



**THE BUCHANS REMEDIATION PROJECT – PHASE II
RESIDENTIAL AND PUBLIC AREAS REMEDIATION
YEAR 1 CONSTRUCTION REPORT**



Veteran’s Memorial Park – Remediated



PROVINCE OF NEWFOUNDLAND	
PEG Newfoundland and Labrador	PERMIT HOLDER
	CLASS "A"
	This Permit Allows
HATCH MOTT MACDONALD LTD.	
To practice Professional Engineering in Newfoundland and Labrador Permit No. as issued by PEG-NL X0316 which is valid for the year 2013.	

PREPARED FOR: DEPARTMENT OF ENVIRONMENT AND CONSERVATION
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1. INTRODUCTION

The Buchans Remediation Project – Phase II - Residential and Public Areas Remediation is a continuation of the overall cleanup and remediation of lead impacted soils present throughout various areas of the Town of Buchans, Newfoundland and Labrador. Phase I of the project was completed in 2010, as noted in the Department of Environment and Conservation (DOEC) Terms of Reference (TOR), “saw the remediation of the source areas that had been contributing to the dispersion of lead impacted tailings throughout the Town of Buchans”. The source of the lead impacted tailings is the Buchans Mine which started operations in 1928 and continued until 1984 leaving approximately 10 million tonnes of residual waste material as mine tailings. Several significant mine closure activities have been ongoing since the shutdown of the mine in 1984. Phase II is in response to a Human Health Risk Assessment (HHRA) completed by Conestoga-Rovers & Associates (CRA) in 2010 which identified areas of concern, both residential and public properties, throughout the Town of Buchans that exceed site specific Risk Based Concentrations with respect to lead impacted soil.

On August 20, 2011 DOEC issued a TOR for the Provision of Engineering Services related to the Design, Tender Preparation, On Site Supervision and General Project Management for the Buchans Remediation Project – Residential Properties and Public Areas three (3) year remediation program. Hatch Mott MacDonald (HMM) and its sub-consultant CRA submitted a proposal to provide these Engineering services of which the design and construction management of the year 1 remediation program as outlined in this document is a critical part. The HMM/CRA proposal was subsequently accepted by the DOEC on February 14, 2012 and a formal engineering agreement to proceed was signed on March 15, 2012.

2. PROJECT DESIGN/TENDERING

Although the project engineering agreement was not signed until March 15, 2012 pre-engineering and design services started on February 9, 2012 with verbal acknowledgement from DOEC of the project award status. HMM/CRA convened a review meeting to kick start the project and to outline areas and extents of remediation required under this project. On February 15, 2012 a meeting was held with Dan Michielsen, Manager of Industrial Projects, to review and confirm the requirements of the program and to set the guidelines moving forward. During this meeting it became apparent that, given the late start date for the project and the snow cover during this time frame, conventional surveying and pre-engineering work would have to be sacrificed in order to move the project schedule forward as quickly as possible to get to construction in the 2012 year. The proposed areas of remediation were outlined by CRA in their Risk Management Plan (RMP) and the design objective was to complete the design work for the various affected areas as per that outlined in year 1 priority settings of the RMP.

Design ramped up during the week of February 13th and the first stage of the engineering design was to visit the site and review the proposed scope of the work and the site conditions that would be encountered. This visit took place during the week of February 20th when there was significant snow cover throughout the Town. Despite this HMM noted and measured various stationary items such as stairs, decks, out buildings, oil tanks, fences, tree, shrubs and, where possible, various surface features such as hard surface driveways and walkways. This information was used to supplement the previous mapping of the Town which was supplied by DOEC. This mapping, although only 2-D, was used as the primary design tool for the project. From the mapping the HMM design team outlined the various components of the project site. Firstly, HMM outlined the buildings present at each property including residential housing, sheds and commercial buildings. Each property was then assessed for hard surface features such as concrete and asphalt areas including driveways and walkways. When all of these dominant features were outlined the team then reviewed the mapping to separate grass areas from common material areas. This approach was then supplemented by the information gathered by the pre-design team during their site visits to Buchans. When the design of the proposed year 1 areas was completed, an overall review of the project from a constructability point of view was implemented. The design team looked at the issues of adjacency from a construction continuance standpoint and it was noted that some of the areas that had a low remediation priority were surrounded by areas of higher priority. This meant that, with the existing guidelines, the year 1 construction would skip the low priority areas and they would be deferred until the year 2 construction program was completed. It was felt that this was an unreasonable approach and that a more prudent approach would be to ensure that each area was completed in its entirety when the work started. To achieve this some low priority areas were included in the year 1 construction if they were adjacent to or surrounded by areas of higher priority. This was decided in conjunction with a year 1 budgetary review and the total project quantities proposed for this year.

After the project areas were finalized and mapped attributes outlined, the proposed project construction drawings were completed. These drawings were then taken to Buchans where the design team completed a direct drawing annotation on the ground to ensure there were no glaring errors or omissions. When all drawings were annotated and corrections completed, the project quantities and proposed tender documents were prepared. These documents were submitted to DOEC for review and approval to proceed to tender on May 16, 2012 and approval to proceed was granted on May 17, 2012. During the tender period HMM answered contractor queries regarding the tender documents and a tender site visit was held on May 30th with the recommendation that all interested bidders attend to resolve any outstanding questions and to review the scope of work on site.

Tenders closed on June 7th with Marine Contractors Ltd. being the low bidder. Project construction was awarded to Marine Contractors Ltd. on June 12th in the amount of \$1,362,749.49 HST included.

3. PROJECT MEETINGS

During the course of the year 1 design and construction period several meetings were held to ensure that the work was proceeding as outlined.

The first of these was a design award and pre-design meeting held on February 15th at the CRA offices in St. John's with Dan Michielsen, Manager of Industrial Projects and Brian Luffman of CRA to review and confirm the requirements of the program and to set the guidelines moving forward. During this meeting the parameters and governing documents to be used for the design of the remediation tender documents was presented to HMM. As discussed previously, CRA is the sub-consultant of HMM and is responsible for the science testing and reporting of the project. CRA also developed the Risk Management Plan (RMP) which outlined the remediation parameters suggested and accepted by DOEC and presented to HMM as the guidelines for project design.

On March 27, 2012 a progress meeting was held with DOEC and CRA at the CRA St. John's office to review the status of the design effort and to resolve any issues outstanding prior to the completion of the contract design drawings and documents. HMM presented the drawings and no major areas of concern were noted.

On April 11, 2012 a public meeting was convened in the Town of Buchans to review the scope of the proposed remediation work with the citizens of the Town. The meeting started with an introduction of HMM and CRA as the design team for the proposed residential and public areas remediation. CRA made a presentation outlining the results of the testing program undertaken as part of the HHRA and associated RMP and the properties that were scheduled for remediation work as per the results of the assessment. HMM made a presentation outlining the remedial actions to be taken and gave an overview of the scope of work and how it was generally scheduled to proceed at each affected property. At the end of the presentations a question and answer period was provided to enable residents of the Town to present their questions regarding the results of the HHRA and RMP as well as the proposed scope of the construction remediation. An informal session was also offered after the meeting for any residents to ask direct questions in private or view the results of the assessments for their particular piece of property. All questions were answered and/or commitments given to follow up on the questions and given the feedback it is understood that the presentations were informative for the residents and helped to alleviate any anxieties with respect to the ongoing remediation programs.

On May 9th a meeting was held with the Town of Buchans at the Town Hall as part of the final annotation of drawings for the project. The project drawings and specifications were presented for Council to review and indicate its' approval to proceed. All documents prepared met with Council approval and it was decided to submit this package to DOEC requesting approval to proceed with a tender call.

On May 30th a tender site meeting was held at the Buchans Town Hall to review the scope of the tender package with prospective bidders. The drawings and contract documents were discussed in detail by HMM. All prospective bidders were given the opportunity to ask questions. After the in office meeting an on-site meeting was convened to review the scope of work at a typical property and also at some of the more congested properties throughout the project footprint. The site visit also reviewed the Buchans River Bridge assessment that had previously been completed by HMM.

On June 14th a pre-construction meeting was held with the successful bidder, Marine Contractors Limited. The scope of work was reviewed and tentative schedules were presented for completion of the remediation program. All items were satisfactory and work started the following week with the start of mobilization of equipment to the site.

