

# TOWN OF BASHAW ALBERTA



## VISTAS SUBDIVISION STORMWATER MANAGEMENT PLAN

REPORT

Date: December 2011  
Prepared for: Rosemary Wittevrongel & Murray Holroyd  
File #: TE-2011-08

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## 1. INTRODUCTION & OBJECTIVES

The Vistas Development area is situated in the north-west quadrant (NW ¼ Section 4 Township 42 Range 22 W4M) of the Town of Bashaw and represents the future growth zone for the Town. Figure 1.1 highlights the location of the site.

The Vistas Area Structure Plan (ASP)<sup>1</sup> was prepared for the Town in 2008 and provided a general overview of the site, a proposed configuration along with servicing concepts. A copy of the ASP has been included within the appendices. This plan was adopted by bylaw #711-2008 by the Town of Bashaw. It should be noted that the proposed stormwater concept presented within differs slightly from the ASP primarily due to additional detailed information obtained in preparation of this report.

With most developments, the amount of impervious surfaces will increase due to the removal of trees and with the natural ground being replaced by buildings, roadways, sidewalks and other less pervious surfaces. The impacts of this result in increased volume of runoff from the site, increased runoff flow rates and increased pollutants.

There are a variety of methods to mitigate these impacts such as filtration systems, dry ponds, wet ponds and constructed wetlands. The best method is determined on a case by case basis and affected by a multitude of factors.

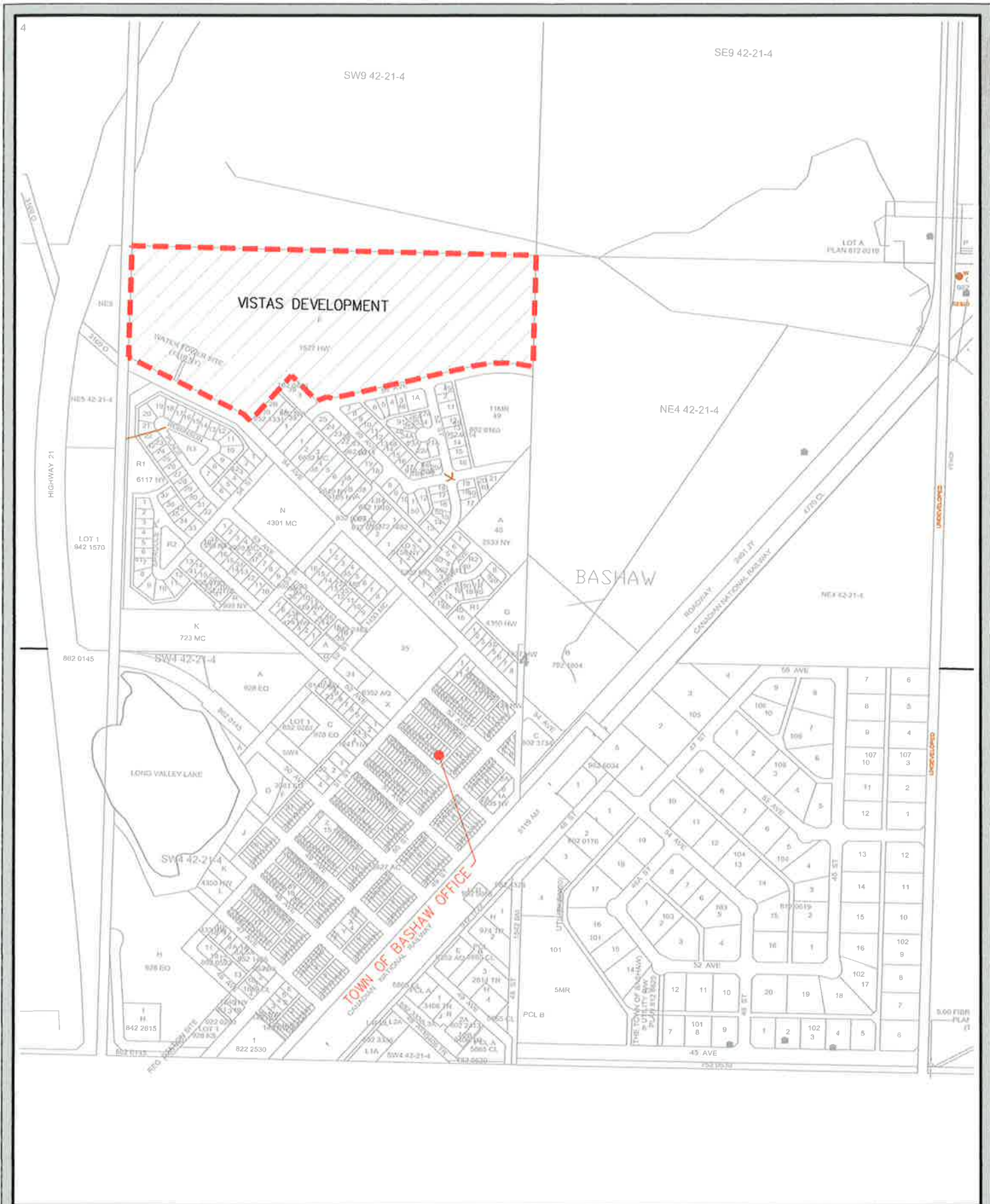
The primary objectives of this Stormwater Management Plan are:

- Assess the existing topography of the Vistas area
- Review existing stormwater systems within the North-east area of the Town
- Determine pre-development and post development conditions using the proposed configuration of the area (i.e as per ASP)
- Determine best method to mitigate increased runoff flows by limiting it to at least pre-development rate, or to the maximum capacity of the existing storm sewer systems, whichever is less.
- Determine best method to improve the quality of the post development runoff waters
- Consider the immediate and ultimate case scenarios

It should be noted that this plan does not provide precise sizing of underground piping or facilities as this will be undertaken at the time of detailed design of the development.

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<sup>1</sup> The Vistas Area Structure Plan, Town of Bashaw, October 2008, Midwest Consulting



**VISTAS DEVELOPMENT STORMWATER PLAN**

**BASHAW, ALBERTA**

**NW-4-42-21-W4M**

**Figure 1.1  
LOCATION PLAN  
1:10,000**

## 2. STORMWATER PLANNING

### 2.1 KEY CONCEPTS

Presently, the Town does not have specific drainage designations or standards, therefore, the City of Edmonton Design and Construction Standards and Alberta Environment 2006 Standards and Guidelines have been employed to determine the service and management planning goal. This goal is,

“To provide adequate drainage and promote the general health, welfare, security and economic well being of the public and to protect and enhance the water quality of receiving watercourses”

To meet this goal, the stormwater drainage system must include stormwater management facilities (e.g. catch basin and curb and gutter, retention pond, etc) so that the following level-of-service objectives can be met:

- Avoid all property damage and flooding and minimize inconvenience to the public in a 1:5 year return frequency rainfall event and more frequent rainfall events.
- Avoid significant property damage from a 1:100 year return frequency rainfall event.
- Avoid loss of life and injuries and minimize damage to property, through control of runoff during unusual or infrequent storm events with high-intensity rainfall and large runoff volume.
- Avoid degradation of receiving watercourses.

In the context of management planning, a stormwater management planning process should be developed based on the ‘Hierarchical Planning’ concept. The important feature of this principal is that stormwater management planning is implemented in a top-down fashion. This is accomplished by first examining impacts at the watershed level, then refining to an ever-increasing level of detail to subwatershed (or catchment area), neighbourhood and finally to a site level, as shown at Figure 2.1.

### GLOSSARY OF TERMS

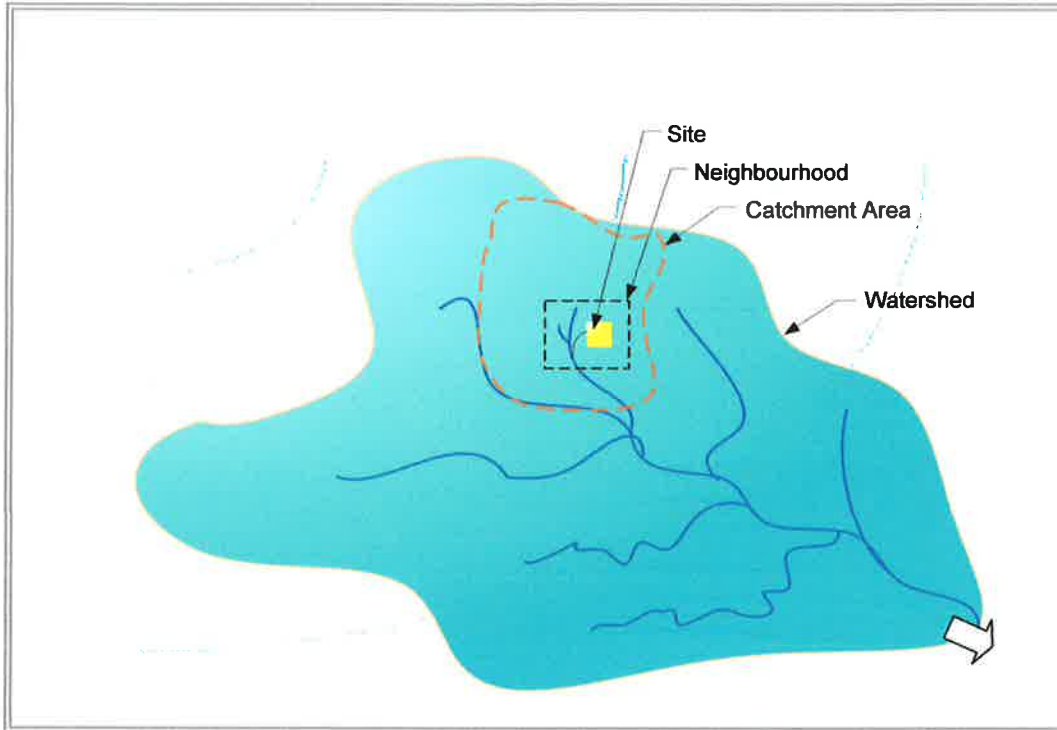
**Hierarchical Planning** – In the context of stormwater management planning, examining the impacts of development first at a larger watershed level and then at a subwatershed and site level.

**Catchment Area** – Land that is bounded by natural features such as hills or mountains, from which all run-off water flows into a low point or a river. This low point in the system is an ideal location for a dam where run-off can be stored.

