HYDROLOGIC BUDGET ANALYSIS

WHITES POINT QUARRY
LITTLE RIVER, DIGBY COUNTY, NOVA SCOTIA

Prepared For:

Bilcon of Nova Scotia

OCTOBER 2005
REF. NO. 821191B
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1.0 INTRODUCTION

Conestoga-Rovers and Associates (CRA) (formerly MGI Limited) was requested to carry out a hydrologic budget analysis on behalf of Bilcon of Nova Scotia (Bilcon), for the proposed Whites Point Quarry Project. This report summarizes the methodology used and presents the results of the analysis.

Please note that the initial analysis and Preliminary Results were submitted by MGI Limited while MGI was still 50% owned by CRA. As of October 1, 2005, MGI is 100% owned by CRA and therefore this report is presented to your office as a CRA document.

1.1 BACKGROUND

The proposed Whites Point Quarry site is located along the Digby Neck at Whites Point, near the community of Little River, Digby County, Nova Scotia. A location map is provided as Figure 1.

The project involves the construction and operation of a basalt quarry, processing facility and marine terminal. Year-round extraction and processing activities are expected to take place on 300 acres of land, with approximately 40,000 tonnes of aggregate produced for ship loading each week, totaling two million tonnes per year.

The intent is to ship washed aggregate from the site, utilizing only surface water runoff collected on site to make-up for losses in the washing process. The runoff would be collected in a series of sedimentation ponds.

1.2 STUDY OBJECTIVES

The purpose of this study was to carry out a hydrologic budget analysis of the proposed quarry site and contributing drainage basin. Study objectives were as follows:

- Assess surface water hydrology for the site, based on average historic climate records for the area;
- Estimate losses in the hydrologic budget such as evapotranspiration, and storage pond evaporation and seepage losses;
- Determine average expected moisture surplus available at the site (i.e. runoff) on a monthly basis; and,
- Estimate water storage volumes required to satisfy make-up demand during deficit periods.

2.0 METHODOLOGY

A hydrologic budget is essentially a climate-based accounting of the water gains and losses at a location or region. Temperature and precipitation records are used to develop the water budget, tabulating the additions, losses, and changes in water storage at a location. A simple water budget model was used for this analysis.

2.1 MODEL DESCRIPTION

The water budget model maintained and operated by the Meteorological Service of Canada (MSC), Environment Canada, was used for this analysis. The model is based on the Thornthwaite and Mather water balance procedure, and accounts for temperature, precipitation, snow storage and melt, evapotranspiration, and soil water holding capacity for the basin. Model input consists of mean daily temperature and precipitation data for the station and period of interest, station latitude, and site soil and vegetation cover information (used to estimate soil water holding capacity). The model generates a monthly water balance tabulation, from which total runoff is determined. Model background and additional details can be found in Johnstone and Louie (1983).

The Thornthwaite and Mather water balance procedure is commonly used for a wide variety of water resource planning applications, given its simplicity and basic data requirements. The MSC model improves on the procedure, by using daily temperature and precipitation data (as opposed to monthly), which permits better modeling of snowmelt and improves the accounting of snow storage (Johnstone and Louie, 1983). This is particularly important for applications in colder climates such as Canada. The model was considered appropriate for the level of analysis required.

2.2 HYDROLOGY

Model input consisted of daily temperature and precipitation data for the Weymouth Falls climate station, operated by the MSC (ID# 8206275), for the 35 year period from 1963 – 1997. The station is located approximately 16 km southeast of Whites Point at Weymouth Falls (44º 24'N, 65º 57'W) at an elevation of 11 m. The station was selected based on its proximity to the site and length of record. Any data gaps were filled with data from nearby stations, such as Meteghan River (ID# 8203500). Figure 2 shows the mean monthly precipitation and temperature data for the 35 year period.

Total contributing basin area was delineated for the project, based on 1:10,000 topographic mapping obtained from Service Nova Scotia and Municipal Relations, with 5 m contour interval (Map #10444450066100). The contributing area is shown superimposed on the Concept Quarry Plan (Year 1 - 5) provided by Bilcon, which utilizes the same base mapping. The plan is reproduced here as Figure 3. Total contributing area was measured at 143 ha, and includes the entire topographic basin to the north of Whites Cove Road, and west and south of the natural topographic divide above the property line. The basin rises from sea level to an elevation of approximately 100 m at the topographic divide. Note that the property area to the south of Whites Cove Road was not included in the contributing drainage area, as it was assumed that runoff from this portion of the property would not drain across the road and would not be captured for use.

2.3 SOILS/COVER INFORMATION

Basin soils information along with vegetation cover was required to estimate soil water holding capacities required for model input. Soils information was obtained from soils surveys and mapping for the Digby County area (Hilchey *et. al.*, 1962). Additional soils information was also obtained from the Canadian Soil Information System (CanSIS) website and database.

The soil for the entire basin area is the Rossway Series, which is described as a very stony, sandy loam, and well drained with medium to rapid internal drainage (Hilchey *et. al.*, 1962). Based on a site visit and communication with Bilcon, it is apparent that soil cover along the steeper portions of the basin is extremely shallow, with frequent bedrock outcrops. Existing vegetation cover is predominantly forest of spruce, maple, fir, birch and poplar. Soil water holding capacities in the range of 100 – 250 mm were used given the soil type and cover information.

2.4 LAND USE

The contributing basin area was subdivided into varying land uses at the end of 5 or 10 year intervals over the 50 year project life, as delineated in Concept Quarry Plans provided by Bilcon (included here in Appendix B). Table 1 summarizes the varying land uses and their measured areas. Time steps of 0 (existing conditions), 5, 10, 15, 20, 30, 40 and 50 (reclaimed conditions) years were assessed in the analysis. Areas with different land use and cover characteristics were assigned different soil water holding capacities, giving slightly different model surplus water tabulations. Note that quarry areas, roads and other areas without soil were assigned a minimal water holding capacity of 25 mm.

2.5 MODELING AND ANALYSIS

Detailed monthly water budget output was obtained from the MSC water budget model for the Weymouth Falls climate data and various soil water holding capacities. Summary model output data is included in Appendix A.

2.5.1 RUNOFF

Monthly runoff amounts for each land use area with a different soil water holding capacity were calculated, based on surplus water determined from the model results. Surplus water is defined as the excess moisture available after the evapotranspiration demands of the surface have been met and soil water storage has been returned to the water holding capacity level. Individual runoff amounts were then summed for the entire basin area. Following the convention of the Thornthwaite and Mather method, it is assumed that 50% of the surplus water for any given month is detained in the watershed and contributes to runoff the following month.

2.5.2 POND AREAS

For sedimentation pond areas, the total direct monthly input was calculated as the sum of rainfall and snow melt over the ponds, as determined from the model. Evaporation losses for the ponds were estimated using lake evaporation data for the Kentville CDA climate station (ID#8202800), which is the closest MSC station for which lake evaporation data exists. The station is located approximately 150 km northeast of Whites Point, near Kentville, NS (45º 4'N, 64º 28'W). The data is based on 1971 – 2000 climate normals.

Pond seepage losses were estimated using Darcy's Law. The ponds will be excavated along the western edge of the property, in an area characterized by beach gravels and silt. Hydraulic gradient and conductivity values were estimated representative of pond location. Seepage estimates were kept constant for the analysis, however it is likely that seepage rates would decline over time as fines settle in the ponds and seal larger voids.

2.5.3 WATER DEMAND

Based on information obtained from Bilcon, process demand for aggregate washing operations is estimated to be approximately 5000 igpm (0.38 m^3/s) for 16 hours per day, 264 days per year (i.e. 44 weeks x 6 days/week). It is assumed that 5 percent will be lost in the recycle process, or roughly 24,000 m^3/month. This constitutes the plant make-up demand.

3.0 RESULTS

It is assumed that all runoff from the contributing drainage area (Figure 3) can be directed to the sedimentation ponds for collection and storage. This water plus the water collected directly by the ponds (i.e. rain plus melt above the ponds) constitutes the total available water for the basin.

Table 2 presents a summary of the results for the analysis, employing the information and assumptions discussed. The table presents the average *net* monthly water surplus volume once all losses and process demand have been accounted for. Values were calculated for basin conditions existing at the end of each time step, as outlined in Table 1. A negative value indicates a water deficit for that month, so that storage would be required to meet demand. The sum of consecutive deficit months indicates the total storage requirements for the time step, based on average climatic conditions. The results indicate that a net surplus of water exists for all months except August and September. The minimum storage requirements to satisfy demand during these months ranges from approximately 20,000 to 22,000 m^3.

Detailed results for each time step considered are presented in Tables 3 through 10. The tables show monthly runoff volumes for the quarry and watershed areas and net water volumes collected directly by the ponds. Pond evaporation and seepage loss estimates are also shown.

Figures 4 through 11 show the distribution of surplus water from month to month and also present a simple mass diagram (Rippl plot) for each time step which indicates the cumulative supply and demand over the year and required storage during deficit periods. The mass diagram indicates excess supply when the slope of the supply curve is equal to or greater than the slope of the demand curve. Demand exceeds supply when the slope of the supply curve is less than that of the demand curve. Storage is determined by the maximum distance between the line parallel to the demand curve (drawn tangent to the supply curve) and the supply curve. The Rippl plot represents a visual indication of storage requirements, and storage values indicated in the figures correspond to those presented in Table 2 (i.e. 20,000 to 22,000 m^3).

4.0 CONCLUSIONS

The results of the analysis indicate that little variation in the hydrologic budget exists for the various quarry phases, based on average climate data and given the abundant precipitation and size of contributing basin.

Based on the above analysis it is evident that generally a net surplus of water is available, with the exception of the months of August and September, for each time step. For these months, storage of approximately 22,000 m^3 would be required to satisfy demand.

As indicated earlier, the results represent average expected conditions, based on historical data for the Weymouth Falls climate station. It is recognized that actual water supply during the year and from year to year will fluctuate, so that sufficient supply may not always exist, depending on the size of storage facilities incorporated into the final site design.

5.0 REFERENCES

Canadian Soil Information System (CanSIS) - http://sis.agr.gc.ca/cansis/

Hilchey, J.D, Cann, D.B. and MacDougall, J.I. 1962. Soil Survey of Digby County Nova Scotia. Report No. 11, Nova Scotia Soil Survey, Truro Nova Scotia.

Johnstone, K. and Louie, P.Y.T. 1983. Water Balance Tabulations for Canadian Climate Stations. Hydrometeorology Division, Canadian Climate Centre, Atmospheric Environment Service.

Thornthwaite, C.W. and J. R. Mather. 1955: The Water Balance. Publications in Climatology, Vol. 8, No. 1, Drexel Institute of Technology, Centerton, New Jersey.

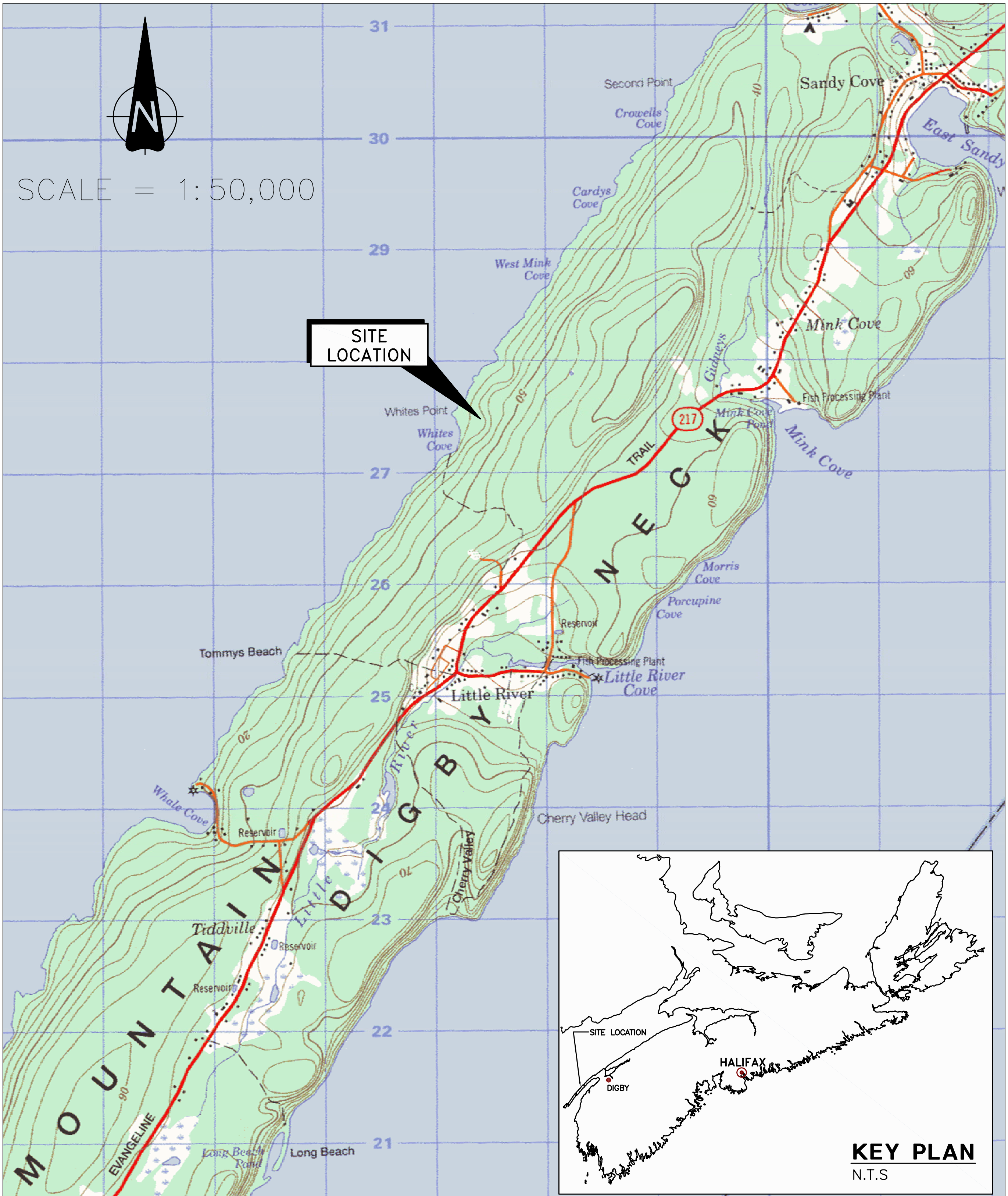
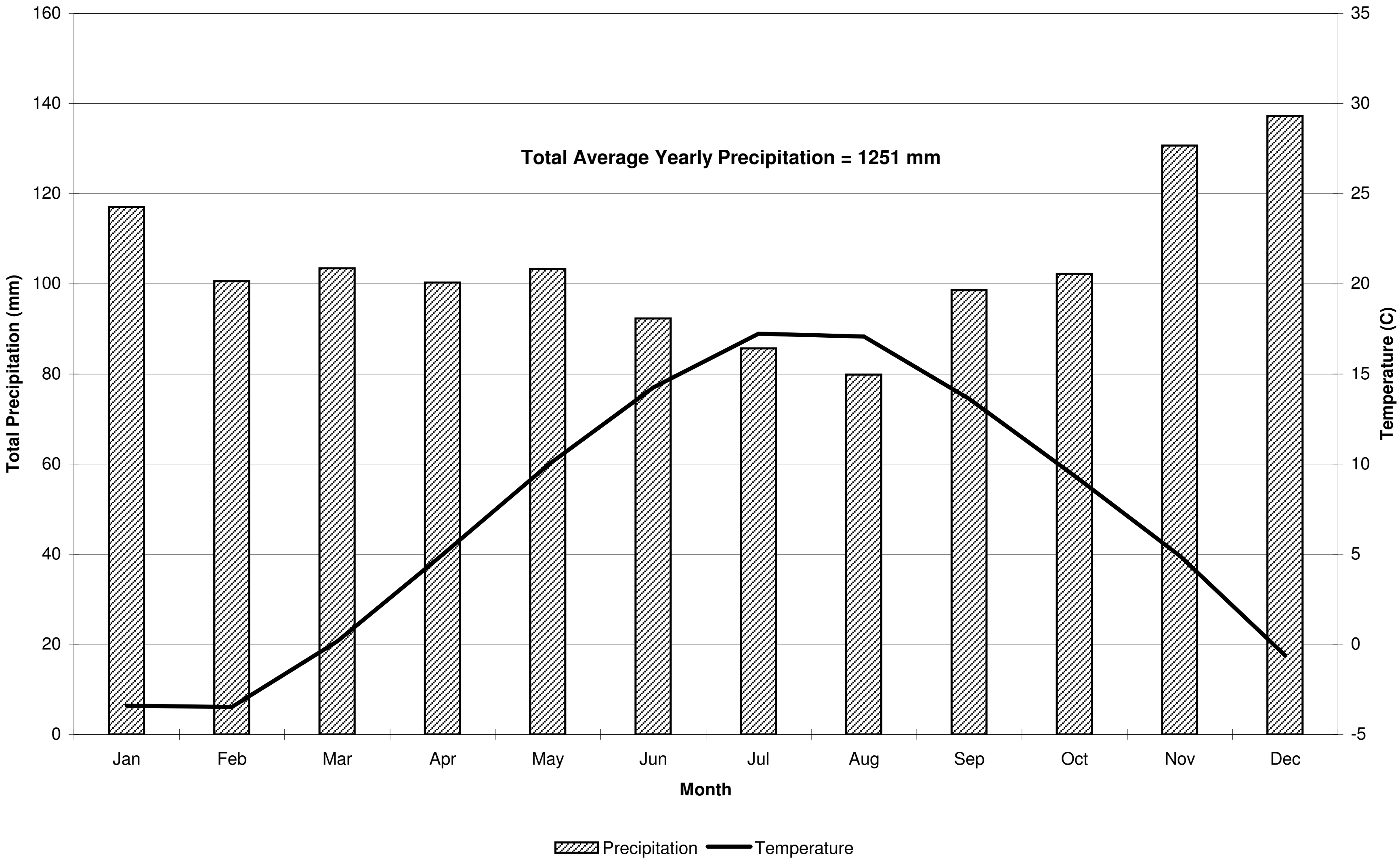


