not significantly change air emissions, impede water flow, impact aquatic life, hinder wildlife access or increase noise levels.

The potential residual effects to fish habitat are not significant, as the reaches of the unnamed tributary to Phillips Creek (Stream M05) which Stage 2 of the expansion will affect, do not likely support fish directly. The lower portion of the unnamed tributary (i.e. well below the diversion) may potentially support Arctic char during the open water summer months due to its direct connection with Phillips Creek. While mostly influenced by the direct connection with Phillip Creek, this habitat will be maintained by diverting flows in Stream M05 around the east side of the stockpile expansion area through a diversion channel and back into Stream M05. No loss of fish habitat is anticipated provided flows to lower Stream M05 are maintained. Field surveys in 2019, and input from DFO on the Request for Review will confirm the mitigation requirements related to Stream M05.

Infilling of Pond ML-01 will not result in the loss of fish habitat as it is too shallow to support fish or provide overwintering habitat, and seasonal upstream colonization by Arctic char from Phillips Creek is considered very unlikely. A Request for Review will be submitted to DFO for consideration before commencing any work at Stream M05 or Pond ML-01 (Stage 2).

Most of the effects are considered reversible as reclamation will be carried out once the activity is complete. Additional cumulative effects are not expected given that there are no new residual effects predicted from the requested modification.

2.3 OTHER REQUIRED APPROVALS

In addition to requiring NWB approval as a modification under the Type A Water Licence, the proposed modification requires approval from the QIA as land owner, as part of the annual work plan approval process. Additionally, adequate reclamation security is required for the proposed works, for which Baffinland has engaged QIA though the 2019 Work Plan to complete a review of the appropriate marginal increase.

Baffinland has prepared a Request for Review for submission to DFO before commencement of any Stage 2 works. Baffinland expects that a Letter of Advice will satisfy the requirements of DFO, however, it is possible an Authorization under the *Fisheries Act* could be required.

2.4 RECONSIDERATION OF THE PROJECT CERTIFICATE

Baffinland reviewed Section 12.8.2 of the Nunavut Agreement and Section 112 of the *NuPPAA* and has determined that reconsideration of the existing Project Certificate is not appropriate.

Section 112 of *NuPPAA* states the following:

- **112 (1)** The Board may, on its own initiative or at the request of the Designated Inuit Organization, the proponent or any interested person, reconsider the terms and conditions set out in a project certificate that it has issued if
- (a) the terms and conditions are not achieving their intended purpose or are having effects that are significantly different from those anticipated at the time the certificate was issued;
- (b) the circumstances relating to the project are significantly different from those anticipated at the time the certificate was issued; or



(c) technological developments or new information provides a more efficient method of achieving the intended purpose of the terms and conditions.

Section 12.8.2 of the Nunavut Agreement presents nearly identical wording as NuPPAA Section 112.

The requested modification is consistent with the scope of the Approved Project, hence Baffinland has concluded that the terms and conditions of the Project Certificate are achieving their purpose (Clause a); and that the circumstances related to the project and its effects remain unchanged from the Approved Project (Clause b). No technological developments or new information have been identified in relation to Clause c. The requested modification does not warrant changes to existing conditions or new conditions within the Project Certificate. As such, reconsideration of the Project Certificate is not appropriate.

The requested modification is described in Section 3, in accordance with Part G, Item 3 of the Type A Water Licence.

2.5 SELF-ASSESSMENT CONCLUSION

Based on the self-assessment provided in Sections 2.1 through Section 2.4, Baffinland has concluded that:

- The proposed modification is an activity that was previously assessed by Baffinland;
- The effects of the proposed modification are not significant;
- No other permits, licences or approvals (or modifications of existing approvals) are required beyond
 approval of this modification request by the NWB, and posting of adequate reclamation securities
 associated with the 2019 Work Plan. However, a Request for Review shall be submitted to DFO for advice
 on the Stage 2 works; and
- Reconsideration of the terms and conditions in Project Certificate No. 005 is not required.

3 – MODIFICATION REQUEST

In accordance with Part G of Baffinland's Type A Water Licence, the Licensee may carry out modifications after written notification has been provided to the Board, provided such modifications do not place the Licensee in contravention of the Licence or the *Nunavut Waters and Nunavut Surface Rights Tribunal Act*, and such modifications are consistent with the NIRB Project Certificate.

In Section 2, Baffinland confirmed that the requested modifications are consistent with the scope of the Approved Project, and that a reconsideration of the Project Certificate is not appropriate.

Baffinland has also reviewed the proposed modification to determine if it potentially contravenes the Water Licence, thereby requiring written approval from the NWB before proceeding. Baffinland will not proceed with the works until written approval is granted. Baffinland will provide as-built documentation in accordance with the Type 'A' Water Licence and the Commercial Lease Operations Guide, to be submitted within 90 days following completion of construction.

3.1 MILNE PORT ORE STOCKPILE WATER MANAGEMENT UPGRADES

3.1.1 Description of Facilities and/or Works to be Constructed

The construction of a southern and northern stormwater diversion berm, new conveyor berm and associated infrastructure, and new settling Pond No. 3 is required to accommodate the addition of approximately 143,000 m² of footprint to the Ore Stockpile No. 1 pad at Milne Port (2019 Work Plan Item No. 6). The increased surface area of



the stockpile area results in the need to increase water management capacity to handle an increase to the surface water volume. Expanding the stockpile pad involves leveling, grading, infilling, and limited excavation in an area of previous rockfill. Additional detail is provided below and in Attachment 2 (Hatch 2019a). The design basis is as described in the Civil Design Philosophy, H353004-00000-200-210-0001 (Attachment 5).

Description of Project Components

• Construction of a drainage ditch in the footprint of Stockpile No. 1 to convey water towards Pond No. 1 (Drawing H353004-40000-221-272-0020-0001).

• New Pond No. 3:

- Construction of a diversion berm on the southern end of the expanded stockpile footprint to convey water towards Settling Pond No. 3 (Drawings H353004-40000-221-272-0020-0001 for Stage 1; H353004-40000-221-272-0022-0001 for Stage 2).
- Construction of concrete channels along the conveyor berm to allow runoff to pass through and drain towards the pond (Drawing H353004-40000-221-272-0025-0001)
- Construction of lined berms and spillways for the pond to store water and allow for emergency spillage (Drawings H353004-40000-221-272-0019-0001 for Stage 1 and H353004-40000-221-272-0021-0001 for Stage 2).
- Diversion of runoff not originating from the stockpile for Stage 2 development: The construction of a drainage ditch on the southern end of Stockpile No.1 (Attachment 2, Drawings H353004-40000-221-272-0022-0001 & H353004-40000-221-272-0024-0001).
- New ditches and berms shall be constructed to convey water to the ponds as well as the use of existing ditches and berms. Refer to the drawings, Attachment 2.
- There will be a total of 4 channels in the conveyor berm to allow runoff to drain towards the ponds.

Pond Capacity

Settling Pond No. 3 is not classified as a dam according to the Canadian Dam Association, since it will contain less than 30,000 m³ and is less than 2.5 m in height. The emergency spillway is designed to safely pass the 1:200 peak flow without any overtopping of the embankment. The spillway is designed as a broad crested weir as described in the Civil Design Philosophy referenced above.