**Neighbourhood** – The area where planned development requires infrastructure to service several owners and sub-areas. This infrastructure is typically planned and supplied by the municipality.

**Site** – The area to be developed which is controlled by one owner. Infrastructure typically planned and supplied by this owner.

**Sub-Catchment Area** – The area that is draining to a specific point on the landscape. Examples of drainage areas would be the areas draining to culverts, dugouts or drainage ditches.



Stormwater Management Planning Framework

## 2.2 MAJOR/MINOR CONVEYANCE SYSTEM

As per the City of Edmonton Design Standard, new development areas shall be designed using the major/minor system concept, with each system planned and design to archive specific level-of-service objectives as outlined in the previous section.

### 2.2.1 Minor System

In general, a minor system is designed for drainage to accommodate the runoff, which would occur in relative frequent (e.g. 1:5 year) return period rainfall events. More specifically, the minor system is typically applied to the buried drainage network of local and trunk sewers, inlets and street gutters, which have traditionally provided conveyance of storm water runoff from road surface.

### 2.2.2 Major System

As for the major system, it is typically designed to control flooding to accommodate runoff rates and volumes for a 100-year or more return period rainfall event. For instance, when the rate of storm runoff generated by less

frequent, more intense, rainfall events may exceed the capacity of the minor system, subsequent ponding may occur in depression areas or follow whatever overflow escape route is available. This network of planned or unplanned ponding areas and overland flow routes is referred to as the “major system”.

## 2.3 RUNOFF CONTROL

The post development increased rate of runoff can be controlled by several methods including:

- Catchbasin inlet control
- Detention/Retention ponds
- Swales and ditches
- Infiltration areas

Wet or dry retention ponds are the most commonly used for runoff control prior to discharge to a water body or existing water course. They are used for temporarily storage of excess runoff which is released to a pre-defined rate. In less frequent cases where discharge is not feasible, a detention facility is constructed, whereas evaporation and infiltration maintain water levels.

Wet ponds are constructed for storage of stormwater runoff and provide the added benefit of sediment settling and reduction of organic contaminants. Conversely, dry ponds only retain storm water during the actual rainfall event and are not considered to provide significant treatment benefits depending upon the design features. As the configuration requirements for dry ponds tend to be less restrictive than those for wet ponds, the dry pond storage concept can be applied in a very linear form, such as natural or manmade channel.

## 2.4 OTHER CONSIDERATIONS

### 2.4.1 Streets/Sidewalks Infrastructure Upgrading

In urban areas without an underground storm water system, the roads (ex/ ditches, culverts, etc...) provide drainage for both the minor and major stormwater systems.

Many drainage concerns can be alleviated by improving road crowning, street grades, re-grading ditches or by the addition of curb & gutter, swales and sidewalks.

There are a variety of interim design cross sections that work well for phasing from a rural to an urban configuration. This planning will save considerable costs in the future.

### **3. SITE TOPOGRAPHY & DRAINAGE FEATURES**

#### **3.1 OFFSITE**

A review of the drainage scheme surrounding the Vistas Site was completed. 1:20,000 DEM (digital elevation model) data was purchased and contours prepared. The result is illustrated in Figure 3.1.

The northwest sector of the Town drains to an existing 7 Ha wetland lying adjacent to Highway 21. This wetland used to form part of Valley Lake which has now receded further north and separate by the Highway. Several crossing culverts serve to maintain historical drainage patterns.

In addition to the other developments in the NW part of Town, one third of the runoff from the Vistas Development drains southerly and into the existing wetland. The highway crossing culvert near the wetland's midpoint sits approximately 1.2m higher than the lowest point in the wetland. During Spring melt and subsequent larger storm events, the runoff will travel through the culvert and drain northwesterly towards the Lake as noted within Figure 3.1.



Existing Wetland along Highway 21 & Main Access to Bashaw



 EXISTING DRAINAGE DIRECTION  
 CONTOURS (OBTAINED FROM 1:20,000 DEM DATA)

**VISTAS DEVELOPMENT STORMWATER PLAN**  
 BASHAW, ALBERTA  
 NW-4-42-21-W4M

Figure 3.1  
 OFFSITE TOPOGRAPHY  
 SCALE 1:10,000

### 3.2 ONSITE

The Vistas site sits within the highest elevation within the Town of Bashaw. An extensive field survey was conducted of the entire area and contours were prepared as part of the Area Structure Plan.

The topography is undulating within several hills and depressions with slopes in some areas exceeding 10%.

The area is predominantly treed with several open areas populated with small scrub brush. An existing wetland pond lies within and extends beyond the eastern boundary into the adjacent property.

A smaller wet pond is situated south of the larger wetland and straddles the theoretical extension of 56<sup>th</sup> Avenue. This pond appears to be partially man made and is currently collects some runoff from the Vistas along a constructed swale paralleling 56<sup>th</sup> Avenue.

The Town's water treatment facility and old water tower (not currently in use) were constructed in the southwest extents of the Vistas area. A Senior's Lodge is currently under construction along the north side of 56<sup>th</sup> Avenue.

Figure 3.2 highlights the existing onsite topography and drainage features.



View from NW corner of Vistas – Looking SW towards Schultz Subdivision

### 3.3 EXISTING ONSITE POND

The existing wetland within the Vistas Development site encompasses an area of approximately 4 Ha. The pond extends into the adjacent property owned by Mr. Norman Schultz. Mr. Schultz was consulted as part of this report and a letter with his acknowledgement is included in the appendices.

The wetland collects runoff from all directions with a noticeable draw coming from the lands north west of the Vistas site. At the time of the inspection, the depth of the water ranged from 0.2 to 0.5 meters. After lengthy rainfall events and during Spring melt, the elevation of the wetland will fluctuate up to 1.0 meter in depth.

The existing topography is illustrated within Figure 3.1.

The smaller 0.6 Ha wet pond directly south of the wetland is partially natural and partially man made. Evidence of excavation and construction of berms were likely completed during the initial construction of the Schultz Subdivision. A small walking bridge was constructed to provide access from the Schultz Subdivision area and the through the natural area to the South.



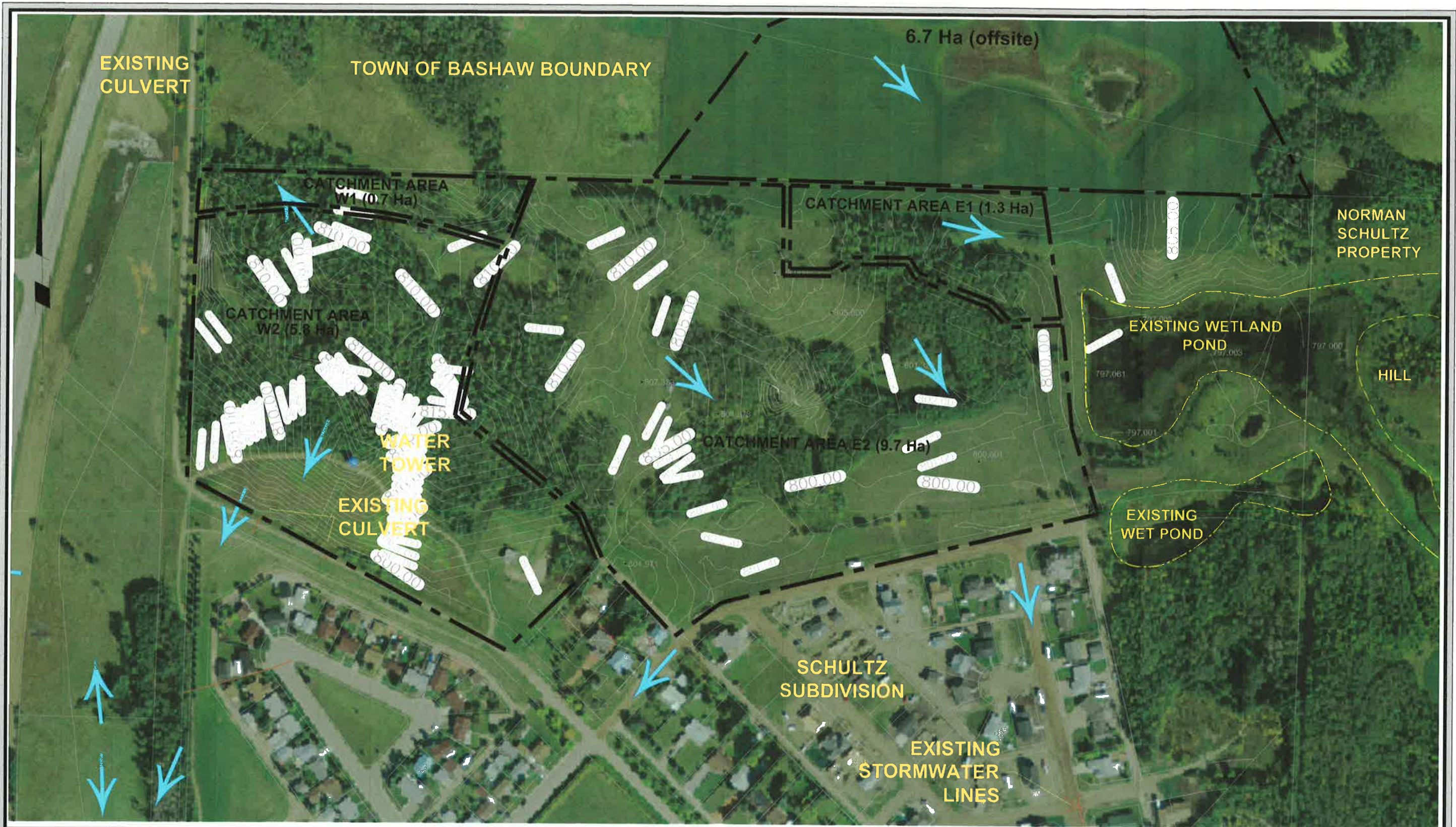
Onsite Wetland – Looking East



Wetland on Norman Schultz Property – Looking East from Hill



Existing Smaller Pond – Looking South East from near 56<sup>th</sup> Avenue



 EXISTING DRAINAGE DIRECTION  
 ONSITE CONTOURS  
 (OBTAINED FROM FIELD SURVEY, MIDWEST SURVEYS)

**VISTAS DEVELOPMENT STORMWATER PLAN**  
 BASHAW, ALBERTA  
 NW-4-42-21-W4M

Figure 3.2  
 EXISTING TOPOGRAPHY & FEATURES  
 SCALE 1:2,500

## 4. SITE HYDROLOGY

For this site, the City of Edmonton Standards and rainfall data was used for the theoretical assessment of the site hydrology. Catchment areas were delineated from contours and adjusted upon completion of a site inspection.