During construction there were three (3) meetings to review the on-site progress of the remediation effort. These meetings were held on July 2nd, August 13th and September 25th. Each meeting was convened at the Buchans Town Hall to review any formal issues associated with the project prior to on-site visits to physically view the work ongoing.

A post construction meeting was held at the Buchans Town Hall on November 15th. Members of the council, DOEC, HMM and CRA attended the meeting. All aspects of the project were discussed including recommendations for improvements for next years' program. The meeting was a positive one with no unresolved issues. The Town gave a very positive review of the work completed by all parties including Marine Contractors, DOEC, CRA and HMM.

4. MOBILIZATION TO SITE

The contractor started mobilization to the site during the week of June 25, 2012. Equipment deemed necessary to start the initial quarrying process were mobilized to the site first so that this work could proceed. This consisted of power screening equipment to allow for the processing and separation of materials that will be used in the remediation process. Also on site with the power screen was a loader and 1 excavator. On June 27th the first of the equipment that was used to complete the actual remediation work on the properties started to arrive on site. This equipment consisted of four (4) mini Excavators and one (1) Tandem Dump Truck. On the 28th the contractor hired a local sub-contractor to help with the excavation and remediation of properties. The sub-contractor supplied another Excavator and Tandem Dump Truck. With the presence of excavation and materials processing equipment on site the actual remediation work started at Williams Turnpike on June 29, 2012. As the project progressed, additional work specific equipment including a Roller/Compactor, Grader, Water Truck and Bull Dozer were mobilized to the site to complete each specific task. This equipment generally remained on site until the intended task was completed. As each particular piece of equipment was no longer required for construction purposes it was then demobilized from the site. In

essence mobilization and demobilization was ongoing as required throughout the entire year 1 construction program.

5. QUARRY DEVELOPMENT

Quarry development was the first procedure started under the year 1 construction remediation program. This work started on the 26th of June and continued throughout the remainder of the project. The quarry location was at first in doubt due to the inaccessibility of the traditional quarry areas across the Buchans River to the east of the Town. The inaccessibility was caused when it was determined that the bridge over the Buchans River and the bridge over the Nalcor penstock were not in satisfactory condition to safely support the loading associated with a loaded Tandem Dump Truck. With the suggestion of DOEC personnel other options/areas on the west side of the Town were explored as possible quarry sites with the chosen option being approximately one (1) kilometre to the northwest of the Town. The contractor was advised that this site was not believed to be lead impacted beyond any limits established for the required fill material and the site was subsequently developed. As part of the due diligence CRA sampled the quarry during the first week of development and the results were found to be satisfactory.

5.1 SAND AND ROCK FILL PRODUCTION

During the first week of the quarry development the contractor worked on the screening of sand and 100 mm diameter rock to be used in the rock lining of ditches and for use as rock fill material as required throughout the site. No drilling or blasting was required to gather processing materials as this quarry is a fairly substantial pit run deposit with a large percentage of small boulders and cobbles present as well as clean sand. To process the rock fill material required for this project the pit run material was excavated and passed through a jaw crusher and then through a cone crusher to achieve the desired material parameters. Crushing of this type of material continued for the duration of the project to facilitate the remediation requirements in the contract documents.

5.2 TOPSOIL PRODUCTION

During the second week of the quarry development the contractor expanded to include the production of topsoil material. The topsoil material was processed by creating a mixture of sand and peat bog using the power screen to complete the mixing process. The peat bog used for this material was excavated immediately adjacent to and west of the quarry. The process mixture was fine tuned by basic trial and error. First the contractor would process a small stockpile of topsoil material using the power screen to provide consistency to the product as each ingredient was added by a loader. The small stockpile then underwent a further mixing process with the loader working the stockpile from one location to

another. This allowed for further mixing and eliminated any inconsistencies due to the time lapse during the loading period for each specific material within the mix. As it was not practical to stop processing and have the material sent to an agricultural lab for controlled testing a visual analysis of the finished topsoil material was completed by HMM and the contractor. During each analysis it was decided whether or not to add or reduce any of the material types within the mixture to get the desired product. After approximately two (2) days of production a satisfactory mixture, application rate and methodology for topsoil production was arrived at, and all material was rescreened and mixed to adhere to the established mixture ratios. Production of this material then continued for the duration of the project to facilitate the project requirements as outlined.

6. CONSTRUCTION METHODOLOGY

The scope of work for this project involved the excavation, removal and disposal of lead impacted soils and the subsequent importation of common materials including common backfill, Class “A” granular material, topsoil and sod. This scope of work was outlined and recommended as suitable for remediation in the RMP previously developed by Conestoga Rovers and Associates. Given that the remediation was scheduled to occur on residential, commercial, institutional and recreational properties it was important to clearly develop a construction methodology during the design phase. Although the removal of the lead impacted materials was the predominant concern other potential issues required reconciliation prior to and during actual construction. HMM developed the primary methodology during the design phase and incorporated it into the contract documents for each contractor’s use as a guideline. The methodology is a combination of detail drawings and construction notes and clearly outlines the construction parameters with respect to excavation and back filling around existing infrastructure typical in residential and commercial properties. These drawings and notes outlined excavation depths at or near buildings, trees, fences, hard surfaced areas, hydro poles, decks and roadways. The detail methodology is shown on As-Built Drawing C12 of 12.

As most all of the remediation was proposed for private residential and commercial properties the consent of each owner was required prior to remediation. The HMM inspector visited each individual property owner to speak directly about the extents of remediation proposed. This discussion usually resulted in the owners consenting to the proposed remediation and this consent was documented on a prepared consent form. The form included the civic address of each property and the owner’s name. The civic numbers assigned for each property were as per the RMP. It also included an inventory of the existing surface features and any known underground features and facilities on the property. The owner was then required to sign the consent form. Although most of the property owners consented it was not unanimous and those that declined the remediation also signed the form in the declined option. The properties were then usually photographed by the HMM inspector to ensure that remediation was suitable and to

document property and feature conditions both before and after remediation. This was important to use to evaluate any possible valid claims for damages associated with construction and also to evaluate any invalid claims.

Prior to the start of the actual remediation for each property the HMM inspector and the contractors' superintendent were responsible for reviewing the work methodology and then deciding what applicable structures were within that property to be remediated. After each property inspection the excavation parameters were delineated around the various structures. The areas within the remediation zone that were to receive a sod finish were outlined as well as the areas for a Class "A" finish. These areas were staked at strategic locations and marked directly to ensure that existing grades were maintained in the remediation effort and also to ensure that the required depths of excavation and removal of lead impacted materials was maintained.

Several areas had fences within the remediation zone and many of these fences had to be removed to provide access to the construction equipment being used in the remediation. The contractor predominantly utilized small excavators in these areas to complete the work. All fences that were removed were reinstalled after the project was completed. Fences that were of satisfactory construction and in relatively good shape were reinstated and in areas where the fences were rotten and in poor shape new materials were used to re-construct the fences.

Properties that had hard surface asphalt or concrete driveways/walkways were remediated with these areas remaining untouched as per the design and construction parameters outlined on the detail drawings. Similarly, several properties had exterior decks, stairs or access ramps. These areas also were not remediated.

Several of the properties had visible above ground oil tanks. As per the standard design parameters the contractor did not use machinery to excavate within 1 meter of these tanks to avoid tank disruption and possible oil spills. All work in close confines was carried out using small hand tools. The majority of these areas were successfully remediated without any oil spill or other incidents. The Contractor did, however, strike an unknown underground oil tank at 7 Gilchrist Road in Zone 1 – R1. This is more particularly discussed in Section 8.

Hand and small machinery excavation was used to remove the lead impacted soils from within the drip line area of the trees that were present on properties within the remediation zone. This work was undertaken with direct supervision of the HMM inspector. Where possible excavation was minimized around trees and re-grading of imported fill and topsoil material was undertaken to ensure that each area received the necessary 300 mm depth coverage over the remaining soil base. No tree lost was documented during or after the work. Shrubs that were small and could be removed to complete remediation were removed and replanted.