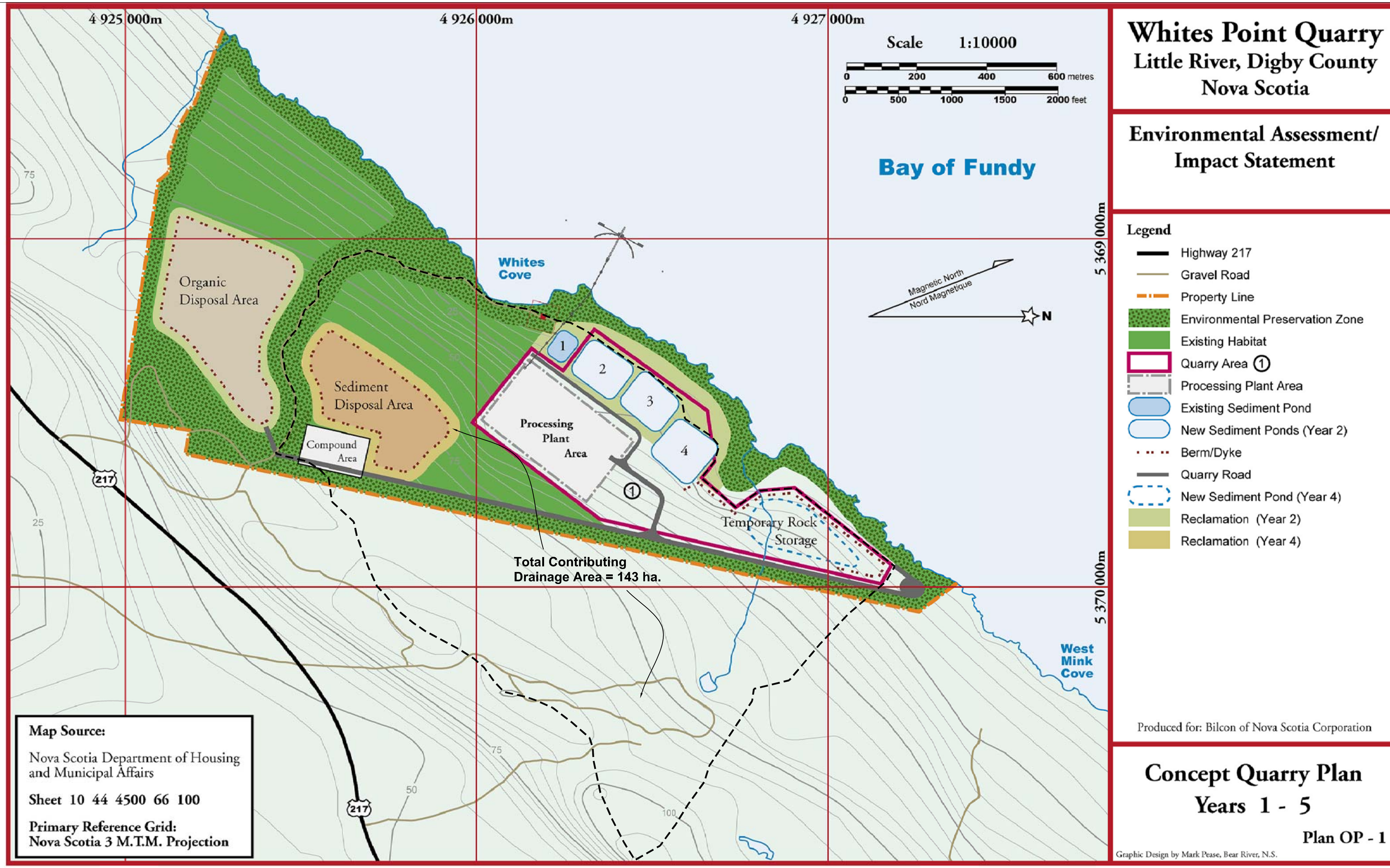
figure 1

Site Location Map
Whites Point Quarry Hydrologic Budget Analysis
Whites Point, Nova Scotia
821191B

October 2005

Figure 2
Whites Point Quarry Hydrologic Budget
Average Precipitation & Temperature
Weymouth Falls, NS





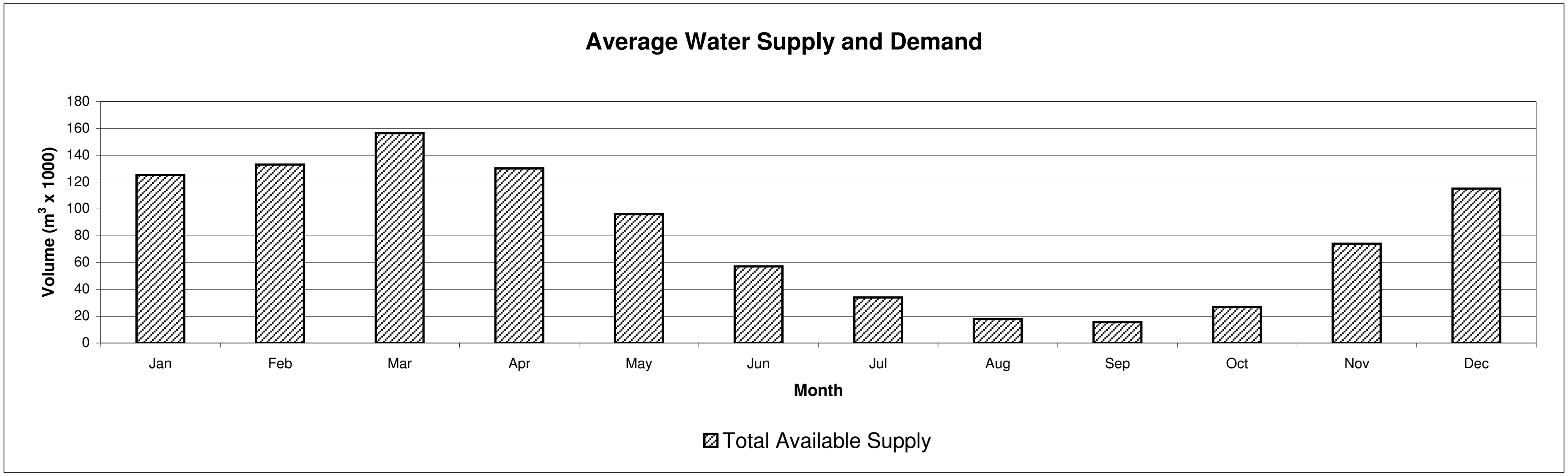
NOTE: Original drawing provided by Bilcon NS.

figure 3

Contributing Drainage Area
Whites Point Quarry Hydrologic Budget Analysis
Whites Point, Nova Scotia
821191B

October 2005

Figure 4
Whites Point Quarry Hydrologic Budget
Conceptual Layout - Year 0 (Existing)



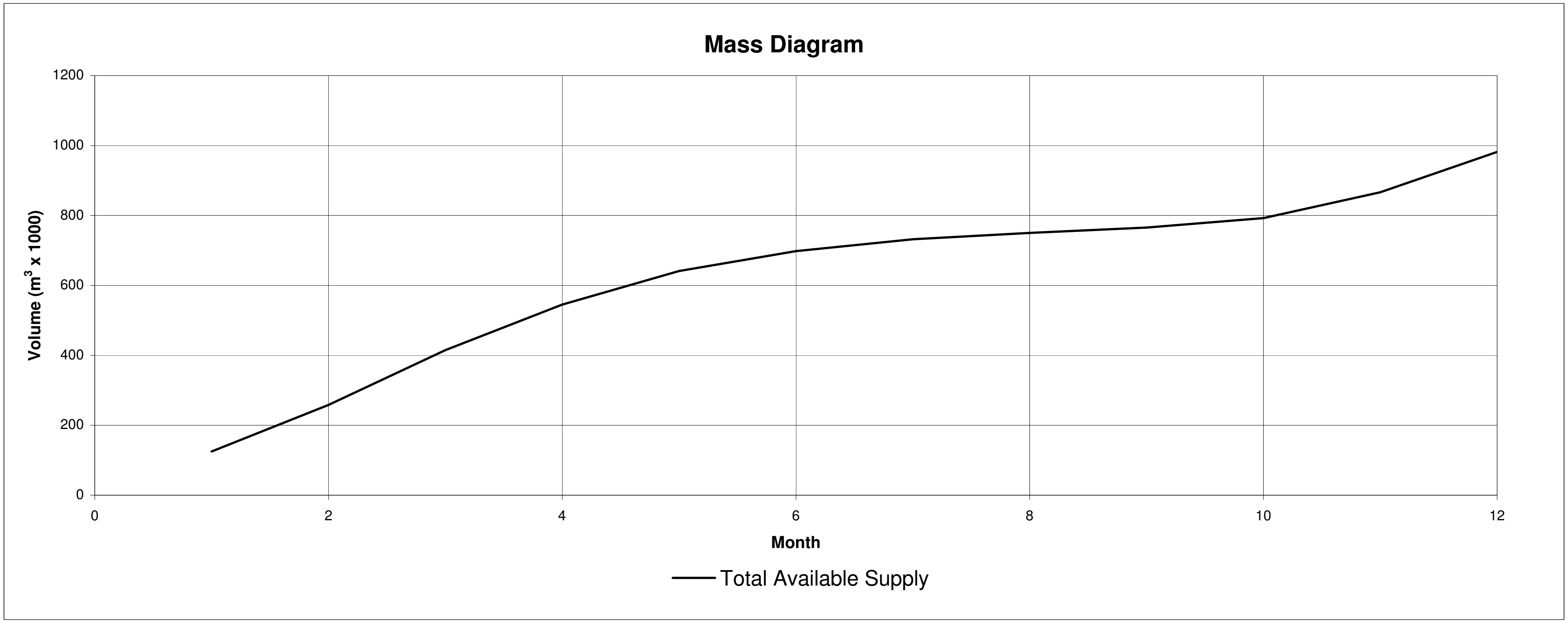
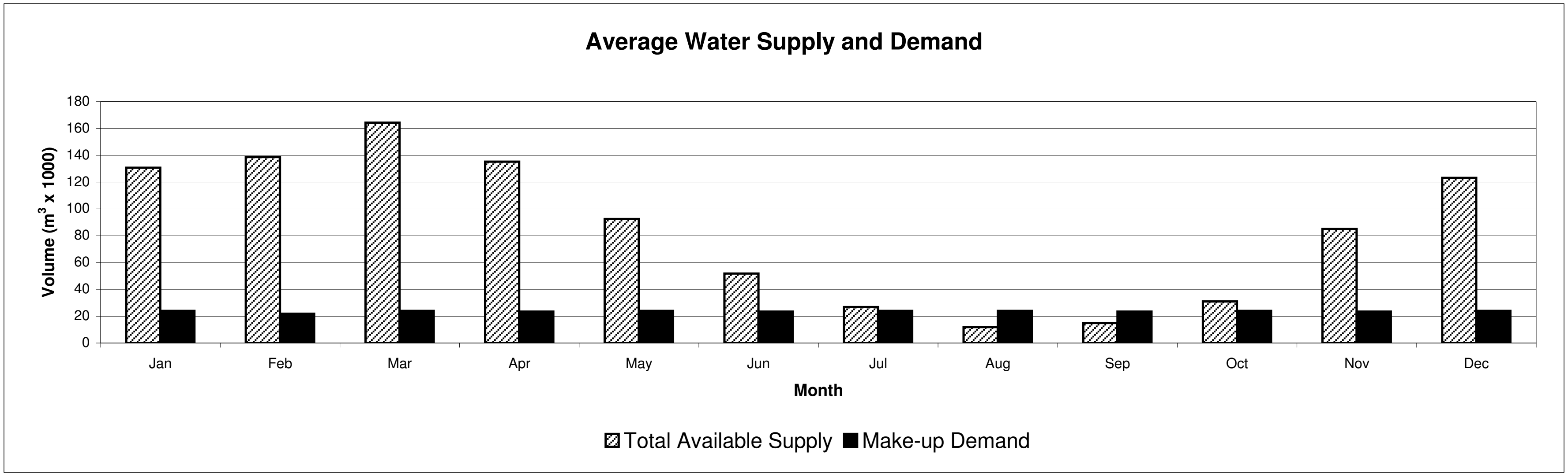


Figure 5
Whites Point Quarry Hydrologic Budget
Conceptual Layout - Year 5



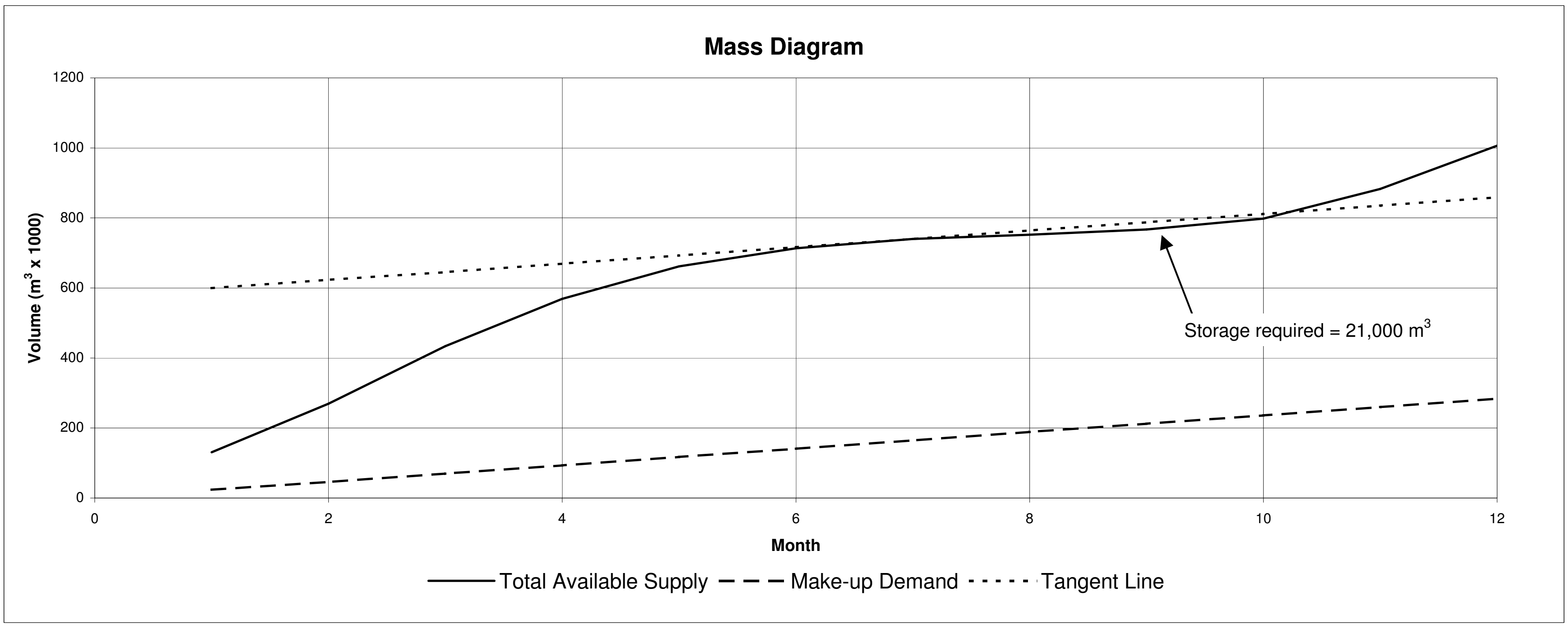
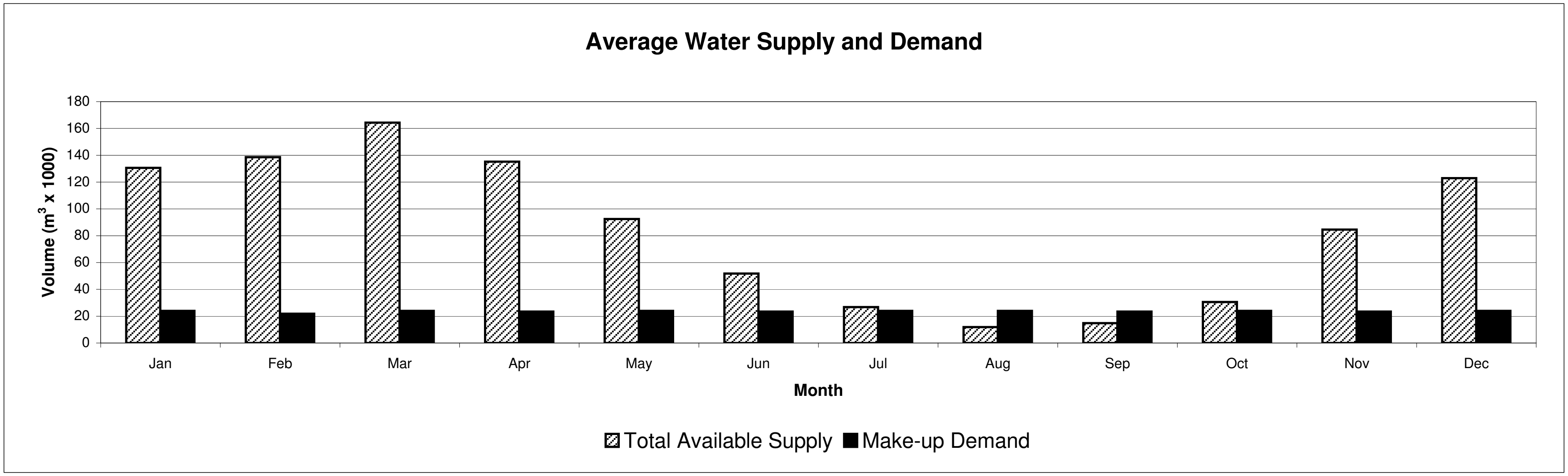