The total catchment areas for the site are described as follows:

Area	Onsite Catchment (Ha)	Offsite Catchment (Ha)	Total Area (Ha)	Notes
West Area, W1	0.7	n/a	0.7	Travels north to low area culvert and west across Hwy 21
West Area, W2	5.8	n/a	5.8	Drains southerly along Highway 21 ditches and to existing wetland
East Area, E1	1.3	6.7	8.0	Drains into existing onsite wetland
East Area, E2	9.7	n/a	9.7	Drains south easterly to onsite wet pond
<b>TOTALS</b>	<b>17.5</b>	<b>6.7</b>	<b>24.2</b>	

The catchment areas were used in the analysis of the runoff flow for the pre-development and post development conditions. Estimated storage volumes for the storm pond facility to maintain pre-development rates were also calculated.

The 1:100 year rainfall events used in this report were the 24 Hour Huff Distribution Storm and the 4 Hour Chicago Storm (City of Edmonton). The maximum runoff volumes during the 1:100 year rainfall events were determined using the rational model and verified using HydroCad stormwater software. From these two rainfall events, the 24 Hour storm produced the greatest impacts and therefore used to size the stormwater management facility.

The single event 1:100 year storm results are shown for the four onsite catchment areas:

Areas	Estimated 1:100 Year Post-Pre Development Runoff	Notes
Catchment Area E1	255 m <sup>3</sup>	To onsite wetland
Catchment Area E2	4,700 m <sup>3</sup>	To onsite pond
Catchment Area W1	270 m <sup>3</sup>	To north culvert
Catchment Area W2	2,400 m <sup>3</sup>	To offsite wetland

## 5. PROPOSED STORMWATER FEATURES

### 5.1 ONSITE STORM POND

Upon review of the available solutions for stormwater management for the Vistas areas, the existing smaller storm pond south of the onsite wetland would be well suited to serve as a “wet pond” for the development. This is based upon the following rationale:

- Can be expanded and modified to meet Alberta Environmental “wet pond” guidelines.
- Will avoid disturbing the natural topography and ecology of the existing wetland.
- Will not alter or change natural offsite drainage patterns.
- Expanded pond would be large enough to facilitate a slower discharge (than pre-development rate) to the existing underground storm piping. This will ensure that the existing downstream piping is not surcharged.
- Will incorporate current walking trails through natural area. A walkway will be constructed around the pond and can include features such as lighting and seating.

The existing pond can be expanded to provide the necessary storage. The minimum storage volume to provide detention for the 1:100 year storm event is 4,700 m<sup>3</sup>; however, it is recommended that additional capacity be designed to allow for a smaller discharge rate to the existing underground storm system. An active detention zone depth of 1.0m would provide a storage volume of nearly double the required amount.

A discharge from the pond is proposed along the back alley connecting to the existing storm system at 52<sup>nd</sup> Street & 55<sup>th</sup> Avenue. This can be installed by directional drill method to minimize disturbance.

The work on the pond would include excavation of the existing pond area to create minimum depth requirement and the construction of embankment berms around the perimeter. A weir style control structure in the berm of the pond would give the Town flexibility for discharge in the event of an emergency. The exact sizing of the discharge piping is subject to detailed design.

The proposed stormwater pond and features are shown within Figure 4.1.

## 5.2 PHASE 1 UNDERGROUND STORM PIPING

A Senior's Lodge facility is currently being constructed in the Vistas Development Area. The interim plan for stormwater management is to direct runoff easterly along 56<sup>th</sup> Avenue where it will be collected by a swale and drain into the existing pond. The site has its own small stormwater retention area.

In order to facilitate future development for the Vistas, it is proposed to construct an underground storm pipe system within an easement along the north side of 56<sup>th</sup> Avenue. Manholes would be installed at bends and critical locations to facilitate maintenance. Catch basins would be installed at both the 55<sup>th</sup> & 55A Avenue intersections. Expansion of the underground system can be done in phases as the development grows.

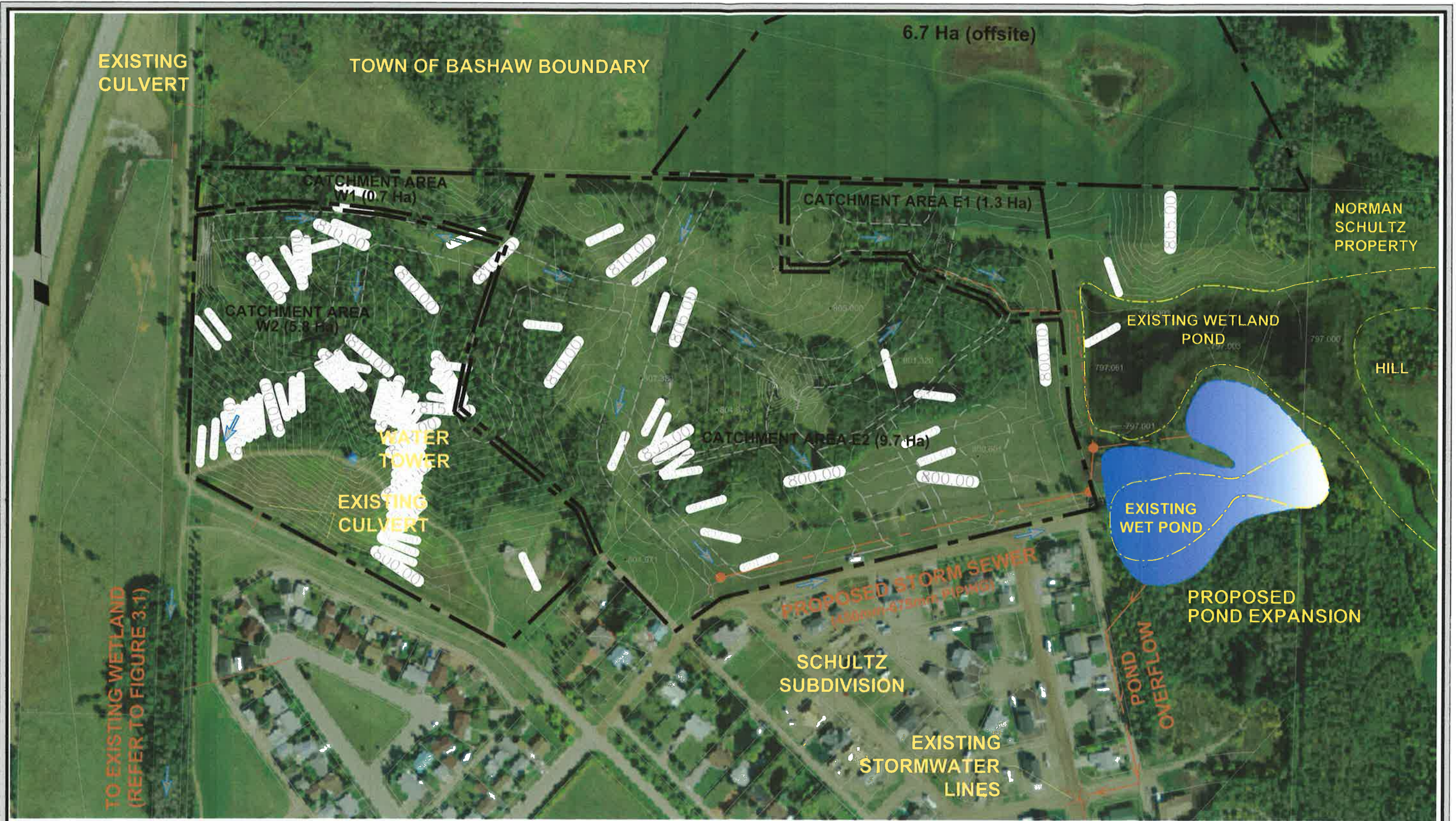
The size of the piping is shown between 450mm and 675mm. This exact sizing is subject to the results from the detailed design.

## 5.3 OFFSITE WETLAND

It is estimated that 5.8 Ha of developed land (noted as Catchment Area W2) would be directed to the existing wetland along the Highway. Based upon a single event 1:100 year storm, the increased volume of runoff is estimated at 2,400 m<sup>3</sup>. This amounts to an increase of 3cm in elevation to the current area. The wetland would provide the necessary quality treatment prior to eventual discharge north-westerly to Valley Lake.

## 5.4 ONSITE WETLAND

A small portion of post development land (noted as Catchment Area E1) would be directed to the existing wetland in the Vistas Area. Based upon a single event 1:100 year storm, the increased volume of runoff is estimated at 270 m<sup>3</sup>. This amounts to an increase of less than 1cm in elevation to the current wetland area.