After the soil material was removed from the property the contractor installed the required 200 mm of imported fill material under the areas delineated for sod installation. This material depth was initially slated to be 150 mm with a covering of 150 mm of topsoil. It was discovered however that the 150 mm of topsoil was excessive and due to its' moisture retention properties it would become soft before and after sod was applied whenever there was a rainfall event. It was therefore decided that 100 mm depth topsoil would be installed and proof rolled. The 50 mm extra depth not being installed would instead receive an extra 50 mm of imported fill material to bring the total to 200 imported fill and 100 mm of topsoil. This would achieve the minimum 300 mm new material depth as outlined in the RMP. In the areas where Class "A" was to be installed the depth of imported fill material was 150 mm followed by the installation of a 150 mm deep layer of Class "A". Sodding of the remediated area was then completed. Each site was monitored during excavation and reinstatement by the HMM project inspector to ensure adherence to the parameters outlined and the grades set in the field.

7. FIELD CONSTRUCTION AND REMEDIATION

7.1 ZONE 1

Zone 1 is an area in the northwest section of the Town and is bounded by an area to the north of the Fore Bay Road along the north and the northwest, by Main Street on the south and by Jackson Avenue on the east. The area is comprised of residential and commercial properties as well as some leisure and sports facilities. Within the Zone 1 boundaries three (3) areas were identified for year 1 remediation in the CRA RMP. These three (3) areas are comprised of two (2) residential properties and one (1) leisure/park area. They are labelled as Zone 1 – R1, Zone 1 – R2 and Zone 1-P1 and are discussed further in the following section.

7.1.1 ZONE 1 – R1 (As-Built Drawing Sheet - C1 of 12)

Zone 1 – R1 is one of two residential sections within Zone 1 that was recommended for remediation in the CRA report. This area is located north of the Fore Bay Road at 7 Gilchrist Street. The area is comprised of 1 residential building and two (2) out buildings currently being used as storage sheds. This property was not initially scheduled to be remediated during this construction season but with the favourable tender price received for this season's work and the contractor being ahead of schedule it was decided to add this property to the year 1 program for remediation. The general condition of the property was fair with substantial debris on the south, west and north extents of the property. The buildings were in fair condition and presented no perceived barrier to the remediation effort. An underground oil tank was encountered during the remediation. This is further discussed in Section 8. The remediation area

measured for this property was 936 m². Property attributes are shown in Table 7.1.1:

TABLE 7.1.1							
ZONE 1 – R1 - PROPERTY ATTRIBUTES							
Civic Address	Priority Setting	Remediated	Asph/Conc. Drive/Walk	Wood Fences	Trees Shrubs	Wood Deck	Oil Tank
7 Gilchrist	Moderate	X	X		X	X	X

7.1.2 ZONE 1 – R2 (As-Built Drawing Sheet – C2 of 12)

Zone 1 – R2 is the second of the two residential sections within Zone 1 that was recommended for remediation in the CRA report. This area is located in the southeast section of Zone 1 at civic address 14 Main Street which is in the center of the main commercial area of the Town. The area is comprised of 1 residential building with one (1) out building currently being used as storage shed. The general condition of the property was good with no debris noted. The buildings were in good condition and presented no perceived barrier to the remediation effort. The remediation area measured for this property is approximately 1339 m². An underground 300 mm diameter steel pipe storm sewer runs from the extreme north of the property to the Town storm sewer system on Main Street. Property attributes are shown in Table 7.1.2:

TABLE 7.1.2							
ZONE 1 – R2 - PROPERTY ATTRIBUTES							
Civic Address	Priority Setting	Remediated	Asph/Conc. Drive/Walk	Wood Fences	Trees Shrubs	Wood Deck	Oil Tank
14 Main	Moderate	X			X	X	X

7.1.3 ZONE 1 - P1 – Veterans Memorial Park (As-Built Drawing Sheet – C3 of 12)

Zone 1 – P1 is a section of the project comprised of Veterans Memorial Park that was originally scheduled to be remediated during the year 2 construction program. It comprises the park area only and is located in the northwest section of the Town. It is bounded on the west and north by the Fore Bay Road, on the south by Main Street and on the east by a gravel road to the west of the RCMP building. The remediation area measured for this property is approximately 3953 m². Property attributes are shown in Table 7.1.3:

ZONE 1 – P1 - PROPERTY ATTRIBUTES – VETERANS’ MEMORIAL PARK							
Civic Address	Priority Setting	Remediated	Asph/Conc. Drive/Walk	Wood Fences	Trees Shrubs	Wood Deck	Oil Tank
Main Street	Low	X			X	X	

7.2 ZONE 2

Zone 2 comprises one of the larger areas that are included in the year 1 remediation program. It is an area in the northeast section of the Town and is bounded by Williams Turnpike on the north and the east, by Jackson Avenue on the west and by North Street on the south. Streets included throughout this zone are East Street and Church Street and there are also three (3) gravel access roads that travel from Williams Turnpike to North Street in a north/south direction. These three (3) gravel access roads are used for access to the back lots of each property within the zone. The area is comprised of 40 properties which include 39 residential properties and 1 undeveloped Town property. Within the Zone 2 boundaries five (5) areas were identified for year 1 remediation in the RMP. They are labelled as Zone 2 – R1, Zone 2 – R2, Zone 2 – R3, Zone 2 - R4 and Zone 2 – R5. They are discussed further in the following section.

7.2.1 ZONE 2 – R1, R2 (As-Built Drawing Sheet – C4 of 12)

Zone 2 – R1, R2 is the 1st of the two residential sections within Zone 2 that was recommended for remediation in the CRA report. This area is located in the west section of Zone 2 bounded by Jackson Street on the west, Williams Turnpike on the north, a gravel road east of Church Street on the east and North Street on the south. It is comprised of addresses 74 – 84 Jackson Street even numbers and 63 –

82 Church Street including both even and odd numbers. The rear yard sections of civic addresses 74 – 84 Jackson Street were not recommended for remediation in the RMP and hence these were not completed. The area is comprised of residential buildings only with the majority of buildings being of quad occupancy. All property owners consented to the remediation in this section. The general condition of the properties varied from location to location with most properties being relatively free of debris. The buildings were in good condition and presented no perceived barrier to the remediation effort. The remediation area measured for this property is approximately 4078 m². Property attributes are shown in Table 7.2.1:

Civic Address	Priority Setting	Remediated	Asph/Conc. Drive/Walk	Wood Fences	Trees Shrubs	Wood Deck	Oil Tank
74 Jackson	High	X		X	X	X	X
76 Jackson	High	X		X	X	X	
78 Jackson	High	X	X			X	X
80 Jackson	High	X	X			X	X
82 Jackson	High	X	X			X	X
84 Jackson	High	X		X		X	
63 Church	High	X	X			X	X
65 Church	High	X	X		X	X	X
67 Church	High	X	X	X	X	X	
68 Church	High	X		X	X	X	X
69 Church	High	X	X	X		X	
70 Church	High	X		X		X	
72 Church	High	X		X		X	
73 Church	High	X	X	X		X	X
74 Church	High	X		X	X	X	
75 Church	High	X	X	X	X	X	
76 Church	High	X	X	X		X	
77 Church	High	X	X		X	X	X
78 Church	High	X	X	X		X	
80 Church	High	X	X	X	X	X	
82 Church	High	X	X	X	X	X	



7.2.2 ZONE 2 – R3, R4, R5 (As-Built Drawing Sheet – C5 of 12)

Zone 2 – R3, R4, R5 is the 2nd of the two residential sections within Zone 2 that was recommended for remediation in the CRA report. This area is located in the east section of Zone 2 bounded by a gravel road at the rear lots of Church Street on the west, Williams Turnpike on the north and east and North Street on the south and is more particularly shown on Drawing C3 of 9. It is comprised of addresses 29 – 44 East Street both even and odd numbers and 41 – 47 Williams Turnpike odd numbers only. There is also a substantial piece of property owned by the Town on the northeast extreme of Williams Turnpike that is part of this section. Not all of the property owners in this section consented to the proposed remediation plan. The properties at 29 East Street, 44 East Street, 45 Williams Turnpike and 47 Williams Turnpike chose Option 1 and requested that no remediation be completed within their property boundaries. The R3 section of the zone is classified as a low priority area in the CRA RMP with sections R4 and R5 being classified as moderate and high priority areas respectively. The area is comprised of residential buildings only with the majority of buildings being of triple or quad occupancy. The general condition of the properties varied from location to location with several of the properties having scattered wood piles, scrap metals and other forms of debris. Some of the buildings are in poor condition and extreme care had to be taken to not damage the structural integrity of the buildings when excavating. The majority of the properties have sheds at the rear of the lots in close confines and this provided some impediment to remediation work. The area also had a lot off fences delineating side yard and rear yard property boundaries. Many of these fences had to be removed to provide access to the construction equipment being used in the remediation. The remediation area measured for these properties is approximately 5044 m². Property attributes are shown in Table 7.2.2:

TABLE 7.2.2

ZONE 2 – R3, R4, R5 - PROPERTY ATTRIBUTES

Civic Address	Priority Setting	Remediated	Asph/Conc. Drive/Walk	Wood Fences	Trees Shrubs	Wood Deck	Oil Tank
29 East St.	Low	NO	X	X	X	X	
30 East St.	Mod	X		X	X	X	
31 East St.	Low	X				X	
32 East St.	Mod	X	X	X	X	X	
33 East St.	Low	X	X	X	X	X	
34 East St.	Mod	X	X	X		X	

TABLE 7.2.2 (Cont'd)
ZONE 2 – R3, R4, R5 - PROPERTY ATTRIBUTES

Civic Address	Priority Setting	Remediated	Asph/Conc. Drive/Walk	Wood Fences	Trees Shrubs	Wood Deck	Oil Tank
35 East St.	Low	X	X	X	X	X	
36 East St.	Mod	X	X	X	X	X	
37 East St.	Low	X	X	X	X	X	
38 East St.	Mod	X	X	X	X	X	X
40 East St.	Mod	X		X		X	
41 East St.	Low	X		X		X	
42 East St.	Mod	X	X	X	X	X	
43 East St.	Low	X	X			X	
44 East St.	Mod	NO	X	X	X	X	
41 Williams	High	X		X	X	X	
43 Williams	High	X	X	X		X	
45 Williams	High	NO	X	X	X	X	
47 Williams	High	NO		X	X	X	
Town Lot	High	X		X			

7.3 ZONE 3

Zone 3 also comprises one of the larger remediation areas that are included in the year 1 remediation program. It is an area in the northeast section of the Town and is bounded by North Street on the north, Jackson Avenue on the west, Main Street on the south and Williams Turnpike on the east. Streets included throughout this zone are Church Street, the rear yards of a portion of East Street and Williams Turnpike south of North Street. The area is comprised of 42 properties which include 41 residential properties and 1 unoccupied building that appears to be commercial. Within the Zone 3 boundaries four (4) areas were identified for year 1 remediation in the CRA Risk Management Plan. They are labelled as Zone 3 – R1, Zone 3 – R2, Zone 3 – R3 and Zone 3 – R4. They are discussed further in the following section.

7.3.1 ZONE 3 – R1, R2, R3 (As-Built Drawing Sheet – C6 of 12)

Zone 3 – R1, R2, R3 is the 1st of the two residential sections within Zone 3 that was recommended for remediation in the CRA report. This area is located in the western section of Zone 3 bounded by a gravel road at the rear lots of Church Street on the west, Williams Turnpike on the east, North Street on the north and Main Street on the south. It is comprised of addresses 38 – 61 Church Street both even and odd numbers and the front yards of 1-13 East Street odd numbers only.

Not all of the property owners in this section consented to the proposed remediation plan. The properties owners at 45 Church Street, 53 Church Street, 1 East Street and 7 East Street requested that no remediation be completed within their property boundaries. The R1 section of the zone is classified as a low priority area in the RMP with sections R2 and R3 both being classified high priority areas. The area is comprised of residential buildings with the majority being duplexes and three being of triple or quad occupancy. One property at 61 Church Street appears to be a commercial building but it is currently unoccupied. The general condition of the properties varies from location to location with several of the properties having scattered wood piles, scrap metals and other forms of debris. Some of the buildings are in poor condition and extreme care had to be taken to not damage the structural integrity of the buildings when excavating. The majority of the properties have sheds at the rear of the lots in close confines and this provided some impediment to remediation work. Nearly all of the properties have fences delineating side yard and rear yard property boundaries. The remediation area measured for these properties is approximately 6434 m². Property attributes are shown in Table 7.3.1:

Civic Address	Priority Setting	Remediated	Asph/Conc. Drive/Walk	Wood Fences	Trees Shrubs	Wood Deck	Oil Tank
1 East St.	High	NO	X	X		X	
3 East St.	High	X		X	X	X	
5 East St.	High	X	X	X	X		
7 East St.	High	NO		X			
9 East St.	High	X	X	X			
11 East St.	High	X		X			
13 East St.	High	X	X	X			
15 East St.	High	X		X			
38 Church	High	X	X	X	X	X	
40 Church	High	X		X	X	X	
42 Church	High	X	X	X	X	X	
44 Church	High	X		X	X		
45 Church	Low	NO	X	X	X	X	
46 Church	High	X		X	X		
47 Church	Low	X	X	X			
48 Church	High	X		X	X	X	
49 Church	Low	X		X			

TABLE 7.3.1 (Cont'd)

ZONE 3 – R1, R2, R3 - PROPERTY ATTRIBUTES

Civic Address	Priority Setting	Remediated	Asph/Conc. Drive/Walk	Wood Fences	Trees Shrubs	Wood Deck	Oil Tank
50 Church	High	X	X	X		X	
51 Church	Low	X		X		X	
52 Church	High	X		X	X	X	
53 Church	Low	NO	X	X	X	X	
54 Church	High	X	X	X	X	X	
55 Church	Low	X		X	X	X	
56 Church	High	X		X			
57 Church	Low	X	X	X		X	
58 Church	High	X		X	X		
59 Church	Low	X			X	X	
61 Church	Low	X	X				X

7.3.2 ZONE 3 – R4 (As-Built Drawing Sheet – C7 of 12)

Zone 3 – R4 is the 2nd of the two residential sections within Zone 3 that was recommended for remediation in the CRA report. This area is located in the extreme eastern section of Zone 3 bounded by a gravel road at the rear lots of East Street on the west, Williams Turnpike on the east, North Street on the north and Main Street on the south and is more particularly shown on Drawing C5 of 9. It is comprised of addresses 13 – 39 Williams Turnpike odd numbers only. One of the property owners in this section declined the proposed remediation plan. This property is located at 33 Williams Turnpike. This section of the zone is classified as a high priority area in the RMP. The area is comprised of residential buildings with two (2) duplexes, one (1) single dwelling unit, two (2) quad dwelling units and 1 vacant property. The general condition of the properties varied from location to location but nearly all of the properties were in relatively good condition. All of the buildings are in good condition. The majority of the properties have sheds at the rear of the lots in close confines and this provided some impediment to remediation work. One property has a greenhouse structure within the side yard. Nearly all off the properties have fences delineating side yard and rear yard property boundaries. The remediation area measured for these properties is approximately 3164 m². Property attributes are shown in Table 7.3.2:

TABLE 7.3.2
ZONE 3 – R4 - PROPERTY ATTRIBUTES

Civic Address	Priority Setting	Remediated	Asph/Conc. Drive/Walk	Wood Fences	Trees Shrubs	Wood Deck	Oil Tank
13 Williams	High	X		X		X	
15 Williams	High	X				X	
17 Williams	High	X	X	X		X	
19 Williams	High	X		X		X	
21 Williams	High	X	X	X	X	X	
23 Williams	High	X	X	X	X	X	
25 Williams	High	X		X		X	
27 Williams	High	X		X	X	X	
29 Williams	High	X		X	X	X	
31 Williams	High	X		X			
33 Williams	High	NO		X		X	
35 Williams	High	X	X	X		X	X
37 Williams	High	X	X	X		X	X
39 Williams	High	X		X	X	X	

7.4 ZONE 4

Zone 4 is a large area outlined in the RMP that includes residential, recreational, and health facilities. It is an area in the southwest section of the Town and is bounded by Main Street on the north, the Mucky Ditch on the south, the mine site on the west and Center Street on the east. Streets included throughout this zone are Main Street, Water Street, Center Street, Court Road, Gilchrist Road, West Street and Prospect Street. The affected areas in this zone were initially scheduled for Year 2 remediation. The Zone 4 – P1 area within the zone, however, was included in year 1 as an addition to the contract. This area is discussed further in the following section.