Figure 6
Whites Point Quarry Hydrologic Budget
Conceptual Layout - Year 10



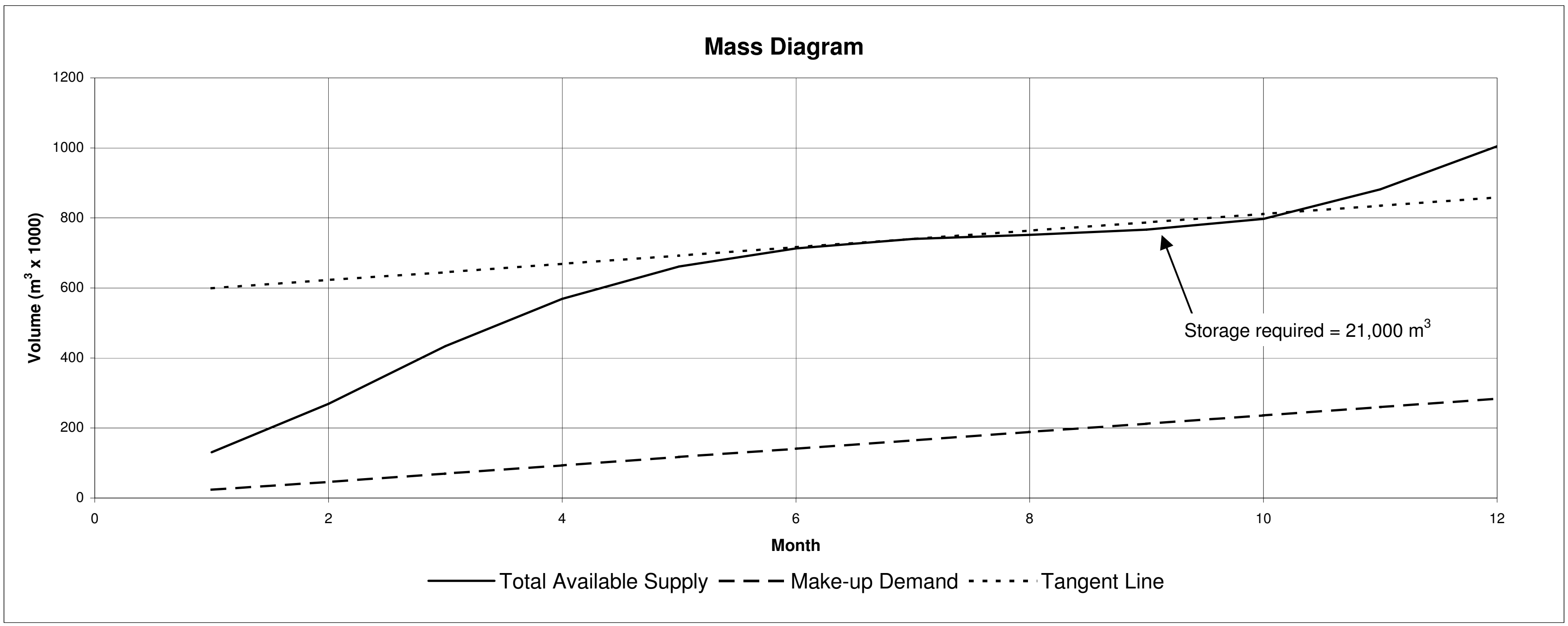
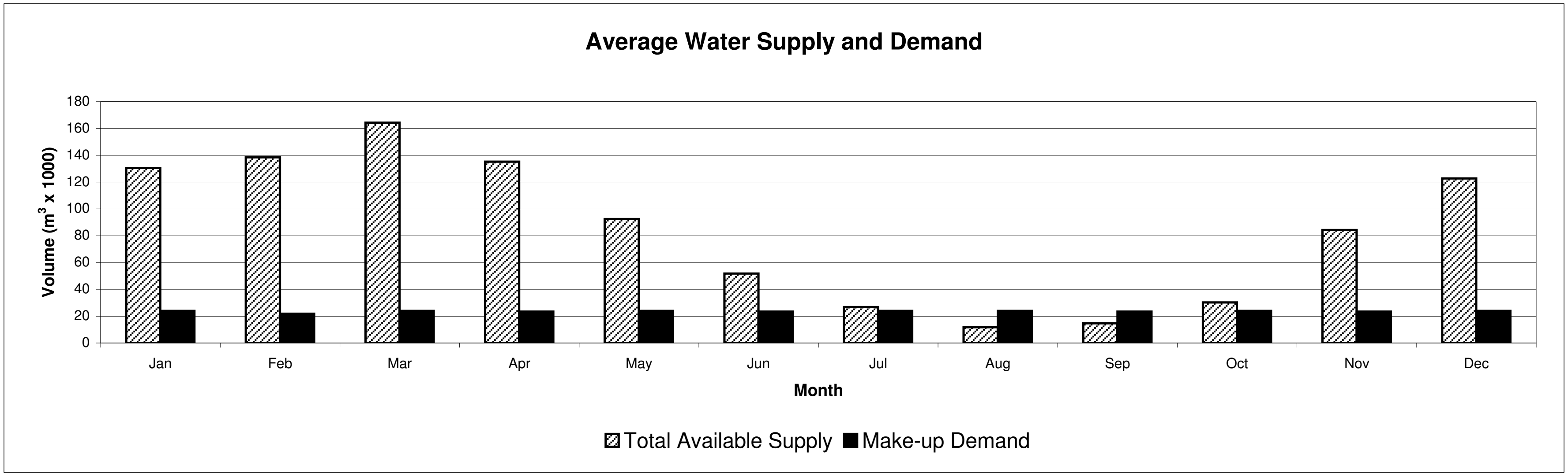


Figure 7
Whites Point Quarry Hydrologic Budget
Conceptual Layout - Year 15



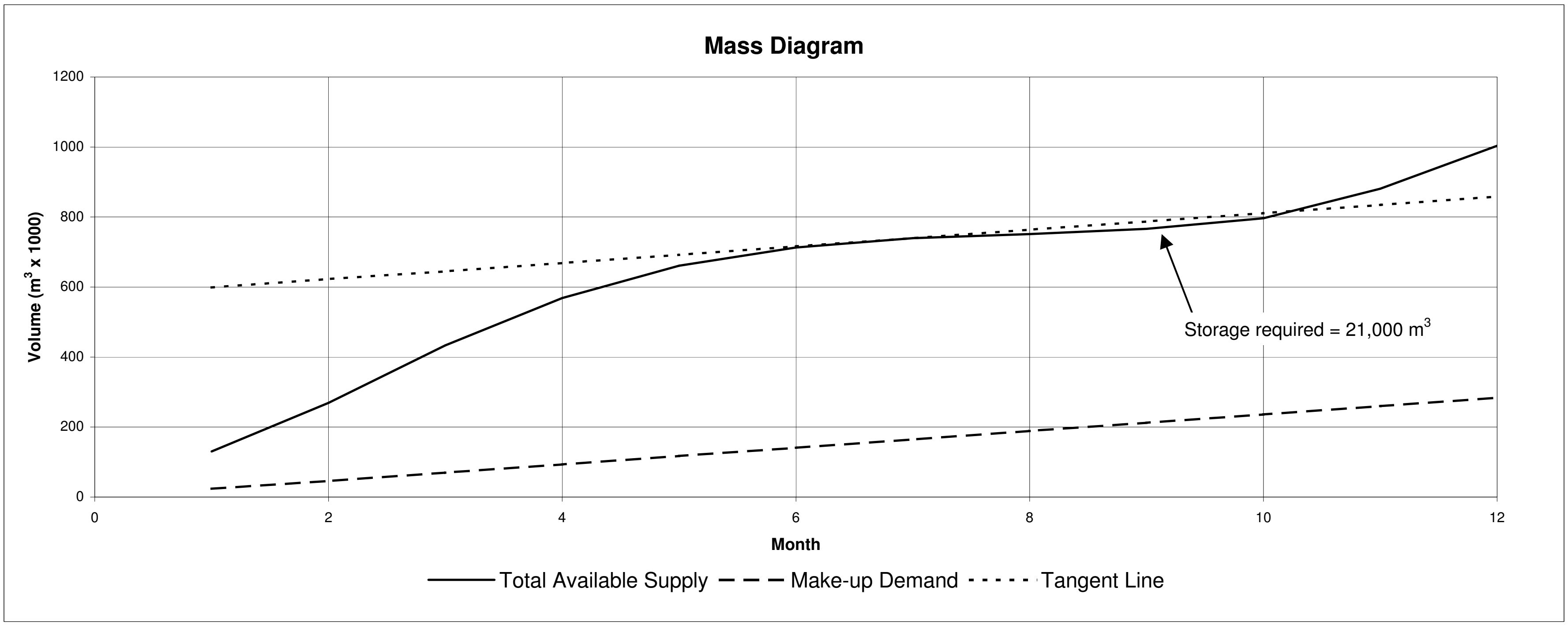
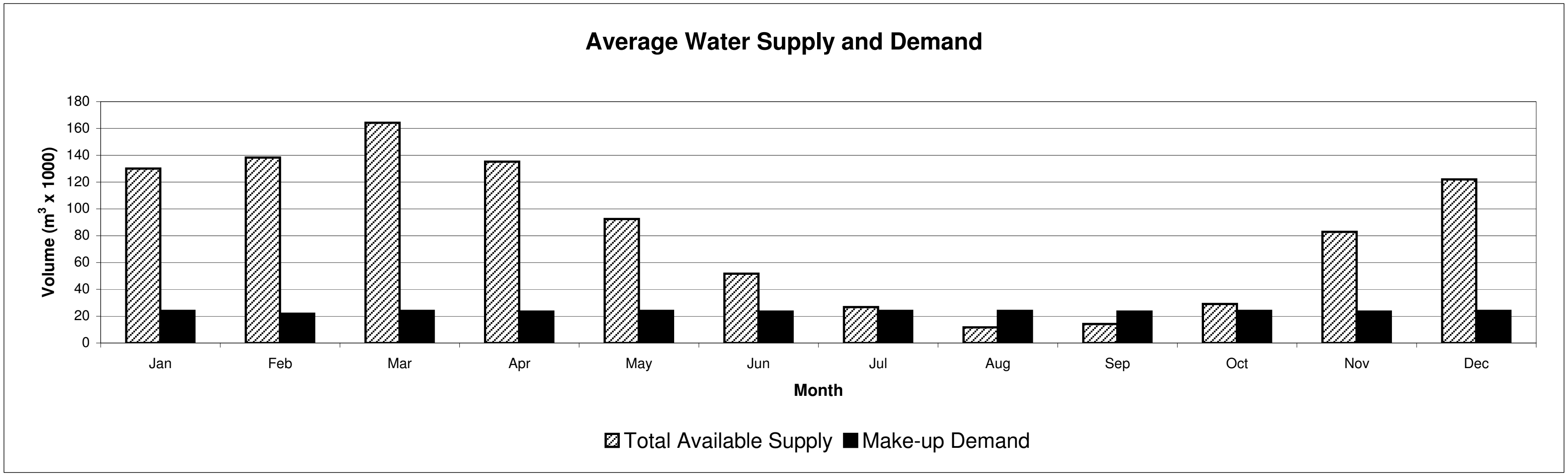


Figure 8
Whites Point Quarry Hydrologic Budget
Conceptual Layout - Year 20



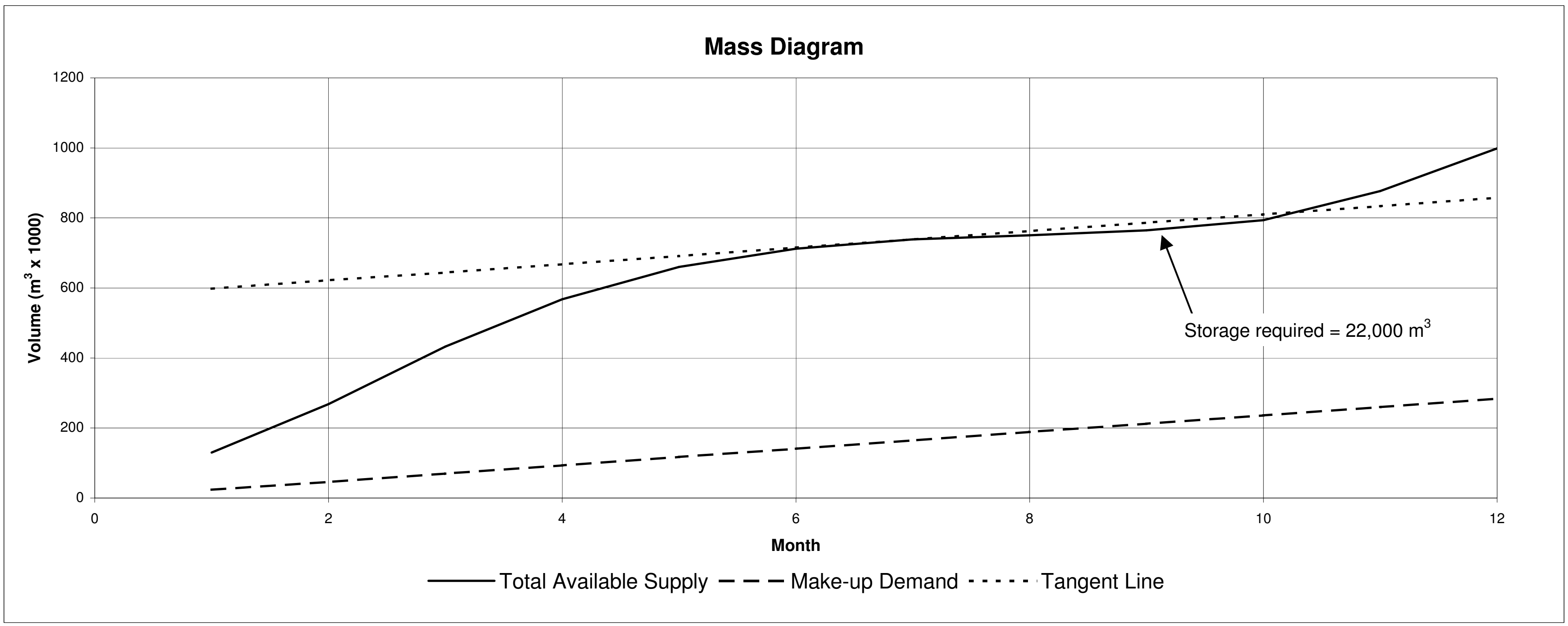
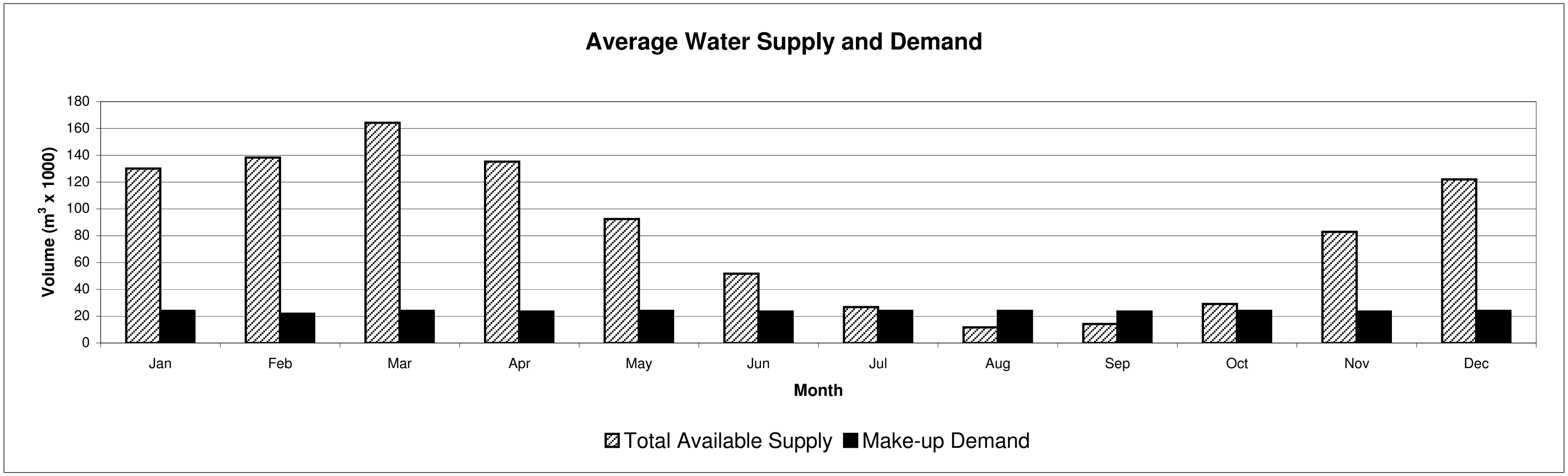