The ponds are sized in accordance with the Civil Design Philosophy. This requires that the ponds are able to contain the 1:10 year return period 24-hour storm event which equates to 40.8 mm of rainfall. A runoff coefficient of 0.9 is used over the proposed catchment area. The catchment areas consists of rockfill pad and fines iron ore stockpiles.

The existing ponds 1 and 1A have sufficient capacity to allow for the construction of the expansion (Hatch 2019b; Attachment 4). The existing (as-built) capacity for Settling Pond No. 1 is 3,075 m³ and for Pond 1A is 3,709 m³, for a total of 6,784 m³. The total required capacity is approximately 5,972 m³.



The required and design capacities for Pond 3 are described in Table 4 below:

Table 4 Required and Design Capacities of Proposed Pond #3

Stage	Required Capacity (m³)	Design Capacity (m³)
Stage 1	4,881	5,967
Stage 2	8, 193	8,582

3.1.2 Proposed Location of the Structure

The proposed work will occur within the existing PDA at Milne Port, as shown in Attachment 1.

3.1.3 Identification of any Potential Impacts to the Receiving Environment

The proposed pond and related water management facilities are consistent with the Approved Project and the potential impacts of the activity have been assessed in the FEIS and Addendum (Table 1). Sedimentation and erosion mitigation measures, as required, shall be in place before commencing construction. A temporary water management plan shall be developed and implemented prior to construction.

The proposed work and associated activities will permit the containment of a higher volume of water associated with the enlarged ore stockpile and historic runoff, and therefore reduce the potential for accidental release of sediment-laden water into Milne Inlet and nearby natural drainages and surface water bodies during and following significant precipitation events.

Stage 2 of the stockpile expansion involves the infilling of waterbodies (ML-01 and portions of M05) and periodic release of stormwater from Pond 3. However, mitigation and project design will limit the release of sediment during construction and operation. Flow to the lower reaches of M05 which flows into Phillips Creek will be maintained with the diversion and Pond 3 release of stormwater that meets water quality standards. Additional field surveys will be conducted in 2019 and DFO will be consulted through a Request for Review to identify the need for any additional mitigation. Potential adverse residual effects are considered not significant.

3.1.4 Monitoring

Periodic environmental inspections will be conducted by Baffinland's Environmental personnel in conjunction with the Contractor's Health, Safety and Environment Lead. Inspections will ensure that Contractors are complying with the conditions of the Type A Water Licence (in particular Part D, Conditions Applying to Construction and Operation) and Baffinland's management plans and procedures. Inspections will be documented by taking photos and using Baffinland's environmental inspection forms. This includes inspections and photos before and after the work, and during the course of the work to document any deficiencies. Documented deficiencies will be forwarded to the responsible Contractor for corrective action.

Baffinland will prepare a Construction Summary Report for the modification described in this request, in accordance with Part D, Item 17 of the Type A Water Licence and the Commercial Lease Operations Guide. The Construction Summary Report will include the information specified in Schedule D of the licence and the Commercial Lease Operations Guide.

During operation, monitoring of the final (treated) effluent quality at Pond 3 (MP-## to be determined) will be carried out in accordance with the Type A Water Licence. Monitoring parameters are expected to be consistent with Pond 1 (MP-06) and Pond 2 (MP-05). Existing management plans for the Mary River Project are sufficient to address the ongoing monitoring and management of the expansions to the water management ponds once constructed. The



Surface Water and Aquatic Environmental Management Plan will be updated with site plans and water balance information, and a new water monitoring station will be added for Pond 3.

3.1.5 Schedule for Construction

Construction is expected to begin 60 days following submission of this modification request in accordance with Part G Item 1 of the Type A Water Licence, or upon written approval from the Board in accordance with Part G Item 2. Stage 2 work will not proceed until DFO releases a positive Letter of Advice. The work is expected to be completed before the end of 2019, and would proceed approximately as follows:

- Initiate Stage 1 construction earthworks (60 days from submission)
- Construct Stage 1 portion of Pond #3 (30 days)
- Construct Stage 1 portion of Stockpile #1 Expansion pad (35 days)
- Construct Stage 1 portion of Stockpile #1 Expansion berms (7 days)
- Following Letter of Advice from DFO, Construct Stage 2 portion of Pond #3 (20 days)
- Excavate Stage 1 Temporary Berms to Allow Stage 2 Pad Construction (7 days)
- Construct Stage 2 portion of Stockpile #1 Expansion pad (15 days)
- Construct Stage 2 portion of Stockpile #1 Expansion berms (15 days)

Note that the above schedule is provided for reference only, and is subject to change based on the timing of approvals, weather conditions, material and contractor availability, equipment availability, and any other unforeseen circumstances.

3.1.6 Drawings of Engineered Structures

The following engineering documents in Hatch (2019a; Attachment 2) provide details on the Expansion of the Milne Port Ore Stockpile and Water Management:

- PORT SITE STAGE 1 NEW STOCKYARD No. 1 –LAYOUT PLAN (Drawing No. H353004-40000-221-272-0019-0001
- PORT SITE STAGE 1 NEW STOCKYARD No. 1 DRAINAGE LAYOUT (Drawing No. H353004-40000-221-272-0020-0001
- PORT SITE STAGE 2 NEW STOCKYARD No. 1 –LAYOUT PLAN (Drawing No. H353004-40000-221-272-0021-0001
- PORT SITE STAGE 2 NEW STOCKYARD No. 1 DRAINAGE LAYOUT (Drawing No. H353004-40000-221-272-0022-0001
- PORT SITE STOCKYARD No. 1 DRAINAGE CHANNEL PLAN AND PROFILE (Drawing No. H353004-40000-221-272-0024-0001
- PORT SITE –STOCKYARD 1 CONVEYOR BERMS PLAN AND PROFILE (Drawing No. H353004-40000-221-272-0025-0001
- PORT SITE STAGE 1 NEW STOCKYARD No. 1 –CROSS SECTION SHEET 1 (Drawing No. H353004-40000-221-273-0008-0001



- PORT SITE STAGE 1 NEW STOCKYARD No. 1 –CROSS SECTION SHEET 2 (Drawing No. H353004-40000-221-273-0008-0002
- PORT SITE STAGE 2 NEW STOCKYARD No. 1 -CROSS SECTIONS (Drawing No. H353004-40000-221-273-0009-0001

3.1.7 Proposed Sediment and Erosion Control Measures

Baffinland will employ a combination of sediment and erosion control measures (check dams, rip-rap, silt fences, etc.), as outlined in the Environmental Protection Plan (Baffinland 2016a) and Surface Water and Aquatic Ecosystems Management Plan (Baffinland 2016b) to address and manage sedimentation concerns during construction. Stormwater management plans for construction have been developed for both stages (Attachment 3), and existing ponds 1 and 1A have sufficient capacity to allow for the construction of the expansion (Hatch 2019b; Attachment 4). Regular maintenance of the water management ponds will be required so they continue to function as intended. Existing management plans for the Mary River Project are sufficient to address the ongoing monitoring and management of the expansions to the water management ponds. The Surface Water and Aquatic Environmental Management Plan will be updated with site plans and water balance information. The following best management practices will also be followed:

- If the design cannot be implemented as planned (i.e. ground water is encountered) the contractor must inform the engineer and the design must be adjusted accordingly so that adequate storage capacity within water management structures is maintained;
- Sedimentation and erosion mitigation measures, as required, shall be in place before commencing construction;
- All materials shall be placed in accordance with the placement of fill specification;
- As-built surveys shall be completed to document all construction activities; and
- The operating conditions related to the settling ponds includes emptying the ponds. Once the required water quality has been achieved the pond shall be pumped empty to avoid uncontrolled discharge.