-  DRAINAGE DIRECTION
-  PROPOSED UNDERGROUND STORMWATER PIPING
-  FUTURE UNDERGROUND STORMWATER PIPING
-  PROPOSED MANHOLE
-  PROPOSED CATHBASIN

VISTAS DEVELOPMENT STORMWATER PLAN

BASHAW, ALBERTA  
NW-4-42-21-W4M

Figure 4.1  
PROPOSED STORMWATER FEATURES  
SCALE 1:2,500

Respectively Submitted,

**TECKERA CONSULTING LTD.**



**TeckEra Consulting Ltd.**

**Permit: 11655**

(The Association of Professional  
Engineers, Geologists and  
Geophysicists of Alberta)

Date: January 10, 2012

Note

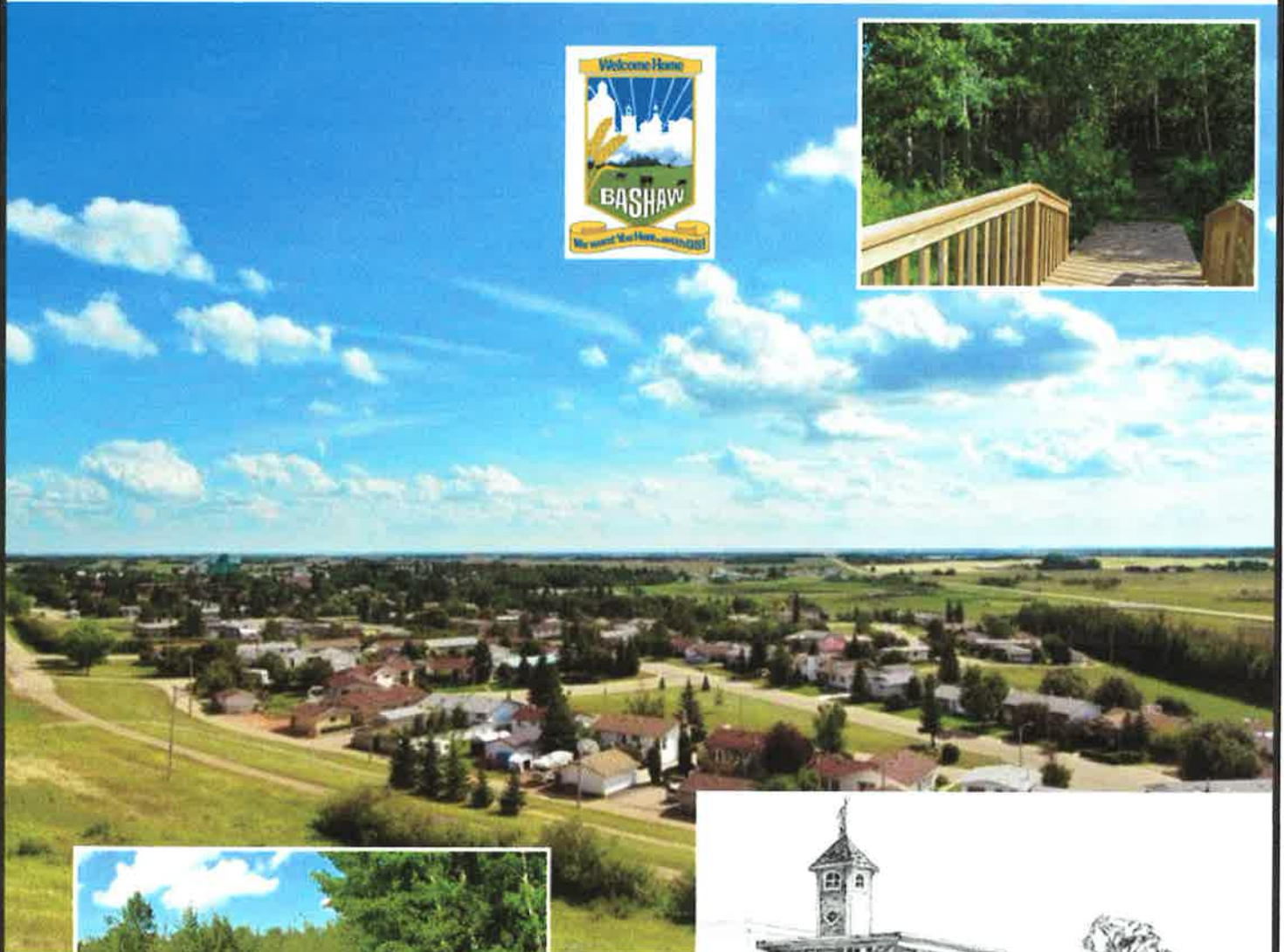
This report was prepared by TeckEra Consulting for the Town of Bashaw. The material in this report reflects TeckEra Consulting's best judgement in light of the information available at the time of preparation.

# Appendix A

## VISTAS AREA STRUCTURE PLAN

# THE VISTAS AREA STRUCTURE PLAN

THE TOWN OF BASHAW



Bylaw No. 711:2008

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## **THE TOWN OF BASHAW BY-LAW 711:2008**

### **A Bylaw for the Purpose of Establishing and Adopting The Vistas Area Structure Plan Within the Town of Bashaw**

## **1 INTRODUCTION AND BACKGROUND**

Recent demands for housing in the Town of Bashaw, throughout Alberta and particularly in proximity to the Highway #2 corridor have caused the Town to examine options and undertake community planning exercises. In particular, the Town owned lands in the North West sector of the community, represent the location of the most recently developed subdivision. It is also the subject of a Conceptual Plan generated many years ago by Alberta Housing Corporation in conjunction with a former land bank agreement. Examination of this concept results in the conclusion that this document is no longer valid or appropriate neither for the present market demands nor for effective servicing of the lands. Midwest Consulting was requested to assist with revisiting the planning and engineering aspects of future development within Bashaw. Results of this study in conjunction with administration and Council have resulted in the decision to update all aspects of proposed development through preparation and adoption of a new Area Structure Plan (ASP) for The Vistas Subdivision area. This ASP will be the first in the history of the Town of Bashaw.

### **1.1 Purpose**

The purpose of The Vistas Area Structure Plan is to provide a framework for a planned residential area that is controlled, attractive, effectively serviced and imposes fair but firm development guidelines. This will allow for consistency in the future, easier decision making and a precedent with a track to follow for future Councils and Administrators. This plan will also identify the configuration of development, future land uses, densities, and servicing concepts to be followed irrespective of whether it is undertaken by the Town or by private interests.

### **1.2 Plan Area**

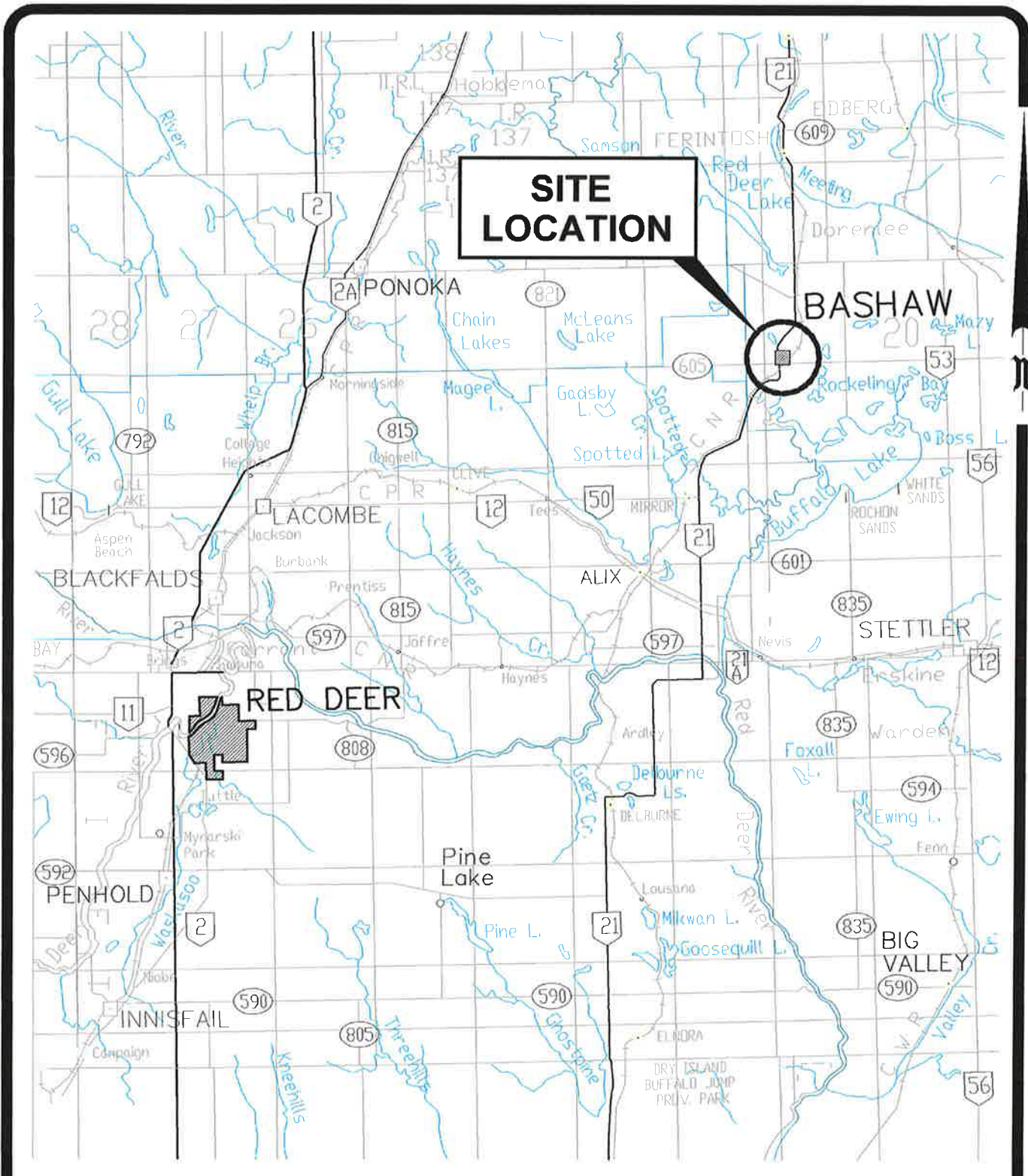
The land directly affected by this Area Structure Plan is Part of NW ¼ 4-42-21 W4M. The rationale for selection of the somewhat restricted plan area is premised upon the following factors:

- It is a logical extension of the most recent subdivision in the community.
- It is bounded:
  - On the north by the Town Boundary (in common with Camrose County).
  - On the West by Highway #21
  - On the East by a pond and trail system
  - On the south by existing compatible development

- 
- Development of land to the north will require annexation as well as the likelihood of Joint Municipal Development Plans being ratified.
  - Development of lands to the east requires addressing of several issues including suitability (feasibility), zoning and addressing of potential restrictions occasioned by former land fill site(s).

Please see Figures 1& 1a

It is therefore concluded that there will be little direct impact on adjoining lands or land uses other than the beneficial extension of roads and service to those properties, thereby accommodating the potential for future development.