Figure 9
Whites Point Quarry Hydrologic Budget
Conceptual Layout - Year 30



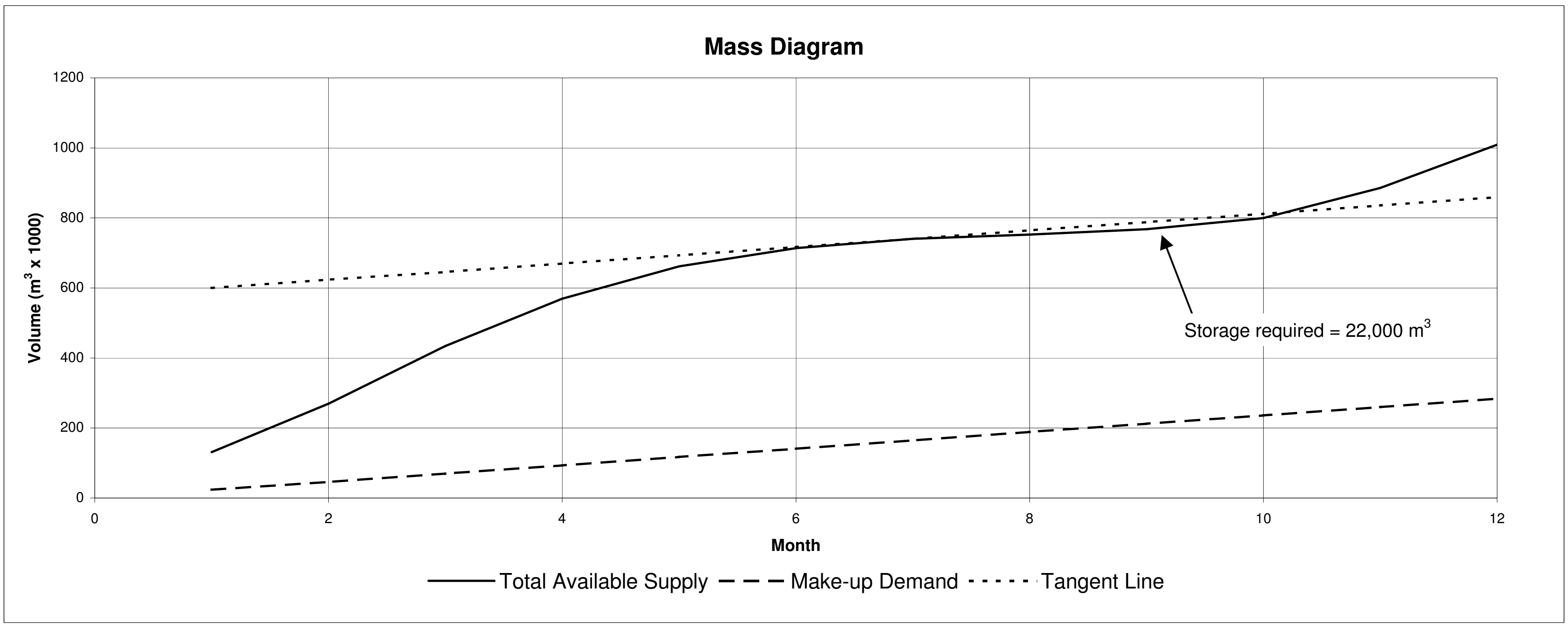
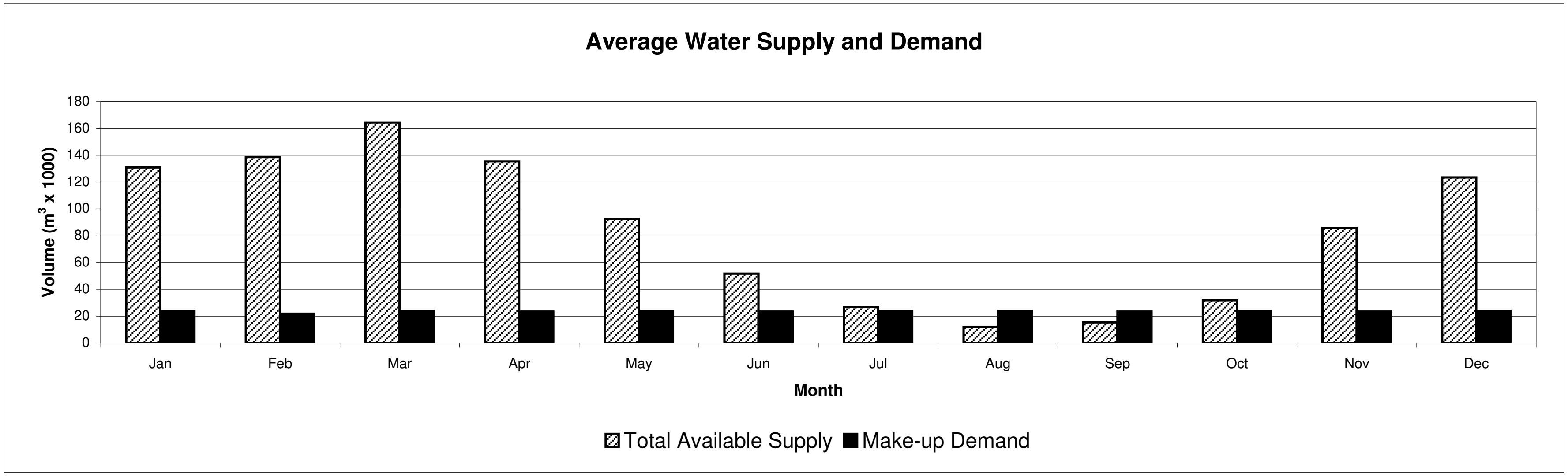


Figure 10
Whites Point Quarry Hydrologic Budget
Conceptual Layout - Year 40



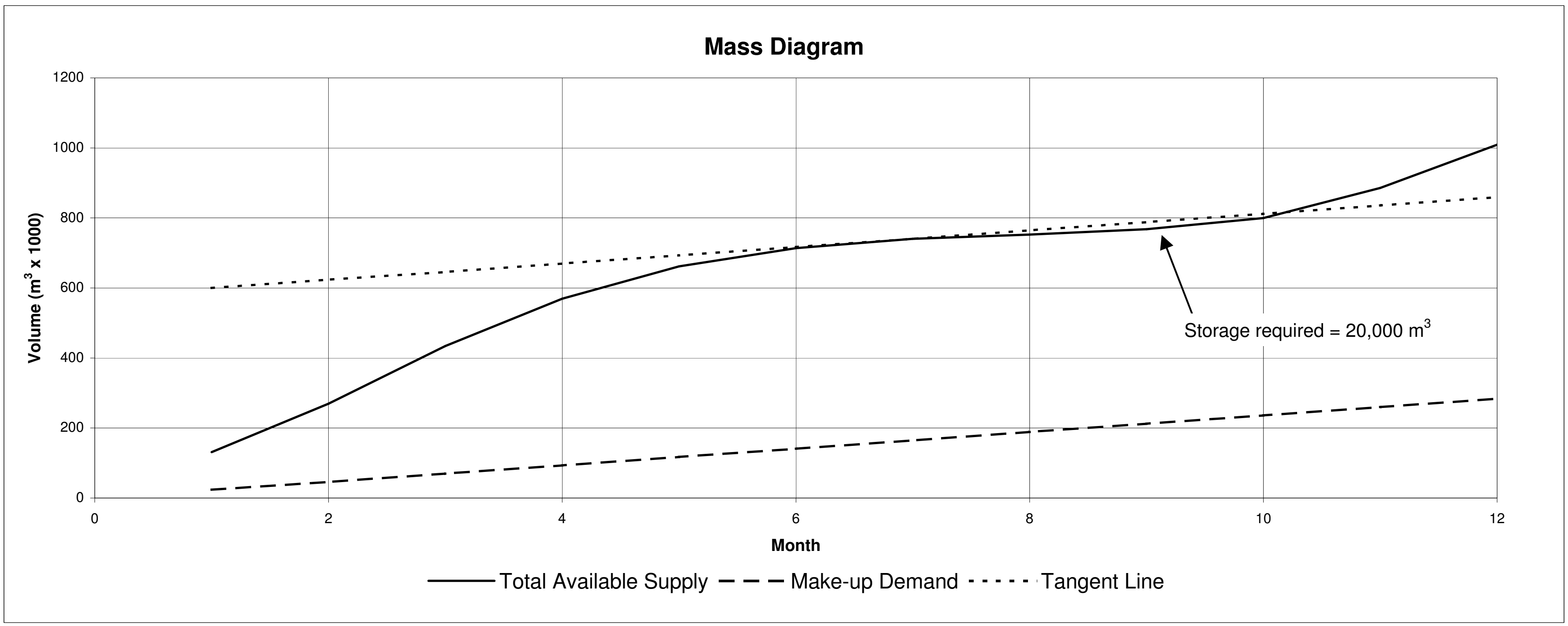
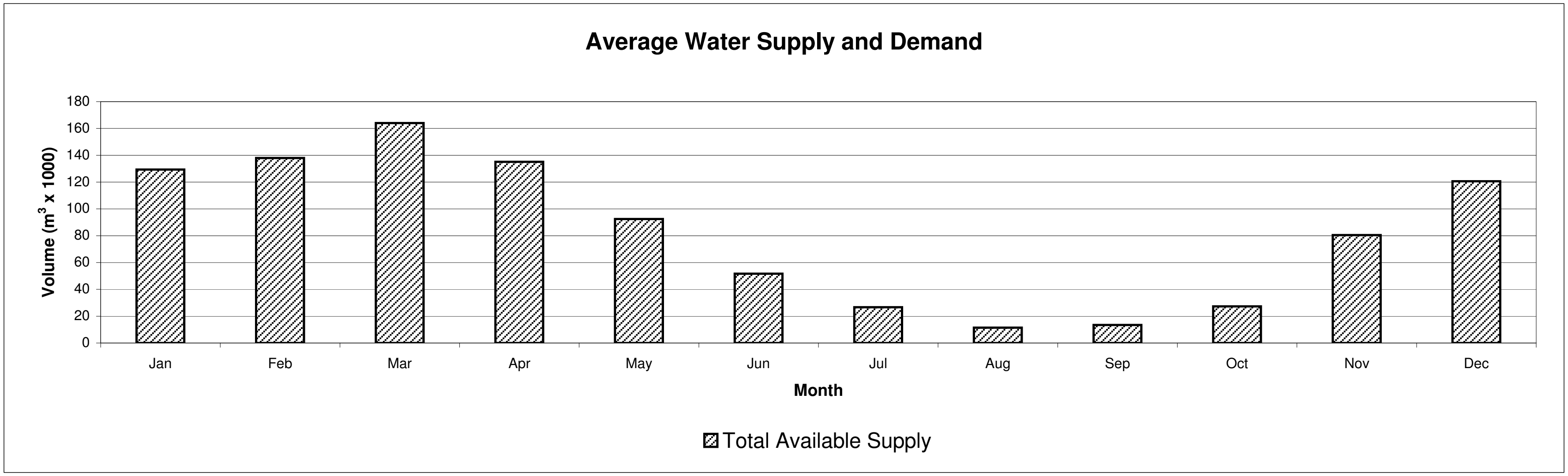


Figure 11
Whites Point Quarry Hydrologic Budget
Conceptual Layout - Year 50 (Reclaimed)



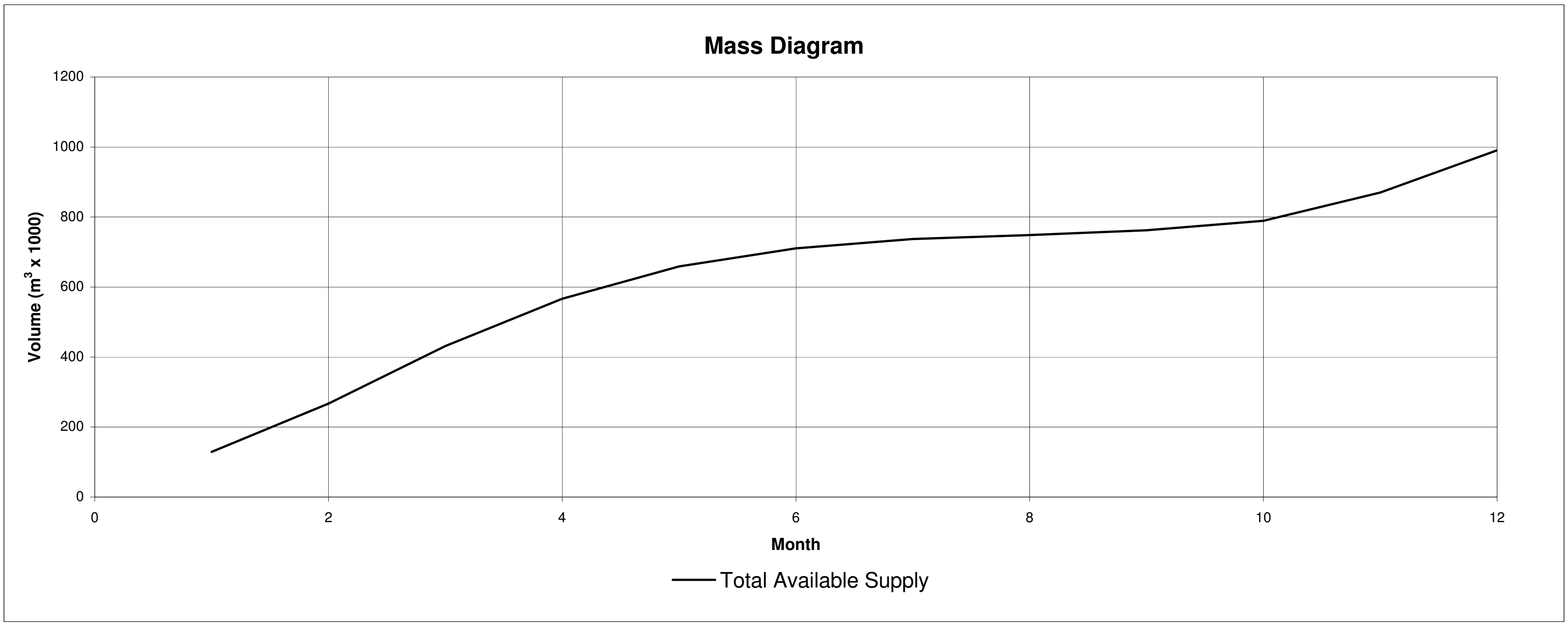


Table 1
Whites Point Quarry Hydrologic Budget
Land Use / Area Summary

Area No.	Description	Land Use	WHC[1] (mm)	Area (ha) by Year 0	5	10	15	20	30	40	50
1	Environmental Preservation Zone	Property buffer strip (cleared or forest)	250	0.0	11.7	11.7	11.7	11.7	11.7	11.7	11.7
2	Existing/Reclaimed Habitat	Existing use or future reclaimed areas	150	63.9	23.3	25.4	27.2	33.8	33.8	27.2	53.2
3	Existing Grubbed Area	Bare bedrock	25	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	Quarry Areas	Active quarrying	25	0.0	12.5	8.8	7.0	0.0[2]	0.0[2]	16.5	0.0
5	Processing Plant	Plant facilitities, aggregate piles, etc.	25	0.0	7.9	9.5	9.5	9.5	9.5	9.5	0.0
6	Sediment Ponds	Storage of runoff	-	0.8	9.6	9.6	9.6	9.6	9.6	9.6	9.6
7	Compound Area	Offices, power, fuel tanks, etc.	25	0.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5
8	Roads	Roads	25	0.0	2.7	2.7	2.7	3.1	3.1	3.2	3.2
9	Sediment Disposal Area	Sediment from thickener tank	100	0.0	10.0	10.0	10.0	10.0	10.0	0.0	0.0
10	Clearcut Area	Cleared forest	75	11.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	Remainder of Drainage Area East of Property	Forest	250	64.2	64.2	64.2	64.2	64.2	64.2	64.2	64.2
			Total Land	**142.6**	**133.8**	**133.8**	**133.8**	**133.8**	**133.8**	**133.8**	**133.8**
			Total Pond	**0.8**	**9.6**	**9.6**	**9.6**	**9.6**	**9.6**	**9.6**	**9.6**
			Total	**143.4**	**143.4**	**143.4**	**143.4**	**143.4**	**143.4**	**143.4**	**143.4**

Notes: 1) Water holding capacity assigned based on soil type/landuse/cover.
2) Active quarrying outside of contibuting basin area during these time steps.