7.4.1 ZONE 4 - P1 (As-Built Drawing Sheet – C8 of 12)

Zone 4 – P1 is a section of the project that is comprised of the tennis courts and a newly constructed residential house that was originally scheduled to be remediated during the year 2 construction program. It is located in the southwest section of the Town. It is bounded on the north by Water Street, on the west by the mine site property, on the south by a previously remediated area known as the

Mucky Ditch and on the east by the property of the A.M. Guy Memorial Hospital. The area is listed as a high priority area in the RMP. Other than the area where the tennis courts are situated the remainder of the area is covered by a coarse granular material. There are no trees within the remediation area. The tennis court portion of the area is surrounded by a chain link fence. The existing fence structure is of a wooden framework and is in poor condition. It has been constructed without the aluminum framework common to chain link applications. The base of the tennis court is an asphalt hard surface area and does not require any remediation effort. The surrounding area has no impediments to construction remediation and is wide open to remediation. The house is of new wood frame construction with no landscaping in place to impede remediation. The remediation area is 3,513 m². Property attributes are shown in Table 7.4.1.

Civic Address	Priority Setting	Remediated	Asph/Conc. Drive/Walk	Wood Fences	Trees Shrubs	Wood Deck	Oil Tank
8 Water St.	High	X					
Tennis Court	High	X	X	X			

7.5 ZONE 5

Zone 5 is an area located in the center portion of the Town of Buchans and is bounded by Main Street on the north, by Church Street on the east, Center Street on the west and South Street on the south. Street addresses included throughout this zone are Center Street and Jackson Avenue. This zone is mainly residential and recreational. Some areas within this zone will be remediated in the year 2 construction program. Zone 5 – R1 is the only area within this zone to be remediated during this construction program. It is discussed further in the following section.

7.5.1 ZONE 5 – R1 (As – Built Drawing Sheet – C9 of 12)

Zone 5 – R1 is the area bounded by Main Street on the north, Jackson Avenue on the east, Center Street on the west and Water Street on the south. It is the only section within Zone 1 that was included for remediation during this construction program. The area is comprised of nine (9) residential properties and one (1) vacant property. All residential dwellings are single family units. The area is more particularly shown on

As-Built Drawing C9 of 12. It is comprised of addresses 2 – 10 Center Street even numbers only and 51 – 57 Jackson Street odd numbers only. The vacant property is referred to as 59 Jackson Street. All of the property owners in this section consented to the proposed remediation plan and all properties were remediated. This section of the zone is classified as a moderate priority area in the RMP. The area is comprised of single dwelling residential and 1 vacant property. The general condition of the properties is excellent prior to remediation. All of the buildings are in good condition. The majority of the properties have sheds at the rear of the lots in close confines and this provided some impediment to remediation work. All of the properties could be accessed without removing fences. The remediation area measured for these properties is approximately 4486 m². Property attributes are shown in Table 7.5.1.

TABLE 7.5.1

ZONE 5 – R1 - PROPERTY ATTRIBUTES

Civic Address	Priority Setting	Remediated	Asph/Conc. Drive/Walk	Wood Fences	Trees Shrubs	Wood Deck	Oil Tank
2 Center St.	Mod	X		X	X	X	
4 Center St.	Mod	X		X	X	X	
6 Center St.	Mod	X	X	X		X	
8 Center St.	Mod	X	X		X	X	
10 Center St.	Mod	X			X	X	
51 Jackson	Mod	X	X	X	X	XX	
53 Jackson	Mod	X		X	X	X	
55 Jackson	Mod	X	X	X	X	X	
57 Jackson	Mod	X	X	X	X	X	
59 Jackson	Mod	X		X	X		

7.6 ZONE 8

Zone 8 is comprised of residential and leisure areas in the mid southeast section of Town and is bounded by South Street on the north, Lundberg Avenue on the west, Walsh Memorial Street on the south and the rear boundaries of the properties east of Lakeview Avenue on the east. Street addresses included throughout this zone are on Pine Street and Lundberg Avenue. The area is comprised of forty (40) residential properties. There are ten (10) residential buildings with all being quad

occupancy. This area is labelled as Zone 8 – R1 and R2. It is discussed further in the following report.

7.6.1 ZONE 8 – R1, R2 (As-Built Drawing Sheet – C10 of 12)

Zone 8 – R1, R2 are the only residential sections noted within Zone 8 that was recommended for Year 1 remediation in the CRA report. It is an area located in the southeast section of the Town of Buchans and is bounded by South Street on the north, Lundberg Avenue on the west, Walsh Memorial Street on the south and Pine Street on the east. Some areas within this zone will be remediated in the year 2 construction program. Zone 8 – R1, R2 is comprised of addresses 2 – 40 Lundberg Avenue even numbers only and 1 – 39 Pine Street odd numbers only. Two (2) of the property owners in this section declined the proposed remediation plan. These properties are located at 16 Lundberg Avenue and 33 Pine Street. Both the R1 and R2 sections of the zone are classified as high priority areas in the RMP. The area is comprised of ten (10) residential buildings with all being quad occupancy. The general condition of the properties is good prior to remediation. All of the buildings are in good condition. Three (3) of the properties have sheds and one (1) property has a greenhouse. Approximately one third of the properties have fences. The lots are relatively wide open when some of the fences are removed and there was no major impediment to remediation of the proposed areas. The remediation area measured for these properties is approximately 5250 m². Property attributes are shown in Table 7.6.1.

TABLE 7.6.1

ZONE 8 – R1, R2 - PROPERTY ATTRIBUTES

Civic Address	Priority Setting	Remediated	Asph/Conc. Drive/Walk	Wood Fences	Trees Shrubs	Wood Deck	Oil Tank
1 Pine St.	High	X			X	X	
3 Pine St.	High	X			X	X	
5 Pine St.	High	X	X	X		X	
7 Pine St.	High	X	X	X	X	X	
9 Pine St.	High	X	X	X	X	X	
11 Pine St.	High	X					
13 Pine St.	High	X	X	X		X	
15 Pine St.	High	X		X		X	
17 Pine St.	High	X	X	X	X	X	

TABLE 7.6.1 (Cont'd)
ZONE 8 – R1, R2 - PROPERTY ATTRIBUTES

Civic Address	Priority Setting	Remediated	Asph/Conc. Drive/Walk	Wood Fences	Trees Shrubs	Wood Deck	Oil Tank
19 Pine St.	High	X		X		X	
21 Pine St.	High	X		X		X	
23 Pine St.	High	X		X	X	X	
25 Pine St.	High	X		X	X	X	
27 Pine St.	High	X		X		X	
29 Pine St.	High	X			X	X	
31 Pine St.	High	X			X	X	
33 Pine St.	High	NO	X	X	X		
35 Pine St.	High	X		X	X	X	
37 Pine St.	High	X			X	X	
39 Pine St.	High	X				X	
2 Lundberg	High	X				X	
4 Lundberg	High	X		X	X	X	
6 Lundberg	High	X		X		X	
8 Lundberg	High	X				X	
10 Lundberg	High	X	X	X	X	X	X
12 Lundberg	High	X	X	X		X	
14 Lundberg	High	X	X	X		X	X
16 Lundberg	High	NO	X	X	X	X	
18 Lundberg	High	X		X	X	X	
20 Lundberg	High	X		X		X	
22 Lundberg	High	X		X	X	X	
24 Lundberg	High	X		X		X	
26 Lundberg	High	X		X		X	
28 Lundberg	High	X				X	
30 Lundberg	High	X				X	
32 Lundberg	High	X	X	X		X	X
34 Lundberg	High	X	X	X		X	
36 Lundberg	High	X		X	X	X	
38 Lundberg	High	X		X	X	X	
40 Lundberg	High	X		X		X	