4 - CLOSURE

We trust that this information meets the requirements under Part G under Baffinland's Type A Water Licence and look forward to the NWB's response. Please do not hesitate to contact the undersigned should you have any questions or comments.

Regards,

Lou Kamermans

Director, Sustainable Development

Cc: Karén Kharatyan, NWB Stephanie Autut, NWB Solomon Amuno, NIRB Jared Ottenhof, QIA



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Russel Sykes, ECCC
Steve Borcsok, BIM
Tim Sewell, BIM
Megan Lord-Hoyle, BIM
Grant Goddard, BIM

ATTACHMENTS: 1: Milne Port Site Plan – Modification No. 12

2: Project Memo – Stockyard No.1 Ponds (Hatch, 2019a) 3: Stormwater Management Plans (Stage 1 and Stage 2)

4: Project Memo – Stockyard No. 1 Settling Ponds (Hatch, 2019b)

5: Civil Design Philosophy



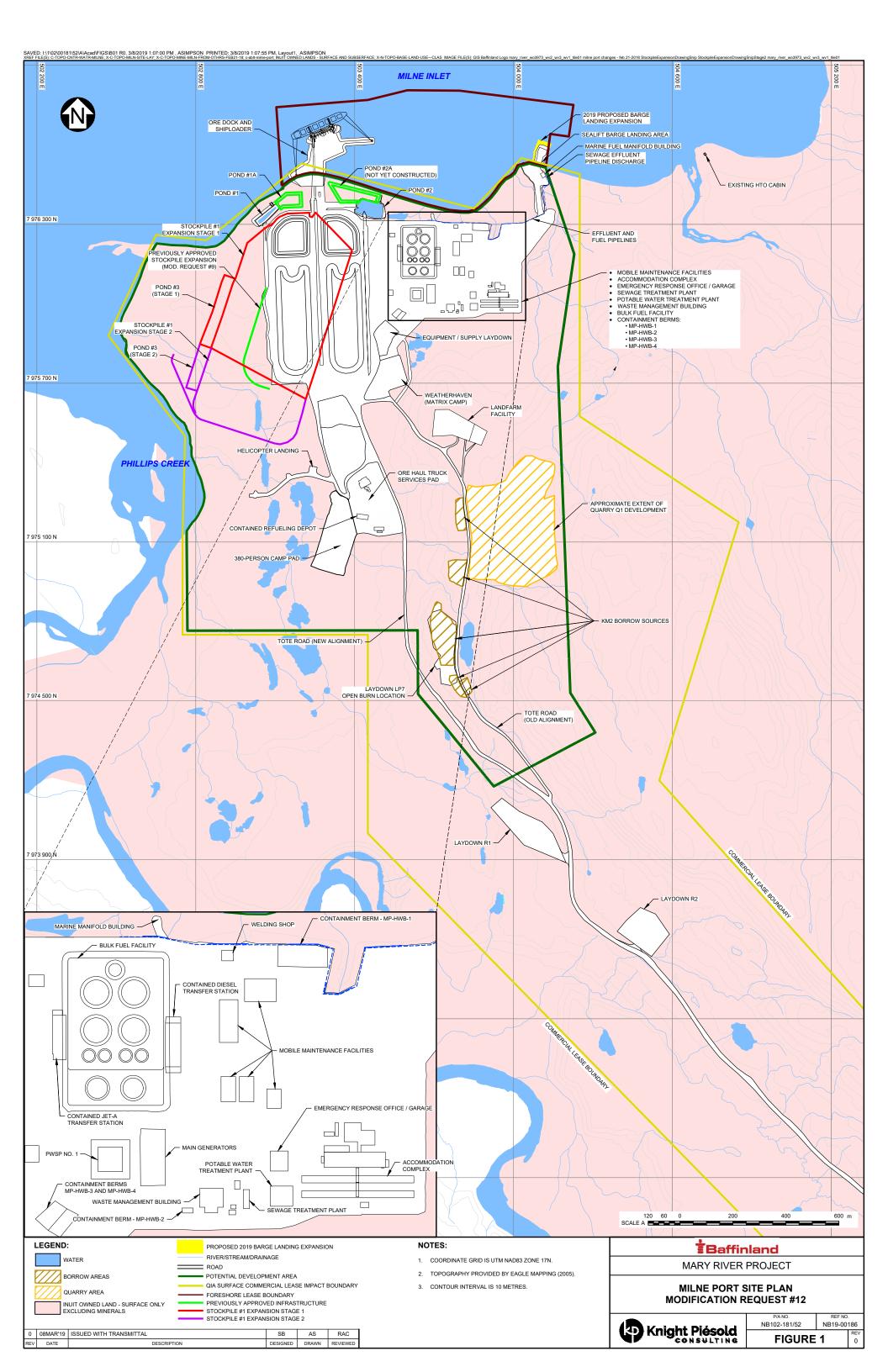
REFERENCES:

- Baffinland Iron Mines Corporation (Baffinland). 2012. *Mary River Project Final Environmental Impact Statement*. February 2012.
- Baffinland Iron Mines Corporation (Baffinland). 2013. Mary River Project Addendum to the Final Environmental Impact Statement for the Early Revenue Phase. June 2013.
- Baffinland Iron Mines Corporation (Baffinland). 2016a. *Environmental Protection Plan*. Doc. No. BAF-PH1-830-P16-0008, Rev. 1, August 30, 2016.
- Baffinland Iron Mines Corporation (Baffinland). 2016b. *Surface Water and Aquatic Ecosystems Management Plan.* Doc. No. BAF-PH1-830-P16-0026, Rev.4, March 17, 2016.
- Baffinland Iron Mines Corporation (Baffinland). 2019. 2019 Work Plan. Rev. 0 dated November 1, 2018.
- Hatch. 2019a. Stockyard No.1 Ponds. Project Memo H353004-40000-228-030-0002, Rev. 1, Dated March 13, 2019
- Hatch. 2019b. Stockyard No.1 Settling Ponds. Project Memo H353004-40000-228-030-0003, Rev. 0, Dated April 4, 2019.
- Nunavut Impact Review Board (NIRB). 2018. *Process for Seeking Approval for Modifications to Previously-Approved Projects*. Memorandum dated February 14, 2018 issued to the Nunavut Wide Distribution List.



Attachment 1:

Milne Port Site Plan – Modification No. 12





Attachment 2:

Project Memo – Stockyard No.1 Ponds and Other Design Drawings (Hatch, 2019a)





Project Memo

H353004

March 13, 2019

To: T Atiba From: K Rughoonandan

cc: BIM Hatch

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Baffinland Iron Mines Corporation Mary River Expansion Project

Stockyard No.1 Ponds

1. Introduction

Hatch has been retained by Baffinland Iron Mines (BIM) to provide the design for the Mary River Project. Mary River is an operational iron ore mine on Baffin Island in Canada's Nunavut territory. Ore is mined from the open pit, crushed onsite and hauled to the Milne Port (approximately 100 km from the mine site).