Table 2
Whites Point Quarry Hydrologic Budget
Summary Results

Month	Net Water Surplus[1] (m^3 x 1000)							
	Year 0	**Year 5**	**Year 10**	**Year 15**	**Year 20**	**Year 30**	**Year 40**	**Year 50**
Jan	125	107	107	107	106	106	107	129
Feb	133	117	117	117	117	117	117	138
Mar	156	140	140	140	140	140	140	164
Apr	130	112	112	112	112	112	112	135
May	96	69	69	69	68	68	69	92
Jun	57	28	28	28	28	28	28	52
Jul	34	3	3	3	3	3	3	27
Aug	18	*-12*	*-12*	*-12*	*-12*	*-12*	*-12*	11
Sep	16	*-9*	*-9*	*-9*	*-9*	*-9*	*-8*	13
Oct	27	7	7	6	5	5	8	27
Nov	74	62	61	61	59	59	62	80
Dec	115	99	99	99	98	98	99	121
Total	**982**	**722**	**721**	**720**	**715**	**715**	**725**	**990**
Storage Required (m^3 x 1000)	**N/A**	**21**	**21**	**21**	**22**	**22**	**20**	**N/A**

Notes: 1) Represents available surplus water after all losses have been considered and demand satisfied. Negative values represent a water deficit.

Table 3
Whites Point Quarry Hydrologic Budget
Detailed Summary Table
Quarry Conceptual Layout - Year 0 (Existing)

Month	Quarry and Watershed Areas			Pond Areas					Total Available	Make-up	Net Surplus
	Water Surplus[1] (mm)	Surface Runoff[2] (mm)	Runoff Volume (m^3 x 1000)	Input[3] (mm)	Evaporation (mm)	Seepage Loss (mm)	Net Input (mm)	Volume (m^3 x 1000)	Water Supply (m^3 x 1000)	Demand[4] (m^3 x 1000)	(m^3 x 1000)
Jan	95	88	125	100	0	48	52	0.4	125	n/a	125
Feb	98	93	133	102	0	43	59	0.5	133	n/a	133
Mar	125	109	156	135	0	48	88	0.7	156	n/a	156
Apr	73	91	130	103	0	46	56	0.5	130	n/a	130
May	44	68	96	103	96	48	-40	-0.3	96	n/a	96
Jun	13	40	58	92	108	46	-62	-0.5	57	n/a	57
Jul	8	24	35	86	121	48	-83	-0.7	34	n/a	34
Aug	2	13	18	80	105	48	-73	-0.6	18	n/a	18
Sep	9	11	16	99	75	46	-23	-0.2	16	n/a	16
Oct	27	19	27	102	47	48	8	0.1	27	n/a	27
Nov	84	52	73	130	0	46	84	0.7	74	n/a	74
Dec	109	80	115	119	0	48	71	0.6	115	n/a	115
Total	**688**	**688**	**980**	**1250**	**552**	**561**	**137**	**1**	**982**	**n/a**	**982**

Storage Required: N/A

Notes: 1) Sum of water surpluses from varying land-use areas within contibuting drainage area.
2) Runoff calculated as 50% of surplus for current month plus 50% of runoff from previous month.
3) Pond input is the sum of rainfall and snowmelt over pond areas.
4) Based on 5% process loss and 16 hr/day operation, 264 days/yr.

Table 4
Whites Point Quarry Hydrologic Budget
Detailed Summary Table
Quarry Conceptual Layout - Year 5

Month	Quarry and Watershed Areas			Pond Areas					Total Available	Make-up	Net Surplus
	Water Surplus[1] (mm)	Surface Runoff[2] (mm)	Runoff Volume (m^3 x 1000)	Input[3] (mm)	Evaporation (mm)	Seepage Loss (mm)	Net Input (mm)	Volume (m^3 x 1000)	Water Supply (m^3 x 1000)	Demand[4] (m^3 x 1000)	(m^3 x 1000)
Jan	95	88	126	100	0	48	52	5.0	131	24	107
Feb	98	93	133	102	0	43	59	5.6	139	22	117
Mar	125	109	156	135	0	48	88	8.4	164	24	140
Apr	73	91	130	103	0	46	56	5.4	135	23	112
May	44	68	96	103	96	48	-40	-3.9	93	24	69
Jun	13	40	58	92	108	46	-62	-5.9	52	23	28
Jul	8	24	35	86	121	48	-83	-8.0	27	24	3
Aug	2	13	19	80	105	48	-73	-7.0	12	24	-12
Sep	11	12	17	99	75	46	-23	-2.2	15	23	-9
Oct	30	21	30	102	47	48	8	0.8	31	24	7
Nov	87	54	77	130	0	46	84	8.0	85	23	62
Dec	109	82	116	119	0	48	71	6.8	123	24	99
Total	**697**	**697**	**993**	**1250**	**552**	**561**	**137**	**13**	**1006**	**284**	**722**

Storage Required: 21

Notes: 1) Sum of water surpluses from varying land-use areas within contibuting drainage area.
2) Runoff calculated as 50% of surplus for current month plus 50% of runoff from previous month.
3) Pond input is the sum of rainfall and snowmelt over pond areas.
4) Based on 5% process loss and 16 hr/day operation, 264 days/yr.

Table 5
Whites Point Quarry Hydrologic Budget
Detailed Summary Table
Quarry Conceptual Layout - Year 10

Month	Quarry and Watershed Areas			Pond Areas					Total Available Water Supply (m^3 x 1000)	Make-up Demand[4] (m^3 x 1000)	Net Surplus (m^3 x 1000)
	Water Surplus[1] (mm)	Surface Runoff[2] (mm)	Runoff Volume (m^3 x 1000)	Input[3] (mm)	Evaporation (mm)	Seepage Loss (mm)	Net Input (mm)	Volume (m^3 x 1000)			
Jan	95	88	126	100	0	48	52	5.0	131	24	107
Feb	98	93	133	102	0	43	59	5.6	139	22	117
Mar	125	109	156	135	0	48	88	8.4	164	24	140
Apr	73	91	130	103	0	46	56	5.4	135	23	112
May	44	68	96	103	96	48	-40	-3.9	93	24	69
Jun	13	40	58	92	108	46	-62	-5.9	52	23	28
Jul	8	24	35	86	121	48	-83	-8.0	27	24	3
Aug	2	13	19	80	105	48	-73	-7.0	12	24	-12
Sep	11	12	17	99	75	46	-23	-2.2	15	23	-9
Oct	30	21	30	102	47	48	8	0.8	31	24	7
Nov	86	54	77	130	0	46	84	8.0	85	23	61
Dec	109	81	116	119	0	48	71	6.8	123	24	99
Total	**696**	**696**	**992**	**1250**	**552**	**561**	**137**	**13**	**1005**	**284**	**721**
										Storage Required:	**21**

Notes: 1) Sum of water surpluses from varying land-use areas within contibuting drainage area.
2) Runoff calculated as 50% of surplus for current month plus 50% of runoff from previous month.
3) Pond input is the sum of rainfall and snowmelt over pond areas.
4) Based on 5% process loss and 16 hr/day operation, 264 days/yr.

Table 6
Whites Point Quarry Hydrologic Budget
Detailed Summary Table
Quarry Conceptual Layout - Year 15

Month	Quarry and Watershed Areas			Pond Areas					Total Available Water Supply (m^3 x 1000)	Make-up Demand[4] (m^3 x 1000)	Net Surplus (m^3 x 1000)
	Water Surplus[1] (mm)	Surface Runoff[2] (mm)	Runoff Volume (m^3 x 1000)	Input[3] (mm)	Evaporation (mm)	Seepage Loss (mm)	Net Input (mm)	Volume (m^3 x 1000)			
Jan	95	88	125	100	0	48	52	5.0	131	24	107
Feb	98	93	133	102	0	43	59	5.6	139	22	117
Mar	125	109	156	135	0	48	88	8.4	164	24	140
Apr	73	91	130	103	0	46	56	5.4	135	23	112
May	44	68	96	103	96	48	-40	-3.9	93	24	69
Jun	13	40	58	92	108	46	-62	-5.9	52	23	28
Jul	8	24	35	86	121	48	-83	-8.0	27	24	3
Aug	2	13	19	80	105	48	-73	-7.0	12	24	-12
Sep	10	12	17	99	75	46	-23	-2.2	15	23	-9
Oct	30	21	30	102	47	48	8	0.8	30	24	6
Nov	86	53	76	130	0	46	84	8.0	84	23	61
Dec	109	81	116	119	0	48	71	6.8	123	24	99
Total	**695**	**695**	**990**	**1250**	**552**	**561**	**137**	**13**	**1003**	**284**	**720**
										Storage Required:	**21**

Notes: 1) Sum of water surpluses from varying land-use areas within contibuting drainage area.
2) Runoff calculated as 50% of surplus for current month plus 50% of runoff from previous month.
3) Pond input is the sum of rainfall and snowmelt over pond areas.
4) Based on 5% process loss and 16 hr/day operation, 264 days/yr.

Table 7
Whites Point Quarry Hydrologic Budget
Detailed Summary Table
Quarry Conceptual Layout - Year 20

Month	Quarry and Watershed Areas: Water Surplus[1] (mm)	Surface Runoff[2] (mm)	Runoff Volume (m^3 x 1000)	Pond Areas: Input[3] (mm)	Evaporation (mm)	Seepage Loss (mm)	Net Input (mm)	Volume (m^3 x 1000)	Total Available Water Supply (m^3 x 1000)	Make-up Demand[4] (m^3 x 1000)	Net Surplus (m^3 x 1000)
Jan	95	88	125	100	0	48	52	5.0	130	24	106
Feb	98	93	133	102	0	43	59	5.6	138	22	117
Mar	125	109	156	135	0	48	88	8.4	164	24	140
Apr	73	91	130	103	0	46	56	5.4	135	23	112
May	44	68	96	103	96	48	-40	-3.9	92	24	68
Jun	13	40	58	92	108	46	-62	-5.9	52	23	28
Jul	8	24	35	86	121	48	-83	-8.0	27	24	3
Aug	2	13	19	80	105	48	-73	-7.0	12	24	-12
Sep	10	11	16	99	75	46	-23	-2.2	14	23	-9
Oct	28	20	28	102	47	48	8	0.8	29	24	5
Nov	85	53	75	130	0	46	84	8.0	83	23	59
Dec	109	81	115	119	0	48	71	6.8	122	24	98
Total	**691**	**691**	**986**	**1250**	**552**	**561**	**137**	**13**	**999**	**284**	**715**

Storage Required: 22

Notes: 1) Sum of water surpluses from varying land-use areas within contibuting drainage area.
2) Runoff calculated as 50% of surplus for current month plus 50% of runoff from previous month.
3) Pond input is the sum of rainfall and snowmelt over pond areas.
4) Based on 5% process loss and 16 hr/day operation, 264 days/yr.

Table 8
Whites Point Quarry Hydrologic Budget
Detailed Summary Table
Quarry Conceptual Layout - Year 30

Month	Quarry and Watershed Areas: Water Surplus[1] (mm)	Surface Runoff[2] (mm)	Runoff Volume (m^3 x 1000)	Pond Areas: Input[3] (mm)	Evaporation (mm)	Seepage Loss (mm)	Net Input (mm)	Volume (m^3 x 1000)	Total Available Water Supply (m^3 x 1000)	Make-up Demand[4] (m^3 x 1000)	Net Surplus (m^3 x 1000)
Jan	95	88	125	100	0	48	52	5.0	130	24	106
Feb	98	93	133	102	0	43	59	5.6	138	22	117
Mar	125	109	156	135	0	48	88	8.4	164	24	140
Apr	73	91	130	103	0	46	56	5.4	135	23	112
May	44	68	96	103	96	48	-40	-3.9	92	24	68
Jun	13	40	58	92	108	46	-62	-5.9	52	23	28
Jul	8	24	35	86	121	48	-83	-8.0	27	24	3
Aug	2	13	19	80	105	48	-73	-7.0	12	24	-12
Sep	10	11	16	99	75	46	-23	-2.2	14	23	-9
Oct	28	20	28	102	47	48	8	0.8	29	24	5
Nov	85	53	75	130	0	46	84	8.0	83	23	59
Dec	109	81	115	119	0	48	71	6.8	122	24	98
Total	**691**	**691**	**986**	**1250**	**552**	**561**	**137**	**13**	**999**	**284**	**715**

Storage Required: 22

Notes: 1) Sum of water surpluses from varying land-use areas within contibuting drainage area.
2) Runoff calculated as 50% of surplus for current month plus 50% of runoff from previous month.
3) Pond input is the sum of rainfall and snowmelt over pond areas.
4) Based on 5% process loss and 16 hr/day operation, 264 days/yr.

Table 9
Whites Point Quarry Hydrologic Budget
Detailed Summary Table
Quarry Conceptual Layout - Year 40

Month	Quarry and Watershed Areas			Pond Areas					Total Available Water Supply	Make-up Demand[4]	Net Surplus
	Water Surplus[1] (mm)	Surface Runoff[2] (mm)	Runoff Volume (m^3 x 1000)	Input[3] (mm)	Evaporation (mm)	Seepage Loss (mm)	Net Input (mm)	Volume (m^3 x 1000)	(m^3 x 1000)	(m^3 x 1000)	(m^3 x 1000)
Jan	95	88	126	100	0	48	52	5.0	131	24	107
Feb	98	93	133	102	0	43	59	5.6	139	22	117
Mar	125	109	156	135	0	48	88	8.4	164	24	140
Apr	73	91	130	103	0	46	56	5.4	135	23	112
May	44	68	96	103	96	48	-40	-3.9	93	24	69
Jun	13	41	58	92	108	46	-62	-5.9	52	23	28
Jul	8	24	35	86	121	48	-83	-8.0	27	24	3
Aug	2	13	19	80	105	48	-73	-7.0	12	24	-12
Sep	11	12	17	99	75	46	-23	-2.2	15	23	-8
Oct	31	22	31	102	47	48	8	0.8	32	24	8
Nov	87	55	78	130	0	46	84	8.0	86	23	62
Dec	109	82	117	119	0	48	71	6.8	123	24	99
Total	**699**	**699**	**996**	**1250**	**552**	**561**	**137**	**13**	**1009**	**284**	**725**

Storage Required: 20

Notes: 1) Sum of water surpluses from varying land-use areas within contibuting drainage area.
2) Runoff calculated as 50% of surplus for current month plus 50% of runoff from previous month.
3) Pond input is the sum of rainfall and snowmelt over pond areas.
4) Based on 5% process loss and 16 hr/day operation, 264 days/yr.