7.7 RECREATIONAL VEHICLE PARK (As-Built Drawing Sheet – C11 of 12)

The recreational vehicle park area is located in the northwest section of the Town and is more particularly shown on As-Built Drawing Sheet - C11 of 12. The area is bounded on the north by the Fore Bay Road, by Gilchrist Road on the west, the softball field on the east and the back lot road access on the south behind the commercial businesses of Main Street. This area was not slated for any remediation work in the original proposed year 1 construction schedule. However, the poor condition of the Buchans River Bridge and the Penstock Bridge leading to identified disposal areas east of Town created a need for a suitable disposal area. This area was identified by council as a desirable RV Park location for the Town and although it had lead impacted soils throughout it was not slated for remediation because it was not residential or commercial. Hence DOEC agreed to study the area for suitability as a disposal option and then to cap it to create a RV Park as per Council request. The area was studied by CRA and HMM and a grading/disposal plan was created to allow for all of the excavated materials from the year 1 construction program to be deposited at this site. A capped containment system was then designed to cover the deposited lead impacted soils. The design included the capping with a minimum of 300 mm of imported fill material as per the residential guidelines previously established. In areas where there were to be access roads for RV vehicles the fill material was upgraded to provide adequate bearing capacity. This consisted of a minimum of 300 mm thickness 100 mm minus rock fill material supplemented by 100 mm thickness Class “A” material. The Park was designed with a 26 lot capacity and a water service hook-up for each lot was provided. Although electrical hook-ups were not provided an electrical plan was designed by HMM and given to the Town so that they would be able to have this work done separately at a later date. It was decided that the conduit for the electrical installation for each lot would be installed as this would negate the excavation of any portion of the lot to provide the electrical hook-up at a later date. The entire RV Park area was designed and constructed to provide drainage to the existing town storm sewer system on Main Street. The site was graded from the Fore Bay Road toward the south side of the park where rock lined drainage ditches will collect the run-off and carry it to an underground 375 mm storm pipe that crossed the property of 14 Main Street and discharged into the storm system on Main Street. The rock lined ditches were constructed to contain water on the west, east and south sides. New headwalls were installed and the storm piping system replaced an older deteriorated system that was also removed as part of the project. The storm sewer system was completed during the last week of July. This work was completed at this time to accommodate a Town reunion that was happening during the last week of July and the first week of August. The area throughout the park that was not constructed for vehicle access was hydro seeded. This work started at the beginning of the project in the last week of June. All of the excavated materials from the remediation zones throughout the Town was deposited at the site and

graded as per the grading plan. Pipe work at the site for the water supply and the electrical conduits were completed in August. Final work on the grading was not completed until September month when all of the excavation of the remediation areas was completed. After final grading and proof rolling of the disposal material the contractor imported and installed the rock fill material to stabilize the site. Class “A” was then installed on the vehicle accessible areas and topsoil on the remaining areas. The topsoil on common areas were then treated with a hydro-seed application. This work was not completed until October 20th which is considered late in the season for this type of work as it does not provide sufficient time for the germination of the grass seed being applied. It was decided however to allow the contractor to complete the hydro seeding and then process a holdback for the work that would allow for re-seeding during the 2013 season if required. All work within this park was completed by October 22, 2013.

7.8 SOFTBALL FIELD DRAINAGE REMEDIATION

The softball field drainage remediation was not an original item for construction during this remediation project. It was undertaken to provide relief for some areas of Jackson Street that had experienced flooding as a result of what the Town perceived as the original ball field construction. The original ball field had been constructed directly adjacent to Jackson Street and as such there was no room remaining to allow for the installation of any drainage infrastructure. Due to it being directly adjacent to Jackson Street and the fact that there was no proper slope protection infrastructure installed some of the material from the ball field outfield was undergoing erosion and filtrating into the surface of Jackson Street clogging the existing old drainage infrastructure along Jackson. HMM inspected the area and proposed the installation of a prefabricated modular concrete block wall to alleviate the soil erosion issues of the ball field outfield and the upgrade of the existing storm sewer along the affected portion of Jackson Street to enable the sufficient drainage for snow melt and storm drainage. BAE Newplan Inc. completed the design of the recommended system as part of their original contract for the ball field design. HMM implemented and supervised the construction. The designed modular block wall was extended beyond the design area to ensure protection of the ball field slopes. In addition HMM had the remaining slopes along Jackson Street rock lined and the end sections near the public entrances had sod installed to provide an additional level of erosion protection. Drainage ditches were constructed along the south and west side of the ball field to capture any run off and channel it into the upgraded storm system. The old existing catch basins that were clogged were removed and new concrete catch basins with sumps and new frames and covers were installed to allow for preventative maintenance. At the end of each drainage ditch a concrete headwall was installed to stop the infiltration of material into the end of the storm system from the sides of the ditch. All of the ditches were rock lined to provide continued stability and flow. This

work started in the 1st week of September and was completed by the end of September.

7.9 FOREBAY ROAD DRAINAGE DITCH

The Fore Bay Road drainage ditch was not part of the original scope of work outlined in the contract documents. This work was requested by the Town during a site visit to discuss the drainage issues with the ball field construction and to divert as much water as possible away from the new RV Park and disposal area. As previously discussed the Town felt that the construction of the ball field created a drainage problem along Jackson Street and for the homes in that area. As part of the ball field drainage remediation it was decided to cut off as much surface run-off as possible and divert it prior to it reaching the ball field area on the south side of the Fore Bay Road. To meet this end the Town suggested that we construct a ditch along the north side of the Fore Bay Road and divert the water to an area northeast of town and away from all residences within the Town. Subsequently a drainage ditch was constructed by the contractor along the north side of the Fore Bay Road starting at the Buchans Outfitter's building on the west end and proceeding in a northeast direction for a distance of approximately 500 meters. Drainage culverts were used at the east end to cross the Fore Bay Road and to allow for the run-off to discharge into a natural drainage pattern north of Williams Turnpike. This work was completed during the last week of July when the town reunion was underway.

7.10 TENNIS COURT FENCE

The tennis court fence, similar to the Fore Bay Road drainage ditch was not part of the original scope of work for this project. It was however requested as an addition to the project by the Town of Buchans. Given that the existing fence was completely surrounded by area P1 in Zone 4 that was scheduled to be remediated the ability to maintain the stability of the fence during remediation was a concern. The existing fence was of a chain link construction with a wooden structure and appeared to be installed using material taken from a previous site. It was decided, in the interest of remediating the area that it would be cheaper to remove the existing fence, complete the remediation and then re-install a completely new fence. Price quotes were received from the contractor to install a 3 meter high chain link fence with a 38 mm mesh. The mesh size is important as most chain link fences for security purposes have a 50 mm mesh. For sports purposes the desired mesh is 38 mm. The contractor received approvals to supply and install the fence and installation work started on November 7, 2012. Marine Contractors Ltd. sub-contracted the fence supply and installation work to CANGRO Services Limited. The fence area was delineated and the fence structure was set on

November 7th with the chain link fence, man gates and vehicle gate installation completed on November 15th.

8. CONSTRUCTION ISSUES – OIL TANK

As discussed previously an oil tank was encountered at Zone 1 – R1 during the excavation of lead impacted materials. The normal protocol and work methodology was practiced prior to the start of excavation with the HMM inspector discussing the extents of the remediation effort required directly with the homeowner. All excavation work proceeded throughout the property without any problem until the fuel tank was encountered on September 12, 2012. The tank was discovered when the excavator struck the fill pipe during the excavation process. The tank did not sustain any damage as a result of the excavator strike and it was subsequently uncovered to reveal its full size and contents. The contractor removed the top cover of the fuel tank and measured the contents. It was estimated that the tank had a 1000 gallon capacity with approximately 200 gallons of petroleum product remaining in it. The fuel tank was in poor condition and would buckle when weight was applied to it. A subsequent investigation revealed that the owner was unaware of the tanks presence. The property had been purchased some years ago from the federal government. It had previously been used as a post office and the tank had obviously been abandoned as is. The immediate area around the fuel tank was secured with barricades and the responsible government agencies were notified of its' presence. On September 14, 2012 Marine Contractor's Inc provided a quote to pump its' contents and remove the tank. On October the 10th HMM recommended tank removal under project funding. This recommendation was reviewed by DOEC and subsequent approvals were granted under the project funding to proceed with the removal of the tank as per the contractor's quotation. The tank was pumped on October 18, 2012 by Pardy's Industrial Services of Grand Falls-Windsor. Approximately 36 tonnes of soil was removed from the immediate area of the underground tank and delivered for treatment at GDH Environmental Inc. at Stephenville. The removal of the product and the soil was supervised by Stantec Inc. All documentation with respect to the removal of the product and the soils was handled by Stantec as part of their agreement with DOEC. A copy of this report has not been made available to HMM and is not included in this report.