— Location

**Figure 1**  
**The Vistas Area Structure Plan**  
**Location Plan**  
**Town of Bashaw**

SCALE 1:500,000

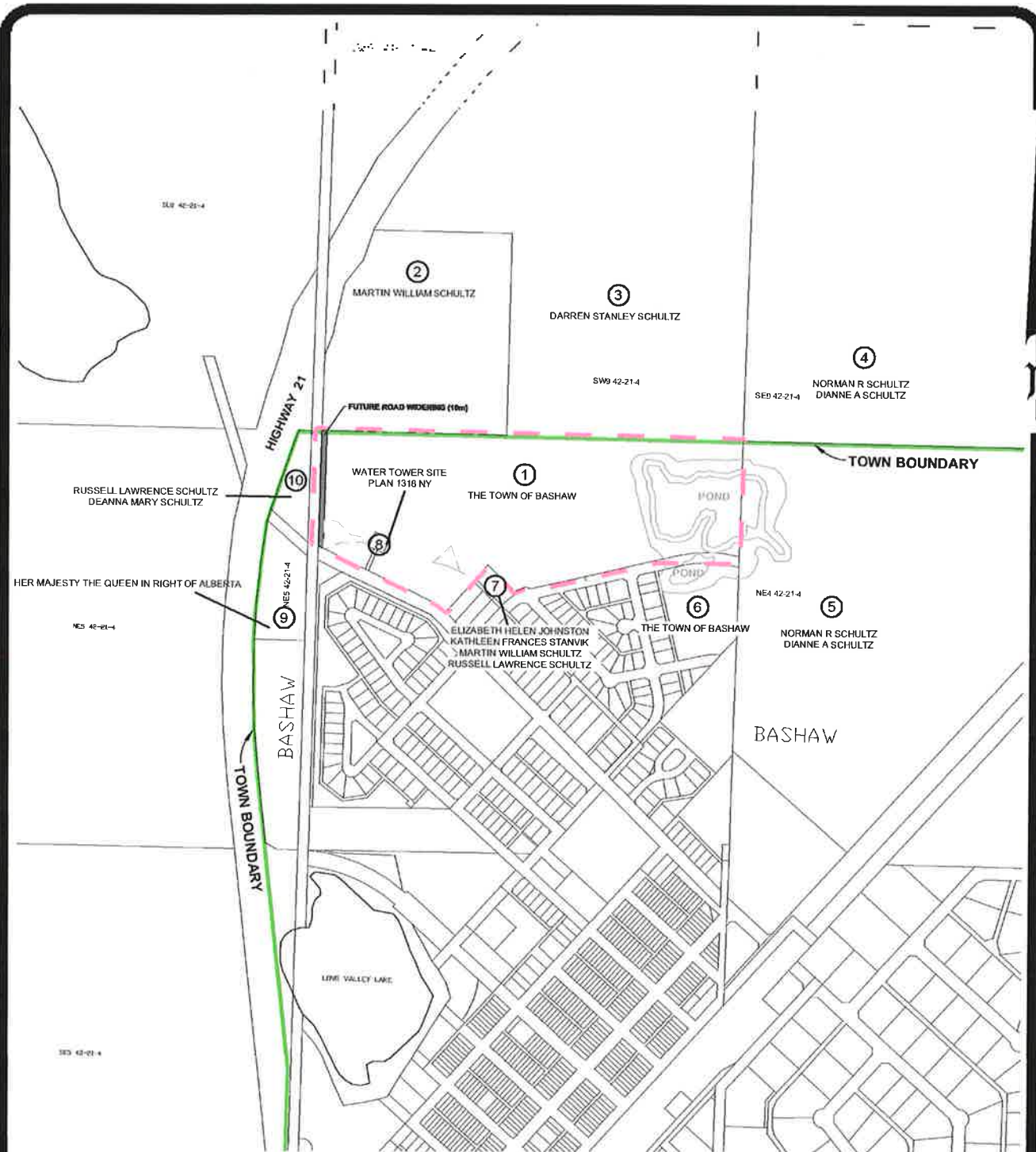
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**1.3 Land Ownership**

The property is owned by the Town of Bashaw and contains approximately 21.5 ha. (53 Acs.) Immediately adjoining lands and owners are identified in Figure #2 (Land Ownership Plan) and Figure #2a (Ownership Table)



--- Town of Bashaw Boundary  
--- The Vistas Area Structure Plan Boundary  
 # Landowner Reference Number

**Figure 2**  
**The Vistas Area Structure Plan**

**Ownership Plan**  
**Town of Bashaw**

SCALE 1:10,000  
 FILE# N-0046-08



<b>OWNERSHIP TABLE</b>		
<b>#</b>	<b>LEGAL DESCRIPTION</b>	<b>OWNER</b>
* 1	NW 4-42-21-4 (PLAN 1527HW)	THE TOWN OF BASHAW
2	SW 9-42-21-4 (PLAN 052 1853)	MARTIN WILLIAM SCHULTZ
3	SW 9-42-21-4	DARREN STANLEY SCHULTZ
4	SE 9-42-21-4	NORMAN R SCHULTZ and DIANNE A SCHULTZ
5	NE 4-42-21-4	NORMAN R SCHULTZ and DIANNE A SCHULTZ
6	NW 4-42-21-4 (PLAN 802 0180)	THE TOWN OF BASHAW (WaterTower)
7	NW 4-42-21-4 (PLAN 792 0489)	ELIZABETH HELEN JOHNSTON, KATHLEEN FRANCES STANVIK, MARTIN WILLIAM SCHULTZ and RUSSELL LAWRENCE SCHULTZ
8	NW 4-42-21-4 (PLAN 1318 NY)	THE TOWN OF BASHAW
9	NE 5-42-21-4	H/R MAJESTY THE QUEEN IN RIGHT OF ALBERTA OF C/O MINISTER OF TRANSPORTATION ALBERTA TRANSPORTATION
10	NE 5-42-21-4	RUSSELL LAWRENCE SCHULTZ and DEANNA MARY SCHULTZ

\* Represents Lands within plan area  
All others are adjoining lands

Figure 2a  
The Vistas Area Structure Plan

Ownership Table



FILE# N-0046-08

#### 1.4 Bylaw:

The Vistas Area Structure Plan shall be adopted through Bylaw by Council.

## 2 PHYSICAL FEATURES

In preparation of this plan, certain factors were considered not only through research but also through careful consideration by Council of the results and ramifications of that data.

### 2.1 Existing Site Conditions

- a. The property is vacant land with immature tree cover in scattered areas
- b. The property contains widely varying topography with hummocks and un-drained kettles (See Figure 3, Existing Topography)
- c. Existing ponds on the easterly extremities appear conducive to long term use as both storm ponds and amenity areas
- d. A much used trail system in the Town of Bashaw extends to the easterly side of this property
- e. The south side of the land terminates on a promontory overlooking the Town and the Lake. The water treatment plant and the water tower occupy portions of this hill.
- f. The property to the north is farmland and although there is always some inherent conflict between dense residential development and farming operations, this property is presently being pastured and this potential for conflict is therefore considered to be minor in nature. The relationship of farming operations to smaller rural communities is historically a much smaller issue than it is closer to large urban centers where lifestyles seem less tolerant of one another.
- g. Although formal testing has not yet been carried out, the soils and sub-soils based upon field inspections and the existing records from the Schultz Subdivision previously constructed, indicates that the property is suitable for the intended residential and related uses.



**Figure 3**  
**The Vistas Area Structure Plan**

SCALE 1:2500  
 FILE# N-0046-08

**Existing Topography**  
**Town of Bashaw**

-  Town of Bashaw Boundary
-  Existing Drainage Pattern
-  Contour Line
-  The Vistas Area Structure Plan Boundary

## 2.2 Inventory of active influences

- a. A review of the Schultz Subdivision and investigation of options for disposal of stormwater within the Plan Area would indicate that it would be prudent to have the Plan Area stand alone in this regard and not to introduce additional water into the existing Schultz Subdivision.
- b. Looping of Roads and Trailways: The proximity to the highway corridor on the west side of the property and a partially developed Government Road Allowance necessitates the addressing of critical movement of vehicles and pedestrians.

## 2.3 Opportunities and constraints (both natural and man-made)

- a. Public Works staff has identified problems with the past configuration of carriageways which result in inefficiency and increased costs in using maintenance equipment such as snow removal machinery in small cul-de-sacs. The result is the introduction of larger radius bulbs in cul-de-sacs.
- b. Public Works staff as well as administration and Council have recognized the need for the adoption of more updated and formal engineering design and construction standards; while not a component of this ASP, will be addressed within this plan along with other development requirements such as an enforced grading plan for any new subdivision.
- c. The site conditions and physical topography are conducive to a wide variety of unique lot settings inclusive of walkout basements, view lots and lots with either direct or visual access to pond areas and walking trails. Creation of these identified positive opportunities will come with an added requirement for increased earth moving, landscaping and compaction.
- d. The current policies applicable to the handling and approvals for disposal of storm water are much more onerous than in previous years and will require a formal Storm Water Management Plan to be prepared and formally approved during any significant development proposal or, in fact, with any proposal for development which may have a deleterious effect on neighboring properties. This will also apply to any proposal which purports to dispose of any flow volumes or rates of disposal of any significance.
- e. Looping of Roads and Trailways: There is opportunity for looping of both vehicular circulation as well as the recreational trail systems to improve both of these facilities in town and particularly in this area of the community. Both of these have been identified by Council and Administration as important issues and community assets.

## 2.4 Market demands

### 2.4.1 Rear lanes

Rear lanes are no longer the norm in newer developments throughout Alberta and do come with an inherent increased cost in terms of both construction and additional maintenance effort and cost. Council has recognized that, to some extent, the prospect of lanes is favorable to some persons and does support some lifestyles. Some lanes are therefore included in the concept. These lanes have also been incorporated into the potential for secondary use as components of the overall trail system without the

commitment of dedicated corridors singularly for that purpose in all instances. This is also preferable to using road rights of way for pedestrian traffic.

#### **2.4.2 Densities:**

Trends throughout the Province in smaller communities clearly support the introduction of multi-family opportunities resulting in Council's directive to include such opportunities in this plan, along with a mix of lot sizes to address all of the potential residents needs.

#### **2.4.3 Lot sizes:**

Recent requests for property for single family use have indicated that there is an obvious preference for larger single family parcels.

### **2.5 Economic responsibility**

It is recognized that the present day cost of construction of roads, utilities and landscaping, especially in smaller communities, requires special attention in terms of insuring efficiency in design parameters, proper lot yields and still meeting market demands for such components as lot sizes. This plan will attempt to provide the impetus to meet the delicate balance of larger but affordable lots while generating a development of which the residents and the community at large can be proud.

With respect to lot sizes as indicated in 2.4.3 above, market studies do indicate however that many purchasers may NOT be willing to pay a proportionally escalated price for larger lots.