Table 10
Whites Point Quarry Hydrologic Budget
Detailed Summary Table
Quarry Conceptual Layout - Year 50 (Reclaimed)

Month	Quarry and Watershed Areas			Pond Areas					Total Available Water Supply	Make-up Demand[4]	Net Surplus
	Water Surplus[1] (mm)	Surface Runoff[2] (mm)	Runoff Volume (m^3 x 1000)	Input[3] (mm)	Evaporation (mm)	Seepage Loss (mm)	Net Input (mm)	Volume (m^3 x 1000)	(m^3 x 1000)	(m^3 x 1000)	(m^3 x 1000)
Jan	95	87	124	100	0	48	52	5.0	129	n/a	129
Feb	98	93	132	102	0	43	59	5.6	138	n/a	138
Mar	125	109	156	135	0	48	88	8.4	164	n/a	164
Apr	73	91	130	103	0	46	56	5.4	135	n/a	135
May	44	68	96	103	96	48	-40	-3.9	92	n/a	92
Jun	13	40	58	92	108	46	-62	-5.9	52	n/a	52
Jul	8	24	35	86	121	48	-83	-8.0	27	n/a	27
Aug	2	13	19	80	105	48	-73	-7.0	11	n/a	11
Sep	9	11	16	99	75	46	-23	-2.2	13	n/a	13
Oct	26	19	27	102	47	48	8	0.8	27	n/a	27
Nov	83	51	72	130	0	46	84	8.0	80	n/a	80
Dec	109	80	114	119	0	48	71	6.8	121	n/a	121
Total	**686**	**686**	**977**	**1250**	**552**	**561**	**137**	**13**	**990**	**n/a**	**990**

Storage Required: N/A

Notes: 1) Sum of water surpluses from varying land-use areas within contibuting drainage area.
2) Runoff calculated as 50% of surplus for current month plus 50% of runoff from previous month.
3) Pond input is the sum of rainfall and snowmelt over pond areas.
4) Based on 5% process loss and 16 hr/day operation, 264 days/yr.

APPENDIX A

SUMMARY MODEL OUTPUT DATA

WBNRMSD.025

Weymouth Falls, NS — WATER BUDGET MEANS FOR THE PERIOD 1963-1997 — DC20492

LAT.... 44.40 WATER HOLDING CAPACITY... 25 MM HEAT INDEX... 29.75
LONG... 65.95 LOWER ZONE............... 15 MM A............ .975

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-3.4	117	59	41	3	3	0	97	35	25	491
28- 2	-3.5	101	53	49	3	3	0	98	34	25	590
31- 3	.2	103	79	56	10	10	0	125	2	25	695
30- 4	5.0	100	97	6	30	30	0	73	0	25	795
31- 5	9.9	103	103	0	65	64	-1	44	0	20	898
30- 6	14.2	92	92	0	94	86	-8	14	0	12	990
31- 7	17.2	86	86	0	114	83	-31	9	0	6	1077
31- 8	17.1	80	80	0	105	75	-30	5	0	6	1157
30- 9	13.6	99	99	0	73	68	-5	20	0	17	1256
31-10	9.3	102	102	0	46	45	-1	52	0	22	102
30-11	4.9	131	128	2	21	21	0	106	1	25	231
31-12	-.6	137	98	20	7	7	0	112	19	25	370
AVE	7.0 TTL	1251	1076	174	571	495	-76	755			

Weymouth Falls, NS — STANDARD DEVIATIONS FOR THE PERIOD 1963-1997 — DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	1.8	46	40	31	3	3	0	55	49	0	106
28- 2	1.7	38	39	44	3	3	0	60	37	0	106
31- 3	1.3	43	42	48	4	4	0	65	8	0	120
30- 4	1.4	34	34	9	8	8	0	33	0	0	141
31- 5	1.3	52	52	0	9	9	3	45	0	9	155
30- 6	1.4	44	44	0	9	16	12	32	0	11	172
31- 7	1.6	53	53	0	10	33	32	24	0	11	186
31- 8	1.4	44	44	0	9	29	32	12	0	10	190
30- 9	1.1	48	48	0	6	14	13	35	0	11	200
31-10	1.1	39	39	0	5	6	4	36	0	7	39
30-11	1.2	43	43	5	5	5	0	43	4	0	59
31-12	2.2	50	54	20	4	4	0	52	27	0	91

WBNRMSD.050

Weymouth Falls, NS   WATER BUDGET MEANS FOR THE PERIOD 1963-1997   DC20492

LAT.... 44.40   WATER HOLDING CAPACITY... 50 MM   HEAT INDEX... 29.75
LONG... 65.95   LOWER ZONE............... 30 MM   A............ .975

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-3.4	117	59	41	3	3	0	96	35	50	491
28- 2	-3.5	101	53	49	3	3	0	98	34	50	590
31- 3	.2	103	79	56	10	10	0	125	2	50	695
30- 4	5.0	100	97	6	30	30	0	73	0	50	795
31- 5	9.9	103	103	0	65	65	0	44	0	44	898
30- 6	14.2	92	92	0	94	92	-2	13	0	31	990
31- 7	17.2	86	86	0	114	93	-21	8	0	15	1077
31- 8	17.1	80	80	0	105	79	-26	2	0	13	1157
30- 9	13.6	99	99	0	73	68	-5	15	0	29	1256
31-10	9.3	102	102	0	46	45	-1	42	0	44	102
30-11	4.9	131	128	2	21	21	0	102	1	50	231
31-12	-.6	137	98	20	7	7	0	112	19	50	370
AVE	7.0 TTL	1251	1076	174	571	516	-55	730			

Weymouth Falls, NS   STANDARD DEVIATIONS FOR THE PERIOD 1963-1997   DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	1.8	46	40	31	3	3	0	55	49	0	106
28- 2	1.7	38	39	44	3	3	0	60	37	0	106
31- 3	1.3	43	42	48	4	4	0	65	8	0	120
30- 4	1.4	34	34	9	8	8	0	33	0	0	141
31- 5	1.3	52	52	0	9	9	0	45	0	12	155
30- 6	1.4	44	44	0	9	10	4	32	0	20	172
31- 7	1.6	53	53	0	10	28	27	23	0	20	186
31- 8	1.4	44	44	0	9	28	30	6	0	20	190
30- 9	1.1	48	48	0	6	13	12	31	0	20	200
31-10	1.1	39	39	0	5	6	3	35	0	14	39
30-11	1.2	43	43	5	5	5	0	45	4	0	59
31-12	2.2	50	54	20	4	4	0	52	27	0	91

WBNRMSD.075

Weymouth Falls, NS WATER BUDGET MEANS FOR THE PERIOD 1963-1997 DC20492

LAT.... 44.40 WATER HOLDING CAPACITY... 75 MM HEAT INDEX... 29.75
LONG... 65.95 LOWER ZONE............... 45 MM A............ .975

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-3.4	117	59	41	3	3	0	96	35	75	491
28- 2	-3.5	101	53	49	3	3	0	98	34	75	590
31- 3	.2	103	79	56	10	10	0	125	2	75	695
30- 4	5.0	100	97	6	30	30	0	73	0	75	795
31- 5	9.9	103	103	0	65	65	0	44	0	69	898
30- 6	14.2	92	92	0	94	94	0	13	0	54	990
31- 7	17.2	86	86	0	114	103	-11	8	0	29	1077
31- 8	17.1	80	80	0	105	84	-21	2	0	23	1157
30- 9	13.6	99	99	0	73	69	-4	12	0	41	1256
31-10	9.3	102	102	0	46	45	-1	33	0	65	102
30-11	4.9	131	128	2	21	21	0	98	1	75	231
31-12	-.6	137	98	20	7	7	0	112	19	75	370
AVE	7.0 TTL	1251	1076	174	571	534	-37	714			

Weymouth Falls, NS STANDARD DEVIATIONS FOR THE PERIOD 1963-1997 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	1.8	46	40	31	3	3	0	55	49	0	106
28- 2	1.7	38	39	44	3	3	0	60	37	0	106
31- 3	1.3	43	42	48	4	4	0	65	8	0	120
30- 4	1.4	34	34	9	8	8	0	33	0	0	141
31- 5	1.3	52	52	0	9	9	0	45	0	12	155
30- 6	1.4	44	44	0	9	9	0	32	0	22	172
31- 7	1.6	53	53	0	10	21	21	23	0	29	186
31- 8	1.4	44	44	0	9	26	27	5	0	28	190
30- 9	1.1	48	48	0	6	12	10	25	0	29	200
31-10	1.1	39	39	0	5	6	3	35	0	22	39
30-11	1.2	43	43	5	5	5	0	47	4	0	59
31-12	2.2	50	54	20	4	4	0	52	27	0	91

WBNRMSD.100

Weymouth Falls, NS WATER BUDGET MEANS FOR THE PERIOD 1963-1997 DC20492

LAT.... 44.40 WATER HOLDING CAPACITY...100 MM HEAT INDEX... 29.75
LONG... 65.95 LOWER ZONE.............. 60 MM A............ .975

DATE	TEMP (C)		PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-3.4		117	59	41	3	3	0	96	35	100	491
28- 2	-3.5		101	53	49	3	3	0	98	34	100	590
31- 3	.2		103	79	56	10	10	0	125	2	100	695
30- 4	5.0		100	97	6	30	30	0	73	0	100	795
31- 5	9.9		103	103	0	65	65	0	44	0	94	898
30- 6	14.2		92	92	0	94	94	0	13	0	79	990
31- 7	17.2		86	86	0	114	110	-5	8	0	47	1077
31- 8	17.1		80	80	0	105	90	-15	2	0	36	1157
30- 9	13.6		99	99	0	73	70	-3	9	0	55	1256
31-10	9.3		102	102	0	46	45	-1	28	0	83	102
30-11	4.9		131	128	2	21	21	0	92	1	100	231
31-12	-.6		137	98	20	7	7	0	112	19	100	370
AVE	7.0	TTL	1251	1076	174	571	548	-24	700			

Weymouth Falls, NS STANDARD DEVIATIONS FOR THE PERIOD 1963-1997 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	1.8	46	40	31	3	3	0	55	49	0	106
28- 2	1.7	38	39	44	3	3	0	60	37	0	106
31- 3	1.3	43	42	48	4	4	0	65	8	0	120
30- 4	1.4	34	34	9	8	8	0	33	0	0	141
31- 5	1.3	52	52	0	9	9	0	45	0	12	155
30- 6	1.4	44	44	0	9	9	0	32	0	22	172
31- 7	1.6	53	53	0	10	15	13	23	0	36	186
31- 8	1.4	44	44	0	9	24	25	5	0	36	190
30- 9	1.1	48	48	0	6	11	10	22	0	38	200
31-10	1.1	39	39	0	5	6	4	36	0	28	39
30-11	1.2	43	43	5	5	5	0	49	4	0	59
31-12	2.2	50	54	20	4	4	0	52	27	0	91

WBNRMSD.150

Weymouth Falls, NS WATER BUDGET MEANS FOR THE PERIOD 1963-1997 DC20492

LAT.... 44.40 WATER HOLDING CAPACITY...150 MM HEAT INDEX... 29.75
LONG... 65.95 LOWER ZONE.............. 90 MM A............ .975

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-3.4	117	59	41	3	3	0	95	35	150	491
28- 2	-3.5	101	53	49	3	3	0	98	34	150	590
31- 3	.2	103	79	56	10	10	0	125	2	150	695
30- 4	5.0	100	97	6	30	30	0	73	0	150	795
31- 5	9.9	103	103	0	65	65	0	44	0	144	898
30- 6	14.2	92	92	0	94	94	0	13	0	129	990
31- 7	17.2	86	86	0	114	114	-1	8	0	93	1077
31- 8	17.1	80	80	0	105	98	-7	2	0	73	1157
30- 9	13.6	99	99	0	73	71	-2	9	0	92	1256
31-10	9.3	102	102	0	46	45	-1	26	0	124	102
30-11	4.9	131	128	2	21	21	0	84	1	148	231
31-12	-.6	137	98	20	7	7	0	110	19	150	370
AVE	7.0 TTL	1251	1076	174	571	561	-11	687			

Weymouth Falls, NS STANDARD DEVIATIONS FOR THE PERIOD 1963-1997 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	1.8	46	40	31	3	3	0	55	49	0	106
28- 2	1.7	38	39	44	3	3	0	60	37	0	106
31- 3	1.3	43	42	48	4	4	0	65	8	0	120
30- 4	1.4	34	34	9	8	8	0	33	0	0	141
31- 5	1.3	52	52	0	9	9	0	45	0	12	155
30- 6	1.4	44	44	0	9	9	0	32	0	22	172
31- 7	1.6	53	53	0	10	10	4	23	0	42	186
31- 8	1.4	44	44	0	9	17	17	5	0	48	190
30- 9	1.1	48	48	0	6	9	6	21	0	51	200
31-10	1.1	39	39	0	5	6	3	36	0	39	39
30-11	1.2	43	43	5	5	5	0	53	4	7	59
31-12	2.2	50	54	20	4	4	0	54	27	0	91

WBNRMSD.250

Weymouth Falls, NS — WATER BUDGET MEANS FOR THE PERIOD 1963-1997 — DC20492

LAT.... 44.40 — WATER HOLDING CAPACITY...250 MM — HEAT INDEX... 29.75
LONG... 65.95 — LOWER ZONE..............150 MM — A............ .975

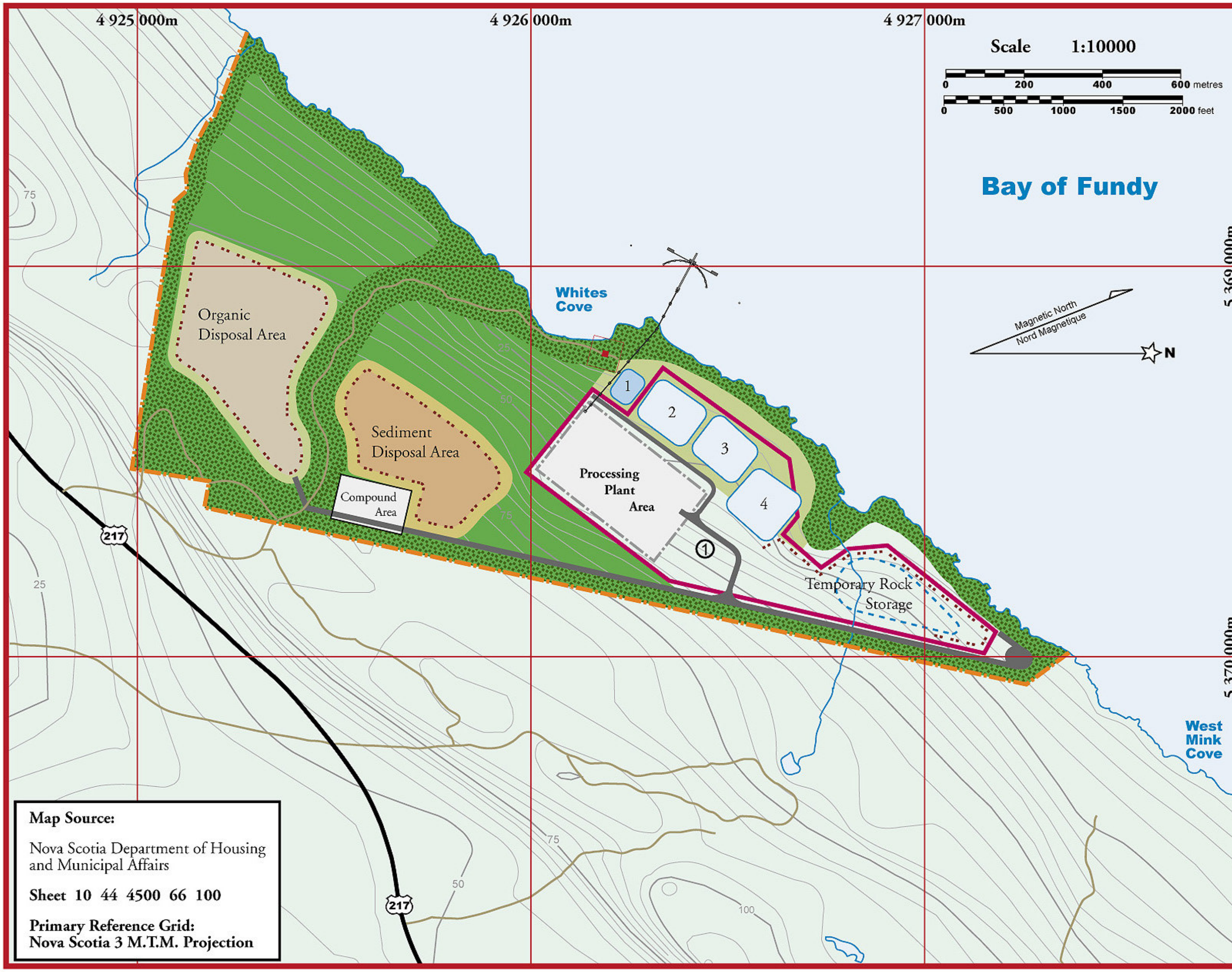
DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-3.4	117	59	41	3	3	0	94	35	250	491
28- 2	-3.5	101	53	49	3	3	0	98	34	250	590
31- 3	.2	103	79	56	10	10	0	125	2	250	695
30- 4	5.0	100	97	6	30	30	0	73	0	250	795
31- 5	9.9	103	103	0	65	65	0	44	0	244	898
30- 6	14.2	92	92	0	94	94	0	13	0	229	990
31- 7	17.2	86	86	0	114	114	0	8	0	192	1077
31- 8	17.1	80	80	0	105	104	-2	2	0	167	1157
30- 9	13.6	99	99	0	73	73	0	9	0	184	1256
31-10	9.3	102	102	0	46	45	0	25	0	216	102
30-11	4.9	131	128	2	21	21	0	81	1	244	231
31-12	-.6	137	98	20	7	7	0	108	19	248	370
AVE	7.0 TTL	1251	1076	174	571	569	-2	680			