9. BUCHANS RIVER BRIDGE ASSESSMENT

The Buchans River Bridge structural assessment was completed to determine whether or not the structure was suitable for use during the construction portion of the project. The structure had been used earlier and there were some concerns that the fully loaded tandem dump trucks were too heavy to safely use the bridge. As most of the developed quarry areas were across this structure it was decided during the design process to complete the assessment in order to put all potential bidders on a level playing field with respect to the

condition of the structure and it's suitability for the loads anticipated. The assessment was completed in the field in March month and it was found that the bridge required a fairly significant upgrade and was not suitable for use with tandem dump trucks. This information was presented in the tender documents to enable all potential bidders to review it and assess their options with respect to potential quarry development. A copy of the bridge assessment report is included in Appendix "I".

10. BUCHANS PENSTOCK BRIDGE ASSESSMENT

The Buchans Penstocks Bridge assessment was not completed during the current construction season but it was decided during the last construction meeting that it would be prudent to complete an assessment to determine if the bridge was suitable to safely pass a fully loaded tandem dump truck as per the Buchans River Bridge. This was done to provide insight in the event that DOEC or Nalcor decided to complete an upgrade of the Buchans River Bridge. This assessment would allow them to determine whether or not both bridges would require any further upgrades. It was determined during the assessment analysis that the bridge is unsuitable for loads likely to be encountered during remediation construction and that any expected use would require an upgrade. A copy of the bridge assessment report is included in Appendix "J".

11. SAFETY

As is the case with any construction project the safety of both the workers and the general public is the primary objective on a daily basis. To this end, the contractor was diligent in providing his workers with the necessary training and support to complete their work in a safe and effective manner. No incidents or accidents were reported during the mobilization, construction or demobilization phases of this project. HMM has noted however that many of the electrical services to sheds throughout the remediation zones are installed by the homeowners as an extension of the home electrical system. It has been recommended and accepted by DOEC that the next phase of this remediation program expected to be completed in the 2013 construction season should contain a bid item for scanning of all underground electrical/communication systems as well as underground services such as water, sewer, storm sewer and oil and fuel lines and storage tanks. The inclusion of underground scanning as a bid item is intended to provide further and absolute clarification with respect to the contractor's responsibilities concerning underground infrastructure. It will place the onus for underground scanning on the contractor as a paid item within the contract. This will also ensure that the contractor completes the required scanning of each site and is adequately reimbursed for the costs of doing so. This will serve to identify underground utilities prior to the start of construction and hence will protect all workers from inadvertent interception with these utilities and other infrastructure as the project proceeds. In addition, it will hold the contractor financially responsible for any repairs or cleanup to underground infrastructure

that may be intercepted during the project work. Another aspect of the safety for this project is the inclusion of certified flag persons/spotters in the contract documents. As much of the remediation work is being completed in close confines in residential areas and heavy equipment with sometimes limited lines of sight is being utilized the need for constant traffic and pedestrian control is critical. This project has included these items as paid items to ensure that they are provided at all times and that the contractor does not cut back on flag persons/spotters to limit project costs. We feel that this item creates a safer work place for the general public both vehicular and pedestrian and this is recommended to remain in future contract documents as a paid item. Another item that was implemented in this construction package was the supply of a water truck to limit the amount of airborne particulate during construction. This was especially critical given the timeframe from start of property remediation to the final application of Class “A” or sods. Sometimes the timeframe extended to three weeks and the water truck provided the wet down service required especially in the hot dry summer period when dust on construction sites sometimes becomes a problem. No reports of dust problems were received during this construction. The implementation by the contractor of daily tool box meetings and a monthly safety meeting as part of their core safety certification was also effective in maintaining a constant reminder of the need to be vigilant in the work place given the potential for interaction with the general public. Overall the safety record for this project was excellent.

12. GENERAL HOUSEKEEPING/MATERIAL STORAGE

This item was generally very good throughout the project with no complaints received by HMM from concerned citizens regarding the contractor’s storage or housekeeping responsibilities. Generally, materials were not brought to the developed or populated areas of the site until they were required for installation and they were generally installed in a consistent and efficient manner as they were delivered. This created no issues with respect to untidiness or danger areas within the project site. The contract documents referenced a two week time frame from the start of excavation of a site to the installation of sods and completion of the grading for the site. This was done to emphasize the importance of completing each site in a timely fashion and also to enable HMM to exert pressure if required on the contractor to ensure that the work was completed in a timely fashion. Fortunately this contractor was very organized and very diligent in completing the project and all of the rules of housekeeping and material storage were adhered to.

13. CONTRACT SCHEDULE

This project was initially scheduled to have the engineering portion of the work completed in the autumn of 2011 and then provide an early tender close in the spring of 2012 to enable an early start of construction. Unfortunately this timeframe was knocked off the rails at the start with the project not being awarded until February of 2012.

Fortunately both CRA and HMM had the personnel to assign to the project to get the design completed relatively early and the DOEC provided the necessary approvals in a timely fashion to allow the project to go to tender in mid May with a tender close on June 5, 2012. The tender review was completed within a day or so and the recommendation to award the project by the Department was accepted and processed within a couple of days. Although not the normal timeframe, this allowed for the contractor to get on site during the 3rd week of June and start the processing of materials that would be required to complete the remediation. Actual removal of lead impacted soils started during the last week of June and continued throughout the project. The contractor's organization and multi pronged approach to the construction enabled them to get the bulk of the work done during the summer season. This summer was especially dry which worked well for the contractor given the nature of the materials required for installation in the remediation process. This organized approach ensured that the project was completed on time and well within budget. There were no delays due to the weather for the bulk of the construction schedule. The only delay due to weather was at the end of the schedule in October when the contractor was completing additional work that had been assigned. During this period the autumn rains were significant and this created a slowdown of the work at the very end. Overall the schedule went very well and it is recommended that an even earlier start during the next remediation phase be achieved if at all possible.

14. PROGRESS CLAIMS/PROJECT QUANTITIES

Progress claims for this work were completed on a monthly basis at the end of each month and included all work associated with the remediation effort up to that point in time. HMM and Marine Contractors' personnel prepared the claims in unison at the end of each month. All work areas were measured directly in the field as the work progressed with Marine and HMM agreeing on the quantities used usually on a daily basis. This allowed for thorough tracking of the project costs and enabled the approval of additional work items early on in the remediation program. The original remediation work came in slightly under budget and allowed for additional work as previously outlined. A summary of the quantities and project costs are shown in Appendix "C".

15. QUALITY CONTROL

Quality control on the project started early in the design process, continued on throughout the construction phase and is ongoing during this reporting period. Design quality control consisted of an ongoing check and review of the design drawings and documents by internal means at the HMM office in Clarendville and by the CRA personnel assigned to the project through their St. John's office. Quality checks included a review of priority sites and their inclusion, drawings and documentation checks on an ongoing basis for scope of work compliance and drawing and document annotation on site prior to submission for tendering.

On-site quality control during construction was continuous with full time resident administration and inspections provided by HMM personnel. The inspection personnel reviewed the scope of work with the contractor at each site prior to the start of construction. They then photographed and delineated the site to be remediated to enable the reinstatement of the property with the original conditions or better or as per that agreed upon by the property owners.

Grade markings were measured directly at critical locations to ensure that the contractor provided the sub-excavation of each property to the depths required in the design documents. These grade markings were then used to reinstate the property to the original grades to prevent any changes within the existing drainage systems and to provide positive drainage away from the structures on the property.

Material testing was ongoing during the materials processing stage at the quarry. Granular Class “A” material was tested for sieve analysis to determine its’ suitability for use on the project. The samples were generally along the bottom of the preferred scale which indicated that the materials were a little cleaner then desired. Given that the materials are for incorporation into driveways and walkways on private property HMM generally found the materials to be acceptable for use on the project.

Proctor testing of Class “A” material was also completed to enable density testing on the RV Park portion of the project. Density testing was not conducted on the individual private properties as the compaction effort utilizing a standard roller compactor would generally create more instability issues then it resolved given the unknown existing sub-grade. As the properties is not part of a highway system and does not form the sub-grade for a large structure HMM considered it acceptable to have the contractor proof roll the materials under the supervision of the resident inspector. This work was completed on an ongoing basis throughout the entire construction period. The area of the RV Park was proof rolled in the topsoil areas and also density tested on the Class “A” areas. The results of the compaction testing does not meet the 100% noted in the specifications but is generally acceptable with 100% exceeding 90% compaction, 89% exceeding 95% compaction, 67% exceeding 98% compaction and 44% exceeding 100%. These compaction areas are in areas of low vehicle travel with a minimum of sub-grade preparation materials used. It is not anticipated that any failure of the sub-grade under an RV Park usage will be encountered.