This memo describes the basis of design for the settling ponds that service the proposed expansion of Stockyard No.1.

2. Background

The expansion of Stockyard No.1 will be done in two stages. The stormwater runoff for the stockyard will be conveyed into three ponds which are: existing Pond #1 & #1A (situated north of the stockyard); existing Pond #2 and new #2A (situated north east of the stockyard); and a new Pond #3 (situated on the western side of the stockyard).

Ponds #1 & #1A and #2 & new #2A caters for the runoff from the existing Stockyard No 1 and future planned section of Stockyard No 2. Pond #3 will cater for mainly the storm water runoff from the area resulting from the expansion. This area drains to the western side of the stockyard and will be constructed in two stages in parallel with the staged construction of the Stockyard No.1 expansion.





3. Site Conditions

3.1 Geotechnical

The closest borehole to pond #3 is BH 17-13. (See borehole log in Appendix A) The location of the borehole is within the footprint of the existing stockyard and therefore iron ore was encountered between depths 0.0m and 0.4m. Rockfill was encountered between depths 0.4m - 0.8m and sand with some gravel and silt was found between depths 0.8m - 6.1m (termination depth was 6.1m).

The slope angles of 1V:3H used in the design for ponds #1 and #2 are deemed appropriate and performed well. Therefore, the surrounding berms for pond #3 was designed using the same parameters.

3.2 Climate and Hydrology

The project is located in the North Baffin Region of Baffin Island. Based on regional data collected by Knight Piesold (2012), the mean rainfall at the port is about 217mm and the mean annual temperature is approximately -15°C. The monthly average temperatures are mostly above freezing between June and August.

Short-term rainfall intensity-duration-frequency curves recommended by Knight Piesold (2012) for the Mary River Project and established in the civil design criteria (Hatch 2013) are based on rainfall data from the Environment Canada Clyde River (ID 2400800) and Pond Inlet Airport (ID 2403201) climate stations. The intensity-duration-frequency values in Table 1 present rainfall statistics for durations between 5 minutes and 24 hours for return periods 2 years to 200 years.

Duration	2 yrs	5 yrs	10 yrs	15 yrs	20 yrs 25 yrs		50 yrs	100 yrs	200 yrs
5 min	9.5	12.0	14.0	15.1	15.9	16.5	18.3	20.1	22.0
10 min	7.2	9.0	10.5	11.3	11.9	12.4	13.7	15.1	16.5
15 min	6.0	7.5	8.7	9.4	9.9	10.3	11.4	12.6	13.7
30 min	5.0	6.3	7.3	7.9	8.3	8.6	9.5	10.5	11.4
1 hr	4.0	5.2	6.1	6.6	7.0	7.3	8.1	9.0	9.9
2 hr	3.0	3.9	4.6	5.0	5.2	5.5	6.1	6.8	7.4
6 hr	2.0	2.7	3.3	3.6	3.9	4.0	4.6	5.1	5.7
12 hr	1.3	1.8	2.2	2.4	2.6	2.7	3.1	3.4	3.8
24 hr	1.0	1.4	1.7	1.9	2.0	2.1	2.4	2.7	3.0

Table 1: Milne Port intensity-Duration-Frequency Values

The rainfall intensity-duration-frequency values shown in the table above were confirmed by Knight Piesold in December of 2016 in a memo addressed to the project director. It is therefore accepted that the information is valid and does not need to be updated.





4. Proposed Scope of Work for the Stockyard No 1 Expansion

Pond #1 drainage system and catchment area is revised and involves the following scope:

 Construction of a drainage ditch in the stockyard footprint to convey water towards the existing settling Pond #1 (See reference drawing H353004-40000-221-272-0020-0001).

Pond #2 drainage system related to Stockyard No.1 involves the following scope:

 Existing drainage system and catchment area remains the same as before and is sufficient to convey water towards settling Pond #2 (See reference drawing H353004-40000-221-272-0020-0001).

The construction of the Pond #3 drainage system involves the following scope:

- Construction of a diversion berm on the southern end of the expanded stockyard footprint to convey runoff towards settling Pond #3 (See reference drawings H353004-40000-221-272-0020-0001 for stage 1 & H353004-40000-221-272-0022-0001 for stage 2).
- Construction of concrete channels along the conveyor berm to allow runoff to pass through and drain towards Pond #3. (See reference drawing H353004-40000-221-272-0025-0001).
- Construction of lined berms and spillways for Pond #3 to store water and allow for emergency spillage (See reference drawings H353004-40000-221-272-0019-0001 for stage 1 and H353004-40000-221-272-0021-0001 for stage 2).

Diversion of runoff not originating from stockyard No.1 for stage 2 development involves the following scope:

 The construction of a drainage ditch on the southern end of Stockyard No.1 (See reference drawings H353004-40000-221-272-0022-0001 and H353004-40000-221-272-0024-0001).

5. Design Basis

5.1 General

The design basis is as described in the Civil Design Philosophy, H353004-00000-200-210-0001.

5.2 Dam Classification

The settling pond #1 & #1A, #2 & #2A and #3 is not classified as a dam according to the Canadian Dam Association Guidelines, since each pond will contain less than 30 000m³ of water and is less than 2.5m in height.

5.3 Emergency Spillway

The emergency spillway is designed to safely pass the 1:200 year peak flow without any overtopping of the embankment. The spillway is designed as a broad crested weir as described in the Civil Design Philosophy referenced above.





5.4 Pond Capacity

The ponds are sized in accordance with the Civil Design Philosophy. This requires that the ponds are able to contain the 1:10 year return period 24 hour storm event which equates to 40.8mm of rainfall. A runoff coefficient of 0.9 is used over the proposed catchment area. The catchment areas consists of rockfill pad and fines iron ore stockpiles.

The required capacity and the design capacity of the ponds are shown below:

- The existing capacity for Settling Pond #1 (based on the as-built survey) is 3 019 m³. The total required capacity for Pond #1 and #1A is 4 838 m³ before expansion of Stockpile No 1. Settling Pond #1 and #1A has a constructed total capacity of 6 639 m³ after expansion of Stockpile No.1 which is sufficient to store the run-off volume expected.
- The 732 m³ capacity for the existing Settling Pond #2 will be increased to 6 910 m³ through the construction of pond #2A.
- In stockpile 1 (stage 1) development, Pond #3 has 2 separate catchments that drains to northeast and southwest end of the pond. These catchments run-off requires a total pond capacity of 2 536 m³ and 2 345 m³ respectively. Pond #3 has a designed capacity of 2 725 m³ and 3 242 m³ for the northeast and southwest end respectively (Note: Required capacity = Run-off volume to be stored. Designed capacity = spillway level capacity of pond).
- In stockpile 1 (stage 2) development for Pond #3 the northeast part of the pond has the same required and designed capacity as in stage 1. The total required capacity for the southwest part in stage 2 was increased from 2 345 m³ to 5 657 m³ due to the stage 2 increased catchment area. Pond #3 in stage 2 has a designed capacity of 5 830 m³ for the southern end.