Weymouth Falls, NS — STANDARD DEVIATIONS FOR THE PERIOD 1963-1997 — DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	1.8	46	40	31	3	3	0	57	49	0	106
28- 2	1.7	38	39	44	3	3	0	60	37	0	106
31- 3	1.3	43	42	48	4	4	0	65	8	0	120
30- 4	1.4	34	34	9	8	8	0	33	0	0	141
31- 5	1.3	52	52	0	9	9	0	45	0	12	155
30- 6	1.4	44	44	0	9	9	0	32	0	22	172
31- 7	1.6	53	53	0	10	10	0	23	0	44	186
31- 8	1.4	44	44	0	9	9	7	5	0	58	190
30- 9	1.1	48	48	0	6	6	2	21	0	62	200
31-10	1.1	39	39	0	5	6	2	36	0	51	39
30-11	1.2	43	43	5	5	5	0	53	4	21	59
31-12	2.2	50	54	20	4	4	0	55	27	11	91

APPENDIX B

QUARRY CONCEPT PLANS



Whites Point Quarry
Little River, Digby County
Nova Scotia

Environmental Assessment/ Impact Statement

Legend

- Highway 217
- Gravel Road
- Property Line
- Environmental Preservation Zone
- Existing Habitat
- Quarry Area ①
- Processing Plant Area
- Existing Sediment Pond
- New Sediment Ponds (Year 2)
- Berm/Dyke
- Quarry Road
- New Sediment Pond (Year 4)
- Reclamation (Year 2)
- Reclamation (Year 4)

Produced for: Bilcon of Nova Scotia Corporation

Concept Quarry Plan
Years 1 - 5

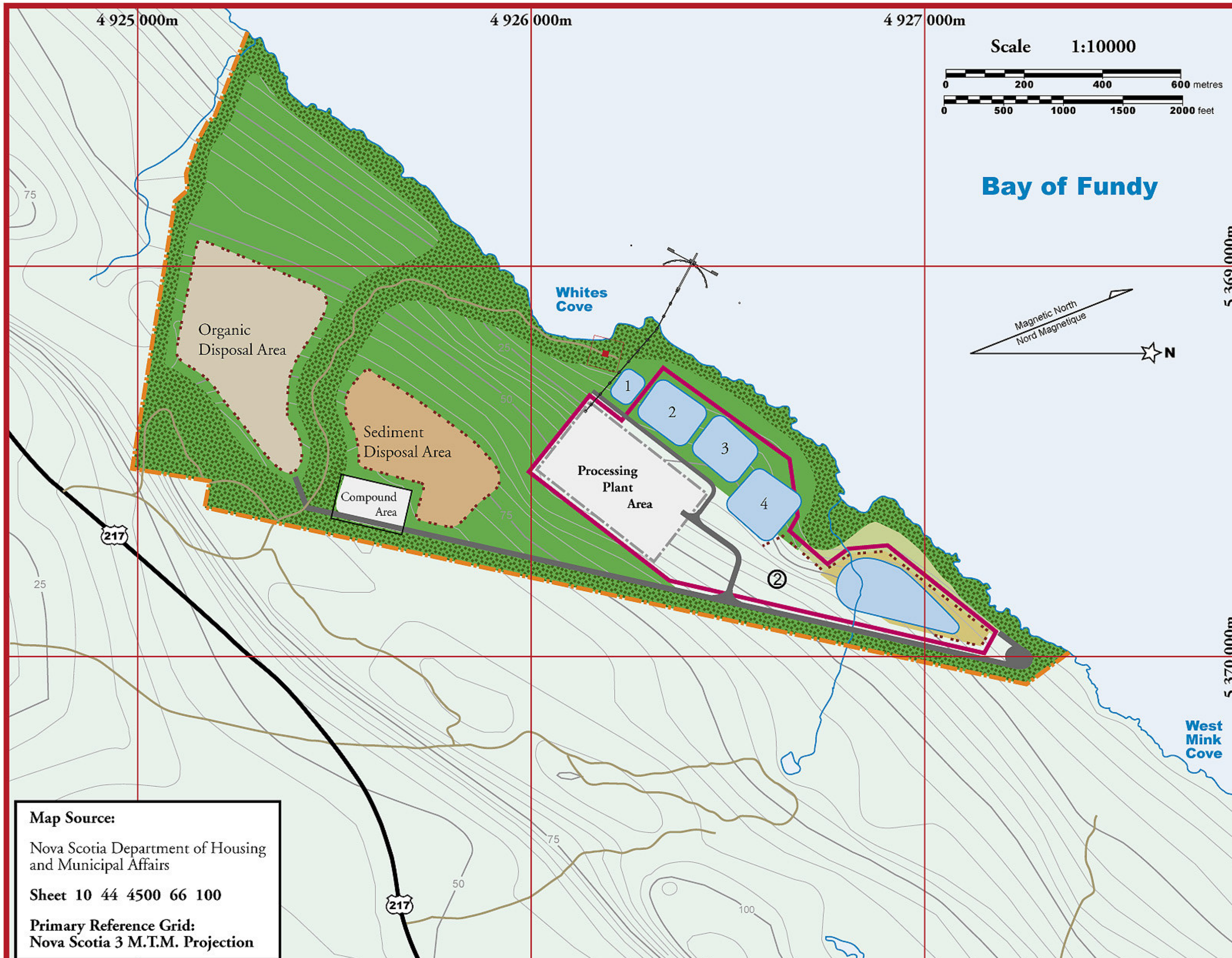
Plan OP - 1

Graphic Design by Mark Pease, Bear River, N.S.

Buxton & Kern

Whites Point Quarry
Little River, Digby County
Nova Scotia

Environmental Assessment/ Impact Statement



Legend

- Highway 217
- Gravel Road
- Property Line
- Environmental Preservation Zone
- Existing and Reclaimed Habitat
- Quarry Area ②
- Processing Plant Area
- Existing Sediment Pond
- Berm/Dyke
- Quarry Road
- Reclamation (Year 6)
- Reclamation (Year 10)

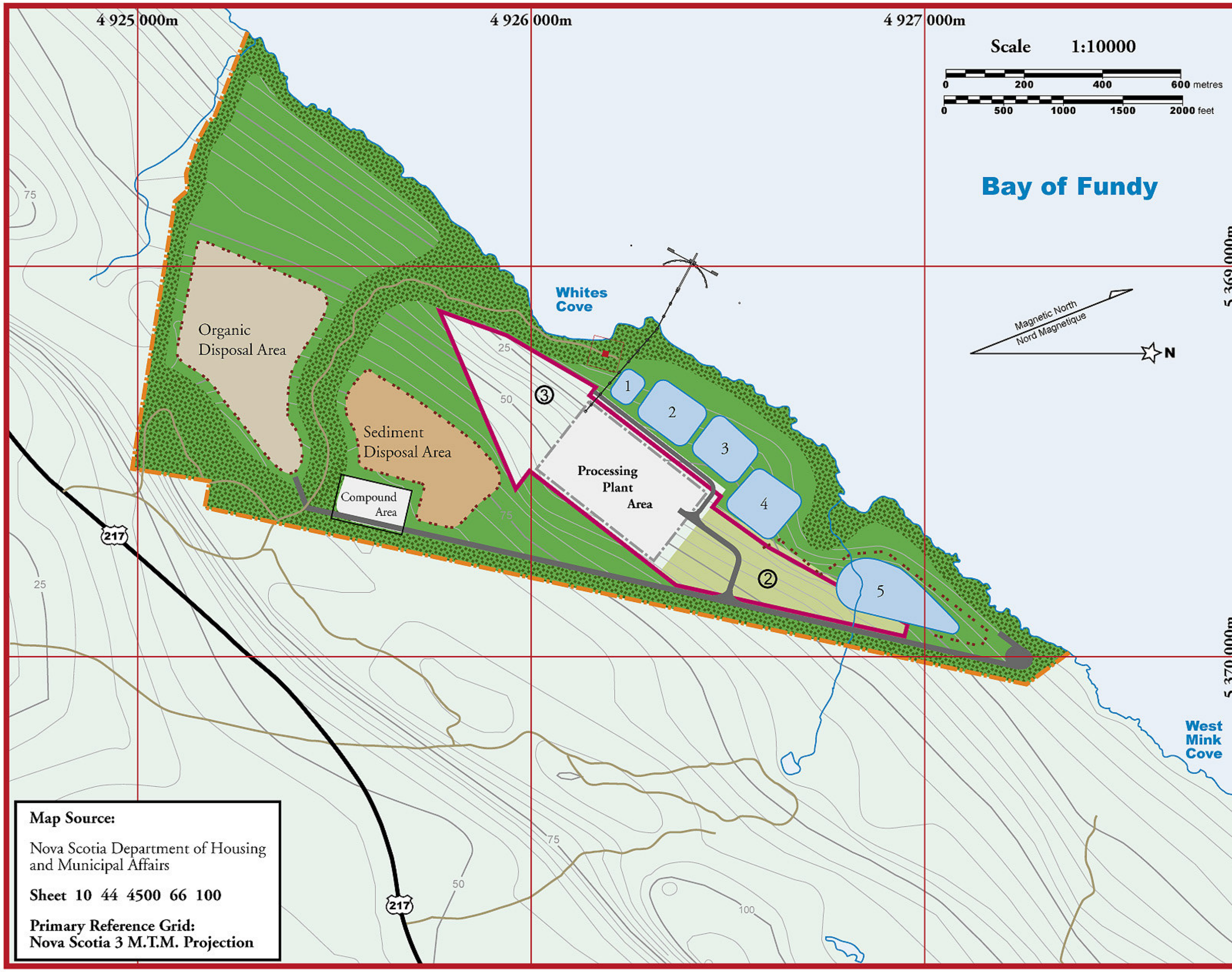
Produced for: Bilcon of Nova Scotia Corporation

Concept Quarry Plan
Years 6 - 10

Plan OP - 2

Graphic Design by Mark Pease, Bear River, N.S.

Buxton & Kern



Whites Point Quarry

Little River, Digby County
Nova Scotia

Environmental Assessment/ Impact Statement

Legend

- Highway 217
- Gravel Road
- Property Line
- Environmental Preservation Zone
- Existing and Reclaimed Habitat
- Quarry Area ② and ③
- Processing Plant Area
- Existing Sediment Pond
- Berm/Dyke
- Quarry Road
- Reclamation (Year 14)

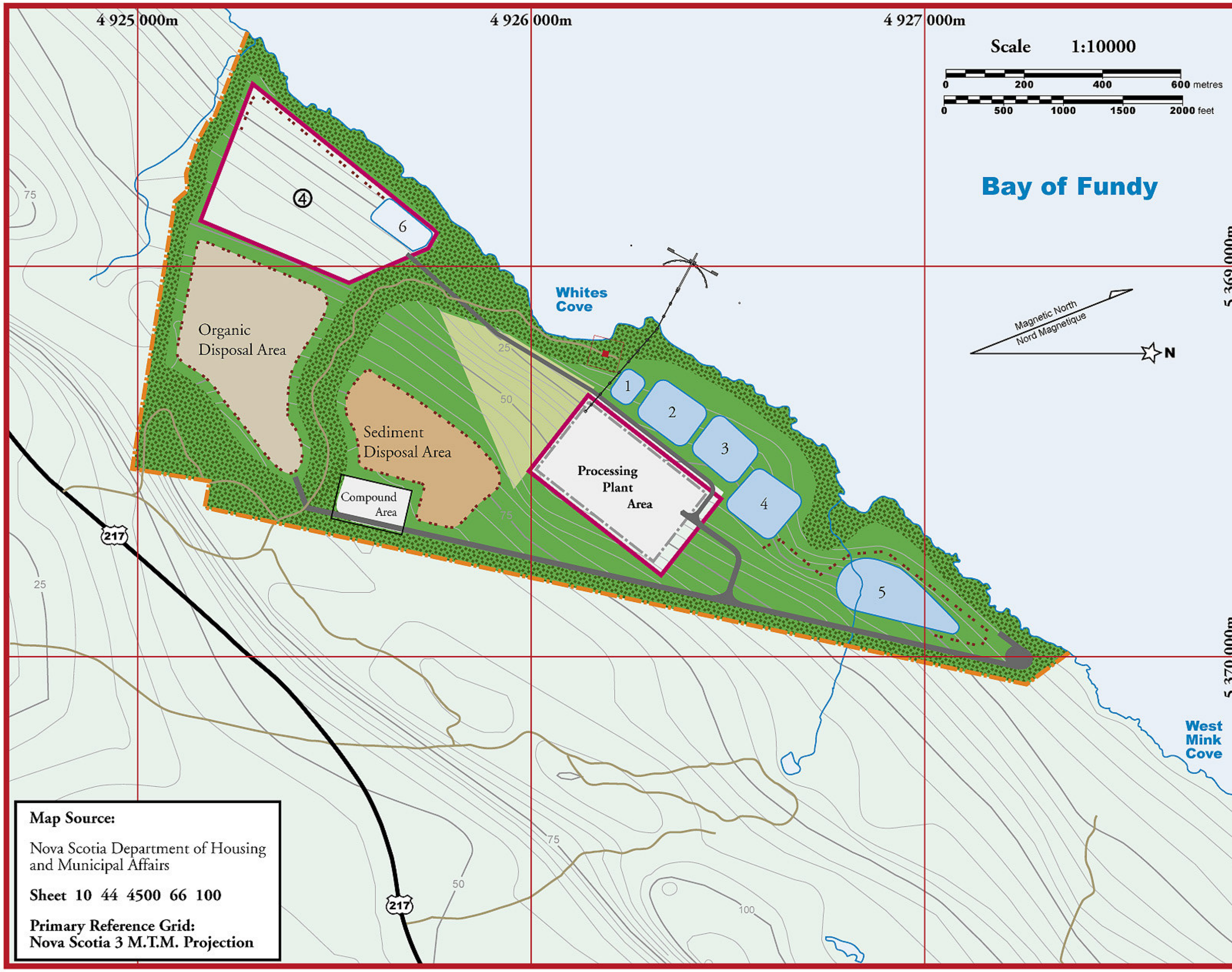
Produced for: Bilcon of Nova Scotia Corporation

Concept Quarry Plan
Years 11 - 15

Plan OP - 3

Graphic Design by Mark Pease, Bear River, N.S.

Buxton & Kern



Whites Point Quarry

Little River, Digby County
Nova Scotia

Environmental Assessment/ Impact Statement

Legend

- Highway 217
- Gravel Road
- Property Line
- Environmental Preservation Zone
- Existing and Reclaimed Habitat
- Quarry Area ④
- Processing Plant Area
- Existing Sediment Pond
- New Sediment Pond (Year 16)
- Berm/Dyke
- Quarry Road
- Reclamation (Year 17)

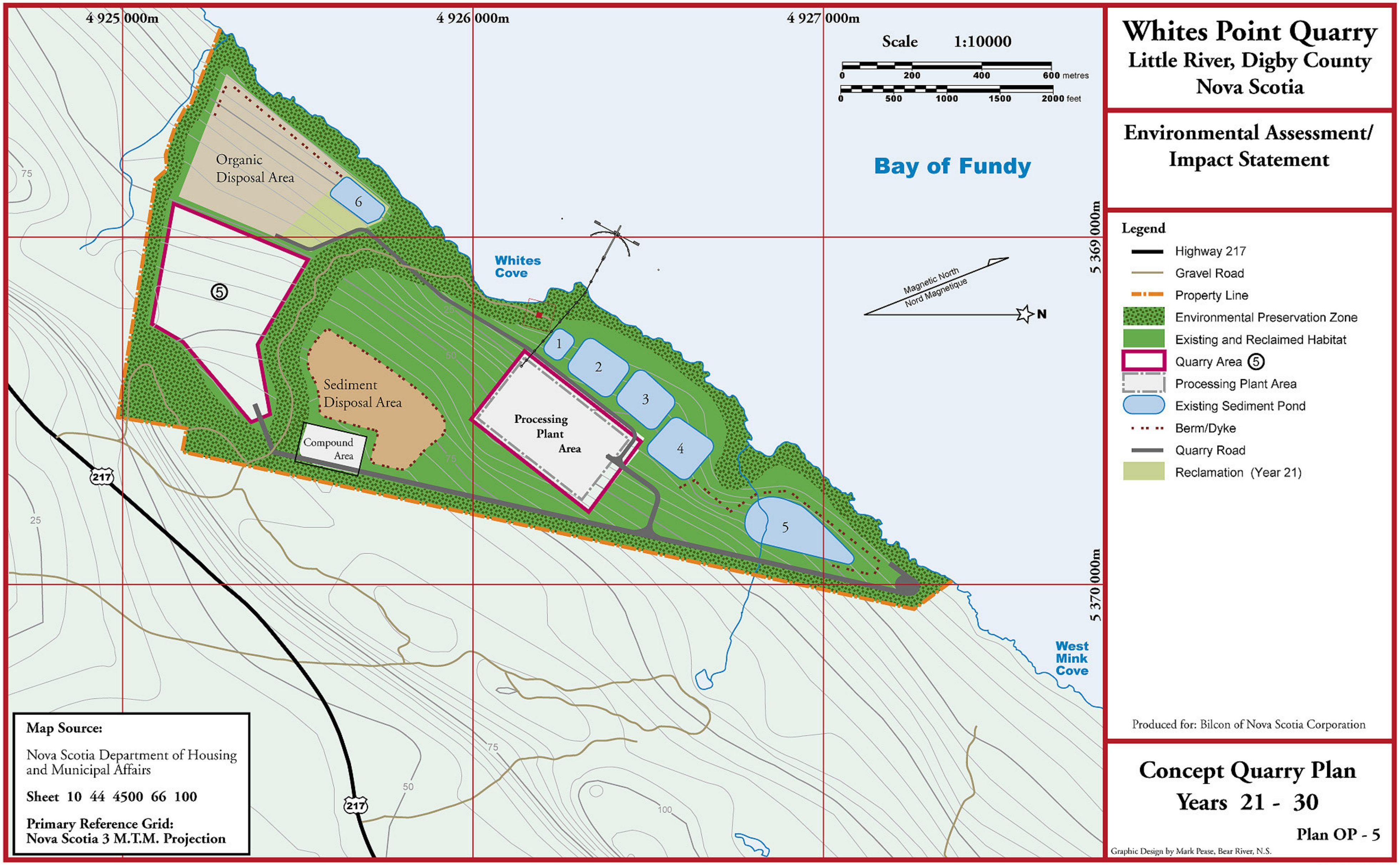
Produced for: Bilcon of Nova Scotia Corporation