## **3 POLICY and STATUTORY FACTORS**

There are few statutory limitations at this time that will influence the plan. The Town of Bashaw, by virtue of present population does not have a mandatory requirement for a Municipal Development Plan. There is no Intermunicipal Development Plan with Camrose County. There are no other Area Structure Plans or other precedents of that nature. The Town's existing Land Use Bylaw appears to be the primary local statutory influence upon the Vistas Area Structure Plan. The future land uses and densities identified within this plan fall within the present terms of Land Use Bylaw #675:2004. Both the Land Use Bylaw and this Area Structure Plan are prepared under the authority of the Municipal Government Act.

The land falls within 800 meters of a Primary Highway and is therefore subject to the statutory requirements of Alberta Infrastructure and Transportation (AIT). Specifically, AIT may require an Area Structure Plan, a Traffic Impact Assessment or other technical information in order to issue a required Roadside Development Permit at the time of any particular development or subdivision application.

The Town of Bashaw prepared and adopted a General Municipal Plan (GMP) in 1985. This plan has not formally been revisited or updated since that time. A cursory review of the plan does provide the indication that certain growth expectations were the impetus for preparation of the Plan. The GMP does acknowledge the value of the sloughs in the area as well as Long Valley Lake as "an environmental benefit as a collector for surface runoff, habitat for waterfowl and acts as an aesthetic feature." At that time, 72 serviced lots were available for development. Today there are virtually none. This GMP clearly identifies the lands contained within this ASP as representative of the next appropriate location of future development within the Town.

## **4 GOALS AND OBJECTIVES**

The Vistas Area Structure Plan will provide the overall policy framework for the ultimate development of the area.

### **4.1 Overall Objectives**

#### **4.1.1**

To conserve and optimize the use of the natural topography as much as possible.

#### **4.1.2**

To integrate the natural low areas with Storm Water Management and with the recreational walking trails.

#### **4.1.3**

To provide effective service concepts which meet and exceed the standards of the Town of Bashaw.

#### **4.1.4**

To encourage energy efficiency through progressive planning and site orientation techniques.

#### **4.1.5**

To allow for economic phased development supported by infrastructure capacities and market demands.

### **4.2 Residential**

#### **4.2.1**

To introduce opportunities for low to medium density multi-family development, thereby providing more flexible lifestyle opportunities for prospective and existing residents of the community.

#### **4.2.2**

To capitalize on and maximize the scenic view opportunities inherent in the development area.

#### **4.2.3**

To maximize the opportunities for walk-outs and lots backing onto ponds and trails.

#### **4.2.4**

To ensure available parcels for residential construction to encourage growth and to attract builders.

**4.2.5**

To maximize the southern exposure of lots for energy efficiency.

**4.3 Recreational, Parks, Reserve and Schools**

**4.3.1**

To maintain and enhance the successful and valuable trail system.

**4.3.2**

To extend the overall plan for looping of the trail system through the north west sector and back to the west central part of the Town.

**4.3.3**

To maximize the use of scenic vistas inherent in the plan area.

**4.3.4**

To encourage the continued philosophy of schools which are central to the downtown core area and in proximity to community recreational facilities.

**4.3.5**

To determine input through public hearing and provide the requirements suitable to residents for recreational facilities in the Plan Area.

**4.4 Transportation**

**4.4.1**

To provide for safe and convenient access for vehicles and pedestrians to and from the Plan Area.

**4.4.2**

To ensure that all roadways, lanes and trails are constructed to appropriate Urban Municipal standards.

**4.4.3**

To ensure that the plan area is suitably connected and configured to allow for future growth, annexation and incorporation of adjoining lands.

**4.5 Utilities**

**4.5.1**

To ensure the orderly and economic provision of sewer, water and all other infrastructure components to new residents of the plan area.

#### 4.5.2

To incorporate Stormwater retention and detention facilities as amenity areas wherever possible while ensuring that no more than pre-development flows are discharged onto surrounding lands.

#### 4.5.3

To ensure that, prior to new development, existing infrastructure and adjoining neighborhoods are not adversely affected by the servicing and development of the plan area.

## 5 DEVELOPMENT CONCEPT

The proposed development concept for The Vistas Area Structure Plan is shown in Figure #4. The intent of the plan is to provide a generalized land use concept that may be refined and justified at the time of subdivision application.



- The Vistas Area Structure Plan Boundary
- Trail System
- 10m Road Widening

**Figure 4**  
The Vistas Area Structure Plan

## Development Concept Town of Bashaw

SCALE 1:5,000  
FILE# N-0046-08



Any application for future development within the area will be required to be supported by addressing other detailed factors, including but not limited to the following:

- Near surface groundwater, soils and geotechnical testing and considerations
- Detailed Stormwater Management Plan either prior to subdivision approval or prior to permit to construct depending on the complexity of any particular application
- Full compliance with good engineering practices as well as the current Standards of the Town of Bashaw respecting Engineering Design and Construction
- Compliance with the terms and conditions of this ASP and the Land Use Bylaw and any other Statutory Plan in place at the time of development

### 5.1 Residential

It is required by this plan that there shall be flexibility in the development to deliver a variety of lot sizes and some affordable housing so that more than one specific market demand shall be satisfied. The majority of the lands are designated for future R1 single family dwellings. Some allowance for low to medium density multi-family housing is also identified.

Densities within the Single Family portion of the Plan Area shall conform to the following range of densities and shall endeavor to encourage a reasonable mix of lot sizes to fulfill the range of market demands expressed above:

- R1** Single Family detached: 8.5 to 12.5 units per hectare  
**R3** Single family attached (duplex and fourplex): 2.5 to 20.0 units per hectare  
 Row housing/condominium: 20.0 to 30.0 units per hectare  
 Maximum three story walkup Apartment: at discretion of the Town of Bashaw

<b>Area Breakdown</b>	<b>Area (ha.)</b>	<b>Area (ac.)</b>	<b>Estimated Population</b>
<b>Gross Developable Area (GDA)</b>	<b>15.584</b>	<b>38.49</b>	
<b>Net Areas by Land Use:</b>			
R1 - Single Family Residential	10.928	26.99	204 to 300
R3 - Multi-Family Residential	0.625	1.54	22 to 53
<b>Sub Total:</b>	<b>11.553</b>	<b>28.53</b>	<b>226 to 353</b>
Circulation (Roads, Lanes & trails)	4.031	9.96	
E.R. - Environmental Reserve	0.968	2.39	
M.R. - Municipal Reserve	1.652	4.08	
PUL - Public Utility Lots (Storm Ponds)	1.801	4.45	
Unallocated Area	1.454	3.59	
<b>TOTAL:</b>	<b>21.459</b>	<b>53.00</b>	

<b>Population</b>	<b>Population per ha.</b>		
R1 - 2.2/Unit	18.7 to 27.5		
R3 - 2.8/Unit	35 to 84		

## 5.2 Schools

The School Division has advised that there is no identified requirement for a school site within the Plan Area.

The 1985 General Municipal Plan advocates the benefit of the central school locations with close proximity to recreational facilities. With potential impact in population of the ultimate development within this Plan Area of 250 to 380 persons, it is deemed that ultimate impact on the School facilities will not be great over time. Many of the future residents of the area may be retirees.

## 5.3 Open Space and Municipal Reserve

### 5.3.1

The philosophy of the plan is that there are adequate community recreational facilities within close proximity to the Plan Area. The demonstrated high usage of the trail system throughout the community speaks directly to current lifestyles and to the logic in the extension of this system through the plan area and looping the trails back to the south west and reconnecting the west side of the community, thereby creating a full circuit.

### 5.3.2

Rest areas along the trail system are to be equipped with low maintenance benches at strategic locations taking advantage of scenic vistas where possible.

### 5.3.3

Municipal Reserve will therefore be dedicated by way of corridors of land containing the trail system, by way of smaller nodes affording the rest areas along the bank and along the trails, by dedication of some of the land in the proximity of the water tower and water treatment plant and lastly, if required, by money in lieu of reserve as permitted by the Municipal Government Act (MGA).

The ASP demonstrates a concept which will embrace a focus upon the active trail system with viewpoints and rest areas at the pond areas as well as along the promontory identified as a major viewpoint opportunity. This concept allows for the development to maximize the lot yield and thereby support the required economics. Major active or organized recreation and sports have been deemed by the Town of

Bashaw to be more appropriately provided within the core of the community and at established community facilities. The dedication of 10% of the Net Developable Area will be required from the developer, generally in the configuration shown herein. Any deficiency in this figure identified in the detailed subdivision stage shall be accommodated by dedication within other lands acceptable to the Town or by way of Money In Lieu of Reserve as contemplated by the Municipal Government Act and at the sole discretion and approval of the Council of the Town of Bashaw.

#### 5.3.4

Any money in lieu of reserve will be deposited in special funds as required by the Legislation and will be used as allowed by the Act (MGA) and as decided by Council for community recreational purposes.

#### 5.4 Community Services

Institutional land uses within the community are quite active with churches, community service clubs, medical services, hospital, seniors' lodge and other organizations.

### 6 SERVICING CONCEPT

Servicing of the development area shall be undertaken in strict accordance with the Town of Bashaw Engineering and Construction Standards as published and amended from time to time and in accordance with good engineering practices. There is no implication herein that the Town of Bashaw is committed to participate in funding of infrastructure within the Plan area either directly or through grant application, nor through the guarantee of substantial capacity within the Town of offsite infrastructure components. Development which demands or requires upgrading of other facilities both for capacity and operability should and will be the responsibility of proponents of future development. Existing ratepayers shall not be burdened with subsidizing of development which does not directly benefit those owners and residents except where deemed by Council as representing a community benefit.

The subsequent sections outline the proposed infrastructure servicing concepts, based upon the following premises, assumptions and constraints:

- The configuration of development will likely require significant moving of material by cutting of higher hills and the filling of un-drained kettles in order to facilitate drainage and proper construction.
- Redirection of Stormwater will be required by both surface and underground piping methods both to the east and to the south west. Stormwater shall not be redirected into the Schultz Subdivision gutters or underground systems, nor to any other neighboring lots except as approved within a formal Stormwater Management Plan.
- Every effort shall be made to eliminate the need for lift stations.
- All lanes, roadways and trails are to be paved.
- The developer may be required to oversize utilities and other components to allow for future development.
- All design shall accommodate underground power, gas, telephone and cable networks preferably within utility rights of way in the fronts of lots.
- Grading plans are a mandatory component and shall be strictly enforced by the Town of Bashaw.