See Figure 5.4 (a) & (b) below depicting Pond #3 footprint area discussed.

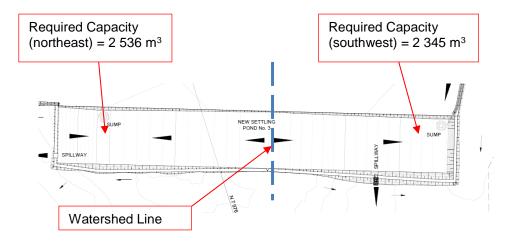


Figure 5.4(a) - Footprint Areas - Pond #3 in Stage 1



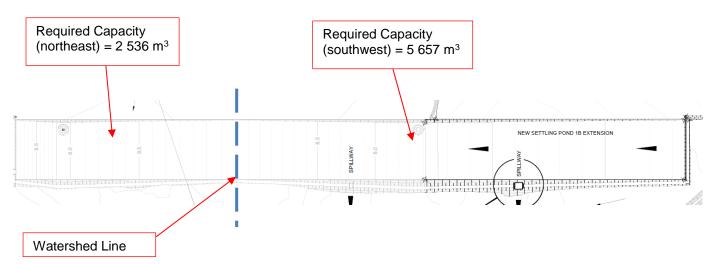


Figure 5.4(b) - Footprint Areas - Pond #3 in Stage 2

5.5 Runoff Conveyance

As described in Section 4, new ditches and berms shall be constructed to convey water to the ponds as well as the use of existing ditches and berms. Refer to the drawings as mentioned in Section 4.

There will be a total of 4 channel crossings in the conveyor berm to allow runoff to drain towards the ponds.

A new access road will be constructed to join Stockyard No.1 on the southern end. (This is the previous Southern bypass road access to the Stockyard No.1 area). This road will cross a diversion channel on the southern end of the stockyard which diverts an existing stream around the Stockpile No.1 Stage 2 expansion and therefore a Corrugated Steel Pipe (CSP) culvert of 600mm will be installed at this crossing. The culvert was sized to allow the 1:25 year return period peak flow, as per the requirements set out in the Civil Design Philosophy.

6. Construction

6.1 Construction and Operating Considerations

The construction considerations related to the settling ponds construction and Stockyard No.1 expansion includes the following:

- Test pitting to be carried out along the footprint prior to any fill placement, if ground conditions permit in order to assess the founding conditions for the Stockyard expansion.
- If ground water is encountered the contractor must inform the engineer and the design must be adjusted accordingly to ensure that adequate storage capacity is maintained.
- Sedimentation and erosion mitigation measures, as required, shall be in place before commencing construction.





- A temporary water management plan shall be developed and implemented prior to construction.
- All materials shall be placed in accordance with the placement of fill specification H353004-00000-221-078-0001.
- As-built surveys shall be collected to document all construction activities.
- The operating conditions related to the settling ponds includes emptying the ponds. Once
 the required water quality has been achieved the pond must be pumped empty to avoid
 uncontrolled discharge.

6.2 Construction Materials

The ponds will be constructed using non-frost susceptible rockfill material consisting of:

- Type 8 General Fill
- Type 5 Intermediate Bedding Material
- Type 9 Fine Bedding Material
- Type 19 Riprap

For more information about the materials mentioned above refer to H353004-00000-280-078-0001, Quarried Fill Materials Requirements.

K Rughoonandan

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Reference Documents:

H353004-40000-221-272-0019-0001

H353004-40000-221-272-0020-0001

H353004-40000-221-272-0021-0001

H353004-40000-221-272-0022-0001

H353004-40000-221-272-0024-0001

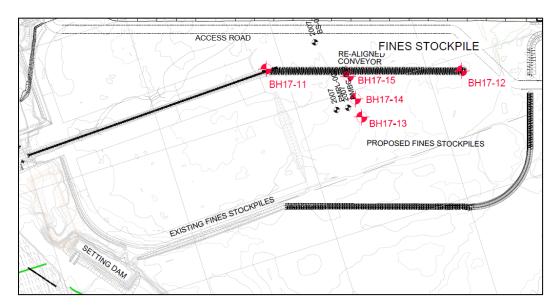
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Appendix A Geotechnical BH Log Data