Concept Quarry Plan
Years 16 - 20

Plan OP - 4

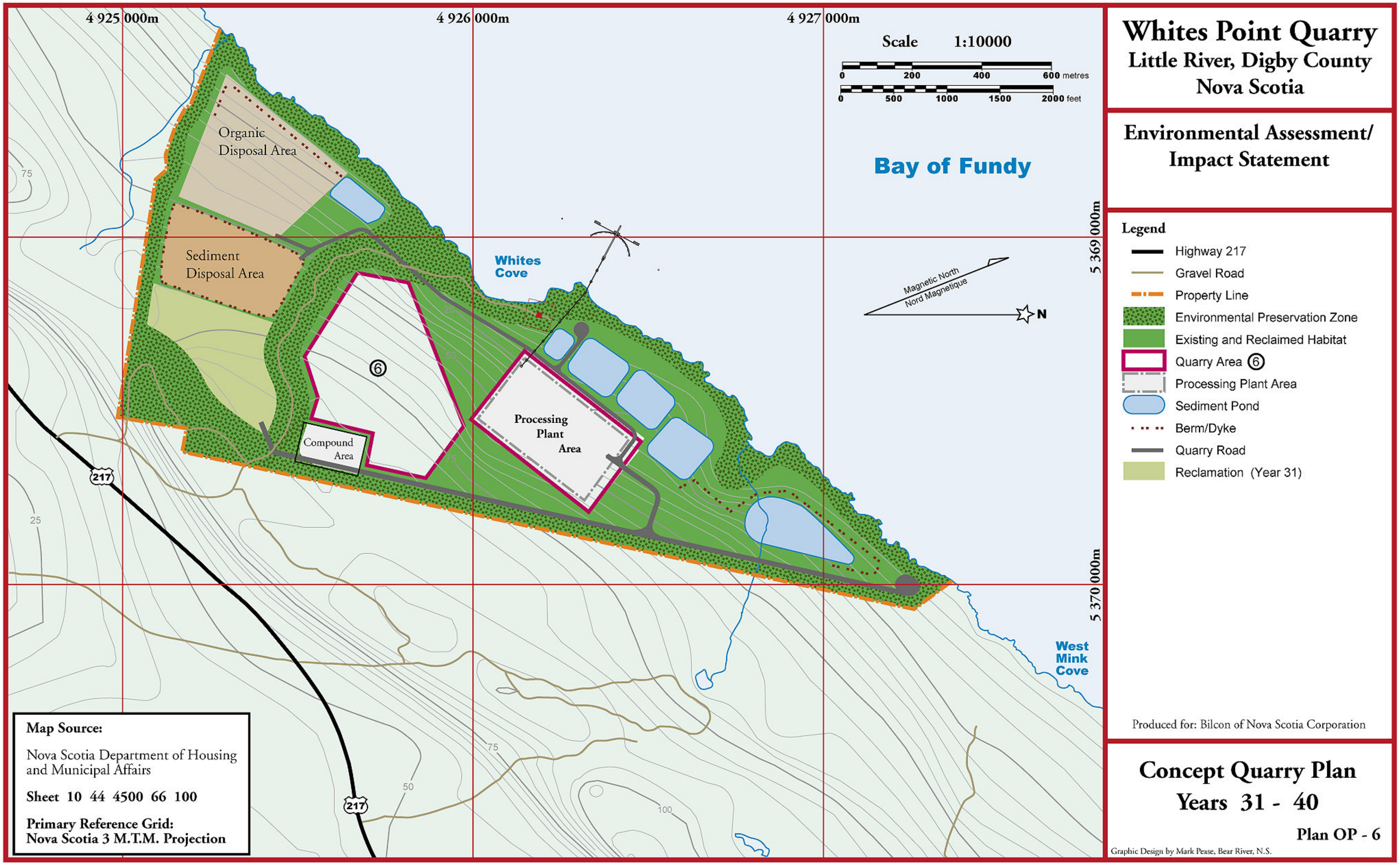
Graphic Design by Mark Pease, Bear River, N.S.

Buxton & Kern



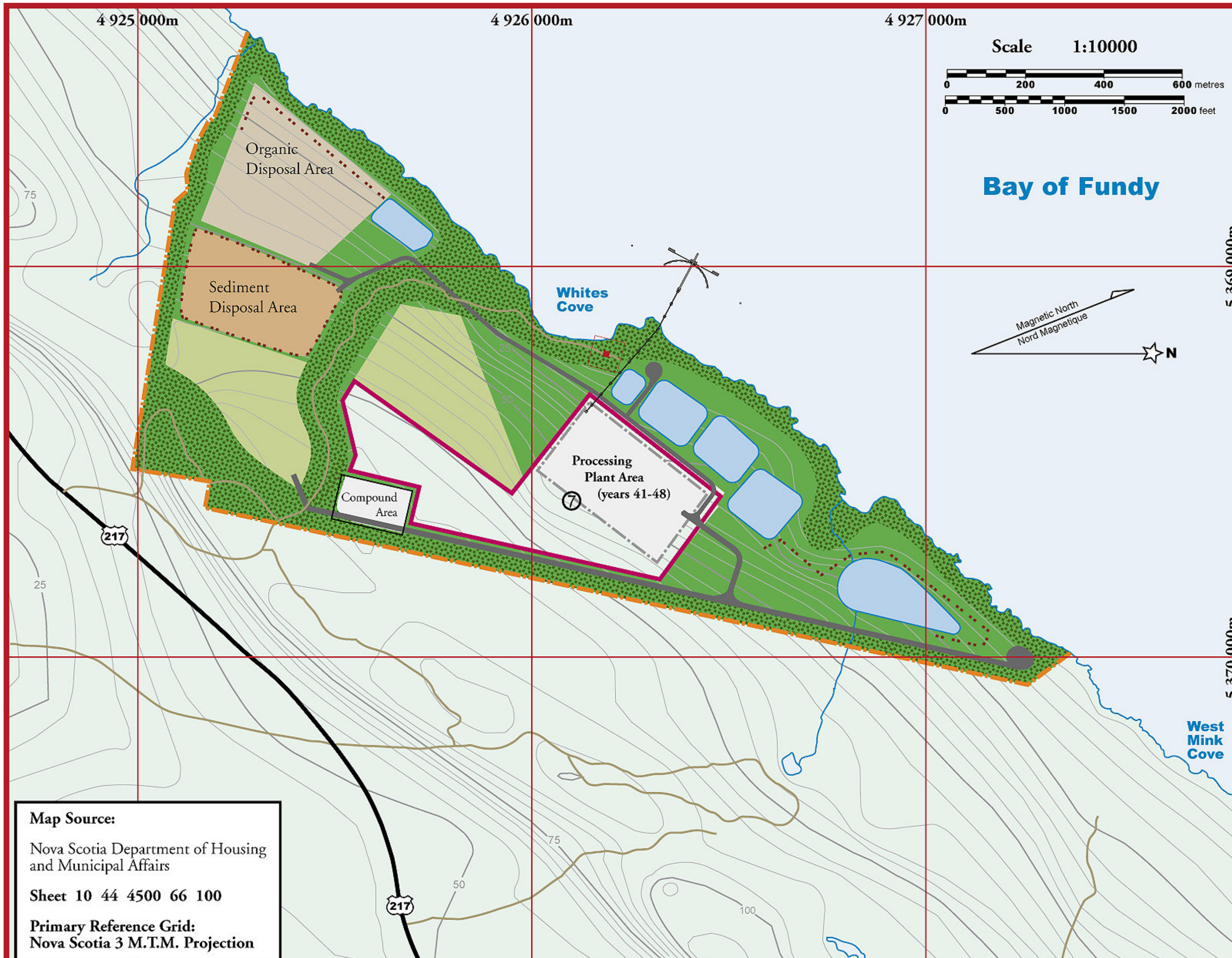
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/ Impact Statement
Legend
Highway 217
Gravel Road
Property Line
Environmental Preservation Zone
Existing and Reclaimed Habitat
Quarry Area 5
Processing Plant Area
Existing Sediment Pond
Berm/Dyke
Quarry Road
Reclamation (Year 21)
Produced for: Bilcon of Nova Scotia Corporation
Concept Quarry Plan
Years 21 - 30
Plan OP - 5
Graphic Design by Mark Pease, Bear River, N.S.
4 925 000m
4 926 000m
4 927 000m
5 369 000m
5 370 000m
Scale 1:10000
0 200 400 600 metres
0 500 1000 1500 2000 feet
Bay of Fundy
Whites Cove
West Mink Cove
Magnetic North
Nord Magnetique
N
Organic Disposal Area
Sediment Disposal Area
Compound Area
Processing Plant Area
217
Map Source:
Nova Scotia Department of Housing and Municipal Affairs
Sheet 10 44 4500 66 100
Primary Reference Grid:
Nova Scotia 3 M.T.M. Projection

Buxton & Kern



Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Legend
Highway 217
Gravel Road
Property Line
Environmental Preservation Zone
Existing and Reclaimed Habitat
Quarry Area 6
Processing Plant Area
Sediment Pond
Berm/Dyke
Quarry Road
Reclamation (Year 31)
Produced for: Bilcon of Nova Scotia Corporation
Concept Quarry Plan
Years 31 - 40
Plan OP - 6
Graphic Design by Mark Pease, Bear River, N.S.
Scale 1:10000
0 200 400 600 metres
0 500 1000 1500 2000 feet
4 925 000m
4 926 000m
4 927 000m
5 369 000m
5 370 000m
Bay of Fundy
Whites Cove
West Mink Cove
Magnetic North
Nord Magnetique
N
Organic Disposal Area
Sediment Disposal Area
Compound Area
Processing Plant Area
6
217
Map Source:
Nova Scotia Department of Housing and Municipal Affairs
Sheet 10 44 4500 66 100
Primary Reference Grid:
Nova Scotia 3 M.T.M. Projection

Buxton & Kern



Map Source:

Nova Scotia Department of Housing and Municipal Affairs

Sheet 10 44 4500 66 100

Primary Reference Grid:
Nova Scotia 3 M.T.M. Projection

Whites Point Quarry
Little River, Digby County
Nova Scotia

Environmental Assessment/ Impact Statement

Legend

- Highway 217
- Gravel Road
- Property Line
- Environmental Preservation Zone
- Existing and Reclaimed Habitat
- Quarry Area ⑦
- Processing Plant Area
- Sediment Pond
- Berm/Dyke
- Quarry Road
- Reclamation (Year 41)

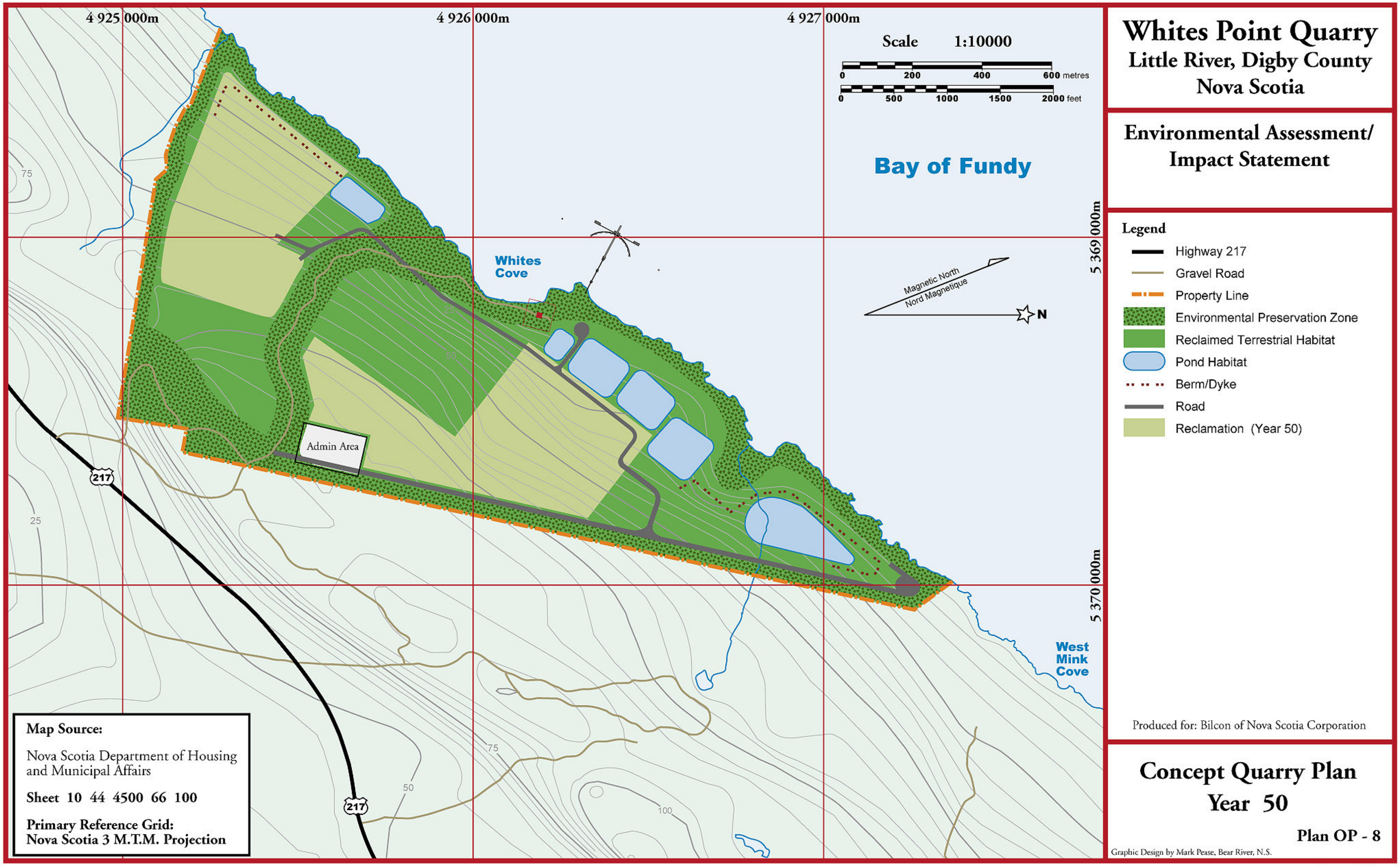
Produced for: Bilcon of Nova Scotia Corporation

Concept Quarry Plan
Years 41 - 49

Plan OP - 7

Graphic Design by Mark Pease, Bear River, N.S.

Buxton & Kern


Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Legend
Highway 217
Gravel Road
Property Line
Environmental Preservation Zone
Reclaimed Terrestrial Habitat
Pond Habitat
Berm/Dyke
Road
Reclamation (Year 50)
Produced for: Bilcon of Nova Scotia Corporation
Concept Quarry Plan
Year 50
Plan OP - 8
Graphic Design by Mark Pease, Bear River, N.S.
Scale 1:10000
0 200 400 600 metres
0 500 1000 1500 2000 feet
Bay of Fundy
Whites Cove
West Mink Cove
Magnetic North
Nord Magnetique
N
Admin Area
4 925 000m
4 926 000m
4 927 000m
5 369 000m
5 370 000m
217
Map Source:
Nova Scotia Department of Housing and Municipal Affairs
Sheet 10 44 4500 66 100
Primary Reference Grid:
Nova Scotia 3 M.T.M. Projection

Buxton & Kern