## 6.1 Storm Water

The Town of Bashaw is situated within a major drainage basin centered around a former lake bed known as Long Valley Lake. The remnant lying east of Highway 21 and south of 50th Avenue serves as the Town's stormwater pond (wetland).

The natural features of the ASP site including the pond identified at the easterly extremity of the property appear to be conducive to use for the purpose of enhanced amenities as well as the critical control and ultimate discharge of Storm Water. This pond could be connected to the Town's existing wetland pond before it drains northwesterly across Highway 21.

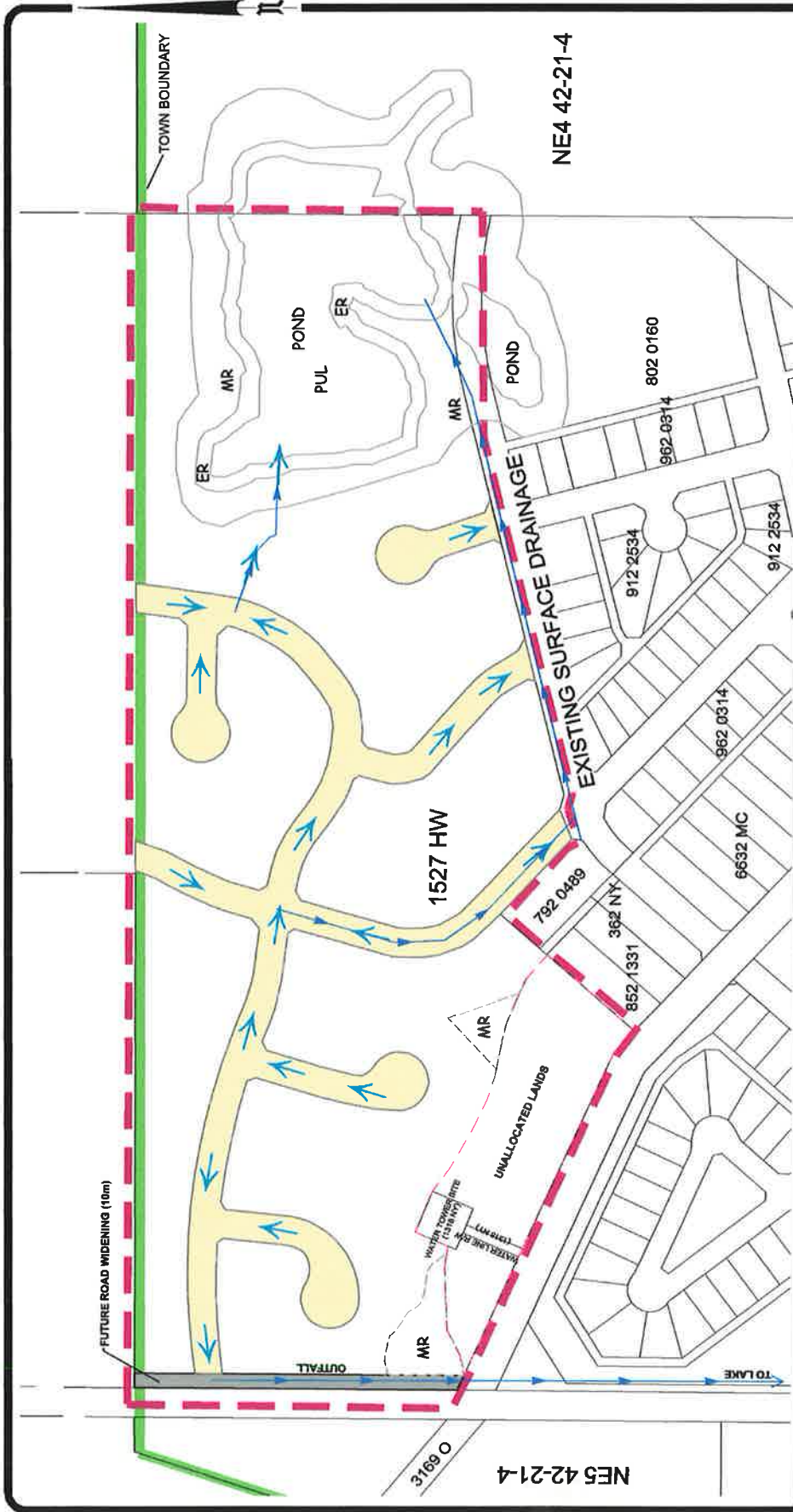
Tertiary treatment is a common component of today's Stormwater systems and shall be addressed in formal design plans and approvals by the Town and other Regulatory Agencies.

The steep bank along the southerly portion of the Plan area shall also be protected from adverse influences of either surface or subsurface water.

Figure #5 illustrates the general concept for on-site flows of both overland water and storm sewer.

The overall Concept Plan (Figure #4) illustrates the concept for the use of the pond on the easterly side of the property as an integral component of the Stormwater Management Plan. The use of the pond will require approval and cooperation by the adjoining landowner as the pond straddles the eastern boundary of the ASP area. See Figures #2 & #2a.

A Stormwater Management Plan shall be required for any Stage or Phase of development for any new lots exceeding an aggregate of 10 parcels of single family development or for any Multi-Family project.



**Figure 5**  
**The Vistas Area Structure Plan**  
**Proposed Stormwater Management**  
**Town of Bashaw**

SCALE 1:2500  
 FILE# N-0046-08

- Town of Bashaw Boundary
- Proposed Surface Drainage
- The Vistas Area Structure Plan Boundary
- Proposed Underground Stormsewer

## 6.2 Sanitary Sewer

All portions of this plan area shall be serviced by underground gravity pipes. The sanitary sewer system in the northwest quadrant of Bashaw flows towards Lift Station #1 located near the RCMP detachment where it is pumped into a manhole in the downtown core.

At the time of construction of the existing gravity mains downstream of the ASP area, it was common practice to connect roof leaders and weeping tile (stormwater) into the sanitary sewer system. Although this practice is no longer acceptable, this current situation results in capacity issues with the underground pipes and lift station during wet weather periods. The Town is embarking on a program to remove stormwater connections to the sanitary sewer system.

Prior to introducing additional flows into the system a more detailed assessment of the potential "bottle neck" areas and existing capacities will be required by the proponent of future development.

Some offsite improvements of sanitary networks may be occasioned as a result of the impact of any particular development. These improvements and any analysis required to determine the appropriate improvements shall be the full responsibility of the applicant at that time subject to the provisions for potential recovery as described in Section 8.3.

No roof leaders or weeping tile within the Plan Area shall be connected to the Sanitary Sewer system.

The general configuration of the proposed sanitary servicing concept is illustrated in Figure #6.



--- Proposed Underground Sanitary Sewer  
 --- Proposed Underground Water Distribution

**Figure 6**  
**The Vistas Area Structure Plan**

**Proposed Servicing Concept**  
**Town of Bashaw**

SCALE 1:5,000

FILE# N-0046-08



### 6.3 Water

The Town of Bashaw's water system is comprised of three raw water wells, a water treatment facility and distribution mains networked throughout the Town.

The water treatment plant contains two distribution pumps, a 500,000 US gal clearwell reservoir and a chlorination system.

Bashaw has recently entered into agreements to temporarily supply the Village of Ferintosh with potable water until the 2112 Regional Water System is constructed. Three new variable frequency drive (VFD) pumps are being installed in the existing plant to accommodate the new demand.

It is understood that the regional water system will be realized within a two year period. At that time, Bashaw will receive treated water from the water treatment facility located just outside the Town of Stettler along with Ferintosh and Alix. The existing force main from Bashaw to Ferintosh will be reverse-fed with Bashaw then receiving treated water from the new Regional System via Ferintosh.

A cursory review of the water system suggests that the increased demand associated with the ASP area development will not drastically task the existing water system; however, a detailed hydraulic analysis will be required at the time of development to determine if upgrades to the existing distribution pumps and fire pump are required to ensure that peak flows and fire flows can be met. In addition, an expansion of the clearwell reservoir may be required prior to full ASP area development.

The size of the clear well reservoir will be sufficient to accommodate the new development barring any other major growth in the community.

Review of the water system suggests that the increased demand associated with the ASP area development will not drastically task the existing water system; however, a detailed hydraulic analysis will be required at the time of development to determine if upgrades to the existing distribution pumps and fire pump are required to ensure that peak flows and fire flows can be met. The size of the clear well reservoir will be sufficient to accommodate the new development barring any other major growth in the community.

### 6.4 Franchise Utilities

Power to the plan area is supplied on a franchise basis by Fortis Alberta. Natural gas is supplied and distributed by Atco. The proponent of any development shall be responsible to ensure that power, gas, telephone and cable are fully installed components of any development.

## 6.5 Emergency Services

### 6.5.1 Fire

Fire Protection is provided by a volunteer fire department operating from central Community owned facilities. Back up protection is available on the basis of a cooperative agreement with Camrose County.

### 6.5.2 Police

Community policing is handled under contract with the RCMP. The current detachment consists of five members who also provide highway patrol services in addition to community policing. Short term impact of development within the Plan Area will not have a significant effect on the Policing aspect of the Town of Bashaw. Full occupation of the lands may ultimately require manpower to be increased by one member.

### 6.5.3 Ambulance and Medical

Hospital, ambulance, medical clinic, dental services and other essential services are readily available in the Town of Bashaw. This development will not have a negative impact on such services but rather will provide an opportunity for more professional service businesses.

## 7 TRANSPORTATION

### 7.1 Vehicular Access and Circulation

The intent of the ASP is to provide increased standards of construction as well as better geometrics to allow for ease of maintenance and upkeep by Town forces. As such, any development within the Plan Area shall comply with the then published **Engineering and Construction Standards** of the Town of Bashaw. Further the plan does call for the completion of the roadway within the north south Government Road Allowance adjoining the west side of the subject lands.

### 7.2 Pedestrian Circulation

The philosophy is to retain the successful and popular concept of trail systems while separating as much as possible the inherent conflict between vehicles and pedestrians. To this end, some walkways are contained within dedicated corridors, situated where possible near amenities such as ponds and viewpoints. In other cases walkways are directed toward new laneways. Major collector roads are encouraged to construct sidewalks on both sides to minimize pedestrian crossings and all roads shall have sidewalk on at least one side.