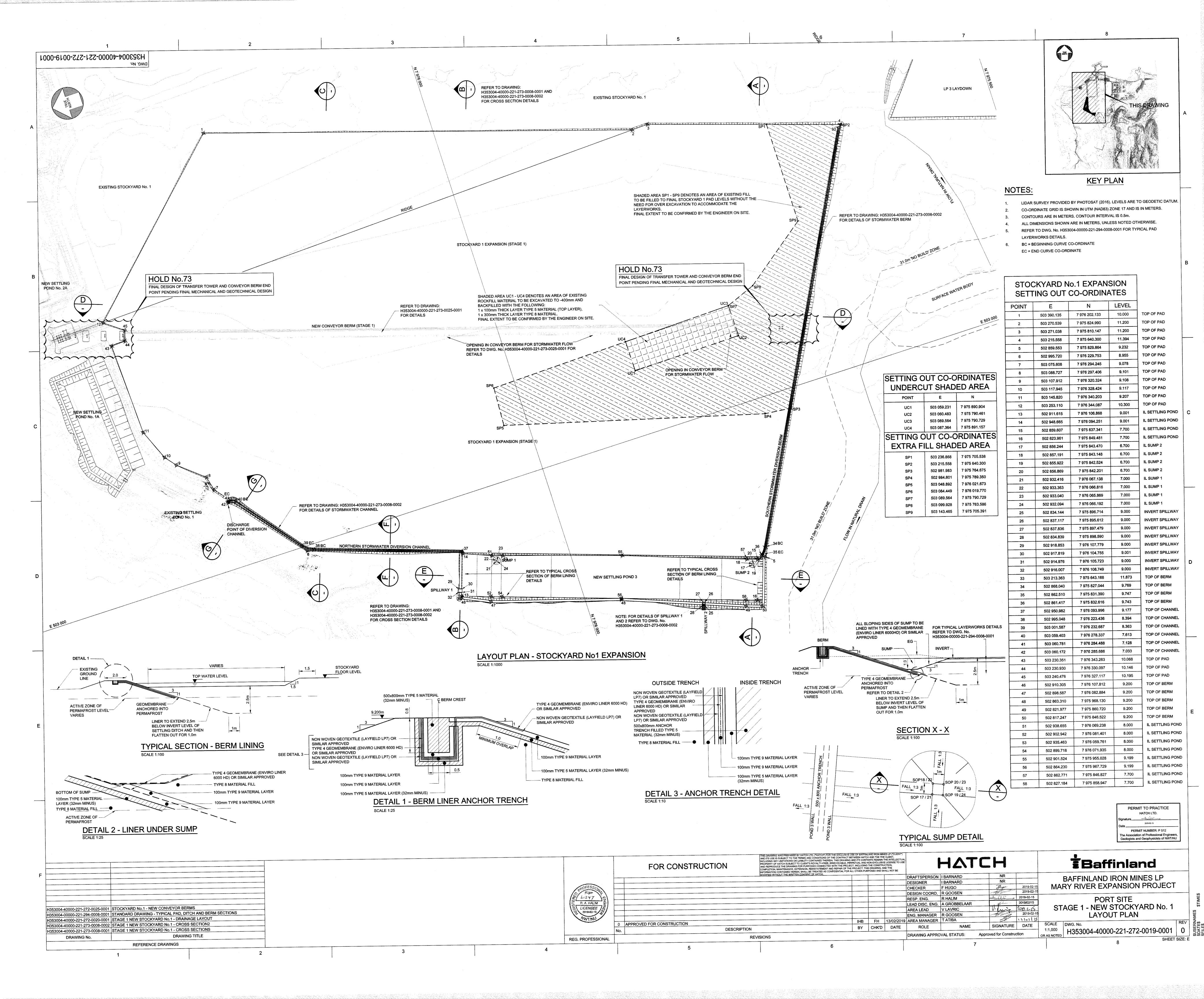


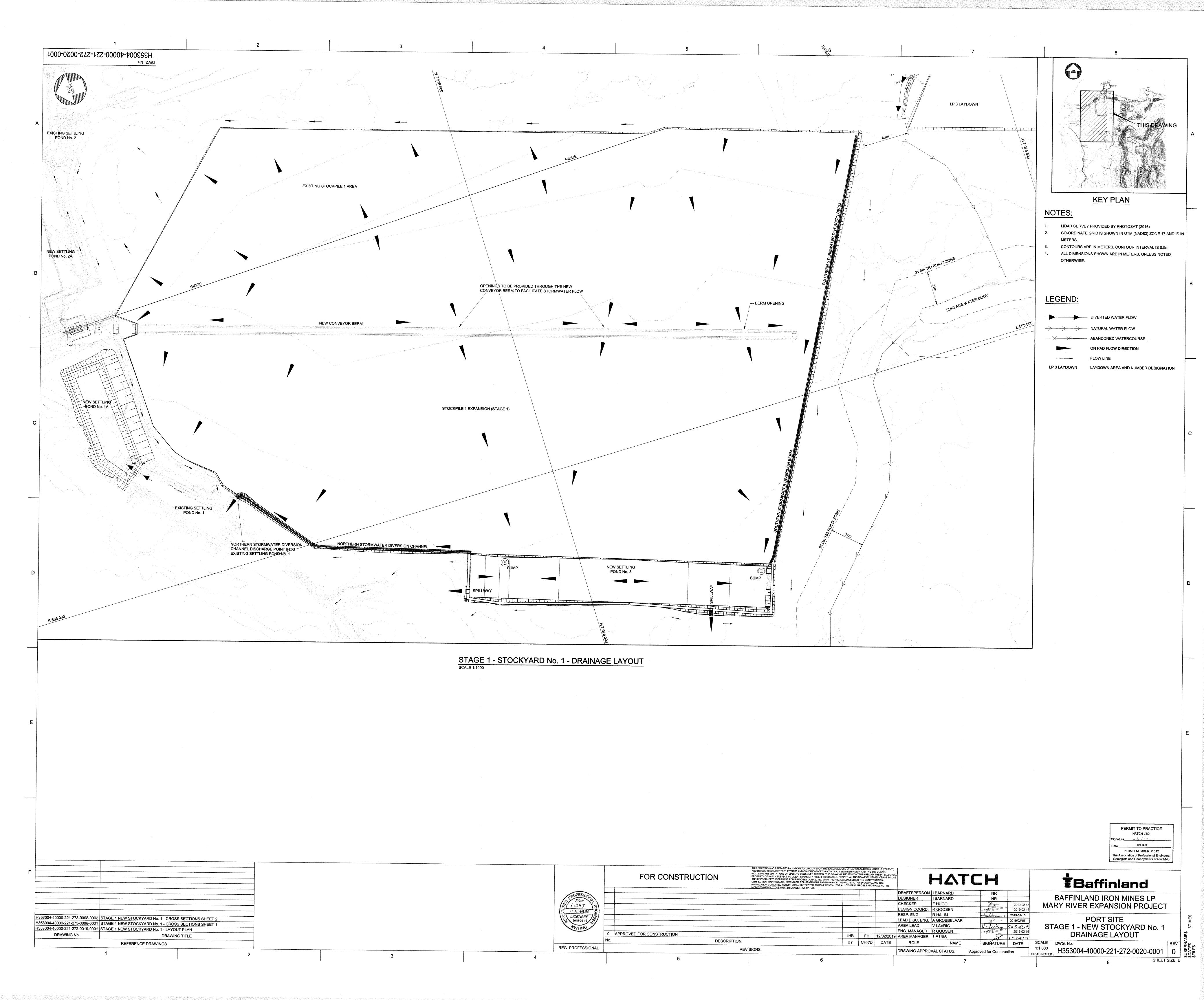
Geotechnical BH Log Location

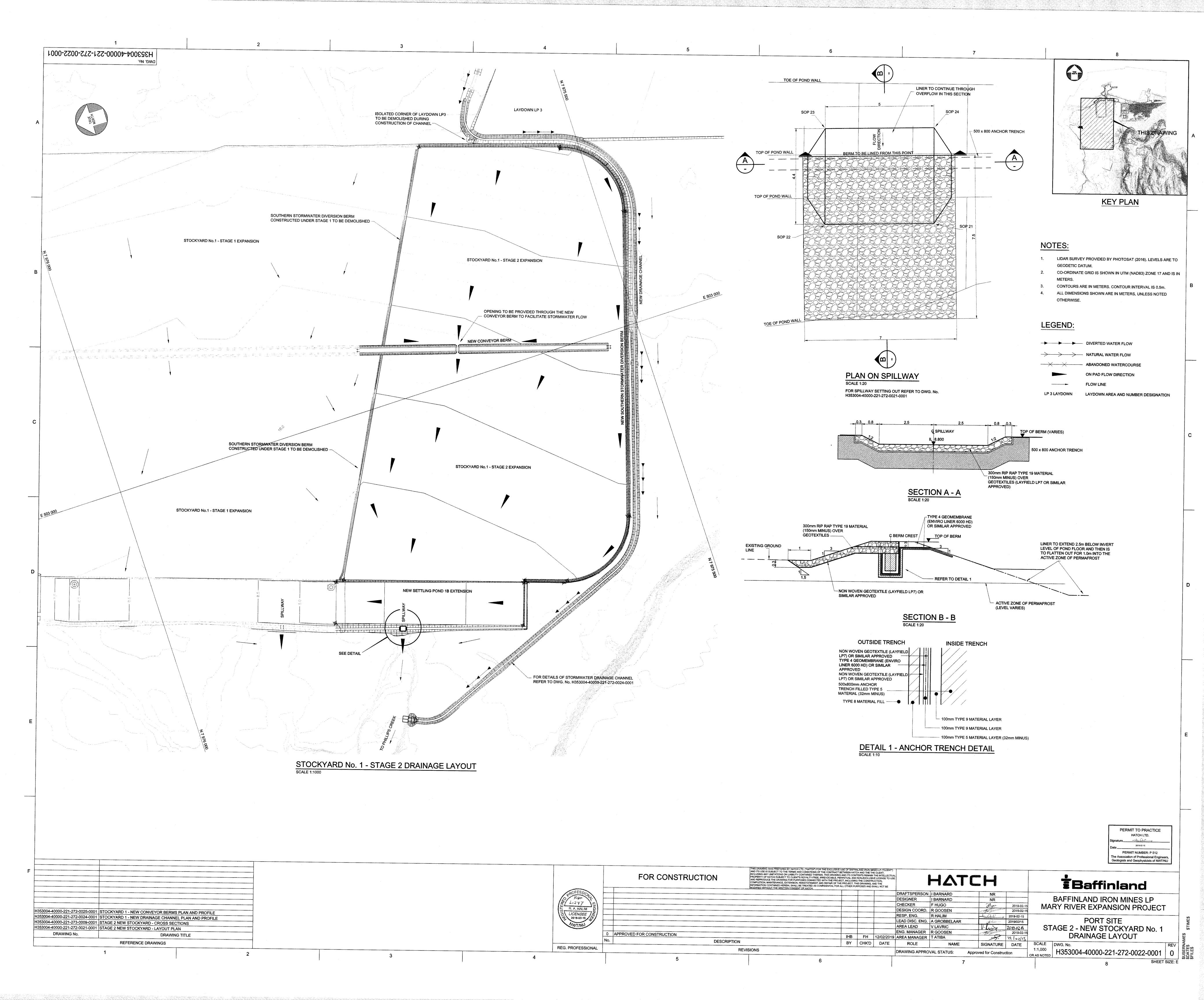


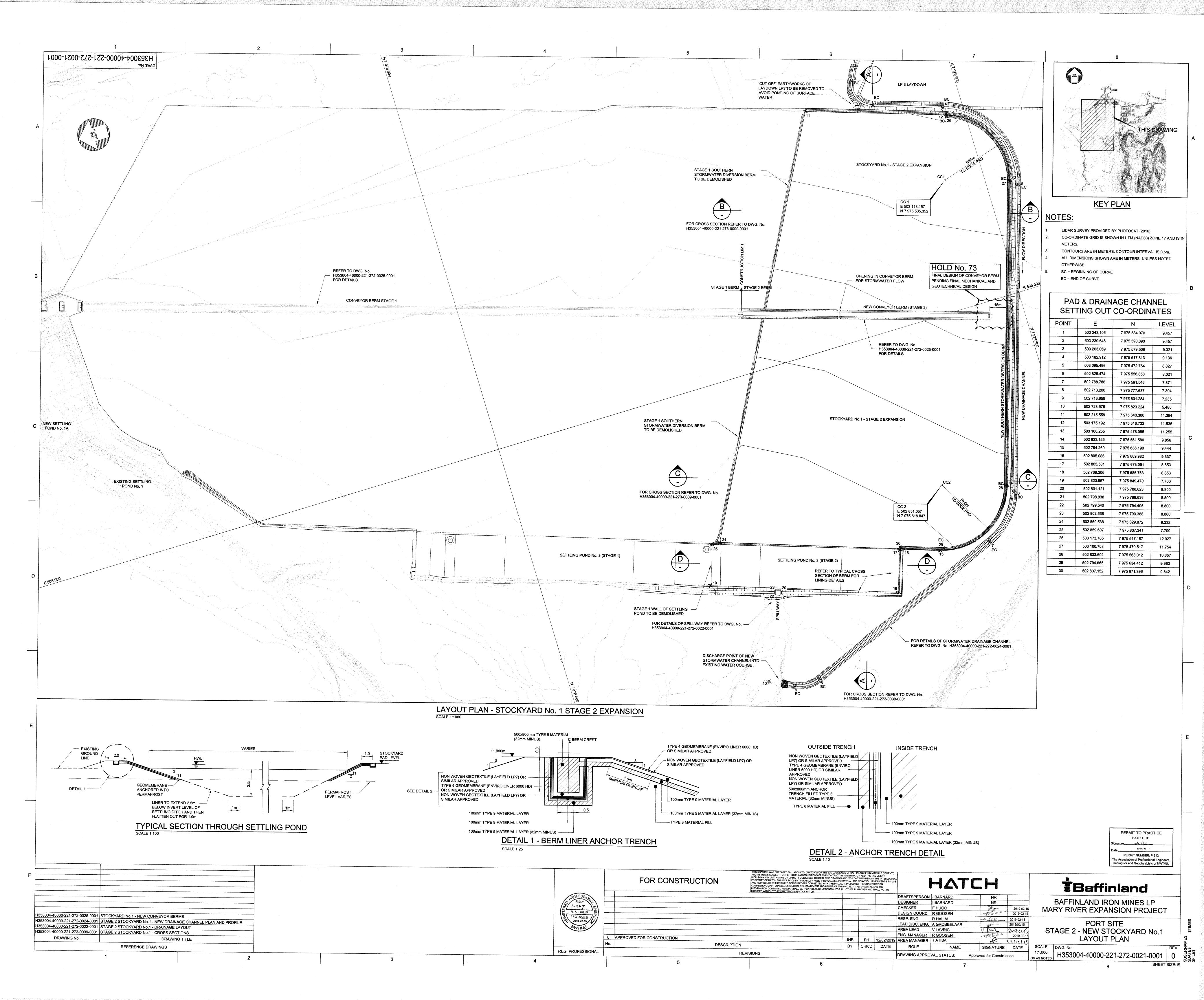


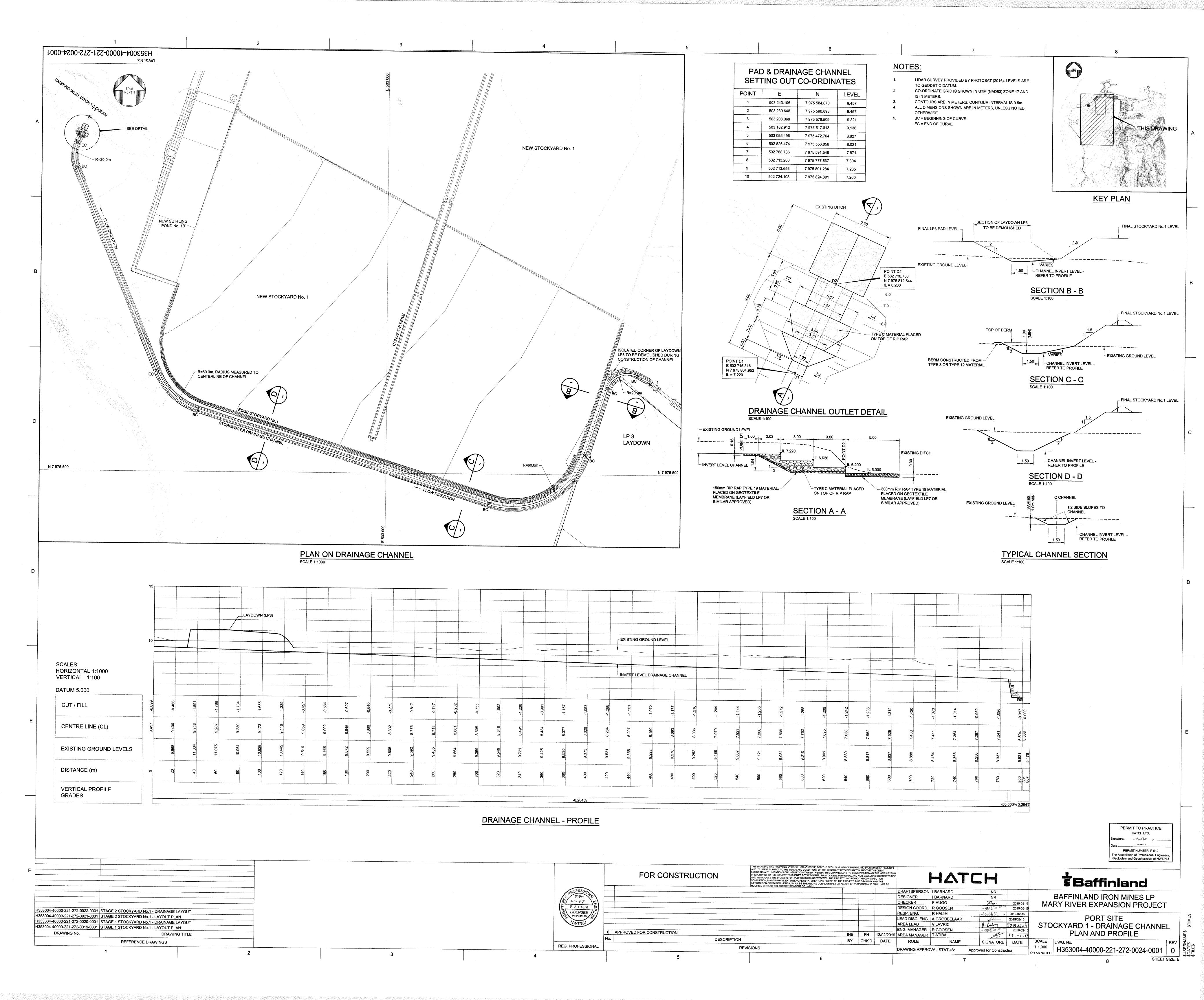
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Project:	Mary	River Expansion Study Stage 2	Datu	m:		NAD 83		Surface Elevation: Bottom Elevation:							
Location:	Cente	er of Ore Pile	Platf	orr	n:	Ground								4.42 m	
Contractor: Boart L	opawar	Rig Type/ Mounting: MiniSonic Rig	Date		and:	10/8/2017		Total Depth: Logged By:						6.1 m	