Rock fill material including 100 mm minus and 200 mm minus were visually inspected on a regular basis during production and installation. The material size is more of a guideline to achieve a drainage medium that can alleviate erosion within the drainage ditches constructed. The material is of good clean quality and generally meets the project specifications and its installation is satisfactory for the purpose intended.

Given the short timeframes associated with getting the work completed prior to the end of the construction season topsoil testing was limited to the visual inspections and remixing

as required by the contractor and the HMM inspector. The topsoil material utilized appears to be of good quality for the production of grass and other shrubs. The sod also provides a topsoil component and was imported from a commercial sod producing farm.

16. PROJECT TEAM

Both HMM and CRA utilized some of our best qualified, experienced and dedicated personnel for this assignment. The skill sets of the design and construction management team have provided the DOEC with the appropriate blend of local knowledge, extensive experience with provincial and federal processes; and the technical and managerial expertise to successfully complete the first and second years of the Phase II project. We have been committed to the project thus far and have endeavored to work closely with the DOEC staff involved in the project to provide the best solutions possible to all issues as they have arose. A brief description of the main personnel complete with qualifications, experience and project responsibilities are summarized below.

Kirk Peddle, P. Eng.
Project Director

Mr. Peddle is a civil engineer with 20+ years of experience in planning, design development, contract administration, project management and construction management of projects throughout Newfoundland and Labrador. His experience is primarily in the municipal, civil, marine, and industrial sectors with a focus on site development, site grading, and site services. As Project Director Kirk Peddle organized and oversaw the various phases of this project, and acted as the lead quality assurance and quality control officer. Although he was not involved in the day-to-day running of the project, he did provide input into the overall development and assignment of the project team, provided an overview and advice on key strategies and reviewed documentation released to outside agencies throughout the duration of the project. In addition to the roles outlined Mr. Peddle also assumed the following tasks:

- Internal responsibility for delivery of the project;
- Provide overview on key strategies; and
- Allow access for the PM to senior management.

***Michael Hogan, P.Eng.
Structural Quality Manger***

Mr. Hogan is the Newfoundland sub-division Manager, and a Senior Associate with Hatch Mott MacDonald Ltd. He is a Senior Structural Engineer and Project Manager with over 24 years experience in structural design and building projects. Mr. Hogan's role for this project was the Structural Quality Manager with emphasis on the Bridge Assessment completed by HMM. He also assumed responsibility for the overall internal management of resources with particular additional responsibilities as follows:

- Resolution of non-conformances;
- Managed the distribution of structural QA/QC reports;
- Ensured QES work plans were being followed;
- Performed random QES audits.

***Douglas Short, Senior Technologist
Project Manager***

Mr. Short is a Project Manager/Civil Designer with over 23 years experience in providing a variety of services in support of the Engineering Profession to facilitate pre-design, design and construction management in several fields including transportation, municipal infrastructure, mining, oil and gas, hydro and recreation. Mr. Short was the single point of contact for the project tasked with the responsibility for coordination of the overall project from project kick-off to project close out. In addition, Mr. Short's responsibilities included:

- Liaised with DOEC and the contractor throughout the project as required;
- Liaised with HMM sub-consultant CRA to clearly establish design objectives;
- Provided overall project management of HMM employees assigned to the project;
- Prepared change orders, construction progress claims, project design change coordination and chaired project meetings;
- Ensured technical requirements of the project were adhered to;
- Established client review/approval procedures;
- Ensured QA/QC and OHS policies and procedures were implemented and followed;
- Reviewed and approved project cost and schedule updates with prior DOEC approval;
- Prepared project construction report and coordinated turnover to the Owner.

Brian Luffman, P. Eng.
Environmental Engineer

Mr. Luffman is a senior project manager with CRA Limited and has 15 years of experience in the environmental, remediation and construction engineering fields. Brian's experience in the environmental field includes the completion and/or management of over 150 environmental projects throughout Newfoundland and Labrador. The work has been completed at a variety of sites including: mining sites, gas stations, marine terminals; and commercial and residential properties. The work completed at these sites has involved remedial design, implementation and monitoring programs (for a variety of contaminants such as hydrocarbons, metals, and PAHs). Mr. Luffman's project responsibilities included management of all environmental aspects of the work including the following:

- evaluation of suitable fill material;
- soil sampling for metals analysis and leachability testing;
- evaluation of soil disposal options;

Scott Smith, P. Eng.
Project Engineer

Scott is a Civil Engineer and Project Manager with over thirteen (13) years experience managing and designing civil engineering projects for a range of Clients throughout Newfoundland and Labrador. In recent years Scott was the project manager for the new Long Term Care Facility, Water Treatment Plant, 2010 / 2011 GAP Compliance at North Atlantic Refining and several municipal infrastructure projects. In his role as project engineer Mr. Smith was responsible for:

- Primary project design and liaising with CRA to clearly establish design objectives;
- Supervision of drawings and specifications preparation;
- Development of remediation solutions;
- Providing ongoing technical supervision.

Kimberlea M. Green, M. Sc.
Environmental Scientist

Ms. Green has over 10 years of environmental project management experience. Ms. Green has managed site investigations, waste management studies, landfill closures and remediation projects across Atlantic Canada. She has conducted environmental

assessments for numerous projects, such as marine developments, new building construction and landfill developments. This has provided Ms. Green with a comprehensive understanding of both the provincial and federal regulatory frameworks. Ms. Green's responsibilities included the development of health and safety protocols with respect to the construction management of the site.

***Kevin Goodyear, P.Tech.
Geotechnical Lead***

Kevin is a Senior Materials Technologist with over 27 years experience in the municipal and environmental sectors. He has been responsible for pre-design investigative work, design review, supervision of all quality control work undertaken at the HMM materials testing facility in Clarenville, and management of technical staff and resources to complete quality control work required during construction. Since 2002, Kevin has also been a Project Manager/Civil Designer with HMM providing a variety of services to facilitate pre-design, design and construction management in the fields of landfill closures, municipal infrastructure, transportation and building construction. For this particular project, Mr. Goodyear supervised the materials testing analysis and reporting including the field QA/QC of materials.

***Keith Ralph, C.E.T.
Geomatics and CAD Lead***

Mr. Ralph is an Intermediate Geomatics Engineering Technologist with 10 years experience in surveying, civil construction, Auto CAD and field inspections. He has been responsible for project QA/QC and pre-design investigative work on several large earth works projects throughout Newfoundland and Labrador including the Duck Pond Mine development and the North Atlantic Refining GAP projects. Mr. Ralph was the primary CAD worker for the design team and also prepared quantities calculations for the contract documents as well as providing ongoing field support during construction.

***Ross Sweeney, Senior Inspector
HMM Site Supervisor***

Mr. Sweeney is a Senior Project Superintendent with 40 years experience in construction management and construction quality control for highway, residential, industrial and municipal infrastructure projects. His most recent earthworks project was the supervision of construction for approximately 100 kilometers of the Trans Labrador Highway for Eastlinks Construction Ltd. Mr Sweeney was the HMM on site construction manager

with specific duties being supervision of the contractor to ensure adherence to the contract documents and specifications, liason with all associated parties including property owners, quantity and quality control and project reporting.

17. CONCLUSIONS

Overall the project has progressed extremely well given the tight time lines to get it off the ground for this past construction season. The work was a concerted effort of all parties including DOEC and the Town of Buchans in ensuring that all issues arising were dealt with in a timely fashion and the tender packages submitted were reviewed and approved to proceed in a short time frame. The quality of the contractor was also a positive for the project in that they presented an optimistic schedule and then proceeded to implement that schedule so that the work was completed in a timely fashion. The quality of the work was never compromised and the contractor provided both the personnel and the equipment to get the project completed as is witnessed by the early addition of extra work to the contract. Another positive concerning the project was the overall weather experienced during the construction season. The summer was very hot and dry in the Buchans region and this allowed the contractor to adhere to the schedule set out without experiencing any significant delays.

The design of the project appears to have been successful as the remediation package was straight forward and easy to implement. The work is basically an earth moving project and the drawings and documents encompassed the requirements without complication and without encumbering the project with highly technical specifications that were not required. Overall the project has been a good success.