### 7.3 Hierarchy of Roadways

Hierarchy of Roadways is shown on Figure #7, "Road Network and Future Connections". These classifications shall dictate the geometry of each facility in accordance with the current standards published by the Town.



- Collector Road
- Minor Collector Road
- Local Road
- Proposed Walking Trail System
- Proposed Lane
- Existing Collector
- 10m Road Widening

**Figure 7**  
The Vistas Area Structure Plan

## Road Network Town of Bashaw

SCALE 1:5,000

FILE# N-0046-08



## **8 IMPLEMENTATION**

### **8.1 Staging**

Any development within the Plan Area should be encouraged to limit each stage to a size or number of parcels which would satisfy the market demand for no more than five years. In that manner, additional stages can more readily react to market demands in an economic and meaningful manner while ensuring that short term demands are adequately met. Adoption of this ASP will allow for more efficient processing of future applications for both zoning and subdivision.

### **8.2 Subdivision and Amendments to the Land Use Bylaw**

Bylaw/Area Structure Plan:

This Area Structure Plan does not represent having an immediate effect on Zoning nor on Subdivision approval, both of which will require formal applications and full supporting information as required by the Municipal Government Act and the Land Use Bylaw of the Town of Bashaw.

### **8.3 Oversizing, Beneficiaries and Endeavors to Assist**

The developer of lands within the Plan Area may be required to oversize utilities or facilities or to construct off site works to accommodate future adjoining development. Should this requirement of a development agreement with the Town occasion the possibility of benefiting another developer or land owner, the original developer may be entitled to recovery of some of the oversizing or offsite costs. The Town of Bashaw will endeavor to assist in said recovery when and if a benefiting developer or owner actually undertakes such a benefiting development. Said recovery shall be in accordance with current Policy or Bylaw of the Town of Bashaw.

### **8.4 Levies**

The development of any lands within the Plan Area may be subject to the payment of Levies (offsite or otherwise) in accordance with duly enacted Bylaw or Bylaws of the Town of Bashaw.

### **8.5 Compliance with and Amendments to the Area Structure Plan**

All developments within the Plan Area shall comply with this Plan. Any noncompliance shall require a formal amendment to this Area Structure Plan by amending Bylaw, prior to the development application.

WHEREAS it is deemed advisable and necessary to define the terms and conditions of future development within the area to be known as "The Vistas" and as detailed within the Area Structure Plan;

NOW THEREFORE under the authority of the Provisions of the MUNICIPAL GOVERNMENT ACT, Chapter M-26, RSA 2000, AND amendments thereto, the Municipal Council of the Town of Bashaw in the Province of Alberta duly assembled HEREBY ENACTS AS FOLLOWS:

That this By-Law shall come into effect upon third and final reading of this Bylaw.

READ a First time this 12th day of  
August, A.D. 2008

\_\_\_\_\_  
MAYOR

\_\_\_\_\_  
TOWN MANAGER

READ a Second time this 12th day of  
August, A.D. 2008

\_\_\_\_\_  
MAYOR

\_\_\_\_\_  
TOWN MANAGER

UNANIMOUS CONSENT given for a  
third reading this 12th day of August,  
A.D. 2008

\_\_\_\_\_  
MAYOR

\_\_\_\_\_  
TOWN MANAGER

READ a Third time and finally passed  
this 12th day of August, A.D. 2008

\_\_\_\_\_  
MAYOR

\_\_\_\_\_  
TOWN MANAGER

## Appendix B

### LETTER FROM ADJACENT LANDOWNER (NORMAN SCHULTZ)



File #: N-0070-11

Aug18th, 2010

Alberta Environment

Attention: Alberta Environment

**RE: TOWN OF BASHAW OVERALL DRAINAGE STUDY  
NOTIFICATION TO ADJACENT LANDOWNERS**

To whom it may concern:

On August 18, 2011, at approximately 10:00 a.m., Midwest consulting met with the adjacent landowner to the Vista's subdivision who is Norman Schultz.

Midwest consulting made aware Mr. Norman Schultz of the concept plan for the proposed drainage study and ensured that he has no major concerns.

As a copy of this letter was signed by Mr. Norman Schultz, it in no way holds any legal bearing of agreeing to anything other than he has been notified of our proposed plans.

We trust that this meets with your approval. Should you have any questions or comments, please do not hesitate to contact me by phone at (780) 433-6411, by fax at (780) 439-2614 or by email at [ckupka@midwestconsulting.ca](mailto:ckupka@midwestconsulting.ca)

Sincerely,

**Midwest Consulting**

  
Norman Schultz

  
Colin Kupka, C.E.T.

# Appendix C

## STORMWATER CALCULATION SHEETS



**Project:** Vistas Subdivision  
**Location:** Bashaw, Alberta  
**Reference:** WEST CATCHMENT AREA (TO OFFSITE WETLAND)

**Client:** Town of Bashaw  
**File #:** TE-2011-08  
**Date:** Dec 11/2011



**STORMWATER SYSTEM DESIGN**

**Facility Type:** Huff Distribution (City of Edmonton) & 4 Hour Chicago Storm (City of Edmonton)  
**Calculation Method:** Huff Distribution (City of Edmonton) & 4 Hour Chicago Storm (City of Edmonton)

Table A: PRE-DEVELOPMENT Area & Run-off Coefficients

Location	Area (Ha)	Description	C	A°C
West Area	5.8	Undeveloped treed site	0.20	1.16
<b>Totals</b>	5.8		<b>Combined C Factor</b> 0.20	1.16

Table B: POST DEVELOPMENT Area & Run-off Coefficients

Location	Area (Ha)	Description	C	A°C
Roads	0.45	Paved roadway surface & curbs	0.95	0.43
Boulevard	0.28	Grass boulevard between road & lots	0.25	0.07
Lots	5.07	Lots	0.50	2.54
<b>Totals</b>	5.8		<b>Combined C Factor</b> 0.52	3.03

Table C: Required Storage Results

Method	Estimated Volume (m <sup>3</sup> )		
	1:5 Yr	1:25 Yr	1:100 Yr
"Huff" Distribution	1294	n/a	2371
"Chicago" Distribution	698	1027	1295

Table D: Peak Runoff Rates

Method	Estimated Runoff Rates (m <sup>3</sup> /s)					
	1:5 Yr		1:25 Yr		1:100 Yr	
	Pre	Post	Pre	Post	Pre	Post
"Huff" Distribution	0.033	0.086	n/a	n/a	n/a	0.157
"Chicago" Distribution	0.219	0.574	0.329	0.859	n/a	1.087

**Project:** Vistas Subdivision  
**Location:** Bashaw, Alberta  
**Reference:** EAST CATCHMENT AREA (TO ONSITE WETLAND)

**Client:** Town of Bashaw  
**File #:** TE-2011-08  
**Date:** Dec 11/2011



**STORMWATER SYSTEM DESIGN**

**Facility Type:** Huff Distribution (City of Edmonton) & 4 Hour Chicago Storm (City of Edmonton)  
**Calculation Method:** Huff Distribution (City of Edmonton) & 4 Hour Chicago Storm (City of Edmonton)

Table A: PRE-DEVELOPMENT Area & Run-off Coefficients

Location	Area (Ha)	Description	C	A°C
East Area	1.3	Undeveloped treed site	0.20	0.26
<b>Totals</b>	1.3		<b>0.20</b>	0.26

Table B: POST DEVELOPMENT Area & Run-off Coefficients

Location	Area (Ha)	Description	C	A°C
Roads	0	Road to be directed to Catchment E2	0.95	0.00
Boulevard	0	Road to be directed to Catchment E2	0.25	0.00
Lots	0.92	Lots	0.50	0.46
<b>Totals</b>	0.9		<b>0.50</b>	0.46

Table C: Required Storage Results

Method	Estimated Volume (m <sup>3</sup> )			
	1:5 Yr	1:25 Yr	1:50 Yr	1:100 Yr
"Huff" Distribution	138	n/a	n/a	253
"Chicago" Distribution	75	110	n/a	138

Table D: Peak Runoff Rates

Method	Estimated Runoff Rates (m <sup>3</sup> /s)					
	1:5 Yr		1:25 Yr		1:100 Yr	
	Pre	Post	Pre	Post	Pre	Post
"Huff" Distribution	0.007	0.013	n/a	n/a	n/a	0.024
"Chicago" Distribution	0.049	0.087	0.074	0.130	n/a	0.165

**Project:** Vistas Subdivision  
**Location:** Bashaw, Alberta  
**Reference:** EAST CATCHMENT AREA (TO ONSITE POND)

**Client:** Town of Bashaw  
**File #:** TE-2011-08  
**Date:** Dec 11/2011



**STORMWATER SYSTEM DESIGN**

**Facility Type:** Huff Distribution (City of Edmonton) & 4 Hour Chicago Storm (City of Edmonton)  
**Calculation Method:** Huff Distribution (City of Edmonton) & 4 Hour Chicago Storm (City of Edmonton)

**Table A: PRE-DEVELOPMENT Area & Run-off Coefficients**

Location	Area (Ha)	Description	C	A°C
East Area	11.0	Undeveloped treed site	0.20	2.20
<b>Totals</b>	11.0		<b>Combined C Factor 0.20</b>	2.20

**Table B: POST DEVELOPMENT Area & Run-off Coefficients**

Location	Area (Ha)	Description	C	A°C
Roads	1.38	Paved roadway surface & curbs	0.95	1.31
Boulevard	0.89	Grass boulevard between road & lots	0.25	0.22
Lots	8.73	Lots	0.50	4.37
<b>Totals</b>	11.0		<b>Combined C Factor 0.54</b>	5.90

**Table C: Required Storage Results**

Method	Estimated Volume (m³)		
	1:5 Yr	1:25 Yr	1:100 Yr
"Huff" Distribution	2556	n/a	4683
"Chicago" Distribution	1379	2028	2559

**Table D: Peak Runoff Rates**

Method	Estimated Runoff Rates (m³/s)					
	1:5 Yr		1:25 Yr		1:100 Yr	
	Pre	Post	Pre	Post	Pre	Post
"Huff" Distribution	0.062	0.167	n/a	n/a	0.114	0.305
"Chicago" Distribution	0.416	1.116	0.623	1.671	0.788	2.114