	CAndrew	Hole Diameter (mm): 100 mm				d:3/21/2018								R.S	
		Soil Description	Date		Т	d.3/21/2016		Reviewed By:						G.Q	
Elevation (m) Depth (m) Method	Casing Graphic Log	TYPE; plasticity or particle characteristics (size, grading, shape, roundness), colour, structure, accessory components.	Frozen Soil Description	Pacovery	Sample Type	Moisture Content Profile	50	Rold Water Cortes	Purant Gravel	Porcont Sand	Percent Pleas	UpddLinit	Rastoindex	Other Tests	
	\otimes	Iron Ore (from stockplie base)	Unfrozer	П	Т										
	300	Rockfill (base material)	Unfrozer												
9.5 1.6	4	SAND and GRAVEL: Brown, particles up to 50 mm. Ice poor soil	Unfrozer	١	_										
-13 28- -73 38- -13 48- -13 58- -14 58-		SAND some GRAVEL some SILT: Brown to beige, particles up to 20 mm, rounded. Ice poor soil.	Nbn		N										
		To Target Depth. Drillhole BH17-13 terminated at 6.1m.													
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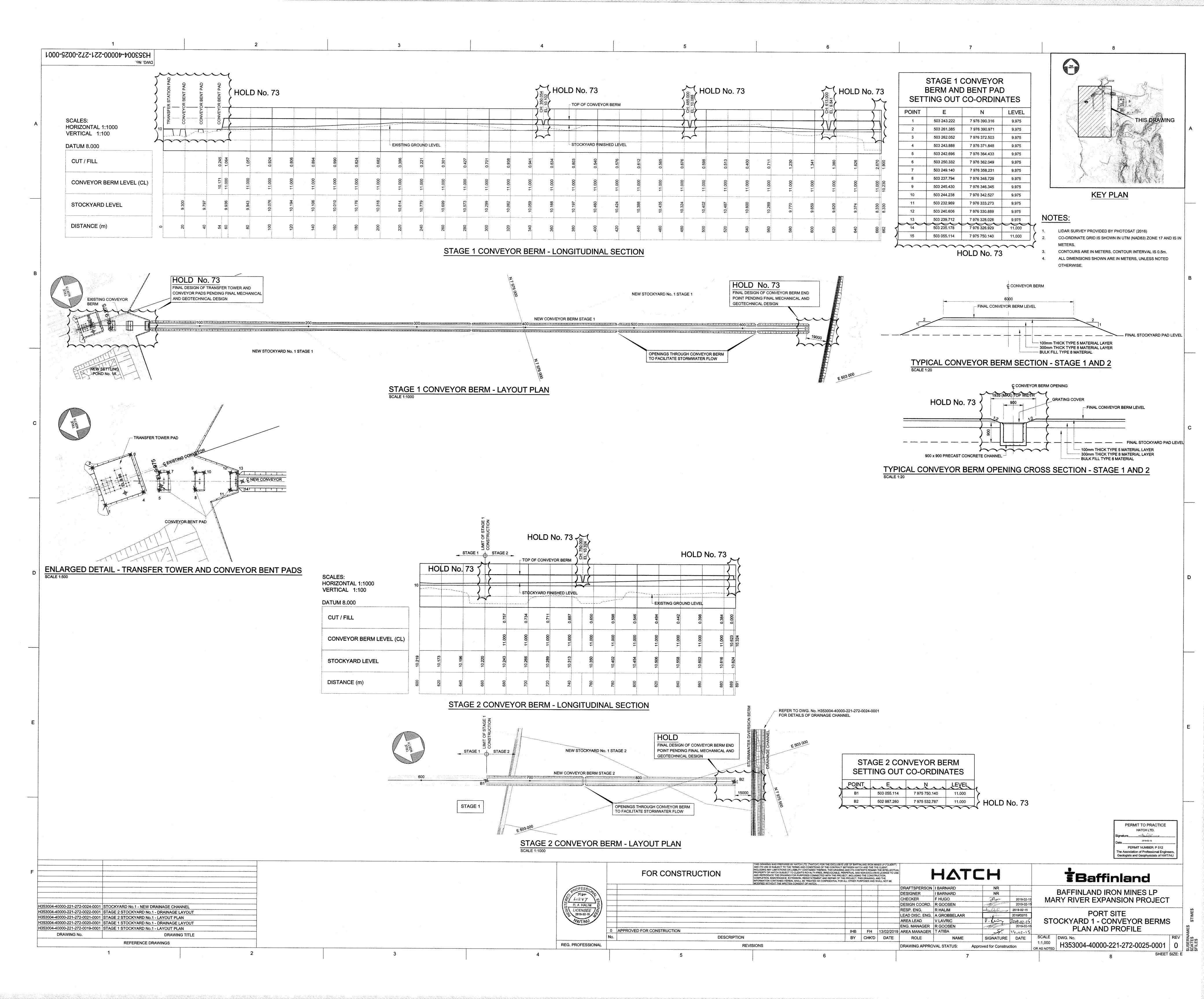












Attachment 2:

Other Design Drawings

